- Preliminary -

GENERALCONSTRUCTION SUPERVISION MANUAL

FOR

[.....Project Name.....]

Under JICA Loan Agreement No.[.....]

EMPLOYER:
[YCDC]

ENGINEER:
[Consultant's name]

REVISION RECORD

Revision	Issue Date	Amendment / Remarks
0	December 21, 2015	Preliminary Issue

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SYNOPSIS

This General Construction Supervision Manual for [project name] provides reference and guidelines for the Engineer on management during the construction phase. Generally the manual includes the following items;

- Project implementation arrangement and organization interfaces,
- General duties and responsibilities of the Engineer,
- Job description of the Engineer's staff members and
- Specific Duties, Roles and Responsibilities of the Contractor, the Engineer and the Employer.

Owing to the complicated and complex nature of contract management, the guidelines provided in this manual shall in no way be construed as directives overriding the powers and responsibilities of the Engineer and his staffs who shall always make their own decisions on behalf of the Employer under the Contract.

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1 GENERAL

1.1 ABBREVIATION

The following list shows the meaning of the abbreviations for the common terms used in [project name].

Abbreviation	Term
JICA	Japan International Cooperation Agency
YCDC	Yangon City Development Committee, the Employer
TECI	TEC International Co. Ltd., Japan, the Consultant
ASTM	American Society for Testing and Materials
BS	British Standards
EN	European Standards
ISO	International Organization for Standardization
JIS	Japanese Industrial Standards
ITP	Inspection and Test Plan
EWS	Engineering Works Schedule
QMP	Quality Management Plan
HSP	Health and Safety Plan
EIA	Environmental Impact Assessment (report)
RAFR	Reportable accident frequency rate (safety)
IR	Incident Rate (safety)
BOD	Biochemical Oxygen Demand
SS	Suspended Solids
TM / TBM	Tunneling Machine / Tunnel Boring Machine
SM	Shield Machines
CCTV	Closed Circuit Television
PP	Polypropylene
PE	Polyethylene
MDPE	Medium-density polyethylene
HDPE	High density polyethylene pipes
PVC-U	Unplasticised polyvinyl chloride
GRP	Glass-reinforced thermosetting plastics / Glass Reinforced Plastic

1.2 DEFINITIONS

In the Contract Document, the following words and expressions shall have the meanings stated. Words indicating persons or parties include corporations and other legal entities, except where the context requires otherwise.

(a) The Contract

(1) "Contract" means the Contract Agreement, the Letter of Acceptance, the Letter of Tender, these Conditions, the Specification, the Drawings, the Schedules, and the further documents (if any), which are listed in the Contract Agreement or in the Letter of Acceptance.

(2) "Letter of Acceptance" means the letter of formal acceptance, signed by the Employer, of the Letter of Tender, including any annexed memoranda comprising agreements between and signed by both Parties. If there is no such letter of acceptance, the expression "Letter of Acceptance" means the Contract Agreement and the date of issuing or receiving the Letter of Acceptance means the date of signing the Contract Agreement.

(3) "Specification" means the document entitled specification, as included in the Contract, and any additions and modifications to the specification in accordance with the Contract. Such document specifies the Works.

(4) "Drawings" means the drawings of the Works, as included in the Contract, and any additional and modified drawings issued by (or on behalf of) the Employer in accordance with the Contract.

(5) "Schedules" means the document(s) entitled schedules, completed by the Contractor and submitted with the Letter of Tender, as included in the Contract. Such document may include the Bill of Quantities, data, lists, and schedules of rates and/or prices.

(6) "Tender" means the Letter of Tender and all other documents which the Contractor submitted with the Letter of Tender, as included in the Contract.

(7) "Bill of Quantities", "Daywork Schedule" and "Schedule of Payment Currencies" mean the documents so named (if any) which are comprised in the Schedules.

(8) "Contract Data" means the pages completed by the Employer entitled contract data which constitute part of the Particular Conditions.

(b) Dates, Tests, Periods and Completion

(1) "Commencement Date" means the date notified in the Contract.

(2) "Time for Completion" means the time for completing the Works or a Section (as the case may be), as stated in the Contract Data (with any extension as Extension of Time for Completion), calculated from the Commencement Date.

(3) "Tests on Completion" means the tests which are specified in the Contract or agreed by both Parties or instructed as a Variation, and which are carried out before the Works or a Section are taken over by the Employer.

(4) "Taking-Over Certificate" means a certificate issued upon passing of the Tests on Completion and completing all work for the purposes of taking over.

(5) "Defects Notification Period" means the period for notifying defects in Works or a Section (as the case may be), which extends over 365 days except if otherwise stated in the Contract Data, calculated from the date on issue of Taking Over Certificate.

(6) "Performance Certificate" means the certificate issued after the expiry dates of the Defects Notification Periods, or as soon thereafter as the Contractor has supplied all the Contractor's Documents and completed and tested all the Works, including remedying any defects.

(7) "day" means a calendar day and "year" means 365 days.

(c) Works and Goods

(1) "Contractor's Equipment" means all apparatus, machinery, vehicles and other things required for the execution and completion of the Works and the remedying of any defects. However, Contractor's Equipment excludes Temporary Works, Employer's Equipment (if any), Plant, Materials and any other things intended to form or forming part of the Permanent Works.

(2) "Goods" means Contractor's Equipment, Materials, Plant and Temporary Works, or any of them as appropriate.

(3) "Materials" means things of all kinds (other than Plant) intended to form or forming part of the Permanent Works, including the supply-only materials (if any) to be supplied by the Contractor under the Contract.

(4) "Permanent Works" means the permanent works to be executed by the Contractor under the Contract.

(5) "Plant" means the apparatus, machinery and vehicles intended to form or forming part of the Permanent Works, including vehicles purchased for the Employer and relating to the construction or operation of the Works.

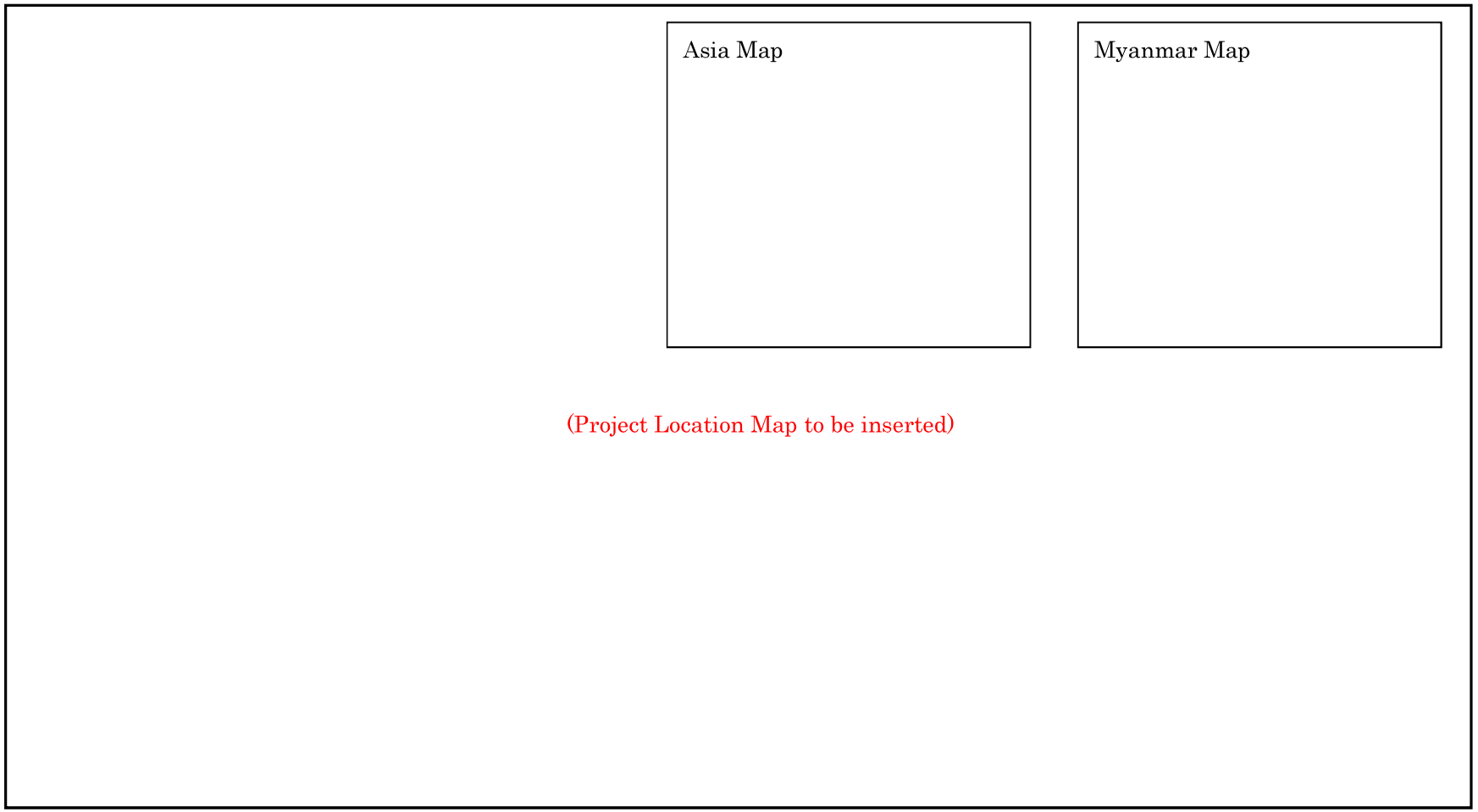
(6) "Section" means a part of the Works specified in the Contract Data as a Section (if any).

(7) "Temporary Works" means all temporary works of every kind (other than Contractor's Equipment) required on Site for the execution and completion of the Permanent Works and the remedying of any defects.

(8) "Works" mean the Permanent Works and the Temporary Works, or either of them as appropriate.

1.3 PROJECT LOCATION MAP

PROJECT LOCATION MAP



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2 PROJECT INFROMATION

(Examples are given below)

a).	Project Title :		
b).	Loan Agreement :	Under JICA Loan Agreement No…….	
		Date of Sign :	
		Name of Project :	
c).	The Employer :	Yangon City Development Committee (YCDC)	
		Address :	
		Tel :	
		Fax :	
d).	The Engineer :	TEC International Co. Ltd., Japan (TECI)	
		Address :	
		Tel :	
		Fax :	
		Date of Consulting Services Contract :	
e).	The Contractor :		
		Address :	
		Tel :	
		Fax :	
		Date of Construction Contract :	
f).	Project Finance :	Government of Japan	
g).	Bank's Name :	Japan International Cooperation Agency (JICA)	
h).	Borrower's Name :	Government of Republic of the Union of Myanmar	
i).	Project Description		
	(1) Background	-	
		-	
		-	
		-	
	(2) Scope of Project	-	
		-	
		-	
j).	Scope of Works	-	
		-	
		-	

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3 CONTRCT DATA

3.1 CONTRCT DATA (based on Construction Contract)

(Examples of Contract Data are given below, the table to be filled with the data)

No.	Condition	Reference Clauses	Data
(1)	Employer's name and address		(Name) (Address)
(2)	Engineer's name and address		(Name) (Address)
(3)	Bank's name		Japan International Cooperation Agency (JICA)
(4)	Borrower's name		Government of Republic of the Union of Myanmar
(5)	Time for Completion		xx months
(6)	Defects Notification Period		365 days (12 months)
(7)	Governing Law		
(8)	Ruling Language		
(9)	Language for Communication		
(10)	Time for Access to the Site		
(11)	Performance Security		
(12)	Normal working hours		
(13)	Accepted Contract Amount		
(14)	Delay Damage for the Works		x.xx % of the Contract Price per day.
(15)	Maximum Amount of Delay Damages		xx % of the final Contract Price.
(16)	Provisional Sums		xx%
(17)	Total advance payment		xx% of the Accepted Contract Amount
(18)	Percentage of Retention		x%
(19)	Limit of Retention Money		x% of the Accepted Contract Amount
(20)	Priority of Documents		1.
			2.
			3.
			4.

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4 SUBMISSION / ACTION LIST

The Engineer should arrange his staff to prepare “Submission / Action List” using the form in Appendix 5. The list is a basic guideline for implementation of the Construction Project and ready to use before commencement of the Construction.

Copy of the list will be provided to the Contractor in order for him to have same understanding about submission and actions required by the Contract.

Subsequent to Submission / Action List is issued, then “Engineering Works Schedule (EWS)” should be prepared by both of the Engineer and the Contractor. A sample form of EWS is attached in Appendix 6.

Engineering Works Schedule contains details of submission identified in Submission / Action List with planning and actual dates for “Preparation”, “Submission” and “Approval” and status of submission, which aim to plan, monitor and control documents submission by the Parties. Review on EWS should be on regular basis, at least once a month, and included in their Monthly Progress Report.

The Contractor should make further breakdown of each submission for Method Statement, Request for Material Approval, Temporary Works Design, Traffic Management Plan, Shop Drawings, and/or such in order to link with construction sequence planned in Works Programme. The Engineer should request the Contractor to submit his EWS for approval.

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5 SITE

5.1 HANDING OVER TO CONTRACTOR

The Site includes Works Areas is indicated in the Contract Documents. The boundaries of the Works Areas are indicative only and will be confirmed by the Engineer upon the Contractor being granted access to the relevant Works Areas.

The Contractor shall be given access to and shall be required to vacate the Works Areas in accordance with the dates set out in "Schedule of Access Date for Works Areas" in Appendix 7.

5.2 SURVEY AND SETTING OUT

5.2.1 Initial Site Survey

1 Although result of topographical survey of the Works Areas and their surroundings conducted during planning stage was provided to the Contractor within the Contract Documents, the Contractor shall conduct Initial Site Survey fully;

(a) The Contractor shall carry out an initial survey within and around the Site (the Initial Site Survey). The Initial Site Survey shall include:

(b) A photographic record clearly showing the condition of any roads, footpaths, slopes, drainage channels, stream, structures and bridges;

(c) Measurements of buildings, paved areas, cables, pipes, structures and bridges within the area of impact of the construction;

(d) The excavation of trial pits or trenches in order to identify the exact locations of all utilities; and

2 The Contractor shall make reference to the Employer's topographical survey in completing the Initial Site Survey. The Initial Site Survey shall focus, in particular, on features that will be affected by the Execution of the Works and which are required to be handed back in their original condition upon completion.

3 The Contractor shall not commence works within any Works Area until the Initial Site Survey Report of the relevant Works Area has been submitted to and approved by the Engineer.

5.2.2 Setting out

Accuracy of the survey network comprised of control points and bench marks is very important. Since the control points and benchmarks should be provided by the Contractor for all Works Area, the Engineer's surveyor shall confirm the control points and benchmarks are properly installed on site within acceptable tolerance. The Engineer's surveyor should check not only the Contractor's survey result and the calculation but also jointly survey with the Contractor's surveyor if required.

5.3 MANAGEMENT

When formal notice is given by the Engineer to the Contractor to commence work, the Contractor must be required to take charge of the Site, and immediately he takes possession of the Site, be responsible for its care and control, including keeping it clean and clear of illegal occupation. If any illegal occupation is found on the Site, the Contractor should initiate eviction action with witness by the Engineer's staffs, if it is unsuccessful, the case should be reported to the Employer for assistance to liaise with the relevant authorities to clear the illegal occupation.

The Contractor must be fully aware of and comply with any restrictions on the use of the Site as specified in the Contract. Close liaison should be maintained among Parties. If any site offices or temporary accommodations are to be erected on Site which may conflict with the permanent works or in areas which may have to be handed back to the Authority before the whole of the Works are completed, the implications should be carefully considered and appropriate conditions should be added to avoid claims from the Contractor regarding any necessary vacation and re-erection of the site offices or temporary accommodations.

5.4 SECURITY

(a) The Contractor shall be responsible for the design, installation, maintenance and removal upon completion of all hoardings, fencing, barriers and the like required by the Contract. The Contractor shall make proposal of site arrangement showing such for review of the Engineer prior to commence.

(b) Security guards should be provided at site entrance gates, and where recognized necessary, in order to control the construction traffic to the site.

(c) Unless they are required to be handed over to the Employer, the Contractor shall remove all hoardings, covered walkways, fencing and gates upon completion of the Works or at such earlier time as instructed by the Engineer.

5.5 RE-POSSESSION ON COMPLETION

(a) Re-possession and handing over should be by a joint inspection followed by an exchange of written confirmation as described in the Contract. Procedure on Completion of Works in this manual. Return Date for each Works Area is stated in "Schedule of Access Dates for Works Areas" in Appendix 7.

6. SUPERVISING PERSONNEL

6.1 ENGINEER'S STAFF

Upon signing the Contract, the Engineer should advise the Contractor of the organization of the Engineer's staffs as soon as practicable. The Organization Chart is attached in Appendix 8 "Engineer's Organization Chart".

The Engineer's key staffs and their basic roles are listed in below,

6.1.1 Site Engineer (Construction)

(a) To lead contractor's on site construction management and supervision

(b) To examine appropriate construction method and sequence to ensure progress of works and discuss with contractor to improve

(c) To review contractor's submissions particularly for construction matters such as drawings, method statement and programme

(d) To review contractor's construction sequence daily to avoid conflict of construction between other structures

(e) To monitor progress of works daily and chair progress meeting

(f) To carry out safety and quality audit and chair safety and quality meeting

(g) To lead inspectors to carry out their tasks and duties properly

(h) To observe daily performance of contactor's works and direct contractor to correct improper works

6.1.2 Site Engineer (Engineering)

(a) To manage contractual and commercial matters

(b) To review contractor's correspondences and take action for responses

(c) To assist Project Manager on contractual and commercial matters

(d) To assist Site Engineer (Construction) to review/approve contractor's submissions relating contractual issue

(e) To liaise with Site Engineer (Construction) to notify contractor's nonconformance issue

(f) To prepare variation order

(g) To evaluate/resolve contractor's claim issue

(h) To review/approve to contractor's submission for temporary works design and shop drawings

(i) To review/approve to contractor's submission for test reports for materials

6.1.3 Inspector

(a) To check contractor's daily labour and plant return

(b) To inspect and verify delivered materials comply with specifications and requirements

(c) To inspect and check works comply with Inspection and Testing Plan (ITP)

(d) To observe safety conditions and notify contractor to correct any unsafe matters

6.2 CONTRACTOR'S STAFF

The Contractor should employ skilled, experienced and competent staff to carry out the Works. It is therefore necessary that the contract documents stipulate the minimum requirements and qualifications of his staffs. The Engineer has to be satisfied that these staff members meet the contract requirements and that the Contractor has fulfilled his obligations under the Contract.

6.2.1 Technical Resources and Site Supervision Structure

The technical resources on managerial and technical staff and the technical proposal on site supervision should be checked against the Contractor's "Technical Submission" made at the tendering stage to ensure that adequate site supervision will be provided by the Contractor. In the event the Contractor is unlikely to provide or maintain any staff of the management team submitted by the Contractor in his Tender submissions on technical resources or necessarily inferred therefrom, he shall report to the Engineer as soon as practicable.

6.2.2 Contractor's Organization

(a) The Contractor shall submit the Contractor's Organization Chart detailing management and technical staff organization and the director responsible for the Contract. The Contractor's Organization Chart shall identify all aspects of the Contract, the identity, function, responsibility and lines of reporting and authority of each person.

(b) The Contractor shall submit names, qualifications and experience of all key personnel identified in the Contractor's Organization Chart prior to their commencing employment on the Contract.

6.2.3 Contractor's Representative (Project Manager)

(a) The Contractor shall provide all necessary superintendence for the execution of the Works.

(b) The Contractor shall appoint a competent and authorized English-speaking representative i.e. Project Manager. Such representative shall be available on Site and shall give his full time to the superintendence of the Works.

(c) Such authorized representative shall receive on behalf of the Contractor directions and instructions from the Engineer.

(d) The representative shall possess relevant qualifications accepted by the Engineer.

(e) The Engineer shall have the authority to withdraw his approval to the representative at any time. If such approval is withdrawn the Contractor shall, on receipt of such notice, remove the representative from the Site forthwith and shall not thereafter employ him again on Site in any capacity and shall replace him by another competent English-speaking representative.

6.2.4 Surveyor

The Contractor shall appoint a surveyor responsible for all survey and setting out matters associated with the Works. This person shall possess a survey license and be registered in accordance with the relevant laws and regulations. He shall be authorized to receive from the Engineer all survey data relevant to the Contract. The particulars of the surveyor shall be submitted prior to the commencing employment on the Contract.

6.2.5 Safety Officer

The Contractor shall appoint full-time safety personnel including a full time Safety Officer who has adequate experience in the scope of the Works. The Contractor's safety personnel shall supervise and monitor implementation of a Health and Safety Plan.

6.2.6 Planning and Programming Engineer

The Contractor shall appoint a full time Planning and Programming Engineer on Site who are fully experienced in the use of modern project planning and reporting techniques. The Contractor shall submit his particulars for review by the Engineer.

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7 INSPECTION AND TESTING OF WORKS

7.1 THE BASIC CONCEPT OF INSPECTION AND TESTING

1 The Employer's Personnel (including the Engineer and his staff) shall at all reasonable times:

(a) have full access to all parts of the Site and to all places from which natural Materials are being obtained, and

(b) during production, manufacture and construction (at the Site and elsewhere), be entitled to examine, inspect, measure and test the materials and workmanship, and to check the progress of manufacture of Plant and production and manufacture of Materials.

2 The Contractor shall give the Engineer's staff full opportunity to carry out these activities, including providing access, facilities, permissions and safety equipment. No such activity shall relieve the Contractor from any obligation or responsibility.

3 The Contractor shall give notice to the Engineer whenever any work is ready and before it is covered up, put out of sight, or packaged for storage or transport. The Engineer shall then either carry out the examination, inspection, measurement or testing without unreasonable delay, or promptly give notice to the Contractor that the Engineer does not require to do so.

4 Except as otherwise specified in the Contract, the Contractor shall provide all apparatus, assistance, documents and other information, electricity, equipment, fuel, consumables, instruments, labour, materials, and suitably qualified and experienced staff, as are necessary to carry out the specified tests efficiently. The Contractor shall agree, with the Engineer, the time and place for the specified testing of any Plant, Materials and other parts of the Works.

5 The Engineer's supervision staff should communicate with the Contractor at Daily Coordination Meeting for the schedule of inspection and testing for coming days. When more than 2 inspections and/or testing are demanded at the same time, the Engineer's staff should make arrangements with the Contractor the order of inspection and/or testing minimizing the adverse influence to the Project.

7.2 INSPECTION AND TEST PLAN

1 The Engineer's staff should also monitor the construction progress closely, maybe refer to the Contractor's Tree Week and/or Three Month Rolling Programme, and manage by themselves to be fully aware the method of inspection/testing, acceptance criteria and other requirements for the coming inspection and testing as scheduled.

2 Inspection and Test Plan (ITP) is the most essential document for control the quality of the Works, which usually be prepared by the Contactor and the Engineer will review the

Contractor's ITP carefully and make sure the ITP covers all requirements in the Specification. Further it should be linked between Engineering Works Schedule (EWS) and ITP with no inconsistency.

3 Sample form of Inspection and Test Plan (ITP) in Appendix 9 is basically required to include and identify the followings:

(a) the sequence of inspection and testing activities;

(b) the inspection and testing requirements of either activities or materials;

(c) the acceptance criteria or relevant specification;

(d) the level of inspection required including the provision for witnessing by the Engineer; and

(e) any certification requirements or records to be kept.

4 For item (d), Control Points are defined in the ITP as follows:

(a) Hold Point (H): Approval shall be obtained before subsequent operations proceed. Request for inspection form to be submitted to party before inspection and test is performed.

(b) Witness (W): Request for inspection form to be submitted to party for witnessing the test and for confirming that the results are correctly recorded.

(c) Verification (V): Make sure that the required inspection and test is completed and records demonstrating compliance with the specified requirements exist where appropriate

(d) Surveillance (S): Continual monitoring and/or analysis of the inspection and test records to ensure that specified requirements have been fulfilled.

In case of procedures of inspection and testing are complicated, it is recommended to prepare "Check List" for Inspectors. It helps to prevent their oversight, misunderstanding or such during inspection and testing.

7.3 REQUESTS FOR INSPECTION FORM

Request for Inspection Forms are prepared in Appendix 10, the form has a cell for entering Inspection and Test Points (ITP No.) specified in the Inspection and Test Plan, which are corresponding to the inspection and test conducted on site requested by the Request for Inspection Forms, for better traceability of the records.

The Engineer should assign a quality record controller in his office, who is responsible for not only collecting and maintaining the quality records, but also he/she examines the quality records are processed

according to the ITP and monitors no missing inspection and testing occurs.

8 RECORDS

8.1 GENERAL

1 The keeping of good comprehensive records is very important. Records serve three basic purposes:

(a) They provide information for the administration of the Contract, and in particular, for the evaluation of work done for payment.

(b) They provide the management with necessary information on progress, the level of resources and the condition of the Works, on which engineering and management decisions may be based.

(c) They provide information on the history of the Works, so that facts are available for the evaluation of claims or resolution of disputes should these arise.

8.2 CONTRACT DOCUMENTS

Copy of the signed contract documents, including a set of the original contract drawings should always be kept in the site office. The Engineer's staffs should make a list of the document and update regularly if any.

8.3 RECORD DRAWINGS

1 One set of drawings should be kept separate from the set of original contract drawings, the latter being kept intact for reference only. To ensure the building up of a comprehensive set of record drawings as the Works proceed, the following should be observed:

(a) A set of drawings comprising the contract drawings and one copy of all revised drawings and additional drawings issued to the Contractor shall be designated for record purposes.

(b) Where the as-constructed work deviates from the drawings, the as-constructed details should be recorded as soon as possible and marked in red ink on the relevant drawings in the set to record exact dimensions and positions of the finished work.

(c) Where details of the finished work are the subject of a record survey, either a copy of the survey plan produced should be kept in the set or the results of the survey should be abstracted and incorporated into the relevant drawings.

8.4 SITE DIARY

The site diary is one of the most important records for the Contract, its primary aim being to record facts.

It should therefore contain an accurate and concise record of the progress of work, plant and labour employed, weather and site conditions, and any occurrences which affect the progress and/or quality of the work, including the extent to which they are affected. In addition, comments on causes of delays and disruptions to normal progress should be noted where appropriate.

8.5 PROGRESS RECORD

The Engineer shall coordinate his staff to record the progress apart from the as-built progress filled in the Works Programme which shall be submitted to the Engineer as the Contractor's Monthly Progress Report. Then the Engineer should compare with both progress records in order to bring up-to-date every month. There must be some discrepancy between the records, the Engineer shall discuss and agree with the Contractor to confirm the discrepancy and correct.

8.6 SITE INSTRUCTIONS

Instructions given to the Contractor on Site should be issued on the standard form "Site Instruction" shown at Appendix 12. The form may also be used by the Engineer's staffs, with delegated authority. However, it should not be used for ordering variations where the standard form "Engineer's Instruction" at Appendix 12 should be employed for such circumstances.

8.7 MINUTES OF MEETINGS AND CORRESPONDENCE

Minutes of meetings with the Contractor, including monthly meetings, meetings with utilities, rate fixing meetings etc., and all correspondence with the Contractor will form part of the records of the Contract and must therefore be kept in the site Engineer's office and stored in conformity with the filing system. A sample form of correspondences register is in Appendix 13 "Correspondence Register Sheet".

8.8 RECORD PHOTOGRAPHS

1 The main purposes of taking photographs are:

(a) to provide a visual record of the conditions of the Site and surroundings before and during the course of the Contract (supplement the Photographic Survey Record of Initial Survey Record prepared by the Contractor.)

(b) to record particular features of the work, especially which will later be covered (such as works progress),

2 These photographs should be kept together with the following information;

(a) Date on which the photograph was taken,

(b) Exact location and description of the subject photographed, and

8.9 REQUESTS FOR INSPECTION AND SURVEY CHECK

The standard form “Request for Inspection From” shown at Appendix 10 should be used for recording the Contractor’s request for inspection and/or survey of work performed and the Engineer’s permission to proceed with proposed work after inspection/survey of the preceding stage. The purpose of using this standard form is to improve communications on Site and provide a record of the sequence of events. The Engineer should respond to the contractor's request for inspection expeditiously.

8.10 MATERIALS TESTING

Tests required in the Project shall be carried in accordance with latest version of approved Inspection and Test Plan (ITP) and the test reports should be printed Inspection and Testing Point (I&T Point) numbers corresponding to each test scheduled in the ITP. Records of tests on materials used in the Contract should be kept by the Engineer according to I&T Points.

8.11 MISCELLANEOUS RECORDS

8.11.1 Record for soil and rock conditions

Full records should be kept of the soil and rock conditions as the Works progress. Apart from their importance during construction in respect of the method of working, confirmation of original design, safety, progress evaluation etc., these records will be of great value for future maintenance of the Works and also for planning future works in the vicinity.

8.11.2 Settlement and movement records

These should be carefully planned at an early stage, particularly for works where settlement/movement is expected. The Surveyor should be consulted to devise a method for monitoring and recording the movements efficiently.

8.11.3 Concrete casting records

A record should be kept of the location, date, time, grade, approximate quantity, test cube reference numbers, and supplier (if more than one source) of each concrete pour. Where a structure is cast in more than one operation, the sequence of casting should also be recorded. This type of record will be particularly useful in the subsequent identification of materials in a structure should it be necessary to investigate the extent of non-complying materials. “Concrete Test Cube Register” in Appendix 14 should be used.

8.11.4 Bar bending schedules

These are required for all works with reinforced concrete construction. Schedules should be prepared on the standard form shown at Appendix 15. All bar bending schedules should be kept in the site office with the R.C. drawings. They should be updated in the same manner as record drawings. It should be noted that bending schedules shall be prepared by the Contractor and

submitted to the Engineer for approval before bending of reinforcement starts.

8.11.5 Record of materials on Site

A record of materials delivered to Site should be kept to enable the Engineer to certify interim payment regarding the materials on Site. This record should include separate sections for each type of material, listing the quantity delivered, date of delivery, (and time of delivery when appropriate), together with such information as delivery tickets, truck numbers and any other useful data. The format of the record should be agreed with the Contractor prior to delivery of materials on site.

9 SITE MEETINGS

9.1 FREQUENCY

Site meetings should be called and chaired by the Engineer once a week and a month, named Weekly Progress Meeting and Monthly Progress Meeting respectively, and ad-hoc meetings as required.

Daily Coordination Meetings should be held every day at each works areas or sections and chaired by the Site Engineers and/or Inspectors. The Engineer's staffs should try to manage Daily Coordination Meetings finishing in a short time, in order to do so, they are requested to prepare the materials in advance, such as agenda, previous meeting minutes, etc.

9.2 TYPICAL TOPICS

Typical topics discussed during the meeting should include progress and programme of the Works, site supervision, site resources including labour and plant, workmanship, materials, inspection and testing and site safety.

Meetings; Problem Resolution Forum

Meetings	Venue	Chaired by	Attendance	Addenda
Daily Coordination Meeting	Site offices	Site Engineer Inspector	Consultant and Contractor's site staff	Daily progress, Works for tomorrow, Site safety
Weekly Progress Meeting	Consultants office	Engineer.	Representatives from each party	Progress review Progress forecast
Monthly Progress Meeting	Consultant's office	Engineer	Representatives from each party	Status review Status forecast
Technical Meeting (held at irregular interval)	Consultant's office	Engineer Site Engineer	Technical staff from each party	Solution on technical problems
Ad-hoc Meeting	T.B.A.	T.B.A.	T.B.A.	T.B.A.

9.3 RECORDS

Matters discussed at site meetings should be recorded in the minutes. The sequential number of the meetings, date, time, venue and whoever attends should be stated. The minutes of meetings should be sent to the all participants for their comment and confirmation. The Engineer should provide reasonable time for the participants to return their comments, if any.

The meetings should be conducted with reference to the minutes of the previous meetings and by checking of actions as recorded in the minutes.

Example blank forms of the Weekly and Monthly Progress Meetings are in Appendix 16.

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10 SAFETY

10.1 RESPONSIBILITY

It is the Contractor's responsibility to ensure the safety of all persons on Site and the general public during execution of the Works. The Engineer and his all supervisory staff should encourage the Contractor and his workers to use safe methods of working and remind them of the provisions of the safety regulations and other relevant regulations.

10.2 CONTRACTOR'S SAFETY ORGANISATION

The Contractor shall appoint full-time safety personnel including a full time Safety Officer who has adequate experience in the scope of the Works. The Contractor's safety personnel shall supervise and monitor implementation of a Health and Safety Plan.

10.3 CHECKING OF TEMPORARY WORKS

The Contractor is responsible for the design and stability of all temporary works required in the Contract.

The Engineer's staff is required to examine the Contractor's design details concerning the design, erection, use and removal of the temporary works and shall satisfy himself that it contains no obvious deficiency. In particular, the Engineer's staff is to carry out all necessary checks to ensure that the methods proposed by the Contractor do not have a detrimental effect on the permanent works.

Where the requirements for checking, testing or inspecting temporary works have been given in the Contract then these requirements are to be implemented and monitored accordingly. In the majority of cases where no such specific requirements are stated, the Engineer's staff should make all checks as appear to be reasonable as to the adequacy of the design and implementation, pointing out any errors or areas of uncertainty that become apparent.

The responsibility for the temporary works remains with the Contractor but no work should be commenced until the Engineer has issued his consent in writing upon making such verification.

10.4 REPORTING OF SITE INCIDENTS AND ACCIDENTS

1 All accidents causing personal injury, affecting the Works or adjacent property, and incidents on or adjacent to the Site are to be recorded by the Engineer's staff. An accident is classified as a notifiable accident if:

(a) it has led to fatality, or

(b) the victim is in critical condition, or

(c) the media have arrived on Site or have telephoned to ask information concerning the accident.

2 Then, where practicable, the situation should be extensively photographed. The Engineer's staff should ensure that all evidence and facts are recorded. This must be done as soon after the occurrence of the event as practically possible. When ascertaining and recording the evidence and facts it is necessary to ensure that nothing is said or done which will:

(a) Suggest that the Contractor has been relieved of any responsibilities or liabilities,

(b) Interfere with the relationship between the Contractor and any insurance company, or

(c) Admit any liability on behalf of Government or Government employees.

10.5 CONSTRUCTION SITE SAFETY MANUAL

The Contractor shall devise and implement a project specific Health and Safety Plan to fully comply with the requirements of the Contract, all relevant Enactments, Code of Practice, safety guidelines, the requirements of the independent risk assessment, project conditions, proposed work activities and relevant international standards.

The Engineer will give approval on the Contractor's Health and Safety Plan, the plan shall be reviewed and revised time to time for the improvement. The Engineer will work on the Contractor revising his Health and Safety Plan on the basis of "The Guidance for the Management of Safety for Construction Works in Japanese ODA Projects, September 2014" published by JICA.

The JICA's Safety Guidance gives guidelines in policy, legislation, contractual provisions and site safety set-up and actions during construction. It also contains guidelines of a comprehensive safety plan, which help the Contractor to ensure the provision of a safe and healthy working environment for all personnel in public works construction sites and others who may be affected by the works. It is imperative that every professional and supervisory staff are familiar with and adhere to the contents of the Health and Safety Plan (HSP), particularly those involved in the administration and supervision of public works contracts.

The JICA's Safety Guidance can be downloaded from JICA's web site.

10.6 SITE SAFETY CYCLE

10.6.1 Since the Site Safety Cycle is operated in many countries worldwide, and it is evaluated effective for improvement of Construction Safety, especially safety awareness of all personnel on site, the Engineer should encourage the Contractor to employ the Site Safety Cycle as described below,

10.6.2 Basically, the activities of Site Safety Cycle are classified into three categories, namely Daily Cycle, Weekly Cycle and Monthly Cycle. Each of these cycles comprises activities as follows:

1 Daily Cycle

(a) Pre-work Exercise and Safety meeting (Morning Briefing)

(b) Hazard Identification Activity meeting (Tool Box Talk);

(c) Pre-work Safety Checks;

(d) Safety inspection by Project Manager or his/her representatives;

(e) Guidance and supervision during work;

(f) Safety co-ordination meeting (=Daily Coordination Meeting);

(g) Daily cleaning and tidying up of the Site; and

(h) Checking of the Site after each day's work.

2 Weekly Cycle

(a) Weekly Safety Walk by Contractor's Representative and Safety Officer in company with the Representatives from each party;

(b) Weekly Meeting attending; and

(c) Weekly overall cleaning and tidying up of the Site.

3 Monthly Cycle

(a) Site Safety meeting (including pre-meeting inspection) attending by Representatives from each party; and

(b) Monthly Progress Meeting.

10.6.3 "Safety Check Record" (Sample A) and "Safety and Environmental Control Check List" (Sample B) in Appendix 17 are prepared for both Weekly and Monthly safety inspection.

10.7 SAFETY TRAINING

The Engineer should ensure that adequate site safety training is provided to his staff, particularly those responsible for the administration and/or supervision of the Contract on sites. He should prepare and maintain the schedule of Safety Training for the implementation throughout the Contract period.

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11 ENVIRONMENTAL PROTECTION

The Contractor shall take all reasonable steps to protect the environment (both on and off the Site) and to limit damage and nuisance to people and property resulting from pollution, noise and other results of his operations.

The Contractor shall ensure that emissions, surface discharges and effluent from the Contractor's activities shall not exceed the values stated in the Specification or prescribed by applicable Laws.

11.1 ENVIRONMENTAL MANAGEMENT PLAN

1 The Engineer to review for approval the Contractor's Environmental Management Plan has been prepared complying with the following requirements.

(a) The Contractor will be issued with the Employer's Environmental Impact Assessment Report. The EIA shall be regarded as the minimum standard to be achieved but it does not relieve the Contractor of any statutory duty.

(b) The Contractor shall take all reasonable precautions to avoid any nuisance arising from the execution of the Works. This should be accomplished where at all possible by suppression of the nuisance at source rather than abatement of the nuisance once generated.

(c) The provision listed herein regarding environmental protection shall apply to and be binding upon the Contractor for any part of the Works on the Site and shall apply to and be binding on his subcontractors. The Contractor shall ensure that proper and adequate provisions to this end are included in all subcontracts.

(d) The Contractor shall employ appropriate construction methods and carry out the Works in a manner as to minimize any adverse impacts on air, noise and water quality and the existing environment within or outside any construction sites during the Contract.

(e) The Contractor shall submit an Environmental Management Plan indicating how they will comply with the Contract requirements. The plan shall be properly implemented by the Contractor during the Contract.

11.2 AIR QUALITY

If after commencement of the Works that the Contractor's Equipment and/or method of working are found to be causing serious air pollution impacts, they shall be inspected by the Engineer and remedial proposals shall be drawn up by the Contractor.

11.3 WATER QUALITY

The Contractor shall not discharge directly or indirectly (by runoff) or cause or permit or suffer to be discharged into any public sewer, storm water drain channel, stream course or river, any effluent or foul or contaminated water. The Contractor shall provide, operate and maintain within the premises or otherwise, suitable works for the treatment and disposal of such effluent or foul or contaminated water.

11.4 WASTE MANAGEMENT

The Contractor shall be responsible for the control of all waste generated from construction activities, the removal of the waste and implementation of any measures to minimize any adverse impact to the environment and public. Where possible the waste shall be separated into recyclable items and hazardous waste shall be disposed of. All disposal of waste, including hazardous waste and recycling, shall be in accordance with the relevant local laws and regulations.

11.5 NOISE CONTROL

The Contractor shall take all necessary measures to ensure that the operation of all mechanical equipment and construction processes on or off the Site shall not cause excessive noise which may disturb any occupant of any nearby dwellings, schools, hospitals or premises with similar sensitivity to noise.

The Contractor shall submit details of the Contractor's Equipment including method of use and construction operations together with proposed measures for limiting noise wherefrom that shall include, but not limited to the relocation of noise emitting plant, the use of silencers, mufflers, acoustic shields, shed or screens and shall be based upon the best proven practice.

11.6 VIBRATION CONTROL

All mechanical equipment and construction processes on or off the Site shall not cause excessive vibration which may disturb any occupant of any nearby dwellings, schools, hospitals or premises with similar sensitivity to vibration. Vibration caused by any construction activities, including movement of construction equipment, shall be in accordance with the relevant local laws and regulations.

11.7 PROTECTION ON EXISTING STREAMS OR RIVERS

Natural streams or rivers within or adjacent to the Site where no work is being carried out shall be kept clean and free of any floating debris. All equipment and working methods to be used in or near the natural streams or rivers shall be planned to reduce disturbance. No material storing or no parking of the Contractor's Equipment or other vehicles near the streams or rivers is allowed.

11.8 ENVIRONMENTAL MANAGEMENT

The Contractor's environmental performance shall be monitored and controlled through the Weekly Safety Walk, Pre-meeting site inspection of Monthly Progress Meeting. If the Engineer considers that the Contractor has exhibited consistently poor environmental performance, it should be duly reflected in the

Report on Contractor's Performance. See "Safety and Environmental Control Check List" (Sample B) in Appendix 17

12 PROGRAMME, PROGRESS AND EXPENDITURE

The Contractor shall plan in detail the full scope of the Contract taking into account the complex nature and different phases and aspects of the Contract and shall provide Works Programme which reflect the detailed planning undertaken and which are realistic, achievable and are accompanied by supporting information.

The Contractor shall monitor performance against the Works Programme required by the Contract. The Contractor shall include for direct daily monitoring of the progress of the Works and the preparation of written reports submitted every month which shall include all necessary supporting data. The Contractor shall maintain full and comprehensive progress records on Site.

12.1 CONTRACTOR'S PROGRAMME AT COMMENCEMENT

1 The programme should normally be in the form of a bar chart. As the Contract involving a large number of inter-related activities, the programme needs to be in the form of a network diagram and programmed on the Microsoft Project soft wear or similar. Critical activities and the critical path should be identified on the programme, as extension of time of the Works described in this manual is normally examined and measured on the critical path.

2 When a programme is submitted by the Contractor, the programme should be analyzed and examined for the following points:

(a) Whether details shown on the programme, in respect of sequence, method and timing, conform with the requirements of the Contract,

(b) Whether the programme is over-optimistic in respect of any critical activity or the Works as a whole.

12.2 PROGRAMME UPDATING AND REVISION

1 The Contractor should be required to revise the Works Programme during the course of the Contract, for example;

(a) An extension of time for completion of the Works or any Section of the Works has been granted by the Engineer;

(b) Progress is too slow to ensure completion by the due date and the Contractor has been so informed;

(c) Progress on critical activities is falling behind the original programme or the latest revised programme, particularly where the Contractor had been informed that his

programme was in the opinion of the Engineer overoptimistic,

12.3 MONITORING AND REPORTING PROGRESS

1 It is one of routine works required by the Contract, the Contractor shall prepare the Monthly Progress Reports to be submitted and the Engineer should review and comment on them for correction by the Contractor every month.

2 For monitoring of the progress, the Works Programme showing the progress to date which is included in the Contractor's Monthly Progress Report will be checked in detail by the Engineer, comparing with his own records prepared by his inspectors/site engineers, and if there are some difference, the Engineer should correct them with the Contractor until both parties reaches mutual agreement.

3 The Engineer should further analyze the agreed updated Works Programme together with other data in order to prepare the Consultant's Monthly Progress Report as described in this manual.

4 As a general guideline, the report for the progress in the Consultant's Monthly Progress Report may include:

(a) Commencement Date, original completion date, extension of time (EOT) granted, revised completion date, time elapsed in days and in percentage of the contract period, a realistic estimated completion date based on the actual progress made and the expected time to complete outstanding works;

(b) Original contract sum, predicted final contract sum, estimated percentage of work physically completed, amount and percentage of certified value of works, expenditure to date, yearly forecast expenditure and a predicted/actual cash flow chart;

(c) Dayworks, variations and drawings issued;

(d) Description of progress with a progress table and progress chart;

(e) Claim record;

(f) Safety matters and accident matters;

(g) Record of meetings;

(h) Record of hand over of works; and

(i) Environmental issues.

13 PROCEDURE ON COMPLETION OF WORKS

13.1 PRIOR TO ISSUE OF TAKING-OVER CERTIFICATE

13.1.1 The Contractor shall complete the whole of the Works within the Time for Completion including following (a) and (b) for issue of the Taking-Over Certificate:

(a) achieving the passing of the Tests on Completion, and

(b) completing all work which is stated in the Contract as being required for the Works or Section to be considered to be completed for the purposes of taking over, except for any minor outstanding work and defects which will not substantially affect the use of the Works or Section for their intended purpose.

13.1.2 Test on Completion

The Contractor shall give to the Engineer advance notice of the date after which the Contractor will be ready to carry out each of the Tests on Completion.

13.1.3 As-Built Drawings and Operation and Maintenance Manuals

The Engineer should confirm the Contractor has submitted As-Built Drawings and documents, as required, and Operation and Maintenance Manuals in accordance with the Specification prior to commencement of the Test on Completion.

Immediately after the Test on Completion, the suitable corrected manuals shall be compiled into its final form and be submitted to the Engineer for approval. The Taking-Over Certificate will not be issued until all copies of the final Operation and Maintenance Manuals have been handed over.

13.1.4 Testing and Commissioning

1 The Contractor shall carry out Tests during construction to demonstrate the performance of the Works to the satisfaction of the Engineer that:

(a) The Works comply fully with the Specification; and

(b) The Plant perform satisfactorily when function under both manual and automatic control mode.

2 The Tests shall include, but not be limited to:

(a) Factory Tests;

(b) Site Tests; and

(c) Tests on Completion.

3 Test on Completion shall not be commenced until all (a) factory Tests and (b) Site Tests are completed complying with the Specifications and the testing records and/or reports submitted to the satisfactory of the Engineer.

13.2 TAKING-OVER CERTIFICATE

13.2.1 When the works are approaching substantial completion, normally the Contractor will try their best to receive the Taking-Over Certificate without delay or even earlier than the Time for Completion because the Contractor could proceed further the following steps, which are beneficial for him:

(a) The Contractor can pass the responsibility of the care of the Works and Goods to the Employer.

(b) The Contractor will submit Statement at Completion with the supporting documents for final payment.

13.2.2 Handing Over Completed Works

1 When the Works are approaching substantial completion, the Engineer should liaise with the Employer to arrange a joint inspection with the relevant authority of the Employer responsible for the future operation and maintenance of the completed works. The results of the inspection shall be recorded to show, among other things, all incomplete items distinguishing between those items for which the Contractor is responsible under the Contract and those which are not. When all works are completed, a further/final joint inspection shall be made.

2 Handing-over notes covering at least the following headings should be prepared and jointly signed by the Engineer's Representative and the officer of the Employer responsible for taking over the Works:

(a) Date of joint inspection(s);

(b) A list of outstanding works/defects which will not substantially affect the use of the Works or Section for their intended purpose;

(c) Schedule of as-built drawings and documents; and

(d) Any relevant remarks.

13.2.3 Outstanding Works

A list of outstanding works requiring attention or action shall be prepared at the effective date of the certificate of completion. A Taking-Over Certificate shall not be issued until the Contractor undertakes to carry out all these outstanding works or otherwise agreed.

13.3 MATTERS DURING DEFECTS NOTIFICATION PERIOD

13.3.1 Working during the Defects Notification Period

During the Defects Notification Period, any defects arising, which the maintenance department of the Employer considers may be the Contractor's liability, should be referred to the Engineer's Representative or the Engineer for action.

If the Contractor is instructed to carry out repairs to damage occurring during the Defects Notification Period, which is not due to the Contractor's fault or not due to materials or workmanship not being in accordance with the Contract, the work shall be paid for under the terms of the Contract.

13.3.2 Inspections before the End of the Defects Notification Period

Two to four weeks before the end of the Defects Notification Period, the Engineer should arrange a joint inspection with the Contractor, the Employer and other parties if necessary, to check whether all outstanding works have been completed and any further works are required. Should any defects or deficiencies of any kind be identified, then the Contractor shall be notified for his remedial works.

13.4 POST-COMPLETION

The Engineer shall issue the Performance Certificate after the latest of the expiry dates of the Defects Notification Periods, or as soon thereafter as the Contractor has supplied all the Contractor's Documents and completed and tested all the Works, including remedying any defects. A copy of the Performance Certificate shall be issued to the Employer. The significance of the issue of Performance Certificate for the Contractor is:

(a) The Contractor submits a Final Statement as the application for Final Payment Certificate.

(b) The Performance Security is returned from the Employer to the Contractor within 21 days after receiving a copy of the Performance Certificate.

(c) Second half of Retention Money is released to the Contractor within 21 days after receiving a copy of the Performance Certificate.

(d) Performance of Contractor's Obligations are considered to have completed under the Contract, and

(e) The Performance Certificate constitutes acceptance of the Works.

13.4.1 Project Completion Report

The Project Completion Report is recommended to be prepared and submitted to the Employer after the completion of Project.

The Project Completion Report will be prepared in the form summarizing the Engineer's Quarterly Progress Report including a final financial summary with the following contents:

(Sample Summary of Final Account)

	Financial Summary Report on Completion of Contract		
1.	Project name		
2.	Brief description of the Works		
3.	Original Contract Sum		¥_____
4.	Final Contract Sum		¥_____
5.	Excess/saving on Contract Sum		¥_____
6.	Excess due to	(a) Variations	¥_____
		(b) Price Adjustment	¥_____
		(c) Claims	¥_____
		(d) Others	¥_____
7.	Original estimated time for completion of the Works		xx months
8.	Date of commencement of the Works		
9.	Months of substantial completion of the Works		_____months
10.	Actual time taken to complete the Works		_____days
11.	Extension of time granted for completion		_____days
12.	Deduction of delay damages for:		
	(a) Section I	____days (@ ¥ _____ /day)	¥_____
	(b) Section II	____days (@ ¥ _____ /day)	¥_____
	(c) Whole of the Works	____days (@ ¥ _____ /day)	¥_____
13.	Taking-Over Certificate was issued on		_____
14.	Defects Notification Period:	from_____	to_____
15.	Retention Money was released:		
	(a) First half (50%)	on_____	¥_____
	(b) Second half (50%)	on_____	¥_____
16.	Performance Security was returned to the Contractor on		_____
17.	Performance Certificate was issued on		_____
18.	Final Payment Certificate was issued on		_____
19.	Final payment was disbursed to the Contractor		_____
20	Remarks		

REFERENCES

INTERNATIONAL STANDARDS;

The Contractor shall carry out the Works and provide materials described in the Specification in accordance with the appropriate international standards such as ISO, ASTM and JIS standards. The main standards are, but are not limited by, in Appendix 18.

The Engineer should confirm with the Contractor that they are referring the latest version or as stated in the Specification as soon as the contract commenced.

A library containing all the standards is required to be established in the Engineer's office either hard copy or in electronic format whichever convenient for his staff's use.

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APPENDICES

Appendix 1	Main Bill of Quantities Item Summary
Appendix 9	Inspection and Test Plan (ITP)
Appendix 10	Forms – Request for Inspection
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Appendix 14	Concrete Test Cube Register
Appendix 15	Bar Bending Schedules
Appendix 17	Safety and Environmental Control Check List

Appendix 1 Main Bill of Quantities Item Summary

[Project Name] Sewerage System Improvement Project: Main BQ Item Summary

BQ No.		Earth Work								Concrete							Form	Rebar	Rebar Ratio		BQ No.
		Siteformation	Excavation		Backfill	Disposal	Fill	Fill	Retaining	Blinding	C20/25	C20/25	C25/30	C30/37	C30/37	Total					
		Excavation /Fill to formation level	General Material	Hard Material	Suitable Material		Gravel 0-40mm to blind bed	Crush Stone 0-40mm	Wall H=2.0m-9.0m			Anti Sulphate			Anti Sulphate						
		m3	m3	m3	m3	m3	m3	m3	m	m3	m3	m3	m3	m3	m3	m3	m2	t	Con m3	t/Con m3	
B2	SEWAGE TREATMENT PLANT (STP) SITE	193,500							856												B2
B3	GRIT CHAMBER AND PUMPING STATION		17,864		5,997		1,084	111		115	150	163		2,663	3,323	6,414	11,912	705	6,299	0.11	B3
B4	PRIMARY SETTLING TANKS		698		48		5,621			240	48			2,910	60	3,258	5,088	231	3,018	0.08	B4
B5	SECONDARY SETTLING TANKS		59,836		24,275		15,102			546	78			6,288	72	6,984	9,918	436	6,438	0.07	B5
B6	TRICKLING FILTERS TRAIN 1		431		37		13,182			1,272				10,360		11,632	14,944	840	10,360	0.08	B6
B7	TRICKLING FILTERS TRAIN 2		2,835		121		9,746			1,272				10,360		11,632	14,944	840	10,360	0.08	B7
B8	TRICKLING FILTERS TRAIN 3		10,175		631		6,629			1,272				10,360		11,632	14,944	840	10,360	0.08	B8
B9	CHLORINATION TANK AND EFFLUENT CHANNEL		7,844		2,429		875	1,283		175	62			2,579		2,816	8,948	271	2,641	0.10	B9
B10	SLUDGE THICKENERS						941			46	12	2		6	598	664	1,546	69	618	0.11	B10
B11	SLUDGE DISTRIBUTION TANK AND SLUDGE THICKENER PUMP HOUSE						379			15	10			115	24	164	380	14	149	0.09	B11
B12	SLUDGE DIGESTERS		69,039	2,008	33,350		64	7,834		136	4,408	12		18,440	1,126	24,122	34,582	3,940	23,986	0.16	B12
B13	SLUDGE DEWATERING MACHINE HOUSE AND SLUDGE STOCK YARD		3,104		442		1,557			196	133	23	382	1,921	201	2,856	5,666	265	2,660	0.10	B13
B14	GAS HOLDERS, DESULFERIZER AND COMBUSTION UNITS						1,953			96	936					1,032	256	79	936	0.08	B14
B15	SLUDGE DRYING BEDS		39,956		5,454		2,005	45		3,380	6,100		2,160			11,640	10,040	499	8,260	0.06	B15
B16	MAIN DISTRIBUTION TANK		202		29		88	168		18	35			590		643	2,155	51	625	0.08	B16
B17	OTHER DISTRIBUTION TANKS		3,524		2,120		307	368		64	71			1,543		1,678	5,781	152	1,614	0.09	B17
B18	PUMP HOUSES		3,216		1,937		899			55	31			568		654	1,384	72	599	0.12	B18
B22	ELECTRICAL ROOMS		23		1		632			25			164			189	795	19	164	0.12	B22
B23	ADMINISTRATION BUILDING AND OTHER BUILDINGS						4,245			64	41		1,059			1,164	4,022	150	1,100	0.14	B23
	TOTAL	193,500	218,747	2,008	76,871		65,309	9,809	856	8,987	12,115	200	3,765	68,703	5,404	99,174	147,305	9,473			
		m3	m3	m3	m3	m3	m3	m3	m	m3	m3	m3	m3	m3	m3	m3	m2	t			

BQ No.		Piping																			BQ No.
		Dactile										HDPE									
		100-150mm	200mm	350mm	400mm	500mm	600mm	900mm	1000mm	1200mm	1800mm	200mm	250mm	300mm	315mm	400mm	500mm	600mm /630mm	800mm	1000mm	
		m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	
B19	PIPE WORKS IN SEWAGE TREATMENT PLANT	3,800	944	177	1,392	592	2,094	335	44	1,649	1	1,369	1,259		143	1,122	741	1,721	873	801	B19
B24	MAIN AND BRANCH SEWERS IN AREA A												5,795		399	553	423	12			B24
B25	MAIN AND BRANCH SEWERS IN AREA B												964	59	1,289	249	186	726			B25
B26	MAIN AND BRANCH SEWERS IN AREA S07												80		317	63	58	40			B26
	TOTAL	3,800	944	177	1,392	592	2,094	335	44	1,649	1	1,369	8,098	59	2,148	1,987	1,408	2,499	873	801	
		m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	

BQ No.		Piping										External Works									BQ No.
		HDPE	GI			PVC	SS	Micro Tunnel				Road Works		Drainage							
		Perforated 160mm	15-100mm	125-250mm	300-400mm	20-80mm	50-200mm	1500mm	Soil Disposal	Shaft	Overflow Structure	Asphalt Pave W=3-6.5m	Gravel Pave W=3-5.5m	Channel W=1.5-2.5m							
		m	m	m	m	m	m	m	m3	no	no	m	m	m							
B2	SEWAGE TREATMENT PLANT (STP) SITE											4,326	951	1,151							B2
B15	SLUDGE DRYING BEDS	6,750																			B15
B19	PIPE WORKS IN SEWAGE TREATMENT PLANT		3,591	225	429	440	1,816														B19
B27	SHAFTS FOR TRUNK SEWER									24											B27
B28	TRUNK SEWER							4,400	13,630												B28
B29	OVER FLOW STRUCTURES										20										B29
	TOTAL	6,750	3,591	225	429	440	1,816	4,400	13,630	24		4,326	951	1,151	0	0	0	0	0	0	
		m	m	m	m	m	m	m	m3	no	no	m	m	m	m	m	m	m	m	m	

Appendix 9 Inspection and Test Plan (ITP)

(JV Logo) **(Company Name)** **(Document No.)**

Inspection and Test Plan

Proccess will be Concrete, Formwork, Reinforcment, Drainage, or such.

Project / Section :
Process :
ITP No : : Revision :

Page 1 of #

I&T Pt.	Description	Spec. Ref.	App. Std.	Inspection & Test Method	Frequency of I/T	Acceptance Criteria	Control Points S/C	Control Points Co	Control Points En	Records /Remarks
	Inspection and test point	Specification reference	Applicable Standards	For example, submission, visual, slump test, cube test, relative compaction test, survey, or such	Frequency of inspection / test		Sub-contractor	The Contractor	The Engineer	Name of records if any

Control Points:
Hold (H) : Approval shall be obtained before subsequent operations proceed. Request for inspection form to be submitted to party before inspection and test is performed.
Witness (W) : Request for inspection form to be submitted to party for witnessing the test and for confirming that the results are correctly recorded.
Verification (V) : Make sure that the required inspection and test is completed and records demonstrating compliance with the specified requirements exist where appropriate
Surveillance (S) : Continual monitoring and / or analysis of the inspection and test records to ensure that specified requirements have been fulfilled

Ful with H, W, V and/or S as appropriate

Prepared by : _____ Name and Signature

Reviewed by : _____ Name and Signature

Approved by : _____ Project Manager

Date : _____

(JV Logo) **(Company Name)**

(Document No)
Inspection and Test Plan

Project / Section :
Process :
ITP No : : Revision :

I&T Pt.	Description	Spec. Ref.	App. Std.	Inspection & Test Method	Frequency of I/T	Acceptance Criteria	Control Points			Records / Remarks
							S/C	Co	En	

Appendix 10　Request for Inspection Forms

Request For Inspection / Survey Check Form	Engineer :
Contract Title :	Contract No. :
Reference Number : RFISC New Submission ☐ or Resubmission ☐ (previous No. : _____)	ITP Point No. _____

Part A : Works Description

The following works will be completed / commenced on Date : Time :

(i) Work Location: _____

Description: _____

_____

_____

(ii) Works Proposed after Approval: _____

Relevant Drawing / Sketchs / Reference : Enclosures : Yes ☐ No ☐

Category of Conctrol Point: Quality Hold Point ☐ Quality Conctrol Point ☐

Form : Contractor's Representative Name: Signature: Date: Time:	Contractor :

Part B & C :

Part B: Action

Received by RE or his delegate : _____

Date : _____ Time: _____ am / pm *

Inspection Required : Yes ☐ No ☐

Person responsible for inspection :

Mr. / Ms.* _____ Please check the setting out

Mr. / Ms.* _____ Please inspect the above works

Part C: Results

The above works were inspected / surveyed * on _____

(i) Quality Notification:

Notice of No Objection ☐

Notice of No Objection, subject to comments (Please see below) ☐

Notice of Rejection (Please see below) - Please re-submit RISC No. : _____ ☐

(ii) The works describe in Part A (i) have been inspected / surveyed. * Permission to carry out the proposed outlined in Part A (ii) is given / not given * until the following remedial / outstanding works are completed satisfactory :

_____

_____

_____

_____

The above remedial works (if any) have been completed. Date : _____ Time: _____ am / pm *

(iii) Verbal Notification : #

RE or his delegate (Mr. / Ms.*) informed verbally to

Contractor's (Mr. / Ms.*) Date : _____ Time : _____

(iv) Confirmed By :

(Position : _____) Date : _____ Time : _____

For the RE or his delegate

Items to be completed if applicable * Deleted where appropriate ✓ Tick in appropriate box

1) White copy is for Contractor, 2) Pink copy for Contractor, 3) Yellow copy is for Engineer and 4) Blue copy is for Engineer

Appendix 12 Forms - Instructions

To : Attn :	(Project Name)	(Company Logo and Name)

ENGINEER'S INSTRUCTION

Engineer's Instruction No.

Subject :

Location :

Signed : The Engineer Date :	Distribution Date : File Ref :			Received for Contractor (Stamp / Chop)
	Name	Action	Info	

To : Attn :	(Project Name)	(Company Logo and Name)

SITE INSTRUCTION

Site Instruction No.

You are hereby instructed to carry out the following work in accordance with the terms and conditions of the Contract.

Area :

Title :

From :

Name :

Signature :

Date :

Distribution Date :

File Ref :

Name	Action	Info

Received for Contractor (Stamp / Chop)

Appendix 14　Concrete Test Cube Register

Appendix11-59

CONCRETE TEST CUBE REGISTER

Contract No. _____ Concrete Grade _____ Batching _____ Cement Brand _____ Additives _____ Coarse Agg. Source _____ Fines Source _____

Request Form No.	Date of Cast	Location	Slump (mm)	Compliance (Y/N)	28-day Results							Average four consecutive results	Standard Deviation (N/mm^2)	Compliance Criteria	Compliance (Y/N)	Remarks (Follow-up action)
					Test Certificate No.	Cube Mark	Date of Test	Age (days)	Density (kg/m^3)	Compressive Strength (N/mm^2)	Test Result					

Appendix 15　Bar Bending Schedule

Appendix11-61

Bar Bending Schedule

OFFICE / DIVISION _____ DEPARTMENT _____

CONTRACT NO. _____

TITLE _____

BAR SCHEDULE NO. ☐☐☐ AMD ☐

DRAWING NO. ☐☐☐☐☐☐☐☐

Location and member	Bar mark	Type and Size	No. of members	No. in each	Total No.	Shape code	A* mm	B* mm	C* mm	D* mm	E/R* mm	Length of each bar mm	Total length M #	Mass/metre kg %	Total mass kg %

Legends

* specified to nearest 5 mm
\# specified to nearest 10 mm
% specified to two decimal places

Prepared by	Designation	Date	Checked by	Designation	Date	Amendments

Note: This Schedule is prepared for the Contractors' guidance only. The Contractor shall be responsible for checking all dimensions of reinforcement on the Site and/or from the drawings and no claim will be allowed in respect of any inaccuracies in this Schedule.

Appendix 17　Safety and Environment Control Check List

Safety Check Record for [project name]

Date;	Location;	Type of works;
Inspected by;		Witnessed by;

No.	Item	Check Point	Findings	Response/Comment
1	Worker's gear			
	(a) Helmet	Wearing or not	Not	Need for wearing
	(b) Wear	Neat for work or not	Not	Need for wearing
	(c) Footwear	Neat for work or not	Not	Need for wearing
2	High place work Height of position H= m			
	(a) Workers	Appropriateness of skill.		
	(c) Scaffolding	Appropriateness of facility.		
	(d)Neglected materials	Spruce-up. (for fear of drop down from high place)		
3	With Heavy Machineries Work : Earth Work			
	(a) Maintenance	Implementation or not for all machines	Good	
	(b) Handling tools	Appropriateness of the materials (strength enough)	Good	
	(c)Working position	Ground stability & appropriateness of the posturing	Good	
4	Earth Work			
	(a) Inclination	Protection for erosion	Good	
	(b) Dewatering	Working conditions	Good	
	-'do -	Wiring for pumps	Good	
5	Spruce-up of site		Good	
6	Prevention measures for third party incident		Good	
7	Emergency case			
	Provision or not	Preparation of First aid kit	Not	Need to work that next week I suggest to make it
		Emergency contact network	Not	Find not ready to show emergency contact

Safety and Environment Control
Check List

DATE: 2012 MM DD

Ref. No. :

Site :

[Check List of Safety Control]

No.	Check Item	Check Point	Result	Comment
1.	Personal Protective Equipment (PPE)			
	(1) Safety helmet	Do all workers wear Safety helmet?	Good / Poor	
	(2) Working shoes	Do all workers wear appropriate Working shoes?	Good / Poor	
2.	Site Safety			
	(1) Project sign board	Is Project sign board visibly placed near the site?	Good / Poor	
	(2) Site cleaning	Is the working site cleared and tidied up?	Good / Poor	
	(3) Safety indication	Is understandable Safety indication installed in appropriate place?	Good / Poor	
	(4) Roping or Barricade	Are outsiders kept out from the working site?	Good / Poor	
3.	Traffic Safety			
	(1) Access road	Is traffic safety on the access road maintained?	Good / Poor	
	(2) Driver	Are all drivers licensed and well skilled?	Good / Poor	
	(3) Vehicle	Are all vehicles performed enough maintenance?	Good / Poor	
	(4) Safe driving	Do vehicles slowdown in neighborhood of residential area?	Good / Poor	
4.	Safety Meeting	Is a meeting held for safety awareness?	Good / Poor	
5.	Emergency Case			
	(1) First aid Kit	Is first aid kit prepared?	Good / Poor	
	(2) Emergency Network	Is emergency contact network prepared?	Good / Poor	
	(3) Communication	Is wireless system or cellular phone prepared?	Good / Poor	
6.	Cargo Truck and Dump Truck			
	(1) Driver	Is the driver licensed and well skilled?	Good / Poor	
	(2) Site Conductor	Is site conductor allocated for operator?	Good / Poor	
	(3) Loading	Is freight loaded safely?	Good / Poor	
7.	Mobile Crane			
	(1) Scaffold	Is the scaffold stable?	Good / Poor	
	(2) Outrigger	Are outriggers standing on stable scaffold?	Good / Poor	
	(3) Operator	Is the operator well skilled or licensed?	Good / Poor	
	(4) Signal man	Is site signal man allocated for operator?	Good / Poor	
8.	Excavator / Bulldozer / Breaker			
	(1) Operator	Is the operator licensed and well skilled?	Good / Poor	
	(2) Foundation	Is the foundation firm and steady?	Good / Poor	
	(3) Site conductor	Is a site conductor allocated for operator?	Good / Poor	

[Check List of Environment Protection]

No.	Check Item	Check Point	Result	Comment
1.	Dust Control	Is dust generated from construction work controlled by watering or covering?	Good / Poor	
2.	Noise and Vibration	Do noise and vibration generated from construction work not disturb surrounding dwelling environment?	Good / Poor	
3.	Biodiversity	Is deforestation in and around construction site minimized?	Good / Poor	
4.	Waste management			
	(1) Surplus soil and Construction debris	Are surplus soil and construction debris dumped in the designated area?	Good / Poor	
	(2) Solid waste	Are solid wastes such as used dunnage and other domestic wastes collected and disposed in appropriate method?	Good / Poor	
	(3) Hazardous waste	Is Hazardous waste (Toxic or Flammable) collected and disposed in appropriate method?	Good / Poor	
5.	Wastewater management			
	(1) Drainage from excavation site	Is drainage from excavation site not polluting the existing drainage, ditch, river etc.?	Good / Poor	
	(2) Domestic wastewater	Is domestic wastewater from construction site not polling the existing drainage, ditch, river etc.?	Good / Poor	

REMARKS (if any)

Contractor		Engineer	
Date	:	Date	:
Recorded by	:	Checked by	:
Name	:	Name	:
Sign	:	Sign	: