



Planning Document:

**Planning Specifications For
Contractors.**

Report N°

CDC-CG-SPC-001-17

01 November 2017

DOCUMENT INFORMATION SHEET

Title of Document : *Planning Specifications for Contractors*
Type of Document : *Planning Document*
Report Number : *CDC-CG-SPC-001-17*
Prepared by : *Duaine Moroney*
Typed by : *Duaine Moroney*
Business Unit : *IDZ Infrastructure Programme (IIP)*
Prepared for : *CDC*
Date of Issue : *01 November 2017*

Copyright

All rights reserved. No part of this document may be reproduced or distributed in any form or by any means, electronic, mechanical, photocopying or recording or otherwise, or stored in a database or retrieval system, without the prior written permission of the Coega Development Corporation (Pty) Ltd. ©

DOCUMENT CONTROL SHEET

The purpose of this form is to ensure that documents are reviewed and approved prior to issue. The form is to be bound into the front of all documents released by the CDC.

PROJECT NAME : *CDC Planning Specifications*

DOCUMENT TITLE : *Planning Specifications for Contractors*

DOCUMENT No. : *CDC-CG-SPC-001-17*

SIGNING OF THE ORIGINAL DOCUMENT

We, the undersigned, accept this document as a stable work product to be placed under formal change control as described by the Change Control Procedure document.

ORIGINAL	Prepared by	Reviewed by	Approved by
Date: 13 October 2017	Name: Duaine Moroney	Name: Hennie van der Kolf	Name: Maria van Zyl
	Signature:	Signature:	Signature:

Distribution:	CDC
----------------------	------------

REVISION CHART

REVISION 1	Name:	Name:	Name:
Date:	Signature:	Signature:	Signature:
Distribution:			

REVISION 2	Name:	Name:	Name:
Date:	Signature:	Signature:	Signature:

REVISION 3	Name:	Name:	Name:
Date:	Signature:	Signature:	Signature:

This document, and the information or advice which it contains, is provided by the Centre of Excellence Business Unit solely for the use by the Coega Development Corporation (Pty) Ltd and for reliance by its Executive Management and the Board in performance of that Business Unit's duties.

Basis Of Schedule (Planning Document)

TABLE OF CONTENTS

1.	CIDB Grading 1-3	1
1.1	Introduction	1
1.2	General.....	1
1.2.1	The Contractor shall comply with the requirements of this Attachment.....	1
1.2.2	The following templates will be provided by the Employer and shall be used for the preparation of the construction Programme and reports:	1
1.3	Planning and Construction Programme.....	1
1.3.1	Submission.....	1
1.3.2	Activities	1
1.3.3	Logic and Sequencing.....	2
1.3.4	Equipment allocation.....	3
1.3.5	Construction Programme Commodities.....	3
1.3.6	Approval of Construction Programme.....	3
1.3.7	Revisions to the Construction Programme.....	3
1.3.8	Cash Flow	4
1.4	Progress Reporting	4
1.4.1	Weekly Progress Reporting	5
1.4.2	Progress Monitoring and Corrective Action	5
1.4.3	Monthly Status Report (Planning Aspects Only).....	5
2.	CIDB Grading 4-6	7
2.1	Introduction	7
2.2	General.....	7
2.2.1	The Contractor shall comply with the requirements of this Attachment.	7
2.2.2	The following templates will be provided by the Employer and shall be used for the preparation of the construction Programme and reports:	7
2.3	Planning and Construction Programme.....	7
2.3.1	Submission.....	7
2.3.2	Logic and Sequencing.....	8
2.3.3	Man-hour allocation	9
2.3.4	Equipment allocation.....	9
2.3.5	Contractor 'S-Curve'	9
2.3.6	Construction Programme Commodities.....	10
2.3.7	Approval of Construction Programme.....	10
2.3.8	Revisions to the Construction Programme.....	10
2.3.9	Supplementary Schedules and Programmes	11

2.3.10	Cash Flow	11
2.4	Progress Reporting	11
2.4.1	Weekly Progress Reporting	11
2.4.2	Progress Monitoring and Corrective Action	12
2.4.3	Monthly Status Report (Planning Aspects Only).....	12
3.	CIDB Grading 7-9	14
3.1	Introduction	14
3.2	General	14
3.3	Planning and Construction Programme	14
3.3.1	Submission	14
3.3.2	Activities	14
3.3.3	Logic and Sequencing	15
3.3.5	Construction Programme Resources	16
3.3.6	Man-hour allocation	16
3.3.7	Equipment allocation	16
3.3.8	Contractor 'S-Curve'	16
3.3.9	Construction Programme Commodities	17
3.3.10	Approval of Construction Programme	17
3.3.11	Revisions to the Construction Programme	17
3.3.12	Supplementary Schedules and Programmes	18
3.3.13	Cash Flow	19
3.4	Progress Reporting	19
3.4.1	Fortnightly Progress Reporting	19
3.4.2	Progress Monitoring and Corrective Action	19
3.4.3	Monthly Status Report (Planning Aspects Only).....	20

1. CIDB Grading 1-3

1.1 Introduction

The Construction Programme and all associated documents as detailed in this Attachment, are an essential part of the Project control system used by the Employer's Representative in monitoring the progress of the work under the Contract. The information and data provided by the Contractor shall be reliable, accurate, timely in presentation, and in an agreed format and style that allows for ease of incorporation into the Employer's Representative's Project control system. If the contractor does not have a dedicated planner it is the responsibility of the contractor to then provide a selected individual from within their organisation which the Employer's Representative would help train in the planning field.

1.2 General

1.2.1 The Contractor shall comply with the requirements of this Attachment.

1.2.2 The following templates will be provided by the Employer and shall be used for the preparation of the construction Programme and reports:

1.2.2.1 Standard Schedule Layout

1.3 Planning and Construction Programme

1.3.1 Submission

1.3.1.1 The Construction Programme shall be a time scaled bar chart with fully continuous logic that clearly highlights the critical path(s) throughout the network.

1.3.1.2 Within the time specified in the Contract, the Contractor shall submit for the Employer's approval, a Construction Programme which represents the sequencing and methodology accepted by the Employer's Representative at the time of award and includes the milestones and key events detailed in the tender documents. The Construction Programme shall be generated using the Primavera Project Planner (P6) software package or an approved alternative and submitted in both hard copy and native (soft copy) file format.

1.3.2 Activities

1.3.2.1 The Construction Programme shall break up the work under the Contract into identifiable, structured items of work ("activities"). Each activity shall:

1.3.2.2 Be an activity of work, not a piece of equipment;

1.3.2.3 Be readily measurable for progress;

1.3.2.4 Express the logical progression of the work;

1.3.2.5 Be suitable for critical path and dependency networking;

- 1.3.2.6 Be continuous from start to finish;
- 1.3.2.7 Generally be of a single “trade” or work content;
- 1.3.2.8 The sum total of all activities shall equate the work under the Contract.

1.3.3 Logic and Sequencing

The Construction Programme shall clearly indicate the logic and sequence of activities necessary to complete the work under the Contract, including but not be limited to:

- 1.3.3.1 Duration of each activity;
- 1.3.3.2 Early start, early finish and total float of each activity;
- 1.3.3.3 Activities that lie on the critical path(s) as determined by the network;
- 1.3.3.4 Precedence relationships (logic) between activities;
- 1.3.3.5 Dates for submissions to the Employer of documents requiring review;
- 1.3.3.6 Subcontractor tendering, award and mobilisation processes;
- 1.3.3.7 Activities to be completed by others which may affect the timely completion of the Works including;
- 1.3.3.8 Issue of information, materials or equipment for use or incorporation in work;
- 1.3.3.9 Activities, dependent upon any other contractor engaged by the Employer; or
- 1.3.3.10 Review time for required documentation such as specifications, drawings, procedures and calculations.
- 1.3.3.11 Tie in activities to existing services and utilities;
- 1.3.3.12 Statutory approval dates;
- 1.3.3.13 Date for access to the Site;
- 1.3.3.14 Date for access to follow-on contractors;
- 1.3.3.15 Date for Key Events and Milestones;
- 1.3.3.16 Date for Practical Completion of the Works or each Separable Portion;
- 1.3.3.17 Manufacture and delivery durations for Contractor supplied equipment and materials, with ties to the respective installation activities, detailed into activities no longer than 2 weeks;
- 1.3.3.18 Delivery dates for Employer supplied equipment and materials, with ties to the respective installation activities, detailed into activities no longer than 2 weeks;
- 1.3.3.19 Activity durations shall be in working days, the programme calendar shall indicate public holidays, leisure days or other non-working days;

1.3.3.20 Off Site and on Site activities shall be clear and identifiable;

1.3.3.21 Calendar - the bar chart heading shall show the year, the month and the week. The bar chart shall commence on the date of Contract Award;

1.3.4 Equipment allocation

1.3.4.1 Special tools and mobile equipment shall be assigned to their respective activities

1.3.4.2 Shared equipment such as mobile equipment shall be allocated to level of effort activities within the Construction Programme.

1.3.5 Construction Programme Commodities

1.3.5.1 The Construction Programme site activities shall be loaded with applicable commodity quantities.

1.3.5.2 The Employer utilises the following commodities;

1.3.5.2.1 Concrete (m³)

1.3.5.2.2 Mechanical Equipment (t)

1.3.5.2.3 Platework (t)

1.3.5.2.4 Structural Steel (t)

1.3.5.2.5 Pipework (m) & Diameter Inch's (Inch)

1.3.5.2.6 Electrical and Communication Cables (m)

1.3.5.2.7 Electrical & Instrumentation Terminations (Qty)

1.3.6 Approval of Construction Programme

1.3.6.1 The Contractor shall submit the proposed baseline Construction Programme including a native (soft copy) copy of the programme.

1.3.6.2 Provided the Construction Programme is in accordance with this addendum A, it will be approved as the revision '0' Baseline Construction Programme. Against which the Contractors progress will be measured.

1.3.7 Revisions to the Construction Programme

1.3.7.1 The Contractor shall review the Construction Programme when any one of the following events occurs:

1.3.7.2 Progress of the work under the Contract falls significantly behind or otherwise materially departs from that shown in the Construction Programme;

1.3.7.3 A variation is issued which affects the Construction Programme;

-
- 1.3.7.4 There is a change in method of working adopted by the Contractor which affects the Construction Programme; or
- 1.3.7.5 The Employer's Representative directs that the Construction Programme be revised because in the opinion of the Employer's Representative the current Construction Programme does not reflect the actual work patterns of the Contractor.
- 1.3.7.6 If any of the events listed above occurs, the Contractor shall submit for approval, within seven (7) days of the event occurring, the revised Construction Programme. Upon approval, the revised Construction Programme will become the approved baseline for all future progress updates.
- 1.3.7.7 The Contractor shall address identified deviations from the Construction Programme by either:
- 1.3.7.8 Demonstrating that the deviation does not constitute a delay; or
- 1.3.7.9 Providing a course of action to remedy the deviation.
- 1.3.7.10 The revised Construction Programme shall clearly indicate the following:
- 1.3.7.11 The differences between the revised Construction Programme and the previously approved Construction Programme; and
- 1.3.7.12 The revision number and date of issue of the revised Construction Programme.
- 1.3.7.13 At any time additional detail may be inserted into the Construction Programme at the request of either the Contractor or Employer's Representative. In such cases, the overall start and finish dates of the detail activities shall not vary from the original summary activity(s) which were replaced.
- 1.3.7.14 All revisions to the Construction Programme shall be prepared by, and at the cost of the Contractor.
- 1.3.7.15 Supplementary Schedules and Programmes
- The Employer's Representative may at any time, and at the cost and expense of the Contractor, direct the Contractor to produce supplementary documents to highlight a particular aspect of the work under the Contract.

1.3.8 Cash Flow

The Contractor shall submit to the Employer detailed cash flow forecast charts based on the Construction Programme (and any revisions) showing the anticipated monthly cash flow as represented by expected payment claim submission, not by payments received.

1.4 Progress Reporting

The cut-off, and submission dates for monthly reports will be as required by the Employer to ensure appropriate and timely integration into the Employer's overall progress reporting systems. These dates are subject to change as per the status of the project or at the discretion of the employer.

1.4.1 Progress Reporting

- 1.4.1.1 To demonstrate the actual progress of the work under the Contract the Contractor shall, on a monthly basis, update and submit to the Employer;
- 1.4.1.2 The updated Construction Programme shall show two (2) separate bars for each activity:
 - 1.4.1.2.1 The Construction Programme "baseline" activity bar.
 - 1.4.1.2.2 The current schedule activity bar identifying the currently forecast start and finish dates of the activity.
- 1.4.1.3 Deviations from the 'baseline' Construction Programme will form the basis for assessing progress and performance. Where significant deviations from the scheduled progress are being tabled in the report, the Contractor shall provide sufficient detailed written analysis and data, to adequately demonstrate the primary areas of schedule concern with short term recovery plan.
- 1.4.1.4 Overall Schedule.

1.4.2 Progress Monitoring and Corrective Action

- 1.4.2.1 Monitoring and review of the progress of the work under the Contract shall consist of an assessment of all activities currently in progress. The following shall be determined:
 - 1.4.2.1.1 Percentage complete;
 - 1.4.2.1.2 Forecast completion date;
 - 1.4.2.1.3 Deviations from the baseline programme; and
 - 1.4.2.1.4 Actions required remedying any deviations.
- 1.4.2.2 Progress reviews may be conducted to assist control of the work under the Contract. The format, content, and structure of these reviews will be agreed between the Contractor and the Employer's Representative.

1.4.3 Monthly Status Report (Planning Aspects Only)

- 1.4.3.1 In addition to the formal monthly report, the Contractor shall provide the following.
- 1.4.3.2 The report shall include but not be limited too:
 - 1.4.3.2.1 The report shall summarise progress and problems encountered during that month in respect of all parts of the work under the Contract.

-
- 1.4.3.2.2 Progress against the approved Construction Programme;
 - 1.4.3.2.3 Deviations from the Construction Programme, and in particular, the forecast completion dates of activities which should have been completed;
 - 1.4.3.2.4 Status of approvals;
 - 1.4.3.2.5 Actual or anticipated problems with corresponding action plans to mitigate / minimise their risk or impact;
 - 1.4.3.2.6 Summary of work activities planned for the following period;
 - 1.4.3.2.7 Cash flow status versus the original forecast and;
 - 1.4.3.3 The Progress Report shall be submitted for review prior to the monthly progress meetings.

2. CIDB Grading 4-6

2.1 Introduction

The Construction Programme and all associated documents as detailed in this Attachment, are an essential part of the Project control system used by the Employer's Representative in monitoring the progress of the work under the Contract. The information and data provided by the Contractor shall be reliable, accurate, timely in presentation, and in an agreed format and style that allows for ease of incorporation into the Employer's Representative's Project control system. If the contractor does not have a dedicated planner it is the responsibility of the contractor to then provide a selected individual from within their organisation which the Employer's Representative would help train in the planning field.

2.2 General

2.2.1 The Contractor shall comply with the requirements of this Attachment.

2.2.2 The following templates will be provided by the Employer and shall be used for the preparation of the construction Programme and reports:

2.2.2.1 Standard Schedule Layout

2.2.2.2 S-Curve

2.3 Planning and Construction Programme

2.3.1 Submission

2.3.1.1 The Construction Programme shall be a time scaled bar chart with fully continuous logic that clearly highlights the critical path(s) throughout the network.

2.3.1.2 Within the time specified in the Contract, the Contractor shall submit for the Employer's approval, a Construction Programme which represents the sequencing and methodology accepted by the Employer's Representative at the time of award and includes the milestones and key events detailed in the. The Construction Programme shall be generated using the Primavera Project Planner (P6) software package or an approved alternative and submitted in both hard copy and native file format.

2.3.1.3 Activities

The Construction Programme shall break up the work under the Contract into identifiable, structured items of work ("activities"). Each activity shall:

2.3.1.4 Be an activity of work, not a piece of equipment;

2.3.1.5 Be readily measurable for progress;

2.3.1.6 Express the logical progression of the work;

- 2.3.1.7 Be suitable for critical path and dependency networking;
- 2.3.1.8 Be continuous from start to finish;
- 2.3.1.9 Generally be of a single “trade” or work content;
- 2.3.1.10 Be fully resourced; and
- 2.3.1.11 The sum total of all activities shall equate the work under the Contract.

2.3.2 Logic and Sequencing

- 2.2.1 The Construction Programme shall clearly indicate the logic and sequence of activities necessary to complete the work under the Contract, including but not be limited to:
 - 2.3.2.1 Duration of each activity;
 - 2.3.2.2 Early start, early finish and total float of each activity;
 - 2.3.2.3 Activities that lie on the critical path(s) as determined by the network;
 - 2.3.2.4 Precedence relationships (logic) between activities;
 - 2.3.2.5 Dates for submissions to the Employer of documents requiring review;
 - 2.3.2.6 Subcontractor tendering, award and mobilisation processes;
 - 2.3.2.7 Activities to be completed by others which may affect the timely completion of the Works including;
 - 2.3.2.8 Issue of information, materials or equipment for use or incorporation in work;
 - 2.3.2.9 Activities, dependent upon any other contractor engaged by the Employer; or
 - 2.3.2.10 Review time for required documentation such as specifications, drawings, procedures and calculations.
 - 2.3.2.11 Tie in activities to existing services and utilities;
 - 2.3.2.12 Statutory approval dates;
 - 2.3.2.13 Date for access to the Site;
 - 2.3.2.14 Date for access to follow-on contractors;
 - 2.3.2.15 Date for Key Events and Milestones;
 - 2.3.2.16 Date for Practical Completion of the Works or each Separable Portion;
 - 2.3.2.17 Manufacture and delivery durations for Contractor supplied equipment and materials, with ties to the respective installation activities
 - 2.3.2.18 Delivery dates for Employer supplied equipment and materials, with ties to the respective installation activities

- 2.3.2.19 Activity durations shall be in working days, the programme calendar shall indicate public holidays, leisure days or other non-working days;
- 2.3.2.20 Off Site and on Site activities shall be clear and identifiable;
- 2.3.2.21 Calendar - the bar chart heading shall show the year, the month and the week. The bar chart shall commence on the date of Contract Award;

2.3.3 Man-hour allocation

- 2.3.3.1 Scheduled Direct Labour Hours – Per Activity.

For each appropriate activity in the Construction Programme, the Contractor shall allocate the associated direct labour hours.

- 2.3.3.2 Direct Labour Hours – Total.

The total of the direct labour hours per week shall be calculated after activities have been resource levelled.

- 2.3.3.3 Direct Labour Workforce Histogram

The site workforce (direct labour only) scheduled per week shall be calculated from the direct labour hours and a histogram plotted.

2.3.4 Equipment allocation

- 2.3.4.1 Special tools and mobile equipment shall be assigned to their respective activities
- 2.3.4.2 Shared equipment such as mobile equipment shall be allocated to level of effort activities within the Construction Programme.

2.3.5 Contractor 'S-Curve'

- 2.3.5.1 The Contractor shall submit progress S-Curves for the overall Contract
- 2.3.5.2 The S-Curves shall be based upon the distribution of man-hours where attainable from within the approved Construction Programme.
- 2.3.5.3 The S-Curves shall be presented using the approved templates provided by the Employer.
- 2.3.5.4 To generate the overall Contract S-Curve each of the phases shall be weighted according to the monetary value of the phase.
- 2.3.5.5 The reporting of progress for each component shall be in the form of earned value (EV), which is the physical percent progress of the component of the work.

2.3.6 Construction Programme Commodities

The Construction Programme site activities shall be loaded with applicable commodity quantities. Offsite fabrication of structural steel, plate work and spooling of pipework shall also be reported.

2.3.6.1 The Employer utilises the following commodities;

2.3.6.1.1 Concrete (m³)

2.3.6.1.2 Mechanical Equipment (t)

2.3.6.1.3 Plate work (t)

2.3.6.1.4 Structural Steel (t)

2.3.6.1.5 Pipework (m) & Diameter Inch's (Inch)

2.3.6.1.6 Electrical and Communication Cables (m)

2.3.6.1.7 Electrical & Instrumentation Terminations (Qty)

2.3.6.2 Commodity Curves shall be presented in the same format as the S-Curves.

2.3.7 Approval of Construction Programme

2.3.7.1 The Contractor shall submit the proposed baseline Construction Programme including a native copy of the programme.

2.3.7.2 Provided the Construction Programme is in accordance with this addendum A, it will be approved as the revision '0' Baseline Construction Programme. Against which the Contractors progress will be measured.

2.3.8 Revisions to the Construction Programme

2.3.8.1 The Contractor shall review the Construction Programme when any one of the following events occurs:

2.3.8.2 Progress of the work under the Contract falls significantly behind or otherwise materially departs from that shown in the Construction Programme;

2.3.8.3 A variation is issued which affects the Construction Programme;

2.3.8.4 There is a change in method of working adopted by the Contractor which affects the Construction Programme; or

2.3.8.5 The Employer's Representative directs that the Construction Programme be revised because in the opinion of the Employer's Representative the current Construction Programme does not reflect the actual work patterns of the Contractor.

-
- 2.3.8.6 If any of the events listed above occurs, the Contractor shall submit for approval, within seven (7) days of the event occurring, the revised Construction Programme. Upon approval, the revised Construction Programme will become the approved baseline for all future progress updates.
- 2.3.8.7 The Contractor shall address identified deviations from the Construction Programme by either:
- 2.3.8.8 Demonstrating that the deviation does not constitute a delay; or
- 2.3.8.9 Providing a course of action to remedy the deviation.
- 2.3.8.10 The revised Construction Programme shall clearly indicate the following:
- 2.3.8.10.1 The differences between the revised Construction Programme and the previously approved Construction Programme; and
- 2.3.8.10.2 The revision number and date of issue of the revised Construction Programme.
- 2.3.8.11 The revised Construction Programme shall be accompanied by a revised S-Curve
- 2.3.8.12 At any time additional detail may be inserted into the Construction Programme at the request of either the Contractor or Employer's Representative. In such cases, the overall start and finish dates of the detail activities shall not vary from the original summary activity(s) which were replaced.
- 2.3.8.13 All revisions to the Construction Programme shall be prepared by, and at the cost of the Contractor.

2.3.9 Supplementary Schedules and Programmes

The Employer's Representative may at any time, and at the cost and expense of the Contractor, direct the Contractor to produce supplementary documents to highlight a particular aspect of the work under the Contract.

2.3.10 Cash Flow

The Contractor shall submit to the Employer detailed cash flow forecast charts based on the Construction Programme (and any revisions) showing the anticipated monthly cash flow as represented by expected payment claim submission, not by payments received.

2.4 Progress Reporting

The cut-off, and submission dates for monthly reports will be as required by the Employer to ensure appropriate and timely integration into the Employer's overall progress reporting systems. These dates are subject to change as per the status of the project or at the discretion of the employer.

2.4.1 Progress Reporting

- 2.4.1.1 To demonstrate the actual progress of the work under the Contract the Contractor shall, on a monthly basis, update and submit to the Employer;
- 2.4.1.2 The updated Construction Programme shall show two (2) separate bars for each activity:
 - 2.4.1.2.1 The Construction Programme “baseline” activity bar.
 - 2.4.1.2.2 The current schedule activity bar identifying the currently forecast start and finish dates of the activity.
- 2.4.1.3 The progress ‘S-Curves’;
- 2.4.1.4 Deviations from the ‘baseline’ Construction Programme together with the ‘S-Curves’ will form the basis for assessing progress and performance. Where significant deviations from the scheduled progress are being tabled in the report, the Contractor shall provide sufficient detailed written analysis and data, to adequately demonstrate the primary areas of schedule concern with short term recovery plan.
- 2.4.1.5 Overall Schedule.
- 2.4.1.6 2 week look ahead Schedule.

2.4.2 Progress Monitoring and Corrective Action

- 2.4.2.1 Monitoring and review of the progress of the work under the Contract shall consist of an assessment of all activities currently in progress. The following shall be determined:
 - 2.4.2.1.1 Percentage complete;
 - 2.4.2.1.2 Forecast completion date;
 - 2.4.2.1.3 Deviations from the baseline programme; and
 - 2.4.2.1.4 Actions required remedying any deviations.
- 2.4.2.2 Weekly progress reviews may be conducted to assist control of the work under the Contract. The format, content, and structure of these reviews will be agreed between the Contractor and the Employer’s Representative. The Contractor’s Weekly Progress Report will be used as the discussion tool for the weekly progress meeting.

2.4.3 Monthly Status Report (Planning Aspects Only)

- 2.4.3.1 In addition to the formal monthly report, the Contractor shall provide the following.
- 2.4.3.2 The report shall include but not be limited too:
- 2.4.3.3 The report shall summarise progress and problems encountered during that month in respect of all parts of the work under the Contract.

-
- 2.4.3.4 Progress against the approved Construction Programme;
 - 2.4.3.5 Summary of progress achieved during the period using progress 'S-Curves';
 - 2.4.3.6 List of milestones achieved during the period;
 - 2.4.3.7 Status of design, procurement, off-site works, and construction;
 - 2.4.3.8 Deviations from the Construction Programme, and in particular, the forecast completion dates of activities which should have been completed;
 - 2.4.3.9 Status of approvals;
 - 2.4.3.10 Actual or anticipated problems with corresponding action plans to mitigate / minimise their risk or impact;
 - 2.4.3.11 Summary of work activities planned for the following period;
 - 2.4.3.12 Cash flow status versus the original forecast;
 - 2.4.3.13 The Progress Report shall be submitted for review prior to the monthly progress meetings.

3. CIDB Grading 7-9

3.1 Introduction

The Construction Programme and all associated documents as detailed in this Attachment, are an essential part of the Project control system used by the Employer's Representative in monitoring the progress of the work under the Contract. The information and data provided by the Contractor shall be reliable, accurate, timely in presentation, and in an agreed format and style that allows for ease of incorporation into the Employer's Representative's Project control system.

3.2 General

- 3.2.1 The Contractor shall comply with the requirements of this Attachment.
- 3.2.2 The following templates will be provided by the Employer and shall be used for the preparation of the construction Programme and reports:
- 3.2.3 Standard Schedule Layout
- 3.2.4 S-Curve

3.3 Planning and Construction Programme

3.3.1 Submission

- 3.3.1.1 The Construction Programme shall be a time scaled bar chart with fully continuous logic that clearly highlights the critical path(s) throughout the network.
- 3.3.1.2 Within the time specified in the Contract, the Contractor shall submit for the Employer's approval, a Construction Programme which represents the sequencing and methodology accepted by the Employer's Representative at the time of award and includes the milestones and key events detailed in the. The Construction Programme shall be generated using the Primavera Project Planner (P6) software package or an approved alternative and submitted in both hard copy and native file format.

3.3.2 Activities

The Construction Programme shall break up the work under the Contract into identifiable, structured items of work ("activities"). Each activity shall:

- 3.3.2.1 Be at level 4;
- 3.3.2.2 Be an activity of work, not a piece of equipment;
- 3.3.2.3 Be readily measurable for progress;
- 3.3.2.4 Express the logical progression of the work;

- 3.3.2.5 Be suitable for critical path and dependency networking;
- 3.3.2.6 Be continuous from start to finish;
- 3.3.2.7 Be located in a single geographical area;
- 3.3.2.8 Generally be of a single “trade” or work content;
- 3.3.2.9 Be compatible with quality assurance plans;
- 3.3.2.10 Be fully resourced; and
- 3.3.2.11 Be capable of producing commodity based reports
- 3.3.2.12 The sum total of all activities shall equate the work under the Contract.

3.3.3 Logic and Sequencing

- 3.3.3.1 The Construction Programme shall clearly indicate the logic and sequence of activities necessary to complete the work under the Contract, including but not be limited to:
 - 3.3.3.1.1 Duration of each activity;
 - 3.3.3.1.2 Early start, early finish and total float of each activity;
 - 3.3.3.1.3 Activities that lie on the critical path(s) as determined by the network;
 - 3.3.3.1.4 Precedence relationships (logic) between activities;
 - 3.3.3.1.5 Subcontractor tendering, award and mobilisation processes;
 - 3.3.3.1.6 Activities to be completed by others which may affect the timely completion of the Works including;
 - 3.3.3.1.7 Activities, dependent upon any other contractor engaged by the Employer; or
 - 3.3.3.1.8 Review time for required documentation such as specifications, drawings, procedures and calculations.
- 3.3.3.2 Tie in activities to existing services and utilities;
- 3.3.3.3 Statutory approval dates;
- 3.3.3.4 Date for access to the Site;
- 3.3.3.5 Date for access to follow-on contractors;
- 3.3.3.6 Date for Key Events and Milestones;
- 3.3.3.7 Date for Practical Completion of the Works or each Separable Portion;
- 3.3.3.8 Manufacture and delivery durations for Contractor supplied equipment and materials, with ties to the respective installation activities;

- 3.3.3.9 Activity durations shall be in working days, the programme calendar shall indicate public holidays, leisure days or other non-working days;
- 3.3.3.10 Off Site and on Site activities shall be clear and identifiable;
- 3.3.3.11 Calendar - the bar chart heading shall show the year, the month and the week. The bar chart shall commence on the date of Contract Award;

3.3.4 Construction Programme Resources

- 3.3.4.1 The Contractor shall submit histograms showing the direct labour required to complete the work under the Contract based on the approved Construction Programme.
- 3.3.4.2 The histograms shall be prepared from the schedule.
- 3.3.4.3 Equipment requirements / utilisation bar charts shall be submitted to the Employer for all Site plant and mobile equipment required to complete the work under the Contract.

3.3.5 Man-hour allocation

- 3.3.5.1 Scheduled Direct Labour Hours – Per Activity.
- 3.3.5.2 For each appropriate activity in the Construction Programme, the Contractor shall allocate the associated direct labour hours.
- 3.3.5.3 Direct Labour Hours – Total.
- 3.3.5.4 The total of the direct labour hours per week shall be calculated after activities have been resource levelled.
- 3.3.5.5 Direct Labour Workforce Histogram
- 3.3.5.6 The site workforce (direct labour only) scheduled per week shall be calculated from the direct labour hours and a histogram plotted.

3.3.6 Equipment allocation

- 3.3.6.1 Special tools and mobile equipment shall be assigned to their respective activities
- 3.3.6.2 Shared equipment such as mobile equipment shall be allocated to level of effort activities within the Construction Programme.

3.3.7 Contractor 'S-Curve'

- 3.3.7.1 The Contractor shall submit progress S-Curves for the overall Contract and each of the phases of the Contract.
- 3.3.7.2 The S-Curves shall be based upon the distribution of man-hours where attainable from within the approved Construction Programme.

- 3.3.7.3 The S-Curves shall be presented using the approved templates provided by the Employer.
- 3.3.7.4 To generate the overall Contract S-Curve each of the phases shall be weighted according to the dollar value of the phase.
- 3.3.7.5 All S-Curves shall be developed using the 'Earned Value Method'. This method applies a weighted value (WV) to all measurable components of the Works.
- 3.3.7.6 The reporting of progress for each component shall be in the form of earned value (EV), which is the physical percent progress of the component of the work.

3.3.8 Construction Programme Commodities

- 3.3.8.1 The Construction Programme site activities shall be loaded with applicable commodity quantities. Commodity curves shall be produced for forecast installation and actual installation quantities from this data. Offsite fabrication of structural steel, platework and spooling of pipework shall also be reported.
- 3.3.8.2 The Employer utilises the following commodities;
 - 3.3.8.2.1 Concrete (m³)
 - 3.3.8.2.2 Mechanical Equipment (t)
 - 3.3.8.2.3 Plate work (t)
 - 3.3.8.2.4 Structural Steel (t)
 - 3.3.8.2.5 Pipework (m) & Diameter Inch's (Inch)
 - 3.3.8.2.6 Electrical and Communication Cables (m)
 - 3.3.8.2.7 Electrical & Instrumentation Terminations (Qty)
- 3.3.8.3 Commodity Curves shall be presented in the same format as the S-Curves.

3.3.9 Approval of Construction Programme

- 3.3.9.1 The Contractor shall submit the proposed baseline Construction Programme including a native copy of the programme.
- 3.3.9.2 Provided the Construction Programme is in accordance with this Attachment 10, it will be approved as the revision '0' Baseline Construction Programme. Against which the Contractors progress will be measured.

3.3.10 Revisions to the Construction Programme

- 3.3.10.1 The Contractor shall review the Construction Programme when any one of the following events occurs:

-
- 3.3.10.2 Progress of the work under the Contract falls significantly behind or otherwise materially departs from that shown in the Construction Programme;
- 3.3.10.3 A variation is issued which affects the Construction Programme;
- 3.3.10.4 There is a change in method of working adopted by the Contractor which affects the Construction Programme; or
- 3.3.10.5 The Employer's Representative directs that the Construction Programme be revised because in the opinion of the Employer's Representative the current Construction Programme does not reflect the actual work patterns of the Contractor.
- 3.3.10.6 If any of the events listed above occurs, the Contractor shall submit for approval, within seven (7) days of the event occurring, the revised Construction Programme. Upon approval, the revised Construction Programme will become the approved baseline for all future progress updates.
- 3.3.10.7 The Contractor shall address identified deviations from the Construction Programme by either:
- 3.3.10.8 Demonstrating that the deviation does not constitute a delay; or
- 3.3.10.9 Providing a course of action to remedy the deviation.
- 3.3.10.10 The revised Construction Programme shall clearly indicate the following:
- 3.3.10.11 The differences between the revised Construction Programme and the previously approved Construction Programme; and
- 3.3.10.12 The revision number and date of issue of the revised Construction Programme.
- 3.3.10.13 The revised Construction Programme shall be accompanied by a revised manning histogram and S-Curve with an additional data line called 'reforecast planned progress'.
- 3.3.10.14 At any time additional detail may be inserted into the Construction Programme at the request of either the Contractor or Employer's Representative. In such cases, the overall start and finish dates of the detail activities shall not vary from the original summary activity(s) which were replaced.
- 3.3.10.15 All revisions to the Construction Programme shall be prepared by, and at the cost of the Contractor.

3.3.11 Supplementary Schedules and Programmes

The Employer's Representative may at any time, and at the cost and expense of the Contractor, direct the Contractor to produce supplementary documents to highlight a particular aspect of the work under the Contract.

3.3.12 Cash Flow

The Contractor shall submit to the Employer detailed cash flow forecast charts based on the Construction Programme (and any revisions) showing the anticipated monthly cash flow as represented by expected payment claim submission, not by payments received.

3.4 Progress Reporting

The cut-off, and submission dates for monthly reports will be as required by the Employer to ensure appropriate and timely integration into the Employer's overall progress reporting systems. These dates are subject to change as per the status of the project or at the discretion of the employer.

3.4.1 Progress Reporting

- 3.4.1.1 To demonstrate the actual progress of the work under the Contract the Contractor shall, on a monthly basis, update and submit to the Employer;
- 3.4.1.2 The updated Construction Programme shall show two (2) separate bars for each activity:
 - 3.4.1.2.1 The Construction Programme "baseline" activity bar.
 - 3.4.1.2.2 The current schedule activity bar identifying the currently forecast start and finish dates of the activity.
- 3.4.1.3 The progress 'S-Curves';
- 3.4.1.4 Direct Manning Histograms;
- 3.4.1.5 Deviations from the 'baseline' Construction Programme together with the 'S-Curves' will form the basis for assessing progress and performance. Where significant deviations from the scheduled progress are being tabled in the report, the Contractor shall provide sufficient detailed written analysis and data, to adequately demonstrate the primary areas of schedule concern with short term recovery plan.
- 3.4.1.6 Overall Schedule.
- 3.4.1.7 2 week look ahead Schedule.

3.4.2 Progress Monitoring and Corrective Action

- 3.4.2.1 Monitoring and review of the progress of the work under the Contract shall consist of an assessment of all activities currently in progress. The following shall be determined:
 - 3.4.2.1.1 Percentage complete;
 - 3.4.2.1.2 Forecast completion date;
 - 3.4.2.1.3 Manning histograms showing actual and forecast versus baseline figures;

- 3.4.2.1.4 Deviations from the baseline programme; and
- 3.4.2.1.5 Actions required remedying any deviations.
- 3.4.2.2 Progress reviews shall be conducted to assist control of the work under the Contract. The format, content, and structure of these reviews will be agreed between the Contractor and the Employer's Representative. The Contractor's Progress Report will be used as the discussion tool for the progress meeting.

3.4.3 Monthly Status Report (Planning Aspects Only)

- 3.4.3.1 In addition to the formal monthly report, the Contractor shall provide the following.
- 3.4.3.2 The report shall include but not be limited too:
 - 3.4.3.2.1 The report shall summarise progress and problems encountered during that month in respect of all parts of the work under the Contract.
 - 3.4.3.2.2 Progress against the approved Construction Programme;
 - 3.4.3.2.3 Summary of progress achieved during the period using progress 'S-Curves' for each of the PCS elements;
 - 3.4.3.2.4 List of milestones achieved during the period;
 - 3.4.3.2.5 Status of construction;
 - 3.4.3.2.6 Deviations from the Construction Programme, and in particular, the forecast completion dates of activities which should have been completed;
 - 3.4.3.2.7 Actual or anticipated problems with corresponding action plans to mitigate / minimise their risk or impact;
 - 3.4.3.2.8 Summary of work activities planned for the following period;
 - 3.4.3.2.9 Cash flow status versus the original forecast;
- 3.4.3.3 The Progress Report shall be submitted for review prior to the monthly progress meetings.