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1.0 PURPOSE

The purpose of this procedure is to define the requirements for the planning and scheduling activity on projects. The objective is to develop plans and schedules and then to monitor, analyse, report and forecast performance in such a manner that projects are delivered on or ahead of schedule. This objective will be achieved if:

- Planners/schedulers fully understand the scope of the project and are pro-active both in interpreting the Clients requirements and producing project schedules.
- The project team effectively 'buys-in' and owns the project schedule.
- Planning and scheduling information and documentation is produced which can be effectively utilised by project team members.
- The schedule is pro-actively analysed & reviewed to identify any potential restraints to progress. Any restraints identified being reviewed with all appropriate project team members, including the Project Manager.
- Any Specific project requirements should be identified and included in the Project Quality Plan
- The objectives of the Global / Regional / Industry / Quality Systems are met

The Planning Manager is responsible for allocating planning resources, planning departmental budgetary control and maintenance of the quality procedures.

2.0 SCOPE

This procedure is applicable to all planning and scheduling activities from project kick-off to project closure. These activities include schedule generation and subsequent maintenance, progress measurement and reporting and resource planning. This will necessitate the incorporation of information provided by sub-contractors, vendors and construction contractors.

3.0 DEFINITIONS

Planning	The breakdown of work into its component events, and the sequencing, resourcing and strategy of those events.
Scheduling	Detailed assignment of logic, durations & start/finish dates to project activities, within the overall plan.
Schedule/Programme	Pictorial or tabular representation of the time phased events or activities required to execute the project. May be based on a critical path network (CPN).
Critical Path Network (CPN)	A representation of activities and/or events with their inter-relationships and dependencies.
Milestone	An event selected for its importance in the project and/or activity/deliverable.
Precedence Network	A network diagram in which the nodes symbolise the project activities.
Productivity/Efficiency	Ratio of hours earned versus hours expended.

Spent/Burnt	Actual hours expended on project activities, up to the report date.
Earned Hours	Performance Budget work-hours x % complete.
Performance Measurement Baselines	The original project quality, HSE, budget & contract duration objectives set by Management at Commencement.
Change Process	The formal system by which key parameters of cost, scope and schedule are changed
PBS	Project Breakdown Structures – defines an hierarchical structure by which the work is to be done - can include structures for Work, Cost, Contract, Organisation, Risk, Resources etc

4.0 METHOD

4.1 SCHEDULING REQUIREMENTS AND RESPONSIBILITIES

Every project shall have a plan and/or a schedule which will be prepared by the Project Planner/Scheduler in co-ordination with the Project Manager, Construction Manager, Contracts Administrator and Discipline Leads. For minor projects, engineering studies, etc. the Project Manager may elect to prepare the schedule. Milestone schedules shall be sufficient for small projects.

Plans and schedules will be updated and issued at a minimum of monthly intervals and more frequently if deemed necessary by the Client or the Project Manager.

The recommended information that a schedule should contain is:

- Activity number and description
- Original base line target start and finish dates
- Current planned start and finish dates
- Actual start and finish dates
- % complete
- Forecast start and finish dates

Critical activities must be identified. Detailed schedules should be developed on a rolling wave principle.

All planning deliverables will contain a signature block and be approved for project use by the Project Planner/Scheduler, Discipline Leads, Construction Manager, Project Controls Manager, Project Manager, and by the Client (where appropriate).

It is the responsibility of the Project Planner/Scheduler to make the project team aware of the key milestones. The Project Planner/Scheduler must inform the Project Manager of all scheduling problems or potential problems. It is the Project Manager's responsibility to hold the project team accountable for making the necessary recoveries and meeting all further milestones, thus ensuring successful project completion.

The Project Planner/Scheduler shall utilise the recent project experience of other planners & departments as well as the cost & schedule department databases for planning norms.

The Company standard for computer-assisted planning/scheduling systems is Primavera P5. Other computer systems may be used as appropriate, but only with the prior approval of the Project Controls Manager. Precedence network techniques are preferred but not mandatory.

The Company maintains a number of schedule & resource templates which can be utilised for projects. Specific Company layout, resource and activity coding is set out within these templates and the P5 User Manual.

The project shall be structured to enable the collection of progress and work-hour expenditure such that roll up from detailed levels to higher summary levels is possible.

Occasionally the schedule basis should be recorded.

Occasionally a schedule duration risk analysis is required to be undertaken on projects at Key Gate Stages. Planners should refer to the Planning Manager when utilising the Risk Analysis Tool (Pertmaster).

4.2 PROGRESS MEASUREMENT

The Planner/Scheduler is responsible for ensuring that the various progress measurements used throughout the project are a fair representation of the actual project progress. As a minimum, the following should be provided:

Studies/Engineering/ Design	Actual % complete vs scheduled % complete. Work-hours expended vs budget work-hours. Productivity. Forecast work-hours at completion.
Procurement	Schedule of planned, actual and forecast order and delivery dates, summary of enquiry/PO packages issued.
Contracts	Schedule of tender compilation and issue, tendering period, tender return, tender evaluation, award and completion dates for each construction contract package.
Construction	Actual % complete vs scheduled % complete.
Validation (Pharma)	No. of Docs identified v currently approved
Start-up/ Commissioning	No. of systems accepted vs total number of systems

4.3 RESOURCE PLANNING

The Planner/Scheduler is also responsible for providing information to assist with the management of resources required to execute the work. These tasks include, but are not limited to:

- At the earliest possible stage, using the best available data, by assessing the Scope of Services and material quantities to provide management with an overall resource overview of the project.
- From the project approved budgets assess the quantities of major resources required, issue discipline resource manpower requirement to Project Manager and Lead Discipline Engineers and determine if the supply may be a limiting factor.
- Where limitations occur pro-actively identify resolution by:
 - co-ordinating and re-sequencing activities
 - providing sufficient warning so that resources can be obtained
 - Recommend other actions such as work sharing, sub-contracting, etc.

- Provide and update forecasts of discipline manpower requirement and other facilities

4.4 DESIGN SUB-CONTRACTORS, VENDORS AND CONSTRUCTION CONTRACTORS

Whenever major portions of the engineering, procurement, construction, or start-up are performed by the Client or others, the Planner/Scheduler must co-ordinate the planning and scheduling effort and ensures it satisfies the master project schedule. The following approach shall be used:

- Seek and obtain details of Client schedule requirements (e.g. shutdown windows) and incorporate into the master schedule.
- Establish an IT environment in which schedule data can be shared & efficiently managed between parties
- Review the Purchase Order and Sub Contract Planning & Scheduling detailed requirements or co-ordination procedures
- Issue the necessary schedules to the Vendors and Sub-contractors showing the required key start and finish dates. Critical and interface activities must be highlighted.
- Request comments and receive Vendors' and Sub-contractors' proposed schedules in the format that is required, along with other documentation required to support and monitor the schedule i.e. work-hour histograms, Progress 'S' curves, productivity tabulations, etc.
- Review these schedules with the project team to enable subsequent review and agreement with the Vendor/Sub-contractor. When accepted by the Vendor/Sub-contractor, incorporate into the master schedule.
- Ensure that reported progress meets the requirements of the project and that sufficient time is given to analysing the data to highlight variances and propose corrective actions as necessary.

4.5 INTERACTIVE PLANNING

At various stages in each project, interactive planning sessions may be held with the Client and the Project team (including, where relevant, sub-contractors, vendors and construction contractors) with the intention of obtaining buy-in to the agreed schedule by all parties. This is designed to facilitate the production of an integrated project schedule which highlights the key constraints and major issues which impact successful execution. Alignment with key execution strategies is essential. The main tool is a time phased wall mounted bar chart which should be readily accessible to all parties involved in the project and can form the basis of the detailed schedules as well as recording key risks, assumptions and opportunities.

4.6 TYPES OF SCHEDULE

The Planner/Scheduler must produce documents that help co-ordinate, inform and optimise the schedule of a project. This can only be achieved if such documents are well thought out, agreed with the Project Manager and Discipline Leads and issued in a timely fashion.

Each project should be examined and, along with the Project Manager, a determination made as to which types of schedules will be appropriate. The schedules to be utilised shall be stated in the Project Procedures.

Upon receipt of instructions to proceed with the project, and prior to the first issue of the agreed Project Schedule, the project will be controlled with advanced 30 day or 60 day

project initiation action list / Start Up Schedule to ensure that early activities are identified and acted upon to protect the overall schedule.

The following types of schedules have been categorised for convenience, refer to **Attachment 6.1**.

4.7 LEVEL 1 - MAJOR MILESTONE SCHEDULES

Purpose	Generally used to summarise the overall project performance for project management and client information purposes.
Typical Applications	Proposals, at the planning stages of a major project, small studies, engineering projects with a low level of complexity, few activities and short duration, as a monthly summary of Level II and III schedules.
Contents	Schedule shall identify contract milestones, significant engineering, procurement, construction and operations milestones, other significant milestones and/or constraints. Normally restricted to one bar per discipline.
Layout/Format	Refer to Attachment 6.2 for typical.
Timing/Frequency	Updated and issued monthly within five working days of the close-out date.

4.8 LEVEL II - INTERMEDIATE MILESTONE SCHEDULES

Purpose	To inform groups of major constraints, due dates, manning levels, progress achievement, etc. and the critical path.
Typical Applications	Major proposals and studies, engineering projects with a medium level of complexity, small construction projects, contract payment milestones.
Contents	<p>Schedule will be a further breakdown of Level 1 reflecting major activities for each phase i.e. engineering, procurement, construction and commissioning.</p> <p>Manpower histogram will indicate each phase manning requirement.</p> <p>Progress 'S' Curve for each phase will indicate schedule % complete and actual % complete.</p>
Layout/Format	<p>Schedule will be a bar chart or logic network with critical path identified, refer to Attachment 6.3.</p> <p>Manpower histogram will indicate schedule manning levels vs actual manning levels for each phase, refer to Attachment 6.4 for typical.</p> <p>Typical Progress 'S' curves are shown on Attachment 6.5.</p>
Timing/Frequency	Updated and issued at least monthly, within five working days of the close-out date.

4.9 LEVEL III - DETAILED WORK SCHEDULES

Purpose	To inform all disciplines as to the status and progress of individual work packages, and of critical path issues.
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Typical Applications	On all complex engineering-only projects and all EPC projects. Also on smaller projects where elements of the schedule are extremely critical and, hence, need to be managed at this level.
Contents	Schedule detailed into controllable and identifiable work activities which can be “rolled-up” to Level II. The schedule should identify key issue activities for deliverable types. The schedule will normally be generated from precedence logic network with critical path identified, refer to Attachment 6.6 as typical which also includes a schedule risk analysis example.
Layout/Format	<p>‘S’ Curves will be generated (per discipline) to monitor scheduled vs actual progress.</p> <p>Manpower histograms will be produced to identify individual discipline manning requirements.</p> <p>Summary WBS Report - Document will be produced to provide an overview of the project status. It will contain original work-hour budget, unapproved change notices, approved change notices, current budget, work-hours expended, % achieved, productivity achieved, productivity to go, forecast work-hours to complete and forecast work-hours at completion, refer to Attachment 6.7 as typical of DD&E and Site Reports.</p> <p>Display summary information on project notice board</p>
Typical Analysis	<p>Typically at this level the schedule should be analysed for the top 5 critical paths and the current critical activities highlighted to the team. The logic and durations within these critical paths should be continually addressed to ensure schedule robustness.</p> <p>Forecast man hours / productivity to go and resourcing levels should be analysed for consistency</p> <p>Trend analysis on key parameters e.g. Material deliveries to site, pipe work productivity, schedule float usage etc</p>
Timing/Frequency	Update continually. To be issued monthly by the 5th working day after the close-out date.

4.10 LEVEL IV - SCHEDULING STUDIES/LOOK-AHEADS ETC

Purpose	To finitely manage aspects of the master schedule. To keep the discipline leads and field personnel informed of upcoming tasks.
Typical Application	On any project that has special scheduling needs defined by the Project Controls Manager in the Project Procedures. Every construction project that involves direct control of the labour.
Contents	Scheduling of individual deliverables, drawings, data sheets, specifications, line lists, requisitions, purchase orders, materials, process systems, RoS / Forecast On Site Delivery Dates etc. within the Level III activities etc. that may be necessary to properly manage the project. This activity should be done by the individual disciplines.
Layout/Format	As per the project needs. Two week look-ahead's for field activities. Display summary information on project notice boards

Timing/Frequency	As required. Two week look-ahead's are rolling every week and issued at least two working days before the first week and should be reviewed at the progress meeting as to their viability.
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An example of an effectively targeted overall 2 + 2 report is shown in **Attachment 6.8** which also forms the basis of the agenda and minutes of a progress meeting

5.0 AUDITS / RECORDS

It is expected that, as part of the Quality System to maintain ISO accreditation, project will be audited against this procedure on an annual basis. Non – conformance raised will be closed out by the project planner & planning manager. The planning manager may require specific audits more frequently.

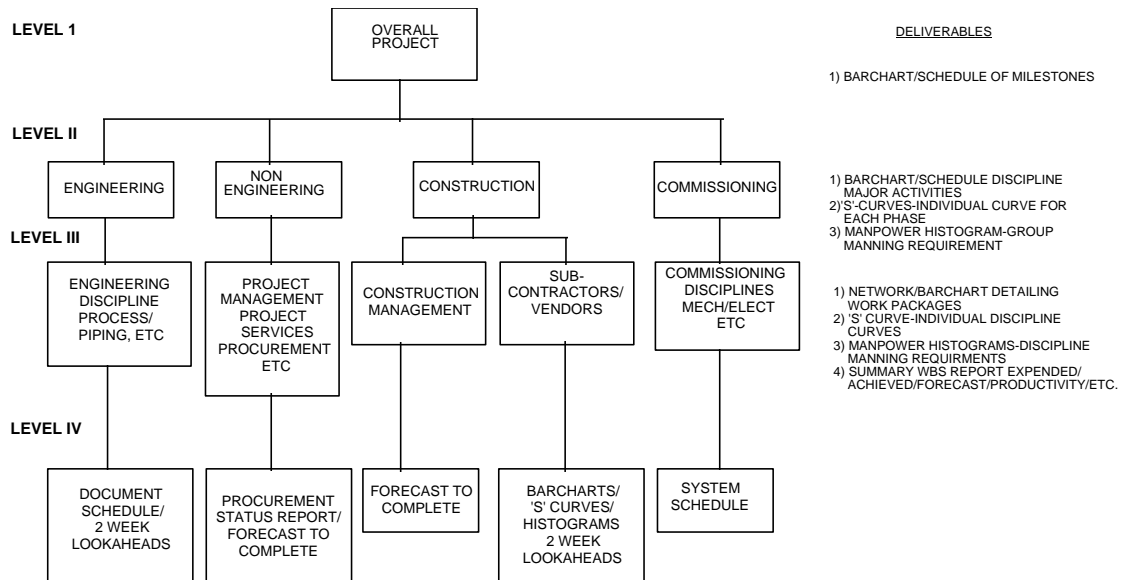
The project detailed schedule is a quality record. Baseline data, schedule updates, key changes to scope and methodology should all be recorded and kept within the filing and document record system for subsequent contract requirements, post project close out & reporting. The Project Close Out procedure requires an analysis of the key project parameters for subsequent use on further projects and cost & schedule database upkeep of metrics & benchmark data.

6.0 ATTACHMENTS

See 'Table of Contents'.

ATTACHMENT 6.1

HIERARCHY OF SCHEDULE DELIVERABLES



TYPICAL LEVEL I SCHEDULE

Dublin Waste to Energy Facility

Project Name: Dublin Waste to Energy Facility
 Project Manager: [Name]
 Project Start: 2019-01-01
 Project End: 2019-12-31

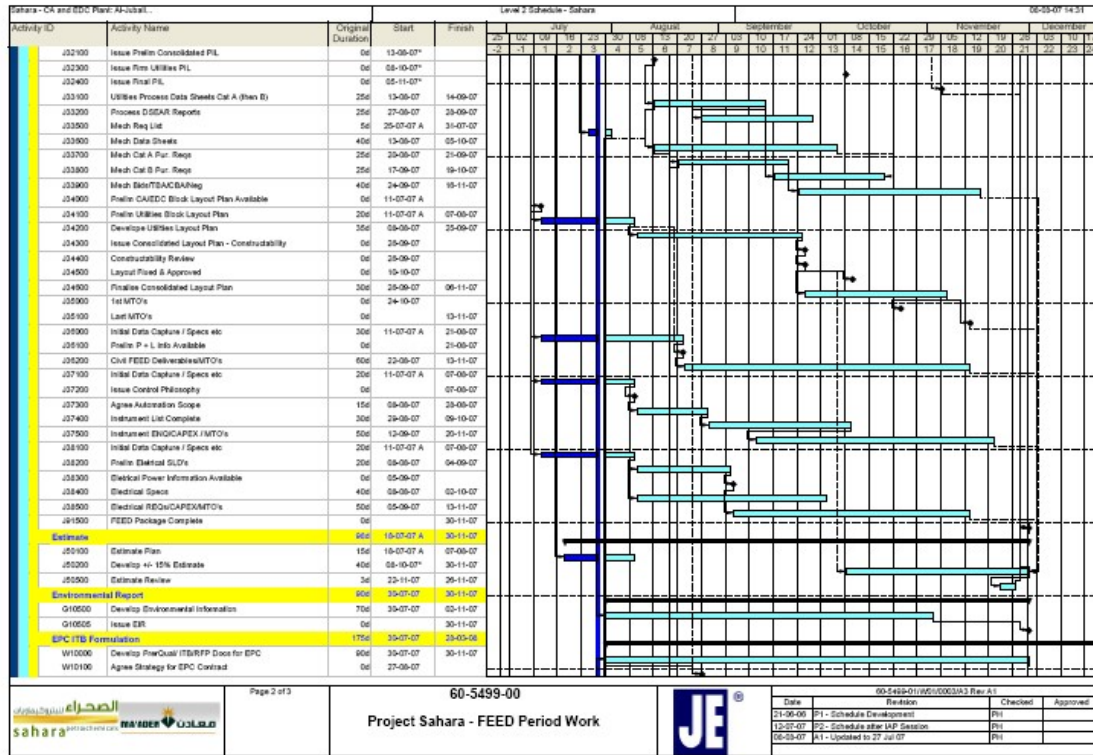
Summary

Task ID	Task Name	Start Date	End Date	Duration (Days)	Actual Level of Effort	Remaining Level of Effort	Actual Work	Remaining Work	Critical Remaining Work
1	Overall Project	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
2	Design & Construction	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
3	Design	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
4	Construction	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
5	Design & Construction	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
6	Design	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
7	Construction	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
8	Design & Construction	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
9	Design	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
10	Construction	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
11	Design & Construction	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
12	Design	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
13	Construction	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
14	Design & Construction	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
15	Design	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
16	Construction	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
17	Design & Construction	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
18	Design	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
19	Construction	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
20	Design & Construction	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
21	Design	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
22	Construction	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
23	Design & Construction	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
24	Design	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
25	Construction	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
26	Design & Construction	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
27	Design	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
28	Construction	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
29	Design & Construction	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
30	Design	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
31	Construction	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
32	Design & Construction	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
33	Design	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
34	Construction	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
35	Design & Construction	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
36	Design	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
37	Construction	2019-01-01	2019-12-31	365	100%	0%	100%	0%	0%
38	Design & Construction	2019-01-01	2019-12-31	365</					

ATTACHMENT 6.3

TYPICAL LEVEL II BAR CHART

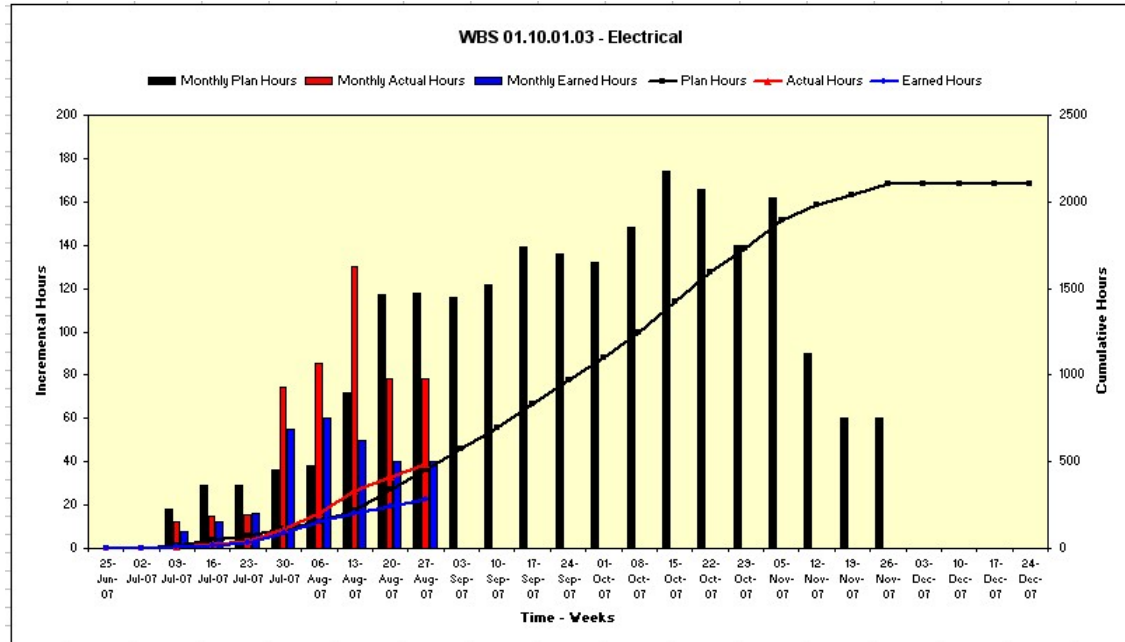
Owner's example to be placed here



ATTACHMENT 6.4

TYPICAL LEVEL II MANPOWER HISTOGRAM

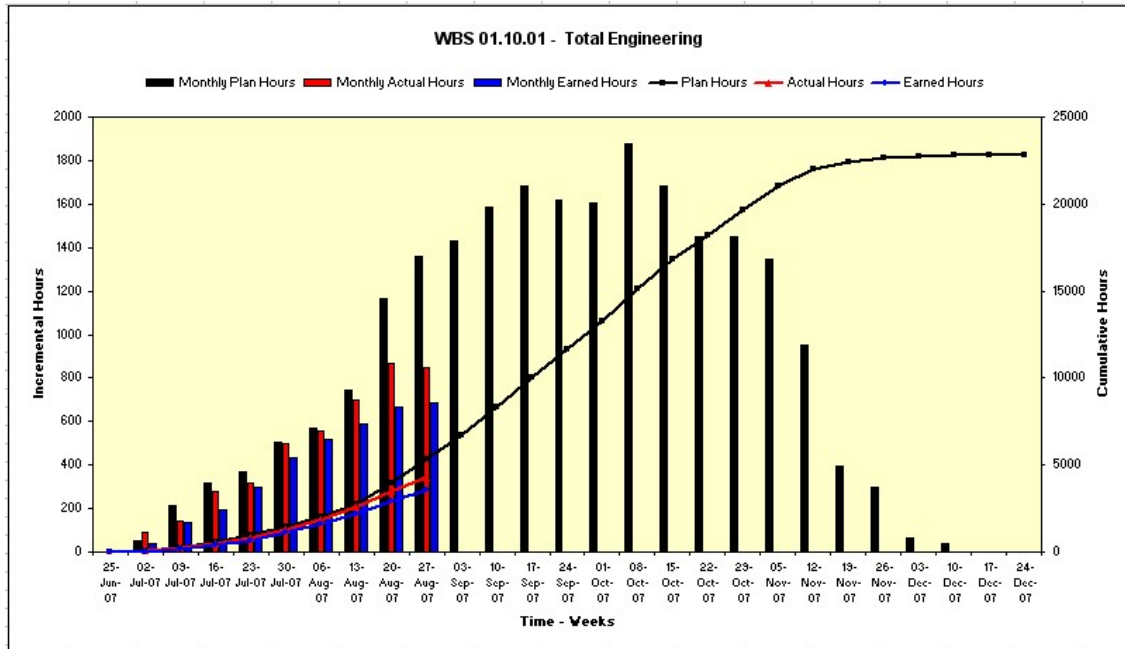
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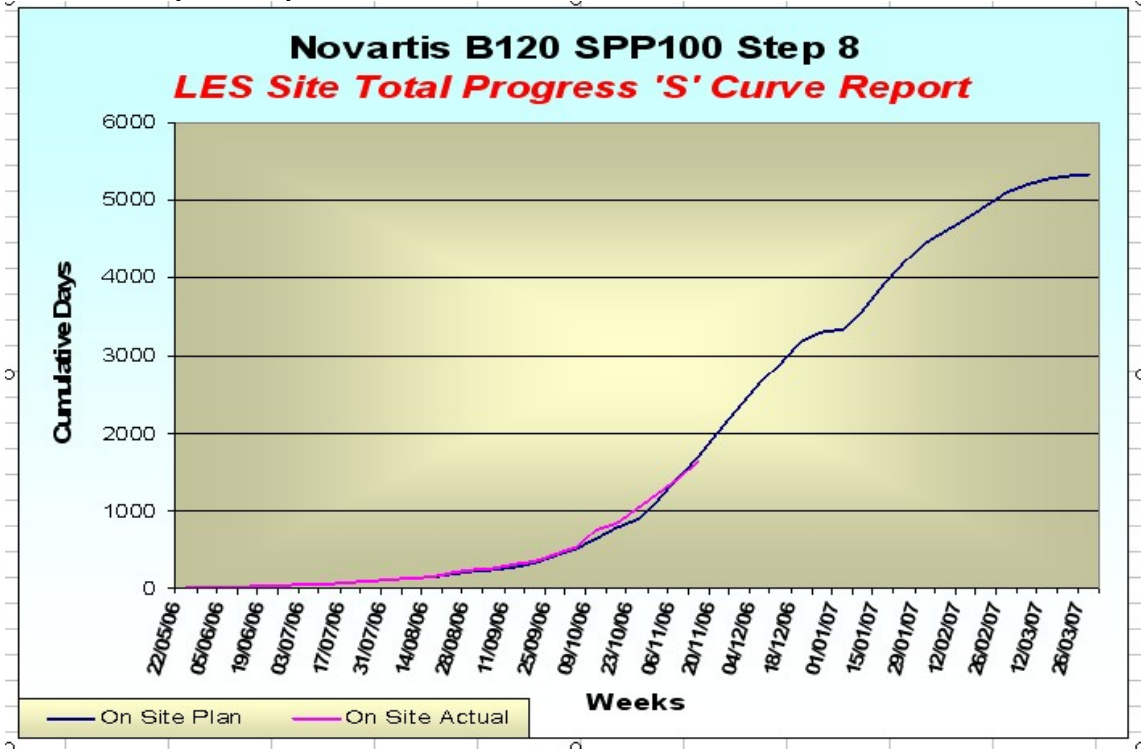
ATTACHMENT 6.5

TYPICAL LEVEL II PROGRESS 'S' CURVE

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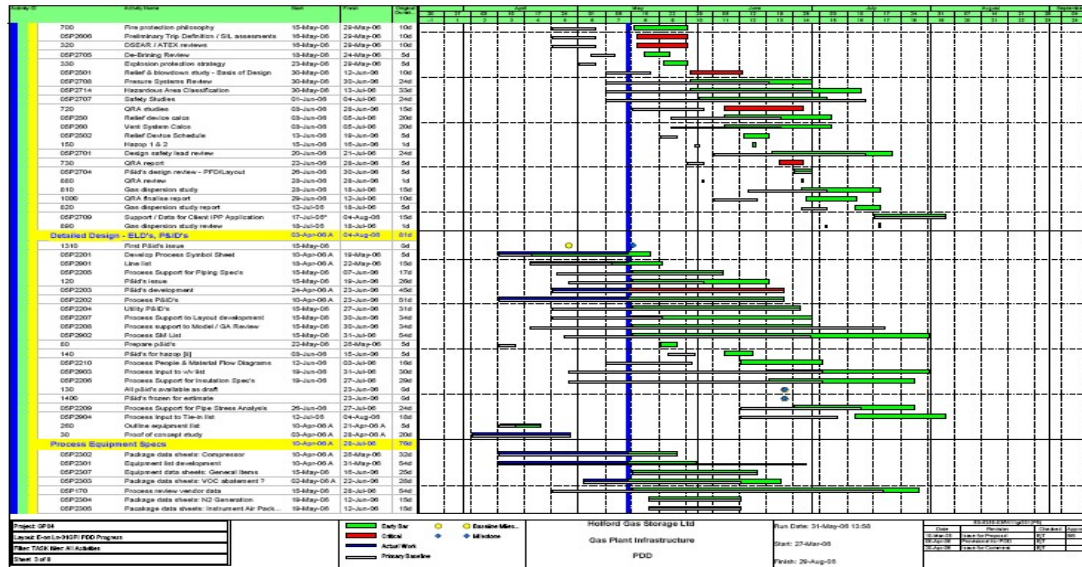


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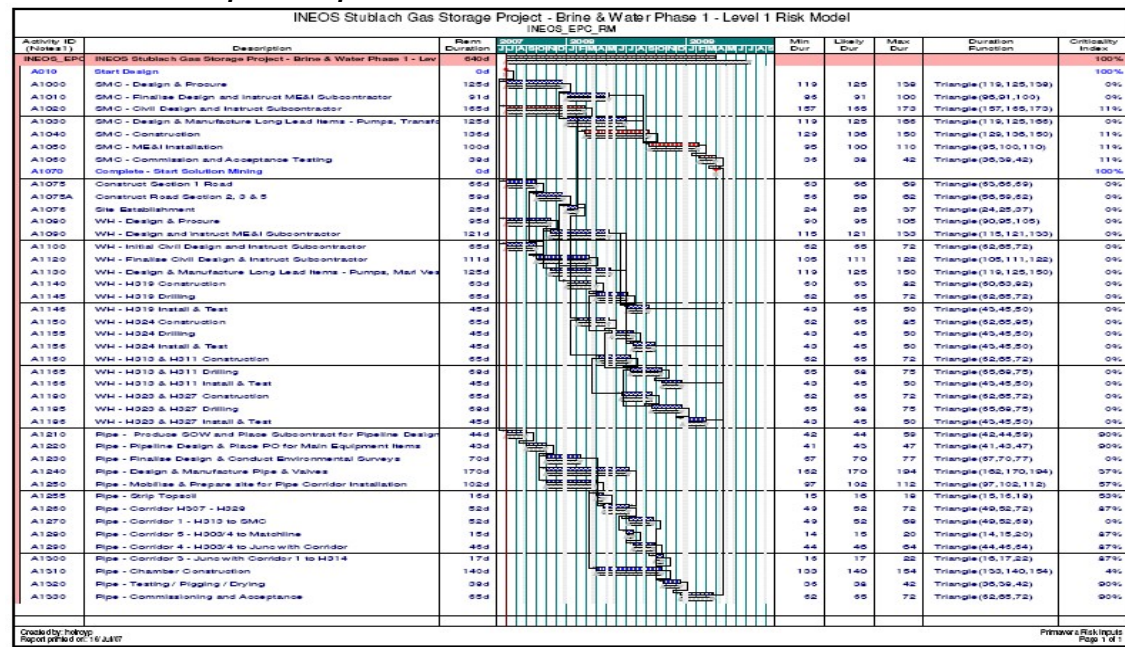


TYPICAL LEVEL III SCHEDULE

Owner's example to be placed here



Owner's risk example to be placed here



ATTACHMEN 6.7

TYPICAL SUMMARY WBS REPORT

Owner's example to be placed here

Project: XXXXXXXXXXXXXXXXXXXX
Client: ZZZZZZZZZZZZZZZZZZ
Name: SSSSSS Plant, AGC
Date: 04/09/07

Project Progress Report
SSSSSSS Plant
Period Ending : 31 August 2007

WBS	Discipline	ICDS Budget	Approved Variations	Pending Variations	Budget Transfers	Current Budget	Actual Hours	Earned Hours	Planned %	% Complete	Forecast to Go	Total Forecast	Variance	Productivity to Date	Productivity To Go
01.10.01.01	PROCESS SUB-TOTAL	6,131	0	0	384	1,121	1,818	1,623	37%	24%	5,559	1,437	316	86%	93%
01.10.01.02	PIPING SUB-TOTAL	4,127	0	0	0	4,127	664	637	18%	13%	4,063	4,127	-1	96%	101%
01.10.01.03	ELECTRICAL SUB-TOTAL	2,106	0	0	0	2,106	489	281	22%	13%	1,650	2,139	33	58%	111%
01.10.01.04	INSTRUMENT SUB-TOTAL	2,137	0	0	0	2,137	329	335	24%	16%	1,900	2,229	92	102%	95%
01.10.01.05	MECHANICAL SUB-TOTAL	3,630	0	0	100	3,730	759	517	16%	14%	3,030	3,849	119	68%	104%
01.10.01.06	HVAC SUB-TOTAL	0	0	0	0	0	0	0	0%	0%	0	0	0	0%	0%
01.10.01.07	CIVIL SUB-TOTAL	3,462	0	0	0	3,462	195	168	12%	5%	3,267	3,462	-1	86%	101%
01.10.01	ENGINEERING DESIGN	22,739	0	0	484	23,283	4,312	3,561	23%	16%	19,529	23,841	558	83%	101%
01.50.01	PROJECT MANAGEMENT	8,663	0	0	-812	7,851	1,125	1,165	25%	22%	5,940	7,665	-187	102%	102%
01.10.02	CONSTRUCTION	50	0	0	0	50	0	0	0%	0%	50	50	0	0%	100%
1.10	PROJECT TOTAL	31,512	0	0	-328	31,184	6,037	5,326	24%	17%	25,519	31,556	372	88%	101%

Owner's example to be placed here

Report for Week Ending - 30-Mar-07 Week No 13											
Project No ZZZZZZZZZZ Client AAAAAAA Plant SSSSSSS - Progress Summary Sheet											
(Previous periods figures in brackets)											
	Contract Planned Progress	Actual Progress	Diff	Forecast Hrs at completion	Forecast % at completion	Contract Planned Hrs	Hrs planned (PV)	Hrs achieved to date (EV)	Hrs Used to date (AV)	Periods Progress (Last Period)	Comments
EPCm Contractor	34.2% (23.2%)	27.7% (22.1%)	-6.5% (-1.1%)	106,601	106.7%	99,888	36,456	29,529	30,489	5.60% (7.10%)	Rebaseline Dec 06
Structwork Fab	10.6% 4.4%	10.6% 4.4%	0.0% 0.0%	6,800	100.0%	6,800	720	720	720	6.19% (0.40%)	
Pipework Fab	6.1% 3.4%	6.1% 3.4%	0.0% 0.0%	9,810	100.0%	9,810	600	600	600	2.72% (3.40%)	
MECAI	10.7% 7.3%	5.9% 3.5%	-4.8% -3.8%	58,832	100.0%	58,832	6,300	3,500	3,500	2.45% (3.50%)	
Civils	0.0% 0.0%	0.0% 0.0%	0.0% 0.0%	6,480	100.0%	6,480	0	0	0	0.00% (0.00%)	
Fire Proofing, Insulation, etc	0.0% 0.0%	0.0% 0.0%	0.0% 0.0%	18,400	100.0%	18,400	0	0	0	0.00% (0.00%)	
DCS	0.0% 0.0%	0.0% 0.0%	0.0% 0.0%	3,508	100.0%	3,508	0	0	0	0.00% (0.00%)	
HVAC	0.0% 0.0%	0.0% 0.0%	0.0% 0.0%	3,150	100.0%	3,150	0	0	0	0.00% (0.00%)	
Building Finishes, Others	11.7% 11.7%	10.8% 10.8%	-0.8% -0.9%	6,000	100.0%	6,000	700	650	650	0.03% (4.10%)	
Total Site	7.4% (5.0%)	4.8% (2.9%)	-2.5% (-2.1%)	112,980	100.00%	112,980	8,320	5,470	5,470	1.94% (2.35%)	
Total Project	20.4% (14.8%)	15.9% (12.2%)	-4.5% (-2.6%)	219,581	103.15%	212,868	44,776	34,999	35,959	3.74% (4.73%)	

ATTACHMEN 6.8

TYPICAL TARGETTED PERIOD REPORT

Owner's example to be placed here

