

## Typical Engineering Deliverables at Various Stages of a Project

NAV-GE-0607

Deliverable	FEL 1 Study	FEL-2 Study	FEL-3 Study	Detailed Design
Purpose	Project Ideas Define Alternatives	Evaluate Alternatives	Define the facility to be built	Design for Project Execution
<b>Drawings</b>				
Process Flowsheet	yes	yes	yes	yes
P & ID Drawing			preliminary	yes
Key Plan/Site Plan	yes	yes	yes	yes
General Arrangement(s)	yes	yes	yes	yes
Details				yes
Electrical Schematics			preliminary	yes
Cable Schedule			preliminary	yes
Instrument Loop Drawings				yes
Piping Line List			preliminary	yes
Vendor Information/Drawings			preliminary	yes
Shop Drawings				yes
<b>Other</b>				
Design Calculations	preliminary	preliminary	preliminary	yes
Scope of Work/Report	FEL 1 Report	FEL 2 Report	FEL 3 Report	Technical SOW
Equipment List	Major Equip	Major Equip	yes	yes
Instrument List			preliminary	yes
Functional Specification			preliminary	yes
Process Hazards Review	TBD (Study Mgr)	TBD (Study Mgr)	yes	yes
Soils Investigation Report		Prelim - as req'd	Prelim - as req'd	as req'd
Equipment Quotations	Major Equip	Major Equip	Budget grade	yes
Lifting Device Certification				yes
Specifications		preliminary	yes	yes
Cost Estimate	+/-30 %	+25/-10%	+15/-10%	● +15/-10%
<b>Approvals</b>				
TSSA				as req'd
ESA				as req'd
Building Permit				as req'd
Excavation Permit		as req'd	yes	yes
Buried Services Locates			as req'd	as req'd
Insurance Underwriter				as req'd
Min of Natural Resources				as req'd
<b>Project</b>				
Engineering (% of Total Eng)	< 5%	●● 5% to 15%	15% to 20%	Remaining 60-75%
Approx. Eng Hours	<100 hrs	75-200 hrs	200-300 hrs	1100-1500 hrs
\$1M Total Project Cost				
Schedule	Preliminary Gantt (As Req'd)	Preliminary Gantt (As Req'd)	WBS, Gantt chart	WBS, Gantt chart
Estimate Method	Historical data, Unit costs	Unit costs, supplier quotes	Detailed take off, supplier quotes	Check Estimate (if applicable)
Estimate Accuracy	Ballpark +/-30 %	OME +25/-10%	●●●Budget +15/-10%	● Budget ● +15/-10%
<b>Notes</b>				
●	If a project change occurs during the detail design stage or the construction phase, an estimate may be required to evaluate the impact on the approved budget.			
●●	The % of Engineering listed is typical of standard Engineering Packages -- Major Earthworks projects typically require up to 35% Engineering at the FEL 2 Stage and only ~5% at the FEL 3 Stage			
●●●	Major Earthworks projects typically have estimates with a lower level of accuracy at the FEL 3 stage - The FEL 2 stage gate steering committee has agreed to allow OME grade estimates at the FEL 3 stage with AFE submissions for major earthworks projects			