COAA

Questionnaire Version 10.5

(Revised May 10th, 2011 for comments)

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1. General Information Form

Your Company Name: _____
Please provide the Name that you will use to refer to this Project: _____
Contact Person: (Benchmarking Associate) _____
Contact's Phone: _____
Contact's Fax: _____
Contact's E-mail Address: _____
Project Location: _____
All Project costs should be recorded herein using Canadian Dollars (CAD).
Project quantities to be recorded as: ☐ Metric(cm., m., tonne) ☐ Imperial(in., ft., ton)
Expected project Completion Date (MM/DD/Year): _____

1.1. Project Description

Principal Type of Project:

Choose a Project Type which **best** describes the project from the categories below. If the project is a mixture of two or more of those listed, select the principal type. If the project type does not appear in the list, select other under the appropriate industry group and specify the project type.

Heavy Industrial	Light Industrial
☐ Chemical Manufacturing ☐ Electrical (Generating) ☐ Environmental ☐ Metals Refining/Processing ☐ Mining ☐ Tailing ☐ Natural Gas Processing ☐ Oil and Gas Exploration/Production (well-site) ☐ Oil Refining ☐ Oil Sands Mining/Extraction ☐ Oil Sands SAGD ☐ Oil Sands Upgrading ☐ Cogeneration ☐ Pulp and Paper ☐ Other Heavy Industrial	☐ Automotive Manufacturing ☐ Consumer Products Manufacturing ☐ Foods ☐ Microelectronics Manufacturing ☐ Office Products Manufacturing ☐ Pharmaceutical Manufacturing ☐ Pharmaceutical Labs ☐ Clean Room (Hi-Tech) ☐ Other Light Industrial

Buildings	Infrastructure
☐ Communications Center	
☐ Courthouse	
☐ Dormitory/Hotel/Housing/Residential	☐ Airport
☐ Embassy	☐ Electrical Distribution
☐ Low rise Office (≤3 floors)	☐ Flood Control
☐ High rise Office (>3 floors)	☐ Highway (including heavy haul road)
☐ Hospital	☐ Marine Facilities
☐ Laboratory	☐ Navigation
☐ Maintenance Facilities	☐ Rail
☐ Movie Theatre	☐ Tunneling
☐ Parking Garage	☐ Water/Wastewater
☐ Physical Fitness Center	☐ Telecom, Wide Area Network
☐ Prison	☐ Pipeline
☐ Restaurant/Nightclub	☐ Tank farms
☐ Retail Building	☐ Gas Distribution
☐ School	☐ Other Infrastructure
☐ Warehouse	
☐ Other Buildings	

If other, please describe: _____

1.2. Project Nature

From the list below select the category that best describes the nature of this project. If your project is a combination of these natures, select the category that you would like your project to be benchmarked against. Please see the glossary for definitions.

The Project Nature was:
- ☐ Grass Roots, Green Field
- ☐ Brownfield (co-locate)
- ☐ Modernization, Renovation
- ☐ Addition, Expansion, In-Fill
- ☐ Other Project Nature (Please describe):_____

Is this project part of a larger project? ☐ **Yes** ☐ **No**

If Yes, please describe: _____

1.3. Project Characteristics

a. Project Priority

Please select the **primary** factor influencing the execution of this project. Assume safety is a given for all projects.

- ☐ Cost
- ☐ Schedule
- ☐ Balanced

b. Business Driver

Please choose all that apply:

- ☐ Quality
- ☐ Risk
- ☐ Operability
- ☐ Environmental
- ☐ Social
- ☐ Others

c. Turnarounds/Shutdowns/Outages

Construction performance (cost, schedule and quality) during project turnarounds, shutdowns, and outages may be impacted by schedule demands of the turnaround. These turnarounds may be scheduled or unscheduled. Please complete the blocks below to indicate the percentage of construction work completed during turnaround.

1. Percent construction during **scheduled turnaround:**		%
2. Percent construction during **unscheduled turnaround:**		%
3. Percent construction during **non-turnaround:**		%

Note: the percentages should add up to 100 %

d. Percent Modularization

Choose a percentage value that best describes the level of modularization (offsite construction) used. This value should be determined as a ratio of the cost of all modules divided by total installed cost.

_____%

e. Percent Offsite Construction Labour Hours

Choose a percentage value that best describes the level of offsite labour hours for building modules. This value should be determined as a ratio of the offsite labour hours of all modules divided by **total construction hours**.

_____%

1.4. Project Delivery System

Please choose the project delivery system from those listed below that most closely characterizes the delivery system used for your project. If more than one delivery system was used, select the primary system.

	Delivery System	Description
	Traditional Design-Bid-Build	Serial sequence of design and construction phases; Owner contracts separately with designer and constructor.
	Design-Build (or EPC)	Overlapped sequence of design and construction phase; procurement normally begins during design; owner contracts with Design-Build (or EPC) contractor.
	CM at risk	Overlapped sequence of design and construction phases; procurement normally begins during design; owner contracts separately with designer and CM (constructor). CM holds the contracts.
	Parallel Primes	Overlapped sequence of design and construction phases; Procurement normally begins during design. Owner contracts separately with designer and multiple prime constructors.
	Other Delivery System_____	

Did you use a Construction Manager not at Risk in conjunction with the selected delivery system?
☐Yes ☐No

1.5. Work Scope

[Contractor Only] What was your company responsible on this project? (check all that applied)

- ☐ FEP
- ☐ Design/Engineering
- ☐ Procurement
- ☐ Construction
- ☐ Commissioning and Startup

1.6. Project Complexity

Choose a value that best describes the level of complexity for this project as compared to other projects from all the companies within the same industry sector. For example, if this is a heavy industrial project, how does it compare in complexity to other heavy industrial projects? Use the definitions below as general guidelines.

- **Low** - Characterized by the use of no unproven technology, small number of process steps, small facility size or process capacity, previously used facility configuration or geometry, proven construction methods, etc.
- **High**- Characterized by the use of unproven technology, an unusually large number of process steps, large facility size or process capacity, new facility configuration or geometry, new construction methods, etc.

Low			Average			High
1	2	3	4	5	6	7
◘	◘	◘	◘	◘	◘	◘

1.7. Engineering Standards and Specifications

Engineering Deliverables

1) Engineering deliverables were released in a timely manner to support construction operations?

Seldom			Sometimes			Always
1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐

☐ Don't Know

2) Engineering deliverables were complete and accurate (minimal errors and omission)?

Seldom Complete and Accurate			Sometimes Complete and Accurate			Always Complete and Accurate
1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐

☐ Don't Know

1.8. Project Scope

Please provide a brief description of the project scope (what is actually being designed / constructed). Limit your response to 200 words.

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1.9. Contract Type

[Owner required section; Contractor please check the contract type for your work scope]

Please indicate below the contract types that were used on this project. If you had multiple contractors for a particular function, please answer the questions below in terms of what was most common.

	Lump Sum	Cost Reimbursable (including unit price)
FEP	☐	☐
Engineering or design	☐	☐
Procurement	☐	☐
Module	☐	☐
Construction	☐	☐
Commissioning/Startup	☐	☐
Overall	☐	☐

1.10. Percentage Union Workforce

Please indicate the percentage of Building Trades, Alternate Union and Non Union Labour employed for the following disciplines. Each row should sum up to 100%.

Building Trades Unions are organizations of workers formed for the purpose of advancing their members' interests in respect to wages, benefits and working conditions. Building trades unions typically represent single trades.
Example: IBEW - International Brotherhood of Electrical Workers

Alternate Unions are multicraft unions or wall-to-wall unions similar in purpose to building trades unions but are inclusive of mulitiple trades and industries.
Example: CLAC - Christian Labour Association of Canada

Discipline	Percentage Building Trades	Percentage Alternate Union	Percentage Non Union	Total (%)
Concrete	_____ % ◘ NA ◘Unknown	_____ % ◘ NA ◘Unknown	_____ % ◘ NA ◘Unknown	100%
Structural Steel	_____ % ◘ NA ◘Unknown	_____ % ◘ NA ◘Unknown	_____ % ◘ NA ◘Unknown	100%
Electrical	_____ % ◘ NA ◘Unknown	_____ % ◘ NA ◘Unknown	_____ % ◘ NA ◘Unknown	100%
Piping	_____ % ◘ NA ◘Unknown	_____ % ◘ NA ◘Unknown	_____ % ◘ NA ◘Unknown	100%
Instrumentation	_____ % ◘ NA ◘Unknown	_____ % ◘ NA ◘Unknown	_____ % ◘ NA ◘Unknown	100%
Equipment	_____ % ◘ NA ◘Unknown	_____ % ◘ NA ◘Unknown	_____ % ◘ NA ◘Unknown	100%
Insulation	_____ % ◘ NA ◘Unknown	_____ % ◘ NA ◘Unknown	_____ % ◘ NA ◘Unknown	100%
Total	_____ % ◘ NA ◘Unknown	_____ % ◘ NA ◘Unknown	_____ % ◘ NA ◘Unknown	100%

2. Performance

2.1 Budgeted and Actual Project Costs by Phase

Please indicate the Budgeted (Baseline) and Actual Project Costs by phase. All project costs should be recorded using Canadian Dollars (CAD).

1. Budget amounts include contingency and correspond to funding approved at time of Project Sanction. This is the original baseline budget, and should not be updated to include any changes since change data are collected in a later section. Metrics definitions specifically address changes as appropriate.
2. Click on the project phase links below for phase definitions and typical cost elements.
3. If this project did not include a particular phase, please select N/A.
4. The total project **budget** amount should include all **planned expenses (**excluding the cost of land**)** from front end planning through commissioning/startup, including amounts estimated for in-house salaries, overhead, travel, etc.
5. For Owners, the total **actual** project cost should include all **actual** project costs at time of project closeout **(**excluding the cost of land**)** from front end planning through commissioning/startup, including amounts expended for in-house salaries, overhead, travel. For Contractors, please report the total project cost excluding OH and profit.
6. **If you know total project costs but have incomplete phase information**, you may enter as much phase information as you know and override the automatic totaling function by manually filling in the total project cost. As long as you don't click back into a phase field, your total will be accepted and recorded.

Project Phase		Baseline Budget (Including Contingency)	Amount of Contingency in Budget	Actual Phase Cost
Front End Planning				
		◘NA ◘Unknown	◘NA ◘Unkn wn	◘ NA ◘Unknown
Detail Engineering				
		◘NA ◘Unknown	◘NA ◘Unknown	◘ NA ◘Unknown
Procurement[1]				
		◘NA ◘Unknown	◘NA ◘Unknown	◘ NA ◘Unknown
Construction[2]	Directs			
	Indirects			
	Total			
		◘ NA ◘Unknown	◘NA ◘Unknown	◘NA ◘Unknown
Commissioning /Startup				
		◘NA ◘Unknown	◘NA ◘Unknown	◘ NA ◘Unknown
Total Project				
If you track the cost of construction management, please provide it. $_____				

Owner's total cost $CAD_____ (owner only question) (need definition …)

Owner's cost for project management $CAD_____ (owner only question)

Permit fee $CAD_____ (owner only question)

Land cost $CAD_____ (owner only question)

Site preparation cost _____

Environmental Studies & Monitoring $CAD_____ (owner only question)

Construction Equipment Cost $CAD_____ (including excavators, side booms, graders, dozers, etc..) (TBD)

Contractors' indirect cost $CAD_____ (owner only question)

Camp cost

Camp Capital Cost $CAD_____

Camp Operating Cost $CAD_____

Health, Safety, and Environment (HSE) Cost: $ CDN_____

Engineering and review $ (CAD)_____

Leadership and communication $ (CAD)_____

Human resource capability $ (CAD)_____

Construction planning and scheduling $ (CAD)_____

Material and equipment supply $ (CAD)_____

Previous COAA Committee discussion of identifying profit and fee as distinct from budget and cost is not included here (yet). This may be a point of contention for COAA contractors who may be unwilling to disclose this information.

Remark: [1] **Procurement Phase Cost** – Costs of **Major Equipment** including process and mechanical equipment, construction equipment left on site and used after commissioning (see table p.13) and modules fabricated offsite.

[2] **Construction Cost** – See "**Instructions for Construction Direct and Indirect Costs**" below.

Construction Direct and Indirect Cost

Direct costs are those which are readily or directly attributed to, or become an identifiable part of, the final project (e.g., piping labour and material). Indirect costs are costs that cannot be attributed readily to a part of the final product (e.g. temporary facilities).

Please use the following table as a guide in categorizing direct and indirect construction cost.

Direct Construction Cost	Indirect Construction Cost
Direct labour - See construction productivity table (p.26)	Indirect labour - See construction productivity table
Labour burdens and fringe benefits	Overtime premium (additional cost for which no work is performed)
Direct subcontracts	Mobilization, Demobilization
Bulk materials - See bulk material table (p.12)	Construction office trailers and equipment.
	Construction utilities (power, water etc.)
	Temporary construction (e.g. roads, fencing, fab. shops, etc.)
	Construction equipment (rental/ ownership & consumables – fuel, oil, etc.)
	Other consumables- small tools, supplies
	Scaffolding materials (rental/ ownership)
	Field services
	Permits (construction related)
	Vendor representatives
	Freight (for items listed in this table)
	Camp, Catering, accommodations
	Travel (busing and flight)
	Misc. (insurance, etc.)
	Indirect subcontracts

Note: For benchmarking purposes exclude the following:
- Demolition cost
- Remediation cost
- Site preparation cost (construction cost begins with excavation for foundations or driving of piles)

Provide data for Construction subtotal if indirect and indirect breakout is not available.

Bulk Material

Bulk materials are generally defined as the balance of construction components outside the major equipment classification. Bulks are commonly referred to as commodity materials. In general bulks do not include tagged/numbered equipment. Please use the following table as a guide in categorizing cost of bulk materials.

Bulk Material Reference Table	
Craft	**Examples of Bulk Material**
Civil/Structural	Concrete
	Reinforcing Steel
	Concrete Embeds
	Structural Steel
	Piling
Pipe	Pipe
	Fittings
	Manual valves
	Hangers / Supports
	Process Air Duct
Instrumentation	Control valves
	Control panels
	Field instrumentation
	Instrument air tubing
Electrical	Cable tray
	Conduit
	Wire/Cable
	Light fixtures
	Electrical heat tracing
	Grounding
Misc.	Insulation
	Paint
	Fireproofing

Total Cost of Major Equipment

The purpose of this question is to determine the extent to which the overall project cost is driven by the purchase of **major equipment in general and more particularly, mechanical and process equipment.** Please see the Equipment Reference Table provided below. Record the total purchase cost of major equipment overall as well as the total purchase cost of mechanical and process equipment. Include freight. Exclude costs of project team, costs for field services, bulk construction equipment (such as valves, bus duct etc.) and off-the-shelf equipment.

Total Cost of Major Equipment $_____ ◘ N/A ◘ Unknown

Total Cost of Mechanical and Process Equipment $_____ ◘ N/A ◘ Unknown

Equipment Reference Table	
Examples of Major Equipment	**Kinds of Equipment Covered**
Electrical Equipment	
HVAC Systems	Prefabricated air supply houses
Motors	600V and above
Electricity Generation and Transmission	Major electrical items (e.g., unit substations, transformers, switch gear, motor-control centers, batteries, battery chargers, turbines and other miscellaneous power generation equipment).
Mining Equipment	
Loaders and Haulers	Dozers, haul trucks, graders.
Excavators	Hydraulic/ electric shovels, draglines, etc.
Material Handling Equipment	
Mechanical & Process Equipment	
Exchangers	Heat transfer equipment: tubular exchangers, condensers, evaporators, reboilers, coolers (including fin-fan coolers and cooling towers).
Pumps	All types of liquid pumps and drivers.
Direct-fired Equipment	Fired heaters, furnaces, boilers, kilns, and dryers, including associated equipment such as super-heaters, air preheaters, burners, stacks, flues, draft fans and drivers, etc.
Columns and Pressure Vessels	Towers, columns, reactors, unfired pressure vessels, bulk storage spheres, and unfired kilns; includes internals such as trays and packing.
Tanks	Atmospheric storage tanks, bins, hoppers, and silos.
Vacuum Equipment	Mechanical vacuum pumps, ejectors, and other vacuum producing apparatus and integral auxiliary equipment.
Material Handling Equipment	Conveyers, cranes, hoists, chutes, feeders, scales and other weighing devices, packaging machines, and lift trucks.
Package Units	Integrated systems bought as a package (e.g., air dryers, air compressors, refrigeration systems, ion exchange systems, etc.).
Special Processing Equipment	Agitators, crushers, pulverizers, blenders, separators, cyclones, filters, centrifuges, mixers, dryers, extruders, fermenters, reactors, pulp and paper, and other such machinery with their drivers.

2.2 Planned and Actual Project Schedule

Please indicate your company's Planned Baseline and Actual Project Schedule by phase:

1. The dates for the planned schedule should be those in effect at Project Sanction. If you cannot provide an exact day for either the planned or actual, estimate to the nearest week.
2. Click on the project phase links below for a description of starting and stopping points for each phase.
3. If this project did not include a particular phase please select N/A.
4. **If you have incomplete phase information**, you must enter overall project start and stop dates. Please enter as much phase information as possible.

Project Phase	**Baseline Schedule**		**Actual Schedule**	
	Start **mm/dd/yyyy**	Stop **mm/dd/yyyy**	Start **mm/dd/yyyy**	Stop **mm/dd/yyyy**
Front End Planning				
	◘Unknown	◘Unknown	◘Unknown	◘Unknown
Detail Engineering				
	◘Unknown	◘Unknown	◘Unknown	◘Unknown
Procurement				
	◘Unknown	◘Unknown	◘Unknown	◘Unknown
Construction				
	◘Unknown	◘Unknown	◘Unknown	◘Unknown
Startup/Commissioning				
	◘Unknown	◘Unknown	◘Unknown	◘Unknown
Overall Project Start and Stop Dates				
	◘Unknown	◘Unknown	◘Unknown	◘Unknown

2.3 % Design Complete

What percentage of detailed engineering work-hours was completed as of total Project Sanction? _____%

◘ Unknown

What percentage of detailed engineering work-hours was completed as of start of the construction phase? _____%

◘ Unknown

2.4 Schedule Disruption

Were there any uncontrollable or unanticipated schedule disruption on this project (this does not include project changes)?

☐ Yes ☐ No ☐ Don't Know

If yes, what was the total duration in weeks of any uncontrollable or unanticipated schedule disruption?

_____Number of weeks ☐ Don't Know

Please explain the reason(s) for the schedule disruption(s)

_____

_____

_____

_____

2.5 Project Development Changes and Scope Changes

Please record the **approved** changes to your project by phase in the table provided below. For each phase indicate the net cost impact, and the net schedule impact resulting from project **approved** development changes and scope changes. Either the owner or contractor may initiate changes. **All costs should be recorded using Canadian Dollars (CAD).**

Project Development Changes include those changes required to execute the original scope of work or obtain original process basis.

Scope Changes include changes in the base scope of work or process basis.

1. Changes should be included in the phase in which they were initiated. Click on the project phase links below for assistance in classifying the changes by project phase. **If you cannot provide the requested change information by phase** but can provide the information for the total project, please fill in the totals field manually, thereby overriding the totaling function. As long as you don't click back into a phase field, your total will be accepted and recorded.
2. Indicate whether the net impact was a decrease (-) or an increase (+) by indicating a negative number for a decrease and a positive number for an increase. If no change orders were granted during a phase, write "0" in that row.

Project Phase	Cost Increase (+) / Decrease (-) of Project Development Changes	Cost Increase (+) / Decrease (-) of Scope Changes	Change Cost
Pre-Construction	$_____	$_____	$_____
Construction thru Startup	$_____	$_____	$_____
Total	$_____	$_____	$_____

Project Phase	Schedule Increase (+) / Decrease (-) of Project Development Changes (weeks)	Schedule Increase (+) / Decrease (-) of Scope Changes (weeks)	Schedule Change
Pre-Construction	_____	_____	_____
Construction thru Startup	_____	_____	_____
Total	_____	_____	_____

2.6 Field Rework

If you tracked field rework, indicate the Direct Cost of field rework. The direct cost of field rework relates to all costs needed to perform the rework itself. If there was no direct cost or schedule impact of field rework, please enter "0". The field rework hours include both direct and indirect work hours associated with rework.

Direct Cost of Field Rework: $ (CAD)_____

Schedule Impact of field Rework (weeks): _____

Total field rework hours: _____

3. Engineering Productivity Metrics

Instructions for Computation of Work-Hours and Rework-Hours

Work-hours are computed by the summation of all the account hours that are listed as **Direct** in the following table. All the account hours listed as **Indirect** are to be **excluded** from the work-hours that are submitted in the productivity data for the following sections.

Direct work-hours should include all detailed engineering hours used to produce deliverables including site investigations, meetings, planning, constructability, RFIs, etc., and rework. Specifically exclude work-hours for operating manuals and demolition drawings. Engineering work-hours reported should only be for the categories requested and may not equal the total engineering work-hours for the project.

Exclude the following categories: architectural design, plumbing, process design, civil/site prep, HVAC, insulation and paint, sprinkler/deluge systems, etc. Within a category, direct work-hours that cannot be specifically assigned into the provided classifications, and have not been excluded, should be prorated based on known work-hours or quantities as appropriate. Please review this table completely before providing data in the following sections.

	Direct	Indirect
Account	Discipline Engineer	Document Control
	Designer	Reproduction Graphics
	Technician	Project Management
		Project Controls (cost/schedule/estimating)
		Project Engineer
		Secretary/clerk
		Procurement (supply management)
		Construction Support (test package support, commissioning, etc.)
		Quality Assurance
		Accounting
		Legal

Unit of Measure Legend:

cm. centimeter	m^2 Square Meter	WH Work-hour
mm. millimeter	MT Metric Ton	HP Horse Power
LM Linear Meter	m^3 Cubic Meter	kW kilo-watts

3.1. Engineering Team and Workhours

3.1.1 Please provide the total detailed engineering work hours for this project. This total should include work performed by all disciplines including process engineering:

_____Direct Work Hours _____Indirect Work Hours

3.1.2 Was the Front End Planning (FEP) design team the same as the detailed engineering team?

☐ No ☐ Yes ☐ Don't Know

3.2. Concrete

Instructions

Please complete the following tables indicating quantity and engineering work-hours for the categories appropriate to your project. If you cannot enter all data then enter totals only. Include rework in the work-hours only. If the project had no work-hours or quantities for a category, enter none.

The quantity of concrete is the amount of concrete that is required for the specified slab, foundation, or structure provided in the final Issued for Construction (IFC) drawings.

Refer to the section "Instructions for Computation of Work-Hours and Rework-Hours" for a detailed listing of direct hours to be included and indirect hours that are to be excluded from the computation of the work-hours.

Which design platform was used for this category in this project? Check all that apply.

2D ( ) 3D ( )

Slabs	**None**	**IFC Quantity (m^3)**	**Engineering WH (including rework) (hours)**
Total Slabs			

Foundations	**None**	**IFC Quantity**	**Engineering WH (including rework) (hours)**
Total Foundations (m^3) (Excluding piling)			
Piling (each)			

Concrete Structures	**None**	**IFC Quantity (m^3)**	**Engineering WH (including rework) (hours)**
Concrete Structures			
Concrete Structures include concrete structures, columns, beams, cooling tower basins, trenches, formed elevated slabs/structures, and retaining walls.			

Total Concrete	None	IFC Quantity (m^3)	Engineering WH (including rework) (hours)
Total Concrete			
The total concrete quantity and work hours may be **greater than** the sum of totals for slabs, foundations and concrete structures if the project included concrete not in these categories.			

3.3. Structural Steel

Instructions

Please complete the following tables indicating quantity and engineering work-hours for the categories appropriate to your project. If possible, separate data for structural steel, pipe racks & utility bridges and miscellaneous steel. If you can not separate structural steel from pipe racks & utility bridges, combine these data in the space provided below. If you cannot enter all data then enter totals only. Include rework in the work-hours only. If the project had no work-hours or quantities for a category, enter none.

The quantity of steel is the amount of steel provided in the final Issued for Construction (IFC) drawings.

Refer to the section "Instructions for Computation of Work-Hours and Rework-Hours" for an additional detailed listing of direct hours to be included and indirect hours that are to be excluded from the computation of the work-hours.

Which design platform was used for this category in this project? Check all that apply.

2D ( ) 3D ( )

Structural Steel	None	IFC Quantity (MT)	Engineering WH (including rework) (hours)
Structural Steel			
This includes trusses, columns, girders, beams, struts, girts, purlins, vertical and horizontal bracing, bolts, and nuts.			
Pipe Racks & Utility Bridges			
This includes steel structures outside the physical boundaries of a major structure, which are used to support pipe, conduit, and/or cable tray.			
Combined Structural Steel / Pipe Racks & Utility Bridges*			
* Enter combined structural steel and pipe racks & utility bridges if you cannot separate the quantities above.			
Miscellaneous Steel			

This includes handrails, toe plate, grating, checker plate, stairs, ladders, cages, miscellaneous platforms, pre-mounted ladders and platforms, miscellaneous support steel including scab on supports, "T" and "H" type supports, trench covers, and Q decking.			
Total Steel			
This is the total of structural steel, pipe racks & utility bridges, and miscellaneous steel from above or the total of combined structural steel, pipe racks & utility bridges (if not separated) and miscellaneous steel. If you have quantities for steel not included in the breakouts above, include them in the totals here.			

3.4. Electrical

Instructions

Please complete the following tables indicating quantity and engineering work-hours for the categories appropriate to your project. If you cannot enter all data then enter totals only. Include rework in the work-hours only. If the project had no work-hours or quantities for a category, enter none.

- Total Direct Engineering Electrical Work-Hours for This Project _____
- Total Connected Horsepower of Motors _____
- Number of Motors _____
- Total KVA Load of Project _____

The quantity of electrical equipment, conduit, cable trays, wire, termination, and lighting fixtures are the amount of each provided in the final Issued for Construction (IFC) drawings.

Refer to the section "Instructions for Computation of Work-Hours and Rework-Hours" for an additional detailed listing of direct hours to be included and indirect hours that are to be excluded from the computation of the work-hours.

Which design platform was used for this category in this project? Check all that apply.

2D ( ) 3D ( )

Electrical Equipment	**None**	**IFC Quantity (each)**	**Engineering WH (including rework) (hours)**
Total Electrical Equipment			
Electrical equipment includes transformers, switchgear, UPS systems, MCCs, rectifiers, motors, generators, etc. This also includes work-hours for single line, elementary diagrams and studies.			

Conduit		**None**	**IFC Quantity**	**Engineering WH (including rework) (hours)**
Conduit	LM			
	Number of Runs			
This includes power plan, cable and conduit schedule and interconnects. Exposed / aboveground and underground				

Cable Tray	None	IFC Quantity (LM)	Engineering WH (including rework) (hours)
Cable Tray			
This includes electrical and instrument cable trays, channels, supports, covers, etc.			

Wire & Cable		None	IFC Quantity	Engineering WH (including rework) (hours)
Wire & Cable (w/o conduit or tray)	LM			
	Number of Terminations			
This includes power, control and grounding cables.				

Other Electrical	None	IFC Quantity	Engineering WH (including rework) (hours)
Lighting Fixtures (each)			
This includes fixtures, conduit, wiring, panels, and control devices. Quantity is the number of fixtures.			
Electrical Heat Tracing (LM)			
This includes electric heat trace cable, power feeds to the cable, control accessories, end of line devices, connectors, tape or other strapping/support materials, and any other items needed to complete the heat trace system. Length is based on the lineal meter of process and utility piping heat traced.			

3.5. Piping

Instructions

Please complete the following tables indicating quantity, percent hot and cold, and engineering work-hours for the categories appropriate to your project. Piping includes under ground pressure pipe. **Exclude tubing except where indicated**. If you cannot enter all data then enter totals only. Include rework in the work-hours only. If the project had no work-hours or quantities for a category, enter none.

The quantity of piping is the amount of piping specified in the final Issued for Construction (IFC) drawings. This quantity should not be "cut lengths" but should be measured "center-to-center" through valves and fittings as with the quantity for the construction metric. Most "CADD dumps" are cut lengths. The quantity should be adjusted to be the length measured as noted above.

Refer to the section "Instructions for Computation of Work-Hours and Rework-Hours" for an additional detailed listing of direct hours to be included and indirect hours that are to be excluded from the computation of the work-hours.

Which design platform was used for this category in this project? Check all that apply.
2D ( ) 3D ( )

Piping	None	IFC Quantity	Percent Hot and Cold (%)	Engineering WH (including rework) (hours)
Small Bore (2-1/2" and Smaller) (LM)				
Large Bore (3" and Larger) (LM)				
Engineered Hangers and Supports (each) (Includes stress analysis)				
Number of pipe fittings*				
Total Piping (LM)**				
Total Heat Tracing Tubing (LM)				

* Elbows, flanges, reducers, branch connection fittings e.g. o-lets, saddles etc., Y's, T's, caps, unions, couplings, etc.
** Total piping quantity is linear meter only. The total piping work-hours include those hours for small & large bore piping, engineered hangers and supports and fittings.

3.6. Instrumentation

Instructions
Please complete the following tables indicating quantity and engineering work-hours for the categories appropriate to your project. If you cannot enter all data then enter totals only. Include rework in the work-hours only. If the project had no work-hours or quantities for a category, enter none.

The quantity of instrumentation is the amount provided in the final Issued for Construction (IFC) drawings.

Refer to the section "Instructions for Computation of Work-Hours and Rework-Hours" for an additional detailed listing of direct hours to be included and indirect hours that are to be excluded from the computation of the work-hours.

Which design platform was used for this category in this project? Check all that apply.
2D ( ) 3D ( )

Instrumentation	None	IFC Quantity	Engineering WH (including rework) (hours)
Loops (count)			
Tagged Devices (count)			
I/O (count)			
This includes all instrument and control design work-hours except DCS/PLC Configuration and Programming. I/O (count) includes the I/O that comes over digital communication interfaces from outside of the control system. For such interfaces, count the addressable points. For fieldbus interfaces, count only the devices.			
◘ DCS/PLC Design included			
DCS/PLC Configuration and Programming			

3.7. Equipment

Instructions

Please complete the following tables indicating quantity and engineering work-hours for the categories appropriate to your project. If you cannot enter all data then enter totals only. Include rework in the work-hours only. If the project had no work-hours or quantities for a category, enter none.

The Total Quantity of equipment is the amount of tagged items provided in the final Issued for Construction (IFC) drawings with vendor designed skids being counted as a single item. The Individually Designed quantity is the quantity defined by unique data sheets. For example, pump P201a/b is one unique data sheet, but is a total of two items.

These hours include only mechanical discipline hours.

Refer to the section "Instructions for Computation of Work-Hours and Rework-Hours" for an additional detailed listing of direct hours to be included and indirect hours that are to be excluded from the computation of the work-hours.

Which design platform was used for this category in this project? Check all that apply.

2D ( )
3D ( )

Pressure Vessels	None	Individually Designed (each)	Total Quantity (each)	Engineering WH (including rework) (hours)
This includes tray/packed towers, columns, reactors/regenerators, and miscellaneous other pressure vessels. Field fabricated towers, columns, reactors and regenerators are to be included.				

Atmospheric Tanks	None	Individually Designed (each)	Total Quantity (each)	Engineering WH (including rework) (hours)
This includes storage tanks, floating roof tanks, bins/hoppers/silos/cyclones, cryogenic & low temperature tanks and miscellaneous other atmospheric tanks.				

Heat Transfer Equipment	None	Individually Designed (each)	Total Quantity (each)	Engineering WH (including rework) (hours)
This includes heat exchangers, fin fan coolers, evaporators, cooling towers and miscellaneous other heat transfer equipment.				

Boiler & Fired Heaters	None	Individually Designed (each)	Total Quantity (each)	Engineering WH (including rework) (hours)	Total (BTU/Hr)
This includes packaged boilers, field erected boilers, fired heaters, waste heat boilers, stand-alone stacks, and miscellaneous other boilers and fired heaters.					

Rotating Equipment (w/drivers)	None	Individually Designed (each)	Total Quantity (each)	Engineering WH (including rework) (hours)	Total (horsepower)
This includes compressors (centrifugal/reciprocating), blowers, screw rotary compressors, metering/in-line pumps, pumps (centrifugal/reciprocating), positive displacement pumps, agitators, mixers, blenders and other miscellaneous compressors, fans and pumps.					

Material Handling Equipment (w/drivers)	None	Individually Designed (each)	Total Quantity (each)	Engineering WH (including rework) (hours)
This includes conveyors (belt, chain, screen, rotor, etc.), cranes & hoists, scales, lifts, stackers, reclaimers, ship loaders, compactors, feeders and baggers, and miscellaneous other material handling equipment.				

Power Generation Equipment	None	Individually Designed (each)	Total Quantity (each)	Engineering WH (including rework) (hours)	Total (kilo-watts)
This includes gas turbines, steam turbines, diesel, and other miscellaneous power generation equipment.					

Other Process Equipment	None	Individually Designed (each)	Total Quantity (each)	Engineering WH (including rework) (hours)
This includes specialty gas equipment, bulk chemical equipment, process equipment, particle extraction (bag houses, scrubbers, etc.), treatment systems (water treatment, etc.), incinerators, and flares/flare systems.				

Total Equipment Count*	None	Individually Designed (each)	Total Quantity (each)	Engineering WH (including rework) (hours)**
Skids & modules with multiple equipments are counted still as a single entry. * Total equipment count may include items not identified above. ** This is total mechanical discipline direct work-hours.				

Vendor-Designed Modules & Pre-Assembled Skids	None	Individually Designed (each)	Total Quantity (each)	Engineering WH (including rework) (hours)
This includes modules (partial units) and complete skids units.				

4. Construction Productivity Metrics

Instructions for Computation of Actual Work-Hours, Rework-Hours, and Installed Costs

Actual work-hours are computed by the summation of all the account hours that are listed as **Direct** in the following table. All the account hours listed as **Indirect** are to be **excluded** from the actual work-hours that are submitted in the productivity data for the following sections.

Estimated quantities and work-hours should be updated to include all change orders. **Actuals** include all quantities installed and work-hours, to include rework-hours for these quantities.

Total installed unit cost (TIUC) is defined as the burdened cost of **direct labour, bulk material, final asset equipment, and civil and sitework equipment by pro rata share** including **overhead and profit from both direct hire and subcontract.** Burden cost of direct labour includes insurance, welfare and other fund and charges associated to labour by regulations.

The **direct labour costs** are those associated with work-hours by craft persons listed as **Direct** in the following table.

	Direct	Indirect	
Account	Direct Craft Labour	Accounting	Procurement
	Foreman	Area Superintendent	Process Equipment Maintenance
	General Foreman	Assistant Project Manager	Project Controls
	Load and Haul	Bus Drivers	Project Manager
	Oilers	Clerical	QA/QC
	Operating Engineer	Craft Planners	Quantity Surveyors
	Safety Meetings	Craft Superintendent	Receive and Offload
	Scaffolding	Craft Training	Recruiting
	Truck Drivers Direct	Crane Setup/take down	Safety
		Document Control	Safety Barricades
		Drug Testing	Security
		Equipment Coordinator	Show-up/Travel Time
		Evacuation Time	Site Construction Manager
		Field Administration Staff	Site Maintenance
		Field Engineer-Project	Subcontract Administrator
		Field Staff (Hourly)	Supervision (Hourly)
		Field Staff (Salary)	Surveying Crews
		Fire Watch	Temporary Facilities
		Flag Person	Temporary Utilities
		General Superintendent	Test Welders
		Hole Watch	Tool Room
		Janitorial	Truck Drivers Indirect
		Job Clean-Up	Warehouse
		Master Mechanic	Warehousing
		Material Control	Water Hauling
		Mobilization	Workface Planner (WFP)
		Nomex Distribution	
		Orientation Time	
		Payroll Clerks/ Timekeepers	

Unit of Measure Legend:

cm. centimeter	m^2 Square Meter	WH Work-hour
mm. millimeter	MT Metric Ton	HP Horse Power
LM Linear Meter	m^3 Cubic Meter	kW kilo-watts

4.1. Concrete

Instructions

Please provide actual productivity below for the categories appropriate to your project for the installation of concrete.

for each category, provide the ***actual installed neat quantity,*** the ***work-hours (including rework),*** and the ***actual total installed unit cost (TIUC).*** Indicate if the work performed for each category was subcontracted or not. If work was both subcontracted and in-house, indicate the type that was more predominant.

Total installed unit cost (TIUC) is defined as the burdened cost of **direct labour, bulk material , final asset equipment, and civil and sitework equipment by pro rata share** including **overhead and profit from both direct hire and subcontract.** Burden cost of direct labour includes insurance, welfare and other fund and charges associated to labour by regulations.

Include work-hours for the following selected activities:
Loading material at the jobsite yard, hauling to, and unloading at the job work site; local layout, excavation and backfill, fabrication, installation, stripping and cleaning forms; field installation of reinforcing material; field installation of all embeds; all concrete pours, curing, finishing, rubbing, mud mats; and anchor bolt installation.

Do not include work-hours for:
Piling, drilled piers, wellpoints and major de-watering, concrete fireproofing, batch plants, non-permanent roads and facilities, third party testing, mass excavations, rock excavations, site survey, q-deck, sheet piles, earthwork shoring, cold pour preparation, grouting, precast tees, panels, decks, vaults, manholes, etc.

Definitions

The **Installed Net Quantity** of concrete is the amount of concrete that is required for the specified slab, foundation, or structure provided in the project's plans and specifications and does not include any quantity of concrete that is used due to rework.

Refer to the section "**Instructions for Computation of Actual Work-Hours, Rework-Hours and Installed Cost**" for a detailed listing of direct hours and their associated costs to be included as well as indirect hours and their associated costs to be excluded.

Slabs	Actual Productivity			
	Subcontracted (Yes or No)	Installed Quantity (m^3)	Actual WH (including rework) (hours)	Total Installed Unit Cost ($/$m^3$)
Total Slabs				
Total Installed Unit Cost (TIUC) for Total Slabs is the weighted average by quantity of the On-Grade, Elevated Slabs/ On Deck, Area Paving and any other slabs not included above.				

Foundations	Actual Productivity			
	Subcontracted (Yes or No)	Installed Quantity (m^3)	Actual WH (including rework) (hours)	Total Installed Unit Cost ($/$m^3$)
Total Foundations				
Total Installed Unit Cost (TIUC) for Total Foundations is the weighted average by quantity of the each category above.				

Concrete Structures	Actual Productivity			
	Subcontracted (Yes or No)	Installed Quantity (m^3)	Actual WH (including rework) (hours)	Total Installed Unit Cost ($/$m^3$)
Concrete Structures				

Total Concrete	Actual Productivity			
	Subcontracted (Yes or No)	Installed Quantity (m^3)	Actual WH (including rework) (hours)	Total Installed Unit Cost ($/$m^3$)
Total Concrete				
Total Installed Unit Cost (TIUC) for Total Concrete is the weighted average by quantity of the total slabs, total foundations, total concrete structures and any other concrete not included above.				

4.2. Structural Steel

Instructions

Please provide actual productivity below for the categories appropriate to your project for the installation of structural steel.

for each category, provide the ***actual installed neat quantity,*** the ***work-hours (including rework),*** and the ***actual total installed unit cost (TIUC).*** Indicate if the work performed for each category was subcontracted or not. If work was both subcontracted and in-house, indicate the type that was more predominant.

Total installed unit cost (TIUC) is defined as the burdened cost of **direct labour, bulk material, final asset equipment, and civil and sitework equipment by pro rata share**

including **overhead and profit from both direct hire and subcontract.** Burden cost of direct labour includes insurance, welfare and other fund and charges associated to labour by regulations.

Include work-hours for the following selected activities:
Shake-out, transporting, erection, plumbing, leveling, bolting, and welding.

Do not include work-hours for:
Fabrication, demolition, and architectural work, such as roofing, siding and vents.

Definitions

The **Installed Quantity** of steel is the amount of steel provided in the project's plans and specifications and does not include any quantity of steel that is used due to rework.

Refer to the section "**Instructions for Computation of Actual Work-Hours, Rework-Hours and Installed Cost**" for a detailed listing of direct hours and their associated costs to be included as well as indirect hours and their associated costs to be excluded.

Structural Steel	**Actual Productivity**			
	Sub contracted (Yes or No)	**Installed Quantity (MT)**	**Actual WH (including rework) (hours)**	**Total Installed Unit Cost ($/ MT)**
Structural Steel				
This includes trusses, columns, girders, beams, struts, girts, purlins, vertical and horizontal bracing, bolts, and nuts.				
Pipe Racks & Utility Bridges				
This includes steel structures outside the physical boundaries of a major structure, which is used to support pipe, conduit, and/or cable tray.				
Miscellaneous Steel				
This includes handrails, toe plate, grating, checker plate, stairs, ladders, cages, miscellaneous platforms, pre-mounted ladders and platforms, miscellaneous support steel including scab on supports, "T" and "H" type supports, trench covers, and Q decking.				
Total Structural Steel				
Total Installed Unit Cost (TIUC) for **Structural Steel** is the weighted average by quantity of Structural Steels, Pipe Racks & Utility Bridges, Miscellaneous Steels and any other Structural Steel not included above.				

4.3. Electrical

Instructions

Please provide actual productivity below for the categories appropriate to your project for the installation of electrical.

for each category, provide the ***actual installed neat quantity,*** the ***work-hours (including rework),*** and the ***actual total installed unit cost (TIUC).*** Indicate if the work performed for each category was subcontracted or not. If work was both subcontracted and in-house, indicate the type that was more predominant.

Total installed unit cost (TIUC) is defined as the burdened cost of **direct labour, bulk material, final asset equipment, and civil and sitework equipment by pro rata share** including **overhead and profit from both direct hire and subcontract.** Burden cost of direct labour includes insurance, welfare and other fund and charges associated to labour by regulations.

Include work-hours for the following selected activities:
Installation, testing, labeling, etc.

Definitions

The **Installed Quantity** of electrical equipment, devices, conduit and cable trays are the amount of each provided in the project's plans and specifications and does not include any quantity that is used due to rework.

Refer to the section "**Instructions for Computation of Actual Work-Hours, Rework-Hours and Installed Cost**" for a detailed listing of direct hours and their associated costs to be included as well as indirect hours and their associated costs to be excluded.

- Total Direct Electrical Work-Hours for This Project _____
- Total Connected Horsepower of Motors _____
- Number of Motors _____
- Total KVA Load of Project _____

Electrical Equipment and Devices	Actual Productivity			
	Subcontracted (Yes or No)	Installed Quantity (each)	Actual WH (including rework) (hours)	Total Installed Unit Cost ($/Each)
Total Electrical Equipment				
- This includes all labour for the installation of transformers, switchgear, UPS systems, MCCs, DCS/PLC racks and panels, etc. - Total Installed Unit Cost (TIUC) for **Electrical Equipment** is the weighted average by quantity of Electrical Equipments 1kV & Below, Electrical Equipments Over 1kV.				

Instructions for calculation of Weighted-Average Diameter of Conduit (Hyperlink)

Conduit	Weighted Average Diameter (inches)	Actual Productivity			
		Subcontracted (Yes or No)	Installed Quantity (LM)	Actual WH (including rework) (hours)	Total Installed Unit Cost ($/LM)
Total Conduit					
- Total Installed Unit Cost (TIUC) for **Conduit** is the weighted average by quantity of Exposed or Aboveground Conduits, Underground, Duct Bank or Embedded Conduit.					

Instructions for calculation of Weighted-Average Size of Cable Tray (Hyperlink)

Cable Tray	Weighted Average Size (inches)	Actual Productivity			
		Sub Contracted (Yes or No)	Installed Quantity (LM)	Actual WH (including rework) (hours)	Total Installed Unit Cost ($/LM)
Cable Tray					
This includes all labour for the installation of tray, channel, supports, covers, grounding jumpers, marking, etc. Includes cable tray for instrument cable but does not include fire stop.					

Wire and Cable	Actual Productivity			
	Subcontracted (Yes or No)	Installed Quantity (LM)	Actual WH (including rework) (hours)	Total Installed Unit Cost ($/LM)
Total Wire and Cable				
- Total Installed Unit Cost (TIUC) for **Wire and Cable** is the weighted average by quantity of Control Cables, Power Cable below 1kV, Power Cable above 1kV listed above.				

Transmission Line	Actual Productivity			
	Subcontracted (Yes or No)	Installed Quantity (LM)	Actual WH (including rework) (hours)	Total Installed Unit Cost ($/LM)
Total Transmission Line				
This includes all labour for the installation of line, tower, foundations, switch yards and testing of power and control line.				

Other Electrical	Actual Productivity			
	Subcontracted (Yes or No)	Installed Quantity	Actual WH (including rework) (hours)	Total Installed Unit Cost ($/each or $/LM)
Electrical Heat Tracing (LM)				
This includes the labour for the installation of electric heat trace cable, power feeds to the cable, control accessories, end of line devices, connectors, tape or other strapping/support materials, and any other items needed to complete the heat trace system. Length is based on the total meters of process and utility piping heat traced.				

4.4. Piping

Instructions

Please provide actual productivity below for the categories appropriate to your project for the installation of piping.

for each category, provide the ***actual installed neat quantity,*** the ***work-hours (including rework),*** and the ***actual total installed unit cost (TIUC).*** Indicate if the work performed for each category was subcontracted or not. If work was both subcontracted and in-house, indicate the type that was more predominant.

Total installed unit cost (TIUC) is defined as the burdened cost of **direct labour, bulk material, final asset equipment, and civil and sitework equipment by pro rata share** including **overhead and profit from both direct hire and subcontract.** Burden cost of direct labour includes insurance, welfare and other fund and charges associated to labour by regulations.

Include work-hours for the following selected activities:
Erecting and installing large bore piping, including welding, valves, in-line specials, flushing/hydro testing, tie-ins (excluding hot taps), material handling (from the laydown yard to the field), in-line devices, specialties, equipment operators, and hangers & supports.

Do not include work-hours for:
Non-destructive evaluation (NDE), steam tracing, stress relieving, offloading pipe as it is received, commissioning, and field fabrication of large bore.

Definitions

The **Installed Quantity** of piping is the amount of piping specified in the project's plans and specifications and does not include any quantity of piping that is used due to rework.

%Shop Fabricated is the percentage of offsite fabricated pipe from the total pipe installed by length. *The shop fabrication does not include on-site, field fabricated pipe.*

Refer to the section "**Instructions for Computation of Actual Work-Hours, Rework-Hours and Installed Cost**" for a detailed listing of direct hours and their associated costs to be included as well as indirect hours and their associated costs to be excluded.

Instructions for calculation of Small Bore Weighted Diameter (Hyperlink)

Small Bore (2-1/2" and Smaller)
Include only onsite workhours: Field fabricated and installation workhours **(Excludes Tubing)**

Small Bore	Weighted Diameter (inches)	Percent Shop Fabricated (%)	Actual Productivity			
			Subcontracted (Yes or No)	Installed Quantity (LM)	Actual WH (including rework) (hours)	Total Installed Unit Cost ($/LM)
Total Small Bore						
- Total Installed Unit Cost (TIUC) for **Small Bore** is the weighted average by quantity of types of small bore listed above and any other small bore not listed above.						

Tubing	Weighted Diameter (inches)	Percent Shop Fabricated (%)	Actual Productivity			
			Subcontracted (Yes or No)	Installed Quantity (LM)	Actual WH (including rework) (hours)	Total Installed Unit Cost ($/LM)
Total Heat Tracing Tubing (LM)						
- Total Installed Unit Cost (TIUC) for **turbing** is the weighted average by quantity of types of small bore listed above and any other small bore not listed above.						

In the following section for large bore piping, the following definitions apply for hot and cold piping: Hot piping is that which has a design temperature greater than 121 degrees Celsius. Cold Piping is that which has a design temperature less than minus 28 degrees Celsius.

Instructions for calculation of ISBL and OSBL Large Bore Weighted Diameter (Hyperlink)

Inside Battery Limits (ISBL) Large Bore (3" and Larger) (Excludes Tubing)

Within a ISBL facility, there are above ground and below ground piping systems. These should **BOTH** be included in the ISBL section. Underground can include Process Systems, and a small amount of drainage systems.

Actual Productivity

Large Bore (ISBL)	Subcontracted (Yes or No)	Weighted Diameter (inches)	Average Schedule	Installed Quantity (LM)	Actual WH (including rework) (hours)	% Shop Fabricated	Total Installed Unit Cost ($/LM)
Total Large Bore (ISBL)							
- Total Installed Unit Cost (TIUC) for **Large Bore (ISBL)** is the weighted average by quantity of types of large bore listed above and any other large bore pipe not listed above.							

Outside Battery Limits (OSBL) Large Bore (3" and Larger) (Excludes Tubing)

Within an OSBL facility, there are above ground and below ground piping systems. These should **BOTH** be included in the OSBL section.

Actual Productivity

Large Bore (OSBL)	Subcontracted (Yes or No)	Weighted Diameter (inches)	Average Schedule	Installed Quantity (LM)	Actual WH (including rework) (hours)	% Shop Fabricated	Total Installed Unit Cost ($/LM)
Total Large Bore (OSBL)							
- Total Installed Unit Cost (TIUC) for **Large Bore (OSBL)** is the weighted average by quantity of types of large bore listed above and any other large bore not listed above.							

Total Piping

Actual Productivity

Large Bore	Subcontracted (Yes or No)	Weighted Diameter (inches)	Average Schedule	Installed Quantity (LM)	Actual WH (including rework) (hours)	% Shop Fabricated	Total Installed Unit Cost ($/LM)
Total Large Bore							
- Total Installed Unit Cost (TIUC) for **Large Bore** is the weighted average by quantity of types of large bore listed above and any other large bore not listed above.							

4.5. Instrumentation

Instructions

Please provide actual productivity below for the categories appropriate to your project for the installation of instrumentation.

For each category, provide the ***actual installed neat quantity,*** the ***work-hours (including rework),*** and the ***actual total installed unit cost (TIUC).*** Indicate if the work performed for each category was subcontracted or not. If work was both subcontracted and in-house, indicate the type that was more predominant.

Total installed unit cost (TIUC) is defined as the burdened cost of **direct labour, bulk material, final asset equipment, and civil and sitework equipment by pro rata share** including **overhead and profit from both direct hire and subcontract.** Burden cost of direct labour includes insurance, welfare and other fund and charges associated to labour by regulations.

Include work-hours for the following selected activities:
Installation, calibration, testing, check out, and otherwise field certify the devices. A device is a physical device that has a tag number. This category includes process tubing, instrument air tubing, cable trays, conduits, instrument wire and cable, junction boxes, **stand**, etc.

Do not include work-hours for:
DCS, software, installation of in-line devices, programming and configuration.

Definitions

The **Installed Quantity** of instrumentation is the amount provided in the project's plans and specifications and does not include any quantity of instrumentation that is used due to rework.

Refer to the section "**Instructions for Computation of Actual Work-Hours, Rework-Hours and Installed Cost**" for a detailed listing of direct hours and their associated costs to be included as well as indirect hours and their associated costs to be excluded.

Instrumentation	Actual Productivity				
	None	Sub contracted (Yes or No)	Installed Quantity (each)	Actual WH (including rework) (hours)	Total Installed Unit Cost ($/ each)
Loops (count)					
Devices (Instruments, count)					
Unit of measure: Dual – Each based on loop check quantity. Each based on field-installed devices. Instrumentation wire and cable are recorded in electrical section (4.3).					

4.6. Equipment

Instructions

Please provide actual productivity below for the categories appropriate to your project for the installation of equipment.

For each category, provide the ***actual installed neat quantity,*** the ***work-hours (including rework),*** and the ***actual total installed unit cost (TIUC).*** Indicate if the work performed for each category was subcontracted or not. If work was both subcontracted and in-house, indicate the type that was more predominant.

Total installed unit cost (TIUC) is defined as the burdened cost of **direct labour, bulk material, final asset equipment, and civil and sitework equipment by pro rata share** including **overhead and profit from both direct hire and subcontract.** Burden cost of direct labour includes insurance, welfare and other fund and charges associated to labour by regulations.

Definitions

The **Installed Quantity** of equipment is the amount provided in the project's plans and specifications and does not include any quantity of equipment that is used due to rework.

Refer to the section "**Instructions for Computation of Actual Work-Hours, Rework-Hours and Installed Cost**" for a detailed listing of direct hours and their associated costs to be included as well as indirect hours and their associated costs to be excluded.

Total Equipment	Subcontracted (Yes or No)	Installed Quantity (each)	Actual Work-Hours (including rework) (hours)	Total Weight (tons)
Total Equipment				
Include all major equipment list below				

Pressure Vessels Field Fab. & Erected	Actual Productivity				
	Subcontracted (Yes or No)	Installed Quantity (each)	Actual WH (including rework) (hours)	Total Weight (MT)	Total Installed Unit Cost ($/ MT)
Pressure Vessels					
This includes tray/packed towers, columns, reactors/regenerators, and miscellaneous other pressure vessels. Work-hours should include installation of trays and packing if installed in the field.					

Pressure Vessels Shop Fab./ Field Erected	Actual Productivity				
	Subcontracted (Yes or No)	Installed Quantity (each)	Actual WH (including rework) (hours)	Total Weight (MT)	Total Installed Unit Cost ($/ MT)
Pressure Vessels					
This includes tray/packed towers, columns, reactors/regenerators, and miscellaneous other pressure vessels. Work-hours should include installation of trays and packing if installed in the field.					

Atmospheric Tanks – Shop Fabricated	Actual Productivity				
	Subcontracted (Yes or No)	Installed Quantity (each)	Actual WH (including rework) (hours)	Total Capacity (MT)	Total Installed Unit Cost ($/ MT)
Atmospheric Tanks – Shop Fabricated					
This includes storage tanks, floating roof tanks, bins/hoppers/silos/cyclones, cryogenic & low temperature tanks and miscellaneous other atmospheric tanks. Include all shop built-up and field-erected tanks. Excluded are field fabricated and assembled tanks.					

Atmospheric Tanks – Field Fabricated	Actual Productivity				
	Subcontracted (Yes or No)	Installed Quantity (each)	Actual WH (including rework) (hours)	Total Capacity (MT)	Total Installed Unit Cost ($/ MT)
Atmospheric Tanks – Field Fabricated					
This includes storage tanks, floating roof tanks, bins/hoppers/silos/cyclones, cryogenic and low temperature tanks, and other miscellaneous atmospheric tanks.					

Heat Transfer Equipment	Actual Productivity				
	Subcontracted (Yes or No)	Installed Quantity (each)	Actual WH (including rework) (hours)	Total Weight (MT)	Total Installed Unit Cost ($/ MT)
Heat Transfer Equipment					
This includes heat exchangers, fin fan coolers, evaporators, package cooling towers and miscellaneous other heat transfer equipment.					

Boiler & Fired Heaters	Actual Productivity				
	Subcontracted (Yes or No)	Installed Quantity (each)	Actual WH (including rework) (hours)	Total (MBTU)	Total Installed Unit Cost ($/ MBTU)
Boiler & Fired Heaters					
This includes packaged boilers, field erected boilers, fired heaters, waste heat boilers, stand-alone stacks, and miscellaneous other boilers and fired heaters.					

Rotating Equipment (w/drivers)	Actual Productivity				
	Subcontracted (Yes or No)	Installed Quantity (each)	Actual WH (including rework) (hours)	Total (HP)	Total Installed Unit Cost ($/ HP)
Rotating Equipment (w/drivers)					
This includes compressors (centrifugal/reciprocating), blowers, screw rotary compressors, metering/in-line pumps, pumps (centrifugal/reciprocating), positive displacement pumps, agitators, mixers, blenders and other miscellaneous compressors, fans and pumps.					

Material Handling Equipment (w/drivers)	Actual Productivity				
	Subcontracted (Yes or No)	Installed Quantity (each)	Actual WH (including rework) (hours)	Total Weight (MT)	Total Installed Unit Cost ($/ MT)
Material Handling Equipment (w/drivers)					
This includes conveyors (belt, chain, screen, rotor, etc.), cranes & hoists, scales, lifts, stackers, reclaimers, ship loaders, compactors, feeders and baggers, and miscellaneous other material handling equipment.					

Power Generation Equipment	Actual Productivity				
	Subcontracted (Yes or No)	Installed Quantity (each)	Actual WH (including rework) (hours)	Total (kW)	Total Installed Unit Cost ($/ kW)
Power Generation Equipment					
This includes gas turbines, steam turbines, diesel, and other miscellaneous power generation equipment.					

Other Process Equipment	Actual Productivity				
	Subcontracted (Yes or No)	Installed Quantity (each)	Actual WH (including rework) (hours)	Total weight (MT)	Total Installed Unit Cost ($/ MT)
Other Process Equipment					
This includes specialty gas equipment, bulk chemical equipment, process equipment, particle extraction (bag houses, scrubbers, etc.), treatment systems (water treatment, etc.), incinerators, and flares/flare systems.					

Modules & Pre-Assembled Skids	Actual Productivity				
	Subcontracted (Yes or No)	Installed Quantity (each)	Actual WH (including rework) (hours)	Total weight (MT)	Total Installed Unit Cost ($/ MT)
Modules & Pre-Assembled Skids					
This includes modules (partial units) and complete skids units.					

4.7. Insulation

Instructions

Please provide actual productivity below for the categories appropriate to your project for the installation of insulation.

for each category, provide the ***actual installed neat quantity,*** the ***work-hours (including rework),*** and the ***actual total installed unit cost (TIUC).*** Indicate if the work performed for each category was subcontracted or not. If work was both subcontracted and in-house, indicate the type that was more predominant.

Total installed unit cost (TIUC) is defined as the burdened cost of **direct labour, bulk material, final asset equipment, and civil and sitework equipment by pro rata share** including **overhead and profit from both direct hire and subcontract.** Burden cost of direct labour includes insurance, welfare and other fund and charges associated to labour by regulations.

Definitions

The **Installed Quantity** of insulation is the amount of insulation that is required for the equipment and piping provided in the project's plans and specifications and does not include any quantity of insulation that is used due to rework.

Refer to the section "**Instructions for Computation of Actual Work-Hours, Rework-Hours and Installed Cost**" for a detailed listing of direct hours and their associated costs to be included as well as indirect hours and their associated costs to be excluded.

Equipment

Include work-hours for the following selected activities:
Installation of insulation, jacketing overall vessels, tanks, exchangers, etc.; installation of equipment blankets for pumps, exchangers, etc.; material handling.
Do not include: **scaffolding.**

Insulation	Average Thickness (inches)	Actual Productivity			
		Subcontracted (Yes or No)	Installed Quantity (m^2 of insulated area)	Actual WH (including rework) (hours)	Total Installed Unit Cost ($/ SM)
Equipment					

Piping

This includes work-hours for the following selected activities:
Installation of insulation and jacketing over pipe, valves and fittings; installation of valve insulation blankets and flange insulation.

Instructions for calculation of Weighted Diameter of Piping with Insulation (Hyperlink)

Insulation	Average Thickness (inches)	Actual Productivity			
		Subcontracted (Yes or No)	Installed Quantity (ELM)	Actual WH (including rework) (hours)	Total Installed Unit Cost ($/ ELM)
Piping					
ELM – Equivalent Linear Meters of insulation applied to piping. Multiple layers count only one time in linear meters.					

4.8. Module Installation

Instructions

Please provide actual productivity of installing modules below for the categories applicable to your project**.** This includes field workhours to install all modules which are fabricated offsite and transported to the work site as over-dimensional loads requiring special heavy haul/lifting equipment (e.g. pipe rack modules, process modules and building modules). **Exclude large vessels, towers, columns or drums.**

for each category, provide the ***actual installed neat quantity,*** the ***work-hours (including rework),*** and the ***actual total installed unit cost (TIUC).*** Indicate if the work performed for each category was subcontracted or not. If work was both subcontracted and in-house, indicate the type that was more predominant.

Total installed unit cost (TIUC) is defined as the burdened cost of **direct labour, bulk material, final asset equipment, and civil and sitework equipment by pro rata share** including **overhead and profit from both direct hire and subcontract.** Burden cost of direct labour includes insurance, welfare and other fund and charges associated to labour by regulations.

Definitions

The **Installed Quantity** of offsite modules is the number of metric tones (MT) amount indicated in units shown below of offsite modules that are field-installed as provided in the project's plans and specifications.

Refer to Section 4, "**Instructions for Computation of Actual Work-Hours, Rework-Hours and Installed Cost**" for a detailed listing of direct hours and their associated costs to be included as well as indirect hours and their associated costs to be excluded.

Pipe Racks Modules	Actual Productivity			
	Subcontracted (Yes/No)	Installed Quantity (MT)	Actual WH (including rework) (hours)	Total Installed Unit Cost ($/ MT)
Pipe rack module structure may include several components such as structural steel for framework, walkway, platform to support the piping, piping c/w (cooling water) valving. It also may include electrical tray, heat tracing and insulation.				

Process Equipment Modules	Actual Productivity			
	Subcontracted (Yes/No)	Installed Quantity (MT)	Actual WH (including rework) (hours)	Total Installed Unit Cost ($/ MT)

Building Modules	Actual Productivity			
	Subcontracted (Yes/No)	Installed Quantity (SM)	Actual WH (including rework) (hours)	Total Installed Unit Cost ($/ SM)
Building Modules are considered as 1 (or more) structural framework structures with a portion (or all of the structure) attached with a building cladding. The structures must be suitable for transport, and fabricated in a location remote to the final location. Examples of modules with buildings are: Electrical MCC buildings, Piping Manifold Buildings, etc.				

Modules	Quantity (each)
Pipe Rack	
Process Equipment	
Building Modules	

4.9. Scaffolding

Instructions

Please provide estimated and actual productivity for scaffolding:

Enter the *estimated total work-hours* required for scaffolding installation, the *estimated scaffolding work-hours divided by total direct hours*, and the *estimated total installed scaffolding cost. Total direct hours include scaffolding installation work hours. Total installed scaffolding cost* includes direct labour, materials and equipment cost for scaffolding installation at the time of project sanction (or as soon as available following sanction).

For *actual productivity*, please indicate whether the scaffolding activity was ***subcontracted or not***. If work was both subcontracted and in-house, indicate which was more predominant.

Last, please provide the *actual total work-hours* (including rework) required for scaffolding installation, the *actual scaffolding work-hours divided by total direct hours*, and the *actual total installed scaffolding cost.* Again, *total installed scaffolding cost* include material, labour and equipment cost for installation from both direct hire and subcontract.

Overall, please indicate the percentage amount of scaffolding procured by the owner. ____ %

Scaffolding	Actual			
	Subcontracted (Yes or No)	Total Scaffolding Work- Hours	Scaffolding WH/ Total direct hours	Total Installed Scaffolding Cost ($)

Scaffold Materials

- ◘ Free Issue to Contractor
- ◘ Rented
- ◘ Purchased & Included as part of Scaffold Cost

4.10. Construction Work-Hours

Instructions

Please provide estimated and actual Construction Indirect and Direct Work-hours. If either estimated or actual work-hours are not available, please provide your estimated and actual ratio of indirect work-hours to direct work-hours.

Refer to the section "**Instructions for Computation of Actual Work-Hours and Rework-Hours**" in the construction productivity section and "**Instruction for Construction Direct and Indirect Costs"** for a detailed listing of directs and indirects.

Construction Work-hours	Estimated		Actual	
	Total Work-hours	Total Indirect WH/ Total Direct WH	Total Work-hours	Total Indirect WH/ Total Direct WH
Direct				
Indirect				

5. Practices

5.1. Project Definition Rating Index (PDRI)

PDRI - a comprehensive checklist of 70 scope definition elements presented in a score sheet format. The PDRI provides a means for an individual or a team to evaluate the status of an industrial project during pre-project planning and to determine a score that corresponds to its level of definition.

Overall PDRI Score _____ (%) at the time of authorization

Please refer to CII PDRI website (a link will be provided)
If the respondent uses the Excel file or link to calculate their score, the system needs to capture the score by section.

	Industry	Building	Infrastructure
Section I - Basis Of Project Decision			
Section II - Basis Of Design			
Section III - Execution Approach			

The following Practices sections include questions about practices implemented on this project. Please respond to every Practice. If a project did not implement a certain practice, indicate as such and skip to the next section.

5.2. Front-End Planning (FEP)

Front-End Planning involves the process of developing sufficient strategic information such that owners can address risk and decide to commit resources to maximize the chance for a successful project. Front-End Planning includes putting together the project team, selecting technology, selecting the project site, developing project scope, and developing project alternatives. Front-End Planning is often perceived as synonymous with front-end loading, pre-project planning, feasibility analysis, and conceptual planning.

5.2.1 [Contractor only] Did your company participate in the Front-End Planning effort?

☐ Yes, as a front-end planner for the owner

☐ No, my company did not participate in the front-end planning effort

5.3. Project Risk Assessment

Project Risk Assessment is the process to identify, assess and manage risk. The project team evaluates risk exposure for potential project impact to provide focus for mitigation strategies.

5.3.1 How would you describe the risk assessment(s) conducted on this project? Please select the statement that best fits.

☐ No risk assessment was conducted

☐ Informal risk assessment

☐ Formal structured risk assessment

☐ Don't Know

5.3.2 Was the risk mitigation plan developed and implemented?

Not at All			Partially			Fully	Don't Know
1	2	3	4	5	6	7	
☐	☐	☐	☐	☐	☐	☐	☐

5.4. Team Building

Team Building is a ***formal*** project-focused process that builds and develops shared goals, interdependence, trust and commitment, and accountability among team members and that seeks to improve team members' problem-solving skills.

5.4.1 Was team building used <u>on this project</u>?

☐ No ☐ Yes ☐ Don't Know

5.5. Alignment during Front End Planning

Alignment is the condition where appropriate project participants are working within acceptable tolerances to develop and meet a uniformly defined and understood set of project objectives.

5.5.1 Did the project implement Alignment during FEP?

☐ No ☐ Yes ☐ Don't Know

5.5.2 How clearly was the project operations and maintenance philosophy communicated?

Not at All, Poorly			Fair			Very Well	Don't Know
1	2	3	4	5	6	7	
☐	☐	☐	☐	☐	☐	☐	☐

5.6. Constructability

Constructability is the effective and timely integration of construction knowledge into the conceptual planning, design, construction and field operations of a project to achieve the

overall project objectives in the best possible time and accuracy, at the most cost-effective levels.

5.7.1 Was there a documented constructability plan for this project?

☐ No ☐ Yes ☐ Don't Know

Answer the next question, if yes to above.

5.7.2 Was the constructability plan integrated into the project execution plan?

Not at All			Variable, Partial			Fully	Don't Know
1	2	3	4	5	6	7	
☐	☐	☐	☐	☐	☐	☐	☐

5.7.3 How successful was constructability?

Not at All			Neutral			Very Successful	Don't Know
1	2	3	4	5	6	7	
☐	☐	☐	☐	☐	☐	☐	☐

5.7. Change Management

Change Management is the process of incorporating a balanced change culture of recognition, planning and evaluation of project changes in an organization to effectively manage project changes.

5.9.1 Was there a documented change management process for this project?

☐ No ☐ Yes ☐ Don't Know

Skip this section if no or don't know to above.

5.9.2 How clearly was the change management process specified in the project contract?

Not at all Clear			Moderate Clear			Very Clear	Don't Know
1	2	3	4	5	6	7	
☐	☐	☐	☐	☐	☐	☐	☐

5.9.3 How well would you say key project personnel (both owners and contractors) understood the change management process?

Not at all Clear			Moderately Well			Very Well	Don't Know
1	2	3	4	5	6	7	
☐	☐	☐	☐	☐	☐	☐	☐

5.8. Zero Accident Techniques

Zero Accident Techniques include site specific safety programs and implementation, and auditing and incentive efforts to create a project environment and a level of training that embraces the mind set that all accidents are preventable, and that zero accidents are an obtainable goal.

5.10.1 Was there a written site specific safety plan for this project?

☐ No ☐ Yes ☐ Don't Know

5.10.2 Overall how many workers per full time safety professionals were typically (i.e., in terms of the average workforce) on site?

Over 200	150 to 200	70 to 150	20 to 70	1 to 20	Don't Know
☐	☐	☐	☐	☐	☐

5.9. Technology Use and Integration

This section investigates the degree of technology use and integration for specific work functions on your project. For each work function, please use the first column to assess the level of automation. Using the second and third columns, please assess the level of internal company-level integration such as integration with other functions, project management systems and/or company systems and external company-level integration such as integration with other project stakeholders, respectively.

Use Levels

Automation

- **None (1):** No electronic tools or commonly used electronic tools, all processes completed manually
- **Minimal (2):** Checklists or simple tools are available to help complete the process
- **Moderate (3):** Electronic tools are available to help complete part of the work
- **Extensive (4):** Electronic tools complete most of the work after entering input data, with minimal amount of manual work after data are entered
- **Complete (5):** Entire process automatically completed after input data are entered.

Integration

- **None (1):** *No data communication* or sharing with other electronic tools
- **Minimal (2):** Data (or information) produced from the work function are transferred manually because the data are *rarely interoperable*.
- **Moderate (3):** Data (or information) produced from the work function are still manually transferred but some data are *somewhat interoperable* with other functions/stakeholders.
- **Extensive (4):** Data (or information) produced from the work function are *mostly interoperable* with other functions/stakeholders and do not require manual transfer.
- **Complete (5):** Data (or information) produced from the work function are *seamlessly interoperable* with other functions/stakeholders and no manual data transfer is required.

	Level of Work Task Automation					Level of Internal Integration					Level of External Integration					N/A or UNK
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
Project Management	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Front End Planning	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Detail Design	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Procurement	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Construction	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Startup/Commission	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

5.10. Planning for Startup

[For Heavy and Light Industrial Projects Only]

Startup is the transitional phase between plant construction completion and commercial operations, including all of the activities that bridge these two phases. **Planning for**

Startup consists of a sequence of activities that begins during requirements definition and extends through initial operations. This section assesses the level of Startup Planning by evaluating the degree of implementation of specific activities throughout the various phases of a project.

Contractor only question.

5.13.1 Was your company responsible for startup?

Yes, full responsibility	Yes, partial responsibility	No, not responsible at all
☐	☐	☐

5.13.2 To what extent was a <u>formal</u> startup execution plan developed?

Not at All Developed			Partially Developed			Very Extensively Developed	Don't Know
1	2	3	4	5	6	7	
☐	☐	☐	☐	☐	☐	☐	☐

5.13.3 To what extent was a <u>formal</u> startup execution plan implemented?

Not at All Implemented			Partially Implemented			Very Extensively Implemented	Don't Know
1	2	3	4	5	6	7	
☐	☐	☐	☐	☐	☐	☐	☐

5.11. Partnering

Partnering is a commitment between two or more organizations for the purpose of achieving specific business objectives by maximizing the effectiveness of each participant's resources. This requires changing traditional relationships to a shared culture without regard to organizational boundaries. The relationship is based on trust, dedication to common goals and an understanding of each other's individual expectations and goals.

5.15.1 Did you have a partnering agreement on this project with the owner/contractor?

☐ No ☐ Yes ☐ Don't Know

5.12. Project Delivery and Contract Strategy

Owner only; contractors automatically skip this entire section

Project Delivery and Contract Strategy involves a structured process of evaluating and prioritizing owner's objectives, reviewing and evaluating delivery methods and contract types, and then determining what is the appropriate delivery method and contract type for this project.

5.16.1 Did you consider alternative project delivery methods for this project?

☐ No ☐ Yes ☐ Don't Know

5.16.2 Did you consider alternative contract types for this project?

☐ No ☐ Yes ☐ Don't Know

5.13. Workface Planning (WFP)

Workface Planning is the process of organizing and delivering all the elements necessary, before work is started, to enable craft persons to perform quality work in a safe, effective and efficient manner.

(More information about WFP on the COAA web site- http://www.coaa.ab.ca/BESTPRACTICES/ConstructionIndustryPerformance/WorkfacePlanning/tabid/96/Default.aspx)

Was Workface Planning used in this project?

Yes ◘ No ◘

If "Yes", Please select the response below that best describes the level of implementation of workface planning in five critical areas:

– Field Installation Work Packages (FIWP)
– FIWP Planners
– EWP/ CWP Release Plan and Approvals

– Integration and Coordination of FIWP

A work package is a detailed scope of work to be completed by a construction crew over a specified period of time. This work package includes details of drawings, specifications, labour requirements, required material, equipment and tools, scaffolding needs, quality control, risk response plans, sequence of work and interdependencies with other work package.

How many Field Installation Work Packages (FIWP) were issued? _____

How many FIWPs were completed? _____

Score each question using the following criteria:

– **Strongly Disagree** - The identified practice is not followed on this project.
– **Disagree** - We often fail to meet the requirement as defined by the practice on this project.
– **Neutral** - We follow the defined practice but inconsistently or consistently but not all the time
– **Agree** - We follow the defined practice consistently and meet the requirement most of the time.
– **Strongly Agree** - We follow the defined practice all the time.

Note: Please fill in "**Not Applicable**" to indicate if any element does not apply to your project.

	Critical Areas	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	NA / UNK
A. Field Installation Work Packages (FIWP)							
A.1	Work is always packaged in Field Installation Work Packages (FIWP). *Clarification: An FIWP is a detailed scope of the work to be completed by a crew, over a specified period of time (usually a 1 to 4 week period).*	◘	◘	◘	◘	◘	◘
A.2	Dedicated Planner completes FIWP and signs-off as ready before FIWP is released to crew. *Clarification: An FIWP Checklist is discipline specific (civil, structural, piping, electrical, etc.) and itemizes all the information and documentation that should be part of the completed FIWP.*	◘	◘	◘	◘	◘	◘
B. Planners							
B.1	Dedicated planner(s) develop the Field Installation Work Packages (FIWP)? *Clarification: A dedicated planner spends virtually all of their time developing FIWP.*	◘	◘	◘	◘	◘	◘
C. EWP/CWP Release Plan and Approvals							
C.1	Engineering Work Package (EWP) identification and release plans are developed prior to the start of detailed engineering, which are reviewed and agreed to by the contractor or construction management.	◘	◘	◘	◘	◘	◘

Critical Areas		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	NA / UNK
C.2	Construction Work Package (CWP) identification and release plans are developed prior to the start of detailed engineering, which are reviewed and agreed to by engineering.	◘	◘	◘	◘	◘	◘
D. FIWP Release Plan and Approvals							
D.1	A schedule and release plan is developed for all Field Installation Work Packages (FIWP) based on the CWP	◘	◘	◘	◘	◘	◘
D.2	General foremen, planners and construction superintendents review and agree to the schedule, scope, sequence and timing of the FIWP	◘	◘	◘	◘	◘	◘
D.3	Final approval by Construction superintendent or their designate of the schedule, scope, sequence & timing of the FIWP	◘	◘	◘	◘	◘	◘
E. Integration and Coordination of FIWP							
E.1	Responsibility for integration planning was established to proactively resolve anticipated conflicts between individual FIWP's.	◘	◘	◘	◘	◘	◘
E.2	Responsibility for material coordination of individual FIWP's were assigned to a dedicated Coordinator(s).	◘	◘	◘	◘	◘	◘
E.3	Responsibility for specialty tools and construction equipment coordination for each FIWP was assigned to a dedicated Coordinator(s).	◘	◘	◘	◘	◘	◘

Based on the COAA Workface Planning Scorecard, what is the Combined WFP Score: ____%

Please evaluate the overall effectiveness for each practice you used in this project. Respond with NA if you did not use a best practice.

Workface Planning

On a scale of 0 to 10, with 0 indicating not effective and 10 indicating very effective, please assess ***the overall effectiveness of Workface Planning*** on this project.

0	1	2	3	4	5	6	7	8	9	10	NA	UNK
◘	◘	◘	◘	◘	◘	◘	◘	◘	◘	◘	◘	◘

6. Closeout

6.1. Achieving Facility Capacity

Indicate the **primary** product or function of the completed facility and the unit of measure which best relates the product or function capacity of the completed facility. [Only for industrial projects]

Product or Function	Production capacity
_____	_____

Examples:

Product or Function	***Unit of Measure***
Chemical Products	*Tonnes / Day*
Oil and Gas	*BOE / Day* *(BOE = Barrel Oil Equivalent)*

6.1.1 ***[Contractor only]*** Were you involved in startup activities?

☐ No ☐ Yes ☐ Don't Know

If contractor did not perform start up activities, skip the rest of this section.

[Heavy/Light Industrial project only] What percent of initial planned capacities were achieved during Startup?

_____% ☐ Don't Know

6.1.2 [Heavy/Light Industrial project only] To what extent were product quality specifications achieved?

Not at All			Moderately			Fully Achieved	Don't Know	NA
1	2	3	4	5	6	7		
☐	☐	☐	☐	☐	☐	☐	☐	☐

6.1.3 [Building project only] To what extent was the planned functionality of the building achieved?

Not at All			Moderately			Fully Achieved	Don't Know	NA
1	2	3	4	5	6	7		
☐	☐	☐	☐	☐	☐	☐	☐	☐

6.1.4 To what extent were planned project quality specifications achieved?

Not at All			Moderately			Fully Achieved	Don't Know	NA
1	2	3	4	5	6	7		
☐	☐	☐	☐	☐	☐	☐	☐	☐

6.2. Project Outcomes

Using a scale from 1 to 7, where 1 means "not at all successful" and 7 means "extremely successful" please indicate the overall success of this project in terms of:

	Not at All Successful			Moderately Successful			Extremely Successful
	1	2	3	4	5	6	7
Meeting cost expectations	☐	☐	☐	☐	☐	☐	☐
Meeting schedule expectations	☐	☐	☐	☐	☐	☐	☐
Meeting safety expectations	☐	☐	☐	☐	☐	☐	☐
Meeting business objectives	☐	☐	☐	☐	☐	☐	☐
Meeting quality goals	☐	☐	☐	☐	☐	☐	☐

Using a 1 to 7 scale where 1 means "not at all effective" and 7 means "extremely effective", please indicate how effective the following were on this project:

	Not at All Effective			Moderately Effective			Extremely Effective
	1	2	3	4	5	6	7
Project teamwork	☐	☐	☐	☐	☐	☐	☐
Project team communications	☐	☐	☐	☐	☐	☐	☐
Your working relationship with the owner / primary contractor	☐	☐	☐	☐	☐	☐	☐
The key project team members understood the owner's goals and objectives of this project	☐	☐	☐	☐	☐	☐	☐

Projects invariably differ in a variety of ways. Please indicate in the space below what you found to be particular challenges or difficulties on this project, compared to other comparable projects on which you have worked.

_____

_____

_____

What do you think could have improved this project?

_____

_____

_____

_____

6.3. Work-hours and Accident Data

To measure Safety Performance and with the goal of achieving zero injuries and illnesses, the recording and classification of occupational injuries and illnesses of all direct hire workers and contractors are reported following the industry guidelines in Canada (WCB and CAPP).

In the spaces below, please record the **Total Number of Fatalities, Lost Time Cases, Medical Aid Cases and First Aid Cases and the Total Number of Restricted Work Cases, Restricted Medical Aid Cases and Restricted First Aid Cases.** With the exception of fatalities, also provide the total number of days away from work for each.

Next, record the number of **Near Misses,** the **Total Site Work-hours (Exposure Hours), Total Number of Employees, the Average Full Time Equivalent,** and the **Number of Hours in Your Normal Work Week.**

Use WCB and CAPP definitions. If you do not track in accordance with these definitions, click Unknown in the boxes below.

<table>
<tr><td colspan="2">Please provide the Total Number of Fatalities from:
_____ Workplace occupational injuries or illnesses ◘Unknown
_____ Travel-related ◘Unknown</td></tr>
<tr><td>Please provide the Total Number of Lost Time Cases, Medical Aid Cases and First Aid Cases:</td><td>Please provide the total workdays away for Lost Time, Medical Aid and First Aid incidents:</td></tr>
<tr><td>_____ Lost Time Cases ◘ Unknown
_____ Medical Aid Cases ◘ Unknown
_____ First Aid Cases ◘ Unknown</td><td>_____ Lost Time Days ◘ Unknown
_____ Medical Aid Days ◘ Unknown
_____ First Aid Days ◘ Unknown</td></tr>
<tr><td>Please provide the Total Number of Restricted Work Cases, Restricted Medical Aid Cases and Restricted First Aid Cases:</td><td>Please provide the Total Workdays for Restricted Work, Restricted Medical Aid and Restricted First Aid incidents:</td></tr>
<tr><td>_____ Total Restricted Work Cases
◘ Unknown</td><td>_____ Total Restricted Workdays
◘ Unknown</td></tr>
</table>

Near Misses
Near Misses are common at many worksites. They do not result in injury-but they may cause property damage. If, say, an employee had been in a slightly different position or place, or the equipment or product placement had been to the left or right, serious injury and/or damages could have resulted. A lot depends on sheer luck and circumstance (Heberle, 1998).

How many near misses occurred? _____ ◘Unknown

Total Site Work-hours (Exposure Hours): _____ ◘ Don't Know

Peak Workforce Number of Employees: _____◘ Don't Know

Percentage of Overtime Hours: _____(%) ☐ Don't Know

"**Overtime**" - above 40 work week. If the actual percentage cannot be calculated, please provide your best assessment. Answer Don't Know only if you cannot make a reasonable assessment.

6.4. Project Impact Factors

Using a scale from -5 to +5, where -5 means "an extremely negative impact" compared to what was expected or planned and +5 means an "extremely positive impact" compared to what was expected or planned, please indicate the extent to which each of the following factors had a net positive impact, a net negative impact, or was essentially as planned?

Factors	Extremely Negative					As Planned					Extremely Positive	Don't Know
	-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5	
Labor Disruption	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Engineering work sequence	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Owner site requirement	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Engineering Deliverables	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Weather / Climate	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Availability of Skilled Labor	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Materials Availability/Cost	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Site Conditions	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Project complexity	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Regulatory requirements	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Project team expertise	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Project team communication	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Core project team turnover	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Use of offshore (remote) engineering	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Use of multiple design offices	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Material or labor cost escalation	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Construction productivity	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Availability of construction equipment on the job	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Quality of Field Level Supervision	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Amount of Scheduled Overtime	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Amount of Unplanned Overtime	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Craft Labour Skill	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Engineering Labour Skill	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Business Market Conditions	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Coordination with Plant Shutdown	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

6.5. Workforce Conditions

6.5.1 Percentage of Workweek by Workforce Shifts and Schedules:

Indicate on average, the predicted and actual percentage of the project's workforce working day, evening and night shifts, by work week schedules. If the actual percentage cannot be calculated, please provide your best assessment. Answer Unknown only if you cannot make a reasonable assessment. Percentages may be indicated in increments of 5 %.

As budgeted in AFE				
Work Schedule (days)	Days		Nights	
4-3	_____%	◘ Unknown	_____%	◘ Unknown
5-2	_____%	◘ Unknown	_____%	◘ Unknown
6-1	_____%	◘ Unknown	_____%	◘ Unknown
7-0	_____%	◘ Unknown	_____%	◘ Unknown
10-4	_____%	◘ Unknown	_____%	◘ Unknown
11-3	_____%	◘ Unknown	_____%	◘ Unknown
12-2	_____%	◘ Unknown	_____%	◘ Unknown
Other	_____%	◘ Unknown	_____%	◘ Unknown
Total	100 %		100 %	

Actual at project completion				
Work Schedule (days)	Days		Nights	
4-3	_____%	◘ Unknown	_____%	◘ Unknown
5-2	_____%	◘ Unknown	_____%	◘ Unknown
6-1	_____%	◘ Unknown	_____%	◘ Unknown
7-0	_____%	◘ Unknown	_____%	◘ Unknown
10-4	_____%	◘ Unknown	_____%	◘ Unknown
11-3	_____%	◘ Unknown	_____%	◘ Unknown
12-2	_____%	◘ Unknown	_____%	◘ Unknown
Other	_____%	◘ Unknown	_____%	◘ Unknown
Total	100 %		100 %	

6.5.2 Level of Overtime as % of Total Field Work-Hours

Indicate below the planned and actual percentage of field work-hours classified as overtime.

Planned overtime	Actual overtime
_____% ◘ Unknown	_____% ◘ Unknown

If the ratio of Actual exceeds Planned overtime, please provide the reason why:

_____

6.5.3 Worker Accommodations

Indicate below the planned and actual percentage of workers living in camps and with living out allowance (LOA).

Planned % of workers in camps	Actual % of workers in camps
_____% ◘ Unknown	_____% ◘ Unknown

Planned % of workers with LOA	Actual % of workers with LOA
_____% ◘ Unknown	_____% ◘ Unknown

If LOA applicable, what was the LOA amount?_____($CAD/day/person)
If Camps applicable, what was the camps amount?_____($CAD/day)

6.5.4 Peak Construction Work Force

Indicate the peak construction work force planned and achieved for this project by inputting the maximum number of working personnel at the jobsite at one time:

Planned Peak Work Force	Actual Peak Work Force
_____ ◘ Unknown	_____ ◘ Unknown

Planned Peak Indirect Work Force	Actual Peak Indirect Work Force
_____ ◘ Unknown	_____ ◘ Unknown

6.5.5 Indicate as a percentage below the planned and actual methods utilized by personnel for travel to the worksite.

Mode of Travel	Planned	Actual
Bus	_____% ◘ Unknown	_____% ◘ Unknown
Air	_____% ◘ Unknown	_____% ◘ Unknown
Personal Vehicle	_____% ◘ Unknown	_____% ◘ Unknown
Other	_____% ◘ Unknown	_____% ◘ Unknown
Total	100 %	100 %

6.5.6 Percentage of winter work:

What percentage of **winter work was performed in outdoor conditions from October 15 to April 15?** If the actual percentage cannot be calculated, please provide your best assessment. Answer Unknown only if you cannot make a reasonable assessment.

Planned Outdoor Work in Winter	Actual Outdoor Work in Winter
_____% ◘ Unknown	_____% ◘ Unknown

7. Wellsite specific questions

(Please answer the following questions with actual data unless otherwise indicated)

Please check-off the most appropriate location for this well-site

- ☐ NE British Columbia / NW Alberta Border
- ☐ Foothills
- ☐ Athabasca
- ☐ Peace River
- ☐ Southern Alberta
- ☐ United States
- ☐ Other

What is the type of production at this well-site?

- ☐ Sweet Gas
- ☐ Sour Gas (>1% H2S)
- ☐ Insitu/Cold Production
- ☐ Thermal Production

Is this a Single-Well-Facility (SWF) or Multiple-Well-Facility/Multi-Well-Pad (MWF)?

- ☐ SWF
- ☐ MWF

(If a MWF) number of wells on-site_____

Production Information

(Design) Flow Rate _____(10^3m^3/d or mscf/d)

(Design) Gas Flow Rate _____(10^3m^3/d or mscf/d)

(Design) Condensate/Oil Rate _____(10^3m^3/d or mscf/d)

(Design) Water Rate _____(10^3m^3/d or mscf/d)

Which of the following equipment is found on your wellsite? Please check all that apply and whether or not these are temporary or permanent.

	Temporary	Permanent
Separator Pkg	☐	☐
Dehydration	☐	☐
Refrigeration	☐	☐

Meter Pkg	☐	☐
Wet Metering	☐	☐
Dry Metering	☐	☐
Condensate Metering	☐	☐
Water Metering	☐	☐
On-site Tanks	☐	☐
Water Tankage	☐	☐
Condensate Tankage	☐	☐
Oil Tankage	☐	☐
Pumps	☐	☐
Water	☐	☐
Condensate	☐	☐
LACT		
Heater Pkg	☐	☐
Flare Pkg	☐	☐
Sand Separator Pkg	☐	☐

Other (Please list)

_____

_____

Planned and Actual Schedule

Was this project constructed in stages or all at once? Please check the appropriate answer.

☐ Stages ☐ All at once

Cycle Time - Completion Rig Release to Production Flowing to Sales
(this seems like start-up and commissioning phase duration factor – may be duplication)

_____Planned (Days)

_____Actual (Days)

8. Pipeline Specific Questions

Project type

☐ Greenfield/No Existing ROW

☐ Expansion/Looping utilizing existing ROW

☐ Parallel Foreign Pipeline ROW

What was the most predominant diameter of pipe used on this project?

☐ Under 16" Diameter

☐ 16" to Under 24" Diameter

☐ 24" to Under 36" Diameter

☐ 36" and Larger Diameter

What type of pipeline is it?

☐ above ground ☐ buried ☐ mixed

	Numbers of crossings for all spreads in the project	How many of these achieved by Horizontal Directional Drilling (HDD)?
Major Roads		
Minor Roads*		
Railway		
Major River		
Minor River*		
Sensitive environment zone		
Other pipelines or communication lines		

Note: a minor crossing is less than 50 meters.

How many spreads did this project have?_____

Please identify the percentage of each labour type

Alternate Unions (Merit, CLAC) _____%
Building Trades / PLCC _____%
Non-Union _____%
Other Unions _____%

Pipe cost: $CAD_____(excluding transportation and installation cost)

Pipe coating cost: $CAD_____

Pipe freight cost (coated pipe landed at stockpile at ROW): $CAD_____

Pipe freight cost (bare pipe to coater): $CAD_____

Mainline construction cost: $CAD_____

Crossing construction cost: $CAD_____

Surveying Cost: $ CDN_____

NDT Cost: $ CDN_____

Right of Way (ROW) Initial Restoration (@ completion): $ CDN_____

Pipe size (weighted average diameter) _____(meters / inches)

Estimated length of Pipe:_____(km)

Actual length of Pipe:_____(km)

Total weight of pipe: _____(ton)

Length of pipe with concrete coating _____km

Length of pipe with pipe weights or anchors_____km

Length of pipe with road ditch _____km

	Pipe Joint Length
Single-Jointed Pipe	_____(km / miles)
Double-Jointed Pipe	_____(km / miles)

Pipe wall thickness (weighted average) _____(cm / inches)

Type of coating (please select main coating)

- ☐ Epoxy
- ☐ Rock Jacket
- ☐ 3 layer
- ☐ Other

Pipe grade (project average grade – most prevalent) _____

Primary source of pipe (list countries)

_____

Product Type

- ☐ Oil
- ☐ Gas
  - ☐ Sweet
  - ☐ Sour
- ☐ Other

Terrain Type	%
Farmland/Agricultural	
Grassland/Prairie	
Forest	

Note: percentages must add up to 100%.

Terrain Grade	%
Hilly	
Flat	
Mountainous	

Note: percentages must add up to 100%.

Type of Soil	%
Saturated Soils (wet/boreal forest)	
Muskeg	
Rocky	
Sandy	

Note: percentages must add up to 100%.

Land Use	%
Crown	
Rural Freehold	
Semi-Rural	
Populated	

Note: percentages must add up to 100%.

Design capacity (m^3/day)	
Actual capacity (m^3/day)	

	Average Crew Size (number of people)	Cost ($CAD)	Total Work Hours
Clearing			
Ditching			
Grading			
Bending			
Welding			
Tie-in			

Clean-up			
Hydro Testing			
Other			

Total number of welds _____

Welding phase duration: _____(in days, excludes tie-ins)