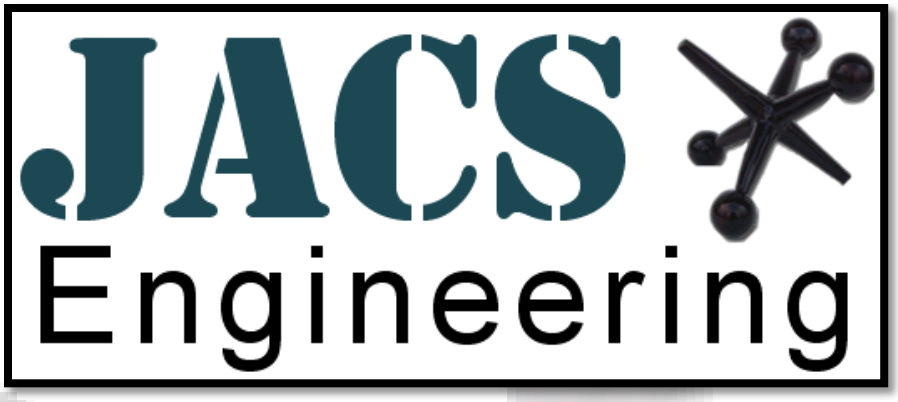


Project Work Plan

Project: Polar Centre

Client: AE Consultants

Location: St. Anthony, NL

JACS Engineering – Group 5

Jeremy Cooper

Andrew Fudge

Colin Pollard

Steve Forward

PREPARED FOR DR. STEVE BRUNEAU JANUARY 29, 2010

JACS ENGINEERING
35 EDGECOMBE DR.
ST. JOHN'S, NL, CANADA
A1B 4P2

JANUARY 29, 2010

DR. STEVE BRUNEAU

MEMORIAL UNIVERSITY OF NEWFOUNDLAND
ST. JOHN'S, NL, CANADA
A1C 5S7

CC: ***KRISTA HANCOCK*** *– AE CONSULTANTS LTD*

Dear Mr. Bruneau,

Enclosed for submission is the Work Plan for the Polar Centre project. This report has been created by JACS Engineering as a requirement for the Civil Engineering Project course at Memorial University.

The enclosed report encompasses the foreseeable work scope involved with the structural engineering design of the Polar Centre arena. This scope includes the work involved with the design of the support system for the second floor of the arena. It should be noted that the commencement of this scope of work is pending and is subject to further discussion with the client (AE Consultants Ltd).

If there are any questions concerning this report, I would be pleased to discuss them with you.

Yours sincerely,

COLIN POLLARD
PROJECT MANAGER
JACS ENGINEERING – GROUP 5

Table of Contents

1.0 – Project Description

The Polar Centre is a proposed arena to be built in the community of St. Anthony, NL. The building will be a steel super structure with concrete foundations. A plan view of the architectural design can be seen in Figure 1. The arena will consist of two floors and an attached mechanical annex. The Polar Centre is intended to replace the community's existing arena.

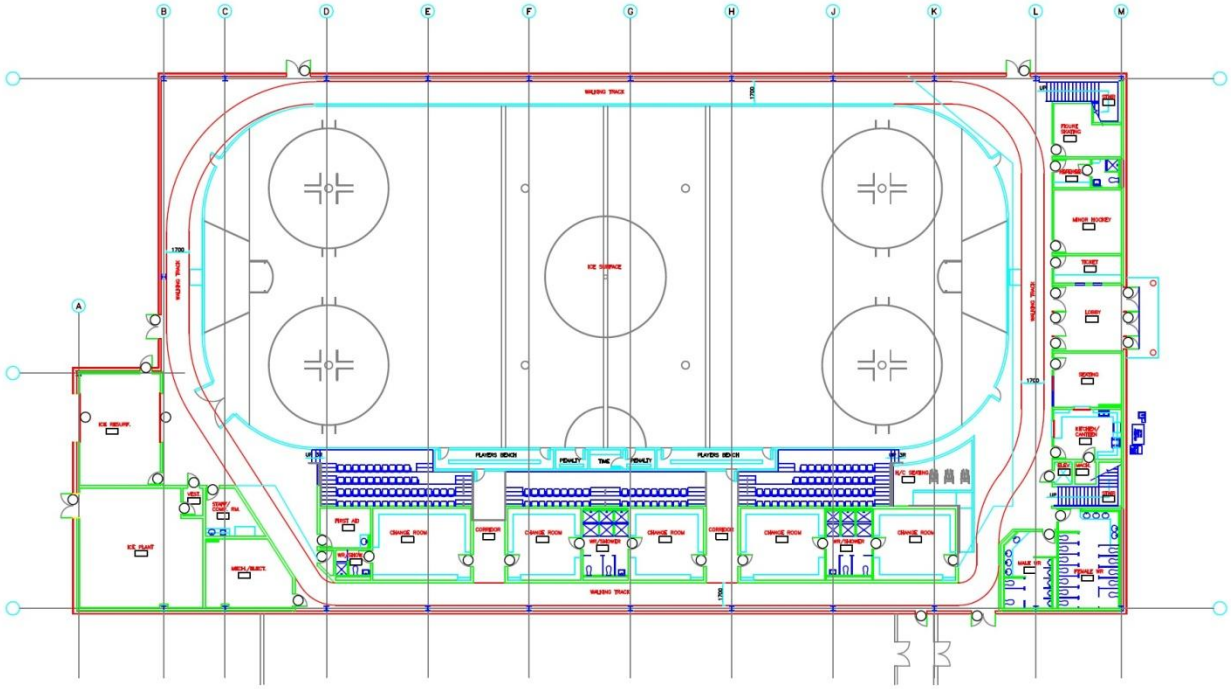


Figure 1 - Polar Centre Plan View

2.0 – Statement of Project Requirements

The objective of this project is to develop a comprehensive structural design for a proposed arena in St. Anthony, NL. A set of working drawings for this design must be created and submitted to the client. A class C cost estimate (+/- 25%) will be provided for all required structural materials and construction materials and labour.

Midway through the project timeline a midterm report and presentation will be submitted. Weekly progress reports will also be submitted through the lifetime of this project. Upon project completion a project binder containing all deliverables, correspondence and all other documentation must be provided. A final report and presentation will also be prepared and performed at this time.

3.0 – Project Overview

3.1 – Client Interaction

The client for this project is AE Consultants Ltd. (AECL) who are the architects and structural engineers for the Polar Centre. AECL will be a source of advice and information for the arena design. Biweekly meetings will be held with the client to discuss progress and any current challenges surrounding the project. The client will receive agendas and minutes for all meetings. A schedule will also be presented at the beginning of the project.

A&E has supplied a geotechnical report, “Geotechnical Sub-Surface Investigation – Polar Centre” which has been prepared by ADI Ltd. A set of architectural CAD drawings has also been provided, as prepared by AECL

3.2 – Design Principles

All design procedures will follow the most appropriate building, concrete and steel design codes. All loads and calculations will follow the National Building Code of Canada. Steel design and concrete design will conform to CSA codes. S-Frame (S-Steel and S-Concrete) will be used for design and analysis of most members. The S-Frame results will all be accompanied with supporting hand calculations.

3.3 – Cost Estimation Strategy

Materials, construction and labour costs should be based on areas closest to St. Anthony. Costworks software and RS Means data is available for use. Since this data is based on Avalon area pricing manufacturers and suppliers in the St. Anthony area will be contacted for material pricing data. Contractors and shipping companies will be contacted for required labour and freight costs respectively. Costworks will be used only when and if data is not obtainable from the discussed parties and its outputs will be adjusted accordingly.

4.0 – Scope of Work

To satisfy project objectives the scope of work for the project will include all engineering analysis and design of the Polar Centre structural systems. This consists of all steel and concrete elements inherent to the building support structure. All hand written sample calculations completed during this stage will be included with design analysis reports. S-Frame will be used to assist in all structural element design.

All results from design will be used to generate a set of working drawings. These drawings will be created using AutoCAD software and will include all members and connection details specified in the design.

For simplicity the planned scope of work has been divided into concrete design, steel design, cost estimation and project administration. Furthermore all work expected for the second floor of the arena has been segregated. This portion of the project is not currently included in this work scope. The second floor may be added at a later date.

4.1 - Load Scenarios

To determine the required resistance of the building structural elements, all loads must be known. Environmental loads need to be determined along with the interior loads (scoreboard, HVAC, Electrical). The National Building Code of Canada contains relevant data pertaining to the snow and wind loadings found in St. Anthony.

Using the NBCC, a set of loading scenarios will be completed for various wind directions and snow distribution. The slope of the roof must be taken into account for the snow loads. Lateral loading, wind exposure and roof material scencarios must also be calculated.

The buildings intended usage will determine the amount of live load that will need to be designed for. The building will also need to be classified as normal, high or post-disaster to determine the safety factors that must be utilized for determining the maximum design loads.

4.2 – Analysis and Design of Steel Structure

The main structural support system will be a steel frame. This will consist of steel trusses and open web joists for the roof and steel columns and bracings for the perimeter wall support. Standard carbon steel sizes are the most easily accessible material in St. Anthony and therefore will be used for the design of this structure.

4.2.1 – Roof Structure

The roof structure will contain two main components: trusses and the open-web steel joists. The strength of the trusses will be determined using the maximum design loads found from various loading scenarios (both snow and wind loads).

The spacing of the trusses has been specified by AECL. The most economical member configuration would be the target design. AECL has recommended that stiffeners be avoided and bolted connections should be used throughout the structural system for simplicity of installation. This will also help reduce labour hours.

Open web steel joists are also to be included in the roof structure design. Joists will carry all load transferred from the roof cladding material to the trusses. The load magnitudes will be used to select the appropriate joist based upon CANAM specifications.

4.2.3 – Zamboni Area

There is an additional one story section attached to the main arena. This area is to be used for the housing of an ice plant and for Zamboni maintenance. Due to the lower roof in this section the snow loading becomes more complex. Therefore drifting and partial loads will be considered in analysis. The roof support system for the Zamboni area will differ from the main roof system due to its geometry. The structural system here is yet to be determined.

4.2.4 – Perimeter Support

The trusses and roof loads will rest upon perimeter steel columns. Horizontal bracing will be connected to these columns in order to resist lateral loading caused by wind. The columns will need to be designed for both vertical and lateral loads transferred. All connections of trusses and braces to columns will also need to be designed using bolted connections.

4.3 – Analysis and Design of Concrete Members

Foundations, floors and bleachers will be designed using concrete. The perimeter columns of the building will be supported by a concrete strip footing. The main floor of the arena will be constructed of a concrete slab on grade. A small section of the upper level will be a suspended concrete slab. A set of concrete bleachers will be designed as well.

All concrete will be designed using a standard strength of 30 MPa. Concrete should be designed to be easily mixed on site as there are no batch plants in the immediate area of St. Anthony.

4.3.1 – Bleachers

The bleachers for the Polar Centre will require a support system that will be able carry the expected capacity as well as installed seats. The bleachers will span from the ground floor to the second level. These bleachers will be supported by load bearing masonry walls, and there will be an intermediate support at the midpoint of this span. Formwork complexity will need to be accounted for as intricate systems should be

avoided for economic reasons. Concrete volume should also be minimized as well as it would affect loading on the bearing walls and material costs.

4.3.2 – Bearing Walls

Bearing walls have been selected for support of the bleachers. They also act as partitions for changing rooms and washrooms. Various wall configurations will be evaluated. Potential configurations could include Insulate Concrete Formwork or traditional masonry. These walls will need to be designed for buckling. Grout filling and rebar support bars will be added as per design. Lower grouting requirements will be desired as a higher grout amount will increase cost.

4.3.3 – Footings

Strip footings are to be placed around the perimeter of the structure. This footing transfers all loads from the perimeter columns and perimeter walls to the surrounding soil. This must occur without causing excess soil settlement. The design of these footings will be governed by the bearing capacity of the soil and the loads to which it is subjected. The bearing capacity of the soil has been stated by the geotechnical report “Geotechnical Sub-Surface Investigation – Polar Centre”. Additional NBCC foundation codes will also be adhered to.

Should the second level become part of this scope of work there may also be a requirement for interior column footings. The slab on grade may be thickened such that the column will not punch through or cause excess soil deflection.

4.3.4 – Slab

The slab will be designed as a slab on grade as per the NBCC. Spacing allowances will be considered for mechanical equipment.

Any slab being used on the second level will need to be designed as a suspended slab. This slab will either be supported by load bearing walls or a beam system. This concrete will also be designed as per NBCC.

4.4 – Cost Analysis

Material and construction costs will be based on the design details. A class C estimate will be prepared for this project and will come within +/- 25% of the actual cost. This is to be a preliminary estimate provided for information purposes.

4.4.1 – Quantity Take-Offs

Steel members will be quantified by their sizes. This includes beams, columns, and truss members, cross bracing and steel rebar. The volume of concrete specified will be also be quantified.

4.4.2 – Construction Costs

The costs involved with the construction phase are to be included in the estimate. The labour required to install steel members must be determined. More complex steel connections will increase the cost of installation. Any welded sections will need to be noted and priced separately.

The cost of concrete installation is heavily influenced by amount of formwork required. As formwork complexity increases, costs will also increase.

4.5 – Project Administration

Effective communication and organization are essential to the management of the project. A progress report will be created on a weekly basis and submitted the AECL and MUN. This will cover the work undertaken the previous week, work that is on schedule for the following week and any foreseeable challenges or issues.

All meeting minutes and agendas with AECL must be recorded and filed. These documents will be a requirement of each meeting. The agenda will include minutes from the previous meeting (old business) and current items requiring discussion.

The project schedule will be updated on a biweekly basis. The schedule will be maintained to show completion and time re-allocation. Keeping to the project time line is important and the schedule should be followed closely.

Design reports, meeting minutes, and all other communications and paper work will be filed into a project binder for submittal at project completion

5.0 – Key Project Assumptions

In order to design the members required for the Polar Centre some key assumptions must be made. The availability of materials in St. Anthony and the surrounding area will be considered. Basic carbon steel will be used with an assumed yield strength of 350 MPa. All concrete will be of standard mix with a yield strength of 30 MPa.

Mechanical system details are not available and the exact loads of the HVAC and electrical systems will not be known. To ensure a safe design a conservative estimate of

this load will need to be made. AECL has suggested including an additional 1.0 KPa dead load for roofing systems to account for these weights.

6.0 – Roles and Responsibilities

Roles have been assigned in order to delegate project tasks and ensure all required project work is completed. These roles are discussed in detail below. All drafting activity will be shared amongst all roles.

6.1 – Project Manager

The project manager will be tasked with creating a working schedule at the start of the project. It will be their duty to ensure that all work meets the set deadlines and the schedule is kept up to date. The project manager will also be responsible for any client liaison and reporting.

6.2 – Concrete Design Engineer

The concrete design engineer will lead the design of all concrete elements. This role will also include analysis and design reporting regarding the concrete and masonry design. The concrete design engineer will also ensure that all concrete drawings are complete and correct.

6.3 – Steel Design Engineer

The steel design engineer will lead the design of structural steel members. This will include the analysis and design of roof trusses, open web joists, columns, cross-bracing and connection details. The steel design engineer will also ensure that all steel drawings are complete and correct.

6.4 – Estimator

The estimator's main duties will be in developing the required cost estimate. This will include quantity take-offs and pricing duties. The estimator will also develop the final cost report to be included in the estimate.

7.0 – Project Milestones

Milestones have been included in the project schedule to highlight important events. These milestones are either related to course objectives or project objectives. A breakdown of all included milestones is included below.

7.1 – Course Related Milestones

A midterm progress report will be submitted on February 16th, 2010. All work completed to this date will need to be prepared in a written report and presented.

A final report will be prepared to include all project information and will be submitted on April 5th, 2010. All weekly progress reports, meeting agendas and minutes will be filed and maintained for submission at end of project. The design documents and cost estimate will be presented along with these reports. A final presentation must also be prepared to accompany the project material. The presentation will give an overview of project work and outcomes.

7.2 – Project Related Milestones

A pair of milestones has been included for each design related task. These milestones mark the completion of the design and drafting of each task. Another milestone has been included to mark the completion of the cost estimate.

8.0 – Project Schedule

A detailed project schedule has been created and is included in Appendix B.

10.0 – Project Costs

Costs associated with carrying out this project are shown in Table 1.

Item	Associated Cost
Office Supplies	
Printing	$40
Binding	$30
Travel Expenses	
Fuel	$40

Table 1 - Expected Project Costs

11.0 – Deliverables

All deliverables associated with project are discussed in Table 2.

Deliverable	Description
Working Drawing Set	Delivered as full printed drawings. All CAD files and PDF files of drawings will be provided on a CD.
Cost Estimate	Cost estimate report will be delivered as a hard copy and in PDF format.
Meeting Agendas and Minutes	PDF documents to be delivered by email throughout term. Collection of these documents will be delivered in hard copy format at end of project.
Midterm Report	Delivered in hard copy format personally to instructor. PDF file will also be emailed to instructor.
Final Report	Delivered in hard copy format to both instructor and client. PDF copes will also be delivered by email.
Project Binder	All stated reports will be collected together in a project binder. This will be delivered to the instructor on project completion

Table 2 - Project Deliverables

12.0 – Risks and Vulnerability

There major foreseeable risks lie in the cost information and software availability. These issues may cause schedule delays or discrepancies in the project objectives. Available cost information is for the St. John's region only and there is expected to differ from the actual costs in the St. Anthony region. The availability of software is essential for analysis and design.

APPENDIX A – SOQ

JACS

Engineering

Statement of Qualifications

Mission Statement:

To provide quality consulting services for engineering challenges with a primary focus on safety, the environment and client satisfaction.

Goals and Objectives

As an emerging team of young engineers JACS Engineering aims to meet client needs and exceed expectations. We are prepared to undertake any engineering project with the goal of providing quality deliverables and sound design recommendations. To maximize performance we intend to utilize all available recourses and prepare our work with the utmost care and prudent engineering judgement.

About Us

JACS Engineering is comprised of four enthusiastic and hard-working senior civil engineering students from the Faculty of Engineering and Applied Science at Memorial University of Newfoundland. We have a multi-disciplinary background and are host to a set of valuable skills and experiences. JACS Engineering is eager to apply these skills to any engineering challenge.

Statement of Qualifications

Jeremy Cooper

Jeremy has gained valuable experience in the field of construction through his co-op terms. He was heavily involved with project coordination and field engineering. He has worked on two major hospitals, one of which requiring seismic reinforcement. He also gained experience with skeletal steel structures and coastal communication structures.

He is interested mainly in the fields of structural engineering and construction.

Andrew Fudge

Andrew is a well rounded student who is versed in a wide range of engineering fields. He has worked extensively in the transportation, municipal and hydroelectric engineering industries. His experience includes field engineering, bridge design, highway design, power generation, environmental assessment, transmission, structural and municipal engineering.

Andrew is interested in the areas of hydrology, hydroelectricity, municipal and transportation engineering

Colin Pollard

Colin has completed six co-op terms in the oil & gas industry with a strict focus on safety and the environment. His experience includes field engineering at a processing plant, subsea pipeline specification development at a consulting firm, project engineering for Hibernia platform and planning/estimating for an EPCM company.

Colin's interests lie in project management for engineering and construction projects in both industrial and commercial environments.

Steve Forward

Through his co-op terms with three diverse engineering consultants and a municipality, Steve has been involved with a number of challenging projects. His work experience includes but is not limited to municipal infrastructure design, earthworks, utility co-ordination, structural design, hydraulic design, environmental assessment and remediation, contractor oversight, and offshore and onshore geotechniques.

Steve is interested in geotechnical engineering, structural engineering and hydropower, and is considering graduate studies.

Statement of Qualifications

Experience

Client	Project
• Suncor Energy	*Firebag SAG-D*
• Production Services Network	*Hibernia*
	Terra-Nova
• C-CORE	*North Caspian Subsea Pipeline*
	Steel Catenary Risers
• EllisDon Construction Inc	*McCaig Tower*
	Ottawa General Hospital
• Royal Canadian Coast Guard	*MCI Division St. John's*
• Iron Ore Company of Canada	*Labrador City Mine*
• Conestoga Rovers & Associates	*Rambler Mine Site Remediation*
	Ontario Landfill Management
• Atlantic Engineering Consultants	*Corner Brook Courthouse*
	Wellington St. Sports Complex
• Town of Baie Verte	*Municipal GIS Development*
• Dept. of Transportation & Works	*Kenamu River Bridge*
	Bell Island Ferry Terminal
• Newfoundland Power	*Soldiers Pond Dam and Spillway*
	Rehab. of Mount Carmel Dam
	Cape Broyle Plant Improvements
• Nalcor Energy	*Lower Churchill Project*
• Dept. of Municipal Affairs	*Eastern Regional Operations*

Statement of Qualifications

Software Capabilities

AutoCAD	S-FRAME
Matlab	STAAD
Primavera	MS Project
MS Office	L-Pile
C++	HEC-HMS
Visual Basic	LandGEM
Fortran	CostWorks

Code Familiarity

CSA Standard A23.3-04	Municipal Master Specs.
CSA Standard S16-01	CSA Standard S6-06
Nation Construction Codes of Canada (NBC, NFC, NPC)	Industry Piping Specs.
Dept. Of Transportation and Works Master Specs.	Provincial Environmental Assessment Guidelines

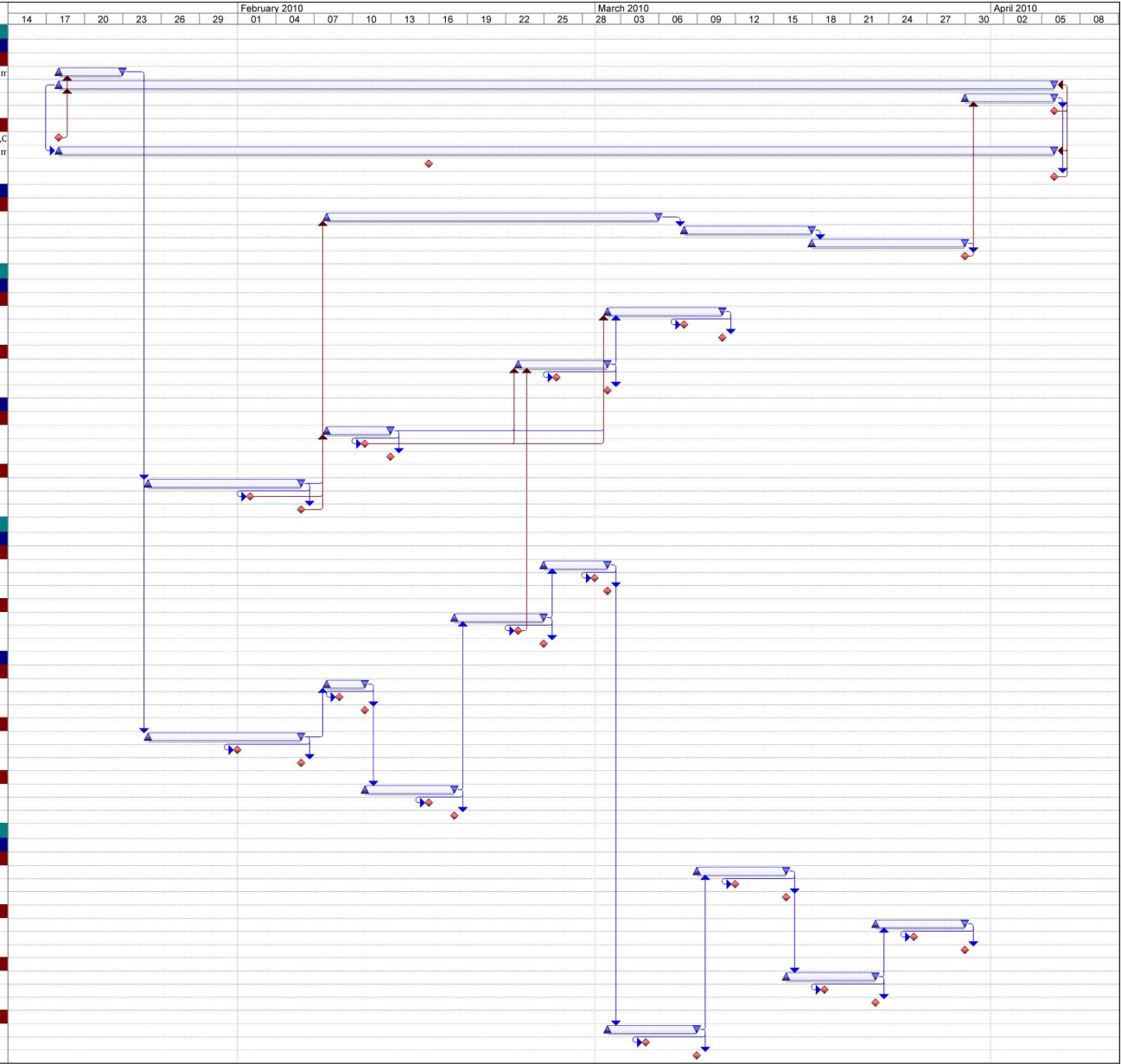
Contact Info

Email: JACS.Engineering@google.com

Tel:	(709) 728-7125	Jeremy Cooper
	(709) 693-7075	Steve Forward
	(709) 277-1847	Andrew Fudge
	(709) 351-0897	Colin Pollard

APPENDIX B – Project Schedule

Name	Task Code	Duration	Start	Finish	% Complete	Resource Names
:: ADMIN		56 days	Mon 18/01/10	Mon 05/04/10	0%	
::: CORE		56 days	Mon 18/01/10	Mon 05/04/10	0%	
:::: AECL		56 days	Mon 18/01/10	Mon 05/04/10	0%	
Conceptual Design	PC-X-001	5 days	Mon 18/01/10	Fri 22/01/10	0%	Project Manager[50%],Estim
Project Manager - General	PC-X-003	56 days	Mon 18/01/10	Mon 05/04/10	0%	Project Manager[25%]
Closeout	PC-X-002	5 days	Tue 30/03/10	Mon 05/04/10	0%	Project Manager[50%]
Client Handover	PC-X-M04	0 days	Mon 05/04/10	Mon 05/04/10	0%	Project Manager
:::: MUN		56 days	Mon 18/01/10	Mon 05/04/10	0%	
Project Kickoff	PC-X-M01	0 days	Mon 18/01/10	Mon 18/01/10	0%	Project Manager,Estimator,C
Project Support	PC-X-004	56 days	Mon 18/01/10	Mon 05/04/10	0%	Project Manager[25%],Estim
Midterm Report	PC-X-M02	0 days	Tue 16/02/10	Tue 16/02/10	0%	Project Manager[50%]
Final Report	PC-X-M03	0 days	Mon 05/04/10	Mon 05/04/10	0%	Project Manager[50%]
::: COST		36 days	Mon 08/02/10	Mon 29/03/10	0%	
:::: ESTIMATE		36 days	Mon 08/02/10	Mon 29/03/10	0%	
Quantity Takeoff	PC-C-001	20 days	Mon 08/02/10	Fri 05/03/10	0%	Estimator[50%]
Materials	PC-C-002	8 days	Mon 08/03/10	Wed 17/03/10	0%	Estimator[50%]
Labour	PC-C-003	8 days	Thu 18/03/10	Mon 29/03/10	0%	Estimator[50%]
Complete Estimate	PC-C-M01	0 days	Mon 29/03/10	Mon 29/03/10	0%	Estimator
:: CONCRETE		33 days	Mon 25/01/10	Wed 10/03/10	0%	
::: FOUNDATION		12 days	Tue 23/02/10	Wed 10/03/10	0%	
:::: SLAB		7 days	Tue 02/03/10	Wed 10/03/10	0%	
Slab	PC-F-001	7 days	Tue 02/03/10	Wed 10/03/10	0%	Concrete Design Engineer
Design Report	PC-F-M01	0 days	Mon 08/03/10	Mon 08/03/10	0%	Concrete Design Engineer
CAD Drawings	PC-F-M02	0 days	Wed 10/03/10	Wed 10/03/10	0%	Concrete Design Engineer
:::: STRIP FOOTINGS		5 days	Tue 23/02/10	Mon 01/03/10	0%	
Strip Footings	PC-F-002	5 days	Tue 23/02/10	Mon 01/03/10	0%	Concrete Design Engineer
Design Report	PC-F-M03	0 days	Fri 26/02/10	Fri 26/02/10	0%	Concrete Design Engineer
CAD Drawings	PC-F-M04	0 days	Mon 01/03/10	Mon 01/03/10	0%	Concrete Design Engineer
::: INTERIOR		15 days	Mon 25/01/10	Fri 12/02/10	0%	
:::: BEARING WALLS		5 days	Mon 08/02/10	Fri 12/02/10	0%	
Bearing Walls	PC-P-004	5 days	Mon 08/02/10	Fri 12/02/10	0%	Concrete Design Engineer
Design Report	PC-P-M07	0 days	Thu 11/02/10	Thu 11/02/10	0%	Concrete Design Engineer
CAD Drawings	PC-P-M08	0 days	Fri 12/02/10	Fri 12/02/10	0%	Concrete Design Engineer
:::: BLEACHERS		10 days	Mon 25/01/10	Fri 05/02/10	0%	
Bleachers	PC-P-003	10 days	Mon 25/01/10	Fri 05/02/10	0%	Concrete Design Engineer
Design Report	PC-P-M05	0 days	Tue 02/02/10	Tue 02/02/10	0%	Concrete Design Engineer
CAD Drawings	PC-P-M06	0 days	Fri 05/02/10	Fri 05/02/10	0%	Concrete Design Engineer
:: STEEL		26 days	Mon 25/01/10	Mon 01/03/10	0%	
::: PERIMETER		8 days	Thu 18/02/10	Mon 01/03/10	0%	
:::: BRACING		3 days	Thu 25/02/10	Mon 01/03/10	0%	
Bracing	PC-P-002	3 days	Thu 25/02/10	Mon 01/03/10	0%	Steel Design Engineer
Design Report	PC-P-M03	0 days	Mon 01/03/10	Mon 01/03/10	0%	Steel Design Engineer
CAD Drawings	PC-P-M04	0 days	Mon 01/03/10	Mon 01/03/10	0%	Steel Design Engineer
:::: COLUMNS		5 days	Thu 18/02/10	Wed 24/02/10	0%	
Columns	PC-P-001	5 days	Thu 18/02/10	Wed 24/02/10	0%	Steel Design Engineer
Design Report	PC-P-M01	0 days	Tue 23/02/10	Tue 23/02/10	0%	Steel Design Engineer
CAD Drawings	PC-P-M02	0 days	Wed 24/02/10	Wed 24/02/10	0%	Steel Design Engineer
::: ROOF		18 days	Mon 25/01/10	Wed 17/02/10	0%	
:::: STEEL JOISTS		3 days	Mon 08/02/10	Wed 10/02/10	0%	
Steel Joists	PC-R-002	3 days	Mon 08/02/10	Wed 10/02/10	0%	Steel Design Engineer
Design Report	PC-R-M03	0 days	Tue 09/02/10	Tue 09/02/10	0%	Steel Design Engineer
CAD Drawings	PC-R-M04	0 days	Wed 10/02/10	Wed 10/02/10	0%	Steel Design Engineer
:::: TRUSS		10 days	Mon 25/01/10	Fri 05/02/10	0%	
Truss System	PC-R-001	10 days	Mon 25/01/10	Fri 05/02/10	0%	Steel Design Engineer
Design Report	PC-R-M01	0 days	Mon 01/02/10	Mon 01/02/10	0%	Steel Design Engineer
CAD Drawings	PC-R-M02	0 days	Fri 05/02/10	Fri 05/02/10	0%	Steel Design Engineer
:::: ZAMBONI AREA		5 days	Thu 11/02/10	Wed 17/02/10	0%	
Zamboni Area	PC-R-003	5 days	Thu 11/02/10	Wed 17/02/10	0%	Steel Design Engineer
Design Report	PC-R-M05	0 days	Tue 16/02/10	Tue 16/02/10	0%	Steel Design Engineer
CAD Drawings	PC-R-M06	0 days	Wed 17/02/10	Wed 17/02/10	0%	Steel Design Engineer
:: TEMP		20 days	Tue 02/03/10	Mon 29/03/10	0%	
::: SECOND FLOOR		20 days	Tue 02/03/10	Mon 29/03/10	0%	
:::: BEAMS		5 days	Tue 09/03/10	Mon 15/03/10	0%	
Beams	PC-S-002	5 days	Tue 09/03/10	Mon 15/03/10	0%	Steel Design Engineer
Design Report	PC-S-M03	0 days	Fri 12/03/10	Fri 12/03/10	0%	Steel Design Engineer
CAD Drawings	PC-S-M04	0 days	Mon 15/03/10	Mon 15/03/10	0%	Steel Design Engineer
:::: COLUMN FOOTINGS		5 days	Tue 23/03/10	Mon 29/03/10	0%	
Column Footings	PC-F-003	5 days	Tue 23/03/10	Mon 29/03/10	0%	Concrete Design Engineer
Design Report	PC-F-M05	0 days	Fri 26/03/10	Fri 26/03/10	0%	Concrete Design Engineer
CAD Drawings	PC-F-M06	0 days	Mon 29/03/10	Mon 29/03/10	0%	Concrete Design Engineer
:::: COLUMNS		5 days	Tue 16/03/10	Mon 22/03/10	0%	
Columns	PC-S-001	5 days	Tue 16/03/10	Mon 22/03/10	0%	Steel Design Engineer
Design Report	PC-S-M01	0 days	Fri 19/03/10	Fri 19/03/10	0%	Steel Design Engineer
CAD Drawings	PC-S-M02	0 days	Mon 22/03/10	Mon 22/03/10	0%	Steel Design Engineer
:::: FLOOR		5 days	Tue 02/03/10	Mon 08/03/10	0%	
Floor	PC-S-003	5 days	Tue 02/03/10	Mon 08/03/10	0%	Steel Design Engineer
Design Report	PC-S-M05	0 days	Fri 05/03/10	Fri 05/03/10	0%	Steel Design Engineer
CAD Drawings	PC-S-M06	0 days	Mon 08/03/10	Mon 08/03/10	0%	Steel Design Engineer



Client: AE Consultants Ltd
Project: Polar Centre
Date: January 29, 2009
Printed: Wed 27/01/10 , 7:38 PM

JACS Engineering

Task Split Progress Milestone