



Quality Civil Engineering Consultants

Duckworth Street Retaining Wall Project Plan ENGI 8700

Prepared for: Acuren & Dr. Bruneau Prepared by: Erica Soucy, Chantel Nicolle, Qiong Zhang & Chenel Waight



Quality Civil Engineering Consultants Memorial University of Newfoundland St. John's, NL, A1B 3X5

February 4, 2013

Emad Rizk Acuren Group Inc. 112 Forest Rd St. John's, NL, A1A 1E6

Dear Mr. Rizk,

Please see the enclosed document for details pertaining to our plan to complete the design of a temporary retaining wall in St. John's, Newfoundland.

The project plan outlines the requirements for the design of the retaining wall and QCEC's approach to completing the project. The project is divided into six primary tasks which are subdivided into smaller tasks and assigned to individual members. A schedule has also been developed to enforce major deadlines for the duration of the project and is included in the appendices.

If there are any questions regarding the project plan, please feel free to contact the undersigned.

Sincerely,

Quality Civil Engineering Consultants

Chantel Nicolle

Erica Soucy

Qiong Zhang

Chenel Waight

cc. Dr. Steve Bruneau



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1.0 PROJECT DESCRIPTION

Quality Civil Engineering Consultants (QCEC) has been contracted by Acuren Group Inc. to design a temporary retaining wall. A new parking garage is in development for Duckworth St./Henry St and a temporary retaining wall is required for support along Henry St to allow for construction (Figure 1).



Figure 1: Site Location

A geotechnical investigation was completed on the site in 2011 and a topographical survey of the site is also available. The developers of the parking garage have also provided architectural drawings.

2.0 PROJECT REQUIREMENTS

QCEC is responsible for reviewing various retaining wall methods and determining two suitable options for the location. A cost comparison and feasibility study will be completed for each option and a retaining wall will be selected based on the results.



The requirements of the project include:

- A short summary of various design solutions
- Select two retaining wall design options
- Soil profile
- Structural design of a retaining wall to applicable design codes
- Cost estimate of both retaining wall options
- Analysis of the final design selection
- Detailed drawings of the selected design
- Detailed construction plan/Final written report
- Presentation

3.0 METHODOLOGY

3.1 PROJECT APPROACH

The project will begin with preliminary research of various types of retaining walls. Based on this research QCEC will choose two options that are deemed suitable for the location. A schedule will be developed to ensure efficient execution of the project and maintain important milestone dates. QCEC will determine the final design and a complete set of drawings will be prepared along with a construction plan and schedule.

QCEC has divided the project into six major division of effort: research, scheduling, design, drawings, cost estimating and reporting.

3.1.1 RESEARCH

Acuren provided a list of retaining wall options for QCEC to investigate and determine the most appropriate design:

- Earth backfilling
- Mechanically Stabilized Earth (MSE) walls
- Prefabricated modular gravity walls
- Reinforced concrete cantilever walls
- Partially embedded soldier piles
- Continuous sheet piles
- Tieback walls
- Soil nailing



Each member will research two options focussing on costs, constructability and any design code requirements. After the research is completed, QCEC will evaluate the options and determine the two most appropriate options for this project. It is anticipated that additional research will be required of the selected design options.

3.1.2 SCHEDULING

A project schedule will be completed and continuously updated throughout the duration of the project. An updated Gantt chart will be submitted to the instructor at the weekly business meetings indicating important milestones, any schedule changes and percentage completed of the tasks.

As requested by the client, a construction schedule will also be developed to illustrate construction timelines.

3.1.3 DESIGN

Both of the selected retaining wall options will be designed to a point where a rough cost estimate can be completed. Subsequently, one option will be selected and the overall retaining wall design will be finalized. Some design codes that may be used are the CSA Concrete Design Handbook and the CISC Handbook of Steel Construction as well as the textbook "Foundations and Earth Retaining Structures" by Muni Budhu which was recommended for retaining wall design [1].

Calculations will be required to determine the forces on the retaining wall and ensure sliding and overturning will not occur. Calculations will be completed by hand or with excel.

3.1.4 DRAWINGS

The project requires a soil profile of the retaining wall site, basic drawings of both retaining wall options considered and detailed drawings of the final design.

The soil profile will be completed in AutoCAD early in the project. After two retaining wall options are chosen, basic drawings will be developed to allow for preliminary estimates. These drawings will be hand sketches as they are not the final drawings. Based on the preliminary estimates, a final design will be chosen and four drawings will be developed: site plan, elevations, sections and notes. The detailed drawings will be completed in AutoCAD for submission to the client.



3.1.5 COST ESTIMATING

There will be two preliminary cost estimates completed for the selected design methods. A detailed cost estimate will be prepared for the final retaining wall design. Cost estimating will be discussed more in depth in section 3.3.

3.1.6 REPORTING

QCEC will develop a document to communicate the project plan to the client early in the project. The progress of the project will be updated every week with a short report and updated schedule which will be submitted during the ENGI 8700 weekly business meeting. Upon completion of the project, a construction plan and final report will be submitted to the client and instructor. The details and requirements of these reports will be outlined in section 3.4.

3.2 ORGANIZATION

QCEC will mainly work as a team on most aspects of the project. However, roles have been assigned to improve organization during the execution of the project.

- Erica Soucy Design Engineer
- Chenel Waight Design Engineer
- Chantel Nicolle Estimator
- Qiong Zhang Draftsperson

Design Engineers will be responsible for the preliminary design of both retaining wall options as well as the final design. They will also be responsible developing a clear set of calculations to include with the final report.

The Estimator will be responsible for all quantity take offs and cost estimates required throughout the project.

The Draftsperson will be responsible for developing AutoCAD drawings throughout the term as well as finalizing the drawings to be submitted for construction at the end of the term.

3.2.1 MEETING TIMES

QCEC meets very regularly and maintains communication between group members to ensure all members are aware of any changes or upcoming deadlines. Meetings occur a minimum of twice a week at Memorial University but additional meetings are often requested.



QCEC and Acuren have agreed to meet biweekly on Wednesdays with Emad Rizk unless additional meeting times are required. Meetings times will be determined at the previous meeting or via e-mail. All meetings will be held at the client's office at 112 Forest Rd.

3.3 COST ESTIMATING STRATEGY & LEVEL OF ACCURACY

Initially, two preliminary estimates will be completed on the selected retaining wall options. At this point the estimates will be approximately 50% complete. When a final design is selected, a full detailed cost estimate including material and labour will be calculated. RSMeans will be used to obtain the material and labour cost for the St. John's region.

An Excel spreadsheet will be developed and maintained for the detailed cost estimate which will be provided to the client if requested. Some materials that QCEC anticipates may be included in the estimate are: steel, concrete, formwork, timber and/or excavated materials.

3.4 PROJECT OUTCOMES

QCEC desires to engage in an effective working relationship with the client. Through careful planning and design, it is QCEC's intention to provide a financially and physically viable solution for the retaining wall requirements. The group also believes the retaining wall research could be beneficial for the client with future projects.

When the project is complete, QCEC will submit a construction plan, final report and presentation.

3.4.1 CONSTRUCTION PLAN

Acuren has requested a construction plan to be submitted at the end of the project. The plan will include a detailed construction schedule, drawings, and possible risks.

The construction schedule will outline the duration of construction and important milestones. QCEC will attempt to foresee any potential delays during the construction period that may arise during the construction period. Some considerations may include the season construction will occur, availability of materials, availability of labourers, etc.

Drawings will be finalized and issued for construction to provide a visual aid to the construction plan. As stated before, these drawings will be produced in AutoCAD and provided to the client.

QCEC will investigate possible risks associated with the construction of the retaining wall and outline them in the construction plan. These risks could include potential upcoming strikes, weather, safety issues, etc.



3.4.2 FINAL REPORT AND PRESENTATION

The final report will be submitted to the instructor and client on April 1, 2013. The report will describe QCEC's method used for the final retaining wall design and include schedules, drawings, calculations, and other information to provide a document that is clear and concise for the reader.

QCEC will also present the report to other student consultants, the client and the instructor on April 1, 2013.

4.0 TASKS

QCEC has divided the Duckworth Retaining Wall project into six primary tasks. Primary tasks have been broken into subtasks and each subtask has been allocated to one or two individuals based on skill level or experience. Table 1 will summarize each primary task and subtask with personnel allocation, resource requirements and estimated duration.

4.1 PRIMARY TASKS

The primary tasks for the project are:

- Research
- Project plan
- Preliminary retaining wall design
- Detailed retaining wall design
- Construction plan
- Deliverables



TASK	SUB TASK	PERSONNEL	DURATION	RESOURCES		
Decease	Choose Option	All	2 Weeks	Internet		
Research	Soil Profile	Qiong	1 Week	AutoCAD		
Project Plan	Report	Erica Chantel	1 Week	MS Word		
•	Schedule	Chenel	1 Week	MS Excel		
	2 Retaining Wall Options:					
Preliminary Retaining Wall	Calculations	Erica	3 Weeks	Relevant Textbooks		
Design	Drawings	Qiong Chenel	3 Weeks	AutoCAD		
	Cost Estimate	Chantel	3 Weeks	RS Means		
Detailed	Calculations	Erica	2 Weeks	Relevant Textbooks		
Retaining Wall Design	Drawings	Qiong Chenel	2 Weeks	AutoCAD		
C	Cost Estimate	Chantel	2 Weeks	RS Means		
Construction	Report	All	2 Weeks	MS Word		
Plan	Schedule	All	2 Weeks	MS Excel		
	Minutes & Agendas	Chantel	Weekly	MS Word		
Deliverables	Weekly Progress Reports & Schedule	All	Weekly	MS Word		
	Final Report	All	2 Weeks	MS Word		
	Final Presentation	All	2 Weeks	MS PowerPoint		

Table 1: Division of Primary Tasks



5.0 SCHEDULE

QCEC has developed a weekly and daily schedule to ensure efficient progress throughout the term. These schedules are in the form of two Gantt charts located in Appendix A.

Each schedule includes the start time, duration, and percentage completed of all major activities required for the project. Key milestones for the Duckworth Retaining Wall project include:

- Two retaining wall design options selected (January 30, 2013)
- Project plan (February 4, 2013)
- Construction plan and schedule (March 20, 2013)
- Final report and presentation (April 1, 2013)

QCEC believes it is essential to meet all deadlines but also understands that unforeseen circumstances can cause delays. In an effort to avoid any major interruptions, QCEC has allotted extra time for each activity. Also, midterm break has been included in the schedule (February 18 - 20) because at this time most members will not be available.

The weekly schedule will be updated for each ENGI 8700 Business Meeting on Mondays and submitted with the Weekly Progress Report. The weekly updates will allow QCEC to be aware of any delays in the schedule so they can be rectified before milestones are affected.

6.0 COSTS

The costs of the project will be minimal and will consist mostly of transportation, printing and binding (Table 2). QCEC does not anticipate any costs for software, testing or models.

Estimated Project Cost									
Transportation	\$ 60.00								
Printing	\$ 50.00								
Binding	\$ 20.00								
TOTAL	\$ 130.00								

Table 2: Project Costs



7.0 DELIVERABLES

The deliverables of the project are to be submitted to Acuren and instructor in hardcopy and/or softcopy format. The following is a breakdown of the deliverables for the project:

<u>Hardcopy</u>

- Project plan
- Construction plan and schedule
- Project schedule
- Soil profile
- Design calculations

- <u>Softcopy (PDF)</u>
 - Project Plan
 - Drawings
 - Project schedule
 - Final report
 - Presentation

- Drawings
- Quantity take off
- Cost estimate
- Final report

Hardcopies will be delivered to the instructor and client in person and softcopy (PDFs) will be distributed by e-mail.

8.0 RISKS

Risks related to the term project include limited accessibility of software, time restraints, client's availability and obtaining appropriate reference material.

AutoCAD and RSMeans are required to complete drawings and cost estimates for the project. AutoCAD is available at Memorial University which can be limited due to other groups requiring the program. QCEC will obtain a student licence for AutoCAD to increase availability of the software and complete drawings within the scheduled timeline. RSMeans accounts will be provided by the university in a limited quantity. If any issues arise with attaining an account, QCEC will use the three day trial version of RSMeans only when the cost estimate is underway.

The project is to be completed within approximately three months. Each member of QCEC is enrolled in four additional courses; therefore time management will be essential. Members also have various obligations which may cause difficulties in determining meeting times. QCEC will develop a project schedule that can accommodate all members during the execution of the project. Meetings will also be arranged ahead of time to eliminate conflicts with individual schedules.



Acuren has emphasized they will make an effort to be available for any issues that may arise during project execution. However, QCEC is aware that the client may not always be accessible due to other meetings, unforeseen sickness or business trips. When possible, QCEC will arrange meetings with the client at least a week ahead of time to ensure availability.

Reference material has been recommended by a faculty member with experience in the design of retaining walls. Due to the cost of these references, they will have to be borrowed from a library where their availability is not guaranteed. Also, libraries generally have two week borrowing periods which can restrict access to the references. QCEC will check various libraries for the references early in the project to ensure it is available.

9.0 REFERENCES

[1] Bipul Hawlader, January 25, 2013. *Personal Communication*.

APPENDIX A

Project Schedules

ENGI 8700 Civil Engineering Project Group: N Client: Acuren 2 Professor: S. Bruneau

Weekly Project Plan

Duckworth Street Retaining Wall





NO.	ΑCTIVITY	PLAN START	PLAN DURATION	ACTUAL START	ACTUAL DURATION	PERCENT COMPLETE	WEEK										
							1	2	3	4	5	6	7	8	9	10	11
1	Research and Pick Design Choice (Jan 30th)	1	2	1	2	100%			}								
2	Develop Rough Project Plan & Schedule	1	2	1	2	100%											
3	Project Plan Due (Feb 4th)	2	1	1	2	50%			\diamond								
4	Prelim Wall Design, Calculations & Drawings	3	3	0	0	0%											
5	MT Break	5	1	0	0	0%											
6	Detailed Wall Design, Calculations & Drawings	6	2	0	0	0%											
8	Quantity Take-Offs & Initial Cost Estimate	7	2	0	0	0%											
9	Construction Plan & Schedule	8	2	0	0	0%									\$		
10	Finalize Drawings & Calculations	9	2	0	0	0%											
11	Finilize Schedule & Cost Estimate	10	2	0	0	0%											
25	Final Presentation & Report	10	2	0	0	0%											
26	Final Report & Presentation Due (Apr 1st)	11	1	0	0	0%											
						18/20-18	1,26 13/127	Feb? Feb?	Feb 9 Feb 10	Hebrio Hebri	1 Feb 23 Feb 24	Mar2 Mar3	Nar9 Nar12	Marib Maria	Mar23 Mar24	Mar30 Mar31	APIS

ENGI 8700 Civil Engineering Project Group: N Client: Acuren 2 Professor: S. Bruneau

Project Schedule Plan



Duckworth Street Retaining Wall

Period Highlight: 11 Plan Actual Complete Actual (beyond plan) Complete (beyond plan)

											Date					
ACTIVITY	DI ANI START	PLAN	ACTUAL	ACTUAL	DERCENT COMPLETE	Jan 20 - Jan 26	Jan 27 - Feb 2	Feb 3 - Feb 9	Feb 10 - Feb 16	Feb 17 - Feb 23	Feb 24 - Mar 2	Mar 3 - Mar 9	Mar 10 - Mar 16	Mar 17 - Mar 23	Mar 24 - Mar 30	Apr
Activity	P DAIN START	DURATION	START	DURATION	PERCENT COMPLETE	20 21 22 23 24 25 2	5 27 28 29 30 31 1	2 3 4 5 6 7 8 9	10 11 12 13 14 15 16	17 18 19 20 21 22 23	24 25 26 27 28 1	2 3 4 5 6 7 8 9	10 11 12 13 14 15 16	17 18 19 20 21 22 2	3 24 25 26 27 28 29	30 31 1
						1 2 3 4 5 6	8 9 10 11 12 13	8 14 15 16 17 18 19 20 21	1 22 23 24 25 26 27 28	29 30 31 32 33 34 35	36 37 38 39 40 41 4	2 43 44 45 46 47 48 49	50 51 52 53 54 55 56	57 58 59 60 61 62 6	3 64 65 66 67 68 69	70 71 72
Research and Pick Design Choice	1	11	2	10	100%											
Develop Rough Project Plan & Schedule	2	10	4	8	100%											
Project Plan Due	3	14	4	13	50%											
Prelim Wall Design, Calculations & Drawings	11	20	0	0	0%											
MT Break	30	3	0	0	0%											
Detailed Wall Design, Calculations & Drawing	s 33	14	0	0	0%											
Quantity Take-Offs & Initial Cost Estimate	40	14	0	0	0%											
Construction Plan & Schedule	47	14	0	0	0%											
Finalize Drawings & Calculations	50	14	0	0	0%											
Finilize Schedule & Cost Estimate	57	14	0	0	0%											
Final Presentation & Report	64	9	0	0	0%											
Submit Final Report & Presentation	72	1	0	0	0%											

Date: 31/01/2013

APPENDIX B Statement of Qualifications

QCEC Staff Contact Information

Chantel Nicolle

Phone: 709-691-4507 Email: cjn518@mun.ca

Erica Soucy

Phone: 709-631-2176 Email: esoucy@mun.ca

Qiong Zhang

Phone: 709-763-5998 Email: q.zhang@mun.ca

Chenel Waight

Phone: 709-749-2780 Email: cwaight@mun.ca





Quality Civil Engineering Consultants



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S.J. Carew Building St. John's, NL A1B 3X5



Chantel Nicolle

Previous Employers

- Town of Rocky Harbour Gov of NL Department of Health
- and Community Services North American Construction
- Group N.D. Dobbin Ltd.

BIO

Chantel is a senior engineering student at Memorial University of Newfoundland and Labrador and through her work terms Chantel has gained valuable engineering experience. Past experiences has ranged from municipal government, to health care designs, to the oil sands and estimating which will be beneficial in assisting potential clients. Other skills and knowledge that she has gained throughout the years include LEED. AutoCAD, S-Frame and HEC-RAS. With the variety of experience through work and school, Chantel has built-up her knowledge to well prepare herself for her future career

Qiong Zhang Previous Employers

Shanxi Project Management Ltd.

Qiong Zhang is a senior civil engineering student at Memorial University of

Newfoundland. She spent three work-terms with Fracflow Consultants Inc.

performing investigations on environmental and geotechnical sites in both

Newfoundland and Yellowknife. Previously she was employed as a

laboratory assistant by Memorial's professor, Dr. Cynthia Coles, to research

arsenic contamination in drinking water. She has also worked in a Chinese

construction firm studying the feasibility of a coal mine. In addition, Qiong

has volunteered for Tong Mei Technical Magazine doing report translation

which familiarized her with leading technical research.

(WTI&VI) MUN-Faculty of Engineering and Applied Science (WT II), Fracflow Consultants Inc. (WTIII, IV & V)



OUR MISSION

Quality Civil Engineering Consultants (QCEC) strives to provide professional engineering support to our clients. Through our range of collective experiences we are capable of accurately and efficiently completing a variety of civil engineering projects that meet our clients' standards. Our team is determined to safely engineer economic and innovative solutions while maintaining a strong environmental awareness.

Erica Soucy

Previous Employers

- Public Works & Government Services Canada Gov of NL Dept. of Municipal
- Affairs Stantec Consulting
- Conestoga-Rovers & Associates
- Kiewit-Kvaerner Contractors

RIO.

Erica Soucy is a senior civil engineering at Memorial University of Newfoundland. Erica gained construction experience with the federal government assisting in site inspections for wharf construction projects. She also spent a term managing the concrete material testing lab for a consulting company. In 2010, Erica spent a term with an environmental consulting company collecting soil and groundwater samples, writing technical reports detailing contamination results, assisting in environmental site assessments and remediation projects. Most recently, Erica worked on the Hebron Gravity Based Structure project performing quality control inspections, cost control for sub-contracts, and concrete design.



RIO

BIO

Previous Employers Anthony Thurton & Associates Tiller Engineering Inc. Gov of NL Department of Education Newfoundland Housing Corp.

Pennecon Heavy Civil Ltd.

Chenel is a senior civil engineering student at Memorial University of Newfoundland. The majority of her educational and initial work experiences occurred in Belize City, Belize, where she was born and raised. Following her love of math and physics and a desire to further her education. Chenel travelled abroad to pursue a Bachelor's Degree in Civil Engineering at MUN in St. John's. To date, she has completed five works terms through MUN's Co-op Program with various companies, private firms and government offices and has gained a lot of valuable work experience. She enjoys her educational and work experiences and aims to become a well known and respected professional in her field.

QCEC Staff Contact Information

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