

Public and Catholic District School Board Writing Partnerships

Course Profile Construction Technology

Grade 11
College Preparation
TCJ3C

• *for teachers by teachers*

This sample course of study was prepared for teachers to use in meeting local classroom needs, as appropriate. This is not a mandated approach to the teaching of the course. It may be used in its entirety, in part, or adapted.

Course Profiles are professional development materials designed to help teachers implement the new Grade 11 secondary school curriculum. These materials were created by writing partnerships of school boards and subject associations. The development of these resources was funded by the Ontario Ministry of Education. This document reflects the views of the developers and not necessarily those of the Ministry. Permission is given to reproduce these materials for any purpose except profit. Teachers are also encouraged to amend, revise, edit, cut, paste, and otherwise adapt this material for educational purposes.

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Acknowledgments

Public and Catholic District School Board Writing Teams –

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Course Overview

Construction Technology, Grade 11, College Preparation, TCJ3C

Policy Document: *The Ontario Curriculum, Grade 11 and 12, Technological Education*

Course Description

This course focuses on residential and light construction systems related to commercial, industrial, and/or recreational construction. Students learn about the tools, materials, equipment, and methods used in the light construction industry; structural analysis and design; presentation and working drawings; and auxiliary systems. They also estimate materials and labour costs; study industry standards and building codes; consider health and safety issues and energy conservation and explore careers and the impact of construction technology on society and the environment.

How This Supports the Ontario Catholic School Graduate Expectations

The shared intent of this document is to demonstrate to the students that progress must be tempered with the understanding that everything is a gift from God and as such must be treated with respect. Students complete units and activities that give them the opportunity to display their inner spiritual growth in the areas of the environment and stewardship of their surroundings.

The Catholic School Graduate Expectations are used as an opportunity to enhance student awareness of their surroundings and to relate their experiences to the life and values demonstrated by Jesus Christ. The world and its possessions are a gift from God and as stewards of His world, we must make informed decisions, being mindful of both the short and long term consequences on our environment, quality of life, and how this relates to our Catholic values as followers of Jesus Christ.

The students work through open-ended problems that allow them not only to problem-solve but also to be innovative in their creative decisions. Students are given the opportunity to grow in the communication of their faith. All students, regardless of ability, age, or gender are given the opportunity to express their values and attitudes that their faith has given them for the improvement of the community as a whole.

Course Notes

This course is directed toward students who wish to continue their post secondary education in construction related courses such as Architecture, Engineering, Urban Planning and Development and Environmental Studies. The course challenges students to develop open-ended solutions to real life situations that affect their community and the local environment. This course profile is inclusive to all students regardless of race, gender, belief systems, disabilities, or economic background.

It is imperative that safety be the prime concern of both the teacher and student. To help ensure that all possible precautions are taken it is suggested that a SAFETY PASSPORT (Appendix A, Sample – Safety Passport) be given to each student. This form tracks the student through the process of introduction to, demonstration of, and then student demonstration of the safe operation of the tools.

The use of newspapers, magazines, Internet, journal entries and other sources of information allows the student to demonstrate their understanding of local, community, and world environmental issues.

The college bound students build their skills in the proper use of tools of the industry and looks beyond the product to the process of making it and its effect on the community, challenging the student to design with considerations of factors such as time, effort required, facilities available, cost of materials, selection of proper materials, long-range cost for upkeep and maintenance, and accessibility to all persons.

The student-centred, activity-based mode of delivery provides students opportunities to develop individual and group skills and time management skills. They are also given an opportunity to demonstrate the ability to design and follow an organizational plan for the completion of a range of different tasks and to show commitment to a task by maintaining a level of effort required to work toward the development of a final product.

Each unit provides the opportunity for students to have exposure to many career opportunities for insights into the skills required for a variety of related professions.

A number of teaching/learning strategies employed in the classroom allow for career orientation such as job shadowing, computer career and education research, field trips, and guest speakers.

Unit: Titles and Times

Unit 1	Environmental Concerns and Community Responsibilities	10 hours
* Unit 2	Architectural Millwork and Detailing	40 hours
* Unit 3	Land Use Planning and Development	40 hours
Unit 4	Structural Support and Concrete Structures	10 hours
Unit 5	Career Opportunities and Entrepreneurship	10 hours

* These units are fully developed in this Course Profile.

Unit Overviews

Unit 1: Environmental Concerns and Community Responsibilities

Time: 10 hours

Unit Description

This unit is applied over the entire semester, with the students gathering information from local papers, libraries, Internet, and magazine articles on topics related to the construction industry and environmental issues. Students present their findings in the form of a presentation and engage in discussions on the findings. This sharing of ideas and open discussion allows the students to gain exposure to ideas and information that other students have researched and feel are relevant to the local and world communities' welfare.

Research topics could be stewardship and environmental concerns resulting from material selection and use, overuse and exhaustion of natural resources, i.e., wood, disposal of construction materials, local urban planning issues, green space use and, tree planting programs. Budgets from local and national organizations could be monitored. This is a student-driven unit and their personal area of interest should be encouraged where appropriate.

Topics to be covered may include a variety of issues: the history of material development; the impact on society over generations of use (e.g., asbestos); the development of new products and their consequences; costs and how they are absorbed by the consumer; loss of retrieval habitat; pollution of air, water and land.

Unit 1 Synopsis Chart

Activity	Time	Expectations	Assessment	Focus/Tasks
1. Project Introduction	1 hour	TFV.01, TFV.03, TFI.01, SPI.01, CGE 1e, 1i, 2, 2b, 3a, 4a, 7i	Knowledge	Environmental Responsibility Instructor describes the assignment and gives examples and promotes discussion on topics related to assignment (land use, natural resources, taking ownership of community).

2. Topic is Investigated by student	7 hours	SPI.01, SPI.06, IC1.04, IC2.01, IC2.03, IC2.06 CGE 2b, 2e, 3c, 4c, 4d, 5a, 5e, 5f	Thinking/ Inquiry	Gathering and analysis of information on topics related to project. The student begins to research and gather information on the topic(s) they have chosen through various mediums.
3. Presentation and Discussion	2 hours	SPI.05, SPI.06, ICV.01, ICV.02IC1.02, IC1.03 CGE 2c, 2d, 3d, 4a, 5d, 6e	Communication	Presentation of collage; discussion of findings and how they are applicable to today's society. Students present for class discussion materials that support their position.

Unit 2: Architectural Millwork and Detailing

Time: 40 hours

Unit Description

Students investigate aspects of construction that involve fine woodworking and architectural details. They explore period styles, architectural restoration techniques, and traditional and contemporary materials, tools and processes. Students research, design, sketch, draw, and construct a wide range of components for use in both new buildings and those undergoing renovation or restoration. Students investigate careers in interior design, architecture, fine woodworking, architectural restoration, and new construction. Learning is assessed by a variety of means including written reports, research documentation, class discussion, drawings, models, and prototypes. An emphasis is placed on using materials in an environmentally conscious manner. This includes experience in the rehabilitation of architectural components and structures in an attempt to both appreciate and preserve the rich architectural heritage we enjoy.

Unit 2 Synopsis Chart

Activity	Time	Expectations	Assessment	Focus/Tasks
1. Building a Louvered Cupola	14 hours	TF1.01, TF1.02, TF2.01, TF2.02, TF2.03, TF2.05, SP1.09, SP1.10, SP2.15, IC1.02, CGE 2a, 2b, 3b, 3c	Knowledge Thinking/ Inquiry Application Communication	Design, Structure, Joinery, Finishing. Research, design, draw, and fabricate a wooden cupola that provides ventilation for, and enhance the appearance of a small building.
2. Producing turned balusters and handrail for a veranda	6 hours	TFV.01, TF1.02, TF2.06, SP1.04, SP1.05, SP3.06, IC2.04, IC2.05, CGE 2c, 2e, 3d, 4a, 7i	Thinking/ Inquiry Application Knowledge Communication	Drawing (sketching and CAD), Use of tools research, draw and fabricate veranda components for a specific client.
3. Fabricating trim components for a front entrance	6 hours	TFV.01, TF1.02, TF2.03, TF2.05, SP1.05, SP2.12, SP2.13, IC2.02, IC3.01, IC3.03 CGE 2c, 4b, 4c, 4f, 5b	Thinking/ Inquiry Application Knowledge Communication	Use of machines, finishing research, design, draw, and produce mouldings and panels to be used in the construction of a front entrance for a residence.

4. Building a period fireplace surround	14 hours	TFV.01, TF1.01, TF1.02, SP1.04, SP1.05, SP2.14, SP2.16, IC2.02, IC3.01, IC3.03, CGE 1i, 2c, 2e, 3c, 4g	Thinking/ Inquiry Application Knowledge Communication	Historical research, CAD, quality of work research, design, draw, and fabricate an authentic moulded surround appropriate for a particular architectural period.
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Unit 3: Land Use Planning and Development

Time: 40 hours

Unit Description

Students explore the concepts of land use planning and development. They develop an understanding of how our urban surroundings are created and structured. This unit introduces students to potential careers in Urban Planning, Engineering, and Development. They develop design and problem-solving skills (see Unit 2) and increase their knowledge of the environment, technical terminology, design and drafting, and model building. An emphasis is placed on conscientious environmental design and respect for the environment as is our Christian duty. Students demonstrate their learning through discussions, research, written work, and preparing land use plans and scale models.

Unit 3 Synopsis Chart

Activity	Time	Expectations	Assessment	Focus/Tasks
1. Land use planning- Official Plans and Zoning By-laws	7 hours	TFV.04, SP1.06, SP2.03, ICV.01, IC1.01, IC3.01, CGE 2a, 2b, 3f	Knowledge/ Understanding	Historical context of planning. Teacher introduces the assignment and gives a historical perspective into the planning process. Students analyse how their area (town/city/subdivision) was planned.
2. Designing a Residential Subdivision	10 hours	TFV.01, TF1.02, SPV.01, SPV.02, SP1.01, SP2.02, SP2.03, CGE2c, 3b, 3e, 3f	Thinking/ Inquiry Application	Official Plans and By-laws. Teacher reviews how official plans and zoning bylaws were developed for the area they live in. Students research and gather information on the area. (town/city/subdivision)
3. Presentation Drawings- Design and Drafting	10 hours	TFV.01, TFV.02, SP1.07, SP1.08, SP1.09, CGE3c, 4f, 5g	Thinking/ Inquiry Application	Students create presentation drawings and models. Students design a subdivision plan on a real local site, interpreting data, setting parameters and developing rough sketches.
4. Model building	10 hours	TFV.02, SP1.09, IC2.02, CGE 3c, 4f, 5g, 7i	Communication Knowledge/ Understanding	Students visualize their designs and create presentation drawings and models.
5. Presentation and Reflection	3 hours	TFV.02, TFV.04, SPV.05, SP1.07, SP1.08, IC1.01, IC1.04, IC3.01 GCE 1d, 1i, 2c, 3b, 4c	Application Communication	Students present their designs and review designs of others. Students create a scale model of their design.

Unit 4: Structural Support and Concrete Structures

Time: 10 hours

Unit Description

This unit focuses on the structural components of buildings. Through research, experimentation, model building, and the construction of a variety of prototypes, students discover how buildings behave structurally. They also investigate which building materials and techniques are best suited for particular applications, as well as, implications for mechanical and electrical systems.

Unit 4 Synopsis Chart

Activity	Time	Expectations	Assessment	Focus/Tasks
1. What makes buildings stand up (or fall down)	1 hour	TF2.04, TF2.05, TF3.03, SP1.11, SP2.04, CGE 2a, 2b, 3c, 4g, 7g, 5g	Knowledge/ Understanding Thinking/ Inquiry Application	Structure, Materials, History. Analyse a variety of buildings to determine sound construction principles.
2. Building a scaled structural model	5 hours	TFV.03, TFV.05, TF2.04, TF2.05, TF2.06, TF3.01, TF3.02, TF3.03, SP1.05, SP1.10, SP1.11, SP2.04, SP2.05, SP2.06, SP2.07, SP2.08, SP2.09, SP2.10, SP2.11, SP3.03, SP3.04, SP3.05, IC1.02, IC1.03, IC1.04, CGE 2b, 2c, 3b, 3d, 5g	Knowledge/ Understanding Thinking/ Inquiry Application Communication	Materials and Structural techniques. Draw and construct a residential model to show essential construction techniques and materials. Models will demonstrate electrical and mechanical systems
3. Building a poured concrete fireplace surround	4 hours	TFV.01, SP1.02, .04 .08, SP2.15, .16, ICV.02, IC2.01, .02, .03, CGE 2b, 3b, 3c, 4b, 4f	Knowledge/ Understanding Thinking/ Inquiry Application	Moulds, Concrete, Casting techniques. Using moulds and light weight concrete, design and produce modular cast units suitable for this application.

Unit 5: Career Opportunities and Entrepreneurship

Time: 10 hours

Unit Description

This unit explores career and business opportunities in the Construction industry. Students research potential careers and businesses as opportunities for the future. Students investigate College and University programs that relate to the construction industry, including, but not limited to; Urban Planning, Engineering, Architecture, Landscape Architecture and Construction Estimating. Students also research starting a small business in consulting, design build, or construction.

Unit 5 Synopsis Chart

Activity	Time	Expectations	Assessment	Focus/Tasks
1. Identifying Construction related careers	2 hours	ICV.03, IC3.01, IC3.02, IC3.03, IC3.04, CGE 1e, 1i, 2a, 3a, 3c	Knowledge Thinking/Inquiry	Understanding and discussing the assignment. Students research construction careers in college/University calendars and the Internet.
2. Choosing the Right Career	2 hours	IC3.02, IC3.03, IC3.04, CGE 2b, 2c, 5b, 5h	Knowledge Application	Describe and relate specific jobs. Skills profiles done by students after careers are researched.
3. Business Opportunities- Why go into Business for Yourself	1 hour	ICV.01, IC1.01, IC3.04, CGE 2a, 2b, 2e, 1i, 5b	Knowledge	Listen to presentations from people with first hand experience. Teacher presents information/speakers who are self employed in the construction industry.
4. Setting up a Small Business	3 hours	ICV.01, IC1.01, IC3.04, SP3.01, SP3.06, CGE 2c, 3d, 3f, 5a	Thinking/Inquiry Application	Set up their own company. Students set up a small business plan, complete with company name and business identity.
5. Sales and Marketing	2 hours	SP1.06, IC3.01, CGE 2b, 2c, 3c, 5a, 7b	Thinking/Inquiry Communication	Small business investigation. Students research and compare how businesses advertise and attract business.

<p>Teaching/Learning Strategies Includes the following:</p> <ul style="list-style-type: none"> Brainstorming through group generation of initial ideas expressed without criticism or analysis; Collaborative/Cooperative in small group learning providing high levels of student engagement and interdependence; Conferencing through student to student discussion; Design Process is applied in a problem-solving approach using a prescribed series of steps; Inquiry is conducted through a problem-solving approach using prescribed processes involving a number of steps (e.g., SPICE model) Independent Study through an exploration and research of a topic interesting to students; 	<p>Assessment and Evaluation Techniques Students are assessed using the following strategies:</p> <ul style="list-style-type: none"> <i>Diagnostic</i>: occurs at the beginning of a term, a unit of study or whenever information about prior learning is useful; <i>Formative</i>: during learning; ongoing feedback to the student about the quality of learning and the effectiveness of instruction; <i>Summative</i>: usually carried out at the end of a learning process. <p>Personal Communication:</p> <ul style="list-style-type: none"> Journals/conferencing logs; self-assessment; student/teacher conferencing. <p>Paper-and-pencil Tests:</p> <ul style="list-style-type: none"> unit tests. <p>Observation:</p> <ul style="list-style-type: none"> formal and informal.
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<ul style="list-style-type: none"> • Construction activities in the development of products and services; • Report/Presentation using a variety of media both orally and in writing of the researched topics to the class; • Use of daily contact with the student to ensure they remain on task, and provide positive, and constructive feedback, or judgment, as required. 	<p>Performance Assessment:</p> <ul style="list-style-type: none"> • product research; • construction projects (how they meet design expectations); • drawing and sketching. <p>Conferencing:</p> <ul style="list-style-type: none"> • student/teacher; roving conferencing. <p>Reflection:</p> <ul style="list-style-type: none"> • self-assessment; • journal; • learning logs; • peer assessment. <p>Assessment Tools include:</p> <ul style="list-style-type: none"> • checklists; • marking schemes (i.e., tests, written assignments, presentations); • rubrics; • anecdotal comments with suggestions for improvement.
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Assessment & Evaluation of Student Achievement

Students are assessed using the following strategies:

Diagnostic: occurs at the beginning of a term, a unit of study, or whenever information about prior learning is useful;

Formative: during learning; ongoing feedback to the students and teacher about the quality of learning and the effectiveness of instruction;

Summative: usually carried out at the end of a learning process; may include feedback and/or judgement.

Seventy per cent of the grade will be based on assessments and evaluations conducted throughout the course. Thirty per cent of the grade will be based on a final evaluation in the form of an examination, performance, essay, and/or other method of evaluation.

Accommodations

The nature of these units and their activities allow for a wide range of course delivery methods.

Accommodations are made to cover the needs of all students identified with exceptionalities. Refer to the appropriate school personnel for a list of students in your class who have been identified as exceptional through an IPRC.

Some accommodations that could be used are:

- Written, audio, and video taped materials in the form of notes, or samples of completed work, sketches, drawings;
- Facilities for physically handicapped students must be considered (e.g., ramps, lowered tables, special tools, and protective wear) to provide an environment that is supportive both in academic content and physical set-up;
- Advance and/or additional use of equipment if needed;
- Large print texts, large screen monitors, and other adaptive devices that are appropriate;
- Pre-testing at the beginning for knowledge and specific vocabulary where appropriate;
- Data received from student's IEP must use student's strength to build understanding and confidence through adaptation of the Activity and Teaching/Learning Strategies;

- Small group learning;
- Use of peer tutor;
- Use of Ministry Document: Technology and Education 1999, p. 48 re exceptional students;
- Modify testing and evaluation as required.

Resources

Print

Canadian Electrical Code. Rexdale, Ontario: Canadian Standards Association, current.

Canadian Home Workshop. Volumes 1-22. Markham, Ontario: Camar Publications. ISSN 1485-8509
<http://www.canadianhomeworkshop.com> (1-905-475-8440)

Cantanese, A. J. and J.C. Snyder. *Introduction to Urban Planning*. Toronto: McGraw Hill, 1979.
 ISBN 0070102287

Clidero, Robert K. and Kenneth H. Sharpe. *Applications of Electrical Construction*. Don Mills, Ontario: General Publishing, 1979. ISBN 0-7725-1719-3

Expanding Your Horizons. McGraw-Hill Ryerson Limited, 1993. ISBN 0-07-551392-7

Hire Expectations – Employment Strategies for Canada’s Youth. Canadian Federation of Independent Business, 1998. ISBN 0-9693268-4-X

The Home Depot. *Kitchen and Bath 1-2-3*. Des Moines, Iowa: Meredith Books, 1999.

The Home Depot. *Outdoor Projects 1-2-3*. Des Moines, Iowa: Meredith Books, 1998.

Hosie, R.C. *Native Trees of Canada*. Canada: Fitzhenry and Whiteside Ltd., 1979.
 ISBN- 0-88-902-572-X

Kirchner, Harold B. *Wiring Installation and Maintenance*. Toronto: McGraw-Hill Ryerson, 1978.
 ISBN – 0070828296

Kirklighter, Clois E. *Modern Masonry Brick, Block, Stone*. South Holland, Illinois: The Goodheart-Willcox Company, 1985.

Landers, Jack M. *Home Repair and Maintenance*. Tinley Park II: Goodheart- Willcox 1991.
 ISBN 0-87006-820-2

Lieper/De Jordy/Schultz. *The Entrepreneurial Spirit*. Toronto: McGraw Hill Ryerson, 1991.
 ISBN 0-07-549931-2

Long, Frank J. *Intermediate Electricity*, 3rd ed. Toronto: General Publishing, 1985. ISBN- 0773650296

Massey, Howard C. *Plumbers Handbook*, 2nd ed. Carlsbad, California: Craftsman Book Company, 1985.
 ISBN – 091046093

Ontario Hydro Electrical Safety Code. Toronto, Ontario, current.

Ontario Job Futures and the Ontario Ministry of Training, Colleges and Universities.
 ISBN 0-7778-8799-1

Ontario Plumbing Code. current.

Plywood Handbook. Revised. Vancouver, British Columbia: Council of Forest Industries of British Columbia, 1980.

Stirling, Norman, *Fundamentals of Technical Drawing*. Canada: Gage Educational Publishing, 1984.
 ISBN 0-7715-0327x

Tech Prep Career Programs – A Practical Guide to Preparing Students for High-Tech, High-Skill, High-Wage Opportunities. Corwin Press Inc., Thousand Oaks, California, 1997. ISBN 0-8039-6510-9

Transitions – A Practical Guide to the Workplace. Collier MacMillan Canada, Inc., 1989.

Wood, Robert W. *All Thumbs Guide to Home Plumbing*. Blue Ridge Summit, Pennsylvania: Tab Books, 1992. ISBN 0830625461

Websites

Note: The URLs for the websites have been verified by the writer prior to publication. Given the frequency with which these designations change, teachers should always verify the websites prior to assigning them for student use.

<http://www.lafarge.ca>

La Farge Construction Materials, Technical Services Group, 7880 Keele St., Concord, Ontario, L4K 4G7. 1-800-523-2743

<http://www.scc.ca>

Publications of the Standards Council of Canada. Rexdale, Ontario.

<http://www.finehomebuilding.com>

Fine Homebuilding. Numbers 1-126. Newtown, Connecticut: The Taunton Press.
ISSN 1096-360-X (1-800-477-8727)

<http://www.finewoodworking.com>

Fine Woodworking. Numbers 1-139. Newtown, Connecticut: The Taunton Press.
ISSN 0361-3453 (1-800-477-8727)

<http://www.finehomebuilding.com>

Canadian Home Workshop. Volumes 1-22. Markham, Ontario: Camar Publications. ISSN 1485-8509

<http://www.augusthome.com>

Shopnotes. Numbers 1-48. Des Moines, Iowa: August Home Publishing Company. ISSN 1062-9696
(Tel: 1-800-333-5854)

<http://www.augusthome.com>

Woodsmith. Numbers 1-126. Des Moines, Iowa: August Home Publishing Company. ISSN 0164-4114
(Tel: 1-800-333-5075)

[www:Algonquincollege.com](http://www.Algonquincollege.com)

Algonquin College WebPage

(Other colleges will have similar websites)

www.pacificconcrete.com

Material Search site

[Www.recycle.net](http://www.recycle.net)

Recycled Furniture Info

www.ilovethisplace.com

Eco Choices Community WebPage

<http://www.wood.ca>

Canadian Wood Council. <http://www.wood.ca> (613) 747-0755

<http://www.scc.ca>

Publications of the Standards Council of Canada. Rexdale, Ontario.

www.msbigday.com

Microsoft Free Seminar Series

www.msnbc.com/news/SMALLBUSINESS

Assistance for Small Business

www.hrdc-drhc.gov.ca

Human Resources Development Canada

www.edu.gov.on.ca

Apprenticeship Website Address: Ministry of Education and Training

www.rubricbuilder.on.ca

An Ontario website that assists teachers with the new assessment tool, rubrics.

Community Resources

Co-op placements, job shadows, speakers, local businesses, Municipal, Provincial and Federal Government Agencies, local clubs (gardening and landscape), Royal Botanical Gardens (Aldershot), Public and University Libraries, School Libraries

Human Resources and Development Canada

Local school and Public Libraries

Municipal Offices of local Communities

Province of Ontario

Ministry of Municipal Affairs and Housing. *Ontario Building Code* (1997). Housing Development and Buildings Branch, 777 Bay Street, 2nd Floor, Toronto, Ontario, M5G 2E5.

OSS Considerations

“To prepare students effectively for the challenges that await them, Ontario’s schools should offer an education program that promotes a high standard of achievement, that provides all students with the learning opportunities and support they need, and that is relevant to society’s needs and expectations”* *Ontario Secondary Schools Grades 9 to 12*. Today’s technology programs, challenge students to develop an understanding of the effects of technology and how its applications for individuals and society must be considered when they are about to be applied.

In order to earn their diploma for graduation, students starting in 1999/2000 school year must complete a total of 30 credits. These credits are made up of 18 compulsory and 12 optional plus 40 hours of community involvement.

Technological Education Programs offer the students an exciting and challenging opportunity to help the student investigate what they think may be areas of interest in post secondary or direct entry into the work force. Courses allow students to work with computers and computer software that encourages and improves their ability to research, analyse and present information on researched topics. The course design allows for research into future employment opportunities, practical work experience through co-op programs to help with these life long decisions.

Technology offers students the opportunity to complete credits in a variety of ways including co-op placements, courses that include school time towards apprentice programs, correspondence, independent study, private study, continuing education, as well as summer school. The technology programs have no boundaries when it comes to the needs of students. Technology has the ability to accommodate students of all abilities. The following Ontario Ministry of Education Curriculum Policy Documents must be used in the development of Technological Education Courses.

- *Program and Diploma Requirements, 1999*
- *Technological Education Guidelines, Grades 11 and 12, 1999*
- Appendices

Appendix A

Sample Safety Passport

This is a sample of a generic safety passport that may be adopted for use in a number of technology classrooms. The purpose of the safety passport is to ensure that students are fully aware of all safety features on each piece of equipment in the technical facility prior to using it independently. This process may be adapted to suit the needs of the teacher and student.

The general process is as follows:

1. The student records the date of the safety demonstration on the safety passport. It is initiated by the teacher (see sample below) when a new piece of equipment, e.g., lathe, is introduced. The teacher demonstrates techniques for the safe operation of the machine and personal protective equipment i.e., proper eye protection, securing loose hair, removing jewellery, protective clothing, etc. The student takes notes of the demonstration and records the information in a notebook along with the signed passport slip. If a student is absent on the day of a safety demonstration, a makeup opportunity must be provided.
2. Each student must complete a written/oral test on the safe operation of the machine tool, outlining all safety features that must be observed. The student keeps the written tests in a notebook. These individual machine tests are designed to complement any general facility safety rules. The student dates the “tested” column and the teacher initials this as complete when the test is completed satisfactorily. Next, students must demonstrate to the teacher that they have a thorough knowledge of the safety rules for the equipment and are able to demonstrate their competency on the equipment. Once the teacher has observed the required safe set-up and operation of the equipment by a student, the teacher signs off that portion of their passport.
3. The teacher signs the final column of student’s safety passport once the student has completed steps 1, 2, and 3. The student is now able to use that piece of equipment. Students must be able to provide the teacher with their signed passport for that equipment each time they wish to use it. A summary document of all the various permissions may be created by the student and signed by the teacher (as permissions are earned); these summary safety passports may be protected with page protectors or laminated for protection. See the sample summary passport below.

Sample Equipment Safety Passport

Student Name: _____							
Equipment: _____							
See notebook for the note on safe set-up and operation of the equipment.							
Attended Teacher Safety Instruction and Demonstration (and note recorded)		Passed Written or Oral Testing		Demonstrated Safe Set-up and Operation of Equipment to Teacher		Granted Permission to use Equipment by Teacher	
Date of Lesson	Teacher Initial	Date Tested	Teacher Initial	Date of Demo	Teacher Initial	Date	Teacher Initial

Appendix B

Sample Design Process

Open Ended Problem Solving and the Design Process

Design is the act of inventing and innovating new products or services to satisfy needs or a change in needs. Design is a creative problem-solving activity. Like most creative processes, there are no correct procedures, but there are guidelines that assist the designer in ensuring the optimal solution is met. These guidelines are called the design process.

Students analyse at the beginning of the design process, a given set of conditions in order to identify a technological problem, challenge, or need. Students then work through a number of stages in order to arrive at a solution. Design processes include all stages in the development of a product. Although the design process may have distinctive stages, they are not followed in a rigid, step-by-step sequence. For example, students must evaluate their work at each stage of the process. As they do so, students may discover that they need to return to an earlier stage to make modifications or complete a particular step sooner than originally planned. A portfolio and/or a design report is used to document the design process.

Identification and Clarification of a Technological Problem

Students identify the technological problem and begin keeping a record of the design process. Students initially outline the broad aims of the project and describe in a general way what needs to be done to achieve those aims. Students may periodically revise the initial broad plan to reflect what is actually happening. They need to translate the information given to them by the teacher into the sub-stages below. This provides an understanding of each sub-stage so students can independently complete the stage in later grades. Possible sub-stages for the design report are:

- context;
- problem situation;
- technological problem statement;
- performance specifications and constraints;
- planned sources of information.

Generation of Multiple Solutions

Students identify possible solutions for the technological problem and the resources required to achieve each proposed solution. Students determine the availability of required resources and record their findings. Students during this stage, may discover they need to redefine the problem. Possible sub-stages for the design report include:

- brainstorming to generate ideas/solutions for the technological problem;
- selecting several ideas from the solutions generated in the brainstorming exercise (typically three);
- drawing rough sketches for these ideas;
- completing an analysis for each idea (i.e., indicate details on the rough sketches);
- identifying the materials and tools needed for each idea;
- making scale models of technological problem ideas to work out initial details of complexity and feasibility (scale models are not always required - they are used only if they help to clarify ideas).

Appendix B (Continued)

Selection of a Best Solution

Students establish evaluation criteria for the selection of a best solution. They consider such factors as: what materials, tools, and resources are available; the amount of time needed to carry out difficult procedures; and any relevant ergonomic and aesthetic requirements. Students choose the best solutions based on the results of these activities. They record the reasons for choosing a particular solution.

Possible sub-stages for the design report include:

- establishing evaluation criteria for the best solution based on performance specifications, constraints, attribute analysis (details from rough sketches of ideas), and available materials;
- evaluating ideas according to the established evaluation criteria for the best solution by creating a chart to rate each idea;
- creating a working drawing of the idea selected as the best solution.

Production Plan

Students determine ways of producing the best solution and then construct a prototype of the product. Students produce a model size prototype using production-type materials, where possible. Students draft a revised or working drawing and develop a production plan. Students may modify their best solution while moving through the production phase to incorporate ideas that emerge during constructions.

Students document all such changes. Possible sub-stages for the design report include:

- creating drawings of the selected ideas;
- calculating the materials needed to produce the selected idea and the associated costs;
- ordering supplies for the project;
- developing a critical path, incorporating key dates;
- completing the project, producing, in detail, the sequential steps used, and all modifications made.

Project and Process Evaluation

Students evaluate the project and their design report. They consider their own expectations and criteria and the reactions of their peers, teachers, and if applicable, their client.

Present the Results

The final project and design reports are presented to communicate the results.

This design process is adapted from the work of Dr. Ann Marie Hill, Queens University.

Coded Expectations, Construction Technology, Grade 11, College Preparation, TCJ3C

Theory and Foundation

Overall Expectations

- TFV.01** · apply the design process to develop solutions, products, processes, or services in response to challenges or problems in construction technology;
- TFV.02** · explain different techniques used to visualize, describe, present, and build final products of designs of buildings and other structures (e.g., presentation and working drawings);
- TFV.03** · describe the properties of natural and manufactured building materials, processes, and finishes;
- TFV.04** · identify the building codes, regulations, and standards governing a construction project;
- TFV.05** · describe appropriate building construction techniques; construction systems (electrical, mechanical, structural); and the building materials, tools, and equipment used in the construction industry.

Specific Expectations

The Design Process

- TF1.01** – explain how a human need or want can be met through a new or improved product;
- TF1.02** – apply the following steps of the design process to solve a variety of construction technology challenges or problems:
- identify what has to be accomplished (the problem);
 - gather and record information, and establish a plan of procedures;
 - brainstorm a list of as many solutions as possible;
 - identify the resources required for each suggested solution, and compare each solution to the design criteria, refining and modifying it as required;
 - evaluate the solutions (e.g., by testing, modelling, and documenting results) and choose the best one;
 - produce presentation and working drawings, sketches, graphics, mathematical and physical models, or a prototype of the best solution;
 - evaluate the prototype and determine the resources, including computer applications, required to produce it;
 - communicate the solution, using one or more of the following: final drawings, graphs, charts, sketches, technical reports, electronic presentations, flow charts, mock-ups, models, prototypes, and so on;
 - obtain feedback on the final solution and repeat the design process if necessary to refine or improve the solution.

Building Materials and Methods

- TF2.01** – describe the properties (physical, mechanical, and thermal) of the natural and manufactured building products used in construction projects;
- TF2.02** – describe the processes used to prepare natural and manufactured wood products for the construction industry;
- TF2.03** – describe the various finishes and preservatives applied to wood products used in construction projects;
- TF2.04** – describe the materials commonly used for the various components of a construction project (e.g., footings, foundations, floors, walls, roof systems, windows, doors, millwork, interior and exterior finishes, hardware);

TF2.05 – identify a variety of building materials, construction techniques, architectural styles and details, and engineering features used in different construction projects;

TF2.06 – identify and describe the building codes, regulations, and standards applicable to construction projects.

Electrical, Mechanical, and Structural Systems

TF3.01 – describe the operating principles of basic electrical, plumbing, heating, ventilation, and air-conditioning systems used in construction projects;

TF3.02 – use appropriately the terminology, symbols, industry standards, codes, regulations, and conventions related to the electrical, mechanical, and structural systems of a construction project;

TF3.03 – describe the types of loads and structural support members for footings, foundations, floors, walls, roofs, framing systems, bearing walls, columns, beams, lintels, and other parts of the systems used in a wood-frame construction project.

Skills and Processes

Overall Expectations

SPV.01 · demonstrate an understanding of the design process skills by applying them to a variety of construction projects;

SPV.02 · interpret and use technical data, building codes, regulations and standards, and other resources correctly;

SPV.03 · demonstrate a general understanding of residential and light construction systems, as well as the appropriate technical skills for using the tools, equipment, and materials required to complete a construction project;

SPV.04 · describe various documents, bidding procedures, and preliminary estimating methods used in construction projects;

SPV.05 · explain the importance of such aspects of construction projects as architectural styles and features, quality design and workmanship, and efficient and functional planning.

Specific Expectations

Design, Planning, and Communication Skills

SP1.01 – design using effective brainstorming techniques, plan, and implement the best solutions for a variety of construction projects;

SP1.02 – apply design principles to, and identify good planning characteristics of, construction projects;

SP1.03 – describe and use the basic elements of space planning for different areas of a building or structure;

SP1.04 – describe different architectural styles and features of a construction project;

SP1.05 – describe the characteristics of a quality product in terms of good design, choice and finish of materials, and workmanship;

SP1.06 – research, document, and use resources applicable to construction projects such as technical data, charts, tables, reports, zoning by-laws, and building codes, regulations, and standards;

SP1.07 – explain the purpose and content of presentation and working drawings used in the construction industry;

SP1.08 – describe and, where appropriate, use basic traditional and computer-assisted drafting practices used in construction projects;

SP1.09 – produce appropriate presentation drawings (including isometric and oblique drawings, scale models, and two- and three-dimensional computer-generated drawings) using a variety of techniques (e.g., pencil, ink, computer software);

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- SP1.10** – produce appropriate working drawings, including site plans, floor plans, elevations, sections, and details, using a variety of techniques and computer software for a range of construction projects;
- SP1.11** – design the structural elements of a construction project and develop drawings describing them and the required materials;
- SP1.12** – design the mechanical systems of a building project (including electrical, plumbing, heating, ventilation, and air-conditioning systems) in accordance with building codes, regulations, and standards.

Building and Materials Application Skills

- SP2.01** – evaluate a property with respect to important design considerations (e.g., orientation, site restrictions, public services, zoning restrictions, and building codes, regulations, and standards);
- SP2.02** – describe the tools, equipment, and procedures required to properly locate and stake out a building on a property;
- SP2.03** – identify the major features of a site plan;
- SP2.04** – identify the major considerations (e.g., soil type, building type and use, weight of the building material) for the footings of a construction project;
- SP2.05** – identify the major features included in a foundation plan;
- SP2.06** – identify the components of a floor system and determine proper joist and subfloor sizes;
- SP2.07** – identify structural members and explain methods of frame wall construction;
- SP2.08** – describe types of basic roof designs used in construction projects;
- SP2.09** – describe the components of a roof system and determine the correct sizes for ceiling joists, rafters, and sheathing;
- SP2.10** – explain the advantages of trusses for use in construction projects;
- SP2.11** – explain the importance of allowing for proper ventilation and moisture protection, as well as using flashing correctly, in construction projects;
- SP2.12** – describe the advantages and disadvantages of different types of windows and doors used in construction projects;
- SP2.13** – demonstrate an ability to design and, where appropriate, build a stairway for a construction project;
- SP2.14** – demonstrate an ability to design and, where appropriate, build a fireplace for a construction project;
- SP2.15** – use a variety of tools and equipment to complete a construction project;
- SP2.16** – complete a construction project using a variety of methods and procedures for laying out, assembling, and joining.

Estimates, Specifications, and Contracts

- SP3.01** – explain what is involved in developing an estimate of building costs;
- SP3.02** – prepare a materials list for a construction project;
- SP3.03** – estimate accurately the cost of a construction project using the volume and area method;
- SP3.04** – explain the purpose and organization of material and work specifications;
- SP3.05** – identify specification guides for building materials and work related to construction projects;
- SP3.06** – describe various types of contracts and bidding processes used in the construction industry.

Impact and Consequences

Overall Expectations

- ICV.01** · explain the impact of the construction industry on the economy, on society, and on the environment;
- ICV.02** · describe, and apply where appropriate, health and safety legislation; general shop and site safety rules; and rules specific to the safe use of materials, tools, and equipment;
- ICV.03** · identify careers in construction technology and the skills, education, and training each requires.

Specific Expectations

Economic, Social, and Environmental Impacts

- IC1.01** – explain how the construction industry is directly linked to the local economy;
- IC1.02** – explain how to reduce negative environmental and social impacts through the choice of particular energy sources, materials, or processes for construction projects;
- IC1.03** – explain the use of natural and manufactured construction materials and the short- and long-term impact of their use on the environment;
- IC1.04** – evaluate different types of construction projects in terms of efficiency, community building needs, environmental impact, and local building codes, regulations, and standards.

Health and Safety

- IC2.01** – identify hazards related to the materials, processes, and equipment used in a construction work environment;
- IC2.02** – demonstrate safe shop practices when using hand and power tools, materials, and equipment;
- IC2.03** – describe the basic health and safety needs of workers on construction sites;
- IC2.04** – explain the need for health and safety laws and regulations;
- IC2.05** – identify safety codes, regulations, and standards applicable to construction projects and the workplace;
- IC2.06** – explain how to handle hazardous materials in accordance with the Workplace Hazardous Materials Information Systems (WHMIS) guidelines.

Education, Training, and Career Opportunities

- IC3.01** – identify career opportunities in the various sectors of the construction industry;
- IC3.02** – describe the education and training required for employment in construction-related careers;
- IC3.03** – identify postsecondary programs in the construction industry and describe their admission requirements;
- IC3.04** – explain the importance of lifelong learning for someone choosing a career in the construction field.

Ontario Catholic School Graduate Expectations

The graduate is expected to be:

A Discerning Believer Formed in the Catholic Faith Community who

- CGE1a** -illustrates a basic understanding of the **saving story** of our Christian faith;
- CGE1b** -participates in the **sacramental life** of the church and demonstrates an understanding of the centrality of the Eucharist to our Catholic story;
- CGE1c** -actively reflects on **God’s Word** as communicated through the Hebrew and Christian scriptures;
- CGE1d** -develops attitudes and values founded on Catholic **social teaching** and acts to promote social responsibility, human solidarity and the common good;
- CGE1e** -speaks the **language of life**... “recognizing that life is an unearned gift and that a person entrusted with life does not own it but that one is called to protect and cherish it.” (Witnesses to Faith)
- CGE1f** -seeks intimacy with God and celebrates **communion** with God, others and creation through prayer and worship;
- CGE1g** -understands that one’s purpose or **call in life** comes from God and strives to discern and live out this call throughout life’s journey;
- CGE1h** -respects the **faith traditions**, world religions and the life-journeys of **all people of good will**;
- CGE1i** -integrates faith with life;
- CGE1j** -recognizes that “sin, human weakness, conflict and forgiveness are part of the human journey” and that the cross, the ultimate sign of forgiveness is at the heart of **redemption**. (Witnesses to Faith)

An Effective Communicator who

- CGE2a** -listens actively and critically to understand and learn in light of gospel values;
- CGE2b** -reads, understands and uses written materials effectively;
- CGE2c** -presents information and ideas clearly and honestly and with sensitivity to others;
- CGE2d** -writes and speaks fluently one or both of Canada’s official languages;
- CGE2e** -uses and integrates the Catholic faith tradition, in the critical analysis of the arts, media, technology and information systems to enhance the quality of life.

A Reflective and Creative Thinker who

- CGE3a** -recognizes there is more grace in our world than sin and that hope is essential in facing all challenges;
- CGE3b** -creates, adapts, evaluates new ideas in light of the common good;
- CGE3c** -thinks reflectively and creatively to evaluate situations and solve problems;
- CGE3d** -makes decisions in light of gospel values with an informed moral conscience;
- CGE3e** -adopts a holistic approach to life by integrating learning from various subject areas and experience;
- CGE3f** -examines, evaluates and applies knowledge of interdependent systems (physical, political, ethical, socio-economic and ecological) for the development of a just and compassionate society.

A Self-Directed, Responsible, Life Long Learner who

- CGE4a** -demonstrates a confident and positive sense of self and respect for the dignity and welfare of others;
- CGE4b** -demonstrates flexibility and adaptability;
- CGE4c** -takes initiative and demonstrates Christian leadership;
- CGE4d** -responds to, manages and constructively influences change in a discerning manner;
- CGE4e** -sets appropriate goals and priorities in school, work and personal life;
- CGE4f** -applies effective communication, decision-making, problem-solving, time and resource management skills;
- CGE4g** -examines and reflects on one's personal values, abilities and aspirations influencing life's choices and opportunities;
- CGE4h** -participates in leisure and fitness activities for a balanced and healthy lifestyle.

A Collaborative Contributor who

- CGE5a** -works effectively as an interdependent team member;
- CGE5b** -thinks critically about the meaning and purpose of work;
- CGE5c** -develops one's God-given potential and makes a meaningful contribution to society;
- CGE5d** -finds meaning, dignity, fulfillment and vocation in work, which contributes to the common good;
- CGE5e** -respects the rights, responsibilities and contributions of self and others;
- CGE5f** -exercises Christian leadership in the achievement of individual and group goals;
- CGE5g** -achieves excellence, originality, and integrity in one's own work and supports these qualities in the work of others;
- CGE5h** -applies skills for employability, self-employment and entrepreneurship relative to Christian vocation.

A Caring Family Member who

- CGE6a** -relates to family members in a loving, compassionate and respectful manner;
- CGE6b** -recognizes human intimacy and sexuality as God given gifts, to be used as the creator intended;
- CGE6c** -values and honours the important role of the family in society;
- CGE6d** -values and nurtures opportunities for family prayer;
- CGE6e** -ministers to the family, school, parish, and wider community through service.

A Responsible Citizen who

- CGE7a** -acts morally and legally as a person formed in Catholic traditions;
- CGE7b** -accepts accountability for one's own actions;
- CGE7c** -seeks and grants forgiveness;
- CGE7d** -promotes the sacredness of life;
- CGE7e** -witnesses Catholic social teaching by promoting equality, democracy, and solidarity for a just, peaceful and compassionate society;
- CGE7f** -respects and affirms the diversity and interdependence of the world's peoples and cultures;
- CGE7g** -respects and understands the history, cultural heritage and pluralism of today's contemporary society;
- CGE7h** -exercises the rights and responsibilities of Canadian citizenship;
- CGE7i** -respects the environment and uses resources wisely;
- CGE7j** -contributes to the common good.

Unit 2: Architectural Millwork and Detailing

Time: 40 hours

Unit Description

Students investigate aspects of construction that involve fine woodworking and architectural details. They explore period styles, architectural restoration techniques, and traditional and contemporary materials, tools and processes. Students research, design, sketch, draw, and construct a wide range of components for use in both new buildings and those undergoing renovation or restoration. Students investigate careers in interior design, architecture, fine woodworking, architectural restoration, and new construction. Learning is assessed by a variety of means including written reports, research documentation, class discussion, drawings, models, and prototypes. An emphasis is placed on using materials in an environmentally conscious manner. Investigation of applicable building codes and standards will be undertaken. This includes experience in the rehabilitation of architectural components and structures in an attempt to both appreciate and preserve the rich architectural heritage we enjoy.

Unit Synopsis

Activity	Time	Expectations	Assessment	Tasks
2.1 Building a louvered cupola	14 hours	TF1.01, TF1.02, TF2.01, TF2.02, TF2.03, TF2.05, SP1.09, SP1.10, SP2.11, SP2.15, ICI.02	Knowledge/ Understanding Thinking/ Inquiry Application Communication	Research, design, draw, and fabricate a wooden cupola that provides ventilation for, and enhance the appearance of a small building.
2.2 Producing turned balusters and handrail for a veranda	6 hours	TFV.01T, F1.01, TF2.06, SP1.04, SP1.05, SP3.06, IC2.04, IC2.05	Knowledge/ Understanding Thinking/ Inquiry Application Communication	Research, draw and fabricate veranda components for a specific client.
2.3 Fabricating trim components for a front entrance	6 hours	TFV.01, TF1.02, TF2.03, TF2.05, SP1.05, SP2.12, SP2.13, IC2.02, IC3.01, IC3.03	Knowledge/ Understanding Thinking/ Inquiry Application Communication	Research, design, draw, and produce mouldings and panels to be used in the construction of a front entrance for a residence.
2.4 Building a period fireplace mantelpiece	14 hours	TFV.01, TF1.01, TF1.02, SP1.04, SP1.05, SP2.14, SP2.16, IC2.02, IC3.01, IC3.03	Knowledge/ Understanding Thinking/ Inquiry Application Communication	Research, design, draw, and fabricate an authentic moulded mantel appropriate for a particular architectural period.

Activity 1: Building a Louvered Cupola

Time: 840 minutes

Description

Students design, construct, and install a cupola for use on a boathouse, storage shed, or other small building. The structure provides ventilation and enhances the appearance of the building. Working in a small group, students research the history and design of cupolas, meet with a client (if possible), develop designs, produce drawings, and construct the cupola. Students investigate architectural history, ventilation, wood as a material, use of appropriate tools and machines, wood finishing and installation procedures that may involve structural adaptations to the existing building. This activity allows students the opportunity to investigate careers in Architectural History, Carpentry, and Design. Depending on facilities available, students may complete this activity as a model rather than a full size project.

Strand(s) & Learning Expectations

Strand(s): Theory and Foundation, Skills and Processes, Impact and Consequences

TF1.01 - explain how a human need or want can be met through a new or improved product;

TF1.02 - apply the following steps of the design process to solve a variety of construction technology challenges or problems:

- identify what has to be accomplished (the problem);
- gather and record information, and establish a plan of procedures;
- brainstorm a list of as many solutions as possible;
- identify the resources required for each suggested solution, and compare each solution to the design criteria, refining and modifying it as required;
- evaluate the solutions (e.g., by testing, modeling, and documenting results) and choose the best one;
- produce presentation and working drawings, sketches, graphics, mathematical and physical models, or a prototype of the best solution;
- evaluate the prototype and determine the resources, including computer applications, required to produce it;
- communicate the solution, using one or more of the following: final drawings, graphs, charts, sketches, technical reports, electronic presentation, flow charts, mock-ups, models, prototypes, and so on;
- obtain feedback on the final solution and repeat the design process if necessary to refine or improve the solution;

TF2.01 - describe the properties (physical, mechanical, and thermal) of the natural and manufactured building products used in construction projects;

TF2.02 - describe the processes used to prepare natural and manufactured wood products for the construction industry;

TF2.03 - describe the various finishes and preservatives applied to wood products used in construction projects;

TF2.05 - identify a variety of building materials, construction techniques, architectural styles and details, and engineering features used in different construction projects;

SP1.09 - produce appropriate presentation drawings (including isometric and oblique drawing, scale models, and two- and three- dimensional computer-generated drawings) using a variety of techniques (e.g., pencil, ink, computer software);

SP1.10 - produce appropriate working drawings, including site plans, floor plans, elevations, sections, and details, using a variety of techniques and computer software for a range of construction projects;

SP2.11 - explain the importance of allowing for proper ventilation and moisture protection, as well as using flashing correctly, in construction projects;

SP2.15 - use a variety of tools and equipment to complete a construction project;
IC1.02 - explain; how to reduce negative environmental and social impacts through the choice of particular energy sources, materials, or processes for construction projects.

Prior Knowledge & Skills

- Research skills using the Internet, publications and other sources.
- Experience in the safe use of woodworking tools and equipment.
- An understanding of the design process.

Planning Notes

- The teacher should assess student experience and expertise, by means of diagnostic testing, before commencing this activity. Demonstrations and lessons may then be presented in order to ensure that students have adequate instruction related to the tools and processes required to complete the project.
- If the full-scale size of the project creates storage difficulties, students may construct the project in the form of a scale model using many of the same tools and processes.
- It should be noted that while students work in groups on an individual project, each student is involved in the fabrication of some components of the project.
- Whenever possible, recycled materials should be used in the fabrication of the cupola.
- In designing a cupola the teacher and students should discuss ventilation of buildings to provide air circulation and minimize heat build-up. This activity can also be tied into roof pitch, roof framing (particularly if the cupola is to be installed), comparison of materials, and safe practices on a roof.
- Locate examples of existing cupolas in books and magazines, paintings and illustrations of old buildings, and local examples.
- Invite a guest speaker, with experience in this or related projects, to share with the students.

Teaching/Learning Strategies

- The teacher introduces the project challenge to the students.
- The teacher and students discuss the project with a guest speaker, with experience in this or related projects.
- The teacher leads a walking tour around town to identify details similar to those that may be used in the cupola design. If a tour is not feasible then students may research cupola designs in textbooks, magazines or on the Internet.
- Students research design considerations for a cupola designed for a specific application. The application may be theoretical, however students should attempt to identify a client who may use the finished cupola.
- Students develop a set of working drawings using conventional drawing techniques.
- Students research and compare various construction materials (including finishes) to determine those that would be most appropriate for the cupola.
- When possible, the students and the teacher consult with the client frequently, to ensure effective communication and the best possible final product.
- The teacher helps students organize the shared tasks to be performed throughout the activity. This may be done in the form of a production planning chart.
- Students and the teacher apply the safety passport (Appendix A – Safety Passport) in the instruction and use of equipment as required.
- Students use a variety of tools and equipment to fabricate and install (when possible) the cupola.

- The teacher may introduce jig and fixture design. (For example, to simplify the cutting of properly spaced slots in the louver frame, one can employ an indexing pin attached to the mitre fence on the table saw. The index pin fits into a preceding louver slot to align successive cuts accurately.)
- The teacher and students evaluate the success of the activity by making a group presentation of all the components of the design and construction process.

Assessment & Evaluation of Student Achievement

- If students are producing work for a specific “client,” part of the assessment can occur in a final consultation between group members and the client.
- Students are assessed on all aspects of the activity – research, conceptualization, design and drawing, fabrication, installation (when appropriate) and final presentation/critique. To facilitate this a design report should be a part of the material to be assessed. This may include an activity journal and time/work log. The report can be done on an individual basis or can be part a group submission when this is more appropriate. The teacher evaluates each group’s portfolio to ensure that it includes the following information:
 - material selection;
 - sketches;
 - working drawings;
 - written documentation of the design process;
 - safety considerations;
 - assembly plans;
 - evidence of problem-solving;
 - ideas for improvement of the design.
- This checklist is used to evaluate drawings. Ensure that all components are complete.

Title block is complete.	
Drawing is to scale.	
Drawing is clearly labelled.	
Drawing is centred on page.	
Dimensioning is complete (in metric).	
Object(s) are fully described.	
A number of views are presented.	

Accommodations

Various accommodations may be made throughout the activity to assist students. Possible accommodations and modifications are:

- Teachers must review exceptional students’ Individual Education Plans (IEPs) and consult with the appropriate special education teachers in order to be able to implement prescribed accommodations.
- Timelines for the completion of this activity may be modified to suit student need.
- Students requiring extra help may be assigned peer tutors.
- Student-to-student discussion and teacher-to-student conferencing may be provided throughout the project.
- Students may be provided with a choice of complexity of the cupola design.
 - The teacher may demonstrate techniques and practices.
 - Provide drawings of a predetermined design.
 - Use templates.
 - Use example drawings.

- Isometric grid and/or graph paper may be provided to help students create layout drawings.
- Students with knowledge of drawing techniques from previous art and/or technology courses may be paired with students who are not yet familiar with these techniques.
- Some students may require the use of full size plots of some components of their CAD drawings for use as templates in manufacturing certain components.
- As an enrichment, students may produce more detailed drawings (e.g., cutaway, assembly, or perspective drawings), or may use computer-aided design drawings or 3-D illustration software to produce realistic illustrations or animation.
- The complexity of the cupola design may vary significantly to meet the needs of all students.

Resources

Publications

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Canadian Home Workshop. Markham, Ontario: Camar Publications. ISSN 1485-8509
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Fine Homebuilding. Newtown, Connecticut: The Taunton Press. ISSN 1096 360-X
<http://www.finehomebuilding.com>

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<http://www.finewoodworking.com>

Woodsmith. Des Moines, Iowa: August Home Publishing Company. ISSN 0164-4114
<http://www.augusthome.com>

Websites

<http://www.doityourself.com>

Do It Yourself Website

<http://www.taunton.com>

Taunton Publishing

<http://www.pbs.org/wgbh/thisoldhouse/home.html>

This Old House

Videos

Do It Yourself Video Series

Taunton Video Series e.g., Router Joinery
Router Jigs and Techniques
Frame and Panel Construction
Wood Finishing
Roof Framing

Activity 2: Producing a Balustrade (balusters and handrail) for a Deck or Veranda

Time: 360 minutes

Description

Students research, design, and produce a balustrade (handrail and a series of duplicate balusters) of a particular architectural style. These are used either in new construction or as reproduction units to be employed in a renovation or restoration. This activity involves research to determine the most appropriate components to either match existing details or to complement new work. Students accurately produce a set of identical balusters either by lathe turning or other means, depending on the design. If time permits, students may install the railing system on site. Depending on facilities available this activity may be done as a model rather than a full size project.

Strand(s) & Learning Expectations

Strand(s): Theory and Foundation, Skills and Processes, Impact and Consequences

TFV.01 - apply the design process to develop solutions, products, processes, or services in response to challenges or problems in construction technology;

TF1.02 - apply the following steps of the design process to solve a variety of construction technology challenges or problems:

- identify what has to be accomplished (the problem);
- gather and record information, and establish a plan of procedures;
- brainstorm a list of as many solutions as possible;
- identify the resources required for each suggested solution, and compare each solution to the design criteria, refining and modifying it as required;
- evaluate the solutions (e.g., by testing, modeling, and documenting results) and choose the best one;
- produce presentation and working drawings, sketches, graphics, mathematical and physical models, or a prototype of the best solution;
- evaluate the prototype and determine the resources, including computer applications, required to produce it;
- communicate the solution, using one or more of the following: final drawings, graphs, charts, sketches, technical reports, electronic presentation, flow charts, mock-ups, models, prototypes, and so on;
- obtain feedback on the final solution and repeat the design process if necessary to refine or improve the solution;

TF2.06 - identify and describe the building codes, regulations, and standards applicable to construction projects;

SP1.04 - describe different architectural styles and features of a construction project;

SP1.05 - describe the characteristics of a quality product in terms of good design, choice and finish of materials, and workmanship;

SP3.06 - describe various types of contracts and bidding processes used in the construction industry;
IC2.04 - explain the need for health and safety laws and regulations;
IC2.05 - identify safety codes, regulations, and standards applicable to construction projects and the workplace.

Prior Knowledge & Skills

- Research skills using the Internet, publications, and other sources.
- Experience in the safe use of woodworking tools and equipment, especially the wood lathe.
- An understanding of the design process.
- Illustration and CAD skills.
- Safety Passport.

Planning Notes

- The teacher should assess student experience and expertise, by means of diagnostic testing, before commencing this activity. Demonstrations and lessons may then be presented in order to ensure that students have adequate instruction related to the tools and processes required to complete the project.
- If the full-scale size of the project creates storage difficulties, students may construct the project in the form of a scale model using many of the same tools and processes.
- It should be noted that students work in groups on an individual project, with each student involved in the fabrication of some components of the project.
- Whenever possible, recycled materials should be used in the fabrication of the balustrade.
- Teachers should facilitate a working relationship between a “client” and the group of students who are involved in this activity.
- Teachers must know and share with students the building code requirements relating to railings and porches. This presents an opportunity to have students examine local and provincial building codes.
- Attempt to arrange for the local Building Inspector to visit the class or provide the required building code information.
- Invite a professional wood turner to provide a workshop for students.
- Visits to local demolition businesses or architectural salvagers may yield interesting, useful, and potentially valuable architectural components like railings, turnings, doors, windows, and hardware. These are also potential sources for old lumber that may be used in reproduction or restoration of wooden details.

Teaching/Learning Strategies

- The teacher introduces the challenge.
- Students use the design process as a framework to design their balustrade (see Appendix B).
- The teacher or local Building Inspector provides students with information on building code requirements for balustrades.
- Students research balustrades and develop an appropriate design for a specific application.
- The teacher and students discuss and compare various construction materials (including finishes) to determine those that would be most appropriate for the balustrade.
- Students develop a set of presentation drawings for the client. The teacher and students discuss the importance of communication between client and professional/craftsperson.
- Students develop a set of working drawings using Computer-aided design software to construct the balustrade.
- The teacher helps students organize the shared tasks to be performed throughout the activity using a production planning process
- The teacher should check cutting lists before the student proceeds.

-
- The teacher and the students must give special attention to the safe, competent use of tools. (Appendix A – Sample Safety Passport)
 - The teacher provides individual and group instruction on specific equipment as needed, and employs the safety passport.
 - Students use a variety of tools and equipment to fabricate and install (when possible) the balustrade.
 - The teacher and students consult with the client for whom the balustrade is being fabricated on an ongoing basis, to ensure effective communication and the best possible final product.
 - Students meet with a professional wood turner to provide insights into the commercial issues and career opportunities in industrial woodworking.
 - Students make a group presentation of all the components of the design and construction process.

Assessment & Evaluation of Student Achievement

- The group presentation is part of the submission of work for evaluation.
- If students are producing work for a specific “client”, part of the assessment may occur during a final consultation between group members and the client.
- A design report should be a part of the material to be assessed. This may include (but is not restricted to) an activity journal and time/work log. The report can be done on an individual basis or can be part a group submission when this is more appropriate.
- Students are evaluated on the quality of drawings, completeness of information, and accuracy (e.g., line thickness, squareness, the use of CSA standard symbols and conventions, etc.). See– Checklist for Technical Drawings in Activity 1.
- A pre-test should be administered to determine measuring competency.
- Each student should keep daily logs. The logs along with in-class questions and answers can be evaluated for correct use of technical language.

Accommodations

Various accommodations may be made throughout the activity to assist students including those with special needs. Possible accommodations are:

- The teacher must review students’ Individual Education Plans (IEPs) and consult with the appropriate special education teachers in order to be able to implement prescribed accommodations.
- Teachers should group students together who have a range of skills. Students with skill and experience in specific areas (wood turning, for example) could work with others who are developing these skills.
- The teacher is encouraged to expand teaching strategies to accommodate learning styles. This may include:
 - oral testing and student demonstrations of acquired skills;
 - conferencing/discussion;
 - student-to-student discussion and teacher-to-student discussion to encourage confidence and motivation;
 - small group learning;
 - flexible timelines;
 - adaptation of handouts;
 - peer assistance and tutoring.
- Students may follow a pre-designed production sequence.
- Create some sample templates for use in duplicating balusters. These may be used by some students who require a less open-ended learning strategy.
- For enrichment, students may enhance their balustrade and increase the manufacturing complexity through a variety of techniques (e.g., incorporate a variety of materials and assembly methods).

Resources

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Do It Yourself

<http://www.taunton.com>

Taunton Publishing

<http://www.pbs.org/wgbh/thisoldhouse/home.html>

This Old House

Videos

Do It Yourself Video Series

Hometime Video Series – Managing Home Construction Video

Hometime Video Series – Three Season Porch Video

Taunton Video Series e.g., Turning Furniture Spindles
 Turning Projects
 Turning Wood
 Router Joinery
 Router Jigs and Techniques
 Frame and Panel Construction
 Wood Finishing

Activity 3: Fabricating an Entranceway

Time: 360 minutes

Description

Students research, design, and fabricate components (e.g., mouldings, panels, and pilasters) to be used in the construction of an entranceway for a residence. The architectural style dictates the essential design features, but the exact elements to be produced are determined by the specific application and the final design. Whether the entranceway is for new construction, an addition or renovation, or restoration of existing features, the project provides an opportunity for skill development and a problem-solving approach to producing architectural details. This activity may be done as a model rather than a full size project.

Strand(s) & Learning Expectations

Strand(s): Theory and Foundation, Skills and Processes, Impact and Consequences

TFV.01 - apply the design process to develop solutions, products, processes, or services in response to challenges or problems in construction technology;

TF1.02 - apply the following steps of the design process to solve a variety of construction technology challenges or problems:

- identify what has to be accomplished (the problem);
- gather and record information, and establish a plan of procedures;
- brainstorm a list of as many solutions as possible;
- identify the resources required for each suggested solution, and compare each solution to the design criteria, refining and modifying it as required;
- evaluate the solutions (e.g., by testing, modeling, and documenting results) and choose the best one;
- produce presentation and working drawings, sketches, graphics, mathematical and physical models, or a prototype of the best solution;
- evaluate the prototype and determine the resources, including computer applications, required to produce it;
- communicate the solution, using one or more of the following: final drawings, graphs, charts, sketches, technical reports, electronic presentation, flow charts, mock-ups, models, prototypes, and so on;
- obtain feedback on the final solution and repeat the design process if necessary to refine or improve the solution;

TF2.03 - describe the various finishes and preservatives applied to wood products used in construction projects;

TF2.05 - identify a variety of building materials, construction techniques, architectural styles and details, and engineering features used in different construction projects;

SP1.05 - describe the characteristics of a quality product in terms of good design, choice and finish of materials, and workmanship;

SP2.12 - describe the advantages and disadvantages of different types of windows and doors used in construction projects;

SP2.13 - demonstrate an ability to design and, where appropriate, build a stairway for a construction project;

IC2.02 - demonstrate safe shop practices when using hand and power tools, materials, and equipment;

IC3.01 - identify career opportunities in the various sectors of the construction industry;

IC3.03 - identify postsecondary programs in the construction industry and describe their admission requirements.

Prior Knowledge & Skills

- Sketching and Computer-aided design software.
- Research skills using the Internet, publications and other sources.
- Experience in the safe use of woodworking tools and equipment.
- An understanding of the design process.

Planning Notes

- Skills developed in this activity can be transferred to other applications like exterior cornice details, interior trim, cabinet work and built-ins.
- There is almost limitless variation in the type of entranceway that one could undertake, given the great range of architectural styles and individual needs.
- Collect as many examples of trim components and details as possible, as samples for students and as teaching aids. These may be constructed by the teacher or by students. Other sources for these examples are salvage yards and demolition sites.
- The teacher should assess student experience and expertise, by means of diagnostic testing, before commencing this activity. Demonstrations and lessons may then be presented in order to ensure that students have adequate instruction related to the tools and processes required to complete the project.
- If the full scale size of the project creates storage difficulties, students may construct the project in the form of a scale model using many of the same tools and processes.
- It should be noted that students work in groups on an individual project, with each student involved in the fabrication of some components of the project.
- Whenever possible, recycled materials should be used in the fabrication of the entranceway.
- Contact wooden trim manufacturers and request samples of all their products. These make a valuable resource and make it easier for students to identify the most appropriate components for their designs.
- Develop an ever-growing resource of photographs depicting architectural details and construction elements.
- Organize an architectural scavenger hunt. Arrange the hunt to highlight outstanding examples of architecture.

Teaching/Learning Strategies

- The teacher and students discuss the goals of the activity and possible enrichment opportunities.
- Students research architectural styles and entranceways and develop an appropriate design for a specific application.

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- Groups of students engage in an architectural scavenger hunt. The hunt takes a route through a neighbourhood that contains outstanding examples of architecture. Each team has a list of architectural elements, examples of which are evident along the route. The team must find the element and record its location (street and address). An additional component to this trip could be the requirement that the details be sketched and/or photographed by group members.
 - The teacher arranges for a guest lecture by a member of the Art or History department in the school (or a member of the local community) who has particular interest in, and knowledge about, architectural history.
 - Groups of students apply the design process as a framework to design and produce the required elements for an entranceway. (Appendix B – Sample Design Process)
 - Students develop a set of working drawings to construct the entranceway.
 - Teacher helps students organize the shared tasks to be performed throughout the activity using a production planning process
 - The teacher should check cutting lists before the student proceeds.
 - Special attention must be given to the safe, competent use of tools (Appendix A – Sample Safety Passport).
 - The teacher provides individual and group instruction on specific equipment as needed, and employs the safety passport.
 - Students use a variety of tools and equipment to fabricate and install (when possible) the entranceway.
 - Students develop a photographic archive of architectural details that involve trim elements and prepare a “scrapbook” of examples of entranceways that reflect a broad range of architectural styles.
 - The teacher and students assess the success of the activity through group presentations and discussions on all the components of the design and construction process.
 - Discussion of career opportunities will occur throughout.

Assessment & Evaluation of Student Achievement

- The group presentation is part of the submission of work for evaluation.
- Students are assessed on all aspects of the activity – research, conceptualization, design and drawing, fabrication, installation (when appropriate) and final presentation/critique.
- A design report should be a part of the material to be assessed. This may include (but is not restricted to) an activity journal and time/work log. The report can be done on an individual basis or can be part a group submission when this is more appropriate.
- The teacher may use the students’ daily journals, written quizzes and tests, conferencing, checklists, and assessment charts to assess the following:
 - selection of materials;
 - application of design processes;
 - research and written documentation;
 - quality of work (reporting and drawings);
 - evidence of problem solving;
 - analysis of the design, and ideas for improvements;
 - safe working practices.

Accommodations

- Various accommodations may be made throughout the activity to assist students including those with special needs. Possible accommodations are:
- Provide samples for students to see the variations of drawing quality, information, and formality (hand-drafted versus computer drafting);

- Group students who may require peer tutoring while doing task assignments within the group;
- The teacher should be familiar with student's IEP, and make appropriate accommodations;
- Allow students ample time to practise each skill;
- Students can work in pairs or groups to balance out the abilities of each member of the group;
- The use of jigs should not be overlooked – a simple jig can remove much of the risk from a particular operation (i.e., stop blocks on the mitre saw);
- Encouraging students to incorporate more elaborate joints or finishes may provide enrichment. As well, students can be encouraged to use hand tools in place of power tools.

Resources

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Do It Yourself

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Taunton Publishing

<http://www.pbs.org/wgbh/thisoldhouse/home.html>

This Old House

Videos

Do It Yourself Video Series

Hometime Video Series - Finish Carpentry Video

Taunton Video Series e.g., Router Joinery
Router Jigs and Techniques
Frame and Panel Construction
Wood Finishing

Activity 4: Building a Period Fireplace Mantel

Time: 840 minutes

Description

In this activity students research, design and fabricate a fireplace mantel. They base their design either on their own selection of a specific architectural period (which may include modern) or on design requirements determined by a “client”. Although mantels often seem impossibly intricate and difficult to make, students have an opportunity to simplify the process by identifying the separate parts and are thereby able, with care, to construct examples of intricate woodwork. This activity may be done in groups or as a model rather than a full size mantle.

Strand(s) & Learning Expectations

Strand(s): Theory and Foundation, Skills and Processes, Impact and Consequences

TFV.01 - apply the design process to develop solutions, products, processes, or services in response to challenges or problems in construction technology;

TF1.01 - explain how a human need or want can be met through a new or improved product;

TF1.02 - apply the following steps of the design process to solve a variety of construction technology challenges or problems:

- identify what has to be accomplished (the problem);
- gather and record information, and establish a plan of procedures;
- brainstorm a list of as many solutions as possible;
- identify the resources required for each suggested solution, and compare each solution to the design criteria, refining and modifying it as required;
- evaluate the solutions (e.g., by testing, modeling, and documenting results) and choose the best one;
- produce presentation and working drawings, sketches, graphics, mathematical and physical models, or a prototype of the best solution;
- evaluate the prototype and determine the resources, including computer applications, required to produce it;

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- communicate the solution, using one or more of the following: final drawings, graphs, charts, sketches, technical reports, electronic presentation, flow charts, mock-ups, models, prototypes, and so on;
 - obtain feedback on the final solution and repeat the design process if necessary to refine or improve the solution;

SP1.04 - describe different architectural styles and features of a construction project;

SP1.05 - describe the characteristics of a quality product in terms of good design, choice and finish of materials, and workmanship;

SP2.14 - demonstrate an ability to design and, where appropriate, build a fireplace for a construction project;

SP2.16 - complete a construction project using a variety of methods and procedures for laying out, assembling, and joining;

IC2.02 - demonstrate safe shop practices when using hand and power tools, materials, and equipment;

IC3.01 - identify career opportunities in the various sectors of the construction industry;

IC3.03 - identify postsecondary programs in the construction industry and describe their admission requirements.

Prior Knowledge & Skills

- Sketching and Computer-aided design software
- Experience in the safe use of woodworking tools and equipment.
- An understanding of the design process.
- Previous experience in measuring and layout and the use of a scale would be helpful.

Planning Notes

- Precision and accuracy are critical in this activity. Reference must be made to Appendix 2.1 – Glossary of Terms. Teachers should emphasize the need to take special care at all stages of construction. Students should be encouraged to seek help and instruction whenever necessary.
- The teacher should assess student experience and expertise, by means of diagnostic testing, before commencing this activity. Demonstrations and lessons may then be presented in order to ensure that students have adequate instruction related to the tools and processes required to complete the project.
- If the full scale size of the project creates storage difficulties, students may construct the project in the form of a scale model using many of the same tools and processes.
- It should be noted that a group of students will usually be working on an individual project, with each student involved in the fabrication of some components of the project.
- Whenever possible, recycled materials should be used in the fabrication of the mantel.
- It would be very helpful to provide a sample of an old fireplace surround. Perhaps one could be located and obtained at a reasonable cost from a demolition company or architectural salvager.
- Produce any jigs that would facilitate the production of the surround. (For example, pilaster faces can be fluted on a router table by registering them against 1-inch MDF strips instead of directly against the rip fence. After each pass, a strip is removed; the rip fence is not moved.)
- To save expense and conserve resources, use plywood, rather than solid wood, wherever feasible.

Teaching/Learning Strategies

- The teacher introduces the challenge.
- The teacher and students discuss the correct terminology to describe the components of mantels.
- Research architectural styles and mantels and develop an appropriate design for a specific application.
- The teacher provides information on classical columns and entablatures (consisting of cornice, frieze and architrave).

-
- A local Building Inspector (or teacher) introduces safety issues related to wood burning, required clearances, and use of materials and finishes.
 - The teacher organizes students into appropriate small groups, taking into account individual skills and knowledge.
 - Groups of students apply the design process in designing and producing their mantel.
 - Students develop a set of working drawings using Computer-aided design software to produce scaled working drawings to construct the mantel.
 - The teacher helps students organize the shared tasks to be performed throughout the activity
 - Use a variety of tools and equipment to fabricate and install (when possible) the mantel. Teacher emphasizes the need for precision, care, and accuracy throughout the process of producing the mantel.
 - The teacher continues to utilize the safety passport (see Appendix A – Sample Safety Passport) to track student’s readiness to operate equipment safely.
 - Students develop a photographic archive of architectural details that involve trim elements and examples of entranceways that reflect a broad range of architectural styles.
 - Students submit their final design reports and present to the class their finished projects.

Accommodations

Various accommodations may be made throughout the activity to assist students. Possible accommodations are:

- students may be given extra time to practise;
- provide some students with a sequential list of tasks to be completed during the course of this activity;
- students may be paired to balance strengths;
- peer helpers may be assigned;
- students can develop proficiency in using hand tools in place of power tools;
- other opportunities could include students designing and building jigs;
- omit the mortise and tendon joinery, and substitute a biscuit joint;
- simple designs can be achieved by drilling holes (e.g., three overlapping holes gives a clover shape);
- final finish can be omitted or applied to any level of complexity (hand rubbed or faux paint).

Assessment & Evaluation of Student Achievement

- A design report should be a part of the material to be assessed. This may include (but is not restricted to) an activity journal and time/work log. The report can be done on an individual basis or can be part a group submission when this is more appropriate.
- Teamwork, and the ability to work accurately and with precision, form part of the assessment criteria.
- Students demonstrate knowledge of the design process and how it leads to detailed construction drawings and notes for fabrication by themselves or others.
- Students are assessed individually on research material gathered and based on accuracy and detail of the overall working drawings.
- Students are assessed using a checklist to ensure accuracy and detail in the overall working drawings (see Drawing Checklist in Activity 1).
- Teacher-student group conference with anecdotal notes made by both teachers and students are important as students may need assistance adhering to timelines and budget. Students’ anecdotal notes on conferences are part of their final submission of their daily log.
- Students self-assess the quality and quantity of work performed in the various designs stages.

Resources

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Do It Yourself

<http://www.mantles.com>

Mantles

<http://www.taunton.com>

Taunton Publishing

<http://www.pbs.org/wgbh/thisoldhouse/home.html>

This Old House

<http://www.woodcarverinc.com>

Wood Carver

Videos

Do It Yourself Video Series

Taunton Video Series e.g.,

Router Joinery

Router Jigs and Techniques

Frame and Panel Construction

Wood Finishing

Appendix 2.1

Glossary of Terms

Architrave: A moulding that surrounds a door or window

Baluster: One of a series of short pillars or other uprights that support a handrail

Balustrade: A series of balusters connected on top by a handrail (top rail) and sometimes on the bottom by a bottom rail; used on staircases, balconies, porches, et cetera

Cornice: A decorative moulding forming a junction between the walls of a room and the ceiling or the uppermost horizontal moulding of a classical entablature

Cupola: A small structure built on the ridge of a roof

Entablature: The band of mouldings near the top of a façade, divided into cornice, frieze, and architrave

Flashing: A weatherproof strip (usually of metal) used to cover the junction between a roof and a wall or chimney, or between one part of a roof and another

Fluting: Vertical, concave channels on columns, pilasters, and other surfaces

Frieze: In classical architecture, the member between the architrave and cornice. Also any plain or decorative band, or board, on the top of a wall immediately below the cornice

Jig: A device that holds and/or locates a piece of work and/or guides the tools that operates upon it; or a shop-made device that extends or improves the usefulness or accuracy of a tool

Louvers: Closely spaced parallel strips of material used to obstruct the passage light or rain while allowing the passage of air

Mantel: The ornamental work or facing around a fireplace

Miter: An angular shape formed by joining two obliquely cut members of similar size

Moulding: A continuous decorative band; serves as an ornamental device on both the interior and exterior of a building or structure

Panel: A sunken or raised portion of a wall, ceiling, mantel, or door with a frame-like border

Pilaster: A rectangular column or shallow pier attached to a wall; quite frequently decoratively treated to represent a classical column with a base, shaft and capital

Plywood: A composite board made up of veneers glued together, with the grain of adjacent layers perpendicular to one another

Roof Pitch: The slope of a roof

Verandah: A roofed space attached to the exterior wall of a house and supported by columns, pillars, or posts

Unit 3: Land Use and Development

Time: 40 hours

Unit Description

Students explore the concepts of land use planning and development. They develop an understanding of how our urban surroundings are created and structured. This unit introduces students to potential careers in Urban Planning, Engineering and Development. They will further develop their design and problem solving skills and will increase their knowledge of the environment, technical terminology, design and drafting, and model building. An emphasis is placed on conscientious environmental design and respect for preserving the environment that already exists and ensuring that the future needs of the community are met. We are stewards of our world and God has given us the responsibility to act and make decisions that reflect our Christian beliefs. There will be opportunities to discuss and make informed decisions especially around moral and ethical issues. Students demonstrate their learning through discussions, research, written work, preparing land use plans, presentation drawings, and scale models.

Strand(s) & Learning Expectations

Strand(s): Theory and Foundation; Skills and Processes; Impact and Consequences

Overall Expectations

TFV.01 - apply the design process to develop solutions, products, processes, or services in response to challenges or problems in Construction Technology;

TFV.02 - explain different techniques used to visualize, describe, present, and build final products;

TFV.04 - identify the building codes, regulations, and standards governing a construction project;

TF1.01 - explain how a human need or want can be met through a new or improved product;

TF1.02 - apply the steps in the design process to solve a variety of Construction Technology challenges or problems;

SPV.01 - demonstrate an understanding of the design process skills by applying them to a variety of construction projects;

SPV.02 - interpret and use technical data, building codes, regulations and standards and other resources correctly;

SPV.05 - explain the importance of such aspects of construction projects and architectural styles and features, quality design and workmanship, and effective functional planning.

Specific Expectations

SP1.01 - design using effective brainstorming techniques, plan, and implement the best solutions for a variety of construction projects;

SP1.06 - research, document, and use resources applicable to construction projects;

SP1.07 - explain the purpose and content of presentation and working drawings used in the construction industry;

SP1.08 - describe and, where appropriate, use basic traditional and computer assisted drafting practices used in construction projects;

SP1.09 - produce appropriate presentation drawings using a variety of techniques;

SP2.01 - evaluate a property with respect to important design considerations;

SP2.03 - identify the major features of a site plan;

ICV.01 - explain the impact of the construction industry on the economy, on society, and on the environment;

IC1.01 - explain how the construction industry is directly linked to the local economy;

IC1.04 - evaluate different types of construction projects in terms of efficiency, community building needs, environmental impact, and local building codes, regulations, and standards;

IC3.01 - identify career opportunities in the various sectors of the construction industry.

Ontario Catholic School Graduate Expectations

CGE1d - develops attitudes and values founded on Catholic social teaching and acts to promote social responsibility, human solidarity and the common good;

CGE1i - integrates faith with life;

CGE2a - listens actively and critically to understand and learn in light of Gospel values;

CGE2b - reads, understands, and uses written materials effectively;

CGE2c - presents information and ideas clearly and honestly and with sensitivity to others;

CGE2e - uses and integrates the Catholic faith tradition, in the critical analysis of the arts, media, technology, and information systems to enhance the quality of life;

CGE3b - creates, adapts, and evaluates new ideas in light of the common good;

CGE3c - thinks reflectively and creatively to evaluate situations and solve problems;

CGE3e - adopts a holistic approach to life by integrating learning from various subject areas;

CGE3f - examines, evaluates, and applies knowledge of interdependent systems for the development of a just and compassionate society;

CGE4b - demonstrates flexibility and adaptability;

CGE4d - responds to, manages, and constructively influences change in a discerning manner;

CGE4f - applies effective communication, decision-making, problem solving, time and resource management skills;

CGE5b - thinks critically about the meaning and purpose of work;

CGE5c - develops ones' God given potential and makes a meaningful contribution to society;

CGE5g - achieves excellence, originality, and integrity in one's own work and supports these qualities in the work of others;

CGE7b - accepts accountability for one's own actions;

CGE7I - respects the environment and uses resources effectively.

Activity: Titles and Time

Activity 1	Land Use Planning- Official Plans and Zoning By-laws	420 minutes
Activity 2	Designing a Residential Subdivision	600 minutes
Activity 3	Presentation Drawings- Design and Drafting	600 minutes
Activity 4	Model Building	600 minutes
Activity 5	Presentation and Reflection	180 minutes

Unit Synopsis Chart

Activity	Time	Expectations	Assessment	Tasks
1. Land use planning- Official Plans and Zoning By-laws	7 hours	TFV.04, IC3.01, SP1.06, SP2.03, ICV.01, IC1.01, CGE2a, 2b, 3f	Knowledge/ Understanding Thinking/ Inquiry	Instructor gives historical perspective into the planning process and discusses how official plans and zoning bylaws are developed locally Students research and gather information on the area (town/city/subdivision)
2. Designing a Residential Subdivision	10 hours	TFV.01, TF1.02, SPV.01, SPV.02, SP1.01, SP2.01, SP2.03, CGE2c, 3b, 3e, 3f	Knowledge/ Understanding Thinking/ Inquiry Application	Students design a subdivision plan on a real local site, interpreting data, settings parameters and developing rough sketches

3. Presentation Drawings- Design and Drafting	10 hours	TFV.01, TFV.02, SP1.07, SP1.08, SP1.09, CGE3c, 4f, 5g	Knowledge/ Understanding Application Communication	Students visualize their designs and create presentation drawings
4. Model Building	10 hours	TFV.02, SP1.09, IC2.02, CGE3c, 4f, 5g, 7i	Application	Students create a scale model of their design
5. Presentation and Reflection	3 hours	SP1.07, SP1.08, TFV.04, IC1.01, IC1.04, TFV.02, SPV.05, IC3.01 CGE1d, 1I, 2c, 3b, 4c	Knowledge/ Understanding Communication	Students present their designs and prepare a reflection paper on their learning

Unit Planning Notes

- The overall intent of this unit is to utilize a real site and to create an overall subdivision plan.
- A model building approach is taken, an actual site should be selected so that students are working in real world measurements to real site restrictions.
- The focus of this unit is to engage students to work independently and collaboratively in activities in which they are interested, promoting some specialization in urban planning, land use management, subdivision design and model building.
- Some activities may proceed simultaneously i.e., model building and presentation drawings. Teachers may choose to do Activities 3 and 4 simultaneously. The flow of the drawing preparation and the coordination of the model building and presentation drawings may be more cohesive if done together. If a large scale model building option is selected (all students contribute to one final model), teachers may choose to keep the activities separate until they are linked in the model building portion of the project.
- Building the final scale model may be done as a number of activities so that different scale sizes may be used or as one overall model.

Prior Knowledge & Skills

- Research and problem-solving skills
- Individual self-directed learning
- Collaborative group learning
- Sketching and drawing techniques
- Use of measuring tools and devices (tape measure, scale rulers, T squares, set squares, surveying equipment where available)

Teaching/Learning Strategies

- Students work individually or in groups to complete the activities. Individually for understanding of terms, in groups to design, develop drawings, and model building
- The emphasis on mastering learning and cooperative teams is to be stressed in this unit.
- Students may focus or specialize in certain areas of their interest (design, presentation drawings, model building) so that they may guide/lead their team through the final presentation. This will allow all students an opportunity for participation and to demonstrate their strengths, i.e., drawing, computer work, model building, presentation of products, etc.

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- Personal Christian development in working as a group member is important when dealing with deadlines, personal and peer conflicts, and conflict resolution, respecting others, their ideas, gifts and talents and using them for the common good;
 - Students may be grouped so each includes a variety of learning types and has a balance of visual and analytical thinkers. Grouping like abilities and skills may allow for more intensive teacher direction.

Assessment & Evaluation of Student Achievement

- This unit will introduce students to design and problem-solving models as they apply to specific site limitations and design restrictions
- It will introduce them to design conceptualizing, master planning, drafting, presentation drawings and model building as process in the construction industry
- Students will work through conceptual ideas to final design presentation.

Accommodations

- Written, audio and video taped materials, samples of completed work, sketches, drawings to support a multi-disciplinary approach;
- Facilities for special needs and physically handicapped students must be considered (e.g., ramps, lowered tables, special tools, and protective wear) provide an environment that is supportive both in academic content and physical set-up;
- Use of Ministry Document: *Technology and Education 1999*, p. 48 re exceptional students;
- Large print texts, large screen monitors and other adaptive devices as appropriate;
- Educational Resource Worker or Special Education staff for 1:1 support, and support within group if required;
- Provide modifications/accommodations for assessment and evaluation recommended as appropriate for students with special needs such as but not limited to:
 - Word lists, glossaries, definitions of terms to assist in understanding and retention;
 - Selectivity in group pairing as appropriate;
 - Remediation and enrichment opportunities as appropriate
 - Testing alternatives as recommended in students IPRC;
 - Conferences to keep on task and offer a variety of assigned formats;
 - An environment that includes all health and safety precautions (especially for students with mobility concerns).

Resources

Publications

Blumenson, J. *Ontario Architecture, A Guide to Styles and Building Terms*. Fitzhenry and Whiteside, 1990. ISBN 0-88902-872-9

Eisner, E., Gallion, A., Eisner, S. *The Urban Pattern*, 6th ed. New York: Van Nostrand Reinhold. 1993. ISBN 0-442-00752-3

Gill, R.W. *Rendering with Pen and Ink*. London: Thames and Hudson Ltd., 1973. ISBN 0-500-68003-5

Hodge, G. *Planning Canadian Communities*. Canadian Cataloguing in Publication Data, 1986. ISBN 0-458-95880-8

Jacobs, J. *The Death and Life of Great American Cities*. Random House Inc., 1972. ISBN 0-6797-4195-x

Lang, R.S. *Goals in Official Plans*. Toronto: The Metropolitan Toronto Planning Board, 1973.

MaCaulay, D. *City- A Story of Roman Planning and Construction*. Boston: Houghton, Mifflin Co., 1974. ISBN 0-395-19492-X

Mackenzie, D. *Design for the Environment*. New York: Rizzoli International Publisher, 1991. ISBN 0-8478-1390-8

McHarg, I. *Design with Nature*. New York: Natural History Press, 1969.

Ontario, *Planning Act Review Committee, Ministry of Housing, Report of the Planning Act Review Committee*. 1997

Pressman, N.E.P. *Planning New Communities in Canada*. Occasional Paper. (University of Waterloo, School of Urban and Regional Planning) Ottawa: 1975. ISSN 14-0318-1286

Pressman, N.E.P. *New Towns*. Occasional Paper No. 1, Contact (Bulletin of Urban and Environmental Affairs), Division of Environmental Studies, University of Waterloo, Ontario, June, 1972.

Specter, D.K. *Urban Spaces*. New York: New York Graphic Society, 1974. ISBN 0-8212-0463-7

Spirn, A.W. *The Granite Garden – Urban Nature and Human Design*. New York: Basic Books, Inc., 1974. ISBN 0-465-02699-0

Stirling, N. *Fundamentals of Technical Drawing*. Gage Educational Publishing, 1984. ISBN 0-7715-0327x

Tutt, P., Adler, D., *New Metric Handbook, Planning and Design Data*. Butterworth Heinemann, Oxford. 1979. ISBN. 0-7506-0853-6

Websites

www.utoronto.ca

www.ryerson.ca, and other university websites for careers and programs in Applied Science, Engineering, Landscape Architecture, Architecture, Urban Planning

City Planning- www.encarta.msn.com/eng/. History of City Planning.

History of Planning- www.library.cornell.edu Planning from 1794-1918

Videos

News in Review, CBC- *The New Toronto: Is Bigger Better?* C. 1997 Canadian Broadcasting Corporation

News in Review, CBC- *Canada: Urban and Rural Lifestyles*. C. 1992 Canadian Broadcasting Corporation

Activity 1: Land Use Planning- Official Plans and Zoning By-Laws

Time: 7 hours

Description

Students will explore the history of land use planning around the world and specifically in Canada. They will be introduced to the overall unit objectives. Students will interact with other group members to research and gather information on the area and to research appropriate sites for a future new subdivision. Information gathering will provide the foundation for the production of land use plans, scale drawings, presentation drawings and scale models. Emphasis should be placed on their concern for the environment and their Catholic responsibility as stewards of the environment making decisions using an informed conscience. They will be introduced to a variety of careers related to Planning, Design and Development.

Strand(s) & Learning Expectations

Ontario Catholic School Graduate Expectations

CGE2a - listen actively and critically to understand in the light of gospel values;

CGE2b - read, understand, and use written material effectively;

CGE3f - examine, evaluate and apply knowledge of interdependent systems (physical, political, ethical, socio-economic, and ecological) for the development of a just and compassionate society.

Strand(s): Theory and Foundation, Skills and Practices, Impact and Consequences

Learning Expectations

IC3.01 - identify career opportunities in the various sectors of the construction industry;

ICV.01 - explain the impact of the construction industry on the economy, on society, and on the environment;

SP2.03 - identify the major features of a site plan;

TFV.04 - identify building codes, regulations, and standards governing a construction project;

SP1.06 - research, document, and use resources applicable to construction projects such as technical data, charts, tables, reports, zoning by-laws, and building codes, regulation, and standards;

IC1.01 - explain how the construction industry is directly linked to the local economy.

Planning Notes

- Teachers must familiarize themselves with local planning history and have an understanding of the local by-laws governing their city/town/hamlet.
- Ensure students participate actively in the discussions of how the final subdivision should be planned.
- Ensure students understand the connection between the preparation of models and their important function in community-based planning.
- Teachers may choose a parcel of land where zoning by-laws have been set but where no construction has occurred or a development that has already been designed and built.
- Guest speakers should be arranged (municipal or provincial governments, local business people, etc.)

Prior Knowledge & Skills

- Research skills (Internet and Publications)
- Interactive and collaborative group skills
- Communication skills (to participate in discussions, conflict resolution, and be an interdependent group member)

Teaching/Learning Strategies

(Whole group)

- Encourage students to investigate and use their cultural background in these activities.
- Students work individually and in small groups to research the history of town planning.
- Discuss how global communities are planned and the need for planning (especially at the community level, having control of the local environment).
- Share samples of historical plans (i.e., Ancient Greece, Babylon, Ancient Rome, China, etc.) and specifically Canadian cities (Charlottetown, Toronto, Guelph, Kingston, London, Hamilton, and Ottawa).
- Discuss how planners deal with all aspects of community development; transportation, housing, natural environments, parkland, industrial areas, religious buildings, cemeteries, social well being, and the local economy. Discuss ethical questions that may arise and how they will reflect their Christian values.

-
- Set up teams to simulate real life planning and development companies to maximize the development of the drawings and to divide tasks and model building.
 - Discuss how the local community has been planned and the need for planning, Share samples of local town plans and pictures of the town at various stages of development.

(Small group 2-3 students)

- Research (Internet or publications) the design of historical cities (i.e., Babylon, Ancient Rome, China, etc.) and develop criteria for important land use considerations.
- Research Canadian cities (Charlottetown, Toronto, Guelph, Kingston, London, Hamilton, and Ottawa) and of “new” (1940’s to mid 1960’s) suburbs, e.g., Don Mills, Ajax, Bramalea, Erin Mills, Kanata, Malvern, Meadowvale, North Pickering, Saltfleet, Gloucester, etc.
- Research local land use plans and bylaws to develop local criteria.
- Research and choose important ways to zone areas.
- Discuss the important environmental aspects of land use plans.

The teacher will

(Whole group)

- Introduce the historical perspective of the planning process, referring to ancient civilizations.
- Introduce and discuss the role of the urban planner, engineers, architects, developers, and builders play in the design and construction of new communities (refer to Appendix 3.1A).
- Discuss the professional obligation of these designers and builders to promote safe, ecologically sound, and aesthetically pleasing communities.
- Introduce the idea of Mastery learning- students may spend more time developing computer assisted drawings, illustrations, presentation drawings, and/or model building depending on their overall interests.
- Provide the criteria for evaluation, provide examples of completed work including key terms and definitions (Appendix 3.1A; 3.1B)
- Provide samples for students of local historical land use plans and modern subdivision plans.

Assessment & Evaluation of Student Achievement

Teachers will consult individual student IEPs for specific direction on accommodation for individuals.

- Students will be assessed individually on research material gathered on local land use planning and zoning. A formative evaluation will be used to assess their knowledge and understanding of land use and zoning terms. (Appendix 1.1A, 3.1B)
- Students should demonstrate knowledge of the planning process and how it leads to detailed construction drawings and future development.

Accommodations

- Students should be grouped to ensure full potential keeping in mind their IEP and IPRC reports where applicable
- Ensure remediation and enrichment opportunities including peer tutoring is available.
- Groups should be reminded to discuss and arrange for sharing of task responsibilities.
- Group students for peer tutoring and separation of tasks within each group.
- Adult students may be used as mentors (depending upon their prior knowledge and experience).

Resources

Websites

City Planning - www.encarta.msn.com/eng/. History of City Planning: Greece and Rome, the Renaissance and beyond, 20th century city planning, and after World War II.

Books

Hodge, G. *Planning Canadian Communities*. Canadian Cataloguing in Publication Data, 1986. ISBN 0-458-95880-8

Jacobs, J. *The Death and Life of Great American Cities*. Random House Inc., 1972. ISBN 0-6797-4195-x

Lang, R.S. *Goals in Official Plans*. Toronto: The Metropolitan Toronto Planning Board, 1973.

MaCaulay, D. *City- A Story of Roman Planning and Construction*. Boston: Houghton, Mifflin Co., 1974. ISBN 0-395-19492-X

Mackenzie, D. *Design for the Environment*. New York: Rizzoli International Publisher, 1991. ISBN 0-8478-1390-8

McHarg, I. *Design with Nature*. New York: Natural History Press, 1969.

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Pressman, N.E.P. *New Towns*. Occasional Paper No. 1, Contact (Bulletin of Urban and Environmental Affairs), Division of Environmental Studies, University of Waterloo, Ontario, June, 1972.

Specter, D.K. *Urban Spaces*. New York: New York Graphic Society, 1974. ISBN 0-8212-0463-7

Spirn, A.W. *The Granite Garden – Urban Nature and Human Design*. New York: Basic Books, Inc., 1974. ISBN 0-465-02699-0

Appendix 3.1a

Site Planning Terms

New Community - A group of people living in the same locality and under the same government. An area of planned urban growth having all of the facilities of a self contained community

Zoning - To divide into zones relating to commercial, residential, or industrial use.

- An area or a region distinguished from adjacent parts by a distinctive feature or characteristic.
- A section of an area or a territory established for a specific purpose, as a section of a city restricted to a particular type of building, enterprise, or activity: a residential zone.

Site Plan - A drawing, which illustrates the spatial location of an actual or planned structure or set of structures (as a building, town, or monuments) and all connecting roadways

City - A centre of population, commerce, and culture; a town of significant size and importance.

- An incorporated municipality in the United States with definite boundaries and legal powers set forth in a charter granted by the state
- A Canadian municipality of high rank, usually determined by population but varying by province.
- A large incorporated town in Great Britain, usually the seat of a bishop, with its title conferred by the Crown.

Town - A population centre often incorporated, larger than a village and usually smaller than a city. A township, a rural village that has a market or fair periodically.

Subdivision - An area composed of subdivided lots.

Parkland - land with clumps of trees and shrubs in cultivated condition used as or suitable for use as a park, may also describe a zoned natural environment which may not have structures or roadways built through it

Environment - the complex of physical factors (as climate, soil, and living things) that act upon an ecological community and ultimately determine its form and survival

Industrial use - relating to industry and/or engaged in industry

Commercial use - occupied with, engaged in commerce, or work intended for commerce, designed for a large market

Highway - artery, avenue, boulevard, drag, path, road, street, thoroughfare, track

Street - Artery, avenue, boulevard, highway, path, road, thoroughfare, track

Housing - dwellings provided for people; these may include single-family homes, apartment buildings, seniors residences, low income housing

Appendix 3.1b

Community Needs

The needs of a new community are dependent on what is existing around it and what is required to be supplied for the future residents. A community is an area that is planned for urban growth and has all of the facilities of a self-contained community. The development of a new community or subdivision requires a sensitive combination and juxtaposition of all of the uses required by the residents.

Students should be aware that all community interests and environmental issues must be addressed so that the resulting design will meet everyone's needs but will also be environmentally sound.

New Community Requirements

Transportation	<ul style="list-style-type: none">• Access to existing highways• Access to existing roads• Proposed local roads required to be constructed
Housing	<ul style="list-style-type: none">• single family dwellings• multi-family dwellings, apartments, condominiums• special use dwellings- low income housing, retirement homes
Natural environment/ parkland	<ul style="list-style-type: none">• parkland, naturally sensitive areas• natural waterways, unique natural environments for preservation• natural wildlife habitats
Recreational use	<ul style="list-style-type: none">• sports and recreational outdoor facilities• playgrounds
Industrial use	<ul style="list-style-type: none">• concentrated industrial use area• single industrial buildings
Commercial use	<ul style="list-style-type: none">• large scale commercial, malls• small scale commercial, strip malls, single stores
Hospitals/health care facilities	<ul style="list-style-type: none">• local or regional hospital access• health care facilities, long term care facilities
Educational facilities	<ul style="list-style-type: none">• access to elementary and secondary school facilities• colleges and universities
Historical preservation	<ul style="list-style-type: none">• existing historical buildings or archeologically important areas that should be preserved
Community use	<ul style="list-style-type: none">• community centres, drop in centres, sports facilities
Religious use	<ul style="list-style-type: none">• demographics, providing for the different religious groups that will live in the community• churches, cemeteries, synagogues, temples, etc.

Activity 2: Designing a Residential Subdivision

Time: 10 hours

Description

Students will research and design a subdivision plan for a real local site. They will interpret existing data, set land use policies, develop zoning guidelines and design a site plan. Emphasis should be placed on understanding existing site restrictions and environmental sensitivity. Students will explore the existing community planning needs in order to design an aesthetically pleasing and functional subdivision plan (including topics such as parks, stores, religious accommodations, shopping, single family and public housing requirements etc). This is an opportunity for students to demonstrate and apply their Catholic beliefs in a practical open-ended design projects being aware of how their choices/decisions will impact on the environment and others.

Strand(s) & Learning Expectations

Ontario Catholic School Graduate Expectations

CGE2c - present information and ideas clearly and honestly and with sensitivity to others;

CGE3b - create, adapt, and evaluate new ideas in light of the common good;

CGE3e - adopt a holistic approach to life by integrating learning from various subject areas and experiences;

CGE3f - examine, evaluate and apply knowledge of interdependent systems (physical, political, ethical, socio-economic, and ecological) for the development of a just and compassionate society.

Strand(s): Theory and Foundation, Skills and Practices, Impact and Consequences

Learning Expectations

TFV.01 - apply the design process to develop solutions, products, processes, or services in response to challenges or problems in construction technology;

TF1.02 - apply the following steps of the design process to solve a variety of construction technology challenges or problems;

SPV.01 - demonstrate an understanding of the design process skills by applying them to a variety of construction projects;

SPV.02 - interpret and use technical data, building codes, regulations and standards, and other resources correctly;

SP1.01 - design using effective brainstorming techniques, plan, and implement the best solutions for a variety of construction projects;

SP2.01 - evaluate a property with respect to important design considerations (orientation, site restrictions, public services, zoning restrictions, and building codes, regulations and standards);

SP2.03 - identify the major features of a site plan.

Planning Notes

- Teachers must familiarize themselves with new planning goals and guidelines as set out in the local official plan and understand the local zoning by-laws.
- Ensure students follow the design process (see Appendix 3.2A, 3.2B, 3.2C).
- Teachers may choose a parcel of land where zoning by-laws have been set but where no construction has occurred (alternately, students may re-design an existing parcel of land based on new design guidelines).

Prior Knowledge & Skills

- Research skills (Internet and Publications)
- Interactive and collaborative group skills
- Brainstorming techniques
- Communication skills (including reading/creating scale drawings, interpreting symbols, etc.)

Teaching/Learning Strategies

(Whole group)

- Discuss how the local community has been planned and the need for future planning (especially at the community level including the physical needs of the community, and having control of the local environment).
- Discuss the design philosophy, architecture, and landscape of the existing community.
- List a set of parameters that will have to be included in the design, i.e., church, community centre, industrial area, park-land, residential areas, commercial areas, cemetery, etc.
- Discuss how the team should divide the tasks in order to maximize the development of the drawings, illustrations, and model building while they are brainstorming and developing the overall community design.
- Explain how the design process checklist is used to ensure that the final design is suitable and well thought out (see Appendix 3.2A).

(Small group 2-3 students)

- Develop criteria for important land use considerations: (philosophy of design i.e., should industrial use land be next to residential areas because of noise and pollution issues.)
- Develop a set of guidelines to help in the design of the subdivision e.g., roadways will be 10 metres wide, parkland will run along all waterways.
- Brainstorm ideas for the overall plan (garden city, urban areas, juxtaposition of elements - residential, commercial, industrial).
- Prepare bubble diagrams showing importance of land use areas within the site
- Identify the important environmental aspects of the site.
- Develop an Official Plan (general guidelines for development of the community).

The teacher will

(Whole group)

- Help students develop a strategy to evaluate and design the site: start with identifying environmentally sensitive - no construction areas, areas of greatest importance, main roads connecting to existing arteries.
- Discuss the role of a professionals related to the construction industry and their involvement in the planning process.
- Discuss the sequence of events for land development, explaining how it begins with raw land owned by farmers, or other land owners, and is sold and subdivided; surveyors, market analysts, engineers, and lawyers are involved in this process. Lots are designed and marketed by developers and homebuilders, involving architects, engineers, and landscape architects. Once designs are approved and sold, surveyors, contractors, and builders construct the roads, houses, parks, and buildings.
- Discuss the flow of a construction project from conceptualization through completion.
- Once brainstorming is complete, focus student attention on design details and functional site plan considerations e.g., how wide should roads be? How large should an industrial area be? Within the overall site.

Assessment & Evaluation of Student Achievement

- Students will be assessed as a group on brainstorming activities and rough plan design (Appendix 3.2B, 3.2C, 3.2D). Evaluation of individual student work will be necessary for reporting.
- Students should demonstrate knowledge of how the design stage will directly impact the working drawings and model building

Accommodations

- Provide samples for students to see bubble diagrams, design drawings, local historical land use plans, and modern subdivision plans and presentation illustrations
- Group students so that varied abilities are present to allow for peer tutoring and delineation of tasks according to skills, interests and abilities.
- Provide a print copy when reviewing the design process as a check; provide a chart that will support/indicate progress
- Use concrete materials, clearly labelled with pre-tested vocabulary/terms list

Resources

Blumenson, J. *Ontario Architecture, A Guide to Styles and Building Terms*. Fitzhenry and Whiteside, 1990. ISBN 0-88902-872-9

Eisner, E., A. Gallion, and S. Eisner. *The Urban Pattern*, 6th ed. New York: Van Nostrand Reinhold. 1993. ISBN 0-442-00752-3

Hodge, G. *Planning Canadian Communities*. Canadian Cataloguing in Publication Data, 1986. ISBN 0-458-95880-8

Lang, R.S. *Goals in Official Plans*. Toronto: The Metropolitan Toronto Planning Board, 1973.

Mackenzie, D. *Design for the Environment*. New York: Rizzoli International Publisher, 1991. ISBN 0-8478-1390-8

McHarg, I. *Design with Nature*. New York: Natural History Press, 1969.

Pressman, N.E.P. *Planning New Communities in Canada*. Ottawa: 1975. ISSN 14-0318-1286

Specter, D.K. *Urban Spaces*. New York: New York Graphic Society, 1974. ISBN 0-8212-0463-7

Spirn, A.W. *The Granite Garden – Urban Nature and Human Design*. New York: Basic Books, Inc., 1974. ISBN 0-465-02699-0x

Activity 3: Presentation Drawings – Design and Drafting

Time: 10 hours

Description

Once the overall site plan is designed students visualize their idea of design and create presentation drawings. Students may further develop their skills in computer design software and computer-generated imagery by creating professional quality site plans and illustrations. Students will also develop skills in sketching, drawing and hand rendering site plans, architectural plans, and illustrations.

Strand(s) & Learning Expectations

Ontario Catholic School Graduate Expectations

CGE2c - present information and ideas clearly and honestly with sensitivity to others;

CGE3c - think reflectively and creatively to evaluate situations and solve problems;

CGE4f - apply effective communication, decision-making, problem-solving, time and resource management skills;

CGE5a - work effectively as an interdependent team member;
CGE5g - achieve excellence, originality, and integrity in one's own work and support these qualities in the work of others.

Strand(s): Theory and Foundation, Skills and Practices, Impact and Consequences

Learning Expectations

TFV.01 - apply the design process to develop solutions, products, processes, or services in response to challenges or problems in construction technology;

TFV.02 - explain different techniques used to visualize, describe, present, and build final products of designs of buildings and other structures, e.g., presentation and working drawings;

SP1.07 - explain the purpose and content of presentation drawings used in the construction industry;

SP1.08 - describe and, where appropriate, use basic traditional and computer-assisted drafting practices used in construction projects;

SP1.09 - produce appropriate presentation drawings (including isometric and oblique drawings, scale modes, and two- and three- dimensional computer-generated drawings) using a variety of techniques e.g., pencil, ink, and computer software.

Planning Notes

- Teachers should prepare quick reference sheets for computer-design software programs and review handouts on manual technical drawing (drafting standards, techniques, symbols, etc.) used on site plans and illustrations.
- Ensure students follow the design process.
- Teachers should provide scale rulers (triangle scales with metric measurements).
- Provide computers with drafting programs, computer-aided design programs or alternates.
- Teachers may choose to have Activities 3 and 4 occur simultaneously, with group members dividing tasks for mastery learning.

Prior Knowledge & Skills

- Working knowledge of scale, sketching, and drafting techniques.
- Students should have mastered some aspects of computer drafting programs in previous activities or in Grade 10.
- Interactive and collaborative group skills.
- Communication and research skills.

Teaching/Learning Strategies

(Whole group)

- Discuss how students should refine designs in order to complete one master plan for the group.
- Discuss the design philosophy, architecture, and landscape components of the existing community and how the new development should complement, fit in with, the existing community.
- Review the set of parameters that have to be included in the design (i.e., church, community centre, industrial area, parkland, residential areas, commercial areas, cemetery, etc.) so that students have addressed all design components.
- Share samples of professional site plans, working drawings, engineering drawings and artists renderings of new communities. Local newspapers may have a new home section, if not national newspapers carry new home news and plans and construction information and drawings. Local government should have subdivision and development plans and drawings, which may be made available to students for reference.

-
- Discuss how the team should divide the tasks in order to maximize the development of the model. If this activity is occurring at the same time as the model building stage a clear overall structure and division of tasks for each group member is important.

(Small group 2-3 students)

- Research and choose an aesthetic and ecologically sound overall design for the subdivision
- Produce refined plans and sketches using computer software, for discussion and presentation
- Produce an overall site plan and a number of detailed sketches and elevations of the design proposal
- Render final plans and sketches for final presentation

The teacher will

(Whole group)

- Help students develop a strategy to evaluate and refine their design of the site (start with reviewing environmentally sensitive - no construction areas, areas of greatest importance, main roads connecting to existing arteries, aesthetic consideration, and sequencing of construction)
- Focus student attention on design details and functional site plan considerations

Assessment & Evaluation of Student Achievement

- Students will be assessed as a group and individually on the overall plan design and their role in developing design and presentation drawings
- Students should demonstrate knowledge of how the working drawings relate to the model building
- Students will be assessed individually on their group contribution and respect for the opinions and ideas of other group members as part of the assessment of their learning skills development

Accommodations

- Provide samples of land use plans, subdivision plans, and a variety of sales and marketing plans and illustrations
- Provide opportunities for enrichment, i.e., design of individual buildings, houses or park-land
- Group students for peer tutoring and separation of tasks within each group
- Meet with groups to ensure individuals needing support within the group receive peer/teacher support.

Resources

Blumenson, J. Ontario Architecture, *A Guide to Styles and Building Terms*. Fitzhenry and Whiteside, 1990. ISBN 0-88902-872-9

Stirling, N. *Fundamentals of Technical Drawing*. Gage Educational Publishing, 1984. ISBN 0-7715-0327x

Spirn, A.W. *The Granite Garden – Urban Nature and Human Design*. New York: Basic Books, Inc., 1974. ISBN 0-465-02699-0

Gill, R.W. *Rendering with Pen and Ink*. London: Thames and Hudson Ltd., 1973. ISBN 0-500-68003-5

Pressman, N.E.P. *Planning New Communities in Canada*. Ottawa: 1975. ISSN 14-0318-1286

Sufley, T. *Autocad Lt: Fundamentals and Applications*. The Goodheart-Willcox Co. Inc., Illinois. 1997. ISBN 1-56637-322-0

Ontario, Planning Act Review Committee, Ministry of Housing. *Report of the Planning Act Review Committee*. 1997.

Hodge, G. *Planning Canadian Communities*. Canadian Cataloguing in Publication Data, 1986. ISBN 0-458-95880-8

Tutt, P. and D. Adler. *New Metric Handbook, Planning and Design Data*. Butterworth Heinemann, Oxford. 1979. ISBN. 0-7506-0853-6

Local newspapers are an excellent source of new home plans and subdivision designs

Local, school or college libraries

Activity 4: Model Building

Time: 10 hours

Description

Once the overall site plan is designed students will visualize their designs by creating one or more three-dimensional scale models. Students may fabricate one large-scale model or several smaller scale models showing more detailed designs. Students will develop their skills in conceptualizing three-dimensional models from two-dimensional drawings. They will interpret computer design software and computer generated imagery in order to create a professional quality three-dimensional model of their design idea that will be used in the final presentation. It is expected that the students will reflect their Catholic beliefs and tradition in how they act as interdependent team members and show respect for the work and ideas of others.

Strand(s) & Learning Expectations

Ontario Catholic School Graduate Expectations

CGE3c - think reflectively and creatively to evaluate situations and solve problems;

CGE4f - apply effective communication, decision-making, problem-solving, time and resource management skills;

CGE5g - achieve excellence, originality, and integrity in one's own work and supports these qualities in the work of others;

CGE7I - respect the environment and uses resources wisely.

Strand(s): Theory and Foundation, Skills and Practices, Impact and Consequences

Learning Expectations

TFV.02 - explain different techniques used to visualize, describe, present, and build final products of designs of buildings and other structures, presentation and working drawings;

SP1.09 - produce appropriate presentation drawings (including isometric and oblique drawings, scale models, and two- and three- dimensional computer-generated drawings) using a variety of techniques, pencil, ink, computer software);

IC2.02 - demonstrate safe shop practices when using hand and power tools, materials, and equipment.

Planning Notes

- Teachers should recommend a scale for the final model that will allow students to provide a sufficient amount of detail for the overall plan.
- Teachers should provide an area for students to work and store the models so that they are not damaged during other classes. As these models could be quite large, they will require storage space during their construction.

-
- If possible, foam-core or other lightweight, easily shaped material should be used. Wood, plasticine, and other heavier, less costly material, will weigh more and be difficult to move and set up for presentations.
 - Ensure that students with Special Needs are accommodated for in the form of physical room changes, modified tooling, and other modifications as required (check OSR and IPRC for details)

Prior Knowledge & Skills

- Safety issues relating to the model building materials
- Interactive and collaborative group skills
- Communication, research, and conflict resolution skills
- Understanding of construction drawings, measurements, and scale

Teaching/Learning Strategies

(Whole group)

- Review safety issues relating to the model building materials: the use of X-acto knife, hot glue guns, and power tools.
- Issue safety passports where required (Appendix 3.4A).
- Discuss the overall model size and the various sizes of the objects which will be on the model (e.g., the size of trees at 1:100 scale).
- Discuss how the team should divide the tasks in order to maximize the development of the model. If this activity is occurring at the same time as the presentation drawings a clear overall structure and division of tasks for each group member is important.

(Small group 2-3 students)

- Draw out a rough footprint to scale to use as a template for the model.
- Develop the overall site plan onto the model.
- Add details such as trees, buildings, cars, waterways, and people.

The teacher will

(Whole group)

- Help students conceptualize the sizes of model pieces, i.e., trees, buildings, etc.
- Share samples of models or pictures of models so that students can see simple and complex models.
- Discuss how models may be built with and without assuming the topography of the site (a flat topographical model or a model that is accurate topographically).

Assessment & Evaluation of Student Achievement

- Students will be assessed as a group and individually based on the project breakdown
- Use of confidential peer- and self-assessment forms can be used at the teacher's discretion
- Students should demonstrate understanding of how sketches and drawings are converted into three-dimensional working models and how these models are used for presentation and analysis of the overall design. (Appendix 3.2B)

Accommodations

- Groups should be reminded to discuss and arrange for sharing of task responsibilities.
- Enriched activities could include topographically accurate models showing landforms at scale.
- Provide peer support 1:1 direction
- Ensure Safety Passport is in place for all students

Resources

Blumenson, J. *Ontario Architecture, A Guide to Styles and Building Terms*. Fitzhenry and Whiteside, 1990. ISBN 0-88902-872-9

Eisner, E., A. Gallion, and S. Eisner. *The Urban Pattern*, 6th ed. New York: Van Nostrand Reinhold. 1993. ISBN 0-442-00752-3

Hodge, G. *Planning Canadian Communities*. Canadian Cataloguing in Publication Data, 1986. ISBN 0-458-95880-8

Lang, R.S. *Goals in Official Plans*. Toronto: The Metropolitan Toronto Planning Board, 1973.

Mackenzie, D. *Design for the Environment*. New York: Rizzoli International Publisher, 1991. ISBN 0-8478-1390-8

McHarg, I. *Design with Nature*. New York: Natural History Press, 1969.

Pressman, N.E.P. *Planning New Communities in Canada*. Ottawa: 1975. ISSN 14-0318-1286

Specter, D.K. *Urban Spaces*. New York: New York Graphic Society, 1974. ISBN 0-8212-0463-7

Spirn, A.W. *The Granite Garden – Urban Nature and Human Design*. New York: Basic Books, Inc., 1974. ISBN 0-465-02699-0

Activity 5: Presentation and Reflection

Time: 180 minutes

Description

In this activity, the groups will present their ideas, drawings, and model(s) to the class. Their presentation to the class should include all brainstorming information, design philosophy, environmental choices, and economic and environmental impacts. The presentation should reflect the students' Catholic faith and how they see their beliefs being applied to better society. They must be able to answer questions regarding their design plan and also ask properly directed and applicable questions to other groups. Once groups have presented their findings students will discuss the overall design philosophies and prepare a reflection paper on the importance of design and planning to the construction industry.

Strand(s) & Learning Expectations

Ontario Catholic School Graduate Expectations

CGE1d - develop attitudes and values founded on Catholic social teaching and act to promote social responsibility, human solidarity and the common good;

CGE1I - integrate faith with life;

CGE2c - present information and ideas clearly and honestly and with sensitivity to others;

CGE3b - create, adapt, and evaluate new ideas in light of the common good;

CGE4c - take initiative and demonstrate Christian leadership.

Strand(s): Theory and Foundations, Skills and Processes, Impacts and Consequences

Overall Expectations

TFV.02 - explain different techniques used to visualize, describe, present, and build final products of designs of buildings and other structures (e.g., presentation and working drawings);

SPV.05 - explain the importance of such aspects of construction projects as architectural styles and features, quality design and workmanship, and efficient and functional planning.

Specific Expectations

SP1.07 - explain the purpose and content of presentation drawings used in the construction industry;

IC1.01 - explain how the construction industry is directly linked to the local economy;

IC1.04 - evaluate different types of construction projects in terms of efficiency, community building needs, environmental impact, and local building codes, regulations, and standards;
IC3.01 - identify career opportunities in the various sectors of the construction industry.

Planning Notes

Part A - Presentation

- Principal (or VP and local planners or developers) to observe and comment on presentations (act as a prospective customers).
- Ensure all groups are given equal time.
- Have computers and overhead projectors available for presentation programs.
- Encourage students to wear jackets and ties/ dresses for formal presentation.

Part B - Reflection

- Students write a reflection discussing their learning and experience working in a collaborative group for the project. They should mention how they have grown as Catholics and what they have contributed to the common good through this exercise.
- Students discuss one career area that they were exposed to during the course of the project and expand on the role of that professional in the construction industry.

Prior Knowledge & Skills

- An understanding of the design process and the ability to discuss choices made by the group
- Ability to use materials and facilities for presentation of work
- An understanding of design decisions

Teaching/Learning Strategies

- Students will formally present their designs to the class and to visitors
- Students will reflect on their individual learning and their group interaction

The teacher will

Part A - Presentation

- Discuss appropriate presentation attire and attitude, both while presenting and while observing the presentations of other groups in the class
- Review how formal presentations are set up and delivered (the use of cue cards, visuals, and voice)
- Discuss the importance of practising the presentation so that everything runs smoothly
- Discuss the importance of positive constructive criticism and respect for each other's design ideas, individuality and feelings

Part B - Reflection

- Discuss the purpose of a reflection paper and its importance in the learning process.
- Outline the expectations (the paper should be word-processed, include an opening paragraph, discuss the major learning that occurred, discuss career opportunities in this area, and include a closing paragraph).
- Review the variety of careers that students were exposed to over the course of the project and review the career opportunities available in the planning and development industry.

Students will

Part A - Presentation

- Observe and participate in the presentation of their final site plans and drawings.
- Discuss the different ideas that individual groups have proposed.
- Give positive, constructive criticism in light of the final product and presentation.

Part B - Reflection

- Write a reflection paper that discusses the following: the overall project and their individual learning; a rationale for the choices they made over the course of the project; one career area that they were exposed to over the course of the project; evidence of research into opportunities at the college/university level.
- Reflect on their learning in light of gospel values.
- Identify some impacts of construction on society and the environment.

Assessment & Evaluation of Student Achievement

- Teacher will assess individual papers for insightful observations and evaluate student reflections based on spiritual growth and the student's deeper understanding of their stewardship role for the environment (Appendix 3.5a).
- Should explore personal growth and learning in light of gospel values.

Accommodations

- Students who feel uncomfortable in public speaking situations should not be forced to speak, possibly given another task in the presentation.
- Written work may be submitted in place of verbal presentation

Resources

The Ontario Catholic Graduate Expectations

The *Bible*

Previously taped presentations as examples

VCR and TV; computer projection machines etc

Use of presentation software on computers (Power Point, etc.)

Appendix 3.5a

Urban Planning and Municipal Design

Reflection Paper Guideline

The reflection paper should be written in sentence and paragraph format and should be word processed using grammar and spell check.

1. Describe the role of at least two professions who are involved in the design and planning of urban and rural communities. Identify which universities and colleges offer courses relating to these professions.
2. Describe the process that you followed from the initiation of this project to its completion. Describe specifically how your group was formulated, how decisions were made and carried out, and the leadership role that you played within your group.
3. Describe and discuss a minimum of three things that you learned over the course of this unit. Be specific about the learning that took place.
4. Describe the collaborative group learning environment and your contribution to it.
5. Using the Catholic Graduate Expectations listed in the overall unit show how you have demonstrated these expectations.
6. Do you feel that you have been successful in this project relating to the graduate, overall, and specific expectations. Reflect on your learning and prepare a written response.

Appendix 3.2A

Evaluation Rubric Appendix: Design Process Checklist

The Design Process is used extensively in Construction Technology. Applying the steps of the design process assists students in staying on track and being organized when trying to solve the challenge or problem.

- _____ identify what has to be accomplished (the problem)
- _____ gather and record information, and establish a plan for procedures
- _____ brainstorm a list of as many solutions as possible
- _____ identify the resources required for each suggested solution, and compare each solution to the design criteria, refining and modifying it as required
- _____ evaluate the solutions testing, modeling, and documenting results, and choose the best one
- _____ develop presentation and working drawings, sketches, graphics, mathematical and physical model, or a prototype of the best solution
- _____ evaluate the prototype and determine the resources, including computer applications, required to produce it
- _____ communicate the solution, using one or more of the following: final drawings, graphs, charts, sketches, technical reports, electronic presentation, flow charts, mock-ups, models, prototypes
- _____ obtain feedback of the final solution and repeat the design process if necessary to improve the solution

Appendix 3.2B

Design Report Rubric

Criteria	Level 1 (50-59%)	Level 2 (60-69%)	Level 3 (70-79%)	Level 4 (80-100%)
Communication The student uses various forms of communication to relate thoughts and ideas	- communicates information with limited clarity	- communicates information with moderate clarity	- communicates information with considerable clarity	- communicates information with a high degree of clarity, and with confidence
Application The student demonstrates the ability to research and organize ideas and plans	- applies few of the skills involved in an inquiry/design process	- applies some of the skills involved in an inquiry/design process	- applies most of the skills involved in an inquiry/design process	- applies all or almost all of the skills involved in an inquiry/design process
Knowledge The student demonstrates working knowledge of plans or concepts	- demonstrates limited understanding of design concepts	- demonstrates some understanding of design concepts	- demonstrates considerable understanding of design concepts	- demonstrates thorough and insightful understanding of design concepts
Application The student demonstrates the ability to apply concepts and ideas in a safe and correct manner	- uses procedures, equipment, and technology safely and correctly only with supervision	- uses procedures, equipment, and technology safely and correctly with some supervision	- uses procedures, equipment, and technology safely and correctly	- demonstrates and promotes the safe and correct use of procedures, equipment, and technology

Note: A student whose achievement is below level 1 (50%) has not met the expectations for this assignment or activity.

Appendix 3.4A

Safety Passport

Student Name	Safety Video on Tool	Tool Demonstration	Student Demo	Sign On
Table Saw	Nov. 12	Nov. 12	Nov.13	
Router table				
Mitre Saw				
Jointer		Nov. 12		
Planner	Nov. 10	Nov.10	Nov.11	OK
Radial Arm				

Appendix 3.2C

Design and Drawing Plans

Criteria	Level 1 (50-59%)	Level 2 (60-69%)	Level 3 (70-79%)	Level 4 (80-100%)
Communication The student uses technological terms correctly in written and oral presentations	- demonstrates limited knowledge of facts, technical terminology, procedures, and standards	- demonstrates some knowledge of facts, technical terminology, procedures, and standards	- demonstrates considerable knowledge of facts, technical terminology, procedures, and standards	- demonstrates thorough knowledge of facts, technical terminology, procedures, and standards
Knowledge The student uses technological concepts correctly in designs, fabrication, and evaluation	- demonstrates limited understanding of concepts, fabrication, and evaluation	- demonstrates some understanding of concepts, fabrication, and evaluation	- demonstrates considerable understanding of concepts, fabrication, and evaluation	- demonstrates thorough and insightful understanding of concepts, fabrication, and evaluation
Application The student can interpret and produce technical drawings using graphic conventions, techniques, instruments, and computer technologies	- demonstrates limited ability to interpret, produce, and understand technical drawings and conventions	- demonstrates some ability to interpret, produce, and understand technical drawings and conventions	- demonstrates considerable ability to interpret, produce, and understand technical drawings and conventions	- demonstrates thorough and insightful ability to interpret, produce, and understand technical drawings and conventions
Communication The student can communicate ideas and solutions to technological problems through a variety of media landscape and pond design and working drawings	- limited ability to communicate ideas and solutions through a variety of media	- able to communicate some ideas and solutions through a variety of media	- able to communicate considerable ideas and solutions through a variety of media	- able to communicate ideas and solutions through a variety of media with clarity and appropriate detail
Thinking/Inquiry The student can apply problem-solving skills to projects	- applies few of the skills involved in an inquiry/design process	- applies some of the skills involved in an inquiry/design process	- applies most of the skills involved in an inquiry/design process	- applies all or almost all of the skills involved in an inquiry/design process
Application The student can demonstrate skill in the use of tools, materials, and processes	- uses equipment, and technology safely and correctly with supervision	- uses equipment, and technology safely and correctly with some supervision	- uses equipment, and technology safely and correctly	- demonstrates and promotes the safe and correct use of equipment and technology

Knowledge The student can recognize and describe the impacts of construction technology on society and the environment	- recognizes and describes the impacts of construction technology with limited effectiveness	- recognizes and describes the impacts of construction technology with moderate effectiveness	- recognizes and describes the impacts of construction technology with considerable effectiveness	- recognizes and describes the impacts of construction technology with a high degree of effectiveness
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Note: A student whose achievement is below level 1 (50%) has not met the expectations for this assignment or activity.

Appendix D Cooperative Learning Checklist

Criteria	Level 1	Level 2	Level 3	Level 4
The student contributes to the development of the group's plan	- rarely contributes to the development of the group's plan	- contributes to the development of the group's plan some of the time	- contributes to the development of the group's plan most of the time	- always or almost always contributes to the development of the group's plan
The student is prepared to discuss issues and make project changes as necessary	- rarely prepared to discuss issues and make changes to the project	- prepared to discuss issues and make changes to the project some of the time	- prepared to discuss issues and make changes to the project most of the time	- always or almost always prepared to discuss issues and make changes to the project as necessary
The student shows respect for the ideas and opinions of others in the group or class	- rarely shows respect for the ideas and opinions of others in the group or class	- shows respect for the ideas and opinions of others in the group or class some of the time	- shows respect for the ideas and opinions of others in the group or class most of the time	- always or almost always shows respect for the ideas and opinions of others in the group and class
The student encourages group members to participate and/or stay on task	- rarely encourages group members to participate and/or stay on task	- encourages group members to participate and/or stay on task some of the time	- encourages group members to participate and/or stay on task most of the time	- always or almost always encourages group members to participate and stay on task
The student shares the workload and helps others	- limited evidence of sharing the workload and helping others	- some evidence of sharing the workload and helping others	- constantly shares the workload and helps others	- seeks opportunities to share the workload and help others
The student is aware of the group's plans and follows them	- seldom aware of the group's plans and rarely follows them	- is aware of the group's plans and follows them some of the time	- is aware of the group's plans and follows them most of the time	- always or almost always aware of the group's plans and routinely follows them