

Creating Civic Minded, Engaged Engineers through Assignment Design



Alan Chong, Engineering Communication Program

Overview:

1. Praxis II in Context
2. Service Learning and Engineering Design Courses
3. The Civic Engagement Model
 1. Building Civic Engagement into the Assignment
 2. Genre: Engagement in a Community of Practice
 3. Payback: Reciprocal Engagement
4. Supporting Civic Engagement: Key Concerns

Background:

Toronto, Ontario, Canada

City of Toronto: Civic Engagement

http://www.toronto.ca/civic-engagement/index.htm

HOME CONTACT US HOW DO I...? SEARCH: GO

LIVING IN TORONTO DOING BUSINESS VISITING TORONTO ACCESSING CITY HALL

CIVIC ENGAGEMENT

- [Civic Engagement](#)
- [Consultations](#)
- [Ongoing projects](#)
- [Improvements](#)
- [Learning material](#)
- [Resources](#)
- [Speaking to a Committee](#)
- [Public appointments](#)

Civic Engagement

Your User Guide
to the City of Toronto

The City of Toronto creates opportunities for the public to:

- shape a vision for the future
- plan changes in their neighbourhoods
- provide information and insight on the issues Council is debating and
- serve on the City's agencies, board and commissions

[Search for local and city-wide consultations.](#)

Consultations

City of Toronto 2012 Budget

City Council

Social Media

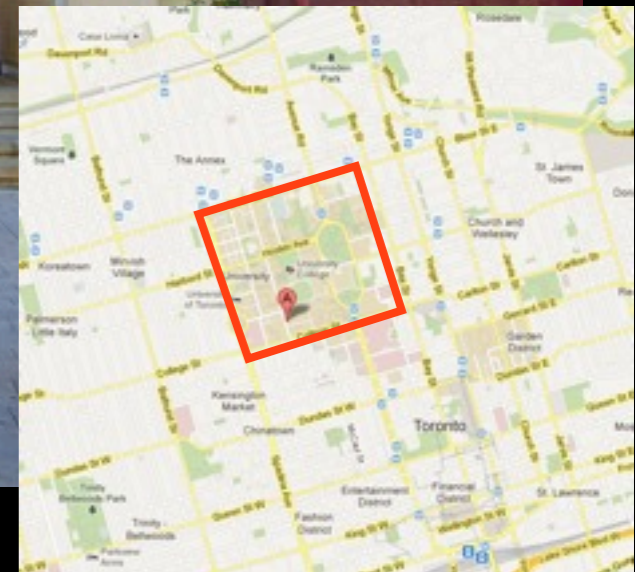
GOOGLE TRANSLATE™
in 51 languages

Highlights

- [Agencies, boards, commissions and corporations](#)
- [City Administrative Structure](#)
- [Civic Engagement on Twitter \(@TorontoCivicEng\)](#)
- [Demographic information](#)
- [Polling](#)

Background:

University of Toronto, Downtown Campus



Service Learning and Engineering Design Courses:

- Service learning a very common pedagogical, situated approach for engineering design courses
 - Courses find “clients” for students
 - Clients define a problem for students to solve
 - Students research the problem, design and present a solution to the problem for the client
- Ideal for integration of technical communication practices within engineering design, as students must communicate with their clients
- Challenges:
 - Quality and nature of student projects
 - Client engagement / understand of course objectives
 - Scaling number of clients / projects to large class sizes

Background:

First Year Engineering Design ~ 1300 Freshman Class

~ 300 students

~ 1000 students



Engineering
Science



“Core Eight” Programs

Civil, Electrical, Mechanical, etc.



2000

Clients / Year

Service Learning and Engineering Design Courses:

Finding a Solution for Engineering Science

- A different method for students to provide service, engage in engineering design and communication
- Teaches key skills in engineering and critical thinking, and forces them to work in established engineering genres that will be useful for them later
- Focusing on all stages of the engineering design process, from problem understanding to, conceptual design, to solution implementation & planning
- Challenging and interesting enough for Engineering Science cohort, and fits into the E4TW motto and the Global Engineer in creating civic minded students

A “Civic Engagement” Model?

- Remove the “Client”; provide service to the broader community, with more stakeholders
- Eliminate the predefined problem understanding specified by client; explore community for problems / opportunities where engineering design can intervene
- Use municipal/local issues as step towards global issues, so that students can have access to stakeholders
- Establish a *fictional yet realistic* scenario through which we can allow the students to engage in problem finding, understanding, and defining activities, within a predefined community

TORONTO Praxis II Design Project:

The City of Toronto solicits proposals for sustainably improving an aspect of the city.

The competition consists of an initial problem identification / requirements gathering phase and a subsequent solution generation and prototyping phase.

TORONTO Praxis II Design Project:

The Phase I deliverable is a Request for Proposal (RFP) suitable for tender. The RFP must justify the choice of the targeted problem, in addition to providing complete engineering requirements.

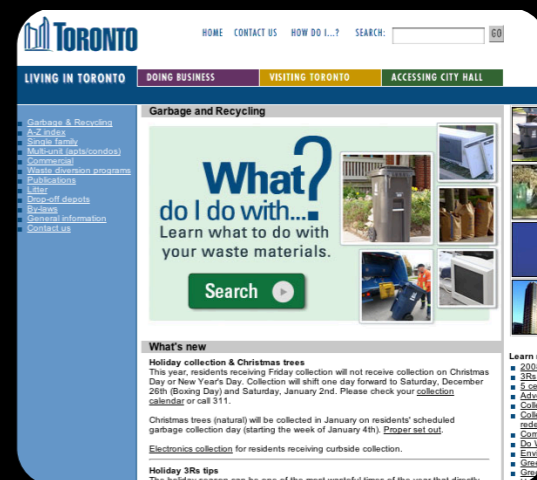
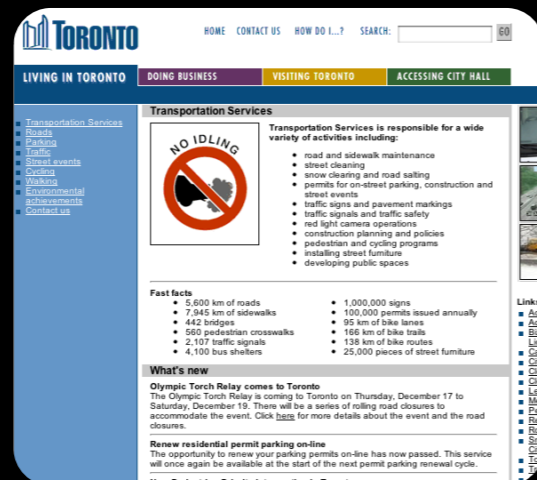
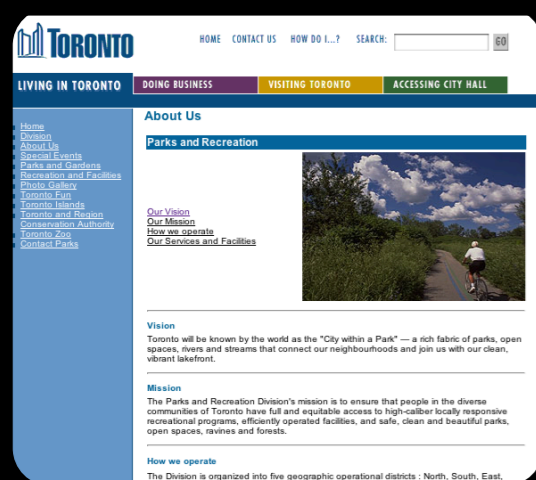
A limited number of RFPs will be selected to proceed to tender in Phase 2.

[2/3]

TORONTO Praxis II Design Project:

Proposals must fall under the jurisdiction of Toronto departments or agencies, such as, but not limited to:

- Parks and Recreation
- Transportation Services + the TTC
- Urban Planning
- Solid Waste Management



[3/3]

Building Civic Engagement into the Assignment

ESC102 – ENGINEERING SCIENCE PRAXIS II – 20111

Phase One Overview

Background

In an engineering context, a Request for Proposal (RFP) is a document that is written and distributed to solicit proposed solutions to a well-defined problem. The proposed solutions are then evaluated, and the best solution(s) – as determined by criteria set out in the RFP – are chosen for implementation or additional development.

Although engineering designers typically respond to RFPs, they also often write them. Even when there is no formal RFP – for example, in most open-ended design projects – design engineers must engage in a thinking process similar to the one involved in writing an RFP. Context development, problem framing, requirements gathering, and formalizing constraints and criteria – all of which are important parts of the RFP – are themselves essential stages in any design process.

Developing an RFP is the primary task for Phase One of Praxis II.

Assignment Statement

In Praxis I you developed a Design Brief that targeted the University of Toronto St. George Campus. In that design brief you identified a problem, gained an understanding of the problem and its context, and developed requirements for potential solutions. In Praxis II, you will be refining and extending the skills learned writing the Design Brief as you produce a formal engineering RFP in response to the following Request for Proposal from the City of Toronto:

As part of the City Initiatives strategy (http://www.toronto.ca/city_initiatives/), the City of Toronto is procuring the services of an engineering consulting group to identify and codify, in the form of an engineering Request for Proposal (RFP), one aspect or element of the City of Toronto which can be sustainably improved.

The targeted aspect or element **must** fall under City jurisdiction. If the jurisdiction is under a City Division, priority will be given to the Divisions of:

- City Planning: <http://www.toronto.ca/planning/>
- Solid Waste Management: <http://www.toronto.ca/garbage/> and <http://www.toronto.ca/compost/>
- Parks, Forestry, and Recreation: <http://www.toronto.ca/parks/>
- Transportation Services, including the Office of the Public Realm: <http://www.toronto.ca/transportation/>
- The Toronto Transit Commission: <http://www.toronto.ca/ttc/>

RFPs that fall under the jurisdiction of another City Division (see <http://www.toronto.ca/divisions/>), an affiliated Agency, Board, Commission, or Corporation (ABCC; <http://www.toronto.ca/abcc/>), or other component of City governance will also be considered.

Variations to, or improvements on, a current civic improvement project can be submitted in response to this procurement, so long as no final design has been established and no implementation work begun on the existing project.

The targeted aspect or element of the City, and associated need(s) for improvement(s), **must**:

- Draw upon credible primary and secondary information (e.g. direct observation, media reports, expert testimony or commentary, etc.)
- Focus on the needs of multiple stakeholder groups (e.g. multiple user groups, city employees, city management, local businesses, etc.)
- Target a contextualized, neighbourhood-or-smaller-scale aspect or element of the City (e.g. where a solution will have immediate impact on a recognizable community)

The only additional restriction is that the problem defined in the RFP **must not** duplicate one defined in either of the previous two iterations of Praxis II. See Appendix A: List of Excluded Projects.

[1/3]

ESC102 – ENGINEERING SCIENCE PRAXIS II – 20111

This procurement seeks to bridge the problem-solving talents of Toronto's citizens with the City's existing Get Involved initiatives (<http://www.toronto.ca/involved/>). The approach is patterned after the Agile Software Development movement and focuses on the rapid and iterative identification, solution, and small-scale testing and implementation of targeted improvements to the City at the neighbourhood scale. This agile approach to procurement and civic improvement is intended to become the new operational standard within the City of Toronto.

The City is seeking RFPs that have the potential for high return on investment and that can deliver measurable improvements with limited capital expenditure. Note that the return on investment is not measured in strictly monetary terms. Up to \$250,000 will be available to develop and design solutions in response to the delivered RFP; the RFP should be scoped such that measurable results can be obtained within this budgetary constraint. For larger projects the \$250,000 budget may be applied to a pilot project – for example, the development of prototypes and their testing in a specific area of Toronto – and additional resources may be made available to implement the complete solution based on the results of the pilot.

Preference will be given to RFPs that balance the needs of a specific context with applicability to other contexts within the City.

Phase One of Praxis II will focus on developing design and communication tools that will allow you to select, develop an appropriate scope for, and clearly define a complex design problem incorporating nontechnical (e.g. social, political, and ethical) and technical perspectives, and present that problem in a professional manner.

Deliverables

The final deliverable for the City of Toronto RFP is itself an RFP. This delivered RFP must be suitable for advertising to engineering solution providers. However, there are four deliverables for Phase One of Praxis II. More detailed descriptions of the requirements for each deliverable will be provided prior to their due dates.

1. Topic Presentation and Précis (5%) Studio, Week of 01-24

In a short group oral presentation accompanied by a half-page (single-spaced) précis, you will present your preliminary problem statement. Based on feedback received at the time of the presentation and on the results of any additional investigations, teams may choose to change their design problem prior to submitting the Request for Proposal.

3. Request for Proposal (20%) 2011-02-20 @ 2400
4. Revised Request for Proposal (10%) 2011-03-06 @ 2400

You must submit two versions of the RFP. Neither should be considered a draft RFP; the first should be treated as a final submission, and both will be measured against the requirements set out in the forthcoming detailed assignment statement. The revision provides you with an opportunity to improve your RFP based on feedback from instructors and to refine your RFP based on additional investigation or consideration; assessment of the revision will consider both the original requirements and the degree to which you have improved on your first version. The Revised Request for Proposal must be accompanied by a brief written description of the key changes made during your revision process.

PHASE ONE OVERVIEW

[2/3]

Building Civic Engagement into the Assignment

ESC102 – ENGINEERING SCIENCE PRAXIS II – 20111

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[1/3]

- Demands engagement with civic/municipal issues/communities
- Problems more substantive and real world
- Empowers students by allowing them to determine what they work on
- Mandates use of multiple sources, including direct communication with key stakeholders in problem
- Students learn how to credibly use different types of sources
- Interactions not mediated, but supported, by teaching assistants and instructors

Building Civic Engagement into the Assignment

- Series of assignments and tutorials serve as scaffolding for project



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Initial phase ends with 8 “winning RFPs,” forming student projects for 2nd half of term

Genre: Engagement in a Community of Practice

- Request for Proposals an essential genre for engineering, but one that is highly context specific, often technical, and very foreign to students (esp. freshmen)
- Learning a new genre represents real challenge
- Genre: a typified response to rhetorical situation developed by and evolving within a community of practice (C. Miller and others)
- Creating engagement with genre:
 - Construct a rhetorical situation which mimics the real context for genre
 - Students themselves, along with course instructors form a real community of practice

Genre: Engagement in a Community of Practice

- Before submission:
 - Students given previous years' RFPs and asked to respond/critique from perspective of designer responding to problem statement/requirements
 - Take this knowledge into writing/revising their RFP
- After submission:
 - Students must work with one of the chosen RFPs in developing their conceptual design proposal
 - Document become entry point for professional discussion of problem and requirements
 - Students can interact with, push back on, and question RFP and its authors
 - Working with RFP, students see that communication has real consequences for design and design understanding

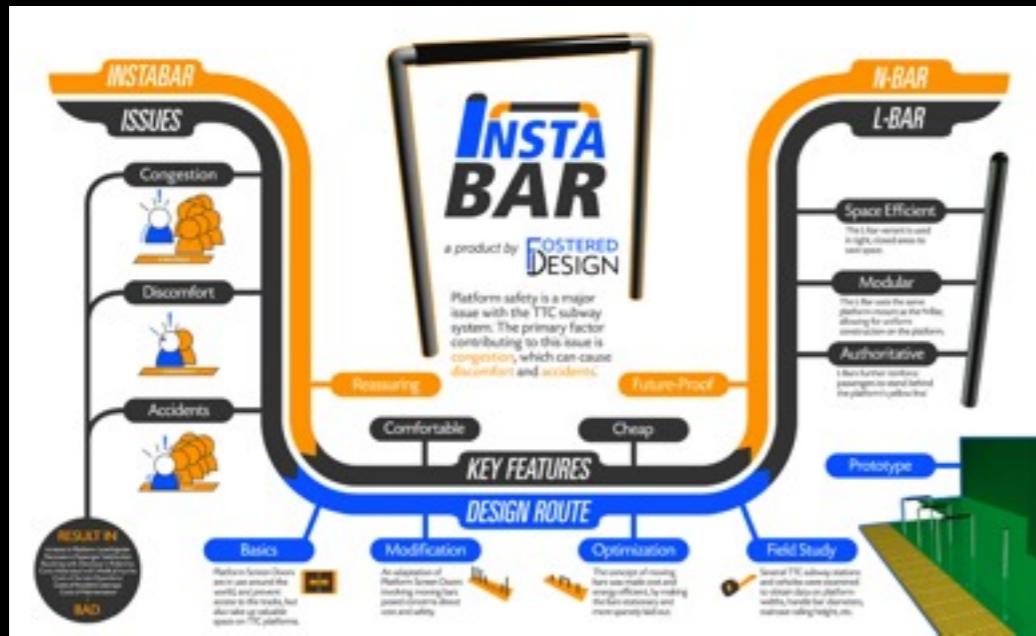
Payback: Reciprocal Engagement

Depends on Creating Engagement from Community

- Because problems are based on real experiences of urban commuters, residents, etc. engagement often comes back
- Course ends with a year end Showcase where students display their solutions through:

Payback: Reciprocal Engagement

① Posters



② Presentations



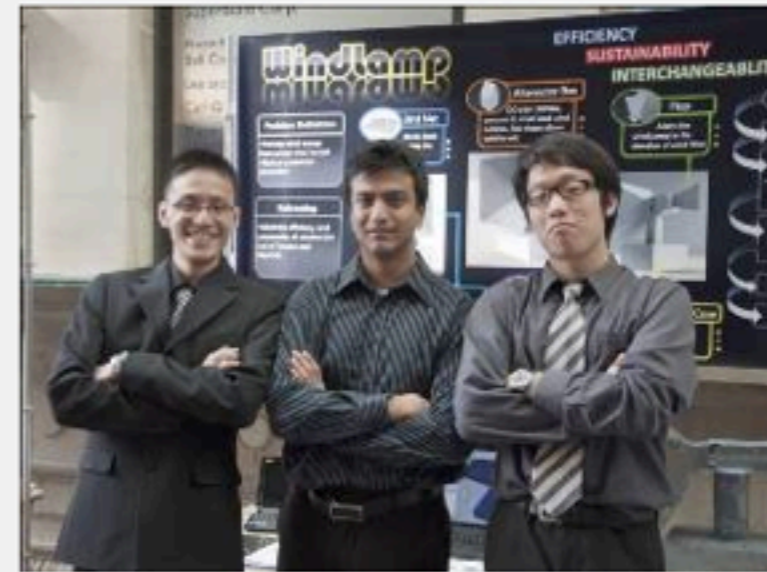
③ Prototypes



Payback: Reciprocal Engagement

Depends on Creating Engagement on Both Sides

- Instructors work at publicizing event across all levels of municipal government, corporations, NGOs, and non-profits, as well as across media outlets
- Create an environment where students can experience real feedback from public and real stakeholders in their defined problem area
- Assistance from:
 - Faculty's Communication/Public Relations group
 - Faculty's Industry and Alumni Liasons
 - Student contacts made throughout the project's process



Praxis II culminates in the Praxis Design for Toronto Showcase. At the Showcase students share both their understanding of the challenges and their design solutions to a wide audience through posters, prototypes and presentations. Last year's Showcase, our first Design for Toronto themed event, produced designs for, among others, improving signage in the PATH, integrating alternative energy (production methods) into the downtown core, cyclist and pedestrian safety at several major routes and intersections, and improving the TTC's emergency response system.

The students defended their designs to city councillors, representatives of the TTC and to other skilled designers from the Toronto area. The participation of these City officials, corporations, and members of the public in the Showcase helped create a more authentic design experience for the students, giving their work a much more real and immediate context. Designs from last year's Showcase were featured in a five day feature in The Toronto Star's "Your City My City" section, The National Post and several local blogs. More pictures of last year's event, posters, and prototypes are available [here](#).



This year, our first year Engineering Science students have identified challenges relating to the TTC (34% of the teams), environmental issues (10%), cycling (10%), litter (0%), roads and traffic (0%), urban and pathogens



Student teams were each on display for 1.5hrs during the day, but had scheduled 45min. assessment sessions with course instructors.

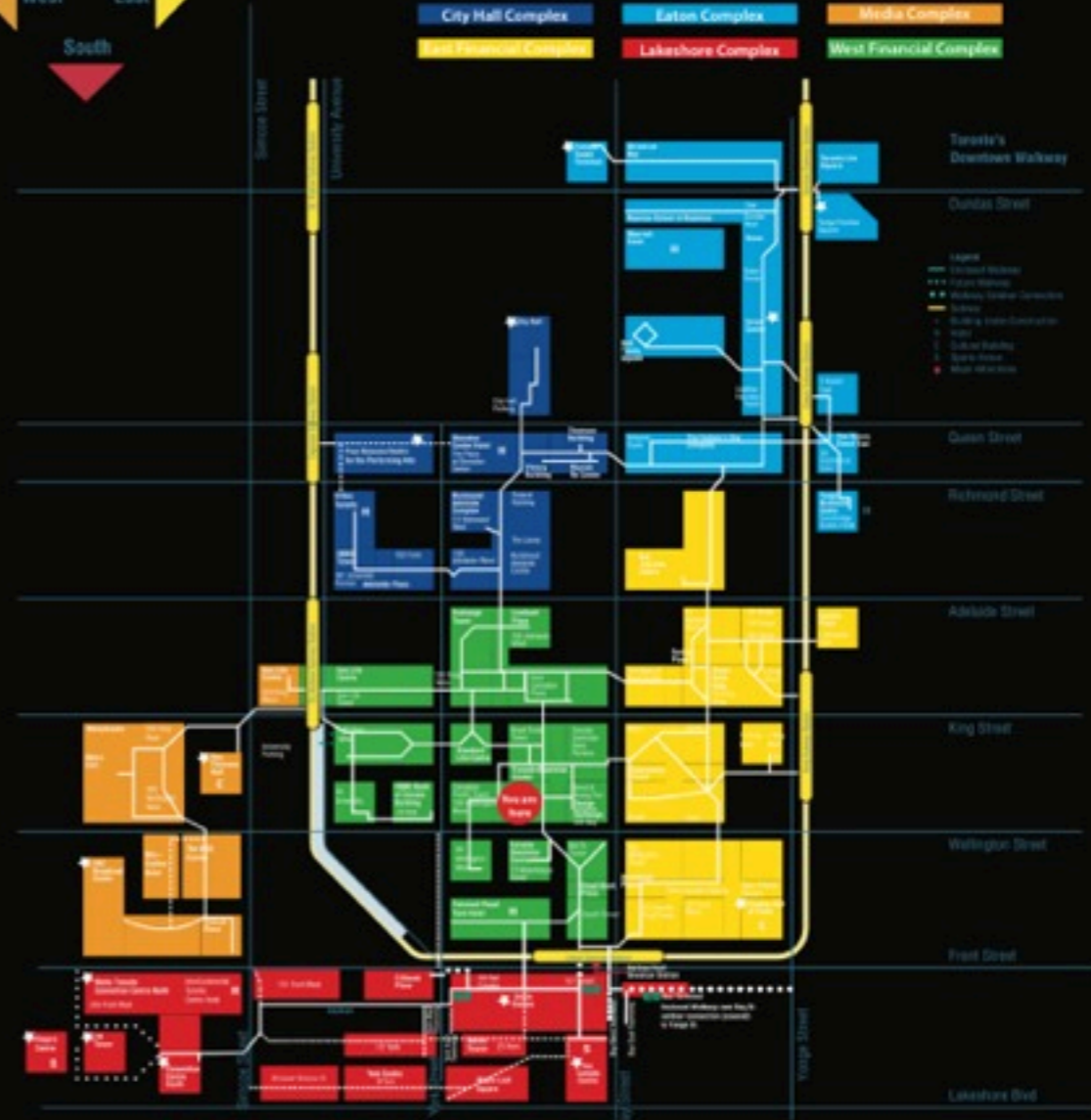


Navigation/Map System for Downtown Underground (PATH)

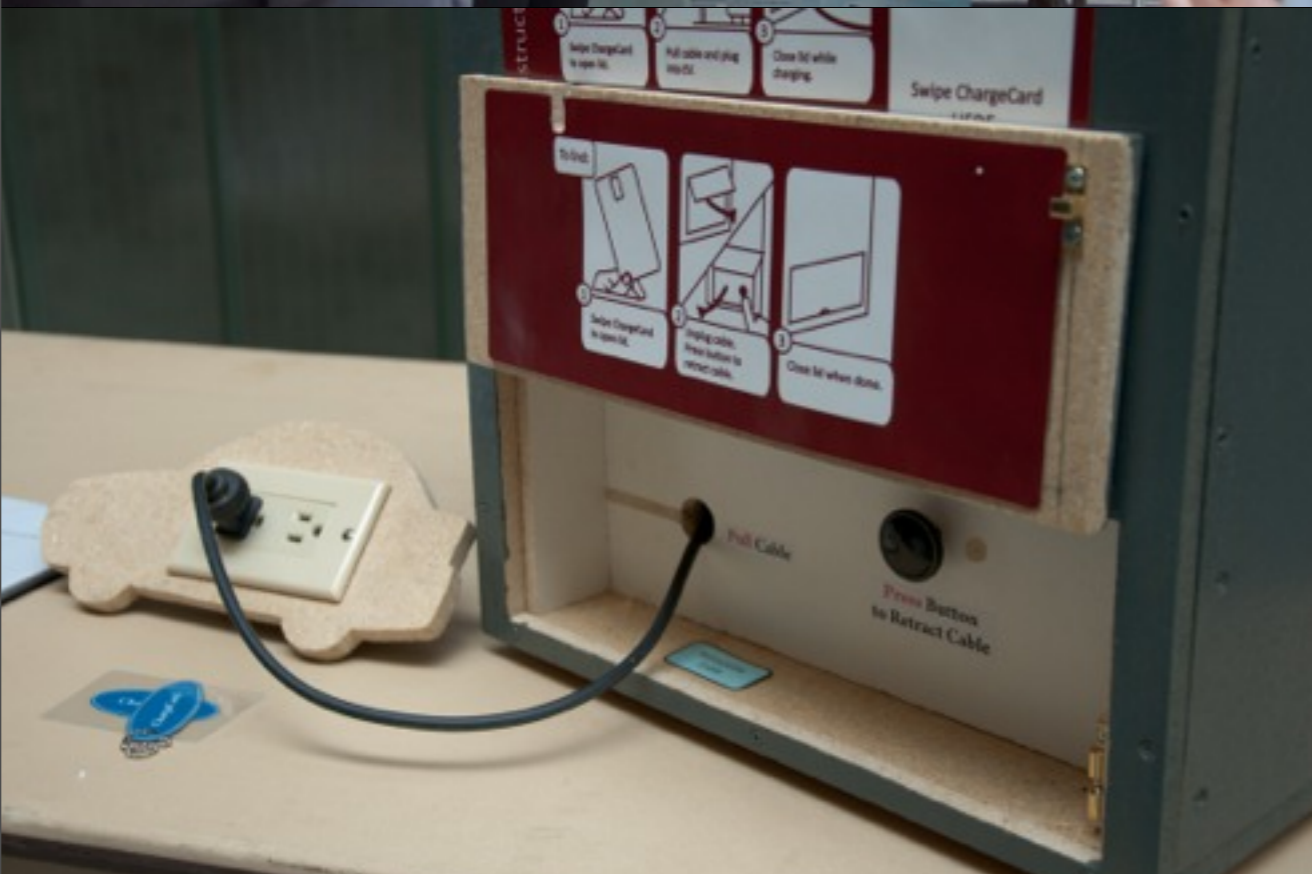
Toronto Dominion Bank Tower



Toronto PATH



- | | | | | | | |
|--|---|--|---|--|---|---|
| <ul style="list-style-type: none"> TD Bank Tower TD Bank Pavilion TD Bank Tower Canadian Pacific Tower Ernst & Young Tower | <p>Food Hall</p> <ul style="list-style-type: none"> 100 Lettieri Espresso Bar & Cafe 101 Starbucks 102 Quiznos 103 Thai Island 104 Tim Hortons 105 McDonald's 106 Piazza Manna 107 Tabouli 108 Jimmy the Greek 109 Fresh West Grill 110 Asian Gourmet 111 Made in Japan 112 Hero Burger 113 Druzy's 114 Freshii 115 Bosto Nouveau 116 Purgernickel's Deli 117 Yogurt Fruit | <p>Restaurants</p> <ul style="list-style-type: none"> 109 Cafe Supreme (77 King St. W) 110 Bymark Restaurant 111 The Duke of Devon 112 Cafe Supreme (222 Bay St.) <p>Fashion Accessories</p> <ul style="list-style-type: none"> 108 Bitter Sweet 109 Obsessions <p>Photography</p> <ul style="list-style-type: none"> 108 Black's <p>Toys, Hobbies, Games & Pets</p> <ul style="list-style-type: none"> 108 Toys, Toys, Toys | <p>Specialty Food</p> <ul style="list-style-type: none"> 109 Mercato Giovanni Fresh Food 110 Treats 111 Lavana Second 112 Michel's Baguette 113 Jugo Juice 114 Soup Nutsy 115 Timothy's World Coffee 116 The Bagel Stop <p>Footwear</p> <ul style="list-style-type: none"> 109 Aerosoles 110 Town Shoes <p>Electronics, Computers & Telephones</p> <ul style="list-style-type: none"> 109 Wireless Wave | <p>Services</p> <ul style="list-style-type: none"> 105 Mr. Pesto Shoe Repair 106 The Printing House (77 King St. W) 107 Stick It 108 Herbal Magic 109 Canada Post 110 TD Canada Trust 111 House of Salgado 112 Flight Centre 113 The Premier 114 The Printing House (222 Bay St.) <p>Housewares, Furnishings & Decor</p> <ul style="list-style-type: none"> 108 Bowwing <p>Ladies Apparel</p> <ul style="list-style-type: none"> 105 Femme de Carriere 106 Holly's 107 Ann Stuart 108 Lavina 109 La Senza 110 Reitmans 111 Cleo | <p>Jewellery</p> <ul style="list-style-type: none"> 108 European Jewellery Boutique 109 Primetime Watchery <p>Books, News & Lottery</p> <ul style="list-style-type: none"> 105 Gateway Newsstands (100 Wellington St. W) 106 Gateway Newsstands (77 King St. W) 107 Gateway Newsstands (66 Wellington St. W) <p>Men's Apparel</p> <ul style="list-style-type: none"> 105 Joshua Brogue <p>Children's Apparel</p> <ul style="list-style-type: none"> 105 The Children's Place | <p>Cards, Stationery & Gifts</p> <ul style="list-style-type: none"> 105 Carlton Cards 106 Essence du Papier 107 Grand & Toy <p>Specialty Apparel</p> <ul style="list-style-type: none"> 105 Danier Leather <p>Personal Care, Beauty & Health</p> <ul style="list-style-type: none"> 105 The Concourse Dental Centre 106 Tony's Salon & Spa 107 Dr. Rupal Raju (Optometrist) 108 Eyewear by Emery 109 Aldo's Hair Design 110 Trade Secrets 111 Enchante Perfumes 112 Sutherland-Chan Clinic 113 Shoppers Drug Mart 114 Nutrition House 115 Barkley Opticians |
|--|---|--|---|--|---|---|



Climate Resistant Charging Station for Electric Vehicles



11

RETROFITTING "STREET FURNITURE" Litter Bins

DURABILITY

- Segmentation of mechanics
- Resistant to hostile users

USABILITY

- Ensure accessibility for disabled users
- Sustain comfort for foot pedal users

CLEANLINESS

- Minimize user contact with bin
- Minimize vermin intrusion
- Minimize garbage build-up

Internal: Cable and pulley system

Slanted Flap

- User friendly angle
- Prevents garbage buildup

Piston Mechanism

- Hydraulic piston for slowed flap closing

Push Handle

- Alternative accessibility for disabled users

Increased Base

- Maximum stability
- Prevents garbage build up beneath

Embedded Foot Pedal

- Hands-free opening
- Resistant to hostile users



Improved Garbage Cans / Raccoon Proof Green Bins



Intersection Safety Redesigns



For the remainder of their session, they were responsible for presenting their ideas to showcase guests, media, invited faculty, and the public.



Students reported on in local news coverage, interviewed by national radio broadcasters, made key contacts in industry through our showcase ...

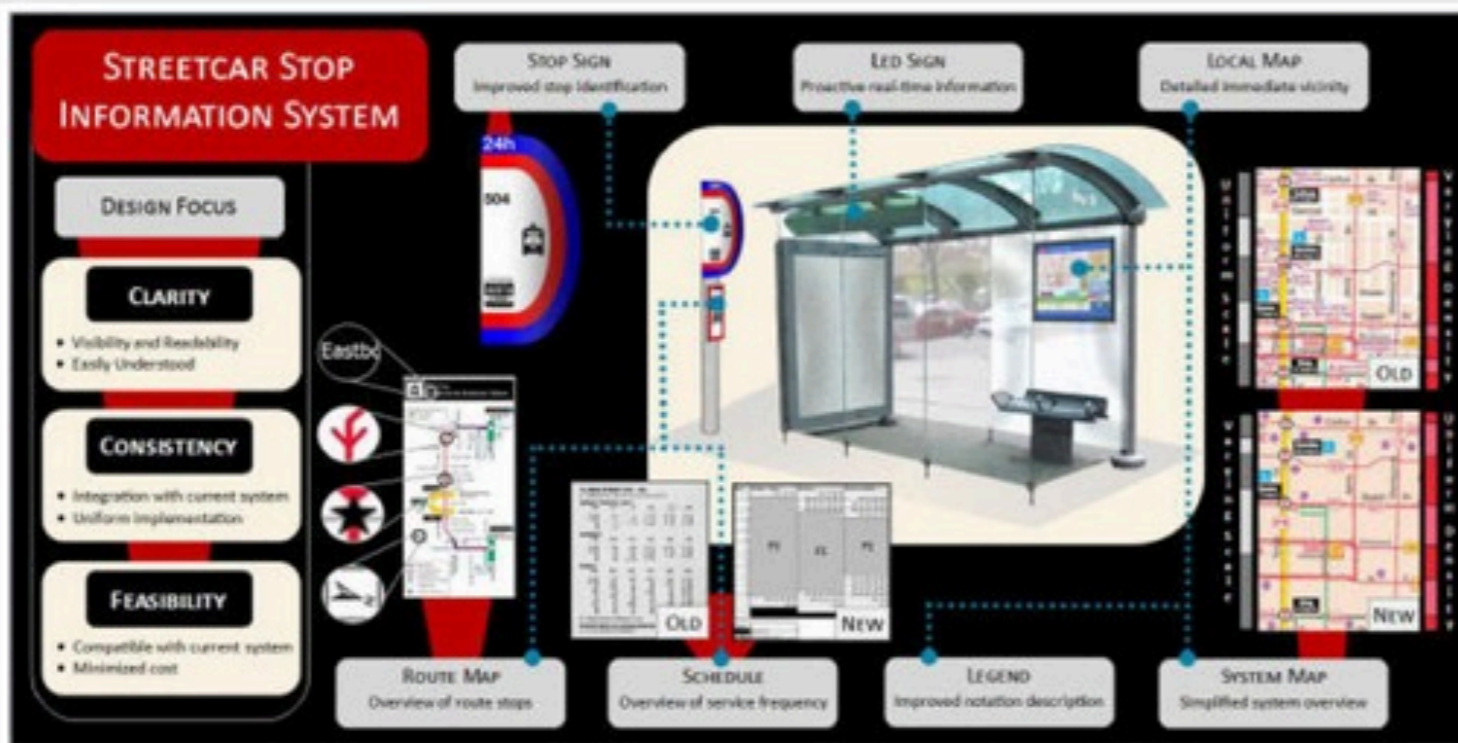


U of T students devise clever fixes for Toronto's ills

Article

Published On Thu Apr 14 2011

Email | Print | RSS



Engineering students summarize their suggested improvements to streetcar stop signage, including a map of the immediate area and more pertinent information for riders.

SUPPLIED POSTER

Patty Winsa
Urban Affairs Reporter

Recommend 99

If there's something wrong with Toronto's infrastructure, U of T engineering students will find a way to fix it.

And on Tuesday, that's what they did

TORONTO STAR

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Facebook Activity

- Reena Newman shared thestar.com iPhone : Fiorito: Eaton Centre shooter a loser. - about an hour ago
- Topher Stott shared Aveda Born to Style hairstyling contest crowns two winners. - about a week ago
- Cat found alive in garbage bag in Scarborough with surgically-inserted... 147 people recommend this.
- Victim of face-eating cannibal attack identified 2,295 people recommend this.

Facebook social plugin

Must Reads



Friday, June 11, 2010 Toronto Edition

thestar.com

15°C Forecast | Traffic

Home News GTA Opinion Business Sports A & E Living Travel Columns Blogs Store

Could wind turbines work in Toronto?
Engineering students tackle an environmental challenge

Published On Sun Apr 11 2010

University of Toronto first year engineering students Wilson Dao, Jai Lee and Puhai Bai designed this model of a canopy that cuts the wind faced by pedestrians along many city streets.

University of Toronto

Friday, June 11, 2010 Toronto Edition

thestar.com

15°C Forecast | Traffic

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Your City My City: 'Bike boxes' mean safer cycling
Engineering students propose a design to give cyclists priority

Published On Tue Apr 13 2010

University of Toronto engineering students say installing bike boxes — a marked-off area at the front of an intersection — along with bike lanes would ensure greater safety.

As part of a first-year engineering science course, students were dispatched to find problems around the city and figure out solutions, ranging from preventing jaywalking to harnessing wind power. Cycling safety was identified as a key issue on many streets, but the class studied a stretch of Bloor St. between Yonge and Bathurst Sts.

Opal Densmore and teammates Nadine Soliman and Reem Helou decided the best way to protect cyclists was to eliminate parking on both sides of the street and install bike lanes, clearly marked in blue.

Friday, June 11, 2010 Toronto Edition

thestar.com

15°C Forecast | Traffic

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Imagining the future with electric cars
University of Toronto engineering students design parking-lot stations that could charge electric cars

Published On Tue Apr 13 2010

Imagine the day when electric vehicles are zipping across the city. As those motorists run low on power, they'll be on the hunt for a charging station, not a gas station.

Engineering students at the University of Toronto are already thinking about that future — and how to set up the necessary infrastructure.

Friday, June 11, 2010 Toronto Edition

thestar.com

15°C Forecast | Traffic

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Engineers try to make sense of the PATH
After getting lost themselves, students propose info terminals and colour-coding

Published On Wed Apr 14 2010

The engineering student team's conception of what the PATH information stand might look like. The team's proposal would place these terminals around the 30-km PATH system, allowing users to find their way and even get a glimpse of the route.

Thursday, June 10, 2010 Toronto Edition

thestar.com

15°C Forecast | Traffic

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Would a bridge at Dundas and Spadina save lives?

Published On Mon Apr 12 2010

A team of first-year University of Toronto engineering science students proposed a bridge over Dundas St. at Spadina, which at 30,000 pedestrian crossings a day, is the busiest in the city's downtown core.

Could a bridge over Dundas St. at Spadina in Chinatown solve the problem of pedestrian-car collisions and still maintain the cultural atmosphere of one of the most ethnically concentrated areas in the city?

Five part coverage in the Toronto Star print and online editions*

NATIONAL POST

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Green bins versus raccoons: Round 2

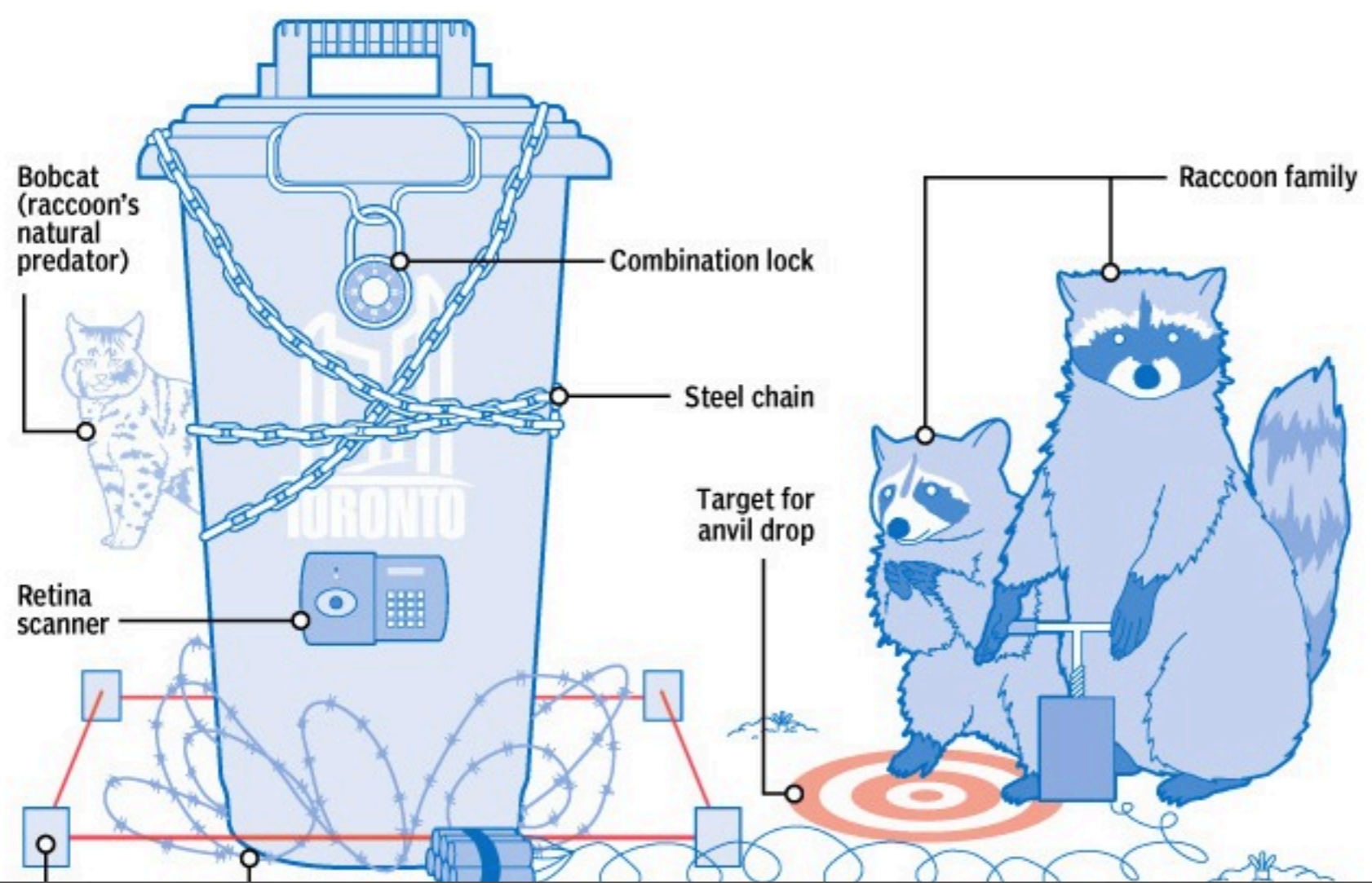
Kristin Annable Apr 19, 2012 – 12:51 AM ET | Last Updated: Apr 19, 2012 1:13 AM ET

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TO0419-GREEN-BIN

IF YOU BUILD IT, THEY WON'T COME (AND STEAL YOUR COMPOST)

The National Post imagines a more raccoon-proof green bin



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Supporting the Civic Engagement Model / Conclusions:

- Students are more engaged with what they perceive to be “real” and “important” projects
- Placing the onus on students to come up with projects that engage - other students, instructors, the community at large - demands their engagement
- We can deploy writing assignments in a manner that encourage engagement with genre and writing
- Demonstrating reciprocal engagement - whether from students, instructors, and other stakeholders - is key to student buy-in and motivation
- Students civic engagement depends on creating a strong, active community of practice extending beyond the classroom