

## Praxis Bridge Design Assignment

### Overview

In the teams formed for the Library exercise in Studio 04, visit a pedestrian bridge in the GTA and perform a bridge inspection. Your inspection should consider, at a minimum, structure, use, and design. The goals of the assignment are

1. to help you understand bridges in context rather than just in theory;
2. to give you understanding of how bridges serve particular purposes (DfX);
3. to give you experience organizing an engineering activity to meet particular standards; and
4. to develop understanding of how design must consider multiple requirements from accessibility to sustainability.

### Objectives

1. Assess a bridge not only from the perspective prescribed by codes but also from your team's priorities based on your understanding of engineering design
2. Present your bridge assessment in Studio 05
3. Present a revised assessment of your bridge and recommendations for improvement of its design in Studio 06
4. Reflect upon and improve your presentation skills between presentations.

### Logistics

This project requires your team to plan and execute a site visit to a pedestrian footbridge in the GTA. Before you visit, plan how you will get there and what aspects of the design to assess. Resources from Studio 04 will be helpful. **Only visit the bridge you selected during the Studio 04 activity.** If you have to change your bridge for any reason please contact Professor Irish or Patricia Sheridan to arrange it.

Your team should create a checklist that incorporates relevant portions of codes (OSIM, City of Toronto Accessibility Guidelines, etc.) and of DfX that are interesting to your team and relevant to bridge assessment. Once you have generated a meaningful checklist that considers, at a minimum, structural and use issues, visit the site. Ensure that you have the necessary tools to complete your assessment (e.g. a camera and a measuring device). Plan to spend sufficient time at the bridge that you can gather not only structural evidence but also evidence about how the bridge is used. Such evidence should include:

1. The purpose of the bridge
2. The bridge type (e.g. truss, beam, arch, etc.)
3. Key design features of the bridge
4. Current state of repair of the bridge (including decking, railings, and structural members, etc.)
5. Whether the bridge meets code based on your observations (hint: look for signs of wear, cracks in concrete, rust, evidence of structural defects as defined in the OSIM), and
6. The bridge's use patterns and possible problems for those who interact with the bridge.
7. A photograph of members of your team at the bridge.

Note that the scope of a bridge assessment includes both the bridge proper and its approaches and abutments.

While you are not professional engineers able to complete a full-scale assessment, you should be able to take simple measurements (e.g. size and number of cracks in concrete, signs of decay on wooden or steel members) and photographs as evidence for reasonable claims about your bridge. Note that the OSIM invites the inspector to request "additional investigations" (1.3.4) if problems are observed.

### Constraints

This assignment has two deliverables in the form of presentations. Each deliverable has its own constraints. Each team **must** present twice.

Teams **must** practice safety throughout the inspection. Note: Bridges can be dangerous, especially if they traverse roadways, railways, waterways or deep ravines. Always keep safety in mind. Do nothing that might put you or your teammates in danger.

Your team **must** provide photographic evidence of your visit as part of both presentations.

**Deliverables:****Bridge Inspection Presentation**

1. Your team **must** present a six-minute presentation during Studio 05 in the week of October 8, 2012.
2. Your team **must** include the following:
  - a. Identify your bridge,
  - b. Briefly describe it by type and purpose,
  - c. Describe key design features,
  - d. Assess the bridge relative to applicable codes,
  - e. Assess the bridge according to relevant DfX, and
  - f. Give an assessment of the bridge's uses.
3. Your team **must** make appropriate use of presentation media (PowerPoint, Keynote) that can be displayed by connection to a VGA data projector (Note: Mac users require a Mac-to-VGA dongle). No laptops will be provided.
4. All members of the team **must** share the speaking relatively equitably.

**Bridge Improvement Presentation**

1. Your team **must** present a completed Presentation Reflection Form based on having reviewed the recording of your Bridge Inspection presentation and your formative assessment form.
2. Your team **must** present a six-minute presentation during Studio 06 in the week of October 15, 2012.
3. Your presentation **must** include:
  - a. Essential aspects of your presentation from Studio 05;
  - b. Recommendations for emendations or required maintenance work, if necessary;
  - c. **Two** improvements to the design of the bridge; and
  - d. The implications of the improvements on the bridge (e.g. improved accessibility, increased maintainability, etc.)
4. Your team **must** make appropriate use of presentation media (PowerPoint, Keynote) that can be displayed by connection to a VGA data projector (Note: Mac users require a Mac-to-VGA dongle). No laptops will be provided.
5. All members of the team **must** share the speaking relatively equitably.

Note that a design improvement need not be a major change: just as snapfit might make a VCR more manufacturable than screws, so a simple change might improve an aspect of the bridge.

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**Criteria**

Your bridge design presentations will be assessed on the following criteria:

- The depth, breadth and rigour of your analysis of the design, structure and use;
- The quality and structure of your arguments to explain your assessment and improvements;
- The clear basis of your arguments in evidence from both site visit and relevant research;
- The quality and coherence of your presentation within the established constraints;
- The effectiveness of visuals to provide support for the presentation;

plus, for the second presentation:

- The quality of the design improvement and the assessment of its implications for the structure or its users (including incorporation of reference designs as precedents);
- The appropriateness of the proposed improvement to the bridge considering its age and context of use; and
- The effective use of reflection to improve subsequent performance.

The Bridge Inspection Presentation is “formative,” that is, it is designed to enable you to learn and reflect on your presentation ability. The Bridge Improvement Presentation is valued as 8+2; that is 8 marks for the presentation itself + 2 marks for the considered improvement over the first presentation. As with all of your work in Praxis I, your work on the bridge inspection forms part of your English proficiency assessment and your praxis of engineering design.