Professional Report Writing Guidelines

As you write your reports, it's crucial to maintain a professional presentation. Remember, you're not only demonstrating your understanding of the subject matter, but also practicing important communication skills that will serve you well in the real world. Please be aware that *up to 15 points* may be deducted for "unprofessional" submissions. Please adhere to the following guidelines to ensure that your reports meet the necessary professional standards:

- **Presentation and Clarity:** Ensure your submissions adhere to the requirements outlined in Section 7 of the syllabus:
  - Show all work (i.e., no credit for a list of answers without calculations).
  - Be neat and legible.
  - Use the correct units.
  - Do not write in the margins or between lines of the problem set document.

- **Depth and detail**: Ensure you thoroughly respond to lab questions using relevant terminology and concepts being taught.

- **Graphs in lab reports:** Present clear and accurate graphs by following these guidelines:
  - Use straight lines for axes (use a ruler or a computer program).
  - Implement a proper scale (graph paper or plotting software is recommended).
  - Label all axes and include units.
  - Do NOT use college-ruled paper for graphing.

- **Sketches:** You may make sketches by hand and insert a photo, but it is expected that the sketch is neat and uses a straight edge when needed. Avoid sketching on college-ruled paper.
- **Equations:** Type the equations, if possible, for best presentation. If there are too many equations, you may hand write them BUT it is expected that the presentation is very neat and clear. In all cases, it is expected that the equation (showing the variables) is presented before it is used.

Remember, your reports should be of a quality that you would proudly submit to an employer, a client, or someone to impress. Demonstrating clarity in your calculations and maintaining a professional presentation are essential skills in engineering and beyond. If you have any questions or concerns about what constitutes a "professional" report, please reach out to course instructor, or consult with your AI.

Lab 4: Tall Buildings: Columns and Cantilevers

Introduction

1. State the **goal** of the lab **and** describe **the steps** of each procedure that help you to achieve this goal, using diagrams as necessary.**[5]**

2. Draw sketches of both models (Eiffel Tower and Washington Monument), showing the complete models and highlighting the parts that represent the partial models. Include **dimensions** for the full height, partial height, base width, and width at the second platform for each sketch. **[10]**

Results

3. Show the results from Tables 3 and 6 for your group **and** the other groups in your lab section, including the appropriate units. For **only** the wind load of your group, show the step-by-step calculations for theoretical moment, tension, and compression forces for both the full and partial models of each structure (Eiffel Tower and Washington Monument). Describe how the moment changes with load by comparing the measured moment at the base for each lab group. Discuss how this change correlates with the equation predicting moment. **[15]**

4. Draw a free body diagram for both complete models using the templates in Figure 1. Include **only** the wind load assigned to your group. To receive full credit, ensure the diagram shows the **scaled** wind load, tension and compression forces, and full height dimensions. Recall that free body diagrams must be in equilibrium. **[5]**

5. Calculate the moment, tension, and compression forces at the approximate ¼ (quarter), ¾ (three-quarter), and top positions of both structures using the distributed wind load **only for your lab group data**. Remember to use scaled values for wind load and height based on your full model measurements in the lab. Measure "y" from the bottom of the structure. **[15]** **Hint: the moment equation is given by:**

$$\boldsymbol{M_y = \frac{p(h-y)^2}{2}}$$

6. Create graphs showing experimental **and** theoretical moments (**only for your lab group data**), for **both** the Eiffel Tower and Washington Monument models. Use the x-axis for moments, and the y-axis for height (i.e., measured from the bottom). Use Figure 2 as a reference. For each structure, connect the data points with the appropriate curve, resulting in 2 curves per model. Label axes and use labels or colors to distinguish curves. It is recommended you use Excel, Python, or MATLAB for this part. **[15]**

7. Create graphs showing experimental **and** theoretical forces (tension **and** compression) for **both** the Eiffel Tower and Washington Monument models (**only for your group**). Use the x-axis for forces, and the y-axis for height (i.e., measured from the bottom). Use Figure 3 as a reference. For each model, connect each group's points with a parabola, resulting in 2 curves per model. Label axes and use labels or colors to distinguish curves. It is recommended you use Excel, Python, or MATLAB for this part. **[10]**

Discussion

8. Compare the experimental values to the theoretical values. Do they agree? What can account for some differences observed? **[4]**

9. Describe the relationship between wind load, moment, and form in the two structures (Eiffel Tower and Washington Monument) by addressing the following aspects: **[6]**

    a. Describe how the theoretical moments change as you move up each of the two structures.

    b. Assess whether the moment diagram is consistent with the form of the structures.

    c. **describe the variation** of theoretical tension and compression forces as you move up the structures.

10. Analyze the impact of dead and wind loads on the internal vertical forces in both models by addressing the following points: (a) Determine the total internal vertical forces on the windward and leeward sides of each model under the combined effects of dead and wind loads (b) Assess the influence of wind on the forces at the base of the models. Is the effect significant? **[10]**

11. In light of your findings from questions above, (a) Evaluate the efficiency of each structure in carrying wind loads based on your findings from previous questions (b) Explain whether the efficiency of handling wind loads matters for each structure, considering the governing loads on the structure [5].

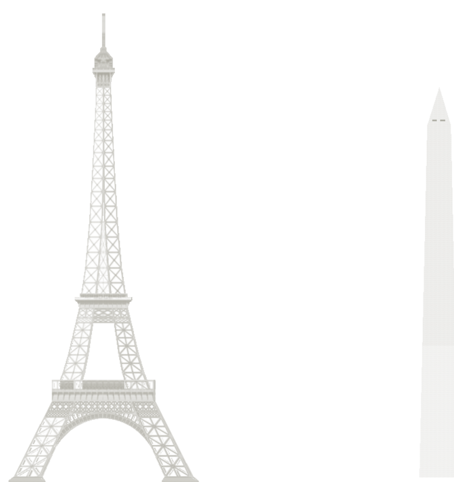

Figure 1 Template for part 4

Figure 2 Template for part 6

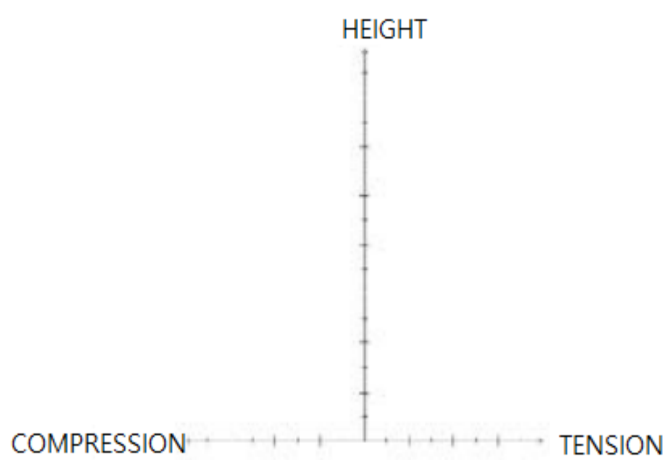

Figure 3 Template for part 7