

Each project group will submit a single Engineering Recommendation Report at the conclusion of APSC 459/479. The terms Final Report and Engineering Recommendation Report will be used interchangeably.

The goal of the Engineering Recommendation Report is to describe the following:

- The background and significance for the project;
- The methods, techniques and technology used to execute the project;
- The results and conclusions from the project work;
- The state of the final deliverables of the project;
- The recommendations drawn from the results and conclusions.

Below are components which must be a part of the Final Report submission for projects in the Project Lab. The bulk of the Report contained in the Discussion section will depend greatly on the type of project work undertaken by the group and will differ substantially from group to group.

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# Letter of Transmittal

The letter of transmittal makes the delivery of the report official; it documents the submission. It also identifies the report and what the recipient is to do with it. It is not unusual for senior managers to receive several reports daily, and the letter of transmittal is their first orientation to the report.

The Letter of Transmittal is not a formal part of the Final Report, and should be submitted as a separate document or file.

The letter should include the following:

- The title of the report.
- An official statement of submission, including the date of submission.
- A brief explanation of why it was written (Who assigned it? When? Why? How?)
- A one- to -three-sentence synopsis of the main theme of the report
- A brief note on any particular features or sections of the report that may be of special interest to the recipient.
- An indication of what the recipient is to do with the report, particularly if the report is not directed primarily to him or her. In other words, is the recipient expected to respond in some way to it, or simply to be aware of it and keep it on file?
- Letters of transmittal should be included to both your project sponsor as well as the Project Lab.

## Example of a Letter of Transmittal

	5001 West 10th Avenue Vancouver, B.C. V6R 5Z0 November 23, 1997
J.J.Smith Engineering manager Union Island Brewery Vancouver, B.C.	
Dear Mr. Smith: I am enclosing the report "Methods of Sealing Glass Beer Bottles" which you requested at our meeting on July 10, 1997.	
As you anticipated, the report concludes that no changes in your bottling procedures are justified at this time.	
Sincerely Yours	
(signature) Jane Doe	
Enclosure	

## Title Page

The Title Page helps the report look more formal and provides information about the project title, team members, sponsor, course, and project number. Some Title Pages include one figure which best represents the Final Report.

### Example of a Title Page

ELECTRICAL EQUIVALENT CIRCUIT MODEL  
OF A SEMICONDUCTOR LASER



Alvin Loke  
Raymond Yip

Project Sponsors:  
Dr. David Pulfrey  
Dr. Tom Tiedje

Project 9102  
Applied Science 479  
Engineering Physics Project Laboratory  
The University of British Columbia  
December 2, 1991

## **Preface**

This section is optional. The preface is used when the circumstances which led to the report must be presented. The preface often gives the qualifications of the authors and acknowledgement of help received. It is used to outline restrictions or confidentiality of the information in the report. The preface is signed by all authors of the report.

## **Executive Summary**

The Executive Summary should be a clear overview of the entire project:

- statement of the project objectives;
- key methods and results;
- key conclusions; and
- key recommendations for the project.

Ideally, the Executive Summary will be a self-contained section and require no outside material in order to understand the general objectives, tasks and results associated with the project.

The Executive Summary is NOT an introduction to the entire report, it is meant to SUMMARIZE all aspects of the report as clearly and succinctly as possible.

You should indicate clearly and succinctly what was delivered to the client. An Executive Summary for an Engineering Recommendation Report may contain several paragraphs with a total of about 300-500 words, and should not normally exceed one page.

## **Table of Contents / List of Figures / List of Tables**

Always provide a full list of the contents of the proposal starting with the Abstract.

The first sections of the proposal are numbered with Roman numerals starting with the Title Page, which is page i (but not shown on the page).

The first page of the body of the proposal, traditionally called the Introduction, is numbered starting at page 1. All pages, including any appendices, are numbered consecutively.

# 1. Introduction

The Introduction section provides context for the report by indicating its purpose, significance, scope, organization, and relevance to the sponsor of the project. It is very likely that the Project Proposal contains much of the information that will also appear in the Introduction section. The Introduction will normally address the following issues:

- **Background and significance of the project** - This section should address several questions for the reader of the report, such as: Why is it necessary to have this report? Has this or a similar problem been investigated in the past? Why is it worth investigating again?

Although your immediate audience usually knows why the report was prepared, other readers may not be very familiar with the circumstances regarding the report. In addition, if your report is consulted some time in the future, no one may know what particular circumstances prompted its writing. A description of the significance of the project may help persuade senior managers that the report's recommendations are important and should be implemented.

This is an appropriate section to describe the technical background information necessary to understand the scope and context of the project. Full technical descriptions of specific aspects of the project may be included in the Discussion or Appendices of the report, as is appropriate.

- **Statement of the Problem / Project Objectives** – A brief statement for the overall objectives of the project work. This can be taken directly from the Project Proposal.
- **Scope and limitations** – This is where the subject of the report can be specified fully; indicate not only what you are examining, but also when and where, as appropriate.

As well as knowing what to expect in your report, your reader needs to know what not to expect. Indicate the kinds of problems, places, times, and personnel that are not considered and the impact these omissions and constraints may have on your results. You may also want to explain why these limitations have been necessary.

- **Organization** – The Introduction should describe the main sections of the Recommendation Report in the order in which they appear. This provides the reader with an idea of the structure and scope of the report itself.

## 2. Discussion

This is the body of the report where evidence and arguments on the subject material are developed in an organized and logical manner. Each major heading requires a separate section in the body of the report.

Since every project will have a different focus, not every project will contain all of the following sections in the Discussion section. Use these as a general guideline to see how your project work can be grouped together in written form to provide a logical description of the project, methods, and results.

- **Theory** – Identify any theoretical aspects of your project. This can include published papers, or relevant discussions from textbooks. Any theoretical descriptions which might be useful to the reader as a reference but would not be considered a core section of the report can be included as an Appendix.
- **Methods / Testing Protocol** – It is useful to provide a description of the methods, techniques and technologies used which were used in the project. Give enough detail so that the reader can be aware of the general approaches taken during the project, and include technical details in the Discussion section.

This is also an appropriate section to describe in appropriate detail alternative methods and techniques which were also considered for the project but were not chosen due to any number of factors – time, financial expense, technical expertise and resources, or technical limitations may have restricted the viable alternatives for the project.

- **Experimental Equipment / Flow Diagram / Algorithms** - This section should include figures and photos of the experimental apparatus and team-fabricated elements, but should not show detailed drawings of the components. Technical details and drawings can be included in an appendix.
- **Results** – Any results from the technical work completed in the project should be included here. There should be a focus on quantitative aspects of the project – any metrics which can be used to measure the performance of the technical solution should be documented in relatively good detail.

When possible, use graphs rather than tables of data in the report body. It is hard to see relationships between variables from tabulated data.

- **Discussion of Results** - It is useful to not only discuss the results from testing, but also the interpretation, implications and limitations of the collected data. This may include:
  - describing alternative tests which might give further insight to the process.
  - discussions on sources of error
  - deriving upper or lower limits of performance or measurement

## **2. Conclusions**

The Conclusions section of an Engineering Recommendation Report is a concise statement of the relationships or inferences that you draw from the results and how these inferences satisfy the objectives.

The body of the report is concerned primarily with presenting results of project work, while the Conclusions present the interpretation of the results bringing everything together for the reader. The Conclusions should provide precise information such as important numerical values from tests including the accuracy and repeatability of the measurements.

A main function for the Conclusions section is to provide the information that is necessary for the reader to understand the Recommendations section. The conclusions should answer the following questions:

- What are the most important results?
- What inferences can be drawn from the analysis of the results?

Note that no new information about the project work is introduced in the Conclusions section.

The Conclusions are written in paragraph form with only one theme or conclusion in each paragraph.

### **3. Project Deliverables**

This section specifically lists the final Project Deliverables, financial details, and any ongoing issues with regards to the project and team members once the report is completed.

Much of the information contained in this section will be very similar in format to the “Project Completion Report”, a separate document to be reviewed and signed off by team members and Project Sponsors at the final handoff of Project Deliverables.

Details to be included in this section include:

1. **List of Deliverables** - This is a direct follow-up from the details contained in the Project Proposal section. The list can describe the final state of each item in the list, any differences between the original deliverables and the actual deliverables, and in what form the Project Sponsor can expect to receive the Deliverable from the Team Members.
2. **Financial Summary** - This can be used to identify the major costs associated with the project, and can be used as a tool to assist the Project Sponsors and Project Lab in determining final costs of the project. The information can be contained in a table

#	Description	Quantity	Vendor(s)	Cost	Purchased by:	To be funded by:
1	Servo Motor					
2	Stock Aluminum					
3	DAQ board					

3. **Ongoing commitments by team members** - This section explicitly states any ongoing commitments that the team members have made to the project after submitting the final report. This list is expected to be made in consultation with the Project Sponsor. It is desirable to make the items in this section as specific as possible, and to include a target end-date for the commitment.



## **4. Recommendations**

The main purpose of an Engineering Recommendation Report is to propose new actions or changes to occur. The changes appear in the form of the Recommendations section of the report.

If a project has been completed according to the proposal, and the objectives have been met, you may suggest to the project sponsor that a new project evolve from the original plan. You will also suggest how to implement the results of the work. However, if the project deviated from the objectives, or was not completed successfully, you could recommend remedial action such as modifying the goals or following different procedures to get around the difficulty. The recommendations are a suggested course of action for the project sponsor.

The Recommendations are supported by the conclusions and the suggested actions may be positive or negative. In other words, you may recommend that a course of action not be undertaken. Recommendations must be specific about why the action is suggested, how it should be done, and what is the expected outcome. Recommendations should be phrased as clearly and completely as possible, so that the reader does not have to consult the body of the report to determine how to interpret them.

Recommendations are expressed in parallel format using sequential numbers with one recommendation for each numbered point.

Remember that:

The **Conclusions section** presents facts about the project work.

The **Recommendations section** presents the opinions of the writer and contains suggested actions on the part of the reader and project sponsor based on the Conclusions section.

## **5. Appendices**

An Appendix is an optional supplement that can be added to contain additional information that would interrupt the body of the report or that only some readers would need. Whether you need one (or more) depends on the nature of the material in the report, on the audience(s) for which the report is designed, and on the uses to which the report will be put.

A rule of thumb: If the reader must refer to material in the Appendix to directly support any arguments made in the body of the text, then consider moving the appendix material back into the main text.

The kinds of material that could be placed in appendices include the following:

- Complete data or complex calculations that would interrupt the report but that the reader may need in order to verify your conclusions.
- Supporting documents referred to in the report, such as letters, other reports, booklets, agreements, contracts, rules, and regulations.
- Software code
- Mechanical drawings of key components.
- Electronics schematics
- Bill of Materials for the project.

### **General guidelines for Appendices:**

- Treat each Appendix as if it were a main heading in the report: begin each Appendix on a new page with the heading "Appendix."
- If you have more than one appendix, begin each one on a separate page and use A, B, C, and so on to distinguish them.
- Figure and Table numbering should appear it were the next one in the body. For example, if the last illustration in the body is Figure 7, then the first one in an appendix will be Figure 8.
- Number the appendix pages just as you do those in the body, beginning with the page after the conclusion and recommendations.

## **6. References**

The References section should include information support the technical content to support the Report. Please include direct references to all material used during the research, design, fabrication and analysis stages of the project.

Please refer to your Technical Communications references for appropriate formatting and reference styles.

# **Common Problems and Issues with Final Reports**

Below is a checklist of general problems with proposals at all stages of composition. Please review this list over at different times of the proposal writing stage – or get assistance from other groups in reviewing your work.

## **Content Issues**

- Always assume the reader is technically competent but not necessarily an expert in the field of the report. Although the report is written with the Project Sponsor in mind, it is equally likely that the report will be passed on to others in the company or research group that are interested, or a follow-up student group, which is may not be as technically proficient in the topic as the direct project sponsor within the company.
- A lack of quantitative information provided in Recommendation Reports. This seriously limits the usefulness and utility of the project once the report and project work has been given back to project sponsors. Plan ahead to provide as much quantitative information as possible to persuade the report reader –resolution, time, accuracy, precision, robustness and the like are all useful metrics to include in the majority of Recommendation Reports.
- Recommendations are not laid out in a clear and well-organized manner. The Recommendations should lay the foundation for the Project Sponsor to plan for continuing on with the project.
- Not enough discussion describing existing and state of the art techniques or solutions.
- Quantitative data has not been presented in an organized fashion.
- Descriptions of the rationale and procedures for testing were not complete.
- Proper references were not included for figures or data used from other sources.

## **Formatting and Structural Issues**

Figures:

- Figures should follow the first reference to them in the report. Note that all figures should have a reference in the body of the report.
- Figures are numbered and have a descriptive legend that is placed under the figure (e.g. “*Figure 5. Photometric Response of the Test System*”)
- Tables are numbered and have a descriptive title that is placed above the table.
- Pages and Margins:
- All pages, including the appendices, are numbered consecutively. The numbers may be in the upper right corner or in the bottom centre of the page.
- In general, margins are 1.5" left; 1" top, bottom, right