3. Construction Documentation and Report Writing:

Drawings, plans, specifications, etc associated with a construction project.

Construction Documents means physical and electronic things, collectively, paper records such as bids, proposals, contracts, correspondence, memorandums, drafts, reports, drawings, specifications, shop drawings, submittals, all warranties all permits and licenses, daily reports, meeting minutes, E-mails, Facebook posts, texts, tweets, audio and visual recordings and photographic information on computers used in connection with the development of the Project.

Why document the project?

- ➢ For better management of the project
- ➢ To resolve spot issues or problems early
- ➢ To change methodology to avoid problems
- ➢ To provide required notices
- ➢ Accurately advise home office, owners, etc. of job progress
- ➢ To defend against claims
- ➢ To manage subcontractors, vendors, etc.
- ➢ To support for change order requests
- ➢ To record costs or job conditions
- ➢ Support claim
- ➢ To develop historical data for future projects
- ➢ To make your lawyer happy

General Documentation

General Documentation is the documents that are created on a regular basis to record the "story" of the project.

- ➢ Daily Reports, Meeting Minutes, Photos, Schedules, Submittals, Timesheets, Etc.

Why do we fill these documents out?
- To communicate to people who aren't there
- To prevent/protect against selective amnesia
- Organize information for later retrieval

General Rules of Project Documentation

- Keep it as simple and routine as possible
- Do not try to "over record" or assign blame in routine documents
- Use standard forms when possible
- Clearly designate the responsibility for keeping certain records.
- Have a process to review the records
  - Sends a message that they are important
  - Adds value to the process
- Document Facts
  - Who was involved/present
  - What happened
  - When (date/time)
  - Where?
  - Why –be very careful with this one
    - ☆ Remember that the contractor is responsible for the acts,errors,omissions of its subcontractors
    - ☆ DO NOT get personal:"…because you are the worst superintendent I have worked with in 25 years."
    - ☆ Don't self-criticize:"…I know that we got you drawings that were late and incomplete, but you still should have been able to finish on time…

Pre-Construction Phase(Conceptual and Design Phase)

- Concept
- Feasibility
- Design

Pre-construction determines the ultimate outcome of a project. At this stage, construction contracting methodology must be determined.

Concept:

A **project concept** is documented as a concept note or as a section in an opportunity study, business plan or project charter.

A project concept is as short as a sentence and no longer than a page.
The format of a project concept resembles a concept statement and often includes the following sections: project name, client, project concept, background and objectives.

A project concept is similar to a mission statement that outlines your purpose. Alternatively, it may resemble a vision statement that paints a picture of the future.

A project concept is typically considered an element of project branding.

- Project Strategy
    Why build? • Why now? • What resources are available? Project requirements • what to build • Initial timelines
- Project Brief
- Identify the Stakeholders
    • Develop and implement Stakeholder Engagement process
    - Identify Project Objectives
        – Cost – Time – Sustainability – Quality
    - Pre planning discussions
    - Master planning

- Project execution planning
- Feasibility Assessment
- Compile Project Brief
  - Initial Project Programme • Procurement matrix • Initial Risk assessment • Initial Services requirements

Feasibility: A technical study is conducted to determine
- Viability
- Cost
- Options
- Identification of constraints
- Schedules

This phase usually costs around 1% to 2% of the project cost

Design: This phase usually costs around 8% to 10% of the project cost

- Schematic Design
- Design Development
- Construction Documents

The project begins to take shape. Now is the time to make the right decision.

Specification, drawings, Operational policies, Risk assessment, Sustainability strategy, Procurement strategy, Health and Safety strategy, Project program, Funding plan, Handover strategy, Project execution plan

Thus documents required in Pre-construction Phase are:
- Project Proposal
- Preliminary Design
- Detail Design
  - operating plans and performance standards
  - Allocates roles and responsibilities
  - Determine activities and resources

- Work schedule
- Bidding Documents
- Specifications
- Detail Drawings
- Quality standards
- Safety plan

Construction Phase:

The following are the documents required in construction phase:
- Kickoff meeting agenda and minutes
- mobilization monitoring and reporting
- cash flow forecast
- work schedule
- resource deployment plan
- daily progress report
- periodical inspection/ walk down report
- materials control report
- progress control documentation
- monthly progress report
- quality control report
- material testing report
- equipment deployment report
- manpower report
- safety implementation records
- safety training records
- reports of accidents
- third party certification of equipment condition
- work measurement record
- progress payment records
- site instructions, letters, VOs, regular communication records

Post Construction Phase:

The following are the documents required in construction phase:
- Project completion report
- As built drawings
- Operation manuals
- Maintenance manuals
- Project handing over certificate
- Project close out records.

Daily Reports/ Log

- Probably the single most important piece of general documentation
- Must be filled out everyday
- Needs to be in a standard form
- Always make sure you note the weather, the personnel, the work performed, any problems encountered
- Think about daily report as if someone that knows nothing about the job is going to read them at the end of the job to figure out what happened.

Meeting Minutes/Notes
- Do not just rely on the Owner or GC's minutes.
- Keep your own notes of the meeting
- Document the participants, the subjects discussed, any future actions to be taken
- Be cognizant that in a pinch, meeting minutes can serve as a notice. If you are having access issues or are delayed, don't hesitate to note those in the meeting.
- You MUST review and correct any discrepancies, errors, or omissions from the minutes.
- Claims/cases can be won and lost on items that are or are not in the meeting minutes.

Minutes of Weekly Job Meeting
Held December 21, 1997

Persons Attending:		Representing:
Joe Brown	....	XYZ Company
Fred Jones	....	A Subcontractor
Jim Smith	....	B Subcontractor

1. X Subcontractor – X Subcontractor is to complete electrical work in Area 3 by Monday, December 28, 2007 and begin electrical work in Area 6 on Tuesday.

2. Y Subcontractor – Y Subcontractor was notified that defective plumbing needs to be repaired in area 901, and that notice of this problem was given to Y's superintendent twice last week. Y informed that if defective plumbing is not repaired by Thursday at 9:00 a.m., XYZ Company will repair and backcharge Y.

Photographic or Video Documentation

- Photographic evidence can be incredibly powerful tool for documenting things that happen on the project.
- Perform an initial documentation of the site before you perform any work
- Create a photographic record of the site on a regularly scheduled basis
- Record all completed work (especially if your work is going to be covered up or modified by subsequent trades."

How to maintain the photo record?

➢ Best practice is to use a digital camera that will create a time/date stamp on each photo

- Don't rely on the time/date stamp though. Keep a record of when photos were taken and who took them

➢ Create a photo file on your computer and save each week's worth of photos or each occurrence as a separate, clearly-labeled file.

➢ At the close of the project, create a CD of the photos for the job file

CLAIM DOCUMENTATION

➢ Documentation created upon the occurrence of an event that you believe will affect your ability to perform your contractual obligation on time or will affect the amount that it will cost to perform the contractual obligations.

➢ Once you are aware of a claim, all of the items that we have discussed become tools that you can use to protect yourself and your interests:

- Photos, Daily reports, meeting minutes
- Not some much the blame game as describing what is happening and how you are being impacted
- Process of documenting your damages also begins as soon as you believe you have a claim. Keep track of time/days, extra costs (no matter how small), and the efforts made to minimize the impact on the job and your own wallet.

Claim Documentation -Notices

- ➢ Remaining silent is NEVER the correct response to realizing that you have a claim.
- ➢ Remember: Know your contractual requirements
  - In order to protect your right to recover from anyone upstream OR downstream from you, you are required to give them notice.
    - ✓ Always notify the owner of a differing site condition, change, delay, force majeure, etc.
    - ✓ Always notify your subcontractors of delays in their work, defects in their work, interference with other subcontractors, etc.

- ➢ Develop a minimalist response that reserves your rights!

Giving Notice
- Timely Notice
- Avoid Inconsistent Paper Trails Upstream and Downstream
- Identify Allowable vs. Not Allowable Costs permitted by your Contract terms
- Understand Subcontractor Pass-Through Requirements
- Pricing –Actual vs. Estimated Cost (disclose)

See: progress/ project completion report

REPORT WRITING

Engineers spend significant amounts of time writing reports, whether they are design reports, construction reports, reports for clients, and so on. It is essential that all engineers be able to present their ideas in a logical manner which engages their audience.

Any report needs some clear guidelines:
• Why are you writing the report? (the purpose)
• Who will read the report? (the audience)
• What will it cover? (the scope)
• How will this be conveyed? (clear language, logical progression of topics, use of figures, tables, equations, appendices, references, etc)
• When is it required? (time management)
• Where is it required? (physical location)

These are the six basic questions that can be used in all problem solving tasks. These issues will be expanded in the sections that follow. Much of this report discusses the how issue. However, unless the why, who and what are right, there is little point in producing a nicely structured and formatted report which no-one reads. Likewise, if it is not delivered on time, and at the appropriate location, it may also be of little value.

What is Report? Understand Meaning of Report

Report is a self-explanatory statement of facts relating to a specific subject and serves the purpose of providing information for decision making and follow up actions. It is a systematic presentation of ascertained facts about a specific event / subject. Report is a summary of findings and recommendations about a particular matter / problem. Report is for the guidance of higher authorities including company executives and directors. Report helps to facilitate timely decisions and follow up measures.

What are Features or Characteristics of Report ?

1. **Complete and Compact Document:** Report is a complete and compact written document giving updated information about a specific problem

2. **Systematic Presentation of Facts:** Report is a systematic presentation of facts, figures, conclusions and recommendations. Report writers closely study the problem under investigation and prepare a report after analyzing all relevant information regarding the problem. Report is supported by facts and evidence. There is no scope for imagination in a report which is basically a factual document.

3. **Prepared in Writing:** Reports are usually in writing. Writing reports are useful for reference purpose. It serves as complete, compact and self-explanatory document over a long period. Oral reporting is possible in the case of secret and confidential matters.

4. **Provides Information and Guidance:** Report is a valuable document which gives information and guidance to the management while framing future policies. It facilitates planning and decision making. Reports are also useful for solving problems faced by a business enterprise.

5. **Self-explanatory Document:** Report is a comprehensive document and covers all aspects of the subject matter of study. It is a self-explanatory and complete document by itself.

6. **Acts as a Tool of Internal Communication:** Report is an effective tool of communication between top executives and subordinate staff working in an organization. It provides feedback to employees and to executives for decision making. Reports are generally submitted to higher authorities. It is an example of upward communication. Similarly, reports are also sent by company executives to the lower levels of management. This is treated as downward communication.

In addition, reports are also sent to shareholders and others connected with the company. It may be pointed out that report writing / preparation acts as a backbone of any system of communication.

7. **Acts as Permanent Record:** A report serves as a permanent record relating to certain business matter. It is useful for future reference and guidance.
8. **Time Consuming and Costly Activity:** Report writing is a time consuming, lengthy and costly activity as it involves collection of facts, drawing conclusion and making recommendations.

Important of Business Reports

Reports are the primary means of communication in organization. In large-scale organizations, there is no alternative to use reports. Reports also play an important role in small-scale organizations. Some points highlighting the purposes or objectives or important of business report are:

- **Transmitting Information:** Business report is very important for transmitting information from one person to another or form one level to another. Although a manager can personally collect required information in a small scale enterprise, it is not possible in the context of a large scale organization. In the latter case, the managers rely on reports for obtaining necessary information.
- **Interpretation and Explanation of event:** Report provides interpretation and explanation of information. As a result, readers can easily understand it.
- **Making decisions:** A report is the basic management tool for making decisions. The job of a manager is nothing but making decisions. Reports supply necessary information to managers to solve problems.
- **Communication with external stakeholders:** In addition to internal use, reports also communicate information to the

external stakeholders like shareholders, creditors, customers, suppliers, government officials and various regulatory agencies. In the absence of formal business report, such stakeholders would remain at dark about the organizations.

- **Development of information base:** Reports also contribute to the development of information base in organization. It develops information base in two ways. Firstly, day to day information is recorded permanently for writing reports. Secondly, the written reports are preserved for future reference. In these ways, reports help in developing a strong and sound information base.

- **Developing labor-management relationship:** Reports also help to improve labor-management relationship particularly, in large organizations. In a large organization, there is little opportunity of direct communication between top-level management and employees. In this case, report is used as mechanism of keeping both sides informed about each other and improving their relationships.

- **Controlling:** Controlling is the final function of management. It ensures whether the actual performance meets the standard. In order to perform the managerial function of controlling, report serves as a yardstick. It supplies necessary information to impose controlling mechanism.

- **Recommending actions:** Reports not only supply information but also recommend natural actions or solutions to the problem. When someone is given the charge of investigating a complex problem and suggesting an appropriate remedy, the investigator usually submits a report to the concerned manager.

From above it clear that reports are the commonly used vehicles that help mangers in planning, organizing, staffing and controlling. In a nutshell, report is indispensable for carrying out the management functions. Report is the nerve of an organization that circulates information.

Business reports are all about conveying information. Not just any information, but essential information, such as the facts, figures and analysis of a situation. The whole point of reports is to give a company the information it needs to make major decisions and plan for the future. Businesses can prepare budgets, business plans, make advertising decisions and much more based on the information in a report. When it comes to different business reports, formatting is critical to making the report instantly recognizable and quick and easy to read without missing the most important information.

- **Analytical Reports:** Analytical reports are essential when a company is on the cusp of making crucial decisions. In such cases, the leadership needs an analysis of the company's situation. An analytical report will present relevant data with explanations and even conclude the status quo. For example, in the case of a quarterly operations analysis, the report will include actions taken by the executive team, the sales revenue and the net profit or loss during the quarter. Normal business operations that occurred during that quarter are analyzed and explained in the analytical report, helping the business to make sound decisions going forward.

- **Informational Reports:** Informational reports present non-biased facts without presuming to explain the "whys" and "what ifs" of the situation. If you need objective information on

something, then you ask for an informational report. If you would like to know about the structure of a company, such as the number of employees, the departments they work in and what role each employee plays in the organization, then an informational report is required. The information can be presented in myriad ways, such as a table showing employee names, salaries and so on, a graph or a pie-chart. You might also want an informational report detailing the company expenditures broken down into different departments and covering different time frames. The information report typically represents a building block that goes into creating the other, more complex types of reports such as analytical and research reports.

- **Research Reports:** Research reports are the most comprehensive types of reports. They are typically required when a company is contemplating venturing into new territories, such as offering a new product or going into a new geographical area. A research report involves giving a topic to a team of researchers or specialists and asking them for all the relevant details and statistics gleaned from an informational report, followed by an in-depth analysis of the situation found in an analytical report. The research report will include their conclusions on the matter in light of the available data as well as some alternatives. As you can see, a research report is a kind of hybrid between an analytical and an information report. Its purpose is to help executives in making major decisions. As such, research reports are the most complex and time-consuming type of business reports to prepare.

The Purpose – Why write this report?
Whenever you write a report, the purpose must be clear in your mind. If it is not, you will have great trouble getting started. An example, relevant to students, might be to review the literature on a topic, or it might be to document the design calculations for a structure.

The Audience – Who will read it?
Your audience must also be known. This allows you to adapt the language of the report to what the audience might reasonably be expected to know. For example, I have decided that this report will mostly be read by students. Hence, the main body of the report deals with brief reports, typical of those submitted by students.

One issue that you also need to keep in mind is that different members of your potential audience may read your report differently. Some people will want just an overview, and may read only the Summary or perhaps the Conclusions as well. Others may also read the body of the report, and some may even get to the appendices.

Do not assume that each person will read all of your report.

The Scope – What will it contain?
The scope of the report more clearly identifies what will go into the report, and what will be left out. In the process of reviewing the literature on a particular topic, for example, you may have found interesting information on many related issues. You must decide how much of that goes into your report, and which
of it will be left out. If you put too much into the report, you run the risk of boring your reader. If you put too little in, you run the risk of

appearing incompetent. Getting this balance right requires judgment that can only be developed through practice.

The Structure and Presentation – How to present it?

Having identified in your mind why, for whom, and about what your report will be written, your task is now to structure it and present it in a manner which will be easy to read and pleasing to the eye. Look at books which you find easy to read, or pleasing to use. Is it the structure of the chapters, or the layout of text on the page? Word processors now make both structure and presentation easier through the use of spelling and grammar checkers, vocabulary lookup, figure and table captioning, paragraph numbering, bulleting etc. Make sure that you know how to use all of these features.

The Deadline – When is it required?

Always know when a report is appropriate. Failure to produce it by the due date may mean no further work from that client, delayed payment, or other unpleasant outcomes.

The Place – Where is it required?

Delivering your report to the client's head office in Kathmandu may not be of much use if it is required the following morning for discussions in Narayangrah.

Basic Report Structure

The following components are present in almost all engineering reports:

1. Title page (including Authors)
2. Table of contents
3. Summary
4. Introduction
5. Body of the Report
6. Conclusions and Recommendations
7. List of References or Bibliography
8. Appendices

Title Page

The title page includes the name of the report, who wrote it, their organization and the date. Authors include those who made a major, direct contribution to the report or study. Minor contributors can be mentioned in the Acknowledgements section.

Table of Contents

The Table of Contents lists all the major sections of the report. You can use your word processor to do this automatically for you. Student's reports should include the name of the subject, assignment, student, lecturer, the due date, and the date submitted.

Summary or Executive Summary

This section briefly summarizes the purpose of the study, major findings, conclusions, and recommendations. It is designed for those who do not have the time to read the entire report and as a means of refreshing a reader's mind at some later time. It is probably the most important section of the report, because it is almost certain to be read. The summary can be anything from 1-30 pages, depending on the complexity of the report. Most student reports should have a 1 page summary.

Introduction

The Introduction is an extremely important part of any report. It should not include too much detail, but it should give the reader a good idea of where the report is going (including a brief description of the contents of the report).

Just as the Summary gives an overview of the total project, including principal findings and recommendations, the Introduction covers the following issues:

- **what** was the problem and its context,
- **why** was it a problem,
- **how** was the problem solved (briefly).

Body of the Report

The body of the report is composed of a series of chapters that describe the subject of the report. The body of the report must address:

• Why was the study necessary? (the purpose)
• When, where, how and by whom the study was conducted?
• What were the findings?
• What conclusions were drawn?
• What recommendations were made?

The Introduction will deal with the first of these. A series of sections or chapters will cover the next two, and Conclusions and Recommendations will handle the last two.

Tables and Figures

Any substantial report is likely to contain many tables of data and figures which illustrate and support the content of the report. Attractive charts are now easily produced using spreadsheet programs, and should be used instead of tables where possible. Consider the following two possible ways of presenting the data in the table below, and the advantages and disadvantages of each. These

are just two of the more attractive ways of presenting such data. (By the way, you can easily use side-by-side figures like this by using a two cell table).

Table 4.1 Flakiness and Elongation test result of selected road projects

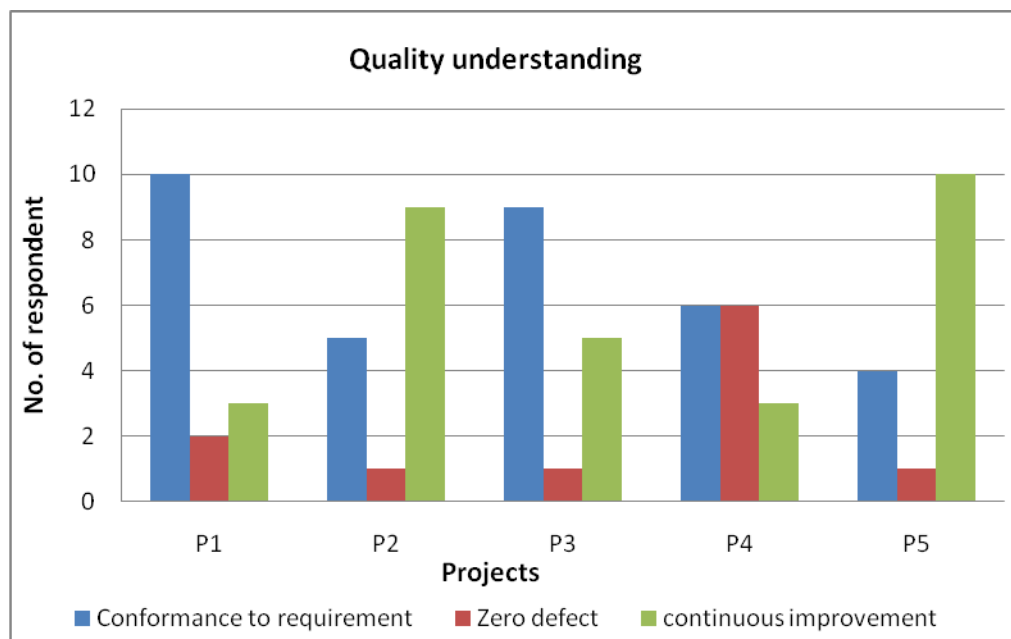| S.N	Project Id	Specified limit	Test Frequency	Test Standards	Test Result	
					Flakiness index %	Elongation index %
1	P1				20.38	25.04
2	P2		Each	Standard Specification	20.85	24.61
3	P3		source	of Road and Bridge, DOR	20.46	23.50
4	P4	Max.	and		18.12	23.15
5	P5	30%	Every 200 m3		20.84	24.60

Figure 4.1 Quality understanding of the respondent

Figures are often center in the text, with a bolded caption below it. Tables usually have the caption at the top as shown above.

Conclusions and Recommendations

Your report will typically describe some findings which have been derived from observation, experiment, calculation, etc. From these findings, you should draw some conclusions. The insights that you can extract from your basic findings are a key part of your report. You may also be expected to make some recommendations based on your conclusions. The findings are the foundations on which the conclusions rest, while the conclusions, in turn, support the recommendation.

List of References or Bibliography

When you use material from other reports or books, you must properly acknowledge it, by citing the report or book in a list of references, and referring to the list at the places in the text where the material is used. The two most common ways of citing are the use of numbered references or by author and year of publication.

The list of references is usually placed either at the end of the report. Citations and References are such important parts of writing in an academic environment, that an entire appendix of this report is devoted to them.

A **bibliography** is a listing of books or reports that contain similar or otherwise pertinent material that may prove useful to the reader who wants to pursue the subject matter further. Reports describing engineering studies do not usually contain bibliographies, unless the report is encouraging further study or explanation.

Appendices

Detailed material that is not essential to, but supports the information contained in the body of the report, should be placed in an appendix. Appropriate appendix materials include supporting data, detailed explanations of methodologies or procedures, derivation of formulas, conversion factors, and data collection formats, protocols, and checklists. Appendices are a powerful means of fully documenting and supporting the results of the study without cluttering the body of the report.

Layout and Formatting
(source:http://www.lc.unsw.edu.au/sites/default/files/uploads/PDF/ReportGuide_Mining_WEB.pdf)

The layout and formatting is a matter of personal preference but there are norms that should be observed. In any case, the selected format should make the report easy to read and pleasing to the eye. Importantly, the format should be consistent throughout the report unless a special effect is required.

Some recommended settings for a report are shown in Table 1.

Table 1: Typical format settings for a report.

Format Option	Setting
Font – body of report	Times New Roman (serif font)
Report headings	(or other sans serif font)
Font size	12 point
Paragraph spacing	6 or 12 pt
Line spacing	Single
Left Margin	25.4 mm (alternatively 30 mm)
Right margin	25.4 mm (alternatively 20 mm)
Top margin	25.4 mm (alternatively 20 mm)
Bottom margin	25.4 mm (alternatively 20 mm)

Bold and italics typefaces are used to give emphasis to particular words or phrases as they tend to attract the eye. A common mistake is to make too much use of either of these formatting options.

Bold is used to give emphasis to usually one or two words. It is also often used in major headings.

Italics, being slightly less striking to the eye, is used to give emphasis to phrases, entire sentences or when including a direct quotation or title of a publication.

Since the development of desktop printing and the word processor underlining is rarely used as it has been replaced by bold and italic fonts. It is reserved for those occasions when you want to scream at the reader. Underlining is also particularly effective whenever part of a word needs to be emphasized, for example unrepresentative. Do not mix the underlining of words that have been set in bold or italic typeface.

Emphasis can also be given to words by the use of CAPITALS but like underlining, this should be rarely used. A common use is in GUIDE TO REPORT WRITING UNSW Mining Engineering 17 circumstances where the reader might otherwise misread the meaning of a sentence such as "water from outlets in this laboratory is not potable and MUST NOT be consumed." It can also be difficult to read words set in capitals and can cause mistakes in comprehension.

An example of a set of format settings that can be used in a report is shown in Table 2

Table 2: Report layout and formatting.

1. HEADING LEVEL 1	18 pt Arial bold font, small caps, start new page, align left
1.1 HEADING LEVEL 2	14pt Arial bold font, all caps, align left, 18 pt line space before
1.1.1 Heading level 3	12 pt Times italic bold font, align left, 12 pt line space before
Text in report	12 pt Times font, justify left and right margins, sentence case
Table/Figure Captions	10 pt Times font
Header	10 pt Times italics font, thin line below the text
Footer	10 pt Times italics font, thin line above the text
Reference List	12 pt Times font, align left, indent second & consecutive entry lines

1. Justify the purpose of construction documentation for contractors to remain in the competitive business environment. Explain different types of documents that are generated by the contractors at implementation phases of project life cycle for a academic building of engineering college.

2. Why project manager of any construction project needs construction report? Write down the standard format of table of contents for the project completion report of ADB funded small town water supply Project in Nuwakot district of Nepal.

3. Write short notes on: **Structures of good reports**

4. Define documentation and its purpose in project management. Write down the various documents to be generated by the client during various phases of project life cycle.

5. List down various types of report and its purpose which are used in construction project management. Write down the standard format of table of contents for the progress report of World Bank funded project of hospital building in Kathmandu Valley.