DIALOG ALBERTA ARCHITECTURE ENGINEERING AND INTERIOR DESIGN PLANNING INC.

PROFESSIONAL PRACTICE MANAGEMENT PLAN

Prepared November, 2004
Updated April 2011
1. INTRODUCTION

Canadian Architecture and Engineering Associations generally require consulting firms to develop and maintain a Professional Practice Management Plan (PPMP) that is appropriate to its professional practice.

This PPMP specifies responsibilities and authority of personnel as they relate to professional practice. The programs outlined in this plan and the referenced procedures are intended to ensure that the public interest is considered and kept paramount in the firm’s professional activities.

To implement this policy, it is the objective of DIALOG to establish and maintain an effective and efficient PPMP and regularly review its effectiveness. The PPMP will be reviewed and updated annually.

Acceptance of the principles and obligations contained in the PPMP is acknowledged by endorsement:

Practice Chair: ___________________________ Dated ________________
Douglas J. McConnell
Architect, AAA, FRAIC

Managing Principal: ___________________________ Dated ________________
Tom Sutherland
Architect, AAA, FRAIC

Financial/Business Principal & Member Responsible for Engineering Work of the Firm: ___________________________ Dated ________________
Dr. C. James Montgomery, P.Eng.
1.1 Statement of Ethics

We believe that good ethical practice is reciprocated and leads to successful and rewarding businesses. We will strive to uphold the professional nature of the architecture and engineering professions and work within the guidelines presented in the AAA Code of Ethics, OAA Code of Ethics, AIBC Code of Ethics and Professional Conduct, APEGGA Guideline for Ethical Practice, and common courtesy.

DIALOG endeavours to conduct its business and professional practice in a manner that reinforces the fundamental canons of ethical conduct respecting public safety, competency, integrity, rule of law, and the dignity of the professions.

Appendix A contains a copy of the AAA Code of Ethics.

Appendix B contains a copy of excerpts from the APEGGA Code of Ethics.

1.2 References

The following references were used in the preparation of the PPMP. Latest versions shall be referred to in the day to day activities of the professionals in the firm.

- Guideline for Ethical Practice, APEGGA, March 2003.
- Practice Standard for Authenticating Professional Documents, APEGGA, April 2002.
- The Engineering, Geological and Geophysical Professions Act, Regulations and By-Laws, April 2003.
- Advertising of Professional Services, APEGGA, September 1996.
- Safety Manual, DIALOG.
- Safety Orientation Manual, DIALOG.
- Drawing Standards, DIALOG.
- Quality by Design, DIALOG.
- Project Management Procedures, DIALOG.
- Project Accounting Reports, DIALOG.
2. MANAGEMENT, ORGANIZATION AND RESPONSIBILITIES

2.1 Scope of Practice

DIALOG's architects, engineers, interior designers, and planners provide fully integrated design consulting services in the arts and culture, commercial office, government, health care, hospitality, housing, retail, post-secondary, research, school, sports and recreation, and transportation sectors through its provincial practice corporations.

2.2 Provincial Practice Corporations

DIALOG's principals practice architecture, engineering, interior design, and planning in various provinces across Canada through provincial practice corporations. “DIALOG” is licensed to each of DIALOG’s provincial practice corporations for their use. DIALOG’s Alberta practice corporation is DIALOG Alberta Architecture Engineering Interior Design Planning Inc.

DIALOG is a practice of corporations that supplies management and support services to each of DIALOG’s provincial practice corporations.

2.3 DIALOG

2.3.1 Governance

DIALOG has a clear governance model set out in detail in Appendix C. Key points include:

- Our principal group itself sets our strategic direction and makes high-level decisions. Doug McConnell chairs the principals.

- The principals delegate executive accountability for firm management to our Leadership Team. The Leadership Team is chaired by our Managing Principal, Tom Sutherland, who is responsible for strategic direction and operation of the firm.

- Jim Montgomery is our Financial/Business Principal and a member of our Leadership Team, as well as being the Responsible Member for engineering operations as required by APEGGA.

- Individual principals are responsible for each of the various studios, initiatives, roles, and responsibilities as set out in Appendix C.

DIALOG's PPMP serves as our plan for our Alberta practice corporation and principals of the firm practicing in Alberta.
2.3.2 Strategic Plan

DIALOG develops and documents a strategic plan on an annual basis. The principals measure the performance of the firm against the goals set out in the firm’s strategic plan.

3. PROFESSIONAL AND TECHNICAL RESOURCES

3.1 Professional Resources

The principals and senior people of DIALOG are competent to practice in the areas of architecture, structural, mechanical, and electrical engineering, interior design, and planning. Each of the principals is an expert in their area of specialization.

Hiring

The firm assesses the skill levels required for staff positions and hires only qualified personnel. Skill levels are determined on the basis of responsibility, education, training, and professional status. The firm observes fair hiring practices and does not discriminate on the basis of race, gender, age, religion, or disability.

Performance Reviews and Related Matters

The firm maintains a system of employee evaluation that addresses technical skills, professional development, requirements for continuing education, and the appropriate level of responsibility. Employee evaluations are treated as confidential; however, a record of the evaluations is retained by the human resources group.

The firm maintains the resumes for all professional and technical staff. The resumes of our people are updated on a regular basis by our marketing group.

The company encourages participation in professional development activities.
4. TECHNICAL FACILITIES AND RESOURCES

DIALOG maintains adequate resources for use by professional and technical staff in performing their duties, in accordance with the recognized codes and standards.

The firm maintains libraries in each office having at least one copy of: relevant and current codes, standards, regulations, technical journals, AAA, OAA, AIBC, and APEGGA guidelines appropriate to its scope of practice. The latest versions of reference materials are used and made available by either procuring the reference material or identifying validated websites (i.e. www.apegga.org, www.safetycodes.ab.ca...) that maintain the latest versions of their publications.

DIALOG has developed a comprehensive education program, integral to the professional development of our people. integrateducation®, managed by an advisory committee of employees and principals, offered over 150 sessions last year. The curriculum features a weekly workshop in each studio, with internal and external speakers. Workshops cover all aspects of our business, including: building technology, professional skill development, contracts and construction, integrated design, personal development, project management, software and computer skills. In February 2008, we were honoured to receive an Award of Merit from the Consulting Engineers of Alberta for our integrateducation program in the category of ‘Community Outreach & In-house Initiative’. In February 2009, we were recognized with a national Award of Excellence from Canadian Consulting Engineering and the Association of Canadian Companies for our integrateducation program. As of 2011, many of the courses being offered through integrateducation now qualify for professional learning credits with our provincial regulatory bodies.

The firm has standard contract forms and fee letters available for project managers undertaking professional work. Contract forms and fee letters are available to our team members on the firm’s file server. The contract forms and fee letters are to assist project managers and clients in understanding and documenting the scope of project work, responsibilities, and fees.

The computer systems and software used for professional related work are suitable for the activities being performed. Valid licenses for users are maintained by the information technology group.
5. QUALITY CONTROL

5.1 Professional Business Practices

DIALOG maintains an effective and efficient Quality Program planned and developed in conjunction with all Management Functions. This Program assists the firm in developing a respectable and successful business.

- The firm respects client confidentiality and all client information is treated as the confidential property of the client. The firm ensures that any information acquired with respect to the business and affairs of a client is used solely for the benefit of that client. When required by clients, confidentiality agreements are included in all employee contracts.

- Intellectual property relating to project services that resides with the client prior to engagement remains the property of the client. Intellectual property relating to project services that resides with DIALOG prior to engagement remains the property of the firm. New intellectual property arising from and due the project services are the property of DIALOG, unless otherwise specified in our agreement with the client.

- DIALOG recognizes the potential for disputes or conflicts of interest and supports a proactive approach to identifying and resolving contentious issues at the earliest stages. Resolution of disputes or conflicts between professionals and clients shall be handled in the most appropriate and professional ways. Mechanisms for dispute resolution include, in order of preference: negotiation, conciliation, mediation, arbitration, and litigation. Conflict of interest situations shall be avoided by all professional employees in the firm. In the event of a conflict of interest, the principals agree to review and handle the conflict in the most suitable and ethical manner.

- DIALOG supports educational and technical events within its field of practice. The firm does not advertise or solicit new business at the expense of its competitors.

- The firm follows AAA’s, OAA’s, AIBC’s, and APEGGA’s guidelines on advertising of professional services for promotional materials.

- Professional Service Agreements are negotiated with clients/customers in a professional manner. Contracts clearly document the fees and scope of services.

- Multi-disciplinary project teams have an organization chart developed showing the lines of communication and responsibilities of project people. The principals are responsible for the quality control of the professional work of the firm.
5.2 Project Management

- The Project Managers are responsible for preparing and tracking project costs, schedules, and completion using suitable methods to both the client and the firm.
- Project execution plans are prepared for projects to identify the project management systems being used including: organizational structure, communication plan, project scope, quality management plan, deliverables, professional expertise, execution strategy, budget, schedules, change control, and close-out. Appendix D provides a document to be used by project managers in assembling project execution plans.
- Procedures for handling change requests, payment processing, drawing reviews, and other client correspondence are the responsibility of the project manager and are identified on the project execution plan.

5.3 Technical Work

The firm maintains systems of quality control in each discipline that ensure all work being performed is properly defined, is undertaken by competent personnel, meets applicable codes and standards, is adequately supervised and reviewed, and is documented in an appropriate manner.

For each project or professional service undertaken by the firm, the quality control process includes:

- Assigning a project file.
- Preparing a detailed description of project, assessing goals and defining deliverables.
- Assessing level of complexity, assigning qualified personnel, and allocating resources.
- Determining input requirements, including applicable codes, standards, and regulations, and preparing a sequence of tasks or events.
- Specifying requirements and document control.
- Undertaking review(s), including client input as may be required by contract or project task, to ensure that deliverables are satisfied.
- Where appropriate, design parameters, calculations, and code requirements are validated through a separate review process. Detailed reviews may be performed by the originating professional or an independent checker. The level of review for the professional work shall be defined by the principals. Once the professional work is reviewed, it is stamped in accordance with AAA, OAA, AIBC, and APEGGA requirements as appropriate. For engineering work completed in Alberta, the APEGGA permit number is applied to the document after it is stamped. APEGGA's Practice Standard for Authenticating Professional Documents is used to determine authentication requirements.
• Computer programs, spreadsheets, and calculation methods used in professional work are verified using either detailed review or secondary calculations methods. The principals confirm that professionals are using only verified tools.

Appendices E, F, G, H and I contain quality control documents for the architectural, structural, mechanical, electrical, and interior design disciplines.

6. PROFESSIONAL DOCUMENTS AND RECORDS

6.1 Document Policy

DIALOG handles all professional documents with the appropriate controls to maintain accuracy and completeness. Professional and technical staff are responsible for the preparation of the documents in accordance with procedures identified for the project.

• Both electronic and paper documentation are kept and filed in the project folders. Documents may be stored either electronically or via hard copy and are maintained for a period of no less than ten years.

• Computer systems are backed up on a regular basis by the information technology group with off-site storage of back-ups.

• Professional documents list the relevant regulatory codes and standards as applicable. In addition, assumptions made to complete the work are listed on the appropriate documents or otherwise noted in the project files.

• Communications with regard to professional work (including E-mails) are filed in the project files. Verbal communications are noted where appropriate and records of conversations are placed in the project file.

6.2 Professional Documents Requiring Authentication

The following are professional documents requiring controls. Authentication (sealing, signing, and dating) and the permit number are required on the documents if noted.

Plans, drawings, detailed drawings – Each sheet in a set of drawings shall be authenticated.

Reports – Reports are authenticated on the cover page at the front or on the signature page at the end of the report.
Specifications - Specifications that are separate from related project documents should clearly refer to the related documents.

Reviewed Documents - A professional who has thoroughly reviewed and accepts responsibility for a professional document prepared by another person shall authenticate the document.
Schedule

Code of Ethics

Integrity

1. An authorized entity must discharge, with honesty, courtesy and good faith, the duty that it owes to its client, to the public and to the profession.

Compliance and quality of service

3. An authorized entity must
   - act in the best interests of its client,
   - provide professional services with integrity, objectivity and independence,
   - serve its clients in a conscientious and efficient manner, and
   - provide a quality of service at least equal to that which would generally be expected from a competent authorized entity in a similar situation.

Advising clients

4. An authorized entity must be candid and honest when advising its clients.

Avoiding questionable conduct

5. An authorized entity must observe the spirit as well as the letter of the rules set out in this Code.

Confidentiality

6(1). An authorized entity must hold in strict confidence all information respecting the business and affairs of a client.

   (2) An authorized entity shall not disclose any information respecting the business and affairs of a client unless the authorized entity is
      - expressly or impliedly authorized to do so by the client, or
      - required to disclose the information by an enactment or an order of a court.

Fees

7(1). The fee charged by an authorized entity should be disclosed to the authorized entity’s client and must be fair and reasonable taking into consideration such of the following factors as are relevant:
   - the time and effort required to be spent on the project;
   - the complexity of the project;
   - whether special skill or service is required and provided;
   - the customary charges of other authorized entities of equal standing in the locality in like matters and circumstances;
   - the cost of the work involved in the construction of the project;
   - such other special circumstances, including loss of other employment, uncertainty of reward and urgency, as may apply with respect to a particular project.

   (2) A fee will be fair and reasonable if it is one which can be justified in light of all pertinent circumstances, including the factors mentioned in subsection (1).

Withdrawal of services

8. An authorized entity shall not withdraw professional services except for good cause and with notice that is appropriate in the circumstances.
Impartiality and conflict of interest

9(1) An authorized entity must act impartially and should not favour the authorized entity’s own interests over the legitimate interests of the client or the public.

(2) An authorized entity shall not act or continue to act for a client if a conflict of interest arises or is likely to arise unless the authorized entity explicitly explains the conflict to the client and the client, with full knowledge of the conflict, requests that the authorized entity continue to act.

(3) An authorized entity must, if a conflict of interest arises, immediately disclose it personally to the client.

(4) For the purposes of this rule, “conflict of interest” means a situation

   (a) that would be likely to adversely affect the judgment of the authorized entity on behalf of, or its loyalty to, a client or prospective client, or

   (b) that might prompt an authorized entity to prefer the authorized entity’s own interests over the interests of a client or prospective client.

Guarantee of estimates

10 An authorized entity shall not guarantee an estimate of the cost of construction, furnishings, fixtures and equipment, whether prepared by the authorized entity or not.

Knowledge and skills

11 An authorized entity must maintain currency in the knowledge and skills necessary to provide professional services.

Prohibition on practice

12(1) An authorized entity shall not make any arrangement or agreement whereby a person who is not entitled to engage in the practice of architecture or the practice of interior design may

   (a) directly or indirectly engage in the practice of architecture or the practice of interior design, or

   (b) represent or hold out, expressly or by implication, that the person is entitled to engage in the practice of architecture or the practice of interior design.

(2) An authorized entity must bring to the attention of the Council any individual or corporation involved in the unlawful practice of architecture or the unlawful practice of interior design.

Outside interests

13 An authorized entity that engages in another profession, business or occupation concurrently with the practice of architecture or the practice of interior design shall not allow that other profession, business or occupation to jeopardize that authorized entity’s professional integrity, independence or competence in the practice of architecture or the practice of interior design.

Advertising

14(1) An authorized entity may promote or advertise the authorized entity’s abilities if the advertising does not impair the dignity of the profession and fees are neither quoted nor implied.

(2) An authorized entity must ensure that the advertising serves the public interest by reporting accurate and factual information which neither exaggerates nor misleads.
APPENDIX B: EXCERPTS FROM APEGGA CODE OF ETHICS

RULES OF CONDUCT

1. Professional engineers, geologists and geophysicists shall, in their areas of practice, hold paramount the health, safety and welfare of the public, and have regard for the environment.

2. Professional engineers, geologists and geophysicists shall undertake only work that they are competent to perform by virtue of their training and experience.

3. Professional engineers, geologists and geophysicists shall conduct themselves with integrity, honesty, fairness and objectivity in their professional activities.

4. Professional engineers, geologists and geophysicists shall comply with applicable statutes, regulations and bylaws in their professional practices.

5. Professional engineers, geologists and geophysicists shall uphold and enhance the honour, dignity and reputation of their professions and, thus, the ability of the professions to serve the public interest.
## APPENDIX D: PROJECT EXECUTION PLAN

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<td>Project Description (What, Who, Why):</td>
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<td>Organizational Structure/Professional Responsibilities:</td>
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In progress
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1. Introduction

1.1 This guideline presents the methodology by which the Structural Group at DIALOG delivers projects of high quality.

1.2 The intent of the guideline is to provide structures that:
   1.2.1 Meet the Owner’s requirements.
   1.2.2 Are well coordinated with requirements of other disciplines on the project.
   1.2.3 Satisfy the requirements of design codes and standards.
   1.2.4 Can be constructed without unreasonable difficulty.
   1.2.5 Will perform for the intended use for the design life.

1.3 The guidelines emphasize:
   1.3.1 Having all project people feel responsible for delivering high quality work.
   1.3.2 Bringing the knowledge of our experienced people to the project early in the design process.
   1.3.3 Doing structural engineering work correctly from the start of the project and minimizing the amount of re-design.
   1.3.4 Monitoring and improving quality on a continuous basis throughout the course of design and construction.

2. Roles and Responsibility for Quality Enhancement

2.1 General
   2.1.1 The success of a project depends on the efforts of each member of the DIALOG team.
   2.1.2 As a minimum, project people are responsible for the accuracy and completeness of their own work.
   2.1.3 To achieve projects of excellent quality, we must look beyond our individual responsibilities to ensure that the overall project is successful.

2.2 Project Leader
   2.2.1 The structural project leader is the individual who is responsible for the overall success of the structural aspects of the project.
   2.2.2 The structural project leader is responsible for:
       - The structural work plan and project organization.
       - Reviewing or establishing the structural design concept.
       - Monitoring the quality of the work.
       - Monitoring of the people working on the project.
2.3 Engineers

2.3.1 Structural project engineers carry out the detailed design of the structural aspects of a project.

2.3.2 Structural project engineers are responsible for:

- Carrying out detailed calculations to establish the member sizes for the structural framing.
- Keeping a set of design notes for the project.
- Transferring information to the drafting technicians so that drawings can be prepared for the structure.
- Preparing structural specifications.
- Spot checking his or her own design calculations on an ongoing basis.
- Reviewing drawings for accuracy of information.
- Back checking to ensure that the required changes have been made to drawings.
- Coordinating the structural work with other disciplines.
- Carrying out independent design reviews of the structural engineering work completed by others.

2.4 Technicians

2.4.1 Structural drafting technicians prepare drawings to convey the structural design to the contractor, owner, and other disciplines.

2.4.2 Structural drafting technicians are responsible for:

- Understanding the design intent of the project.
- Preparing a well-organized and accurate set of structural drawings.
- Coordinating the structural aspects of the project with other disciplines on an ongoing basis.
- Questioning the engineers if aspects of the project seem unusual.
- Back checking drawings before giving the drawings to the engineer for checking.

2.5 Construction Administrator

2.5.1 The structural construction administrator is assigned the responsibility of attending to the structural aspects of the project during the construction phase.

2.5.2 The structural construction administrator will be responsible for:
3. Project Work Plan
   3.1 A detailed work plan must be prepared at the start of the project.
   3.2 The project work plan should include:
      - An allocation of fees by project phase.
      - A project schedule.
      - A drawing list.
      - A specification section list.
   3.3 The work plan should be updated on a continual basis as the project proceeds.

4. Design Standards
   4.1 Design shall be in conformance with the applicable building code and the material standards referenced in the code.
   4.2 DIALOG General Notes, Standard Details, and Standard Specification Sections should be used on all projects. Any deviations from these standards should be discussed with the project leader.

5. Design Parameters and Material Specifications
   5.1 When a project commences, the structural project leader should prepare design parameters and material specifications summary sheets.
   5.2 The design parameters summary sheet should list:
      5.2.1 The applicable design code(s).
      5.2.2 The wind design parameters.
      5.2.3 The seismic design parameters.
      5.2.4 For each component or area of the structure, the uniform live load, superimposed dead load, and concentrated loads.
      5.2.5 Geotechnical design parameters, as applicable, for footings, piles, foundation walls, retaining walls, and the like.
5.3 The material specifications summary sheet should list:
5.3.1 The applicable material standards.
5.3.2 Concrete compressive strengths for each of the components in the structure.
5.3.3 Reinforcing steel grades for the various bar sizes.
5.3.4 The structural steel grades for each type of shape and plate.

5.4 All design engineers assigned to the project shall have a copy of the design parameters and material specifications summary sheets.
5.5 When changes are made, all design engineers should receive copies of the revised sheets.

6. Design Notes
6.1 Design notes shall be prepared for all structural projects.
6.2 The intent of the design notes is that an engineer not involved with the project could:
   6.2.1 Independently check the notes with no or limited discussion with the original design engineer.
   6.2.2 Pick the design up from the point where the original engineer left off, should the engineer be away on holidays, become ill, or leave the firm.
6.3 The notes should have a table of contents at the front.
6.4 All pages should be numbered, dated, labeled, and initialed by the design engineer.
6.5 The notes should be neat and easy to follow.
6.6 The notes should contain the results of the final computer runs for the analysis and design of the structural components, or a listing of where the appropriate files can be found on the file server.
6.7 The notes must be filed at the completion of the project.

7. Schematic Design
7.1 Near the completion of schematic design, a project leader or senior engineer not involved in the project should review the conceptual design of the structure.
7.2 The conceptual review should include a review of:
   7.2.1 The design parameters and material specifications summary sheets.
   7.2.2 The geotechnical report and geotechnical design parameters.
   7.2.3 The design concept.
7.3 The conceptual review should ensure that gravity loads are transmitted to the foundations in as direct a path as possible, and that lateral loads can be resisted by the structure.

8. Design Development

8.1 Near the completion of the design development phase, a project leader or senior engineer should once again review the conceptual design of the structure.

8.2 The conceptual review would be as described in Section 7 for the schematic design phase.

9. Contract Documents

9.1 General

9.1.1 Near the completion or shortly after the completion of the preparation of contract documents for a project phase or project, the following reviews should be completed:
- Coordination Review
- Back-Check by Structural Project Team
- Design Review

9.2 Coordination Review

9.2.1 The structural drawings should be coordinated with the drawings prepared by the architectural and other engineering disciplines.

9.2.2 Notwithstanding the ongoing coordination that occurs during the course of a project, the engineering and architectural disciplines should sit together with complete drawings to conduct a final coordination review.

9.3 Back-Check By Structural Project Team

9.3.1 The drafting technicians are responsible for back-checking their own work prior to giving the drawings to the design engineers for review.

9.3.2 Following back-checking by the drafting technician, the engineer responsible for the design should back-check the drawings. In back-checking the drawings, the engineer should “yellow” mark items that are correct and “red” mark incorrect items.

9.3.3 Following back-checking, the “red” marks made by the engineer should be corrected by the drafting technician and re-checked by the engineer.

9.4 Design Review

9.4.1 An engineer not involved in the original design should complete the design review.

9.4.2 The design review shall consist of:
- A review of drawings for completeness and accuracy.
As a first step in the process, all section and detail references should be checked. Correct references should be “yellow” marked and incorrect references should be changed in “red”.

- Check of design parameters and material specifications, as shown on the drawings.
- Confirmation of load paths for gravity and lateral loads.
- An approximate check of 10% of each type of structural member.
- Other members of the type should be “eyeballed” to ascertain whether the sizing is reasonable, by comparison to the checked members.

9.4.3 The review engineer should keep notes for the member checks. These notes should be included with the design notes for the project.

9.4.4 Any areas of concern determined by the design review should be discussed with the design team. Corrective action should be taken, as required.

9.4.5 Schedule A contains a design/drawing checklist intended to assist the design engineers and review engineer in their checking processes.

10. Construction Administration

10.1 General

10.1.1 As engineers of record, we are responsible for the integrity of the structure. This responsibility must remain as the primary focus of the construction administrator.

10.2 Shop Drawings

10.2.1 Shop drawings shall be reviewed for conformance to the design intent.

10.2.2 The shop drawing review is our second last opportunity to correct design discrepancies and errors.

10.3 Site Reviews

10.3.1 Site reviews should be carried out to report to the owner on the quality of the work and conformity to the drawings and specifications.

10.3.2 Site reviews are our last opportunity to correct discrepancies and errors.

10.4 Testing Agency Reports

10.4.1 Testing agency reports shall be monitored to ascertain whether materials satisfy the project requirements.
Schedule A - Design/Drawing Checklist

1. General

1.1 Design Loads
- Reviewed.
- Snow drift and snow sliding loads considered.
- Rain ponding loads considered.
- Wind uplift loads considered.
- Mechanical equipment loads, hanging piping loads, housekeeping pad loads, and so forth considered.
- Electrical equipment loads considered.
- Truck wheel loads considered where required.

1.2 Geotechnical Report
- Reviewed.
- Recommendations covered in contract documents.
- Testing requirements specified.

1.3 Material Specifications
- All materials specified.
- Concrete strengths.
- Reinforcing steel grades.
- Structural steel grades.
- Testing requirement specified.

1.4 Standard Details
- Reviewed.
- Reinforcement splice lengths specified.

1.5 Structural Movements
- Slab pour strips shown.
- Expansion joints and expected movements shown.
2. Foundations

2.1 Cast-in-place Concrete Piles

☐ Bearing capacity or skin friction capacity shown.
☐ Bottom elevations shown.
☐ Cut-off elevations shown.
☐ Locations shown in plan.
☐ Reinforcing shown.
☐ Pile cap detail shown.
☐ Piles shown under every column.
☐ Design checked.

2.2 Spread Footings

☐ Bearing capacity shown.
☐ Top elevations shown.
☐ Adequate depth for frost penetration.
☐ Spread footings shown under every column.
☐ Design checked.

2.3 Foundation Walls

☐ Lateral pressure including surcharge considered.
☐ Control joints shown.
☐ Temperature and shrinkage reinforcement specified.
☐ Concrete strength of walls consistent with supported columns.
☐ Design checked.

3. Slabs-on-grade and Grade Beams

☐ Structural slabs-on-grade specified where required.
☐ Structural slabs-on-grade used at doors for soils susceptible to frost heave.
☐ Void form specified under structural slabs-on-grade and grade beams.
☐ Thickness specified.
☐ Sub-base specified for floating slabs-on-grade.
☐ Construction joints/saw cut joints shown.
☐ Flatness specified.
☐ Lateral forces from walls considered.
4. Reinforced Concrete Structures

4.1 Parkade Slabs

☐ Protection system shown.
☐ Epoxy coated reinforcing steel specified where required.
☐ Adequate reinforcing steel cover.
☐ Minimum thickness checked.
☐ Sloped to drain.
☐ Camber specified.
☐ Integrity steel shown.
☐ Reinforcing shown to control restraint cracks at rigid supports.
☐ Bar lengths shown.
☐ Design checked.

4.2 Flat Plates and Flat Slabs with Drop Panels

☐ Adequate reinforcing steel cover for fire.
☐ Minimum thickness checked.
☐ Camber specified.
☐ Integrity steel shown.
☐ Reinforcing shown to control restraint cracks at rigid supports.
☐ Bar lengths shown.
☐ Design checked.

4.3 One-way Slabs, Slab Bands and Beams

☐ Adequate reinforcing steel cover for fire.
☐ Span-to-depth checked.
☐ Camber specified.
☐ Typical reinforcing details shown.
☐ Details reviewed at intersecting beams, girders and columns.
☐ Coordinate plans with schedules.
☐ Beams or slab-bands shown where required to support one-way slabs.
☐ Design checked.
4.4 Concrete Roof Construction
- Roof slopes shown.
- Design checked for live, snow, and rain ponding loads.

4.5 Columns
- Adequate reinforcing steel cover for fire.
- Longitudinal bar arrangements and tie details shown.
- Splice and embedment lengths specified.
- Transition details.
- Coordinate plans with column schedule.
- Columns shown where required to support every gravity load carrying element.
- Design checked.

5. Steel Structures

5.1 Floor Construction
- Steel floor deck specified.
  - Profile
  - Base steel minimum thickness
  - Composite action specified?
- Concrete thickness specified.
- Reinforcing specified.
  - Welded wire mesh
  - Reinforcing over girders
  - Reinforcing at beam column joints
- Framing around openings.
- Design checked.

5.2 Roof Construction
- Steel roof deck specified.
  - Profile
  - Base steel minimum thickness
- Roof slopes shown.
- Framing around openings.
- Design checked for live, snow, and rain ponding loads.
5.3 Open-Web Steel Joists
- Loads specified.
  - Uniform live
  - Superimposed dead
  - Concentrated loads
  - Mechanical and electrical equipment loads
- Deflection criteria and camber specified.
- Extra deck support shown where joists change directions.
- Can mechanical and electrical services pass through joists and joist bridging?
- Specified joist depths adequate for spans and loading.

5.4 Non-composite Beams and Girders
- Camber specified.
- Moment connections detailed.
- Web openings detailed.
- End reactions specified.
- Stiffeners and lateral bracing specified where required.
- Stiffness and strength adequate at edges to support cladding.
- Vibration criteria specified for floors.
- Design checked.

5.5 Composite Beams and Girders
- Camber specified.
- Stud diameter, length, and spacing specified.
- Web openings detailed.
- End reactions specified.
- Stiffeners and lateral bracing specified where required.
- Stiffness and strength adequate at edges to support cladding.
- Vibration criteria satisfied for floors.
- Design checked.
5.6 Columns
- Base plates detailed and coordinated with architectural requirements.
- Anchor bolts specified.
- Splice details shown.
- Columns shown where required to support every gravity load carrying element.
- Design checked for:
  - Axial loads
  - Transverse loads
  - Connection eccentricities

6. Lateral Stability

6.1 General
- Description of lateral load resisting system on drawings.
- Lateral loads can be transferred through horizontal diaphragms to the lateral load resisting systems and onto the foundation.

6.2 Diaphragm Action
- Extra reinforcing shown where required in concrete floor and roof systems.
- Steel decking.
  - Connection to supporting members
  - Connection of adjacent sheets
  - Chords specified
  - Drag struts shown
- Design checked.

6.3 Concrete Flexural Walls
- Detailed for ductility.
- Reinforcing details shown.
  - Typical details
  - Zone reinforcing
  - Lap splices, embedment
  - Extra reinforcing around openings
  - Header reinforcing
- Deflections considered.
- Design checked.
6.4 Structural Steel Braced Frames
- Detailed for ductility.
- Bracing loads shown on drawings.
- Connection work points shown.
- Tension shown at splices.
- Uplift considered at foundations.
- Shear transfer considered at foundations.
- Deflections considered.
- Design checked.

6.5 Moment Frames
- Detailed for ductility.
- Joints detailed.
- Uplift considered at foundations.
- Shear transfer considered at foundations.
- Deflections considered.
- Design checked.

7. Additional Design and Coordination Items

7.1 Cladding
- Cladding vertical, horizontal, and torsional loads and stiffness requirements considered in the design of supporting members.
- Cladding support details specified.
- Reinforced concrete construction.
  - Embedded plates shown
- Structural steel construction.
  - Edge members braced for eccentric loads from cladding support
  - Stiffeners provided where required

7.2 Guardrails, Handrails
- Designed for horizontal loads specified in the code.
- Adequately connected to the structure.
- Embedded plates shown.
7.3 Elevators
- Geometrical requirements coordinated with the architects.
- Structure designed to resist loads from the elevator equipment.
- Adequate support provided for elevator rails.
- Elevator divider beams specified.
- Elevator hoist beams specified.

7.4 Mechanical Coordination
- Mechanical equipment and piping loads considered.
- Shaft sizes, openings, and the like coordinated with the mechanical consultant. Do sizes and openings consider the additional space requirements for insulation and fire dampers?
- Framing shown for rooftop units.
- Equipment housekeeping pads, curbs, sumps, etc. considered.

7.5 Electrical Coordination
- Electrical equipment loads considered.
- Openings for electrical services shown.

7.6 Window Washing Equipment
- Window washing equipment loads considered.
- Structural support, anchors, and so forth provided.

7.7 Partition Loads and Architectural Finishes
- Supports shown for folding partitions.
- Masonry partition walls considered.
- Heavy acoustic walls and ceilings considered.
- Heavy floor tiling systems considered.
STRUCTURAL ENGINEERING
LESSONS LEARNED ON LARGE PROJECTS

Project and Construction Management
- Work closely with the construction manager to confirm that he understands the structural systems and has reasonable values for his cost estimates.
- Do not show “N.I.C.” symbols construction-managed jobs. Use “under separate contract” or omit entirely. The construction manager should determine what is or is not in each particular contract.
- For cost changes that are very small, collect a number of such changes into one change order so as to streamline paperwork on the job.

Miscellaneous Design Issues and Drawings
- Standardize anchor rod sizes and layouts as much as possible, using doubly symmetric patterns where possible. Use four rods minimum for all but the smallest of columns to improve safety during erection. Place anchor rods outside of column flanges if possible.
- Minimize the number of different types of embedded plates—use a slightly larger plates than necessary, since often they are not located accurately. Make the plate dimensions for each type different so that it is possible to check whether the right type has been installed. Indicate orientation of installation.
- It is very difficult to install embedded plates that have long rebar “tails” oriented parallel to the plate. If used, the tails should be detailed to point upward—the contractor will often cast the concrete below and forget to install the embed first.
- Duct openings in slabs and walls must be large enough to accommodate insulation and dampers, if required. Confirm that mechanical engineer has specified correct size.
- Show dimensions only where necessary. Repeating plan dimensions on sections makes it difficult to make revisions accurately.
- Confirm column type names are consistent from the foundation to the top.
- Both the draftsperson and the engineer must check section marks for accuracy.
- It is good practice to provide scuppers and to inform the architects of this at an early stage of design.
- Check drawing notes carefully: copying a note from one location to another but forgetting to modify the text is a common drafting error.
- Do not use “text override” for dimensions without adding “NTS”.
- Confirm that architect’s gridlines are actually drawn to scale.
- Elevator shaft walls usually should not have small returns at the corners at the door openings. Use concrete block as much as possible to allow adaptability for doors and for wiring.
- Elevator machines may sit directly on the machine room floor slab, not on machine room beams. Check the shop drawings (request them early!).
- Request details from the architect for window-washing equipment and fall arrest anchors early in the job. A large number of detail drawings may be required for these items. Note that cold-formed joist chords (e.g. Omega) do not have sufficient strength to support standard post-type fall-arrest anchors. Special framing or other solutions will be required.
Check all strip windows to confirm that adequate structural support is provided for the metal stud walls.

Specify that all interior steel stud walls overlooking an atrium be engineered, since they essentially are acting as a guard.

Note on drawings that contractor is to co-ordinate exact dimensional requirements for elevator shaft with the elevator supplier. Do not show “exact” dimensions. Use similar requirements for supports of mechanical equipment.

Make provisions for guardrail post supports.

Try to convince architect to have brick supports at the floor levels, rather than hanging below, or establish another system that makes sense from a structural point of view.

All dimensions to existing structures must be marked “Site Verify.”

Concrete Design

- Minimize number of column sizes and column size changes.
- Avoid changes in concrete wall thickness. It causes formwork and rebar conflicts.
- Where concrete columns or zones are rectangular, designate sizes as project N-S x E-W consistently.
- Whenever possible, do not use integrally cast corbels on walls (leads to major formwork complication and expense). Cast on later, or use steel.
- If steel column baseplates are recessed, top rebar must be pushed downward. Account for this in concrete beam design.
- Draw beam elevations for those beams having complicated geometry or reinforcing. The beam schedule is not sufficient for these cases. A common error for the supplier/installer is to place the stirrups at the wrong end of a beam.
- Show wall embedded plates on an elevation drawing where the layout is complicated.
- Shrinkage strips: try to convince architects to lay out shear walls to avoid need for them. If this is not possible, try to come up a detail that minimizes difficulty with finishing the floor at the strip.
- Add note to drawings to state that foundation walls rely on floor slabs for their structural integrity and that backfilling must not occur until after floors in place.
- Do not use concrete topping less than 80mm on metal deck unless the quantity of reinforcing is very limited. It is difficult to fit all of the bars in otherwise.
- Provide temporary infill for future floor openings so as to prevent the need for guards around the opening.
- Avoid changes in geometry from floor to floor, as modification of formwork is expensive.

Rebar Design

- Avoid using “typical” reinforcing plans for floor systems unless the floors are truly very similar.
- Use caution where vertical column steel intersects with heavy grade beam steel (e.g. at the base of shear walls). Not enough room to fit in all of the bars!
- Provide a typical detail for top reinforcing where it is interrupted by column pockets.
- Column ties with a 90° bend at one end and a 135° bend at the other should be oriented in alternating directions.
- Provide additional bars in slabs beneath masonry walls.
STRUCTURAL ENGINEERING
LESSONS LEARNT ON LARGE PROJECTS

- Identify which trade is to provide mechanical anchorages for rebar. Threading the bar is generally cheaper than using weldable bars. (Note loss of x-section, however.)
- Minimize number of different types of slab mats. Specify the bar placement location for moment transfer reinforcing.
- Detail seismic rebar ties from the core walls to the slab carefully to confirm that they will fit into the available space.
- Try to use column splice details that do not involve dowelling. Some dowels will be missed when constructed!
- For structural slab-on-grade, show how the pile rebar hooks into the floor slab.
- Extra stirrups in girders that support beams may be required. This clause was accidentally omitted from the CSA A23.3-94 design code. Whenever possible, standardize the number of these stirrups to simplify installation and checking.
- For one-way slab systems, do not specify slab bottom rebar as continuous over beams. Normal practice is for beam cages to be tied on the ground and then placed with the crane. It is difficult to thread the slab rebar in afterwards if it is continuous.

Structural Steel Design
- Do not use OWSJs for the roof in elevator machine rooms. The elevator installer will want to use the roof as a support for temporary hoist equipment.
- On elevator shop drawings, check minimum allowable headroom for the machine room. Again, this will usually preclude the use of OWSJs.
- Look carefully at architect’s proposed brick support details, particularly when the detail is used in many locations. Guide the architect towards a logical design.
- Provide specifications for steel gratings.
- Check to confirm that the architect has not supported stud walls or glazing directly on metal deck.
- Specify full-depth stiffeners at all stair stringer cranks.
- Check for interference between diagonal bracing and concrete upstand walls on gradebeams.
- Show column baseplates on plan, complete with baseplate extensions for bracing gussets.
- Avoid C230 channels. They are much more expensive than C250 channels.
- If bracing acts both in tension and compression, show both forces on the brace. (The beam to which the brace is attached might have seated end connections, for example.)
- Be prepared to spend a lot of time on cladding details in a building that has a lot of unique details—perhaps as much time as is spent on the framing plans. Use “typical” cladding support details with caution. Watch out where grid-to-brick distance changes or where floor/roof member sizes change.
- Avoid centre stringers for wide stairs. If necessary, reinforce beneath pans with angle sections that run from stringer to stringer. Use wide stair pans with caution: they are difficult to fabricate and erect. It is better to add extra visible stringers, which can also serve to support posts for intermediate handrails.
- Avoid “Algoma only” structural shapes.
- Provide typical details for openings in metal deck.
- Provide structural support for roof ladders.
- HSS 406x406 is not readily available in grade 350W, only ASTM A500 Grade C.
- Confirm that truss panel points do not align with OWSJ shoe locations where the joists bear on the bottom chord.
- It is easier to weld tubular truss tension members than it is to weld solid round bars.
- Meet with the metal decking/stud contractor to explain the importance of shear studs and the installation procedures.
- Check architectural drawings for items such as benches or wing walls that require structural support.
- Require that the steel fabricator submit welding procedures along with the shop drawings where difficult or unusual welds exist.
- Recessed column baseplates are difficult to construct. Surface mount baseplates unless visual appearance is critical. Also recess baseplates if lateral force in braced bays is excessive and can not be taken out by anchor rods alone (i.e. use lateral bearing force on the concrete).
- Do not allow weight of window mullions to bear directly on steel deck.
- Emphasize to mechanical engineers and trades to verify that doors and hatches of mechanical equipment do not conflict with steel structure OR provide detailed and accurate shop drawings to structural at a stage in the project when it is still possible for us to relocate steelwork.

Masonry
- Do not use discontinuous angles as lateral support at the top of masonry walls. Causes confusion regarding where support is required and has ugly appearance. Use a thin, continuous bent steel sheet.
- Structural engineers should review the architectural masonry specification.
- Review architectural drawings for half-height partition walls. Check for lateral stability.

Construction Administration
- Have a pre-construction meeting to discuss formwork and falsework design requirements and construction sequence. Insist from the beginning on receiving survey data. Establish clearly the survey requirements.
- Explain to the contractor the requirements of A23.1 for construction joints, and that keyways are not required unless shown on the drawings.
- Have the contractor designate one individual who is responsible for QA before concrete placements begin. Have a copy of his inspection report faxed to our office before casting begins.
- When concrete strength tests come in low, reject the very first batch so that the contractor gets things back on track. Accepting low strengths on a case-by-case basis does not encourage the supplier to fix the problem.
- Check the first couple of concrete placements on metal deck. Typical errors include missing top bars in negative moment regions, missing reinforcing around openings, inadequate welded wire fabric overlap, cutting of welded wire fabric around shear studs, missing diaphragm reinforcement.
- Formply that has excessive amounts of wood sugars can retard the surface of concrete from setting properly, similar to laitance.
- Meet with the rebar installers early in the job and explain critical or complicated aspects of their work. Explain in particular the requirements for rebar at shrinkage strips: which
bars are continuous, which are cut, where the additional stirrups go, etc. Explain corner details, opening details, chairs, lap splices, cover, and how to read your structural drawings. Explain the difference between integrity reinforcing and regular reinforcing.

- Insist from the start of a job that the rebar be complete prior to the beginning of a concrete placement.
- Confirm that structural steel inspection agency understands the intent of your design and the your particular areas of concern.
APPENDIX G: MECHANICAL QUALITY CONTROL DOCUMENTATION
MECHANICAL ENGINEERING
QUALITY MANAGEMENT PROCESS

PROCESS

- **ENGINEERING MEETINGS**: Hold regularly scheduled documented meetings of professional and technical staff to review and update standards of practice and manuals.

- **MASTER SPECIFICATIONS**: Maintain master specification in electronic format, compile updates as identified by feedback from construction and market driven technology changes, and make updates to the electronic master bi-annually.

- **DESIGN STANDARDS**: Maintain engineering design manual containing technical standards for all core components of the Buildings Mechanical Engineering business. Components to include site utilities (water, sanitary, storm, and natural gas), plumbing systems, heating and ventilation systems, air conditioning and cooling systems, humidification systems, fire protection and suppression systems, refrigeration, automated building control systems, piped specialty gases and fluid systems, compressed air and vacuum systems, pure water systems, air and water filtration, chemical treatment systems, and vibration and sound analysis.

- **DESIGN CHECK LISTS**: Implement formal check list to be used by all technical staff to ensure completeness of drawings and specifications. Check list to be signed off and dated for every project.

- **COST ESTIMATING**: Maintain cost estimating manual in electronic format for mechanical components and systems to facilitate preparation of budget estimates and verification of bids. Regularly update data base to reflect market conditions and inflationary influences.

- **FIELD SERVICES AND SAFETY**: Maintain manual in electronic format outlining basic procedures and responsibilities to be followed during inspection of mechanical systems during the construction period. Maintain safety manual at both workplace and construction site outlining procedures to be followed.

- **CODES AND STANDARDS**: Maintain index of relevant codes and standards books for reference purposes and identify location where these documents are available.

- **PRODUCT LIBRARY**: Maintain product catalogue library of relevant equipment and materials specified for projects and update library annually.

- **CONTINUING EDUCATION**: Encourage writing and publishing of technical papers by professional and technical staff, organize internal technical seminars specific to various aspects of mechanical systems, and encourage attendance at local technical association chapter meetings and annual conferences, e.g. ASHRAE, USGBC, etc.

- **ENGINEERING SOFTWARE**: Research and make available industry recognized and accepted software to assist in design calculation and analytical processes.
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1. Introduction

1.1 This guideline presents the methodology by which the Electrical Group at DIALOG delivers projects of high quality.

1.2 The intent of the guideline is to provide electrical systems that:
   1.2.1 Meet the Owner’s requirements.
   1.2.2 Consider and respect their environmental impact.
   1.2.3 Satisfy the requirements of design codes and standards.
   1.2.4 Serve the electrical requirements of other disciplines on the project.
   1.2.5 Are well coordinated with other disciplines on the project.
   1.2.6 Will perform the intended function for the design life.

1.3 The guidelines emphasizes:
   1.3.1 Having all project people feel responsible for delivering high quality work.
   1.3.2 Bringing the knowledge of our experienced people to the project early in the design process.
   1.3.3 Coordinating the electrical engineering work with other disciplines correctly from the start of the project and minimizing the amount of re-design.
   1.3.4 Monitoring and improving quality on a continuous basis throughout the course of design and construction.

2. Roles and Responsibility for Quality Enhancement

2.1 General
   2.1.1 The success of a project depends on the efforts of each member of the DIALOG team.
   2.1.2 As a minimum, project team members are responsible for the accuracy and completeness of their own work.
   2.1.3 To achieve projects of excellent quality, we must look beyond our individual responsibilities to ensure that the overall project is successful.

2.2 Project Leader
   2.2.1 The project leader is the individual responsible for the overall success of the electrical aspects of the project.
   2.2.2 The project leader is responsible for:
      - Reviewing or establishing the electrical design concept.
      - Attending client meetings and passing electrical information on to the team.
      - Monitoring the quality of the work.
      - Monitoring the people working on the project.
Ensuring that the design and drawings have been checked and reviewed.

2.2.3 Depending on the size of the project, the project leader may also act as the design engineer or project designer.

2.3 Engineers / Technologists

2.3.1 Electrical project engineers and technologists carry out the detailed design of the electrical aspects of a project.

2.3.2 Project engineers and technologists are responsible for:

- Carrying out detailed calculations to establish the overall electrical loading of the project.
- Carrying out detailed calculations for critical lighting areas in the project.
- Keeping a design binder for the project.
- Transferring information to the drafting technicians so that drawings can be prepared.
- Preparing electrical specifications.
- Reviewing drawings for accuracy of information.
- Reviewing mark-ups to ensure that the required changes have been made to drawings.
- Coordinating the electrical work with other disciplines, and ensuring that all electrical items within other disciplines are serviced.

2.4 Engineer

2.4.1 In addition to the above, the Project Engineer has the following additional responsibilities:

- Preparing electrical specifications and maintaining the master specifications
- Carrying out independent design reviews of the electrical engineering work completed by others.

2.5 Technicians

2.5.1 Electrical drafting technicians prepare drawings to convey the electrical design to the contractor, owner, and other disciplines.

2.5.2 Electrical drafting technicians are responsible for:

- Understanding the design intent of the project.
- Preparing a well-organized and accurate set of electrical drawings.
- Coordinating the electrical aspects of the project with other disciplines on an ongoing basis.
- Questioning the engineers and technologists if aspects of the project seem unusual.
- Back checking drawings before giving the drawings to the engineer for checking.
2.6 Construction Administrator

2.6.1 The electrical construction administrator is assigned the responsibility of attending to the electrical aspects of the project during the construction phase.

2.6.2 The electrical construction administrator will be responsible for:

- Reviewing the work with the electrical project leader prior to the start of construction.
- Ensuring that the shop drawings for the project are reviewed.
- Monitoring the contractor’s work in the field to ascertain conformance to the design intent.
- Making regular site visits, with site reports or deficiency lists.
- Discussing with the electrical project leader anything that seems unusual in the field.
- Working with the contractor(s) to minimize change orders.
- Writing change orders when required.
- Reviewing electrical contractor invoices.
- Reporting to the owner and electrical project leader on the quality of the contractor’s work.

3. Process

3.1 Engineering Meetings

3.1.1 Hold regularly scheduled documented meetings of professional and technical staff to review project status, standards of practice and review and update manuals.

3.2 Master Specifications

3.2.1 Maintain electrical portions of the master specification in electronic format, compile updates as identified by feedback from construction and market driven technology changes and make updates to the electronic master on an ongoing basis.

3.3 Design Standards

3.3.1 Maintain electrical engineering design manual containing technical standards for all core components of the building electrical engineering business. Components to include site servicing (power, telephone, cable TV), site lighting, power systems, lighting systems, emergency power generation, fire alarm and life safety systems, structured cabling, paging and sound systems, UPS systems, fire alarm verifications, electrical commissioning and systems testing. Design manuals are issued to each electrical employee and are updated on an ongoing basis.
3.4 Design Check Lists
3.4.1 Implement formal checklist to be used by all technical staff to ensure completeness of drawings and specifications. Checklists are to be used for reference purposes.

3.5 Cost Estimating
3.5.1 Maintain cost estimating guidelines within the electrical design manuals for electrical components and systems to facilitate preparation of budget estimates and verification of bids. Regularly update RS MEANS electrical cost data guideline on a bi-annual basis to reflect market conditions and inflationary influences. For larger projects, outside cost consultants will be retained.

3.6 Field Services and Safety
3.6.1 Maintain manual in electronic format outlining basic procedures and responsibilities to be followed during inspection of electrical systems during the construction period. Maintain safety manual with both workplace and construction site procedures outlined. DIALOG is a member of the Alberta Construction Association’s Certificate of Recognition program, for the control and maintenance of safety standards.

3.7 Codes and Standards
3.7.1 Maintain an index of relevant codes and standards books for reference purposes (located in the electronic electrical library) and identify location where these documents are available.

3.8 Product Library
3.8.1 Maintain product catalogue library of relevant equipment and materials specified for projects and update library on an ongoing basis.

3.9 Continuing Education
3.9.1 Encourage writing and publishing of technical papers by professional and technical staff, organize internal technical seminars specific to various aspects of electrical systems and encourage attendance at local technical association chapter meetings and annual conferences, e.g. IES, CaGBC, USGBC, etc.

3.10 Engineering Software
3.10.1 Research and make available industry recognized and accepted software to assist in design calculation and analytical processes.
4. Project Work Plan

4.1 A detailed work plan should be prepared at the start of the project. For small projects, budget forms will serve this purpose.

4.2 The project work plan should include:
   - An allocation of fees by project phase.
   - A project schedule.
   - A drawing list.
   - A specification section list.

4.3 The work plan should be updated on a continual basis as the project proceeds.

5. Design Standards

5.1 Design shall be in conformance with the applicable building code and the material standards referenced in the code.

5.2 DIALOG General Notes, Standard Details, and Standard Specification Sections should be used on all projects. Any deviations from these standards should be discussed with the project leader, and documented in the project design binder.

5.3 Electrical design guidelines have been prepared, and are located in each electrical design binder, with an electronic copy on the network.

6. Schematic Design

6.1 The schematic design should list the electrical systems proposed for the project, and provide a general overview of each system. Preliminary calculations for service size would be included at this level.

7. Design Development

7.1 Design development expands on the schematic design, and may include cut sheets of proposed materials, single line drawings and basic details.

7.2 For larger projects, a project leader or senior engineer should review the conceptual design.
8. Contract Documents

8.1 General

8.1.1 Near the completion or shortly after the completion of the preparation of contract documents for a project phase or project, the following reviews should be completed:
   - Co-ordination Review
   - Mark-up review by Electrical Project Team
   - Design Review

8.2 Coordination Review

8.2.1 The electrical drawings should be coordinated with the drawings prepared by the architectural and other engineering disciplines.

8.2.2 Notwithstanding the ongoing coordination that occurs during the course of a project, the engineering and architectural disciplines should sit together with complete drawings to conduct a final coordination review.

8.3 Mark-up review By Electrical Project Team

8.3.1 The drafting technicians are responsible for checking their own work against the mark-ups prior to giving the drawings to the design engineers for review.

8.3.2 Following the check by the drafting technician, the engineer responsible for the design should check the drawings, and mark any errors or omissions.

8.3.3 Following review, the corrections made by the engineer should be corrected by the drafting technician and re-checked by the engineer.

8.4 Design Review

8.4.1 Formal peer design reviews are recommended for all jobs, and required for large projects.

8.4.2 An engineer or technologist not involved in the original design should complete the design review. The review may also be completed by the contract administrator when they are familiarizing themselves with the project.

8.4.3 The design review shall consist of:
   - A review of drawings for completeness and accuracy.
   - Section and detail reference check
   - Check of the single line drawing
   - Check of the lighting layout
   - Check for completeness of systems
   - Check of fire alarm system
   - Check of motor control schedule
8.4.4 Any areas of concern determined by the design review should be discussed with the design team. Corrective action should be taken, as required.

9. Construction Administration

9.1 General

9.1.1 As engineers of record, we are responsible for the integrity of the electrical systems. This responsibility must remain as the primary focus of the construction administrator.

9.2 Shop Drawings

9.2.1 Shop drawings shall be reviewed for conformance to the design intent, and specification requirements.

9.3 Site Reviews

9.3.1 Site reviews should be carried out to report to the owner on the quality of the work and conformity to the drawings and specifications.
APPENDIX I: INTERIOR DESIGN QUALITY CONTROL DOCUMENTATION

In Progress