

WRITER'S GUIDE FOR CHAPTER B DETAIL ESTIMATING SECTIONS

1.0 Introduction

The purpose of this document is to provide insight and guidance to persons involved in writing Contract Design Estimation and Documentation (CDED) Chapter B Detail Estimating sections.

Detail Estimating sections provide designer guidance on how to design, estimate quantities and document tender items related to each applicable Ontario Provincial Standard (OPS) construction specification. The CDED Manual, Chapter B typically forms part of the terms-of-reference for detailed design projects. Design project managers and the project team shall follow the guidance given unless reasons exist to do things in different ways. Designers shall be prepared to explain and justify departures from the guidance provided. The end-product includes a biddable tender package and a constructible design package that is suitable for administration of capital construction projects on the Ministry's Provincial highway network.

The CDED Manual is the guide for designers to complete detailed design for highways. Some Structural and all Electrical engineering functions are not covered by the CDED Manual, Chapter B. Guidance in detailed design for those engineering functions may be obtained in the Structural Manual, CDED Volume 3 Electrical, and CDED Volume 4 Advanced Traffic Management Systems (ATMS).

1.1 Contract Documentation

The core of tender packages consists of the Tender. The Tender is supported by engineering standards, including:

- Ontario Provincial Standard Specifications (OPSSs),
- Ontario Provincial Standard Drawings (OPSDs) and Ministry of Transportation Ontario Drawings (MTODs).
- Standard Special Provisions (SSPs) are used to modify OPSSs, as warranted.

The Contract Package includes:

- Contract Drawings are drawings or plans provided by the owner for the work, as defined in the MTO General Conditions of Contract (OPSS.PROV 100), GC 1.07.
- Non-standard special provisions (NSSPs) which supplement and modify the standards to provide specific information on the Construction Project.

The MTO General Conditions of Contract (OPSS.PROV 100), GC 2.02, Order of Precedence, provides guidance on the relationship between the different types of documents.

The tender package contains adequate information to estimate the cost of the work for tendering purposes. Supporting information in the design package provides all the details required to construct the work. This includes all dimensioned data, such as detailed cross-sections for example.

When changes are made to engineering standards, the corresponding sections of the CDED Manual, Chapter B and the CA&IT Manual should be updated. Having these documents compatible with one-another will help to ensure that tender packages are properly assembled and construction contracts are properly administered.

Relationship to Other Documents:

Document	Custodial Office	Primary Reader	Task Performed by Primary Reader
CDED Manual, Chapter B *	Design and Contract Standards Office (DCSO)	Design Project Manager and Project Team	Detailed Design
Engineering Standards (OPSS, OPSD, SSP)	Applicable Provincial Functional Office (PFO)	Contractor	Construction
Construction Administration and Inspection Task (CAIT) Manual	Contract Management Office (CMO)	Contract Administrator (CA)	Construction Administration

* The Electrical and ATMS CDED chapters and the Structural Manual cover their respective functions.

1.2 Authors and Readers of CDED Chapter B Sections

Authors of CDED Chapter B sections:

- are typically representatives from engineering functional offices within the Ministry that are similarly involved with writing and updating design policies and contract documentation, including OPS Specifications.
- are assumed to have a good understanding of the technical subject (engineering discipline) that is relevant to the Chapter B section. For multi-disciplinary Chapter B sections, consultation with other functional offices may be necessary. The author and their office colleagues are assumed to have a good understanding of ministry construction practice with respect to the particular subject. Liaison with CMO may be necessary to confirm ministry practice regarding construction administration. Liaison with regional staff and the appropriate functional committee(s) may be necessary to obtain an adequate understanding of the current practices in all of the ministry's regions.

- may not have direct experience in creating contract documents or administering construction contracts and may need some assistance with the documentation functions. Staff of the Engineering and Specifications Management Section (ESSMS), DCSO are able to assist with this.

Readers of Chapter B sections:

- are typically project managers and their project team for a detailed design project. These persons could be ministry staff or employees of an engineering consulting firm.
- will often be relying on the technical content of design reports and will not be in a position to technically review them or accept responsibility for their content.
- will often be responsible to assemble a contract package as a deliverable. Such a person may have a reasonable understanding of ministry construction practice and the components of a tender package and a design package.

1.3 Writing Chapter B Sections

Write the CDED section as if you are directly telling the reader how to design, estimate and document the design project to create a tender package. Use standard English with good grammar and complete sentences. Where appropriate, diagrams, figures, tables, numbered lists or bulleted lists may be used. Large tables or figures should be included in an appendix to the Chapter B section. Expand all acronyms at first usage within the section.

Under sub-section 1: GENERAL, provide a general description of the subject being covered. Discuss major principles, constraints or limitations. Describe how other tender item quantities may be influenced by installations under these tender items, as applicable. For these cases provide reference to the appropriate CDED Chapter B sections. For example, many tender items cover installation of appurtenances (i.e. safety hardware, drainage features, illumination, etc.) that will influence grading requirements. Details on the contents of sub-sections 2 through 8 are given below in the corresponding sub-section.

1.4 Section, Sub-section Numbering and Headings

The CDED B-section title should match the title of the corresponding OPS construction specification, where practical. The Chapter B section number corresponds to the three-digit OPS construction specification number and the first four digits of the tender item code (first digit is “zero”) for related tender items. Where multiple CDED Chapter B sections are applicable to one OPSS, they are further identified as -1, -2, etc.

There are nine mandatory standardized first-level sub-section headings in each Chapter B section. Second-level headings may be used at the author's discretion.

Some possible second level headings are provided, but their applicability depends on the subject being covered. Second-level headings are appropriate to subdivide a lengthy sub-section.

Mandatory first-level sub-section headings	Examples of second-level sub-section headings. These may be determined at the author's discretion
NNN.1: GENERAL	NNN.1.1: Introduction NNN.1.2: Definitions
NNN.2: REFERENCES	
NNN.3: TENDER ITEMS	
NNN.4: SPECIFICATIONS	
NNN.5: SPECIAL PROVISIONS	NNN.5.1: Fill-in Special Provisions NNN.5.2: Non-Standard Special Provisions
NNN.6: STANDARD DRAWINGS	NNN.6.1: Ontario Provincial Standard Drawings (OPSDs) NNN.6.2: MTO Drawings (MTODs) NNN.6.3: Contract Drawings
NNN.7: DESIGN	NNN.7.1: Information to be Provided to Bidders
NNN.8: COMPUTATION	
NNN.9: DOCUMENTATION	NNN.9.1: Contract Drawings NNN.9.2: Quantity Sheets NNN.9.3: Documentation Accuracy NNN.9.4: Non-Standard Special Provisions

For cases when a sub-section is not used, its title shall be included with the words “- not applicable” added for sub-sections 1, 7, 8 & 9. For all other sub-sections, 2 through 6, the word “- none” shall be included with the title, when that sub-section is not used.

2.0 Step Process to Write a Draft CDED Chapter B section

A CDED Chapter B Section shall be revised to be compatible with any changes are made to the corresponding OPSS, or SSPs.

This process should be initiated when an OPSS and related documents are being developed by the ministry or by an OPS Specialty Committee. This will allow the CDED Chapter B section to be nearly complete by the time that the OPSS is published. Final edits may be done, based on the published OPSS, when it becomes available. This will help to ensure that OPSS and all related documents may be implemented in CPS per the scheduling requirements set out in the Memorandum 'Implementation of OPS Specifications in Construction Contracts' (dated: August 27, 2007 and signed by G. Todd).

Step 1 - Assemble and Review all Relevant Contract Documentation

- Obtain the existing CDED Chapter B section, as applicable
- Obtain the applicable published OPS specification (or OPSS under development, as applicable) and standard drawings.
- Obtain existing applicable standard special provisions (SSPs). Additional information may be found in 'Regional' non-standard special provisions (Regional NSSPs).
- Confirm whether the published specification is compatible with current ministry practices and policies.
- Follow the requirements of the document: 'Scheduling and Tracking Updates of Standard Specifications and the CDED Manual' (dated November 30, 2007) See Appendix A.
- Establish whether the existing and/or proposed standard tender items are appropriate.
- SSP(s) may be required to modify the published OPSS.

Step 2 Gather all Pertinent Design-Related Information

- Obtain and review the content of any design documents that may be a reference document (i.e. manuals, design memoranda, design bulletins).
- ESSMS can provide a list of OPSSs and SSPs that have a reference to the subject OPSS.

Step 3 Produce First Draft of CDED Chapter B Section

- Refer to this document and existing, recently published CDED Chapter B sections for guidance and examples.

Step 4 Review Content with Appropriate Functional Committee(S) and/or Regional Staff

- Review the contract documentation and draft CDED section to ensure that it is compatible with current practice.
- Make revisions based on feedback from functional committees or regional staff.
- Construction administration issues should be reviewed with CMO.

Step 5 Review Content with ESSMS

- Via E-mail, send electronic copies of the draft CDED Chapter B section, along with the applicable OPS specification, any draft SSP(s) and applicable standard drawings.
- In the covering E-mail, describe all the documentation for implementation, along with any proposed tender item revisions. Also note any corresponding documentation that is currently active in CPS which will be superseded.
- Address comments received back from ESSMS.

Step 6 Review with Contract Documentation Committee (CDC)

- CDC meeting agendas and schedules are arranged through ESSMS.
- The draft CDED Chapter B section, and all related documents (OPSS, OPSDs, SSPs, as applicable) shall be distributed to CDC a minimum of two weeks in advance of the next scheduled meeting.
- Functional office representation at the CDC meeting is essential.
- Address CDC comments and finalize Chapter B section.

Step 7 Implement the CDED Section and Associated Documentation in CPS

- Submit final documentation to ESSMS with a covering E-mail as per Step 5, above.
- As applicable, co-ordinate this activity with an update to the Construction Administration and Inspection Task (CAIT) Manual that is administered by CMO.

2.1 Use of Words

'shall': indicates a mandatory obligation and is widely used in standard specifications and similarly used in CDED Chapter B Sections.

'should': is used to describe use of a recommended practice.

'may': indicates that there is a choice. 'May' is typically to allow an exception to a rule, provided that certain circumstances apply

3.0 References

List all applicable Ministry design manuals, directives, memoranda or bulletins in this section. Construction standards documentation is listed under appropriate headings below. Do not repeat references of documentation that are provided in the referenced OPSS. Referenced documents should be discussed within the body of the CDED Chapter B section so that designers are directed appropriately to these specific documents.

All referenced documents should be readily available to the designer. Include the source of the document, as applicable. The source could be a library, publisher or web-site. Such reference documents would typically be listed in the terms-of-reference for a consultant assignment of a detailed design project.

List proprietary documentation, such as design guides or installation guides, if applicable.

A brief description of the type of information to be obtained from reference documents may be provided, as it pertains to the applicable tender item(s). Any design document referred to within the Chapter B section should be listed in the REFERENCES sub-section.

List project-specific design reports that are typically provided for the applicable engineering function. As a CDED Chapter B section is typically used by project Managers and the project team, it is not necessary to include reference documents of a highly technical nature that would be used only by practitioners of specific engineering functions. Designers would typically rely upon and follow the recommendations within a design report from such practitioners and would not need to address or verify the details provided by those functions.

3.1 Reference Documents (as applicable to this guide)

- OPSS.PROV 100; MTO General Conditions of Contract
- Recently implemented CDED Chapter B Sections

- Highway Design Bulletin 2008-003; Management of New: NSTs, NSSPs and Modified SSPs
- Structural Manual
- Electrical Engineering Manual
- Construction Administration and Inspection Task Manual

4.0 Tender Items

List tender item names. These should exactly match the tender item names given in the OPS specification or SSPs (if applicable) and in CPS.

Applicable tender items are identified in CPS by the 2nd, 3rd and 4th digits of the tender item code which correspond to the three-digit OPSS construction specification number and the three-digit number for the CDED Chapter B Section. Codes are not required to be included.

5.0 Specifications

Provide a general reference about where applicable Ontario Provincial Standard Specifications (OPSS) are located.

The subject OPSS is identified, as applicable. The OPSS number may represent either an OPSS.common or OPSS.PROV (Provincial) Specification, as applicable. However, if an OPSS.MUNI (Municipal) is required, it must be specifically identified.

6.0 Special Provisions

Provide a general reference about where applicable standard special provisions (SSPs) are located. Specific references to SSPs should not be given. Designers will rely on SSP warrants to ensure that appropriate SSPs are included in the contract documents.

Use of fill-in SSPs may be appropriate for cases where similar project-specific details must be included repetitively in many contracts. The 'Notes to Designer' appendix to an SSP should only be used to include information to assist the designer to complete fill-in SSPs. All other SSP-related information should be contained in the corresponding CDED Chapter B section.

The warrant for use of each SSP is provided at the end of the SSP.

7.0 Non-Standard Special Provisions (NSSPs)

Discuss possible needs for NSSPs, if applicable, under Section 9: DOCUMENTATION, below.

Regional Offices have 'Regional' NSSPs that they typically use to apply specific requirements to particular situations. Regional NSSPs may be downloaded from CPS.

8.0 Standard Drawings

Provide a general reference about where applicable standard drawings are located. Ontario Provincial Standard Drawings (OPSDs), MTO Drawings (MTODs) and Structural Standard Drawings (SSDs) may be applicable. Reference would typically be made to a division or 'hundred' series of drawings, not the individual drawing numbers. For example: 200 Series drawings are for General Grading features. The individual OPSDs or MTODs may change on a frequent basis which, if included, would require updating of the corresponding CDED Chapter B section each time such a change was made.

9.0 Design

Discuss circumstances where use of specific tender items is recommended. Information may be provided on the relationship and applicability of the various design manuals to the particular tender items. Any design manuals shall be listed in sub-section 2: REFERENCES, above. For cases where design manuals do not exist, a complete discussion of design requirements is appropriate in this sub-section.

Providing a brief summary of design requirements is not recommended because it may be problematic, as readers may be led to believe that all design requirement details have been met.

a) Information to be Provided to Bidders

Bidders will need specific information in order to bid on the tendered work. Providing such detailed information will allow bidders to provide a well-informed and competitive bid. This will help to reduce risks and extra costs associated with uncertainty. Such information could include but is not limited to:

- Geotechnical borehole data
- Survey data
- Existing condition data

10.0 Computation

Discuss each tender item or group of similar tender items in a separate paragraph.

Indicate whether each tender item is Plan Quantity Payment (PQP) item. This information is available in CPS for existing tender items but will need to be determined for all new tender items. The level of checking or verification should be provided for PQP tender items.

There is a unique unit-of-measure (UOM) to express the quantity for each tender item, as provided in CPS. Discuss the UOM for each tender item and specifically how the quantity is measured. For example, linear measure in metres, m, could be either horizontal or following a slope. Describe from where the quantity measurement may be obtained. For example: quantities may be measured from field measurement, design cross-sections or contract drawings, etc.

Detailed discussion may be provided on how to measure tender quantities in difficult or unusual project-specific situations, where appropriate. The 'complimentary summary sheet' form (PH-CC-44) should be identified for use for computation of applicable tender item quantities.

Some tender items have UOMs of LS/M, LS/M2, LS/M3 and LS/T. These are not PQP items and are mostly structural oriented. Quantities are provided for estimating purposes only. They are similar to lump-sum tender items but allow for tracking of unit prices on a length, area, volume or weight basis. In the tender document, the quantities for these items appear as 100% and the measured quantities do not appear.

Discuss how work done under these tender items may influence requirements for other tender items or their quantities. It may be necessary to discuss how to avoid double payment of the same feature over multiple tender items, where applicable. An example of where double payment could occur would be where the neat lines of different excavations overlap, causing double payment for this excavation.

11.0 Documentation

This sub-section provides guidance on how to document tender item(s) with respect to contract drawings, quantity sheets and NSSPs. Project-specific details are provided in these documents. Improving consistency in documentation across the province will improve quality and efficiency.

OPSSs often contain wording, such as: "...., as specified in the Contract Documents". This guides readers to seek out more project-specific information elsewhere in the contract. Such information may reside in other specifications, SSPs, quantity sheets or drawings (OPSDs or MTODs). However, for some cases,

such information may be required within the non-standard documentation to address project-specific circumstances. For each such notation in the OPSS, the writer of the CDED Chapter B section should verify that the required information is either contained in the accompanying standard documents or will be accounted for in the project-specific non-standard documentation. Where non-standard documentation is needed, the CDED Chapter B section must provide guidance to the designer as to how and where in the tender package the details are to be provided. This type of information is often detailed in Appendix A of OPSS's. Appendix A is not used by the Ministry, but it provides useful information that is typically provided in the CDED Chapter B section.

Information contained in standard specifications or other contract documentation should not be repeated.

a) Contract Drawings

Contract drawings include drawings or plans, profiles, typical cross-sections and non-standard details and may include other reports, lists or schedules. These may include standard or modified OPSDs or MTODs. Explain how to show the information on these drawings, as applicable. Standard symbology is provided in the 100 series of both OPSDs and MTODs.

Provide descriptions of any other information that shall be provided on the contract drawings to support these tender items. For example: geotechnical borehole data.

Quantity sheets are considered to be contract drawings. Sample quantity sheets may be obtained from Chapter F. Instructions on which quantity sheet format to use and how to complete filling it out, for each applicable tender item, is covered in sub-section 9: DOCUMENTATION.

b) Quantity Sheets (Q-sheets)

Q-sheets are usually provided in 11X17 format. Information on Q-sheets is contained in CDED Chapter F.

As applicable to the tender item, provide a line entry in the Q-sheet for each installation or segment of product to be supplied, installed or constructed. As applicable, locate the installation by including start and end locations (chainages) of each installation and indicate left or right of centreline. Separate tender items should not be combined on one line of the Q-sheet.

Indicate whether additional information in addition to chainage is required, for example: offset, left or right. In complex projects, staging considerations should be accounted for such that quantities applicable to each stage are provided. The required accuracy of such dimensions should be included in the CDED Chapter B section, where appropriate.

For variation tender items, list each possible variation with a brief explanation of its application. Each variation of the tender item shall be entered in a separate column heading in the Q-sheet. The space available for headings is 92 characters (4 lines of up to 23 characters each). Quantities for each installation shall be entered in the Q-sheet in the appropriate box where the line for that installation meets the column applicable to the tender item variation. An appropriate title shall be provided for each column in the quantity sheet.

Tender item "column types" : Normal, Variation, Special, and Breakdown.

"Column types" of tender items are documented in Contract Preparation System (CPS), under CPS Help. This type influences how these items are documented in quantity sheets (Q-sheets). The type of each tender item listed in CPS is listed under "Items Master".

c) Non-Standard Special Provisions (NSSPs)

Discuss how project-specific information is documented in NSSPs, modified SSPs and fill-in SSPs.

Improperly drafted NSSPs are a major source of contractual problems that lead to engineering claims. Use of NSSPs should be minimized, where possible. The use of existing contract documentation, including NSSPs that have been successfully used before, is usually preferable to drafting new NSSPs.

References on how to write NSSPs are included in the SP writer's guide. See CDED Chapter E for detailed information on how to write SSPs and NSSPs.

The requirements of Highway Design Bulletin 2008-003, Management of New: Non-Standard Tender Items, Non-Standard Special Provisions and Modified Standard Special Provisions, shall be complied with for the NSSP and non-standard tender item review process.

d) Documentation Accuracy

Indicate the accuracy (rounding) for the UOM of the tender quantity.