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## Designer Quality Control Plan Guidelines

*Guideline as defined for this manual is a detailed minimum requirement to implement a Designer Quality Control Plan*

4/13/2012

# Metropolitan Sewer District of Greater Cincinnati (MSDGC)

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# Section 1 - Introduction

## 1.1 Purpose

The purpose of these guidelines is to assist the consultant-led project team in creating a project specific Designer Quality Control Plan for Preconstruction activities. These guidelines represent minimum requirements for implementation. The Design Consultant's corporate officer responsible for quality merges these guidelines with corporate Quality Assurance/Quality Control requirements. The Design Consultant is responsible for the overall quality of the final design product and is required to incorporate the review of all sub-consultants' work into the project specific Designer Quality Control plan.

A well-structured Designer Quality Control Plan helps to ensure that designs are economical, constructible, maintainable and appropriate for their locations and surroundings. The project team is required to submit the project specific Designer Quality Control to MSD. The Department's Technical Review Committee reviews and approves the Designer Quality Control Plan prior to any design work. Adherence to the Designer Quality Control plan is required regardless of schedule or deadlines.

The Designer Quality Control plan assists with the verification that the design and project documents are produced with due diligence using acceptable industry standards, appropriate techniques, available resources and reasonable decisions by competent professionals. The Designer Quality Control Plan is a process tool and does not replace the sound judgment and experience of competent professionals. It is the project team's responsibility to verify the quality of project documents **before** any design work begins.

MSD reserves the right to audit the Design Consultant for compliance with Quality Assurance/Quality Control procedures as provided in the Master/Professional Services Agreement. No additional compensation is provided to the Design Consultant for time or materials associated with the audit.

## 1.2 Roles and Definitions

### Designer's Corporate Officer Responsible for Quality

- Prepares and administers corporate quality standards.
- Reviews Designer Quality Control Plans for compliance with corporate policies/standards.

### Project Team Design Leader

- Typically is the Project Manager for the Design Consultant.
- Implementation of the Quality Assurance/Quality Control Procedures.

### Discipline Design Lead

- Ensure Quality Assurance/Quality Control procedure compliance within their specialized discipline (including sub-consultants).
- Monitor design activities for compliance with criteria and standards.
- Verify that assigned personnel are capable of performing the required analysis or calculations.
- Release the completed contract documents for their specialized discipline. Do not release any contract documents until the Quality Assurance/Quality Control process is complete.

### **Originator (Designer)**

- Responsible for design completeness, accuracy, adequacy and inter-disciplinary coordination.
- Responsible to ensure quality control is performed and documented.
- Cannot rely upon the Quality Assurance/Quality Control Procedure to correct design or calculation deficiencies.
- Present all calculations in a neat and logical manner to facilitate checking.
- Review the completed plan set to ensure that it satisfies the design intent.
- Cannot function as the Checker or Quality Assurance Manager.

### **Checker**

- Check work product independently of the Originator.
- Can only check work that he/she did not originate.
- Must be competent and experienced in the type of element being checked.
- Cannot function as the Originator, Back Checker or Quality Assurance Manager.

### **Back Checker**

- Review corrections asserted by the Checker.
- In most cases, the Back Checker is the Originator.
- Cannot function as the Verifier or Quality Assurance Manager.

### **Corrector**

- Incorporate all corrections.
- In most cases, the Corrector is the Originator.
- Cannot function as the Verifier or Quality Assurance Manager.

### **Verifier**

- Verify back checked corrections were accurately made.
- Confirm all information is highlighted to verify that all information was checked.
- In most cases, the Verifier is the Checker.
- Cannot function as the Corrector or Quality Assurance Manager.

### **CAD Manager**

- Verifies that all project drawings follow MSDGC's CAD Standards (conveyance projects) or National CAD Standards (treatment projects) and the project Specific CAD Management Plan.

### **Quality Assurance Manager**

- Verify that all project documents were checked in accordance with the Quality Assurance/Quality Control procedures.
- Cannot perform ANY of the Quality Control Procedures.

### **Engineer of Record**

- Responsible for the design.
- Stamp the complete plans and calculations.
- The Discipline Design Lead if the Originator is not licensed in the state of Ohio

## **Section 2 – Minimum Requirements**

### **2.1 Project Description**

Provide a general overview of the project and the various disciplines involved in the design. State what development phase the Quality Control Plan is for (Planning, Design or both).

### **2.2 Lead Consultant’s Quality Control Organization**

Provide identification, responsibility and authority of Design Consultant’s corporate Quality Control officer/manager and an organizational chart describing the Consultant’s quality assurance team/manager’s interface with the project team.

### **2.3 Project Team**

Provide a list of the key personnel on the project for the prime and sub consultants. The list will include Quality Assurance Manager, Quality Control Manager, Project Manager, Discipline Leaders, Checkers, Back Checkers, CAD Managers and Supervising Engineers. A brief resume shall be provided for personnel listed. *It is important to note that if a personnel change occurs after initial submission of qualifications and resume, an amendment to the Quality Control Plan shall be submitted including required information.*

### **2.4 List of Deliverables, Responsible Persons, Completion Dates**

Provide a list of design submittals, person responsible for each submittal, person responsible for quality control reviews, supervising engineer and completion dates.

### **2.5 Design Review Process**

Provide all necessary detailed elements of the design review process including report, calculation, design and specification checking protocols. Specify detailed procedure for checking, revising and reviewing markups. Maintain a QC log.

### **2.6 Document Control**

Include Design Consultant procedures for document control, including configuration management and management of project files for all members of the project team. Use Document Naming Convention Listing for all correspondence.

### **2.7 Sub Consultant Quality Control**

Describe the sub-consultant’s quality control process. Describe the Design Consultant’s process to review sub-consultants’ work. Maintain a Quality Control Log of the review of the sub-consultant’s work.

### **2.8 CAD Management**

Describe the CAD Management Plan to coordinate the work of the prime and sub consultants so that MSD CAD Standards are followed (conveyance projects should follow MSD CAD Standards, treatment projects should follow the National CAD Standard).

## **2.8 Quality Control Plan Acknowledgement Form**

Distribute Quality Control Plan Acknowledgement Form to the key personnel listed in this plan to sign/date the form for acceptance of this Quality Control Plan and review of each of the project deliverables.

## Checklists

## Calculation Design Review Checklist

Project Name:	
Design Status:	
Wet Weather Improvement Program #	
Sewer #	
Capital Improvement Program #	

YES	NO	N/A	
			Calculation includes title, date, preparer's name and checker's name.
			Manual calculations are on computation paper in clear and legible print.
			Calculation pages are sequentially numbered.
			Record calculations bear the stamp of a qualified professional engineer.
			Assumptions and design criteria are listed.
			References to text books or technical papers are included as appropriate.
			Clarifying sketches, maps or diagrams are included.
			Computer software is identified by name and revision date.
			Input and output data are clearly indicated.
			Computer calculations include a narrative of the computational process.
			Electronic versions of input and output files are provided.
			Calculations contain a summary of conclusions and results.

Additional Comments (attach additional sheets as required):


Reviewer Signature:		Date:	
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## Consistency Design Review Checklist

Project Name:	
Design Status:	
Wet Weather Improvement Program #	
Sewer #	
Capital Improvement Program #	

YES	NO	N/A	
			Physical drawings agree with diagrammatic drawings.
			General arrangement drawings are consistent across disciplines.
			Plan views are consistent within disciplines and consistently oriented.
			Plan drawings are to a consistent scale.
			Sectional views are oriented consistently and sectional references are clear.
			Equipment list is complete and tag numbers are consistent and correct.
			Drawn elements are consistent across matchlines.
			Dimensioning and survey control are sufficient for layout and construction.
			Technical specifications are complete and in accordance with standards.
			Specification requirements are explicit where required.
			Functional and performance-based specifications are used where appropriate.
			Preferred vendors are listed appropriately to optimize competition.

Additional Comments (attach additional sheets as required):


Reviewer Signature:		Date:	
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## Constructability Design Review Checklist

Project Name:	
Design Status:	
Wet Weather Improvement Program #	
Sewer #	
Capital Improvement Program #	

YES	NO	N/A	
			Proposed site affords sufficient material laydown space.
			Utility review information included.
			Locations and depths of excavations are feasible.
			Shoring requirements are feasible.
			Proposed site affords sufficient access for equipment.
			Conventional equipment may be used for lifting and placement operations.
			Required field welding is accessible and can be performed as shown.
			Piping and equipment layouts allow sufficient room for assembly.
			Confined space entry requirements are identified.
			Site is amenable for multiple contractor access if applicable.
			Impacts of process outages are identified.
			Proposed construction sequence is described.
			Soil information shown.
			Construction methods are consistent with the geotechnical baseline report.

Additional Comments (attach additional sheets as required):


Reviewer Signature:		Date:	
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## Format Design Review Checklist

Project Name:	
Design Status:	
Wet Weather Improvement Program #	
Sewer #	
Capital Improvement Program #	

YES	NO	N/A	
			All drawings are the correct size.
			All drawings have been prepared with the required CADD software.
			Project titles are correct and consistent for all documents.
			Prescribed title blocks have been used.
			Line weights are correct.
			Text size and font style are correct.
			Process, mechanical, electrical and Instrumentation & Controls symbology are correct.
			Graphic scales are shown.
			Drawing numbering system is correct and consistent between disciplines.
			Specifications are in the correct format (MSD Detailed Provisions or CSI).
			Drawings bear an Ohio PE stamp.

Additional Comments (attach additional sheets as required):


Reviewer Signature:		Date:	
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## Functional Design Review Checklist

Project Name:	
Design Status:	
WWIP#	
Sewer #	
CIP #	

YES	NO	N/A	
			Proposed systems and processes meet the stated performance objectives.
			Design reflects the most effective solution to meeting the design criteria.
			MSD directions from previous meetings and reviews have been incorporated.
			Design has been analyzed for problematic secondary effects.
			Level of complexity of the design is appropriate.
			Operating staffing level is appropriate.
			Maintenance and training burden is appropriate.
			Lessons learned are incorporated.
			All existing conditions are shown.
			Existing buried utilities are identified.
			Design is appropriate for chosen equipment and procurement methodology.

Additional Comments (attach additional sheets as required):


Reviewer Signature:		Date:	
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# MSD CAD Standard Check

## Plan Checklist

### **30%**

- Existing sewers and appurtenances, including material type.
- Proposes sewers and appurtenances
- Property lines, parcel numbers.
- Section lines, corporation lines and township lines.
- Buildings and addresses.
- Utilities, including house service connections.
- Right-of-Way.
- North Arrow.
- Flow arrows on pipes (existing and proposed.)
- Size of pipes.
- Existing topology (if outside paved area) and features, trees (sizes if necessary), creeks, fences, walls, etc.
- Label tunnel, jack & bore and creek crossing sections (plan & profile.)
- Detail for tunnel, jack & bore and creek crossing sections.
- Call out modifications to existing sewers and manholes, i.e., maintain, plug, fill, seal and abandon, remodel bottom, etc.
- OUPS stamp (title sheet only.)
- Mitigative measures (notes for construction and staging areas.)
- Scale used on plan and profile.
- Proposed test bore locations shown.
- Book, Page, Parcel number where easements are needed.
- Existing and proposed building connections/taps.
- Construction access designated.

### **60%**

- Streets (indicate pavement type.)
- Construction notes.
- Label proposed manhole in plan with:
  - Number
  - Station
  - Deflection angle
- Limits of construction.
- Pavement restoration details.
- Laterals extended to Permanent Easement on new sewers.
- Accession numbers.
- Sheet numbers.
- Match lines if needed.
- Sheet index on cover sheet.
- Vicinity Map on cover sheet.
- Test bore locations updated.

## MSD CAD Standard Check

### Plan Checklist (Cont.)

#### 90%

- Existing and proposed manhole coordinates.
- Fore easements see Accession Number on each sheet.
- Standard drawing index with accession numbers on cover sheet.
- Benchmarks on cover sheet.
- "FOR EPA APPROVAL" stamp on all plan sheets.

#### Final

- Contract stamp.
- PE stamp and signature.
- MSD signatures.

# MSD CAD Standard Check

## Profile Checklist

### 30%

- Elevation lines numbered.
- Pipe size, type, type of joint and pipe alternates.
- Distance and slope of pipe between manholes.
- Distance and slope of pipe between manholes.
- Show and label utility and feature (creeks, swales) crossings.
- Show and label (not in same profile) utilities paralleling sewer that might affect construction.
- Show and label roads.
- Existing ground line over proposed sewer.
- Proposed ground line over proposed sewer (if needed.)
- House, house # and basement elevations.

### 60%

- Label proposed manhole in profile with:
  - o Number.
  - o Station.
  - o Existing – Size, invert elevation, direction (drop if needed).
- Concrete encasement (if required).
- Match lines if needed.

# MSD CAD Standard Check

## General Checklist

### **30%**

- Geotechnical Report.
- Survey of project site.
- Follow layer-naming standard.
- Using standard border, symbols and details.
- Enough cover for creek crossing.
- Sewer deep enough to serve basement elevations.
- Watertight lids in 100-year flood zone or in street gutter.
- Manhole spacing.
- Re-usability of existing manholes.
- Model flow report (check pipe sizes).
- Review detailed provisions and estimate.

### **60%**

- Review detailed provisions and estimate.

### **90%**

- Review detailed provisions and estimate.

### **Final**

- One set of mylars.

# MSD Easement Checklist

## Print Date for Drawing

- Located on plans

## Property Owner Information

- Property owner name
- Parcel number
- Transfer date
- Transfer reference

## Easement Components

- Easement language block
- Property owner signature block
- Notary block
- County Administrator block
- Sewers Chief Engineer block

## MSD Components

- Project name block
- Project ID block
- Township, Section, Range (Military Survey)
- Accession number
- Construction accession reference
- Take area calculation tables
- MSD CAD standards
- PDF only submitted at review stages

## Survey Components

- CL sewer easement property corner references
- Metes & bounds easement references
- Property line references
- Easement take area references
- Survey stamp & signature
- Basis of bearings at north arrow
- Topo and buildings not displayed

## MSD Document Naming Convention List

To facilitate document searches and to easily access project information, it's important to identify communications/documentation in a manner that reduces the time spent when looking for specific information. This is as important for Consultants and Contractors as it is for MSD personnel. We recommend the following format for document file names, subject lines in emails and other correspondence/documentation as well as document footer identifiers in reports, task orders, etc:

[Project ID#/Abbreviated Name/Keyword(s)]

**NOTE:** Document Control, in cooperation with the Planner/Project Manager, will determine the abbreviated project name.

Documents are categorized by Document Control on SharePoint, first by the project number, then by the category, and if applicable, then by the subcategory as indicated on the following chart. Additionally, specific examples of document, file, subject line, etc, names are provided. (This is not an all inclusive list.)

Document Categories	Document Subcategories	Descriptive Title/Subject Line/Footer Reference
Planning	Project Charter Business Case Evaluation Turnover/Closeout (depending upon project, some items may be categorized as Design)	10131220 Glenview PSE – Capital Project Nomination
		10131220 Glenview PSE – Business Case Evaluation
		10131220 Glenview PSE – Field Notes
		10131220 Glenview PSE – Turnover Memoranda
		10131220 Glenview PSE –Value Engineering
		10131220 Glenview PSE – Environmental Compliance Report
		10131220 Glenview PSE – Geotechnical Report
		10131220 Glenview PSE – Hydraulic Report
		10131220 Glenview PSE – Modeling Report/Flow Data
		10131220 Glenview PSE –Soil Report
Design	30% Design Review 60% Design Review 90% Design Review Final Review	10131220 Glenview PSE –Technical Report
		10240016 CSO 127 – Field Assessment
		10240016 CSO 127 – Design Memoranda
		10240016 CSO 127 – Environmental Site Assessment Phase 1
		10240016 CSO 127 – Preliminary Design Plans
		10240016 CSO 127 – Alternative Analysis
		10142020 Daly Rd Relief Sewer – December 2011 TV Inspection
		10240021 CSO 483 – Project Risk Register
		10142020 Daly Rd Relief Sewer – 30% Design Package
		10142020 Daly Rd Relief Sewer – 60% Design Package
		10142020 Daly Rd Relief Sewer – 90% Design Package
		10142020 Daly Rd Relief Sewer – Final Design Package
		10142020 Daly Rd Relief Sewer – Plat Surveys
		10142020 Daly Rd Relief Sewer – Alignment Surveys
10440017 W Galbraith Sewer Lateral – Technical Memoranda		
10180600 – Mill Creek Incinerator Fluid Bed Designer Progress/Status Report		
Quality Assurance/ Safety	Quality Assurance	10142020 Daly Rd Relief Sewer – Project Management Plan
		10180600 – Mill Creek Incinerator Designer Quality Control Plan
	Safety	1014020 Daly Rd Relief Sewer Soil Erosion Plan
		1014020 Daly Rd Relief Sewer Traffic Control Plan

All communications can be scanned, attached and emailed to [documentcontrol.msd@cincinnati-oh.gov](mailto:documentcontrol.msd@cincinnati-oh.gov).