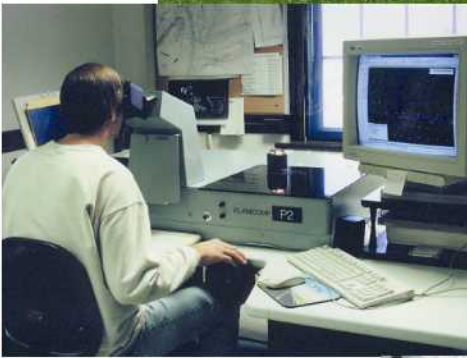




Plan Quality



Working
Together



Quality Control
Quality Assurance



 Iowa Department
of Transportation



ACEC

May 2003

**Measuring Quality of Plans Team
Iowa DOT/ACEC/FHWA**

American Council of Engineering Companies (ACEC)

Sirpa Hall	CH2M Hill Inc
Paul Kline	HGM Associates Inc
Rick White	Howard R. Green Company

Iowa Department of Transportation (Iowa DOT)

Keith Cadwell	Road Design
Jim Nelson	Bridge Design
Roger Gould	Engineering Bureau
John Smythe	Construction

Federal Highway Administration (FHWA)

Jennifer Balis	Programs Engineer
----------------	-------------------

Facilitator

Carol Culver	Iowa DOT, Research and Technology
--------------	-----------------------------------

Liaison

Mitch Dillavou	Iowa DOT, Director, Engineering Bureau
----------------	--

This report submitted to the Iowa DOT/ACEC/FHWA Partnering Council
March 2003

On May 20, 2003, the Iowa DOT/ACEC/FHWA Partnering Council
approved this report and requested implementation of each of the
recommendations.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	2
BACKGROUND	3
WORKPLAN	4
RECOMMENDATIONS.....	8
APPENDIX A.....	10
APPENDIX B	11
APPENDIX C	12
APPENDIX D.....	13
APPENDIX E	14

Executive Summary

On May 8, 2002, the Iowa DOT/ACEC/FHWA Partnering Council established a team to identify a process for measuring the quality of plans prepared by Iowa DOT and Consultant design teams. The team's mission was to **define performance measures that allow users to measure and monitor the quality of plans**. It was determined that the intent was to measure the quality of plans, not the quality of design.

The Measuring Quality of Plans team, hereinafter referred to as, "the Team," acknowledged that earlier teams had been formed to improve the quality of plans. Although previous teams provided recommendations for improving the quality of plans, the Partnering Council recognized that there was no data available to characterize the quality of plans produced for primary construction projects.

The team recommends a 3-phase process to measure and monitor the quality of plans that includes:

Quality Control (QC) Requirements

Specific standards that provide guidance for designers on satisfying plan quality criteria are identified. This guidance is in the form of checklists that include plan requirements that contribute to plan quality attributes. Separate checklists have been developed for Road and Bridge project plans. A formal submittal is required to document the QC process.

Quality Assurance (QA) Evaluation

Construction personnel provide an evaluation of plan quality that is based on the criteria included in the QC requirements. This QA evaluation provides a "measure" of the conformance to the QC requirements. Criteria have been identified that allow for an objective measurement of plan quality. A system of providing formal feedback to designers is included.

Continuous Improvement

A process for reviewing the QC requirements, identifying trends in plan quality measurements, and sharing best practices are included.

The process of measuring plan quality will require commitment by all stakeholders to sustain the process over time. Since the average project duration including design and construction is several months or years, it will take several years to determine trends and provide an assessment of plan quality. The team understands that stakeholders may not be willing to make this commitment unless it is understood how the information will be used. Therefore, a detailed implementation plan is provided that includes specific action items to ensure the process of measuring plan quality provides benefit to designers, construction staff and contractors by enhancing the project development process.

Background

“Late in 1996, representatives of the Consulting Engineers Council, Iowa Department of Transportation and Federal Highway Administration began discussing a formal partnering effort. The goal of the effort was continuous improvement in design consultant engineering program, processes, and procedures in Iowa. It would be accomplished by building top-level support and awareness of quality concepts and establishing a formal partnership between the organizations. The result would be a more interactive and collaborative relationship.”¹

Since the original Partnering Workshop in February 13, 1997, the Partnering Council has established teams to review issues identified by the Partnership. Two previous teams have studied the issue of Quality of Plans. The missions and accomplishments of these teams are summarized below.

COPEs Team (Communication of Policies and Engineering Standards)¹

Mission: To identify applicable (administrative and technical) policies and standards, their format, and how they are communicated to consultants and DOT employees. Evaluate the current communication process and provide recommendations on improving this process.

Accomplishment: COPEs made a total of twenty recommendations to improve the flow of information between DOT and consultants. These included developing sample plans and standards, presenting more information via the Internet, holding an information fair, making the Cost Determination Policy known and organizing technical memos.

Quality of Plans Team (This is an earlier team with a different mission than the current Quality of Plans team)¹

Mission: Identify how to improve the quality of plans for the construction industry, including both roadway and bridge plans.

Accomplishment: Based on results from a survey of construction plan users, the team recommended developing guidance to direct the field review of plans along with standards to ensure that plans are true to scale, use standard symbols and fonts and use clear printable drawings. These recommendations are being implemented. DOT’s Office of Design published design aids and bulletins on its Web page. Construction developed checklists for field reviews and Design uses staff meetings to debrief the results.

The status of the recommendations of these teams is included in Appendix A.²

¹ Iowa DOT/CEC/FHWA Partnership paper dated 6/22/98

Workplan

On May 8, 2002, the Iowa DOT/ACEC/FHWA Partnering Council established a team to identify a process for measuring the quality of road and bridge plans prepared by Iowa DOT and Consultant design teams. The team's mission was to **define performance measures that allow users to measure and monitor the quality of plans**. It was determined that the intent was to measure the quality of plans, not the quality of design.

The Team elected to build upon the work of these previous teams. A Workplan was developed that included the following tasks:

1. Identify existing QC/QA processes by surveying DOT, consultants and other States
2. Identify characteristics of a quality plan
3. Define standards for these characteristics that are objective
4. Develop a process to measure and monitor plan quality
5. Develop an implementation plan

1. Identify existing QC/QA processes by surveying DOT, consultants and other States

IaDOT, Consultants, and other DOTs were surveyed to identify existing QC/QA processes currently in use. The Team determined that existing QC processes used by design teams varied from informal reviews by experienced staff to customized checklists for items to be included in specific plan sheets. A few other State DOTs indicated a formal plan review and submittal was required before the plan was authorized for letting in their State. However, no existing formal QA or measurement processes were identified.

2. Identify characteristics of a quality plan

The earlier Quality of Plans team survey results were used to determine the problems with plan quality that were expressed by plan users. The results indicated the problems in the following areas:

Not Enough Information
Accuracy and Quantity Errors
Details or Notes Unclear
Inconsistent presentation

² <http://www.prof-tech-consultant.dot.state.ia.us/>

Based on the problems identified, the Team concluded that the following characteristics would provide an indication of the quality of the plan:

- Complete
- Consistent
- Clear
- Correct
- Constructible

3. Define standards for these characteristics that are objective

A measurement system must be objective to provide meaningful results. Specific plan quality standards must be defined. Quality control methods must be developed to address the characteristics that will be evaluated during the measurement process. A well-defined plan preparation process with established standards for specific plan requirements provides a framework for the quality control work.

Earlier teams had also identified the importance of well-defined standards for plan preparation. The COPES team focused on improved communications and a repository of current requirements that can be accessed by designers to ensure the plan satisfies the latest standards and policies. In fact, COPES Recommendation No. 16 specifically calls for a comprehensive plan check procedure and a checklist was developed in 1999. The earlier Quality of Plans team also recommended development of standards for plans and checklists for review of plans.

4. Develop a process to measure and monitor plan quality

Survey results from Task 1 indicate designers are interested in obtaining feedback from construction staff and contractors regarding the quality of plans. Therefore, it is intended that the “customers,” i.e. construction staff and contractors, measure plan quality.

The purpose of Quality Assurance (QA) is to determine if the QC activities are producing the desired results. The QA assessment then becomes an opportunity to measure those plan quality attributes that are addressed in the QC phase. It is intended that the measurement system focus on specific plan requirements that provide an assessment of the effectiveness of the QC activities.

Since each project is unique, it is impractical to “cookbook” the design process so that modified details, unique plan notes, special drawings, or generic items will not be used. Therefore the QC activities cannot address every conceivable design consideration. The measurement process must also provide an opportunity to identify “best practices” and other “issues” with the overall plan quality.

The process of measuring plan quality cannot be accomplished without some additional effort by all stakeholders. The team has attempted to use existing processes to the extent

possible to minimize additional time and effort for design and construction staff. The benefit of collecting this data will be determined by how it is used. The data will need to be summarized and distributed to all parties interested in plan quality. Most importantly, this data must be used to establish design standards and policies where lacking, develop and refine QC requirements, and improve general understanding of plan quality expectation through communication with all stakeholders.

5. Develop an implementation plan

The initial steps to implement a quality of plan measurement system involve the development of a Quality Control program for Road and Bridge design teams. This report includes recommended checklists to be used for this purpose. The Team recommends that these checklists be considered “version 1.0” and that the process for updating the quality control checklists be included in appropriate design manuals that are used for reference by all IaDOT and consultant design teams.

The Office of Design must establish an internal process to formally and regularly review the plan quality results, and take specific actions to address areas where improvement is warranted.

The Office of Bridges and Structures currently use checklists to provide a quality control function of their plans. However, a process to utilize the plan quality measurements must be developed to ensure appropriate follow up actions are taken.

While it is beyond the scope of this report to identify each and every conceivable action that may be appropriate, this follow up work must occur and be communicated back to construction staff and contractors so that the interest and willingness to continue the process is sustained.

The overall process for measuring and monitoring the quality of plans is briefly described as follows:

- The documentation of quality control must be formally submitted for further use during the subsequent Quality Assurance and Continuous Improvement phases. The QC checklists that the design teams use to ensure specific plan quality criteria have been met are to be forwarded to the Office of Construction.
- The Office of Construction will be responsible for distribution of these documents to the RCE office responsible for administering the project, along with a request to complete and return the Quality Assurance Report. During this distribution, a specific field engineer will be identified who will be available for assisting the RCE office should questions or concerns arise regarding the plan quality measurement process.
- The RCE will consult with the inspection team and contractors to evaluate the quality of plans as defined by the specific standards included on the QC checklists. This evaluation will be summarized on the Quality Assurance Report and returned to the Office of Construction.

- The Office of Construction will develop a tracking system to ensure the plan quality measurements are completed and returned for compilation.
- The Office of Construction will submit the measurements to the Office of Design and the Office of Bridges and Structures for further consideration.

In addition to the established plan quality attributes that are considered during the QC and QA processes, a continuous improvement process is included. This process will identify best practices, provide recommendations for addressing unique design features that may be used in the future, and provide insight into additional QC items that should be considered for future “versions” of the QC checklists.

Recommendations

1. Measure plan quality for all primary and Interstate road and bridge projects let by the Iowa DOT. The team recognizes this will require a significant commitment by DOT and consultant design teams and the construction offices. This approach will provide feedback to all central office and district design teams and consultants performing design work for the DOT.
2. Formally incorporate the quality control process into the design manuals for the Office of Design and the Office of Bridges and Structures. This will ensure the process is effectively communicated to all design teams, and will be maintained as revisions are implemented. Each Office shall designate an individual to be responsible for maintaining the quality control checklists and to be the custodian of these documents.
3. Encourage other offices responsible for plan preparation to develop plan quality measurement processes. This includes development of QC checklists and working with the Office of Construction to obtain Quality Assurance Reports.
4. Provide formal training for all potential designers to inform them of the purpose, procedures, and expected outcomes of the plan quality measurement process. The Office of Design, Office of Bridges and Structures, and the Office of Construction shall jointly facilitate this training.
5. Adopt the quality control checklists included in Appendix B and Appendix C as a major feature of the Quality Control process. Design teams may wish to “customize” these checklists to include other items. However, since these checklists include the plan quality attributes to be measured, standardization of specific items will produce more meaningful measurements. If additions to the checklists are desired, but not considered a plan quality issue, codes can be used to exclude these items from the Quality Assurance report described below. As improvements to these checklists are identified, they should be formally incorporated into the appropriate design manuals. The changes shall be highlighted and forwarded to the Office of Construction for incorporation into a revised Quality Assurance Report.
6. Include a general reference to a Design Manual requirement or policy in future versions of the checklists, where applicable, so users can refer to them for more details. It is recommended that the Office of Design and the Office of Bridges and Structures review the quality control processes on a quarterly basis, at a minimum. This shall also apply to other offices that adopt these procedures.
7. Forward the completed quality control checklists to the Office of Construction. For DOT designs, the design project engineer forwards the checklist to Construction when the plan is turned into Contracts. For consultant designs, the

Consultant forwards the checklist to the consultant section with the final plan, which will in turn forward it to the Office of Construction. The Office of Construction distributes the completed QC checklist to the RCE office administering the construction project, with a request to complete a Quality Assurance evaluation during/following the construction phase. A sample of the Quality Assurance reports is included in Appendix D.

8. Complete the Quality Assurance review, which will provide a measurement of the quality of the plan by evaluating specific attributes included on the quality control checklists. The RCE will consult with inspectors and contractors performing work on the project to get their input into the evaluation. The RCE will return the completed Quality Assurance document the Office of Construction, which will compile the results and forward to the appropriate design office. These results will be provided to the design team responsible for the plan.
9. Conduct an annual meeting involving the Office of Design, Office of Bridges and Structures, Office of Construction, District and RCE offices, Consultants, and contractor representatives to review plan quality measurements, areas of concern, and best practices. A planning team should be assembled by July 1 to develop the structure and participation for this meeting. The use of facilitators, small break out groups, documentation of issues raised, and follow-up responsibilities should be considered in the planning process.

Appendix A

Status of earlier plan quality team recommendations

Action on Team Recommendations

November 28, 2000

Team: IDOT/CEC/FHWA - COPEs

Contact: John Bender - Ament Engineering, Ron Meyer - DOT

#	Recommendations	Responsible for Implementation	Completion Date	Status
1.	Conduct an information fair to improve communication of policies and standards.	DOT and FHWA Coordinating Group	Completed	The information fair was held in conjunction with the 1998 Annual meeting.
2.	Revise the updated schedule of various resources.	Design Methods	6/99	Complete See http://www.dot.state.ia.us/Design/rsclist.htm
3.	Revise method of updating information on CompuServe	Contracts & Proj Dev Internet Group	6/99	Complete. Now available at http://www.ia.bidx.com
4.	Develop a set of Sample Plans and CADD Standards	Design Methods, Bridges & Structures	In progress	See http://www.dot.state.ia.us/design/index.htm http://www.dot.state.ia.us/bridge/bridge.htm
5.	Maintain Resource List and assign responsibility to a specific office.	Design Methods	12/99	Complete
6.	Develop a filing system for technical memos.	Development Support	1999	Currently under review by a DOT/CEC partnered team.
7.	Define who has authority to change standards by memo.	Development Support	1999	Same as 6
8.	Coordinate revisions to eliminate need for technical memos.	Development Support	1999	Same as 6

#	Recommendations	Responsible for Implementation	Completion Date	Status
9.	Catalog memos and make available electronically.	Development Support	1999	Same as 6
10.	Create a format to index memos for most current version, etc.	Development Support	1999	Same as 6
11.	Make consultants aware of Cost Determination Policy on first contact.	External Audits	Completed	Complete: External Audits hands out copies of Cost Determination Policy and Federal Acquisition Regulations at site audits.
12.	Make Cost Determination Policy available electronically.	External Audits	6/99	Pending development of Audits home page.
13.	External Audits discuss Cost Determination Policy at CEC annual meeting.	External Audits	Tabled	Tabled since External Audits now presents the policy at audit site and will have copies available at Information Fair.
14.	Assure that local jurisdictions and consultants understand DOT policies.	Local Systems	Ongoing	This is a continuing charge of Local Systems.
15.	Appoint a new team, if necessary to study communication of policies.	Partnering Council	Dropped	This was not identified as a priority at 1998 Partnering Workshop.
16.	Develop a comprehensive plan check procedure.	Interdivisional Management Team - Proj Dev, Planning, Engineering	1999	Checklists have been developed and can be found at: http://www.dot.state.ia.us/design/index.htm http://www.dot.state.ia.us/bridge/bridge.htm
17.	Hold periodic design/concept review meetings.	Individual offices	1/98	This is a continuing charge to each office.

#	Recommendations	Responsible for Implementation	Completion Date	Status
18.	Use addenda to keep project on schedule.	Contracts		
19.	Explore ways to utilize Internet to speed up documents from plan turn-in to letting.	Contracts, Internet Committee	6/99	Contractors will be allowed to test bidding electronically beginning with the 11/14/00 letting and may submit actual electronic bids in January, 2001. http://www.ia.bidx.com .
20.	Send final plans to engineers as well as bidders.	Contracts	8/98	Began in 1998.

Action on Team Recommendations

November 28, 2000

Team: IDOT/CEC/FHWA/AGC - Quality of Plans

Contact: Mike Heitzman - DOT

#	Recommendation	Responsible for Implementation	Completion Date	Status
1.	Develop guidance to direct the field review of plans, including checklists.	Central Construction Office and Transportation Center Construction Engineers (TCCE's)	Completed	Construction developed the checklist. TCCE's initiate reviews and work with the respective offices. Design uses staff meetings to debrief the results of reviews and share information with all designers.
2.	Review and implement post-construction review process with measurable features for ongoing quality control monitoring.	Design, Field construction	Completed	A process was recommended by Consultant Evaluation team and will be ongoing.
3.	Develop standards to ensure that plans are true to scale, use standard symbols/fonts, and use clear printable drawings.	Design	Completed	Design bulletins and design aids are available at http://www.dot.state.ia.us/design/index.htm
4.	Improve the consistency and format by which plan are presented.	Design, Bridges & Structures	Completed	Format, fonts, etc. are available at http://www.dot.state.ia.us/design/index.htm http://www.dot.state.ia.us/bridge/bridge.htm
5.	Use design software to automate tasks that are currently being performed manually.	Design, Bridges & Structures	Ongoing	This is a constant effort throughout the division.

Appendix B

Quality Control Checklist
Office of Design



Revision Date: 6/20/2003

QA/QC code

County: _____ Project No.: _____
 Project Description: _____
 Project Engineer: _____ Reviewer: _____ Date: _____
 Organization: _____

- 1 - Complete
- 2 - Consistent
- 3 - Clear
- 4 - Correct
- 5 - Constructible

Quality Control Plan Review Checklist for Road Plans

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
	General	General Plan Content	DM=Design Manual				
2	General 1	Is the presentation of the plan consistent with the requirements?	DM, Chapter 13 (future)				
3	General 2	Are the plans legible throughout?					
4	General 3	Have copies of applicable agreements been requested from OLE and Local Systems?					
4	General 4	Have specific requirements of project agreements been included in the plans?					
1	General 5	Have plan sheets prepared by other offices been appropriately incorporated into the main plan?	DM, IE-2				
1	General 6	Have items been added for applicable Special Provisions, Supplemental Specifications and Developmental Specifications?					
1	General 7	Are erosion control features (typicals, bid items, detail sheets, etc.) provided to protect sensitive areas?	DM, 10C-1				
5	General 8	Is all information necessary to complete construction staking clearly indicated on typicals, D, E, and G sheets, and cross sections?					
3	General 9	Do all plotted sheets show current date stamp, directory and file name, is the design team, county, project number, and sheet number shown correctly?					
-	General 10	Consultants should check the Design web site for current Design Manual, Design Details, Standard Road Plans and other design information: http://www.dot.state.ia.us/design/index.htm					

General Remarks:

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
	A	Title Sheet, Project Location, Legend					
4	A 1	Is The road system correct?					

Quality Control Plan Review Checklist for Road Plans

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
-	A 2	Does the project number match the production schedule?					
-	A 3	Does the description match the production schedule?					
2	A 4	Do the index of sheets match the sheets included?	DM, 1F-1 & Tab 105-3				
1	A 5	Are the appropriate Standard Road Plans included with the correct dates?	DM, 1F-1 & Tab 105-4 Consultants, check wkeb site.				
2	A 6	Is the project length correct, and does it match the plans?	DM, 1F-1 & Tab 105-1				
4	A 7	Are division breaks needed and shown?	DM, 1F-1				
4	A 8	Do the beginning and ending stations match the D Sheets?					
4	A 9	Does the total number of sheets at top = the hand count of sheets?					
4	A 10	As much as practical, does the map accurately show the project?					
4	A 11	Is Tab 101-4: filled out and up to date? Check ESALS for all HMA projects against numbers given in letter file.					
1	A 12	Are existing utilities identified in the legend and properly shown on plan sheets?	DM, 1F-3				
1	A 13	Legend sheet: Are contacts listed for the utilities?	DM, 1F-3				
4	A 14	Are equations shown on the location map?	DM, 1F-2				
3	A 15	Is a large location map included? Should it be?	DM, 1F-1 or 1F-2				
-	A 16	Is the signature block signed?	DM, 1E-1				
-	A 17	Index of seals needed?	DM, 1E-1 & 1F-1				
	A 18						

General Remarks:

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
	B	Typicals					
1	B 1	Is every road template defined with a typical?	Design Details Manual				
1	B 2	Are all ditching, backslope, culvert, and other appropriate typicals included?	Design Details Manual				
4	B 3	Are current typicals being used?	Consultants check website				
-	B 4	Do the typicals have the proper clear zone?	DM, 1C-2				
1	B 5	Are existing pavement details specified and accurate, including reinforcement?	As Built or PMIS				
1	B 6	Are all appropriate paving typicals included?	Design Details Manual				
1	B 7	Are curb and paved shoulder typicals included?	Design Details Manual				
1	B 8	Are pavement marking typicals included?	Design Details Manual				
2	B 9	Do cross sections match the typicals?					

Quality Control Plan Review Checklist for Road Plans

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
4	B 10	Was a resurfacing thickness used for extra subgrade width?					
1	B 11	Are all the shoulders defined on the shouldering typical?	Design Details Manual				
2	B 12	Do the shoulders shown on the cross sections match the typical?					
4	B 13	Is the earth shoulder fill per station calculated with a % of shrink?	Typ. 7110, 7111, 7112, 7113				
4	B 14	Are asphalt and tack rates correct for HMA?	Pavement Determination Letter				
1	B 15	Is the pavement header typical needed and included?	Typical 7101 or 7102				
2	B 16	Are modifications to typical explained?					
	B 17						

General Remarks:

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
	C	Estimate & Reference Notes and Tabs					
2	C 1	Are all pay items covered by a Specification, plan detail, Special Provision, Supplemental Spec, or Developmental Spec?					
2	C 2	Are the units for each item consistent with the Method of Measurement and Basis of Payment included in the Specifications?					
4	C 3	Check all quantities, no exceptions!!					
4	C 4	Are bid items separated by divisions?	DM 1F-1, Tab 100-0A thru 1C				
1	C 5	Do the reference notes match the quantities?					
1	C 6	Do the bid item reference notes refer to the correct tabs, sheets and other supporting information?					
3	C 7	Are incidental items clearly referenced to a specific bid item?					
1	C 8	Are bid items included for all tabulations that are not incidental?					
1	C 9	Are references to tabulation sheets shown?					
1	C 10	Are all required standard notes included?	Design Details Section 200				
4	C 11	Does the earthwork match the balances and T sheets?					
4	C 12	Is the silt fence tabulated and an extra percentage added for maintenance?	DM 10C-1, Tabs 100-17, 18, 19				
4	C 13	Are the intercepting ditches needed and tabulated?	Tab 100-16, Typ 4104				
4	C 14	Are silt basins needed? Are they tabulated? Is an item provided?	DM 10C-1, Tabs 100-14, -19				
1	C 15	Did Roadside Development review the plans for erosion control / seeding?					
4	C 16	Is guardrail tabbed with the most current method and end treatments?	DM Chap 8, Tab 108-8A, B, -19				

Quality Control Plan Review Checklist for Road Plans

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
4	C 17	Is surfacing for all roads accounted for?	DM 7C-1				
4	C 18	Are subgrade treatments accounted for?					
3	C 19	Has ownership of stockpiles and salvaged materials been addressed?					
1	C 20	Are tabs from others included and split for stage construction?					
2	C 21	Is topsoil bid and tabbed as required by the replacement policy?	Design Manual 10A-1				
1	C 22	Are subdrains included?					
1	C 23	Is there a tab for existing tile lines that need to be reconnected?					
1	C 24	Was mobilization included?					
1	C 25	Is construction survey needed?	Ask RCE				
1	C 26	Is a field office/lab needed?	Ask RCE				
5	C 27	Is saw cut for straight edge along existing pavement needed for detour tie-in?					
1	C 28	Is the pollution prevention plan included?	DM-10D-1				
5	C 29	Are traffic control notes properly sequenced, constructible and complete?	Design Manual, Chapter 9				
2	C 30	Are the traffic control requirements coordinated with other project in the vicinity?					
3	C 31	If traffic control or staging notes are not in the C sheets, are they cross referenced?					
4	C 32	Are the pipes by road contractor tabulation completed?	Tab 104-3				
4	C 33	Culverts by Culvert Contractor tabulation completed?	Tab 104-4				
1	C 34	Is the circular curve data table included?	Tab 101-9				
1	C 35	Are all points of access listed and tabulated?	Tab 102-1 or 102-3				
1	C 36	Are safety and hazard closures tabulated?	Tab 108-13A				
4	C 37	Is Clearing and Grubbing to be bid? Units and/or Area? Area shown in plans?	Spec 2101.03.B				

General Remarks:

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
	D	Mainline Plan and Profile Sheets					
-	D 1	Are the horizontal geometrics designed for the right speed?					
3	D 2	Are all equations clearly labeled?					
3	D 3	Are side road tie-ins clearly labeled?					
1	D 4	Are all entrances shown in the plan and profile?					
5	D 5	Is there access to all properties that have closed access?					
3	D 6	Is shading effective in distinguishing features?					
3	D 7	Is the beginning and end of the work clearly labeled?					

Quality Control Plan Review Checklist for Road Plans

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
2	D 8	Are all pipe drawn and labeled in the plan view? Check tab.					
2	D 9	Does the ditch bar and grades match the cross sections?					
5	D 10	Does the drainage work? Follow the water along all roadways.					
3	D 11	Are there scale blocks and north arrows on each sheet?					
1	D 12	Is the township and range shown on each sheet?					
-	D 13	Are all of the vertical curves good for the design speed?					
5	D 14	Does the profile tie smoothly to the existing road? Check elev. shots.					
2	D 15	Does profile match cross section? Check once for each sheet.					
3	D 16	Are other sheets (side roads, ramps, detour, situation plans) cross referenced?					
4	D 17	Are edge of pavement lines shown correctly, dashed for granular etc.					
5	D 18	Have the ROW lines been compared to required construction limits?					
5	D 19	Are dikes noted and properly shown?					
5	D 20	Do the culvert and drainage notes indicate "Install," "Remove," or other disposition?					
3	D 21	Is bar added for non-standard backslopes?					
4	D 22	Are ROW and easements with calls shown properly?					
4	D 23	Are existing property lines and owners correctly labeled?					
-	D 24	Is ROW correctly cross-hatched?					
4	D 25	Are balances shown and consistent with "T" sheets?					
5	D 26	Are staging details noted and labeled correctly?					
4	D 27	Are division breaks needed and shown?					
	D 28						

General Remarks:

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
	E	Side Road Plan and Profile Sheets					
-	E 1	Are the horizontal geo. designed for the right speed?					
3	E 2	Are all equations clearly labeled?					
3	E 3	Are tie-ins clearly labeled?					
1	E 4	Are all entrances shown in the plan and profile?					
5	E 5	Is there access to all properties that have closed access?					
3	E 6	Is shading effective in distinguishing features?					
3	E 7	Is the beginning and end of the work clearly labeled?					
1	E 8	Are all pipes drawn and labeled in the plan view? Check tab.					

Quality Control Plan Review Checklist for Road Plans

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
2	E 9	Does the ditch bar and grades match the cross sections?					
5	E 10	Does the drainage work? Follow the water along all roadways.					
-	E 11	Are there scale blocks and north arrows on each sheet					
-	E 12	Is the township and range shown on each sheet					
-	E 13	Are all of the vertical curves good for the design speed?					
5	E 14	Does profile tie smoothly to the existing road? Check elev. shots.					
2	E 15	Does profile match cross section? Check once for each sheet.					
3	E 16	Are other sheets (ramps, detour, etc) cross referenced?					
4	E 17	Are edge of pavement lines shown correctly, dashed for granular etc?					
5	E 18	Have the ROW lines been compared to required construction limits, especially at intersections?					
5	E 19	Do the culvert and drainage notes indicate "Install," "Remove," or other disposition?					
5	E 20	Are dikes noted and properly shown?					
-	E 21	Are ROW and easements with calls shown properly?					
-	E 22	Are existing property lines and owners correctly labeled?					
-	E 23	Is ROW correctly cross-hatched?					
4	E 24	Are balances shown and consistent with "T" sheets?					
5	E 25	Are staging details noted and labeled correctly?					
4	E 26	Are division breaks needed and shown?					
	E 27						

General Remarks:

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
	F	Detour Plan and Profile Sheets					
1	F 1	Refer to checklist items for D and E sheets?					
-	F 2	Is temporary easement or additional ROW needed?					
5	F 3	Have you checked for temporary drainage needs?					
4	F 4	Are balances shown and consistent with "T" sheets?					

General Remarks:

Quality Control Plan Review Checklist for Road Plans

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
	G	Benchmark and Reference Information					
1	G 1	Are alignment coordinates tabulated?	Tab 101-16				
1	G 2	Is curve data tabulated?	Tab 101-17				

General Remarks:

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
	H	Right of Way Layout					
3	H 1	Are separate sheets needed to clarify the right of way information?					
	H 2						

General Remarks:

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
	J	Staging Layouts					
5	J 1	Are there adequate provisions for maintaining drainage during staged construction?					
5	J 2	Is there a plan for maintaining temporary access on roads closed for construction?					
5	J 3	Have specific staging and coordination notes been included?					
5	J 4	Have haul roads needed within the project been identified?	Design Manual, Chapter 9C-7				
	J 5						

General Remarks:

Quality Control Plan Review Checklist for Road Plans

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
	K	Interchange Plan, Profile, Geometry Sheets					
4	K 1	Refer to checklist items for D and E sheets?					
1	K 2	Are edge profiles for the K sheets provided?					
	K 3						

General Remarks:

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
	L	Intersection Geometrics, Staking, Jointing Layouts					
4	L 1	Are edge of pavement lines shown correctly, dashed for granular etc.					
4	L 2	Are the areas for returns shown in the plan view or on a tabulation?					
1	L 3	Are edge profiles for the L sheets provided?					
1	L 4	Are pavement widths labeled?					
4	L 5	Are stop sign island details included?					
3	L 6	Are scale blocks and north arrows shown on each sheet?					
4	L 7	Are all joints labeled correctly?	DM, Sections 7A-2, -3, -4, & -5				
4	L 8	Do stations, offsets, elevations, etc. match for plan and profile?					

General Remarks:

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
	M	Storm Sewer Plan and Profile Sheets					
1	M 1	Are other utilities shown and identified?					
	M 2						

General Remarks:

Quality Control Plan Review Checklist for Road Plans

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
	N	Signing Details					
-	N 1	Is signature block signed?					
	N 2						

General Remarks:

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
	P	Lighting Details					
-	P 1	Is signature block signed?					
	P 2						

General Remarks:

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
	Q	Soils Design Plan and Profile Sheets					
-	Q 1	Is signature block signed?					
4	Q 2	Has there been a review for settlement plates, flatter foreslopes and other features affecting bid items, cross sections, or design?					
	Q 3						

General Remarks:

Quality Control Plan Review Checklist for Road Plans

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
	R	Borrow Design Sheets					
	R 1						
	R 2						

General Remarks:

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
	T	Earthwork Tabulation Sheets					
2	T 1	Do the T Sheets match the earthwork balances?					
	T 2						

General Remarks:

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
	U	Special Detail Sheets					
3	U 1	Are any unusual design features clearly shown?					
	U 2						

General Remarks:

Quality Control Plan Review Checklist for Road Plans

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
	V	Structures Sheets					
	V 1						
	V 2						


General Remarks:

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
	W-Z	Cross Sections					
-	W-Z 1	Are the cross section centerlines at the cell centerline so offsets will be correct?					
4	W-Z 2	Are bridge berms drawn correctly in the cross-section view both for the mainline and side road?					
2	W-Z 3	Is the profile grade on the cross sections the same as the profile grade on the plan and profile?					
2	W-Z 4	Is the profile grade tie point at the correct location. EOP etc....					
4	W-Z 5	Was a resurfacing thickness used?					
1	W-Z 6	Are cross road pipes shown?					
1	W-Z 7	Are entrances and pipes (if any) shown?					
1	W-Z 8	Are guardrail blisters shown on the cross sections?					
3	W-Z 9	Is the correct roadway description shown in the top right corner?					
4	W-Z 10	Are all special ditching, ditch grades, etc labeled correctly?					
3	W-Z 11	Are skewed cross sections labeled as such?					

General Remarks:

Appendix C

Quality Control Checklist
Office of Bridges and Structures

 Iowa Department of Transportation	Revision Date: June 18, 2003		QA/QC code	
	County: _____	Project No: _____	1 - Complete	
	Project Description: _____		2 - Consistent	
	Project Engineer: _____	Reviewer: _____	Date: _____	3 - Clear
	Organization: _____	Design No. _____		4 - Correct
Project Name: _____	Checked By: _____	5 - Constructible		

Quality Control Plan Review Check List for Bridges and Structures

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
	1	GENERAL					
	1.1	Title Block					
2	1.1a	"Design For (xxx Skew) (RA)(LA)" "Design For Repair To (xxx Skew) (RA)(LA)."					
2	1.1b	Structure Type and Size (Ex.: "188'-0 x 40'-0 Continuous Concrete Slab Bridge" or "92.1 m x 7.8 m Continuous Welded Curved Girder Bridge").					
2	1.1c	Span Description (Ex.: "41'-0 End Spans" or "33.050 m, 18.600 m, 15.880 m Spans").					
2	1.1d	Sheet Title (Ex.: "General Notes & Bridge Quantities").					
2	1.1e	Station of bridge (mainline) and of feature crossed (Highway, Street, R.R., etc.). Mainline bridge station should agree with envelope. See T.S. & L. for new structure.					
-	1.1f	Turn In Date (Ex.: "December 2000")					
-	1.1g	County					
-	1.1h	"Iowa Department of Transportation - Highway Division"					
2	1.1i	"Design Sht. No. x of x", "File No.", "Design No.".					
-	1.1j	Box around title block.					
	1.2	General					
5	1.2a	Check plan constructability. Sufficient details included to guide contractor. Staging sequence provided if required.					
-	1.2b	Scale not shown on situation plan or any details.					
2	1.2c	Details consistent with Bridge standard sheets.					
-	1.2d	Non-standard details reviewed with appropriate personnel.					
2	1.2e	Sounding data included per IA/DOT practice (sta., offset and surface elev. reqd.) (new design) Show all borings if 'stick diagrams' required. [1.2(A)]					
1	1.2f	Soils sheets (as provided by Office of Design) included in plan set (new design).					
-	1.2g	Clear border provided around sheet; 5/8" sides, 1/4" top & bottom minimum.					
-	1.2h	Cadd file name, using proper naming convention, shown on all sheets.					
2	1.2i	Cadd files drawn with the correct levels for printing color plans.					
	1.3	Culvert Estimate Sheet (Multiple Designs)					
2	1.3a	Second sheet in plan set. Provide tabulation on this sheet to summarize quantities for multi-design projects.					
2	1.3b	Tabulation title "Culvert Estimate Sheet"					
2	1.3c	Column in tabulation for 'As-Built' quantities.					
2	1.3d	Tabulation only information on this sheet.					
2	1.3e	Title of sheet 'Culvert Estimate Sheet'. Title block required.					
2	1.3f	Note below tabulation "Note: See sheets x, x and x for estimate reference information." <u>Note-If only reference note is class C concrete note this note is not needed.</u>					

Quality Control Plan Review Check List for Bridges and Structures

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
2	1.3g	Project number in border.					
4	1.3h	All Item Codes and Descriptions agree with BIAS. - OK to use 'short' BIAS description and capitalized units in BIAS table.					
General Remarks:							
	2	TITLE SHEET					
	2.1	General					
2	2.1a	Title sheet conforms to current DOT format posted on The Office of Bridges and Structures web site.					
-	2.1b	Correct Project Number (upper right side, right lower border and top left border of sheet).					
-	2.1c	Correct PIN Number (upper right side of sheet).					
4	2.1d	Correct File Number, Project Directory Name, and file name (lower border).					
-	2.1e	"Letting Date" (blank) (upper left border).					
-	2.1f	Value Engineering Note.					
2	2.1g	Bridge Standard Plan Box - eliminate if not required.					
2	2.1h	Boxed note referencing Road Standards on road sheets.					
-	2.1i	Index of Seals (sheet number seal is located on, name and expertise).					
-	2.1j	County Name (center of sheet, lower border and bottom left border).					
-	2.1k	Proper sheet heading ("Primary", "Interstate", etc.)					
-	2.1l	Proper 'Work Type'. See Bid Item Book (Ex.: "Bridge New-Steel Girder") (center of sheet, top left border). Use the work type which represents the majority of the work in the project.					
-	2.1m	Verbal location ("on U.S. 151 over N. Fork ...") (center of sheet)					
-	2.1n	Iowa R.R. Crossing Number					
-	2.1o	Revision box					
-	2.1p	Traffic data if NOT shown on situation plan.					
-	2.1q	"Sheet No. 1" bottom right border.					
-	2.1r	No phone number on shop drawing 'reviewed by' note.					
-	2.1s	ROW project # - leave blank					
-	2.1t	Specifications series date indicated inside the double lined box under the project title as required by the FHWA.					
-	2.1u	No title sheet needed					
	2.2	Location Map					
-	2.2a	Remove references to scales on plans.					
2	2.2b	North arrow, North is up.					
-	2.2c	Map Township/Range (Ex.: "R-2W", "T-87N").					
-	2.2d	For larger scale urban map, "Part of City of xx".					
-	2.2e	Leader to bridge location with text "Design No. xx".					
	2.3	Index Of Sheets					
2	2.3a	Sheet containing 'Estimated Bridge Quantities' tabulation referenced (tabulation containing bridge quantities).					

Quality Control Plan Review Check List for Bridges and Structures

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
2	2.3b	Sheet containing 'Estimated Roadway Quantities' referenced.					
2	2.3c	Any tabulations summarizing pay quantities not included in the bridge and road tabulations above.					
-	2.3d	Typically need not itemize bridge sheets; Just indicate "Design No. ____".					
General Remarks:							
	3	FIRST SHEET OF DESIGN					
	3.1	General					
-	3.1a	Project number in border, each design.					
2	3.1b	Traffic Control Note, in box.					
2	3.1c	Roadway quantities note.					
2	3.1d	Pollution prevention plan note [3.1(A)].					
-	3.1e	Repair Project: Structure design history tab. (see standard sheet 1038/M1038).					
-	3.1f	Replacement Project: Site design history tab. (see standard sheet 1038/M1038).					
	3.2	Specifications 'Note'					
-	3.2a	Correct 'Specifications' note [3.2(A)].					
-	3.2b	Supplemental specifications, developmental specifications and special provisions listed by name [3.2(B)].					
-	3.2c	Electronic copy of special provisions (if necessary) placed in the special provision turn in folder [3.2(C)].					
2	3.2d	If Standard 'G1' applies, do not duplicate.					
	3.3	Design Stresses 'Note'					
4	3.3a	Correct 'Design Stresses' note' [3.3(A)].					
4	3.3b	Correct steel fatigue case listed.					
2	3.3c	If Standard 'G1' applies, do not duplicate.					
	3.4	Quantity Tabulation					
3	3.4a	Quantity tabulation for design provided on this sheet.					
3	3.4b	Additional tabulated "Total Estimated Bridge Quantities" table for multi-design projects not required.					
2	3.4c	Tabulation title "Estimated Bridge Quantities".					
2	3.4d	Tabulation should not be broken into units (e.g. '4 Piers', '1 Superstructure', etc.); show breakdown in Estimate Reference Information for reinforcing steel, reinforcing steel epoxy coated, structural steel, and structural steel to aid in the verification of total quantities.					
2	3.4e	In reinforcing bar lists, for variable length bars, the "varies" designation should be provided in the length column in lieu of an average length.					
-	3.4f	Column in tabulation for 'As-Built' quantities.					
4	3.4g	All Item Codes and Descriptions agree with BIAS. - OK to use 'short' BIAS description and capitalized units in BIAS table.					
4	3.4h	Estimated quantities reflect addition of itemized tables in plans.					

Quality Control Plan Review Check List for Bridges and Structures

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
.	3.4i	Modified standard PPC Beam description/mark correct [3.4(A)]; reference on framing plan when required.					
4	3.4j	If the district has requested contractor testing of structural concrete use the Quality Management - Structural Concrete (QM-SC) bid items and developmental specification [3.2(B)].					
2	3.4k	Tabulation title "Total Estimated Culvert Quantities" single design project.					
2	3.4l	Tabulation title "Estimated Culvert Quantities - Design No. xx" multi-design project.					
	3.5	Estimate Reference Information Notes					
	3.5.1	All Projects					
2	3.5.1a	If seeding and fertilizing bid items are less than one acre and are the only erosion control required, they should be made incidental to other construction.					
2	3.5.1b	Item number and not the item code should designate the estimate reference information notes.					
	3.5.2	Repair Projects					
2	3.5.2a	Cost of furnishing and placing sealer in 'Bridge Floor Overlay' (typical) or 'Structural Concrete' item [3.5.2(A)].					
2	3.5.2b	Cost of epoxy coated reinforcing steel and Class D Structural Concrete in 'Retrofit Concrete Barrier Rail' item [3.5.2(B)].					
2	3.5.2c	Cost of conduit incidental to 'Retrofit Concrete Barrier Rail' item [3.5.2(C)].					
2	3.5.2d	'Temporary Barrier Rail' nominal 12'-6 units [3.5.2(D)] or combination of steel/concrete [3.5.2(E)].					
2	3.5.2e	Cost of subdrain, shoring and backfill (backwall repair and barrier rail footings) included in 'Class 20 Excavation' [3.5.2(F)].					
2	3.5.2f	Cost of preformed expansion joint filler included in 'Structural Concrete (Miscellaneous)' [3.5.2(G)]					
2	3.5.2g	Cost of preformed expansion joint filler included in 'Structural Concrete (RCB Culvert)' [3.5.2(H)]					
2	3.5.2h	Cost of all mechanical splice assemblies included in 'Epoxy Coated Reinforcing Steel' item (Include with black steel bid item if there's no epoxy coated steel bid item) [3.5.2(I)].					
	3.5.3	New Designs					
4	3.5.3a	Separate quantities for Structural Concrete, Reinforcing Steel, Epoxy Coated Reinforcing Steel and Structural Steel.					
2	3.5.3b	Cost of furnishing and placing sealer in 'Structural Concrete (Bridge)' item [3.5.3(A)].					
2	3.5.3c	Cost of subdrain and outlet in 'Structural Concrete (Bridge)' item [3.5.3(B)].					
2	3.5.3d	Cost of preformed expansion joint filler in 'Structural Concrete (Bridge)' item [3.5.3(C)].					
2	3.5.3e	If a light pole blister is included on the bridge include anchor bolts and plates in 'Structural Concrete (Bridge)' item [3.5.3(D)].					
2	3.5.3f	If precast deck panel option is used reduce 'Structural Concrete (Bridge)' item [3.5.3(E)].					
2	3.5.3g	If precast deck option is used reduce 'Epoxy Coated Reinforcing' item [3.5.3(F)].					
2	3.5.3h	Cost of conduit incidental to 'Concrete Barrier Rail' item [3.5.3(G)].					
2	3.5.3i	Cost of conduit installation incidental to 'Concrete Barrier Rail' item [3.5.3(H)].					
2	3.5.3j	'Steel Extrusion Joint with Neoprene' note [3.5.3(I)].					

Quality Control Plan Review Check List for Bridges and Structures

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
2	3.5.3k	Cost of various items in 'Macadam Stone' or 'Concrete' slope protection item [3.5.3(J)].					
2	3.5.3l	Cost of standard deck drain in 'Structural Concrete (Bridge)' if no structural steel item or quantity. Included in 'Structural Steel' if this item included exclusive of drains. Use bid item 2499--000400 (paid for as lump sum) for non-standard deck drains (Aesthetic Deck Drain Standards 1054 and m1054) [3.5.3(K)].					
-	3.5.3m	Integral abutment PPCB - Cost of bearing pads and S75x11 in PPCB items [3.5.3(L)].					
-	3.5.3n	Curved sole plates included with PPCB item [3.5.3(M)].					
-	3.5.3o	Cost of pile uplift anchors (if used) in 'Piles, Furnish Steel . . .' [3.5.3(N)]; use of detail should be last resort.					
-	3.5.3p	For Pretensioned Prestressed Concrete Beams, add coarse aggregate note [3.5.3(O)].					
	3.5.4	Steel Bridges					
2	3.5.4a	'Structural Steel' price includes bearings [3.5.4(A)].					
	3.6	General Notes					
	3.6.1	All Projects					
4	3.6.1a	All applicable 'standard' general notes (per design manual) provided. 'Non-standard' notes checked for need and do not conflict with standard specifications and standard plan details.					
-	3.6.1b	Limestone aggregate note for District 1 region projects - avoid river gravel as it has iron in it [3.6.1(A)].					
1	3.6.1c	Scrape test note provided if painted steel is to be cleaned (and/or painted) or removed. If scrape test results will not be available prior to turn-in, provide alternate note. If TCLP result (leachable) is >=5 mg/kg, paint is considered hazardous. If scrape result is >20,000 mg/kg, paint is probably hazardous. See notes [3.6.1(B)].					
2	3.6.1d	If Standard 'G1' applies, do not duplicate General Notes.					
	3.6.2	Repair Projects					
4	3.6.2a	Concrete sealer is to be applied to the vertical face and the top of the existing barrier rails. See note [3.6.2(A)].					
1	3.6.2b	'Removals, As Per Plan' note [440] provides complete listing of work included in item.					
-	3.6.2c	'Surface Raise' note [433] not used on projects with existing overlay.					
-	3.6.2d	A scrape test will not be required on the plans for expansion device repair situations. When removing bridge rails or steel beams that have paint on them, a scrape test is still required.					
	3.6.3	New Designs					
-	3.6.3a	Subdrain note (in general notes listing) is no longer required. Covered on subdrain detail sheet.					
-	3.6.3b	Do not include concrete sealer note (in general notes listing). Cover under abutment and pier notes as required.					

Quality Control Plan Review Check List for Bridges and Structures

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
5	3.6.3c	If footing will be below water table consider need for 'Excavation and Dewatering' note and companion bid item. Applicable when seal coat required. Alternative is Class 21 Excavation with cofferdam and footing constructed in the dry.					
1	3.6.3d	Ensure any geotechnical report requirements, such as waiting period between embankment construction and pile driving and/or pile points, are addressed in general notes [3.6.3(A)].					
General Remarks:							
	4	SITUATION PLAN					
	4.1	New Construction					
	4.1.1	General					
-	4.1.1a	Location information near title block. Example: (Relocated) U.S. 151 Over Maquokete River, T87N R2W, Section 36, Cascade Twp., Dubuque County, City of _____, Railroad X-ing: Federal Railroad Administration Identification No. (FRA) and Iowa crossing number. FHWA # _____ - on all bridges.					
1	4.1.1b	DNR Permit number and date (stream crossings).					
1	4.1.1c	Traffic counts for current and design year - preferred Situation Plan sheet only.					
1	4.1.1d	Hydraulic data					
-	4.1.1e	UP RR bridges, show macadam stone protection on TS&L and assume same during plan development. If UP RR asks us to change to concrete slope protection we will do so, retroactively.					
4	4.1.1f	Profile data, check for coordination with roadway design.					
	4.1.2	Plan					
4	4.1.2a	Shoulder and approach pavement widths and slopes (include foreslope) shown for main and crossing roadway, check for coordination with roadway design.					
4	4.1.2b	Horizontal curve data, check for coordination with roadway design.					
4	4.1.2c	Alignments and stationing (and equations), check for coordination with roadway design.					
4	4.1.2d	Proposed ditches and pipes shown, check for coordination with roadway design.					
1	4.1.2e	Any removals to be performed by bridge contractor designated.					
2	4.1.2f	'Face to Face of Paving Notches' dimension shown.					
-	4.1.2g	Dimensions adjusted for slope if difference between horizontal and profile grade length exceeds 1/8" (3 mm) (see design manual, Plan Preparation, Detailing).					

Quality Control Plan Review Check List for Bridges and Structures

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
4	4.1.2h	Drains called out if not shown in plan view elsewhere. Drains not positioned over berm.					
3	4.1.2i	Bridge lighting conduit, pole bases and junction boxes called out if not shown on a plan view elsewhere.					
3	4.1.2j	Test hole locations if not shown on separate soils data sheet.					
1	4.1.2k	Slope protection shown and labeled as to type.					
3	4.1.2l	Overhead clearance points shown.					
1	4.1.2m	Guardrail shown (if not installed under contract check for appropriate general note).					
3	4.1.2n	Horizontal clearances, especially for railroads, shown.					
3	4.1.2o	Existing structure(s) shown.					
-	4.1.2p	Stream or crossing highway name.					
2	4.1.2q	Subdrain not required, shown on subdrain details sheet.					
3	4.1.2r	Pertinent structures and features close enough to influence construction shown (utilities, old structures, etc.).					
1	4.1.2s	Back to back of parapets' dimension shown.					
1	4.1.2t	Length from centerline roadway left to back of parapet dimension shown.					
1	4.1.2u	Length from centerline of roadway right to back of parapet dimension shown.					
1	4.1.2v	Lengths of individual sections dimension shown.					
1	4.1.2w	Angle of skew tangent from centerline of roadway dimension shown.					
1	4.1.2x	Label headwall size and skew angle.					
2	4.1.2y	Note M608 if metric.					
	4.1.3	Longitudinal Section					
1	4.1.3a	Pier Class 20 and 21 excavation classification lines, when required.					
1	4.1.3b	Channel excavation limits w/ slopes, dimensions and elevations.					
2	4.1.3c	Following elevations labeled and shown: P.G. at CL abutment and CL pier, 'Low Step' elevation for abutment/pier, Bottom of footing, Bottom of predrilled hole for pile, Top of berm, Stream bed, Extreme or design high water, Scour.					
-	4.1.3d	Location and dimension of minimum clearance under overhead bridges. Clearance meets minimum requirements.					
1	4.1.3e	Piling description (length and type).					
2	4.1.3f	For structures with varying pier types (fixed, expansion) pier type is labeled.					
1	4.1.3g	Slope protection shown.					
1	4.1.3h	Benchmark					
1	4.1.3i	Following elevations labeled and shown: Profile grade at centerline of roadway or at centerline of survey or at office relocation centerline. Shoulder elevations. Flowlines at inlet and outlet.					
1	4.1.3j	Foreslopes labeled (3:1, etc.)					
1	4.1.3k	Dimension pavement width.					
1	4.1.3l	Dimension shoulder width.					
1	4.1.3m	Dimension roadway width.					
1	4.1.3n	Dimension distance between two centerlines of roadways.					
2	4.1.3o	Dimension fill height (Use 1' increments). <u>See Culvert Design Manual for metric conversion.</u>					
1	4.1.3p	"Anticipated settlement = ____" below view title.					
1	4.1.3q	Bell joints standard note, if necessary.					
	4.2	Repair/Overlay Projects					
	4.2.1	General					

Quality Control Plan Review Check List for Bridges and Structures

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
-	4.2.1a	Location information near title block. Example: U.S. 151 Over Maquoketa River, T87N R2N, Section 36, Cascade Twp., Dubuque County, Maint. No. 3609.9S137, Railroad X-ing: Federal Railroad Administration No. (FRA) and Iowa crossing number. FHWA # _____					
-	4.2.1b	Traffic counts for current year (or on title sheet).					
	4.2.2	Plan					
1	4.2.2a	Alignments and stationing.					
-	4.2.2b	'Face to Face of Paving Notches' dimension shown.					
1	4.2.2c	Bridge and curb/rail width.					
-	4.2.2d	Highway name shown.					
3	4.2.2e	Legend of work to be performed.					
1	4.2.2f	Back to Back of Parapets' dimension shown.					

General Remarks:

5		STAKING DIAGRAM - NEW CONSTRUCTION	General Reference	Yes	No	N/A	Notes
Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
5	5a	Provide for curved alignments, alignments that do not coincide with CL bridge (dual roadways), bridges with special widths (climbing lanes, tapers, etc.).					
2	5b	Dimension gutterline at abutment. Note skew of gutterline at abutment relative to structure baseline (or other logical control line) if appropriate.					
2	5c	C.L. Bridge shown on plan and referenced (dimensioned) to baseline.					

General Remarks:

6		SUBSTRUCTURE - GENERAL - NEW CONSTRUCTION	General Reference	Yes	No	N/A	Notes
Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
1	6a	Pile information for each substructure unit noted adjacent to piling layout. To include type.					
4	6b	Actual design bearing shown for pile, not maximum allowable bearing [6 (A)].					
4	6c	Driving resistance (including resistance in and above the compressible layers) shown for pile if downdrag was considered in design (see soils report). Include note [6 (B)].					
4	6d	Prestressed concrete pile: Tip-out soil layer blow count 25 to 40 and no boulders.					
-	6e	Pile lengths rounded to 5' (1.5 m) intervals.					

Quality Control Plan Review Check List for Bridges and Structures

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
-	6f	Battered and vertical pile for a substructure unit specified same length (typically). If a drilled shaft foundation is used, "Special Provisions for Concrete Drilled Shafts" must be referenced on the first sheet of design under the specifications note [3.2 (C)].					
1	6g	Anchor bolts set in drilled holes (per standard specifications - 2405.09) if at all possible. When placing anchor bolts, avoid longitudinal bars in the cap.					
-	6h	If least dimension of any concrete unit is greater than 6' (1.8 m), the special provision regarding control of heat of hydration is considered.					
2	6i	Show the "Low Step" elevation for all substructure units.					
2	6j						

General Remarks:

7		PIER DETAILS - NEW CONSTRUCTION					
Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
	7.1	General					
-	7.1a	Only one 'set' of pier notes provided in design to avoid duplication.					
4	7.1b	For piers with expansion device include note regarding concrete sealer [7.1(A)].					
3	7.1c	On pier plan view and footing plan view dimensions are tied into the bridge construction baseline and the baseline is labeled appropriately. Coordinate with 'Staking Diagram' or 'Foundation Layout.'					
3	7.1d	Pier reinforcing marks conform to The Office of Bridges and Structures pier detailing practice [7.1(B)].					
2	7.1e	For the piers, if the top of cap keyway is not shown in the pier cap plan, place a note in the pier notes to refer to the design sheet where the keyway is shown (generally standard sheet 4503/m4503, superstructure details).					
	7.2	Cap					
4	7.2a	Pier step reinforcement provided, including hairpins at all beam lines, except low step.					
4	7.2b	Cap reinforcement epoxy coated if under expansion device.					
5	7.2c	Minimum of 5" (125 mm) clear space between rebar provided for tremie.					
	7.3	Column					
-	7.3a	Column reinforcement epoxy coated if within 30' (9 m) clear distance from edge of travel lane or under expansion device.					
-	7.3b	Corrosion inhibitor in lieu of epoxy coated reinforcing is not permitted [7.3(A)].					
4	7.3c	Crashwall for RR overpass (check T.S.L., generally provided if center track to face column is less than 25' (7.6 m))					
-	7.3d	Spiral ties shown for typical circular column (non-spirally reinforced, 12" (300 mm) spacing).					
-	7.3e	Column tie substitution note (circ. ties for spiral) and bar detail included (12" (300 mm) spacing).					

Quality Control Plan Review Check List for Bridges and Structures

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
2	7.3f	Spacing of vertical bars in round column provided.					
-	7.3g	Round column diameters, use soft conversion for metric projects (3'-0=910 mm, etc.). Column diameter specified in 6" increments.					
1	7.3h	Keyway shown at top and bottom of column and labeled as to size and type.					
4	7.3i	d1, column bars and d2, column to footing bars, should be same size.					
	7.4	Footing					
4	7.4a	Perimeter pile battered. [7.4(A)].					
2	7.4b	Note if battered pile used: "Pile dimensions shown are at bottom of footing. Batter piles X:1 in the direction shown".					
	7.5	Pile Bent					
-	7.5a	Appropriate pile type provided based on blow count, >30 (>20 very firm glacial clay) H-Pile required - see Design Manual.					
-	7.5b	Pile size appropriate for unsupported length.					
General Remarks:							
	8	ABUTMENT DETAILS - NEW CONSTRUCTION					
Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
	8.1	General					
-	8.1a	No measurement/payment note regarding subdrain ("Furnishing and placing"). This is covered on subdrain details sheet.					
-	8.1b	Only one 'set' of abutment notes required in design to avoid duplication.					
2	8.1c	'Abutment Berm Detail' provided. 'Subdrain Details' referenced for subdrain and backfill information shown on this detail. Coordinate with Sect. A-A on subdrain details sheet [8.1(A)].					
2	8.1d	Note on abutment standard sheets modified to read "Backfill behind the abutment between wings is to be as shown on the Subdrain Details sheet. The remainder ...". See item above for additional information.					
3	8.1e	On 'Part plan at abutment' and 'Abutment pile plan' beam and pile spacing (as appropriate) is tied into the bridge construction baseline and the baseline is labeled appropriately.					
	8.2	Stub Abutments					
2	8.2a	Stagger pile between front and back rows to maximize clearance between piles.					
2	8.2b	Pile batter indicated (typically 4:1).					
4	8.2c	Abutment step reinforcement provided.					
4	8.2d	For stub abutments include note regarding concrete sealer [8.2(A)].					
	8.3	Integral Abutments					
2	8.3a	Is pile pre-bore required and if so noted in the appropriate place in the plans (bid-item included in integral abutment quantities table, on long. section of situation plan).					
-	8.3b	Constraints for use of integral abutments within bridge parameters.					
-	8.3c	Abutment step reinforcement not required (m and n bars).					

Quality Control Plan Review Check List for Bridges and Structures

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
-	8.3d	CWPG Superstructure: Beam end reinforcing bars per design manual shown.					
-	8.3e	Integral abutment standards 2078-2084 (M2078-M-2084) show timber piling. Verify that is consistent with the piling design recommendations and revise the standard drawing if a different pile type is used.					

General Remarks:

--	--	--	--	--	--	--	--

9		SUPERSTRUCTURE DETAILS - GENERAL - NEW CONSTRUCTION					
Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
	9.1	Typical Section					
1	9.1a	Drain details included.					
2	9.1b	Drain note specifies cost in 'Structural Concrete' or 'Structural Steel' as appropriate. See estimate reference information.					
3	9.1c	Beam spacing is tied into the bridge construction baseline and the baseline is labeled appropriately.					
5	9.1d	Permissible longitudinal construction joint generally provided for deck width >44' (13.4m). Label "Permissible".					
5	9.1e	If anticipated dead load deflection greater than 2" (50 mm), closure pour required with longitudinal joint.					
4	9.1f	Minimum closure pour width shall be the greater of 3 ft (900 mm) or the splice length plus 4" (100 mm). Closure pours should be placed in areas with constant cross slope in the bridge deck. Closure pours over beams should be avoided.					
4	9.1g	If longitudinal construction joint provided (either permissible or mandatory), transverse reinforcing bars are spliced at joint and weight of splice included in quantity					
4	9.1h	If transverse reinforcing bars will be > 40' (12.1m) and no longitudinal construction joint is shown on plans, transverse reinforcement splice note included. See Std. Sht. 4310/M4310.					
-	9.1i	Table of 'b2' bars (PPCB) from standard drawing not shown (this is for information only).					
1	9.1j	For both standard and non-standard, non-varying bridge widths, show the cross-sectional area of the bridge deck listed on the plans within a box [9.1 (A)].					
-	9.1k	Negative moment reinforcing over piers needs to be designed based on AASHTO Standard Specifications for span lengths greater than 105 ft (32 m). (Note: Check that the standard is modified) [9.1 (B)].					
-	9.1l	For steel bridges remove shear stud note from standard cross section drawing superstructure notes [9.1(C)].					
	9.2	Deck Layout					
1	9.2a	Deck placement sequence shown (if required) with applicable notes.					

Quality Control Plan Review Check List for Bridges and Structures

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
-	9.2b	Deck placement sequence consistent with IA/DOT practice - address uplift concerns if they exist. Pour positive moment sections first, then negative.					
-	9.2c	Proper transverse joint type shown (skewed when ≤ 7.5 deg., stepped when > 7.5 deg.). Skewed 'Alternate Transverse Construction Joint' shown with stepped joint.					
1	9.2d	Both longitudinal and transverse construction joint details provided if a stepped transverse construction joint is shown.					
2	9.2e	Longitudinal dimensions labeled as 'Out to Out of Slab'.					
1	9.2f	Longitudinal construction joint shown (if applicable)					
1	9.2g	Transverse and longitudinal slab reinforcing layout details adequate.					
-	9.2h	For variable width bridges, vary lap splice for transverse bars rather than vary length of transverse bars. However, minimize number of different bar lengths.					
	9.3	Slab Elevation Layout					
2	9.3a	Format of diagram consistent with IA/DOT practice.					
2	9.3b	Spacing provided for deck elevations along C.L. of beam (8' to 10' (2.4 m to 3.0 m) range preferred).					
5	9.3c	Steel bridge deck elevations correspond with the deflection information provided.					
2	9.3d	Transverse elevations provided at the centerline of bearings but not the centerline of pier, (unless the centerline of the bearings corresponds with the centerline of the pier).					
5	9.3e	Deck elevations provided along the centerline of approach roadway, all beam lines, each gutter line and longitudinal construction joint if required.					
1	9.3f	Included new beam line haunch elevation sheet for both PPCB and steel girder bridges.					

General Remarks:

10 SUPERSTRUCTURE DETAILS - CWPG - NEW CONSTRUCTION							
Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
	10.1	Framing Plan					
-	10.1a	Dimensions adjusted for slope - element lengths only - not horizontal lengths.					
	10.2	Girder Details					
-	10.2a	For metric plates, main steel plates (top flange, web and bottom flange) should be shown in hard metric dimensions. All other misc. plates (stiffener plates, splice plates, etc.) should be shown in soft metric sizes rounded to the nearest tenth of a millimeter.					
-	10.2b	Shear stud diameter 7/8" (22.2 mm - metric projects).					
2	10.2c	Part plan view of stiffener details provided.					
-	10.2d	Weld for flange to web noted as "Continuous Submerged Arc Welding".					

Quality Control Plan Review Check List for Bridges and Structures

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
-	10.2e	Shear stud height varies with top flange thickness. As a general rule, use 4" (100 mm) in negative moment region and 5" (125 mm) in positive moment region. Typically set 0" haunch @ piers. Studs should be 2 1/2" (63 mm) minimum into slab, but no higher than 4 1/2" (114 mm) into slab. Studs should be 4" (100 mm), 5" (125 mm), or 6" (150 mm) (i.e. no 1/2" (12.5 mm) incremental length).					
-	10.2f	Intermediate girder termination cross beam has shear studs (dropping girder line).					
4	10.2g	'Weathering Steel Notes' includes provision for steel embedded in integral abutment. ALL PIECES COMPRISING THE [ABUTMENT AND] PIER BEARINGS SHALL COMPLY WITH THE REQUIREMENTS AS STATED IN THE NOTES ON DESIGN SHEET(S) x (& x).					
-	10.2h	Flange width increase clipped 45 degrees at bolted splice, ground to radius at weld.					
-	10.2i	If flange plate size is increased exclusive of a bolted connection, request that analysis be made using larger plate between bolted connections and add appropriate note regarding substitution [10.2(A)].					
-	10.2j	Top/bottom flange radiographed note for butt splice - label tension zone.					
-	10.2k	Proper cross sectional dimensions used for metric steel elements [10.2(B)].					
2	10.2l	A325 7/8" (22.2 mm) diameter bolts are typical.					
-	10.2m	Bolt clearance issue - plate size off plan - quantities based on AASHTO.					
-	10.2n	Preferred maximum girder length between splice points 120' (36.6 m).					
	10.3	Welding Details					
-	10.3a	Proper details for Case I or II fatigue criteria used.					
	10.4	Superstructure Details					
2	10.4a	Floor drain extension connected to beam with two braces on all steel bridges.					
-	10.4b	Flange deflector detail provided. Flange deflector connects to bottom flange with bolts through flange and angle - weathering steel bridges only. Standard sheets 1021 and m1021 have been revised. The deflector uses 3/4" (19.0 mm) bolts in lieu of the standard 7/8" (22.2 mm) bolts.					
-	10.4c	Correct bearing specified based on reaction.					
4	10.4d	Table of rocker and expansion joint settings included.					
4	10.4e	For bridges with closure pours the bracing in the bay to have the closure pour is to be installed after the second stage has been poured and prior to placing the closure pour. The bolt holes shall be field drilled in the cross bracing members to provide allowances for fit up of the diaphragms.					
	10.5	Deflection Diagram					
2	10.5a	Format of camber, haunch and dead load deflection diagrams consistent with Design Manual. Typically interior girder only shown unless unusual circumstances.					
-	10.5b	Label "Girders As Fabricated With Webs Horizontal."					
-	10.5c	For 'Girders As Fabricated' diagram 'Keep' dimensions (measured from 'chord between abut. bearings') provided at all bearings (including '0 Keep' noted at abutments).					
-	10.5d	Dimension from 'chord between abutment bearings' to 'top of web' shown as an individual value at the midpoint and ends of each girder segment (segment is considered end to splice or splice to splice) [10.5(A)]					

Quality Control Plan Review Check List for Bridges and Structures

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
-	10.5e	Dimension from both 'chords' to 'xx of web' shown at midpoint of parabolic camber.					
-	10.5f	Moment and reaction table, consistent with IA/DOT practice, included in plans.					
3	10.5g	Locations of the dead load deflection values should correspond to the deck elevation locations.					
General Remarks:							
11 SUPERSTRUCTURE DETAILS - PPCB - NEW CONSTRUCTION							
Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
	11.1	Framing Plan (If Provided)					
3	11.1a	Dimensions adjusted for slope - element lengths only - not horizontal lengths.					
	11.2	Superstructure Details					
-	11.2a	Appropriate intermediate diaphragm type used (concrete for road overpass, steel all others); steel for bulb tee beams (see below).					
-	11.2b	Intermediate diaphragm details, do not use the note from standard sheet M1036A ("At locations under longitudinal bridge floor . . .") when a longitudinal joint is not permitted.					
-	11.2c	Intermediate diaphragms shall be placed at the ¼ points when using a Bulb Tee beam (i.e. spans greater than or equal to 120 ft.). When using the 72 inch (1800 mm) bulb-T prestressed beams, the appropriate intermediate diaphragm shall be used [11.2 (A)].					
2	11.2d	Slab thickness of 8" (200 mm) with 1/2" (15 mm) minimum haunch typical [11.2 (B)].					
-	11.2e	For spans longer than 105 ft (32 m), an analysis should be performed for the negative steel in the slab based on AASHTO Standard Specifications 9.7.2.3 [11.2 (C)].					
4	11.2f	For bridges including a precast deck panel option check the use of precast deck panels is allowed and include the precast note below the Total Estimated Quantities Tabulation [11.2 (D)].					
-	11.2g	For prestressed concrete beam bridges with intermediate concrete diaphragms, the diaphragm shall not be placed in the bay where the closure pour is to be placed.					
4	11.2h	For prestressed concrete beam bridges with steel intermediate diaphragms, the diaphragm bolts used in connecting the channel to the bent plate shall remain loose until the second stage has been poured then tightened before the closure pour.					
-	11.2i	Appropriate bearing used (per Design Manual): Fixed; <=2% grade, neoprene pad >2% grade tapered neoprene pad or curved sole plate. Expansion (working); laminated neoprene pad where rotation limits allow, neoprene pad with curved sole plate otherwise.					

Quality Control Plan Review Check List for Bridges and Structures

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
-	11.2j	Appropriate sole plate detail and material used based on case (per Design Manual). Case 1, P<410k, ASTM A 852 (A 852M); Case 2, P>410k, ASTM A 709, Grade 70W (A 709M, Grade 485W), flat plate welded to curved sole plate.					
	11.3	Beam Details					
2	11.3a	Current 'Strand Projection at Beam Ends' detail used, with strands upward.					
-	11.3b	Non-Standard beam details/notes reviewed with appropriate staff for need and adequacy.					
4	11.3c	Shear reinforcing modifications provided for haunch >2" (50 mm).					
4	11.3d	Required vent holes provided (stream crossings, per T.S.L.)					
-	11.3e	General notes from the beam standard sheets starting with 'If . .' reviewed for applicability. If applicable, delete the 'implied option' portion of the note (Ex. "If the steel diaphragm option is allowed and used"). If not applicable, note is not used.					
-	11.3f	General note from the beam standard sheet "The portions of the prestress beams that are to be embedded . . ." reviewed for applicability (abutment?, pier?)					
-	11.3g	Modified standard beam mark is consistent with bid item description [3.4(A)].					

General Remarks:

12 DETAILS - REPAIR/OVERLAY PROJECTS							
Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
	12.1	General					
2	12.1a	Existing conduit shown and labeled on typical section.					
3	12.1b	Typical section indicates cross slope of deck.					
3	12.1c	Adequate details provided to define location and scope of concrete repair work.					
4	12.1d	Overlay: Correct number of drains noted for 'Floor repair detail at drains.'					
3	12.1e	Overlay: Classification line shown correctly for bridges with existing overlay. Classification line will be 1/4" (5 mm) below the top of the original bridge deck.					
	12.2	Temporary Barrier Rail					
4	12.2a	Notes, first sentence modified to reflect RE-71/72 standard (standard sheets 1047/M1047 and 1048/M1048 no longer used) [12.2(A)].					
4	12.2b	Reduced width signing plan provided if lane width less than 12' (3.6 m) [12.2 (B)].					
4	12.2c	'F-Shape' used for minimum lane 12'-6 (3.8 m) interstate mainline, 10'-6 (3.2 m) primary. H-Pile section used when these minimums cannot be provided.					
4	12.2d	Traffic lane and work area widths shown on rail layout plan. Correct lane width shown on standard sheet 1049/M1049 note. Traffic lane width should be noted as 'minimum.'					
	12.3	Backwall Repair/Barrier Rail Footings					

Quality Control Plan Review Check List for Bridges and Structures

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
3	12.3a	Detail specifying limits of Class 20 excavation and backfill materials provided.					
2	12.3b	Backwall: Note specifying that subdrain and backfill included in Class 20 excavation [12.3(A)].					
2	12.3c	Barrier Footings: Note specifying that end section excavation is backfilled with special backfill [12.3(B)].					

General Remarks:

13		BARRIER RAIL					
Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
	13.1	New Construction					
3	13.1a	Electric conduit shown.					
-	13.1b	Use "51 mm" conduit.					
-	13.1c	Remember special 3'-8 (1120 mm) rail for UP RR bridges.					
-	13.1d	UP RR bridges, assume 10:1 transition for barrier rail, as taller rail is required.					
-	13.1e	UP RR bridges, do not add fence (splashboard) unless UP RR says that we must.					
4	13.1f	For bridges with super elevations >2%, level the low side of the rail and keep high side of the rail perpendicular to the deck slab (i.e. on same superelevation) for "Jersey type" rails only. Details should be drawn accordingly.					
4	13.1g	For "Aesthetic Barrier Rail" (Jersey type), add extra d1 bars. Also, c3 bar should be shown bent into wingwall. See note and detail [13.1 (A)].					
	13.2	Repair/Retrofit					
-	13.2a	See Design Manual.					

General Remarks:

14		EXPANSION DEVICE					
Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
	14.1	General					
3	14.1a	Note "Temperatures shown are concrete deck temperatures on the underside or shaded portion of the deck".					
-	14.1b	"Or approved equal" indicated in table of approved devices.					
-	14.1c	Latest designation for glands and extrusions shown.					
-	14.1d	For skew >30 deg. only Watson Bowman and D.S. Brown glands listed.					

Quality Control Plan Review Check List for Bridges and Structures

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
	14.2	Repair/Retrofit					
1	14.2a	Extrusion field splice detail included.					

General Remarks:

15 SUBDRAIN/SLOPE PROTECTION DETAILS							
Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
	15.1	Subdrain Details					
2	15.1a	Show subdrain bent around wingwall footings.					
4	15.1b	Proper 'Section B-B' from standard sheet 1007/M1007 selected.					
2	15.1c	Included note when subdrain placed at base of berm: "See Slope Protection Plan For Additional Details."					
	15.2	Slope Protection Details					
.	15.2a	Std. Sht. M1006, References to subdrain details should be made to 'subdrain details', not the 'situation plan'.					
2	15.2b	Std. Sht. M1006, 'Furnishing and placing subdrain' not listed under "Items to be included in slope protection".					
2	15.2c	Std. Sht. M1006, delete sentences at end of general notes describing drain outlets. Last sentence should read "The bridge contractor is to install subdrains at the toe of the bridge berms as detailed on this sheet and as shown on the subdrain details plan."					

General Remarks:

16 LIGHTING DETAILS							
.	16a	Standard sheet modified to reflect the work to be performed to include: - Elimination of details for conduits not provided (underdeck, sign, etc.) - Modification of elevation and plan views to reflect abutment type. -Elimination of light pole bases and expansion fitting details if not used.					
4	16b	Add another sheet to show elevation view of conduit along bridge.					
.	16c	Prefer to not transfer conduit details on Situation Plan, as it becomes to cluttered. Include boxed note on Situation Plan to say, "See design sheet ____ for lighting conduit layout details." Show details instead on added sheet depicting elevation view of bridge.					
2	16d	When installing light pole conduit to multiple bases along the bridge, 1" (25 mm) conduit is shown coming into pole base from both directions along bridge in plan view of pole base.					

Quality Control Plan Review Check List for Bridges and Structures

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
-	16e	Check that standard sheet 1030A/M1030A latest edition is being used (revised 9/6/01). Conduit is no longer a bid item and is incidental to barrier rail construction.					
General Remarks:							
	17	AESTHETICS					
Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
2	17a	Deck drain standard detail sheets 1054/M1054 used for bridges including aesthetic details.					
General Remarks:							
	18	ROADWAY PLANS					
Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
2	18a	Erosion Control, including seeding and mulching, bid items (ALL projects) - do not include as incidental items.					
4	18b	Traffic control bid items (all projects where required by traffic control plan).					
4	18c	Traffic control plan current and acceptable to Office of Design.					
4	18d	PPP current, consistent with grading plan and acceptable to Office of Design.					
General Remarks:							
	19	ROADWAY PLANS					
Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
	19	Details - Repair/Extension Projects					
	19.1	General					
4	19.1a	For an existing culvert that is being extended and the headwall is at a skew to the culvert (not perpendicular) the culvert is "not" to be squared up. The headwall is to be removed but the proposed culvert is to be attached along the skew line.					
4	19.1b	If an existing culvert is being extended at a different skew, a minimum 3' (900 mm) section is to be attached to the existing culvert prior to the proposed bend.					
4	19.1c	If an existing culvert is non-standard, it is to be extended with the same size non-standard culvert (assuming an RCP would not work).					

Quality Control Plan Review Check List for Bridges and Structures

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
1	19.1d	Adequate details provided to define location and scope of concrete repair work.					
5	19.1e	Proposed flowable mortar RCB culverts for bridge replacement should allow a minimum of 3' (900 mm) vertical clearance and 2.5' (760 mm) side clearance for constructability.					
	19.2	Temporary Barrier Rail					
3	19.2a	Notes, first sentence modified to reflect RE-71/72 standard (standard sheets 1047/M1047 and 1048/M1048 no longer used) [12.2(A)].					
4	19.2b	Reduced width signing plan provided if lane width less than 12' (3.6 m) [12.2 (B)].					
4	19.2c	F-Shape' used for min. lane 12'-6" (3800 mm) interstate mainline, 10'-6" (3200 mm) primary. H-Pile section used when these minimums cannot be provided.					
4	19.2d	Traffic lane and work area widths shown on rail layout plan. Correct lane width shown on standard sheet 1049/M1049 note. Traffic lane width should be noted as 'minimum.'					

General Remarks:

20		ROADWAY PLANS					
Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
	20	RCB Culverts					
	20.1	General					
4	20.1a	If fill exceeds maximum used for standards, check that culvert program has been run and output matches values on plan. If metric culvert, check that program output <u>has</u> been converted properly.					
1	20.1b	Check that fill height is included in general notes. Design assumption is that floor of culvert is not placed on bedrock.					
4	20.1c	When using a non-standard barrier, the bell joint sheet must also be modified.					
4	20.1d	Check for appropriate use of bell joints. If flume, include bell joints at junction of culvert end barrel section and flume. If tapered inlet, include a bell joint at junction of tapered inlet and culvert barrel section.					
4	20.1e	Prefer to use "granular material for blanket and subdrain" when a granular blanket is necessary.					
3	20.1f	Do not use the term "working" with blankets.					
1	20.1g	Check if openings for pipes, or weepholes are necessary.					
4	20.1h	Bends located internal to section, not at joint locations.					
4	20.1i	End section minimum/maximum lengths per Design Manual.					
4	20.1j	Avoid joints below centerline of roadway, if possible.					

General Remarks:

Appendix D

Plan Quality Assurance Reports Samples



Revision Date: 6/20/2003

QA/QC code

County: _____ Project No.: _____
 Project Description: _____
 Project Engineer: _____ Reviewer: _____ Date: _____
 Organization: _____

- 1 - Complete
- 2 - Consistent
- 3 - Clear
- 4 - Correct
- 5 - Constructible

Quality Assurance Plan Review Checklist for Road Plans

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
Complete The ability to construct a project based solely on the information provided in the plans and specifications without field corrections for plan errors, omissions, or conflicts.							
1	General 7	Are erosion control features (typicals, bid items, detail sheets, etc.) provided to protect sensitive areas?	DM, 10C-1				
1	A 5	Are the appropriate Standard Road Plans included with the correct dates?	DM, 1F-1 & Tab 105-4 Consultants, check wkeeb site.				
1	A 12	Are existing utilities identified in the legend and properly shown on plan sheets?	DM, 1F-3				
1	A 13	Legend sheet: Are contacts listed for the utilities?	DM, 1F-3				
1	B 1	Is every road template defined with a typical?	Design Details Manual				
1	B 2	Are all ditching, backslope, culvert, and other appropriate typicals included?	Design Details Manual				
1	B 5	Are existing pavement details specified and accurate, including reinforcement?	As Built or PMIS				
1	B 6	Are all appropriate paving typicals included?	Design Details Manual				
1	B 7	Are curb and paved shoulder typicals included?	Design Details Manual				
1	B 8	Are pavement marking typicals included?	Design Details Manual				
1	B 11	Are all the shoulders defined on the shouldering typicals?	Design Details Manual				
1	B 15	Is the pavement header typical needed and included?	Typical 7101 or 7102				
1	C 5	Do the reference notes match the quantities?					
1	C 6	Do the bid item reference notes refer to the correct tabs, sheets and other supporting information?					
1	C 8	Are bid items included for all tabulations that are not incidental?					
1	C 9	Are references to tabulation sheets shown?					
1	C 10	Are all required standard notes included?	Design Details Section 200				
1	C 15	Did Roadside Development review the plans for erosion control / seeding?					
1	C 20	Are tabs from others included and split for stage construction?					
1	C 22	Are subdrains included?					
1	C 23	Is there a tab for existing tile lines that need to be reconnected?					
1	C 24	Was mobilization included?					
1	C 25	Is construction survey needed?	Ask RCE				
1	C 26	Is a field office/lab needed?	Ask RCE				
1	C 28	Is the pollution prevention plan included?	DM-10D-1				
1	C 34	Is the circular curve data table included?	Tab 101-9				
1	C 35	Are all points of access listed and tabulated?	Tab 102-1 or 102-3				
1	C 36	Are safety and hazard closures tabulated?	Tab 108-13A				
1	D 4	Are all entrances shown in the plan and profile?					
1	D 12	Is the township and range shown on each sheet?					

Quality Assurance Plan Review Checklist for Road Plans

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
1	E 4	Are all entrances shown in the plan and profile?					
1	E 8	Are all pipes drawn and labeled in the plan view? Check tab.					
1	F 1	Refer to checklist items for D and E sheets?					
1	G 1	Are alignment coordinates tabulated?	Tab 101-16				
1	G 2	Is curve data tabulated?	Tab 101-17				
1	K 2	Are edge profiles for the K sheets provided?					
1	L 3	Are edge profiles for the L sheets provided?					
1	L 4	Are pavement widths labeled?					
1	M 1	Are other utilities shown and identified?					
1	W-Z 6	Are cross road pipes shown?					
1	W-Z 7	Are entrances and pipes (if any) shown?					
1	W-Z 8	Are guardrail blisters shown on the cross sections?					

General Remarks:

Consistent The degree to which contract plans and other contract documents convey the same intent. In addition, the format of the plans conform to the Iowa DOT's guidelines i.e., design manual, survey notes, plan content, estimates, drafting standards, etc.

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
2	General 1	Is the presentation of the plan consistent with the requirements?	DM, Chapter 13 (future)				
2	A 4	Do the index of sheets match the sheets included?	DM, 1F-1 & Tab 105-3				
2	A 6	Is the project length correct, and does it match the plans?	DM, 1F-1 & Tab 105-1				
2	B 9	Do cross sections match the typicals?					
2	B 12	Do the shoulders shown on the cross sections match the typical?					
2	B 16	Are modifications to typicals explained?					
2	C 1	Are all pay items covered by a Specification, plan detail, Special Provision, Supplemental Spec, or Developmental Spec?					
2	C 2	Are the units for each item consistent with the Method of Measurement and Basis of Payment included in the Specifications?					
2	C 21	Is topsoil bid and tabbed as required by the replacement policy?	Design Manual 10A-1				
2	C 30	Are the traffic control requirements coordinated with other project in the vicinity?					
2	D 8	Are all pipe drawn and labeled in the plan view? Check tab.					
2	D 9	Does the ditch bar and grades match the cross sections?					
2	D 15	Does profile match cross section? Check once for each sheet.					
2	E 9	Does the ditch bar and grades match the cross sections?					

Quality Assurance Plan Review Checklist for Road Plans

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
2	E 15	Does profile match cross section? Check once for each sheet.					
2	T 1	Do the T Sheets match the earthwork balances?					
2	W-Z 3	Is the profile grade on the cross sections the same as the profile grade on the plan and profile?					
2	W-Z 4	Is the profile grade tie point at the correct location. EOP etc....					

General Remarks:

Clear The ability to easily read and understand the intent of the plans and special provisions.

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
3	General 2	Are the plans legible throughout?					
3	General 9	Do all plotted sheets show current date stamp, directory and file name, is the design team, county, project number, and sheet number shown correctly?					
3	A 15	Is a large location map included? Should it be?	DM, 1F-1 or 1F-2				
3	C 7	Are incidental items clearly referenced to a specific bid item?					
3	C 19	Has ownership of stockpiles and salvaged materials been addressed?					
3	C 31	If traffic control or staging notes are not in the C sheets, are they cross referenced?					
3	D 2	Are all equations clearly labeled?					
3	D 3	Are side road tie-ins clearly labeled?					
3	D 6	Is shading effective in distinguishing features?					
3	D 7	Is the beginning and end of the work clearly labeled?					
3	D 11	Are there scale blocks and north arrows on each sheet?					
3	D 16	Are other sheets (side roads, ramps, detour, situation plans) cross referenced?					
3	D 21	Is bar added for non-standard backslopes?					
3	E 2	Are all equations clearly labeled?					
3	E 3	Are tie-ins clearly labeled?					
3	E 6	Is shading effective in distinguishing features?					
3	E 7	Is the beginning and end of the work clearly labeled?					
3	E 16	Are other sheets (ramps, detour, etc) cross referenced?					
3	H 1	Are separate sheets needed to clarify the right of way information?					
3	L 6	Are scale blocks and north arrows shown on each sheet?					
3	U 1	Are any unusual design features clearly shown?					

Quality Assurance Plan Review Checklist for Road Plans

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
3	W-Z 9	Is the correct roadway description shown in the top right corner?					
3	W-Z 11	Are skewed cross sections labeled as such?					

General Remarks:

Correct Minimal variation between the estimated item quantities and the actual quantities needed to perform work. Identifies problems with large overruns and/or under runs. Rating should not reflect quantity changes due to plan changes made after plan turn in.

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
4	General 3	Have copies of applicable agreements been requested from OLE and Local Systems?					
4	General 4	Have specific requirements of project agreements been included in the plans?					
4	A 1	Is The road system correct?					
4	A 7	Are division breaks needed and shown?	DM, 1F-1				
4	A 8	Do the beginning and ending stations match the D Sheets?					
4	A 9	Does the total number of sheets at top = the hand count of sheets?					
4	A 10	As much as practical, does the map accurately show the project?					
4	A 11	Is Tab 101-4: filled out and up to date? Check ESALS for all HMA projects against numbers given in letter file.					
4	A 14	Are equations shown on the location map?	DM, 1F-2				
4	B 3	Are current typicals being used?	Consultants check website				
4	B 10	Was a resurfacing thickness used for extra subgrade width?					
4	B 13	Is the earth shoulder fill per station calculated with a % of shrink?	Typ. 7110, 7111, 7112, 7113				
4	B 14	Are asphalt and tack rates correct for HMA?	Pavement Determination Letter				
4	C 3	Check all quantities, no exceptions!!					
4	C 4	Are bid items separated by divisions?	DM 1F-1, Tab 100-0A thru 1C				
4	C 11	Does the earthwork match the balances and T sheets?					
4	C 12	Is the silt fence tabulated and an extra percentage added for maintenance?	DM 10C-1, Tabs 100-17, 18, 19				
4	C 13	Are the intercepting ditches needed and tabulated?	Tab 100-16, Typ 4104				
4	C 14	Are silt basins needed? Are they tabulated? Is an item provided?	DM 10C-1, Tabs 100-14, -19				
4	C 16	Is guardrail tabbed with the most current method and end treatments?	DM Chap 8, Tab 108-8A, B, -19				
4	C 17	Is surfacing for all roads accounted for?	DM 7C-1				
4	C 18	Are subgrade treatments accounted for?					
4	C 32	Are the pipes by road contractor tabulation completed?	Tab 104-3				
4	C 33	Culverts by Culvert Contractor tabulation completed?	Tab 104-4				
4	C 37	Is Clearing and Grubbing to be bid? Units and/or Area? Area shown in plans?	Spec 2101.03.B				

Quality Assurance Plan Review Checklist for Road Plans

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
4	D 17	Are edge of pavement lines shown correctly, dashed for granular etc.					
4	D 22	Are ROW and easements with calls shown properly?					
4	D 23	Are existing property lines and owners correctly labeled?					
4	D 25	Are balances shown and consistent with "T" sheets?					
4	D 27	Are division breaks needed and shown?					
4	E 17	Are edge of pavement lines shown correctly, dashed for granular etc?					
4	E 24	Are balances shown and consistent with "T" sheets?					
4	E 26	Are division breaks needed and shown?					
4	F 4	Are balances shown and consistent with "T" sheets?					
4	K 1	Refer to checklist items for D and E sheets?					
4	L 1	Are edge of pavement lines shown correctly, dashed for granular etc.					
4	L 2	Are the areas for returns shown in the plan view or on a tabulation?					
4	L 5	Are stop sign island details included?					
4	L 7	Are all joints labeled correctly?	DM, Sections 7A-2, -3, -4, & -5				
4	L 8	Do stations, offsets, elevations, etc. match for plan and profile?					
4	Q 2	Has there been a review for settlement plates, flatter foreslopes and other features affecting bid items, cross sections, or design?					
4	W-Z 2	Are bridge berms drawn correctly in the cross-section view both for the mainline and side road?					
4	W-Z 5	Was a resurfacing thickness used?					
4	W-Z 10	Are all special ditching, ditch grades, etc labeled correctly?					

General Remarks:

Constructible The ability to construct a project in an orderly and logical manner while accommodating traffic within the project limits during construction based on the information provided by the plans, specifications, and other project documents. (Note changes made due to the contractor's preference should not be reflected in this rating.)

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
5	General 8	Is all information necessary to complete construction staking clearly indicated on typicals, D, E, and G sheets, and cross sections?					
5	C 27	Is saw cut for straight edge along existing pavement needed for detour tie-in?					
5	C 29	Are traffic control notes properly sequenced, constructible and complete?	Design Manual, Chapter 9				
5	D 5	Is there access to all properties that have closed access?					
5	D 10	Does the drainage work? Follow the water along all roadways.					
5	D 14	Does the profile tie smoothly to the existing road? Check elev. shots.					

Quality Assurance Plan Review Checklist for Road Plans

Code	Sheets	Items to Check	General Reference	Yes	No	N/A	Notes
5	D 18	Have the ROW lines been compared to required construction limits?					
5	D 19	Are dikes noted and properly shown?					
5	D 20	Do the culvert and drainage notes indicate "Install," "Remove," or other disposition?					
5	D 26	Are staging details noted and labeled correctly?					
5	E 5	Is there access to all properties that have closed access?					
5	E 10	Does the drainage work? Follow the water along all roadways.					
5	E 14	Does profile tie smoothly to the existing road? Check elev. shots.					
5	E 18	Have the ROW lines been compared to required construction limits, especially at intersections?					
5	E 19	Do the culvert and drainage notes indicate "Install," "Remove," or other disposition?					
5	E 20	Are dikes noted and properly shown?					
5	E 25	Are staging details noted and labeled correctly?					
5	F 3	Have you checked for temporary drainage needs?					
5	J 1	Are there adequate provisions for maintaining drainage during staged construction?					
5	J 2	Is there a plan for maintaining temporary access on roads closed for construction?					
5	J 3	Have specific staging and coordination notes been included?					
5	J 4	Have haul roads needed within the project been identified?	Design Manual, Chapter 9C-7				
General Remarks:							



Revision Date: June 18, 2003

QA/QC code

County: _____ Project No: _____
 Project Description: _____
 Project Engineer: _____ Reviewer: _____ Date: _____
 Organization: _____
 Project Name: _____ Design No. _____ Checked By: _____

- 1 - Complete
- 2 - Consistent
- 3 - Clear
- 4 - Correct
- 5 - Constructible

Quality Assurance Evaluation for Bridges and Structures

Code	Sheet	Items to Check	General Reference	Yes	No	N/A	Notes
Complete The ability to construct a project based solely on the information provided in the plans and specifications without field corrections for plan errors, omissions, or							
1	3.6.3d	Ensure any geotechnical report requirements, such as waiting period between embankment construction and pile driving and/or pile points, are addressed in general notes [3.6.3(A)].					
1	4.1.1b	DNR Permit number and date (stream crossings).					
1	4.1.1c	Traffic counts for current and design year - preferred Situation Plan sheet only.					
1	4.1.1d	Hydraulic data					
1	4.1.2e	Any removals to be performed by bridge contractor designated.					
1	4.1.2k	Slope protection shown and labeled as to type.					
1	4.1.2m	Guardrail shown (if not installed under contract check for appropriate general note).					
1	4.1.2s	Back to back of parapets' dimension shown.					
1	4.1.2t	Length from centerline roadway left to back of parapet dimension shown.					
1	4.1.2u	Length from centerline of roadway right to back of parapet dimension shown.					
1	4.1.2v	Lengths of individual sections dimension shown.					
1	4.1.2w	Angle of skew tangent from centerline of roadway dimension shown.					
1	4.1.2x	Label headwall size and skew angle.					
1	4.1.3a	Pier Class 20 and 21 excavation classification lines, when required.					
1	4.1.3b	Channel excavation limits w/ slopes, dimensions and elevations.					
1	4.1.3e	Piling description (length and type).					
1	4.1.3g	Slope protection shown.					
1	4.1.3g	Benchmark					
1	4.1.3i	Following elevations labeled and shown: Profile grade at centerline of roadway or at centerline of survey or at office relocation centerline. Shoulder elevations. Flowlines at inlet and outlet.					
1	4.1.3j	Foreshores labeled (3:1, etc.)					
1	4.1.3k	Dimension pavement width.					
1	4.1.3l	Dimension shoulder width.					
1	4.1.3m	Dimension roadway width.					
1	4.1.3n	Dimension distance between two centerlines of roadways.					
1	4.1.3p	"Anticipated settlement = _____" below view title.					
1	4.1.3q	Bell joints standard note, if necessary.					
1	4.2.2a	Alignments and stationing.					
1	4.2.2c	Bridge and curb/rail width.					
1	4.2.2f	Back to Back of Parapets' dimension shown.					

Quality Assurance Evaluation for Bridges and Structures

Code	Sheet	Items to Check	General Reference	Yes	No	N/A	Notes
1	6a	Pile information for each substructure unit noted adjacent to piling layout. To include type.					
1	6g	If a drilled shaft foundation is used, "Special Provisions for Concrete Drilled Shafts" must be referenced on the first sheet of design under the specifications note [3.2 (C)].					
1	7.3h	Keyway shown at top and bottom of column and labeled as to size and type.					
1	9.1a	Drain details included.					
1	9.1j	For both standard and non-standard, non-varying bridge widths, show the cross-sectional area of the bridge deck listed on the plans within a box [9.1 (A)].					
1	9.2a	Deck placement sequence shown (if required) with applicable notes.					
1	9.2d	Both longitudinal and transverse construction joint details provided if a stepped transverse construction joint is shown.					
1	9.2f	Longitudinal construction joint shown (if applicable)					
1	9.2g	Transverse and longitudinal slab reinforcing layout details adequate.					
1	9.3f	Included new beam line haunch elevation sheet for both PPCB and steel girder bridges.					
1	14.1b	"Or approved equal" indicated in table of approved devices.					
1	14.2a	Extrusion field splice detail included.					
1	19.1d	Adequate details provided to define location and scope of concrete repair work.					
1	20.1b	Check that fill height is included in general notes. Design assumption is that floor of culvert is not placed on bedrock.					
1	20.1g	Check if openings for pipes, or weepholes are necessary.					
Consistent The degree to which contract plans and other contract documents convey the same intent. In addition, the format of the plans conform to the Iowa DOT's guidelines							
2	1.1a	"Design For (xxx Skew) (RA)(LA)" "Design For Repair To (xxx Skew) (RA)(LA)."					
2	1.1b	Structure Type and Size (Ex.: "188'-0 x 40'-0 Continuous Concrete Slab Bridge" or "92.1 m x 7.8 m Continuous Welded Curved Girder Bridge").					
2	1.1c	Span Description (Ex.: "41'-0 End Spans" or "33.050 m, 18.600 m, 15.880 m Spans").					
2	1.1d	Sheet Title (Ex.: "General Notes & Bridge Quantities").					
2	1.1e	Station of bridge (mainline) and of feature crossed (Highway, Street, R.R., etc.). Mainline bridge station should agree with envelope. See T.S. & L. for new structure.					
2	1.1i	"Design Sht. No. x of x", "File No.", "Design No."					
2	1.2c	Details consistent with Bridge standard sheets.					
2	1.2e	Sounding data included per IA/DOT practice (sta., offset and surface elev. reqd.) (new design) Show all borings if 'stick diagrams' required. [1.2(A)]					
2	1.2i	Cadd files drawn with the correct levels for printing color plans.					
2	1.3a	Second sheet in plan set. Provide tabulation on this sheet to summarize quantities for multi-design projects.					
2	1.3b	Tabulation title "Culvert Estimate Sheet"					
2	1.3c	Column in tabulation for 'As-Built' quantities.					
2	1.3d	Tabulation only information on this sheet.					
2	1.3e	Title of sheet 'Culvert Estimate Sheet'. Title block required.					

Quality Assurance Evaluation for Bridges and Structures

Code	Sheet	Items to Check	General Reference	Yes	No	N/A	Notes
2	1.3f	Note below tabulation "Note: See sheets x, x and x for estimate reference information." <u>Note-If only reference note is class C concrete note this note is not needed.</u>					
2	1.3g	Project number in border.					
2	2.1a	Title sheet conforms to current DOT format posted on The Office of Bridges and Structures web site.					
2	2.1g	Bridge Standard Plan Box - eliminate if not required.					
2	2.1h	Boxed note referencing Road Standards on road sheets.					
2	2.2b	North arrow, North is up.					
2	2.3a	Sheet containing 'Estimated Bridge Quantities' tabulation referenced (tabulation containing bridge quantities).					
2	2.3b	Sheet containing 'Estimated Roadway Quantities' referenced.					
2	2.3c	Any tabulations summarizing pay quantities not included in the bridge and road tabulations above.					
2	3.1b	Traffic Control Note, in box.					
2	3.1c	Roadway quantities note.					
2	3.1d	Pollution prevention plan note [3.1(A)].					
2	3.2d	If Standard 'G1' applies, do not duplicate.					
2	3.3c	If Standard 'G1' applies, do not duplicate.					
2	3.4c	Tabulation title "Estimated Bridge Quantities".					
2	3.4d	Tabulation should not be broken into units (e.g. '4 Piers', '1 Superstructure', etc.); show breakdown in Estimate Reference Information for reinforcing steel, reinforcing steel epoxy coated, structural steel, and structural steel to aid in the verification of total quantities.					
2	3.4e	In reinforcing bar lists, for variable length bars, the "varies" designation should be provided in the length column in lieu of an average length.					
2	3.4k	Tabulation title "Total Estimated Culvert Quantities" single design project.					
2	3.4l	Tabulation title "Estimated Culvert Quantities - Design No. xx" multi-design project.					
2	3.5.1a	If seeding and fertilizing bid items are less than one acre and are the only erosion control required, they should be made incidental to other construction.					
2	3.5.1b	Item number and not the item code should designate the estimate reference information notes.					
2	3.5.2a	Cost of furnishing and placing sealer in 'Bridge Floor Overlay' (typical) or 'Structural Concrete' item [3.5.2(A)].					
2	3.5.2b	Cost of epoxy coated reinforcing steel and Class D Structural Concrete in 'Retrofit Concrete Barrier Rail' item [3.5.2(B)].					
2	3.5.2c	Cost of conduit incidental to 'Retrofit Concrete Barrier Rail' item [3.5.2(C)].					
2	3.5.2d	'Temporary Barrier Rail' nominal 12'-6 units [3.5.2(D)] or combination of steel/concrete [3.5.2(E)].					
2	3.5.2e	Cost of subdrain, shoring and backfill (backwall repair and barrier rail footings) included in 'Class 20 Excavation' [3.5.2(F)].					
2	3.5.2f	Cost of preformed expansion joint filler included in 'Structural Concrete (Miscellaneous)' [3.5.2(G)]					
2	3.5.2g	Cost of preformed expansion joint filler included in 'Structural Concrete (RCB Culvert)' [3.5.2(H)]					

Quality Assurance Evaluation for Bridges and Structures

Code	Sheet	Items to Check	General Reference	Yes	No	N/A	Notes
2	3.5.2h	Cost of all mechanical splice assemblies included in 'Epoxy Coated Reinforcing Steel' item (Include with black steel bid item if there's no epoxy coated steel bid item) [3.5.2(I)].					
2	3.5.3b	Cost of furnishing and placing sealer in 'Structural Concrete (Bridge)' item [3.5.3(A)].					
2	3.5.3c	Cost of subdrain and outlet in 'Structural Concrete (Bridge)' item [3.5.3(B)].					
2	3.5.3d	Cost of preformed expansion joint filler in 'Structural Concrete (Bridge)' item [3.5.3(C)].					
2	3.5.3e	If a light pole blister is included on the bridge include anchor bolts and plates in 'Structural Concrete (Bridge)' item [3.5.3(D)].					
2	3.5.3f	If precast deck panel option is used reduce 'Structural Concrete (Bridge)' item [3.5.3(E)].					
2	3.5.3g	If precast deck option is used reduce 'Epoxy Coated Reinforcing' item [3.5.3(F)].					
2	3.5.3h	Cost of conduit incidental to 'Concrete Barrier Rail' item [3.5.3(G)].					
2	3.5.3i	Cost of conduit installation incidental to 'Concrete Barrier Rail' item [3.5.3(H)].					
2	3.5.3j	'Steel Extrusion Joint with Neoprene' note [3.5.3(I)].					
2	3.5.3k	Cost of various items in 'Macadam Stone' or 'Concrete' slope protection item [3.5.3(J)].					
2	3.5.3l	Cost of standard deck drain in 'Structural Concrete (Bridge)' if no structural steel item or quantity. Included in 'Structural Steel' if this item included exclusive of drains. Use bid item 2499--000400 (paid for as lump sum) for non-standard deck drains (Aesthetic Deck Drain Standards 1054 and m1054) [3.5.3(K)].					
2	3.5.4a	'Structural Steel' price includes bearings [3.5.4(A)].					
2	3.6.1d	If Standard 'G1' applies, do not duplicate General Notes.					
2	4.1.2f	'Face to Face of Paving Notches' dimension shown.					
2	4.1.2q	Subdrain not required, shown on subdrain details sheet.					
2	4.1.2y	Note M608 if metric.					
2	4.1.3c	Following elevations labeled and shown: P.G. at CL abutment and CL pier, 'Low Step' elevation for abutment/pier, Bottom of footing, Bottom of predrilled hole for pile, Top of berm, Stream bed, Extreme or design high water, Scour.					
2	4.1.3f	For structures with varying pier types (fixed, expansion) pier type is labeled.					
2	4.1.3o	Dimension fill height (Use 1' increments). <u>See Culvert Design Manual for metric conversion.</u>					
2	5b	Dimension gutterline at abutment. Note skew of gutterline at abutment relative to structure baseline (or other logical control line) if appropriate.					
2	5c	C.L. Bridge shown on plan and referenced (dimensioned) to baseline.					
2	6i	If least dimension of any concrete unit is greater than 6' (1.8 m), the special provision regarding control of heat of hydration is considered.					
2	6j	Show the "Low Step" elevation for all substructure units.					
2	7.1e	For the piers, if the top of cap keyway is not shown in the pier cap plan, place a note in the pier notes to refer to the design sheet where the keyway is shown (generally standard sheet 4503/m4503, superstructure details).					
2	7.3f	Spacing of vertical bars in round column provided.					

Quality Assurance Evaluation for Bridges and Structures

Code	Sheet	Items to Check	General Reference	Yes	No	N/A	Notes
2	7.4b	Note if battered pile used: "Pile dimensions shown are at bottom of footing. Batter piles X:1 in the direction shown".					
2	8.1c	'Abutment Berm Detail' provided. 'Subdrain Details' referenced for subdrain and backfill information shown on this detail. Coordinate with Sect. A-A on subdrain details sheet [8.1(A)].					
2	8.1d	Note on abutment standard sheets modified to read "Backfill behind the abutment between wings is to be as shown on the Subdrain Details sheet. The remainder ...". See item above for additional information.					
2	8.2a	Stagger pile between front and back rows to maximize clearance between piles.					
2	8.2b	Pile batter indicated (typically 4:1).					
2	8.3a	Is pile pre-bore required and if so noted in the appropriate place in the plans (bid-item included in integral abutment quantities table, on long. section of situation plan).					
2	9.1b	Drain note specifies cost in 'Structural Concrete' or 'Structural Steel' as appropriate. See estimate reference information.					
2	9.2e	Longitudinal dimensions labeled as 'Out to Out of Slab'.					
2	9.3a	Format of diagram consistent with IA/DOT practice.					
2	9.3b	Spacing provided for deck elevations along C.L. of beam (8' to 10' (2.4 m to 3.0 m) range preferred).					
2	9.3d	Transverse elevations provided at the centerline of bearings but not the centerline of pier, (unless the centerline of the bearings corresponds with the centerline of the pier).					
2	10.2c	Part plan view of stiffener details provided.					
2	10.2l	A325 7/8" (22.2 mm) diameter bolts are typical.					
2	10.4a	Floor drain extension connected to beam with two braces on all steel bridges.					
2	10.5a	Format of camber, haunch and dead load deflection diagrams consistent with Design Manual. Typically interior girder only shown unless unusual circumstances.					
2	11.2d	Slab thickness of 8" (200 mm) with 1/2" (15 mm) minimum haunch typical [11.2 (B)].					
2	11.3a	Current 'Strand Projection at Beam Ends' detail used, with strands upward.					
2	12.1a	Existing conduit shown and labeled on typical section.					
2	12.3b	Backwall: Note specifying that subdrain and backfill included in Class 20 excavation [12.3(A)].					
2	12.3c	Barrier Footings: Note specifying that end section excavation is backfilled with special backfill [12.3(B)].					
2	15.1a	Show subdrain bent around wingwall footings.					
2	15.1c	Included note when subdrain placed at base of berm: "See Slope Protection Plan For Additional Details."					
2	15.2b	Std. Sht. M1006, 'Furnishing and placing subdrain' not listed under "Items to be included in slope protection".					
2	15.2c	Std. Sht. M1006, delete sentences at end of general notes describing drain outlets. Last sentence should read "The bridge contractor is to install subdrains at the toe of the bridge berms as detailed on this sheet and as shown on the subdrain details plan."					

Quality Assurance Evaluation for Bridges and Structures							
Code	Sheet	Items to Check	General Reference	Yes	No	N/A	Notes
2	16d	When installing light pole conduit to multiple bases along the bridge, 1" (25 mm) conduit is shown coming into pole base from both directions along bridge in plan view of pole base.					
2	17a	Deck drain standard detail sheets 1054/M1054 used for bridges including aesthetic details.					
2	18a	Erosion Control, including seeding and mulching, bid items (ALL projects) - do not include as incidental items.					
Clear The ability to easily read and understand the intent of the plans and special provisions.							
3	3.4a	Quantity tabulation for design provided on this sheet.					
3	3.4b	Additional tabulated "Total Estimated Bridge Quantities" table for multi-design projects not required.					
3	4.1.2i	Bridge lighting conduit, pole bases and junction boxes called out if not shown on a plan view elsewhere.					
3	4.1.2j	Test hole locations if not shown on separate soils data sheet.					
3	4.1.2l	Overhead clearance points shown.					
3	4.1.2n	Horizontal clearances, especially for railroads, shown.					
3	4.1.2o	Existing structure(s) shown.					
3	4.1.2r	Pertinent structures and features close enough to influence construction shown (utilities, old structures, etc.).					
3	4.2.2e	Legend of work to be performed.					
3	7.1c	On pier plan view and footing plan view dimensions are tied into the bridge construction baseline and the baseline is labeled appropriately. Coordinate with 'Staking Diagram' or 'Foundation Layout.'					
3	7.1d	Pier reinforcing marks conform to The Office of Bridges and Structures pier detailing practice [7.1(B)].					
3	8.1e	On 'Part plan at abutment' and 'Abutment pile plan' beam and pile spacing (as appropriate) is tied into the bridge construction baseline and the baseline is labeled appropriately.					
3	9.1c	Beam spacing is tied into the bridge construction baseline and the baseline is labeled appropriately.					
3	10.5g	Locations of the dead load deflection values should correspond to the deck elevation locations.					
3	11.1a	Dimensions adjusted for slope - element lengths only - not horizontal lengths.					
3	12.1b	Typical section indicates cross slope of deck.					
3	12.1c	Adequate details provided to define location and scope of concrete repair work.					
3	12.1e	Overlay: Classification line shown correctly for bridges with existing overlay. Classification line will be 1/4" (5 mm) below the top of the original bridge deck.					
3	12.3a	Detail specifying limits of Class 20 excavation and backfill materials provided.					
3	13.1a	Electric conduit shown.					
3	14.1a	Note "Temperatures shown are concrete deck temperatures on the underside or shaded portion of the deck".					
3	19.2a	Notes, first sentence modified to reflect RE-71/72 standard (standard sheets 1047/M1047 and 1048/M1048 no longer used) [12.2(A)].					
3	20.1f	Do not use the term "working" with blankets.					

Quality Assurance Evaluation for Bridges and Structures

Code	Sheet	Items to Check	General Reference	Yes	No	N/A	Notes
Correct		Minimal variation between the estimated item quantities and the actual quantities needed to perform work. Identifies problems with large overruns and/or under runs.					
4	1.3h	All Item Codes and Descriptions agree with BIAS. - OK to use 'short' BIAS description and capitalized units in BIAS table.					
4	2.1d	Correct File Number, Project Directory Name, and file name (lower border).					
4	3.2a	Correct 'Specifications' note [3.2(A)].					
4	3.2b	Supplemental specifications, developmental specifications and special provisions listed by name [3.2(B)].					
4	3.4g	All Item Codes and Descriptions agree with BIAS. - OK to use 'short' BIAS description and capitalized units in BIAS table.					
4	3.4h	Estimated quantities reflect addition of itemized tables in plans.					
4	3.4j	If the district has requested contractor testing of structural concrete use the Quality Management - Structural Concrete (QM-SC) bid items and developmental specification [3.2(B)].					
4	3.5.3a	Separate quantities for Structural Concrete, Reinforcing Steel, Epoxy Coated Reinforcing Steel and Structural Steel.					
4	3.6.1a	All applicable 'standard' general notes (per design manual) provided. 'Non-standard' notes checked for need and do not conflict with standard specifications and standard plan details.					
4	3.6.2a	Concrete sealer is to be applied to the vertical face and the top of the existing barrier rails. See note [3.6.2(A)].					
4	4.1.1f	Profile data, check for coordination with roadway design.					
4	4.1.2a	Shoulder and approach pavement widths and slopes (include foreslope) shown for main and crossing roadway, check for coordination with roadway design.					
4	4.1.2b	Horizontal curve data, check for coordination with roadway design.					
4	4.1.2c	Alignments and stationing (and equations), check for coordination with roadway design.					
4	4.1.2d	Proposed ditches and pipes shown, check for coordination with roadway design.					
4	4.1.2h	Drains called out if not shown in plan view elsewhere. Drains not positioned over berm.					
4	6b	Actual design bearing shown for pile, not maximum allowable bearing [6 (A)].					
4	6c	Driving resistance (including resistance in and above the compressible layers) shown for pile if downdrag was considered in design (see soils report). Include note [6 (B)].					
4	6d	Prestressed concrete pile: Tip-out soil layer blow count 25 to 40 and no boulders.					
4	7.1b	For piers with expansion device include note regarding concrete sealer [7.1(A)].					
4	7.2a	Pier step reinforcement provided, including hairpins at all beam lines, except low step.					
4	7.2b	Cap reinforcement epoxy coated if under expansion device.					
4	7.3c	Crashwall for RR overpass (check T.S.L., generally provided if center track to face column is less than 25' (7.6 m))					
4	7.3i	d1, column bars and d2, column to footing bars, should be same size.					

Quality Assurance Evaluation for Bridges and Structures


Code	Sheet	Items to Check	General Reference	Yes	No	N/A	Notes
4	7.4a	Perimeter pile battered. [7.4(A)].					
4	8.2c	Abutment step reinforcement provided.					
4	8.2d	For stub abutments include note regarding concrete sealer [8.2(A)].					
4	9.1f	Minimum closure pour width shall be the greater of 3 ft (900 mm) or the splice length plus 4" (100 mm). Closure pours should be placed in areas with constant cross slope in the bridge deck. Closure pours over beams should be avoided.					
4	9.1g	If longitudinal construction joint provided (either permissible or mandatory), transverse reinforcing bars are spliced at joint and weight of splice included in quantity					
4	9.1h	If transverse reinforcing bars will be > 40' (12.1m) and no longitudinal construction joint is shown on plans, transverse reinforcement splice note included. See Std. Sht. 4310/M4310.					
4	10.2g	'Weathering Steel Notes' includes provision for steel embedded in integral abutment. ALL PIECES COMPRISING THE [ABUTMENT AND] PIER BEARINGS SHALL COMPLY WITH THE REQUIREMENTS AS STATED IN THE NOTES ON DESIGN SHEET(S) x (& x).					
4	10.4d	Table of rocker and expansion joint settings included.					
4	10.4e	For bridges with closure pours the bracing in the bay to have the closure pour is to be installed after the second stage has been poured and prior to placing the closure pour. The bolt holes shall be field drilled in the cross bracing members to provide allowances for fit up of the diaphragms.					
4	11.2f	For bridges including a precast deck panel option check the use of precast deck panels is allowed and include the precast note below the Total Estimated Quantities Tabulation [11.2 (D)].					
4	11.2h	For prestressed concrete beam bridges with steel intermediate diaphragms, the diaphragm bolts used in connecting the channel to the bent plate shall remain loose until the second stage has been poured then tightened before the closure pour.					
4	11.3c	Shear reinforcing modifications provided for haunch >2" (50 mm).					
4	11.3d	Required vent holes provided (stream crossings, per T.S.L.)					
4	12.1d	Overlay: Correct number of drains noted for 'Floor repair detail at drains.'					
4	12.2a	Notes, first sentence modified to reflect RE-71/72 standard (standard sheets 1047/M1047 and 1048/M1048 no longer used) [12.2(A)].					
4	12.2b	Reduced width signing plan provided if lane width less than 12' (3.6 m) [12.2 (B)].					
4	12.2c	'F-Shape' used for minimum lane 12'-6 (3.8 m) interstate mainline, 10'-6 (3.2 m) primary. H-Pile section used when these minimums cannot be provided.					
4	12.2d	Traffic lane and work area widths shown on rail layout plan. Correct lane width shown on standard sheet 1049/M1049 note. Traffic lane width should be noted as 'minimum.'					
4	13.1f	For bridges with super elevations >2%, level the low side of the rail and keep high side of the rail perpendicular to the deck slab (i.e. on same superelevation) for "Jersey type" rails only. Details should be drawn accordingly.					
4	13.1g	For "Aesthetic Barrier Rail" (Jersey type), add extra d1 bars. Also, c3 bar should be shown bent into wingwall. See note and detail [13.1 (A)].					
4	15.1b	Proper 'Section B-B' from standard sheet 1007/M1007 selected.					

Quality Assurance Evaluation for Bridges and Structures

Code	Sheet	Items to Check	General Reference	Yes	No	N/A	Notes
4	16b	Add another sheet to show elevation view of conduit along bridge.					
4	18b	Traffic control bid items (all projects where required by traffic control plan).					
4	18c	Traffic control plan current and acceptable to Office of Design.					
4	18d	PPP current, consistent with grading plan and acceptable to Office of Design.					
4	19.1a	For an existing culvert that is being extended and the headwall is at a skew to the culvert (not perpendicular) the culvert is "not" to be squared up. The headwall is to be removed but the proposed culvert is to be attached along the skew line.					
4	19.1b	If an existing culvert is being extended at a different skew, a minimum 3' (900 mm) section is to be attached to the existing culvert prior to the proposed bend.					
4	19.1c	If an existing culvert is non-standard, it is to be extended with the same size non-standard culvert (assuming an RCP would not work).					
4	19.2b	Reduced width signing plan provided if lane width less than 12' (3.6 m) [12.2 (B)].					
4	19.2c	F-Shape' used for min. lane 12'-6" (3800 mm) interstae mainline, 10'-6" (3200 mm) primary. H-Pile section used when these minimums cannot be provided.					
4	19.2d	Traffic lane and work area widths shown on rail layout plan. Correct lane width shown on standard sheet 1049/M1049 note. Traffic lane width should be noted as 'minimum.'					
4	20.1a	If fill exceeds maximum used for standards, check that culvert program has been run and output matches values on plan. If metric culvert, check that program output <u>has</u> been converted properly.					
4	20.1c	When using a non-standard barrier, the bell joint sheet must also be modified.					
4	20.1d	Check for appropriate use of bell joints. If flume, include bell joints at junction of culvert end barrel section and flume. If tapered inlet, include a bell joint at junction of tapered inlet and culvert barrel section.					
4	20.1e	Prefer to use "granular material for blanket and subdrain" when a granular blanket is necessary.					
4	20.1h	Bends located internal to section, not at joint locations.					
4	20.1i	End section minimum/maximum lengths per Design Manual.					
4	20.1j	Avoid joints below centerline of roadway, if possible.					
Constructible The ability to construct a project in an orderly and logical manner while accommodating traffic within the project limits during construction based on the information							
5	1.2a	Check plan constructability. Sufficient details included to guide contractor. Staging sequence provided if required.					
5	3.6.3c	If footing will be below water table consider need for 'Excavation and Dewatering' note and companion bid item. Applicable when seal coat required. Alternative is Class 21 Excavation with cofferdam and footing constructed in the dry.					
5	5a	Provide for curved alignments, alignments that do not coincide with CL bridge (dual roadways), bridges with special widths (climbing lanes, tapers, etc.).					

Quality Assurance Evaluation for Bridges and Structures

Code	Sheet	Items to Check	General Reference	Yes	No	N/A	Notes
s	7.2c	Minimum of 5" (125 mm) clear space between rebar provided for tremie.					
s	9.1d	Permissible longitudinal construction joint generally provided for deck width >44' (13.4m). Label "Permissible".					
s	9.1e	If anticipated dead load deflection greater than 2" (50 mm), closure pour required with longitudinal joint.					
s	9.3c	Steel bridge deck elevations correspond with the deflection information provided.					
s	9.3e	Deck elevations provided along the centerline of approach roadway, all beam lines, each gutter line and longitudinal construction joint if required.					
s	19.1e	Proposed flowable mortar RCB culverts for bridge replacement should allow a minimum of 3' (900 mm) vertical clearance and 2.5' (760 mm) side clearance for constructability.					

 <p> County: _____ Project No.: _____ Project Description: _____ Project Engineer: _____ Reviewer: _____ Date: _____ </p>	Revision Date: 3/3/2003	QA/QC code 1 - Complete 2 - Consistent 3 - Clear 4 - Correct 5 - Constructible
--	-------------------------	--

Quality Assurance Measurements

Rating

Complete – The ability to construct a project based solely on the information provided in the plans and specifications without field corrections for plan errors, omissions, or conflicts.

Rating levels

- 10 – No problems with plans. 100% of **applicable** Quality Control Checklist items appropriately addressed in the plans.
- 8 – some problems with plans. At least 90% of **applicable** Quality Control Checklist items appropriately addressed in the plans.
- 5 – numerous problems with plans. At least 80% of **applicable** Quality Control Checklist items appropriately addressed in the plans.
- 2 – major problem with plans. Less than 80% of **applicable** Quality Control Checklist items appropriately addressed in the plans.

Consistent – the degree to which contract plans and special provisions convey the same intent. In addition, the format of the plans conform to the Iowa DOT's guidelines i.e., design manual, survey notes, plan content, estimates, drafting standards, etc.

Rating levels

- 10 – No discrepancies with the design manual guidelines. 100% of **applicable** Quality Control Checklist items appropriately addressed in the plans.
- 8 – Only minor discrepancies. At least 90% of **applicable** Quality Control Checklist items appropriately addressed in the plans.
- 5 – Moderate discrepancies. At least 80% of **applicable** Quality Control Checklist items appropriately addressed in the plans.
- 2 – Major discrepancies. Less than 80% of **applicable** Quality Control Checklist items appropriately addressed in the plans.

Clear – The ability to easily read and understand the intent of the plans and special provisions.

Rating levels

- 10 – 100% of **applicable** Quality Control Checklist items appropriately addressed in the plans.
- 8 – At least 90% of **applicable** Quality Control Checklist items appropriately addressed in the plans.
- 5 – At least 80% of **applicable** Quality Control Checklist items appropriately addressed in the plans.
- 2– Less than 80% of **applicable** Quality Control Checklist items appropriately addressed in the plans.

Correct– minimal variation between the estimated item quantities and the actual quantities needed to perform work. Identifies problems with large overruns and/or under runs. Rating should not reflect quantity changes due to plan changes made after plan turn in.

Rating levels

10 – actual quantities very close to estimates for bid quantities. 100% of **applicable** Quality Control Checklist items appropriately addressed in the plans.

8 – Minor deviation from bid quantities with no impact on bid prices. At least 90% of **applicable** Quality Control Checklist items appropriately addressed in the plans.

5 – Moderate deviation from bid quantities for very few items. At least 80% of **applicable** Quality Control Checklist items appropriately addressed in the plans.

2 – Major deviation from bid quantities on more than 5 major items. Less than 80% of **applicable** Quality Control Checklist items appropriately addressed in the plans.

Constructible – The ability to construct a project in an orderly and logical manner while accommodating traffic within the project limits during construction based on the information provided by the plans, specifications, and other project documents. (Note changes made due to the contractor’s preference should not be reflected in this rating.)

Rating levels

10 – No modifications required to efficiently perform the work and/or maintain the required traffic volumes. 100%of **applicable** Quality Control Checklist items appropriately addressed in the plans.

8 – Minor modifications required for the contractor to proceed. At least 90% of **applicable** Quality Control Checklist items appropriately addressed in the plans.

5 – Moderate modifications required for the contractor to proceed. At least 80% of **applicable** Quality Control Checklist items appropriately addressed in the plans.

2 – Substantial changes required. Less than 80% of **applicable** Quality Control Checklist items appropriately addressed in the plans.

Comments and best practices

Appendix E

Survey Results

Iowa DOT/FHWA/CEC Survey

The Quality of Plans Team has been assembled to find a ways to measure and monitor the quality of plans. We are asking a representative sample of consultants to complete this questionnaire. Questions may be directed to John Smythe at (515)239-1503. Please return the completed survey by October 25th, 2002 to:

John Smythe, P.E.
Iowa Department of Transportation
Office of Construction
800 Lincoln Way
Ames, IA 50021
Fax (515)239-1845

1. How would you define a high quality set of plans?

2. Do you have a formal QC/QA process to evaluate the quality of plans rather than the quality of design?

Yes

No

3. If so, what are specific elements to evaluate the quality of a final plan? Please describe.

4. When a project includes (a) special provision(s), is there a process in place to evaluate the quality?

Yes

No

5. Do you have information from the client to know what they use to measure the quality of plans?

Yes

No

6. If, yes, what information?

7. Do you receive constructive feedback about the quality of your plans?

Yes

No

8. Do you receive information comparing the quality of your plans to that of other consultants' or clients' plans?

Yes

No

9. If so, in what format is this information given to you?

10. If not, would you like feedback and in what format?

11. In your opinion, should there be a formal process to evaluate the quality of plans?

Yes

No

12. Who, in your opinion, is in the best position to give feedback about the quality of your plan (clients, project manager, contractor...)?

13. Are there other issues you would like to address as it relates to the quality of plans?

Consultant	How would you define a high quality set of plans?
Respondent 1	Consistent with standards and clearly understood by bidders.
Respondent 2	Easily readable, fully dimensioned, technically complete & accurate, not requiring add'l info to interpret & understand
Respondent 3	Consistent format, maximize area to show notes clearly
Respondent 4	Plans that are legible, constructible, and reasonable free of error.
Respondent 5	A high quality set of plans is one that clearly and concisely addresses all the construction improvement and does so using arterials/methods in a highly efficient manner.
Respondent 6	Complete, accurate, appropriate information presented in a clear manner without discrepancies.
Respondent 7	Plans that are presented and organized according to DOT standards. That include clear, concise design drawings with all applicable specifications, notes, etc. And which the DOT can bid without extensive in-hours checking and review.
Respondent 8	Where the construction to be done is clearly defined; information is presented in a uniform manner; drafting standards allow the construction which is to be completed to stand out from the existing information; and the information on the drawings is accurate, and without ambiguity.
Respondent 9	Plans which are easy to read, contain required information to construct the project, including payment references for all items, accurate bid quantities and have been coordinated and reviewed to minimize design oversight. Perfection involves infinite cost.
Respondent 10	Plans are reasonably error free and bid items match the notes and are accurate. Plans are readable and easy to follow and understand the intent.
Respondent 11	A set of plans which present clear and complete details from which a contractor is able to thoroughly understand the product he is expected to build and from which he can develop a fair and reasonable bid estimate without unnecessary "hedging" in his proposal.
	Do you have a formal QC/QA process to evaluate the quality of plans rather than the quality of design?
Respondent 1	Yes
Respondent 2	No
Respondent 3	No
Respondent 4	Yes
Respondent 5	Yes
Respondent 6	Yes
Respondent 7	Yes
Respondent 8	Yes
Respondent 9	Yes
Respondent 10	Yes
Respondent 11	Yes

	If so, what are specific elements to evaluate the quality of a final plan? Please describe.
Respondent 1	Flow charts that indicate process with key check points and check lists to use at key check points.
Respondent 2	
Respondent 3	
Respondent 4	We have an engineer review for Design Quality and a Resident Engineer / Inspector review plan quality
Respondent 5	Each project is assigned a review Engineer and a review Technician to review plan sets for completion (no omissions), clarity, cross-reference, etc....
Respondent 6	Reflection of Data Determined in Computation/Correspondences; Quality of Line Work; Quality in text and alphanumeric data; Information clear/concise/adequate for construction; consistency; Completeness; and Accurate Quantities.
Respondent 7	Generally review plans for quality of design, completeness, presentation, inclusion of special conditions/notes, etc.; and, when possible, for coordination with plans that may be being prepared by others.
Respondent 8	Final review by Director of Engineering to review everything from a check of quantities, to spelling, etc.
Respondent 9	Checklist items related to plan content, including details, quantities, notes, specifications, and CAD format.
Respondent 10	At the beginning of each project we assign a QA/QC manager for the project. This person will put together a QA/QC plan for the project which outlines the milestones for management reviews and technical reviews. Technical reviews are done using a specific color-coded system to ensure that each item on the plan is checked.
Respondent 11	We always send our plans through our independent Inspection Group for a constructability review where they analyze such things as critical path items, equipment necessary for handling concrete segments, shipping requirements, etc. We also have a separate team composed of the Project Manager and the detailer(s) to ensure that the intent of the designer has been understood and properly detailed by the detailer on the plan set. A check print is made and color coded yellow and red for okay and needs correction, respectively, before the set is sent to the client. Objective is legible, complete, well organized and technically and grammatically correct.
	When a project includes (a) special provision(s), is there a process in place to evaluate the quality?
Respondent 1	No
Respondent 2	No
Respondent 3	Yes
Respondent 4	Yes
Respondent 5	No
Respondent 6	Yes
Respondent 7	Yes
Respondent 8	Yes
Respondent 9	Yes
Respondent 10	Yes
Respondent 11	Yes, we either specify a particular product with which we are familiar or specify performance requirements of the product and require either a shop or working drawing from the contractor to be sure the design intent is understood.
	Do you have information from the client to know what they use to measure the quality of plans?
Respondent 1	No

Respondent 2	No
Respondent 3	No
Respondent 4	No
Respondent 5	Yes
Respondent 6	Yes
Respondent 7	Yes
Respondent 8	No
Respondent 9	Yes
Respondent 10	Yes
Respondent 11	Yes - sometimes, not always.
	If yes what information?
Respondent 1	
Respondent 2	
Respondent 3	
Respondent 4	
Respondent 5	HPOR has, in the past, evaluated the services provided by the project's consultant. Absent this evaluation, we ask the client for feedback.
Respondent 6	For example, WisDOT has an evaluation form. See attached
Respondent 7	We have received performance reviews for the Department that have indicated their measures of quality. Also, based on our past experience with the Department and several DOT Project Managers we have a good understanding of what is expected to be included in design plans and how it is to be presented.
Respondent 8	
Respondent 9	For bridges, DOT provides detailed information on design and drafting requirements. Many city and county clients adopt DOT requirements; some have their own.
Respondent 10	Specific information related to the plan quality is given informally and only if initiated by us. The Iowa DOT provides feedback yearly on the overall performance and plan quality is only one item on this evaluation; it does not provide specific information.
Respondent 11	The information is usually in the form of policy and procedure guidelines as to format for completion of plans - content necessary, etc. We often tend to go beyond any instructions based on our experience of needs for a particular structure. For example, we recommend to the client that a "means and method of construction diagram" be furnished on the plans which does not obligate the contractor to follow the scheme but assures the client that the project is buildable and at least one method is shown on the plans. This is especially necessary when there are special requirements such as interim shoring for completion of the design.
	Do you receive constructive feedback about the quality of your plans?
Respondent 1	Yes
Respondent 2	Yes
Respondent 3	No
Respondent 4	Yes
Respondent 5	Yes
Respondent 6	Yes
Respondent 7	Yes
Respondent 8	Yes
Respondent 9	Yes
Respondent 10	No
Respondent 11	Yes, we have from most clients.

	Do you receive information comparing the quality of your plans to that of other consultants' or clients' plans?
Respondent 1	Yes
Respondent 2	Yes
Respondent 3	No
Respondent 4	Yes
Respondent 5	Yes
Respondent 6	No
Respondent 7	Yes
Respondent 8	Yes
Respondent 9	No
Respondent 10	No
Respondent 11	Yes
	If so, in what format is this information given to you?
Respondent 1	Informal comment, project by project basis.
Respondent 2	Verbal - Normally from client or most often from contractor regarding how complete and easy to follow the plans are
Respondent 3	
Respondent 4	We frequently ask clients how we compare in various areas including plan work. Most of the time information is gathered face to face.
Respondent 5	Verbal - Normally from client or most often from contractor regarding how complete and easy to follow the plans are
Respondent 6	
Respondent 7	We have received evaluations prepared by the DOT staff which have indicated that the plans we produce are of very high quality. These evaluations do not specifically compare us to other engineering firms, but do provide a measure against DOT and staff expectations.
Respondent 8	We have occasionally asked the Resident Construction Engineer to give us feedback on the projects we have designed. The responses have dealt more with the quality of plans than the quality of design.
Respondent 9	Normally not done by comparison with other firm's plans.
Respondent 10	
Respondent 11	Both orally and in written format. Most clients require their field personnel to prepare an evaluation form - related to such factors as change orders, plan inquiries before and after bidding, and other similar items.
	If not, would you like feedback and in what format?
Respondent 1	
Respondent 2	Always open to feedback, verbal or written is acceptable - written leaves less room for interpretation
Respondent 3	Yes, word document explaining preferred changes with examples if necessary
Respondent 4	
Respondent 5	
Respondent 6	Yes. Semi-annual summary of our firm's rating along with high, low, and average rating of other firms without names. Highlights on main areas of needed improvement, and DOT comments.

Respondent 7	Feedback is always helpful if it is timely, specific and to the point (I.e.; not simply criticism). A post-submittal, post-letting meeting to review specific problems on a design set would help avoid the same problems on subsequent work. These reviews should be made against DOT standards, methods and procedures and not necessarily against the work of other consultants. If the DOT likes something an engineering firm is doing, it should be incorporated into the Department's standards, methods and procedures.
Respondent 8	May not work if it gets too formal. When we have met with the technicians that had to interpret our plans and just got them to open up and tell us what was good and what was bad, we got our best information. A meeting like this with the contractor would be helpful, also.
Respondent 9	Feedback in written form, with criteria for improvements if warranted. Also recognition for a good quality set of plans. Opportunity to discuss in person if requested.
Respondent 10	It would be beneficial to receive this information after each project milestone, either verbally or written. I would like to know how we compare to other consultants and what we need to improve, if anything. This would help us to continue to improve.
Respondent 11	
	In your opinion, should there be a formal process to evaluate the quality of plans?
Respondent 1	Yes
Respondent 2	Yes
Respondent 3	Yes
Respondent 4	Yes
Respondent 5	Yes
Respondent 6	Yes
Respondent 7	Yes
Respondent 8	Yes
Respondent 9	Yes
Respondent 10	Yes
Respondent 11	Yes, we do because that is the only way to improve.
	Who, in your opinion, is the best position to give feedback about the quality of your plan (clients, project manager, contractor...)?
Respondent 1	Both to client and the contractor. Plans serve both as construction documents and record drawings.
Respondent 2	contractor and experienced PM's
Respondent 3	All the above. Also, recommend on site inspectors feedback as they collaborate with contractors.
Respondent 4	The individual responsible for construction oversight and possibly the contractor
Respondent 5	The client's project manager is the person closest to the project. That person knows what level of service has been provided and how it best compares with the norm.
Respondent 6	The client's design project manager, client construction manager, and contractor should each evaluate plans after design/construction (See Attached for WI example).
Respondent 7	The Project Manager; members of the project Management Team; the responsible Consultant Coordinator; Contracting (including any feed-back from contractors that are bidding the jobs and ultimately constructing them).
Respondent 8	Resident construction office - Tech in responsible charge of the project, and the contractor.
Respondent 9	Clients with engineers on staff, knowledgeable in plan reading, plan layout & construction.

Respondent 10	The project manager for the Iowa DOT - he/she knows the project and has been involved in making decisions related to the project. He/she is then able to evaluate if the consultant did what they were asked to do. There should be a set of guidelines and a checklist that is used for this effort so the evaluation is consistent across the board. The contractor will be able to give valuable information, but may be regarding issues that the designer is not able to change.
Respondent 11	The resident Engineer is probably the best person - at times we have been involved in a
	Are there other issues you would like to address as it relates to the quality of plans?
Respondent 1	
Respondent 2	No Comment
Respondent 3	
Respondent 4	None
Respondent 5	It is very important for state departments to work closely with their local network of contractors in developing plan set requirements that are consistent with their needs and the limitations/skills of their construction workforce. Hence, it is mandatory that agencies solicit contractors for their input and its equally important that they implement worthy comments.
Respondent 6	While you are discussing the "quality of plans," it is also important to review the "quality of design" (i.e., cost effectiveness, constructability review, realistic cost estimates, and qualities.)
Respondent 7	To save in-house staff time and expense, many public agencies (such as the US Army Corps of Engineers) are requiring engineering designers to conduct self-initiated quality reviews prior to the submission of design plans. These agencies are including, and are paying for, QA/AC reviews as part of the Scopes of Work on design projects. The quality of the submittal is then used as one criteria in the overall evaluation of project performance.
Respondent 8	The DOT way isn't always the only way. We have come up with some ideas to help present information on resurfacing plans that the Construction Offices and contractors liked, but the Design Office rejected. Start with an open mind regarding the process.
Respondent 9	Consistency among plan reviewers.
Respondent 10	
Respondent 11	

State	Contact	Comments	Attachment
Arkansas	Billy Connor billy_connor@dot.state.ak.us	Unfortunately, the answer to both of your questions is no. We do have a review process consisting of review by the materials section, maintenance and construction.	NONE
Georgia	David Mulling Project Review Engineer 404-656-6846	Yes to both questions	E.01 2440--Plan Review E.02 Scoring Results
Hawaii	George Atiburcio Drafting Unit Supervisor Department of Transportation Highway Design Branch Highway Design Section 601 Kamokila Boulevard, Rm 609 Kapolei, Hawaii 96707 george_Atiburcio@exec.state.hi.us (808)692-7585	Presently, we do have anything written or guidelines to define performance measures of the plans. Moreover we are in the process of updating our drafting guideline for the preparation of contract plans that will include cad practices. During the pre-final of the PS&E plans, the plans are reviewed through different design department's drafting. Each design section have their way of drafting quality control and therefore, the final contract plans are created the way we wanted to be. By using cad, we do have some kind of quality control of the plans: for example, font styles including text sizes, line styles, and line weights.	NONE
Kansas	Neil Rusch Asst to Director of Engineering and Design KDOT 915 SW Harrison St., 1084-West Topeka, KS 66612-1568 785-296-0930 neil@ksdot.org OR Hakim Saadi PCE-I 785-296-6312 hakim@ksdot.org	We have an annual evaluation by our project managers that rate each consultant with active projects on : Customer service, plan quality, and timeliness. These ratings and comments are retained in a data base which helps to organize the data and run reports. We are also utilizing the evaluation form and process developed by a KQM team (PET-Plan Evaluation Team). This evaluation/form is two way documentation between the consultants and KDOT staff, and is done at key points in project development. They can do a PET evaluation at: field check, at office check, at PSE plans, and after final construction. Neil Rusch and his staff compile this information from the completed forms and it is kept in a database for future reference.	NONE
Maine	Leanne Timberlake Engineer of Design Bridge Program Maine Department of Transportation Leanne.Timberlake@state.me.us OR David M. Sullivan Plan Development Manager David.Sullivan@state.me.us	1. Do you have a method of measuring the quality of plans? (Not the quality of design.) Not directly. We have a quality assessment performance measure that qualitatively evaluates completed bridge projects as a whole for functionality, cost effectiveness, environmental compatibility, and safety. 2. Do you have a QC/QA process to evaluate the quality of plan preparation? Yes, we have a check and review policy that our staff is expected to follow, generally looking for accuracy and completeness. David Sullivan is the Plan Development Manager for the Bridge Program. If you have any additional questions regarding plan quality, please feel free to contact him. If you have additional questions on the Bridge Program's performance measures in general, please feel free to contact me. We'd be more than happy to help in any way we can.	D.01 Check and Review
Maryland	Angela Smith, P.E. Special Assistant to the Director Office of Highway Development MD State highway Administration 410-545-8790 asmith@sha.state.md.us	1. Do you have a method of measuring the quality of plans? (Not the quality of design.) No. We have constructability & design reviews at major milestones, but we do not measure the quality of the plans. 2. Do you have a QC/QA process to evaluate the quality of plan preparation? No. Once again, although we have constructability and design reviews at our major milestones, the reviews are not in place for the evaluation of the actual quality of the plans. One might note that the quality is actually reflected by the amount of comments received related to missing notes, information, or plan errors, but it's not measured or evaluated as a QA/QC for plan quality.	NONE
Minnesota	Gordon Bergstrom Gordon.Bergstrom@dot.state.mn.us OR Delbert Gerdes Office of Technical Support, Director 651-296-3190 gerd1del@dot.state.mn.us		C.01 Plan Quality Index Description C.02 Quality of Plans Rating C.03 Checklist C.04 Plan Rating C.05 Rating Criteria

State	Contact	Comments	Attachment
Missouri	MASTES@mail.modot.state.mo.us	MoDOT does not have formal QC/QA process to evaluate the quality of "plans". We too are struggling with this concept. We "check" plans for mathematical "correctness" but we have no formal process to measure "quality". Being of the "old school", I know "quality" when I see it. Measurement was never an issue	NONE
Montana	Suzy Althof salthof@state.mt.us	MDT doesn't currently have quality control for plans.	NONE
New Jersey	Brian Strizki Brian.Strizki@DOT.STATE.NJ.US	NJ has several systems for measuring plan Quality. Hard copy information coming in the mail.	Coming in mail...
North Dakota	Ken E. Birst kbirst@state.nd.us	In ND, we do not have any formal systems, such as a QC/QA process, to measure the quality of plans. We have been talking about establishing performance measures, but so far nothing has been established. Presently, all plans receive a thorough review at the PS & E stage, and then again just before the plans are signed and sent to FHWA for authorization to bid. We would be interested in receiving a summary of your study, especially a copy of those states that have established performance measures.	NONE
Ohio	Bill Ujvari 614-466-9199 william.ujvari@dot.state.oh.us	Ohio DOT has a Quality Assurance Review (QAR) process that is used to assess the quality of plans by examining random samples from each of the districts.	NONE
Oregon	David Joe Polly, P.E., P.L.S., W.R.E. Transportation Design Manager 503/986-3738 Roadway Section Central Design Team 1 David.J.POLLY@odot.state.or.us	Oregon DOT does not have a method for measuring the quality of the plans we produce. Oregon DOT does have a QA/QC process.	A.01 Final Review Procedure A.02 Final Review Form
Vermont	Don Lathrop, P.E. Materials and Research Engineer Vermont Agency of Transportation 802-828-6911	Vermont DOT does not have a method for measuring the quality of the plans we produce. Vermont DOT does have a QA/QC process.	NONE
Virginia	Dewey Litton Assistant State Location and Design Engineer Dewey.Litton@VirginiaDOT.org 804-786-1876 OR Sam Hayes Assistant State Location and Design Engineer 804-786-2545	1. Do you have a method of measuring the quality of plans? (Not the quality of design.) Yes. We have developed a form (LD-433) Design Quality Index Evaluation form that is filled out by field personnel after a project has been constructed. This form documents the type of problems encountered during construction related to design. 2. Do you have a QC/QA process to evaluate the quality of plan preparation? Yes. We have a process in place where plans are reviewed at Various stages of development such as Preliminary, Right of Way, Public Hearing and Construction where they are reviewed for Quality Control. Also, our Right of way section does a Quality Control on the designers plans before they are officially submitted for land acquisition. Prior to submission for construction we do a Constructability review. Most of the quality reviews are accomplished by submitting the plans to another designer (peer review) for the quality control check.	B.01 Design Quality Index Evaluation
Wyoming	Paul Bercich, P.E. State Highway Development Engineer 307-777-4137	We do not have a true Quality Measure but we do a detailed review of each set of plans, including PS&E plans. A Plans Checker checks each set of final plans whether they are consultant or in-house. In-house, the design team does a check on each set of plans. For consultant designed projects, our consultant squad performs a review of each set of plans.	NONE