

**ATTACHMENT 50 – ANSWERS TO STANDARD SET OF QUESTIONS BY THE
IOWA DOT**
(22 pages)

Iowa DOT
May 15, 2008

Italics represent the responses by the Iowa DOT.

1. What was your procedure in reviewing consultant engineering bridge plans in the early 1960's? What is your procedure in reviewing consultant engineering bridge plans today?

1960's

At the Iowa DOT, consultant-prepared engineering bridge plans from the 1960's were only associated with major bridge projects like those over Missouri River or Mississippi River, rather than routine design work. We interviewed one current employee who at that time worked with the FHWA and two former IA DOT employees, who all worked in that era. Although we were unable to retrieve documents showing the evolution of plan reviews, the interviews all echoed the same philosophy, that consultant-prepared plans only received a constructability review. With their initial plan submittal, we would have received the designer's hand calculations, although we are not aware of having a policy in place that required the review of design calculations. We relied on consultants to perform their own design quality control/quality assurance. Consultants were hired for their expertise and were required to seal their plans, indicating their assurance that work was correct. We would have prepared formal review comments, coordinated those comments with the FHWA, and formally met with the consultant to convey our intent. Final plans would have then been prepared by the consultant.

Today

Philosophically, our processes are not much different from 45 years ago, but there are some nuances. Prior to letting, a cursory and quality control review is performed by in-house staff to insure that the final design plans comply with Iowa DOT policies. Along with our constructability reviews, we also strive for assurance that consultant-prepared plans are biddable and are consistent in presentation to those of in-house prepared plans. We require calculations of consultants, which are electronically preserved in our document management system, but are still not reviewed. In addition to our need for consultants due to their expertise, consultants may receive work due to the inability of our in-house staff to commit to excess work.

For long-span or complex bridges, in-house staff works closely with consultants to establish design criteria and guidelines prior to final design and resolve design issues during final design. In some cases where signature bridges are involved, we may require an independent peer review.

2. How do you ensure the QA/QC process of a consultant engineering firm is adequate? In the early 1960's and today? What procedures are in-place to ensure that the consultant does not submit an inadequate design?

1960's

Back in the 1960's, there were no established procedures to evaluate a consultant's QA/QC process to ensure a high quality plan was provided to the IA DOT. Our thorough constructability reviews, however, would have flagged any obvious idiosyncrasies.

Today

A portion of our Office of Bridges & Structures (OB&S) review process includes an in-depth review of the plan details and coordination with other IA DOT offices. Plans are reviewed for accuracy and adherence to OB&S Bridge Design Manual (BDM) policy, AASHTO Standard Specifications or LRFD Design Specifications, and the OB&S Plan Checklist. The checklist, one for bridge plans and another for box culvert plans, was assembled in 2000 to address common plan errors and design oversights. The checklist is updated twice a year to reflect changes in OB&S policy and to alert designers of recent common errors and oversights. It basically is our quality control guide and contains 300+ items to consider. A paper copy of the checklist has been provided and is available on-line at: <http://www.dot.state.ia.us/bridge/standard.htm>.

The 100% Unapproved Plans are expected to be in final form with no missing details. We expect any unresolved issues to be flagged, so that the reviewer can easily identify such instances. Every effort should be made to resolve outstanding issues prior to the 100% Unapproved Plan Submittal. Consultant initiative to resolve outstanding issues is a separate category in the evaluations.

The OB&S Bridge Design Manual (BDM) is also available at the above webpage. Current work on the BDM includes updates to incorporate LRFD Design Specifications. Designers are charged with being familiar and consistent with OB&S policy as stated in the BDM. Prior to seeking assistance of the Consultant Coordination staff, designers should review design policy in the BDM. If the BDM does not address the designer's questions, then contact should be made with the Consultant Coordination Section to seek policy clarification.

Once the reviewer has completed the initial plan review, all comments on both CADD and policy issues will be forwarded to the consultant. The plan set, with comments, will also be distributed to other IA DOT offices including Construction, Design (Road and Soils), Materials, Districts, RCE (Resident Construction Engineer), etc. This provides other IA DOT staff to review the plan details with comments and provide any additional feedback. Typically, a two to three week review period is given to other IA DOT offices. Any comments provided by other offices will be evaluated and forwarded to the design consultant for inclusion in the final plan submittal. The goal of the Consultant Coordination Section is to give the consultant three weeks to incorporate review comments before the Final Plan Submittal.

The Office of Contracts reviews the plan set for accuracy and correctness in areas such as Specifications, Bid Items, Method of Measurement, and Basis of Payment, etc.

It should be noted that the OB&S makes every effort to avoid “sheet swapping” (replacing incomplete or unfinished sheets after final plan turn in) by completing a thorough review of the plan set before the turn-in to Contracts. If sheet swapping is due to a consultant error or omission, the evaluation will reflect this. Sheet swapping for other reasons will not impact the evaluation score. Again, sheet swapping should only be needed in extreme cases and not viewed as routine. Extensive sheet swapping can result in the letting date being moved back and viewed negatively as a missed letting.

When a construction issue needs the designer’s input, the OB&S will notify the designer of the issue and discussions on a solution will begin. Negotiations may be necessary between the OB&S and the consultant regarding level of effort needed. If the error was caused by the contractor, the consultant may be asked to track their time for the purpose of the IA DOT recovering cost from the contractor. Consultants may be asked to work on their own time to resolve a plan error or omission, per the “Errors and Omissions” article of the Agreement. Time worked on the project, but not billed, should be annotated as such on subsequent invoices.

3. What does the Iowa DOT consider a red-flag item when reviewing consultant engineering bridge plans? What follow-up action is taken to address the red-flag item? Describe the level of detail the Iowa DOT uses in reviewing consultant engineering bridge plans?

We are not entirely sure what is meant by “red-flag item,” but presume this is in the context of a major error. It is not in the consultant’s interest to submit a poor quality plan, as that would be reflected in a subsequent evaluation and ultimately used both in future consultant selections and as one criterion in determining fixed fee on future work. Further, errors and omissions constitute re-work on the part of the consultant at their expense.

Plan comments, both major and minor in nature, are back-checked when the final plan is submitted, to assure that desired changes have been made.

Although our plan review process is very extensive, its primary objective is to review the overall plan quality and not the structural adequacy of individual members.

4. Does the Iowa DOT review consultant engineering bridge plans concurrently with the FHWA Division Office? Does the Iowa DOT review the consultant plans with the expectation that FHWA will be performing a similar type of review?

Interstate and major over-sight bridge projects are reviewed by our local FHWA in Ames. While reviews by our DOT staff and the FHWA are concurrent, they are also independent. We do not expect the FHWA to perform a similar review to the one we perform, so our review process is no different because of their involvement.

Consultant-prepared plans arrive for review typically five months prior to letting (six for major projects with extra advertising), with an allowance of roughly five weeks for review time. When

FHWA reviews field plan comments, the comments are addressed by DOT staff and changes are made to the plans or a response is given explaining the plan intent.

5. What are the qualifications of the Iowa DOT personnel who conduct the review of consultant engineering bridge plans?

Currently, the Office of Bridges & Structures has five engineers dedicated to reviewing consultant work, consultant contracting, and construction assistance, with their titles, roles and experience in the table below. Regarding our position classifications, the TEI is an unlicensed civil or structural engineer, whereas the TE and TES are licensed, with the further distinction that the TES has advanced expertise. A position description questionnaire for the three unique positions charges with review consultant-prepared plans has been provided. We are in the process of filling another engineer position. Beyond this, there are other supporting staff within the office; for instance, the Chief Structural Engineer and Assistant Bridge Engineer who dedicate a portion of their time overseeing policy and design criteria decisions made, especially for the more complex projects.

<u>Title</u>	<u>Primary Role</u>	<u>Yrs. Exp.</u>
<i>Transp. Engr. Specialist (TES)</i>	<i>Contracting, Coordination</i>	<i>20</i>
<i>Transp. Engr. Specialist (TES)</i>	<i>Preliminary Bridge</i>	<i>14</i>
<i>Transp. Engr. Specialist (TES)</i>	<i>Complex to highly complex plan reviews</i>	<i>11</i>
<i>* Transp. Engr. Specialist (TES)</i>	<i>Complex to highly complex plan reviews</i>	<i>??</i>
<i>Transp. Engr. (TE)</i>	<i>Mod. complex to complex plan reviews</i>	<i>27</i>
<i>Transp. Engr. Intern (TEI)</i>	<i>Simple to mod. complex plan reviews</i>	<i>1</i>

** New position currently in process of filling.*

6. What is the percentage of bridge design work that is done in-house versus the percentage that is done by consultant engineering firms?

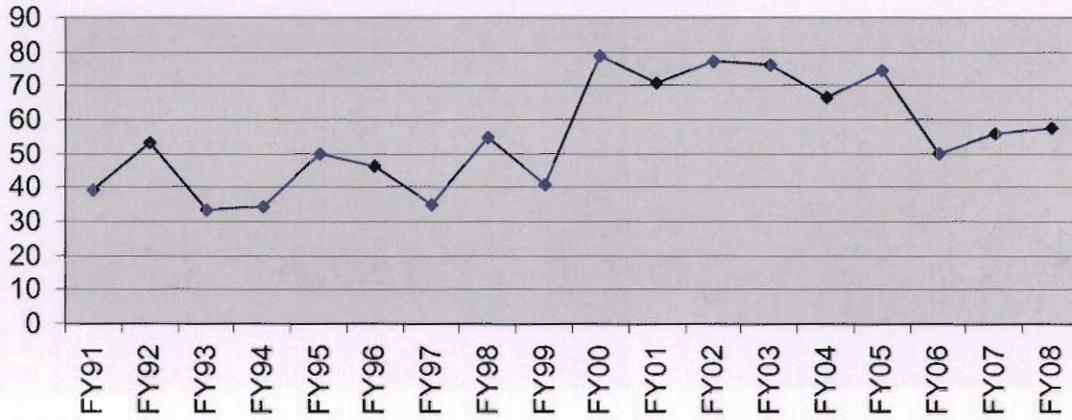
Please see the attached two graphs that answer this question.

7. Describe the structure of the Iowa DOT? Is the bridge office centrally organized? How many district bridge offices are located in the state? Are consultant engineering bridge plans reviewed at the central office or district bridge office?

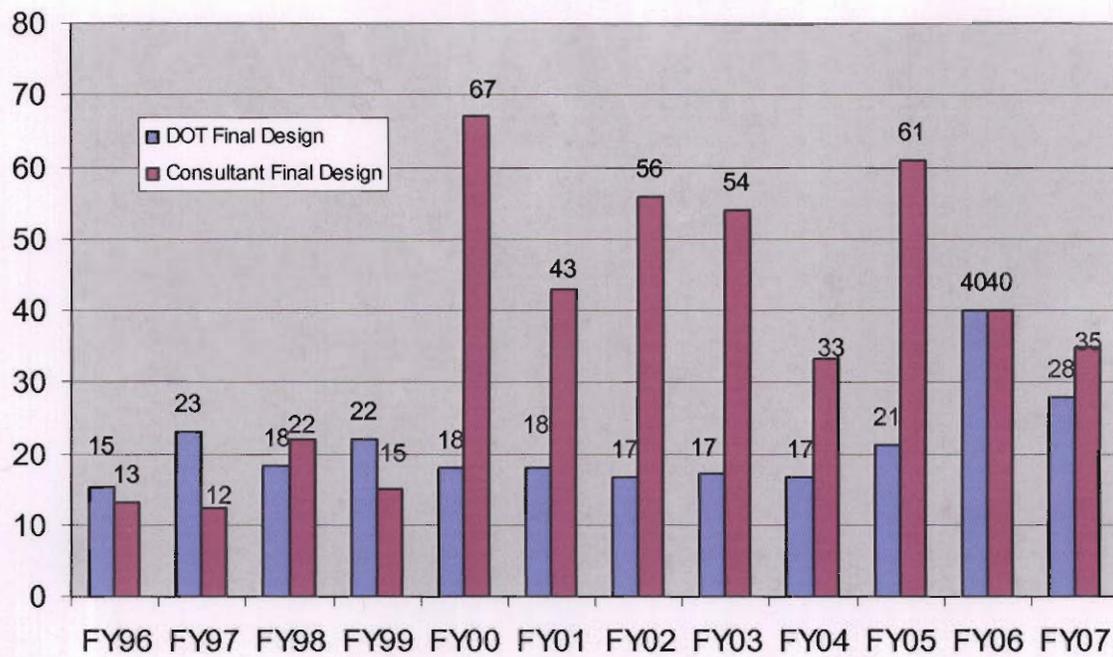
Within the IA DOT there are various Divisions: Information Technology, Operations and Finance, Motor Vehicle, Planning Programming and Modal, and Highway. The Highway Division is comprised of six Districts and three Bureaus: Statewide Operations, Engineering Bureau and Research & Technology. Within the Engineering Bureau are various offices: Bridges & Structures, Office of Design, Location & Environment, Right of Way, and Traffic & Safety. Refer to organizational chart.

The Office of Bridges & Structures is centrally organized, with technical bridge reviews performed there. Refer to office organizational chart. The six District Offices provide review of non-structural aspects of the plans.

Percentage Consultant Work Office of Bridges & Structures (construction cost basis)



Primary and Interstate Bridge & Culvert Projects Construction Cost (Millions)



PLAN REVIEW CHECKLIST

County: _____ Design No.: _____ By: _____ Date: _____
 Project Name: _____

1. GENERAL - ALL PROJECTS

1.1 Title Block

- ___ "Design For (xx Skew) (RA)(LA)" "Design For Repair To (xx Skew) (RA)(LA)."
- ___ 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").
- ___ Span Description (Ex.: "41'-0 End Spans" or "33.050 m, 18.600 m, 15.880 m Spans").
- ___ Sheet Title (Ex.: "General Notes & Bridge Quantities").
- ___ 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.
- ___ Turn In Date (Ex.: "December 2008")
- ___ County
- ___ "Iowa Department of Transportation - Highway Division"
- ___ "Design Sht. No. x of x", "File No.", "Design No."
- ___ Box around title block.

1.2 General

- ___ Check plan constructability. Sufficient details included to guide contractor. Staging sequence provided if required.
- ___ Scale not shown on situation plan or any details.
- ___ Details consistent with Bridge standard sheets.
- ___ Non-standard details reviewed with appropriate personnel.
- ___ Sounding data included per IA/DOT practice (station, offset and surface elevation required.) (new design) Show all borings if 'stick diagrams' required. See [PRCN 1.2(A)].
- ___ Soils sheets (as provided by Office of Design) included in plan set (new design).
- ___ Clear border provided around sheet; 5/8" sides, 1/4" top & bottom minimum.
- ___ Cadd files drawn with the correct levels for printing color plans.
- ___ Lists of proprietary products specified in plans must have at least 3 products listed. Do not use "or approved equivalent" instead of designating a third product.
- ___ Project number in the border all sheets for each design. For routes that are not three digits include the leading zero before the route number (e.g. BRF-063-3(46)—38-62).
- ___ Standard abbreviations used. See [BDM 11.1.4].
- ___ Asbestos clearance has been verified for bridge removals.
- ___ Bent bar details include the note, "Note: All dimensions are out to out. D = pin diameter."

2. TITLE SHEET - ALL PROJECTS

2.1 General

- ___ Title sheet conforms to current DOT format posted on Office of Bridges and Structures web site.
- ___ Correct Project Number (upper right side, right lower border and top left border of sheet).

- ___ Correct PIN Number (upper right side of sheet).
 - ___ Correct File Number, Project Directory Name, and File Name (lower border).
 - ___ "Letting Date" filled in with the letting date (upper left border).
 - ___ Value Engineering Note.
 - ___ Bridge Standard Plan Box.
 - ___ Boxed note referencing Road Standards on road sheets.
 - ___ Index of Seals (sheet number seal is located on, name and expertise).
 - ___ County Name (center of sheet, lower border and bottom left border).
 - ___ Proper sheet heading ("Primary", "Interstate", etc.)
 - ___ 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.
 - ___ Verbal location agrees with PSS ("on U.S. 151 over N. Fork ...") (center of sheet)
 - ___ Iowa R.R./FRA Crossing Number
 - ___ Revision box
 - ___ Traffic data shown on title sheet only unless more than one structure is included in the plans. For multi-structure plans show the traffic data on each individual situation plan.
 - ___ "Sheet No. 1" bottom right border.
 - ___ No phone number on shop drawing 'reviewed by' note.
 - ___ ROW project # - leave blank
 - ___ Specifications series date indicated inside the double lined box under the project title as required by the FHWA.
- 2.2 Location Map**
- ___ Remove references to scales on plans.
 - ___ North arrow, North is up.
 - ___ Map Township/Range (Ex.: "R-2W", "T-87N").
 - ___ For larger scale urban map, "Part of City of xx".
 - ___ Leader to bridge location with text "Design No. xx".
- 2.3 Index Of Sheets**
- ___ Sheet containing 'Estimated Bridge Quantities' tabulation referenced (tabulation containing bridge quantities).
 - ___ Sheet containing 'Estimated Roadway Quantities' referenced.
 - ___ Any tabulations summarizing pay quantities not included in the bridge and road tabulations above referenced.
 - ___ Typically need not itemize bridge sheets; Just indicate "Design No. xx".
 - ___ Correct soil profile sheet naming convention - SPS.xx.

PLAN REVIEW CHECKLIST

3. FIRST SHEET OF DESIGN - ALL PROJECTS

3.1 General

- ___ Traffic Control Note, in box.
- ___ Roadway quantities note.
- ___ Pollution prevention plan note. See [PRCN 3.1(A)].
- ___ Repair Project: Structure design history tab. (see standard sheet 1038/M1038).
- ___ Replacement Project: Site design history tab. (see standard sheet 1038/M1038).

3.2 Specifications 'Note'

- ___ Correct 'Specifications' note. See [BDM 11] note E50/M50.
- ___ Supplemental specifications, developmental specifications and special provisions listed by name. See [PRCN 3.2(A)].
- ___ Electronic copy of special provisions (if necessary) placed in the special provision turn in folder. See [PRCN 3.2(B)].

3.3 Design Stresses 'Note'

- ___ Correct 'Design Stresses' note'. See [BDM 11] note E50/M50.
- ___ Correct steel fatigue case listed.

3.4 Quantity Tabulation

- ___ Quantity tabulation for design provided on this sheet.
- ___ Additional tabulated "Total Estimated Bridge Quantities" table for multi-design projects not required.
- ___ Tabulation title "Estimated Bridge Quantities".
- ___ Tabulation should not be broken into units (e.g. '4 Piers', '1 Superstructure', etc.).
- ___ In reinforcing bar lists, for variable length bars, the "varies" designation should be provided in the length column in lieu of an average length.
- ___ Column in tabulation for 'As-Built' quantities.
- ___ All Item Codes and Descriptions agree with BIAS. - OK to use 'short' BIAS description and capitalized units in BIAS table.
- ___ Estimated quantities reflect addition of itemized tables in plans.
- ___ Modified standard PPC Beam description/mark correct. See [BDM 5.4.1.4.2]. Reference on framing plan when required.
- ___ If the district has requested contractor testing of structural concrete use the Quality Management - Structural Concrete (QM-SC) bid items and developmental specification. See [PRCN 3.2(A)].

3.5 Estimate Reference Information Notes

3.5.1 All Projects

- ___ 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.
- ___ Item number and not the item code should designate the estimate reference information notes.

3.5.2 Repair Projects

- ___ Cost of furnishing and placing sealer in 'Bridge Floor Overlay' (typical) or 'Structural Concrete' item. See [PRCN 3.5.2(A)].

- ___ Cost of epoxy coated reinforcing steel and Class C Structural Concrete in 'Retrofit Concrete Barrier Rail' item. See [PRCN 3.5.2(B)].
- ___ Cost of conduit incidental to 'Retrofit Concrete Barrier Rail' item. See [PRCN 3.5.2(C)].
- ___ 'Temporary Barrier Rail' nominal 12'-6 units [PRCN 3.5.2(D)] or steel [PRCN 3.5.2(E)]. See [BDM 5.8.1.3].
- ___ Cost of subdrain, shoring and backfill (backwall repair and barrier rail footings) included in 'Class 20 Excavation.' See [PRCN 3.5.2(F)].
- ___ Cost of preformed expansion joint filler included in 'Structural Concrete (Miscellaneous).' See [PRCN 3.5.2(G)].
- ___ Cost of preformed expansion joint filler included in 'Structural Concrete (RCB Culvert).' See [PRCN 3.5.2(H)].
- ___ 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). See [PRCN 3.5.2(I)].

3.5.3 New Designs

- ___ Separate quantities for Structural Concrete, Reinforcing Steel, Epoxy Coated Reinforcing Steel and Structural Steel.
- ___ Cost of furnishing and placing sealer in 'Structural Concrete (Bridge)' item. See [PRCN 3.5.3(A)].
- ___ Cost of subdrain and outlet in 'Structural Concrete (Bridge)' item. See [PRCN 3.5.3(B)].
- ___ Cost of preformed expansion joint filler in 'Structural Concrete (Bridge)' item. See [PRCN 3.5.3(C)].
- ___ If a light pole blister is included on the bridge include anchor bolts and plates in 'Structural Concrete (Bridge)' item. See [PRCN 3.5.3(D)].
- ___ If precast deck panel option is used reduce 'Structural Concrete (Bridge)' item. See [PRCN 3.5.3(E)].
- ___ If precast deck option is used reduce 'Epoxy Coated Reinforcing' item. See [PRCN 3.5.3(F)].
- ___ Cost of conduit incidental to 'Concrete Barrier Rail' item. See [PRCN 3.5.3(G)].
- ___ Cost of conduit installation incidental to 'Concrete Barrier Rail' item. See [PRCN 3.5.3(H)].
- ___ 'Steel Extrusion Joint with Neoprene' note. See [PRCN 3.5.3(I)].
- ___ Cost of various items in 'Macadam Stone' or 'Concrete' slope protection item. See [PRCN 3.5.3(J)].
- ___ 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 2499-2300001 (paid for as lump sum) for non-standard deck drains (Aesthetic Deck Drain Standards 1054 and m1054). See [PRCN 3.5.3(K)].
- ___ Integral abutment PPCB - Cost of bearing pads, S shapes and bars in PPCB items. See [PRCN 3.5.3(L)].
- ___ Curved sole plates included with PPCB item. See [PRCN 3.5.3(M)].
- ___ Cost of pile uplift anchors (if used) in 'Piles, Steel, HP ...' See [PRCN 3.5.3(N)]; use of detail should be last resort.

3.5.4 Steel Bridges

- ___ 'Structural Steel' price includes bearings. See [PRCN 3.5.4(A)].

PLAN REVIEW CHECKLIST

3.6 General Notes

3.6.1 All Projects

- ___ 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.
- ___ Limestone aggregate note for District 1 region projects - avoid river gravel as it has iron in it. See [PRCN 3.6.1(A)].
- ___ Scrape test note provided if painted steel is to be cleaned (and/or painted) or removed. See [BDM 11] notes E225/M225.
- ___ Longitudinal grooving notes for decks included. See [BDM 5.2.4.1.2].
- ___ 404 permit note included if necessary. See [MM 167].
- ___ Bridge plan deck dimension table included for new bridges. See [MM 174].

3.6.2 Repair Projects

- ___ Concrete sealer is to be applied to the vertical face and the top of the existing barrier rails. See [PRCN 3.6.2(A)].
- ___ 'Removals, As Per Plan' [BDM 11] note E440/M440 provides complete listing of work included in item.
- ___ 'Surface Raise' [BDM 11] note E433/M433 not used on projects with existing overlay.
- ___ 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. See [BDM 11] notes E480/M480 and E481/M481.

3.6.3 New Designs

- ___ Subdrain note (in general notes listing) is no longer required. Covered on subdrain detail sheet.
- ___ Do not include concrete sealer note (in general notes listing). Cover under abutment and pier notes as required.
- ___ 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. See [BDM 6.6.4.1.4].
- ___ Ensure any geotechnical report requirements, such as waiting period between embankment construction and pile driving and/or pile points, are addressed in general notes [PRCN 3.6.3(A)].

4. SITUATION PLAN

4.1 New Construction

4.1.1 General

- ___ Location information near title block. Example:
(Relocated) U.S. 151 Over Maquoketa 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
- ___ Traffic data shown - only for multiple designs in the same plan.
- ___ Hydraulic data

- ___ 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.
- ___ Profile data, check for coordination with roadway design.

4.1.2 Plan

- ___ Shoulder and approach pavement widths and slopes (include foreslope) shown for main and crossing roadway, check for coordination with roadway design.
- ___ Horizontal curve data, check for coordination with roadway design.
- ___ Alignments and stationing along CL of approach roadway (and equations), check for coordination with roadway design. Label profile grade line.
- ___ Proposed ditches and pipes shown, check for coordination with roadway design.
- ___ Any removals to be performed by bridge contractor designated.
- ___ 'Face to Face of Paving Notches' dimension shown.
- ___ Drains called out if not shown in plan view elsewhere. See [MM 081].
- ___ Bridge lighting conduit, pole bases and junction boxes called out on a plan view elsewhere. [See MM 17].
- ___ Test hole locations if not shown on separate soils data sheet.
- ___ Slope protection shown and labeled as to type.
- ___ Overhead clearance points shown.
- ___ Guardrail shown (if not installed under contract check for appropriate general note).
- ___ Horizontal clearances, especially for railroads, shown.
- ___ Existing structure(s) shown.
- ___ Stream or crossing highway name.
- ___ Subdrain not required, shown on subdrain details sheet.
- ___ Pertinent structures and features close enough to influence construction shown (utilities, old structures, etc.).
- ___ Berm slope location table or recoverable berm location table included if necessary. See [PRCN Appendix A].

4.1.3 Longitudinal Section

- ___ Pier Class 20 and 21 excavation classification lines, when required.
- ___ Channel excavation limits w/ slopes, dimensions and elevations.
- ___ Following elevations labeled and shown:
CL abutment and CL pier along CL of approach roadway
'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
- ___ Location and dimension of minimum clearance under overhead bridges. Clearance meets minimum requirements.
- ___ Piling description (length and type).
- ___ For structures with varying pier types (fixed, expansion) pier type is labeled.
- ___ Slope protection shown.

PLAN REVIEW CHECKLIST

- ___ Benchmark
- 4.2 Repair/Overlay Projects**
 - 4.2.1 General**
 - ___ Location information near title block. Example:
U.S. 151 Over Maquoketa River
T87N R2W
Section 36
Cascade Twp.
Dubuque County
Maint. No. 3609.9S137
Railroad X-ing: Federal Railroad Administration Identification No.
(FRA) and Iowa crossing number.
FHWA # _____
 - ___ Traffic counts for current year.
 - 4.2.2 Plan**
 - ___ Alignments and stationing.
 - ___ 'Face to Face of Paving Notches' dimension shown.
 - ___ Bridge and curb/rail width.
 - ___ Highway name shown.
 - ___ Legend of work to be performed.
- 5. STAKING DIAGRAM - NEW CONSTRUCTION**
 - ___ Provide for curved alignments, alignments that do not coincide with CL bridge (dual roadways), bridges with special widths (climbing lanes, tapers, etc.).
 - ___ Dimension gutterline at abutment. Note skew of gutterline at abutment relative to structure baseline (or other logical control line) if appropriate.
 - ___ C.L. of approach roadway shown as the primary staking control line. For curved bridges a chord baseline is the control line. The chord is defined by the intersection of the C.L. of the abutments and C.L. of approach roadway.
- 6. SUBSTRUCTURE - GENERAL- NEW CONSTRUCTION**
 - ___ Pile information for each substructure unit noted adjacent to piling layout. To include type.
 - ___ Actual design bearing shown for pile, not maximum allowable bearing. See [BDM 6.2.5].
 - ___ Driving resistance (including resistance in and above the compressible layers) shown for pile if downdrag was considered in design (see soils report). Include [BDM 11] note E833/M833.
 - ___ Driving note for piling driven thru scourable materials is included. See [MM 153].
 - ___ Unsupported length of pile checked for pile encased with CMP behind MSE walls. (E.g. Maximum depth of bentonite is 15 ft (4.5 m) for HP10x42 (HP250x62). Fill CMP with sand below bentonite).
 - ___ Prestressed concrete pile: Tip-out soil layer blow count 25 to 40 and no boulders.
 - ___ Steel and wood pile lengths rounded to 5' (1.5 m) intervals.
 - ___ Battered and vertical pile for a substructure unit specified same length (typically).
 - ___ If a drilled shaft foundation is used, "Supplemental Specifications for Concrete Drilled Shafts" must be referenced on the first sheet of design under the specifications note.
 - ___ Drilled shaft CSL tube layout shown.
 - ___ 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.
 - ___ Anchor bolts are not preset on two adjacent fixed piers.
 - ___ Welding restrictions note included when preset anchor bolts are specified. See [MM 158].
 - ___ Anchor bolt layout detailed appropriately. See [MM 168].
 - ___ 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.
 - ___ Show the "Low Step" elevation for all substructure units.
 - ___ Include leveling pad note in plans if necessary, [BDM 11] note E1012/M1012.
 - ___ If HP10 (HP250) piling are used only one of the sizes is used.
 - ___ Abutment backfill flooding details included.
- 7. PIER DETAILS - NEW CONSTRUCTION**
 - 7.1 General**
 - ___ Only one 'set' of pier notes provided in design to avoid inconsistencies.
 - ___ For piers with expansion device include note regarding concrete sealer [PRCN 7.1(A)].
 - ___ 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.'
 - ___ Pier reinforcing marks conform to The Office of Bridges and Structures pier detailing practice [BDM Table 6.6.4.1.1.2].
 - ___ 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**
 - ___ Pier step reinforcement provided when required. See [BDM 6.6.4.1.1.2].
 - ___ Cap reinforcement epoxy coated if under expansion device.
 - ___ Minimum of 5" (125 mm) clear space between rebar provided for tremie.
 - 7.3 Column**
 - ___ Column reinforcement epoxy coated if within 30' (9 m) ~~25'~~ (7.62 m) clear distance from edge of travel lane or under expansion device [BDM 6.6.4.1.2.2].
 - ___ Corrosion inhibitor in lieu of epoxy coated reinforcing is not permitted [PRCN 7.3(A)].
 - ___ Crashwall for RR overpass (check T.S.L., generally provided if center track to face column is less than 25' (7.6 m))
 - ___ Spiral ties shown for typical circular column (non-spirally reinforced, 12" (300 mm) spacing).
 - ___ Column tie substitution note (circ. ties for spiral) and bar detail included (12" (300 mm) spacing).
 - ___ Spacing of vertical bars in round column provided.
 - ___ Round column diameters, use soft conversion for metric projects (3'-0"=910 mm, etc.). Column diameter specified in 6" increments.

PLAN REVIEW CHECKLIST

- ___ Keyway shown at top and bottom of column and labeled as to size and type.
- ___ d1, column bars and d2, column to footing bars, should be same size.
- ___ Space in the column reinforcing provided to accommodate tremie per standard specifications section 2403.07.
- ___ If hooked bars are used projecting from columns provide 12" (300 mm) opening for the tremie. See [BDM 6.6.4.1.2.2].
- 7.4 Footing**
 - ___ Perimeter pile battered. [PRCN 7.4(A)].
 - ___ Note if battered pile used: "Pile dimensions shown are at bottom of footing. Batter piles X:1 in the direction shown".
 - ___ Pile cutoff for battered piling horizontal. See [BDM 6.2.5].
- 7.5 Pile Bent**
 - ___ Appropriate pile type provided based on blow count, >30 (>20 very firm glacial clay) H-Pile required. See [BDM 6.2].
 - ___ Pile size appropriate for unsupported length.
- 8. ABUTMENT DETAILS - NEW CONSTRUCTION**
 - 8.1 General**
 - ___ No measurement/payment note regarding subdrain ("Furnishing and placing"). This is covered on subdrain details sheet.
 - ___ Only one 'set' of abutment notes required in design to avoid inconsistencies.
 - ___ '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.
 - ___ 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**
 - ___ Stagger pile between front and back rows to maximize clearance between piles.
 - ___ Pile batter indicated (typically 4:1).
 - ___ Abutment step reinforcement provided. See [BDM 6.5.4.2.2].
 - ___ For stub abutments include note regarding concrete sealer. See [PRCN 8.2(A)].
 - 8.3 Integral Abutments**
 - ___ 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).
 - ___ Constraints for use of integral abutments within bridge parameters. See [BDM Table 6.5.1.1.1].
 - ___ Abutment step reinforcement not required (m and n bars).
 - ___ CWPG Superstructure: Beam end reinforcing bars per design manual shown. See [BDM Figure 6.5.1.1.1].
- 9. SUPERSTRUCTURE DETAILS - GENERAL - NEW CONSTRUCTION**
 - 9.1 Typical Section**
 - ___ Drain details included.
 - 9.2 Deck Layout**
 - ___ Drain note specifies cost in 'Structural Concrete', 'Structural Steel' or deckdrain bid item, as appropriate.
 - ___ Beam spacing is tied into the bridge construction baseline and the baseline is labeled appropriately.
 - ___ Permissible longitudinal construction joint provided for roadway width >60' (18.29m) or if the roadway is tapered. Label "Permissible". See [BDM5.2.4.1.2].
 - ___ If anticipated dead load deflection greater than 2" (50 mm), closure pour required with longitudinal joint.
 - ___ 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.
 - ___ If longitudinal construction joint provided (either permissible or mandatory), transverse reinforcing bars are spliced at joint and weight of splice included in quantity.
 - ___ For variable width bridge deck placements the sections should be uniform width. Use permissible longitudinal joints to separate the tapered sections.
 - ___ If transverse reinforcing bars will be > 40' (12.1m) and no longitudinal construction joint is shown on plans, transverse reinforcement splice note included. See Standard Sheet 4310/M4310.
 - ___ Table of 'b2' bars (PPCB) from standard drawing not shown (this is for designer information only).
 - ___ 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. See [PRCN 9.1 (A)].
 - ___ Negative moment reinforcing over piers needs to be designed based on AASHTO Standard Specifications for span lengths greater than 115 ft (35 m). (Note: Check that the standard is modified). See [PRCN 9.1 (B)].
 - ___ For bridges with sidewalks, cover plates are detailed at expansion joints to be ADA compliant if necessary.
 - 9.3 Slab Elevation Layout**
 - ___ Deck placement sequence shown (if required) with applicable notes.
 - ___ Deck placement sequence consistent with IADOT practice - address uplift concerns if they exist. Pour positive moment sections first, then negative.
 - ___ Proper transverse joint type shown (skewed when <=7.5 deg., stepped when >7.5 deg.). Skewed 'Alternate Transverse Construction Joint' shown with stepped joint.
 - ___ Both longitudinal and transverse construction joint details provided if a stepped transverse construction joint is shown.
 - ___ Longitudinal dimensions labeled as 'Out to Out of Slab'.
 - ___ Longitudinal construction joint shown (if applicable)
 - ___ Transverse and longitudinal slab reinforcing layout details adequate.
 - ___ For variable width bridges, vary lap splice for transverse bars rather than vary length of transverse bars. However, minimize number of different bar lengths.
 - 9.1 Typical Section**
 - ___ Format of diagram consistent with IADOT practice.
 - ___ Spacing provided for deck elevations along C.L. of beam (8' to 10' (2.4 m to 3.0 m) range preferred).

PLAN REVIEW CHECKLIST

- ___ Steel bridge deck elevations correspond with the deflection information provided.
- ___ 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).
- ___ Deck elevations provided along the centerline of approach roadway, all beam lines, each gutter line and longitudinal construction joint if required.
- ___ Included beam line haunch elevation sheet for both PPCB and steel girder bridges.

10. SUPERSTRUCTURE DETAILS - CWPG - NEW CONSTRUCTION

10.1 Framing Plan

- ___ Dimensions adjusted for slope - element lengths only - not horizontal lengths.

10.2 Girder Details

- ___ 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.

- ___ Shear stud diameter 7/8" (22.2 mm).

- ___ Part plan view of stiffener details provided.

- ___ Weld for flange to web noted as "Continuous Submerged Arc Welding".

- ___ Shear stud height varies with top flange thickness. See [BDM 5.5.1.4.1.8].

- ___ Intermediate girder termination crossbeam has shear studs (dropping girder line).

- ___ Weathering steel notes included for weathering steel bridges. See [BDM 11] note E930/M930.

- ___ Flange width increase clipped 2.5:1 at bolted splice, ground to radius at weld.

- ___ 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. See [BDM 5.5.1.4.1.6].

- ___ Top/bottom flange radiographed note for butt splice - label tension and compression zone. See [BDM 5.5.1.4.2].

- ___ Proper cross sectional dimensions used for metric steel elements. See [BDM 5.5.1.4.1.2].

- ___ A325 7/8" (22.2 mm) diameter bolts are typical.

- ___ Preferred maximum girder length between splice points 120' (36.6 m).

10.3 Welding Details

- ___ Proper details for Case I or II fatigue criteria used.

- ___ Add a third product per FHWA requirements to the flange deflector details on standard sheet 1021/M1021. "... Three products meeting ...and Crafcro Roadsaver Silicone."

10.4 Superstructure Details

- ___ 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.

- ___ Correct bearing specified based on reaction.

- ___ Table of rocker and expansion joint settings included.

- ___ 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.

- ___ Shop welded splice note included. See [MM 164].

10.5 Deflection Diagram

- ___ Format of camber, haunch and dead load deflection diagrams consistent with Design Manual. Typically interior girder only shown unless unusual circumstances.

- ___ Label "Girders As Fabricated With Webs Horizontal."

- ___ For 'Girders As Fabricated' diagram 'Keep' dimensions (measured from 'chord between abut. bearings') provided at all bearings (including '0 Keep' noted at abutments).

- ___ 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). See [PRCN 10.5(A)].

- ___ Dimension from both 'chords' to 'xx of web' shown at midpoint of parabolic camber.

- ___ Moment and reaction table, consistent with IADOT practice, included in plans.

- ___ Locations of the dead load deflection values should correspond to the deck elevation locations.

11. SUPERSTRUCTURE DETAILS - PPCB - NEW CONSTRUCTION

11.1 Framing Plan (If Provided)

- ___ Dimensions adjusted for slope - element lengths only - not horizontal lengths.

11.2 Superstructure Details

- ___ Appropriate intermediate diaphragm type used (concrete for road overpass, steel all others); steel for bulb tee beams.

- ___ 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.

- ___ Intermediate diaphragms shall be placed at the 1/4 points when using a beam span greater than or equal to 120 ft. When using the 72" (1800 mm) bulb-T prestressed beams, the appropriate intermediate diaphragm shall be used. See [BDM 5.4.1.4.2].

- ___ Slab thickness of 8" (200 mm). See [BDM 5.2.1.1].

- ___ For spans longer than 115 ft (35 m) standard negative moment reinforcing is checked. See [BDM 5.2.1.1].

- ___ Deck hanger note included. See [MM 147].

- ___ 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. See [BDM 5.2.4.3].

- ___ 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.

- ___ For prestressed concrete beam bridges with steel intermediate diaphragms, the diaphragm bolts used in connecting the channel

PLAN REVIEW CHECKLIST

to the bent plate shall remain loose until the second stage has been poured then tightened before the closure pour.

- ___ Appropriate bearing used (per Design Manual):
Fixed; $\leq 2\%$ 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.
- ___ 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.
- ___ Appropriate deck concrete strength for longer span BTC and BTD beams. See [BDM 5.2.4.1.1.2].

11.3 Beam Details

- ___ Current 'Strand Projection at Beam Ends' detail used, with strands upward.
- ___ Non-Standard beam details/notes reviewed with appropriate staff for need and adequacy.
- ___ Shear reinforcing modifications provided for haunch $> 2"$ (50 mm).
- ___ Required vent holes provided (stream crossings, per T.S.L.)
- ___ 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.
- ___ General note from the beam standard sheet "The portions of the prestress beams that are to be embedded . . ." reviewed for applicability (abutment?, pier?)
- ___ Modified standard beam mark is consistent with bid item description. See [BDM 5.4.1.4.2].
- ___ Concrete sealer details included for the ends of PPC beams under bridge joints (typically for stub abutments), see IM 570 and standard sheets 1036/M1036.

12. DETAILS - REPAIR/OVERLAY PROJECTS

12.1 General

- ___ Existing conduit shown and labeled on typical section.
- ___ Typical section indicates cross slope of deck.
- ___ Adequate details provided to define location and scope of concrete repair work.
- ___ Overlay: Correct number of drains noted for 'Floor repair detail at drains.'
- ___ 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

- ___ Reduced width signing plan provided if lane width less than 14'-6 (4.42 m). See [BDM 9.1.8.2].
- ___ '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.
- ___ 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

- ___ Detail specifying limits of Class 20 excavation and backfill materials provided.
- ___ Backwall: Note specifying that subdrain and backfill included in Class 20 excavation. See [PRCN 12.3(A)].
- ___ Barrier Footings: Note specifying that end section excavation is backfilled with special backfill. See [PRCN 12.3(B)].

13. BARRIER RAIL

13.1 New Construction

- ___ Electric conduit shown. See [MM 47163].
- ___ Use 2" ("51 mm") conduit.
- ___ Remember special 3'-8 (1120 mm) rail for UP RR bridges.
- ___ UP RR bridges, assume 10:1 transition for barrier rail, as taller rail is required.
- ___ UP RR bridges, do not add fence (splashboard) unless UP RR says that we must.
- ___ 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.
- ___ For aesthetic barrier rail check details with Kimball Olson.
- ___ Class D concrete is not allowed – appropriate barrier rail notes are included. See [BDM 5.8.1.2.6].
- ___ Interstate mainline bridges detail TL-5 railing. See [MM162].

14. EXPANSION DEVICE

14.1 General

- ___ "Or approved equivalent" indicated in table of approved devices.
- ___ Latest designation for glands and extrusions shown.
- ___ For skew > 30 deg. only Watson Bowman and D.S. Brown glands listed.
- ___ Non-weathering steel galvanized finger joints are preferred.

14.2 Repair/Retrofit

- ___ Extrusion field splice detail included.

15. SUBDRAIN/SLOPE PROTECTION DETAILS

15.1 Subdrain Details

- ___ Show subdrain bent around wingwall footings.

16. LIGHTING DETAILS

- ___ 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.
- ___ Sheet to show elevation view of conduit along bridge.
- ___ 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.

PLAN REVIEW CHECKLIST

17. AESTHETICS

- ___ Deck drain standard detail sheets 1054/M1054 used for bridges including aesthetic details.

18. APPROACH SIDEWALK

- ___ For bridges with sidewalks the sidewalk approach slab detail sheet is included.

19. ROADWAY PLANS

- ___ Erosion Control, including seeding and mulching, bid items (ALL projects) - do not include as incidental items.
- ___ Traffic control bid items (all projects where required by traffic control plan).
- ___ Traffic control plan current and acceptable to Office of Design.
- ___ PPP current, consistent with grading plan and acceptable to Office of Design.
- ___ Check that approach roadway plans are either in the bridge plans (preferred) or paving plans. If downdrag is encountered at the abutments the approach roadway details are to be included in the paving plans.

REFERENCE ABBREVIATIONS

BDM – Bridge Design Manual

MM – Methods Memo

PRCN – Plan Review Checklist Notes

CULVERT PLAN REVIEW CHECKLIST

County: _____ Design No.: _____ By: _____ Date: _____
 Project Name: _____

1. GENERAL - ALL PROJECTS

1.1 Title Block

- ___ "Design For (xx Skew) (RA)(LA)" "Design For Repair To (xx Skew) (RA)(LA)."
- ___ Structure Type and Size (Ex.: "Twin 12' x 12' x 240'-0 RCB Culvert" "3.0 m x 3.0 m x 100 m RCB Culvert").
- ___ Sheet Title (Ex.: "General Notes & Culvert Quantities").
- ___ Station of culvert (mainline) and of feature crossed (Highway, Street, R.R., etc.). Mainline culvert station should agree with envelope. See T.S. & L. for new structure.
- ___ Turn In Date (Ex.: "December 2007").
- ___ County
- ___ "Iowa Department of Transportation - Highway Division."
- ___ "Design Sht. No. x of x", "File No.", "Design No."
- ___ Box around title block.

1.2 General

- ___ Check plan constructability. Sufficient details included to guide contractor. Staging sequence provided if required.
- ___ Scale not shown on situation plan or any details.
- ___ Details consistent with culvert standard sheets.
- ___ Non-standard details reviewed with appropriate personnel.
- ___ Clear border provided around sheet; 5/8" sides, 1/4" top & bottom.
- ___ Cadd files drawn with the correct levels for printing color plans.
- ___ Project number in the border all sheets for each design. For routes that are not three digits include the leading zero before the route number (e.g. BRF-063-3(46)—38-62).
- ___ Standard abbreviations used. See [BDM 11.1.4].
- ___ Precast culvert alternate is included for culverts meeting the alternate criteria. See [MM 125].
- ___ Bent bar details include the note, "Note: All dimensions are out to out. D = pin diameter."

2. TITLE SHEET - ALL PROJECTS

2.1 General

- ___ Title sheet conforms to current DOT format posted on Office of Bridges and Structures web site.
- ___ Correct Project Number (upper right side, right lower border and top left border of sheet).
- ___ Correct PIN Number (upper right side of sheet).
- ___ Correct File Number, Project Directory Name, and File Name (lower border).
- ___ "Letting Date" filled in with the letting date (upper left border).
- ___ Value Engineering Note.
- ___ Culvert Standard Plan Box.
- ___ Boxed note referencing Road Standards on road sheets.

- ___ Index of Seals (sheet number seal is located on, name and expertise).
- ___ County Name (center of sheet, lower border and bottom left border).
- ___ Proper sheet heading ("Primary", "Interstate", etc.).
- ___ Proper 'Work Type'. See Bid Item Book (Ex.: "RCB Culvert New - Twin Box") (center of sheet, top left border).
- ___ Verbal location ("on U.S. 151 over N. Fork ...") (center of sheet).
- ___ Revision box
- ___ Traffic data shown on title sheet only unless more than one structure is included in the plans. For multi-structure plans show the traffic data on each individual situation plan.
- ___ "Sheet Number 1" bottom right border.
- ___ No phone number on shop drawing 'reviewed by' note.

2.2 Location Map

- ___ Remove references to scales on plans.
- ___ North arrow, North is up
- ___ Map Township/Range (Ex.: "R-2W", "T-87N").
- ___ For larger scale urban map, "Part of City of xx."
- ___ Leader to Culvert location with text "Design No. xx."

2.3 Index Of Sheets

- ___ Sheet containing 'Estimated Culvert Quantities' tabulation referenced (tabulation containing total culvert quantities).
- ___ Sheet containing 'Estimated Roadway Quantities' referenced.
- ___ Any tabulations summarizing pay quantities not included in the culvert and road tabulations above referenced.
- ___ Typically need not itemize RCB culvert sheets: Just indicate "Design No. xx".

3. FIRST SHEET OF DESIGN - ALL PROJECTS

3.1 General

- ___ Traffic Control Note, in box.
- ___ Roadway quantities note.
- ___ Pollution prevention plan note. See [PRCN 3.1(A)].
- ___ Repair Project: Design history tabulation (see standard sheet 1038/M1038).
- ___ Replacement Project: Design history tabulation (see standard sheet 1038/M1038).

3.2 Specifications 'Note'

- ___ Correct 'Specifications' note. See [BDM 11] note E50/M50.
- ___ Supplemental specifications, developmental specifications and special provisions listed by name. See [PRCN 3.2(A)].
- ___ Electronic copy of special provisions (if necessary) placed in the special provision turn in folder. See [PRCN 3.2(B)].
- ___ If Standard 'G1' applies, do not duplicate.

CULVERT PLAN REVIEW CHECKLIST

- 3.3 Design Stresses 'Note'**
- ___ Correct 'Design Stresses' note'. See [BDM 11] note E50/M50.
 - ___ If Standard 'G1' applies, do not duplicate.
- 3.4 Quantity Tabulation**
- ___ Quantity tabulation for design provided on this sheet.
 - ___ Tabulation title "Estimated Culvert Quantities" single design project.
 - ___ Tabulation title "Estimated Culvert Quantities - Design No. xx" multi-design project.
 - ___ Column in tabulation for 'As-Built' quantities.
 - ___ All Item Codes and Descriptions agree with BIAS. - OK to use 'short' BIAS description and capitalized units in BIAS table.
 - ___ Estimated quantities reflect addition of itemized tables in plans.
- 3.5 Estimate Reference Information Notes**
- 3.5.2 Repair Project**
- ___ 'Temporary Barrier Rail' nominal 12'-6 units [PRCN 3.5.2(D)] or combination of steel/concrete [PRCN 3.5.2(E)].
- 3.6 General Notes**
- 3.6.1 All Projects**
- ___ 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.
 - ___ If Standard 'G1' applies, do not duplicate General Notes.
- 3.6.2 Repair Project**
- ___ 'Removals, As Per Plan' [BDM 11] note E440/M440 provides complete listing of work included in item.
- 4. SITUATION PLAN (Placed after General Notes and Estimated Quantities sheet)**
- 4.1 New Construction**
- 4.1.1 General**
- ___ Location information near title block. Example:
(Relocated) U.S. 151 Over Maquoketa River
T87N R2W
Section 36
Cascade Twp.
Dubuque County
City of _____
FHWA # _____ - on all RCB culverts > 20' along roadway
 - ___ Traffic data shown - only for multiple designs in the same plan.
 - ___ Hydraulic data
 - ___ Profile data, check for coordination with roadway design.
- 4.1.2 Plan**
- ___ Shoulder and approach pavement widths and slopes (include foreslope) shown for main and crossing roadway, check for coordination with roadway design.
 - ___ Horizontal curve data, check for coordination with roadway design.
- ___ Alignments and stationing along CL of approach roadway (and equations), check for coordination with roadway design. Label profile grade line.
 - ___ Proposed ditches and pipes shown, check for coordination with roadway design.
 - ___ Any removals to be performed by culvert contractor designated.
 - ___ 'Back to back of parapets' dimension shown.
 - ___ Length from centerline roadway left to back of parapet dimension shown.
 - ___ Length from centerline of roadway right to back of parapet dimension shown.
 - ___ Lengths of individual sections dimension shown.
 - ___ Angle of skew tangent from centerline of roadway dimension shown.
 - ___ Label headwall size and skew angle.
 - ___ Existing structure(s) shown.
 - ___ Highway name.
 - ___ Pertinent structures and features close enough to influence construction shown (utilities, old structures, etc.).
 - ___ [BDM 11] note M608 if metric.
- 4.1.3 Longitudinal Section**
- ___ Channel excavation limits with slopes, dimensions and elevations.
 - ___ 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.
 - ___ Foreslopes labeled (3:1, etc.)
 - ___ Benchmark
 - ___ Dimension fill height (Use 1' increments). See Culvert Design Manual for metric conversion.
 - ___ "Anticipated settlement = ___" below view title.
 - ___ Bell joints standard note, if necessary.
- 4.2 Repair/Extensions Projects**
- 4.2.1 General**
- ___ Location information near title block. Example:
U.S. 151 Over Maquoketa River
T87N R2W
Section 36
Cascade Twp.
Dubuque County
City of _____
FHWA # _____ - on all RCB culverts > 20' along roadway
 - ___ Traffic data shown - only for multiple designs in the same plan.
- 4.2.2 Plan**
- ___ Alignments and stationing.
 - ___ 'Back to Back of Parapets' dimension shown.
 - ___ Highway name shown.
 - ___ Legend of work to be performed.

CULVERT PLAN REVIEW CHECKLIST

5. DETAILS - REPAIR/EXTENSION PROJECTS

___ PPP current, consistent with grading plan and acceptable to Office of Design.

5.1 General

- ___ 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.
- ___ 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.
- ___ 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).
- ___ Adequate details provided to define location and scope of concrete repair work.
- ___ 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.

REFERENCE ABBREVIATIONS

- BDM – Bridge Design Manual
- MM – Methods Memo
- PRCN – Plan Review Checklist Notes

5.2 Temporary Barrier Rail

- ___ Reduced width signing plan provided if lane width less than 14'-6" (4.42 m). See [BDM 9.1.8.2].
- ___ '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.
- ___ 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'.

6. RCB CULVERTS

- ___ 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 has been converted properly.
- ___ Check that fill height is included in general notes. Design assumption is that floor of culvert is not placed on bedrock.
- ___ When using a non-standard barrel, the bell joint sheet must also be modified.
- ___ 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.
- ___ Prefer to use "granular material for blanket and subdrain" when a granular blanket is necessary.
- ___ Do not use the term "working" with blankets.
- ___ Check if openings for pipes, or weepholes are necessary.
- ___ Bends located internal to section, not at joint locations.
- ___ End section minimum/maximum lengths per Design Manual.
- ___ Avoid joints below centerline of roadway, if possible.

7. ROADWAY PLANS

- ___ Erosion control, including seeding and mulching, bid items (all projects) - do not include as incidental items.
- ___ Traffic control bid items (all projects where required by traffic control plan).
- ___ Traffic control plan current and acceptable to Office of Design.

PLAN REVIEW CHECKLIST - NOTES

1. GENERAL - ALL PROJECTS

1.2 General

- (A) If the soil profile sheet includes the thickness of soil layers and top of boring elevations, sounding data does not have to be provided. This policy was adopted 1/4/00. As the soil profile sheets are produced following the new policy sounding data will not have to be included on the majority of projects. Projects for which the soil layers cannot be represented by the longitudinal section will still need sounding data. This will occur, for example, when borings are taken on both sides of a substructure unit.

3. FIRST SHEET OF DESIGN - ALL PROJECTS

3.1 General

- (A) The Iowa DNR has lowered the threshold for disturbed area from five acres to one acre effective March 10, 2003. All current projects being designed with disturbed areas over one acre need a Pollution Prevention Plan (PPP).

3.2 Specifications Notes

- (A) Examples of supplemental specifications to include if necessary:

"...including Supplemental Specifications for Modular Block Retaining Wall."

"...including Supplemental Specifications for Segmental Retaining Wall."

"...including Supplemental Specifications for Work On Railroad Right-of-Way (Burlington Northern and Santa Fe)."

"...including Supplemental Specifications for Concrete Drilled Shafts."

"...including Supplemental Specifications for Cleaning, Surface Preparation, and Painting of Galvanized Surfaces."

Examples of developmental specifications to include if necessary:

"...including Developmental Specifications for High Performance Concrete for Structures."

"...including Developmental Specifications for High Performance Concrete for Structures (Council Bluffs Interstate System)."

"...including Developmental Specifications for Mechanically Stabilized Earth (MSE) Retaining Wall."

"...including Developmental Specifications for Work On Railroad Right-of-Way (Union Pacific)."

"...including Developmental Specifications for Quality Management - Structural Concrete (QM-SC)."

"...including Developmental Specifications for Removal of Concrete Box Girder Bridges."

"...including Developmental Specifications for High Performance Concrete for Prestressed Concrete Beams."

"...including Developmental Specifications for Colored Sealer Coating for Structural Concrete."

"...including Developmental Specifications for Improved Durability Concrete for Bridge Decks."

Examples of special provisions to include if necessary:

"...including Special Provisions for Fabricated Bearing Assembly."

"...including Special Provisions for Mass Concrete - Control of Heat of Hydration."

- (B) Contact the Bridge Office if it is determined a special provision may be necessary. There are a large number of special provisions already written that may be adaptable to a new project. Follow the Requirements for Preparing and Submitting Special Provisions for State and Local Systems Projects posted on the Specifications Section internet site. Consultants will need to provide an electronic copy of the special provision when turning plans in for 100% unapproved review. DOT Engineer will check the project scheduling software to verify the special provision is listed. At the turn-in-date the DOT Engineer will turn in the special provision to the special provision turn in folder on the network
W:\Highway\Specifications\SpecialProvisions\SPTurn-In.

3.5 Estimate Reference Information Notes

3.5.2 Repair Projects

- (A) "Includes furnishing and placing concrete sealer"
- (B) "Includes xx CY (m³) of structural concrete and xx lb (kg) of epoxy coated reinforcing steel."
- (C) "Includes xx ft (m) of 2" (51 mm) Dia. and xx ft (m) of 1" (25 mm) diameter rigid steel conduit."
- (D) "All temporary barrier rail shall be nominal 12'-6" (4100 mm) long concrete units"
- (E) "All temporary barrier rail shall be nominal 20' (6 m) long steel units."
- (F) "Includes furnishing and placing subdrain including outlet, special backfill, granular backfill, and porous backfill. Includes cost of shoring during stage construction. No measurement will be made for subdrain outlet trench through the foreslope. Cost of excavating and backfilling outlet trench included in the work."
(barrier footings only) "Includes cost of furnishing and placing special backfill"
- (G) "Includes all preformed expansion joint filler required."
- (H) "Includes all preformed expansion joint filler required."
- (I) "Includes all mechanical splice assemblies required."

3.5.3 New Designs

- (A) "Includes furnishing and placing concrete sealer."
- (B) "Includes furnishing and placing subdrain (including excavation), granular backfill, porous backfill and subdrain outlet at abutments and toe of berm."
- (C) "Includes all preformed expansion joint filler required."
- (D) "Includes anchor bolts and plates at light pole bases."
- (E) "If precast prestressed concrete deck panels are used, the structural concrete quantity is reduced xx CY (m³)."
- (F) "If precast prestressed concrete deck panels are used, the epoxy coated reinforcing steel quantity is reduced xx lb (kg)."
- (G) "Includes xx ft (m) of 2" (51 mm) Dia. and xx ft (m) of 1" (25 mm) Dia. rigid steel conduit."

PLAN REVIEW CHECKLIST - NOTES

- (H) "Includes material and labor associated with providing and installing rigid steel conduit, junction boxes and fittings."
- (I) "Includes all necessary hardware and accessories including the anchorage system, temporary erection material and the 3/8" (10 mm) barrier plates with their anchorage system."
- (J) Macadam - "Includes furnishing and placing engineering fabric, macadam stone, 4" x 6" (100 mm x 150 mm) treated timbers, 1/2" (12.7 mm) diameter steel pins (or rebars), porous backfill or granular subbase backfill at front face of abutment footing, and all required excavating, shaping and compacting."

Concrete - "Includes furnishing and placing engineering fabric, #15 rebars, porous backfill or granular subbase backfill at front face of abutment footing, and all required excavating, shaping and compacting."
- (K) "Includes xx deck drains at xx lb (kg) each."
- (L) "Includes pier and abutment bearing material."
- (M) "Includes anchored curved sole plates."
- (N) "Includes pile uplift anchors."

3.5.4 Steel Bridges

- (A) "Includes Girder Sole Plate, Bearing Rockers, Fixed Shoes, Bearing Masonry Plates, Swedge Anchors, Lead Sheet and Bronze Plate".

3.6 General Notes

3.6.1 All Projects

- (A) Place note E109 "All coarse aggregate for structural concrete shall be crushed limestone" in the general notes for bridge projects located in District 1.

3.6.2 Repair Projects

- (A) Add note: "In addition to the requirements of article 2413.09, the vertical, roadway face and the top of the existing concrete barrier rails shall have an application of concrete sealer in accordance with sub-article 2403.21(D)". (Shall not be applied to new concrete barrier rail).

3.6.3 New Designs

- (A) "Abutment piles shall not be driven for a minimum of xxx days following completion of the approach fills."
"The time period between approach fill completion and driving abutment pile may be increased as ordered by the Engineer based upon review of settlement plate results."

7. PIER DETAILS - NEW CONSTRUCTION

7.1 General

- (A) "Concrete sealer is to be applied to the top of piers in accordance with the Standard Specifications."

7.3 Column

- (A) Note that epoxy coated spiral reinforcing is available. If development length of the column reinforcing into the cap is an issue the epoxy can be removed from the end of the bar that extends into the cap. Check with the section leader prior to detailing the plans with the epoxy coating stripped off the end of the reinforcing.

7.4 Footing

- (A) Batter all exterior pile for a footing at 4:1 if possible. Corner pile should be battered in the direction of the bisector of adjacent footing edges. If pile will interfere at 4:1 batter, try 6:1 batter. If pile will interfere at 6:1 batter, drop batter for that pile giving preference to the pile in an exterior column footing. The battered pile pattern for an individual footing should be symmetric.

8. ABUTMENT DETAILS - NEW CONSTRUCTION

8.2 Stub Abutments

- (A) "Concrete sealer shall be applied to the abutment bridge seat in accordance with Standard Specification 2403.21. In addition to the requirements of article 2403.21, sealer shall be applied to the wash between the bridge seat steps."

9. SUPERSTRUCTURE DETAILS - GENERAL - NEW CONSTRUCTION

9.1 Typical Section

- (A) The following note placed inside of a box may be used: "Slab Area = XX.XX ft² (m²). Slab Area does not include the nominal X in (XX mm) haunch".
- (B) The current deck standards were designed for spans up to 115 ft (35 m).

10. SUPERSTRUCTURE DETAILS - CWPG - NEW CONSTRUCTION

10.5 Deflection Diagram

- (A) Dimension from 'chord between abut. bearings' to 'top of web' shown as an individual value, in addition to the component dimensions, at the midpoint and ends of each girder segment (segment is considered end to splice or splice to splice). For example, if a positive camber is being provided, a dimension should be provided with the value being the sum of the 'chord to chord' and the 'chord to top of web' offset. The 'chord to chord' and the 'chord to top of web' offset dimensions would also be shown. For a negative or zero camber, the explicit dimension is generally provided by default. This has been requested by Materials since the camber (offset) is checked at the midpoint and ends of girder segments.

12. DETAILS - REPAIR/OVERLAY PROJECTS

12.3 Backwall Repair/Barrier Rail Footings

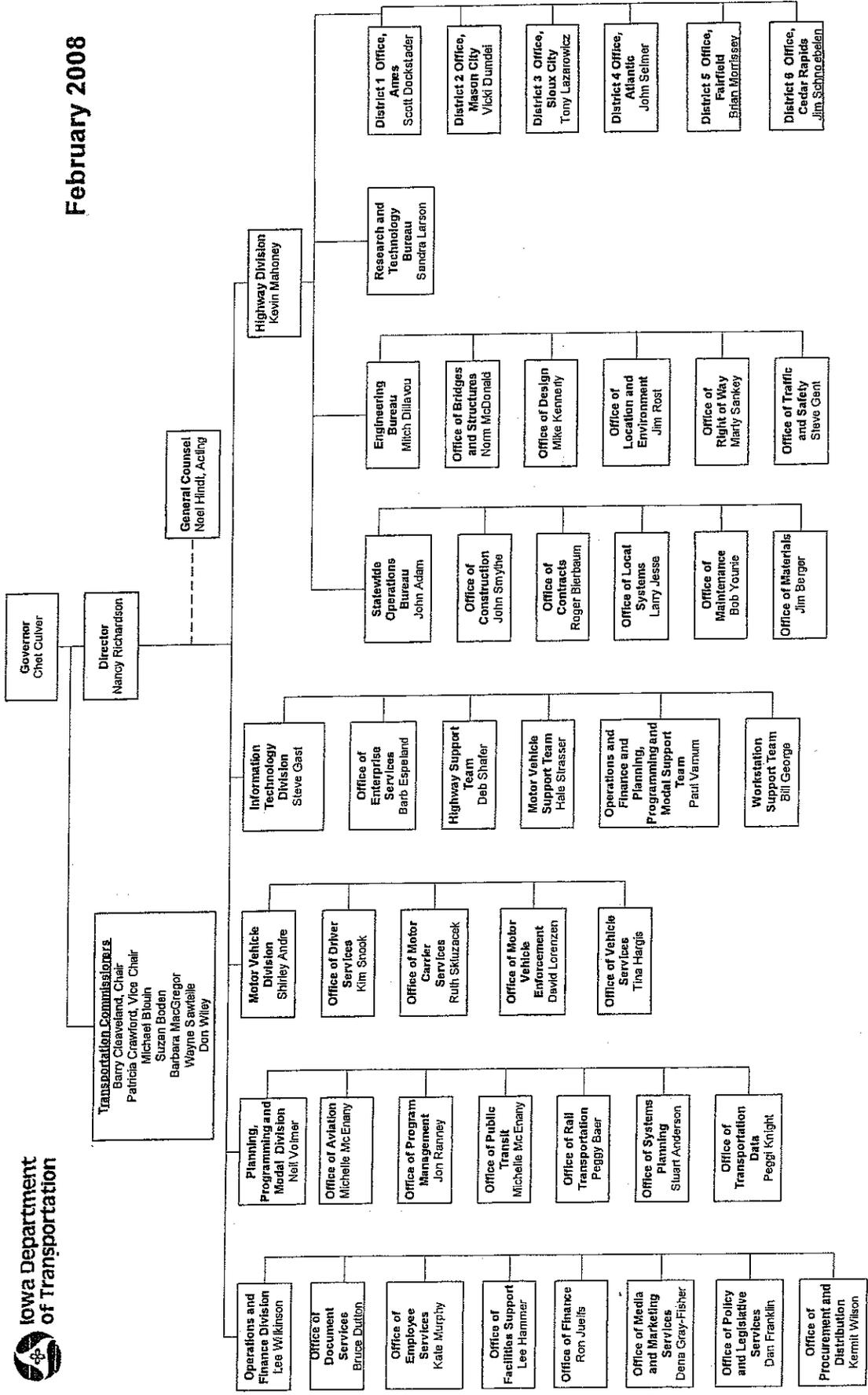
- (A) The cost of furnishing and placing subdrain (including excavation), granular backfill, porous backfill, and subdrain outlet is to be included in the price bid for "Excavation, Class 20. No extra payment will be made."

- (B) "Excavation for end sections shall be backfilled with special backfill."

"The cost of furnishing and placing special backfill is to be included in the price bid for "Excavation, Class 20. No extra payment will be made."



February 2008



**OFFICE
of
BRIDGES & STRUCTURES**
Norm McDonald (a)

Bridge Design Unit
Gary Novy

Secretary
Barbara Johnson

Bridge Maintenance & Inspection Unit
Bruce Brakke (b)

Secretary
Mary Thompson

Border Bridges / Misc. Structures
Mike Tosten (e)

County & City Bridges
Eric Souhrada (f)

- Compliance with National Bridge Inspection Standards (NBIS)
- Technical Assistance to Counties and Cities
- Inspection Quality Assurance
- Bridge Inventory Data Collection

- Inspection / Maintenance of Mississippi and Missouri River Bridges
- Inspection / Maintenance of Overhead Sign Trusses, Cantilever Sign / Sign Support Structures and High Mast Lighting Towers
- Consultant Contracts for:
 - Border Bridge Inspection
 - Paint Inspection
 - Underwater Inspection
 - Technical Assistance
 - Bridge Inspection
 - Bridge Condition Reports
 - Maintenance / Repair Recommendations to Districts

- Bridge Inspection
- Bridge Condition Reports
- Bridge Maintenance / Repair Recommendations to Districts
- Prepare Staff Actions
- Monitor Maintenance / Repair
- Computer Inventory of Bridge Information
- Identification / Selection of Candidates for 5 Year Program
- Identify Long Term Bridge Needs
- Investigation of Maintenance Problems
- Special Bridge Inspections
- Bridge Cleaning & Painting
- Inspect / Evaluate Scour Critical Bridges During / Subsequent to Floods
- Streambed Soundings
- Technical Advice to Districts
- Check for Streambed Scour During / After Floods
- Inspection Quality Assurance
- Compliance with National Bridge Inspection Standards (NBIS)
- Bridge Inspector Training
- Research and Improved Maintenance Procedures
- Review and Approves / Rejects consultants requests for pre-qualification

Bridge Maintenance & Inspection
Dave Jensen (d) Eric Souhrada (f) Tim Dunlay (c)

Office Staff

Technical Team:
Harold Thielens (i)
Elvin Hehner (p)
Denny Eppert (p)
Jerry McClain (g)

Field Coordinator
Jerry McClain (g)

Field Staff

Bridge Rating
Scott Neubauer (l) Gregg Durbin (m) Jan Willey (n) Brian Worrel (o)

- Structural Analysis for Inventory and Operating Ratings
- Structural Analysis for Load Posting
- Bridge Condition Reports
- Bridge Maintenance / Repair Recommendations to Districts
- Identification / Selection of Candidates for 5 Year Program
- Technical Advice to Districts
- Analysis of Fatigue Cracking Problems
- Repair Sketches for District Crews
- Emergency Repair Plans
- Evaluate / Approve Requests for Permit Loads
- Routing of Permit Loads (operate Superload software)
- Maintain Superload Database
- Analyze / Summarize PONTIS Outputs
- Bridge Load Testing
- Legislative Rules and Code Changes for Truck Load Laws

Six Inspection Teams:

- | | | | |
|--------------------|--|-------------------|--------------------|
| Ames | Kevin Holm (h) | Duane Bunting (i) | Ron Stafford (k) |
| Manchester | Darrill Buegert (h) | Tom Wilhelm (j) | Dave Hawker (k) |
| Fairfield | Lynn Veir (i) | Clint Walton (f) | Jaco Batterson (k) |
| Jefferson | Sieve Esshart (h) | Vacant (f) | Gary Parker (k) |
| Atlantic | Chuck Ruffing (h) | Paul Gellar (i) | Allen Lehman (k) |
| Cherokee | Jeff Brown (h) | Jebel Bryan (j) | Wesley Vetter (k) |
| Snooper Operators: | R.C. Adams, Doug Johnson, Lynn Sestina (q) | | |

- (a) Office Director (Bridge Engineer)
- (b) Bridge Maintenance Engineer
- (c) Assistant Bridge Maintenance Engineer
- (d) Operations Engineer
- (e) Special Projects Engineer
- (f) Field Engineer
- (g) Field Coordinator / Technical Team Member
- (h) Senior Team Leader
- (i) Team Leader
- (j) Inspector
- (k) Bridge Rating Engineer
- (l) Assistant Rating Engineer
- (m) Bridge Permits Engineer
- (n) Assistant Bridge Rating Engineer Intern
- (o) Technical Team Member
- (p) Senior Equipment Operators
- (q) Senior Equipment Operators