# C1 General Design

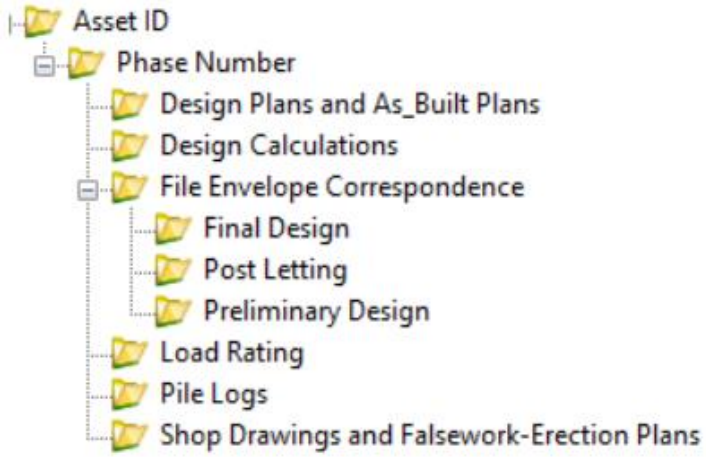
## C1.11.4 Project documentation

The following outlines in more detail the electronic storage location for project documentation.

ProjectWise folder structure:

- ProjectWise Explorer Datasources\PWMain\Documents\Highway\Bridge\Assets
- Under the Assets subfolder are the Bridge-mounted Sign Support Structures, Bridges and Culverts, Highmast Lighting Towers, Mast Arm Structures, Overhead Sign Support Structures and Tunnels subfolders. The electronic file envelope information will be stored under the Asset ID subfolder by the Phase Number as shown below. Future projects will be stored under the same Asset ID subfolder with a new Phase Number.

ERMS will copy out of ProjectWise the contents of the File Envelope Correspondence subfolder under these three categories: Preliminary Design, Final Design and Post Letting.




The Preliminary Design Unit shall place project correspondence and concepts in the ProjectWise Preliminary Design subfolder.

The Final Design Units and Consultant Coordination Unit shall place email correspondence, project plans for letting (including addenda, special provisions, and standards), shop drawings, plan revisions, design calculations, and documentation related to the design decisions into the ProjectWise Final Design subfolder. Staking e-files and other construction e-files are not required in the Asset ID subfolder.

- Project plans with multiple design numbers for different Assets IDs shall have plan sheets split apart to file for the corresponding assets. Geotechnical (soils design) sheets must be included if part of the letting plan set.
- Roadway sheets, roadside sheets, and cross sections shall be included with the project plans if total plan sheets are less than 100 sheets. If total plan sheets are over 100 sheets, include only the main road and roadside sheets and exclude the cross-section sheets (X, W, etc.)

- For design calculations, the files shall be organized and labeled appropriately to reflect the component designed and software application used (e.g. LRFD Footing Design_Pier 3_Column 1.xlsb). PDF output files should be included for structural design results from commercial software when designing for strength or service limit states (e.g. RC-Pier output files). Excel and Mathcad files are acceptable files to be stored.
- Plan revisions are documents that occur post letting but shall be included in the Final Design subfolder.

The ProjectWise Post Letting subfolder will hold correspondence received after the letting associated with design inquiries and construction issues. Final Design Units and the Consultant Coordination Unit place all documentation in the Post Letting subfolder in addition to the Final Design subfolder.

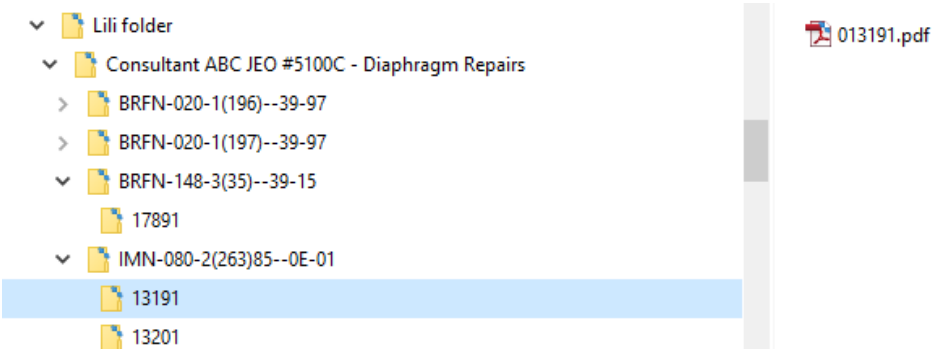
**Requesting an Asset ID subfolder in ProjectWise**

For new or replacement structures or revetment projects, the Preliminary Design Unit Leader or designated designer shall submit a request to the Automation Engineer for the Asset ID subfolder be created in ProjectWise if it does not exist.

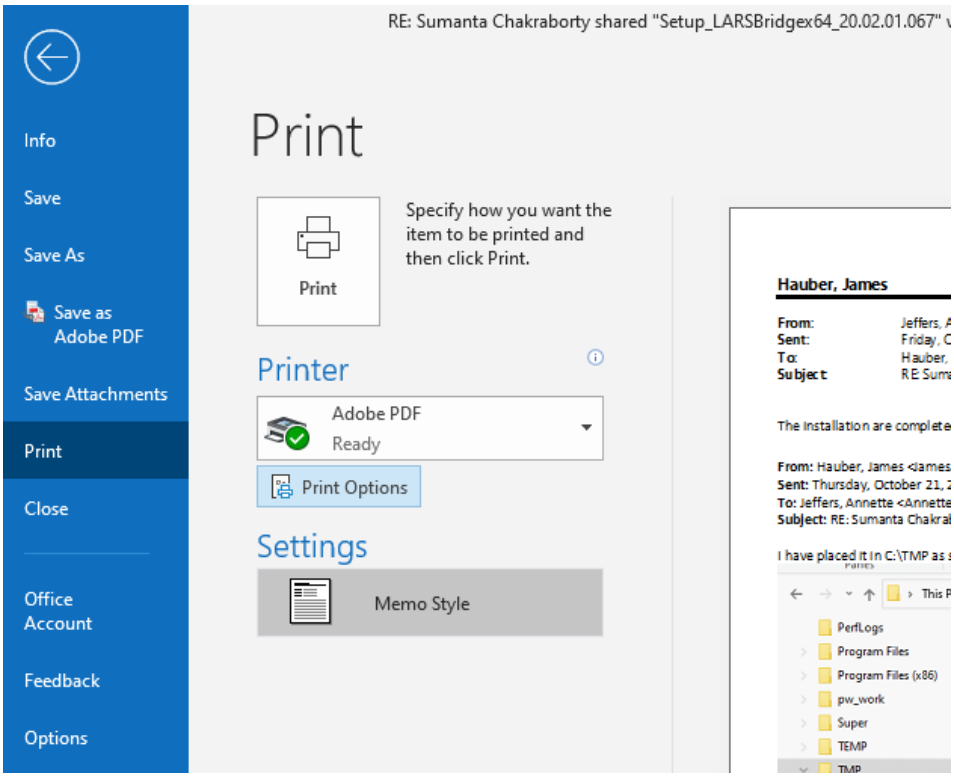
For repair and rehabilitation projects, the assigned Final Design Unit Leader or Consultant Coordination Unit reviewer shall submit a request to the Automation Engineer for the Asset ID subfolder be created in ProjectWise if it does not exist.

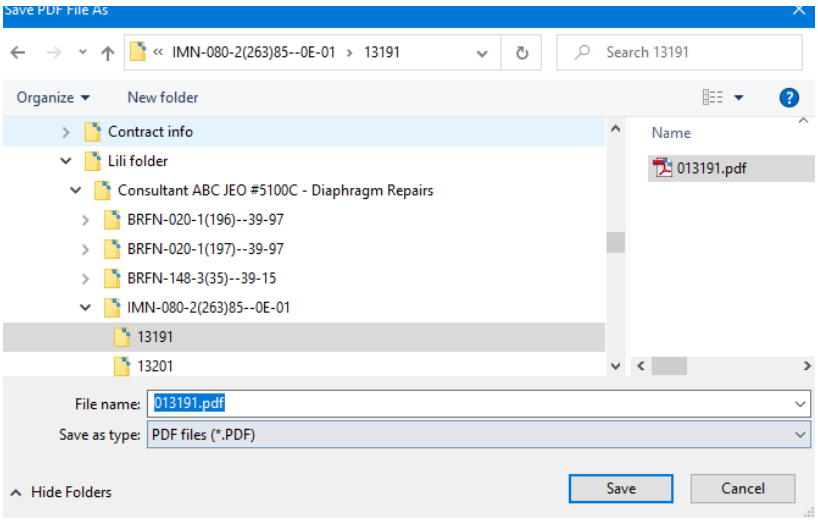
**Printing from Outlook into Windows File Explorer (recommended)**

The items saved in the electronic subfolders are the same items that in the past would have been printed and saved in a yellow manila paper file envelope. Create a folder structure to print digital copies of correspondence. A sample folder structure is shown below but you can use any structure that works for you. For a project, a copy of the file envelope documents will need to be saved for each asset.

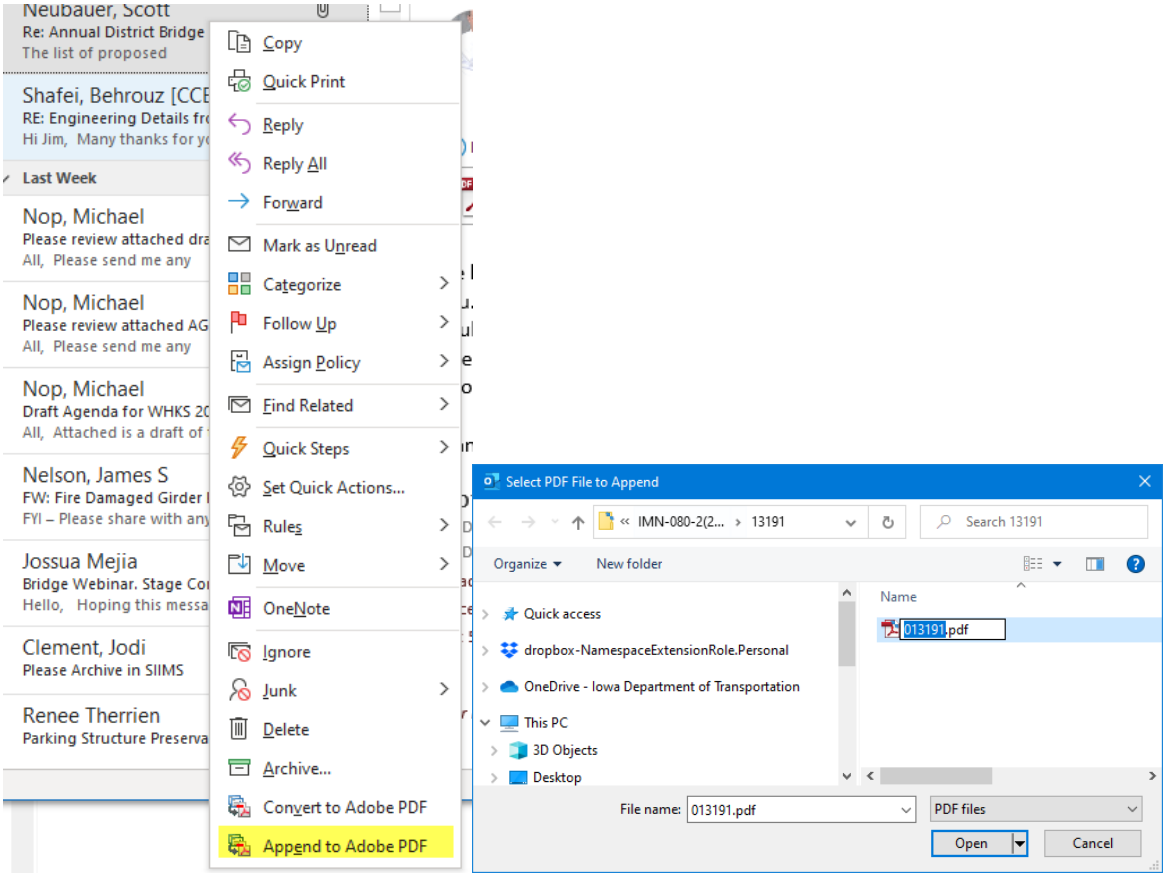



There are several ways to print PDF digital copies of Outlook emails. One method is shown in the following figure. After creating a subfolder to store the PDF files, open the first email to be saved and digitally print to a PDF as shown in the first image. You will be asked to save the file after clicking the ”Print” button. Use a file name that will identify the project and asset. Consider using the Asset ID in the file name.

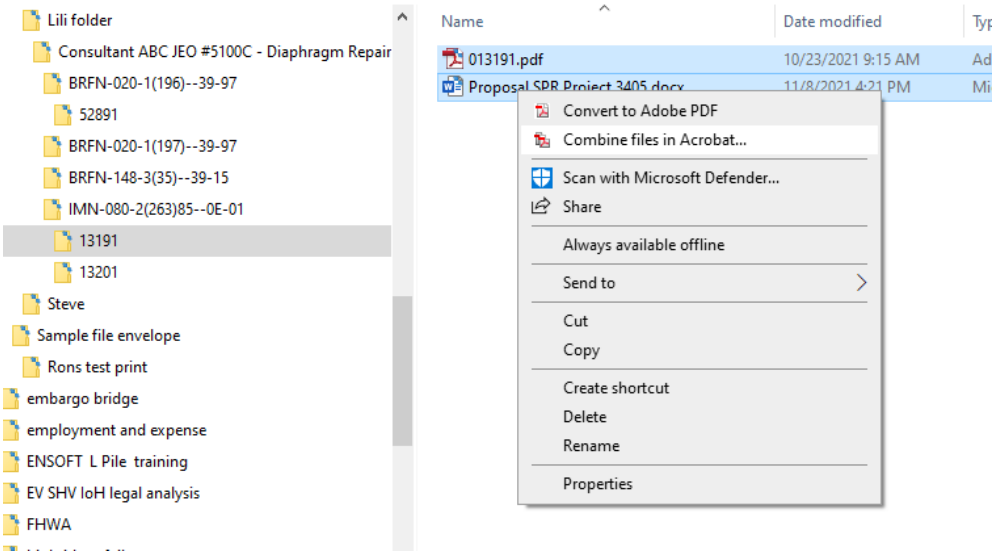


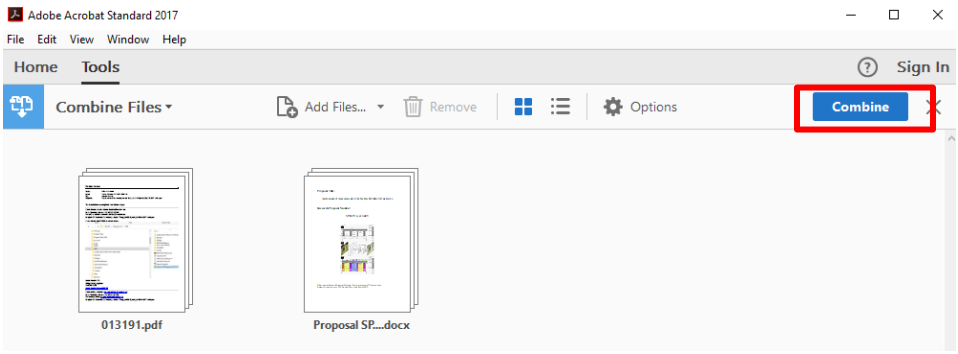




After you digitally print the first PDF file, you can use a feature to append additional correspondence. Right click on a displayed email message and a drop-down menu will give you the option to “Append to Adobe PDF”. Once you select “Append to Adobe PDF”, you will navigate to the original PDF to add the new correspondence. After you click the ”Open” button, the email will be converted into a PDF and become attached to the end of the existing PDF digital print.

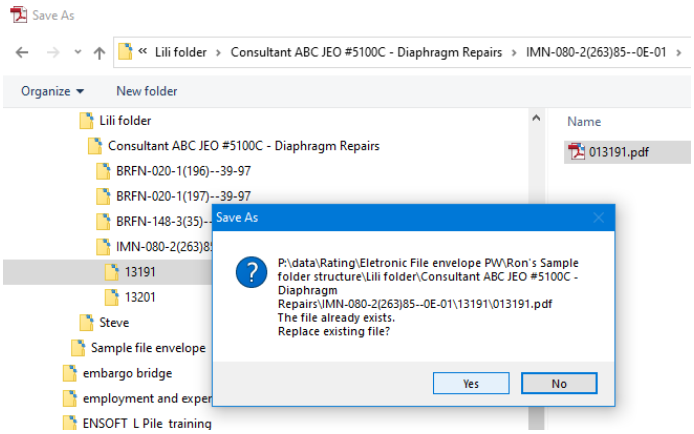



For emails with attachments, save the attachment files in File Explorer. Combine the files by selecting the ones in File Explorer that you want to combine, right click, and then select “Combine files in Acrobat”. Click on the blue ”Combine” button and the files will open as a combined PDF file with a generic name (e.g. “Binder-1”).






After the PDF opens and you have verified that the original files have been combined, save the combined PDF file with an appropriate name (e.g. the name of one of the original attachment files).




After saving the combined PDF containing the converted attachment files and appending the combined PDF to the PDF digital print of email correspondence, you can delete the attachments from File Explorer.

## C1.11.5 Quality assurance

The following information shall be included with the calculation title page document to be stored in the appropriate ProjectWise subfolder:

**Quality Control/Quality Assurance Record**

Project Description:

Project Number:

Design Number:

File Number:

Design Team

Transportation Engineer Manager (TEM):

Designer:

Technician:

Checker:

Engineer of Record (EOR): [EOR shall include electronic signature and PE number.]

Hydraulic Design Engineer:

Design Parameters

Alignment: Straight ____ Curved _____

Superstructure: CCS (std) ____ CCS (dsn) ____ PPCB (std) ____ PPCB (dsn) ____

RSS (std) ____ RSS (dsn) ____ CWPG _____

RCB (std) ____ RCB (dsn) ____ MISC (std) _____ MISC (dsn) ____

Substructure: Integral Abutment ____ Stub Abutment ____

Pile Bent Pier ____ Frame Pier ___ T-Pier ____ Wall Pier ____

## C1.17 Working drawing and calculation submittals

The following letter was sent to the AGC regarding file naming conventions for working drawing and working calculation submittals.

IOWA | DOT

KIM REYNOLDS, GOVERNOR
ADAM GREGG, LT. GOVERNOR

SCOTT MARLER, IOWA DOT DIRECTOR
TROY JERMAN, IOWA DOT COO

**IOWA DEPARTMENT OF TRANSPORTATION**
**DIVISION/BUREAU**
**800 Lincoln Way**
**Ames, IA 50010**
**515-239-1233**
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August 26, 2024

AGC of Iowa
Mitch Dillavou
701 East Court Avenue, Suite B
Des Moines, IA 50309

Dear Mr. Dillavou:

As a follow up to discussion at a joint DOT/AGC meeting on March 24, 2024, the DOT is communicating its intention to reserve the right to reject working drawing (WD) and working calculation (WC) submittals that do not reasonably follow the file naming conventions given in the contract documents. Distributing WD and WC submittals from DocExpress to the appropriate personnel in a timely manner is partially dependent on the ease of with which the submittals can be identified. While many submittals are properly named there have been exceptions. To increase consistency to the benefit of the DOT and AGC, the DOT may elect to reject any submittals starting in 2025 that do not reasonably conform to the file naming standards in the Contract documents. To help avoid submittal delays, any rejections based on file naming conventions will be issued within 8 days starting from the date the complete submittal is received from the Contractor.

Respectfully,

Michael Nop
Bridge Project Development Engineer

## C1.18 Local systems review

LPA CURSORY REVIEW ITEMS FOR BRIDGE OR CULVERT PLANS

The following bulleted items are some of the general issues/concerns to address for cursory structural reviews. Since each structure is different, not all of these items pertain to each cursory review. Furthermore, the extent of the review shall not be limited to the items below. The review engineer shall make a sound judgment on what the critical issues are for the structure.

- Verify the design code and specifications are correct.
- Verify that the plan has typical bridge or culvert design makeup: bridge, geotechnical, and road sheets. Notify the engineer of record if any items might be missing.
- Verify that all disciplines have a PE seal in the plans.
- Briefly verify that the type of structure is appropriate for the location based on the Situation Plan sheet. For bridges and culverts, the structure should meet the general policies established in the BDM. [BDM 7.1.1(culverts) and BDM 3.6, 3.7, 5.1.1, 6.1.1, 6.5.1.1, 6.6.1.1 (bridges)]
- For bridges, verify horizontal and vertical clearances are acceptable or piers are adequately protected. [BDM 3.2.2.4 (waterway), BDM 3.3.1, 3.7.4 (highway), and BDM 3.4.1.1 to 3.4.1.4 and 3.4.2.1 to 3.2.4.2.4 (railroad)]
- For bridges over waterways, briefly review the hydraulic information for conformance to the BSB preliminary design policies. Some example items to review are given below:

1. Pier type is adequately chosen for the drainage area listed or for the potential of debris flowing in the channel. [BDM 3.7.4]
2. Stream velocities and scour depths may indicate a need for stream bank protection. [BDM 3.2.2.6]
3. "Design" and "Check" scour elevations and high water elevation for stage flows should be listed.

- For bridges over railroads, briefly review the proper safety and protection accommodations are in the plan set. (BNSF and UP railroads have additional requirements).
    1. Vertical and horizontal clearance given on the Situation Plan sheet.
    2. Piers within 25' of centerline track shall meet heavy construction as defined in AREMA. [BDM 3.4.1.3, 3.4.2.3, 6.6.2.6]
    3. Bridge berms preferably have macadam stone slope protection.
    4. Proper 44" TL-5 barrier rails or fencing is used based on type of traffic on bridge (vehicular, bicycle, or pedestrian) [BDM 3.4.1.6, 3.4.2.6, 5.8.1.2]
- If standard bridge or culvert sheets appear applicable, encourage the designer to use them:
    1. Bridge wing armoring
    2. Subdrains
    3. Slope protection
    4. Abutment backfill procedures
    5. Other standard sheets (as appropriate)
- For bridges, briefly review the soil borings to obtain an idea of the foundation bearing conditions. For pile foundations, generally assess the Structural Resistance Level (SRL-1, SRL-2, etc.) of the pile foundation and the adequacy for the soil conditions.
- Look for future maintenance headaches (e.g. type of bearings or lack of bridge deck drainage).
- Look for structural adequacy problems. Member sizes should visually be reasonable and all necessary structural components should be included (e.g. intermediate diaphragms).
- Look for constructability problems (e.g. steel reinforcing congestion in concrete).
- Encourage serviceability improvements to the structure (e.g. deck drains).

## C1.19 OSHA fall protection

The following example projects included different types of OSHA-compliant fall protection devices. Note that projects not listed here may be covered by a Fall Protection Plan or targeted training for fall avoidance in lieu of physical devices.

Top of retaining wall railing or fence:

- NHSX-030-7(143)—3H-57, C Street wall, Linn Co. Design No. 109 (metal pipe railing)
- IM-NHS-029-7(45)149—03-97, I-29 at Hwy 77 interchange, Woodbury Co. (chain link fence)
- BRF-052-1(82)—38-49, US 52 near Bellevue SP entrance, Jackson Co. (metal pipe railing)
- IM-080-6(488)242—13-52, 1st Ave DDI over I-80, Johnson Co. (chain link fence)
- STP-009-9(82)—2C-03, IA 9 at Lansing bridge (MSE wall), Allamakee Co. (metal tube railing)
- NHSX-523-1(84/91)—3H-65, Mills Co. Design Nos. 1111/1211 (cable railing)
- IM-380-6(358)25—13-57, Boyson Rd over I-380, Linn Co. Design No. 1425 (AC fence on grade)

Top of retaining wall AASHTO railing or fence (including Access Control):

- NHSX-052-2(83)—3H-31, Dubuque Co. Design No. 311 (AC fence)
- BRFN-065-6(42)—39-42, US 65 over Iowa River, Hardin Co. Design No. 110 (AASHTO metal picket railing)
- BRFN-098-1(7)—38-89, IA 98 over Des Moines River, Van Buren Co. Design No. 114 (AC fence)
- NHSX-151-3(158)—3H-57, US 151 in Fairfax, Linn Co. Design No. 918 (42" chain link fence)
- IM-380-6(449)14—13-57, Wright Bros. Blvd & I-380 interchange, Linn Co. (48" chain link fence on wall top with parallel trail)
- IM-235-2(599)0—13-77, I-235 at MLK Jr Pkwy (AC fence)

- US 71 over Okoboji Lakes Causeway (project no. unknown), Dickinson Co. (AASHTO railing)

MSE wall step abutment-mounted D-bolts:

- FHWA #700200, IM-NHS-029-7(37)49—03-97, Wesley Pkwy over I-29, Woodbury Co. Design No. 1711
- FHWA #700040, IM-NHS-074-1(206)5—03-82, I-74 at US 67 Ramp A, Scott Co. Design No. 1719
- FHWA #700141 and #32081, IM-080-6(489)243—13-52, 1st Ave over I-80 DDI, Johnson Co. Design Nos. 524, 624

Top of retaining wall continuous tie-off cable:

- IM-235-2(599)0—13-77, I-235 tiered CIP walls between E. 9th St and E. 12th St, Polk Co. (inspection tie-off cable)

MSE wall step chain link fence:

- IM-235-2(599)0—13-77, at 50th St and 31st St bridges over I-235, Polk Co.

MSE wall coping-mounted chain link fence along bridge foreslope:

- I-235 over 28th St (fencing project no. unknown), Polk Co.
- IM-029-7(47)49—13-97, I-29 over Virginia St, Woodbury Co.
- NHSX-100-1(77)—3H-57, IA 100 over Ushers Ferry Rd, Linn Co. Design No. 1414

Top of RCB culvert headwall railing or fence:

- STP-122-1(8)—2C-17, Bus 18 over Chelsea Creek, Cerro Gordo Co. (metal picket railing)
- STPN-136-1(118)—2J-23, IA 136 near N. 10th St, Clinton Co. Design No. 1225 (chain link fence)
- (see also RCB trail tunnel headwall examples below)

Top of RCB trail tunnel headwall railing/fence:

- IMN-029-7(43)149—0E-97, Woodbury Co. Design No. 813 (AASHTO metal picket railing)
- BRFN-065-5(30)—39-85, Story Co. Design No. 413 (AASHTO metal pipe railing)
- NHSX-100-1(42)—3H-57, Linn Co. Design No. 614 (chain link fence)
- BRF-34-1(96)—38-65, Mills Co. Design No. 118 (chain link fence)
- IM-NHS-080-7(155)255—03-16, Cedar Co. Design No. 121 (AASHTO metal picket railing)
- IM-NHS-035-4(268)104—03-85, Story Co. Design No. 423 (chain link fence)
- IM-080-3(268)124—13-77, Polk Co. Design No. 1125 (chain link fence, ground-mounted except along parapet)

Drop inlet railing or grate:

- NHSN-019-1(52)—2R-56, Lee Co. Design No. 120 (metal pipe railing; rural conditions)
- US 71 near Okoboji, Dickinson Co. (metal cover grate, urban conditions; project no. unknown)

Traffic barriers previously used in Iowa with OSHA-compliant 42-inch minimum height:

- 44-inch F-Shape
- 44-inch Single Slope*
- Michigan BR27C
- Modified B-25 Series*
- PennDOT PA*
- 42-inch Vertical Parapet
- Retrofit Rail w/Back-Mounted Fence*
- Safety Shape w/Back-Mounted Fence*
- Texas T80HT
- Texas C412 (formerly F411)*
- Texas C411 (not yet used in IA, but conditionally approved for use)*

- MnDOT Concrete Rail w/Back-Mounted Bicycle Railing (Local Systems only)

(* = approved for current and future use by Iowa DOT MASH Implementation Committee)