

## C1 General Design

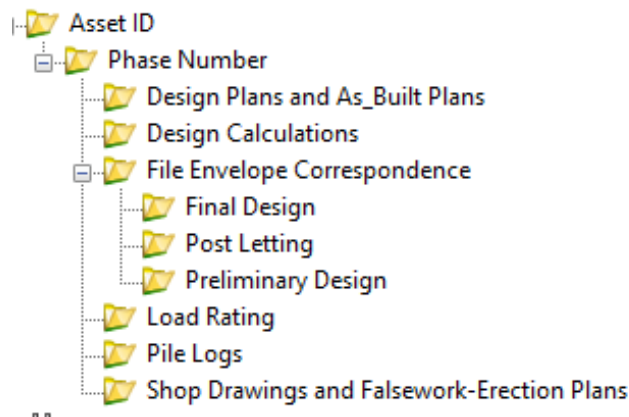
### C1.11.4 Project documentation

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.

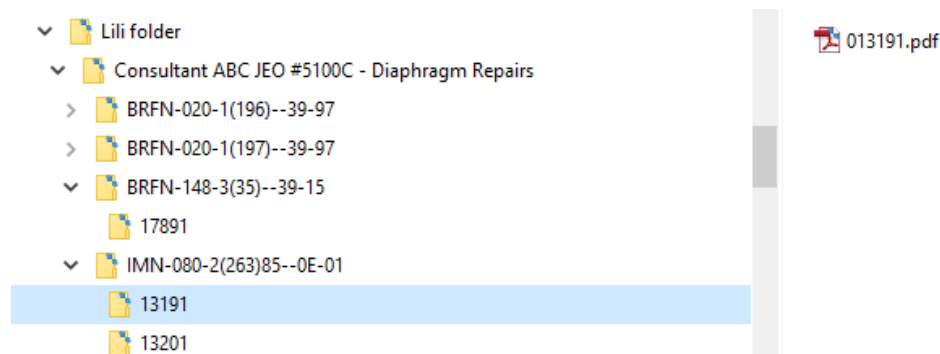
### Requesting an Asset ID subfolder in ProjectWise

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.

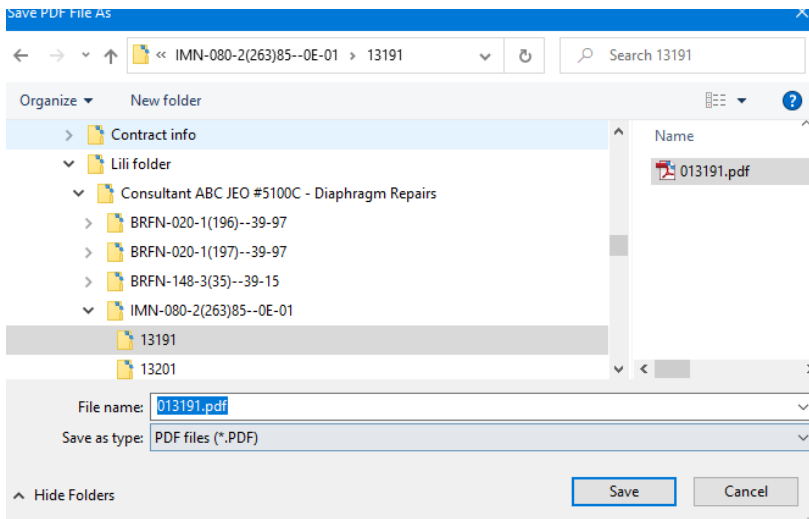
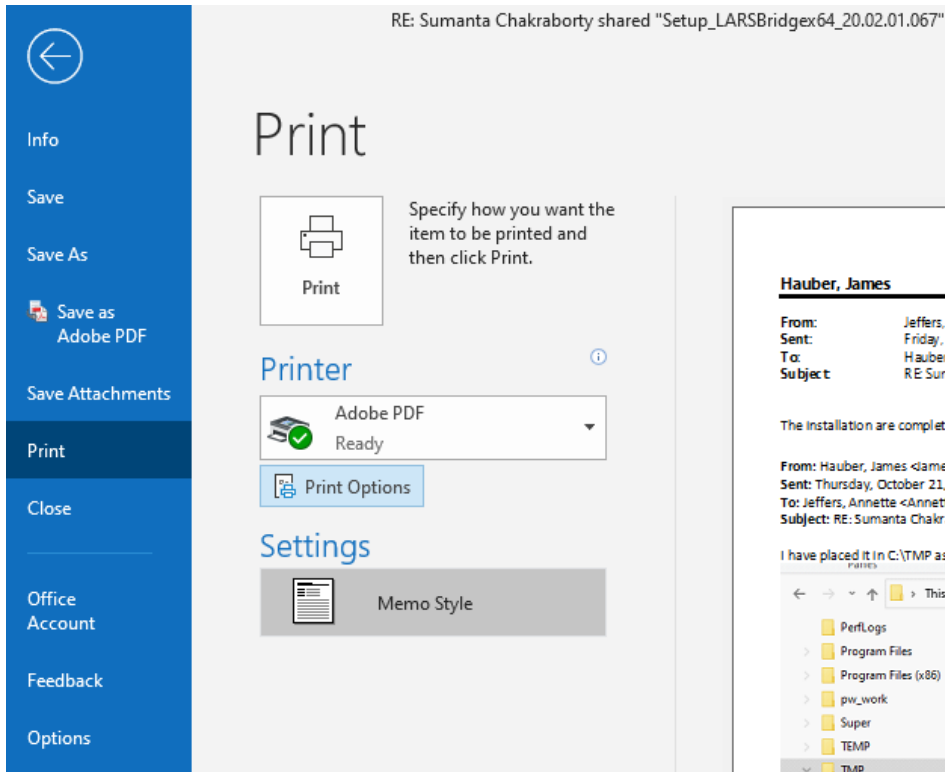
For repair and rehabilitation projects, the assigned Final Design Unit Leader or Consultant Coordination Unit reviewer shall submit a request to the Automation Engineer for the Asset ID subfolder be created in ProjectWise if it does not exist.

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

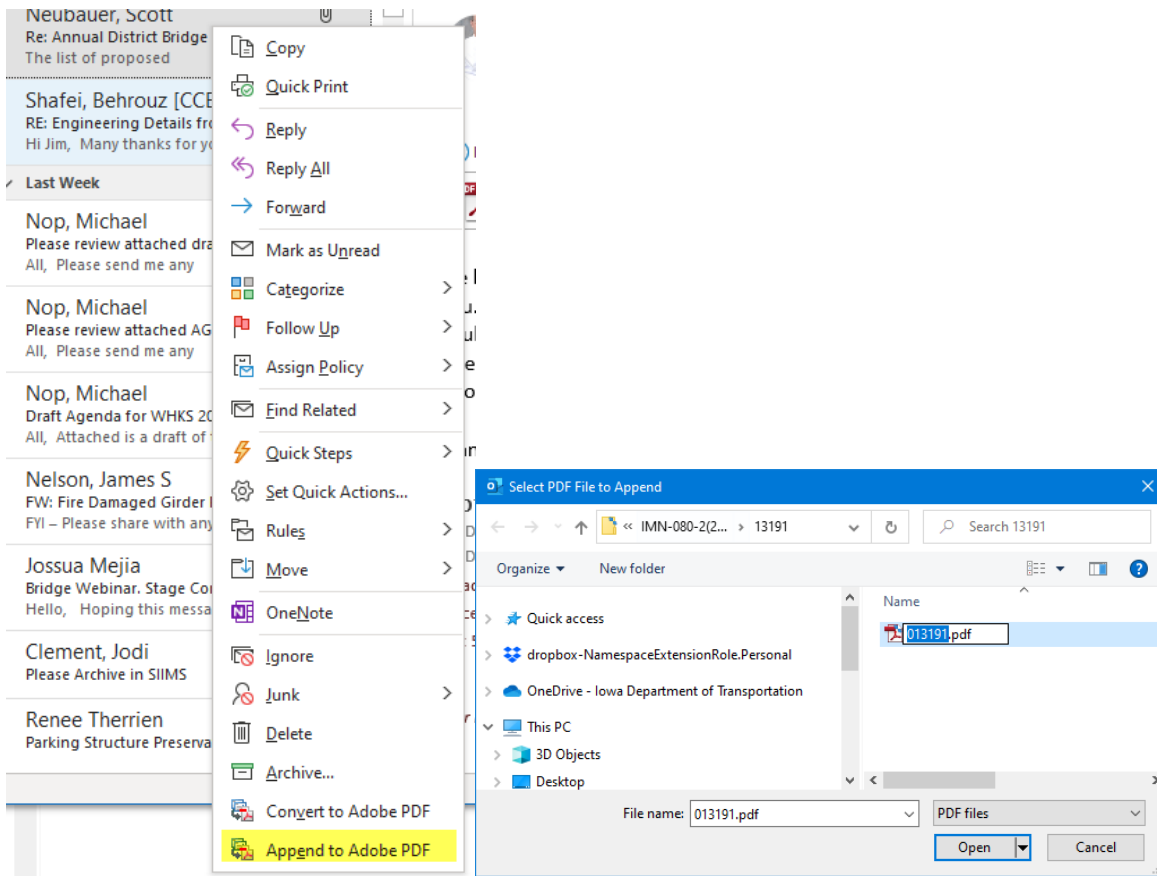
The items saved in the electronic subfolders are the same items that in the past would have been printed and saved in a yellow manila paper file envelope. Create a folder structure to print digital copies of correspondence. A sample folder structure is shown below but you can use any structure that works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



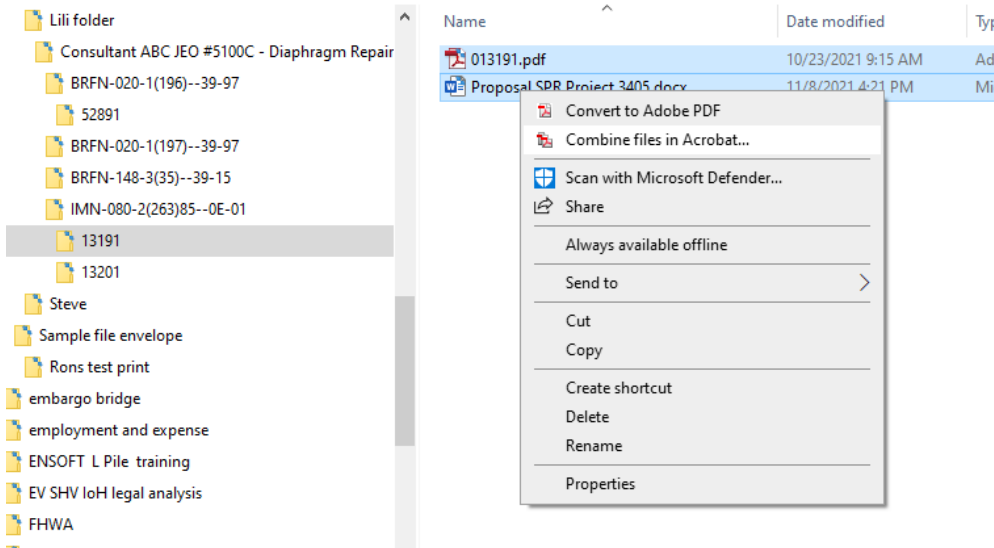
There are several ways to print PDF digital copies of Outlook emails. One method is shown in the following figure. After creating a subfolder to store the PDF files, open the first email to be saved and digitally print to a PDF as shown in the first image. You will be asked to save the file after clicking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

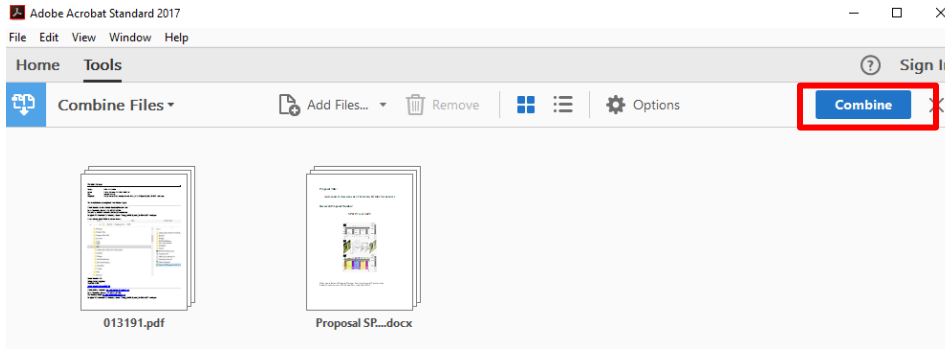


After you digitally print the first PDF file, you can use a feature to append additional correspondence. Right click on a displayed email message and a drop-down menu will give you the option to “Append to Adobe PDF”. Once you select “Append to Adobe PDF”, you will navigate to the original PDF to add 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.

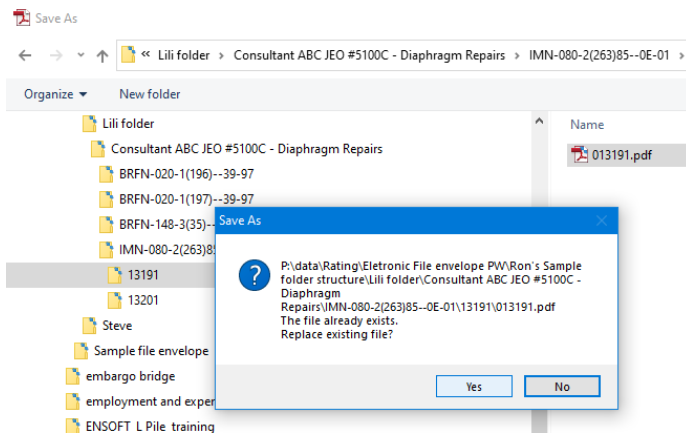


For emails with attachments, save the attachment files in File Explorer. Combine the files by selecting the ones in File Explorer that you want to combine, right click, and then select “Combine files in Acrobat”. Click on the blue “Combine” button and the files will open as a combined PDF file with a 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 \_\_\_\_

## C1.18 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).