

6.5 Maintenance Fabrication Shop

6.5.1 Summary of Maintenance Fabrication Shop

No plans were available to determine baseline information for the Maintenance Fabrication Shop. Therefore, the following description of this structure is based on site observations.

The Maintenance Fabrication Shop is located inside of the PA to the west of the CARP Building and adjacent to the west perimeter security fence. The building's function is to provide metal and wood fabrication shops for facility maintenance.

The Maintenance Fabrication Shop is a pre-engineered metal building. Approximate building dimensions are 56 ft on the north and south sides by 80 ft on the east and west sides. The building consists of rigid steel moment frames that are braced in the orthogonal direction. The perimeter walls are insulated and clad in corrugated metal wall panels. Site observations indicate that the building frames and perimeter cladding are supported on a continuous concrete stem wall and footing system. The floor slab appeared to be a slab on grade with isolation joints at the foundation walls. The building's finished floor elevation is not available.

Two 2-ton fixed jib cranes are located in the metal fabrication shop. These cranes were bolted to isolated concrete foundations that were separated from the remaining floor slab and building structure with expansion jointing.

The Maintenance Fabrication Shop was expanded on the east side during the original construction. This expansion consists of conventional lumber wall and roof construction. However, the walls were constructed to integrate steel shipping containers into the wall. These walls were sheathed between these containers with plywood. This expansion is designated as the wood fabrication shop.

6.5.2 Inputs/References Supporting the Analysis

No references were provided by OPPD that were used to support HDR's analysis of the Maintenance Fabrication Shop. Information used to conduct HDR's analysis was obtained through site observations.

Detailed site observations—field reports, field notes, and inspection checklists—for the Maintenance Fabrication Shop are provided in Attachment 8.

Observed performance and pertinent background data are as follows:

- The Maintenance Fabrication Shop was not protected by an Aqua Dam during the 2011 flood event and was therefore subjected to floodwater.
- The west wall of the Maintenance Fabrication Shop was built in line with the west security perimeter fence, with the fence terminating on either end of the building.
- There were no observed signs of soil movement or structural distress on the outside of the structure.
- The interior slab on grade had some minor shrinkage cracking. This cracking appears to have occurred prior to the 2011 flood event.
- No signs of foundation settlement, slab settlement, or misalignment of jib cranes were observed.

6.5.3 Assessment Methods and Procedures

6.5.3.1 Assessment Procedures Accomplished

Assessments of the Maintenance Fabrication Shop included the following:

- A visual inspection of the interior, including the east building expansion
- A visual inspection of the exterior walls

6.5.3.2 Assessment Procedures Not Completed

No additional assessment procedures were identified for the Maintenance Fabrication Shop.

6.5.4 Analysis

Identified PFMs were initially reviewed as discussed in Section 3.0. The review considered the preliminary information available from OPPD data files and from initial walk-down observations. Nineteen PFMs associated with eight different Triggering Mechanisms were determined to be “non-credible” for all Priority 2 Structures, as discussed in Section 3.6. The remaining PFMs were carried forward as “credible.” After the design review for each structure, the structure observations, and the results of available geotechnical, geophysical, and survey data were analyzed, a number of CPFMs were ruled out as discussed in Section 6.5.4.1. The CPFMs carried forward for detailed assessment are discussed in Section 6.5.4.2.

6.5.4.1 Potential Failure Modes Ruled Out Prior to the Completion of the Detailed Assessment

The ruled-out CPFMs reside in the Not Significant/High Confidence category and for clarity will not be shown in the Potential for Failure/Confidence matrix.

Triggering Mechanism 2 – Surface Erosion

CPFM 2a – Undermining shallow foundation/slab/surfaces

Reason for ruling out:

- Surface erosion was not observed near the Maintenance Fabrication Shop at the time of the site observations.

Triggering Mechanism 4 – Hydrostatic Lateral Loading (water loading on structures)

CPFM 4a – Overturning

CPFM 4b – Sliding

CPFM 4c – Wall failure in flexure

CPFM 4d – Wall failure in shear

CPFM 4e – Excess deflection

Reasons for ruling out:

- Distress to the structure that can be attributed to this Triggering Mechanism and associated CPFMs was not identified at the time of the site observations.

- The Maintenance Fabrication Shop was inundated, resulting in no net differential pressure on the walls.

Triggering Mechanism 5 – Hydrodynamic Loading

- CPFM 5a – Overturning
- CPFM 5b – Sliding
- CPFM 5c – Wall failure in flexure
- CPFM 5d – Wall failure in shear
- CPFM 5e – Damage by debris
- CPFM 5f – Excess deflection

Reason for ruling out:

- Distress to the structure that can be attributed to this Triggering Mechanism and associated CPFMs was not identified at the time of the site observations.

Triggering Mechanism 7 – Soil Collapse (first time wetting)

- CPFM 7a – Cracked slab, differential settlement of shallow foundation, loss of structural support
- CPFM 7b – Displaced structure/broken connections
- CPFM 7c – General site settlement

Reason for ruling out:

- Settlement of the site that could be attributed to this Triggering Mechanism and associated CPFMs was not identified at the time of the site observations.

Triggering Mechanism 9 – Swelling of Expansive Soils

- CPFM 9a – Cracked slab, differential heave of shallow foundation, loss of structural support
- CPFM 9b – Displaced structure/broken connections

Reason for ruling out:

- Degradation that could be attributed to this Triggering Mechanism and associated CPFMs was not identified at the time of the site observations.

Triggering Mechanism 11 – Loss of Soil Strength due to Static Liquefaction or Upward Seepage

- CPFM 11a – Cracked slab, differential settlement of shallow foundation, loss of structural support
- CPFM 11b – Displaced structure/broken connections

Reason for ruling out:

- Visual observations indicate no structure movement. Therefore, degradation that can be attributed to this Triggering Mechanism and associated CPFMs did not occur.

6.5.4.2 Detailed Assessment of Credible Potential Failure Modes

All CPFMs for the Maintenance Fabrication Shop have been ruled out based on the building's relative proximity to the Missouri River and site observations, as discussed in Section 6.5.4.1.

6.5.5 Results and Conclusions

In the assessment of the FCS Structures, the first step was to develop a list of all Triggering Mechanisms and PFMs that could have occurred due to the prolonged inundation of the FCS site during the 2011 Missouri River flood and could have negatively impacted these structures. The next step was to use data from various investigations, including systematic observation of the structures over time, either to eliminate the Triggering Mechanisms and PFMs from the list or to recommend further investigation and/or physical modifications to remove them from the list for any particular structure. Because all CPFMs for the Maintenance Fabrication Shop have been ruled out, no Triggering Mechanisms and their associated PFMs remain credible for the Maintenance Fabrication Shop. Therefore, HDR has concluded that the 2011 Missouri River flood did not impact the geotechnical and structural integrity of the Maintenance Fabrication Shop because the potential for failure of this structure due to the flood is not significant.