

# Service Building



Omaha Public Power District

OPPD



# Field Report

To: Keith Kirchner, Pat Poepsel, Rick Niedergeses	
From: Cameron Collingsworth	Project: OPPD FCS 2011 Flood Inundation Structure Assessment OPPD Plant, Ft. Calhoun, NE
CC: Project File, David Rohan	HDR Project No: 164565, Dept. 134
Date: November, 9 <sup>th</sup> 2011	Field Report No: FR-082

## Team Members:

Cameron Collingsworth (HDR)  
Bryan Kumm (HDR)  
Hugh O'Grady (HDR)

## Field Activity Objective:

Our field activity objective is to observe the Service Building and its surroundings for evidence of damage relating to the flood event.

## Activities Conducted:

The team visually inspected the interior and exterior perimeter of the building for signs of distress and documented areas of concern with photographs.

## Data Obtained:

Each HDR team member noted their observations as the building was inspected. Key areas of concern were specifically documented and photographed. Discipline specific checklists were completed from the field observations to ensure all key items were investigated during the inspection. Team members discussed their observations during and after the inspection to ensure a consensus was formed on all findings at the time of the inspection.

## Observations:

At the time of our field observations water had receded to elevations around 993ft, which are within normal levels. During the flood event, the building was not subjected to floodwaters due to the use of an Aqua Dam. A crack was observed in the masonry wall shared with the Turbine Building. The crack resides in the north-west corner of the building and propagates from a beam penetration through the wall. The beam is approximately 8 feet above the floor elevation. The crack stair steps through the masonry joints and extends at an approximate 45 degree angle up and to the south until it reaches the top of the wall. The crack width is minimal at 1/16" to 1/8". Due to the location of the crack, it is not believed to be related to the flood event and appears to have existed for quite some time. No out of plane movement of the wall was apparent. The crack does not pose any structural concerns in its current condition.

No other signs of distress were seen in the building at this time.

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# Field Report

To: Keith Kirchner, Pat Poepsel, Rick Niedergeses	
From: Bryan Kumm	Project: OPPD FCS 2011 Flood Inundation Structure Assessment OPPD Plant, Ft. Calhoun, NE
CC: Project File, David Rohan	HDR Project No: 164565, Dept. 134
Date: December, 1 <sup>st</sup> 2011	Field Report No: FR-106

## Team Members:

Cameron Collingsworth (HDR)  
Bryan Kumm (HDR)

## Field Activity Objective:

Our field activity objective is to observe the two inspection manholes in the Service Building.

## Activities Conducted:

The team visually inspected inside the inspection manholes for signs of distress and documented areas of concern with photographs.

## Data Obtained:

Each HDR team member noted their observations as the building was inspected. Key areas of concern were specifically documented and photographed. Team members discussed their observations during and after the inspection to ensure a consensus was formed on all findings at the time of the inspection.

## Observations:

The following observations were noted in the inspection manhole near Column SB-7:

- The manhole appears to have been constructed at a later date than the Service Building floor.
- The depth to the ground from the top of the floor slab is about 3 feet.
- The grade beams running along Column Lines SB and 7 were visible.
- The grade beams were slightly undermined in two locations (about 2 inches deep and 1 foot wide).
- The horizontal distance from the edge of the manhole to the adjacent soil was about 9 feet toward the north, 1 foot toward the east, 2 feet toward the south, and 3 feet toward the west.
- An isolated area of the grade beams and overlying floor appeared to be severely deteriorated.
- Up to about 3 inches of concrete and reinforcing steel appeared to be disintegrated.
- A concrete patch appeared to have been placed on the overlying floor about 3 feet southwest of the center of the manhole.
- The soils appeared to consist of fine-grained sand with silt and were loose to medium dense.

The following observations were noted in the inspection manhole near Column SB-5:

- The manhole appears to have been constructed at a later date than the Service Building floor.

- The depth to the ground from the top of the floor slab is about 3 feet.
- The grade beams running along Column Lines SB, 5x, and in between 5 and 4 were visible.
- The grade beams were undermined in several locations (up to about 1 foot deep and 10-foot wide).
- The horizontal distance from the edge of the manhole to the adjacent soil was about 2 feet toward the north, 1 foot toward the east, 12 feet toward the south, and 3 feet toward the west.
- Two pipes wrapped in plastic were visible about 5 feet south of the manhole.
- One pipe covered with asphaltic coating was visible about 6 feet south of the manhole.
- One rusted iron pipe was visible about 3 feet northwest of the manhole.
- The soils appeared to consist of fine-grained sand with silt and were loose to medium dense.

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Priority/Related and/or Personal Information Redacted	Computed: Bpk	Date: 11/9/11
Subject: Service Building	Checked:	Date:
Task: Field Assessment	Page: 1	of: 1
Job #:	No:	

Some stair-stepping cracks in masonry mortar joints on the west wall near the northwest corner of the building. The cracks appear to propagate from a pipe penetration and extend halfway up the wall.

No other obvious signs of distress inside or outside of building.

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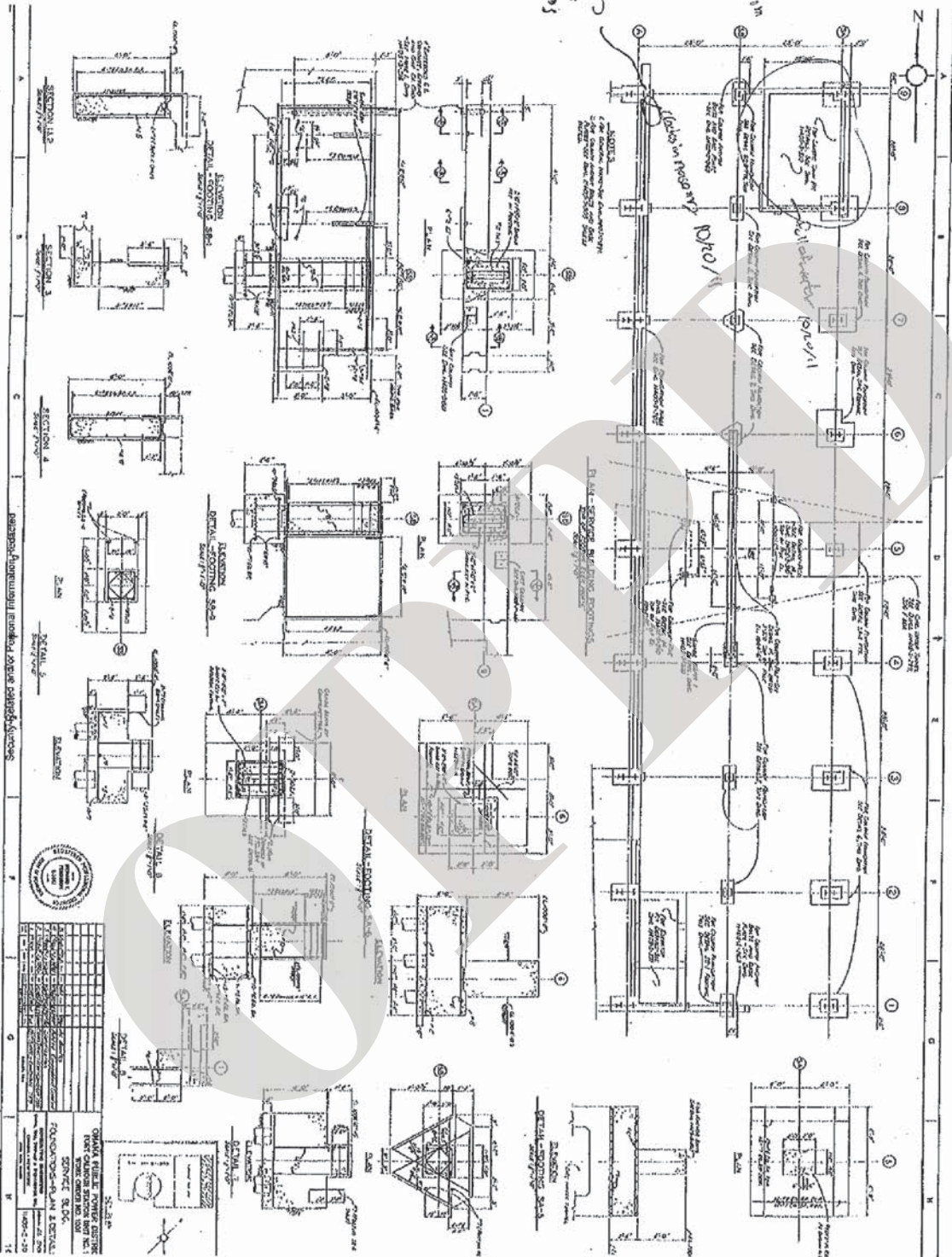
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3394

OPPD00001274

11/09/11 HMC  
202 LF 18'-24"  
AFF  
Sewer 28" dia  
10' below rig  
crusher low

10/27/11  
Tank pumped  
min in the bottom



Security Related and/or Personal Information Redacted

OPPD

**OPPD – FORT CALHOUN STATION  
2011 FLOOD ASSESSMENT - GEOTECHNICAL CONDITION SURVEY**

<b>Structure Number:</b>		<b>Structure Name:</b>	<b>Service Building</b>
Date:	11/09/11	Inspected By:	Bryan Kumm
Weather:	Sunny 40° F		
Current Flood Elev.:	~993'		

<b>Activity 1 – Ground Subsidence</b>	
Is there observable ground subsidence?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
Location	
Areal extent	
Depth	
Cracking	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
Vertical/lateral offset	
Is there observable pavement subsidence?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Location	Pavement area east of Service Building.
Areal extent	Majority of pavement east of Service Building.
Depth	Up to about 2 inches.
Cracking	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Vertical/lateral offset	Up to about 2 inches.

<b>Activity 2 – Erosion</b>	
Is there observable scour?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
Location	
Areal extent	
Depth	
Dimensions	
Is there observable piping (sand boils, sinkholes)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
Location	
Areal extent	

**OPPD – FORT CALHOUN STATION  
2011 FLOOD ASSESSMENT - GEOTECHNICAL CONDITION SURVEY**

Dimensions	
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<b>Activity 3 – Foundation Systems</b>	
Are the foundation plans available?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Is the geotechnical report available?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Is the structure supported on deep foundations?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Deep foundation type	Class B Pipe Pile.
Design capacity	
Is the structure founded on spread footings?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
Allowable bearing pressure	
Sizes of footings	
Is the structure founded on a slab or grade?	No
What is the primary bearing layer for the foundations?	Limestone Bedrock
What are general subsurface conditions?	Old fill overlying alluvial deposits of silt and sand.
Any observable distress?	Yes, minor cracking in the masonry block walls.
Condition of floor slabs?	Good

**OPPD – FORT CALHOUN STATION  
2011 FLOOD ASSESSMENT - STRUCTURAL CONDITION SURVEY**

Structure Number:		Structure Name:	Service Building
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**USER NOTES / INSTRUCTIONS**

1. The purpose of this condition survey is to document observable signs of distress in the structural systems of the Fort Calhoun Nuclear Power Plant due to the 2011 flood event.
2. This inspection is not a condition survey of the entire facility but an opinion of structural damage due to the flood event only. Therefore, documented items of structural distress shall be limited to those attributed to the flood event.
3. Each observed structure shall include a review of existing inspection reports to verify if the observed item was reported prior to the flood event. If possible, review previous inspection reports prior to the on-site structure inspection.
4. Each surveyed structure shall include a review of the available existing structural drawings. If possible, review existing drawings prior to the on-site structure inspection.
5. Structures to be surveyed for flood damage were selected and prioritized by OPPD and include, but are not limited to buildings, process structures, equipment foundations, tank foundations and electrical towers.
6. Where items of distress are found, note the specific location, room number (if possible), nature of the distressed element, loads presently applied and/or load rating of that element, and estimated effect of the flood forces. Use the additional sheet as necessary to document the item. Document each area of distress with photos.
7. Possible damage from flood forces on the structure may be caused by, but are not limited to the following:
  - a. Foundation uplift due to buoyancy forces.
  - b. Undermining of foundations due to flood dynamic (velocity) forces.
  - c. Scouring of foundations due to flood dynamic (velocity) forces.
  - d. Compressibility / consolidation of existing soils due to changes in moisture content.
  - e. Expansive clay materials that undergo volume changes due to the changes in moisture content.
  - f. Settlements due to the loss of soil shear strength.
  - g. Cracking in walls due to additional lateral pressures from higher floodwater elevations.

**OPPD – FORT CALHOUN STATION  
2011 FLOOD ASSESSMENT - STRUCTURAL CONDITION SURVEY**

<b>Structure Number:</b>		<b>Structure Name:</b>	Service Building
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<b>Date:</b>	11/9/2011	<b>Inspected By:</b>	Cameron Collingsworth
<b>Weather:</b>	Partly Cloudy, Mid 50's		
<b>Current Flood Elev. Relative To FFE:</b>	Irrelevant, River levels had previously receded to norm.		

<b>Activity 1 – Description of Structure</b>	
<b>Drawing Ref:</b>	OPPD Document #'s : 10773, 16529, 16530, 16555, 16556, 16557, 16558, 16559, 16590, 16591, 16592, 16593, 16594, 16595, 16596, 16597
<b>Sketch Map – Orientation:</b>	N/A
<b>Foundation:</b>	The building is supported on a deep foundation system. Exterior columns reside on individual pile caps with grade beams between column lines. Interior columns are supported on individual pile caps of varying geometries. Interior grade beams span between columns to support slab above.
<b>Superstructure:</b>	Above grade the building is constructed of steel beams and columns. Lateral resistance is provided by moment frames and collector elements which transfer loads to adjacent structures. The roof is comprised of metal joists supporting a metal deck diaphragm.
<b>Photographs:</b>	

<b>Activity 2 – Previously Documented Condition of Structure</b>	
<b>Item No.</b>	
1	<b>Title:</b> Water Leakage Through Wall Penetration
	<b>Date:</b> 6/10/2011
	<b>Author or Source:</b> Jennifer Forbes
	<b>Summary of Condition:</b> Water was observed leaking into an underground tank pit in the north-east corner of the service building. Water was accumulating below the metal grate flooring and encompassing the tank which resides in the pit.

<b>Activity 3 – Present Condition of Structure</b>	
<b>General Description:</b>	One area of distress was observed in a masonry wall shared with the Turbine building. The crack was behind a large tank located in the north-west corner of the Service Building. The crack propagated from a wall penetration for a steel beam in the north-west corner of the wall approximately 8 feet above floor elevation. The crack followed the masonry joints in a stair stepping fashion at an approximate 45 degree angle up to the roof height. No other signs of distress were observed.
<b>Overall Alignment</b>	
<b>Settlement:</b>	Possible minor settlement in past but not believed to be a new condition.
<b>Deflection:</b>	Possible in past but not believed to be a new condition.

**OPPD – FORT CALHOUN STATION  
2011 FLOOD ASSESSMENT - STRUCTURAL CONDITION SURVEY**

Structure Number:		Structure Name:	Service Building
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Expansion:	N/A
Contraction:	N/A
Other:	N/A

**Activity 4 – Portions Showing Distress**

Item No.	General Description:	
1	A crack was observed in the masonry wall shared with the Turbine Building. The crack was behind a large tank located in the north-west corner of the Service Building. The crack propagated from a wall penetration for a steel beam in the north-west corner of the wall approximately 8 feet above floor elevation. The crack followed the masonry joints in a stair stepping fashion at an approximate 45 degree angel up to the roof height. The crack is thought to have existed for quite some time and is not believed to be related to recent flood events.	
	Distress Item Previously Reported (Y/N) – Report Number?	N
	Photograph:	
Nature of Loading & Detrimental Elements:		
Exposure		
	Freeze / Thaw:	N/A
	Chemical Attack:	N/A
	Abrasion, erosion, cavitation, impact:	N/A
	Salts or Chloride Solution:	N/A
	Other:	N/A
Loading		
	Dead:	Self weight with possible roof load above.
	Live:	Possible lateral load resistance
	Impact:	N/A
	Dynamic / Vibration:	Possible minor vibrations during turbine operation.
	Flood:	N/A

