Carrie Furnace Site Redevelopment
Phase II

Carrie Furnace Facilities

Re-Inspection and Revision Report
April 2009

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Introduction

Wilbur Smith Associates (WSA) was contracted with Rivers of Steel National Heritage Area to re-inspect and revise the previously completed inspection report for the Carrie Furnace site, dated August 2002.

Field Inspection

Wilbur Smith Associates performed an arms length inspection of elements accessible by existing walkways or stairwells, providing they were deemed safe by cursory inspection. WSA accessed the interior roof structure of buildings #1, #2 and #3 with a 60' manlift. The exterior of the roof was not accessible using this equipment.

The top of the stack and the stoves was not inspected at arms length because of the limited access. The top portions of the North and South furnaces were inspected to the limits of safe access.

The focus of the inspection was the identification of maintenance for preservation of the site. No in-depth inspection of the members was performed for determination of load carrying capacity or structural support function.

The following is an overview of the method and scope of the inspection of each structure in accordance with the previous inspection nomenclature (see following sketch):


N
GAS WASHERS
NORTH SKIP
HOIST BUILDING
NORTH FURNACE
STOCK HOUSE
SKIP BRIDGE
STACK
VESSELS / STOVES
SKIP BRIDGE
SOUTH FURNACE
ORE BRIDGE
BUILDING #7
MONONGAHELA RIVER
BUILDING #2
BUILDING #1
BUILDING #3
SOUTH SKIP
HOIST BUILDING
F
A
B
1
12
18
8

Building #1 – the interior and the exterior of the building was inspected using a manlift. The inspection included the overhead crane and roof structure.

Building #2 – the interior and the exterior of the building was inspected using a manlift. The inspection included the exterior pipe supports, the overhead crane and roof structure. The stability of the office area will be investigated.

Building #3 (Cast House) – the interior of the building was inspected using the internal stairs and ladders. The exterior was inspected using a manlift. The inspection will include the floor and roof system surrounding the South Furnace.

Building #7 - the interior of the building was inspected using the internal stairs and ladders.

Dust Catchers #1 and #2 – the walkways surrounding the vessels will be inspected where safely accessible. The interior of the vessels will not be accessed.

Elevator Tower – the tower was inspected using the stairways.

Stoves - the walkways surrounding the vessel was inspected where safely accessible. The interior of the vessels was not be accessed.

Stack – the vessel was inspected to a safe level using the walkways and access ladders. The interior of the vessels was not be accessed.

North and South Furnace – all accessible elements of the furnaces were inspected using the access walkways and stairs. The interior of the furnaces were not be accessed.

Gas Washers – from previous inspection, the condition of the walkways around the gas washers are not structurally sound, therefore the inspection was limited to the visual inspection from surrounding areas.

Stock House – the building was inspected using ladders and access stairs.

Ore Bridge – the structure was inspected using the walkways and stairs along the structure. The inspection included the crane building.

Masonry Buildings – the various buildings were inspected using ladders and the internal stairwells.

In this report, WSA has updated and revised the previous inspection report, from the August 2002 inspection, to reflect the current condition of the facilities. This report includes condition statements of each structure and identifies problem areas. This report includes a priority list of proposed repairs based on the preservation criteria set forth by the Rivers of Steel Heritage Area. All proposed repairs include an estimated cost and a priority coding.

No structural analysis or detailing of structural repairs is part of the report.

During the weeks of March 16, 2009 and March 23, 2009 a WSA inspection team of Steven Kocsuta, PE and Darin Hettich, PE performed a reinspection of the structures incorporated in the Carrie Furnace site.

INSPECTION METHODS

The inspection team inspected all of the structure elements by traversing the existing walkway system with the aid of ladders. The ore bridge was inspected by walking the stairways and walking the bridge deck. The two large buildings we inspected with the aid of a manlift. The manlift was used to access the interior roof system. The insides of the furnace, stoves and other vessels were not inspected.

The following sections present a summary of the inspection findings for each major structural element, including the physical condition, recommended repairs and photos of various elements.

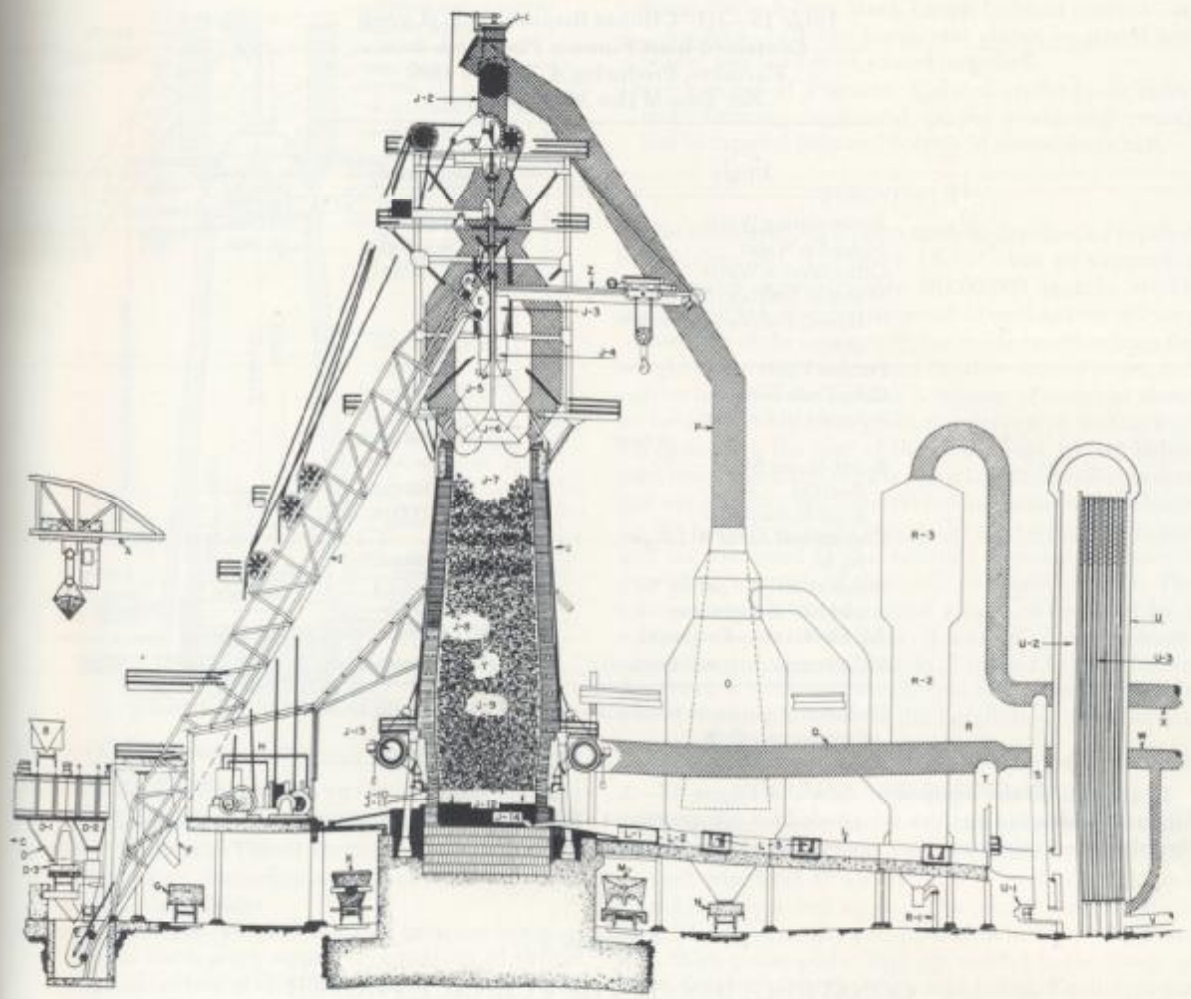

FIG. 15—3. Idealized cross-section of a typical modern blast-furnace plant. Details may vary from plant to plant: for example, Figure 15—2 shows a different arrangement for washing the gases leaving the dust catcher (**O**).

Legend

A. Ore bridge
B. Ore transfer car
C. Ore storage yard
D. Stockhouse
  D-1 Ore and limestone bins
  D-2 Coke bin
  D-3 Scale car
E. Skip
F. Coke dust recovery chute
G. Freight car
H. Skip and bell hoist
I. Skip bridge
J. Blast furnace
  J-1 Bleeder valve
  J-2 Gas uptake
  J-3 Receiving hopper
  J-4 Distributor
  J-5 Small bell
  J-6 Large bell
  J-7 Stock line
  J-8 Stack
  J-9 Bosh
  J-10 Tuyeres
  J-11 Slag notch
  J-12 Hearth
  J-13 Bustle pipe
  J-14 Iron notch
K. Slag ladle
L. Cast house
  L-1 Iron trough
  L-2 Slag skimmer
  L-3 Iron runner
M. Hot-metal ladle
N. Flue dust car
O. Dust catcher
P. Downcomer
Q. Hot blast line to furnace
R. Gas washer
  R-1 Sludge line to thickener
  R-2 Spray washer
  R-3 Electrical precipitator
S. Gas offtake to stove burner
T. Hot blast connection from stove
U. Stove
  U-1 Gas burner
  U-2 Combustion chamber
  U-3 Checker chamber
V. Exhaust gas line to stack
W. Cold blast line from blower
X. Surplus gas line
Y. Stock—Iron ore, coke, limestone
Z. Jib boom crane

Sketch taken from: The Making, Shaping and Treating of Steel, Ninth Edition, Edited by Harold E. McGannon, Copyright 1971 by United States Steel Corporation.

GENERAL CONDITIONS

The majority of the facility is in fair to poor condition with a large amount of surface rusting on the steel members. Most elements of the facility are made of steel or masonry components. The steel surfaces have been coated with a paint system which is likely lead based although no formal test was performed. Some type of encapsulation or removal of the paint will be required to utilize the facility as a public park. The Carrie Furnace grounds and facilities need to be tested for contaminants and hazardous materials.

BUILDING #1

Building #1 is a large warehouse type structure with a steel truss roof system and a 50 Ton crane that runs the length of the building (See Photo 1). Several of the building elements have problem areas in poor condition. The roof, made up of timber planks and metal decking, is in imminent failure condition with large areas of missing and deteriorating planks (See Photos 2, 3 and 4). The wooden planks are rotten and a majority of them are missing or are in pieces inside the building on the floor. The metal roof decking has large areas missing and is present around the exterior perimeter of the building on the ground. The roof wooden planks and metal decking are in a failed condition, meaning that they are beyond repair.

A timber used to support electrical insulators at the roof truss along column line 12 is cracked and presents a potential hazard.

The roof is a hazard and needs corrective action for safety and to help preserve the Building.

The roof support system, made up of steel roof trusses and I shaped purlins, is in good condition (See Photo 6) with isolated areas with missing lateral bracing on the western end of the structure, between column lines 17 and 18 (See Photo 5). Above the crane between column lines 1 and 2, near the north side of the building, a roof truss lateral bracing is not connected and is loose on one end.

The north wall has several large diagonal cracks up to 2 ½" wide from between corners of the old window openings. These exist between column lines 13-14 and 14-15 (See Photo 7). A large hole, approximately 6-ft wide by 10-ft high, had been broken through the north wall between column lines 15-16. The east wall has diagonal cracks underneath old window openings.

Inside the building, the western end has an elevated floor which has large openings that exposes the basement below. These opening exist between column lines 15-18. The remaining portions of the elevated floor have large crack throughout, with some areas showing signs of settlement. The basement area was not inspected due to it being potentially unsafe. Since, the limits of the basement area not being known, the elevated floor cracking being a potential safety issue is not known. If the elevated floor is on grade, the safety issue would be eliminated.

The column bases have cracked and spalled concrete typical. The SE and NE corners have diagonal cracking with cracks open up to 1 ½" wide. The steel columns, which support the crane and carry the majority of the structural loading, are in fair condition with minimal deterioration on the inside of the building. The column flanges on the exterior of the building have areas of section loss up to 50% along the height of the column with some locations having holes through the flanges (See Photo 10). Locations of rust packing exist that has bent the remaining portions of the column flanges in some locations, primarily along the north wall of the building. Column 17-B has roughly 2-ft of exposed anchor bolts and the base plate is roughly 1/3 undermined due to the deteriorated concrete pedestal (See photo 8). Column 1-B has an entirely exposed and unsupported anchor bolt and the pedestal is deteriorated (See photo 9).

North foundation wall near column 1-B has diagonal crack from base of column 1-B up to where large pipe enters building. A crack exists in the foundation wall between columns 1-B and 2-B close to column 2. North foundation wall at base of column 4-B has diagonal crack from base of pedestal up to bottom of old window.

All column anchor bolts are in poor condition, with advanced section loss.

The column pedestals around the exterior of the building are in serious condition, with spalling and crumbling concrete that may have seriously affected the structural condition, with shear cracks present.

The base of columns 1-B thru 6-B have spalled and crumbling concrete typical.

BUILDING #2

Building #2 (See Photos 17 and 18) is a large warehouse type structure with a steel truss roof system and a 50 Ton crane that runs the length of the building. The roof system is in relatively good condition with some lateral bracing elements missing (See Photos 11 and 12). These include bracing between the roof trusses along columns lines:

8-9 between column line A-B;
11-12 between column lines A-B, D-E and E-F.

A roof truss lateral bracing between column 1-2 and E-F is not riveted and is loose. One lateral bracing is twisted between column lines 3-4 and C-D (See Photo 14).

The roofing near column 1-A and also 1-F has separated from the building and is partially detached.

The structure itself is also in relatively fair condition. The concrete pedestals and foundation walls at the base of the column supports are deteriorating and are heavily spalled through out and diagonal cracks exist. The east wall, near column 1-F has a diagonal crack that is open up to ½" and extends from the ground up to about half the building height. At several locations, the column base plates do not have full bearing area. Some column bracing has been cut off and is not connected to the column. This includes bracing between columns along column line A-B and columns 3-4, 5-6 and 7-8.

The crane elements appear in good condition but some minor damage to the stairway leading to the operator cage exists.

The western end of the building houses an office area which is in poor condition. A portion of the front wall of the office area has been partially demolished leaving the remainder of the wall in danger of collapse (See Photo 15). At the upper level of this office space areas of the roof have partially collapsed (See Photo 16). This area is in imminent failure condition and needs to be completely demolished.

EXTERIOR PIPE SUPPORTS ALONG BUILDING #2

The pipe support towers, which run along the exterior of the south wall of Building #2, have major deterioration of the lateral members near the bottom of the towers (See Photo 18). These members tie the towers into the base of the building columns. The webs of the members have 100% section loss at numerous locations and the bottom flanges have 70% section loss. Some members near the top of the pipe support frames near columns 6, 7, 9 and 10 (See Photos 19-24). These members should be repaired to insure the stability of the towers.

BUILDING #3
Building #3 is the Cast House, which is adjacent to the South furnace. It houses the charging platform as well as the troughs which channeled the slag and iron to the various distribution ladles. The concrete and steel platform where the troughs are located is in good condition with minor deterioration. The steel stairways, which had provided accesses to the upper levels, have been cut off approximately 6' off the ground.

Several of the building elements have moderate problem areas. The concrete walls beneath the troughs have several diagonal cracks up to 6" wide. The columns that are exposed to the elements have areas of moderate deterioration with section loss of the base plates, anchor bolts and column flanges and webs at the base. The rear portion of the building which encloses the back side of the furnace has severe deterioration of the roof system with several members supporting the steel plate roof deteriorated to the point of collapse. The roof plates themselves are in fair condition but the connection points have rust holes along the seams (See Photo 27). The roof system on the back side of the building needs to be repaired. The remainder of the roof appears to be in good condition. A roof edge truss that runs along column line A between column lines 3-4 has minor to moderate section loss (See Photo 25). The edge beam on column line 1 has been deformed (See Photo 26).

SOUTH FURNACE
This furnace appears to be the newer of the two furnaces on the site. The furnace itself is in fair condition with minor surface rusting of the elements with no structural damage noted (See Photo 28). The column supports have minor section loss at the floor level. The walkways around the furnace are in fair condition with the walkways within Building #3 being in good condition and the walkways along the exposed portion of the furnace having increased deterioration as the level above the ground increased. The walkway at and above the "bell" level has 100% section loss of several members and severe rust packing and laminations throughout.

DUST CATCHER #1
This vessel sits adjacent to the south furnace. The vessel itself is in good condition with moderate surface rusting. The columns which support the dust collector and the adjacent walkway have some moderate deterioration at the base with some 100% section loss of the webs observed at the column bases (7 locations) (See Photo 29). The platform and support members, at the base of the vessel, have areas of heavy deterioration (up to 100% section loss) but appear to be in stable condition. The walkways at the top of the dust catcher have moderate deterioration. The walkways and platforms which connect the south furnace with the dust catcher are missing the deck grids and many of the support members have advanced deterioration**.**

ELEVATOR TOWER
The elevator tower, which is located between the two furnaces, appears to be in good structural condition with minor surface rusting and corrosion. The functionality of the tower as an elevator was not determined. The stairway that leads to the top of the tower has some serious deterioration throughout and requires repair.

STOVES
The bank of 6 stoves resides between the two furnaces (See Photo 30). The vessels themselves appear in fairly good condition with minor surface rusting throughout. The platforms around the stoves are in good condition with the exception of the platform adjacent to the dust catchers/electrical precipitators and the stock house. These platforms have heavy deterioration are in imminent failure condition and need to be replaced. All other elements in the stove area appear to be structurally sound.

STACK
The single stack was visually inspected from the ground and no significant structural defects were noted. Minor surface rusting was observed. The access ladder appeared to be in good condition, but a member of the ladder is loose and rattles in the wind, and should be repaired.

DUST CATCHER #2
This vessel sits adjacent to the north furnace, to the south. The vessel itself appears to be in good condition with moderate surface rusting. The columns supports are in fair to poor condition with heavy section loss (See Photo 32). Generally, the walkways around the vessel have partially collapsed with the remaining walkways in danger of collapsing (See Photo 31). This platform/walkway needs to be removed.

The stair tower near this dust catcher that leads up to the top of North Furnace has lateral bracing at the lower levels that need to be replaced. The upper levels of the stair tower have some loose grating and areas of section loss. Cables have been attached to the sides of the stair tower for apparent lateral support.

NORTH FURNACE
The north furnace appears to be the older of the two and has some heavier rusting and deterioration with minor section losses along the face and at some of the walkway supports (See Photo 33). The visible portion of the furnace foundation has some diagonal cracking and spalling.

The cast house at the base of the furnace has been partially demolished with the only portions still standing being those around the furnace itself. The areas that remain standing are partially supported in some locations and in danger of collapse. The majority of this area needs to be repaired or demolished.

The platform between the furnace and dust catcher has moderate deterioration and section loss at numerous locations with holes in some of the support members. Numerous repairs are required in this area. The platforms and walkways around the furnace are in fair to poor condition with advanced deterioration at several locations. Many of the stair support beams have advanced section loss and need to be replaced. One of the support columns for the walkway at the bell level has significant deterioration at the base plate where in is connected to the furnace and needs to be repaired. Many of the platforms and ladders at the top of the furnace are deteriorated and in need of repair.

There are several temporary work platforms that were left in place around the furnace where repairs were being made. These platforms are not properly attached and should be removed. A railing between the furnace and the skip bridge along the walkway needs to be replaced.

GAS WASHERS/ELECTRICAL PRECIPITATORS
The gas washers are situated east of the furnaces and adjacent to the stoves. There are two gas washers, one associated with each furnace. The vessels are situated over a large pool filled with water. The vessels are supported by steel columns which are resting on large steel plate girders. The girders themselves are in good condition but the column supports for the vessels are badly deteriorated with total section loss at numerous locations. Each of these columns has buckled and is in failure condition (See Photos 36 and 38). A beam that supports a column has also buckled (See Photo 37). These supports for the gas washers/electrical precipitators are in imminent failure condition and are affecting the structural stability of the precipitators and the walkways surrounding

them. The presence of the water along with some corrosive vapors appears to have created an environment that facilitated the corrosion of the steel members above the pool.

The platforms at the base of the vessels are over the pool. The platforms condition is imminent failure condition with heavy deterioration and section loss on nearly all elements of the platform system. Portions of the platforms have already collapsed into the pools (See Photos 34 and 35). The platforms and walkways at higher levels above the pool are in critical to serious condition (See Photo 59).

Stair tower between electric precipitators and gas washers is severely deteriorated with nearly 100% section loss to many members, including column webs and most horizontal members (See Photo 65). It appears to be in imminent failure condition and presents a hazard. A pipe support tower between electric precipitators and gas washers (between Masonry Bldgs. # 1 and #2) has heavy deterioration; including 100% section loss at the base plates (See Photos 60 and 61). Lateral bracing members have section loss such that they are ineffective and present hazards.

Major repairs will be required in this area to restore or remove the vessels and the walkways to a safe condition.

STOCK HOUSE

The stock house area runs along the west face of the furnaces provided raw material to the furnaces by way of the skip bridge. The top of the stock house, where the railcars sat, is in fair condition with some loose rails and some rotted timbers (See Photos 39 and 40). The walkway from the stock house around the north skip bridge is in poor condition and required repair. The majority of the structure appears stable. The south end of the stock house has been partially demolished and the elements which are still remaining are unstable and in danger of collapse (See Photo 45). This area needs to be stabilized to prevent further collapse. On the upper level of the stock house, an overhead electrical rail has partially fallen and others appear to be ready to fall.

The steel bins themselves are in good condition with some surface rusting and some areas of moderate section loss. A steel bin near the north end has heavy section loss and may be unstable; it is currently partially filled with water.

The concrete walls have diagonal cracking and areas of advanced section loss and spalling throughout and are generally in poor condition (See Photos 41 and 42). The area under the bins is in fair condition. The pit areas where the skip hoists were loaded are filled with water and the platforms in the operator's areas have damaged members and the north skip bridge has collapsed (See Photos 43 and 44). The walkway over the pit at the north skip bridge has partially collapsed.

A stairway connecting the stock house to the southern most skip bridge is not connected and is unsafe.

BUILDING #7 – UNLOADER

This building is at the western base of the ore bridge. A rail car is still in place at the base of the main building. Although the building appears to be in good condition from a distance because of a relatively new coat of paint, several areas have moderate deterioration. The platforms on the first level adjacent to the rail car have areas with 100% section loss and need to be repaired. The walkways and stairs have scattered areas of moderate corrosion and several areas with holes through the members. The concrete deck has cracking and spalling concrete throughout. A

walkway which runs along the backside of the building is heavily deteriorated with the majority of the timber planking rotted and missing. Major repairs of this area are required.

The second level is in fair condition with some heavy deterioration of the steel plate floor with several areas of 100% section loss.

The third level has a walkway which led to a structure which has been demolished. The support pier is not connected to the walkway and is 3' out of plumb (See Photo 46). The walkway is unstable and appears ready to collapse. The third level control room has a wood floor which is rotted. The fourth and fifth levels have some deterioration of the stairs and platforms.

Some repairs need to be performed in building #7 to stabilize the walkways and make the area safe.

Several small buildings are located along the river side of building #7. The buildings are heavily deteriorated with one building having fire damage and others in various stages of collapse. These building should be demolished.

ORE BRIDGE

The ore bridge is made up of two access towers and the main span that houses the crane (See Photo 47). The stairways in the west tower are in good condition with some surface rusting and pitting. The platform at the top of the stair tower is cantilevered 15' from the support and is very unstable. A support angle, which was used to stabilize the platform, is not connected. Some walkway railings are not connected.

Portions of the ore bridge were inaccessible due to unsafe walkways, rotten timbers. One area nearest the river is the counter weights for the crane. These counter weights are suspended up in the air, and the supporting cables have not been inspected.

The main span of the bridge is in good with minimal deterioration of the main structure. The floor system uses checkered plate, which is in good condition with scattered surface rusting. Heavier rusting us present on the end platforms. The operator house has heavy deterioration of the wall and floor panels and louvered panels. These panels need some repair.

The east tower is in fair condition with some minor surface rusting of the stairways. A stairway which is on the furnace side (east) of the tower is in imminent failure condition and in danger of collapse (See Photo 48). This stairway should be removed and replaced. Other stairs on the east side of the ore bridge has loose step and loose handrail.

SKIP HOIST MOTOR BUILDINGS

The two story buildings housed the motors which operated the skip hoists (See Photos 51 and 52). The inside of the building appear stable and the walkways are generally in good condition. Some of the railings on the second level of the north building need to be repaired. A stairway, landing and ladder along the outside south face of the north building are badly deteriorated with advanced section loss. A 30' long ladder along the interior NW face which accesses a platform at the top of the north building is not connected at the top and needs repaired. A column base at the NW corner of the north building made of brick is deteriorated and the base plate is not supported (undermined). The north wall of the north building is cracked (See Photo 53). The south wall of the north building has a ½" wide diagonal crack through the brick from the top of the door up to the roof.

The south building's north wall has cracks in the brick (See Photos 49 and 50). It also has loose, cracked and delaminated concrete that is above the ground (i.e. overhead) that is a possible hazard. The stair up to the second level is missing two steps and is moderately to severely deteriorated.

SKIP BRIDGES

The access to the bridges was limited by field conditions. The skip bridges are in fair condition with minor surface rusting throughout. The top cross bracing of the bridge near the tip of the furnace has some heavier deterioration particularly at the gusset plates. The hoist cables remain in place and need to be further evaluated to insure the skip cars do not release and fall to into the stock house area.

MASONRY BUILDING #1

This small building sits at the SW corner of the motor building (See Photo 54). The building is single story with a below ground area. The below ground area is filled with water and therefore inaccessible (See Photo 56). The building roof is comprised of concrete panels which are collapsing at various locations (See Photo 55). A heater unit suspended from the ceiling is deteriorated and is in danger of collapse.

MASONRY BUILDING #2

This small building sits between the two gas washers (See Photo 57). The basic structure is in fair condition with portions of the corrugated metal roof collapsing. The roof steel support beams are in good condition. The masonry walls are in good condition with some minor cracking.

MISCELLANEOUS

The walkway between the stoves and the stock house has collapsed. Portions that remain are in imminent failure condition (See Photos 62, 63 and 64).

The entire site has various and many locations that have hanging chains, cables and wires. These all need to be secured and/or removed. Currently they present potential hazards.

The site also has many underground pits, rooms and tunnels that have not been accessed or inspected. These underground areas should be evaluated and inspected. Some of the existing pits are covered with steel plates (See Photo 58). Some of these steel plates need to be reinstalled; due to them being misaligned over the pit below and some will require replacement.

The steel surfaces have been coated with a paint system which is likely lead based although no formal test was performed. Some type of encapsulation or removal of the paint will be required to utilize the facility as a public park. The Carrie Furnace grounds and facilities need to be tested for contaminants and hazardous materials. This must be done and any remediation completed prior to opening of the grounds and facility.

IDENTIFICATION OF MAINTENANCE FOR PRESERVATION OF THE SITE

The overall condition of the facility is fair to poor with some walkways in adequate condition to support moderate pedestrian traffic. Minor repairs would be required throughout to upgrade the grating and walkway systems. Some areas need more significant repairs and several isolated areas require major reconstruction and renovation. The following is a summary of areas requiring repair throughout the facility, including a priority and estimated construction cost associated with each repair:

Note: No in-depth inspection of the members was performed for determination of load carrying capacity. The priority for preservation criteria was set forth by the Rivers of Steel Heritage Area. The estimated construction costs are based upon normal conditions, including no hazardous substances, and are estimates.

GENERAL

- The proposed repairs, quantities, estimated costs, repair details, and locations should be confirmed prior to and during the construction of the repairs.
- Testing for hazardous materials, including lead based paint, needs to be performed before any site renovations are begun.
- Paint system is likely lead based throughout and requires encapsulation or removal.
- The proposed repairs are based on the re-inspection of the site for preservation of the site and are not based on detailed inspections or detailed analysis of any members. These are intended to provide only a rough estimate of costs that may be involved in repairs intended for preservation of the site.

Proposed Repairs				
Location	**Priority**	**Description**	**Estimated Quantity @ Unit Cost**	**Estimated Cost**
Building #1				
Roof Replacement	0	Remove existing roofing system and replace with steel decking on entire roof of Building #1.	90-ft x 375-ft = 33750sf @$3/sf	$101,250
Col. Line 12	3	Repair broken timber up in roof trusses used to support electrical insulator	1 each @ $100	$100
Col. Lines 17-18 and 1-2	4	Replace missing roof truss lateral bracing and install bolts missing	2 each @ $500	$1,000
Col. Lines 13-14 and 14-15	4	Repair cracks in walls	30lf x 2 = 60lf @ $10/lf	$600
Col. Line15-16	5	Repair hole in wall	6-ft x 10-ft = 60sf @ $125/sf	$7,500
Entire perimeter of building at column bases and foundation walls	2	Repair cracked, spalled and delaminated concrete at column bases and foundation walls.	2 x (90-ft x 375-ft) x 5-ft H x 2 sides = 9300 sf @ $40/sf	$372,000
Building #2				
Col. Lines: 1-2/E-F; 3-4/C-D; 8-9/A-B; 11-12/A-B; 11-12/D-E; 11-12/E-F	4	Repair and Re-attach loose roof truss lateral bracing	6 each @ $500	$3,000
Col. Lines: 1-A and1-F	0	Replace/Re-attached loose roofing	5ft x 5-ft x 2 = 50sf @ $3/sf	$150

Col. Lines 1-F	4	Repair cracks in walls	40lf @ $10/lf	$400
Col. Lines: 3-4/A-B; 5-6/A-B; 7-8/A-B	4	Replace missing column lateral bracing	3 each @ $500	$1,500
Entire perimeter of building at column bases and foundation walls	2	Repair cracked, spalled and delaminated concrete at column bases and foundation walls.	2 x (105-ft x 225-ft) x 5-ft H x 2 sides = 6500 sf @ $40/sf	$260,000
Interior between Col. Lines 10 and 12	1	Demolition of existing partially demolished offices	Lump Sum @ $25,000	$25,000
Exterior Pipe Support Along Building #2				
Building #2 Col. Lines: 6, 7, 9, 10 and other locations	1	Replace/repair pipe support members	15 each @ $500	$7,500
Building #3				
West side of building behind furnace	0	Replace roof system	50-ft x 20-ft = 1000sf @ $5/sf	$5,000
Near ground level beneath troughs	2	Repair cracked, spalled and delaminated concrete walls beneath troughs	1000sf @ $40/sf	$40,000
South Furnace				
South Furnace	3	Miscellaneous steel repairs	10 each @ $500	$5,000
Dust Catcher #1				
All columns supporting Dust Catcher	3	Repair columns that support Dust Catcher near base	7 each @ $500	$3,500
Walkway and platforms connecting dust catcher and south furnace	0	Miscellaneous steel repairs	10 each @ $500	$5,000
Elevator Tower				
Stairway leading to top of elevator tower	3	Repair/replace portions of deteriorated stairway	20 each @ $500	$10,000
Stoves				
Platform between dust catchers/electrical precipitators	0	Replace platforms adjacent to dust catchers and electrical precipitators	1 each @ $15,000	$15,000
Stack	5	Re-attach loose ladder member that rattles in the wind	1 each @ $100	$100

Dust Catcher #2				
All columns supporting Dust Catcher	3	Repair columns that support Dust Catcher near base	4 each @ $500	$2,000
Walkway and platforms connecting dust catcher and south furnace	0	Replacement of platforms	1 each @ $15,000	$15,000
Stair tower	2	Replace lateral bracing members, especially at lower levels	10 each @ $500	$5,000
Stair tower	1	Replace missing/loose grating and sections with significant section loss	5 each @ $100	$500
North Furnace				
Cast house at base of furnace	0	Demolition of remaining portions of cast house	1 each @ $30,000	$30,000
Platform between furnace and dust catcher	1	Repair support members of platform	20 each @ $500	$10,000
Stair and platforms around furnace	2	Repair many support members of stairs and platforms around the furnace including up near 'bell'	40 each @ $500	$20,000
Between furnace and skip bridge	0	Replace railing	1 each @ $100	$100
Gas Washers/Electrical Precipitators				
Electrical Precipitators	0	Repair/replace/install new supports for electrical precipitators that includes retrofitting buckled columns that support electrical precipitators	2 each @ $50,000	$100,000
Over pool	0	Replace platform over top of pool	1 each @ $10,000	$10,000
Between electric precipitator and gas washer	0	Remove/replace stair tower between electric precipitator and gas washer	1 each @ $10,000	$10,000
Between electric precipitators and Masonry Building #1 and #2	0	Repair/replace pipe support	1 each @ $5,000	$5,000
Stock House				
South end of stock house	0	Demolish the remaining partially demolished area	1 each @ $10,000	$10,000
Upper level of stock house	0	Remove partially fallen electrical railings	2 each @ $100	$200

North end	1	Repair/remove steel bin near north end	1 each @ $2,000	$2,000
Perimeter of building	2	Repair cracked, spalled and delaminated concrete at foundation walls.	5000sf @ $40/sf	$200,000
Skip bridges inside stock house	1	Remove collapsed walkways overtop of skip bridges and remove the collapsed operator's areas.	2 each @ $10,000	$10,000
Stair near southern most stock house	0	Remove stairway connecting the stock house to the southern most skip bridge	1 each @ $5,000	$5,000
Building #7 - Unloader				
First level near rail car	4	Repair platforms near rail car	1 each @ $3,000	$3,000
Backside of building	2	Repair/replace walkways	1 each @ $5,000	$5,000
Second level of building	3	Repair deteriorated steel floor plate	1 each @ $5,000	$5,000
Third level and above	2	Demolition/repair of third level and above including stairs and walkways	1 each @ $20,000	$20,000
River side of Building	5	Demolition of various building that are in stages of collapse	1 each @ $5,000	$5,000
Ore Bridge				
Platform near top of stair tower	1	Attach support for stair tower that is cantilevered and is currently unstable	1 each @ $500	$500
Various walkways	1	Attach various walkway railings, repair rotten timbers in walkways	1 each @ $1,000	$1,000
Operator housing	3	Repair walls and floor panels in operator's housing	1 each @ 1,000	$1,000
Stairs at furnace side of Ore bridge	0	Remove stairs that are partially collapsed	1 each @ $5,000	$5,000
Stairs	0	Repair loose step and loose handrail on other set of stairs on furnace side of Ore bridge	1 each @ $200	$200
Skip Hoist Motor Buildings				
North building Second level	2	Repair railings	1 each @ $200	$200
North building South face	1	Repair stairs, platform and ladder on south face	1 each @ $2,000	$2,000
North building, interior	5	Connect/repair ladder on NW interior face of building	1 each @ $200	$200
North building	2	Repair spalled and	1 each @ $300	$300

NW Column base		undermined column base		
North and South Walls	5	Repair cracks in building walls	100 lf @ $10/lf	$1000
South building Stairs	0	Repair loose steps	2 each @ $100	$200
South building	0	Remove/repair loose concrete on exterior of building	1 each @ $500	$500
Masonry Building #1				
Basement	3	Remove water from basement of building	1 each @ $1,000	$1,000
Roof	0	Remove and replace roof	200sf @ $5/sf	$1,000
Interior	4	Remove over head heater that is collapsing	1 each @ $100	$100
Masonry Building #2				
Roof	0	Remove and replace roof	400sf @ $5/sf	$2,000
Miscellaneous				
Various locations	3	Remove/secure hanging chains, cables and wires through out the site due to potential hazards if the fall		
Various pits, basements, tunnels	3	Replace/cover underground pits, basements, tunnels to ensure safety		

Priority Code:
0 – Prompt action required.
1 – High Priority, as soon as work can be scheduled.
2 – Priority, review work plan, adjust schedule if needed.
3 – Add to schedule.
4 – Routine structural, can be delayed until funds are available.
5 – Routine non-structural, can be delayed until programmed.

Summary of Critical Deficiencies
Priority 0

Proposed Repairs				
Location	**Priority**	**Description**	**Estimated Quantity @ Unit Cost**	**Estimated Cost**
Building #1				
Roof Replacement	0	Remove existing roofing system and replace with steel decking on entire roof of Building #1.	90-ft x 375-ft = 33750sf @$3/sf	$101,250
Building #2				
Col. Lines: 1-A; 1-F	0	Replace/Re-attached loose roofing	5ft x 5-ft x 2 = 50sf @ $3/sf	$150
Building #3				
West side of building behind furnace	0	Replace roof system	50-ft x 20-ft = 1000sf @ $5/sf	$5,000
Dust Catcher #1				
Walkway and platforms connecting dust catcher and south furnace	0	Miscellaneous steel repairs	10 each @ $500	$5,000
Stoves				
Platform between dust catchers /electrical precipitators	0	Replace platforms adjacent to dust catchers and electrical precipitators	1 each @ $15,000	$15,000
Dust Catcher #2				
Walkway and platforms connecting dust catcher and south furnace	0	Replacement of platforms	1 each @ $15,000	$15,000
North Furnace				
Cast house at base of furnace	0	Demolition of remaining portions of cast house	1 each @ $30,000	$30,000
Between furnace and skip bridge	0	Replace railing	1 each @ $100	$100
Gas Washers/Electrical Precipitators				
Electrical Precipitators	0	Repair/replace/install new supports for electrical precipitators that includes retrofitting buckled columns that support electrical precipitators	2 each @ $50,000	$100,000
Over pool	0	Replace platform over pool	1 each @ $10,000	$10,000

Between electric precipitator and gas washer	0	Remove/replace stair tower between electric precipitator and gas washer	1 each @ $10,000	$10,000
Between electric precipitators and Masonry Building #1 and #2	0	Repair/replace pipe support	1 each @ $5,000	$5,000
Stock House				
South end of stock house	0	Demolish the remaining partially demolished area	1 each @ $10,000	$10,000
Upper level of stock house	0	Remove partially fallen electrical railings	2 each @ $100	$200
Stair near southern most stock house	0	Remove stairway connecting the stock house to the southern most skip bridge	1 each @ $5,000	$5,000
Ore Bridge				
Stairs at furnace side of Ore bridge	0	Remove stairs that are partially collapsed	1 each @ $5,000	$5,000
Stairs	0	Repair loose step and loose handrail on other set of stairs on furnace side of Ore bridge	1 each @ $200	$200
Skip Hoist Motor Buildings				
South building Stairs	0	Repair loose steps	2 each @ $100	$200
South building	0	Remove/repair loose concrete on exterior of building	1 each @ $500	$500
Masonry Building #1				
Roof	0	Remove and replace roof	200sf @ $5/sf	$1,000
Masonry Building #2				
Roof	0	Remove and replace roof	400sf @ $5/sf	$2,000

Total Repairs **$310,600**

Summary of Critical Deficiencies
Priority 1

Proposed Repairs				
Location	**Priority**	**Description**	**Estimated Quantity @ Unit Cost**	**Estimated Cost**
Building #2				
Interior between Col. Lines 10 and 12	1	Demolition of existing partially demolished offices	Lump Sum @ $25,000	$25,000
Exterior Pipe Support Along Building #2				
Building #2 Col. Lines: 6, 7, 9, 10 and other locations	1	Replace/repair pipe support members	15 each @ $500	$7,500
Dust Catcher #2				
Stair tower	1	Replace missing/loose grating and sections with significant section loss	5 each @ $100	$500
North Furnace				
Platform between furnace and dust catcher	1	Repair support members of platform	20 each @ $500	$10,000
Stock House				
North end	1	Repair/remove steel bin near north end	1 each @ $2,000	$2,000
Skip bridges inside stock house	1	Remove collapsed walkways overtop of skip bridges and remove the collapsed operator's areas.	2 each @ $10,000	$10,000
Ore Bridge				
Platform near top of stair tower	1	Attach support for stair tower that is cantilevered and is currently unstable	1 each @ $500	$500
Various walkways	1	Attach various walkway railings, repair rotten timbers in walkways	1 each @ $1,000	$1,000
Skip Hoist Motor Buildings				
North building South face	1	Repair stairs, platform and ladder on south face	1 each @ $2,000	$2,000

Total Repairs **$58,500**

PHOTOGRAPHS

Photo 1: Building #1 exterior

Photo 2: Building #1 Roof with missing and deteriorated roof

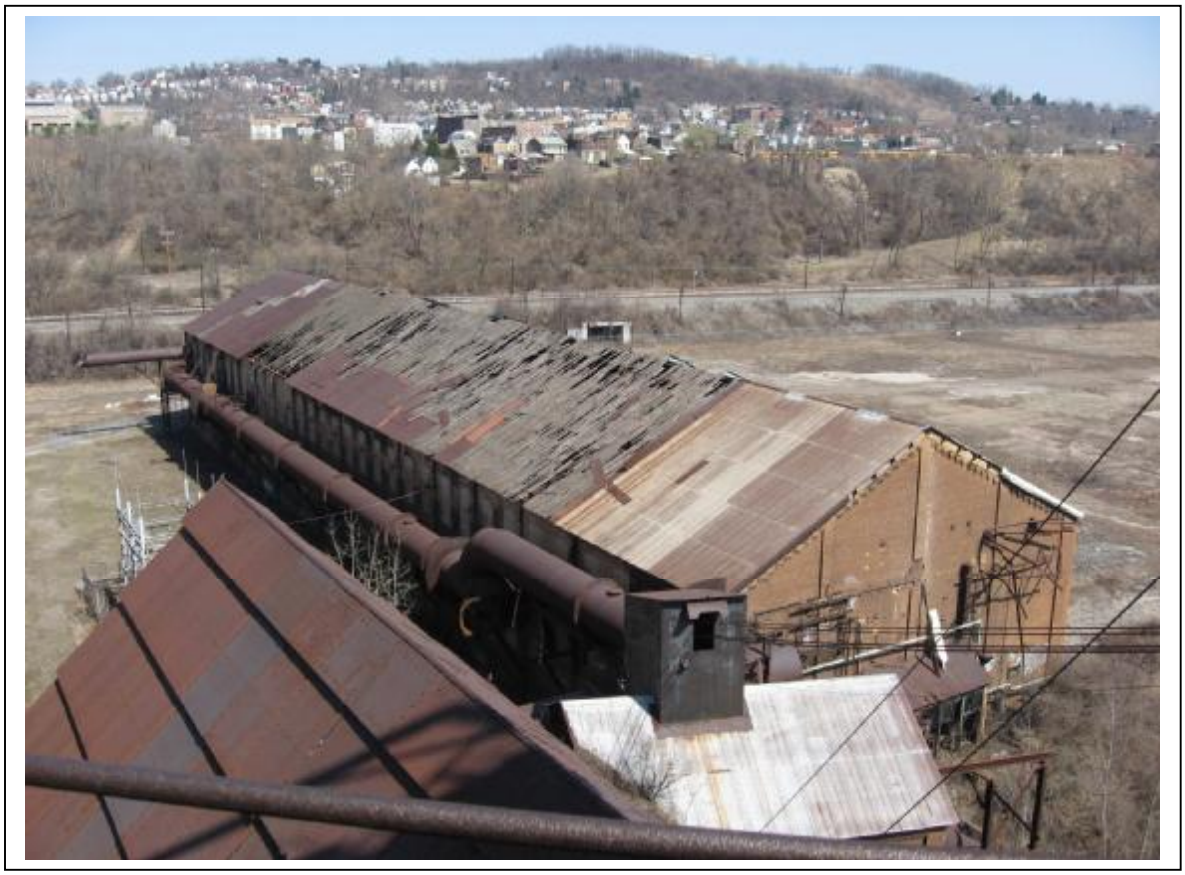

Photo 3: Building #1 Roof

Photo 4: Building #1 with missing and deteriorated roof

Photo 5: Building #1 missing roof truss lateral bracing

Photo 6: Building #1 Typical roof truss condition

Photo 7: Building #1 Crack through north wall between column lines 14-15

Photo 8: Building #1 Column 17-B, exposed anchor bolts and undermined base plate

Photo 9: Building #1 Column 1-B anchor bolt completed exposed

Photo 10: Building #1 Typical condition of exterior column face with section loss to exposed flange

Photo 11: Building #2 Typical roof system

Photo 12: Building #2 Roof

Photo 13: Building #2 Column 12-A near top, four missing rivets

Photo 14: Building #2 twisted lateral bracing of roof truss between columns 3-4 and C-D

Photo 15: Building #2 Partial demolished office space – "Imminent" failure condition

Photo 16: Building #2 Upper floor of office space with roof partially collapsed – "Imminent" failure condition

Photo 17: Building #2 Exterior north wall typical condition

Photo 18: Building #2 Exterior south wall with pipe supports

Photo 19: Exterior of Building #2 pipe support member with section loss

Photo 20: Exterior of Building #2 pipe support with section loss

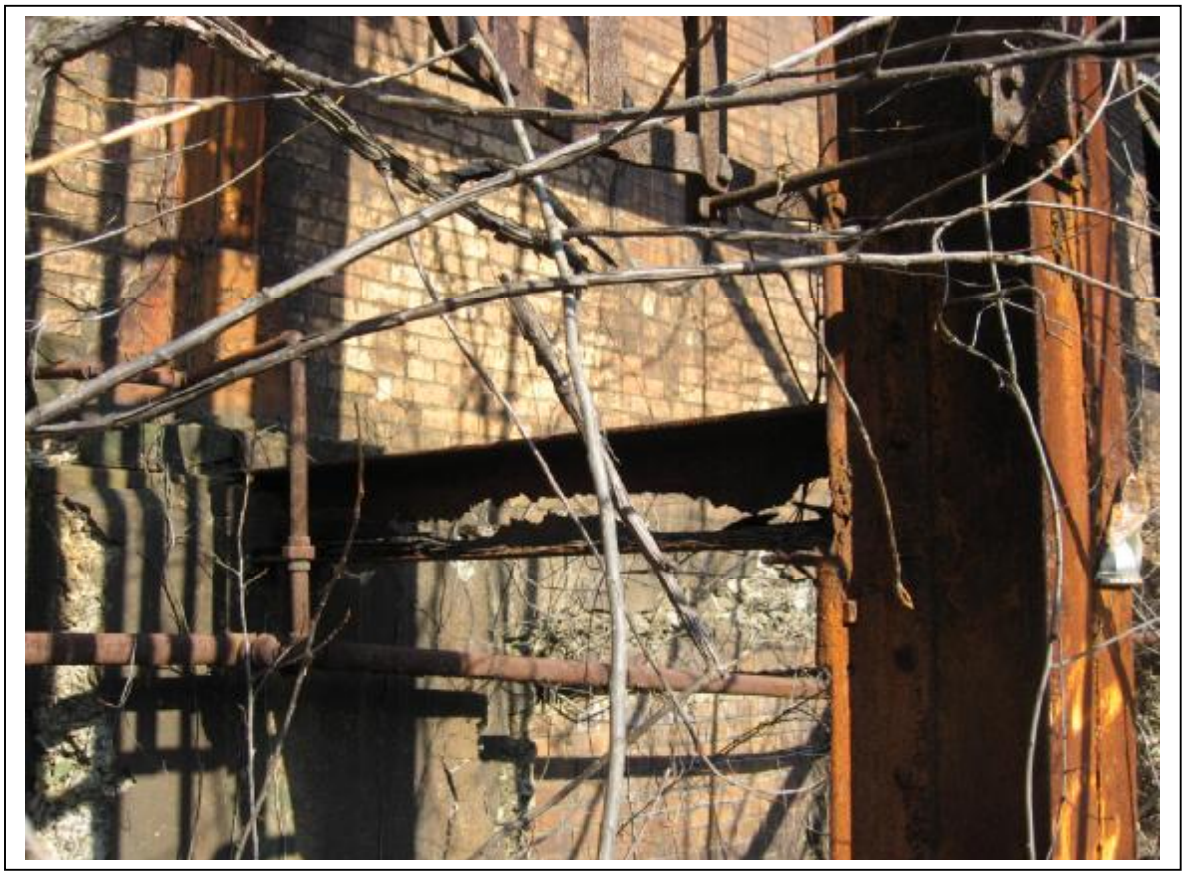

Photo 21: Exterior of Building #2 pipe support member with section loss

Photo 22: Exterior of Building #2 pipe support member with section loss

Photo 23: Exterior of Building #2 pipe support member with section loss (roughly 10-ft above ground)

Photo 24: Exterior of Building #2 pipe support lateral bracing member with 100% section loss to webs

Photo 25: Building #3 roof edge truss on column line A between column lines 3-4 section loss

Photo 26: Building #3 deformed edge beam on column line 1

Photo 27: Building #3 Roof

Photo 28: South Furnace

Photo 29: Dust Catcher #1 (South Furnace) 100% deteriorated webs of all four sides of column box

Photo 30: Stoves – area between the stoves

Photo 31: Dust Catcher #2 (North Furnace) Partially collapsed beam and walkway

Photo 32: Dust Catcher #2 (North Furnace) Section loss to northern most support column

Photo 33: Top of North Furnace

Photo 34: Gas Washers/Electrical Precipitators collapsed and heavily deteriorated members

Photo 35: Gas Washers/Electrical Precipitators heavily deteriorated support member for platform

Photo 36: Gas Washers/Electrical Precipitators buckled and advanced deterioration of column that supports the south electrical precipitator

Photo 37: Gas Washers/Electrical Precipitators buckled and rotated support beam located at NE corner of south

electrical precipitator

Photo 38: Gas Washers/Electrical Precipitators buckled and advanced deterioration of column that supports the north electrical precipitator

Photo 39: Stock House

Photo 40: Stock House

Photo 41: Stock House Exterior elevation

Photo 42: Stock House typical condition of wall

Photo 43: Stock House partially failed bridge at south skip bridge in Stock House

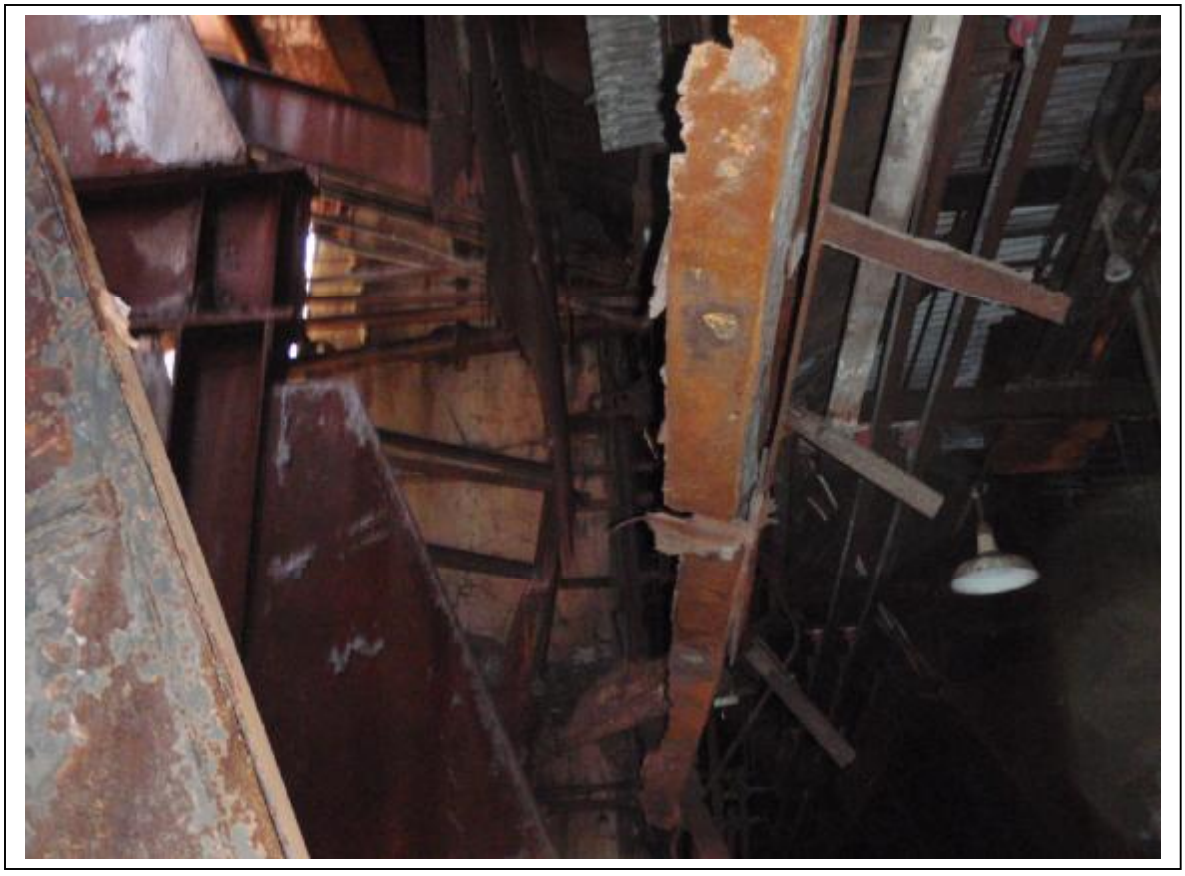

Photo 44: Stock House failed platform at skip bridge

Photo 45: Stock House collapsed walkway at south end of Stock House

Photo 46: Building #7 Unloader

Photo 47: Ore Bridge Elevation

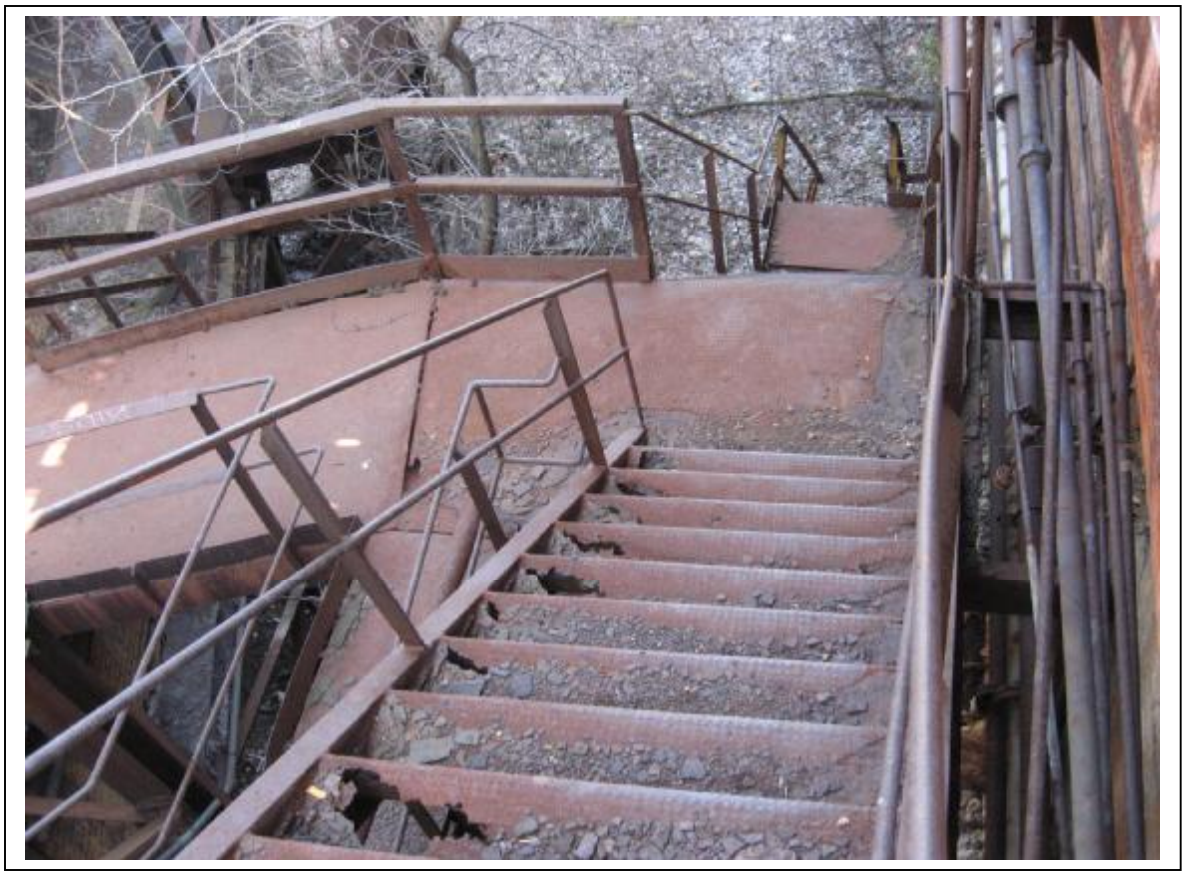

Photo 48: Stair at furnace side of Ore Bridge in unsafe condition

Photo 49: Skip Hoist Motor Building for South Furnace typical exterior

Photo 50: Skip Hoist Motor Building for South Furnace crack in north wall

Photo 51: Skip Hoist Motor Building for North Furnace typical exterior

Photo 52: Skip Hoist Motor Building for North Furnace framing underneath it

Photo 53: Skip Hoist Motor Building for North Furnace crack in wall

Photo 54: Masonry Building #1 Typical exterior

Photo 55: Masonry Building #1 partially collapsed roof and hanging heater unit

Photo 56: Masonry Building #1 basement filled with water and not inspected

Photo 57: Masonry Building #2 typical exterior

Photo 58: Steel plates covering pit near Masonry Building #1 deterioration

Photo 59: Walkway and pipe support beam between electric precipitators and Building #2 with beam deformation,

yielding and web “crushing”

Photo 60: Southern column of tower for pipe support tower between electrical precipitator, and Masonry Building #1 and #2 with critical section loss

Photo 61: North column of tower for pipe support tower between electrical precipitator, and Masonry Buildings #1

and #2 with critical section loss

Photo 62: Walkway between Stoves and Stock House partially collapsed, deformed and settled

Photo 63: Underside of walkway between Stoves and Stock House partially collapsed, deformed and settled

Photo 64: Stairway near north furnace and dust collector collapsed, deformed and settled

Photo 65: Stair near Electrical Precipitator advanced section loss on members