2. FACILITY DESCRIPTION

2.1 PIER DESCRIPTION

Pier 40 was constructed between 1958 and 1962 and is an approximately 810 ft by 810 ft steel pile-supported high-level platform, and includes a typically 175-ft-wide two-story shed along the pier perimeter surrounding an approximately 400-ft-long by 410-ft-wide Court Yard (Photo B-1). The pier shed is currently being used as the project office and maintenance facility for the Hudson River Park Trust, a public parking facility, and various spaces for other commercial and not-for-profit uses, while the Court Yard currently serves as an athletic field. Along the pier perimeter, a 20-ft-wide apron serves as a public esplanade. At the southwest corner of the structure, there is a 55-ft-wide by 142-ft-long finger pier extension supporting a one-story shed (Photo B-2).

The main pier, which includes the Pier Shed and Court Yard, and the Finger Pier Extension are supported on 3,328 and 135 14BP89 steel H-piles, respectively. The area referred to as the Court Yard in this report is identified as the Truck Court in previous inspection reports. The H-piles are driven to bedrock (as indicated on Roberts and Schaefer Co. Drawing F-7). The pier's main deck consists of prestressed concrete panels supported on cast-in-place reinforced concrete beams and pile caps above the steel H-piles. Pile clusters are located along the building column lines under the Pier Shed and are spaced 50 ft to 55 ft on center in the east-west direction, and between 40 ft and 55 ft in the north-south direction (Photo B-3). There are no pile clusters under the Court Yard, which is supported by 483 single steel H-piles (Photo B-4).

The reinforced concrete pile caps over the single steel H-piles typically measure 3 ft long by 3 ft wide by 4 ft deep, while the pile caps over the pile clusters are typically 6 ft deep with variable length and width dimensions. The pile embedment within the concrete pile caps is 1 ft and the pile caps do not contain steel reinforcing around the H-piles.

The reinforced concrete pile cap beams that span between the pile caps in the north-south direction are typically 16 in. wide by 30 in. deep within the Pier Shed and 16 in. wide by 36 in. deep within the Court Yard. The concrete pile cap beams that abut the concrete edge beams at the bents with H-piles clusters are typically 42 in. deep. The pile cap beams generally span north to south, except in the area directly west of the

Court Yard where the pile cap beams span east to west. One foot thick precast concrete panels with two layers of prestressing strands and a 2 in. thick wearing surface span between the pile cap beams to form the deck of the pier structure.

The 135 steel 14BP89 H-piles supporting the Finger Pier Extension are primarily distributed along the north and south edges of the pier with a batter pile and plumb pile spaced approximately 5 ft on center (Photo B-5). There are a total of 18 H-piles located along the centerline of the Finger Pier Extension that support transverse concrete beams (oriented north-south) which span between three longitudinal concrete beams (oriented east-west) that run along the northern edge, southern edge, and center of the Finger Pier Extension. The longitudinal concrete beams also serve as pile caps for the steel H-piles. A reinforced concrete deck spans over the transverse and longitudinal concrete beams.

A total of 11 bollards are located along the southern edge of the pier, seven bollards and two cleats are located along the western edge of the pier, and eight bollards and eight cleats are located along the northern edge of the pier. There are also four bollards and two cleats on the Finger Pier Extension.

Four vessels: Hornblower Hybrid, Hornblower Infinity, Hornblower Serenity, and Vista Jubilee moor along the northern side of the pier (Photo B-6). A timber fender system comprises timber H-piles, wales, and chocks extends the length of the northern edge of the pier, and additional timber fender pile clusters are located at the northwestern corner of the pier and at the offshore corners of the Finger Pier Extension (Photos B-7 and 8). Four steel pipe H-piles with rubber fender blocks are located between Bents N and P-bar and serve as the fender system for the Hornblower vessels.

Originally, an impressed current cathodic protection system provided protection to the H-piles and was operational for approximately ten years before it was abandoned due to maintenance problems. In 1989, a sacrificial anode system replaced the original impressed current system. A new sacrificial anode system with 33 test stations was installed by the Trust in 2000.

2.2 EXISTING PILE REPAIRS

A total of four types of repairs were implemented on the steel H-piles at Pier 40 during two repair phases in the late 1980s. Of these repair types, three are located at the tops of the H-piles and one is located at MLW. At the tops of the H-piles, either a protective epoxy coating, welded steel plates with a protective epoxy coating (steel plate and epoxy repair), or concrete jackets (encasement repair) were installed (Photos B-9 and B-10). These repairs were installed to protect or structurally reinforce the H-piles within the splash zone, which is where a typical zone of severe corrosion is located. The repair at MLW, consisting of C12x30 or MC12x35 channels with 12 or 20 bolts, respectively, functions to span a typical zone of severe corrosion at the MLW elevation and structurally connect the H-pile pile sections above and below the corrosion (channel repair) (Photo B-11 and 12).

Nearly all H-piles have at least one sacrificial anode installed. A typical elevation view of a pile with a channel repair is shown on Figure 2-1.

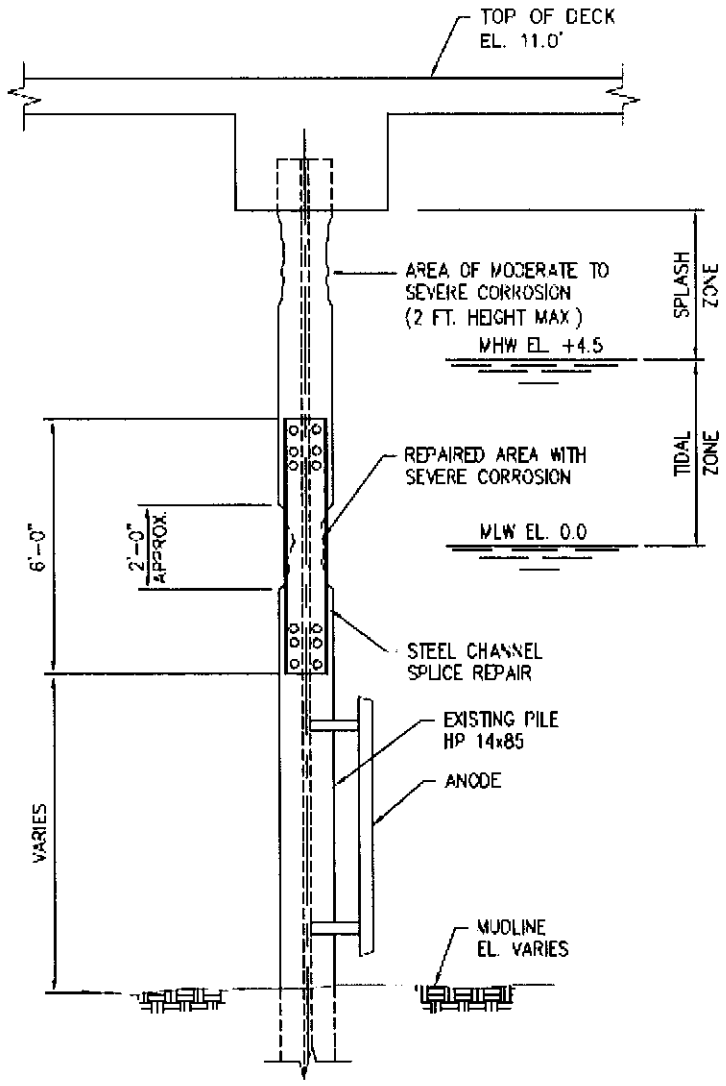
2.2.1 Pier Shed

Nearly all H-piles under the Pier Shed have channel repairs, and the majority of H-piles from Pile Bents F through S and between Pile Rows 4 and 19 have either a steel plate with epoxy coating or an encasement repair installed above MLW. The steel plate and epoxy repairs consist of welded steel plates from approximately 3 ft above MLW to within a few inches of the underside of the pile caps. The epoxy coating extends to the pile cap. Throughout the Pier Shed, a total of 438 H-piles were observed with steel plate and epoxy coating repairs. A total of 382 H-piles have protective epoxy coating without steel plates.

Encasement repairs are generally 3 ft to 4 ft in length and extend down from the pile caps. A total of 254 concrete encasements were observed on H-piles under the Pier Shed. The greatest concentration of encasement repairs are located under the Pier Shed, west of the Court Yard.

In addition to these short encasement repairs, approximately 34 steel H-piles contain full-length concrete encasements or are encased in concrete for most of their

length. These H-piles are located mostly under the Pier Shed in an area to the west of the Court Yard.



TYPICAL STEEL H-PILE
SCALE: 1/4"=1'-0"

1/4"=1'-0" 0 4 8 FT

HUDSON RIVER PARK TRUST
NEW YORK, NEW YORK
PIER 40 CONDITION MONITORING INSPECTION

TYPICAL CHANNEL REPAIRS

Halcrow

FIG 2-1

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2.2.2 Court Yard

The H-piles under the Court Yard only have channel repairs. Unlike the Pier Shed, where all of the H-piles have repairs, only the most severely deteriorated H-piles under the Court Yard were previously addressed. According to calculations performed by Parsons Brinckerhoff and Quade and Douglas Inc. for the repairs installed in the late 1980s, H-piles with a remaining flange thickness of 1/4 in. were determined to be more than adequate to structurally support the required HS20-44 live loads without the need for repair. Thus, the criterion used for recommending repairs to H-piles under the Court Yard included a flange thickness of 1/4 in. or less.

2.2.3 Finger Pier Extension

The majority of the H-piles under the Finger Pier Extension have channel repairs at MLW or are encased in concrete with fabric stay-in-place formwork. A total of 32 H-piles under the Finger Pier Extension are encased in concrete for all or part of their length.