Pier 68-70 Shipyard Facility Condition Survey
Civil Site Utilities Report

Prepared for:

PORT OF SAN FRANCISCO

Prepared by:

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A Joint Venture

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July 21, 2017

Job: 9590-06

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A. As-Built Drawings

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1. EXECUTIVE SUMMARY

The purpose of this report is to assess the capital condition of the existing on-site Civil utility systems. The Civil systems evaluated by AGS include: Sanitary Sewer, Storm Drain, Fresh Water, and Salt Water Systems. The evaluation of associated system pumps were conducted by HRA. The scope of assessment includes portions of Pier 68-70 or "the Shipyard" previously operated by BAE Systems and more recently operated by Puglia Engineering, Inc. for ship maintenance & repair activities. The Shipyard is owned by the Port of San Francisco (SFPort). The assessment of existing conditions conducted by AGS and HRA included field investigations, interviews with Shipyard staff, formerly employed at BAE Systems, and currently retained by SFPort, and review of existing record drawings and reports. Utility location/potholing, utility mapping, utility television inspection, fire hydrant flow tests, and hydraulic calculations for pipes were not included in the scope of this assessment.

2. INTRODUCTION

The Shipyard at Pier 68-70 is a historic ship building and ship repair facility located in the Potrero Point neighborhood of San Francisco. The Shipyard was originally built and operated by Union Iron Works beginning in 1885, until it was sold to Bethlehem Steel Company in 1905. The majority of the existing infrastructure were installed while the site was operated by Bethlehem Steel, with the earliest available as-built records of the existing utilities dating back to 1945 (See Appendix). In 1980, Bethlehem Steel sold their holdings to SFPort, where it was later leased and operated by BAE Systems until January 2017. The Shipyard had been a continuously operating ship repair and/or ship building facility for the past 150 years until the facility was closed in May 2017.

Figure 1. Pier 68-70 viewed from Admin Offices

2.1 Purpose and Scope

The purpose of this report is to provide a general evaluation of the site's existing civil utility systems, note deficiencies in the existing systems, and provide an assessment of the existing systems capabilities to support the activities of a fully operational shipyard. The purpose of this report is also to inform future potential operators interested in leasing the facility of potential repairs and rehabilitations required to bring the civil utility systems up to operational standards.

This report includes recommendations as well as rough order of magnitude cost estimates associated with these recommendations. Because the rough order of magnitude cost estimate has an inherently large margin of error, the rough order of magnitude cost estimate should not be used for actual budgeting purposes. Should the owner/future operator decide to implement any of the recommendations contained in this report, a separate detailed engineer's cost estimate should be prepared for budgeting and implementation purposes.

2.2 Methodology

AGS and HRA conducted site investigations of the Shipyard on June 21st, June 22nd, June 23rd, June 26th, June 27th, June 29th, and July 19th. AGS and HRA photographed existing conditions of the site, interviewed Shipyard staff, and reviewed as-built drawings provided by SFPort. Utility location/potholing, utility mapping, utility television inspection, fire hydrant flow tests, and hydraulic calculations for pipes were not included in the scope of this assessment.

3. SITE UTILITIES (AGS)

Civil site utilities investigated in this section include the Sanitary Sewer, Storm Drain, Fresh Water, and Salt Water systems. For the purposes of this report, the term wharf will be used to mean the marine-side portions of the site including the High Water Platform, Dry Dock Eureka, Dry Dock #2, Pier #3, and Pier #4.

A. Site Sewer System

The Pier 68-70 on-site sanitary sewer system collects sewer flows from sewer service connections to on-site buildings and modular office restrooms, sewer flows from ships along the dry docks and piers, as well as stormwater flows from the landside storm drainage system. According to the as-built dawings "*Utilities – Storm & Sanitary Sewers Todd Shipyards Corporation San Francisco Division*" dated Feb 1971, revised July 1984, the on-site sanitary sewer system discharges into the municipal combined storm and sewer system along 20th Street at multiple locations. There are two CHT pumps (CHTP1, CHTP2) on-site which work to pump sanitary sewer flows to the municipal system. CHTP1 is located at the southeast corner of Building 109 (between Buildings 250 and 109), and CHTP2 is located between Drydock Eureka and Drydock #2, underneath the pier at Building 127 [Exhibit-1]. See Section E. Pumps for evaluations of the existing CHT pumps.

Sanitary Sewer Building Services

The table below summarizes the status of existing building sanitary sewer services. Status of building services were based on site investigations of the buildings and modular offices, supplemented by interviews with Shipyard staff

BUILDING No.	SERVICE	NOTES
ADMIN OFFICE	YES	
MED TRAILER	YES	FOUND BUILDING SEWER PUMP BEHIND MED TRAILER
SAFETY TRAILER	YES	
BLDG 19	YES	

BLDG 36	YES	
BLDG 38	YES	
BLDG 52	NO	
BLDG 58	NO	
BLDG 68	NO	
BLDG 103	YES	INACTIVE; EXISTING BATHROOM OUT OF SERVICE DUE TO BROKEN BLDG PUMP.
BLDG 105	YES	
BLDG 107	YES	
BLDG 108	YES	INACTIVE; PIPE RUNS TO DAMAGED TANK AT BUILDING 111.
BLDG 109	YES	
BLDG 111	YES	INACTIVE; BUILDING CONDEMNED FOLLOWING THE 1989 LOMA PRIETA EARTHQUAKE.
BLDG 119	YES	
BLDG 120	YES	BUILDING SERVICE ACTIVE, BUT SEWER PUMP IS OUT OF SERVICE.
BLDG 121	NO	
BLDG 121 RESTROOMS	YES	
BLDG 127	YES	
BLDG 143	YES	RESTROOMS CLOSED; EXISTING UNDERSIDE WHARF PIPE DAMAGED BY FLOATING DBRIS DURING HIGH TIDES.
BLDG 250	NO	
BLDG 251	NO	

Table-1 Sanitary Sewer Service

The existing sanitary sewer service for Building 103, the Steam Powerhouse No. 2 building is currently inactive. Per interviews with Shipyard staff, the existing building sewer pump has been offline/in disrepair for some time. Since the Shipyard no longer has an active steam system and this building was not manned, the sewer pump was never repaired and the bathroom in this building remains out of service.

The existing sanitary sewer service for Building 111 is currently inactive. Building 111 was structurally condemned following the 1989 Loma Prieta Earthquake, and is currently utilized only for storage on the ground floor. Building 111 was serviced by a building pump and holding tank, but the tank had been damaged and the pump turned off.

The existing sanitary sewer service for Building 108 is also currently inactive. Building 108 was also serviced by the sewer pump and damaged holding tank next to Building 111.

Figure 2. Medical Trailer Sewer Pump

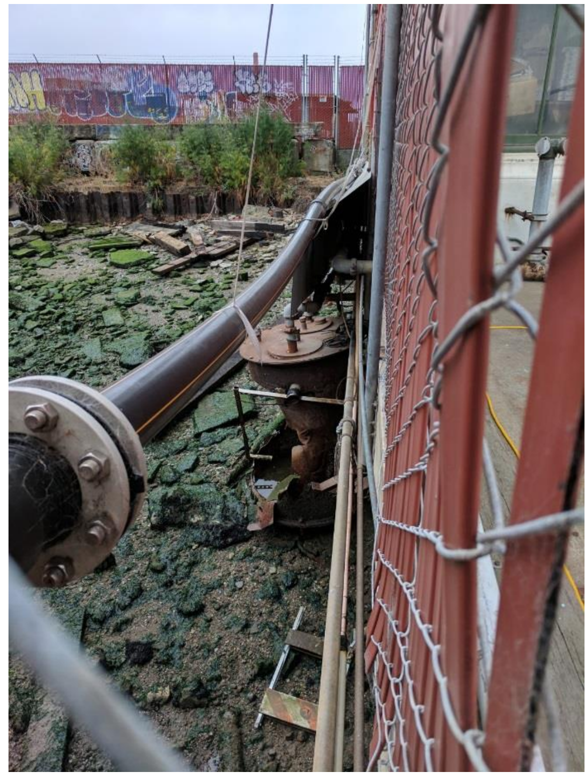


Figure 3. Bldg 111 Damaged Holding Tank and Inactive Pump

The Building 143 restrooms are currently out of order, a segment of the sanitary sewer pipe servicing this building, which runs along the underside of the wharf, was damaged by floating debris. Any discharge from this building currently discharges directly into the Bay, so the restrooms are closed until repairs to the under-pier plumbing can be completed.

Sanitary Sewer High Water Platform/Dry Dock/Pier Services

The marine-side sanitary sewer system is routed along the underside of the High Water Platform and piers and provides services for both the modular offices along the High Water Platform and for the docked ships. Segments of the underside piping was observed to consist of newer plastic piping, in relatively good condition, with the exception of damage to the building service for Building 143 as noted in the building services section above.

The as-built drawing shows three portable ejector pumps located at Pier #3, Pier #4, and on the High Water Platform in front of Dry Dock #2 – these pumps were not found during our site investigations and interviews with Shipyard staff indicate they no longer exist [Exhibit 1]. There are several sewer connections along the pier for ship connections, these connections are located at the highwater platform west of Pier 3, two connections located along Pier 4, and a flexible connection between the highwater platform and Drydock #4. No sewer connection is provided along Pier 3.

Interviews with Shipyard Staff indicate when large cruise ships were serviced, coordination with the onboard sewer pumping systems were needed to constrict pumping flows. When coordination did not take place, cruise ship inflows have exceeded the capacity of the marine-side sewer system, occasionally causing sanitary sewer overflows on the High Water Platform.

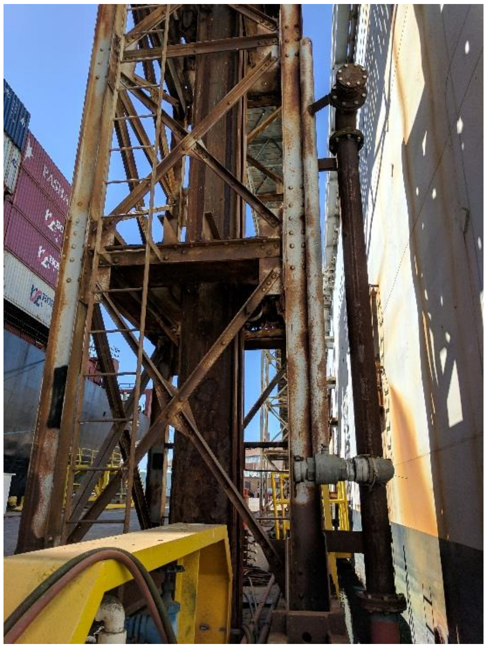


Figure 4. Sewer Ship Connection Pier 4 West

Figure 5. Highwater Platform Sewer Connection Drydock #2

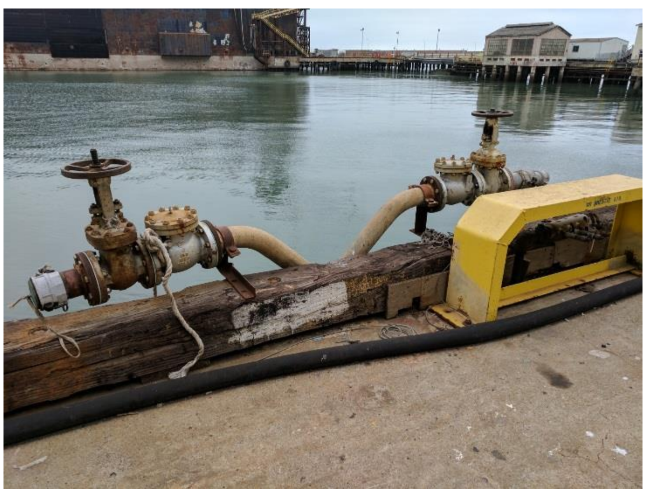


Figure 6. Sewer Ship Connection Pier 4 East

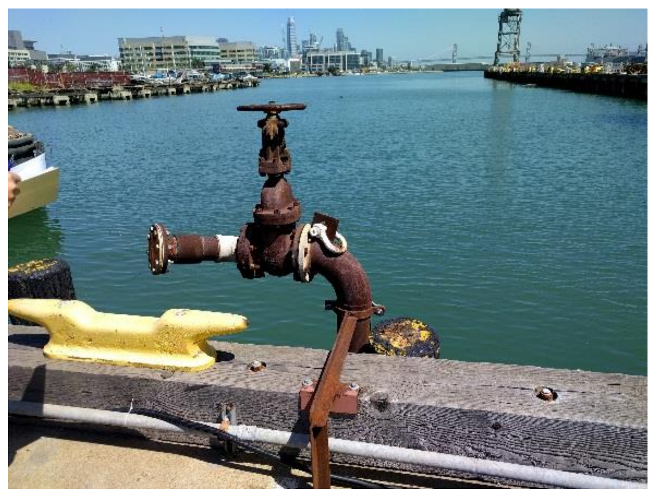


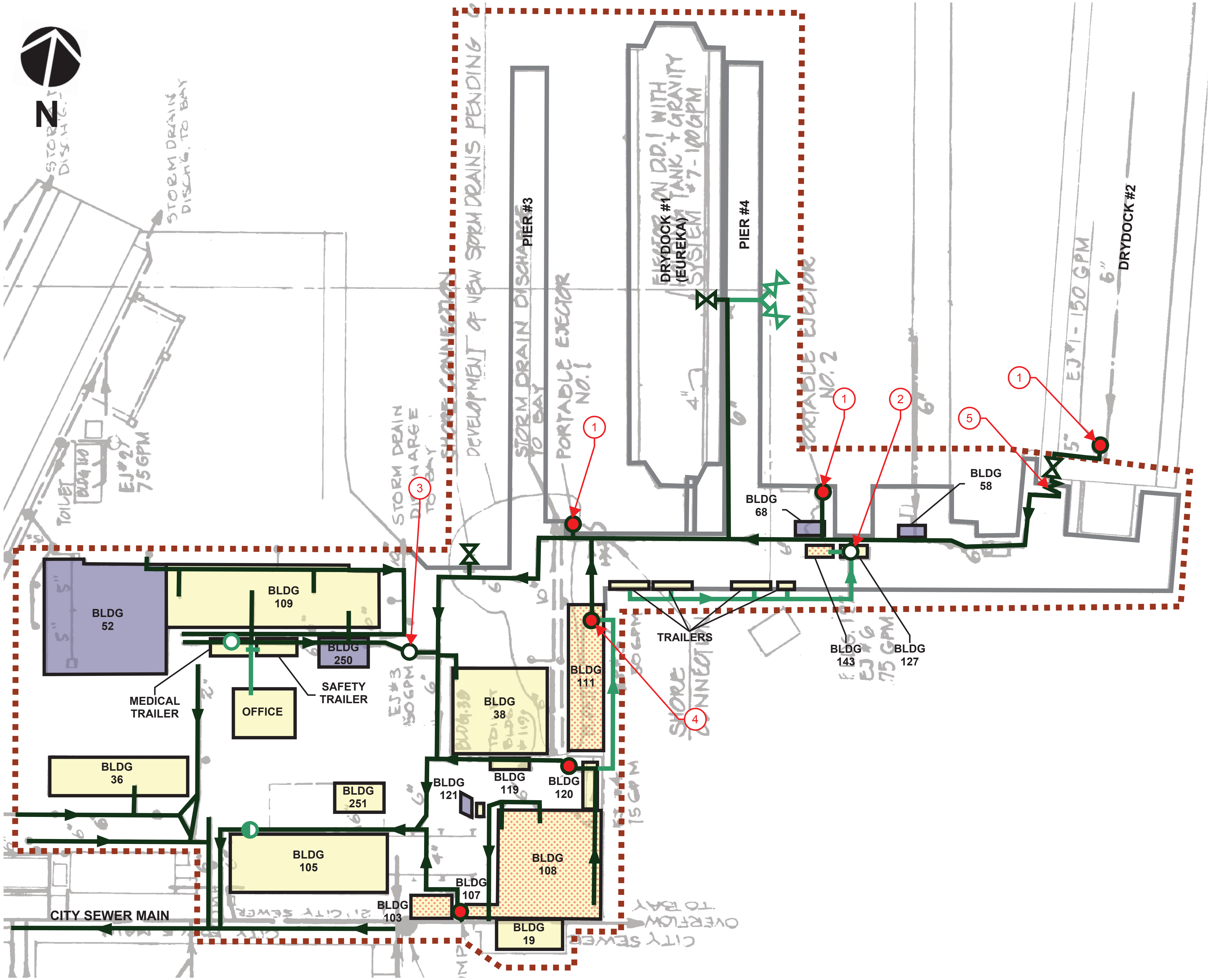
Figure 7. Sewer Ship Connection West of Pier 3

<u>Condition Assessment</u>

The sanitary sewer system appears to be operational to the best extent practical and should continue to service the needs of the Shipyard in the near term. Interviews with Shipyard staff indicate, with the exception of pump failures which occur occasionally, that the existing system seems to work adequately. It was not possible to assess the condition of the underground pipe system or to verify if the utility layout of the underground system is consistent with available as-built drawings, but the portion of piping observed beneath the piers and High Water Platform seems to consist of newer plastic piping. Shipyard staff indicate, to the best of their knowledge, no major upgrades have been made to the landside underground sewer system. It is likely the landside sanitary sewer system in parts or in the whole could be over 70 years old per the as-built drawing: "*Utilities – Sheet 4 Storm & Sanitary Sewer – Bethlehem Steel Co.*" dated January 1945. The useful life of utility systems is typically assumed to be between 50 years to 100 years, as such, the on-site sanitary sewer system is already at or near the end of its useful service life.

Recommendations

It is our recommendation that existing building services be restored where feasible or where desired. The existing sanitary sewer pipes located under the High Water Platform should be repaired or replaced to restore service to Building 143 at a rough order of magnitude cost of about $15,000. The building sewer pumps located by Building 103, 108, and 120 should be repaired, replaced at a rough order of magnitude cost of about $15,000, or removed. It is also our recommendation to upgrade or repair the existing CHT pumps so that they are more reliable; assessment of the CHT pumps can be found in Section E. Pumps. Additionally, due to the age of the sewer system, it is also our recommendation that a thorough television inspection of the existing pipes be performed to better assess the condition of the existing underground pipes. The television inspection has a rough order of magnitude cost of about $15,000.



SHEET NOTES

1. PORTABLE EJECTOR PUMPS WERE REMOVED.
2. ELECTRIC PUMP.
3. ONE OF THE TWO ELECTRIC PUMPS IS INACTIVE.
4. HOLDING TANK CONNECTED TO INACTIVE PUMP IS DAMAGED.
5. 6" FLEXIBLE SEWER PIPE

GENERAL NOTES

1. INFORMATION PROVIDED ON THIS EXHIBIT IS BASED ON SITE INVESTIGATION CONDUCTED ON 06/23/2017 AND BY DISCUSSIONS WITH SHIPYARD EMPLOYEES RETAINED BY SFPORT.
2. BASE DRAWING USED IN THIS EXHIBIT IS FROM "UTILITIES - STORM & SANITARY SEWERS, TODD SHIPYARD CORPORATION SAN FRANCISCO DIVISION" RECORD DRAWINGS, DATED FEBRUARY 1971, REVISED JULY 1984.

LEGEND

- SHIP SEWER CONNECTION
- ACTIVE PUMP
- INACTIVE PUMP
- MONITORING WELL
- SEWER LINE (PER 1984 RECORD PLANS)
- SEWER LINE (INSTALLED AFTER 1984)
- LIMIT OF UTILITY INVESTIGATION
- BUILDING WITH SEWER SERVICE
- BUILDING WITH NO SEWER SERVICE
- BUILDING WITH INACTIVE SEWER SERVICE

0 75 150 400 450

SCALE IN FEET

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UTILITIES - SANITARY SEWER

EXHIBIT 1

DRAWING NAME: Z:\AGS\project\2016\AGS-16-018 Port of SF As-Needed Eng (MN-AGS JV)\Pier 68-70 Shipyard Condition Survey\Report\Civil\Exhibits\Sanitary Sewer Exhibit.dwg
PLOT DATE: 07-07-17
PLOTTED BY: michael.ngo

B. Storm Drain System

The Pier 68-70 on-site storm drain system drains approximately 9 acres of land and consists of two separate storm drain systems: The wharf-side storm drain system outfalls directly to the bay and the landside storm drain system outfalls to the City's combined storm and sanitary sewer system along 20th Street.

Storm Drain Wharf-side System

Drain inlets located along the wharf comprises the first storm drain system, with each drain inlet discharging individually and directly to the bay [Exhibit 2]. The wharf-side storm drain system captures runoff from mainly the High Water Platform and the piers and consists of about 3.7 acres of impervious surfaces and is covered by a Storm Water Pollution Prevention Plan (SWPPP) prepared by Mapistry Stormwater Consultants for Puglia Engineering, Inc. dated February 2017. The SWPPP is designed to comply with California's General Permit for Stormwater Discharges Associated with Industrial Activities (Industrial General Permit or IGP) Order No. 2014-0057-DWQ (NPDES No. CAS000001) issued by the State Water Resources Control Board (State Water Board).

In order to comply with the SWPPP requirements, and to also reduce the number of water quality sampling points and point discharges into the bay, many of the existing drain inlets along the High Water Platform and piers have been deliberately plugged. Since drain inlets are often located at low-spots, plugging existing drain inlets have led to numerous locations of ponding water following storm events. The ponding water creates both a nuisance for staff and have contributed to the deterioration of the wharf top decking.

Figure 8. Wharf-side Plugged Drain

Figure 9. Wharf-side Drain Inlet with Screen

Figure 10. Wharf-side Concrete Deck Damage

AGS reviewed as-builts provided by SFPort, including "*Utilities – Sheet 4 Storm & Sanitary Sewer, Bethlehem Steel Company"* dated January 1945, "*Utilities – Storm & Sanitary Sewers, Todd Shipyards Corporation*" dated revised July 11, 1984, and in conjunction with information provided in the updated facility maps included in the SWPPP dated February, 2017, verified the location and condition of drain inlets for the Wharf-side system [Exhibit 2].

Storm Drain Land-side System

Landside storm drain inlets comprise the second storm drain system and collects both impervious pavement runoff and impervious roof runoff via disconnected and connected roof downspouts. The landside storm drain system is a gravity system that intermingles and combines with the sanitary sewer flows from the CHT pumps discharging collectively into the City's combined sewer and storm drain system south of the site along 20th Street.

Figure 11. Disconnected Roof Downspout w/ Plugged Inlet

Figure 12. Disconnected Roof Downspout

AGS verified the location and condition of drain inlets for the landside system with the as-built drawings provided by SFPort, including "*Utilities – Storm & Sanitary Sewers, Todd Shipyards Corporation*" dated revised July 11, 1984, and the updated facility maps included in the SWPPP dated February, 2017. The findings from this site investigation is summarized in Table-2 below. Site investigation included removing drain inlet covers, where feasible, and assessing the condition of the drain inlet structure, and the condition of inflowing and outflowing pipes.

DRAIN INLET ID NO.	FOUND	BMP	NOTES
SD-01	YES	SILT BAG	STANDING BRACKISH WATER IN SUMP
SD-02	YES	SILT BAG	STANDING BRACKISH WATER IN SUMP
SD-03	YES	SILT BAG	STANDING BRACKISH WATER IN SUMP
SD-04	YES	NONE	STANDING BRACKISH WATER IN SUMP
SD-05	YES	SILT BAG	
SD-06	YES	SILT BAG	STANDING BRACKISH WATER IN SUMP
SD-07	YES	NONE	
SD-08	YES	NONE	DEBRIS/DIRT IN SUMP
SD-09	YES	NONE	DEBRIS/DIRT IN SUMP
SD-10	YES	NONE	DEBRIS/DIRT IN SUMP

SD-11	YES	SILT BAG	STANDING BRACKISH WATER IN SUMP
SD-12	YES	NONE	STANDING BRACKISH WATER IN SUMP
SD-13	YES	NONE	STANDING BRACKISH WATER IN SUMP
SD-14	YES	SILT BAG	STANDING BRACKISH WATER IN SUMP
SD-15	YES	SILT BAG	
SD-16	YES	SILT BAG	
SD-17	YES	SILT BAG	
SD-18	NO	NONE	COULD NOT LOCATE
SD-19	NO	NONE	COULD NOT LOCATE
SD-20	YES	NONE	DEBRIS/DIRT
SD-21	YES	SILT BAG	STANDING BRACKISH WATER IN SUMP
SD-22	YES	NONE	STANDING BRACKISH WATER IN SUMP
SD-23	YES	NONE	STANDING BRACKISH WATER IN SUMP
SD-24	YES	NONE	DEBRIS/DIRT
SD-25	YES	NONE	DEBRIS/DIRT
SD-26	YES	NONE	DEBRIS/DIRT
SD-27	YES	NONE	DEBRIS/DIRT
SD-28	YES	NONE	DEBRIS/DIRT
SD-29	YES	SILT BAG	
SD-30	YES	SILT BAG	STANDING WATER BRACKISH WATER IN SUMP
SD-31	YES	NONE	DEBRIS/DIRT

Table-2 Storm Drain Inlets

Drain inlet covers varied in both size and in shape. It appears, based on the variation of the drain inlet covers, that the storm drain system was installed or modified at different times during the site's history. Drain inlet covers that were removed revealed structures with brackish standing water, debris, and/or silt accumulated in the structure sump, up to but not above the invert of pipe. The on-site storm drain system appears to have relatively shallow cover, with often less than 1' clear between the top of pipe to the existing pavement grade. At numerous locations, the drain inlets were retrofitted with silt sacks and in some instances enclosed with a straw waddle. A Stormwater Management Plan or SWPPP was not available for the landside storm drainage system, so we could not verify if the BMPs were provided at the appropriate locations. The drain inlet pipes appeared to be in serviceable condition, and consisted of a mixture of cast iron pipes and what appeared to be newer plastic piping.

Figure 13. SD-13 Drain Inlet with Brackish Standing Water

Figure 14. SD-20 Drain Inlet with Debris/Dirt

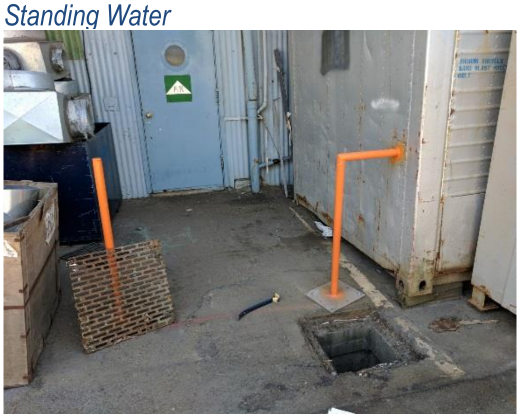


Figure 15. SD-13 Drain Inlet with Brackish Standing Water

Figure 16. SD-20 Drain Inlet with Debris/Dirt and Plastic Pipe

Figure 17. SD-27 Drain Inlet with Plastic Pipe

A portion of the landside storm drain system surrounding Building 111 connects to the inactive sanitary sewer pump with the damaged holding tank [Exhibit 3]. Based on interviews with Shipyard staff, the Building 111 system currently appears to discharge directly to the basement level of Building 111, flooding the basement during storm events and eventually infiltrating through the ground.

Figure 18. Storm Drain Outfall Bldg 111

Condition Assessment

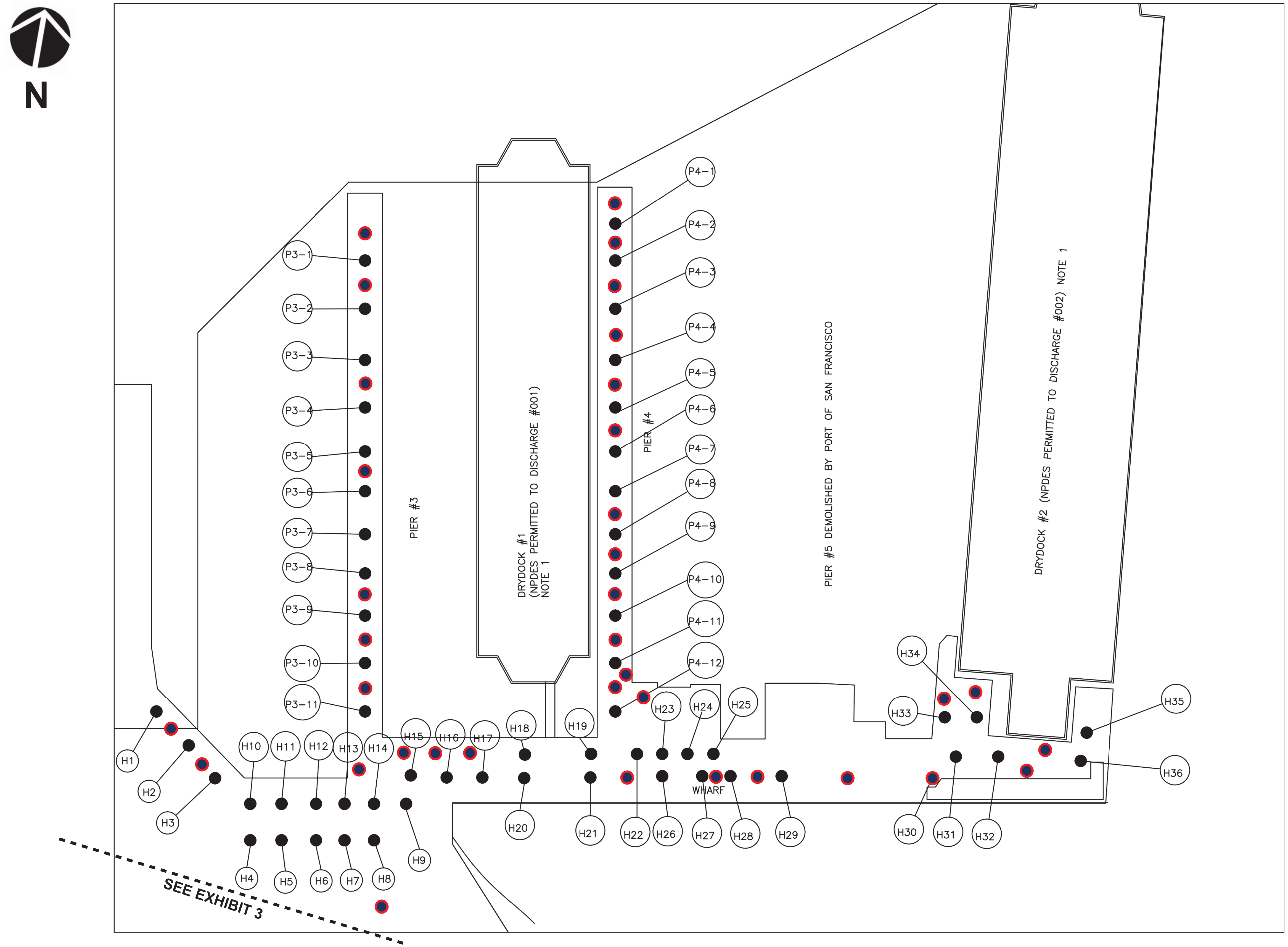
The storm drain system appears to be operational to the best extent practical and should continue to service the needs of the Shipyard in the near term. Interviews with Shipyard staff indicates the existing system seems to work adequately, with the exception of ponding occurring along the wharf due to plugged drain inlets. It was not possible to assess the condition of the underground pipe system, however, based on available as-built information "*Utilities – Sheet 4 Storm & Sanitary Sewers Bethlehem Steel Company*" dated 1945, the on-site storm drain system in parts could be over 70 years old. The useful life of utility systems is typically assumed to be between 50 years to 100 years, as such, the on-site storm drain system is already at or near the end of its useful service life.

Recommendations

The storm drain system appears to be operational to the best extent practical and should continue to service the needs of the Shipyard. The separate storm drain system adjacent to Building 111 should be rerouted to connect to the existing landside storm drain system that discharges into the combined sanitary sewer and storm drain system, at a rough order of magnitude cost of about $5,000. It is also recommended that the existing storm drain inlets be cleaned out to the sump at regular intervals as part of a comprehensive site maintenance program, at a rough order magnitude annual cost of about $10,000. Additionally, due to the age of the storm drain system, it is also recommended to perform a television inspection of the existing pipes to better assess the existing condition of the pipes, see recommendations for sanitary sewer system television inspection in previous section.

Regarding the plugged inlets along the Wharf, it is difficult for AGS to make a recommendation without understanding the cost savings associated with the reduced sampling, we feel this situation would best be addressed by SFPort or by the future operator, the following options could be considered:

1. Unplug the existing drain inlets along the Wharf that were previously plugged, for a rough order of magnitude cost of about $35,000. The unplugging of drain inlets will lead to an increase in sampling points, and associated sampling costs, to meet SWPPP requirements;
2. Unplug the existing drain inlets along the Wharf that were previously plugged, provide storm drain piping beneath the wharf to collect groupings of drain inlets to minimize sampling points to meet SWPPP requirements; OR
3. Leave as is, tolerate the localized ponding around some plugged drain inlets, and accept an increase in maintenance costs associated with more frequent repairs to the wharf deck.



GENERAL NOTES

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2. BASE DRAWING USED IN THIS EXHIBIT IS FROM PUGLIA ENGINEERING'S "STORM WATER POLLUTION PREVENTION PLAN" DATED FEBRUARY 2017.
3. ALL ACTIVE INLETS DRAINS DIRECTLY TO THE BAY.

LEGEND

- ● ACTIVE DRAIN INLET
- ● PLUGGED DRAIN INLET

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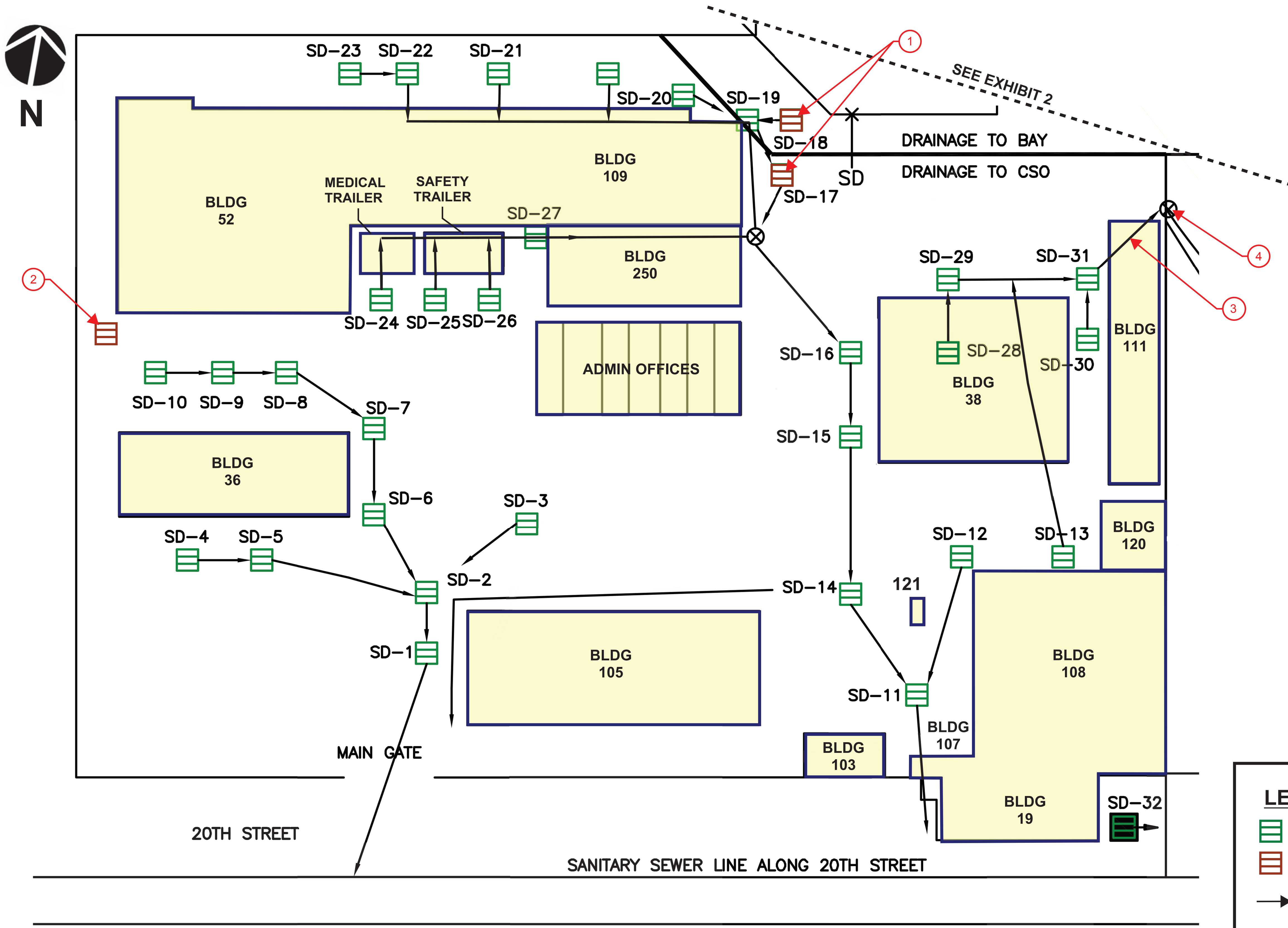
UTILITIES - STORMWATER (WHARF SIDE)

EXHIBIT 2

DRAWING NAME: Z:\AGS\project\2016\AGS-16-018 Port of SF As-Needed Eng (MN-AGS JV)\Pier 68-70 Shipyard Condition Survey\Civil proposal\Exhibits\Storm Water Exhibit - Wharf Side.dwg
PLOT DATE: 07-06-17
PLOTTED BY: michael.ngo



SHEET NOTES

1. CATCH BASIN NOT FOUND
2. CATCH BASIN PLUGGED
3. BROKEN/DISCONNECTED STORM PIPE
4. INACTIVE SEWER PUMP

GENERAL NOTES

1. INFORMATION PROVIDED ON THIS EXHIBIT IS BASED ON SITE INVESTIGATION CONDUCTED ON 06/23/2017 AND BY DISCUSSIONS WITH FORMER SHIPYARD EMPLOYEES RETAINED BY SFPORT.
2. BASE DRAWING USED IN THIS EXHIBIT IS FROM PUGLIA ENGINEERING'S "STORM WATER POLLUTION PREVENTION PLAN" DATED FEBRUARY 2017.

LEGEND

- CATCH BASIN
- CATCH BASIN, SEE NOTES 1 & 2
- DIRECTION OF FLOW (EXACT PIPE LOCATION ARE NOT CLEAR)
- SEWER PUMP

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UTILITIES - STORMWATER (LAND SIDE)

EXHIBIT 3

DRAWING NAME: Z:\AGS\project\2016\AGS-16-018 Port of SF As-Needed Eng (MN-AGS JV)\Pier 68-70 Shipyard Condition Survey\Civil proposal\Exhibits\Storm Water Exhibit - Land Side.dwg
PLOT DATE: 07-06-17
PLOTTED BY: michael.ngo

C. <u>Fresh Water System</u>

The Pier 68-70 fresh water system is serviced by the municipal domestic water system via a single service connection along 20th Street. A single 6" Neptune water meter is located just north of 20th Street between Buildings 105 and 103. The water meter is followed by a Double Detector Check Valve (DDCV) which was recently inspected by the SF Depth of Public Health in 2016 tagged "F 11051". During our investigation, the DDCV was closed and all water to the site flowed through the bypass.

The on-site fresh water system serves both the potable water demands of the site as well as the fire protection system. Site investigations indicate the location of the water meter and fire hydrants appear to be consistent with the as-built plans: "*Utilities – Domestic Water, Todd Shipyards Corporation*" dated January 1971, revised July, 1984.

Site investigations of the fresh water system also included meter readings for the 6" Neptune water meter, below are readings taken on separate days:

- Meter reading Thursday, June 22, 2017 - 29,093 cubic feet
- Meter reading Monday, June 26, 2017 - 31,262 cubic feet

Based on the above water meter readings, 2,169 cubic feet (16,225 gallons) of water flowed through the meter from Thursday June 22, 2017 to Monday June 26, 2017. Since the Shipyard is currently inactive, in a status of non-operation, there appears to be significant losses in the existing fresh water system.

The Shipyard staff with the assistance of a plumbing contractor is currently investigating the location of leaks in the fresh water system. As of July 17, 2017, four separate leaks in the system have been identified:

- Fire hydrant located by Building 36 is leaking at the valve stem.
- Riser to fire hydrant in utility trench west of Building 3 is leaking.
- Two leaks along main in utility trench east of Building 105 where trench tees.

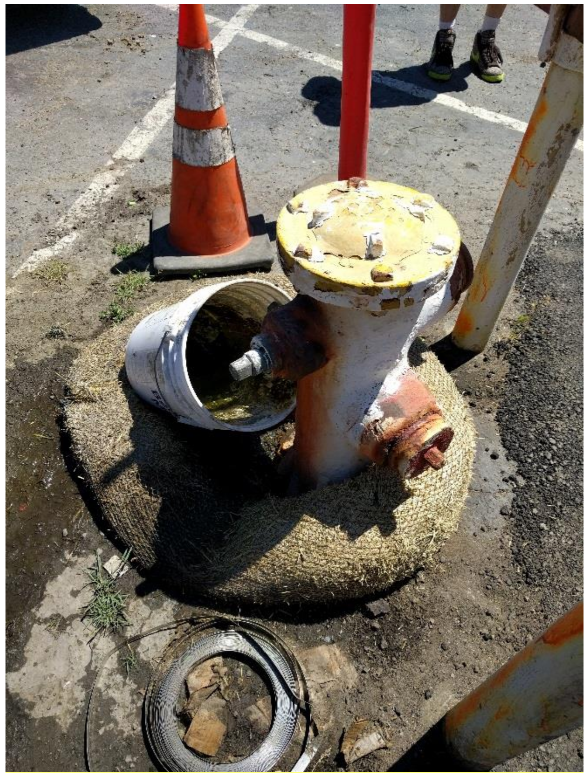


Figure 19. Leaking Fire Hydrant Building 36

Figure 21. 6" Neptune Water Meter

Figure 20. Typical Fresh Water Fire Hydrant

Figure 22. Main Double Detector Check Valve

Domestic Water Building Services

Based on field investigations of the on-site buildings and modular offices, the table below summarizes the status of the fresh water service to each building. Water points of service (faucets, toilets, hose bibs) within each building were operated and either service was verified as YES or as NO. Building fire protection services are not included in the scope of these investigations

BUILDING No.	SERVICE	NOTES
ADMIN OFFICE	YES	
MED TRAILER	YES	
SAFETY TRAILER	YES	
BLDG 19	YES	
BLDG 36	YES	SERVICE LATERAL LEAKS, TEMPORARY ABOVE GROUND RUBER HOSE BYPASS
BLDG 38	YES	
BLDG 52	NO	
BLDG 58	NO	
BLDG 68	NO	
BLDG 103	YES	
BLDG 105	YES	
BLDG 107	YES	INACTIVE; SERVICE CONNECTION FROM BLDG 108
BLDG 108	YES	
BLDG 109	YES	
BLDG 111	YES	INACTIVE; BUILDING CONDEMNED SUBSEQUENT OF

		1989 LOMA PRIETA EARTHQUAKE.
BLDG 119	YES	INACTIVE; SERVICE CONNECTION FROM BLDG 38
BLDG 120	YES	
BLDG 121	NO	
BLDG 121 RESTROOMS	YES	
BLDG 127	YES	
BLDG 143	YES	RESTROOMS CLOSED
BLDG 250	NO	
BLDG 251	NO	

Table-3 Domestic Water Service

The service lateral to Building 36 is currently inactive due to leaks. Service to Building 36 is currently provided using an above ground rubber hose bypass.

The existing fresh water service for Building 111 is currently inactive. Building 111 was structurally condemned following the 1989 Loma Prieta Earthquake, and is currently utilized only for storage on the ground floor. Service to Building 111 was not tested.

Fresh water services to Building 107 and Building 119 were not active during our site investigation.

Building 143 is closed, due to a break in the sanitary sewer service. Fresh water service was not verified, but interviews with Shipyard staff indicate the fresh water service is active.

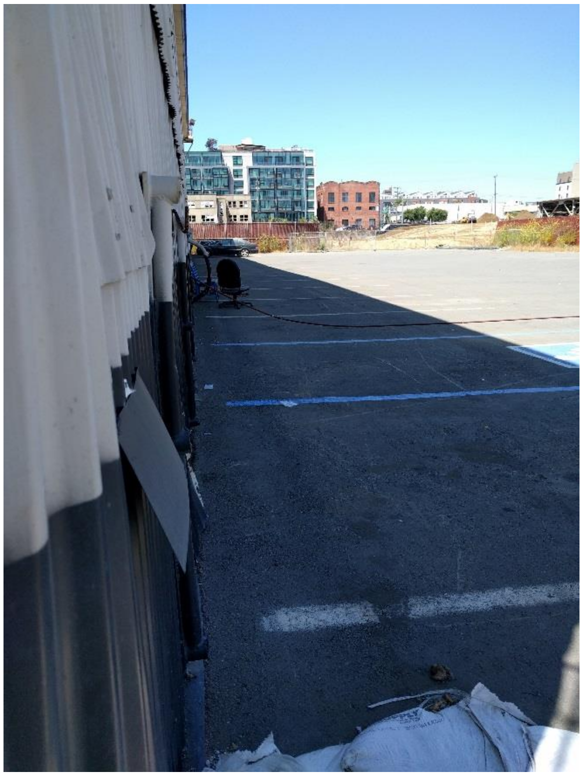


Figure 23. Building 36 Hose Connection

Fresh Water High Water Platform/Dry Dock/Pier Services

The fresh water system also services the piers and the drydocks. This marine-side fresh water system piping is connected to the underside of the High Water Platform and piers, with each individual service connection riser to the surface preceded by its own individual DDCV. The segments of metal pipe, valves, and DDCVs exposed beneath the Piers, when visually inspected at a distance by boat, showed exterior rusting ranging from slight to severe. During our site investigation, Shipyard staff while trying to determine the source of leaks, opened a fresh water riser on Pier 4, releasing what appeared to be muddy-colored water due to rust in the pipes.

There is a freshwater booster pump (DWBP1) located just west of Pier #3 that provides additional pressure for the wharf-side fresh water system. See Section E. Pumps for additional information.

Figure 24. Fresh Water Pipe w/ DDCV at Pier 4

Figure 25. Opened Fresh Water Riser Pier 4

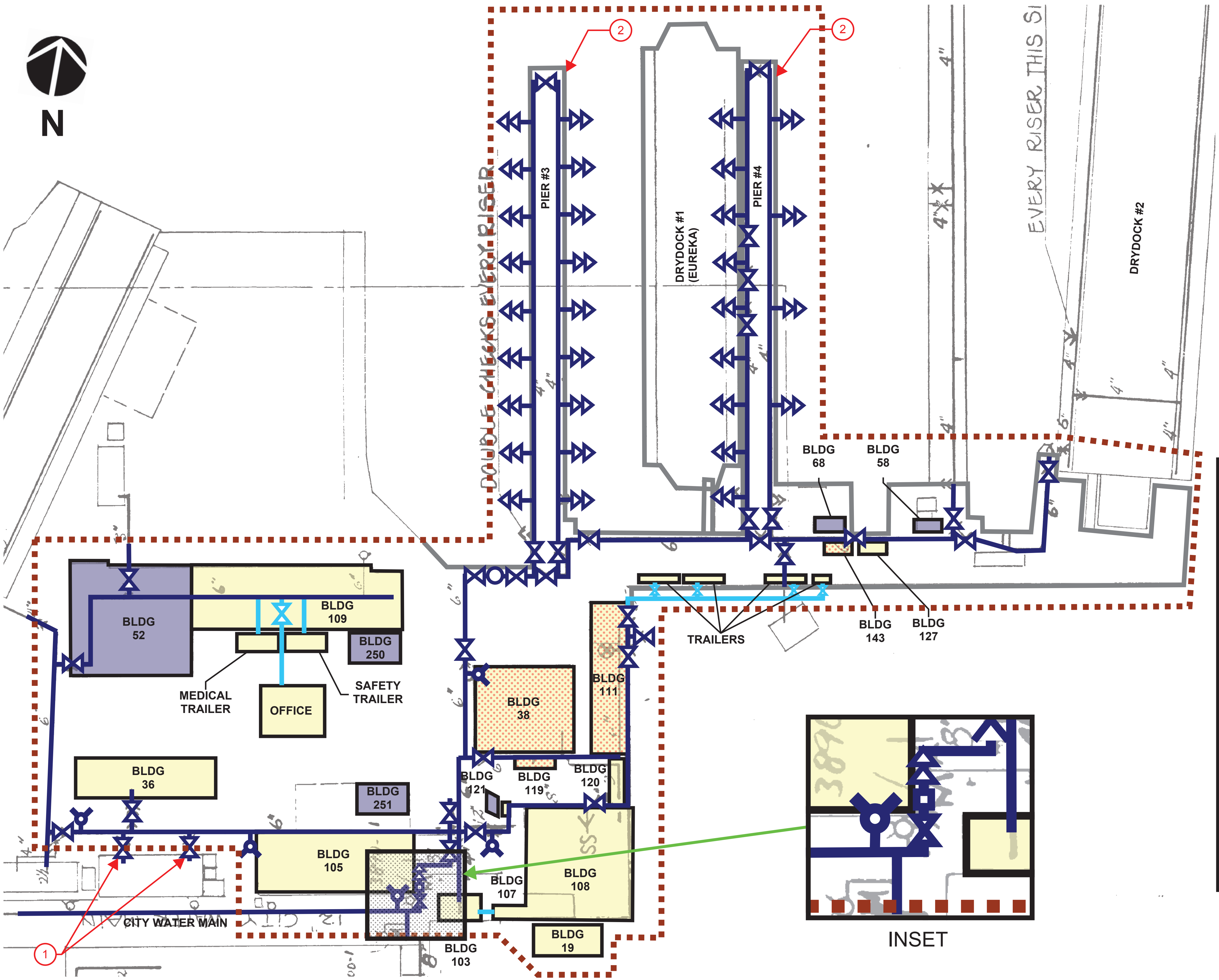
Figure 26. Fresh Water Booster Pump Pipe Rust

Condition Assessment

The fresh water system appears to be operational to the best extent practical and should continue to service the needs of the Shipyard in the near term. Site investigations indicate there are leaks in the existing system which should be found and repaired. The assessment of the underground fresh water pipes is beyond the scope of this report, however, segments of piping and appurtenances underneath the wharf were observed to have rusting ranging from slight to severe. During our site visit on July, 19, we photographed an interior section of pipe which connected to a gate valve that was removed downstream of the fresh water booster pump DWBP1. The interior of pipe and gate valve showed severe rusting. Interviews with Shipyard staff also noted many on-site valves could not be fully closed, attributing this problem to either rusting of the valve or settlements in the pipes. Based on available as-built information "*Utilities – Sheet 5 Domestic & Salt Water, Bethlehem Steel Company"* dated January, 1945, the on-site fresh water system in parts more than 70 years old. The useful life of utility systems is typically assumed to be between 50 years to 100 years, as such, the on-site fresh water system is already at or near the end of its useful service life.

Recommendations

Due to the age of the system and supported by water meter readings, site investigation, and interviews with Shipyard staff, it is our determination that there exists significant leaks in the existing on-site fresh water system. It is our recommendation that the fresh water system be evaluated in more depth and detail to determine the cost-benefit analysis of replacing the system in whole or in part. It is our strong recommendation that the DDCV at the water meter should never be closed and bypassed. The DDCV should be in operation at all times. Ship repair and Auxiliary Ship Repair activities along with the condition of the on-site fresh water system impose serious contamination risks to the public municipal water system. It is also our recommendation that the exposed fresh water pipe and appurtenances beneath the wharf, showing serious rusting should be replaced in segments or in its entirety, for a rough order of magnitude cost of about $450,000. Service lines to Building 36, Building 38, and Building 107 should be restored where feasible and desirable.



SHEET NOTES

1. VALVES WERE REMOVED AND CAPPED
2. BALL VALVES AT EVERY RISER FROM DDCV ALONG THE PIER FOR PIER SERVICES

GENERAL NOTES

1. INFORMATION PROVIDED ON THIS EXHIBIT IS BASED ON SITE INVESTIGATION CONDUCTED ON 06/23/2017 AND BY DISCUSSIONS WITH FORMER SHIPYARD EMPLOYEES RETAINED BY SFPORT.
2. BASE DRAWING USED IN THIS EXHIBIT IS FROM "UTILITIES - DOMESTIC WATER, TODD SHIPYARD CORPORATION SAN FRANCISCO DIVISION" RECORD DRAWINGS, DATED FEBRUARY 1971, REVISED JULY 1984.

LEGEND

- VALVE (PER 1984 RECORD PLANS)
- VALVE (INSTALLED AFTER 1984)
- HYDRANT (PER 1984 RECORD PLANS)
- BOOSTER PUMP (INSTALLED AFTER 1984)
- METER
- DOUBLE DETECTOR CHECK VALVE
- WATER LINE (PER 1984 RECORD PLANS)
- WATER LINE (INSTALLED AFTER 1984)
- LIMIT OF UTILITY INVESTIGATION
- BUILDING WITH WATER SERVICE
- BUILDING WITH NO WATER SERVICE
- BUILDING WITH INACTIVE WATER SERVICE

0 75 150 400 450

SCALE IN FEET

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5 FREELON STREET
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UTILITIES - DOMESTIC WATER

EXHIBIT 4

DRAWING NAME: Z:\AGS\project\2016\AGS-16-018 Port of SF As-Needed Eng (MN-AGS JV)\Pier 68-70 Shipyard Condition Survey\Report\Civil\Exhibits\Domestic Water Exhibit.dwg
PLOT DATE: 07-07-17
PLOTTED BY: michael.ngo

D. Salt Water System

The Salt Water system is supplied with sea water from San Francisco Bay by way of pumps. The Salt Water system includes the salt water fire protection system and a separate cooling water system, each serviced by its own set of pumps.

Salt Water Fire Protection System

The salt water fire protection system supplies the on-site fire hydrants as well as connections to the ships salt water fire protection systems. The salt water fire protection system is supplied by two split case pumps (P3SWP, P4SWP) located along the High Water Platform. The first pump, P3SWP, is located between Pier #3 and Drydock Eureka and the second pump, P4SWP, is located along Pier #4. The system also includes a dump valve located along Pier #4 to ensure proper operations between the two pumps [Exhibit 5]. Interviews with Shipyard staff indicate these pumps required frequent repairs due to failed seals. If repairs were made to either pumps, temporary diesel pumps would be rented and temporarily connected to the system. See Section E. Pumps for an assessment of the split case pumps.

According to the as-built "*Utilities – Salt Water Bethlehem Steel San Francisco Yard"* plans dated Jan, 1971, revised April, 1982, the salt water system supplies three fire hydrants. Of the three salt water fire hydrants shown on the as-built plans, only one could be located during our field investigation. The salt water hydrant labeled "S.W. Fire Hydrant" was found at Building 109. The salt water hydrant shown between Pier #3 and Drydock Eureka no longer exists and according to Shipyard staff, the salt water hydrant shown between Pier #4 and Dry Dock #2 was recently capped and removed due to unknown reasons. The as-built drawings also show one fire boat connection (FDC) each at the northern ends of both Pier 3 and Pier 4, however, these FDCs could not be located in the field.

Figure 27. Salt Water Fire Hydrant

The salt water system servicing the piers and the drydocks are attached to the underside of the High Water Platform and piers with individual riser connections rising above deck. The salt water pipes, appurtenances, and hangers underneath the High Water Platform and piers appeared to be showing slight to severe rusting.

Figure 28. Salt Water Fire Protection Pipe beneath Pier

The as-built drawings also indicate that the salt water system, in addition to servicing the landside salt water fire hydrants, have service connections into the buildings. The evaluation of building fire protection systems are not included in the scope of this report, so we were unable to verify if buildings have salt water connections, however interviews with Shipyard staff indicate there are no salt water fire protection services in any of the existing buildings.

Salt Water Cooling Water System

The salt water cooling system primarily services as the cooling water connection for docked ships. The salt water cooling system is supplied with sea water from San Francisco Bay by way of pumps located on the High Water Platform adjacent to Drydock #2 (SWACP1, SWACP2). The condition and assessment of the existing cooling water pumps are detailed in Section E. Pumps. Based on interviews with Shipyard staff, the cooling water system works with minimal issues.

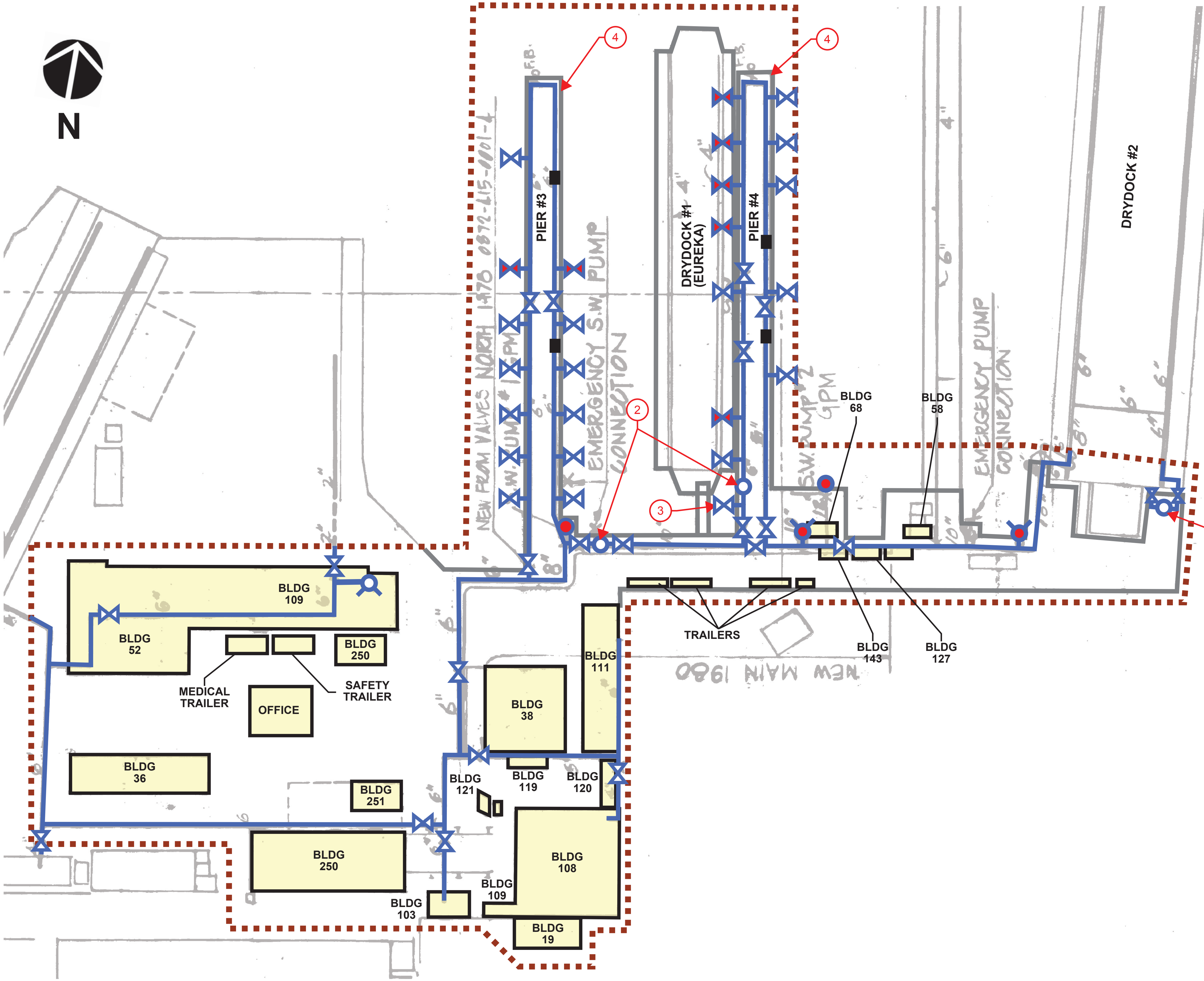
Condition Assessment

The salt water system was inactive during our field investigation. The pumps were non-operational and both the salt water fire protection and salt water cooling systems were not charged nor active. Interviews with Shipyard staff indicate the salt water systems were always active when the shipyard was occupied, but were shutoff following the closure of the shipyard in May 2017. Shipyard staff indicated, when operational, the salt water fire system was charged to 120 PSI and the cooling water system charged to 60 PSI. Shipyard staff expressed the only issues with the salt water systems were the unreliability of the salt water fire protection pumps P3SWP, P4SWP.

Based on available as-built information "*Utilities – Sheet 5 Domestic & Salt Water, Bethlehem Steel Company"* dated January, 1945, the salt water system could be more than 70 years old. The useful life of utility systems is typically assumed to be between 50 years to 100 years, as such, the salt water system is already at or near the end of its useful service life.

Recommendations

Absent of documentation describing the reason for the removal of the two salt water fire hydrants and FDCs originally shown on the as-built plans, it is our recommendation that the two missing salt water fire hydrants along the High Water Platform, and the two FDCs at the northern end of the piers, be restored to service at a rough order of magnitude cost of about $25,000, to provide fire protection coverage as originally intended in the as-built drawings. The heavily rusted portions of the salt water system beneath the piers and High Water Platform should be replaced, at a rough order of magnitude cost of about $400,000.



SHEET NOTES

1. AUXILLARY COOLING PUMPS
2. ELECTRIC SALT WATER PUMP
3. DUMP VALVE
4. PIER SERVICE VALVES ARE LOCATED ON PIER PLATFORM FROM RISERS ALONG PIER

GENERAL NOTES

1. INFORMATION PROVIDED ON THIS EXHIBIT IS BASED ON SITE INVESTIGATION CONDUCTED ON 06/23/2017 AND BY DISCUSSIONS WITH FORMER SHIPYARD EMPLOYEES RETAINED BY SFPORT.
2. BASE DRAWING USED IN THIS EXHIBIT IS FROM "UTILITIES - SALT WATER, TODD SHIPYARD CORPORATION SAN FRANCISCO DIVISION" RECORD DRAWINGS, DATED FEBRUARY 1971, REVISED APRIL 1982.

LEGEND

- VALVE
- CAPPED RISER VALVE
- HYDRANT
- HYDRANT NOT FOUND
- ACTIVE PUMP
- INACTIVE PUMP
- FIRE HOSE STATION
- WATER LINE (PER 1984 RECORD PLANS)
- LIMIT OF UTILITY INVESTIGATION

0 75 150 400 450

SCALE IN FEET

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UTILITIES - SALT WATER

EXHIBIT 5

4. SITE PUMPS (HRA)

E. Pumps

1. Sewer Pumps (2 CHT pumps)
    - CHT Pump #1 (CHTP1) - southeast of Bldg 109
    - CHT Pump# #2 (CHTP2) - underneath wharf at Bldg 127
2. Fresh Water (Booster pump)
3. Salt Water (2 salt water pumps, 2 salt water cooling pump)
    - Pier 3 Salt Water Pump (P3SWP)
    - Pier 4 Salt Water Pump (P4SWP)
    - Salt Water Auxiliary Cooling Pump #1 (SWACP1) - east pump
    - Salt Water Cooling Pump #2 (SWACP1) - west pump

<u>Site Pumps – Sewer Pumps (2 CHT Pumps)</u>

1. CHT Pump #1 (CHTP1) Southeast of Bldg 109 - Two pumps, one pump works well, the other requires service. (Located underneath the wharf. HRA was unable to gain access to and inspect this pump)

2. CHT Pump #2 (CHTP2) underneath wharf at Bldg 127 – (Located underneath the wharf. HRA was unable to gain access to and inspect this pump)

Figure 29. Sewer System CHT Pump Located Underneath the Wharf

<u>Site Pumps – Fresh water (Booster pump)</u>

Fresh Water Booster Pump – Installed in 2002.

Figure 30. 75 HP Fresh Water Booster Pump

Figure 31. 75 HP Fresh Water Booster Pump Nameplate (2 Pictures)

<u>Site Pumps – Salt Water (2 salt water pumps, 2 salt water cooling pump)</u>

- Pier 3 Salt Water Pump (P3SWP) - Split-case pump replaced previous deep well pump – Installed in 2002
- Pier 4 Salt Water Pump (P4SWP)-Split-case pump replaced previous deep well pump - Installed in 2002
- Salt Water Auxiliary Cooling Pump #1 (SWACP1) - east pump- Installed in 2002
- Salt Water Cooling Pump #2 (SWACP1) - west pump- Installed in 2002

Figure 33. 250 HP Pier 3 Salt Water Pump (P3SWP)

Figure 32. 250 HP Pier 3 Salt Water Pump (P3SWP) Nameplates (2 Pictures)

Figure 34. 100 HP Pier 4 Salt Water Pump (P4SWP)

Figure 35. 125 HP Salt Water Auxiliary Cooling Pump #1 and #2 (SWACP1, SWACP2) East Pump Installed in 2002.

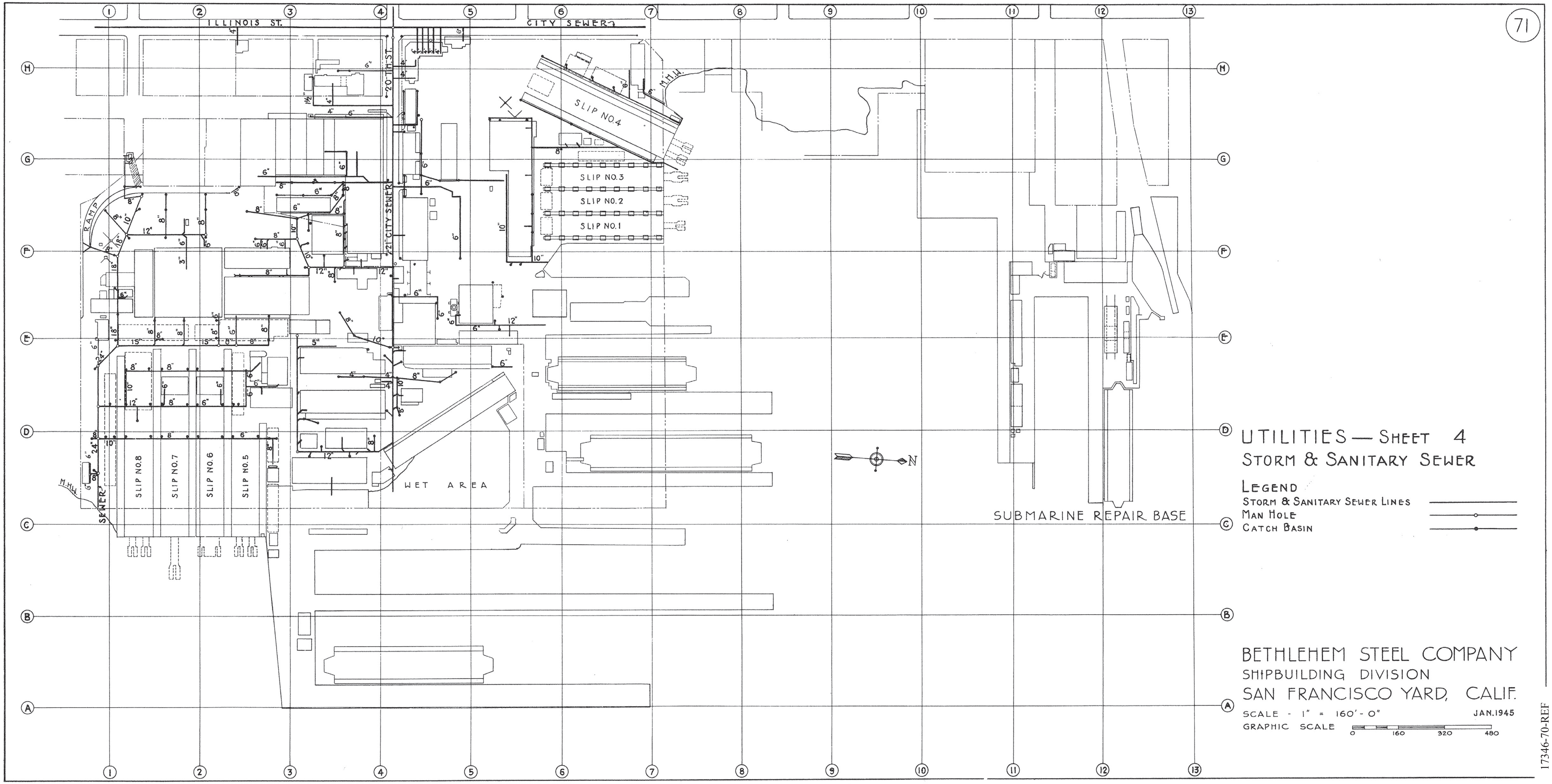
Condition Assessment

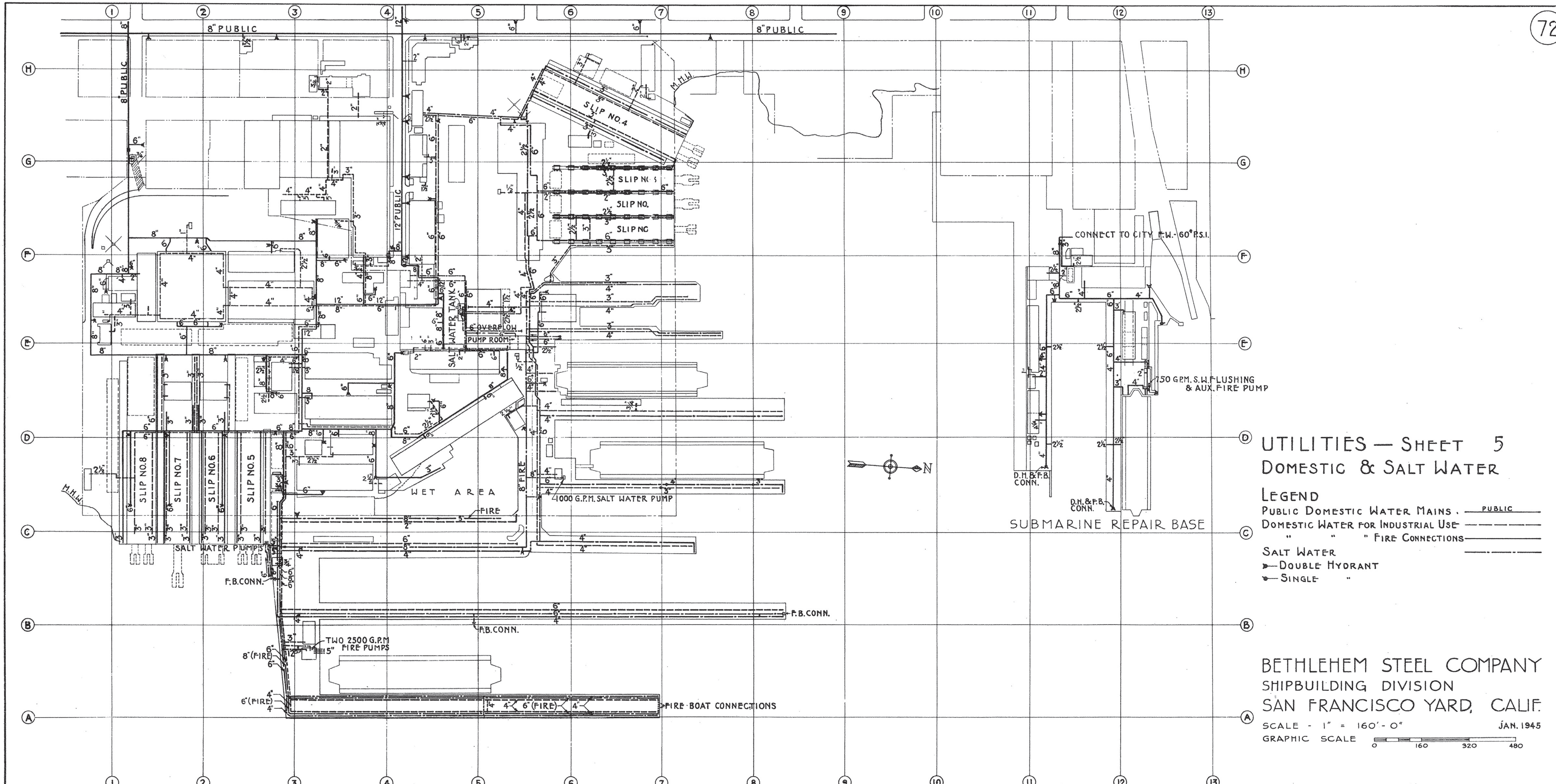
Site pumps were installed in 2002. The site pump systems appear to be operational to the best extent practical and should continue to service the needs of the Shipyard in the near term. Interviews with former Shipyard staff indicates, that the existing site pumps seem to work adequately and are reliable. Existing site pump systems have another 10-15 years useful service life.

CHT sewer pumps nearby buildings 109 and 127 were not accessible at HRA site visits.

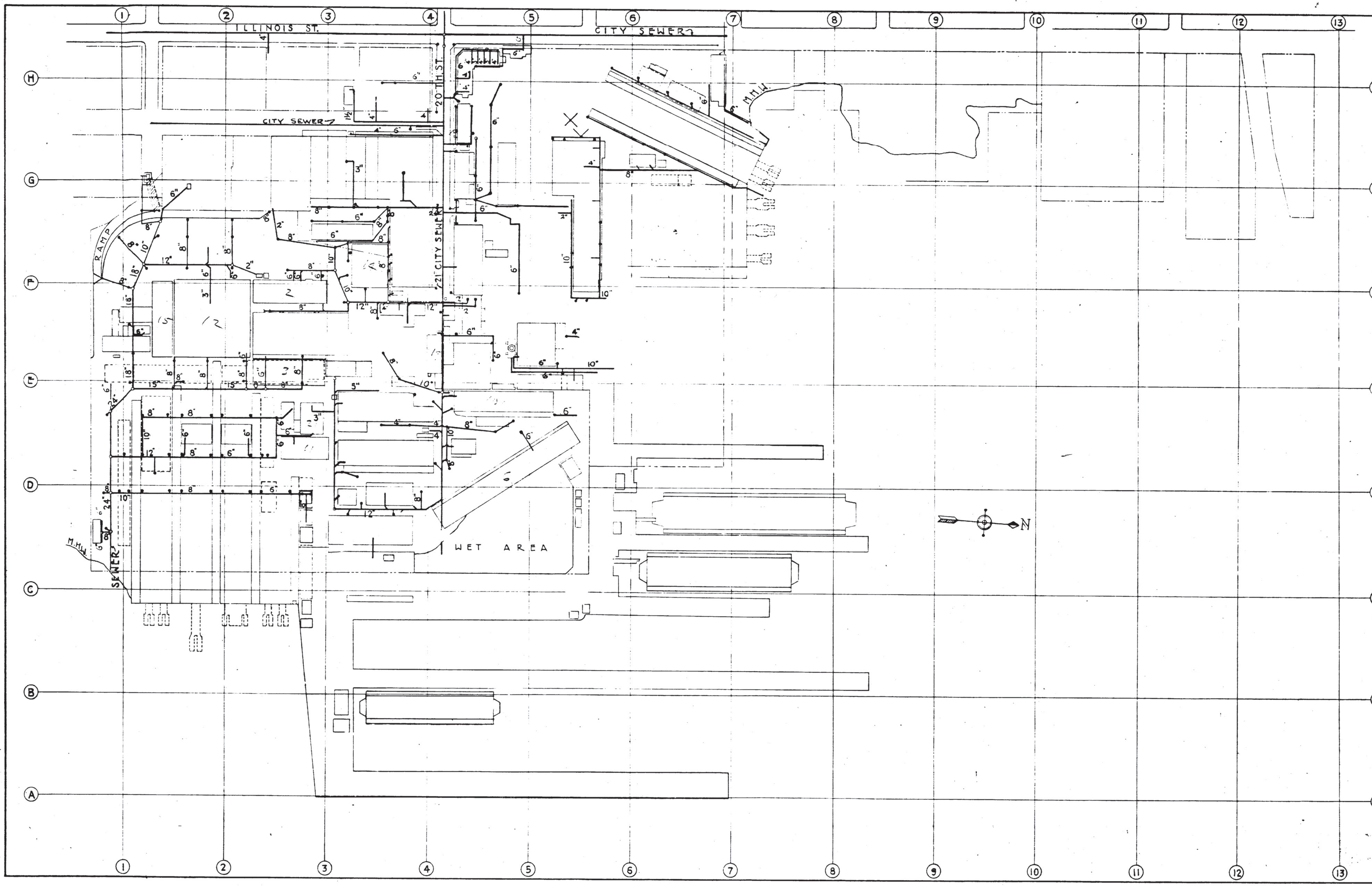
APPENDIX A

AS-BUILT DRAWINGS


71
ILLINOIS ST.
CITY SEWER
20TH ST.
21ST CITY SEWER
SLIP NO.4
SLIP NO.3
SLIP NO.2
SLIP NO.1
SLIP NO.8
SLIP NO.7
SLIP NO.6
SLIP NO.5
RAMP
M.H.W.
SEWER
WET AREA
SUBMARINE REPAIR BASE
N
UTILITIES — SHEET 4
STORM & SANITARY SEWER
LEGEND
STORM & SANITARY SEWER LINES
MAN HOLE
CATCH BASIN
BETHLEHEM STEEL COMPANY
SHIPBUILDING DIVISION
SAN FRANCISCO YARD, CALIF.
SCALE - 1" = 160'-0"
JAN.1945
GRAPHIC SCALE
0
160
320
480
17346-70-REF


72
UTILITIES — SHEET 5
DOMESTIC & SALT WATER
LEGEND
PUBLIC DOMESTIC WATER MAINS . PUBLIC
DOMESTIC WATER FOR INDUSTRIAL USE
" " " FIRE CONNECTIONS
SALT WATER
DOUBLE HYDRANT
SINGLE "
BETHLEHEM STEEL COMPANY
SHIPBUILDING DIVISION
SAN FRANCISCO YARD, CALIF.
SCALE - 1" = 160'-0"
JAN. 1945
GRAPHIC SCALE
0
160
320
480
8" PUBLIC
12" PUBLIC
SLIP NO. 4
SLIP NO. 5
SLIP NO.
SLIP NO.
SLIP NO. 8
SLIP NO. 7
SLIP NO. 6
SLIP NO. 5
SALT WATER PUMPS
SALT WATER TANK
PUMP ROOM
OVERFLOW
WET AREA
4000 G.P.M. SALT WATER PUMP
F.B. CONN.
TWO 2500 G.P.M. FIRE PUMPS
FIRE BOAT CONNECTIONS
CONNECT TO CITY F.W. - 60# P.S.I.
750 G.P.M. S.W. FLUSHING & AUX. FIRE PUMP
D.H. & F.B. CONN.
SUBMARINE REPAIR BASE
M.H.W.
N

17347-70-REF



UTILITIES — SHEET 4
STORM & SANITARY SEWER

LEGEND
STORM & SANITARY SEWER LINES
MAN HOLE
CATCH BASIN

BETHLEHEM STEEL CO

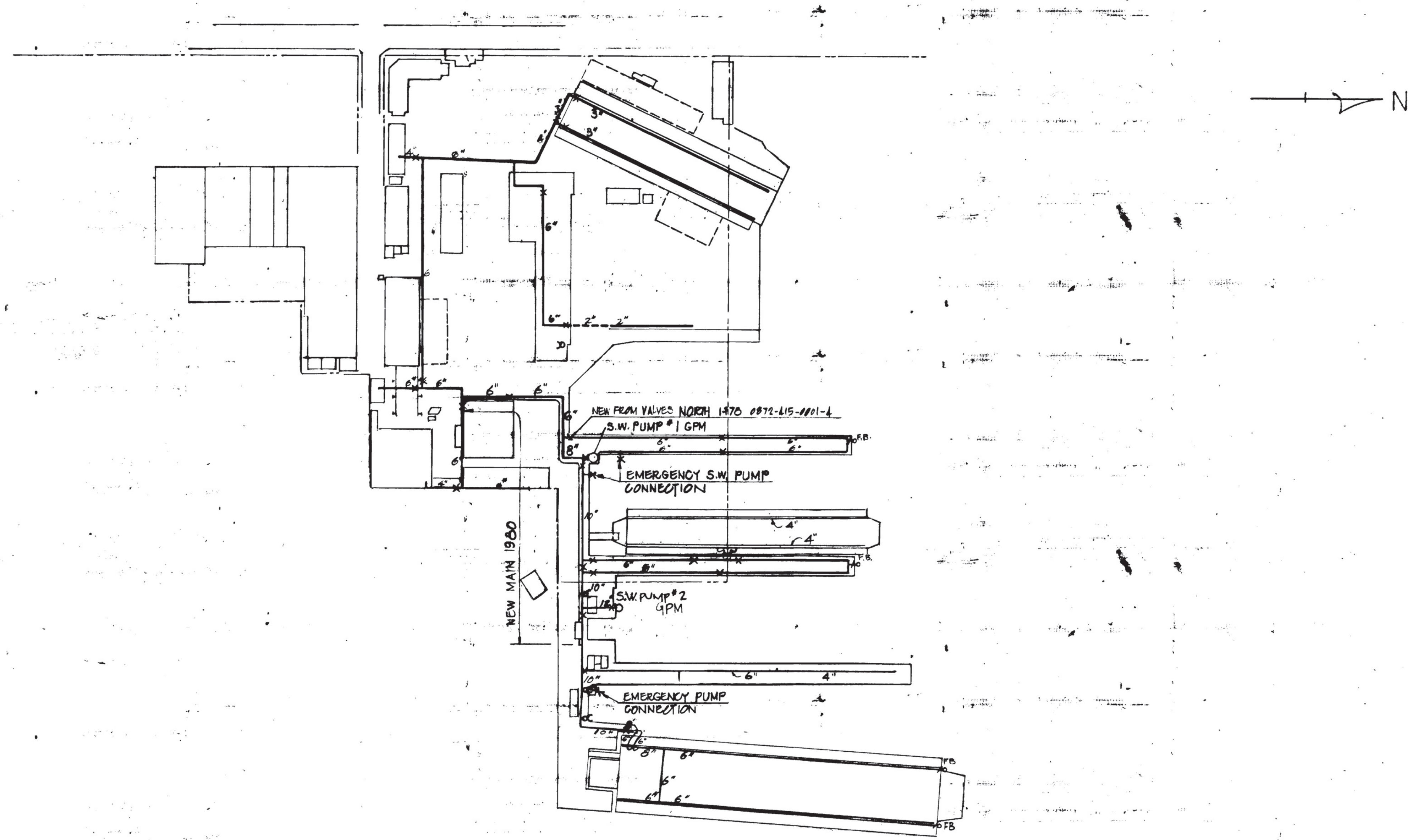
SAN FRANCISCO YARD, CALIF.

SCALE - 1" = 160'-0"
JAN. 1945
GRAPHIC SCALE 0 160 320 480

6-23-59
REV. 1-17-55 12-26-58

11374-70-1

519-22



UTILITIES — SALT WATER

LEGEND
- SALT WATER LINE
- SALT WATER PUMP
- FIRE BOAT CONNECTION
- FIRE HYDRANT
- HOSE RISER TO DRYDOCK

BETHLEHEM STEEL
SAN FRANCISCO YARD

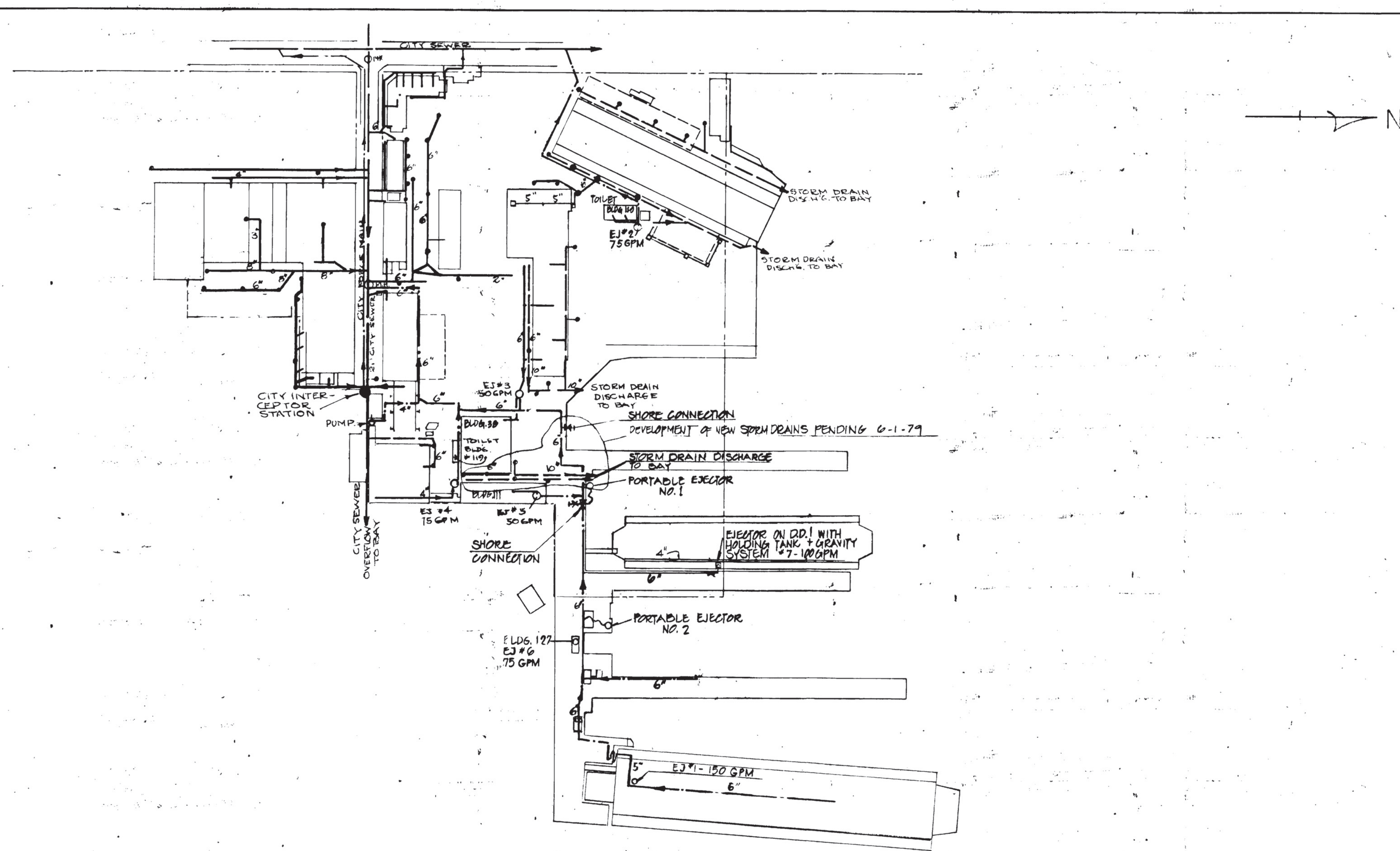
SCALE: 1" = 160'

GRAPHIC SCALE- 0 160 320 480

These drawings are provided for informational purposes only, and Todd makes no representations or warranties whatever as to the accuracy or completeness of the contents thereof.

REV. JAN. 1971, 11-1-77, 6-1-79, 4-13-82

11186-70-1



UTILITIES —
STORM & SANITARY SEWERS

LEGEND

DISCHARGE TO CITY SEWER	
FORCE MAIN TO CITY SEWER	
CITY SEWER	
STORM DRAIN TO BAY	
CATCH BASIN	EDUCTOR
ARROW INDICATES DIRECTION OF FLOW	

TODD SHIPYARDS CORPORATION
SAN FRANCISCO DIVISION

SCALE: 1" = 160'

GRAPHIC SCALE- 0 160 320 480

These drawings are provided for informational purposes only, and Todd makes no representations or warranties whatever as to the accuracy or completeness of the contents thereof.

REV. FEB. 1971, 11-1-77, 6-1-79, 4-13-82, 7-11-84

11181-70-1