Pier 68-70 Shipyard Facility Condition Survey
Electrical Power Systems

Prepared for:

PORT OF SAN FRANCISCO

Prepared by:

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A Joint Venture

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1. Executive Summary

The purpose of this report is to present the assessment and evaluation of the condition, operability, and reliability of the existing electrical power system of Pier 68-70. The assessment of current conditions of the electrical power system at Pier 68-70 was conducted by HRA Consulting Engineers which include site visits on June 21, 28, 29, and July 18, 2017, interviews with former shipyard staff, and review of available Port documents.

The electrical power system appears to be operational to the best extent practical for aged equipment, infrastructure, and cabling and should continue to service the needs of the Shipyard in the near term. Interviews with former Shipyard staff indicate that the existing electrical systems seem to work adequately and are reliable with maintenance as required. See section A - Electrical Power Systems for individual Building conditional assessments and known issues. Most of the electrical equipment is already at or nearing its useful service life. See Appendix A.

Interviews with former Shipyard staff indicate that the existing electrical power system has the following reliability issues:

- Temporary cables strung between buildings. Anything 'temporary' indicates a reliability problem with the permanent system.
- Conduit installed under the High Water Platform to Building 68 in 2012 was damaged by debris and has temporary supports.
- Crane 31 electrical rail along Pier 4 is flooded during king tides and must be turned off ahead of king tides to prevent problems
- Electrical vaults and manholes require regular pump out to prevent flooding

2. Introduction

The Shipyard at Pier 68-70 is a historic ship building and ship repair facility located in the Potrero District of San Francisco.

2.1 Purpose and Scope

The purpose of this report is to provide a general assessment of existing electrical power systems at Pier 68-70. The Port will provide this report to potential ship repair operators interested in leasing the shipyard facility.

2.1 Methodology

Electrical field surveys were conducted by HRA on June 21, 28, 29, and July 18, 2017. All HRA field surveys are visual only. No testing was performed as part of this report.

2.3 Condition Assessment

The Condition Assessment includes photos taken of existing electrical equipment and a general assessment of the equipment's condition, reliability, and operability. There is also reference to Appendices that relate to the electrical power system.

3. Description of Electrical Power System

The existing electrical power system includes equipment installed from 1912 to 2012. Throughout the years most of the existing equipment has been maintained, repaired, and is currently in operating condition. Some of the equipment are disconnected and/or abandoned.

Pacific Gas and Electric (PG&E) is the local electricity utility that owns and maintains the municipal power grid leading to the yard. However, the Shipyard's electricity provider is currently the San Francisco Public Utilities Commission (SFPUC).

The electrical power system is summarized as follows:

PG&E provides 12 KV power to 12 KV Substation #1 in Building 102 first floor. 12 KV Substation #1 provides power to the following 12 KV/480V Substations:

- 1500KVA Substation #1 in Building 102 second floor
- 1500KVA Substation #8 in Building 105
- Two 1000KVA Substation #7 in Building 68
- Two 3000KVA Substation #7A Transformers in Building 68
- Two 4000A Substation #7A Switchboards at Pier 4
- Substation #7 provides power to Substation #3 in Building 111
- 2000KVA Substation #10/ D1 at Dry Dock #2
- 2000KVA Substation #10/ D2 at Dry Dock #2

12 KV Substation #1 also provides power to 12 KV/4160V exterior 1500 KVA Substation #11 between Building 103 and 107.

- The 12KV power is served via manholes to each Substation, refer to Appendix F.
- The 480V power is served throughout the site via above Substations.
- 120/208V power is served throughout the site via 480/208V transformers.

See Single Line Diagram (Appendix B), and Electrical Equipment Location, Capacity, Age and Manufacturer + PBC-Containing Equipment (Appendix A).

A. Electrical Power Systems

Building 102 - 12KV Substation #1 and 480V Substation #1

Figure 1. Building 102 first floor includes 12KV Electrical Substation #1

Figure 2. Building 102 first floor includes 12KV Electrical Substation #1

Figure 3. Building 102 second floor includes 480V Electrical Substation #1

Figure 4. Three 50KVA Single-Phase PCB transformers

Figure 5. 50KVA Single-Phase PCB transformer nameplate

Building 102 Electrical Condition Assessment

PG&E provides 12 KV power to 12 KV Substation #1 in Building 102 first floor. 12 KV Substation #1 provides power to 12KV/480V Substation #1 with 1500KVA PCB transformer and three 50KVA Single Phase PCB transformers in Building 102 second floor. Some temporary cables have been used in building 102 while under maintenance.

Building 102 is outside the Shipyard's lease area, but the Shipyard currently relies on equipment in this building for its electrical service. The Port and a developer are currently working with the Shipyard to potentially replace equipment on the second floor with new equipment located inside the Shipyard's lease area. This project is outside the scope of our assessment, and more details are available directly from the Port if requested. Our assessment focuses on the functionality and condition of the equipment that currently exists.

The electrical power system appears to be operational to the best extent practical for aged equipment, infrastructure, and cabling and should continue to service the needs of the Shipyard in the near term. Interviews with former shipyard staff indicates that the existing electrical systems seem to work adequately and are reliable with maintenance as required. It should be noted, that anything ‘temporary’ indicates a reliability problem with the permanent system while under maintenance. Most of the electrical equipment is already at or nearing its useful service life. See Appendix A.

Substation #11 Between Buildings 103 & 107

12 KV Substation # 1 (Building 102 first floor) feeds exterior Substation #11 between Buildings 103 and 107. 1500 KVA Substation #11 secondary side feeds compressors in Building 103.

Figure 6. exterior of Substation #11

Figure 7. Substation #11 transformer - 1500KVA, 12KV-4160V

Figure 8. switchgear nameplate

Figure 9. Substation #11 - Trip setting General Electric

Building 103 - Steam Powerhouse #2

Substation #1 (Building 102 first floor) feeds Building 103 4160V switchboard. 4160V switchboard feeds the compressors.

Figure 10. 4160V switchboard

Figure 11.400A 480V panel

Substation #11 and Building 103 Electrical Condition Assessment

Substation #11 secondary side feeds compressors in Building 103. Building 103 has a 4160V distribution board to serve the air compressors. Building 103 also has a 400A, 480/277V, 3-Phase, 4-Wire system fed from Substation #8 in Building 105. This 400A panel is currently fed from Building 108 by temporary cables.

The electrical power system appears to be operational to the best extent practical for aged equipment, infrastructure, and cabling and should continue to service the needs of the Shipyard in the near term. Interviews with former shipyard staff indicates that the existing electrical systems seem to work adequately and are reliable with maintenance as required. It should be noted, that anything 'temporary' indicates a reliability problem with the permanent system while under maintenance. Most of the electrical equipment is already at or nearing its useful service life. See Appendix A.

Building 105 - Forging/Machine Shop & Substation #8

Substation #1 (Building 102 second floor) feeds Substation #8 in Building #105

Figure 12. General-electrical distribution

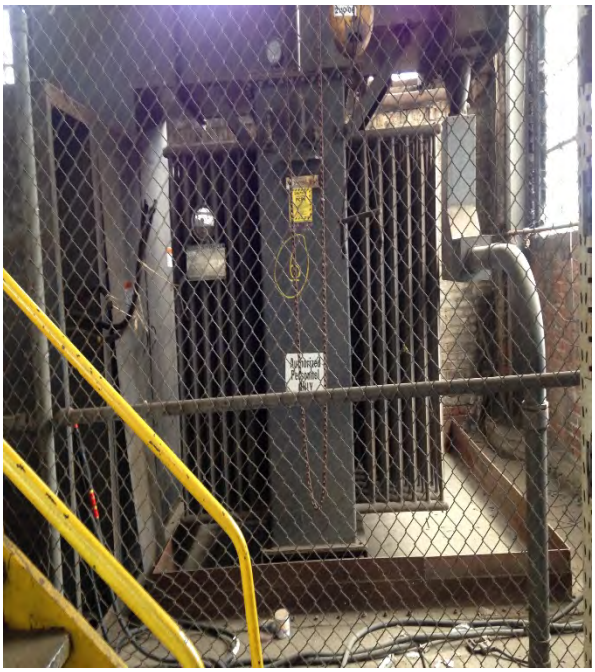


Figure 13. Substation #8 Transformer

Figure 14. Substation #8 Switchgear

Building 105 Electrical Condition Assessment

12 KV Substation # 1 (Building 102 first floor) feeds 1500KVA Substation #8 in Building 105.

There is an abandoned electrical Substation #8 with PCB Transformer located in the south west corner of the building. Current power service is fed with temporary cables from newer Substation east of the building.

Building 105 has 480/277V, 3-Phase, 4-Wire service with multiple panels fed from 480V Substation #1 in Building 102 second floor.

The electrical power system appears to be operational to the best extent practical for aged equipment, infrastructure, and cabling and should continue to service the needs of the Shipyard in the near term. Interviews with former shipyard staff indicates that the existing electrical systems seem to work adequately and are reliable with maintenance as required. It should be noted, that anything 'temporary' indicates a reliability problem with the permanent system while under maintenance. Most of the electrical equipment is already at or nearing its useful service life. See Appendix A.

Building 111 - Administration Building & Substation #3
Substation #7 feeds Substation #3.

Figure 15. Substation #3 - 1000A 480 V 3P

Figure 16. Three 50KVA Single-Phase PCB Transformers

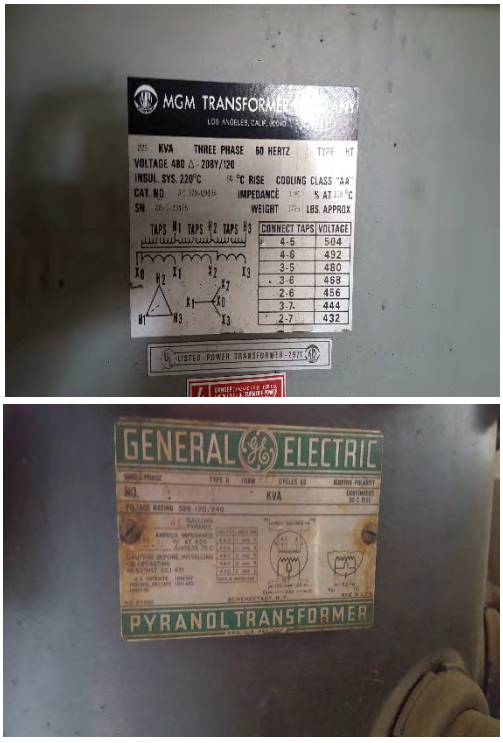


Figure 17. Nameplates for Transformers

Building 103 Electrical Condition Assessment

Substation #3 with three 50KVA PCB transformers is located at the north end of the first floor. Some temporary cabling is used in the electrical room. Each floor is equipped with 120/240V panels throughout.

The electrical power system appears to be operational to the best extent practical for aged equipment, infrastructure, and cabling and should continue to service the needs of the Shipyard in the near term. Interviews with former shipyard staff indicates that the existing electrical systems seem to work adequately and are reliable with maintenance as required. Most of the electrical equipment is already at or nearing its useful service life. See Appendix A.

Building 68 – Power Substation #7 and #7A

12KV Substation #1 (Building 102 first floor) feeds Substation #7 and #7A in Building 68.

Figure 18. Substation # 7A transformers (2) 3000KVA - 12KV-480/277V

Figure 19. Substation #7A switchgear

Figure 20. Substation #7A switchgear

Building 68 Condition Assessment

Building 68 includes Substation #7 with two 1000KVA Transformers and "Substation #7A" (HRA's designation) with two 3000KVA Transformers. Substation #7 has two PCB 1000KVA transformers from 1957 and Substation #7A has two 3000KVA transformers installed in 2012 as part of the shore power upgrade project.

Substation #7 feeds various loads, refer to the single line diagram in Appendix B.

Substation #7A feeds power monuments along the east face of Pier 4 to provide shore power to berthed ships. See drawings from the 2012 shore power upgrade project in Appendix D.

An 80' section of fiberglass conduit installed in 2012 under the High Water Platform deck between shore and Substation #7 and #7A in Building 68 was damaged by debris and currently has temporary supports (shown in Figure 21). Refer to the following Section for details and also see Appendix D.

The Crane 31 electrical rail along Pier 4 is flooded during king tides and must be turned off ahead of king tides to prevent problems.

Based on the observed damage to conduit, HRA recommends that Substation #7 and #7A be thoroughly tested to verify functionality. Substation #7 electrical equipment is already at or nearing its useful service life, and the transformers should be replaced due to PCBs. Other than the damaged conduit, the 2012 equipment installed for Substation #7A has an estimated useful life of 50 years. See Appendix A.

High Water Platform - Substation #7 Feeders

An 80’ section of fiberglass conduit installed in 2012 under the High Water Platform deck between shore and Substation #7 and #7A in Building 68 was damaged by debris and currently has temporary supports.

Figure 21. 3- 4” conduit 80’ conduit run under Wharf (2 pictures)

Substation #7 Feeders Condition Assessment

An 80’ section of fiberglass conduit installed in 2012 under the High Water Platform deck between shore and Substation #7 and #7A in Building 68 was damaged by debris and currently has temporary supports. Permanent supports should be re-installed with consideration to debris impact loading. The fiberglass conduit appears damaged and should be assessed for water-tightness. Depending on the scope of necessary repairs, re-locating this conduit run should be considered to avoid future damage.

Building 36 - Shipping & Receiving/Machine Shop

Figure 22. 400A 480V main service

Figure 23. Interior panel boards & dry type transformer

Figure 24. Rectifier

Figure 25. Nameplate for rectifier

Building 36 Electrical Condition Assessment

Building 36 is equipped with multiple 480V and 120V panels and with a 75KW rectifier for 250VDC equipment.

Feeder 13 has a bad splice and currently is connected to Power Panel 1 via temporary cables.

The electrical power system appears to be operational to the best extent practical for aged equipment, infrastructure, and cabling and should continue to service the needs of the Shipyard in the near term. Interviews with former shipyard staff indicates that the existing electrical systems seem to work adequately and are reliable with maintenance as required. It should be noted that anything 'temporary' indicates a reliability problem with the permanent system while under maintenance. Most of the electrical equipment is already at or nearing its useful service life. See Appendix A.

Building 19 - Blast Grit Remediation Building

Building 19 electrical system is connected to overhead PG&E service that has been cut out.

Figure 26. Overhead PG&E cut line

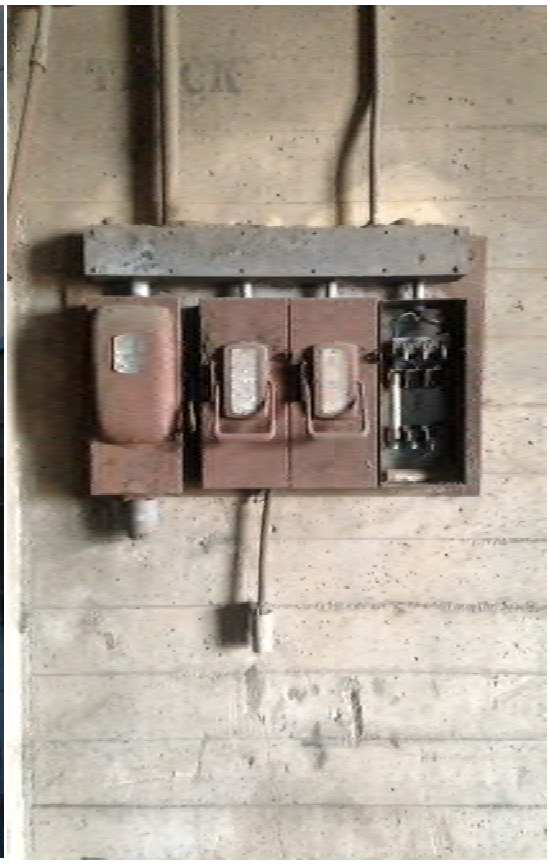


Figure 27. Building panel

Building 19 Electrical Condition Assessment

The equipment located in building 19 is deteriorated, non-operable and PG&E overhead electrical service is cut at the exterior of building-the building has no power.

Building 107 - Pipe Storage

Substation #1 (Building 102 first floor) feeds 4160V switchboard. 4160V switchboard feeds the compressors.

Figure 28. 4160V switchboard

Figure 29. General-electrical distribution system

Building 103 Electrical Condition Assessment

Building 103 has a 4160V switchboard to serve the air compressors.

Building 107 has a 100A, 480/277V, 3-Phase, 4-Wire system fed from 480V Substation #1 in Building 108.

The electrical power system appears to be operational to the best extent practical for aged equipment, infrastructure, and cabling and should continue to service the needs of the Shipyard in the near term. Interviews with former shipyard staff indicates that the existing electrical systems seem to work adequately and are reliable with maintenance as required. Most of the electrical equipment is already at or nearing its useful service life. See Appendix A.

Building 108 - Carpenter's Shop

Building 108 has a 400A 480V 3 Phase service.

Figure 30. 400A 480V power distribution system

Figure 31. Power distribution system Mezzanine

Building 108 Electrical Condition Assessment

Building 108 has a 400A, 480/277V, 3-Phase, 4-Wire system (fed from 480V Substation #1) which feed three 50KVA single phase transformers rated at 480V-208/120V with PCB. Transformers feed the 208/120V panelboards both on first and second floors.

The electrical power system appears to be operational to the best extent practical for aged equipment, infrastructure, and cabling and should continue to service the needs of the Shipyard in the near term. Interviews with former shipyard staff indicates that the existing electrical systems seem to work adequately and are reliable with maintenance as required. Most of the electrical equipment is already at or nearing its useful service life. See Appendix A.

Building 109 - Tool Room/Paint Booth/Sheet Metal & Non-UV Covered Storage

Building 109 has a 400A service and multiple panel boards.

Figure 32. General electrical panel

Figure 33. General electrical panel

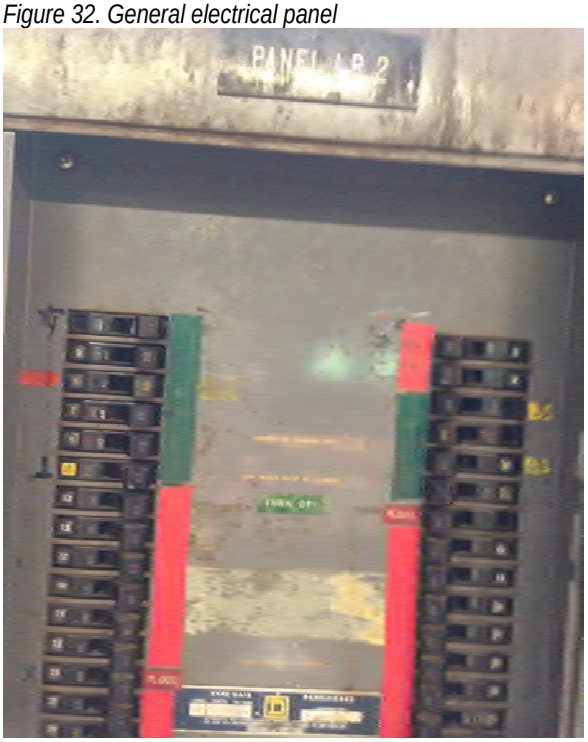


Figure 34. 100A service panel

Figure 35. General-equipment electrical connections

Building 52 - Adjacent to Building 109

Figure 36. Electrical distribution system

Figure 37. 400A main disconnect

Building 108 & 52 Electrical Condition Assessment

Building 109 has 480/277V, 3-Phase, 4-Wire service with multiple panels fed from 480V Substation #1 in Building 108.

Building 52 adjacent to Building 109 is abandoned and there is active electrical equipment in Building 52 which feeds Building 109. It is recommended to provide a different source of power to Building 109 since Building 52 existing power source looks deteriorated.

The electrical power system appears to be operational to the best extent practical for aged equipment, infrastructure, and cabling and should continue to service the needs of the Shipyard in the near term. Interviews with former shipyard staff indicates that the existing electrical systems seem to work adequately and are reliable with maintenance as required. Most of the electrical equipment is already at or nearing its useful service life. See Appendix A.

Building 120 - Hazardous Material Storage & Building 121 - Pipe Storage Office

Building 121 has a 60A 120V electrical panel.

Figure 38. Power and lighting panel

Figure 39. Power and lighting panel

Building 102 & 121 Electrical Condition Assessment

Building 120 has no electrical service.
Building 121 has a 60A 120V electrical panel.

The electrical power system appears to be operational to the best extent practical for aged equipment, infrastructure, and cabling and should continue to service the needs of the Shipyard in the near term. Interviews with former shipyard staff indicates that the existing electrical systems seem to work adequately and are reliable with maintenance as required. Most of the electrical equipment is already at or nearing its useful service life. See Appendix A.

Building 127 - Production Office

Figure 40. 225A 480V service panel

Figure 41. 100A 208V panel

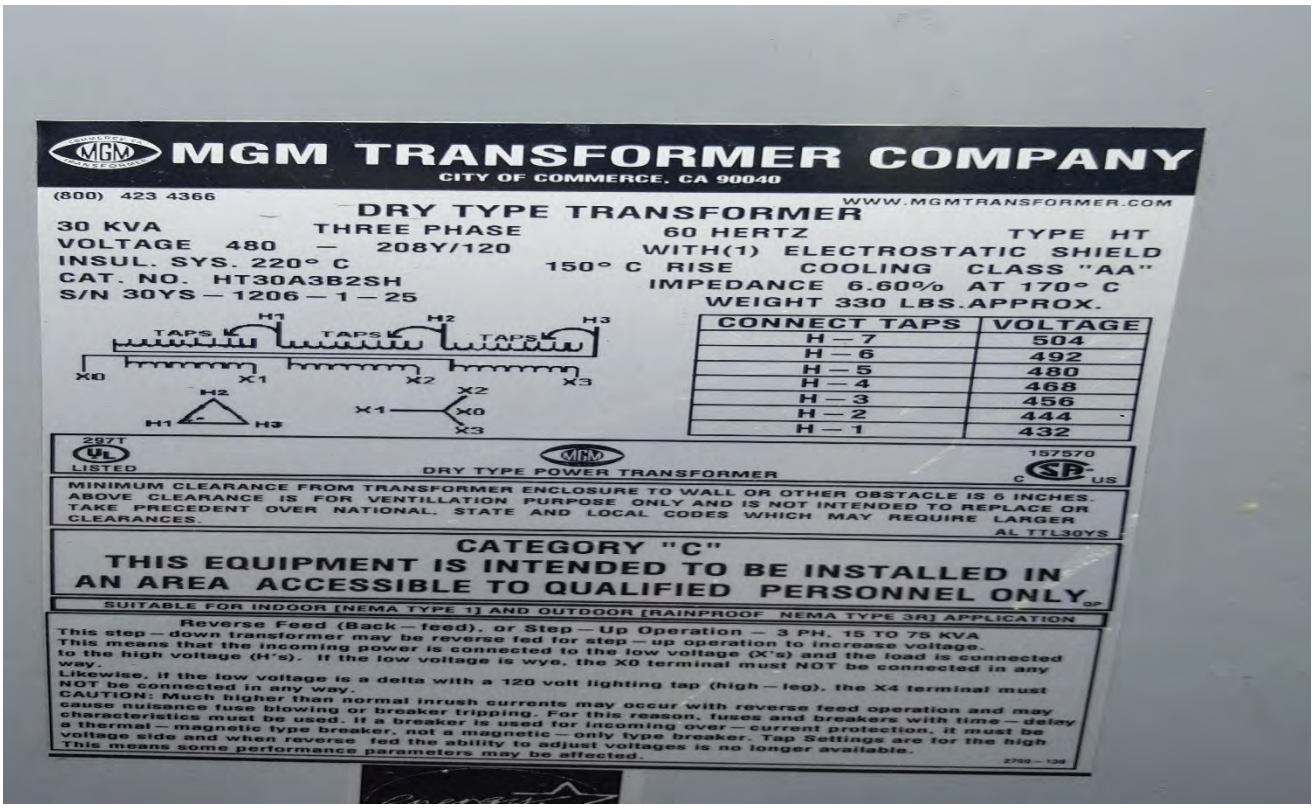


Figure 42. 30KVA 480V-208/120V dry type transformer

Building 121 Electrical Condition Assessment

Building 121 is equipped with a 225A panel rated at 480/277V, and a 30KVA transformer rated at 480V-208/120V and a 100A panel rated at 208/120V.

The electrical power system installed in 2002 as part of the shore power upgrade project and operational to the best extent practical and should continue to service the needs of the Shipyard in the near and long terms. Interviews with former shipyard staff indicate that the existing electrical systems seem to work adequately and are reliable. The 2002 electrical system has an estimated useful life of 50 years. See Appendix A.

Building 143 - Break Area/Washroom

Figure 43. 100A panel

Building 143 Electrical Condition Assessment

Building 143 is equipped with a 100A panel rated at 208/120V.

The electrical power system installed in 2002 and operational to the best extent practical and should continue to service the needs of the Shipyard in the near and long terms. Interviews with former shipyard staff indicates, that the existing electrical systems seem to work adequately and are reliable. The 2002 electrical system has an estimated useful life of 50 years. See Appendix A.

Building 250 - Warehouse

Building 250 is equipped with a 75KVA transformer rated at 480V-208/120V and a 225A panel rated at 208/120V.

Figure 44. 100A 480V disconnect switch, 75 KVA transformer, 225A 208/120V panel

Figure 45. 75 KVA transformer

Building 250 Electrical Condition Assessment

Building 250 is equipped with a 75KVA transformer rated at 480V-208/120V and a 225A panel rated at 208/120V.

The electrical power system installed in 2002 and operational to the best extent practical and should continue to service the needs of the Shipyard in the near and long term. Interviews with former shipyard staff indicate that the existing electrical systems seem to work adequately and are reliable. The 2002 electrical system has an estimated useful life of 50 years. See Appendix A.

Building 251 - Blast Booth

Building 251 has a 400A, 480/277V, 3-Phase, 4-Wire system (fed from Building 105) which feeds a 45KVA transformers rated at 480V-208/120V. Transformer feeds a 100A panel, 208/120V, 3-Phase, 4-Wire.

Figure 46. Interior of building 251

Figure 47. 400A, 480/277V panel, 45KVA transformer, 225A 208/120V panel

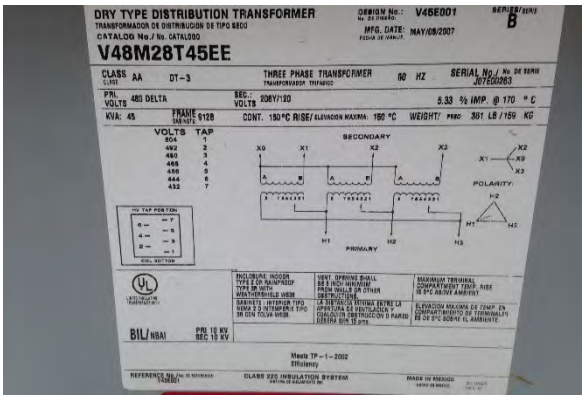


Figure 48. 45 KVA transformer

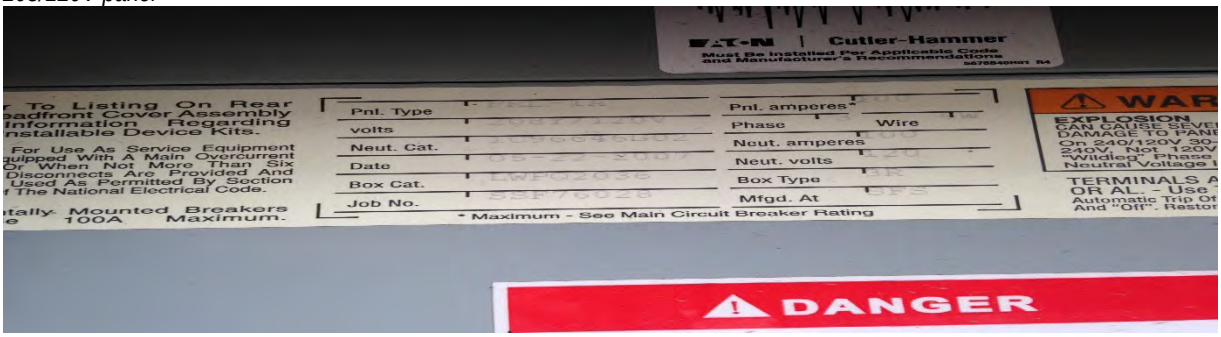


Figure 49. 400A, 480/277V, 3-Phase panel

Building 251 Electrical Condition Assessment

Building 251 has a 400A, 480/277V, 3-Phase, 4-Wire system (fed from Building 105) which feeds a 45KVA transformers rated at 480V-208/120V. Transformer feeds a 100A panel, 208/120V, 3-Phase, 4-Wire.

The electrical power system installed in 2007 and operational to the best extent practical and should continue to service the needs of the Shipyard in the near and long term. Interviews with former shipyard staff indicate that the existing electrical systems seem to work adequately and are reliable. The 2007 electrical system has an estimated useful life of 50 years. See Appendix A.

Appendices

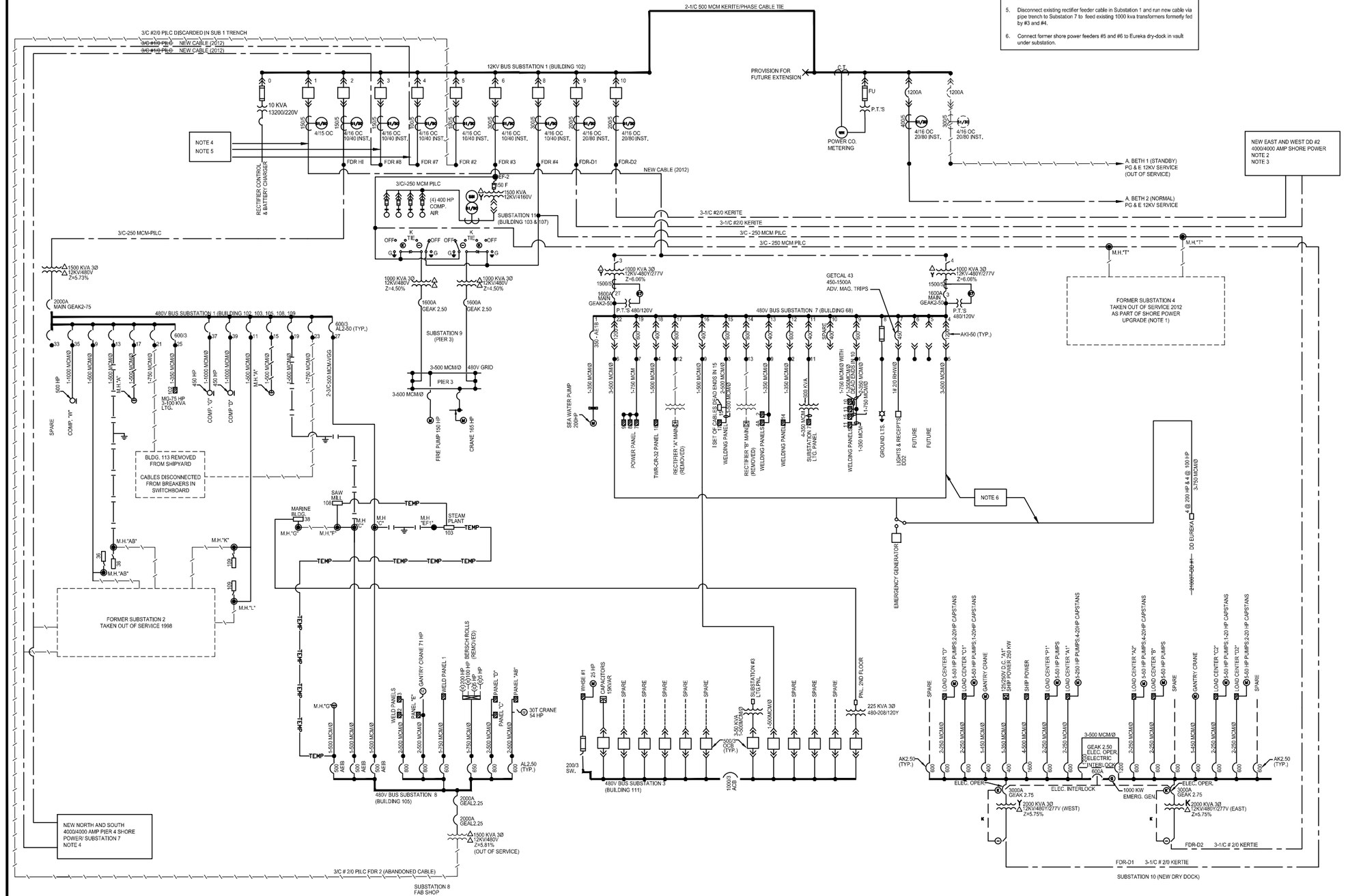
Appendix A: Electrical Equipment Table

Pier 68-70 Electrical Equipment Location, Capacity, Age and Manufacturer

Note: PCB-containing transformers are shown in **Red & Bold**

Electrical Equipment	Location	Transformer Rating	Capacity (Amps)	Voltage	Phase	Wire	Age	Manufacturer	Date Removed or Out of Service	Notes (See Electrical Single Line Diagram for additional detail)
Substation 1	Bldg 102 First Floor			12 kV	3	3	1912	General Electric		
Substation 1	Bldg 102 Second Floor	**1500 kVA**	2000	12 kV / 480 V	3	4	1940	General Electric		**PCB Transformer.** Substation #1 feeds Bldgs. 102, 103, 105, 108 and 109.
~~Substation 2~~		~~1500 kVA~~	~~2000~~	~~12 kV / 480 V~~	~~3~~	~~4~~	~~1940~~		1998	
Substation 8	Bldg 105	**1500 kVA**	2000	12 kV / 480 V	3	4	1940	Westinghouse	Out of Service	**PCB Transformer.** Substation #1 feeds this substation.
Substation 11	Between Bldg 103 & 107	1500 kVA	600	12 kV / 4160 V	3	3		General Electric		
Substation 3	Bldg 111	**50 kVA (3)**	1000	480 V	3	4	1908	S&C Electric Co.		**PCB Transformers**. Substation #7 feeds this substation.
	Bldg 111	225 kVA		480 V / 208 V			1988	MGM		
Substation 7	Bldg 68	**1000 kVA (2)**	1600	12 kV / 480 V	3	4	1957	General Electric		**PCB Transformer.** Substation #1 feeds this substation.
Sub "7A" Transformer	Bldg 68	3000 kVA (2)		12 kV / 480 V	3	3	2012	Eaton		Added during 2012 Eaton Upgrade, for shore power system
Sub "7A" Switchboard	Bldg 68		4000 (2)	480 / 277V	3	4	2012	Eaton		Added during 2012 Eaton Upgrade, for shore power system
Substation 9	Pier 3	1000 kVA	1600	12 kV / 480 V	3	4	1964			
~~Substation 4~~	~~Bldg 58~~	~~**1500 kVA**~~	~~2000~~	~~12 kV / 480 V~~	~~3~~	~~3~~	~~1984~~		2012	Removed after 2012 Eaton Upgrade. **PCB Trasnformers were removed**.
Substation 10 / D1	Dry Dock 2	2000 kVA	3000	12 kV / 480 V	3	4	2012	Eaton		
Substation 10 / D2	Dry Dock 2	2000 kVA	3000	12 kV / 480 V	3	4	2012	Eaton		
100A Panel	Bldg 19		100	208 / 120 V	3	4	1940	Unknown		PG&E overhead electrical service is cut at exterior of building.
400A Panel	Bldg 36		400	480 / 277 V	3	4	1960	Square D		
75 kW Rectifier	Bldg 36			480 V / 250 VDC	3	3	2007	General electric		
300A Panel 2PM1	Bldg 36		300	480 / 277 V	3	4	2003	Eaton		
Switchboard	Bldg 52			480 / 277 V	3	4	1940	Unknown		There is are active electrical equipment in building 52 which feed Bldg 109.
4.160 kV Dist Board	Bldg 103			4.160 kV	3	3	1954	Ampgard		
400A Panel	Bldg 103		400	480 / 277 V	3	4	2015	Cutler -Hammer		
100A Panel	Bldg 107		100	480 / 277 V	3	4	1980	Ampgard		Via Bldg 108
400A Panel	Bldg 108		400	480 / 277 V	3	4	1940	Trumbull		Feeds **(3) 50 kVA** Single Phase **PCB Transformers** 480-120/208V.
100A Panel	Bldg 108 - 2nd Floor		100	208 / 120 V	3	4	2012	Square D		
400A Panel	Bldg 109		400	480 / 277 V	3	4	1960	Square D		
60A Panel	Bldg 121		60	208 / 120 V	3	4	1940	Square D		
225A Panel	Bldg 127		225	480 / 277 V	3	4	2002	ITT		
100A Panel	Bldg 143		100	208 / 120 V	3	4	2002	Cutler Hammer		
75 kVA Transformer	Bldg 250	75 kVA		480 / 208 V	3	3	2002	Square D		
225A Panel	Bldg 250		225	208 / 120 V	3	4	2002	Square D		
400A Panel	Bldg 251		400	480 / 277 V	3	4	2007	Eaton		
45 kVA Trasnformer	Bldg 251	45 kVA		480 / 208 V	3	3	2007	Eaton		
100A Panel	Bldg 251		100	208 / 120 V	3	4	2007	Eaton		

Appendix B: Single Line Diagram



1 SINGLE LINE DISTRIBUTION DIAGRAM - 12KV & 480V POWER
SCALE: NTS

NO.	ISSUED FOR	DATE
3A	ADDITIONAL REVISIONS	08/10/2017
3	CONVERTED TO CAD BY HRA	07/31/2017
2	REV. BY J. CARTER, YARD ELECTRICIAN	05/09/2017
1	REV. BY BETHLEHEM STEEL	07/01/1978
0	ORIGINAL ISSUE - DWG. NO. E-1	07/30/1969

CERTIFIED BY

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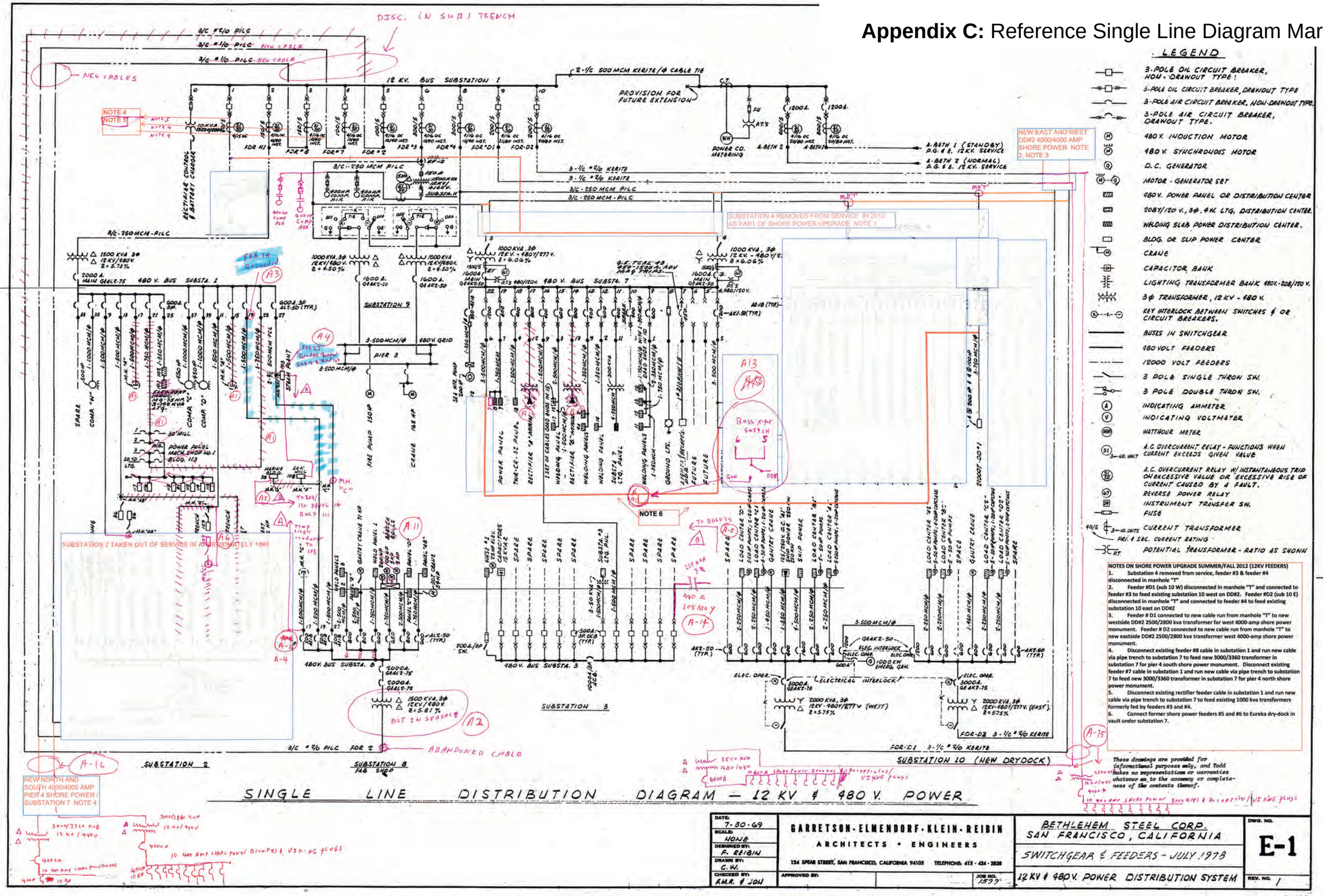
PORT OF SAN FRANCISCO
PIER 68-70 SHIPYARD

HRA PROJECT NO. –
DATE 07/24/2017

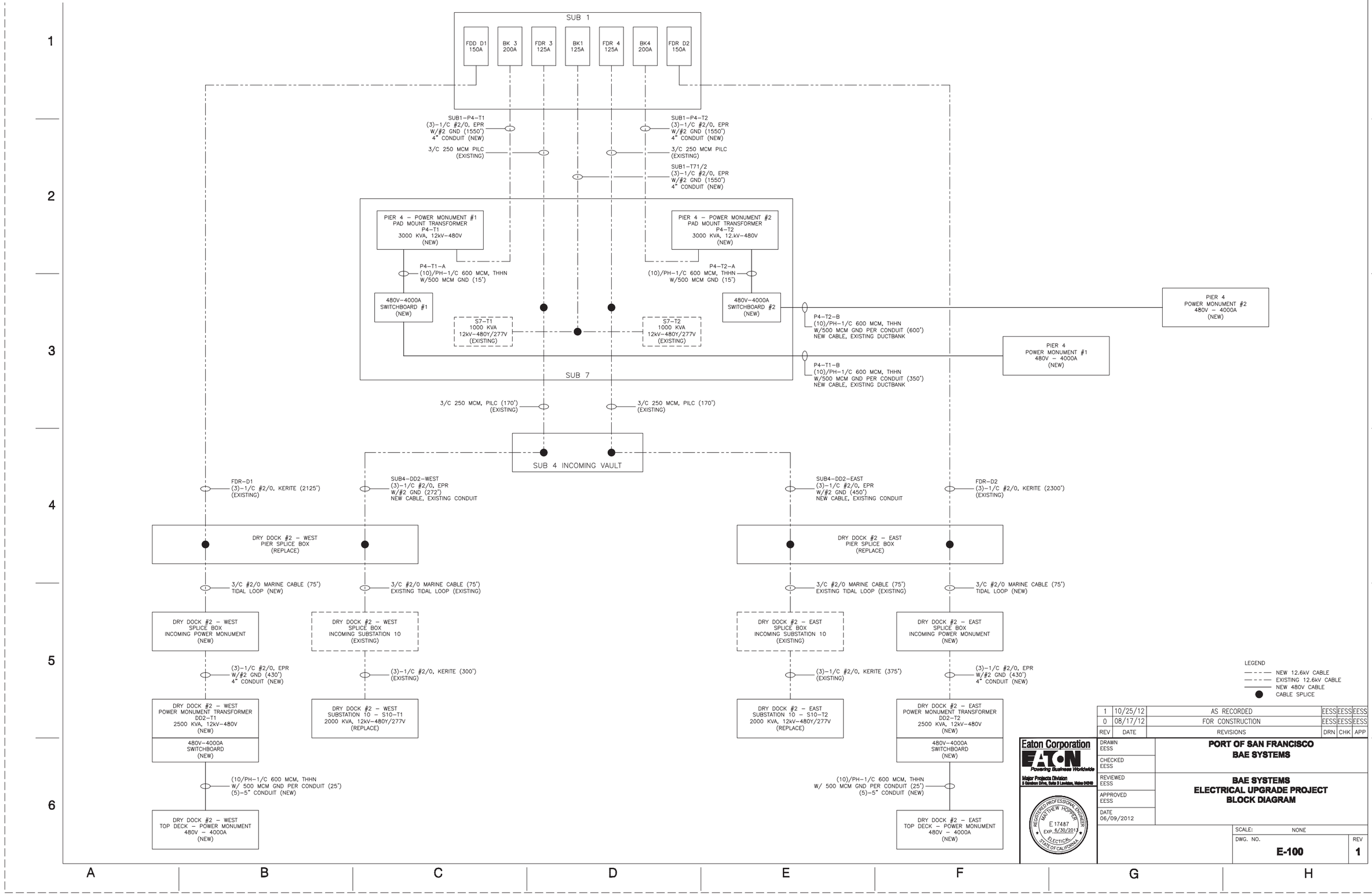
SINGLE LINE DISTRIBUTION DIAGRAM

E-1

Appendix C: Reference Single Line Diagram Markups



Appendix D: Selected drawings from 2012 Shore Power Upgrade (3 pages)



REV	DATE	REVISIONS	DRN	CHK	APP
1	10/25/12	AS RECORDED	EESS	EESS	EESS
0	08/17/12	FOR CONSTRUCTION	EESS	EESS	EESS

Eaton Corporation
EATON
Powering Business Worldwide
Major Projects Division
8 Gendron Drive, Suite 3 Lewiston, Maine 04240

REGISTERED PROFESSIONAL ENGINEER MATTHEW HOPPER E 17487 EXP. 6/30/2013 ELECTRICAL STATE OF CALIFORNIA

DRAWN	EESS
CHECKED	EESS
REVIEWED	EESS
APPROVED	EESS
DATE	06/09/2012

PORT OF SAN FRANCISCO
BAE SYSTEMS

BAE SYSTEMS
ELECTRICAL UPGRADE PROJECT
BLOCK DIAGRAM

SCALE: NONE

DWG. NO. **E-100** REV **1**

NORTH

PIER 3

PIER 4

POWER MONUMENT #2

POWER MONUMENT #1

DWG. E-506

POWER MONUMENTS

SUBSTATION 10

DWG. E-510

DRY DOCK #2

DWG. E-509

DWG. E-507

SUB #7

DWG. E-508

SUB #4

DWG. E-505

SEA WALL

BAE SYSTEMS

WATER

BUILDING 38

DWG. E-504

BUILDING. 36
MACHINE SHOP

DWG. E-503

BUILDING 105
PIPE SHOP

BUILDING 104

GATE

BUILDING 102
SUB #1

DWG. E-502

20TH STREET

REV	DATE	REVISIONS	DRN	CHK	APP
1	10/25/12	AS RECORDED	EESS	EESS	EES
0	08/17/12	FOR CONSTRUCTION	EESS	EESS	EESS

Eaton Corporation
Powering Business Worldwide
Major Projects Division
8 Gladstone Drive, Suite 3 Lewiston, Maine 04240

REGISTERED PROFESSIONAL ENGINEER
MATTHEW HOPPER
E 17487
Exp. 6/30/2013
ELECTRICAL
STATE OF CALIFORNIA

DRAWN EESS
CHECKED EESS
REVIEWED EESS
APPROVED EESS
DATE 06/09/2012

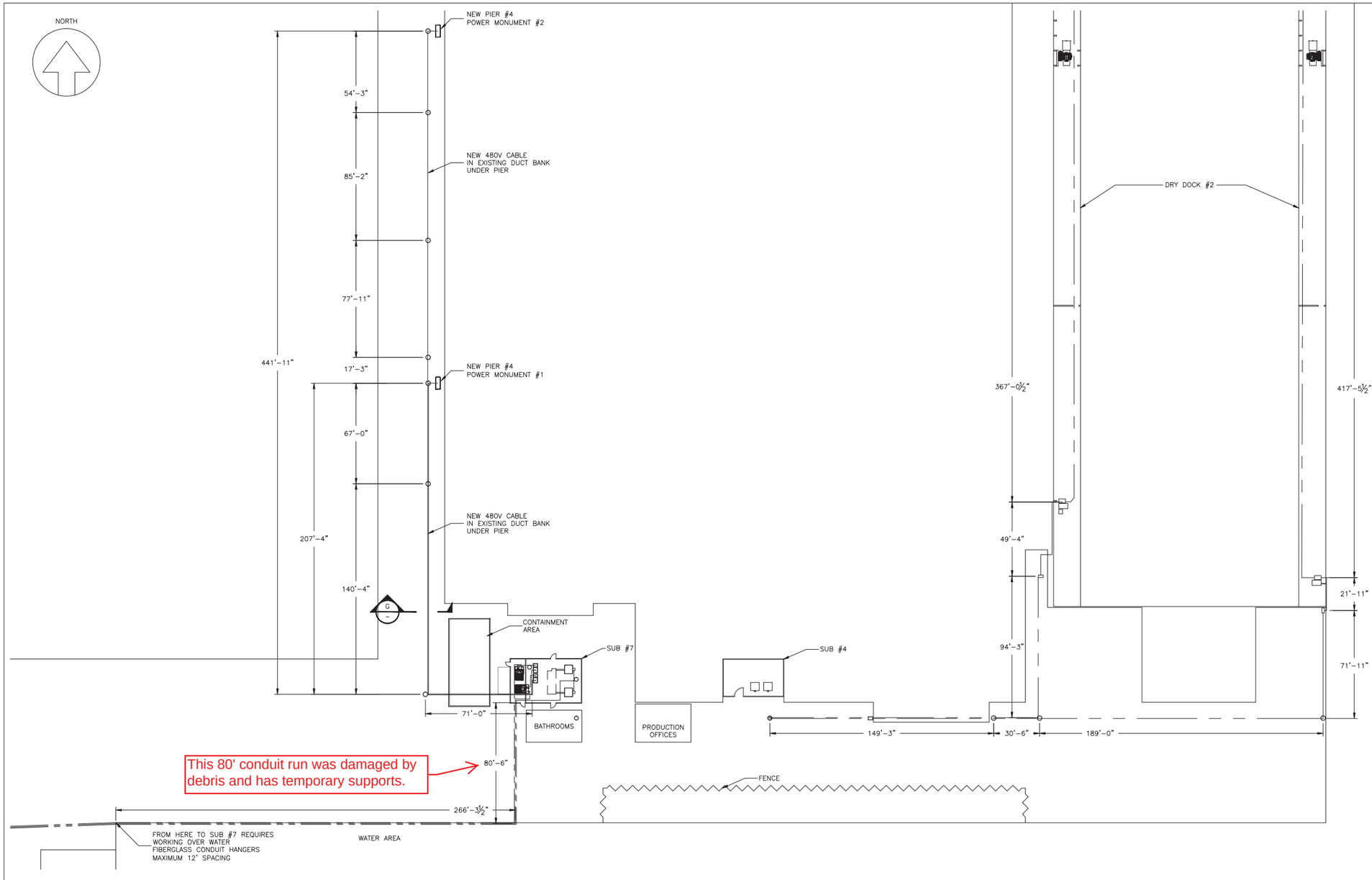
PORT OF SAN FRANCISCO
BAE SYSTEMS

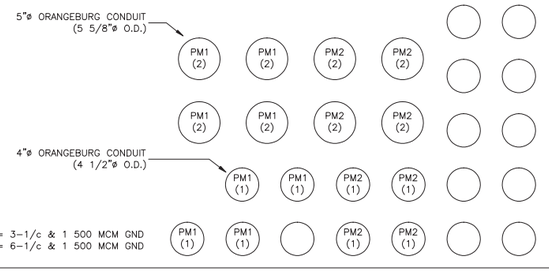
BAE SYSTEMS
ELECTRICAL UPGRADE PROJECT
SITE LAYOUT

SCALE: 1/64" = 1'-0"

DWG. NO. **E-501**

REV **1**





DETAIL 'G'
PIER 4 DUCT BANK LAYOUT
SCALE 1-1/2"=1'0"

NOTE:
1. (1) = 3-1/c & 1 500 MCM GND
2. (2) = 6-1/c & 1 500 MCM GND

LEGEND
NEW 480V CABLE
NEW 12.6kV CABLE

REV	DATE	REVISIONS	DRN	CHK	APP
1	10/25/12	AS RECORDED	EESS	EESS	EESS
0	08/17/12	FOR CONSTRUCTION	EESS	EESS	EESS

Eaton Corporation
EATON
Powering Business Worldwide
Major Projects Division
9 Gardiner Drive, Suite 3 Lewiston, Maine 04240

REGISTERED PROFESSIONAL ENGINEER
MATTHEW HOPPER
E 17487
EXP. 5/30/2013
ELECTRICAL
STATE OF CALIFORNIA

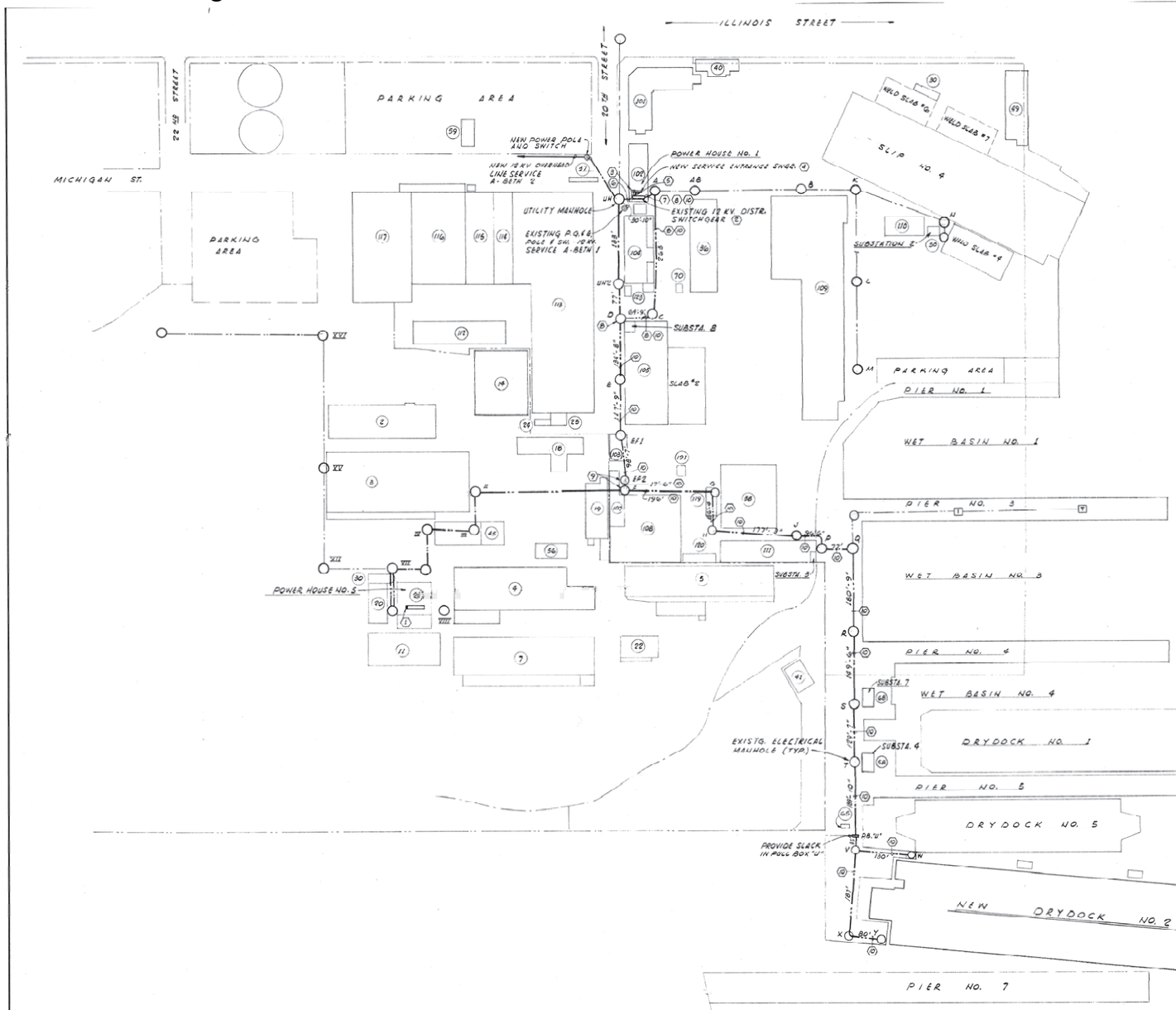
DRAWN EESS
CHECKED EESS
REVIEWED EESS
APPROVED EESS
DATE 06/09/2012

PORT OF SAN FRANCISCO
BAE SYSTEMS

BAE SYSTEMS
ELECTRICAL UPGRADE PROJECT
PIER 4 & DRY DOCK #2 OVERALL LAYOUT

SCALE: 1/32" = 1'-0"
DWG. NO. E-506
REV 1

Appendix E: Underground Feeder Plan 1969



GENERAL NOTES

1. THESE NOTES ARE NOT IN ORDER OF PROCEDURE. WORK SHALL BE DONE IN SEQUENCE APPROVED BY THE PLANT ENGINEER.
2. DIMENSIONS SHOWN ON PLAN ARE CENTER TO CENTER OF MANHOLES. ALLOW PROPER LENGTHS FOR TRAINING OF CABLE & SPLICES IN MANHOLES.
3. CONTRACTOR SHALL INSPECT ALL MANHOLES AND DETERMINE HOW TO PULL IN CABLES WITH MINIMUM NUMBER OF SPLICES. CABLES MUST BE CUT CAREFULLY SO THAT NONE IS WASTED & LENGTHS ON REELS ARE SUFFICIENT FOR THIS WORK. SEE SPECIFICATIONS FOR LENGTHS OF CABLES ON REELS.
4. ALL CABLES & OTHER MATERIALS REMOVED UNDER THIS WORK SHALL REMAIN THE PROPERTY OF THE OWNER.

CONSTRUCTION NOTES

(1) A. REMOVE O.C.B. IN POWER HOUSE NO. 5 (THIS IS CIRCUIT NO. 4 SERVING SUBSTA. 4, 7 & 9) AND DRY O.C.B. CUBICLE PER DWGS. E-4 & E-5.

B. RECONNECT CABLE NO. 4 TO O.C.B. SERVING SUBSTA. G (CIRCUIT NO. 5); IN ORDER TO DO THIS, DISCONNECT CABLE 5 SERVING SUBSTA. G FROM CIRCUIT BKR. AND CLEAR CAP. SPLICE CABLE 5 AND EXTEND TO SUBSTA. G O.C.B. & INSTALL TEMPORARY NAMEPLATE ON BKR. READ "SUBSTATION 4, CABLE 4".

C. AFTER SUBSTA. 4 IS ENERGIZED FROM POWER HOUSE NO. 1, RECONNECT CABLE 5 BACK TO O.C.B. WHICH ORIGINALLY SERVED SUBSTA. NO. G. INSTALL 'OLD' NAMEPLATE "SUBSTATION G CABLE 5", CLEAR CAP. DISCONNECTED CABLE NO. 4.

(2) A. DISCONNECT AND REMOVE EXISTG. SERVICE ENTRANCE O.C.B. & POWER CO. METERING SECTION FROM EXISTG. 12 KV SWITCHGEAR LINE-UP (SEE DWGS. E-1, E-4 & E-5).

B. SEND SWITCHGEAR ITEMS REMOVED UNDER 1A, 2A AND A SPARE BKR. LOCATED IN POWER HOUSE NO. 1 TO A SWITCHGEAR MANUFACTURER FOR MODIFICATIONS AS SHOW ON DWGS. E-4 & E-5. HAVE MANUF. CONSTRUCT A CABLE TIE SECTION FOR SWITCHGEAR LINE-UP.

C. INSTALL MODIFIED 12 KV SWITCHGEAR AS SHOWN ON DRAWING E-2.

D. CHANGE CURRENT TRANSFORMERS & METER FACE IN CIRCUIT BKR. UNIT G AS SHOWN ON DWG. E-4.

(3) INSTALL CABLE TRENCH IN POWER HOUSE NO. 1 PER DWG. E-2

(4) INSTALL NEW 12 KV SERVICE ENTRANCE SWITCHGEAR, FURNISHED BY OWNER, IN POWER HOUSE NO. 1 PER DRAWINGS E-2 & E-3.

(5) A. INSTALL TIE CABLES & CONDUIT BETWEEN NEW 12 KV SERVICE ENTRANCE SWITCHGEAR & 12 KV DISTRIBUTION SWITCHGEAR.

B. INSTALL GROUND ROD IN CABLE TRENCH IN BACK OF NEW SWITCHGEAR. INSTALL EQUIPMENT GROUNDING CABLES FROM ROD TO NEW SWITCHGEAR, TO DISTRIBUTION SWITCHGEAR, TO UTILITY MANHOLE ON 20TH STREET AND TO MANHOLE "A".

(6) A. INSTALL ONE 3-CONDUCTOR 500MCM P.I.L.C. CABLE (DESIGNATED AS A-BETH. 2) FROM NEW SERVICE ENTRANCE SWGR. TO UTILITY MANHOLE "UH" IN STREET. CONNECT CABLE TO CIRCUIT BREAKER.

B. INSTALL ONE 3-CONDUCTOR 250MCM P.I.L.C. CABLE IN CABLE TRENCH. SPLICE TO EXISTG. CABLE (A-BETH. 1) IN TRENCH. CONNECT CABLE TO CIRCUIT BKR.

C. INSTALL ONE #2/0 B.C. CABLE FROM GROUND ROD IN TRENCH AT BACK OF NEW SWGR. TO UTILITY OR MANHOLE. LEAVE 12" OF SLACK IN MANHOLE.

(7) INSTALL NEW DUCT BANK FROM POWER HOUSE NO. 1 CABLE TRENCH TO MANHOLE "A".

(8) PULL FEEDER CABLE NO. 3 (1-#6 250MCM-P.I.L.C. & 1 #2 B.C. GRD.) & FEEDER CABLE NO. 4 (1-3/C 250 MCM. P.I.L.C. & 1 #2 B.C. GRD.) FROM 12 KV. SWGR. IN SUBSTA. NO. 1 TO MANHOLES AS FOLLOWS:

A1. CABLE NO. 3 FROM O.C.B. NO. 6 TO MH-"A", FROM MH-"A" TO MH-"C", FROM MH-"C" TO MH-"D".

A2. SPLICE CABLE NO. 3 TO EXISTG. CABLE NO. 1 IN MH-"D", LABEL AS CABLE 3.

A3. PULL OUT CABLE NO. 1 FROM MH"D" TO POWER HOUSE NO. 1 THROUGH MANHOLES ON 20TH STREET.

B1. CABLE NO. 4 FROM O.C.B. NO. 8 TO MH-"A", FROM MH-"A" TO MH-"C", FROM MH-"C" TO MH-"D".

B2. SPLICE CABLE NO. 4 TO EXISTG. CABLE NO. 2 IN MH-"D", LABEL AS CABLE NO. 4.

B3. PULL OUT CABLE NO. 2 FROM MH-"D" TO POWER HOUSE NO. 1 THRU. MANHOLES ON 20TH STREET.

(9) A1. IN MANHOLE "F" SPLICE CABLE 2 COMING FROM MH-"EF2" TO EXISTG. CABLE III GOING NORTH TO SUBSTA. NO. 4, LABEL AS CABLE 4

A2. SOLDER SEAL CUT END OF CABLE III GOING SOUTH TO SUBSTA. NO. 5. DISCONNECT CABLE FROM CIRCUIT BKR. AT SUBSTA. & SOLDER SEAL END OF CABLE.

B1. IN MANHOLE "F" CUT CABLE III COMING FROM SUBSTA. NO. 5, SOLDER SEAL END GOING SOUTH. DISCONNECT CABLE FROM CIRCUIT BKR. AT SUBSTA. & SOLDER SEAL END OF CABLE

B2. SPLICE NORTH END OF CABLE III TO CABLE NO. 1 GOING TO MANHOLE "EF2".
NOTE: IF CABLE NO. 1 IS TOO SHORT, CUT CABLE IN MANHOLE "EF2", PULL IN NEW PIECE OF 3/C 250MCM-P.I.L.C. BETWEEN MANHOLE "F" & "EF2", SPLICE IN BOTH MANHOLES. LABEL THIS CIRCUIT AS CABLE 3 IN ALL MANHOLES.

(10) PULL CABLES FROM 12 KV DISTRIBUTION SWGR. IN POWER HOUSE NO. 1 TO MH-"A" AND FROM MH-"A" THRU. DUCT SYSTEM TO MH-"N" & MH-"Y" AT DRYDOCK NO. 2 AS FOLLOWS:

A1. FEEDER CABLE NO. D1 (CONSISTING OF 3-1/C #2/0 KERITE CABLES & 1 #2 B.C. GRD.) WILL START FROM CKT. BKR. NO. 9 AND GO TO MH-"N". LEAVE 10FT. OF SLACK IN MH-"N" FOR CONNECTION LATER. SEAL ENDS OF CABLE.

A2. FEEDER CABLE NO. D2 (CONSISTING OF 3-1/C #2/0 KERITE CABLES & 1 #2 B.C. GRD.) WILL START FROM CKT. BKR. NO. 10 & GO TO MH-"Y". LEAVE 10 FT. OF SLACK IN MANHOLE "Y" FOR CONNECTION LATER. SEAL END OF CABLE.

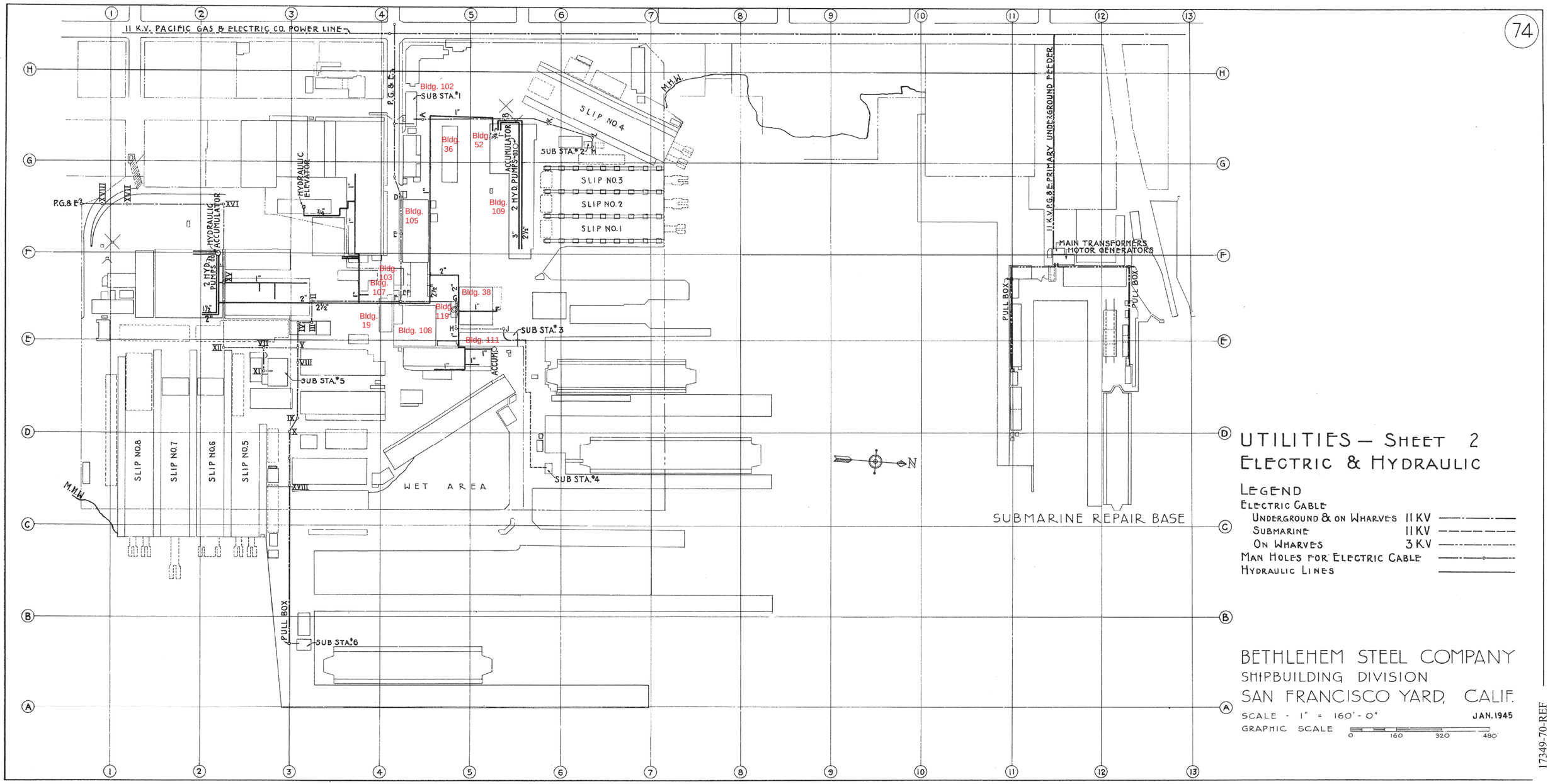
UNDERGROUND FEEDER REVISION PLAN

SCALE: 1" = 100 FT.

DATE: 6-27-69	GARRETSON·ELMENDORF·KLEIN·REIBIN	BETHLEHEM STEEL CORP. SAN FRANCISCO YARD	DWG. NO. E-27-6
SCALE: AS SHOWN	ARCHITECTS • ENGINEERS	20TH & ILLINOIS ST., SAN FRANCISCO, CALIF.	E-6
DESIGNED BY: F.REIBIN	124 SPEAR STREET, SAN FRANCISCO, CALIFORNIA	1969 ELECTRICAL ALTERATIONS	
DRAWN BY: C.W.		DUCT BANK PLAN; CONSTRUCTION NOTES; CABLE INSTALLATION AND REMOVALS	
CHECKED BY: A.M.G.	APPROVED BY: J.C. Klein JOB NO. 777		REV. NO.

12805 - 68 - E

Appendix F: Electrical Site Plan Plan 1945



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UTILITIES — SHEET 2
ELECTRIC & HYDRAULIC

LEGEND

ELECTRIC CABLE	
UNDERGROUND & ON WHARVES	11 KV
SUBMARINE	11 KV
ON WHARVES	3 KV
MAN HOLES FOR ELECTRIC CABLE	
HYDRAULIC LINES	

BETHLEHEM STEEL COMPANY
SHIPBUILDING DIVISION
SAN FRANCISCO YARD, CALIF.

SCALE - 1" = 160'-0" JAN. 1945

GRAPHIC SCALE 0 160 320 480

17349-70-REF