City of Kalamazoo

FY25 CWSRF Project Plan

March 2024

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Engineers

Table of Contents

List of Tables

List of Figures

List of Appendices

1 Introduction

The City of Kalamazoo is the county seat of Kalamazoo County, located in southwestern Michigan. The City is located northeast of the I-94 and US-131 interchange. A location map is shown in Figure 1-1. The City of Kalamazoo municipal wastewater sewer collection system serves properties throughout the City of Kalamazoo as well as surrounding townships and municipalities. The wastewater collection system transports the wastewater to the City of Kalamazoo Water Reclamation Plant (KWRP). The KWRP is located in the northeastern part of the City where it treats wastewater and discharges effluent into the Kalamazoo River. The City is engaged in addressing deficiencies at the KWRP to ensure that safe and consistent service is provided to system users. Since the 1940s, repeated studies and planning have sought to strategically improve the wastewater collection and treatment infrastructure serving the City of Kalamazoo and surrounding areas. This includes targeted studies and proposed improvements for the KWRP to improve treatment efficacy, ensure safety for operators, limit impact to the surrounding community, and improve both economic and energy efficiency.

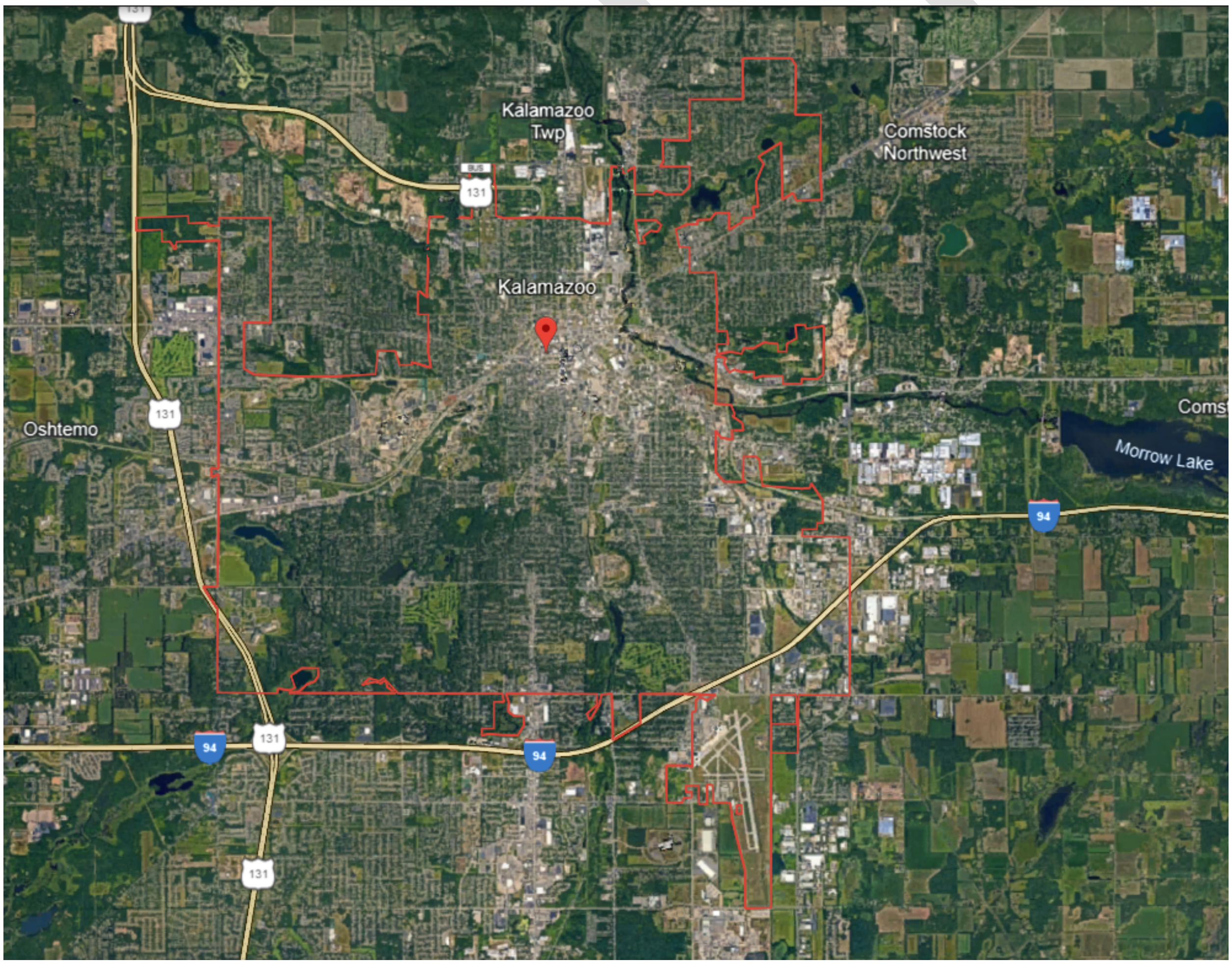


Figure 1-1: Location Map

The City of Kalamazoo Wastewater Division maintains a five (5) year Capital Improvement Plan (CIP) which addresses deficiencies at the plant and plans the financial outlay to deal with the needed improvements. The City intends to utilize the Clean Water State Revolving Fund (CWSRF) as a financial instrument to pay for high priority projects from the CIP. Operations and Maintenance staff were polled as part of the project prioritization to ensure that the most critical improvements were evaluated as part of this Plan. Selected improvements will improve plant operational flexibility and efficiency, bring treatment processes into compliance with current Ten States Standards, reduce odorous emissions, and improve plant safety. Several alternatives were assessed for cost-effectiveness, with the most optimal option over the course of time being selected.

2 Background – Needs, Alternatives, and Environmental Issues

Study and Service Areas

The service area for the KWRP includes the City itself and townships, municipalities, and suburbs in the surrounding region that send their wastewater to the KWRP for treatment; a combination of gravity sewers and force mains transports the wastewater. These areas are contained within Kalamazoo, Barry, and Van Buren Counties. A map of the wastewater system service area is shown in Figure 2-1.

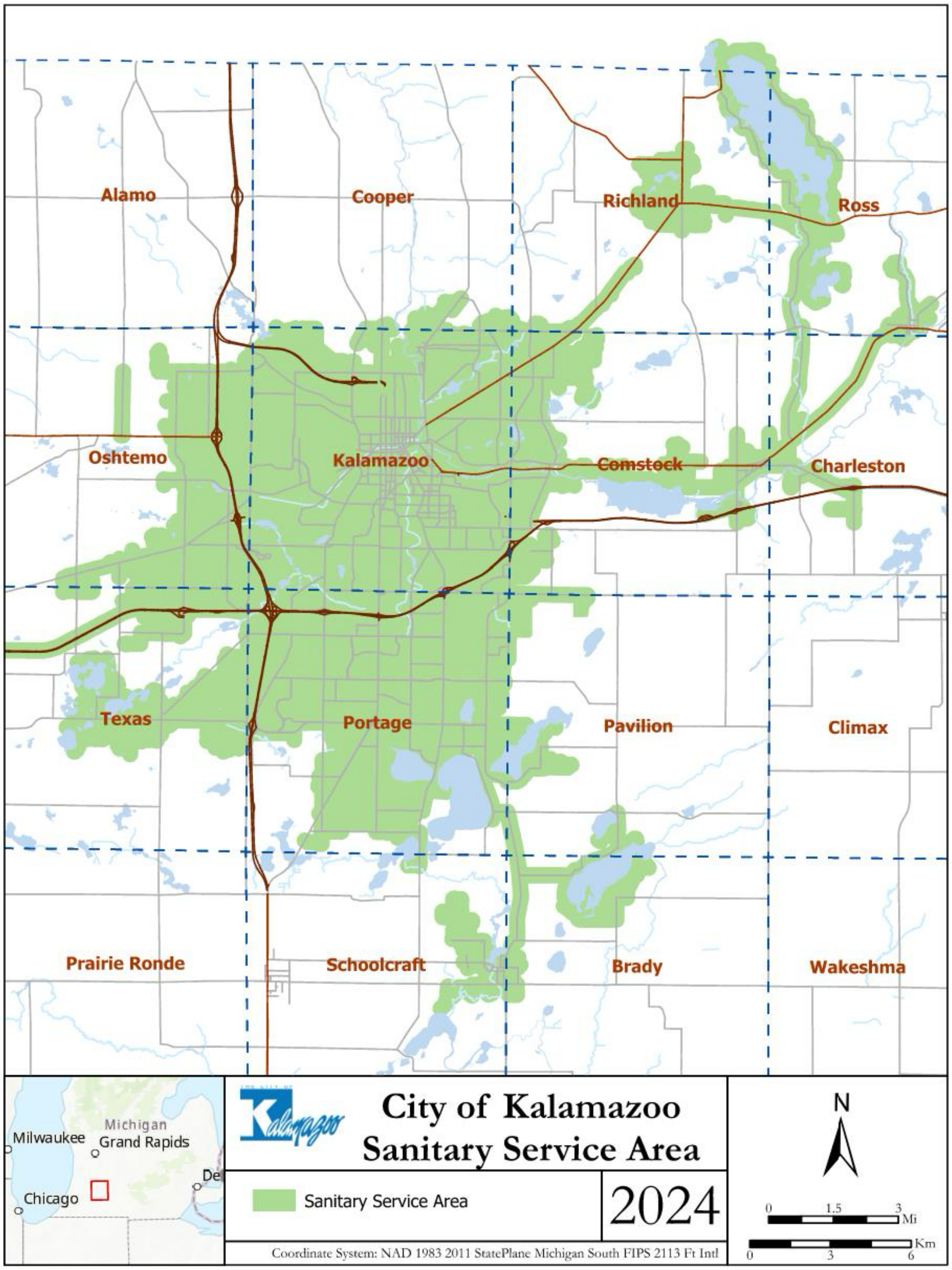


Figure 2-1: Sanitary Service Area Map

Environmentally Detrimental Development Trends

Per- and polyfluoroalkyl substances (PFAS) are noteworthy environmental trends. Western Michigan University, located in Kalamazoo, MI, has been performing independent PFAS studies and are receiving funding to develop a treatment profile for abatement. The City is aware of, and supportive of, these research efforts. Additionally, microplastics, which are likely coming to the KWRP from a nearby industrial pulp and paperboard recycler, Graphic Packaging International (GPI), are an area of ongoing concern. The City is actively working with GPI to study and treat these plastics for removal from the wastestream.

Population

The population for the City of Kalamazoo decreased by 0.9 percent between the 2010 and 2020 censuses and is projected to continue declining through 2045. The surrounding townships and smaller cities are projected to increase slightly. Kalamazoo County is expected to increase in population, as a whole, by roughly seven percent each decade. Since the KWRP serves the vast majority of Kalamazoo County, with small portions of the service area in Barry and Van Buren Counties, the population of Kalamazoo County was used to approximate the population of the service area with US census data from 2020 at 261,670. Census data and estimates for population projections and current populations of smaller cities, towns, and townships are included in Table 2-1 below.

Table 2-1 – Population Data and Projections

Local Unit of Government	Census Data		Projected Population		
	2010	**2020**	**2025**	**2035**	**2045**
City of Kalamazoo	74,262	73,598	73,269	72,614	71,965
City of Portage	46,292	48,891	50,263	53,085	56,066
City of Galesburg*	2,009	2,049	2,069	2,111	2,153
City of Parchment*	1,804	1,926	1,991	2,126	2,270
Village of Augusta*	885	864	854	833	814
Village of Climax*	767	712	686	637	592
Village of Richland*	751	946	1,069	1,346	1,696
Village of Schoolcraft*	1,525	1,466	1,438	1,382	1,329
Village of Vicksburg*	2,906	3,706	4,216	5,377	6,857
Alamo Township*	3,762	3,805	3,827	3,870	3,915
Brady Township*	4,248	4,445	4,548	4,759	4,980
Charleston Township*	1,975	1,904	1,870	1,803	1,738
Climax Township*	2,463	2,364	2,316	2,223	2,134
Comstock Township	14,854	15,231	15,424	15,816	16,217
Cooper Township	10,111	10,418	10,576	10,897	11,228

Kalamazoo Township	21,918	22,777	23,223	24,133	25,079
Oshtemo Township	21,705	23,747	24,864	27,203	29,763
Pavilion Township	6,222	6,387	6,472	6,643	6,819
Prairie Ronde Township*	2,250	2,369	2,432	2,560	2,696
Richland Township	7,580	8,693	9,331	10,701	12,273
Ross Township*	4,664	4,851	4,948	5,147	5,353
Schoolcraft Township	8,214	9,183	9,725	10,872	12,154
Texas Township	14,697	17,691	19,493	23,464	28,244
Wakeshma Township*	1,301	1,341	1,362	1,403	1,447
Kalamazoo County	250,331	261,670	278,172	300,588	316,423

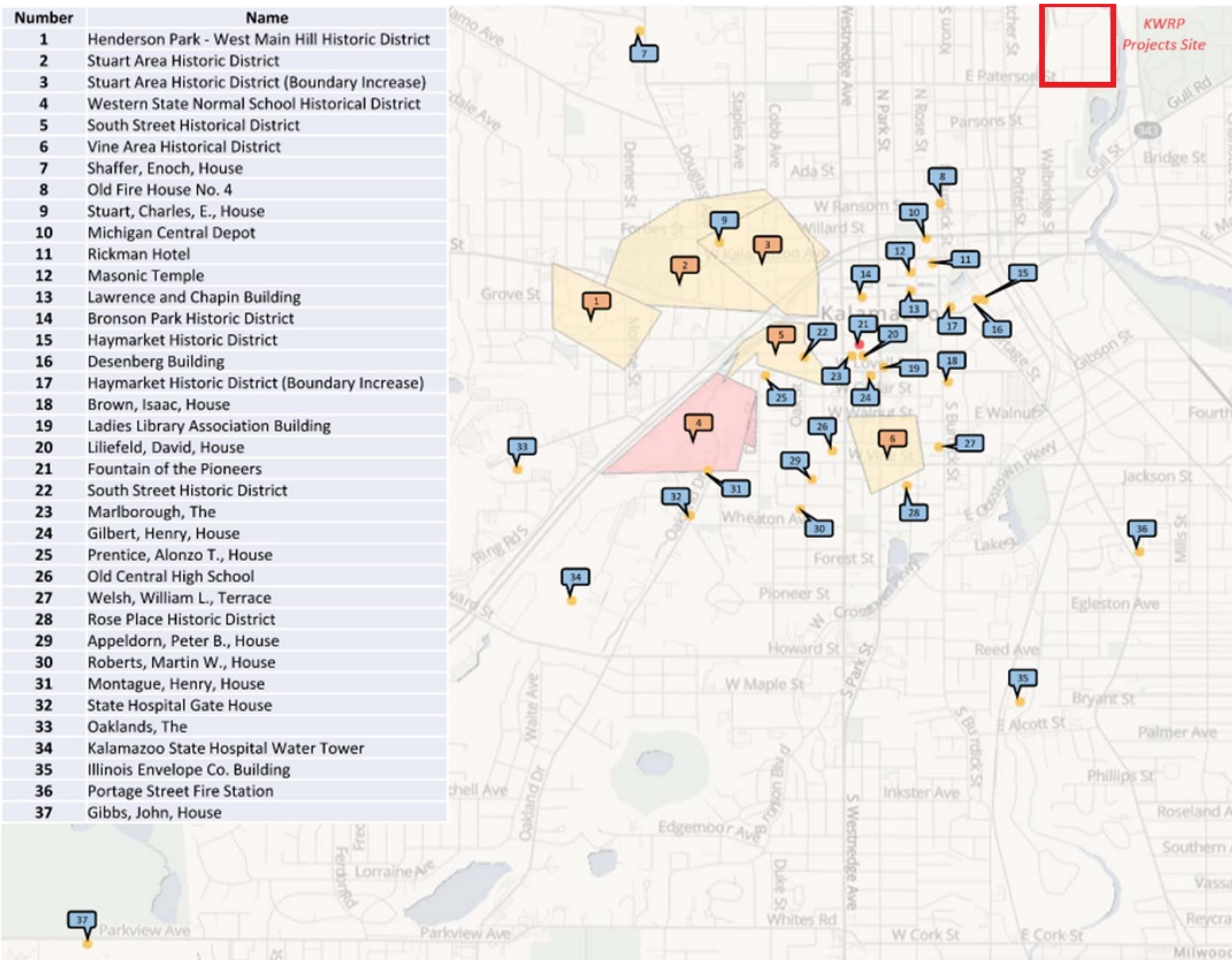
* Census data for these units was derived from a previous report and was assumed to be correct but could not be verified.

1. Census data sourced from census.gov/quickfacts for populations over 5,000 people.
2. Population projections for Kalamazoo County sourced from the Michigan Department of Technology, Management & Budget Labor Market Information. (https://milmi.org/datasearch/popproj)
3. Population projections for the remaining units were based on the percent change in the census data between 2010 and 2020.

There is one transient population in the Kalamazoo service area for which data could be found. Student populations of local Colleges and Universities make up this transient population due to their seasonal residency. There are approximately 26,000 students enrolled in institutions of higher learning within the service area. The service area also includes a few lake areas, so increases in population during the warmer months are possible. The City of Kalamazoo attracts conferences and tourists, and in 2021 Kalamazoo saw approximately 786,000 visitors.

Existing Environmental Evaluation

A. Cultural and Historic Resources: Cultural and historic resources include 31 individual sites listed in the National Register of Historic Places, Michigan State Register, Historic Marker, or Kalamazoo Historic District Listings. The City of Kalamazoo has five historic districts. These sites and districts are shown in Figure 2-2.



Number	Name
1	Henderson Park - West Main Hill Historic District
2	Stuart Area Historic District
3	Stuart Area Historic District (Boundary Increase)
4	Western State Normal School Historical District
5	South Street Historical District
6	Vine Area Historical District
7	Shaffer, Enoch, House
8	Old Fire House No. 4
9	Stuart, Charles, E., House
10	Michigan Central Depot
11	Rickman Hotel
12	Masonic Temple
13	Lawrence and Chapin Building
14	Bronson Park Historic District
15	Haymarket Historic District
16	Desenberg Building
17	Haymarket Historic District (Boundary Increase)
18	Brown, Isaac, House
19	Ladies Library Association Building
20	Liliefeld, David, House
21	Fountain of the Pioneers
22	South Street Historic District
23	Marlborough, The
24	Gilbert, Henry, House
25	Prentice, Alonzo T., House
26	Old Central High School
27	Welsh, William L., Terrace
28	Rose Place Historic District
29	Appeldorn, Peter B., House
30	Roberts, Martin W., House
31	Montague, Henry, House
32	State Hospital Gate House
33	Oaklands, The
34	Kalamazoo State Hospital Water Tower
35	Illinois Envelope Co. Building
36	Portage Street Fire Station
37	Gibbs, John, House

Figure 2-2: Historical Sites and Districts Map

B. Air Quality: Air quality was measured by the EPA's Air Quality Index (AQI). The AQI is an overall indicator of air quality, which takes into account several air pollutants. The last three years of AQI data for the core based statistical area (CBSA) of Kalamazoo-Portage MI are included in Table 2-2 below. The table shows that the main pollutants of concern for the Kalamazoo area are ozone and particulate matter 2.5 microns and smaller. The Kalamazoo area has an AQI in the lower half of the moderate air quality range 90% of the time. The years of 2021 and 2022 show an uptick in air pollution, which is likely closer to average for Kalamazoo than 2020 and what future air quality is expected to resemble.

It should also be noted that the KWRP and its surrounding neighborhoods have a long history regarding Hydrogen Sulfide and other odor emissions which are believed to be emanating for the plant. EGLE and

DHHS are currently working with KWRP to research these emissions to identify sources and provide meaningful solutions to these nuisance odors.

Table 2-2 – Air Quality

Air Quality of the Kalamazoo-Portage Core Based Statistical Area				
Year		**2020**	**2021**	**2022**
Days with:				
AQI Value	**AQI Value Meaning**			
AQI >0		323	349	352
0-50	AQI: Good	269	233	245
51-100	AQI: Moderate	48	116	104
101-150	AQI: Unhealthy for Sensitive Groups	6	0	3
151-200	AQI: Unhealthy	0	0	0
201-300	AQI: Very Unhealthy	0	0	0
>300	AQI: Hazardous	0	0	0
Major Contributing Pollutant, Number of Days				
Carbon Monoxide, CO		0	0	0
Nitrogen Dioxide, NO2		0	0	0
Ozone, O3		220	132	156
Particulate Matter 2.5µm, PM2.5		103	217	196
Particulate Matter 10µm, PM10		0	0	0
Maximum AQI		115	100	134
90th Percentile AQI		58	66	67
Median AQI		38	42	43

Data sourced from: https://www.epa.gov/outdoor-air-quality-data/air-quality-index-report

* Statistics for 2022 not final until May 1, 2023.

C. Wetlands: Wetlands are present inside of the KWRP service area. They are mostly adjacent to the Kalamazoo River and its tributaries, but others exist around unconnected lakes and rivers. A map of the wetlands is shown in Figure 2-3. Wetlands are present at the KWRP site, however proposed projects will not include excavation or fill inside of the wetlands.

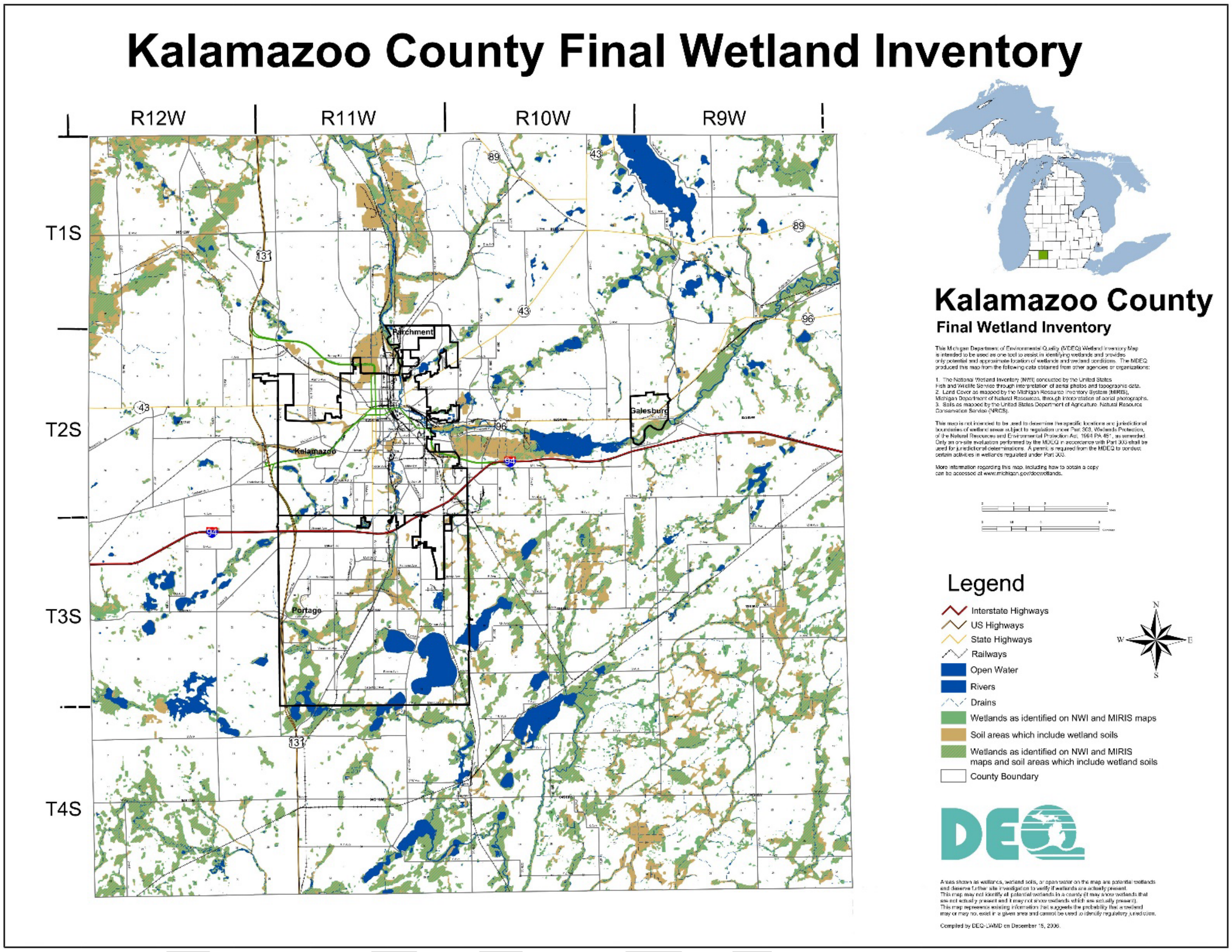


Figure 2-3: Kalamazoo County Wetland Map

D. Great Lakes Shorelands, Coastal Zones, and Coastal Management Areas: There are no coastal areas present in the service area.

E. Floodplains: Floodplains exist around the Kalamazoo River and its tributaries. A FEMA floodplain map is shown in Figure 2-4.

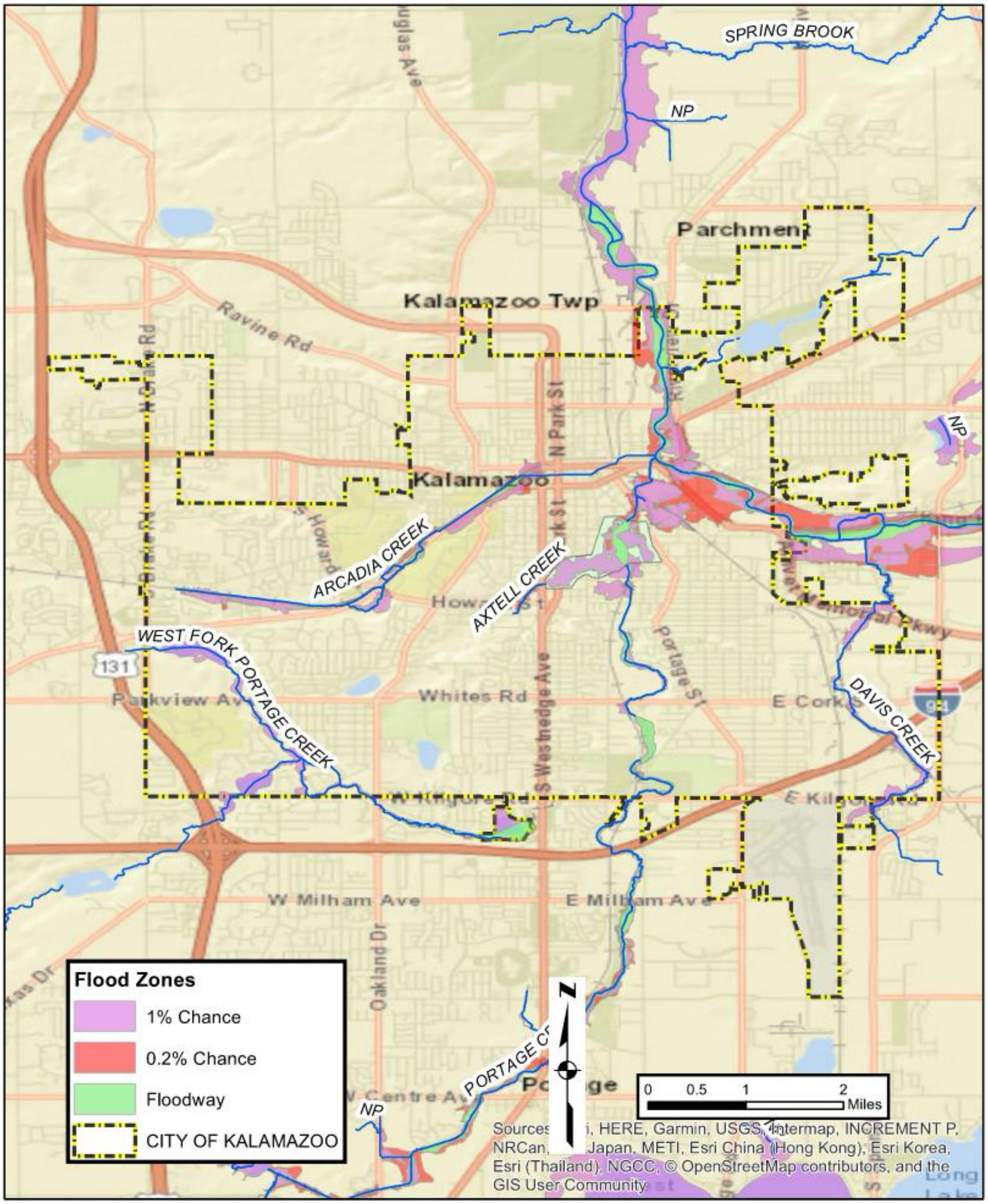


Figure 2-4: FEMA Floodplain Map

F. Natural or Wild and Scenic Rivers: There are no designated Natural or Wild and Scenic Rivers within the service area. The Kalamazoo River does flow into the Lower Kalamazoo River at the northwest exit from Lake Allegan, which is a designated Natural River.

G. Major Surface Waters: Major surface waters inside the City of Kalamazoo include the Kalamazoo River, its three main tributaries that join it in the City, and several connected ponds and lakes in the City. The remaining surface waters are unconnected ponds and lakes. The surface waters in the City are mostly used for recreation and industrial purposes. Further, the three main tributaries parallel some of the main interceptor sewers through the City. Drinking water for the City of Kalamazoo and surrounding areas comes from groundwater wells. There are a few other watersheds in the service area outside of the City. These consist of rivers, streams, ponds, and lakes that generally flow south out of the service area or into the Kalamazoo River.

H. Topography: Elevations range from 750 feet near the Kalamazoo River to 1,050 feet in the northwestern part of the service area.

I. Geology: The primary geological features of the service area are the glacial drainage channel which the Kalamazoo River currently runs through, the outwash plains surrounding the channel, and the Outer Kalamazoo Moraine in the eastern part of the county. The bedrock below the service area is Coldwater Shale from the Mississippian Age, which is at least 500 feet thick.

J. Soil Types: Soil types are shown in the below Table 2-3.

Table 2-3 – Service Area Soils

City		
Soil Type	**Acres**	**% of Area**
Adrian muck, 0 to 1 percent slopes	41.58	0.26%
Brady sandy loam, 0 to 3 percent slopes	7.37	0.05%
Brady sandy loam, 0 to 3 percent slopes	18.8	0.12%
Dowagiac loam, 0 to 3 percent slopes	73.98	0.46%
Gilford sandy loam, 0 to 2 percent slopes, gravelly subsoil	7.8	0.05%
Glendora sandy loam	37.64	0.24%
Houghton and Sebewa soils, ponded	174.83	1.09%
Kalamazoo loam, 0 to 2 percent slopes	157.24	0.98%
Kalamazoo loam, 2 to 6 percent slopes	334.9	2.09%
Kalamazoo loam, 6 to 12 percent slopes	225.09	1.41%
Oshtemo sandy loam, 0 to 6 percent slopes	83.63	0.52%
Oshtemo sandy loam, 6 to 12 percent slopes	36.06	0.23%
Oshtemo sandy loam, 12 to 18 percent slopes	104.23	0.65%
Oshtemo sandy loam, 18 to 35 percent slopes	132.38	0.83%
Pits, gravel	5.22	0.03%
Sleeth loam, 0 to 3 percent slopes	14.71	0.09%
Udipsamments, level to steep	63.1	0.39%
Urban land	4833.56	30.20%

Urban land-Glendora complex	1053.5	6.58%
Urban land-Kalamazoo complex, 0 to 6 percent slopes	4119	25.73%
Urban land-Kalamazoo complex, 6 to 12 percent slopes	44.54	0.28%
Urban land-Kalamazoo complex, 12 to 18 percent slopes	1558.53	9.74%
Urban land-Oshtemo complex, 12 to 25 percent slopes	2513.26	15.70%
Water	366.03	2.29%
Total	16007	100.00%

K. Agricultural Resources: Most of the service area is urban or suburban, with no croplands inside City limits. Therefore, agricultural resources are not considered present.

L. Fauna and Flora: Flora and fauna of special concern or listed Federal or by the State of Michigan are included in the following Table 2-4. Habitats are included in Table 2-5.

Table 2-4 – Flora-Fauna

Scientific Name	Common Name	Federal Status	State Status
Bombus affinis	Rusty-patched bumble bee	LE	E
Epioblasma triquetra	Snuffbox Mussel	LE	E
Myotis sodalis	Indiana bat	LE	E
Neonympha mitchellii mitchellii	Mitchell's satyr butterfly	LE	E
Nicrophorus americanus	American burying beetle	LE	X
Platanthera leucophaea	Prairie white-fringed orchid	LT	E
Sistrurus catenatus	Eastern massasauga	LT	T
Agalinis gattingeri	Gattinger's gerardia		E
Baptisia leucophaea	Cream wild indigo		E
Besseya bullii	Kitten-tails		E
Bombus pensylvanicus	American bumble bee		E
Calephelis muticum	Swamp metalmark		E
Carex straminea	Straw sedge		E
Centronyx henslowii	Henslow's sparrow		E
Clonophis kirtlandii	Kirtland's snake		E
Coreopsis palmata	Prairie coreopsis		E
Erimyzon claviformis	Creek chubsucker		E
Eryngium yuccifolium	Rattlesnake-master or button snakeroot		E
Gentiana alba	White gentian		E
Glyceria acutiflora	Manna grass		E

Lygodium palmatum	Climbing fern		E
Microtus ochrogaster	Prairie vole		E
Notropis anogenus	Pugnose shiner		E
Platanthera ciliaris	Orange- or yellow-fringed orchid		E
Populus heterophylla	Swamp or Black cottonwood		E
Scleria pauciflora	Few-flowered nut rush		E
Silphium laciniatum	Compass plant		E
Stellaria crassifolia	Fleshy stitchwort		E
Valerianella chenopodiifolia	Goosefoot corn salad		E
Viola pedatifida	Prairie birdfoot violet		E
Accipiter gentilis	Northern goshawk		T
Acris blanchardi	Blanchard's cricket frog		T
Alasmidonta viridis	Slippershell		T
Antrostomus vociferus	Eastern whip-poor-will		T
Asclepias hirtella	Tall green milkweed		T
Asclepias purpurascens	Purple milkweed		T
Baptisia lactea	White or prairie false indigo		T
Boechera missouriensis	Missouri rock-cress		T
Calamagrostis stricta ssp. stricta	Narrow-leaved reedgrass		T
Callophrys irus	Frosted elfin		T
Carex albolutescens	Sedge		T
Carex festucacea	Fescue sedge		T
Carex lupuliformis	False hop sedge		T
Carex oligocarpa	Eastern few-fruited sedge		T
Carex seorsa	Sedge		T
Chlidonias niger	Black tern		T
Clemmys guttata	Spotted turtle		T
Collinsia verna	Blue-eyed Mary		T
Cordulegaster erronea	Tiger spiketail		T
Coregonus artedi	Lake herring or Cisco		T
Corydalis flavula	Yellow fumewort		T
Cryptotis parva	Least shrew		T
Cyclonaias tuberculata	Purple wartyback		T
Cyperus acuminatus	Cyperus, Nut grass		T
Cypripedium candidum	White lady slipper		T
Dichanthelium leibergii	Leiberg's panic grass		T
Draba reptans	Creeping whitlow grass		T
Dryopteris celsa	Small log fern		T
Eleocharis compressa	Flattened spike rush		T
Erynnis persius persius	Persius dusky wing		T
Eupatorium sessilifolium	Upland boneset		T

Falco peregrinus	Peregrine falcon		T
Filipendula rubra	Queen-of-the-prairie		T
Flexamia reflexa	Leafhopper		T
Fuirena pumila	Umbrella-grass		T
Galearis spectabilis	Showy orchis		T
Gallinula galeata	Common gallinule		T
Gentianella quinquefolia	Stiff gentian		T
Helianthus mollis	Downy sunflower		T
Hydrastis canadensis	Goldenseal		T
Ipomoea pandurata	Wild potato vine or man-of-the-earth		T
Isotria verticillata	Whorled pogonia		T
Juncus scirpoides	Scirpus-like rush		T
Lechea minor	Least pinweed		T
Lechea pulchella	Leggett's pinweed		T
Linum virginianum	Virginia flax		T
Mertensia virginica	Virginia bluebells		T
Morus rubra	Red mulberry		T
Muhlenbergia richardsonis	Mat muhly		T
Panax quinquefolius	Ginseng		T
Parkesia motacilla	Louisiana waterthrush		T
Perimyotis subflavus	Eastern pipistrelle		T
Potamogeton pulcher	Spotted pondweed		T
Sabatia angularis	Rosepink		T
Setophaga cerulea	Cerulean warbler		T
Silene stellata	Starry campion		T
Silphium integrifolium	Rosinweed		T
Silphium perfoliatum	Cup plant		T
Symphyotrichum sericeum	Western silvery aster		T
Terrapene carolina carolina	Eastern box turtle		T
Trichostema dichotomum	Bastard pennyroyal		T
Trillium sessile	Toadshade		T
Triphora trianthophora	Nodding pogonia or three birds orchid		T
Valeriana edulis var. ciliata	Edible valerian		T
Zizania aquatica	Wild rice		T
Agrimonia rostellata	Beaked agrimony		SC
Alasmidonta marginata	Elktoe		SC
Ammodramus savannarum	Grasshopper sparrow		SC
Amorpha canescens	Leadplant		SC
Angelica venenosa	Hairy angelica		SC
Arnoglossum plantagineum	Prairie indian-plantain		SC
Astragalus canadensis	Canadian milk vetch		SC

Astragalus neglectus	Cooper's milk vetch		SC
Berula erecta	Cut-leaved water parsnip		SC
Betula populifolia	Gray birch		SC
Bombus auricomus	Black and gold bumble bee		SC
Bombus borealis	Northern amber bumble bee		SC
Bombus terricola	Yellow banded bumble bee		SC
Botaurus lentiginosus	American bittern		SC
Brickellia eupatorioides	False boneset		SC
Buteo lineatus	Red-shouldered hawk		SC
Cambarunio iris	Rainbow		SC
Cambarus robustus	Big water crayfish		SC
Carex amphibola	Narrow-leaved sedge		SC
Catocala dulciola	Quiet underwing		SC
Catocala illecta	Magdalen underwing		SC
Cirsium hillii	Hill's thistle		SC
Conioselinum chinense	Hemlock-parsley		SC
Cuscuta campestris	Field dodder		SC
Cuscuta pentagona	Dodder		SC
Cuscuta polygonorum	Knotweed dodder		SC
Cygnus buccinator	Trumpeter swan		SC
Eleocharis engelmannii	Engelmann's spike rush		SC
Eleocharis equisetoides	Horsetail spike rush		SC
Emydoidea blandingii	Blanding's turtle		SC
Erynnis martialis	Mottled duskywing		SC
Euonymus atropurpureus	Wahoo		SC
Euxoa immixta	Mixed dart moth		SC
Falco columbarius	Merlin		SC
Fontigens nickliniana	Watercress snail		SC
Haliaeetus leucocephalus	Bald eagle		SC
Helianthus hirsutus	Whiskered sunflower		SC
Hybanthus concolor	Green violet		SC
Hypericum gentianoides	Gentian-leaved St. John's-wort		SC
Juncus dichotomus	Forked rush		SC
Lasmigona compressa	Creek heelsplitter		SC
Lasmigona costata	Flutedshell		SC
Lepisosteus oculatus	Spotted gar		SC
Lepyronia angulifera	Angular spittlebug		SC
Linum sulcatum	Furrowed flax		SC
Lipocarpha micrantha	Dwarf-bulrush		SC
Lithobates palustris	Pickerel frog		SC
Lycopodiella subappressa	Northern appressed clubmoss		SC

Lycopus virginicus	Virginia water-horehound		SC
Mesomphix cupreus	Copper button		SC
Microtus pinetorum	Woodland vole		SC
Necturus maculosus	Mudpuppy		SC
Nelumbo lutea	American lotus		SC
Oecanthus laricis	Tamarack tree cricket		SC
Pandion haliaetus	Osprey		SC
Pantherophis spiloides	Gray rat snake		SC
Papaipema cerina	Golden borer		SC
Papaipema speciosissima	Regal fern borer		SC
Patera pennsylvanica	Proud globelet		SC
Pleurobema sintoxia	Round pigtoe		SC
Poa paludigena	Bog bluegrass		SC
Polygala cruciata	Cross-leaved milkwort		SC
Potamilus alatus	Pink heelsplitter		SC
Protonotaria citrea	Prothonotary warbler		SC
Pygarctia spraguei	Sprague's pygarctia		SC
Rhexia virginica	Meadow beauty		SC
Rhynchospora macrostachya	Tall beakrush		SC
Rhynchospora scirpoides	Bald-rush		SC
Scleria triglomerata	Tall nut rush		SC
Scutellaria elliptica	Hairy skullcap		SC
Setophaga citrina	Hooded warbler		SC
Smilax herbacea	Smooth carrion-flower		SC
Sphaerium fabale	River fingernail clam		SC
Spiranthes ovalis	Lesser ladies'-tresses		SC
Spiza americana	Dickcissel		SC
Sporobolus heterolepis	Prairie dropseed		SC
Stenelmis douglasensis	Douglas stenelmis riffle beetle		SC
Striatura meridionalis	Median striate		SC
Stylurus laurae	Laura's snaketail		SC
Utterbackia imbecillis	Paper pondshell		SC
Venustaconcha ellipsiformis	Ellipse		SC
Vertigo tridentata	Honey vertigo		SC

All data from https://mnfi.anr.msu.edu/resources/county-element-data

Code Definitions:

LE = Listed Endangered (Federal)
LT = Listed Threatened (Federal)
E = Endangered
T = Threatened
SC = Special Concern
X = Extirpated

Table 2-5 – Habitats

Community Name	State Rank	Occurrences in County	Last Observed in County
Mesic Prairie	S1	2	2004
Mesic Sand Prairie	S1	1	2020
Oak Barrens	S1	1	2020
Coastal Plain Marsh	S2	3	2010
Dry-mesic Southern Forest	S3	2	2020
Floodplain Forest	S3	1	2012
Hardwood-Conifer Swamp	S3	1	
Inundated Shrub Swamp	S3	1	2021
Mesic Southern Forest	S3	2	2008
Prairie Fen	S3	10	2020
Rich Tamarack Swamp	S3	1	
Southern Hardwood Swamp	S3	1	2020
Southern Wet Meadow	S3	3	2018

Data for sensitive environments as defined by the State of Michigan from https://mnfi.anr.msu.edu/resources/county-element-data

Existing System

The KWRP is located on the west bank of the Kalamazoo River between East Patterson Street and East Mosel Avenue. The treatment plant has been in operation since 1955. The facility and processes within have been upgraded and/or expanded upon many times, beginning in 1967.

Currently, the plant is in the middle of a tertiary treatment improvements project. This includes the construction of a new tertiary treatment building and is currently scheduled to be completed in June 2024. Additionally, the City has included seven projects in their CIP scheduled for the year 2025. These include replacements or upgrades to safety railings, clarifier drives/sweeps/electrical gear/controls/appurtenances for secondary clarifiers 5-8, WW supervisory control and data acquisition (SCADA) system improvements, hydrogen peroxide odor control injection system, biosolids storage bunkers' scrubbers, biosolids storage confinement, and arc flash deficiencies mitigation. Details of these items will be discussed further in latter sections of this Plan.

A. Sludge/Residuals Management: Due to the industrial constituents of its biosolids, KWRP can only dispose of their residuals at landfill. The City is paying a significant amount for hauling costs and increasing tipping fees. Finding an alternative with lower costs is a goal the City is working towards.

B. Collection system: The number of new sewers and sanitary sewer connections in Kalamazoo has increased most years. As of around 15 years ago, all sewers were over 50 years old and over half were over 85 years old. A program was created to monitor the integrity of sewers and repair and replace severely damaged portions as needed. There have been no issues with the collection system since. In years to come, the size of the collection system will be dependent on urban growth.

C. Industrial Users: Kalamazoo has an IPP program in place to monitor industrial users. Significant Industrial Users (SIUs) in the area include Pfizer, Kalsec, Cytech, Zoetis, GPI, and Bell's Brewery.

D. Pump Stations: Kalamazoo's wastewater collection system has 193 pumping stations. Additionally, the City operates and maintains 56 other pumping stations in the following jurisdictions:
   1. City of Parchment 3 stations
   2. Village of Augusta 2 stations
   3. Charlestown Township 2 stations
   4. Comstock Township 10 stations
   5. Kalamazoo Township 8 stations
   6. Oshtemo Township 11 stations
   7. Pavilion Township 7 stations
   8. Texas Township 13 stations

E. Inflow & Infiltration (I&I) Concerns: A few years ago, Texas Township experienced flooding from Eagle Lake and Crooked Lake, and many homes were impacted. Hydraulic flow was routed to a lift station, and work was done on that lift station to accommodate the higher level of flow. Levels have since returned to normal. Other sources of I&I are the City's interceptor sewers which run along creeks and rivers and are subject to groundwater pressure. The City continues a targeted approach to address collection system I&I.

F. KWRP Storm Water System: The City has a goal of eliminating the KWRP site storm water plan. This will take moderate rehab to the yellow and orange storm water abandonments, as existing hydraulics cannot physically route these to treatment. A redesign would get the flow routed to a point of treatment and effectively eliminate the need for a storm water pollution prevention site plan.

G. KWRP Operation and Maintenance Problems: There are many pieces of equipment at the plant that are reaching or exceeding their expected useful life, and optimization is no longer a viable option for these. Replacement is necessary for these items. In 2025, the City has planned to replace the secondary clarifier equipment in clarifiers 5-8. In 2028, the City is planning to replace their fine screens. This should eliminate the existing operation and maintenance problems for these critical treatment processes.

H. Climate resiliency: To continue to provide sustainable and safe service, ensuring that climate changes are considered when long term goals are developed is paramount. In planning for the future, climate changes are considered when developing long-term goals for the KWRP. This includes the quality of the receiving discharge body of water, cleaned waste streams, and ensuring the collection system does not negatively impact the water supply or surrounding water resources. Climate considerations will be discussed in several cases outlined in this Plan.

Needs

The needs of KWRP are based on the City's Asset Management Plan (AMP) and its current CIP, the AMP and CIP can be reviewed in Appendix A. The following projects have been scored by Maintenance and Operations staff, as seen in Figure 2-1, as the top priorities in order to ensure safety at the plant as well as maintaining the current quality of service for citizens of Kalamazoo and system users within other jurisdictions. See Table 2-6 below for a description of the 2025 proposed projects.

A. Compliance Status: The current NPDES permit for the City of Kalamazoo Water Reclamation Plant came into effect on September 1, 2021. It is set to expire on October 1, 2025. The NPDES discharge permit is included in Appendix B.

B. Plant Performance vs. Discharge Permit: The KWRP is currently in the middle of a tertiary treatment improvements project. Upon completion of this project, the KWRP is on track to continue meeting permit requirements. This project is nearing completion and should be substantially complete in late Spring 2024.

C. Orders: The City of Kalamazoo KWRP is not currently under any Court, State, or Federal enforcement orders or administrative consent orders at this time.

D. Concerns with aging infrastructure/components that need to be replaced.

    1. Water Quality Problems: The water quality is monitored in and around the City. The Kalamazoo River is of high importance to the community and used for recreation and commerce by many users. Both BOD and fecal coliform levels are major concerns because of the negative impact they can have on the environment and the use of the river. There are no reported water quality issues from the City of Kalamazoo.

    2. Stormwater Projects: There are no stormwater projects planned for at this time.

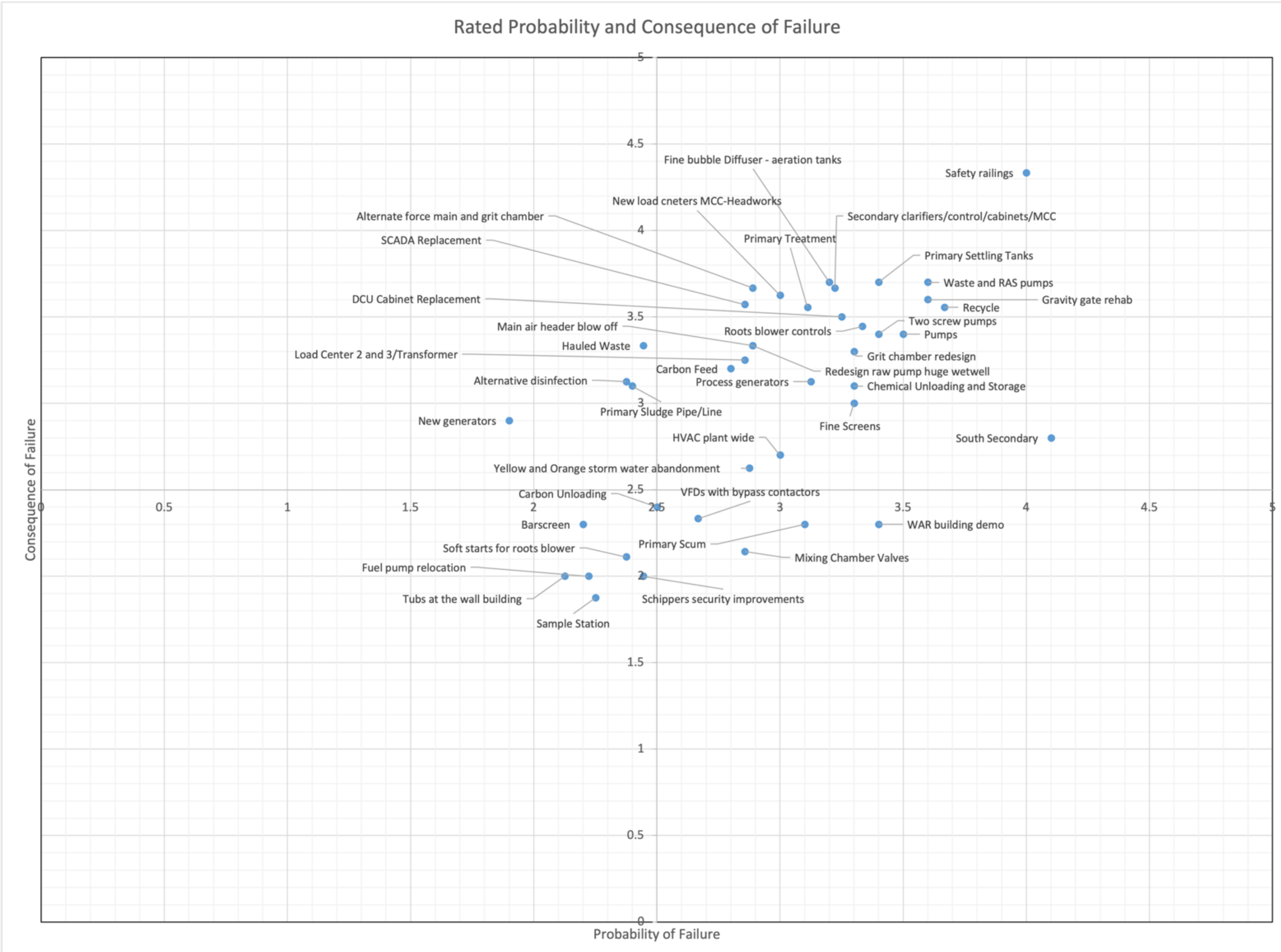


Figure 2-5: Scoring Matrix

Table 2-6 – Project Needs

Project Identifier	CIP Item/Project Name	Project Location	Reason For Project
A1	Safety Railings	Facility Wide	Operator Safety and completion of an AMP/CIP Project(s)
B1	Clarifier 5-8 Drives, Sweeps, Weirs, Baffles, and Electrical Components	Secondary	Elimination of a hydraulic and treatment bottleneck, reduction of SSO potential, replacement of outdated equipment, greater operational flexibility, compliance with industry standards.
C1	WW SCADA System Upgrade	Process Control	Completion of several years' worth of AMP/CIP projects at once which will ensure economies of scale and ultimately cost savings while adding to the resiliency, energy efficiency, and reliability of the entire treatment works.
D1	Hydrogen Peroxide Injection	Primary Sludge	Converts a previous pilot process into a permanent application. Treat odorous emissions in KWRP primary sludge.
E1	Biosolids Storage Bunkers' Scrubbers	Biosolids Storage	Replace obsolete equipment and complete an AMP/CIP project reducing nuisance odors emitted by the KWRP.
F1	Biosolids Storage Odor Confinement	Biosolids Storage	Enhance biosolids loading by completing an AMP/CIP project to reduce nuisance odors emitted by the KWRP
G1	Arc Flash Deficiency Mitigation	Facility Wide	Ensure operator safety while making the KWRP more robust and reliable.

3 Project Descriptions

Proposed Project Needs

<u>Project A1 – Safety Railings</u>

Need:

As required by the Occupational Safety Health Administration (OSHA) any working area adjacent to a drop of greater than four feet. Handrail becomes a necessity around nearly every process tank on the KWRP site. Most existing safety railings are square fiberglass constructed units forty plus years in age.

Fiberglass reinforced plastic railing is an extremely good material choice as it is very corrosion resistant. However, the resins used in the materials production often are susceptible to degradation by ultraviolet (UV) light. As the plant treatment processes are located outdoors, the sites' handrails have begun to deteriorate to an alarming level. They have been recoated and repaired over the years as needed, but ultimately, they are beyond their service life. Additionally, years of exposure to the elements have deteriorated and/or failed the mounting hardware and anchorage surfaces.

Replacement of the handrails is necessary to maintain a safe working environment for plant personnel and is the highest priority on the scoring matrix per KWRP operations and maintenance staff. **This project will quickly address several years' worth of smaller AMP/CIP projects into one larger replacement to achieve economies of scale and reduce overall costs.**

Description of Planned Project

Project will include removal of failed/failing safety railings, repair of mounting surface, and replacement with new, OSHA-compliant safety railings. Mounting substrata will be reinforced or replaced to ensure strong and reliable railings. Rails will be newer, UV resistant fiberglass reinforced plastic (FRP) or aluminum as required by the application and **will meet all current OSHA requirements**.

Project B1 – Secondary Clarifiers (5-8) Improvements

Need:

The role of the secondary clarifiers at the KWRP is to separate biological floc from the treated liquid waste stream. This biological floc settles to the bottom in the form of activated sludge which is a critical food source for the activated sludge treatment process. The existing secondary clarifiers (5-8) are in desperate need of renovation.

Based on a study including computational fluid dynamic (CFD) modelling, the existing secondary clarifiers, with their inboard launders, are the hydraulic and treatment bottle neck for the KWRP. **This has the potential to limit the efficacy of the treatment process and increases the potential of sanitary sewer overflows (SSOs) and discharges of partially treated wastewater to the Kalamazoo River.** The Study and results of the CFD modelling can be reviewed in Appendix C

Additionally, the existing effluent weir elevations **do not meet the current Ten States Standards** for hydraulic grade lines through treatment works. The current mechanism drives were installed in 1997 when the south secondary was last remodeled. These mechanisms and drives have exceeded their expected useful life and need to be replaced. The tankage remains in good condition and will be reused.

Description of Planned Project

Existing mechanisms, drives, weirs, baffles, launders, piping, valves, power equipment, and SCADA components will be removed from the existing tankage. The concrete tankage is estimated to be in good condition with significant life left and will be retained. Concrete tankage will be sandblasted and repaired where necessary. Cracks will be epoxy injected to eliminate any groundwater infiltration. New clarifier mechanisms will be installed with modern drives to produce a more energy efficient and operationally superior treatment process. New mechanisms will remove a large volume of settled solids which will have positive impacts on aeration and biosolids quality. Existing board launders will be replaced with new outboard launders with cleaning apparatus to ensure efficient effluent processing. Electrical motor control center will be replaced as the current unit is past the end of its useful life and is no longer supported by the manufacturer. Instrumentation devices and programming will be updated including the addition of sludge blanket monitoring to ensure the most efficient operation of these updated tanks.

The most critical aspect of the project includes the raising of the effluent weirs approximately 12-18 inches. The most current Ten States Standards require a hydraulic grade line difference of two (2) feet between treatment processes. With the addition of the new tertiary treatment facility immediately downstream the secondary clarifiers do not meet this standard. This project will take advantage of the movement of effluent launders to the perimeter wall to raise the effluent weir and bring the process into compliance with Ten State Standards.

In total this work will increase the treatment and hydraulic capacity of the secondary clarifiers, thereby reducing the possibility of SSOs, while bringing the process into compliance with Ten States Standards and completing this critical AMP/CIP project.

<u>Project C1 – Wastewater SCADA System Improvements</u>

Need:

KWRP is currently undergoing updates to their plantwide SCADA system. The technology currently in use dates back to the mid-1980s and is very wire intensive. As equipment fails, becomes outdated, obsolete, or no longer supported it is replaced and brought into compliance with current City SCADA standards. The SCADA replacement project is an ongoing process. **Replacements and upgrades are ongoing AMP and CIP projects which could achieve economies of scale and cost savings** if grouped together.

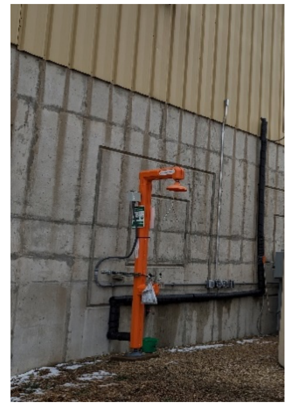
Description of Planned Project

The original equipment cabinets will be updated by removing outdated and unsupported devices and replacing with a newer, modern PLC driven SCADA system. Redundant devices and communication connections will be included to ensure reliability of these critical systems. The City will prioritize the most critical systems first and work to ensure compatibility throughout the plant. This project will **complete several years' worth of AMP/CIP projects at once which will ensure economies of scale and ultimately cost savings while adding to the resiliency, energy efficiency, and reliability of the entire treatment works**.

<u>Project D1 – Hydrogen Peroxide Injection System</u>

Need:

The hydrogen peroxide injection system currently being used is partially rental and partially cobbled together by the City Staff. This system was intended to be a pilot only and was not intended for permanent services. KWRP utilizes hydrogen sulfide to oxidize odorous compounds in the primary



sludge, reducing malodorous emissions by the plant. This system has achieved a desired outcome, and the City would like to make this a permanent installation complete with a secondary containment, redundant feed pump, redundant SCADA controls, and all necessary health and safety equipment. This project is an **AMP/CIP project, and its completion will enhance site safety and security by adding necessary components to the system.**

Description of Planned Project

The existing tankage and controls will be reused but a building will be added to provide required

secondary containment as well as protection for the tank from the elements. A secondary pump suction line will be added along with redundancy for power and controls. All required safety equipment will be installed in the new hydrogen peroxide facility. Full SCADA control will also be added to make chemical dosing more effective and efficient. This **will complete an AMP/CIP project that will improve site safety/security while also reducing nuisance odors** emitted by the KWRP.

<u>**Project E1 – Biosolids Storage Bunker Scrubber Improvements**</u>

Need:

KWRP biosolids are stored, prior to hauling for disposal, in concrete storage bunkers on the west side of the Solids Handling Building. These biosolids storage bunkers are a significant source of odorous emissions from the KWRP. When originally designed, these bunkers had their air captured by a pair of Duall hexmaster dry scrubbers located

in the solids handling building. These scrubbers have reached the end of their useful life and are no longer performing their duties as designed. This project will remove obsolete equipment from the solids handling building while completing **an AMP/CIP project that will reduce nuisance odors** emitted by the KWRP.

Description of Planned Project

The project will remove the existing scrubbers and replace them with either new packed bed scrubbers or bio trickling filter vessels in the same footprint. Thorough sampling of the air in the biosolids storage bunkers will be performed to ensure that the installed system will perform as planned and reduce or eliminate nuisance odors emitted by them. This new odor control equipment will capture air from the biosolids storage bunkers and treat it prior to releasing it. This will return the system to functionality and reduce odorous emissions by KWRP. No new buildings or modifications to existing building are anticipated as modern equipment can/will fit in the existing footprint of the removed equipment. Wherever possible electrical equipment and ductwork will be salvaged and reused. This **will complete an AMP/CIP project that will reduce nuisance odors** emitted by the KWRP.

Project F1 – Biosolids Storage Odor Confinement

Need:

The City's biosolids are currently stored in bunkers on the west side of the solids handling building before being loaded into trucks and removed for disposal at landfill. These bunkers have their west side open to the atmosphere with only fabric doors to contain odorous emissions. The City has worked diligently to try to enclose this space but trucks still enter a carport-like area to be loaded by heavy equipment. This loading process releases odors and with no containment they are free to leave the storage area. This project will complete **an AMP/CIP project that will reduce nuisance odors** emitted by the KWRP.

Description of Planned Project

This project will add wall framing, sheathing, and new overhead doors to the west side of the bunkers. The overhead doors will allow trucks to enter a confined area for loading to limit the amount of exposure of biosolids

odors to the atmosphere and facilitate capture and treatment by the proposed updated scrubber/filter system (Project Alternative E-1). When finished, biosolids haulers will enter an enclosed garage area for truck loading. All nuisance odors will stay captive in the newly enclosed loading area. This project will complete **an AMP/CIP project that will reduce nuisance odors** emitted by the KWRP.

Project G1 – Arc Flash Deficiency Mitigation

Need:

An arc flash is the energy release that occurs during an electrical fault when current flows through the air between two live conductors, causing a short circuit. In a residential setting, an arc flash usually produces little more than a brief flash of light before extinguishing itself harmlessly but in an industrial setting the voltages and currents are significantly higher, so electrical faults typically release far more energy. As a result, an arc flash routinely produces a powerful explosion marked by searing heat, toxic fumes, blinding light, deafening noise and massive pressure waves. As a matter of good maintenance practices, the City recently performed an electrical arc flash study across the entire plant. The report, located in Appendix D listed a series of deficiencies in electrical equipment at KWRP which need to be revised to enhance worker safety.

Description of Planned Project

The project will follow the guidance contained within the Arc Flash Study to mitigate the potential for arc flashed previously identified. This is a **critical project to ensure operator safety while making the KWRP more robust and reliable**.

Projected Future Needs (for the next 20 years minimum)

The City of Kalamazoo is currently designed to operate between 10 MGD and 76.6 MGD (existing secondary clarifiers are the limiting process as the rest of the plant is capable of treating 96 MGD). The average daily flow at current is 28 MGD with a Max Day flow of 53.3 MGD. The KWRP has sufficient treatment capacity based on the given flow data.

A. Flow Data: The current base flows in the system are estimated to be around 27.06 MGD based on a study completed in 2017. The volume can fluctuate with wet weather I&I. The treatment plant is designed and permitted to operate an annual average daily flow of rate of 28 MGD, with a peak hourly flow of approximately 65 MGD.

    1. See Table 2-7 below for a breakdown of existing flow estimates.

Table 2-7 – Current Sanitary System Flows

Line	Characteristic Flow	Flow Rate
1	Average KWRP Inflow	28.0 MGD
2	Average Dry Weather KWRP Flow	25.0 MGD
3	Average Wet Weather Infiltration Inflow (Line 1-Line 2)	3.0 MGD
4	Average Commercial/Industrial Flow	10.0 MGD
5	Dry Weather Residential Flow (Line 2-Line 4)	15.0 MGD
6	Per Capita Dry Weather Flow (Line 5/150,000)	100 GPCD
7	Average Daily Residential Flow (Line 1-Line 4)	18.0 MGD

8	Per Capita Average Residential Flow (Line 7/150,000)	120 GPCD

2. Future flow estimates for the system have been created by increasing current flows proportionally by the anticipated population increase. Based on these projections, Table 2-8 below shows the anticipated system flows for the projected population in 2045.

Table 2-8 – Projected Sanitary System Flows

Line	Characteristic Flow	Flow Rate for 2045 (MGD)
1	Future Dry Weather Flow	28.56
2	Future Industrial/Commercial Flow	11.42
3	Average Wet Weather Infiltration/Inflow	3.43
4	Total Average KWRP Flow	31.99

3. The KWRP has sufficient treatment capacity to accept the anticipated peak flows from the collections system, as reflected by the flow metering.

B. Future Environment without the Proposed Projects: The projects outlined in this plan are focused on safety for the operators, sufficient and reliable operations within the plant, and environmental stewardship/justice for the adjacent neighborhoods. Without correcting these issues, the system cannot safely provide the needed level of service for wastewater flows, and the risks of failure in different parts of the system are increased.

4 Analysis of Alternatives

Described below are the potential alternatives that have been identified. They will be discussed as they relate to the proposed project plan.

A. No Action: The existing KWRP generally complies with its NPDES permit. However, as the system ages, it will become more susceptible to conditions which may limit the capacity of the system to operate as designed, may put workers at higher risk of injury, and may cause significant issues with the surrounding community.

1. Project A1 – Safety Railings – OSHA requires Safety Railings in areas where a drop of four (4) feet is possible. As the existing railings are in disrepair, are failing, or have failed, taking No Action will not remedy concerns regarding operator safety. This Alternative will not be examined further.

2. Project B1 – Secondary Clarifiers (5-8) Improvements – While the current clarifier mechanisms are beyond their useful life and pose a bottle neck to both treatment and hydraulic capacity, they are functional. However, taking No Action will not remedy their

non-compliance with current Ten States Standards nor will it reduce the risk of SSO under heavy hydraulic loads. This Alternative will not be examined further.

3. Project C1 – Wastewater SCADA System Improvements – Functional instrumentation and control is critical to the operation of the KWRP. Current equipment is beyond it useful life, is obsolete, or is unsupported by the original manufacturers. No Action will ultimately result in an inoperable plant and permit violations and will, therefore, not be examined further.

4. Project D1 – Hydrogen Peroxide Injection System – The system, as installed, was adequate for a trial/pilot of the process modification but is not adequate for the permanent storage and injection of oxidizing agents. Additionally, failure to take action will not reduce emission of odorous compounds. No Action will not be examined further.

5. Project E1 – Biosolids Storage Bunker Scrubber Improvements – Choosing to take no action will not remedy the current situation regarding emission of odorous gases to the surrounding community. No Action will not be examined further.

6. Project F1 – Biosolids Storage Odor Confinement – Choosing to take no action will not remedy the current situation regarding emission of odorous gases to the surrounding community. No Action will not be examined further.

7. Project G1 – Arc Flash Deficiency Mitigation – Choosing No Action will not remedy the significant risk of serious injury to workers identified in the recently completed Arc Flash study. No Action will not be examined further.

B. Optimize Performance of Existing System: The KWRP has been expanded upon and maintained over the last 67 years. The majority of the proposed projects are identified in the City's Asset Management Plan and Capital Improvement Plan as described above.

1. Project A1 – Safety Railings – Replacement of the existing railings will not optimize the existing system but will help maintain OSHA compliance. Optimized Performance of Existing Systems will not be examined further.

2. Project B1 – Secondary Clarifiers (5-8) Improvements – While the existing tankage can be salvaged the current equipment is beyond its useful life and creates a treatment and hydraulic bottleneck which increases likelihood of SSOs. There is no Optimization that can remedy this, and Optimized Performance of Existing Systems will not be examined further.

3. Project C1 – Wastewater SCADA System Improvements – Functional instrumentation and control is critical to the operation of the KWRP. Current equipment is beyond its useful life, is obsolete, or is unsupported by the original manufacturers. Optimization of Existing Systems will not remedy the situation. Optimized Performance of Existing Systems will not be examined further.

4. Project D1 – Hydrogen Peroxide Injection System – The injection system currently in place has been achieving desirable results in oxidizing odorous compounds. To Optimize Performance of Existing System will require the construction of containment and a building to project the process from the elements, which is the project that is proposed. This Project's alternative would be complete replacement of a working system which will not be examined further.

5. Project E1 – Biosolids Storage Bunker Scrubber Improvements – The existing air scrubbing equipment failed long ago and has no repair options or salvage value. Optimized Performance of Existing Systems will not be examined further.

6. Project F1 – Biosolids Storage Odor Confinement – The project as proposed will Optimize the Performance of Existing Systems. Installing wall framing, sheathing, and new overhead doors to the west side of the biosolids storage bunkers would optimize odor control in the existing facilities. The overhead doors would allow trucks to enter for loading while still limiting the exposure of biosolids to the atmosphere. This would increase the efficiency of the biosolids storage bunkers' scrubbers as proposed as Project E1.

i. Project G1 – Arc Flash Deficiency Mitigation – The project as proposed will improve operator safety by bringing existing equipment up to current standards. This project aims to address the deficiencies in electrical equipment at the KWRP in order to increase the safety of workers. As no new installations of equipment will be made, this project is solely an optimization project.

C. Water and Energy Efficiency: The conservation of natural water resources and energy usage is a key proponent in ensuring sustainable wastewater operations in the future. All of the proposed projects will maintain/improve upon current conditions through the replacement of antiquated equipment with modern, more efficient.

1. Project A1 – Safety Railings – This project does not involve water or power and therefore this Alternative will not be examined further.

2. Project B1 – Secondary Clarifiers (5-8) Improvements – All proposed equipment will be specified with the highest electrical efficiency in mind. This Alternative will not be examined further.

3. Project C1 – Wastewater SCADA System Improvements – Replacement of critical control equipment will enhance the KWRP's ability to process wastewater more efficiently.

4. Project D1 – Hydrogen Peroxide Injection System – The project as proposed does not include and new water or power equipment and this Alternative does not apply.

5. Project E1 – Biosolids Storage Bunker Scrubber Improvements – Replacement of the failed scrubbers will require the addition of new fans and scrubber units. These items will be specified to include variable frequency drives for the new motors to improve fan performance and conserve power to the extent possible.

6. Project F1 – Biosolids Storage Odor Confinement – Door operators for the proposed project will be specified to ensure the lowest possible energy consumption.

7. Project G1 – Arc Flash Deficiency Mitigation – Replacement of critical electrical equipment will enhance the KWRP's ability to process wastewater more efficiently and with greater worker safety. Modern equipment is inherently more energy efficient than the components it will replace.

D. Regionalization: The City of Kalamazoo is the core of the regional utility systems for the surrounding areas, including parts of Van Buren and Barry Counties that are dependent on the KWRP to handle their waste. In addition, the septage receiving facilities at the plant accept waste from a 25-mile radius from the plant, which serves portions of the Barry, Kalamazoo, and Van Buren Counties. KWRP provides service to both the City of Kalamazoo and much of the surrounding areas.

1. Project A1 – Safety Railings – KWRP is already the Regional Alternative so this will not be examined further.
2. Project B1 – Secondary Clarifiers (5-8) Improvements – KWRP is already the Regional Alternative so this will not be examined further.
3. Project C1 – Wastewater SCADA System Improvements – KWRP is already the Regional Alternative so this will not be examined further.
4. Project D1 – Hydrogen Peroxide Injection System –KWRP is already the Regional Alternative so this will not be examined further.
5. Project E1 – Biosolids Storage Bunker Scrubber Improvements – KWRP is already the Regional Alternative so this will not be examined further.
6. Project F1 – Biosolids Storage Odor Confinement – KWRP is already the Regional Alternative so this will not be examined further.
7. Project G1 – Arc Flash Deficiency Mitigation – KWRP is already the Regional Alternative so this will not be examined further.

E. Monetary Evaluation: The monetary evaluation for if the KWRP were to optimize the existing systems for the proposed projects instead of replacing the units, is outlined in Table 3-1 below.

Table 3-1 – Monetary Evaluation

Proposed Project	CWSRF Costs
Optimization Safety Railings	$808,625
Optimization Clarifiers	$12,750,000
Optimization SCADA	$650,000
Hydrogen Peroxide Injection	$1,000,000

Biosolids Storage Bunkers' Scrubbers	$2,250,000
Biosolids Storage Confinement	$250,000
Arc Flash Deficiency Mitigation	$750,000
Total	**$18,458,625**

F. Environmental Evaluation: The impact on the environment from these projects is expected to be minimal or none. The proposed projects are located within the KWRP, and therefore, do not pose a risk to native wildlife habitats.

G. Implementability and Public Participation: This project plan was created in collaboration with operators and managers at the KWRP. This was done to identify what was viewed as the most critical projects and prioritize them first. The proposed project plan was discussed with community members at a Public Hearing held on March 12, 2024.

5 Selected Alternatives

A. Design Parameters: Projects that include the replacement of existing equipment (not optimization) include:

1. Safety Railings: The point of anchor attachments for the safety railings have become compromised over the course of several years. Workers have scored this as the most probable to fail with the highest consequence of failure of all proposed projects, the consequence of failure being injury/death. The replacement of the railings is a necessary project in order to ensure worker safety. Safety railings surrounding all plant tankage will be replaced with updated FRP or aluminum handrailing and accessories as appropriate for the environment of installation.

2. Clarifier Drives and Sweeps 5-8: The current mechanisms and drives have reached the end of their useful lives and are necessary to operations. These tanks have also been modelled and are the hydraulic and treatment bottleneck for the KWRP limiting future flow capacity and ultimately permit compliance. A reintegration through SCADA would allow for controls for more than simply position valves. Secondary clarifiers 5-8 will have their existing drives and mechanisms replaced with new spiral blade style mechanisms and drives. The updated mechanisms should be significantly more efficient at settling and removing solids while also being more energy efficient. Current inboard launders will be replaced with perimeter mounted launders, weirs, and baffles to promote settling and increased hydraulic loading. Effluent weirs will be raised approximately 1-foot to comply with current Ten States Standards which dictate a minimum of 2 vertical feet between treatment processes in hydraulic grade. The addition of the new tertiary treatment process put KWRP out of compliance with this Standard.

3. WW SCADA System Upgrade: Existing controls equipment and devices need to updated as older equipment is obsolete and/or no longer supported. Equipment will be updated to comply with new City standard PLC-based controls

4. Biosolids Storage Bunkers' Scrubbers: The City's biosolids storage bunkers are a large, identified source of odor emissions within the KWRP. Air within the bunkers is supposed to be captured by an outdated pair of Duall Hexmaster dry scrubbers but these units have failed and been bypassed. The City intends to replace these with either packed bed scrubbers or bio trickling filter vessels, which will capture and treat air prior to releasing. Doing so will create functionality within the system and reduce odorous emissions by the KWRP.

B. Useful Life: See Table 4-1 below for the estimated ages of and useful lives of equipment recommended to be replaced in the proposed projects.

Table 4-1 – Useful Life of Equipment

Component	Estimated Age (Years)	Estimated Useful Life (Years)
Safety Rails	40+	20
Clarifiers	27	20
SCADA	39	10 to 15
Scrubbers	32	20

C. Project map: See Figure 4-1 below for a map of the proposed projects.

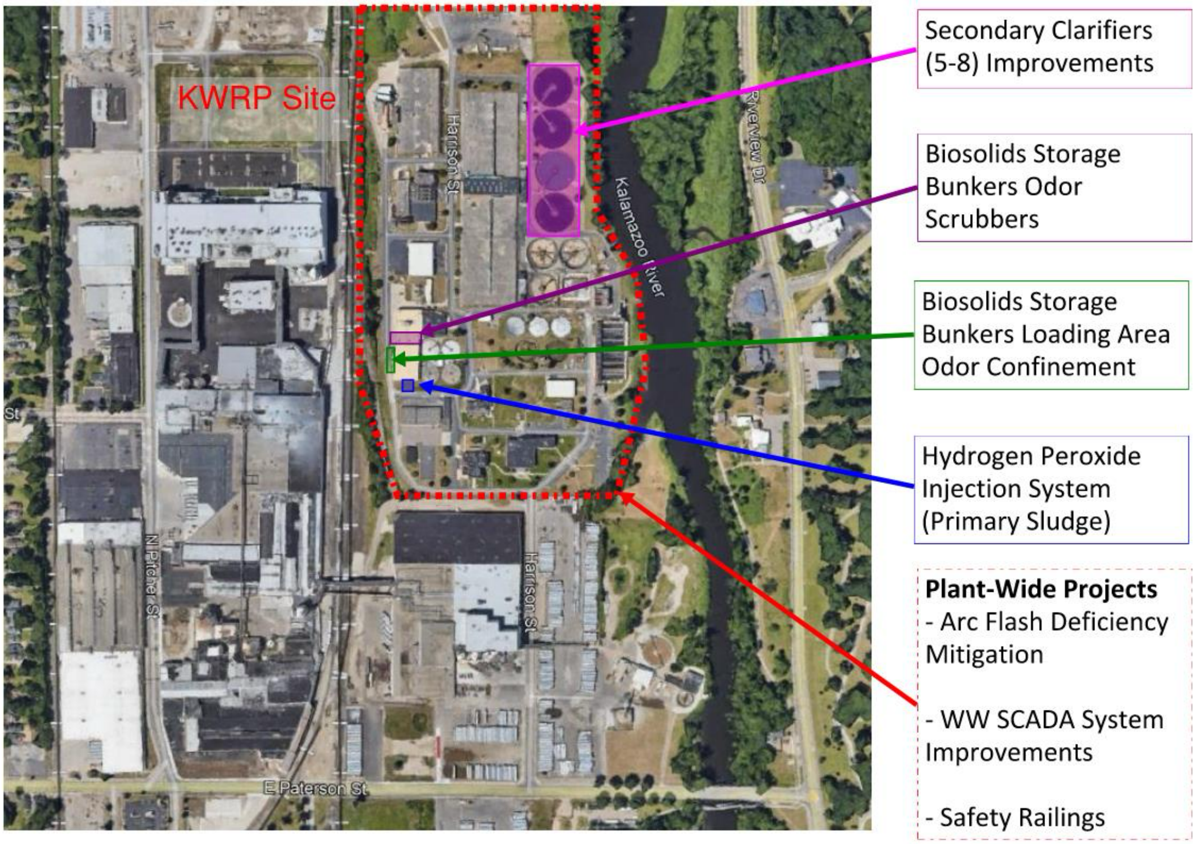


Figure 4-1: Project Location Map

D. Water and Energy Efficiency: The projects outlined will involve a very limited use of water as part of their construction. Once built, they will not require a significant amount of water, if any. Implementation of the recommended alternatives will serve to improve energy usage, as the newer equipment that will replace the antiquated will be able to run more efficiently.

E. Schedule for Design and Construction: The tentative schedule for the proposed projects for fiscal year 2025 (safety railings, clarifier drives and sweeps 5-8, WW SCADA system upgrade, hydrogen peroxide injection system, biosolids storage bunkers' scrubbers, biosolids storage confinement, and arc flash deficiencies mitigation) are outlined in Table 4-2 below. The schedule shows the projects following the quarter 4 schedule, outlined by EGLE and MFA with construction beginning in 2025 and extending into 2028. None of these projects will require a regional review as the KWRP is already a regional system.

Kalamazoo CWSRF Project Plan Schedule

		2024				2025													2026															
Task	Date	10/1/24	10/31/24	11/30/24	12/30/24	1/1/25	1/31/25	3/2/25	4/1/25	5/1/25	5/31/25	6/30/25	7/30/25	8/29/25	9/28/25	10/28/25	11/27/25	12/27/25	1/26/26	2/25/26	3/27/26	4/26/26	5/26/26	6/25/26	7/25/26	8/24/26	9/23/26	10/23/26	11/22/26	12/22/26	1/21/27	2/20/27	3/22/27	4/21/27
Publication of Final IUP																																		
CWSRF Process											B	R		C		N																		
Arc Flash Deficiency																																		
Safety Railings																																		
WW SCADA Improvement																																		
Secondary Clarifier Improvement																																		
Biosolids Storage Odor Scrubbers																																		
Biosolids Storage Odor Confirement																																		
Hydrogen Peroxide Injection System																																		

B - Bid Advertisement
R - Resolution of Tentative Award
C - Loan Closing (Q4)
N - Notice to Proceed

KEY

	EGLE Task Item or Milestone
	City Task Item (Bidding & award)
	Joint Engineer/City Tasks
	Engineers Design Tasks
	Construction Projects and Construction Engineering

F. Implementability: The proposed projects outlined in the Plan are located on KWRP grounds. The KWRP will own and operate the facilities to be built as part of these proposed projects.

G. Environmental and Public Health Impacts:

1. Historical/Archeological: No impacts to historical sites are anticipated. Work will be completed within the KWRP grounds and will not encroach upon the historical sites listed previously in this report.

2. Geological: There is no direct or indirect environmental impact on the geology of the area.

3. Cultural/Social: A direct beneficial impact would be that the construction required would create jobs. An adverse impact would potentially be an uptick in traffic during construction activity in the short term.

4. Recreational: The improvements will have no beneficial or adverse impacts on water recreation in the City. Access to parks and water is not expected to be impacted throughout the construction process.

5. Water Quality/Surface Waters: There are no expected short term or long-term impacts to the water quality of the Kalamazoo River.

6. Air Quality: Any adverse impacts to air quality would be short term caused by construction at the KWRP. Impacts can be minimized through proper maintenance and the use of water to reduce dust problems. Several projects address malodorous emissions from the KWRP and completed projects will have a positive impact on the area's air quality.

7. Wetlands: Proposed work will not impact any wetlands.

8. Coastal Zones: The projects are not located near any coastal zones.

9. Floodplains: Proposed work will not impact any floodplains.

10. Construction Impacts: There will be temporary impacts to vehicle and pedestrian access in the areas of proposed work during construction.

11. Natural or Wild and Scenic Rivers: There are no natural or wild and scenic rivers designated in the project area.

12. Endangered Species: As included above in Table 2-4 (above), there are five federally threatened species identified in Kalamazoo County. The areas of inhabitance of each are not within the KWRP and will not be affected by work done on the proposed projects.

13. Prime and Unique Agricultural Land: There is no prime or unique agricultural land in the project area.

14. Construction Material/Energy Consumption: In order to execute the proposed projects, there will be monetary, material, and energy resources required. This will create a major short-term impact on the environment, as it will involve irreversible expenditures of labor, time, money, and energy for construction.

15. Accidents: The proposed projects, if implemented, will help to increase safety throughout the plant. Therefore, there will be a beneficial impact seen through a decrease in accidents around the KWRP.

16. Unavoidable Adverse Impacts and Mitigative Measures: The main negative impacts are related to the construction work required for the proposed projects. These can be minimized through efficient and economically effective design and construction, air pollution control equipment, and noise control. This will result in more construction per dollar cost and a lower maintenance cost system than what is currently in place. Air pollution can be minimized through proper maintenance such as muffling of equipment. Additionally, calcium chloride and water can be used for dust control. Designated work hours, mufflers, and prohibiting work on weekends and holidays can help to limit noise pollution. The proposed alternative will require labor, time, materials, money, and energy for construction that are irreversible.

6 Selected Alternatives Cost Impacts

For the selected alternatives, total costs associated for each project from planning through construction are shown in Table 6-1.

Table 6-1 – Cost Planning-Construction

Proposed Project	Total Construction Cost
Safety Railings	$808,625
Clarifier Drives and Sweeps 5-8	$12,750,000
WW SCADA System Upgrade	$650,000
Hydrogen Peroxide Injection	$1,000,000
Biosolids Storage Bunkers' Scrubbers	$2,250,000

Biosolids Storage Confinement	$250,000
Arc Flash Deficiencies Mitigation	$750,000
Total Cost Per Category	**$18,458,625**

User Costs:

See Table 6-2 (Insert Monetary Evaluations table located in CWSRF folder) for the Net Present Worth Calculations for the proposed projects. The discount rate used was the real discount rate of 2.50% for a 20- or 30-year planning period. This pulled from the Office of Management and Budget, and documentation can be found in Appendix E. As a household is assumed on average to be 2.5 people, for a total of 250 gallons of water used per year, where 70% of the water goes back to the sewer, and Kalamazoo has and average daily flow of 28 MGD, it can be assumed that there is a total of 160,000 REUs in the Kalamazoo. This equates to $199.20 per REU over the 20 year loan period, or $0.49 per month per REU. This is assuming that all proposed projects have annual O&M costs equivalent to 2.0% of their estimated project costs, with the exception of safety railings, which is at 0.5%, and none of the costs have any salvage value.

Table 6-2 – Net Present Worth Calculations

Item	Estimated Construction Cost	Estimated Design and Engineering Cost	Estimated Admin Cost	Total Estimated Project Costs	Annual O&M Costs	Present Worth Annual O&M	Salvage Value	Present Worth Salvage Value	Net Present Worth	Cost Per REU
Safety Railings	$646,900	$80,862.50	$80,862.5	$808,625	$4043.125	63,028.93	0	$0.00	$871,653.93	$5.45
Clarifier 5-8 Drives, Sweeps, Weirs, Baffles, and Electrical Components	$10,200,000	$1,275,000	$1275000	$12,750,000	$25,500	$397,523.64	0	$0.00	$13,147,523.64	$82.17
WW SCADA System Upgrade	$520,000	$65,000	$65000	$650,000	$1300	$20,265.91	0	$0.00	$670,265.91	$4.19
Hydrogen Peroxide Injection	$800,000	$100,000	$100000	$1,000,000	$2000	$31,178.32	0	$0.00	$1,031,178.32	$6.44
Biosolids Storage Bunkers' Scrubbers	$1,800,000	$225,000	$225000	$2,250,000	$4500	$70,151.23	0	$0.00	$2,320,151.23	$14.50
Biosolids Storage Confinement	$200,000	$25,000	$25000	$250,000	$500	$7,794.58	0	$0.00	$257,794.58	$1.61
Arc Flash Deficiency Mitigation	$600,000	$75,000	$75000	$750,000	$1500	$23,383.74	0	$0.00	$773,383.74	$4.83
Total	$14,766,900	$1845862.50	$1845862.50	$18,458,625	$39,343	$613,326.36	0	$0.00	$19,071,951.36	$119.20

Debt Repayment Method:

The proposed projects discussed within this plan are factored into already existing sewer rates. Capitalizing costs would change rates slightly. If there are any rate increases were to be caused by these projects, they will be minimal, and the City will evaluate before project commencement. Assuming SRF funds are obtained for these projects in the form of a 20-year loan where Kalamazoo meets the overburdened population requirements for a 2.0% interest rate, the City will need to generate an annual debt service of $1,124,337. Assuming there are 160,000 REUs, this works out to $17.60/REU/Year, or $1.46/REU/month. This analysis assumes that the City obtains the loan money for the proposed projects as part of a single phase of construction. If funding were to be in multiple phases, the increase in user fees could be phased appropriately. Capital recovery calculations are shown below in Table 6-3.

Table 6-3 – Capital Recovery Calculations

Total Construction Cost	CWSRF Loan Value	City Cash Contribution	Total Project Cost
Safety Railings	$808,625	$	$808,625
Clarifier Drives and Sweeps 5-8	$12,750,000	$	$12,750,000
Hydrogen Peroxide Injection	$1,000,000	$	$1,000,000
Biosolids Storage Bunkers' Scrubbers	$2,250,000	$	$2,250,000
Biosolids Storage Confinement	$250,000	$	$250,000
Arc Flash Deficiency Mitigation	$750,000	$	$750,000
WW SCADA System Upgrade	$650,000	$	$650,000
Total Cost Per Category	$18,458,625	$	$18,458,625
Period, Years	20	N/A	N/A
Interest %	2.00%	N/A	N/A
Annual Debt Service	$1,124,337	N/A	N/A
Average Daily Flow (MGD)	28	N/A	N/A
Capital Recovery Per REU/Year	$17.60	N/A	N/A

7 Public Participation

A. Public Meeting: The draft plan was submitted on February 16, 2024 to City Staff for their review. Additionally, public participation involved meetings and discussion with the DPS Director and Wastewater Division Staff. A public hearing will be held on March 12, 2024 at 6:30pm. The information and recommendations for proposed projects as well as the monetary and environmental impacts of these projects will be presented. The public will have the opportunity to ask questions of the City Staff and weigh in on the project plan.

B. Public Meeting Advertisement: The public hearing, scheduled for March 12, 2024 was advertised by the City through their typical media release protocols on Monday, February 26, 2024.

C. Public Meeting Summary: The summary of the public hearing will be included in Appendix F.

D. Comments Received and Answered: (Questions received during the public hearing will be addressed here.)

8 Adoption of Project Plan

Information regarding the adoption of the project plan (post public hearing) will be included here.

APPENDIX A

ASSET MANAGEMENT PLAN & CAPITAL IMPROVEMENT PROGRAM

WASTEWATER ASSET MANAGEMENT PLAN

October 2020

Where we're going: System Goals

THE CITY OF Kalamazoo

CITY OF KALAMAZOO
WASTEWATER ASSET MANAGEMENT PLAN

Contents

Prepared by

ENGINEER:
Prein&Newhof
PN# 2180207

INTRODUCTION

Our Mission

Our community, the City of Kalamazoo, Michigan, is committed to supporting public health and safety, and to protecting property and the environment, through responsible and effective management of three infrastructure systems: our water supply system, our wastewater system, and our stormwater system. These three systems affect each other and together they all affect public health, safety, property, and the environment. We strive to manage both three infrastructure systems in a coordinated approach to provide these essential public services for our citizens in a sustainable way. We plan to pursue this mission by implementing asset management.

Asset Management Principals

Asset management is the way to achieve sustainable infrastructure. All infrastructure deteriorates with age and requires proactive management to operate, maintain, repair, and eventually replace each physical component, or asset. This progression over time, from routine operation and maintenance through repairs and eventual replacement, is the asset’s life cycle. Waiting to perform maintenance or make repairs can save money in the short term but may shorten the life cycle of an asset. On the other hand, replacing an asset before it fails may not take full advantage of the asset’s value. It is this balance which puts the decisions for operations, maintenance, repair, and replacement actions at the heart of asset management.

Asset management is an evaluation of needed actions after considering the condition of an asset, the consequences of an asset failure, and the action alternatives available. The solution that provides the lowest life cycle cost at the desired Level of Service (LoS) is implemented.

Our Wastewater System

The City of Kalamazoo’s wastewater system is comprised of collection pipes, manholes, and lift stations that collect wastewater from homes and businesses. These discharge to sewers within the City of Kalamazoo’s wastewater collection system, where it is ultimately transported to the City of Kalamazoo’s Reclamation Plant for treatment and recycled back into the environment.

About this Document

This document is our Wastewater Asset Management Plan (AMP). It defines the goals and guiding principles for running our wastewater system at its lowest life-cycle cost. Each of us pays to operate, maintain and replace those assets through our utility rates. In effect, each of us is an owner of the wastewater system. As owners, we commit to manage our assets and make decisions based on long term life cycle cost. With input from the community, we will maintain our AMP through a joint effort of our staff, administration, and elected officials. We will update it as needed to ensure its relevancy and effectiveness.

A companion document, our Wastewater Asset Management Program, shows how we will apply the principles of asset management to achieve the goals outlined in this AMP.

PART 1: DEFINING OUR GOALS–WHAT IS OUR DESIRED LEVEL OF SERVICE?

As a community, we determine the level of service we want from our wastewater system. Defining these goals has an effect on the cost of the service. Many factors play into this determination including public health, safety, compliance with regulations, aesthetics, odors, service reliability and stable rates. To this end, we have established the following primary goals for our wastewater system:

Goal 1: Meet Regulatory Requirements

Thee water quality of our discharge is an important value for our community to minimize potential health and environmental effects. Our wastewater treatment plant processes our wastewater in a way which meets or exceeds regulations established in the Federal Clean Water Act and State of Michigan Statutes/Rules. Our operators test our process products and water discharged to the environment according to Federal and State laws. We strive to achieve continued compliance with environmental regulations and produce the cleanest, safest treated water achievable with the treatment facilities we have.

Goal 2: Minimize Service Interruptions

Service interruptions are an inevitable part of operating a wastewater system and can be caused by many factors such as equipment failure, power outages, clogging, excessive flows, repairs, and replacement operations. Our goal is to minimize service interruptions by proactively managing and investing in our system.

Goal 3: Minimize Public Hazards

Sewer breaks can cause significant damage, not only to the streets above them but also to adjacent utilities and property. Additionally, sewer breaks and blockages may result in sewer backups which raise health concerns and can cause property damage.

Our goal is to minimize sewer breaks and backups. To minimize the potential for backups, we will continue to fund / perform regular cleaning of sewer as part of routine operations and maintenance. To minimize the potential for breaks, sewers at risk will be improved or replaced as part of our capital improvement program. To minimize the potential for damage from breaks and/or backups, we will continue to coordinate with the City of Kalamazoo to provide emergency response services 24 hours per day, 7 days per week. This also includes emergency response to our partner community with wastewater service agreements.

Goal 4: Manage Storm Water Inflow and Ground Water Infiltration

Storm water inflow through sources like roof drains and catch basins can cause sewer overflows and backups. Groundwater infiltration, if severe enough, can cause backups. Both inflow and infiltration (I/I) take up flow/treatment capacity in the system which reduces the amount of actual wastewater our system can manage and increases our transport/treatment costs.

We will identify and eliminate sources of I/I wherever practical to meet the Federal EPA guidelines for I/I and to reduce the potential for sewer overflows and back-ups.

Goal 5: Provide Capacity for Community Growth

We will design and maintain our wastewater assets to provide adequate capacity for community development, and we will plan for system improvements that allow our sewer service area to develop based on long range future land use plans. We will responsibly control system expansion by balancing requirements for community redevelopment/infill and desires for new development.

Goal 6: Minimize Life Cycle Costs

The best financial decisions are those which achieve the lowest life cycle costs while still meeting the desired level of service. This means we consider the full life cycle of each investment each time we evaluate improvements to our system. We recognize that short term fixes, while they may have the lowest immediate costs, may not be the best long term financial decision. Likewise, not spending money on maintenance and repairs can provide short term cost savings, but may result in asset failure, ultimately increasing life cycle costs. We intend to manage our system to always pursue the lowest life cycle cost possible for each system asset while maintaining our desired level of service.

Goal 7: Partner Communities

Our wastewater system serves not only our residents but also the communities of Village of Augusta, Brady Township, Charleston Township, Comstock Township, Cooper Township, City of Galesburg, Kalamazoo Township, City of Parchment, Pavilion Township, City of Portage, Richland Township, Village of Richland, Ross Township, Schoolcraft Township, Texas Township, and the Village of Vicksburg. This makes us all partners. As community partners, we must work together to manage our wastewater system. We will work with our community partners to facilitate communications regarding O&M, capital improvements, and rates.

PART 2: INVENTORY - WHAT DO WE OWN?

Our System

Our City of Kalamazoo wastewater system includes assets such as collection sewer mains, sewer services from the main to the right-of-way line, manholes, lift stations and metering stations that discharge to sewers in the City of Kalamazoo's wastewater collection system. A variety of materials including vitrified clay pipe (heat-treated clay) and concrete pipe were the main choices for collection sewers in North America for many decades.

We have over 256 miles of sewer pipes within the City of Kalamazoo and over 73 miles of sewer pipes in the partner communities that are multi-jurisdictional (interceptors) that the City of Kalamazoo is responsible to maintain. There are also seven (7) lift stations within the City and 54 lift stations in the partnering communities is responsible to maintain.

The majority of our collection sewers were built before the 1970's and dates back to the late 1800s. Most of these pipes are clay pipe. The remaining pipes from that era are either concrete or cast iron. Most pipes installed after 1980 are typically plastic.

All of the wastewater collected is treated at a City owned Wastewater Treatment Plant (WWTP). The City of Kalamazoo owns and operates a 54 million gallon per day tertiary wastewater reclamation plant to service the greater Kalamazoo metropolitan area. The KWRP main processes include screening, grit removal, primary sedimentation, secondary biological nutrient removal, clarification, disinfection, dechlorination, sludge processing, bio solid processing and sludge storage. The system currently serves approximately 200,000 individual connections/customers.

A detailed summary of our wastewater system assets are in our Wastewater Evaluation Report and in a detailed asset inventory maintained by our Department of Public Service (DPS). The DPS keeps a list of non-pipe assets which includes purchase date, original cost, inspection reports, repair history, maintenance schedule, and specifications.

Our Plan

We will keep our system inventory current by storing records of our wastewater system in our Geographic Information System (GIS) and our Computerized Maintenance Management Systems (CMMS). The GIS contains maps of all our collection system assets, our lift stations and force mains. The City of Kalamazoo will keep an inventory of non-pipe assets (equipment, buildings, etc.) and asset data pertinent to Operations, Maintenance, and Replacement in the CMMS.

PART 3: RISK OF FAILURE–WHAT ARE THE CONDITIONS OF OUR ASSETS?

Our System

To understand how long each of our assets may last, we must track their condition and potential failure risk. An asset condition rating system has been developed for each type of asset in the system inventory. All assets are rated on a scale of 1-5 with 5 representing the worst condition, or highest risk of failure. Sewer pipes and manhole ratings are based on inspections of the assets. Force main ratings are estimated from the pipe age, break history, and material inventory. Lift station ratings and treatment plant components are based on visual inspection and performance testing. Condition rating information is incorporated into the GIS with the asset inventory.

Our Plan

We will keep our condition assessments current using periodic asset inspections at intervals frequent enough to document reasonably expected condition changes. The inspection intervals will vary by asset type and its expected life. We will score each asset on its likelihood or risk of failure (RoF) ratings on a scale of 1-5.

PART 4: CONSEQUENCE OF FAILURE–WHAT HAPPENS WITH A FAILURE?

Our System

It is important we understand the severity of consequences which may occur if any asset in our system fails. In a sewer system, if part of the system fails, the consequences would most commonly be a wastewater backup into basements, a discharge of untreated wastewater to the environment, or a pipe collapse with a sink hole in the street or other places.

Functional failure consequences can occur when pumps stop working, valves cannot open or close, and when sewers become broken or blocked with sediment, debris, or roots. Physical failure consequences can occur when we have sewer main breaks or catastrophic equipment failures.

Our Plan

A rating system has been developed to establish a way for comparing the severity of potential consequences of sewer system failures. All assets are rated on a scale of 1-5 with 5 representing the most severe consequences. We will evaluate the CoF of each asset, from both a functional and physical failure perspective. We will maintain redundancy on assets with a high CoF.

PART 5: CRITICALITY–HOW DO WE PRIORITIZE OUR ACTIONS?

Our System

We must prioritize our actions to meet our Level of Service (LoS) goals while managing our work loads, utility rates, and minimizing life cycle costs. Criticality ratings (otherwise known as Business Risk Factors in some asset management programs) are compiled for all assets in our wastewater system. Each assets "Risk of Failure" rating (1-5) is multiplied by its "Consequence of Failure" rating (1-5) to establish its Criticality rating (1-25). Criticality drives an asset's action priority.

Our Plan

Criticality ratings help us prioritize improvements and with development of our Capital Improvement Plan. Criticality of assets within our system will be determined by multiplying each asset's RoF (1-5) by its CoF (1-5).

PART 6: CAPACITY–DO WE HAVE ENOUGH, NOW AND FOR THE FUTURE?

Our System

Planning for future capacity needs is an essential part of our asset management program. Sewer pipes should last for many decades, so decisions about pipe capacity and system improvements require a very long term view. Over time, flows fluctuate with changes in property use and population. System analysis shows we are currently meeting peak flow and our estimated future flows. A detailed analysis of our system capacity is in our Kalamazoo Metropolitan Area Wastewater System Strategic Plan, February 2003.

Our Plan

We will maintain our wastewater assets to provide adequate capacity for existing development and will plan for system improvements which will allow our community to grow. We plan to monitor land use for compatibility with the sewer system capacity master plan. As land development and new customer connections occur, we plan to continue monitoring the system flows.

We plan to coordinate any needed capacity improvements with sewer rehabilitation/replacement projects to maximize the life cycle of our existing assets and ensure long term capacity needs are met with the construction of any replacement assets.

PART 7: OPERATIONS AND MAINTENANCE–KEEPING UP WITH ROUTINE WORK

Our System

Certain portions of our system need routine, on-going service to continue functioning. Our system Operations and Maintenance (O&M) demands are stable and we will manage the system to maintain stability. We will use CMMS tools to maintain asset inventories and schedule regular O&M activities.

Our Plan

We have established the following O&M goals:

1. Maintain staffing and equipment levels so in-house staff can perform routine O&M activities.

2. Use in-house staff to verify proper function of all system assets such as valves, pumps, motors, and other mechanical equipment.

3. We will hire outside consultants when we need specialized technical or equipment capabilities.

4. We will hire outside consultants or utilize the City of Kalamazoo crews to perform sewer pipe cleaning and root cutting.

PART 8: CAPITAL IMPROVEMENTS–CONTINUING SYSTEM RENEWAL

Our System

Our condition assessments have revealed certain assets which are near the end of their life cycle and are in need of rehabilitation or replacement. Improvement recommendations for our wastewater system are in the Kalamazoo Metropolitan Area Wastewater System Strategic Plan and Wastewater System Evaluation Report. These reports identify the scope and priorities of proposed wastewater system improvements such as sewer pipe replacements, equipment replacements, and major O&M activities.

Our Plan

Planning for capital improvements is a continual management process. We will incorporate the recommendations of the sewer reports into a comprehensive CIP which will document the major projects we plan to complete within the next 10 years. Criticality ratings set the order and timing of projects. Project timing often is driven by the availability of outside funding such as loans and grants. We will maintain and update our comprehensive CIP every year.

PART 9: FINANCIAL STRATEGY–RATE PLANNING AND STABILITY

Our System

We will fund our system costs through our wastewater system billings. We break our wastewater bills into two categories: Readiness to Serve (RTS) charges and Commodity charges.

Our Plan

Financial goals and strategies will be detailed in a regularly updated rate study compiled in collaboration with our partner communities. We will maintain a life cycle forecast of estimated costs, income from rates, and cash balances. We will use this forecast in the rate study to establish sustainable and stable utility rates. This helps our residential, business, and industrial owners in their long term financial planning and is an economic development advantage when recruiting new employers.

We will fund system O&M as defined in the rate study. This will also allow us to pay cash for emergency repairs and minor unanticipated asset replacements.

We will pay cash for planned system repairs and replacements with a stable rate structure.

SUMMARY

Asset management is a collection of best management practices to which we will adhere in order to continue providing reliable wastewater service for our community. Our Asset Management Plan outlines our goals. The specific details of how we implement asset management may be adjusted from time to time as new/improved tools, software, and evaluation techniques are developed. Regardless of those changes, we will incorporate asset management into our everyday activities, including system improvements and master planning. By proactively managing our wastewater system through asset management, we can ensure reliable and sustainable wastewater service at the lowest life cycle cost for our community.

CITY OF KALAMAZOO
WASTEWATER FUND
CAPITAL IMPROVEMENT PROGRAM
2023 - 2027

	PROJECT	START YEAR	FUNDING SOURCE	PRIOR BUDGET	ADOPTED 2022	AMENDED 2022	2023	2024	2025	2026	2027	TOTAL PROJECT BUDGET
GENERAL CAPITAL												
wwr0100000	BUDGET HOLDING - ACCOUNTING USE ONLY	2009	BOND	587,484	-	(24,500)	-	-	-	-	-	**562,984**
wwr0100079	ASSET MGMT-MOBILE WORK ORDER	2011	BOND	120,893	-	-	-	-	-	-	-	**120,893**
wwr0100163	LIFT STATIONS RADIOS	2016	BOND	194,746	-	-	-	-	-	-	-	**194,746**
wwr0100179	SOLIDS HANDLING PROCESS-UPGRADE	2017	BOND	11,813,859	315,000	315,000	-	-	-	-	-	**12,128,859**
wwr0100196	TERTIARY PROCESS UPGRADE	2019	BOND	8,100,000	8,600,000	8,600,000	11,000,000	-	-	-	-	**27,700,000**
wwr0100201	RAW PUMP REPLACEMENT	2018	BOND	98,800	-	-	-	-	-	-	-	**98,800**
wwr0100201	RAW PUMP REPLACEMENT	2018	GRANT	98,800	-	-	-	-	-	431,250	3,881,250	**4,411,300**
wwr0100206	ALTERNATE FORCE MAIN & GRIT SYSTEM	2018	BOND	139,016	-	-	-	-	-	520,000	4,540,000	**5,199,016**
wwr0100212	CLARIFIER DRIVES & SWEEPS (5-8)	2018	BOND	325,495	-	-	115,000	2,951,000	5,902,000	5,902,000	-	**15,195,495**
wwr0100216	MOTOR CONTROL CENTER (MCC) UPGRADES	2019	BOND	-	150,000	150,000	-	268,500	268,500	268,500	243,750	**1,199,250**
wwr0100220	SCHIPPERS DAM & CULVERT REPLACEMENT	2019	BOND	350,000	-	-	450,000	200,000	-	-	-	**1,000,000**
wwr0100221	ACADEMY CULVERT REPLACEMENT	2019	BOND	-	-	-	-	-	200,000	-	-	**200,000**
wwr0100223	POWER STATION SWITCHGEAR	2019	BOND	1,323,659	1,500,000	1,850,000	-	-	-	-	-	**3,173,659**
wwr0100224	SCHIPPERS (STA 5) LATERAL BACKWASH CONN	2019	BOND	326,900	-	-	-	-	-	-	-	**326,900**
wwr0100225	MORRIS ROSE LIFT STATION IMPROVEMENT	2019	BOND	192,000	-	-	-	-	-	-	-	**192,000**
wwr0100228	REAL TIME DECISION SUPPORT SYSTEM (RT-DSS)	2019	BOND	900,000	1,900,000	1,900,000	1,600,000	720,000	780,000	-	-	**5,900,000**
wwr0100230	BAR SCREEN 4	2024	BOND	-	-	-	-	780,000	-	-	-	**780,000**
wwr0100231	FINE SCREEN PROCESS UPGRADE	2019	BOND	-	-	-	-	-	-	-	-	**-**
wwr0100232	KWRP ADMIN HVAC UPGRADE	2027	BOND	-	-	-	-	-	-	-	215,000	**215,000**
wwr0100233	WAR ROOF REPLACEMENT & EQUIP REMOVAL	2025	BOND	-	-	-	-	-	90,000	1,170,000	-	**1,260,000**
wwr0100234	PLANT FIBER CONNECTION	2026	BOND	-	-	-	161,000	-	-	-	-	**161,000**
wwr0100235	SLUDGE CAKE STORAGE SILOS	2024	GRANT	-	-	-	-	-	-	-	-	**-**
wwr0100236	SLUDGE STORAGE & THICKENING	2024	GRANT	-	-	-	-	-	-	-	-	**-**
wwr0100237	WW SCADA SYSTEM UPGRADE (2021-2024)	2023	BOND	-	-	-	150,000	649,350	649,350	649,350	-	**2,098,050**
wwr0100239	KWRP INTERCEPTOR BIOFILTRATION ODOR CONTROL	2020	BOND	4,215,350	-	-	-	-	-	-	-	**4,215,350**
wwr0100240	SCUM HANDLING	2024	BOND	-	-	-	-	90,000	-	1,170,000	-	**1,260,000**
wwr0100241	VACTOR/HAULED WASTE RECEIVING FACILITY	2024	GRANT	-	-	-	-	-	-	-	-	**-**
wwr0100242	KWRP STAFF LOCKER ROOM & PC/IT/ELEC BLDG	2024	BOND	-	-	-	-	-	-	-	250,000	**250,000**
wwr0100243	METER & SAMPLING STATION IMPROVEMENTS	2025	BOND	38,900	-	-	-	-	-	-	-	**38,900**
wwr0100244	PLANT EXTERIOR LIGHTING UPGRADE	2025	BOND	-	-	-	-	-	-	-	-	**-**
wwr0100245	TERTIARY SCREW PUMP #2	2025	BOND	-	100,000	100,000	-	65,000	845,000	-	-	**1,010,000**
wwr0100246	SECONDARY BLOWER #1 & #4 (CONTROLS)	2025	BOND	-	-	-	-	-	25,000	325,000	-	**350,000**
wwr0100247	INTERCEPTOR ACCESS ROAD - SPRING VALLEY	2025	BOND	-	-	-	-	-	-	-	-	**-**
wwr0100248	WWTP TRUCK SCALE/BUILDING	2021	BOND	57,000	693,000	693,000	-	-	-	-	-	**750,000**
wwr0100250	BLDG #5 MASONRY RESTORATION	2022	BOND	-	-	322,560	-	-	-	-	-	**322,560**
wwr0100252	KWRP SUSTAINABLE RESIDUAL BIOSOLIDS	2023	BOND				116,667	116,667	116,667	-	-	**350,000**
wwr01xxxxx	BLDG 24 MEP SYSTEMS	2024	BOND	-	-	-	-	-	-	-	-	**-**
wwr0100253	LIFT STATION IMPROVEMENTS PROGRAM	2023	BOND				200,000	500,000	200,000	200,000	400,000	**1,500,000**
wwr01xxxxx	KWRP EMERGENCY COMMUNICATION SYSTEM	2026	BOND	-	-	-	-	-	-	20,000	260,000	**280,000**
	TOTAL GENERAL CAPITAL			**28,882,902**	**13,258,000**	**13,906,060**	**13,792,667**	**6,340,517**	**9,076,517**	**10,656,100**	**9,790,000**	**92,444,762**
SEWER MAIN CONSTRUCTION & OVERHEAD												
wwr0200000	BUDGET HOLDING - ACCOUNTING USE ONLY	2008	BOND	(85,123)	-	-	-	-	-	-	-	**(85,123)**
wwr0200002	SEWER CONSTRUCTION CONTINGENCY	2006	BOND	1,604,704	500,000	150,000	500,000	500,000	500,000	500,000	500,000	**4,254,704**
wwr0200061	SEWER TRENCHLESS REHAB PROGRAM	2019	BOND	2,196,855	1,500,000	1,500,000	1,100,000	1,100,000	1,175,000	1,225,000	1,400,000	**9,696,855**

CITY OF KALAMAZOO
WASTEWATER FUND
CAPITAL IMPROVEMENT PROGRAM
2023 - 2027

	PROJECT	START YEAR	FUNDING SOURCE	PRIOR BUDGET	ADOPTED 2022	AMENDED 2022	2023	2024	2025	2026	2027	TOTAL PROJECT BUDGET
wwr0200063	INTERCEPTOR ROAD ACCESS-ARCADIA CREEK	2019	BOND	-	-	-	-	-	-	-	-	**-**
wwr0200065	RANSOM ST INTERCEPTOR UPGRADE	2022	BOND	-	150,000	150,000	-	-	-	-	-	**150,000**
wwr0200065	RANSOM ST INTERCEPTOR UPGRADE	2022	CWSRF	-	-	-	4,950,000	3,300,000	-	-	-	**8,250,000**
wwr0200066	NEWTON CT SANITARY SEWER REPLACEMENT	2019	BOND	20,000	-	-	262,500	-	-	-	-	**282,500**
wwr0200067	FELLOWS CT SANITARY SEWER REPLACEMENT	2019	BOND	20,000	-	-	262,500	-	-	-	-	**282,500**
wwr0200073	MICHIGAN AVE SANITARY SEWER	2020	BOND	-	50,000	50,000	42,000	500,000	-	-	-	**592,000**
wwr0200074	WESTNEDGE (PIONEER-CROSSTOWN) SEWER	2022	BOND	-	-	24,500	321,750	-	-	-	-	**346,250**
wwr0200075	6-INCH SEWER UPGRADE PROGRAM	2024	BOND	-	-	-	-	90,000	660,000	-	-	**750,000**
wwr0200077	JOHN ST K-ZOO SIPHON REPLACEMENT	2022	BOND	-	100,000	100,000	1,050,000	350,000	-	-	-	**1,500,000**
wwr0200078	ROSE ST SANITARY (CEDAR TO VINE)	2022	BOND	-	75,000	75,000	-	-	-	93,750	687,500	**856,250**
wwr0200079	N. WESTNEDGE SANITARY(ELIZABETH TO MABLE)	2022	BOND	-	150,000	150,000	-	26,250	192,500	-	-	**368,750**
wwr0200080	REV WRIGHT CT (CHURCH to BURDICK)	2023	BOND				461,125	-	-	-	-	**461,125**
wwr0200081	SEWER EXTENSION PROGRAM	2023	BOND	-	-	-	150,000	150,000	150,000	150,000	150,000	**750,000**
wwr02xxxxx	VINE STREET TRUNK CAPACITY INCREASE (PARK-JASPER)	2023	BOND	-	-	-	-	60,000	-	-	450,168	**510,168**
wwr02xxxxx	W. DUTTON SANITARY (PARK TO S. BURDICK)	2024	BOND	-	-	-	-	90,000	660,000	-	-	**750,000**
wwr02xxxxx	ACKER LN SANITARY	2024	BOND	-	-	-	-	73,125	536,250	-	-	**609,375**
wwr02xxxxx	ENGLESIDE TERRACE SANITARY	2025	BOND	-	-	-	-	-	195,750	1,435,500	-	**1,631,250**
	TOTAL SEWER MAIN CONSTRUCTION & OVERHEAD			**3,756,436**	**2,525,000**	**2,199,500**	**9,099,875**	**6,239,375**	**4,069,500**	**3,404,250**	**3,187,668**	**31,956,604**
SEWER LEADS												
wwr0400001	SEWER CONNECTION CONTINGENCY	2006	BOND	-	30,000	30,000	-	-	-	-	-	**30,000**
wwr0400051	LEAF COMPOST SITE	2019	BOND	134,100	-	-	-	-	-	-	-	**134,100**
wwr0400052	GPI EFFLUENT SERVICE REALIGNMENT	2023	BOND	-	-	-	1,720,000	-	-	-	-	**1,720,000**
	TOTAL SEWER LEADS			**134,100**	**30,000**	**30,000**	**1,720,000**	**-**	**-**	**-**	**-**	**1,884,100**
	TOTAL WASTEWATER CAPITAL IMPROVEMENT PROJECTS			**32,773,438**	**15,813,000**	**16,135,560**	**24,612,542**	**12,579,892**	**13,146,017**	**14,060,350**	**12,977,668**	**126,285,465**
Wastewater Capital Outlay - Operating												
590-536	WASTEWATER ADMINISTRATION	ANNUAL	OPERATING		54,000	54,000	60,000	60,000	60,000	60,000	60,000	**354,000**
590-541	WASTEWATER COLLECTIONS	ANNUAL	OPERATING		-	-	-	-	-	-	-	**-**
590-543	WASTEWATER PLANT MAINTENANCE	ANNUAL	OPERATING		800,000	800,000	525,000	525,000	525,000	525,000	525,000	**3,425,000**
590-544	WASTEWATER PROCESS CONTROLS	ANNUAL	OPERATING		500,000	500,000	260,000	260,000	260,000	260,000	260,000	**1,800,000**
590-545	WASTEWATER ENVIRONMENTAL SERVICES	ANNUAL	OPERATING		-	-	8,000	8,000	8,000	8,000	8,000	**40,000**
590-580	CITY FLEET	ANNUAL	OPERATING		465,000	465,000	260,000	260,000	260,000	260,000	260,000	**1,765,000**
	TOTAL CAPITAL OUTLAY - OPERATING				**1,819,000**	**1,819,000**	**1,113,000**	**1,113,000**	**1,113,000**	**1,113,000**	**1,113,000**	**7,384,000**
	TOTAL WASTEWATER CAPITAL IMPROVEMENT PROJECTS AND CAPTIAL OUTLAY			**32,773,438**	**17,632,000**	**17,954,560**	**25,725,542**	**13,692,892**	**14,259,017**	**15,173,350**	**14,090,668**	**133,669,465**
TOTAL CAPITAL IMPROVEMENT PROJECTS AND OPERATING CAPITAL OUTLAY BY FUNDING SOURCE												
	REVENUE BONDS AND RESERVES		BOND	32,674,638	15,813,000	16,135,560	19,662,542	9,279,892	13,146,017	13,629,100	9,096,418	**113,624,165**
	CONTRIBUTIONS IN AID OF CAPITAL		CIA	-	-	-	-	-	-	-	-	**-**
	CLEAN WATER STATE REVOLVING FUND		CWSRF	-	-	-	4,950,000	3,300,000	-	-	-	**8,250,000**
	GRANTS		GRANT	98,800	-	-	-	-	-	431,250	3,881,250	**4,411,300**
	WASTEWATER OPERATING REVENUE		OPERATING	-	1,819,000	1,819,000	1,113,000	1,113,000	1,113,000	1,113,000	1,113,000	**7,384,000**
	TOTAL BY FUNDING SOURCE			**32,773,438**	**17,632,000**	**17,954,560**	**25,725,542**	**13,692,892**	**14,259,017**	**15,173,350**	**14,090,668**	**133,669,465**

CITY OF KALAMAZOO
WASTEWATER FUND
CAPITAL IMPROVEMENT PROGRAM
2024 - 2028

	A	B	C	D	E	F	K	L	M	N	O	P	Q	R
3			PROJECT	START YEAR	FUNDING SOURCE	PRIOR BUDGET	ADOPTED 2023	AMENDED 2023	2024	2025	2026	2027	2028	TOTAL PROJECT BUDGET
5		**GENERAL CAPITAL**												
6		wwr0100000	BUDGET HOLDING - ACCOUNTING USE ONLY	2009	BOND	562,984	-	-	-	-	-	-	-	**562,984**
7		wwr0100079	ASSET MGMT-MOBILE WORK ORDER	2011	BOND	120,893	-	-	-	-	-	-	-	**120,893**
8		wwr0100163	LIFT STATIONS RADIOS	2016	BOND	194,746	-	10,000	-	-	-	-	-	**204,746**
9		wwr0100179	SOLIDS HANDLING PROCESS-UPGRADE	2017	BOND	12,128,859	-	-	-	-	-	-	-	**12,128,859**
10		wwr0100196	TERTIARY PROCESS UPGRADE	2019	BOND	16,700,000	11,000,000	11,000,000		-	-	-	-	**27,700,000**
11		wwr0100201	RAW PUMP REPLACEMENT	2018	BOND	98,800	-	-	-	-	-	-	-	**98,800**
12		wwr0100201	RAW PUMP REPLACEMENT	2018	GRANT	98,800	-	-	-	-	431,250	3,881,250	3,881,250	**8,292,550**
13		wwr0100206	ALTERNATE FORCE MAIN & GRIT SYSTEM	2018	BOND	139,016	-	-	-	-	520,000	4,540,000	4,540,000	**9,739,016**
14		wwr0100212	CLARIFIER DRIVES & SWEEPS (5-8)	2018	BOND	325,495	115,000	115,000	-	5,000,000	7,000,000	5,000,000	-	**17,440,495**
15		wwr0100216	MOTOR CONTROL CENTER (MCC) UPGRADES	2019	BOND	150,000	-	150,000	300,000	300,000	350,000	350,000	400,000	**2,000,000**
16		wwr0100220	SCHIPPERS DAM & CULVERT REPLACEMENT	2019	BOND	350,000	450,000	450,000	-	-	-	-	-	**800,000**
17		wwr0100221	ACADEMY CULVERT REPLACEMENT	2019	BOND	-	-	-	-	200,000	-	-	-	**200,000**
18		wwr0100223	POWER STATION SWITCHGEAR	2019	BOND	3,173,659	-	411,000	-	-	-	-	-	**3,584,659**
19		wwr0100224	SCHIPPERS (STA 5) LATERAL BACKWASH CONN	2019	BOND	326,900	-	-	-	-	-	-	-	**326,900**
20		wwr0100225	MORRIS ROSE LIFT STATION IMPROVEMENT	2019	BOND	192,000	-	-	-	-	-	-	-	**192,000**
21		wwr0100228	REAL TIME DECISION SUPPORT SYSTEM (RT-DSS)	2019	BOND	2,800,000	1,600,000	1,600,000	720,000	780,000	-	-	-	**5,900,000**
22		wwr0100230	BAR SCREEN 4	2024	BOND	-	-	-	-	1,000,000	-	-	-	**1,000,000**
23		wwr0100231	FINE SCREEN PROCESS UPGRADE	2019	BOND	-	-	-	-	-	-	-	-	**-**
24		wwr0100232	KWRP ADMIN HVAC UPGRADE	2027	BOND	-	-	-	-	-	-	350,000	-	**350,000**
25		wwr0100233	WAR ROOF REPLACEMENT & EQUIP REMOVAL	2025	BOND	-	-	-	-	90,000	1,170,000	-	-	**1,260,000**
26		wwr0100234	PLANT FIBER CONNECTION	2026	BOND	-	161,000	161,000	-	-	-	-	-	**161,000**
27		wwr0100235	SLUDGE CAKE STORAGE SILOS	2024	GRANT	-	-	-	-	-	-	-	-	**-**
28		wwr0100236	SLUDGE STORAGE & THICKENING	2024	GRANT	-	-	-	-	-	-	-	-	**-**
29		wwr0100237	WW SCADA SYSTEM UPGRADE (2021-2024)	2023	BOND	-	150,000	150,000	650,000	650,000	650,000	-	-	**2,100,000**
30		wwr0100239	KWRP INTERCEPTOR BIOFILTRATION ODOR CONTROL	2020	BOND	4,215,350	-	-	-	-	-	-	-	**4,215,350**
31		wwr0100240	SCUM HANDLING	2024	BOND	-	-	-	90,000	-	1,170,000	-	-	**1,260,000**
32		wwr0100241	VACTOR/HAULED WASTE RECEIVING FACILITY	2024	GRANT	-	-	-	-	-	-	-	-	**-**
33		wwr0100242	KWRP STAFF LOCKER ROOM & PC/IT/ELEC BLDG	2024	BOND	-	-	-	-	-	-	-	-	**-**
34		wwr0100243	METER & SAMPLING STATION IMPROVEMENTS	2025	BOND	38,900	-	-	-	-	-	-	-	**38,900**
35		wwr0100244	PLANT EXTERIOR LIGHTING UPGRADE	2025	BOND	-	-	-	-	-	-	-	-	**-**
36		wwr0100245	TERTIARY SCREW PUMP #2	2025	BOND	100,000	-	-	65,000	845,000	-	-	-	**1,010,000**
37		wwr0100246	SECONDARY BLOWER #1 & #4 (CONTROLS)	2025	BOND	-	-	-	550,000			-	-	**550,000**
38		wwr0100247	INTERCEPTOR ACCESS ROAD - SPRING VALLEY	2025	BOND	-	-	-	-	-	-	-	-	**-**
39		wwr0100248	WWTP TRUCK SCALE/BUILDING	2021	BOND	750,000	-	-	-	-	-	-	-	**750,000**
40		wwr0100250	BLDG #5 MASONRY RESTORATION	2022	BOND	322,560	-	-	-	-	-	-	-	**322,560**
41		wwr0100251	WWR INTERCEPTOR ODOR EMISSIONS IMP	2025	BOND	-	-	162,000	500,000	-	-	-	-	**662,000**
42		wwr0100253	LIFT STATION IMPROVEMENTS PROGRAM	2023	BOND	-	200,000	190,000	-	-	-	-	-	**190,000**
43		wwr01xxxxx	BLDG 24 MEP SYSTEMS	2024	BOND	-	-	-	-	-	-	-	-	**-**
44		wwr01xxxxx	LOAD CENTER REPLACEMENTS	2024	BOND	-	-	-	600,000	600,000	650,000	675,000	700,000	**3,225,000**
45		wwr01xxxxx	RCS COMMUNICATIONS RING	2024	BOND	-	-	-	500,000	500,000	750,000	-	-	**1,750,000**
46		wwr01xxxxx	CITY LIFT STATION MECHANICALS PROGRAM	2024	BOND	-	-	-	200,000	200,000	200,000	100,000	-	**700,000**
47		wwr01xxxxx	CITY LIFT STATION CONTROLS PROGRAM	2024	BOND	-	-	-	150,000	150,000	150,000	100,000	-	**550,000**
48		wwr01xxxxx	CITY LIFT STATION GENERATOR PROGRAM	2024	BOND	-	-	-	150,000	150,000	150,000	100,000	-	**550,000**
49		wwr01xxxxx	TWP LIFT STATION MECHANICALS PROGRAM	2024	BOND		-	-	500,000	500,000	500,000	500,000	500,000	**2,500,000**
50		wwr01xxxxx	TWP LIFT STATION CONTROLS PROGRAM	2024	BOND	-	-	-	500,000	500,000	500,000	500,000	500,000	**2,500,000**
51		wwr01xxxxx	TWP LIFT STATION GENERATOR PROGRAM	2024	BOND		-	-	500,000	500,000	500,000	500,000	500,000	**2,500,000**
52		wwr01xxxxx	KWRP EMERGENCY COMMUNICATION SYSTEM	2024	BOND	-	-	-	-	-	20,000	260,000	260,000	**540,000**
53		wwr01xxxxx	EMERGENCY COMMUNICATIONS SUPPORT - CH GENERATOR	2024	BOND	-	-	-	400,000	-	-	-	-	**400,000**
54		wwr01xxxxx	PRIMARY SETTLING MECHANICAL REHABILITATION	2024	BOND	-	-	-	750,000	750,000	750,000	750,000	750,000	**3,750,000**
55			**TOTAL GENERAL CAPITAL**			**42,788,962**	**13,676,000**	**14,399,000**	**7,125,000**	**12,715,000**	**15,461,250**	**17,606,250**	**12,031,250**	**122,126,712**
56		**SEWER MAIN CONSTRUCTION & OVERHEAD**												
57		wwr0200000	BUDGET HOLDING - ACCOUNTING USE ONLY	2008	BOND	(85,123)	-	-	-	-	-	-	-	**(85,123)**
58		wwr0200002	SEWER CONSTRUCTION CONTINGENCY	2006	BOND	1,604,704	500,000	500,000	500,000	500,000	500,000	500,000	500,000	**4,604,704**
59		wwr0200061	SEWER TRENCHLESS REHAB PROGRAM - CITY	2019	BOND	2,196,855	1,100,000	1,100,000	750,000	750,000	900,000	900,000	1,000,000	**7,596,855**
60		wwr02xxxxx	SEWER TRENCHLESS REHAB PROGRAM - TWP	2024	BOND	-	-	-	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	**5,000,000**
61		wwr0200063	INTERCEPTOR ROAD ACCESS-ARCADIA CREEK	2019	BOND	-	-	-	-	-	-	-	-	**-**
62		wwr0200065	RANSOM ST INTERCEPTOR UPGRADE	2022	BOND	682,982	-	-	-	-	-	-	-	**682,982**
63		wwr0200065	RANSOM ST INTERCEPTOR UPGRADE	2022	CWSRF	-	4,950,000	8,000,500	-	-	-	-	-	**8,000,500**
64		wwr0200066	NEWTON CT SANITARY SEWER REPLACEMENT	2019	BOND	20,000	262,500	262,500	410,000	-	-	-	-	**692,500**
65		wwr0200067	FELLOWS CT SANITARY SEWER REPLACEMENT	2019	BOND	20,000	262,500	262,500	410,000	-	-	-	-	**692,500**
66		wwr0200073	MICHIGAN AVE SANITARY SEWER	2020	BOND	-	42,000	42,000	-	-	600,000	-	-	**642,000**
67		wwr0200074	WESTNEDGE (PIONEER-CROSSTOWN) SEWER	2022	BOND	-	321,750	321,750	-	-	-	-	-	**321,750**

CITY OF KALAMAZOO
WASTEWATER FUND
CAPITAL IMPROVEMENT PROGRAM
2024 - 2028

	A	B	C	D	E	F	K	L	M	N	O	P	Q	R
3			PROJECT	START YEAR	FUNDING SOURCE	PRIOR BUDGET	ADOPTED 2023	AMENDED 2023	2024	2025	2026	2027	2028	TOTAL PROJECT BUDGET
68		wwr0200075	6-INCH SEWER UPGRADE PROGRAM	2024	BOND	-	-	-	-	-	-	300,000	700,000	**1,000,000**
69		wwr0200077	JOHN ST K-ZOO SIPHON REPLACEMENT	2022	BOND	-	1,050,000	1,050,000	500,000	-	-	-	-	**1,550,000**
70		wwr0200078	ROSE ST SANITARY (CEDAR TO VINE)	2022	BOND	-	-	-	-	-	93,750	687,500	687,500	**1,468,750**
71		wwr0200079	N. WESTNEDGE SANITARY(ELIZABETH TO MABLE)	2022	BOND	-	-	-	26,250	192,500	-	-	-	**218,750**
72		wwr0200080	REV WRIGHT CT (CHURCH to BURDICK)	2023	BOND		461,125	461,125	1,000,000	-	-	-	-	**1,461,125**
73		wwr0200081	SEWER EXTENSION PROGRAM	2023	BOND	-	150,000	150,000	-	-	-	400,000	400,000	**950,000**
74		wwr02xxxxx	VARIOUS STREETS	2024	BOND	-	-	-	650,000	650,000	650,000	-	-	**1,950,000**
75		wwr02xxxxx	VINE STREET TRUNK CAPACITY INCREASE (PARK-JASPER)	2023	BOND	-	-	-	60,000	-	-	1,000,000	1,000,000	**2,060,000**
76		wwr02xxxxx	W. DUTTON SANITARY (PARK TO S. BURDICK)	2024	BOND	-	-	-	-	90,000	660,000	-	-	**750,000**
77		wwr02xxxxx	ACKER LN SANITARY	2024	BOND	-	-	-	-	73,125	536,250	-	-	**609,375**
78		wwr02xxxxx	ENGLESIDE TERRACE SANITARY	2025	BOND	-	-	-	-	-	195,750	1,435,500	-	**1,631,250**
79		wwr02xxxxx	BURDICK (REED TO VINE)	2024	BOND	-	-	-	90,000	675,000		-	-	**765,000**
80		wwr02xxxxx	BURDICK (CROSSTOWN TO VINE)	2024	BOND	-	-	-	-	90,000	700,000	-	-	**790,000**
81		wwr02xxxxx	WATER STREET (WESTNEDGE TO PARK)	2024	BOND	-	-	-	875,000	-	-	-	-	**875,000**
82			**TOTAL SEWER MAIN CONSTRUCTION & OVERHEAD**			**4,439,418**	**9,099,875**	**12,150,375**	**6,271,250**	**4,020,625**	**5,835,750**	**6,223,000**	**5,287,500**	**44,227,918**
83														
84		**RESIDUAL BIOSOLIDS**												
85		wwr0100252	KWRP SUSTAINABLE RESIDUAL BIOSOLIDS	2023	BOND		116,667	116,667	500,000	600,000	-	-	-	**1,216,667**
86		wwr0100252	KWRP SUSTAINABLE RESIDUAL BIOSOLIDS	2023	TBD		-	-	-	-	45,000,000	45,000,000	45,000,000	**135,000,000**
87			**TOTAL RESIDUAL BIOSOLIDS**			**-**	**116,667**	**116,667**	**500,000**	**600,000**	**45,000,000**	**45,000,000**	**45,000,000**	**136,216,667**
88														
89		**SEWER LEADS**												
90		wwr0400001	SEWER CONNECTION CONTINGENCY	2006	BOND	-	-	-	-	-	-	-	-	**-**
91		wwr0400051	LEAF COMPOST SITE	2019	BOND	134,100	-	-	-	-	-	-	-	**134,100**
92		wwr0400052	GPI EFFLUENT SERVICE REALIGNMENT	2023	BOND	-	1,720,000	1,720,000	-	-	-	-	-	**1,720,000**
93			**TOTAL SEWER LEADS**			**134,100**	**1,720,000**	**1,720,000**	**-**	**-**	**-**	**-**	**-**	**1,854,100**
94														
95			**TOTAL WASTEWATER CAPITAL IMPROVEMENT PROJECTS**			**47,362,479**	**24,612,542**	**28,386,042**	**13,896,250**	**17,335,625**	**66,297,000**	**68,829,250**	**62,318,750**	**304,425,396**
96														
97	**Wastewater Capital Outlay - Operating**								Reflects 900 codes - as of 9/28/23 in OpenGov					
98		590-536	WASTEWATER ADMINISTRATION	ANNUAL	OPERATING	137,000	60,000	60,000	30,000	30,000	30,000	30,000	30,000	**347,000**
99		590-541	WASTEWATER COLLECTIONS	ANNUAL	OPERATING	-	-	-	25,000	25,000	25,000	25,000	25,000	**125,000**
100		590-543	WASTEWATER PLANT MAINTENANCE	ANNUAL	OPERATING	2,368,000	525,000	525,000	545,000	545,000	545,000	545,000	545,000	**5,618,000**
101		590-544	WASTEWATER PROCESS CONTROLS	ANNUAL	OPERATING	1,111,100	260,000	260,000	255,000	255,000	255,000	255,000	255,000	**2,646,100**
102		590-545	WASTEWATER ENVIRONMENTAL SERVICES	ANNUAL	OPERATING	-	8,000	8,000	8,000	8,000	8,000	8,000	8,000	**48,000**
103		590-580	CITY FLEET	ANNUAL	OPERATING	1,977,000	260,000	260,000	260,000	260,000	260,000	260,000	260,000	**3,537,000**
104			**TOTAL CAPITAL OUTLAY - OPERATING**			**5,593,100**	**1,113,000**	**1,113,000**	**1,123,000**	**1,123,000**	**1,123,000**	**1,123,000**	**1,123,000**	**12,321,100**
107			**TOTAL WASTEWATER CAPITAL IMPROVEMENT PROJECTS AND CAPTIAL OUTLAY**			**52,955,579**	**25,725,542**	**29,499,042**	**15,019,250**	**18,458,625**	**67,420,000**	**69,952,250**	**63,441,750**	**316,746,496**
108														
109	**TOTAL CAPITAL IMPROVEMENT PROJECTS AND OPERATING CAPITAL OUTLAY BY FUNDING SOURCE**													
110			REVENUE BONDS AND RESERVES		BOND	47,263,679	19,662,542	20,385,542	13,896,250	17,335,625	20,865,750	19,948,000	13,437,500	**153,132,346**
111			CONTRIBUTIONS IN AID OF CAPITAL		CIA	-	-	-	-	-	-	-	-	**-**
112			CLEAN WATER STATE REVOLVING FUND		CWSRF	-	4,950,000	8,000,500	-	-	-	-	-	**8,000,500**
113			GRANTS		GRANT	98,800	-	-	-	-	431,250	3,881,250	3,881,250	**8,292,550**
114			WASTEWATER OPERATING REVENUE		OPERATING	5,593,100	1,113,000	1,113,000	1,123,000	1,123,000	1,123,000	1,123,000	1,123,000	**12,321,100**
115			**TOTAL BY FUNDING SOURCE**			**52,955,579**	**25,725,542**	**29,499,042**	**15,019,250**	**18,458,625**	**22,420,000**	**24,952,250**	**18,441,750**	**181,746,496**
116														
117														
118														
119						-	-	-	-	-	(45,000,000)	(45,000,000)	(45,000,000)	(135,000,000)

Jones & Henry
ENGINEERS, LTD.

APPENDIX B

NPDES PERMIT

PERMIT NO. MI0023299

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the federal Clean Water Act (federal Water Pollution Control Act, 33 U.S.C., Section 1251 *et seq*., as amended); Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA); Part 41, Sewerage Systems, of the NREPA; and Michigan Executive Order 2019-06,

City of Kalamazoo
241 West South Street
Kalamazoo, MI 49007

is authorized to discharge from the **Kalamazoo Water Reclamation Plant,** located at

1415 Harrison Street
Kalamazoo, MI 49007

designated as **Kalamazoo WWTP**

to the receiving water named the Kalamazoo River in accordance with effluent limitations, monitoring requirements, and other conditions set forth in this permit.

This permit is based on a complete application submitted on April 3, 2020, as amended through May 6, 2020.

This permit takes effect on September 1, 2021. The provisions of this permit are severable. After notice and opportunity for a hearing, this permit may be modified, suspended, or revoked in whole or in part during its term in accordance with applicable laws and rules. On its effective date, this permit shall supersede National Pollutant Discharge Elimination System (NPDES) Permit No. MI0023299 (expiring October 1, 2020).

This permit and the authorization to discharge shall expire at midnight on **October 1, 2025**. In order to receive authorization to discharge beyond the date of expiration, the permittee shall submit an application that contains such information, forms, and fees as are required by the Michigan Department of Environment, Great Lakes, and Energy (Department) by **April 4, 2025**.

Issued: July 28, 2021.

Original signed by Christine Alexander
Christine Alexander, Manager
Permits Section
Water Resources Division

PERMIT FEE REQUIREMENTS

In accordance with Section 324.3120 of the NREPA, the permittee shall make payment of an annual permit fee to the Department for each October 1 the permit is in effect regardless of occurrence of discharge. The permittee shall submit the fee in response to the Department's annual notice. Payment may be made electronically via the Department's MiWaters system. The MiWaters website is located at https://miwaters.deq.state.mi.us. Payment shall be submitted or postmarked by January 15 for notices mailed by December 1. Payment shall be submitted or postmarked no later than 45 days after receiving the notice for notices mailed after December 1.

Annual Permit Fee Classification: Municipal Major, 50 MGD to less than 500 MGD (Individual Permit)

In accordance with Section 324.3118 of the NREPA, the permittee shall make payment of an annual storm water fee to the Department for each January 1 the permit is in effect regardless of occurrence of discharge. The permittee shall submit the fee in response to the Department's annual notice. Payment may be made electronically via the Department's MiWaters system. The MiWaters website is located at https://miwaters.deq.state.mi.us. Payment shall be submitted or postmarked by March 15 for notices mailed by February 1. Payment shall be submitted or postmarked no later than 45 days after receiving the notice for notices mailed after February 1.

In accordance with Section 324.3132 of the NREPA, the permittee shall make payment of an annual biosolids land application fee to the Department if the permittee land applies biosolids. The permittee shall submit the fee in response to the Department's annual notice. Payment may be made electronically via the Department's MiWaters system. The MiWaters website is located at https://miwaters.deq.state.mi.us. Payment shall be submitted or postmarked no later than January 31 of each year for notices mailed by December 15. Payment shall be submitted or postmarked no later than 45 days after receiving the notice for notices mailed after December 15.

CONTACT INFORMATION

Unless specified otherwise, all contact with the Department required by this permit shall be made to the Kalamazoo District Office of the Water Resources Division. The Kalamazoo District Office is located at 7953 Adobe Road, Kalamazoo, MI 49009-5025, Telephone: 269-567-3500, Fax: 269-567-9440.

CONTESTED CASE INFORMATION

Any person who is aggrieved by this permit may file a sworn petition with the Michigan Administrative Hearing System within the Michigan Department of Licensing and Regulatory Affairs, c/o the Michigan Department of Environment, Great Lakes, and Energy, setting forth the conditions of the permit which are being challenged and specifying the grounds for the challenge. The Department of Licensing and Regulatory Affairs may reject any petition filed more than 60 days after issuance as being untimely.

PART I

Section A. Limitations and Monitoring Requirements

1. Final Effluent Limitations, Monitoring Point 001A

During the period beginning on the effective date of this permit and lasting until the expiration date of this permit, the permittee is authorized to discharge treated municipal wastewater from Monitoring Point 001A through Outfall 001. Outfall 001 discharges to the Kalamazoo River at Latitude 42.30824, Longitude -85.57218. Such discharge shall be limited and monitored by the permittee as specified below.

	Maximum Limits for Quantity or Loading				Maximum Limits for Quality or Concentration					
Parameter	Monthly	7-Day	Daily	Units	Monthly	7-Day	Daily	Units	Monitoring Frequency	Sample Type
Flow	(report)	---	(report)	MGD	---	---	---	---	Daily	Report Total Daily Flow
Carbonaceous Biochemical Oxygen Demand (CBOD5)										
May – September	1800	4500	(report)	lbs/day	4	---	10	mg/l	Daily	24-Hr Composite
October	4400	6700	(report)	lbs/day	---	---	15	mg/l	Daily	
November	8000	12000	(report)	lbs/day	---	---	27	mg/l	Daily	
December – April	11000	18000	(report)	lbs/day	25	40	(report)	mg/l	Daily	
Total Suspended Solids (TSS)										
May – September	8900	13000	(report)	lbs/day	20	30	(report)	mg/l	Daily	24-Hr Composite
October – April	13000	20000	(report)	lbs/day	30	45	(report)	mg/l	Daily	
Ammonia Nitrogen (as N)										
May – September	220	890	(report)	lbs/day	0.5	---	2.0	mg/l	Daily	24-Hr Composite
October	---	2900	(report)	lbs/day	---	---	6.5	mg/l	Daily	
November – April	(report)	---	(report)	lbs/day	(report)	---	(report)	mg/l	Weekly	
Total Phosphorus (as P)	225	---	(report)	lbs/day	1.0	---	(report)	mg/l	Daily	24-Hr Composite
Chloride	---	---	---	---	(report)	---	(report)	mg/l	Monthly	24-Hr Composite
Sulfate	---	---	---	---	(report)	---	(report)	mg/l	Monthly	24-Hr Composite
Fecal Coliform Bacteria	---	---	---	---	200	400	(report)	cts/ 100 ml	Daily	Grab
Total Residual Chlorine	---	---	---	---	---	---	38	ug/l	Daily	Grab
Available Cyanide	4.5	---	(report)	lbs/day	10	---	(report)	ug/l	Quarterly	Grab
Total Lithium	380	---	(report)	lbs/day	850	---	(report)	ug/l	Quarterly	Grab
Perfluorooctane Sulfonate (PFOS)	(report)	---	(report)	lbs/day	(report)	---	(report)	ng/l	Quarterly	Grab
Perfluorooctanoic Acid (PFOA)	(report)	---	(report)	lbs/day	(report)	---	(report)	ug/l	Quarterly	Grab
Hexachlorobenzene	**---**	**---**	**---**	**---**	**---**	**---**	<0.01	ug/l	Monthly	24-Hr Composite
Whole Effluent Toxicity (*C. dubia* and fathead minnow)										
Acute Toxicity	---	---	---	---	---	---	1.0	TU_A	Quarterly	24-Hr Composite
						Individual Chronic Value				
Chronic Toxicity	---	---	---	---	2.0	---	(report)	TU_C	Quarterly	24-Hr Composite

PART I

Section A. Limitations and Monitoring Requirements

	Maximum Limits for Quantity or Loading				Maximum Limits for Quality or Concentration					
Parameter	**Monthly**	**7-Day**	**Daily**	**Units**	**Monthly**	**7-Day**	**Daily**	**Units**	**Monitoring Frequency**	**Sample Type**
Total Mercury										
Corrected	(report)	---	(report)	lbs/day	(report)	---	(report)	ng/l	Quarterly	Calculation
Uncorrected	---	---	---	---	---	---	(report)	ng/l	Quarterly	Grab
Field Duplicate	---	---	---	---	---	---	(report)	ng/l	Quarterly	Grab
Field Blank	---	---	---	---	---	---	(report)	ng/l	Quarterly	Preparation
Laboratory Method Blank	---	---	---	---	---	---	(report)	ng/l	Quarterly	Preparation
	12-Month Rolling Avg				**12-Month Rolling Avg**					
Total Mercury	0.0013	---	---	lbs/day	3.0	---	---	ng/l	Quarterly	Calculation
					Minimum % Monthly		**Minimum % Daily**			
CBOD5 Minimum % Removal										
December – April	---	---	---	---	85	---	(report)	%	Monthly	Calculation
TSS Minimum % Removal										
October – April	---	---	---	---	85	---	(report)	%	Monthly	Calculation
					Minimum Daily		**Maximum Daily**			
pH	---	---	---	---	6.5	---	9.0	S.U.	Daily	Grab
Dissolved Oxygen	---	---	---	---	4.0	---	---	mg/l	Daily	Grab

The following design flow was used in determining the above limitations, but is not to be considered a limitation or actual capacity: 53.5 MGD.

a. Narrative Standard
The receiving water shall contain no turbidity, color, oil films, floating solids, foams, settleable solids, or deposits as a result of this discharge in unnatural quantities which are or may become injurious to any designated use.

b. Sampling Locations
Samples for CBOD5, TSS, Ammonia Nitrogen, Total Phosphorus, Chloride, Sulfate, Hexachlorobenzene, Acute Toxicity, Chronic Toxicity, and Total Mercury shall be taken prior to disinfection. Samples for Fecal Coliform Bacteria, Total Residual Chlorine, Available Cyanide, Total Lithium, PFOS, PFOA, pH, and Dissolved Oxygen shall be taken after disinfection. The Department may approve alternate sampling locations that are demonstrated by the permittee to be representative of the effluent.

Section A. Limitations and Monitoring Requirements

c. Quarterly Monitoring
Quarterly samples shall be taken during the months of January, April, July, and October. If the facility does not discharge during these months, the permittee shall sample the next discharge occurring during the period in question. If the facility does not discharge during the period in question, a sample is not required for that period. For any month in which a sample is not taken, the permittee shall enter "*G" on the Discharge Monitoring Report (DMR). (For purposes of reporting on the Daily tab of the DMR, the permittee shall enter "*G" on the first day of the month only).

d. Total Residual Chlorine (TRC)
Compliance with the TRC limit shall be determined on the basis of one (1) or more grab samples. If more than one (1) sample per day is taken, the additional samples shall be collected in near equal intervals over at least eight (8) hours. The samples shall be analyzed immediately upon collection and the average reported as the daily concentration. Samples shall be analyzed in accordance with Part II.B.2. of this permit.

e. Percent Removal Requirements
Monthly percent removal shall be calculated based on the monthly average effluent CBOD5 and TSS concentrations and the monthly average influent concentrations for approximately the same period. Daily percent removal shall be calculated based on the daily effluent CBOD5 and TSS concentrations and the daily influent concentrations for the same day. Reporting of Daily percent removal is only required on days on which an influent sample is obtained.

f. Monitoring Frequency Reduction for Available Cyanide, Total Lithium, and Hexachlorobenzene
After the submittal of 24 months of data, the permittee may request, in writing, Department approval for a reduction in monitoring frequency for Available Cyanide, Total Lithium, and/or Hexachlorobenzene. This request shall contain an explanation as to why the reduced monitoring is appropriate. Upon receipt of written approval and consistent with such approval, the permittee may reduce the monitoring frequency indicated in Part I.A.1. of this permit. The monitoring frequency for Available Cyanide, Total Lithium, and Hexachlorobenzene shall not be reduced to less than annually. The Department may revoke the approval for reduced monitoring at any time upon notification to the permittee.

g. Monitoring Frequency Reduction for Perfluorooctane Sulfonate (PFOS) and/or Perfluorooctanoic Acid (PFOA)
After the submittal of 36 months of quarterly data or at least 10 equally spaced sample results obtained over a minimum of three (3) months, the permittee may request, in writing, Department approval of a reduction in monitoring frequency for PFOS and/or PFOA. This request shall contain an explanation as to why the reduced monitoring is appropriate. Upon receipt of written approval and consistent with such approval, the permittee may reduce the monitoring frequency indicated in Part I.A.1. of this permit. The monitoring frequency for PFOS and/or PFOA shall not be reduced to less than annually. The Department may revoke the approval for reduced monitoring at any time upon notification to the permittee.

h. Limits Below the Quantification Level – Hexachlorobenzene
The sampling procedures, preservation and handling, and analytical protocol for compliance monitoring for Hexachlorobenzene shall be in accordance with EPA Method 612. Upon approval from the Department, the permittee may use alternate analytical methods (for parameters with methods specified in 40 CFR, Part 136, the alternate methods are restricted to those listed in 40 CFR, Part 136). The quantification level shall be 0.01 ug/l unless a higher level is appropriate because of sample matrix interference. Justification for a higher quantification level shall be submitted to the Department within 30 days of such determination.

PART I

Section A. Limitations and Monitoring Requirements

The water quality-based effluent limitation for Hexachlorobenzene is a maximum monthly average of 0.0003 ug/l (0.0001 lbs/day). This is less than the quantification level. Control requirements are therefore established consistent with R 323.1213. **Any discharge of Hexachlorobenzene at or above the quantification level is a specific violation of this permit**. If concentrations in all samples representing a monitoring period are less than the quantification level, the permittee will be considered to be in compliance with the permit for the monitoring period that the samples represent, provided that the permittee is also in full compliance with the Pollutant Minimization Program for Hexachlorobenzene set forth in Part I.A.5. of this permit. For the purpose of reporting on the Daily tab of the DMR, individual sample results less than the quantification level shall be reported as "<0.01." Calculations shall be made using the quantification level in place of any sample result less than the quantification level, and the calculated value ("X") resulting from any calculation made using one or more sample results below quantification shall be reported as less than the calculated value X (i.e., "<X"). For additional guidance including examples, see the document entitled "Reporting Results Below Quantification," available at: https://www.michigan.gov/documents/deq/wrd-npdes-results-quantification_620791_7.pdf.

This permit condition does not authorize the discharge of this parameter at levels that are injurious to the designated uses of the waters of the state or that constitute a threat to the public health or welfare.

i. Final Effluent Limitation for Total Mercury
The final limit for total mercury is the Discharge Specific Level Currently Achievable (LCA) based on a multiple discharger variance from the WQBEL of 1.3 ng/l, pursuant to Rule 1103(9) of the Water Quality Standards. Compliance with the LCA shall be determined as a 12-month rolling average, the calculation of which may be done using blank-corrected sample results. The 12-month rolling average shall be determined by adding the present monthly average result to the preceding 11 monthly average results then dividing the sum by 12. For facilities with quarterly monitoring requirements for total mercury, quarterly monitoring shall be equivalent to three (3) months of monitoring in calculating the 12-month rolling average. Facilities that monitor more frequently than monthly for total mercury must determine the monthly average result, which is the sum of the results of all data obtained in a given month divided by the total number of samples taken, in order to calculate the 12-month rolling average. If the 12-month rolling average for any quarter is less than or equal to the LCA, the permittee will be considered to be in compliance for total mercury for that quarter, provided the permittee is also in full compliance with the Pollutant Minimization Program for Total Mercury, set forth in Part I.A.4. of this permit.

j. Total Mercury Testing and Additional Reporting Requirements
The analytical protocol for total mercury shall be in accordance with EPA Method 1631, Revision E, "Mercury in Water by Oxidation, Purge and Trap, and Cold Vapor Atomic Fluorescence Spectrometry," EPA-821-R-02-019, August 2002. The quantification level for total mercury shall be 0.5 ng/l, unless a higher level is appropriate because of sample matrix interference. Justification for higher quantification levels shall be submitted to the Department within 30 days of such determination.

The use of clean technique sampling procedures is required unless the permittee can demonstrate to the Department that an alternate sampling procedure is representative of the discharge. Guidance for clean technique sampling is contained in EPA Method 1669, "Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels (Sampling Guidance)," EPA-821-R96-001, July 1996. Information and data documenting the permittee's sampling and analytical protocols and data acceptability shall be submitted to the Department upon request.

In order to demonstrate compliance with EPA Method 1631E and EPA Method 1669, the permittee shall report, on the daily sheet, the analytical results of all field blanks and field duplicates collected in conjunction with each sampling event, as well as laboratory method blanks when used for blank correction. The permittee shall collect at least one (1) field blank and at least one (1) field duplicate per sampling event. If more than ten (10) samples are collected during a sampling event, the permittee shall collect at least one (1) additional field blank AND field duplicate for every ten (10) samples

PART I

Section A. Limitations and Monitoring Requirements

collected. Only field blanks or laboratory method blanks may be used to calculate a concentration lower than the actual sample analytical results (i.e., a blank correction). Only one (1) blank (field OR laboratory method) may be used for blank correction of a given sample result, and only if the blank meets the quality control acceptance criteria. If blank correction is not performed on a given sample analytical result, the permittee shall report under "Total Mercury – Corrected" the same value reported under "Total Mercury – Uncorrected." The field duplicate is for quality control purposes only; its analytical result shall not be averaged with the sample result.

k. Whole Effluent Toxicity Final Requirements
Test species shall include fathead minnow **and** *Ceriodaphnia dubia*. Testing and reporting procedures shall follow procedures contained in EPA-821-R-02-013, "Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" (Fourth Edition). When the effluent ammonia nitrogen (as N) concentration is greater than 3 mg/l, the pH of the toxicity test shall be maintained at a pH of 8 Standard Units. The acute toxic unit (TU_A) value and chronic toxic unit (TU_C) value for **each species tested** shall be reported on the DMR. If multiple chronic toxicity tests for the same species are performed during the month, the maximum TU_A value and monthly average TU_C value for the species shall be reported. For **each species not tested**, the permittee shall enter **"*W"** on the DMR. (For purposes of reporting on the Daily tab of the DMR, the permittee shall enter "*W" on the first day of the month only). Completed toxicity test reports for each test conducted shall be retained by the permittee in accordance with the requirements of Part II.B.5. of this permit and shall be available for review by the Department upon request. Toxicity test data acceptability is contingent upon validation of the test method by the testing laboratory. Such validation shall be submitted to the Department upon request.

1) When monitoring shows persistent exceedance of the 2.0 TU_C limit or the 1.0 TU_A limit for effluent toxicity, the Department will determine whether the permittee must implement the toxicity control program requirements specified in 2), below.

2) Upon written notification by the Department, the following conditions apply. Within 90 days of the notification, the permittee shall implement a Toxicity Reduction Evaluation (TRE). The objective of the TRE shall be to reduce the toxicity of the final effluent from Monitoring Point 001A to $<2.0\ TU_C$ and $<1.0\ TU_A$. The following documents are available as guidance to reduce toxicity to acceptable levels: Phase I, EPA/600/6-91/005F (chronic), EPA/600/6-91/003 (acute); Phase II, EPA/600/R-92/080 (acute and chronic); Phase III, EPA/600/R-92/081 (acute and chronic); and Publicly Owned Treatment Works (POTWs), EPA/833B-99/002. Annual reports shall be submitted to the Department within 30 days of the completion of the last test of each annual cycle.

l. Reduction of Total Phosphorus in the Kalamazoo River/Lake Allegan Watershed
The Department has developed a Total Maximum Daily Load (TMDL) for total phosphorus in Lake Allegan. The TMDL is established to protect Lake Allegan from high nutrient levels which has resulted in violations of water quality standards. In addition to establishing the TMDL, the Department is signatory to a "Cooperative Agreement to Meet Total Maximum Daily Load (TMDL) for Phosphorus" (cooperative agreement). Signatories to the cooperative agreement include point source dischargers of phosphorus and other stakeholders including nonpoint source contributors. The signatories to the cooperative agreement have agreed to participate with other point and nonpoint contributors in the watershed to reduce phosphorus as necessary to meet the goals of the TMDL. This will be accomplished by continuing activities outlined in the phosphorus reduction implementation plans as well as other activities as specified in the cooperative agreement.

If it is determined that commitments under the cooperative agreement are not met, this permit may be modified to include the appropriate phosphorus requirements in accordance with applicable laws and rules.

Section A. Limitations and Monitoring Requirements

2. Quantification Levels and Analytical Methods for Selected Parameters

Maximum acceptable quantification levels (QLs) are specified for selected parameters in the table below. These QLs shall be considered the maximum acceptable unless a higher QL is appropriate because of sample matrix interference. Justification for higher QLs shall be submitted to the Department within 30 days of such determination. Where necessary to help ensure that the QLs specified herein can be achieved, analytical methods may also be specified in the table below. The sampling procedures, preservation and handling, and analytical protocol for all monitoring conducted in compliance with this permit, including monitoring conducted to meet the requirements of the application for permit reissuance, shall be in accordance with the methods specified herein, or in accordance with Part II.B.2. of this permit if no method is specified herein, unless an alternate method is approved by the Department. The Department will consider only alternate methods that meet the requirements of Part II.B.2. and whose QLs are at least as sensitive (i.e., low) as those specified herein. **Not all QLs are expressed in the same units in the table below**. The table is continued on the following page:

Parameter	QL	Units	Analytical Method
1,2-Diphenylhydrazine (as Azobenzene)	3.0	ug/l	
2,4,6-Trichlorophenol	5.0	ug/l	
2,4-Dinitrophenol	19	ug/l	
3,3'-Dichlorobenzidine	1.5	ug/l	
4-Chloro-3-Methylphenol	7.0	ug/l	
4,4'-DDD	0.01	ug/l	
4,4'-DDE	0.01	ug/l	
4,4'-DDT	0.01	ug/l	
Acrylonitrile	1.0	ug/l	
Aldrin	0.01	ug/l	
Alpha-Endosulfan	0.01	ug/l	
Alpha-Hexachlorocyclohexane	0.01	ug/l	
Antimony, Total	1	ug/l	
Arsenic, Total	1	ug/l	
Barium, Total	5	ug/l	
Benzidine	0.1	ug/l	
Beryllium, Total	1	ug/l	
Beta-Endosulfan	0.01	ug/l	
Beta-Hexachlorocyclohexane	0.01	ug/l	
Bis (2-Chloroethyl) Ether	1.0	ug/l	
Bis (2-Ethylhexyl) Phthalate	5.0	ug/l	
Boron, Total	20	ug/l	
Cadmium, Total	0.2	ug/l	
Chlordane	0.01	ug/l	
Chloride	1.0	mg/l	
Chromium, Hexavalent	5	ug/l	
Chromium, Total	10	ug/l	
Copper, Total	1	ug/l	
Cyanide, Available	2	ug/l	EPA Method OIA 1677
Cyanide, Total	5	ug/l	
Delta-Hexachlorocyclohexane	0.01	ug/l	
Dieldrin	0.01	ug/l	

PART I

Section A. Limitations and Monitoring Requirements

Parameter	QL	Units	Analytical Method
Di-N-Butyl Phthalate	9.0	ug/l	
Endosulfan Sulfate	0.01	ug/l	
Endrin	0.01	ug/l	
Endrin Aldehyde	0.01	ug/l	
Fluoranthene	1.0	ug/l	
Heptachlor	0.01	ug/l	
Heptachlor Epoxide	0.01	ug/l	
Hexachlorobenzene	0.01	ug/l	
Hexachlorobutadiene	0.01	ug/l	
Hexachlorocyclopentadiene	0.01	ug/l	
Hexachloroethane	5.0	ug/l	
Lead, Total	1	ug/l	
Lindane	0.01	ug/l	
Lithium, Total	10	ug/l	
Mercury, Total	0.5	ng/l	EPA Method 1631E
Nickel, Total	5	ug/l	
PCB-1016	0.1	ug/l	
PCB-1221	0.1	ug/l	
PCB-1232	0.1	ug/l	
PCB-1242	0.1	ug/l	
PCB-1248	0.1	ug/l	
PCB-1254	0.1	ug/l	
PCB-1260	0.1	ug/l	
Pentachlorophenol	1.8	ug/l	
Perfluorooctane sulfonate (PFOS)	2.0	ng/l	ASTM D7979 or an isotope dilution method (sometimes referred to as Method 537 modified)
Perfluorooctanoic acid (PFOA)	0.002	ug/l	ASTM D7979 or an isotope dilution method (sometimes referred to as Method 537 modified)
Phenanthrene	1.0	ug/l	
Phosphorus (as P), Total	10	ug/l	
Selenium, Total	1.0	ug/l	
Silver, Total	0.5	ug/l	
Strontium, Total	1000	ug/l	
Sulfate	2.0	mg/l	
Sulfides, Dissolved	20	ug/l	
Thallium, Total	1	ug/l	
Toxaphene	0.1	ug/l	
Vinyl Chloride	1.0	ug/l	
Zinc, Total	10	ug/l	

PART I

Section A. Limitations and Monitoring Requirements

3. Additional Monitoring Requirements

As a condition of this permit, the permittee shall monitor the discharge from monitoring point 001A for the constituents identified below. This monitoring is an application requirement of 40 CFR 122.21(j), effective December 2, 1999. Testing shall be conducted in October 2021, May 2022, March 2023, and August 2024. Grab samples shall be collected for total phenols and the Perfluoroalkyl and Polyfluoroalkyl Substances and Volatile Organic Compounds identified below. For all other parameters, 24-hour composite samples shall be collected.

The results of such additional monitoring shall be submitted with the application for reissuance (see the cover page of this permit for the application due date). The permittee shall notify the Department within 14 days of completing the monitoring for each month specified above in accordance with Part II.C.5. Additional reporting requirements are specified in Part II.C.11. If, upon review of the analysis, it is determined that additional requirements are needed to protect the receiving waters in accordance with applicable water quality standards, the permit may then be modified by the Department in accordance with applicable laws and rules.

Hardness
calcium carbonate

Metals (Total Recoverable) and Total Phenols

antimony	arsenic	nickel	beryllium
cadmium	chromium	zinc	copper
lead	thallium	selenium	silver
total phenolic compounds			

Volatile Organic Compounds

acrolein	acrylonitrile	benzene	bromoform
carbon tetrachloride	chlorobenzene	chlorodibromomethane	chloroethane
2-chloroethylvinyl ether	chloroform	dichlorobromomethane	1,1-dichloroethane
1,2-dichloroethane	trans-1,2-dichloroethylene	1,1-dichloroethylene	1,2-dichloropropane
1,3-dichloropropylene	ethylbenzene	methyl bromide	methyl chloride
methylene chloride	1,1,2,2-tetrachloroethane	tetrachloroethylene	toluene
1,1,1-trichloroethane	1,1,2-trichloroethane	trichloroethylene	vinyl chloride

Acid-Extractable Compounds

4-chloro-3-methylphenol	2-chlorophenol	2,4-dichlorophenol	2,4-dimethylphenol
4,6-dinitro-o-cresol	2,4-dinitrophenol	2-nitrophenol	4-nitrophenol
Pentachlorophenol	phenol	2,4,6-trichlorophenol	

Base/Neutral Compounds

acenaphthene	acenaphthylene	anthracene	benzidine
benzo(a)anthracene	benzo(a)pyrene	3,4-benzofluoranthene	benzo(ghi)perylene
benzo(k)fluoranthene	bis(2-chloroethoxy)methane	bis(2-chloroethyl)ether	bis(2-chloroisopropyl)ether
bis(2-ethylhexyl)phthalate	4-bromophenyl phenyl ether	butyl benzyl phthalate	2-chloronaphthalene
4-chlorophenyl phenyl ether	chrysene	di-n-butyl phthalate	di-n-octyl phthalate
dibenzo(a,h)anthracene	1,2-dichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene
3,3'-dichlorobenzidine	diethyl phthalate	dimethyl phthalate	2,4-dinitrotoluene
2,6-dinitrotoluene	1,2-diphenylhydrazine	fluoranthene	fluorene
hexachlorobutadiene	hexachlorocyclo-pentadiene	hexachloroethane	isophorone
indeno(1,2,3-cd)pyrene	naphthalene	nitrobenzene	pyrene
n-nitrosodi-n-propylamine	n-nitrosodimethylamine	n-nitrosodiphenylamine	phenanthrene
1,2,4-trichlorobenzene			

PART I

Section A. Limitations and Monitoring Requirements

4. Pollutant Minimization Program for Total Mercury

The goal of the Pollutant Minimization Program is to maintain the effluent concentration of total mercury at or below 1.3 ng/l. The permittee shall modify the Pollutant Minimization Program approved on July 6, 1990, and modifications thereto, to proceed toward the goal. The Pollutant Minimization Program includes the following:

a. an annual review and annual monitoring of potential sources of mercury entering the wastewater collection system;

b. a program for semi-annual monitoring of influent and periodic monitoring of sludge for mercury; and

c. implementation of reasonable cost-effective control measures when sources of mercury are discovered. Factors to be considered include significance of sources, economic considerations, and technical and treatability considerations.

On or before March 31 of each year, the permittee shall submit a status report to the Department for the previous calendar year that includes 1) the monitoring results for the previous year, 2) an updated list of potential mercury sources, and 3) a summary of all actions taken to reduce or eliminate identified sources of mercury.

Any information generated as a result of the Pollutant Minimization Program set forth in this permit may be used to support a request to modify the approved program or to demonstrate that the Pollutant Minimization Program requirement has been completed satisfactorily.

A request for modification of the approved program and supporting documentation shall be submitted in writing to the Department for review and approval. The Department may approve modifications to the approved program (approval of a program modification does not require a permit modification), including a reduction in the frequency of the requirements under items a. and b. above.

This permit may be modified in accordance with applicable laws and rules to include additional mercury conditions and/or limitations as necessary.

5. Pollutant Minimization Program for Hexachlorobenzene

This requirement establishes the program necessary to comply with the final effluent limitations for Hexachlorobenzene. The goal of the Pollutant Minimization Program is to maintain the effluent concentration of Hexachlorobenzene at or below the water quality-based effluent limitation set forth in Part I.A.1.h. The permittee shall develop and implement a Pollutant Minimization Program in accordance with the following schedule:

On or before December 1, 2021, the permittee shall submit to the Department an approvable Pollutant Minimization Program for Hexachlorobenzene designed to proceed toward the goal. The Pollutant Minimization Program shall be implemented upon approval by the Department. The Pollutant Minimization Program shall include the following:

a. an annual review and semi-annual monitoring of potential sources of Hexachlorobenzene entering the wastewater collection system;

b. a program for quarterly monitoring of influent and periodic monitoring of sludge for Hexachlorobenzene; and

c. implementation of reasonable cost-effective control measures when sources of Hexachlorobenzene are discovered. Factors to be considered include significance of sources, economic considerations, and technical and treatability considerations.

Section A. Limitations and Monitoring Requirements

On or before September 1 of each year following approval of the Pollutant Minimization Program, the permittee shall submit a status report to the Department that includes 1) the monitoring results for the previous year, 2) an updated list of potential sources, and 3) a summary of all actions taken to reduce or eliminate identified sources of Hexachlorobenzene.

Any information generated as a result of the Pollutant Minimization Program set forth in this permit may be used to support a request to modify the approved program or may demonstrate that the Pollutant Minimization Program requirement has been completed satisfactorily.

A request for modification of the approved program and supporting documentation shall be submitted in writing to the Department for review and approval. The Department may approve modifications to the approved program (approval of a program modification does not require a permit modification).

The permittee may choose to demonstrate that the program is complete and request removal of the program from the permit. Such request and supporting documentation demonstrating that the water quality-based effluent limits are being achieved shall be submitted in writing to the Department. If the Department determines that the request is approvable, this permit may be modified in accordance with applicable laws and rules to remove this requirement.

This permit may be modified in accordance with applicable laws and rules to include additional conditions and/or limitations as necessary.

6. Pollutant Minimization and Source Evaluation Program for Perfluorooctane Sulfonate (PFOS) and/or Perfluorooctanoic Acid (PFOA)

The goal of the Pollutant Minimization and Source Evaluation Program is to identify and address sources of PFOS and/or PFOA and to reduce and maintain the effluent concentrations of PFOS and/or PFOA at or below the water quality-based effluent limitations (WQBELs). The WQBELs are 12 ng/l for PFOS and 41 ug/l for PFOA.

Within 90 days of written notification by the Department or after the permittee notifies the Department that the final effluent concentration of PFOS and/or PFOA has exceeded the WQBELs, the permittee shall submit to the Department an approvable Pollutant Minimization and Source Evaluation Program for PFOS and/or PFOA to proceed toward the goal. The Pollutant Minimization and Source Evaluation Program shall continue work under the Industrial Pretreatment Program Per- and Polyfluoroalkyl Substances (IPP PFAS) Initiative and shall include the following at a minimum:

a. identification of and strategies to identify any additional potential and probable PFOS and/or PFOA sources;

b. monitoring plan for the permitted facility's influent and effluent, as well as effluent from potential sources;

c. implemented measures thus far to eliminate, reduce, and/or control sources, and an assessment of the degree of success and the strategies used to measure success; and

d. proposed measures and implementation schedules for elimination, control, and/or reduction of the identified sources (prioritizing highest loadings and concentrations), and the strategies that will be used to measure success.

The Pollutant Minimization and Source Evaluation Program shall be implemented upon approval by the Department.

Section A. Limitations and Monitoring Requirements

On or before May 1 of each year following Pollutant Minimization and Source Evaluation Program implementation, the permittee shall submit to the Department a status report for the previous calendar year. Upon written notification by the Department, the permittee may be required to submit more frequent status reports. Status reports at a minimum shall include:

a. complete listing of PFOS and/or PFOA sources;

b. summary of influent and effluent monitoring data;

c. summary of monitoring data from known or potential sources;

d. history and compliance status for sources;

e. implemented measures to eliminate, reduce, or control sources, (prioritizing highest loadings and concentrations), and an assessment of the degree of success and the strategies used to measure success;

f. proposed measures and schedules for elimination, control, or reduction of any newly identified PFOS and/or PFOA sources (prioritizing highest loadings and concentrations), and the strategies that will be used to measure success;

g. barriers to implementation and revisions to the implementation schedule; and

h. laboratory reports, if not previously supplied.

Any information generated as a result of the Pollutant Minimization and Source Evaluation Program set forth in this permit may be used to support a request to modify the Pollutant Minimization and Source Evaluation Program or to demonstrate that the requirement has been completed satisfactorily.

A request for modification of the approved Pollutant Minimization and Source Evaluation Program shall be submitted in writing to the Department along with supporting documentation for review and approval. The Department may approve modifications to the approved Pollutant Minimization and Source Evaluation Program, including a reduction in the frequency of the influent and known or potential source monitoring requirements. Approval of a Pollutant Minimization and Source Evaluation Program modification does not require a permit modification.

This permit may be modified in accordance with applicable laws and rules to include additional PFOS and/or PFOA conditions and/or limitations as necessary.

7. Untreated or Partially Treated Sewage Discharge Reporting and Testing Requirements

In accordance with Section 324.3112a of the NREPA, if untreated or partially treated sewage is directly or indirectly discharged from a sewer system onto land or into the waters of the state, the permittee shall immediately, but not more than 24 hours after the discharge begins, notify local health departments, a daily newspaper of general circulation in the county in which the permittee is located, and a daily newspaper of general circulation in the county or counties in which the municipalities whose waters may be affected by the discharge are located, that the discharge is occurring. The permittee shall also notify the Department via its MiWaters system on the form entitled “Report of Discharge (CSO\SSO\RTB).” The MiWaters website is located at https://miwaters.deq.state.mi.us. At the conclusion of the discharge, the permittee shall make all such notifications specified in, and in accordance with, Section 324.3112a of the NREPA, and shall notify the Department via its MiWaters system on the form entitled “Report of Discharge (CSO\SSO\RTB).”

Section A. Limitations and Monitoring Requirements

The permittee shall also annually contact municipalities, including the superintendent of a public drinking water supply with potentially affected intakes, whose waters may be affected by the permittee's discharge of untreated or partially treated sewage, and if those municipalities wish to be notified in the same manner as specified above, the permittee shall provide such notification.

Additionally, in accordance with Section 324.3112a of the NREPA, each time a discharge of untreated or partially treated sewage occurs, the permittee shall test the affected waters for *Escherichia coli* to assess the risk to the public health as a result of the discharge and shall provide the test results to the affected local county health departments and to the Department. The results of this testing shall be submitted to the Department via MiWaters as part of the notification specified above, or, if the results are not yet available, submitted as soon as they become available. This testing is not required if it has been waived by the local health department, or if the discharge(s) did not affect surface waters. The testing shall be done at locations specified by each affected local county health department but shall not exceed 10 tests for each separate discharge event. The affected local county health department may waive this testing requirement if it determines that such testing is not needed to assess the risk to the public health as a result of the discharge event.

Permittees accepting sanitary or municipal sewage from other sewage collection systems are encouraged to notify the owners of those systems of the above reporting and testing requirements.

8. Facility Contact

The "Facility Contact" was specified in the application. The permittee may replace the facility contact at any time, and shall notify the Department in writing within 10 days after replacement (including the name, address and telephone number of the new facility contact).

a. The facility contact shall be (or a duly authorized representative of this person):
- for a corporation, a principal executive officer of at least the level of vice president; or a designated representative if the representative is responsible for the overall operation of the facility from which the discharge originates, as described in the permit application or other NPDES form,
- for a partnership, a general partner,
- for a sole proprietorship, the proprietor, or
- for a municipal, state, or other public facility, either a principal executive officer, the mayor, village president, city or village manager or other duly authorized employee.

b. A person is a duly authorized representative only if:
- the authorization is made in writing to the Department by a person described in paragraph a. of this section; and
- the authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the facility (a duly authorized representative may thus be either a named individual or any individual occupying a named position).

Nothing in this section releases the permittee from properly submitting reports and forms as required by law.

Section A. Limitations and Monitoring Requirements

9. Monthly Operating Reports

Part 41 of Act 451 of 1994 as amended, specifically Section 324.4106 and associated R 299.2953, requires that the permittee file with the Department, on forms prescribed by the Department, operating reports showing the effectiveness of the treatment facility operation and the quantity and quality of liquid wastes discharged into waters of the state.

Within 30 days of the effective date of this permit, the permittee shall submit to the Department a revised treatment facility monitoring program to address monitoring requirement changes reflected in this permit, or submit justification explaining why monitoring requirement changes reflected in this permit do not necessitate revisions to the treatment facility monitoring program. The permittee shall implement the revised treatment facility monitoring program upon approval from the Department. Applicable forms and guidance are available on the Department's web site at https://www.michigan.gov/egle/0,9429,7-135-3313_71618_44117---,00.html. The permittee may use alternate forms if they are consistent with the approved treatment facility monitoring program. Unless the Department provides written notification to the permittee that monthly submittal of operating reports is required, operating reports that result from implementation of the approved treatment facility monitoring program shall be maintained on site for a minimum of three (3) years and shall be made available to the Department for review upon request.

10. Asset Management

The permittee shall at all times properly operate and maintain all facilities (i.e., the sewer system and treatment works as defined in Part 41 of the NREPA), and control systems installed or used by the permittee to operate the sewer system and treatment works and achieve and maintain compliance with the conditions of this permit (also see Part II.D.3 of this permit). The requirements of an Asset Management Program function to achieve the goals of effective performance, adequate funding, and adequate operator staffing and training. Asset management is a planning process for ensuring that optimum value is gained for each asset and that financial resources are available to rehabilitate and replace those assets when necessary. Asset management is centered on a framework of five (5) core elements: the current state of the assets; the required sustainable level of service; the assets critical to sustained performance; the minimum life-cycle costs; and the best long-term funding strategy.

a. Asset Management Program Requirements
The permittee shall continue to implement the Asset Management Plan approved on January 31, 2017, and approved modifications thereto. The Asset Management Plan contains a schedule for the development and implementation of an Asset Management Program that meets the requirements outlined below in 1) – 4):

1) *Maintenance Staff.* The permittee shall provide an adequate staff to carry out the operation, maintenance, repair, and testing functions required to ensure compliance with the terms and conditions of this permit. The level of staffing needed shall be determined by taking into account the work involved in operating the sewer system and treatment works, planning for and conducting maintenance, and complying with this permit.

2) *Collection System Map.* The permittee shall complete a map of the sewer collection system it owns and operates. The map shall be of sufficient detail and at a scale to allow easy interpretation. The collection system information shown on the map shall be based on current conditions and shall be kept up-to-date and available for review by the Department. **Note: Items below referencing combined sewer systems are not applicable to separate sewer systems.** Such map(s) shall include but not be limited to the following:

a) all sanitary sewer lines and related manholes;

b) all combined sewer lines, related manholes, catch basins and CSO regulators;

Section A. Limitations and Monitoring Requirements

c) all known or suspected connections between the sanitary sewer or combined sewer and storm drain systems;

d) all outfalls, including the treatment plant outfall(s), combined sewer treatment facility outfalls, untreated CSOs, and any known SSOs;

e) all pump stations and force mains;

f) the wastewater treatment facility(ies), including all treatment processes;

g) all surface waters (labeled);

h) other major appurtenances such as inverted siphons and air release valves;

i) a numbering system which uniquely identifies manholes, catch basins, overflow points, regulators and outfalls;

j) the scale and a north arrow;

k) the pipe diameter, date of installation, type of material, distance between manholes, and the direction of flow; and

l) the manhole interior material, rim elevation (optional), and invert elevations.

3) *Inventory and assessment of fixed assets.* The permittee shall complete an inventory and assessment of operations-related fixed assets including portions of the collection system owned and operated by the permittee. Fixed assets are assets that are normally stationary (e.g., pumps, blowers, buildings, manholes, and sewer lines). The inventory and assessment shall be based on current conditions and shall be kept up-to-date and available for review by the Department.

a) The fixed asset inventory shall include the following:

(1) a brief description of the fixed asset, its design capacity (e.g., pump: 120 gallons per minute), its level of redundancy, and its tag number if applicable;

(2) the location of the fixed asset;

(3) the year the fixed asset was installed;

(4) the present condition of the fixed asset (e.g., excellent, good, fair, poor); and

(5) the current fixed asset (replacement) cost in dollars for year specified in accordance with approved schedules;

b) The fixed asset assessment shall include a “Business Risk Evaluation” that combines the probability of failure of the fixed asset and the criticality of the fixed asset, as follows:

(1) Rate the probability of failure of the fixed asset on a scale of 1-5 (low to high) using criteria such as maintenance history, failure history, and remaining percentage of useful life (or years remaining);

(2) Rate the criticality of the fixed asset on a scale of 1-5 (low to high) based on the consequence of failure versus the desired level of service for the facility; and

PART I

Section A. Limitations and Monitoring Requirements

(3) Compute the Business Risk Factor of the fixed asset by multiplying the failure rating from (1) by the criticality rating from (2).

4) *Operation, Maintenance & Replacement (OM&R) Budget and Rate Sufficiency for the Sewer System and Treatment Works.* The permittee shall complete an assessment of its user rates and replacement fund, including the following:

a) beginning and end dates of fiscal year;

b) name of the department, committee, board, or other organization that sets rates for the operation of the sewer system and treatment works;

c) amount in the permittee's replacement fund in dollars for year specified in accordance with approved schedules;

d) replacement fund strategy of all assets with a useful life of 20 years or less;

e) expenditures for maintenance, corrective action and capital improvement taken during the fiscal year;

f) OM&R budget for the fiscal year; and

g) rate calculation demonstrating sufficient revenues to cover OM&R expenses. If the rate calculation shows there are insufficient revenues to cover OM&R expenses, the permittee shall document, within three (3) fiscal years after submittal of the Asset Management Plan, that there is at least one rate adjustment that reduces the revenue gap by at least 10 percent. The permittee may prepare and submit an alternate plan, subject to Department approval, for addressing the revenue gap. The ultimate goal of the Asset Management Program is to ensure sufficient revenues to cover OM&R expenses.

b. Annual Reporting
The permittee shall develop a written report that summarizes asset management activities completed during the previous year and planned for the upcoming year. The written report shall be submitted to the Department on or before <u>February 1 of each year</u>. The written report shall include:

1) a description of the staffing levels maintained during the year;

2) a description of inspections and maintenance activities conducted and corrective actions taken during the previous year;

3) expenditures for collection system maintenance activities, treatment works maintenance activities, corrective actions, and capital improvement during the previous year;

4) a summary of assets/areas identified for inspection/action (including capital improvement) in the upcoming year based on the five (5) core elements and the Business Risk Factors computed in accordance with condition a.3)b)(3) above;

5) a maintenance budget and capital improvement budget for the upcoming year that take into account implementation of an effective Asset Management Program that meets the five (5) core elements;

6) an updated asset inventory based on the original submission; and

Section A. Limitations and Monitoring Requirements

7) an updated OM&R budget with an updated rate schedule that includes the amount of insufficient revenues, if any.

11. Discharge Monitoring Report – Quality Assurance Study Program

The permittee shall participate in the Discharge Monitoring Report – Quality Assurance (DMR-QA) Study Program. The purpose of the DMR-QA Study Program is to annually evaluate the proficiency of all in-house and/or contract laboratory(ies) that perform, on behalf of the facility authorized to discharge under this permit, the analytical testing required under this permit. In accordance with Section 308 of the Clean Water Act (33 U.S.C. § 1318); and R 323.2138 and R 323.2154 of Part 21, Wastewater Discharge Permits, promulgated under Part 31 of the NREPA, participation in the DMR-QA Study Program is required for all major facilities, and for minor facilities selected for participation by the Department.

Annually and in accordance with DMR-QA Study Program requirements and submittal due dates, the permittee shall submit to the Michigan DMR-QA Study Program state coordinator all documentation required by the DMR-QA Study. DMR-QA Study Program participation is required only for the analytes required under this permit and only when those analytes are also identified in the DMR-QA Study.

If the permitted facility's status as a major facility should change, participation in the DMR-QA Study Program may be reevaluated. Questions concerning participation in the DMR-QA Study Program should be directed to the Michigan DMR-QA Study Program state coordinator.

All forms and instructions required for participation in the DMR-QA Study Program, including submittal due dates and state coordinator contact information, can be found at http://www.epa.gov/compliance/discharge-monitoring-report-quality-assurance-study-program.

12. Continuous Monitoring

If continuous monitoring equipment is used and becomes temporarily inoperable, the permittee shall manually obtain a minimum of three (3) equally spaced grab samples/readings within each 24-hour period for the affected parameter(s). On such days, in the comment field on the Daily tab of the DMR, the permittee shall indicate "continuous monitoring system inoperable," the date on which the system is expected to become operable again, and the number of samples/readings obtained during each 24-hour period.

Section B. Storm Water Pollution Prevention

1. Final Effluent Limitations and Monitoring Requirements

The permittee is authorized to discharge storm water associated with industrial activity, as defined under 40 CFR 122.26(b)(14)(i-ix), to the Kalamazoo River. Such discharge shall be limited and monitored by the permittee as specified below.

a. Narrative Standard
In accordance with R 323.1050 of the Part 4 Rules promulgated pursuant to Part 31 of the NREPA, the receiving waters shall not have any of the following physical properties as a result of this discharge in unnatural quantities that are, or may become, injurious to any designated use: turbidity, color, oil films, floating solids, foams, settleable solids, suspended solids, or deposits.

b. Unusual Discharge Characteristics
Storm water discharges shall be monitored as required by this permit to ensure there are no unusual characteristics (i.e., unnatural turbidity, color, oil film, floating solids, foams, settleable solids, suspended solids, or deposits) that would cause a violation of the narrative standard or other water quality standards.

c. Industrial Storm Water Certified Operator
Storm water treatment and/or control measures associated with this discharge shall be under the direct supervision of an industrial storm water operator certified by the Department, as required by Section 3110 of the NREPA.

d. Implementation of Storm Water Pollution Prevention Plan
The permittee shall implement an acceptable Storm Water Pollution Prevention Plan (SWPPP) as required by this permit.

Section B. Storm Water Pollution Prevention

2. Storm Water Pollution Prevention Plan

The SWPPP is a written plan that identifies sources of significant materials associated with industrial activity and includes procedures intended to reduce the exposure of significant materials to storm water. The SWPPP template and other guidance materials are available on the Industrial Storm Water Program webpage at www.michigan.gov/industrialstormwater.

An acceptable SWPPP shall identify the facility name, address, and permit number, and meet the requirements specified in Part I.B.3. through Part I.B.9. below:

3. Source Identification

To identify potential sources of significant materials that have reasonable potential to pollute storm water and subsequently be discharged to surface waters of the state, the SWPPP shall, at a minimum, include the following:

a. Site Map
The site map shall identify and label the following:

1) buildings and other permanent structures;

2) all areas of industrial activity, industrial equipment, and/or industrial material storage;

3) storage, disposal, and/or recycling areas for significant materials;

4) the location of all storm water discharge points and monitoring points (numbered or otherwise uniquely labeled for reference);

5) the location of all storm water inlets (e.g., catch basins, roof drains, etc.) contributing to each storm water discharge point (numbered or otherwise labeled for reference);

6) the location of non-storm water NPDES-permitted discharges;

7) the location of all storm water conveyances (e.g., pipe, ditch, channel, etc.) and outlines of the drainage areas contributing to each storm water discharge point;

8) all structural controls (e.g., secondary containment, inlet filters, etc.) and/or or storm water treatment equipment/devices;

9) area(s) of vegetation (with appropriate labelling such as lawn, old field, marsh, wooded, etc.);

10) area(s) that have the potential for soil erosion and sediment discharges (e.g., gravel lots, access roads, material stockpiles, outfalls, etc.);

11) impervious surfaces (e.g., roofs, asphalt, concrete, etc.);

12) name and location of receiving water(s); and

13) contaminated areas of the site regulated under Part 201 (Environmental Remediation) of the NREPA.

Section B. Storm Water Pollution Prevention

b. List of Significant Materials Associated with Industrial Activity
This list shall identify all significant materials that have a reasonable potential to pollute storm water, and identify the activity or area in which the significant materials are handled or stored. For each activity or area identified, the inlet(s) and discharge point(s) impacted in the event of a spill or leak shall be included on the list. The following industrial activities and/or areas shall be evaluated for the potential to expose significant materials to storm water, as applicable:

1) loading, unloading, and other industrial material handling activities;

2) outdoor industrial material storage areas, including secondary containment structures;

3) outdoor manufacturing or processing activities;

4) dust or particulate generating processes/activities;

5) discharges associated with vents, stacks, and air emission controls;

6) industrial waste or recyclable material storage or disposal areas;

7) activities associated with the maintenance and cleaning of vehicles, machines, and equipment;

8) area(s) that have the potential for soil erosion and sediment discharges (e.g., gravel lots, access roads, material stockpiles, outfalls, etc.);

9) areas of contamination regulated under Part 201 (Environmental Remediation) of the NREPA;

10) areas of significant material residues;

11) areas where animals (wild or domestic) congregate and deposit wastes; and

12) other areas where storm water may come into contact with significant materials.

c. List of Significant Spills and Leaks
This list shall identify the date, volume, and location of each significant spill/leak as defined under Part II.A. of this permit, and the cleanup actions undertaken. Significant spills/leaks shall be controlled in accordance with the SWPPP and are cause for the SWPPP to be updated as specified in Part I.B.7. of this permit. The permittee shall notify the Department of significant spills/leaks as specified in Part II.C.6. and/or Part II.C.7. of this permit. Written reports regarding significant spills/leaks shall be retained with the SWPPP records in accordance with Part I.B.10. of this permit.

d. Summary of Storm Water Discharge Sampling Data
If data have been collected, the SWPPP shall include a list of the pollutants detected, sources identified, and the control measures implemented to reduce the discharge of the detected pollutants. Storm water discharge sampling data shall be retained in accordance with Part I.B.10. of this permit.

e. Illicit Connection Investigation and Elimination Program
The permittee shall implement an illicit connection investigation and elimination program. The SWPPP shall include a written description of the actions taken to identify, investigate, and eliminate illicit connections to Municipal Separate Storm Sewer System (MS4) or surface waters of the state. Any discharge from an illicit connection to an MS4 or surface water of the state is a violation of this permit.

Section B. Storm Water Pollution Prevention

f. Description of Dust Suppression Material Used Onsite
The SWPPP shall include a description of the dust suppression material used onsite, the areas where the material is used, and the actions implemented to prevent an unauthorized discharge of the material. If the permittee does not use dust suppression material onsite, the SWPPP shall indicate this.

4. Total Maximum Daily Loads (TMDLs)

The permittee shall implement nonstructural and/or structural controls to reduce the discharge of the pollutant(s) associated with any TMDL(s) identified below. The SWPPP shall include a list of all TMDL(s) identified below, as well as references to control measures already listed in the SWPPP intended to reduce the discharge of the TMDL pollutant(s). The implementation of an acceptable SWPPP shall meet the control measure expectations of all TMLD(s) identified below; however, the Department may require additional control measures if it is determined that the storm water discharge is negatively impacting the applicable TMDL(s). If no TMDLs are identified below, this condition does not apply.

Name of TMDL	Pollutant of Concern
Kalamazoo River/Lake Allegan	Total Phosphorus

5. Nonstructural Controls

To manage and address sources of significant materials that have reasonable potential to pollute storm water and subsequently be discharged to surface waters of the state, the SWPPP shall, at a minimum, include the following nonstructural controls:

a. Preventative Maintenance
Preventive maintenance procedures shall list the storm water management and control devices, treatment systems, industrial equipment, etc. that will be routinely serviced and maintained to prevent significant material exposure to storm water. The written procedures shall include a maintenance schedule for each item listed.

b. Good Housekeeping Inspections
Good housekeeping procedures shall list the areas that will be routinely inspected and cleaned to prevent significant material exposure to storm water. The areas associated with the items listed in the preventative maintenance procedures shall also be included. The written procedures shall include an inspection and cleaning schedule for each area listed. A written report documenting the implementation of the inspection and cleaning schedule shall be retained in accordance with Part I.B.10. of this permit.

c. Comprehensive Site Inspections
Comprehensive site inspection procedures shall include all items identified in 3) below that will be inspected by an Industrial Storm Water Certified Operator to ensure compliance with this permit. At a minimum, one inspection shall be performed during normal facility operating hours within each of the following quarters unless the Department has approved an alternate schedule in accordance with Part I.B.12. of this permit: January – March, April – June, July – September, and October – December. A written report documenting the comprehensive site inspection shall be retained in accordance with Part I.B.10. of this permit, and shall include the following information:

1) the date of the inspection;

2) the Industrial Storm Water Certified Operator's name(s) and certification number(s);

3) all observations regarding significant material exposure and any necessary corrective actions related to the inspection of the following:

PART I

Section B. Storm Water Pollution Prevention

a) areas identified in Part I.B.3.a. and Part I.B.3.b. of this permit,

b) areas identified in Part I.B.3.c. of this permit where significant spills or leaks have occurred in the past three years,

c) all storm water inlets, conveyances (not including subsurface piping), and discharge points, and

d) all structural controls and/or storm water treatment equipment/devices;

4) a review of the good housekeeping reports, and any other paperwork associated with the SWPPP; and

5) a written statement, based on the results of the comprehensive site inspection, certifying compliance with the terms of this permit and with the permittee's SWPPP.

d. Visual Assessments
At a minimum, one (1) storm water sample shall be collected for visual assessment during normal facility operating hours at each discharge point within each of the following quarters unless the Department has approved an alternate schedule in accordance with Part I.B.12. of this permit: January – March, April – June, July – September, and October – December. Visual assessment guidance is available on the Industrial Storm Water Program webpage at www.michigan.gov/industrialstormwater.

The following are the requirements of the visual assessments and shall be included in the written procedures:

1) The **storm water** sample(s) shall be **collected** during normal hours of operation by **an Industrial Storm Water Certified Operator**, Qualified Personnel as defined in Part II.A. of this permit, or automatic sampling device.

2) The storm water sample(s) shall be collected:

a) with clean equipment and containers, and

b) within the first 30 minutes of the start of a discharge resulting from a qualifying storm event as defined in Part II.A. of this permit. If it is not possible to collect the sample within the first 30 minutes of discharge, the sample shall be collected as soon thereafter as practicable. In the case of snowmelt, samples shall be collected during a period with measurable discharge from the site.

3) The visual assessment of the storm water sample(s) shall be performed and documented by an Industrial Storm Water Certified Operator. Documentation shall be retained in accordance with Part I.B.10. of this permit, and shall include the following information:

a) Sample location(s).

b) Storm water sample collection date(s), time(s), and if applicable, an explanation as to why sample(s) were not collected within the first 30 minutes of discharge.

c) Visual assessment date and time.
d) Name and certification number of the Industrial Storm Water Certified Operator.

Section B. Storm Water Pollution Prevention

e) Storm event information, including the length of event expressed in hours, approximate size of event expressed in inches of precipitation, duration of time since previous event that caused a discharge, date and time the discharge began, and nature of event (i.e., rainfall or snowmelt).

f) Name(s) of personnel who obtained the storm water sample(s) or document that an automatic sampling device was used.

g) Any notable observations of the discharge while the storm water samples were collected. This requirement is waived if an automatic sampling device was used to collect the storm water samples.

h) Sample(s) shall be observed in a colorless glass or plastic container for the following characteristics: color, oil sheen, turbidity, floating solids, suspended solids, settleable solids, foam, and any other unusual characteristics.

i) Unaltered, full-color photograph of the storm water sample(s) against a white background.

j) A description of corrective actions taken if any unusual characteristics are identified during the visual assessment.

4) When a visual assessment cannot be completed for any reason (e.g., adverse weather conditions, no discharge, qualifying event occurred outside the normal facility operating hours, etc.) during any quarter, written documentation explaining the reason for not completing the visual assessment shall be included with the SWPPP records. Adverse weather conditions are those that are dangerous or create inaccessibility for personnel, such as local flooding, high winds, electrical storms, or situations that otherwise make sampling impractical such as drought or extended frozen conditions.

5) If the facility has two (2) or more storm water discharge points that are believed to discharge substantially identical storm water effluents, the facility may conduct visual assessments of the discharge at one (1) of the storm water discharge points and report that the results also apply to the other substantially identical storm water discharge point(s). The determination of substantially identical storm water discharge points is to be based on the significant material evaluation conducted as set forth under Part I.B.3.b. of this permit and shall be clearly documented in the SWPPP. Visual assessments shall be conducted on a rotating basis of each substantially identical storm water discharge point throughout the period of coverage under this permit.

e. Material Handling and Spill Prevention / Response Procedures
Significant material handling and storage procedures shall be developed to minimize the potential for leaks and spills that may be exposed to storm water. For each potential spill or leak area, the procedures shall identify the significant material handling and storage requirements, spill/leak response actions, and locations of spill/leak kits. The SWPPP shall include language describing what a reportable spill or leak is, and the appropriate reporting requirements in accordance with Part II.C.6. and Part II.C.7. of this permit.

For Polluting Materials as defined under Part II.A. of this permit, the SWPPP may reference any of the following plans:

- Pollution Incident Prevention Plan (PIPP) prepared in accordance with the Part 5 Rules (R 324.2001 through R 324.2009 of the Michigan Administrative Code)

Section B. Storm Water Pollution Prevention

- Hazardous Waste Contingency Plan prepared in accordance with 40 CFR 264 and 265 Subpart D, as required by Part 111 of the NREPA

- Spill Prevention Control and Countermeasure (SPCC) plan prepared in accordance with 40 CFR 112

f. Annual Employee Training Program
The SWPPP shall include a written description of the employee training program that will be implemented on an annual basis to inform appropriate personnel of the components of the SWPPP and requirements of this permit. Records of the annual employee training program shall be retained in accordance with Part I.B.10. of this permit.

6. Structural Controls

Structural controls shall be used to reduce significant material exposure and/or the concentration of significant materials in the discharge to ensure compliance with Part I.B.1.a. and Part I.B.1.b. of this permit. The SWPPP shall provide a list of all structural controls utilized onsite and the significant material(s) intended to be managed by the structural controls. The location of the structural controls shall be identified on the site map. Where applicable, structural controls shall, at a minimum, be utilized to achieve the following:

a. prevent unauthorized discharges from industrial waste and recyclable material containers,

b. prevent the discharge of sediment and other particulates that can be mobilized by storm water, and

c. minimize channel/streambank erosion and scour in the immediate vicinity of outfalls.

7. Keeping SWPPPs Current

a. The permittee and/or an Industrial Storm Water Certified Operator shall review the SWPPP annually after it is developed and maintain a written report of the review. Based on the review, the permittee or an Industrial Storm Water Certified Operator shall amend the SWPPP as needed to ensure continued compliance with the terms and conditions of this permit. A SWPPP Annual Review Report form is available on the Industrial Storm Water Program webpage at www.michigan.gov/industrialstormwater. The written report of the SWPPP Annual Review shall be retained in accordance with Part I.B.10. of this permit.

b. The SWPPP developed under the conditions of a previous permit shall be amended as necessary to ensure compliance with this permit.

c. The SWPPP shall be updated or amended whenever changes at the facility have the potential to increase the exposure of significant materials to storm water, significant spills/leaks occur at the facility, or when the SWPPP is determined by the permittee or the Department to be ineffective in achieving the general objectives of controlling pollutants in storm water discharges associated with industrial activity. SWPPP updates necessitated by increased activity or significant spills at the facility shall include a description of how the permittee intends to control any new sources of significant materials or respond to and prevent spills in accordance with the requirements of this permit.

d. The Department may notify the permittee at any time that the SWPPP does not meet minimum requirements of this permit. Such notification shall identify why the SWPPP does not meet minimum requirements of this permit. The permittee shall make the required changes to the SWPPP within

Section B. Storm Water Pollution Prevention

30 days after such notification from the Department and shall submit to the Department a written certification that the requested changes have been made.

e. Amendments to the SWPPP shall be signed and retained on-site with the SWPPP pursuant to Part I.B.9. of this permit.

8. Contact Information and Industrial Storm Water Certified Operator Update

a. The SWPPP shall include contact information (i.e., name, mailing address, phone number, and email address) for the Facility Contact, Industrial Storm Water Certified Operator(s), environmental consultant, and/or any other appropriate individuals who manage the storm water program at the facility. The SWPPP shall be updated, as necessary, to ensure the contact information is current.

b. If the primary Industrial Storm Water Certified Operator is replaced, the permittee shall provide the name and certification number of the new Industrial Storm Water Certified Operator to the Department by updating the facility's MiWaters site. If a facility has multiple Industrial Storm Water Certified Operators, the names and certification numbers of all shall be included in the SWPPP.

9. Signature and SWPPP Certification

a. The SWPPP shall be reviewed and signed by an Industrial Storm Water Certified Operator and by either the permittee or an authorized representative in accordance with 40 CFR 122.22. The SWPPP and associated records shall be retained on-site at the facility that generates the storm water discharge.

b. The permittee shall make the SWPPP and items required by Part I.B.10. of this permit available upon request to the Department. The Department makes the non-confidential business portions of the SWPPP available to the public.

10. Record Keeping

The permittee shall maintain records of all SWPPP-related activities. All such records shall be retained for three (3) years. The following records are required by this permit:

a. good housekeeping inspection reports

b. comprehensive site inspection reports

c. visual assessment reports

d. employee training records

e. SWPPP annual review reports

f. significant spill/leak reports, and

g. storm water discharge sampling data.

PART I

Section B. Storm Water Pollution Prevention

11. Non-Storm Water Discharges

Storm water is defined in Part II.A. of this permit to encompass non-storm water discharges included under the conditions of this permit. Any discharge of wastewater other than storm water as defined under the conditions of this permit shall be in compliance with an NPDES permit issued for the discharge. The non-storm water discharges included under the conditions of this permit are authorized under this permit, provided pollution prevention controls for the non-storm water component are identified in the permittee's SWPPP. The non-storm water discharges included under the conditions of this permit are as follows:

a. discharges from fire hydrant flushing

b. potable water sources, including water line flushing

c. water from fire system testing and fire-fighting training without burned materials or chemical fire suppressants

d. irrigation drainage

e. lawn watering

f. routine building wash-down that does not use detergents or other compounds

g. pavement wash waters where contamination by toxic or hazardous materials has not occurred (unless all contamination by toxic or hazardous materials has been removed) and where detergents are not used

h. uncontaminated condensate from air conditioners, coolers, and other compressors and from the outside storage of refrigerated gases or liquids

i. springs

j. uncontaminated groundwater

k. foundation or footing drains where flows are not contaminated with process materials such as solvents, and

l. discharges from fire-fighting activities. Discharges from fire-fighting activities are exempted from the requirement to be identified in the SWPPP.

12. Alternate Schedule Request for Comprehensive Site Inspections and/or Visual Assessment

The permittee may request Department approval of an alternate schedule for comprehensive site inspections and/or visual assessments. Such a request may be made if the permittee meets the following criteria: the permittee is in full compliance with this permit, the permittee has an acceptable SWPPP, the permittee has installed and/or implemented adequate structural controls at the facility, the permittee has all required inspection reports available at the facility, and the permittee has an Industrial Storm Water Certified Operator at the facility. The Department may revoke the approval of an alternate schedule at any time upon notification to the permittee if these criteria are not being met.

Section B. Storm Water Pollution Prevention

13. Tracer Dye Discharges

This permit does not authorize the discharge of tracer dyes without approval from the Department. Requests to discharge tracer dyes shall be submitted to the Department in accordance with Rule 1097 (R 323.1097 of the Michigan Administrative Code).

PART I

Section C. Industrial Waste Pretreatment Program

1. Federal Industrial Pretreatment Program

a. The permittee shall implement the Federal Industrial Pretreatment Program (FIPP) approved on October 11, 1985, and any subsequent modifications approved up to the issuance of this permit. Approval of substantial program modifications after the issuance of this permit shall be incorporated into this permit by minor modification in accordance with 40 CFR 122.63.

b. The permittee shall comply with R 323.2301 through R 323.2317 of the Michigan Administrative Code (Part 23 Rules), the General Pretreatment Regulations for Existing and New Sources of Pollution (40 CFR Part 403), and the approved FIPP.

c. The permittee shall have the legal authority and necessary interjurisdictional agreements that provide the basis for the implementation and enforcement of the approved FIPP throughout the service area. The legal authority and necessary interjurisdictional agreements shall include, at a minimum, the authority to carry out the activities specified in R 323.2306(a).

d. The permittee shall develop procedures which describe, in sufficient detail, program commitments which enable implementation of the approved FIPP, 40 CFR Part 403, and the Part 23 Rules in accordance with R 323.2306(c).

e. The permittee shall establish an interjurisdictional agreement (or comparable document) with all tributary governmental jurisdictions. Each interjurisdictional agreement shall contain, at a minimum, the following:

1) identification of the agency responsible for the implementation and enforcement of the approved FIPP within the tributary governmental jurisdiction's boundaries; and

2) the provision of the legal authority which provides the basis for the implementation and enforcement of the approved FIPP within the tributary governmental jurisdiction's boundaries.

f. The permittee shall prohibit discharges that:

1) cause, in whole or in part, the permittee's failure to comply with any condition of this permit or the NREPA;

2) restrict, in whole or in part, the permittee's management of biosolids;

3) cause, in whole or in part, operational problems at the treatment facility or in its collection system;

4) violate any of the general or specific prohibitions identified in R 323.2303(1) and (2);

5) violate categorical standards identified in R 323.2311; and

6) violate local limits established in accordance with R 323.2303(4).

g. The permittee shall maintain a list of its nondomestic users that meet the criteria of a significant industrial user as identified in R 323.2302(cc).

h. The permittee shall develop an enforcement response plan which describes, in sufficient detail, program commitments which will enable the enforcement of the approved FIPP, 40 CFR Part 403, and the Part 23 Rules in accordance with R 323.2306(g).

Section C. Industrial Waste Pretreatment Program

i. The Department may require modifications to the approved FIPP which are necessary to ensure compliance with 40 CFR Part 403 and the Part 23 Rules in accordance with R 323.2309.

j. The permittee shall not implement changes or modifications to the approved FIPP without notification to the Department. Any substantial modification shall be subject to Department public noticing and approval in accordance with R 323.2309.

k. The permittee shall maintain an adequate revenue structure and staffing level for effective implementation of the approved FIPP.

l. The permittee shall develop and maintain, for a minimum of three (3) years, all records and information necessary to determine nondomestic user compliance with 40 CFR Part 403, Part 23 Rules and the approved FIPP. This period of retention shall be extended during the course of any unresolved enforcement action or litigation regarding a nondomestic user or when requested by the Department or the United States Environmental Protection Agency. All of the aforementioned records and information shall be made available upon request for inspection and copying by the Department and the United States Environmental Protection Agency.

m. The permittee shall evaluate the approved FIPP for compliance with the 40 CFR Part 403, Part 23 Rules and the prohibitions stated in item f. above. Based upon this evaluation, the permittee shall propose to the Department all necessary changes or modifications to the approved FIPP no later than the next Industrial Pretreatment Program Annual Report due date (see item p. below).

n. The permittee shall develop and enforce local limits to implement the prohibitions listed in item f above. Local limits shall be based upon data representative of actual conditions demonstrated in a maximum allowable headworks loading analysis. An evaluation of whether the existing local limits need to be revised shall be submitted to the Department by September 1, 2022. The submittal shall provide a technical evaluation of the basis upon which this determination was made which includes information regarding the maximum allowable headworks loading, collection system protection criteria, and worker health and safety, based upon data collected since the last local limits review.

The following pollutants shall be evaluated:

1) Arsenic, Cadmium, Chromium, Copper, Cyanide, Lead, Mercury, Nickel, Silver, and Zinc;

2) Pollutants that are subject to limits or monitoring in this permit;

3) Pollutants that have an existing local limit; and,

4) Other pollutants of concern which would reasonably be expected to be discharged or transported by truck or rail or otherwise introduced into the POTW.

Section C. Industrial Waste Pretreatment Program

o. The permittee is required under this permit and R 323.2303(4) of the Michigan Administrative Code to review and update their local limits when:

1) new pollutants are introduced;

2) new pollutants that were previously unevaluated are identified;

3) new water quality or biosolids standards are established or additional information becomes available about the nature of pollutants, such as removal rates and accumulation in biosolids; or

4) substantial increases of pollutants are proposed as required in the notification of new or increased uses in accordance with the provisions of 40 CFR 122.42.

p. On or before April 1 of each year, the permittee shall submit to the Department, as required by R 323.2310(8), an Industrial Pretreatment Program Annual Report on the status of program implementation and enforcement activities. The reporting period shall begin on January 1 and end on December 31. At a minimum, the Industrial Pretreatment Program Annual Report shall include:

1) the Pretreatment Program Reports data identified in Appendix A to 40 CFR Part 127 – NPDES Electronic Reporting;

2) a summary of changes to the approved FIPP that have not been previously reported to the Department;

3) a summary of results of all the sampling and analyses performed of the wastewater treatment plant's influent, effluent, and biosolids conducted in accordance with approved methods during the reporting period. The summary shall include the monthly average, daily maximum, quantification level, and number of samples analyzed for each pollutant. At a minimum, the results of analyses for all locally limited parameters for at least one monitoring event that tests influent, effluent and biosolids during the reporting period shall be submitted with each report, unless otherwise required by the Department. Sample collection shall be at intervals sufficient to provide pollutant removal rates, unless the pollutant is not measurable; and

4) any other relevant information requested by the Department.

Section C. Industrial Waste Pretreatment Program

2. Federal Industrial Pretreatment Standard Exemption

In accordance with Public Law 104-134, the permittee submitted on March 19, 1999 (with supportive documentation through February 8, 2001), a request for an exemption from the Federal Categorical Pretreatment Standards which apply to the Pharmacia Corporation pharmaceutical manufacturing facility located at 7171 Portage Road, Kalamazoo, Michigan and which discharges to the Kalamazoo Water Reclamation Plant. The request was approved on May 23, 2001. The approval was based on a demonstration that the Kalamazoo Water Reclamation Plant will provide treatment and pollution removal equivalent to or better than that which would be required through a combination of pretreatment by such industrial discharger and treatment by the Kalamazoo Water Reclamation Plant in the absence of the exemption and that all other provisions of Public Law 104-134 are complied with.

a. The exemption, as specified in the approval letter, from the Pharmaceutical Point Source Standards are granted for Acetone, Toluene and Methylene Chloride at the facility listed above with the following conditions:

1) All pollutants regulated under Federal Categorical Standards, except for those listed above at the Pharmacia Corporation facility, shall satisfy requirements for Existing or New Source for indirect dischargers.

2) The City of Kalamazoo shall require the Pharmacia Corporation to monitor for all exempted parameters monthly using United States Environmental Protection Agency approved methods in accordance with 40 CFR 136.

3) Monitoring results shall be submitted to the Department annually with the Annual Pretreatment Report for the City of Kalamazoo.

4) The City of Kalamazoo shall require the Pharmacia Corporation facility to report immediately any concentration exceeding the following notification levels:

Acetone 282 mg/l
Toluene 1.7 mg/l
Methylene Chloride 8.9 mg/l

The City of Kalamazoo shall report such discharges to the Department within 30 days of receipt of notice by the pharmaceutical manufacturer.

5) Any substantial change to processes, treatment, loading or concentration of pollutants, discharge location, or other information used as a basis for the exemption shall be reported immediately.

6) If the conditions of the exemption are not met on a consistent basis, the Department reserves the right to withdraw its authorization of the exemption request.

7) Requests for an exemption for additional regulated pollutants shall be submitted for approval to the Department.

8) On approval of additional pollutant exemptions, the exemptions of the approval letter shall be considered part of this permit, including new notification levels. All other portions of Part I.C.2 shall not be changed by this action.

PART I

Section D. Residuals Management Program

1. Residuals Management Program for Land Application of Biosolids

The permittee is authorized to land-apply bulk biosolids or prepare bulk biosolids for land application in accordance with the permittee's approved Residuals Management Program (RMP) approved on April 24, 2003, and approved modifications thereto, and the requirements established in R 323.2401 through R 323.2418 of the Michigan Administrative Code (Part 24 Rules). The approved RMP, and any approved modifications thereto, are enforceable requirements of this permit. Incineration, landfilling and other residual disposal activities shall be conducted in accordance with Part II.D.7. of this permit. The Part 24 Rules can be obtained via the internet (http://www.michigan.gov/egle/ and near the top of the screen click on Water, then towards the bottom right of the screen click on Permits, Wastewater, Biosolids, then click on Biosolids Laws and Rules Information which is under the Laws & Rules banner in the center of the screen).

a. Annual Report
On or before October 30 of each year, the permittee shall submit an annual report to the Department for the previous fiscal year of October 1 through September 30. The report shall be submitted electronically via the Department's MiWaters system at https://miwaters.deq.state.mi.us. At a minimum, the report shall contain:

1) a certification that current residuals management practices are in accordance with the approved RMP, or a proposal for modification to the approved RMP; and

2) a completed Annual Report Form for Reporting Biosolids, available at https://miwaters.deq.state.mi.us.

b. Modifications to the Approved RMP
Prior to implementation of modifications to the RMP, the permittee shall submit proposed modifications to the Department for approval. The approved modification shall become effective upon the date of approval. Upon written notification, the Department may impose additional requirements and/or limitations to the approved RMP as necessary to protect public health and the environment from any adverse effect of a pollutant in the biosolids.

c. Record Keeping
Records required by the Part 24 Rules shall be kept for a minimum of five (5) years. However, the records documenting cumulative loading for sites subject to cumulative pollutant loading rates shall be kept as long as the site receives biosolids.

d. Contact Information
RMP-related submittals shall be made to the Department.

PART II

Part II may include terms and /or conditions not applicable to discharges covered under this permit.

Section A. Definitions

Acute toxic unit (TU_A) means $100/LC_{50}$ where the LC_{50} is determined from a whole effluent toxicity (WET) test which produces a result that is statistically or graphically estimated to be lethal to 50% of the test organisms.

Annual monitoring frequency refers to a calendar year beginning on January 1 and ending on December 31. When required by this permit, an analytical result, reading, value or observation shall be reported for that period if a discharge occurs during that period.

Authorized public agency means a state, local, or county agency that is designated pursuant to the provisions of Section 9110 of Part 91, Soil and Sedimentation Control, of the NREPA, to implement soil erosion and sedimentation control requirements with regard to construction activities undertaken by that agency.

Best management practices (BMPs) means structural devices or nonstructural practices that are designed to prevent pollutants from entering into storm water, to direct the flow of storm water, or to treat polluted storm water.

Bioaccumulative chemical of concern (BCC) means a chemical which, upon entering the surface waters, by itself or as its toxic transformation product, accumulates in aquatic organisms by a human health bioaccumulation factor of more than 1000 after considering metabolism and other physiochemical properties that might enhance or inhibit bioaccumulation. The human health bioaccumulation factor shall be derived according to R 323.1057(5). Chemicals with half-lives of less than 8 weeks in the water column, sediment, and biota are not BCCs. The minimum bioaccumulation concentration factor (BAF) information needed to define an organic chemical as a BCC is either a field-measured BAF or a BAF derived using the biota-sediment accumulation factor (BSAF) methodology. The minimum BAF information needed to define an inorganic chemical as a BCC, including an organometal, is either a field-measured BAF or a laboratory-measured bioconcentration factor (BCF). The BCCs to which these rules apply are identified in Table 5 of R 323.1057 of the Water Quality Standards.

Biosolids are the solid, semisolid, or liquid residues generated during the treatment of sanitary sewage or domestic sewage in a treatment works. This includes, but is not limited to, scum or solids removed in primary, secondary, or advanced wastewater treatment processes and a derivative of the removed scum or solids.

Bulk biosolids means biosolids that are not sold or given away in a bag or other container for application to a lawn or home garden.

CAFO means concentrated animal feeding operation.

Certificate of Coverage (COC) is a document, issued by the Department, which authorizes a discharge under a general permit.

Chronic toxic unit (TU_C) means 100/MATC or $100/IC_{25}$, where the maximum acceptable toxicant concentration (MATC) and IC_{25} are expressed as a percent effluent in the test medium.

Class B biosolids refers to material that has met the Class B pathogen reduction requirements or equivalent treatment by a Process to Significantly Reduce Pathogens (PSRP) in accordance with the Part 24 Rules, Land Application of Biosolids, promulgated under Part 31 of the NREPA. Processes include aerobic digestion, composting, anaerobic digestion, lime stabilization and air drying.

Combined sewer system is a sewer system in which storm water runoff is combined with sanitary wastes.

PART II

Section A. Definitions

Composite sample is a sample collected over time, either by continuous sampling or by mixing discrete samples. A composite sample represents the average wastewater characteristics during the compositing period. Various methods for compositing are available and are based on either time or flow-proportioning, the choice of which will depend on the permit requirements.

Continuous monitoring refers to sampling/readings that occur at regular and consistent intervals throughout a 24-hour period and at a frequency sufficient to capture data that are representative of the discharge. The maximum acceptable interval between samples/readings shall be one (1) hour.

Daily concentration
FOR PARAMETERS OTHER THAN pH, DISSOLVED OXYGEN, TEMPERATURE, AND CONDUCTIVITY – Daily concentration is the sum of the concentrations of the individual samples of a parameter taken within a calendar day divided by the number of samples taken within that calendar day. The daily concentration will be used to determine compliance with any maximum and minimum daily concentration limitations. For guidance and examples showing how to perform calculations using results below quantification levels, see the document entitled "Reporting Results Below Quantification," available at https://www.michigan.gov/documents/deq/wrd-npdes-results-quantification_620791_7.pdf.

FOR pH, DISSOLVED OXYGEN, TEMPERATURE, AND CONDUCTIVITY – The daily concentration used to determine compliance with maximum daily pH, temperature, and conductivity limitations is the highest pH, temperature, and conductivity readings obtained within a calendar day. The daily concentration used to determine compliance with minimum daily pH and dissolved oxygen limitations is the lowest pH and dissolved oxygen readings obtained within a calendar day.

Daily loading is the total discharge by weight of a parameter discharged during any calendar day. This value is calculated by multiplying the daily concentration by the total daily flow and by the appropriate conversion factor. The daily loading will be used to determine compliance with any maximum daily loading limitations. When required by the permit, report the maximum calculated daily loading for the month in the "MAXIMUM" column under "QUANTITY OR LOADING" on the DMRs.

Daily monitoring frequency refers to a 24-hour day. When required by this permit, an analytical result, reading, value or observation shall be reported for that period if a discharge occurs during that period.

Department means the Michigan Department of Environment, Great Lakes, and Energy.

Detection level means the lowest concentration or amount of the target analyte that can be determined to be different from zero by a single measurement at a stated level of probability.

Discharge means the addition of any waste, waste effluent, wastewater, pollutant, or any combination thereof to any surface water of the state.

EC_{50} means a statistically or graphically estimated concentration that is expected to cause 1 or more specified effects in 50% of a group of organisms under specified conditions.

PART II

Section A. Definitions

Fecal coliform bacteria monthly
FOR WWSLs THAT COLLECT AND STORE WASTEWATER AND ARE AUTHORIZED TO DISCHARGE ONLY IN THE SPRING AND/OR FALL ON AN INTERMITTENT BASIS – Fecal coliform bacteria monthly is the geometric mean of all daily concentrations determined during a discharge event. Days on which no daily concentration is determined shall not be used to determine the calculated monthly value. The calculated monthly value will be used to determine compliance with the maximum monthly fecal coliform bacteria limitations. When required by the permit, report the calculated monthly value in the "AVERAGE" column under "QUALITY OR CONCENTRATION" on the DMR. If the period in which the discharge event occurred was partially in each of two months, the calculated monthly value shall be reported on the DMR of the month in which the last day of discharge occurred.

FOR ALL OTHER DISCHARGES – Fecal coliform bacteria monthly is the geometric mean of all daily concentrations determined during a reporting month. Days on which no daily concentration is determined shall not be used to determine the calculated monthly value. The calculated monthly value will be used to determine compliance with the maximum monthly fecal coliform bacteria limitations. When required by the permit, report the calculated monthly value in the "AVERAGE" column under "QUALITY OR CONCENTRATION" on the DMR.

Fecal coliform bacteria 7-day
FOR WWSLs THAT COLLECT AND STORE WASTEWATER AND ARE AUTHORIZED TO DISCHARGE ONLY IN THE SPRING AND/OR FALL ON AN INTERMITTENT BASIS – Fecal coliform bacteria 7-day is the geometric mean of the daily concentrations determined during any 7 consecutive days of discharge during a discharge event. If the number of daily concentrations determined during the discharge event is less than 7 days, the number of actual daily concentrations determined shall be used for the calculation. Days on which no daily concentration is determined shall not be used to determine the value. The calculated 7-day value will be used to determine compliance with the maximum 7-day fecal coliform bacteria limitations. When required by the permit, report the maximum calculated 7-day geometric mean value for the month in the "MAXIMUM" column under "QUALITY OR CONCENTRATION" on the DMRs. If the 7-day period was partially in each of two months, the value shall be reported on the DMR of the month in which the last day of discharge occurred.

FOR ALL OTHER DISCHARGES – Fecal coliform bacteria 7-day is the geometric mean of the daily concentrations determined during any 7 consecutive days in a reporting month. If the number of daily concentrations determined is less than 7, the actual number of daily concentrations determined shall be used for the calculation. Days on which no daily concentration is determined shall not be used to determine the value. The calculated 7-day value will be used to determine compliance with the maximum 7-day fecal coliform bacteria limitations. When required by the permit, report the maximum calculated 7-day geometric mean for the month in the "MAXIMUM" column under "QUALITY OR CONCENTRATION" on the DMRs. The first calculation shall be made on day 7 of the reporting month, and the last calculation shall be made on the last day of the reporting month.

Flow-proportioned composite sample is a composite sample in which either a) the volume of each portion of the composite is proportional to the effluent flow rate at the time that portion is obtained, or b) a constant sample volume is obtained at varying time intervals proportional to the effluent flow rate.

General permit means an NPDES permit authorizing a category of similar discharges.

Geometric mean is the average of the logarithmic values of a base 10 data set, converted back to a base 10 number.

Grab sample is a single sample taken at neither a set time nor flow.

IC_{25} means the toxicant concentration that would cause a 25% reduction in a nonquantal biological measurement for the test population.

PART II

Section A. Definitions

Illicit connection means a physical connection to a municipal separate storm sewer system that primarily conveys non-storm water discharges other than uncontaminated groundwater into the storm sewer; or a physical connection not authorized or permitted by the local authority, where a local authority requires authorization or a permit for physical connections.

Illicit discharge means any discharge to, or seepage into, a municipal separate storm sewer system that is not composed entirely of storm water or uncontaminated groundwater. Illicit discharges include non-storm water discharges through pipes or other physical connections; dumping of motor vehicle fluids, household hazardous wastes, domestic animal wastes, or litter; collection and intentional dumping of grass clippings or leaf litter; or unauthorized discharges of sewage, industrial waste, restaurant wastes, or any other non-storm water waste directly into a separate storm sewer.

Individual permit means a site-specific NPDES permit.

Inlet means a catch basin, roof drain, conduit, drain tile, retention pond riser pipe, sump pump, or other point where storm water or wastewater enters into a closed conveyance system prior to discharge off site or into waters of the state.

Interference is a discharge which, alone or in conjunction with a discharge or discharges from other sources, both: 1) inhibits or disrupts a POTW, its treatment processes or operations, or its sludge processes, use or disposal; and 2) therefore, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or, of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent state or local regulations): Section 405 of the Clean Water Act, the Solid Waste Disposal Act (SWDA) (including Title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including state regulations contained in any state sludge management plan prepared pursuant to Subtitle D of the SWDA), the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act. [This definition does not apply to sample matrix interference].

Land application means spraying or spreading biosolids or a biosolids derivative onto the land surface, injecting below the land surface, or incorporating into the soil so that the biosolids or biosolids derivative can either condition the soil or fertilize crops or vegetation grown in the soil.

LC_{50} means a statistically or graphically estimated concentration that is expected to be lethal to 50% of a group of organisms under specified conditions.

Maximum acceptable toxicant concentration (MATC) means the concentration obtained by calculating the geometric mean of the lower and upper chronic limits from a chronic test. A lower chronic limit is the highest tested concentration that did not cause the occurrence of a specific adverse effect. An upper chronic limit is the lowest tested concentration which did cause the occurrence of a specific adverse effect and above which all tested concentrations caused such an occurrence.

Maximum extent practicable means implementation of best management practices by a public body to comply with an approved storm water management program as required by a national permit for a municipal separate storm sewer system, in a manner that is environmentally beneficial, technically feasible, and within the public body's legal authority.

MBTU/hr means million British Thermal Units per hour.

MGD means million gallons per day.

PART II

Section A. Definitions

Monthly concentration is the sum of the daily concentrations determined during a reporting period divided by the number of daily concentrations determined. The calculated monthly concentration will be used to determine compliance with any maximum monthly concentration limitations. Days with no discharge shall not be used to determine the value. When required by the permit, report the calculated monthly concentration in the "AVERAGE" column under "QUALITY OR CONCENTRATION" on the DMR.

For minimum percent removal requirements, the monthly influent concentration and the monthly effluent concentration shall be determined. The calculated monthly percent removal, which is equal to 100 times the quantity [1 minus the quantity (monthly effluent concentration divided by the monthly influent concentration)], shall be reported in the "MINIMUM" column under "QUALITY OR CONCENTRATION" on the DMRs.

Monthly loading is the sum of the daily loadings of a parameter divided by the number of daily loadings determined during a reporting period. The calculated monthly loading will be used to determine compliance with any maximum monthly loading limitations. Days with no discharge shall not be used to determine the value. When required by the permit, report the calculated monthly loading in the "AVERAGE" column under "QUANTITY OR LOADING" on the DMR.

Monthly monitoring frequency refers to a calendar month. When required by this permit, an analytical result, reading, value or observation shall be reported for that period if a discharge occurs during that period.

Municipal separate storm sewer means a conveyance or system of conveyances designed or used for collecting or conveying storm water which is not a combined sewer and which is not part of a POTW as defined in the Code of Federal Regulations at 40 CFR 122.2.

Municipal separate storm sewer system (MS4) means all separate storm sewers that are owned or operated by the United States, a state, city, village, township, county, district, association, or other public body created by or pursuant to state law, having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under state law, such as a sewer district, flood control district, or drainage district, or similar entity, or a designated or approved management agency under Section 208 of the Clean Water Act that discharges to the waters of the state. This term includes systems similar to separate storm sewer systems in municipalities, such as systems at military bases, large hospital or prison complexes, and highways and other thoroughfares. The term does not include separate storm sewers in very discrete areas, such as individual buildings.

National Pretreatment Standards are the regulations promulgated by or to be promulgated by the Federal Environmental Protection Agency pursuant to Section 307(b) and (c) of the Clean Water Act. The standards establish nationwide limits for specific industrial categories for discharge to a POTW.

No observed adverse effect level (NOAEL) means the highest tested dose or concentration of a substance which results in no observed adverse effect in exposed test organisms where higher doses or concentrations result in an adverse effect.

Noncontact cooling water is water used for cooling which does not come into direct contact with any raw material, intermediate product, by-product, waste product or finished product.

Nondomestic user is any discharger to a POTW that discharges wastes other than or in addition to water-carried wastes from toilet, kitchen, laundry, bathing or other facilities used for household purposes.

Nonstructural controls are practices or procedures implemented by employees at a facility to manage storm water or to prevent contamination of storm water.

NPDES means National Pollutant Discharge Elimination System.

Outfall is the location at which a point source discharge first enters a surface water of the state.

PART II

Section A. Definitions

Part 91 agency means an agency that is designated by a county board of commissioners pursuant to the provisions of Section 9105 of Part 91 of the NREPA; an agency that is designated by a city, village, or township in accordance with the provisions of Section 9106 of Part 91 of the NREPA; or the Department for soil erosion and sedimentation control activities under Part 615, Supervisor of Wells; Part 631, Reclamation of Mining Lands; or Part 632, Nonferrous Metallic Mineral Mining, of the NREPA, pursuant to the provisions of Section 9115 of Part 91 of the NREPA.

Part 91 permit means a soil erosion and sedimentation control permit issued by a Part 91 agency pursuant to the provisions of Part 91 of the NREPA.

Partially treated sewage is any sewage, sewage and storm water, or sewage and wastewater, from domestic or industrial sources that is treated to a level less than that required by the permittee's NPDES permit, or that is not treated to national secondary treatment standards for wastewater, including discharges to surface waters from retention treatment facilities.

Point of discharge is the location of a point source discharge where storm water is discharged directly into a separate storm sewer system.

Point source discharge means a discharge from any discernible, confined, discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, or rolling stock. Changing the surface of land or establishing grading patterns on land will result in a point source discharge where the runoff from the site is ultimately discharged to waters of the state.

Polluting material means any material, in solid or liquid form, identified as a polluting material under the Part 5 Rules, Spillage of Oil and Polluting Materials, promulgated under Part 31 of the NREPA (R 324.2001 through R 324.2009 of the Michigan Administrative Code).

POTW is a publicly owned treatment work.

Predevelopment is the last land use prior to the planned new development or redevelopment.

Pretreatment is reducing the amount of pollutants, eliminating pollutants, or altering the nature of pollutant properties to a less harmful state prior to discharge into a public sewer. The reduction or alteration can be by physical, chemical, or biological processes, process changes, or by other means. Dilution is not considered pretreatment unless expressly authorized by an applicable National Pretreatment Standard for a particular industrial category.

Public (as used in the MS4 individual permit) means all persons who potentially could affect the authorized storm water discharges, including, but not limited to, residents, visitors to the area, public employees, businesses, industries, and construction contractors and developers.

Public body means the United States; the state of Michigan; a city, village, township, county, school district, public college or university, or single-purpose governmental agency; or any other body which is created by federal or state statute or law.

Qualified Personnel means an individual who meets qualifications acceptable to the Department and who is authorized by an Industrial Storm Water Certified Operator to collect the storm water sample.

PART II

Section A. Definitions

Qualifying storm event means a storm event causing greater than 0.1 inch of rainfall and occurring at least 72 hours after the previous measurable storm event that also caused greater than 0.1 inch of rainfall. Upon request, the Department may approve an alternate definition meeting the condition of a qualifying storm event.

Quantification level means the measurement of the concentration of a contaminant obtained by using a specified laboratory procedure calculated at a specified concentration above the detection level. It is considered the lowest concentration at which a particular contaminant can be quantitatively measured using a specified laboratory procedure for monitoring of the contaminant.

Quarterly monitoring frequency refers to a three month period, defined as January through March, April through June, July through September, and October through December. When required by this permit, an analytical result, reading, value or observation shall be reported for that period if a discharge occurs during that period.

Regional Administrator is the Region 5 Administrator, U.S. EPA, located at R-19J, 77 W. Jackson Blvd., Chicago, Illinois 60604.

Regulated area means the permittee’s urbanized area, where urbanized area is defined as a place and its adjacent densely-populated territory that together have a minimum population of 50,000 people as defined by the United States Bureau of the Census and as determined by the latest available decennial census.

Secondary containment structure means a unit, other than the primary container, in which significant materials are packaged or held, which is required by state or federal law to prevent the escape of significant materials by gravity into sewers, drains, or otherwise directly or indirectly into any sewer system or to the surface waters or groundwaters of the state.

Separate storm sewer system means a system of drainage, including, but not limited to, roads, catch basins, curbs, gutters, parking lots, ditches, conduits, pumping devices, or man-made channels, which is not a combined sewer where storm water mixes with sanitary wastes, and is not part of a POTW.

Significant industrial user is a nondomestic user that: 1) is subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR Chapter I, Subchapter N; or 2) discharges an average of 25,000 gallons per day or more of process wastewater to a POTW (excluding sanitary, noncontact cooling and boiler blowdown wastewater); contributes a process waste stream which makes up five (5) percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the permittee as defined in 40 CFR 403.12(a) on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's treatment plant operation or violating any pretreatment standard or requirement (in accordance with 40 CFR 403.8(f)(6)).

Significant materials means any material which could degrade or impair water quality, including but not limited to: raw materials; fuels; solvents, detergents, and plastic pellets; finished materials such as metallic products; hazardous substances designated under Section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (see 40 CFR 372.65); any chemical the facility is required to report pursuant to Section 313 of Emergency Planning and Community Right-to-Know Act (EPCRA); polluting materials as identified under the Part 5 Rules (R 324.2001 through R 324.2009 of the Michigan Administrative Code); Hazardous Wastes as defined in Part 111, Hazardous Waste Management, of the NREPA; fertilizers; pesticides; and waste products such as ashes, slag, and sludge that have the potential to be released with storm water discharges.

Significant spills and significant leaks means any release of a polluting material reportable under the Part 5 Rules (R 324.2001 through R 324.2009 of the Michigan Administrative Code).

PART II

Section A. Definitions

Special-use area means storm water discharges for which the Department has determined that additional monitoring is needed from: secondary containment structures required by state or federal law; lands on Michigan's List of Sites of Environmental Contamination pursuant to Part 201, Environmental Remediation, of the NREPA; and/or areas with other activities that may contribute pollutants to the storm water.

Stoichiometric means the quantity of a reagent calculated to be necessary and sufficient for a given chemical reaction.

Storm water means storm water runoff, snow melt runoff, surface runoff and drainage, and non-storm water included under the conditions of this permit.

Storm water discharge point is the location where the point source discharge of storm water is directed to surface waters of the state or to a separate storm sewer. It includes the location of all point source discharges where storm water exits the facility, including *outfalls* which discharge directly to surface waters of the state, and *points of discharge* which discharge directly into separate storm sewer systems.

Structural controls are physical features or structures used at a facility to manage or treat storm water.

SWPPP means the Storm Water Pollution Prevention Plan prepared in accordance with this permit.

Tier I value means a value for aquatic life, human health or wildlife calculated under R 323.1057 of the Water Quality Standards using a tier I toxicity database.

Tier II value means a value for aquatic life, human health or wildlife calculated under R 323.1057 of the Water Quality Standards using a tier II toxicity database.

Total maximum daily loads (TMDLs) are required by the Clean Water Act for waterbodies that do not meet water quality standards. TMDLs represent the maximum daily load of a pollutant that a waterbody can assimilate and meet water quality standards, and an allocation of that load among point sources, nonpoint sources, and a margin of safety.

Toxicity reduction evaluation (TRE) means a site-specific study conducted in a stepwise process designed to identify the causative agents of effluent toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in effluent toxicity.

Water Quality Standards means the Part 4 Water Quality Standards promulgated pursuant to Part 31 of the NREPA, being R 323.1041 through R 323.1117 of the Michigan Administrative Code.

Weekly monitoring frequency refers to a calendar week which begins on Sunday and ends on Saturday. When required by this permit, an analytical result, reading, value, or observation shall be reported for that period if a discharge occurs during that period. If the calendar week begins in one month and ends in the following month, the analytical result, reading, value, or observation shall be reported in the month in which monitoring was conducted.

WWSL is a wastewater stabilization lagoon.

WWSL discharge event is a discrete occurrence during which effluent is discharged to the surface water up to 10 days of a consecutive 14-day period.

3-portion composite sample is a sample consisting of three equal-volume grab samples collected at equal intervals over an 8-hour period.

PART II

Section A. Definitions

7-day concentration
FOR WWSLs THAT COLLECT AND STORE WASTEWATER AND ARE AUTHORIZED TO DISCHARGE ONLY IN THE SPRING AND/OR FALL ON AN INTERMITTENT BASIS – The 7-day concentration is the sum of the daily concentrations determined during any 7 consecutive days of discharge during a WWSL discharge event divided by the number of daily concentrations determined. If the number of daily concentrations determined during the WWSL discharge event is less than 7 days, the number of actual daily concentrations determined shall be used for the calculation. The calculated 7-day concentration will be used to determine compliance with any maximum 7-day concentration limitations. When required by the permit, report the maximum calculated 7-day concentration for the WWSL discharge event in the "MAXIMUM" column under "QUALITY OR CONCENTRATION" on the DMR. If the WWSL discharge event was partially in each of two months, the value shall be reported on the DMR of the month in which the last day of discharge occurred.

FOR ALL OTHER DISCHARGES – The 7-day concentration is the sum of the daily concentrations determined during any 7 consecutive days in a reporting month divided by the number of daily concentrations determined. If the number of daily concentrations determined is less than 7, the actual number of daily concentrations determined shall be used for the calculation. The calculated 7-day concentration will be used to determine compliance with any maximum 7-day concentration limitations in the reporting month. When required by the permit, report the maximum calculated 7-day concentration for the month in the "MAXIMUM" column under "QUALITY OR CONCENTRATION" on the DMR. The first 7-day calculation shall be made on day 7 of the reporting month, and the last calculation shall be made on the last day of the reporting month.

7-day loading
FOR WWSLs THAT COLLECT AND STORE WASTEWATER AND ARE AUTHORIZED TO DISCHARGE ONLY IN THE SPRING AND/OR FALL ON AN INTERMITTENT BASIS – The 7-day loading is the sum of the daily loadings determined during any 7 consecutive days of discharge during a WWSL discharge event divided by the number of daily loadings determined. If the number of daily loadings determined during the WWSL discharge event is less than 7 days, the number of actual daily loadings determined shall be used for the calculation. The calculated 7-day loading will be used to determine compliance with any maximum 7-day loading limitations. When required by the permit, report the maximum calculated 7-day loading for the WWSL discharge event in the "MAXIMUM" column under "QUANTITY OR LOADING" on the DMR. If the WWSL discharge event was partially in each of two months, the value shall be reported on the DMR of the month in which the last day of discharge occurred.

FOR ALL OTHER DISCHARGES – The 7-day loading is the sum of the daily loadings determined during any 7 consecutive days in a reporting month divided by the number of daily loadings determined. If the number of daily loadings determined is less than 7, the actual number of daily loadings determined shall be used for the calculation. The calculated 7-day loading will be used to determine compliance with any maximum 7-day loading limitations in the reporting month. When required by the permit, report the maximum calculated 7-day loading for the month in the "MAXIMUM" column under "QUANTITY OR LOADING" on the DMR. The first 7-day calculation shall be made on day 7 of the reporting month, and the last calculation shall be made on the last day of the reporting month.

24-hour composite sample is a flow-proportioned composite sample consisting of hourly or more frequent portions that are taken over a 24-hour period and in which the volume of each portion is proportional to the discharge flow rate at the time that portion is taken. A time-proportioned composite sample may be used upon approval from the Department if the permittee demonstrates it is representative of the discharge.

PART II

Section B. Monitoring Procedures

1. Representative Samples

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge.

2. Test Procedures

Test procedures for the analysis of pollutants shall conform to regulations promulgated pursuant to Section 304(h) of the Clean Water Act (40 CFR Part 136 – Guidelines Establishing Test Procedures for the Analysis of Pollutants), unless specified otherwise in this permit. **Test procedures used shall be sufficiently sensitive to determine compliance with applicable effluent limitations**. For lists of approved test methods, go to https://www.epa.gov/cwa-methods. Requests to use test procedures not promulgated under 40 CFR Part 136 for pollutant monitoring required by this permit shall be made in accordance with the Alternate Test Procedures regulations specified in 40 CFR 136.4. These requests shall be submitted to the Manager of the Permits Section, Water Resources Division, Michigan Department of Environment, Great Lakes, and Energy, P.O. Box 30458, Lansing, Michigan, 48909-7958. The permittee may use such procedures upon approval.

The permittee shall periodically calibrate and perform maintenance procedures on all analytical instrumentation at intervals to ensure accuracy of measurements. The calibration and maintenance shall be performed as part of the permittee's laboratory Quality Assurance/Quality Control program.

3. Instrumentation

The permittee shall periodically calibrate and perform maintenance procedures on all monitoring instrumentation at intervals to ensure accuracy of measurements.

4. Recording Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information: 1) the exact place, date, and time of measurement or sampling; 2) the person(s) who performed the measurement or sample collection; 3) the dates the analyses were performed; 4) the person(s) who performed the analyses; 5) the analytical techniques or methods used; 6) the date of and person responsible for equipment calibration; and 7) the results of all required analyses.

5. Records Retention

All records and information resulting from the monitoring activities required by this permit, including all records of analyses performed, calibration and maintenance of instrumentation, and recordings from continuous monitoring instrumentation, shall be retained for a minimum of three (3) years, or longer if requested by the Regional Administrator or the Department.

Section C. Reporting Requirements

1. Start-Up Notification

The permittee shall notify the Department of start-up if one of the following conditions applies and in accordance with the applicable condition:

a. Non-CAFOs

1) **If this is an individual permit** and the permittee will not discharge during the first 60 days following the effective date of this permit, the permittee shall notify the Department via MiWaters within 14 days following the effective date of this permit, and then again 60 days prior to commencement of the discharge.

2) **If this is a general permit** and the permittee will not discharge during the first 60 days following the effective date of the Certificate of Coverage (COC) issued under this general permit, the permittee shall notify the Department via MiWaters within 14 days following the effective date of the COC, and then again 60 days prior to commencement of the discharge.

b. CAFOs

1) **If this is an individual permit** and the permittee will not populate with animals during the first 60 days following the effective date of this permit, the permittee shall notify the Department via MiWaters within 14 days following the effective date of this permit, and then again 60 days prior to populating with animals.

2) **If this is a general permit** and the permittee will not populate with animals during 60 days following the effective date of the Certificate of Coverage (COC) issued under this general permit, the permittee shall notify the Department via MiWaters within 14 days following the effective date of the COC, and then again 60 days prior to populating with animals.

2. Submittal Requirements for Self-Monitoring Data

Part 31 of the NREPA (specifically Section 324.3110(7)); and R 323.2155(2) of Part 21, Wastewater Discharge Permits, promulgated under Part 31 of the NREPA, allow the Department to specify the forms to be utilized for reporting the required self-monitoring data. Unless instructed on the effluent limitations page to conduct "Retained Self-Monitoring," the permittee shall submit self-monitoring data via the Department's MiWaters system.

The permittee shall utilize the information provided on the MiWaters website, located at https://miwaters.deq.state.mi.us, to access and submit the electronic forms. Both monthly summary and daily data shall be submitted to the Department no later than the 20th day of the month following each month of the authorized discharge period(s). The permittee may be allowed to submit the electronic forms after this date if the Department has granted an extension to the submittal date.

Section C. Reporting Requirements

3. Retained Self-Monitoring Requirements

If instructed on the effluent limits page (or otherwise authorized by the Department in accordance with the provisions of this permit) to conduct retained self-monitoring, the permittee shall maintain a year-to-date log of retained self-monitoring results and, upon request, provide such log for inspection to the staff of the Department. Retained self-monitoring results are public information and shall be promptly provided to the public upon request.

The permittee shall certify, in writing, to the Department, on or before January 10th (April 1st for animal feeding operation facilities) of each year, that: 1) all retained self-monitoring requirements have been complied with and a year-to-date log has been maintained; and 2) the application on which this permit is based still accurately describes the discharge. With this annual certification, the permittee shall submit a summary of the previous year's monitoring data. The summary shall include maximum values for samples to be reported as daily maximums and/or monthly maximums and minimum values for any daily minimum samples.

Retained self-monitoring may be denied to a permittee by notification in writing from the Department. In such cases, the permittee shall submit self-monitoring data in accordance with Part II.C.2., above. Such a denial may be rescinded by the Department upon written notification to the permittee. Reissuance or modification of this permit or reissuance or modification of an individual permittee's authorization to discharge shall not affect previous approval or denial for retained self-monitoring unless the Department provides notification in writing to the permittee.

4. Additional Monitoring by Permittee

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified above, the results of such monitoring shall be included in the calculation and reporting of the values required in the Discharge Monitoring Report. Such increased frequency shall also be indicated.

Monitoring required pursuant to Part 41 of the NREPA or Rule 35 of the Mobile Home Park Commission Act, 1987 PA 96, as amended, for assurance of proper facility operation, shall be submitted as required by the Department.

5. Compliance Dates Notification

Within 14 days of every compliance date specified in this permit, the permittee shall submit a written notification to the Department via MiWaters (https://miwaters.deq.state.mi.us) indicating whether or not the particular requirement was accomplished. If the requirement was not accomplished, the notification shall include an explanation of the failure to accomplish the requirement, actions taken or planned by the permittee to correct the situation, and an estimate of when the requirement will be accomplished. If a written report is required to be submitted by a specified date and the permittee accomplishes this, a separate written notification is not required.

Section C. Reporting Requirements

6. Noncompliance Notification

Compliance with all applicable requirements set forth in the Clean Water Act, Parts 31 and 41 of the NREPA, and related regulations and rules is required. All instances of noncompliance shall be reported as follows:

a. 24-Hour Reporting
Any noncompliance which may endanger health or the environment (including maximum and/or minimum daily concentration discharge limitation exceedances) shall be reported, verbally, within 24 hours from the time the permittee becomes aware of the noncompliance by calling the Department at the number indicated on the second page of this permit (or, if this is a general permit, on the COC). A written submission shall also be provided via MiWaters (https://miwaters.deq.state.mi.us) within five (5) days.

b. Other Reporting
The permittee shall report, in writing via MiWaters (https://miwaters.deq.state.mi.us), all other instances of noncompliance not described in a. above at the time monitoring reports are submitted; or, in the case of retained self-monitoring, within five (5) days from the time the permittee becomes aware of the noncompliance.

Reporting shall include: 1) a description of the discharge and cause of noncompliance; 2) the period of noncompliance, including exact dates and times, or, if not yet corrected, the anticipated time the noncompliance is expected to continue; and 3) the steps taken to reduce, eliminate, and prevent recurrence of the noncomplying discharge.

7. Spill Notification

The permittee shall immediately report any release of any polluting material which occurs to the surface waters or groundwaters of the state, unless the permittee has determined that the release is not in excess of the threshold reporting quantities specified in the Part 5 Rules (R 324.2001 through R 324.2009 of the Michigan Administrative Code), by calling the Department at the number indicated on the second page of this permit (or, if this is a general permit, on the COC); or, if the notice is provided after regular working hours, by calling the Department's 24-hour Pollution Emergency Alerting System telephone number, 1-800-292-4706.

Within 10 days of the release, the permittee shall submit to the Department via MiWaters (https://miwaters.deq.state.mi.us) a full written explanation as to the cause of the release, the discovery of the release, response measures (clean-up and/or recovery) taken, and preventive measures taken or a schedule for completion of measures to be taken to prevent reoccurrence of similar releases.

PART II

Section C. Reporting Requirements

8. Upset Noncompliance Notification

If a process "upset" (defined as an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee) has occurred, the permittee who wishes to establish the affirmative defense of upset shall notify the Department by telephone within 24 hours of becoming aware of such conditions; and within five (5) days, provide in writing, the following information:

a. that an upset occurred and that the permittee can identify the specific cause(s) of the upset;

b. that the permitted wastewater treatment facility was, at the time, being properly operated and maintained (note that an upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation); and

c. that the permittee has specified and taken action on all responsible steps to minimize or correct any adverse impact in the environment resulting from noncompliance with this permit.

No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

In any enforcement proceedings, the permittee, seeking to establish the occurrence of an upset, has the burden of proof.

9. Bypass Prohibition and Notification

a. Bypass Prohibition
Bypass is prohibited, and the Department may take an enforcement action, unless:

1) bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

2) there were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass; and

3) the permittee submitted notices as required under b. or c. below.

b. Notice of Anticipated Bypass
If the permittee knows in advance of the need for a bypass, the permittee shall submit written notification to the Department before the anticipated date of the bypass. This notification shall be submitted at least 10 days before the date of the bypass; however, the Department will accept fewer than 10 days advance notice if adequate explanation for this is provided. The notification shall provide information about the anticipated bypass as required by the Department. The Department may approve an anticipated bypass, after considering its adverse effects, if it will meet the three (3) conditions specified in a. above.

c. Notice of Unanticipated Bypass
As soon as possible but no later than 24 hours from the time the permittee becomes aware of the unanticipated bypass, the permittee shall notify the Department by calling the number indicated on the second page of this permit (or, if this is a general permit, on the COC); or, if notification is provided after regular working hours, call the Department's 24-hour Pollution Emergency Alerting System telephone number, 1-800-292-4706.

Section C. Reporting Requirements

d. Written Report of Bypass
A written submission shall be provided within five (5) working days of commencing any bypass to the Department, and at additional times as directed by the Department. The written submission shall contain a description of the bypass and its cause; the period of bypass, including exact dates and times, and if the bypass has not been corrected, the anticipated time it is expected to continue; steps taken or planned to reduce, eliminate, and prevent reoccurrence of the bypass; and other information as required by the Department.

e. Bypass Not Exceeding Limitations
The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to ensure efficient operation. These bypasses are not subject to the provisions of a., b., c., and d., above. This provision does not relieve the permittee of any notification responsibilities under Part II.C.11. of this permit.

f. Definitions

1) Bypass means the intentional diversion of waste streams from any portion of a treatment facility.

2) Severe property damage means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

10. Bioaccumulative Chemicals of Concern (BCC)

Consistent with the requirements of R 323.1098 and R 323.1215 of the Michigan Administrative Code, the permittee is prohibited from undertaking any action that would result in a lowering of water quality from an increased loading of a BCC unless an increased use request and antidegradation demonstration have been submitted and approved by the Department.

11. Notification of Changes in Discharge

The permittee shall notify the Department, via MiWaters (https://miwaters.deq.state.mi.us), as soon as possible but within no more than 10 days of knowing, or having reason to believe, that any activity or change has occurred or will occur which would result in the discharge of: 1) detectable levels of chemicals on the current Michigan Critical Materials Register, priority pollutants or hazardous substances set forth in 40 CFR 122.21, Appendix D, or the Pollutants of Initial Focus in the Great Lakes Water Quality Initiative specified in 40 CFR 132.6, Table 6, which were not acknowledged in the application or listed in the application at less than detectable levels; 2) detectable levels of any other chemical not listed in the application or listed at less than detection, for which the application specifically requested information; or 3) any chemical at levels greater than five times the average level reported in the complete application (see the first page of this permit, for the date(s) the complete application was submitted). Any other monitoring results obtained as a requirement of this permit shall be reported in accordance with the compliance schedules.

Section C. Reporting Requirements

12. Changes in Facility Operations

Any anticipated action or activity, including but not limited to facility expansion, production increases, or process modification, which will result in new or increased loadings of pollutants to the receiving waters must be reported to the Department by a) submission of an increased use request (application) and all information required under R 323.1098 (Antidegradation) of the Water Quality Standards or b) by written notice if the following conditions are met: 1) the action or activity will not result in a change in the types of wastewater discharged or result in a greater quantity of wastewater than currently authorized by this permit; 2) the action or activity will not result in violations of the effluent limitations specified in this permit; 3) the action or activity is not prohibited by the requirements of Part II.C.10.; and 4) the action or activity will not require notification pursuant to Part II.C.11. Following such written notice, the permit or, if applicable, the facility's COC, may be modified according to applicable laws and rules to specify and limit any pollutant not previously limited.

13. Transfer of Ownership or Control

In the event of any change in ownership or control of facilities from which the authorized discharge emanates, the following requirements apply: Not less than 30 days prior to the actual transfer of ownership or control – for non-CAFOs, or within 30 days of the actual transfer of ownership or control – for CAFOs, the permittee shall submit to the Department via MiWaters (https://miwaters.deq.state.mi.us) a written agreement between the current permittee and the new permittee containing: 1) the legal name and address of the new owner; 2) a specific date for the effective transfer of permit responsibility, coverage and liability; and 3) a certification of the continuity of or any changes in operations, wastewater discharge, or wastewater treatment.

If the new permittee is proposing changes in operations, wastewater discharge, or wastewater treatment, the Department may propose modification of this permit in accordance with applicable laws and rules.

14. Operations and Maintenance Manual

For wastewater treatment facilities that serve the public (and are thus subject to Part 41 of the NREPA), Section 4104 of Part 41 and associated Rule 2957 of the Michigan Administrative Code allow the Department to require an Operations and Maintenance (O&M) Manual from the facility. An up-to-date copy of the O&M Manual shall be kept at the facility and shall be provided to the Department upon request. The Department may review the O&M Manual in whole or in part at its discretion and require modifications to it if portions are determined to be inadequate.

At a minimum, the O&M Manual shall include the following information: permit standards; descriptions and operation information for all equipment; staffing information; laboratory requirements; record keeping requirements; a maintenance plan for equipment; an emergency operating plan; safety program information; and copies of all pertinent forms, as-built plans, and manufacturer's manuals.

Certification of the existence and accuracy of the O&M Manual shall be submitted to the Department at least sixty days prior to start-up of a new wastewater treatment facility. Recertification shall be submitted sixty days prior to start-up of any substantial improvements or modifications made to an existing wastewater treatment facility.

Section C. Reporting Requirements

15. Signatory Requirements

All applications, reports, or information submitted to the Department in accordance with the conditions of this permit and that require a signature shall be signed and certified as described in the Clean Water Act and the NREPA.

The Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance, shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

The NREPA (Section 3115(2)) provides that a person who at the time of the violation knew or should have known that he or she discharged a substance contrary to this part, or contrary to a permit, COC, or order issued or rule promulgated under this part, or who intentionally makes a false statement, representation, or certification in an application for or form pertaining to a permit or COC or in a notice or report required by the terms and conditions of an issued permit or COC, or who intentionally renders inaccurate a monitoring device or record required to be maintained by the Department, is guilty of a felony and shall be fined not less than $2,500.00 or more than $25,000.00 for each violation. The court may impose an additional fine of not more than $25,000.00 for each day during which the unlawful discharge occurred. If the conviction is for a violation committed after a first conviction of the person under this subsection, the court shall impose a fine of not less than $25,000.00 per day and not more than $50,000.00 per day of violation. Upon conviction, in addition to a fine, the court in its discretion may sentence the defendant to imprisonment for not more than 2 years or impose probation upon a person for a violation of this part. With the exception of the issuance of criminal complaints, issuance of warrants, and the holding of an arraignment, the circuit court for the county in which the violation occurred has exclusive jurisdiction. However, the person shall not be subject to the penalties of this subsection if the discharge of the effluent is in conformance with and obedient to a rule, order, permit, or COC of the Department. In addition to a fine, the attorney general may file a civil suit in a court of competent jurisdiction to recover the full value of the injuries done to the natural resources of the state and the costs of surveillance and enforcement by the state resulting from the violation.

16. Electronic Reporting

Upon notice by the Department that electronic reporting tools are available for specific reports or notifications, the permittee shall submit electronically via MiWaters (https://miwaters.deq.state.mi.us) all such reports or notifications as required by this permit, on forms provided by the Department.

Section D. Management Responsibilities

1. Duty to Comply

All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant identified in this permit, more frequently than, or at a level in excess of, that authorized, shall constitute a violation of the permit.

It is the duty of the permittee to comply with all the terms and conditions of this permit. Any noncompliance with the Effluent Limitations, Special Conditions, or terms of this permit constitutes a violation of the NREPA and/or the Clean Water Act and constitutes grounds for enforcement action; for permit or COC termination, revocation and reissuance, or modification; or denial of an application for permit or COC renewal.

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

2. Operator Certification

The permittee shall have the waste treatment facilities under direct supervision of an operator certified at the appropriate level for the facility certification by the Department, as required by Sections 3110 and 4104 of the NREPA. Permittees authorized to discharge storm water shall have the storm water treatment and/or control measures under direct supervision of a storm water operator certified by the Department, as required by Section 3110 of the NREPA.

3. Facilities Operation

The permittee shall, at all times, properly operate and maintain all treatment or control facilities or systems installed or used by the permittee to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance includes adequate laboratory controls and appropriate quality assurance procedures.

4. Power Failures

In order to maintain compliance with the effluent limitations of this permit and prevent unauthorized discharges, the permittee shall either:

a. provide an alternative power source sufficient to operate facilities utilized by the permittee to maintain compliance with the effluent limitations and conditions of this permit; or

b. upon the reduction, loss, or failure of one or more of the primary sources of power to facilities utilized by the permittee to maintain compliance with the effluent limitations and conditions of this permit, the permittee shall halt, reduce or otherwise control production and/or all discharge in order to maintain compliance with the effluent limitations and conditions of this permit.

5. Adverse Impact

The permittee shall take all reasonable steps to minimize or prevent any adverse impact to the surface waters or groundwaters of the state resulting from noncompliance with any effluent limitation specified in this permit including, but not limited to, such accelerated or additional monitoring as necessary to determine the nature and impact of the discharge in noncompliance.

Section D. Management Responsibilities

6. Containment Facilities

The permittee shall provide facilities for containment of any accidental losses of polluting materials in accordance with the requirements of the Part 5 Rules (R 324.2001 through R 324.2009 of the Michigan Administrative Code). For a POTW, these facilities shall be approved under Part 41 of the NREPA.

7. Waste Treatment Residues

Residuals (i.e. solids, sludges, biosolids, filter backwash, scrubber water, ash, grit, or other pollutants or wastes) removed from or resulting from treatment or control of wastewaters, including those that are generated during treatment or left over after treatment or control has ceased, shall be disposed of in an environmentally compatible manner and according to applicable laws and rules. These laws may include, but are not limited to, the NREPA, Part 31 for protection of water resources, Part 55 for air pollution control, Part 111 for hazardous waste management, Part 115 for solid waste management, Part 121 for liquid industrial wastes, Part 301 for protection of inland lakes and streams, and Part 303 for wetlands protection. Such disposal shall not result in any unlawful pollution of the air, surface waters or groundwaters of the state.

8. Right of Entry

The permittee shall allow the Department, any agent appointed by the Department, or the Regional Administrator, upon the presentation of credentials and, for animal feeding operation facilities, following appropriate biosecurity protocols:

a. to enter upon the permittee's premises where an effluent source is located or any place in which records are required to be kept under the terms and conditions of this permit; and

b. at reasonable times to have access to and copy any records required to be kept under the terms and conditions of this permit; to inspect process facilities, treatment works, monitoring methods and equipment regulated or required under this permit; and to sample any discharge of pollutants.

9. Availability of Reports

Except for data determined to be confidential under Section 308 of the Clean Water Act and Rule 2128 (R 323.2128 of the Michigan Administrative Code), all reports prepared in accordance with the terms of this permit and required to be submitted to the Department shall be available for public inspection via MiWaters (https://miwaters.deq.state.mi.us). As required by the Clean Water Act, effluent data shall not be considered confidential. Knowingly making any false statement on any such report may result in the imposition of criminal penalties as provided for in Section 309 of the Clean Water Act and Sections 3112, 3115, 4106 and 4110 of the NREPA.

10. Duty to Provide Information

The permittee shall furnish to the Department via MiWaters (https://miwaters.deq.state.mi.us), within a reasonable time, any information which the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or the facility's COC, or to determine compliance with this permit. The permittee shall also furnish to the Department, upon request, copies of records required to be kept by this permit.

Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Department, it shall promptly submit such facts or information.

Section E. Activities Not Authorized by This Permit

1. Discharge to the Groundwaters
This permit does not authorize any discharge to the groundwaters. Such discharge may be authorized by a groundwater discharge permit issued pursuant to the NREPA.

2. POTW Construction
This permit does not authorize or approve the construction or modification of any physical structures or facilities at a POTW. Approval for the construction or modification of any physical structures or facilities at a POTW shall be by permit issued under Part 41 of the NREPA.

3. Civil and Criminal Liability
Except as provided in permit conditions on "Bypass" (Part II.C.9. pursuant to 40 CFR 122.41(m)), nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance, whether or not such noncompliance is due to factors beyond the permittee’s control, such as accidents, equipment breakdowns, or labor disputes.

4. Oil and Hazardous Substance Liability
Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee may be subject under Section 311 of the Clean Water Act except as are exempted by federal regulations.

5. State Laws
Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation under authority preserved by Section 510 of the Clean Water Act.

6. Property Rights
The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize violation of any federal, state or local laws or regulations, nor does it obviate the necessity of obtaining such permits, including any other Department of Environment, Great Lakes, and Energy permits, or approvals from other units of government as may be required by law.

APPENDIX C

CLARIFIER PERFORMANCE TESTING

REPORT

OF

CLARIFIER PERFORMANCE TESTING

AT THE

KALAMAZOO WATER RECLAMATION PLANT

C.P.E, Inc.
Enfield, NH
January 2019

TABLE OF CONTENTS

I. PROJECT OBJECTIVES

The Kalamazoo Water Resource Plant is an activated sludge plant operated in the biological nutrient removal mode to achieve the removal of both nitrogen and phosphorus, and with powdered activated carbon added to remove certain organics. This plant consists of preliminary and primary treatment, an activated sludge process currently operating with four secondary clarifiers, sand filters and chlorine disinfection. (Appendix A, Fig. A1)

The present plant was designed to treat a peak daily flow of 98.2 million gallons per day (mgd) and an average annual design flow of 53.3 mgd. The current average daily flow is approximately 26.3 mgd.

The primary objective of this field study was to evaluate the hydraulic performance characteristics of the secondary clarifiers while operating at both normal and elevated flow rates and solids loadings, This evaluation was to help assess the capacity of the clarifiers and determine (a) their present performance characteristics and (b) the potential for any additional modifications that could improve their performance and reliability under current permit conditions and future operating conditions.

In order to accomplish these objectives, the field investigation was designed to accomplish the following major findings for each of the final clarifiers:

1. Develop flow curves and determine the hydraulic characteristics and actual detention times for the test clarifiers at each test flow.
2. At the initial flow rate, determine the location and intensity of the major and minor currents by conducting drogue current tests.
3. Also at this flow rate, determine and monitor the formation and movement of the sludge blankets.
4. Then, to the extent possible, at elevated surface overflow flow (SOR) rates, repeat the same tests in two focus clarifiers again to determine:
    - their hydraulic characteristics and detention times,
    - the location and intensity of the currents, and
    - formation of the sludge blankets
5. Based on these tests and other observations, assess the capacity of each of these clarifiers and recommend any modifications to improve their performance or the capacity of the clarification system.

II. DESCRIPTION OF THE CLARIFIERS

A. General Clarifier Description:

1. General Clarifier Configuration:

Their four test secondary clarifiers are circular, with a draft-tube suction mechanism to remove the settled activated sludge. Each clarifier is 150 feet (ft) in diameter with a side water depth of 14 feet. The floor slopes at 1” per foot to a center depth of approximately 19.5-ft. These clarifiers also have a 28-ft diameter by 10-ft deep flocculation well.

Clarifier Internals

2. Effluent Launder Configuration:

Each clarifier has a single inboard cantilevered launder, topped with standard V-notched weirs on both sides. The center of the launder is approximately 10-ft inboard from the outer wall of the clarifier

Typical Launder

III. THE CLARIFICATION PROCESS

The secondary clarifier is often the most critical link in the biological wastewater treatment process. Its main function is to separate the activated sludge solids from the treated effluent and to allow the clarified effluent to pass on to the point of discharge. As an additional function, the clarifier is sometimes used to thicken and store the settled activated sludge solids in order to minimize sludge wasting volume and reduce return activated sludge (RAS) flow rates. In the Kalamazoo WRP biological system, the sludge is wasted by removing the mixed liquor suspended solids (MLSS) directly from the mixed liquor distribution channel.

Although many designs assume that a clarifier is a "plug flow" reactor, and that it has a defined detention time (based on its volume) to effectively accomplish these functions, studies have shown that clarifier flow patterns are often more like those of an "arbitrary-flow" or "mixed-flow" reactor. This is particularly true in the case of clarifiers treating a wastewater with a mass of flocculent suspended solids. In all cases, the clarifier's efficiency is affected by the formation of various hydraulic currents. These currents can impair a clarifier’s effectiveness and greatly reduce a clarifier’s ability to separate and thicken the flocculent activated sludge solids from the wastewater.

Under the current operating conditions, this clarification process was aided by the addition of powdered activated carbon (PAC) at the beginning of the aeration process. The need for this PAC addition has been required for the removal of certain organics in the influent.

IV. DISCUSSION OF HYDRAULIC PERFORMANCE TESTING

In evaluating a clarifier’s hydraulic performance, it is useful to compare its performance to an ideal clarifier. For an ideal clarifier, the theoretical detention time (**T_t**) can be determined by dividing the total clarifier volume by the actual flow rate leaving the clarifier. This value represents the time of travel through a plug flow reactor. Although no clarifier can be expected to have this as an actual detention time, the more closely it approaches this value, the more efficient it should be as a settling tank.

A. Use of Flow Curves:

The hydraulic efficiency of a clarifier is a measure of its performance as compared to that of an ideal settling tank. Through the use of dye tracer studies, the performance of a clarifier can be described by several comparisons. For example, if a "slug" of dye is introduced into a clarifier at a point where it will be well mixed with the contents entering the clarifier, the rate at which the dye exits the clarifier can be used to determine its efficiency. The graphical representation of this information is called the "flow curve."

An ideal settling tank would be one that has the characteristics of a plug flow reactor. That is to say, the residence time of an element of flow in that tank is equal to the theoretical detention time at that flow rate. Accordingly, if a slug of dye were injected at the inlet of an ideal clarifier, that slug would travel through the clarifier as a compact mass and exit from the clarifier at the theoretical detention time. The plot of this flow curve is shown in Appendix A, Figure A2a.

At the opposite end of the reactor spectrum, a tank with a high degree of stirring can be likened to a completely-mixed reactor. If a slug of dye were injected at the inlet of this type of reactor, it would immediately be dispersed throughout the entire tank contents. A sample of the effluent near the beginning of the test would be at the maximum concentration with the slug of dye having been diluted by the total volume of the tank. Then, as the flow continued to pass into and through the tank, the effluent would be continuously diluted by the inflow such that its dye concentration would be continuously diminished. The plot of the flow curve for a completely-mixed reactor is shown in Figure A2b.

A typical clarifier, however, is a non-ideal plug flow reactor, often referred to as an "arbitrary flow" reactor. Because of the density currents, along with the various inlet and exit conditions and the dispersion due to mixing, the flow patterns are such that the typical clarifier always displays characteristics that are less efficient than those of the ideal clarifier. The ultimate shape of each clarifier’s flow curve, of course, depends on the influence of these various conditions and is generally similar to that shown in Figure A2c.

B. Determining Flow Curve Characteristics:

With the advances in fluorescent dye tracer technology, the examination of flow curves has become an extremely useful technique for determining the actual field performance of a clarifier. Graphical plotting and computer-based analytical methods enable the data to be analyzed quickly and completely.

In examining a clarifier's flow curve, there are several features that can be identified for comparison with other flow curves. One of the most important of these is the time of the initial appearance of the dye in the effluent ($\mathbf{T_i}$). This is the first good indication of the degree of departure of the clarifier's performance from the ideal. The ratio of the time of the initial appearance of the dye to the theoretical detention time is one indication of the amount of short-circuiting taking place. A low ratio of $\mathbf{T_i / T_t}$ indicates a high degree of short-circuiting, while a high ratio indicates that the clarifier is approaching a plug flow condition.

Another important feature of the flow curve is the rate at which it rises toward the peak value. A fast-rising curve can indicate the presence of a strong short-circuiting current while a curve that rises more slowly can indicate either less short-circuiting or a broader band of influence of the current. Similarly, the rate at which the curve descends from its peak value is another indication of the degree of short-circuiting present. Short-circuiting currents are those that find more concentrated and direct paths to the effluent weirs. The velocities of these currents are often such that they tend to transport the lighter floc particles to the effluent that would have remained settled in a more ideal clarifier.

The time that it takes for the exiting dye to reach its peak/modal value (**T_m**) is also important in clarifiers. This time indicates how fast the major short-circuiting current reached the effluent, and how fast some suspended solids particles are moving with the current through the clarifier. The modal value is more indicative of the effective settling time than any other value. Indeed, this is the time that the mass of solids that have been transported through the clarifier with the major current would actually reach the effluent. One of the major measures of the efficiency of a clarifier, then, would be a comparison of the **T_m** to the **T_t**. This is called the "modal efficiency" (**T_m / T_t**).

The full development of the flow curve can be evaluated to determine the **actual detention** time of the clarifier and the degree of dispersion taking place. Although the time elapsed to reach the center of gravity of the area under the flow curve (as determined by the sum of the moments of the individual areas about the y-axis) is the center of mass of this curve, this location is unduly influenced by the increasingly smaller concentrations of recirculated dye that exit the clarifier during the latter part of the dye test. Accordingly, we use the time to the <u>center of the area under the curve</u> as a more representative indication of the actual detention time (**T_a**), also referred to as the "operating detention time". This time is generally at least 10 percent less than the time to the center of mass (the centroid). The ratio of the actual detention time to the theoretical detention time (**T_a / T_t**) is called the "hydraulic efficiency" of the clarifier.

In order to develop the flow curves for each test clarifier for these stress tests, the effluents from each clarifier were typically sampled at five-minute intervals for the first 60 minutes, then at 10-minute intervals for the next 60 minutes, then at 20-minute intervals for the next 60 minutes, and finally at 30-minute intervals if required for the remainder of the test. (Appendix B, Figures B1 - B3)

V. LOCATING CURRENTS: Use of Drogue Current Tests:

The currents in a clarifier often vary considerably by depth and by distance from the influent point. In order to locate and quantify these currents, we use a type of "flow catcher" called a "drogue." This drogue is constructed to drift with the current at whatever depth and location the drogue is suspended. This drogue test accurately delineates the movements of the clarifier's currents in the horizontal plane. The drogues for these tests were launched from two different locations along each clarifier's access bridge, (Appendix A, Figure A3). The results of all the drogue data are displayed in Appendix D.

Monitoring Drogues in a Clarifier

VI. DISCUSSION OF OTHER TESTS

A. Clarifier Test Flow Rates:

In order to determine the performance of these clarifiers under more stressed conditions, several different test flow rates were imposed on the test clarifiers. The initial flow rate of approximately 8.6 mgd to the four clarifiers represented an average Noon-time flow condition while the second and third flow rates of 13 mgd and 17.5 mgd represented conditions where the clarifiers would have been stressed. These flow rates are listed on the various data graphs and sheets.

The flow rates for each stress level were achieved by delivering the entire plant flow to the specific test clarifiers. The test flow rates were dictated by the normal plant flow at the time of the tests.

B. Return Sludge Flow Rates:

Each final clarifier sends its RAS flow back to the head of the aeration basins. These RAS flow concentrations were sampled at 60-minute intervals for the duration of the stress testing by pulling grab samples from the combined clarifier's RAS pumps. The RAS pumps for the clarifiers were initially set at approximately 5.5 mgd which represented the plant's normal rates for daily operation. This RAS rate was increased to approximately 7.3 mgd for the two higher stress tests.

At the end of the second day's tests, a drawdown was conducted in both SC-5 and SC-8 in order estimate their actual RAS flow rates.

Measuring Drawdown

C. Sludge Blanket Tests / Vertical Solids Profiles:

Using the Royce Model 711 electronic suspended solids analyzer, we can accurately determine the concentration of the suspended solids throughout the entire vertical section of a secondary clarifier at any location. This hand-held meter enables us to quickly determine the formation and composition of the blanket in a clarifier throughout the duration of each stress test. However, the meter's maximum reading capability is 10,000 mg/l.

At several intervals during each stress test, vertical solids profiles (VSP's) were obtained from multiple locations along the clarifier access bridges. These locations are also shown in Appendix A, Figure A3.

The results of all the vertical solids profile testing are displayed in Appendix C.

D. Effluent TSS Concentrations:

The effluent TSS grab samples were collected at 60-minute intervals for the initial stress test of the four clarifiers. For the higher-level stress tests of the two focus clarifiers, these samples were collected at 30-minute intervals. All effluent TSS samples were collected from the combined clarifier effluent channel.

E. Mixed Liquor Concentrations:

The mixed liquor suspended solids (MLSS) concentrations are also an important element in the evaluation of any clarifier's performance. The MLSS concentrations were determined by grab samples at 60-minute intervals from the mixed liquor distribution channel for the initial stress tests, and at 30-minute intervals for the two higher level stress tests.

F. Visual Observations:

During the initial portion of each flow curve dye test at each flow rate, visual observations are often made of the appearance of the dye across the surface of the focus clarifiers. These observations can serve as additional indicators of the initial path of the dye through the clarifiers.

G. Dispersed and Flocculated Suspended Solids (DSS/FSS):

Although a plant may do a good job of growing solids or removing organics in the activated sludge process, one of its most important activated sludge process control activities is developing a floc that settles well and that reduces particulate matter in the effluent. These properties of the floc are a function of the make-up of the influent suspended solids as well as the biological process and the mechanics of the aeration basins and the clarification process.

In order to determine if better settling conditions or additional flocculation in the clarifiers could improve effluent quality, multiple samples of the mixed liquor and the clarifiers effluent were subjected to enhanced flocculation tests. For this type of test, a grab sample was divided into two separate samples: the first well-mixed sample was allowed to settle for 30 minutes to obtain a clear supernatant sample for TSS analysis. This sample is referred to as the "dispersed suspended solids", or DSS. The second portion of the same original sample would first be subjected to 20 minutes of flocculation with a 50-rpm stirrer, and then allowed to settle for 30 minutes. The supernatant of this sample was then also analyzed for TSS concentration. This sample is referred to as the "flocculated suspended solids", or FSS.

During each of these stress tests, a series of MLSS as well as clarifier effluent samples were obtained and subjected to the DSS/FSS testing protocol. The mixed liquor sampled were collected from the distribution channel. The clarifier effluent samples were all obtained from each clarifier's effluent launder.

VII. PLANT CONDITIONS DURING THE TEST PERIOD:

A.1 Final Clarifier Dimensions:

The approximate clarifier dimensions are as follows:

Clarifier Surface Area:	17,660 sf
Approx. Clarifier Volume:	2 Mgal
Approx. Weir Length:	820 lf

These dimensions yield the following unit hydraulic loading values, based on the total forward flow (clarifier effluent flow) divided by the total surface area:

Test #	**Flow Rate per Clarifier (mgd)**	**SOR (gal/sf/d)**	**Weir Loading (gal/lf/d)**
1	8.6	490	10,000
2	13.0	740	16,000
3	17.5	990	21,000

A.2 Final Clarifier Solids Loadings:

The following approximate loading rates and activated sludge characteristics were present in the clarifiers during the various test periods:

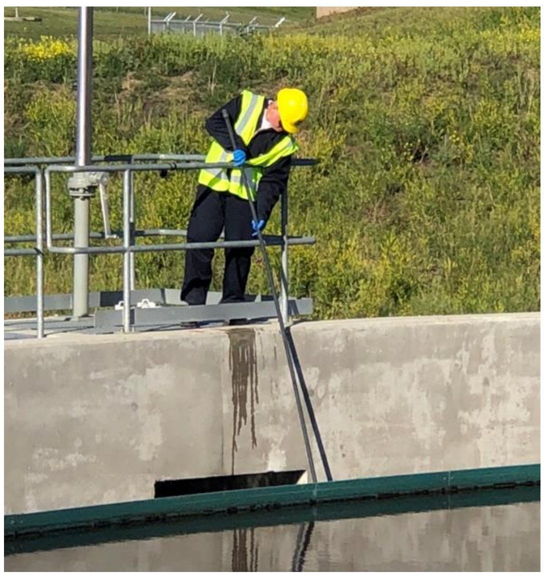
Test Conditions	Test #1	Test #2	Test #3
Test Flow Q (mgd)	8.6	13	17.5
RAS Flow Q_R (mgd)	5.5	7.3	7.3
Total Q + R (mgd)	14.1	20.3	24.8
Aver. MLSS (mg/l)	4075	4700	4300
Aver. RAS (mg/l)	10.400	11,600	11,700
Lbs. Added/day (1,000 Lbs)	480	796	889
Lbs. removed/day (1,000 Lbs)	477	706	712
DIFFERENCE (1,000 Lbs)	**-3**	**-90**	**-177**
Solids Loading (Lb/sf/d)	27	45	50

VIII. THE TEST RESULTS

A. Detention Time Dye Tests: (Appendix B, Figures B1-B3)

A flow curve was developed for the test clarifiers for each flow condition by sampling the dye concentration in the effluent from each clarifier over several hours. For each test, the dye was introduced at the control gate feeding the MLSS to each clarifier so that it would be well-distributed as it entered the clarifier. During each of the tests, whole effluent samples were collected initially at 5-minute intervals, then at greater intervals after the dye concentrations had peaked. The results of each of these tests are shown in Figures B1 to B3 and are summarized in the following table. The theoretical detention time of a clarifier is based on the clarifier volume divided by its estimated effluent flow.

During Tests #2 and #3, dye samples were also collected from the walkway at the inner and outer face of the launder. These dye curve comparisons are shown on Figures B4 and B5.



Sampling Dye

Test #1 at Initial Flow Rate of 8.6 mgd

Clar #	Av. Test Flow Rate (mgd)**	Tt (min)	Ti (min)	Ti/Tt Effic. (%)	Tm (min)	Modal Effic. (%)	Ta (min)	Hydraulic Effic. (%)
SC-5	8.6	335	20	6	25	7	101	30
SC-6	8.6	335	10	3	25	7	94	28
SC-7	8.6	335	20	6	25	7	100	30
SC-8	8.6	335	15	4	20	6	97	29

** This is the average flow rate for the first hour of the dye test.

Test #2 at an Aver. Flow Rate of 13 mgd

Clar #	Actual ** Test Flow Rate (mgd)	Tt (min)	Ti (min)	Ti/Tt Effic. (%)	Tm (min)	Modal Effic. (%)	Ta (min)	Hydraulic Effic. (%)
SC-5	12.6	230	15	7	15	7	57	25
SC-8	13.3	215	15	7	15	7	61	28

** This is the adjusted flow rate for the first hour of the dye test in each clarifier.

Test #3 at an Aver. Flow Rate of 17.5 mgd

Clar #	Actual ** Test Flow Rate (mgd)	Tt (min)	Ti (min)	Ti/Tt Effic. (%)	Tm (min)	Modal Effic. (%)	Ta (min)	Hydraulic Effic. (%)
SC-5	16.9	170	10	6	20	12	57	36
SC-8	18.0	160	10	6	20	12	61	38

** This is the adjusted flow rate for the first hour of the test in each clarifier.

B. Other Observations:

1. Return Sludge Flows and Concentrations:

The RAS flow rates for the four clarifiers were controlled by a single pumping system and a single flow meter reporting the total RAS flow from the entire clarifier battery. The RAS rate for each clarifier was initially set at approximately 5.5 mgd. As the flow rates were increased, the RAS rates were also increased. The RAS was sampled at 60-minute intervals from the system's RAS pump. Based on an average of the grab samples collected during the tests, the following were determined to be the approximate RAS concentrations (in mg/l):

Average RAS Concentrations

RAS in mg/l	Test #1	Test #2	Test #3
	10,400	11,600	11,700

2. Drogue Current Tests: (Appendix D, Figures D1 – D6)

Drogue tests were conducted at all test flow rates throughout the water column of the two focus clarifiers SC #5 and SC #8, and at two locations along the clarifier walkway. Drogues were inserted simultaneously in the test clarifier at each of the selected locations.

The drogue positions were typically noted each minute for two minutes. The movements of the drogues, showing the direction and the rate in feet per minute, are shown as velocity profiles in Appendix D.

3. Vertical Solids Profiles: (See Appendix C for full profiles)

VSP measurements were collected at four locations along the access bridges of the test clarifiers. VSPs were developed at different times throughout each test period to observe the changes in blanket levels and the amount of solids in each clarifier. The following summary of the solids units at each of these stations is an indication of the amount of solids in each clarifier at that time.

VERTICAL SOLIDS PROFILE - SUMMARY					
Depth	**10'**	**25'**	**45'**	**70'**	
SC#	**10/31 Test #1 0900 @ 6.0 mgd**				**TOTALS**
5	50	21	10	1	**82**
8	74	23	0	0	**97**
	1300 @ 7.8 mgd				
5	59	27	17	10	**113**
8	70	32	20	9	**131**
	1500 @ 7.5 mgd				
5	62	25	10	0	**96**
8	69	30	18	0	**117**
	11/1 Test #2 0720 @ 12.0 mgd				
5	60	21	9	0	**90**
8	81	32	16	0	**129**
	0900 @ 14.2 mgd				
5	68	28	18	10	**124**
8	78	42	26	10	**156**
	1000 @ 15.2 mgd				
5	68	35	17	10	**130**
8	84	41	25	10	**160**
	Test #3 1140 @ 16.8 mgd				
5	72	33	23	10	**138**
8	92	48	32	14	**186**
	1400 @ 16.5 mgd				
5	84	38	24	10	**157**
8	102	47	33	20	**202**

4. Effluent TSS Tests:

In order to verify the performance of the test clarifiers during the first "normal flow" test, combined effluent samples were grabbed approximately every 60-minutes from clarifiers' combined effluent channel. For the succeeding higher flow tests, discrete effluent TSS samples were grabbed at 60-minute intervals from each test clarifier's launder as it exited the clarifier. The following are the results of these effluent TSS (ETSS) results (in mg/l) for the respective stress test flow rates, followed by the observed low and high values:

	ETSS (mg/l)
Test #1 – Combined Effluent	5 (4 - 6)
Test #2 – Combined Effluent	9 (4 – 13)
Test #2 – SC #8 only	11 (9 – 12)
Test #3 – Combined Effluent	7 (10 – 4)

5. Activated Sludge MLSS and Settleability:

During the stress tests, the MLSS was sampled from the mixed liquor channel every 60 minutes throughout the test period. Several samples were settled for 30 minutes to determine their sludge volume index (SVI). These samples yielded the following results:

Date / Time	MLSS	SVI
10/31 @ 1400	3900	62
11/1 @ 1100	4400	55
11/1 @ 1200	4600	52

6. Dispersed and Flocculated Suspended Solids:

Multiple samples of MLSS and clarifier effluents were collected for DSS/FSS testing. These samples were split and subjected to 30-minutes of settling without mixing to determine the DSS, and to 30 minutes of settling after 20 minutes of flocculation to determine the FSS. The following are the results in mg/l, along with the actual clarifier effluent:

Day 1 (10/31) / All Clarifiers Combined Effluent				
Time	**MLSS**	**ETSS**	**DSS**	**FSS**
1315	4200	-	<4	9**
1315	-	6	<4	<4
1530	4000	-	12**	10**
1530	-	5	20**	<4

** Indicates lots of floating solids …. difficult to decant.

Day 2 (11/1) / Combined Effluents SC #5 & #8				
Time	**MLSS**	**ETSS**	**DSS**	**FSS**
1040	4800	-	8	<4
1040	-	8	8	4
1300	4250	-	7	4
1300	-	8	5	<4
1400	-	7	4	6

7. Visual Observations:

While the appearances of the dye at the perimeter of the clarifier were difficult to observe by land, the drone provided by the plant staff did show a uniform appearance of the dye during the second flow rate test in SC #5.

Drone View

IX. DISCUSSION OF TEST RESULTS

A. Short-Circuiting Currents:

1. From Flow Curves:

The currents in activated sludge clarifiers are usually rather straight-forward: the flow from the inlet usually drops downward and forms a density current that progresses to the outer wall. The design of the inlet and the effluent launders can either minimize or exacerbate this pattern, but a density current is generally still going to form and determine the hydraulic characteristics of the clarifier.

In the case of draft tube clarifiers, with a normal centerwell, it has been observed that at the lower flow rates, the lack of energy from the lesser incoming mixed liquor flow tends to cause the flow to droop downward (without mixing in the centerwell), thereby enhancing its propensity to produce a density current. However, at higher flow rates, the greater energy from the greater mixed liquor flow will increase the mixing in the centerwell which sometimes improves the hydraulic regime and tend to produce less of a density current.

As the flow curves from the first (normal flow) test indicated, all the curves rose quickly to a peak, although with slightly different intensities, with the SC #8 flow curve rising slightly faster.

During the second stress test at 13 mgd, the curves from the two test clarifiers were identical in all respects. The sharp rise to a peak, and equally sharp decline from the peak indicates a strong density current.

During the third stress test at 17.5 mgd, the curves from the two test clarifiers were quite similar, with the same peaks and almost the same actual detention times. Again, the configuration of their flow curves indicates the presence of strong density currents.

2. From Drogue Data:

The drogue data sometimes shows a more definitive story, usually because of differences in blankets or configuration. In this case, while the clarifiers were identical, there were some noticeable blanket differences, especially at the highest flow rate.

During the stress tests at the “normal flow”, while there were only modest differences in the blankets, with SC #8 having slightly more solids, the drogue currents were significantly greater in SC #8, with a maximum velocity of 10 ft/min.

During the second stress test, with only SC #5 and SC #8 on line, the currents were somewhat similar in both clarifiers. However, the currents in SC #5 were slightly greater in the lower levels and indicated more reversal of currents near the surface.

During the highest-level stress test, again with only SC #5 and SC #8 on line, the currents were significantly stronger in the lower levels of SC #5, while the currents in the upper levels were more similar to each other.

B. Sludge Blanket Formation:

The growth of the sludge blankets as flows are increased is often a performance-limiting factor in many clarifiers. In these clarifiers, throughout the testing, there was a modest increase in the blankets as the flow rate progressed. It was interesting to note that, while the accumulation of solids was always greater in SC #8, the contents of both clarifiers above the firm blanket were relatively devoid of any solids.

C. Return Sludge Flows:

During the first stress test, with all clarifiers on line, they were initially operated at their normal RAS rates of 5.5 mgd. For the second stress test at 13 mgd, the RAS for the two test clarifiers was set at 7.4 mgd. This RAS rate was also maintained for the third stress test of 17.5 mgd.

At the end of the second day’s tests, a drawdown test was performed in both clarifiers in order to verify the actual RAS rate. The results of the test indicated that the RAS flow rate in SC #5 was 6.5 mgd while the RAS flow rate in SC #8 was 6.1 mgd. These flows were approximately 10% less than the plant flow meters indicated.

D. Other Observations:

1. Effluent TSS (ETSS):

The average ETSS from all clarifiers during the normal flow stress tests averaged 5 mg/l, with the only high reading being 6 mg/l. During the second and third stress tests, the ETSS averaged from 7 mg/l to 11 mg/l.

2 DSS/FSS Tests:

The DSS and FSS tests are meant to assist in determining the potential clarifier performance under ideal conditions. Most often, these tests produce better results than the typical clarifier does. With the exception of those data resulting from decants with significant floating solids, the results of these test were quite low, but only slightly lower than the actual clarifier effluent TSS results.

3. Scum:

These clarifiers normally have a surface spray system mounted on the walkways. These sprayers were turned off during these tests. There was never a significant appearance of scum on any of the test clarifiers.

4. Sludge Collection Mechanisms:

The draft tube sludge collection system was designed with five 12” tubes on each arm located at approximately the same distances from the center on each arm. The flow control for each tube was a “twist-turn” device, accessible from the surface deck. Each tube had a “pointer” that indicated the position of the tube.

During the first two flow rates, the concentration of the RAS from each tube was measured using the Royce meter. This information is included in Appendix C. Only the outermost tubes, #1 and #2, and #6 and #7, ever indicated a concentration less than 10,000 mg/l (the upper limit of the Royce meter). All other tubes always indicated a RAS of at least 10,000 mg/l.

Although the majority of the tubes appeared to be fully opened, because of the RAS rate and the concentration of the RAS, it difficult to see whether or not an individual tube was actually flowing.

5. Flow Measurements:

The measurements available to determine clarifier flows were (a) the plant influent flow, (b) the total flow (Q+R) to each clarifier, and (c) the RAS flow from each clarifier. A basic way to look at the metered clarifier flow distribution is with a simple comparison of the reported metered flows (in mgd):

Date	Time	SC #5	SC #6	SC #7	SC #8	Diff.#5-#8
10/31	1200	6.96	8.68	8.68	7.98	15%
11/1	0700	11.82	-	-	12.49	6%
11/1	1100	15.56	-	-	16.83	8%
11/1	1400	15.79	-	-	17.10	8%

Similar examples of the sum of the same clarifier effluent flows (in mgd), along with clarifier flows adjusted upwards to account for reduced RAS flows are:

Date	Time	Plant Flow	Sum of Clarifier Flows	Sum of Clar. Flows w/Decreased RAS Flows	% Difference w/Decreased RAS Flows
10/31	1200	29.13	32.30	34.5	18
11/1	0700	19.85	24.31	25.7	29
11/1	1100	28.30	32.39	33.8	19
11/1	1400	29.21	32.89	34.4	18

X. CONCLUSIONS and RECOMMENDATIONS:

A. Conclusions:

The primary objective of this field study was to evaluate the hydraulic performance characteristics of these clarifiers while operating at both normal and elevated flow rates and solids loadings and to identify any opportunities for improvement.

1. Regarding Hydraulic Performance Characteristics:

The hydraulic performance characteristics of these clarifiers, as shown by the dye tests under normal and slightly elevated flow conditions, were unusually poor. Only at the more elevated flow rate of 17.5 mgd per clarifier did they achieve an efficiency of slightly greater than 30%, which is still below average. It is normal for draft tube clarifiers to be less efficient at lower flows due to the lack of energy as the flow is discharged into the centerwell. Because of this lack of energy, the incoming flow tends to “droop” downward, rather than encourage mixing in the centerwell. The slight improvement in efficiency at higher flows is also typical in draft tube clarifiers. This is because of the improved hydraulics in the centerwell due to the increased energy of the influent at the higher flows.

What should be taken into consideration when discussing hydraulic performances in activated sludge clarifiers is the settling rate of the mixed liquor. These clarifiers, receiving MLSS with such low SVIs, should be expected to exhibit faster currents due to the higher settling rate of the sludge.

It was interesting to note that the appearance of dye at the launders during the two higher flow tests was quite even on both sides of the launder (Aopendix B, figures B4, B5). This is extremely unusual for clarifiers with inboard launders. Usually, the weir facing the outside of the clarifier receives considerably more dye (and solids) than the weir on the inside face. What is also unusual about these launders is their placement approximately 10-ft in from the outer wall; most inboard launders are located much closer to the outer wall. From the even appearance of the dye on both faces, it can be inferred that this launder location is much more efficient than having the launder closer to the outer wall.

The other means of determining the clarifier’s hydraulic characteristics is the drogue testing. At the initial flow rate, the drogues in SC #8 were considerably faster than those in SC #5. This may have been due to the slightly higher flow rate in SC #8.

At the elevated flow rate of 13.5 mgd, the drogue movements were more similar in both clarifiers. However, at the highest flow rate of 17 mgd, the drogues moved faster in SC #5 than they did in SC #8. This was likely due to the more elevated blanket levels in SC #8. Regardless of their differences at the different flow rates, their movements should be expected for activated sludge clarifiers with low SVIs.

2. Regarding Clarifier Flow Distribution:

The ability to measure and control the flow to each clarifier in a system is critical to the efficient operation of the system. Since there is no direct measurement of flow from each clarifier, the flow is estimated by subtracting the measured RAS flow from the total flow (Q + R) into each clarifier. As shown by the comparison of the metered flows, SC #8 appears to routinely receive more flow than SC #5. When these flow rates are adjusted for a lesser RAS flow, the differences become even greater.

3. Regarding the Return Sludge Flow Control:

The ability to measure and control the return sludge flow from each clarifier is also critical to the operation of each clarifier. One of the advantages of the draft tube system for returning settled sludge is the ability to control where on the clarifier floor the sludge is being withdrawn from ….. and how much sludge is being withdrawn from each location. The current "twist-turn" system for controlling each draft tube is usually the most effective means for controlling the flow from the individual draft tubes. Using the Royce meter to monitor RAS concentrations from each tube is also a simple means for determining which tubes are most effectively operating, and for deciding to what extent they should be flowing.

The arrangement of the tubes along this scraper mechanism is extremely unusual. The conventional arrangement would locate each tube in the center of two scraper blades in the form of a vee-plow. However, these scraper blades are arranged in a "echelon" configuration, with all blades plowing sludge downhill towards the center. Some of the tubes in these clarifiers are not only placed along one of the single blades, but some are even located where there is no blade to direct sludge to it. However, given that there is a 1" on 12" floor slope, the activated sludge should flow by gravity downhill towards the center. That may have been a part of the design philosophy for the blade configuration. If so, it probably would have been accompanied by a sludge hopper at the center to facilitate the return of a thicken sludge. This hopper does exist, but is not in current use.

With the benefit of good process control developing of a fast-settling sludge (with SVIs ranging from 52 g/L to 62 g/L), and the addition of PAC to the activated sludge, the draft tubes were generally running greater than 10,000 mg/l, with average RAS concentrations always greater than 10,000 mg/l. This is an ideal condition for good clarifier operation.

As a part of the field evaluation, each RAS tube was sampled several times during the tests, using the Royce meter. This showed that the outermost tubes were always running, but with very low concentrations, typically less than 2,000 mg/l. Whether or not the other tubes were actually returning sludge was difficult to determine. However, since there was not clear water at the surface of the tube, it was assumed that they were operating. Based on the Royce readings, the resulting RAS concentrations were always excellent.

One of the most significant assessments of a return sludge operation is the comparison of "pounds of solids IN" versus "pounds of solids OUT" of the clarifier. As shown by the comparison at the different test conditions, as the flows were increased, although the RAS rates were also increased, the amount of "pounds OUT" was not sufficient to keep up with the "pounds IN". This is not necessarily a problem for these clarifiers in the short term, given the large storage capacity within the cone of the clarifiers. However, if the imbalance continued, at some point the sludge blankets would increase to the point where they would affect the effluent quality. What should also exacerbate this condition is that the actual "pounds OUT" are considerably less than the calculated "pounds OUT" due to the actual RAS flows being less than those used in our calculations.

4. Regarding the Effluent TSS:

In general, while considering their short-circuiting flow curves and moderate density currents, the ultimate proof of a typical clarifier's performance is the effluent TSS. By this standard, and under the conditions tested, these clarifiers were performing very well, with effluent TSS values in the range of the DSS values, and only slightly greater than the FSS values.

B. Recommendations:

As noted previously, the low effluent TSS results under these test conditions were extremely good. However, when looking to the future, it would be reasonable to consider what the operating conditions might be without the addition of PAC. That is to say, with slower settling sludge. With that in mind, it is our opinion that there are several modifications that could be made that would slightly improve present clarifier performance, and improve performance with a slower settling sludge even more.

The following are our short-term recommendations for consideration:

1. With regard to the configuration of the (centerwell), while there was no evidence from this field study to indicate this, we recommend that any future construction of the centerwell be made no deeper than -8-ft from the water surface. This is to minimize the potential for scouring the solids from the center of the clarifier.

2. Our experience has shown that the MLSS flowing out from un-baffled scum ports in the centerwell can lead to elevated ETSS at higher flows.

Accordingly, we recommend the attachment of baffle plates to the outside of the scum ports.

MLSS Flowing Out of Scum Port

3. Recognizing that the removal of scum from the centerwell can be a challenging maintenance problem, we recommend consideration of the addition of a slide gate into the RAS box that will permit the decanting of scum into the RAS box.

4. Having an efficient energy-dissipating inlet has been proven to be beneficial in clarifiers of similar size and depth. With a concern about negative impacts from the density currents from the present inlet, we recommend that consideration be given to adding such an inlet to these clarifiers.

5. The effective removal of scum from the surface of a clarifier is always a concern. In order to achieve this, if there are future mechanical modifications, we recommend having only a single skimmer blade with a more tangential attachment at the centerwell, along with some form of “anti-rotation” scum baffle, and the use of a scum hopper flushing device that is actuated by the passage of the surface skimmer.

A Simple Anti-Rotation Scum Baffle

<u>The following are our recommendations for sludge blanket control:</u>

6. It is our concern that the current draft tubes are larger than necessary for effective sludge removal. This could lead to unnecessary plugging at lower velocities. Although there are standards for minimum and maximum velocities in the tubes, our experience has shown that the effective way to control RAS is often to observe RAS concentrations in the tubes with the goal to operate the minimum number of tubes needed to achieve the maximum efficiency in RAS removal. This can be implemented by the development of an SOP addressing the maintenance and operation of the draft tubes.

7. Another concern is the sloping of the draft tubes downward from the outer sections of the clarifier to the centerwell. This configuration can lead to the “trapping” of gases and other materials in the high spots, which can lead to plugging situations. If there is an updating of the draft tube configuration, we recommend the consideration of smaller diameter tubes, which are sloped upward to the centerwell, along with long radius elbows.

<u>The following are our recommendations for flow control to the clarifiers:</u>

8. It is critical to the performance of a clarifier system that the flow into or out of a clarifier be readily measured and controlled. Given that the control achievable with the present MLSS channel gate configuration is quite difficult, we recommend further investigation into a flow measurement device that could be installed at the clarifier effluent. Although there may not be sufficient head available, the device could be as simple as a weir at the effluent, or a set of weirs in the effluent channel. In an ideal installation, the heads on these devices can then be measured and signaled to the control room for optimal operational control.

Simple Rectangular Weir | Staff Gage or Ultrasonic Meter

9. Even with an effective means of measuring clarifier flow, there needs to be a readily-operated gate mechanism to deliver the required flow. The current downward-closing gates are the most difficult to control. We recommend instead the use of upward-closing gates which will permit some head measurement for a greater degree of flow control. This also facilitates the removal of scum from the mixed liquor channel.

Present Downward-Closing Gates

10. In order to more efficiently control the flow to the clarifiers, we recommend consideration of motorized gate operators that are tied into the SCADA system and able to be controlled from the operations center.

<u>The following is our long-term recommendation for optimizing clarifier capacity and performance:</u>

Given the size of these clarifiers, and the beneficial location of the inboard effluent launders, consideration can be focused on what other kind of clarifier equipment should be installed in the existing concrete shell.

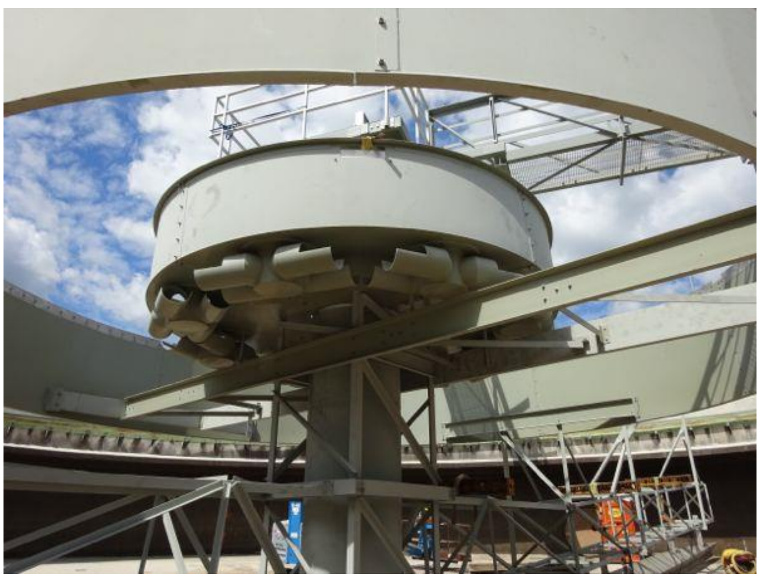
Beginning with the influent structure, we would recommend a slightly larger centerwell, in the range of 35-ft, with a depth no greater than 8-ft from the surface. In order to more effectively enhance flocculation and distribute the flow with the least formation of density currfents, we would recommend an energy-dissipating inlet known as the LA-EDI.

There are then two basic considerations regarding the removal of the settled sudge: either a suction device or a scraper device. When considering the appropriate suction device, the only option that we would consider is the draft tube configuration. The other type of suction device, called a suction manifold, would be difficult to operate in a clarifier with this floor slope due to the need to maintain the sludge blanket above the outermost orifice.

When considering the appropriate scraper device, there are two general types: the standard “echelon blade” configuration, or the “spiral blade” configuration. Based on our own experience, we have seen several examples where the spiral blades have led to poor process performance. Of course, there are probably hundreds of other installations where the spiral blades have performed as designed. However, the problems that we have seen with the spiral blades lead us to avoid this configuration where possible. That leaves us with the standard echelon configuration as our preferred option. Not only is this configuration less costly than the spiral configuration, we have also never seen a problem caused by this configuration.

<u>In summary,</u> the configuration that we would recommend for the optimal performance of these clarifiers is:

- a larger centerwell
- an LA-EDI inlet, and
- a standard echelon design scraper.

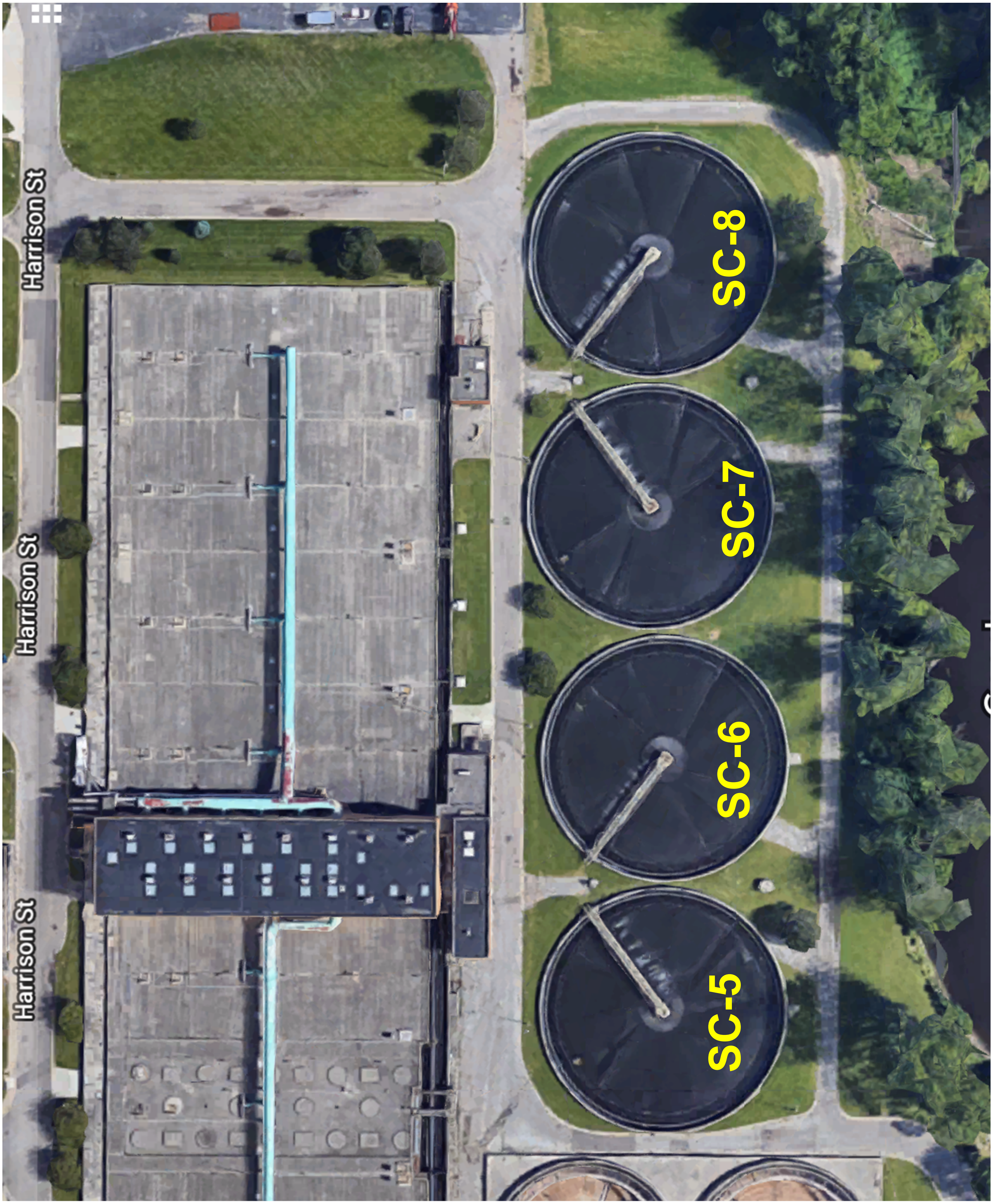


<u>A Typical LA-EDI Inlet within a Centerwell</u>

Although the solids loading was considerably less at the LA-Hyperion WRP, their 150-ft diamter clarifiers with this same 1:12 floor slope were demonstrated to operate at an effluent flow of 30 mgd, without any increase in sludge blanket, decrease in RAS concentration, or deterioration of effluent TSS.

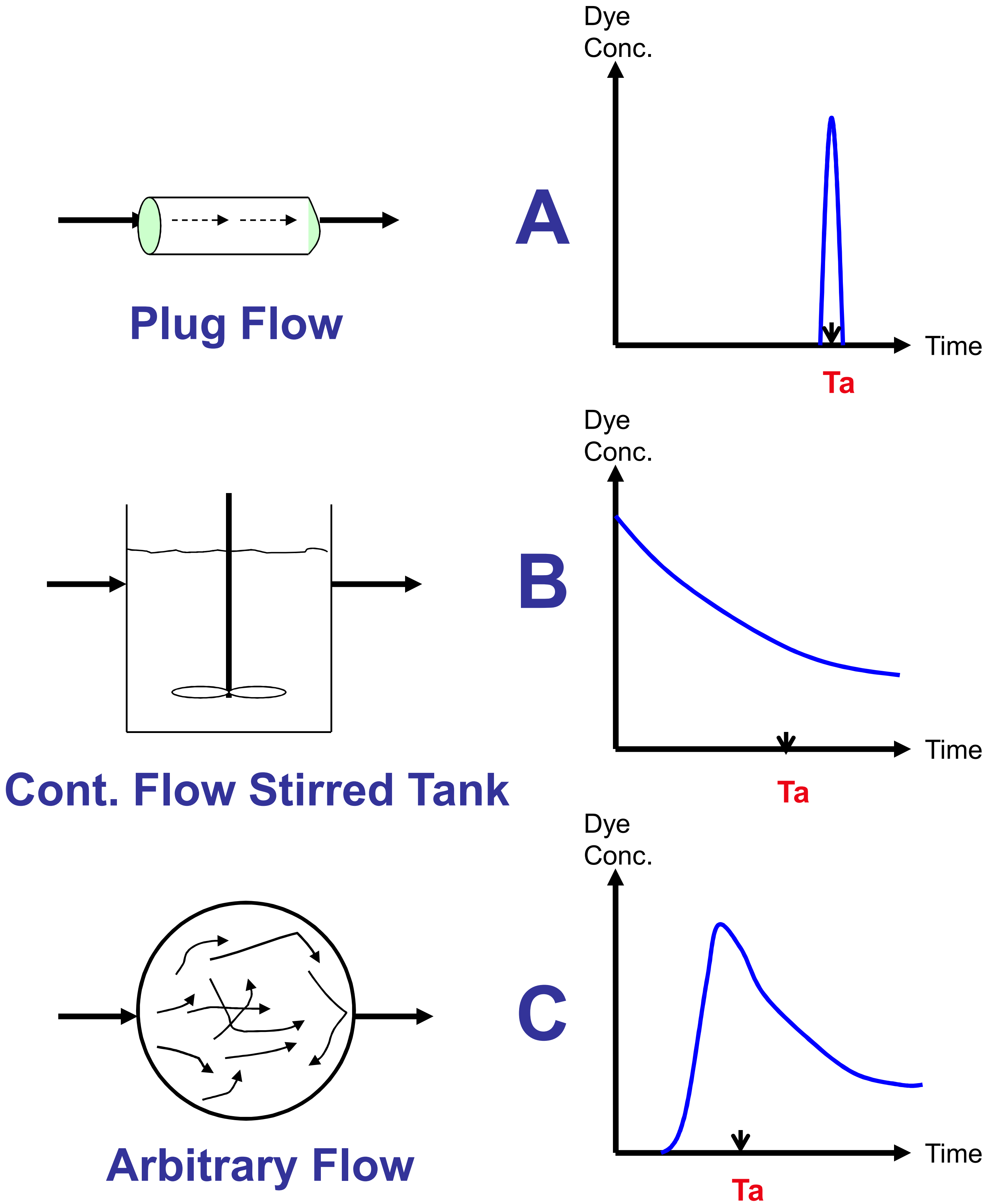
APPENDIX A

REPORT FIGURES



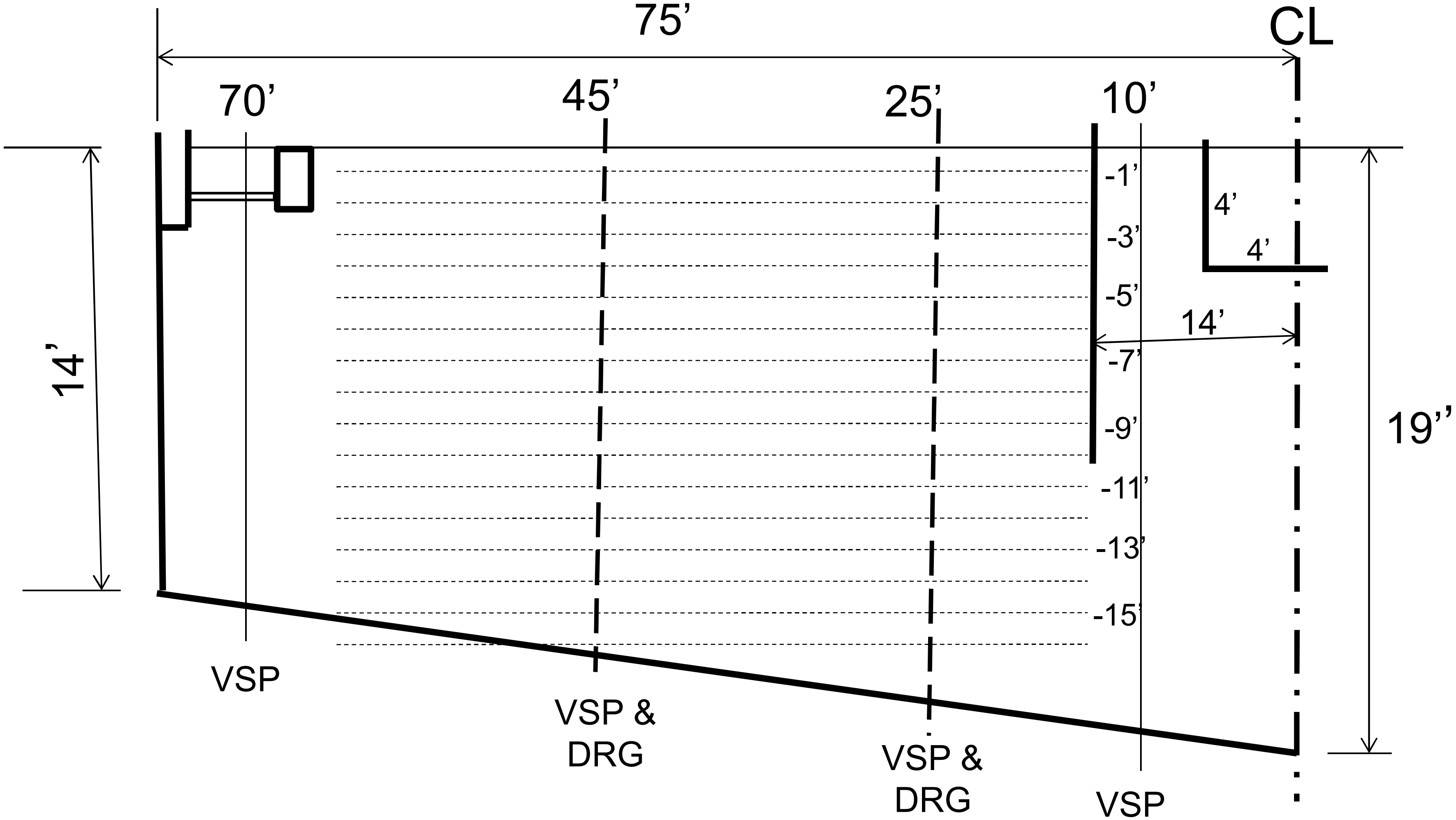
Secondary Clarifier Layout A1

Reactor Configurations and Flow Curves



A2

DROGUE & VSP LOCATIONS

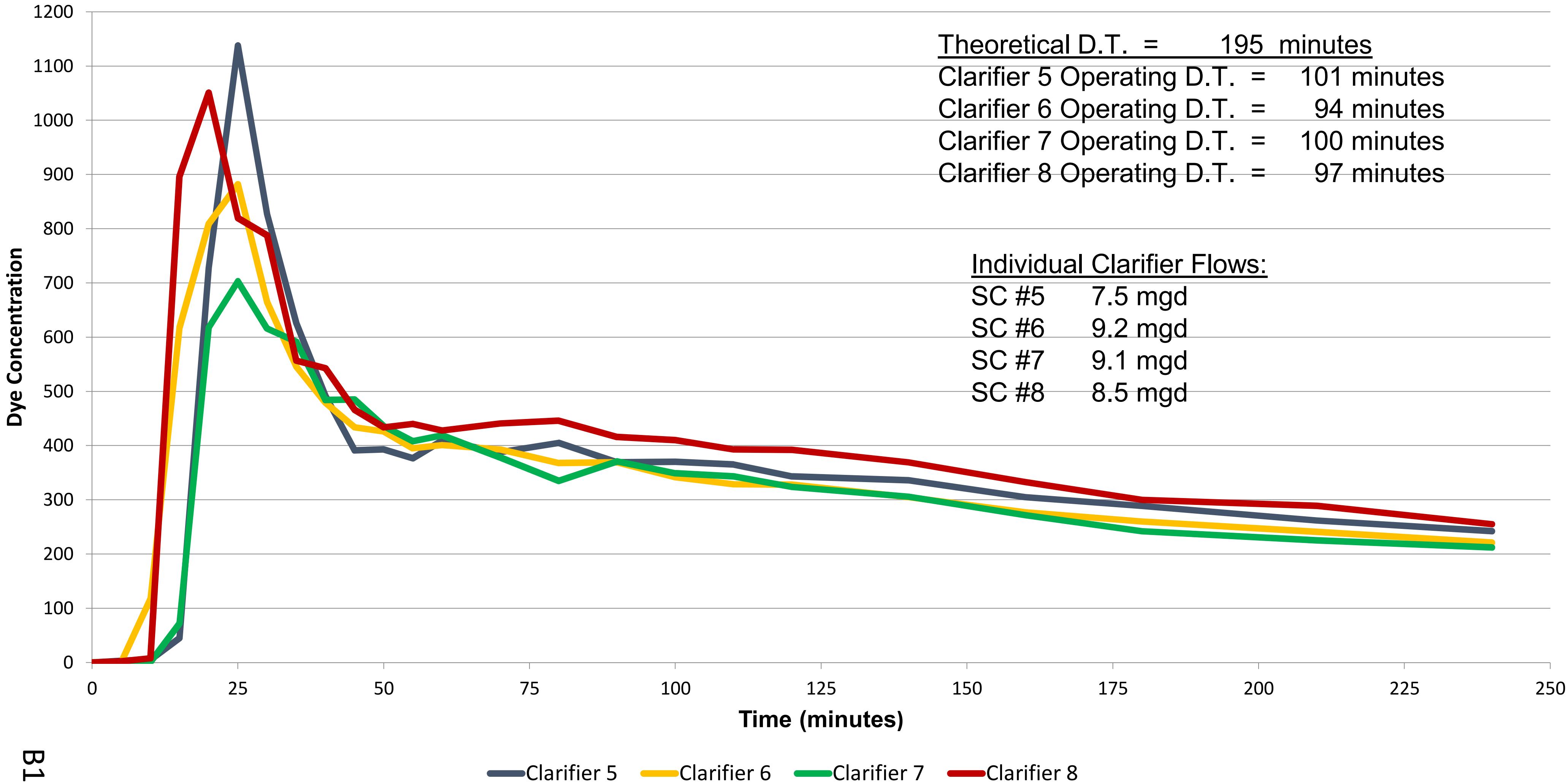


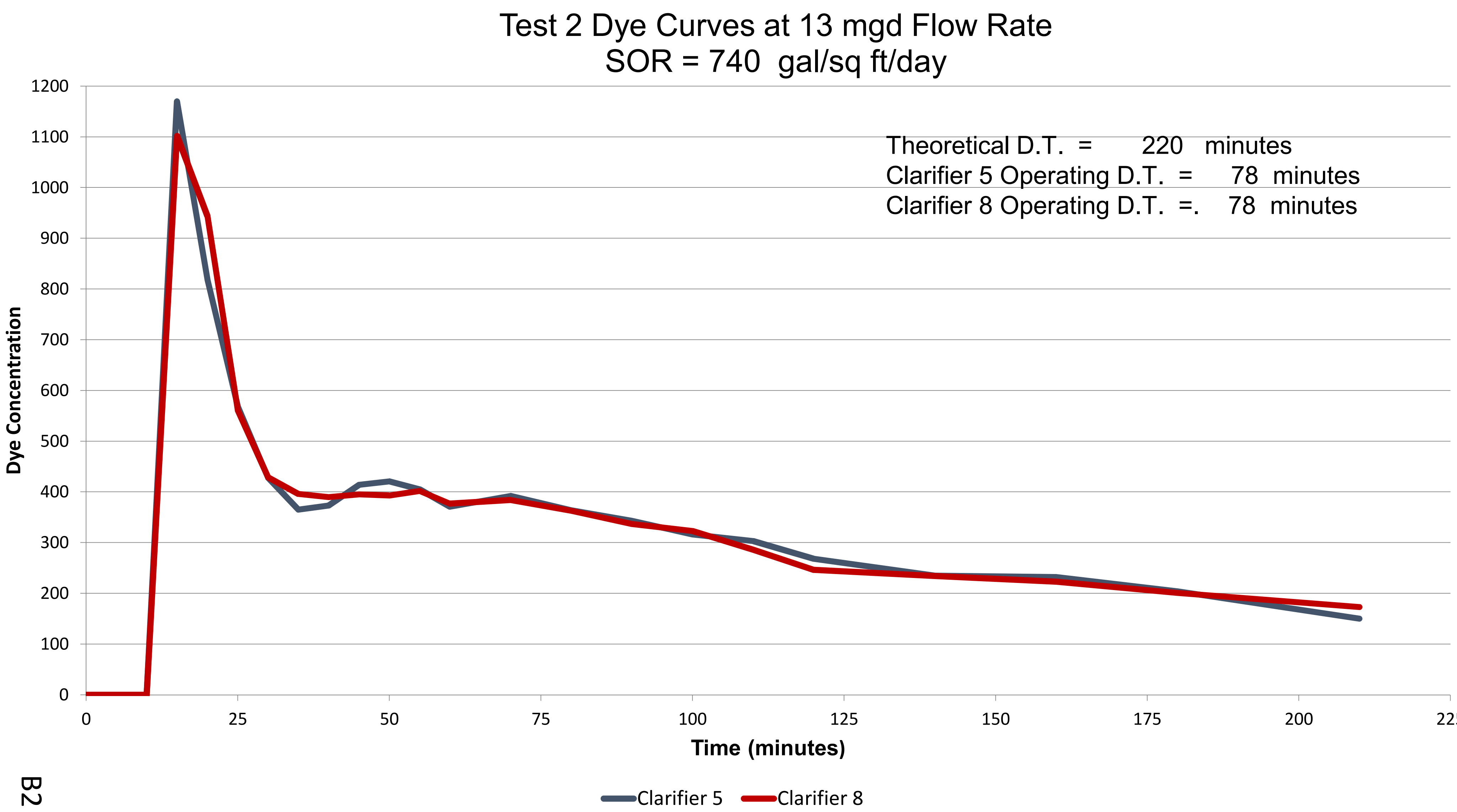
A3

APPENDIX B

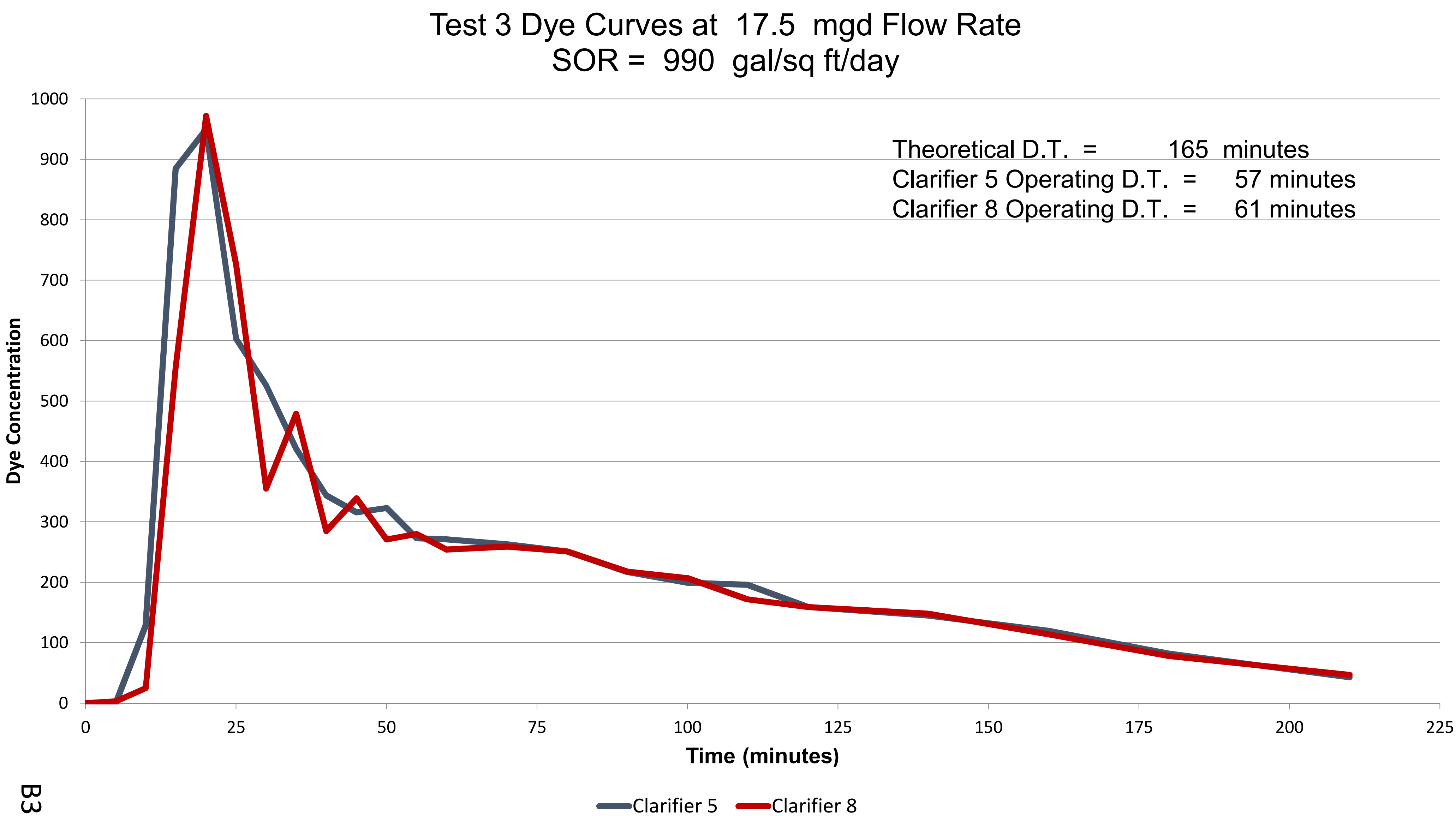
FLOW CURVES

Test 1 Dye Curves at 8.6 mgd Average Flow Rate
SOR = 490 gal/sq ft/day

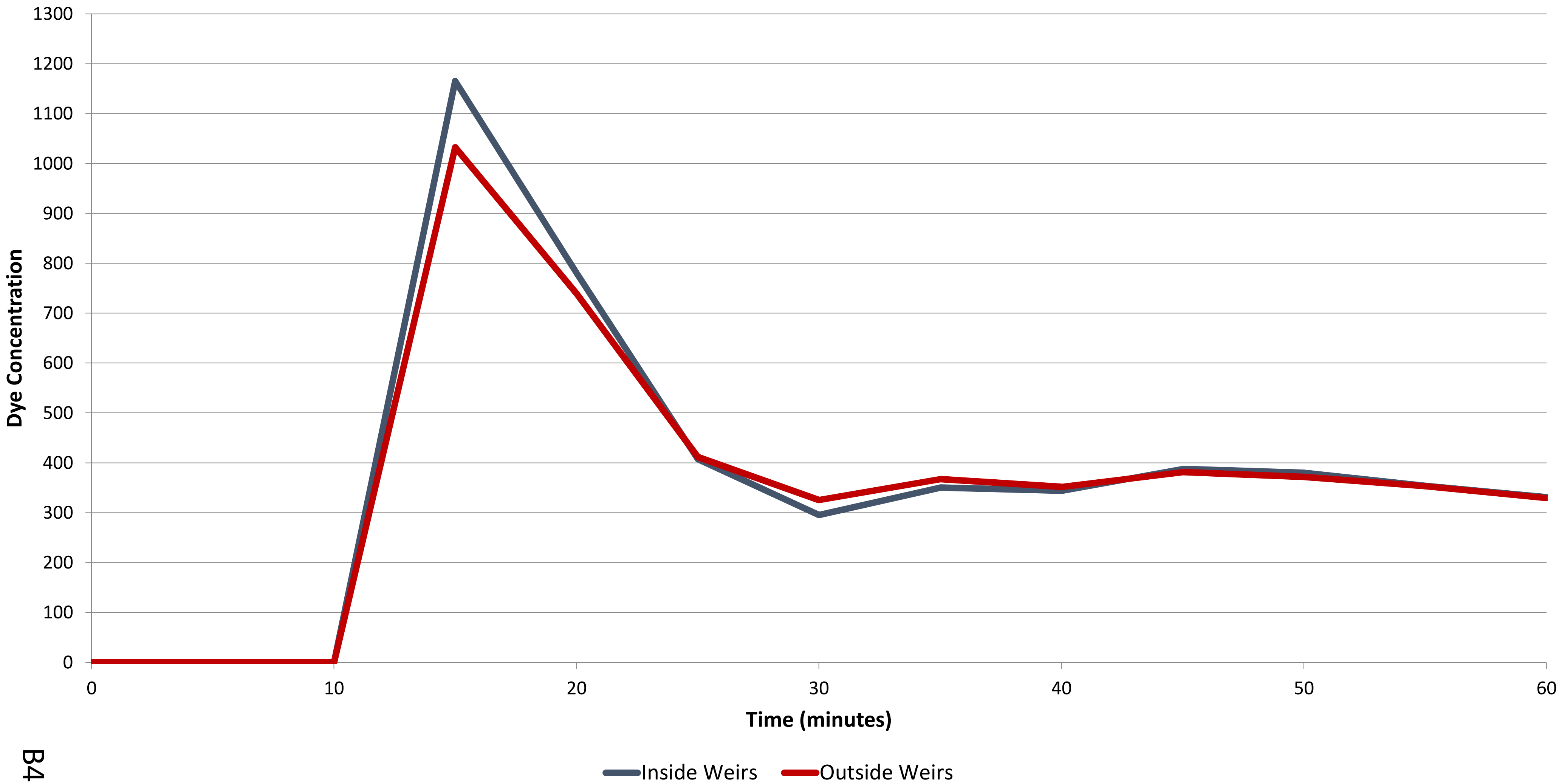




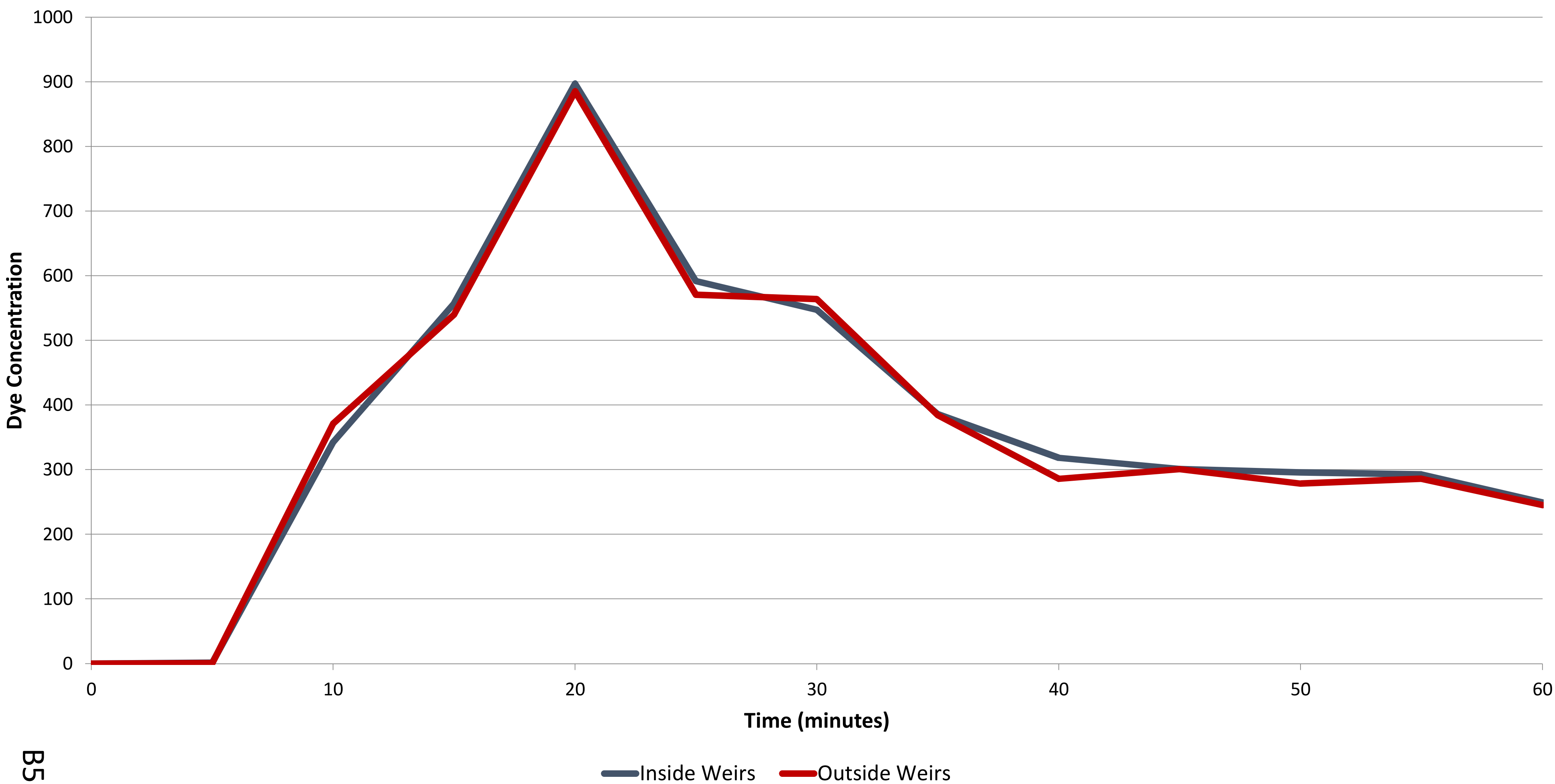
Test 2 Dye Curves at 13 mgd Flow Rate
SOR = 740 gal/sq ft/day
Theoretical D.T. = 220 minutes
Clarifier 5 Operating D.T. = 78 minutes
Clarifier 8 Operating D.T. =. 78 minutes
Dye Concentration
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
0
25
50
75
100
125
150
175
200
225
Time (minutes)
Clarifier 5
Clarifier 8


Test 3 Dye Curves at 17.5 mgd Flow Rate
SOR = 990 gal/sq ft/day
Theoretical D.T. = 165 minutes
Clarifier 5 Operating D.T. = 57 minutes
Clarifier 8 Operating D.T. = 61 minutes
Dye Concentration
0
100
200
300
400
500
600
700
800
900
1000
0
25
50
75
100
125
150
175
200
225
Time (minutes)
Clarifier 5
Clarifier 8

Test 2 Weir Comparison @ 13 mgd



Test 3   Weir Comparison @ 17.5 mgd



APPENDIX C

VERTICAL SOLIDS PROFILES

NOTES:

During these tests, the entire vertical section of each clarifier was cross-sectioned at various locations along their access bridge using a Royce Model 711 Suspended Solids Analyzer.

The sampling locations are noted as distance in feet from the center of the clarifier.

The results of this sampling are recorded in grams/liter; the upper measurement limit of the Royce meter is 10 grams/liter

APPENDIX C: VERTICAL SOLIDS PROFILES

10/ 31 @ 0900 hrs # 5 @ 5.4 mgd Flow

Depth	10'	25'	45'	70'	Totals
-1'	1.7	0	0	0	
-2'	1.1	0	0	0	
-3'	1.0	0	0	0	
-4'	1.2	0	0	0	
-5'	1.2	0	0	0	
-6'	1.2	0	0	0	
-7'	1.2	0	0	0	
-8'	1.5	0	0	0	
-9'	1.2	0	0	0	
-10'	1.4	0	0	0	
-11'	1.4	0	0	0	
-12'	1.4	0	0	0	
-13'	1.3	0	0	0	
-14'	1.2	0	0	0.1	
-15'	1.2	0.1	0		
-16'	1.2	2.1	10		
-17'	10	8.8			
-18'	10	10			
-19'	10				
Totals	50.4	21.0	10.0	0.1	**82**

10/ 31 @ 0900 hrs #6 @ 7.4 mgd Flow

Depth	10'	25'	45'	75'	Totals
-1'			0	0	
-2'			0	0	
-3'			0	0	
-4'			0	0	
-5'			0	0	
-6'			0	0	
-7'			0	0	
-8'			0	0	
-9'			0	0	
-10'			0	0	
-11'			0	0	
-12'			0	0	
-13'			0	0	
-14'			0	0	
-15'			0		
-16'			10		
-17'					
-18'					
-19'					
Totals			10.0	0	

10/ 31 @ 0900 hrs #7 @ 7.4 mgd Flow

Depth	10’	25’	45’	70’	Totals
-1’			0	0	
-2'			0	0	
-3’			0	0	
-4’			0	0	
-5’			0	0.1	
-6’			0	0.1	
-7’			0	0.1	
-8'			0	0.1	
-9’			0	0.1	
-10’			0	0.1	
-11’			0	0.1	
-12’			0	0.1	
-13'			0	0.1	
-14'			0	0.1	
-15'			0		
-16'			10		
-17’					
-18’					
-19’					
Totals			10.0	1.0	

10/31 @ 0900 hrs #8 @ 6.7 mgd Flow

Depth	10’	25’	45’	70’	Totals
-1’	18	0	0	0	
-2'	2.1	0	0	0	
-3’	2.1	0	0	0	
-4’	1.9	0	0	0	
-5’	1.7	0	0	0	
-6’	2.0	0	0	0	
-7’	1.9	0	0	0	
-8'	1.7	0	0	0	
-9’	1.8	0	0	0	
-10’	1.6	0	0	0	
-11’	1.2	0	0	0	
-12’	1.1	0	0	0	
-13'	1.8	0	0	0	
-14'	1.9	0.1	0	0.2	
-15'	2.0	0.3	0		
-16'	2.7	2.1	0.2		
-17’	8.3	10			
-18’	10	10			
-19’	10				
Totals	73.8	22.5	0.2	0.2	**97**

10/31 @ 1300 hrs # 5 @ 7.3 mgd Flow

Depth	10’	25’	45’	70’	Totals
-1’	2.7	0	0	0	RAS tubes
-2'	2.6	0	0	0	1 1.1
-3’	2.4	0	0	0	2 3.2
-4’	2.1	0	0	0	3 10
-5’	2.5	0	0	0	4 10
-6’	2.6	0	0	0	5 10
-7’	2.5	0	0	0	6 0.8
-8'	2.1	0	0	0	7 5.5
-9’	2.2	0	0	0	8 10
-10’	2.3	0	0	0	9 10
-11’	2.4	0	0	0	10 10
-12’	2.3	0	0	0	RAS Box
-13'	0.7	0	0	0	10
-14'	0.9	0	0	10	
-15'	1.4	1.5	7.2		
-16'	1.7	5.1	10		
-17’	5.3	10			
-18’	10	10			
-19’	10				
Totals	58.7	26.6	17.2	10.0	113

10/ 31 @ 1300 hrs # 6 @ 9.0 mgd Flow

Depth	10’	25’	45’	70’	Totals
-1’			0	0	
-2'			0	0	
-3’			0	0	
-4’			0	0	
-5’			0	0	
-6’			0	0	
-7’			0	0	
-8'			0	0	
-9’			0	0	
-10’			0	0	
-11’			0	0	
-12’			0	0	
-13'			0	0	
-14'			0	0	
-15'			2.5		
-16'			10		
-17’					
-18’					
-19’					
Totals			12.5	0	

10/31 @ 1300 hrs #7 @ 9.0 mgd Flow

Depth	10’	25’	45’	70’	Totals
-1’			0	0	
-2'			0	0	
-3’			0	0	
-4’			0	0	
-5’			0	0	
-6’			0	0	
-7’			0	0	
-8'			0	0	
-9’			0	0	
-10’			0	0	
-11’			0	0	
-12’			0	0	
-13'			0	0	
-14'			0	6.1	
-15'			3.9		
-16'			10		
-17’					
-18’					
-19’					
Totals			13.9	6.1	

10/31 @ 1300 hrs #8 @ 8.3 mgd Flow

Depth	10’	25’	45’	70’	Totals
-1’	2.6	0	0	0	
-2'	2.6	0	0	0	
-3’	2.5	0	0	0	
-4’	2.5	0	0	0	
-5’	2.4	0	0	0	
-6’	2.3	0	0	0	
-7’	2.5	0	0	0	
-8'	2.6	0	0	0	
-9’	2.5	0	0	0	
-10’	2.6	0	0	0	
-11’	2.6	0	0	0	
-12’	2.5	0	0	0	
-13'	2.5	0	0	0	
-14'	2.5	1.0	0.5	9.1	
-15'	2.6	3.0	9.5		
-16'	2.5	7.5	10		
-17’	10	10			
-18’	10	10			
-19’	10				
Totals	70.3	31.5	20.0	9.1	**131**

10/31 @ 1500 hrs # 5 @ 8.9 mgd Flow

Depth	10’	25’	45’	70’	Totals
-1’	2.8	0	0	0	RAS tubes
-2'	2.5	0	0	0	1 2.2
-3’	2.3	0	0	0	2 6.0
-4’	2.7	0	0	0	3 10
-5’	2.7	0	0	0	4 10
-6’	2.5	0	0	0	5 10
-7’	1.8	0	0	0	6 1.9
-8'	2.1	0	0	0	7 7.6
-9’	2.1	0	0	0	8 10
-10’	2.8	0	0	0	9 10
-11’	2.7	0	0	0	10 10
-12’	2.5	0	0	0	RAS Box
-13’	2.7	0	0	0	10
-14’	2.0	0.1	0	0	
-15’	2.2	1.7	0		
-16’	2.9	3.0	10		
-17’	2.3	10			
-18’	10	10			
-19’	10				
Totals	61.6	24.8	10.0	0	96

10/31 @ 1500 hrs #6 @ 8.7 mgd Flow

Depth	10’	25’	45’	70’	Totals
-1’			0	0	
-2’			0	0	
-3’			0	0	
-4’			0	0	
-5’			0	0	
-6’			0	0	
-7’			0	0	
-8’			0	0	
-9’			0	0	
-10’			0	0	
-11’			0	0	
-12’			0	0	
-13’			0	0.2	
-14’			0	0.2	
-15’			3.1		
-16’			10		
-17’					
-18’					
-19’					
Totals			13.1	0.4	

10/31 @ 1500 hrs #7 @ 8.6 mgd Flow

Depth	10'	25'	45'	70'	Totals
-1'			0	0	
-2'			0	0	
-3'			0	0	
-4'			0	0	
-5'			0	0	
-6'			0	0	
-7'			0	0	
-8'			0	0	
-9'			0	0	
-10'			0	0	
-11'			0	0	
-12'			0	0	
-13'			0	0	
-14'			0	0.1	
-15'			3.5		
-16'			10		
-17'					
-18'					
-19'					
Totals			13.5	0.1	

10/31 @ 1500 hrs #8 @ 8.0 mgd Flow

Depth	10'	25'	45'	70'	Totals
-1'	2.3	0	0	0	RAS tubes
-2'	2.2	0	0	0	1 1.0
-3'	2.3	0	0	0	2 10
-4'	2.1	0	0	0	3 10
-5'	2.3	0	0	0	4 10
-6'	2.3	0	0	0	5 10
-7'	2.3	0	0	0	6 2.2
-8'	2.2	0	0	0	7 10
-9'	1.5	0	0	0	8 10
-10'	1.2	0	0	0	9 10
-11'	1.1	0	0	0	10 10
-12'	1.2	0	0	0	RAS Box
-13'	1.3	0	0	0	10
-14'	2.2	0.1	0	0	
-15'	2.3	0.1	8.3		
-16'	9.6	10	10		
-17'	10	10			
-18'	10	10			
-19'	10				
Totals	68.4	30.2	18.3	0	117

11/1 @ 0720 hrs #5 @ 11.8 mgd Flow

Depth	10’	25’	45’	70’	Totals
-1’	3.0	0	0	0	RAS tubes
-2’	3.1	0	0	0	1 2.2
-3’	3.2	0	0	0	2 10
-4’	3.2	0	0	0	3 10
-5’	3.2	0	0	0	4 10
-6’	3.1	0	0	0	5 10
-7’	2.6	0	0	0	6 3.9
-8’	2.7	0	0	0	7 10
-9’	2.6	0	0	0	8 10
-10’	2.0	0	0	0	9 10
-11’	2.5	0	0	0	10 10
-12’	2.8	0	0	0	RAS Box
-13’	2.9	0	0	0	10
-14’	2.9	0	0	0	
-15’	2.6	2.0	3.0		
-16’	2.4	2.0	6.0		
-17’	2.5	7.6			
-18’	2.5	10			
-19’	10				
Totals	59.8	21.6	9.0	0	**90**

11/1 @ 0720 hrs # 8 @ 17.5 mgd Flow

Depth	10’	25’	45’	70’	Totals
-1’	3.1	0	0	0	RAS tubes
-2'	2.8	0	0	0	1 4.8
-3’	2.8	0	0	0	2 10
-4’	3.3	0	0	0	3 10
-5’	2.9	0	0	0	4 10
-6’	3.1	0	0	0	5 10
-7’	2.7	0	0	0	6 3.4
-8'	3.0	0	0	0	7 10
-9’	2.9	0	0	0	8 10
-10’	2.7	0	0	0	9 10
-11’	3.1	0	0	0	10 10
-12’	2.5	0	0	0	RAS Box
-13'	2.4	0	0	0	10
-14'	2.5	0	0	0	
-15'	3.0	4.0	6.2		
-16'	7.9	8.3	10		
-17’	10	10			
-18’	10	10			
-19’	10				
Totals	80.7	32.3	16.2	0	**129**

11/1 @ 0900 hrs #5 @ 13.8 mgd Flow

Depth	10’	25’	45’	70’	Totals
-1’	2.3	0	0	0	
-2'	2.6	0	0	0	
-3’	3.1	0	0	0	
-4’	3.1	0	0	0	
-5’	2.6	0	0	0	
-6’	3.0	0	0	0	
-7’	3.0	0	0	0	
-8'	2.8	0	0	0	
-9’	2.5	0	0	0	
-10’	2.6	0	0	0	
-11’	2.8	0	0	0	
-12’	2.9	0	0	0	
-13'	2.8	0.1	0	0.1	
-14'	2.9	1.0	2.2	10	
-15'	2.8	2.5	6.1		
-16'	2.8	4.0	10		
-17’	2.9	10			
-18’	10	10			
-19’	10				
Totals	67.5	27.6	18.3	10.1	**124**

11/1 @ 0900 hrs #8 @ 14.6 mgd Flow

Depth	10’	25’	45’	70’	Totals
-1’	2.6	0	0	0	
-2'	2.9	0	0	0	
-3’	3.3	0	0	0	
-4’	3.6	0	0	0	
-5’	3.6	0	0	0	
-6’	2.6	0	0	0	
-7’	2.4	0	0	0	
-8'	2.3	0	0	0	
-9’	2.0	0	0	0	
-10’	2.2	0	0	0	
-11’	1.9	0	0	0	
-12’	1.9	0	0	0	
-13'	1.9	1.0	0	0	
-14'	2.8	3.5	6.1	10	
-15'	3.5	7.5	10		
-16'	8.1	10	10		
-17’	10	10			
-18’	10	10			
-19’	10				
Totals	77.6	42.0	26.1	10.0	**156**

11/1 @ 1000 hrs #5 @ 14.8 mgd Flow

Depth	10’	25’	45’	70’	Totals
-1’	2.4	0	0	0	
-2'	2.5	0	0	0	
-3’	2.4	0	0	0	
-4’	2.5	0	0	0	
-5’	2.6	0	0	0	
-6’	1.8	0	0	0	
-7’	2.3	0	0	0	
-8'	2.5	0	0	0	
-9’	2.0	0	0	0	
-10’	1.9	0	0	0	
-11’	2.0	0	0	0	
-12’	2.0	0	0	0	
-13'	2.8	0	0	0	
-14'	2.5	2.7	2.2	10	
-15'	2.5	5.1	5.0		
-16'	3.0	7.3	10		
-17’	9.6	10			
-18’	10	10			
-19’	10				
Totals	67.3	35.1	17.2	10.0	**130**

11/1 @ 1000 hrs #8 @ 15.7mgd Flow

Depth	10’	25’	45’	70’	Totals
-1’	3.2	0	0	0	
-2'	3.1	0	0	0	
-3’	3.8	0	0	0	
-4’	3.9	0	0	0	
-5’	3.1	0	0	0	
-6’	2.3	0	0	0	
-7’	2.3	0	0	0	
-8'	2.5	0	0	0	
-9’	2.7	0	0	0	
-10’	2.5	0	0	0	
-11’	2.0	0	0	0	
-12’	2.6	0	0	0	
-13'	2.7	0	0	0	
-14'	3.6	4.3	5.3	10	
-15'	3.7	8.2	9.9		
-16'	9.5	8.9	10		
-17’	10	10			
-18’	10	10			
-19’	10				
Totals	83.5	41.4	25.2	10.0	**160**

11/1 @ 1140 hrs #5 @ 16.4 mgd Flow

Depth	10’	25’	45’	70’	Totals
-1’	3.3	0	0	0	
-2'	3.3	0	0	0	
-3’	3.3	0	0	0	
-4’	3.0	0	0	0	
-5’	2.1	0	0	0	
-6’	2.9	0	0	0	
-7’	2.4	0	0	0	
-8'	2.4	0	0	0	
-9’	2.4	0	0	0	
-10’	2.5	0	0	0	
-11’	2.4	0	0	0	
-12’	2.2	0	0	0	
-13'	2.6	0	0	0	
-14'	2.4	2.0	4.2	10	
-15'	2.5	3.5	8.3		
-16'	2.5	7.3	10		
-17’	10	10			
-18’	10	10			
-19’	10				
Totals	72.2	32.8	22.5	10.0	**138**

11/1 @ 1140 hrs #8 @ 17.1 mgd Flow

Depth	10’	25’	45’	70’	Totals
-1’	3.6	0	0	0	
-2'	3.0	0	0	0	
-3’	3.0	0	0	0	
-4’	3.2	0	0	0	
-5’	3.4	0	0	0	
-6’	3.3	0	0	0	
-7’	3.3	0	0	0	
-8'	3.3	0	0	0	
-9’	3.3	0	0	0	
-10’	3.0	0	0	0	
-11’	3.5	0	0	0	
-12’	3.4	0	0	0	
-13'	3.9	3.0	3.7	4.3	
-14'	3.4	7.4	8.2	10	
-15'	5.6	7.5	10		
-16'	9.9	9.9	10		
-17’	10	10			
-18’	10	10			
-19’	10				
Totals	92.1	47.8	31.9	14.3	**186**

11/1 @ 1400 hrs #5 @ 15.8 mgd Flow

Depth	10'	25'	45'	70'	Totals
-1'	3.7	0	0	0	
-2'	3.7	0	0	0	
-3'	3.7	0	0	0	
-4'	3.4	0	0	0	
-5'	3.3	0	0	0	
-6'	3.4	0	0	0	
-7'	3.4	0	0	0	
-8'	3.4	0	0	0	
-9'	3.4	0	0	0	
-10'	3,1	0	0	0	
-11'	1.8	0	0	0	
-12'	2.3	0	0	0	
-13'	2.6	0.6	0	0	
-14'	1.3	2.4	4.1	10	
-15'	2.5	6.4	10		
-16'	8.9	8.9	10		
-17'	9.4	10			
-18'	10	10			
-19'	10				
Totals	84.2	38.3	24.1	10.0	**157**

11/1 @ 1400 hrs #8 @ 17.1 mgd Flow

Depth	10'	25'	45'	70'	Totals
-1'	4.0	0	0	0	
-2'	4.0	0	0	0	
-3'	3.8	0	0	0	
-4'	3.9	0	0	0	
-5'	3.9	0	0	0	
-6'	4.0	0	0	0	
-7'	4.0	0	0	0	
-8'	4.0	0	0	0	
-9'	3.7	0	0	0	
-10'	3.3	0	0	0	
-11'	3.3	0	0	0	
-12'	3.6	0	0	0	
-13'	3.6	3.3	5.7	10	
-14'	3.0	6.9	6.9	10	
-15'	9.6	7.1	10		
-16'	10	10	10		
-17'	10	10			
-18'	10	10			
-19'	10				
Totals	101.7	47.3	32.6	20.0	**202**

VERTICAL SOLIDS PROFILE - SUMMARY					
Depth	**10’**	**25’**	**45’**	**70’**	
SC#	**DAY 1**	**0900 @ 6.0 mgd**			**TOTALS**
5	50	21	10	1	**82**
8	74	23	0	0	**97**
	1300 @ 7.8 mgd				
5	59	27	17	10	**113**
8	70	32	20	9	**131**
	1500 @ 7.5 mgd				
5	62	25	10	0	**96**
8	69	30	18	0	**117**
	DAY 2	**0720 @ 12.0 mgd**			
5	60	21	9	0	**90**
8	81	32	16	0	**129**
	0900 @ 14.2 mgd				
5	68	28	18	10	**124**
8	78	42	26	10	**156**
	1000 @ 15.2 mgd				
5	68	35	17	10	**130**
8	84	41	25	10	**160**
	1140 @ 16.8 mgd				
5	72	33	23	10	**138**
8	92	48	32	14	**186**
	1400 @ 16.5 mgd				
5	84	38	24	10	**157**
8	102	47	33	20	**202**

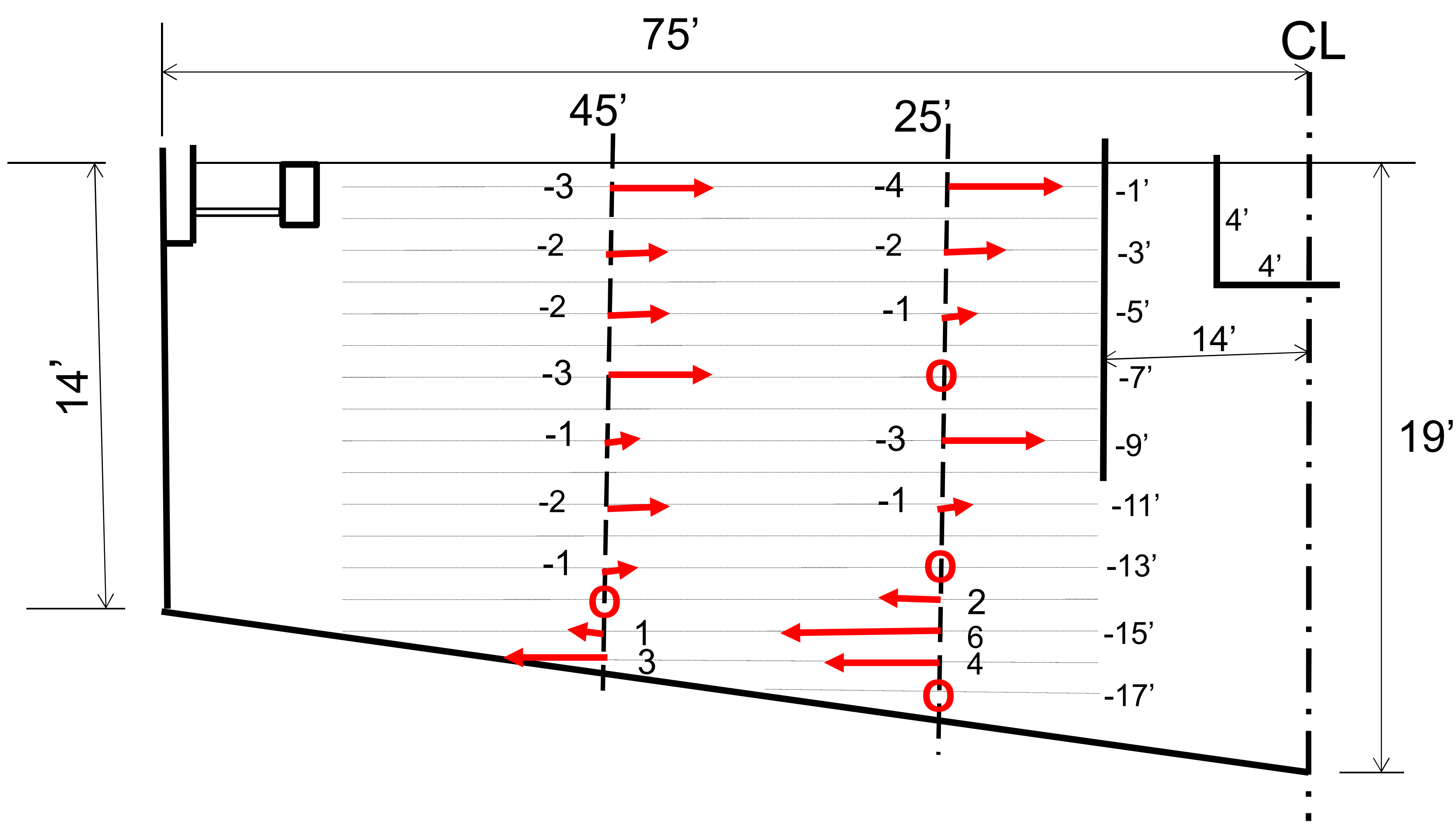
APPENDIX D

DROGUE CURRENT TESTS

NOTE:

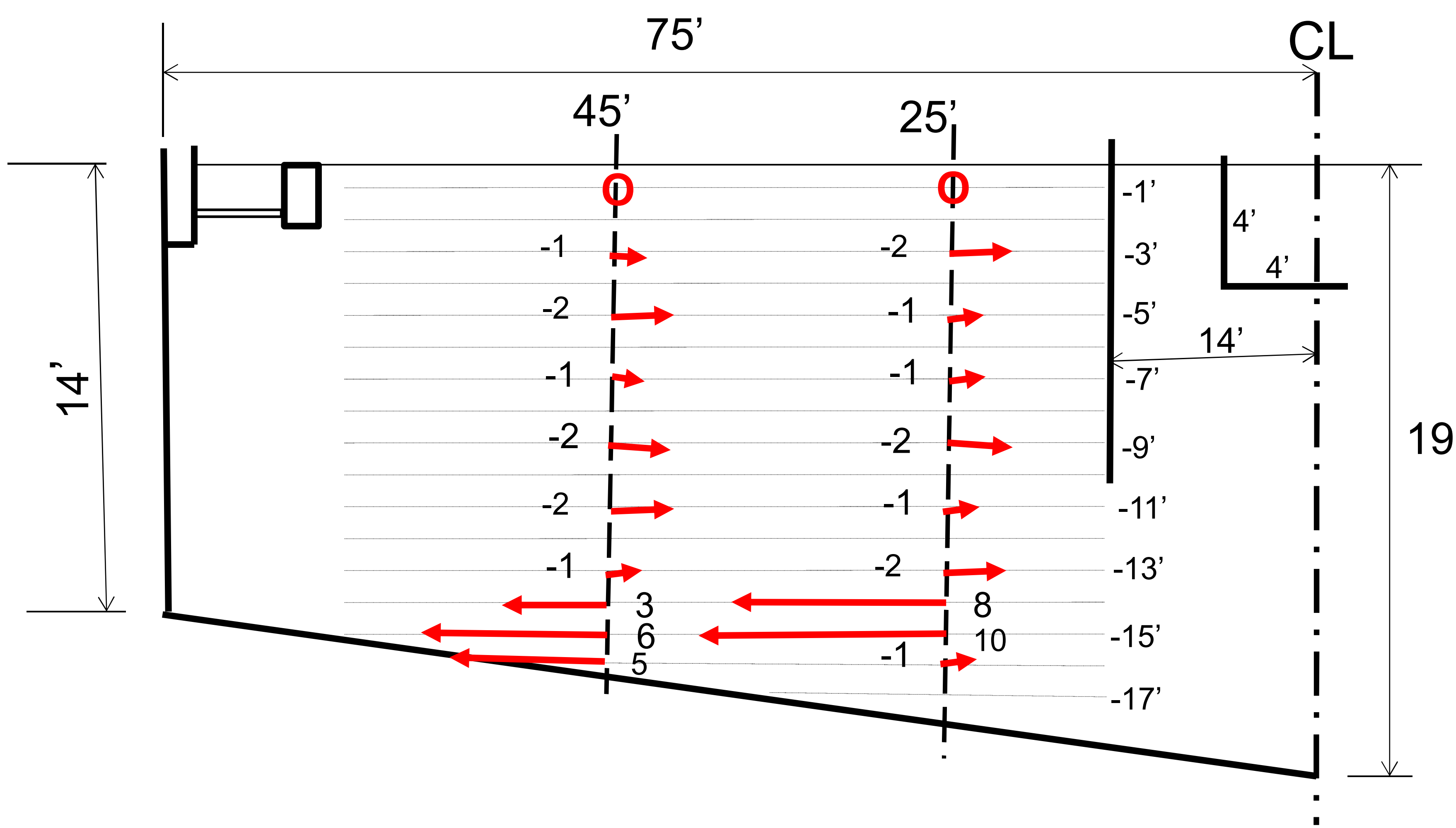
The data presentation shows the average linear velocity of the drogue in feet per minute for each depth at that location.

DROGUE DATA SC #5 @ 7 mgd (400 Gal/sf/d)



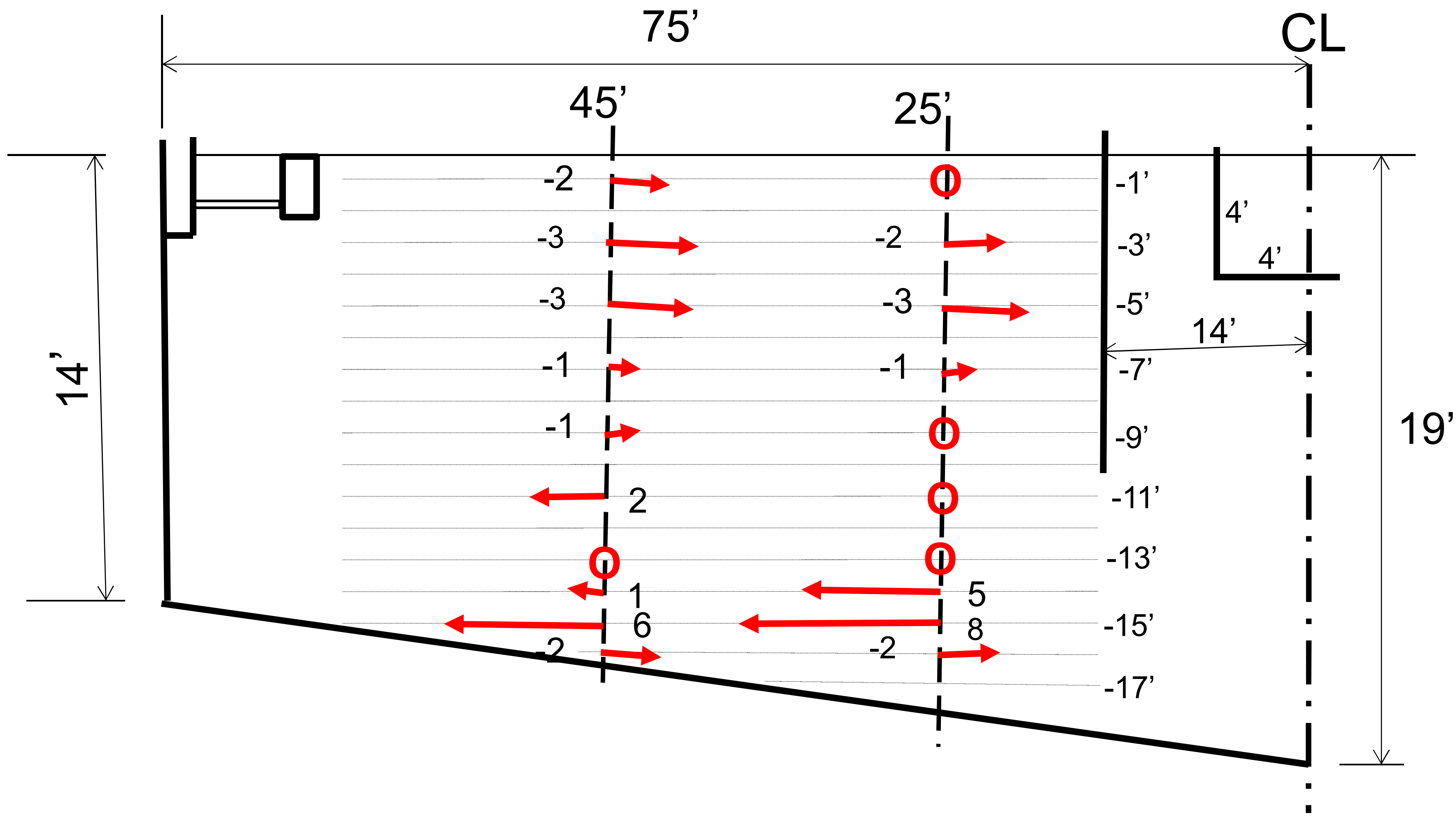
D1

DROGUE DATA   SC #8 @ 8 mgd (450 Gal/sf/d)



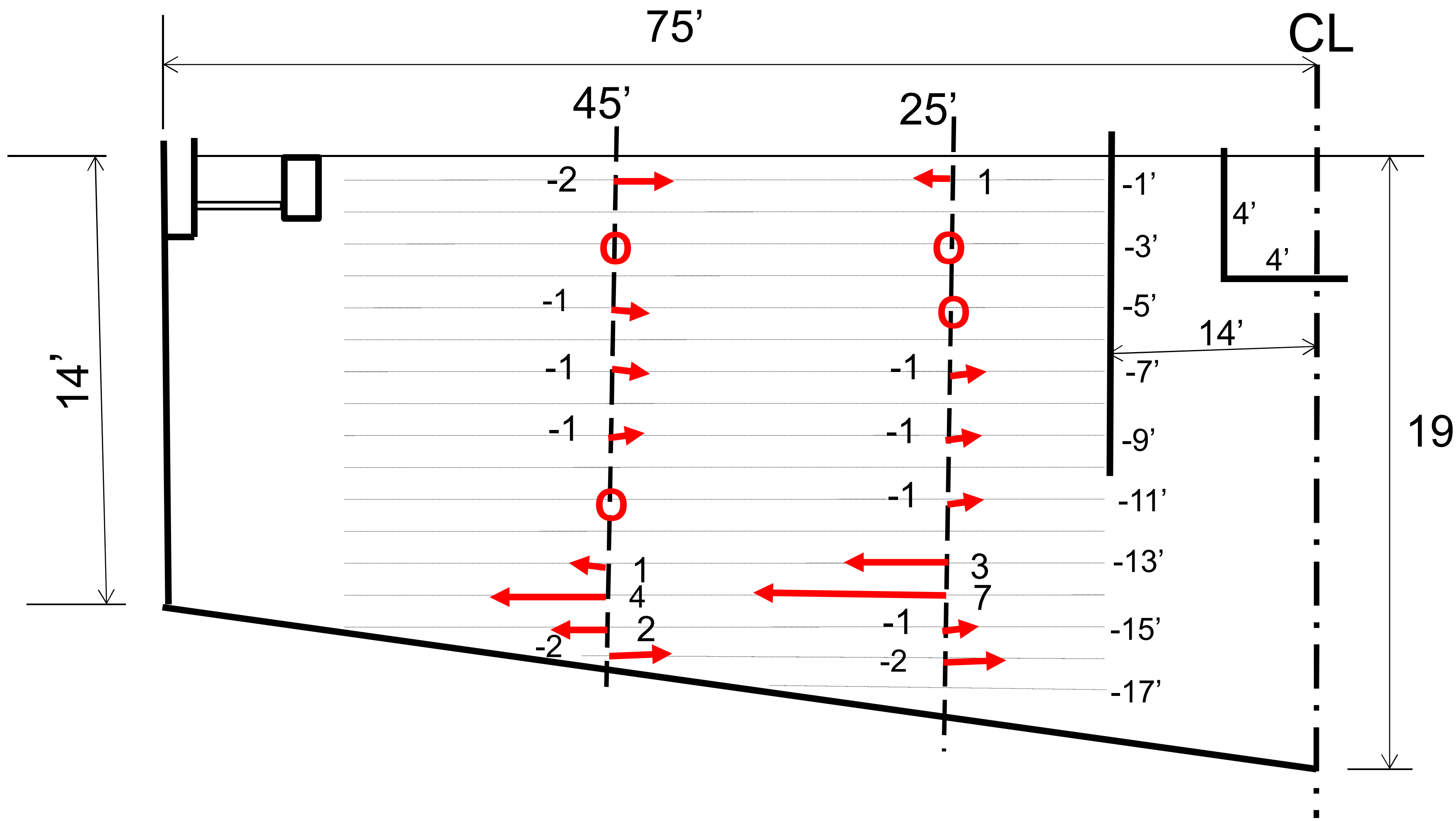
D2

DROGUE DATA SC #5 @ 13.8 mgd (780 Gal/sf/d)



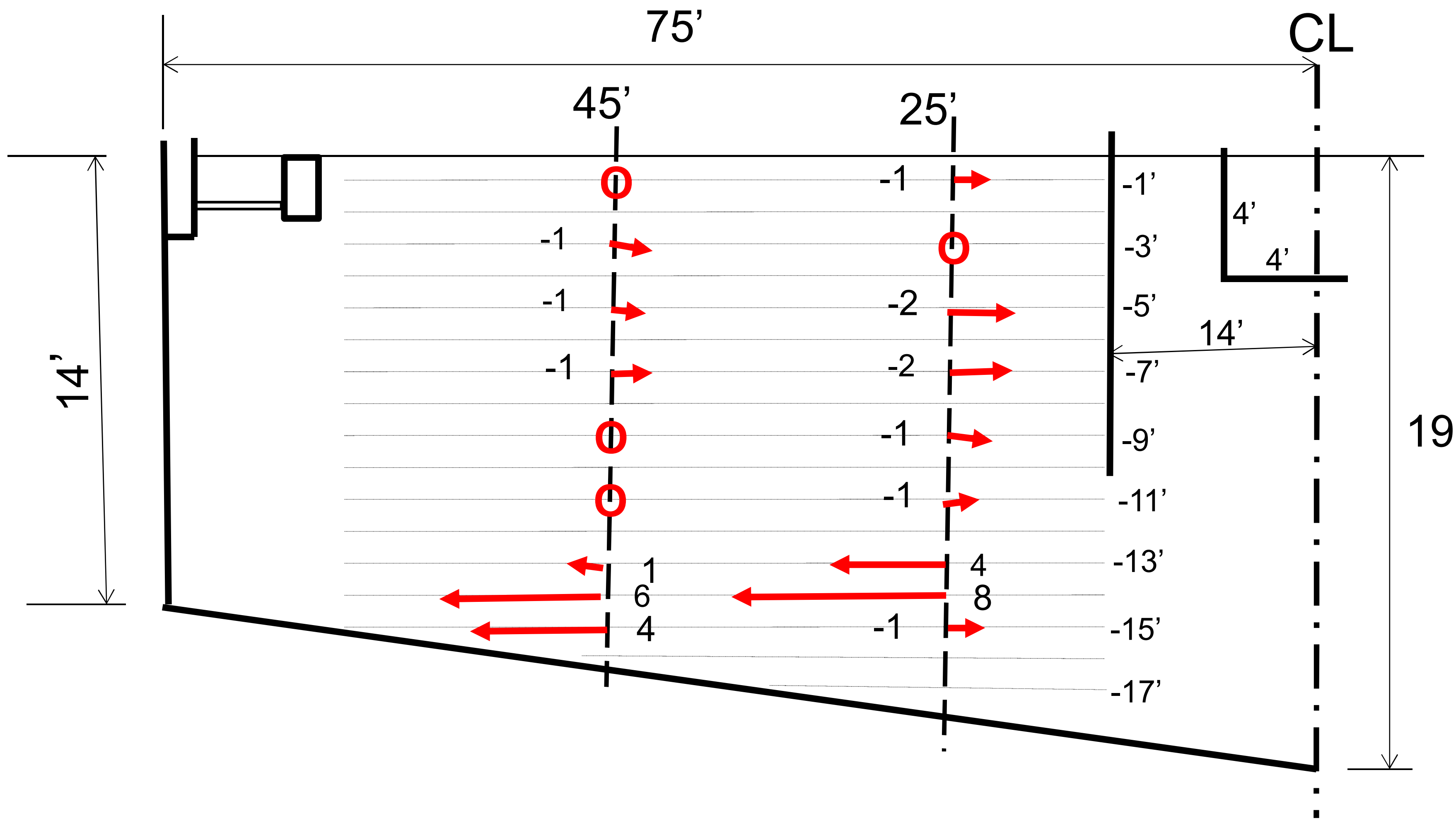
D3

DROGUE DATA SC #8 @ 14.6 mgd (830 Gal/sf/d)



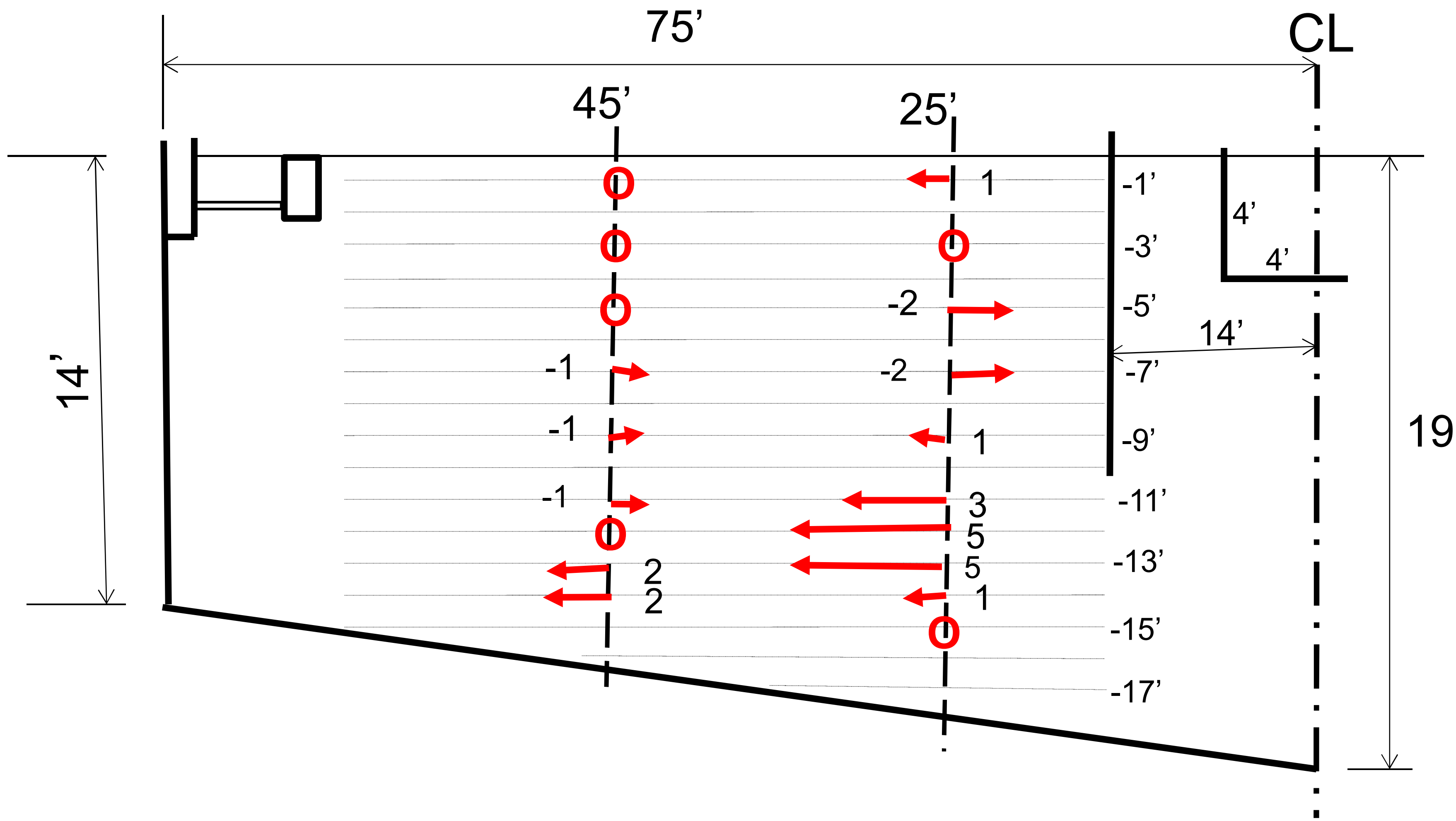
D4

DROGUE DATA SC #5 @ 16.6 mgd (940 Gal/sf/d)



D5

<u>DROGUE DATA   SC#8 @ 17.1 mgd (970 Gal/sf/d)</u>



D6

APPENDIX E

PRIMARY CLARIFIER
DYE STUDY

Primary Clarifier Dye Study

There are six rectangular primary clarifiers ahead of the aeration basins. Each clarifier is 135-ft long by approximately 61-ft wide by approximately 14-ft deep (0.865 Mgal). At a flow rate of 29 mgd to the facility, or, 4.8 mgd per clarifier, a clarifier's theoretical detention time would be approximately 260 minutes.

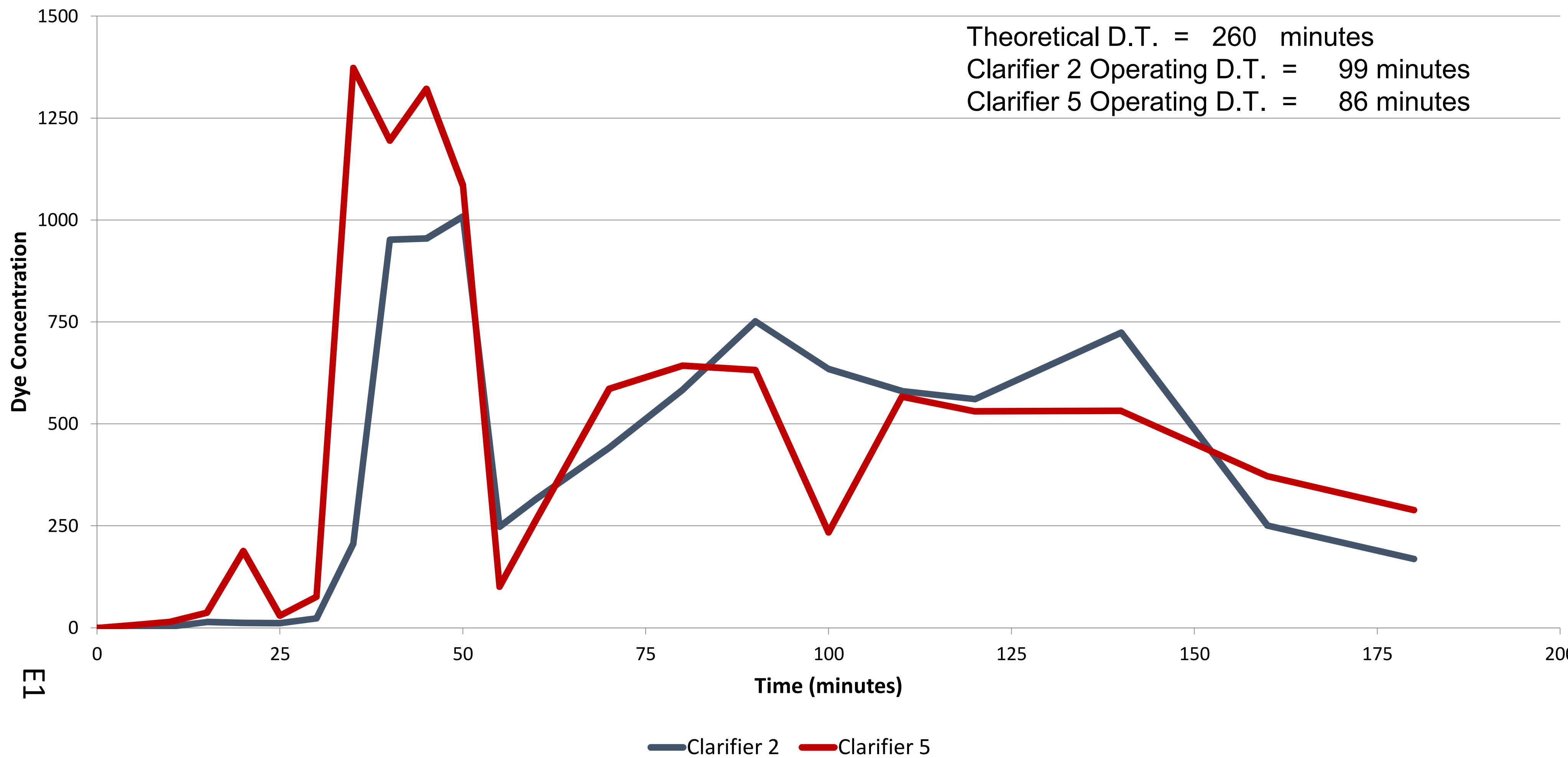
The typical clarifier is divided into three parallel bays, with six access hatches at the inlet end and six at the effluent end. In order to determine the hydraulic characteristics of these clarifiers, a slug of Rhodamine WT dye was poured into the two access ports at the entrance to the central bays of Clarifiers #2 and #5. The effluent was then analyzed for dye, using the same sampling protocol as was used in the secondary clarifier dye study. The attached Figure E1 shows the results of this test.

Observations:
Based on the resultant flow curves, the actual detention times for these clarifiers was 99 minutes for Clarifier #2 and 86 minutes for Clarifier #5. This yielded an hydraulic efficiency of 38% for Clarifier #2 and 33% for Clarifier #5. These flow curves were extremely irregular as compared to typical curves for rectangular primary clarifiers. This was likely due to the insertion of the dye into only the central two of the clarifier's six entrance access hatches. This could have led to the continuing intermittent peaks of dye from the adjacent bays after the initial peaks.

Conclusions:
Based on these flow curves, it appears that some moderate short-circuiting currents are present in both clarifiers, with the currents having a greater impact on Clarifier #5. This difference may have been due to some flow distribution imbalance. Based on the strong appearances of the dye in both clarifiers in 35- to 50-minutes, it can be inferred that there are currents present in the range of 3- to 4-feet per minute. This is not unusual since currents are generally more dispersed in primary clarifiers than in activated sludge clarifiers. However, at an overflow rate of less than 600 gal/sf/d, this has resulted in rather low hydraulic efficiencies.

Recommendations:
From our experience with similar rectangular clarifiers, the hydraulic performance of these clarifiers could be improved with the insertion of simple slotted baffles in the clarifiers. Any improvement in the hydraulic characteristics should result in a more efficient removal of suspended and settleable solids. Such an improvement in solids removals would also be accompanied by a lower effluent BOD.

Primary Clarifier Dye Curves at 29 mgd Flow Rate
SOR = 590 gal/sq ft/day



E1

Jones & Henry
ENGINEERS, LTD.

APPENDIX D

ARC FLASH STUDY

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Comstock Park, MI 49321
(616) 206-8025

GENERAL ORDER NUMBER: GOMGR0010731
REPORT NUMBER: TQSIGR0010731.1
SUBMITTED BY: K. SWARTZ

STATE OF MICHIGAN
CHRISTOPHER J.
KENNEDY
ENGINEER
No.
56873
LICENSED PROFESSIONAL ENGINEER
5/17/23

SHORT-CIRCUIT, PROTECTIVE DEVICE COORDINATION, ARC FLASH INCIDENT ENERGY ANALYSIS FOR KALAMAZOO WASTE WATER TREATMENT PLANT SWITCHGEAR REPLACEMENT PROJECT

KALAMAZOO, MI
REVISION 2
MAY 2023

www.EatonElectrical.com

REVISION HISTORY

Rev #	TQS Number	Issued	Revision / Modification Description
-	TQSIGR0010731.1	10/2022	Initial Study Report Issue
1	TQSIGR0010731.1	2/2023	- Revised utility to Delta configuration, re-ran short circuit and arc flash calculations. - Revised recommendation Section 1.3 per new system data from the contractor.
2	TQSIGR0010731.1	5/2023	- MVUS-1 Relay settings updated - Utility primary feeds revised to 4 cables in cable tray - East and West Banks main fuses replaced with solid blade disconnects

TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY

1.1 General

This summary report contains the results of analyses performed on the electrical distribution system for the Waste Water Treatment facility in Kalamazoo, MI. The purpose of this study is to evaluate new and existing electrical equipment for this facility. System data and necessary modeling assumptions are provided under Section 6.0.

1.2 Objectives

1. Short-Circuit Analysis

Perform a short-circuit study on the electrical distribution system shown in order to determine the available fault current at pertinent locations throughout the distribution system. The scope of the study includes:

- Analysis beginning at the incoming 4.8 kV utility service, continuing through the medium and low voltage substations, and ending at the low voltage panelboards and motor control centers.

The available fault currents determined by the short-circuit study will be used in the electrical distribution analyses.

2. Equipment Evaluation

Evaluate the short-circuit ratings of new and existing protective devices and other distribution equipment supplied by Eaton under this contract.

3. Coordination Study

Develop time-current coordination plots to derive coordinated settings for new protective devices.

4. Arc Flash Analysis

Perform an arc flash incident energy analysis per NFPA 70E on the electrical distribution system as per Eaton's scope of work.

An incident energy analysis is defined by NFPA 70E to be a component of an arc flash risk assessment used to predict the incident energy of an arc flash for a specified set of conditions.

5. Recommendations

Provide specific recommendations for improving the electrical distribution system performance and correcting any deficiencies found by the studies.

1.3 Results and Recommendations

1. Short-Circuit Study

The system was modeled for worst-case fault currents. Short-circuit currents were calculated for a three-phase bolted fault and single-line-to-ground fault at each bus shown on the one-line diagrams found in Section 11.0.

See Section 2.0, Section 7.0, and Section 8.0 for more information.

2. Equipment Evaluation

The Equipment Evaluation is based on the power system worst-case short-circuit current configuration. The short-circuit ratings of protective devices and other distribution equipment are evaluated in Section 2.0, Table 2.1.

In summary of Table 2.1, specific equipment has failed the equipment evaluation and is considered overdutied. It is recommended that the overdutied equipment be reviewed replacement/modification to comply with the short-circuit current ratings required. The following equipment has failed the equipment evaluation:

- Multiple Disconnect Switches indicated in RED within Table 2.1
- MCC-1 ATS
- MCC-4
- MCC-4A
- Pump #5 VFD and Pump #7 VFD
- VFD Pump 4

See Section 2.0 for detailed analysis and evaluation results.

3. Coordination Study

The time-current coordination plots of the protective overcurrent devices are shown in Section 3.0. In developing the device settings, consideration was given to the isolation of faults, protection of cables, and protection of transformers.

Efforts were made to provide the best coordination possible with the protective devices supplied under this contract and existing protective devices. It should be understood that coordination between two instantaneous trip units cannot be achieved for fault levels above the instantaneous pickup of the upstream device. There is some overlapping of curves that cannot be avoided.

In summary of the coordination study, the following recommended changes would maximize coordination while maintaining adequate protection:

- Panelboard Main Breakers: Where data on main breakers was not provided it was assumed the Panelboard had no Main Breaker.The panelboard Main breaker will not affect the short circuit or arc flash analysis and was therefore left out of the system model. Per NEC article(s) 408.36(B) and 240.21(C), panelboards downstream of each transformer should have overcurrent protection within 25’-0” of the transformer secondary. Overcurrent protection sized to protect the secondary tap conductors.

- Tap Conductors: Per NEC article 240.21(B), Tap conductors shall terminate into equipment containing an overcurrent device that is sized/rated to protect the Tap conductors. Where the data provided did not indicate whether a disconnect was fused or non-fused, it was assumed non-fused.

- Tap Conductors: Per NEC article 240.21(B), Tap conductors shall not be over 10' long or not over 25' long (if Tap conductor ampacity is not less than 1/3 the ampacity of the upstream overcurrent device). Several Tap conductors at this facility were provided as over 10' and/over 25' long and not complying with the 1/3 rule. Recommended solution in most cases is to provide a fused disconnect within 10' of each Tap. Locations to review include Taps from:
  - MCC-8A – Mixed Liquer Pumps 1 thru 4
  - MCC-8 – RAS Pumps and MISC Pumps
  - DS-RECYCLE PUMP
  - MCC-1 Unit Heaters
  - MCC-7 DS-XFMR 21 LP-02
  - MCC-7 – MCC-7 Air Comp – revise fuse size to 20Amp in motor disconnect

- Motor Protection: Per NEC article 430.52(C), Motor branch circuit protection shall be sized 175% FLA of the motor for fuses and 250% FLA of the motor for breakers. Cable ampacity shall be 125% the FLA of the motor, per NEC article 430.31 overload protection shall be provided in the motor circuit to protect both the motor and cable ampacity. The provided data collection did not indicate motor overload locations/settings. It is assumed each motor has motor overload protection in place that complies with NEC article 430.31. The following locations should be reviewed for compliance with the above-mentioned NEC articles for motor protection:
  - MCC-4C to MAU-BP-1

- Undersized Cables: The following cables are undersized per NEC table 310.15(B)(16). Each location should be reviewed to determine if the existing cable size should be increased, or the existing overcurrent device size decreased to protect the cable.
  - MCC-27 to PP-SH-1 – 4 sets of #250kcmil fed from 1200A breaker.
  - LC-3 to MCC-24 - #250kcmil cable, no overcurrent protection shown.
  - LC-3A to MCC-13 – 3 sets of #500kcmil cable, no overcurrent protection shown.
  - MCC-15A to Fan Control #1 - #8AWG cable fed from 60A fuse.
  - MCC-10 to Southbelt Pump No 1&2 - #10AWG cable fed from 50A fuse.
  - LC-5 to MCC-7 – 2 sets of #1/0AWG cable fed from 400A breaker.
  - LC-4 to LC-2 – #350kcmil fed from 500A fuse.
  - MCC-15AA to MAU-1 VFD and Disconnect - #12AWG cable fed from 40A breaker
  - MCC-1 ATS to MCC-1 3 sets of #500 fed from 1600A fuses

All of the adjustable low voltage electronic trip and thermal magnetic circuit breakers and medium voltage equipment should be tested and adjusted according to the recommended settings given in Section 4.0.

4. Protective Device Settings

Settings for the protective devices supplied by Eaton should be set as shown and recommended in Section 4.0.

Each entry references a coordination plot number found in Section 3.0. The referenced plot illustrates the coordination of the listed device with the relevant “upstream” and “downstream” protective devices.

5. Arc Flash Incident Energy Analysis

Details of the arc flash incident energy analysis are shown in Section 5.0. Please note for this study, the arc flash hazard has been calculated by performing an incident energy analysis, with the calculation process as specified in IEEE 1584-2018. The results of this study can be used by qualified workers to determine the arc flash boundary and select appropriate arc flash PPE as part of an overall arc flash risk assessment. NFPA 70E Table 130.5(g) provides guidance on the selection of arc rated clothing and other PPE based on the results of an incident energy analysis. It is the responsibility of the employer and qualified person(s) to conduct an overall arc flash risk assessment as detailed in NFPA 70E-2018 Article 130.5 before the commencement of work on electrical equipment. The risk associated with performing energized electrical work will vary based on the work being performed as well as the condition of the equipment and other factors that can be best determined by a qualified person in the field.

The PPE requirements outlined in NFPA 70E only address the thermal hazards associated with arc flash events and do not provide protection against other possible physical trauma resulting from an arc flash event. See NFPA 70E Article 120 for details on establishing an electrically safe work condition.

If the incident energy levels at work locations found in this report are unacceptable to the facility Owner, then those locations should be individually evaluated to determine the most effective means of reducing the incident energy. It is recommended an Arc Flash Mitigation Study be added to the study scope to find the best solution(s) possible to reduce incident energy while maintaining the highest degree of reliability. Also, in some situations the equipment can be upgraded with equipment that is safer by design in order to reduce the risk considering the work being performed.

a) Equipment Design: The following equipment may not reduce calculated incident energy, but is safer by design and can help reduce the risk to the qualified person. Examples:

- Built in IR windows for low voltage and medium voltage switchgear.
- MCC Buckets and Safety Switches with built-in viewing windows.
- High Resistance Grounding Systems.
- Eaton Flashguard MCC with three-position MCC bucket (connected, test and withdrawn) and through-the-door racking mechanism.
- Arc Resistant Medium and Low Voltage Switchgear assemblies
- Remote Racking Device(s).
- Remote “open”/ “close” breaker control.

- The InsulGard™ partial discharge system to provide an early indication of insulation failure in switchgear, failure in switchgear, bus duct, power centers, generators, transformers, and motors.

b) Reducing Incident Energy: The following equipment solutions when applied appropriately can help reduce the calculated incident energy at specific work locations. An Arc Flash Mitigation Study should be included with any of these solutions so design engineering, calculated proof of reduced incident energies, updated arc flash labels, and appropriate device settings can be provided. Examples:

- Provide low voltage breakers with Arcflash Reduction Maintenance System settings and maintenance switch.
- Provide medium voltage multi-function relays with maintenance switch and separate settings group.
- Revise nonadjustable thermal magnetic breakers or fuses to adjustable electronic trip breakers with Eaton 210+ or 310+ trip units.
- Revise design from (1) large 480V-to-120/208V step-down transformer that is over 125KVA to several small transformers that are less than 125KVA.
- Reduce fuse or breaker size(s) – dependent on existing or expected loading.
- Relocate main breaker or fuse located on transformer secondary to a separate enclosure.
- Provide a bus differential scheme.
- Provide an arc flash limiter (AFL) with current sensing on transformer secondary and vacuum breaker on transformer primary. Voltage transient study should be included for this recommendation with dry type transformers.
- Outdoor Pad Mounted Oil Filled Transformer: Provide an arc flash limiter (AFL) with current sensing on transformer secondary and VFI vacuum breaker internal to transformer primary.
- Provide light sensors with Eaton EAFR relay.

NFPA 70E requires that the arc flash analysis be updated:

- Every five years (at minimum)
- When the electrical system is modified, including renovations, additions, or subtractions to the system

6. Testing and Preventative Maintenance

The 2018 edition of NFPA 70E Section 205.3 and 205.4 requires that regularly scheduled testing and preventative maintenance be performed to ensure that the electrical distribution equipment continues to perform at an optimum level. Testing should entail primary injection testing of all circuit breakers to verify proper tripping ranges, contact resistance testing, insulation resistance testing and complete switchgear and transformer cleaning and inspection. Refer to NFPA-70B for specific types of testing and interval recommendations. The industry generally performs breaker testing every 3-5 years.

7. Predictive Diagnostics Using Continuous Partial Discharge Measurements

Eaton recommends conducting Continuous Partial Discharge measurements on most medium voltage power transformers, bus ducts, switchgear, motors, generators, terminations, and splices of transmission and distribution cables. Partial Discharge (PD) analysis is a non-invasive, online method of collecting, filtering, and evaluating PD occurring in electrical apparatus. The goals are:

- To detect partial discharges as a result failing or compromised insulation
- To analyze the partial discharge activity, and if an insulation defect is detected:
- Make conclusions as to the severity of the defect.
- Advise as to possible defect locations and possible cause(s) of the defect.
- Advise as to urgency of inspection.
- Suggest preventive measures both immediate and long term.

Electrical insulation is very important to monitor as it defines a major item in the reliability of electrical machines. Continuous Partial Discharge on-line monitoring using the Eaton InsulGard™ is the most sensitive and reliable method for detecting failing insulation. PD monitoring when used in conjunction with Eaton’s RM™ system offers customers the added benefit of prompt expert analysis and recommendation.

2.0 SHORT-CIRCUIT ANALYSIS

2.1 General

The short-circuit study determines the fault currents that flow in the system during various fault conditions. A system model was created using SKM Systems Analysis software. The calculated fault currents are used in the device evaluation and coordination studies. See Section 7.0 and Section 8.0 for the computer generated input data and output data. NEC-2017, Article 110.24(A) requires that service entrance equipment is labeled with the following pieces of information:

- Maximum available fault current
- Date on which the fault current was calculated

Article 110.24(B) adds that if there is a modification that may change this fault current value, it must be recalculated. The field marking must be updated to reflect the new value of maximum fault current.

Separate "Z" (complex), "X" (reactive), and "R" (resistive) networks are used for the short-circuit analysis. Complex network reduction and the relationship E/Z are used to calculate the fault current magnitude and angle at each faulted bus. The complex equivalent circuit impedance, Z, is calculated by the reduction of the "Z" (complex) network. The X/R ratios calculated for each fault condition are based on the separate reduction of the X and R networks. These X/R ratios are used for the calculation of fault duty multipliers, to evaluate the short-circuit ratings of system components.

The software is capable of generating three types of short-circuit reports for both balanced (three-phase bolted) and unbalanced (line-to-ground) faults. The reports that are generated depend on the system that is being evaluated.

The three types of short-circuit reports are:

- Fault Report (for low voltage)
- Momentary Duty Report (for medium voltage)
- Interrupting Duty Report (for medium voltage)

1. <u>Fault Report</u>

The fault currents reported in the "Fault Report" are applicable to low voltage devices and components. The fault currents calculated in this report are based on the contribution data derived from IEEE Std C37.13™. The fault currents are calculated as follows:

- Motor and generator subtransient reactance values (Xd") are adjusted per the first cycle duty multipliers described in IEEE Std 141™.
- The complex equivalent circuit impedance, Z, is calculated by network reduction of the "Z" (complex) network.
- The momentary symmetrical current = E/Z.
- The X/R ratio is equal to the equivalent circuit reactance, X, divided by the equivalent circuit resistance, R. As discussed above, X is calculated by the reduction of the "X" (reactive) network and R is calculated by the reduction of the "R" (resistive) network.

Multiplying factors are determined, and used to adjust the calculated symmetrical fault current. The adjusted current is used to evaluate low voltage protective devices. Low voltage output algorithms and output reports reflect NEMA AB-1 molded case breaker de-rating multipliers. Breakers are de-rated for circuits where the power factor is lower than the NEMA test circuit (higher X/R ratio). The multipliers adjust the symmetrical fault current to the value associated with the systems fault point X/R ratio. The adjusted value listed on the report may then be compared directly with the manufacturer's published interrupting rating.

2. Momentary Duty Report

The "Momentary Duty Report" contains the calculated fault currents that occur during the first half-cycle of the fault. The momentary fault currents are used to evaluate medium and high voltage fuses, and the "closing and latching" capability (momentary rating) of medium and high voltage breakers. The fault currents reported in the "Momentary Duty Report" are calculated as follows:

- Motor and generator subtransient reactance values (Xd") are adjusted per the first cycle duty multipliers described in IEEE Std 141.
- The complex equivalent circuit impedance, Z, is calculated by network reduction of the "Z" (complex) network.
- The momentary symmetrical current = E/Z.
- The X/R ratio reported is equal to the equivalent circuit reactance, X, divided by the equivalent circuit resistance, R. As discussed above, X is calculated by the reduction of the "X" (reactive) network and R is calculated by the reduction of the "R" (resistive) network.
- The momentary asymmetrical current is calculated and reported in two different ways, once as "sym*1.6" and again as "momentary based on X/R". The "sym*1.6" value is the momentary symmetrical current multiplied by 1.6. The "momentary based on X/R" value is the momentary symmetrical current multiplied by

$$\sqrt{1+2e^{(-2\pi/(X/R))}}$$

3. Interrupting Duty Report

The fault currents reported in the "Interrupting Duty Report" are used to evaluate the interrupting rating of medium- and high-voltage breakers. The interrupting symmetrical current is calculated as follows:

- Motor and generator subtransient reactance values (Xd") are adjusted per the interrupting duty multipliers described in IEEE Std 141.
- The complex equivalent circuit impedance, Z, is calculated by network reduction of the "Z" (complex) network.
- The interrupting symmetrical current = E/Z.
- The X/R ratio reported is equal to the equivalent circuit reactance, X, divided by the equivalent circuit resistance, R. As discussed above, X is calculated by the reduction of the "X" (reactive) network and R is calculated by the reduction of the "R" (resistive) network.

- The calculated X/R ratio is used to determine the minimum contact parting time multiplying factors for 2, 3, 5, and 8 cycle breakers. The multiplying factors are based on IEEE Std C37.5™ and IEEE Std C37.010™ standards. The multiplying factors are applied to the interrupting symmetrical current in order to calculate the RMS short-circuit current interrupting duty for 2, 3, 5, and 8 cycle breakers. This duty is compared to the symmetrical current interrupting rating of the circuit breaker. NACD (No AC Decrement) ratios are calculated with consideration of generator "Local" and "Remote" contributions as outlined in IEEE Std C37.010™.
- Motor and generator impedance multipliers for the short-circuit calculations are summarized in the following table. This is based on the recommended combination network for comprehensive multi-voltage system calculations (from IEEE Std 141:

Machine Type	Impedance (First Cycle Duty)	Impedance (Interrupting Duty)
Turbine generators, Condensers, Hydrogenerators with amortisseur windings	1.0 Xd"	1.0 Xd"
Synchronous motors	1.0 Xd"	1.5 Xd"
Induction motors > 1000 hp at speed ≤ 1800 RPM, or > 250 hp at 3600 RPM.	1.0 Xd"	1.5 Xd"
Induction motors ≥ 50 hp not covered above.	1.2 Xd"	3.0 Xd"
Induction motors < 50 hp	1.67 Xd"	Neglect

Note: Xd" is the subtransient reactance of the rotating machine.

2.2 Objectives

The objective of the short-circuit analysis is to calculate the maximum short-circuit currents produced by balanced three-phase and unbalanced faults at each bus shown on the one-line diagrams.

1. Short-Circuit System Model

The system was modeled for worst-case fault currents. Short-circuit currents were calculated for a three-phase bolted fault and single-line-to-ground fault at each bus shown on the study one-line diagrams.

a) Evaluated Short-Circuit Cases:

The following short-circuit study cases were evaluated:

- Study Case No. 1 – System supplied from Transformer 1 with MB-2 open and Tie closed. This is the worst-case scenario.

2.3 Equipment Evaluation

The purpose of the equipment evaluation is to compare the ***maximum*** calculated short-circuit currents to the short-circuit ratings of protective devices. The comparison is made in order to determine if the device can interrupt or withstand the available fault currents of the electrical system to which the device is applied, as required by NEC Articles 110.9 and 110.10. The device evaluation follows the evaluation procedures outlined in IEEE Std C37.13, IEEE Std C37.010, IEEE Std C37.5, IEEE Std C37.41™, IEEE Std 1015™, and applicable ANSI, NEMA, and UL standards.

The results of the short-circuit equipment evaluation are summarized in Table 2.1 and Table 2.2. The tables indicates “Bus I.D.” (corresponds to bus designations used in the one-line diagrams, “Manufacturer”, “Status” (Pass, fail, unknown, or marginal), “Type” (equipment category), “Equip Volts”, calculated short-circuit duty, the equipment short-circuit rating, the series rating (if applicable), and the maximum duty rating.

The maximum duty rating is calculated by:

$$\frac{S.C.duty}{DeviceS.C.Rating} \times 100$$

If the short-circuit rating of a device is not known, and/or short-circuit rating information is not available, a Minimum Required short-circuit rating is assumed. All short-circuit current values are reported in units of kA.

1. <u>For low voltage devices:</u>

The calculated short-circuit duty is reported under “Calc Isc (kA)" and the device short-circuit rating is reported under "Equip Isc (kA)". The calculated duty has been adjusted accordingly per the system X/R and device test X/R.

2. <u>For medium/high voltage breakers:</u>

The calculated *interrupting* short-circuit duty is reported under "Calc Isc (kA)" and the breaker short-circuit interrupting rating is reported under "Equip Isc (kA)". The interrupting duty has been adjusted per multiplying factors based on the breaker clearing time and system X/R. The calculated momentary duty (i.e. close-and-latch duty) is reported under "Calc Mom (kA)". The breaker momentary (i.e. close-and-latch) rating is reported under "Equip Msc (kA)".

3. <u>For medium/high voltage fuses, switches, and motor starters:</u>

The calculated *momentary symmetrical* short-circuit duty is reported under "Calc Isc (kA)" and the device's momentary symmetrical short-circuit rating is reported under "Equip Isc (kA)". The calculated *momentary asymmetrical* duty is reported under "Calc Mom (kA)". The device's momentary asymmetrical short-circuit rating is reported under "Equip Mom (kA)".

2.4 Short-Circuit Results

Information used in modeling the power system to provide conservative, worst-case results is listed in Section 6.0. The results of the short-circuit analysis, including calculated branch contributions, are provided under Section 8.0. The one-line diagrams with referenced bus identification are included in Section 11.0.

Table 2.1 – Low-Voltage Equipment Evaluation

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Series Rating (kA)	Rating %
04-LP-01 XFER SWITCH	Passed	UNKNOWN	LV DISCONNECT	480	11.91	14.00		85.05
06-LP-01	Passed	WESTINGHOUSE	LV PANELBOARD	208	9.76 (*N1)	10.00		97.63
06-LP-02	Passed	UKNOWN	LV PANELBOARD	208	7.23 (*N1)	10.00		72.26
06-LP-03	Passed	UKNOWN	LV PANELBOARD	208	6.34	10.00		63.43
06-LP-04	Passed	UKNOWN	LV PANELBOARD	208	3.01	10.00		30.05
06-LP-05	Passed	UKNOWN	LV PANELBOARD	208	2.68	10.00		26.79
06-LP-06	Passed	UKNOWN	LV PANELBOARD	208	4.23	10.00		42.33
06-LP-07	Passed	UKNOWN	LV PANELBOARD	208	2.01	10.00		20.11
11-LP-01	Passed	UNKNOWN	LV PANELBOARD	208	0.56 (*N1)	10.00		5.56
11-LP-01A	Passed	UNKNOWN	LV PANELBOARD	208	0.42	10.00		4.22
12A-PP-01	Passed	UNKNOWN	LV PANELBOARD	480	11.47	14.00		81.96
15 KVAC CAP	Passed	UNKNOWN	LV DISCONNECT	480	12.99	10.00	100.00	12.99
15-LP-01	Passed	UNKNOWN	LV PANELBOARD	208	0.93 (*N1)	10.00		9.30
15-LP-02	Passed	UNKNOWN	LV PANELBOARD	208	0.86 (*N1)	10.00		8.58
2-LP-1	Passed	UNKNOWN	LV PANELBOARD	208	1.15 (*N1)	10.00		11.53
2-LP-2	Passed	UNKNOWN	LV PANELBOARD	208	1.06 (*N1)	10.00		10.62
2-LP-3	Passed	UNKNOWN	LV PANELBOARD	208	1.06 (*N1)	10.00		10.62

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Series Rating (kA)	Rating %
2-LP-4	Passed	UNKNOWN	LV PANELBOARD	208	1.11 (*N1)	10.00		11.12
20A-PP-01	Passed	UNKNOWN	LV PANELBOARD	480	6.95	14.00		49.62
20A-PP-1	Passed	SQUARE D	LV PANELBOARD	480	9.49	18.00		52.73
24-LP-01	Passed	UNKNOWN	LV PANELBOARD	208	3.13 (*N1)	10.00		31.30
24-LP-02	Passed	UNKNOWN	LV PANELBOARD	480	2.14	14.00		15.26
28-LP-01	Passed	UNKNOWN	LV PANELBOARD	208	4.65 (*N1)	10.00		46.52
28-PP-01	Passed	EATON	LV PANELBOARD	480	3.27	65.00		5.03
2A-LP-01	Passed	UNKNOWN	LV PANELBOARD	208	0.97 (*N1)	10.00		9.66
45D WATER CIRC PUMP P-9 DISC	Passed	UNKNOWN	LV DISCONNECT	480	3.73	10.00		37.35
AER. TANK AND UNDERDRAIN PUMP	Passed	UNKNOWN	LV DISCONNECT	480	1.96	10.00		19.59
AERATION RECIRC PUMP 1-3 DISC	Passed	UNKNOWN	LV DISCONNECT	480	0.68	10.00		6.82
AERATION RECIRC PUMP 2-3 DISC	Passed	UNKNOWN	LV DISCONNECT	480	0.68	10.00		6.82
AERATION RECIRC PUMP 3-3 DISC	Passed	UNKNOWN	LV DISCONNECT	480	0.94	10.00		9.44
AERATION RECIRC PUMP 4-3 DISC	Passed	UNKNOWN	LV DISCONNECT	480	0.94	10.00		9.44
AERATION RECIRC PUMP 5-3 DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.18	10.00		11.79
AERATION RECIRC PUMP 6-3 DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.82	10.00		18.18
AERATION RECIRC PUMP 7-3 DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.28	10.00		12.80
AERATION RECIRC PUMP 8-3 DISC	Passed	UNKNOWN	LV DISCONNECT	480	0.99	10.00		9.92

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Series Rating (kA)	Rating %
AERATION RECIRC PUMP 9-3 DISC	Passed	UNKNOWN	LV DISCONNECT	480	0.81	10.00		8.14
AERATION TANK PORT BLOWER RECP	Passed	UNKNOWN	LV DISCONNECT	480	0.62	10.00		6.20
AERATION VALVE #1	Passed	UNKNOWN	LV DISCONNECT	480	0.35	10.00		3.54
AERATION VALVE #2	Passed	UNKNOWN	LV DISCONNECT	480	0.42	10.00		4.17
AERATION VALVE #3	Passed	UNKNOWN	LV DISCONNECT	480	0.51	10.00		5.08
AERATION VALVE #4	Passed	UNKNOWN	LV DISCONNECT	480	0.65	10.00		6.48
AERATION VALVE #5	Passed	UNKNOWN	LV DISCONNECT	480	0.90	10.00		8.96
AERATION VALVE #6	Passed	UNKNOWN	LV DISCONNECT	480	1.53	10.00		15.32
AERATION VALVE #7	Passed	UNKNOWN	LV DISCONNECT	480	1.03	10.00		10.28
AERATION VALVE #8	Passed	UNKNOWN	LV DISCONNECT	480	0.77	10.00		7.74
AERATION VALVE #9	Passed	UNKNOWN	LV DISCONNECT	480	0.62	10.00		6.20
AERATION VALVE HEADER	Passed	UNKNOWN	LV DISCONNECT	480	3.43	10.00		34.32
AIR COMPRESSOR	Passed	UNKNOWN	LV DISCONNECT	480	1.76	10.00		17.62
AIR DUCT HEATER CONTACTOR	Passed	UNKNOWN	LV DISCONNECT	480	13.26 (*N1)	10.00	100.00	13.26
AIR DUCT HEATER DISC	Passed	UNKNOWN	LV DISCONNECT	480	7.12	10.00		71.16
ANAEROBIC MIX PUMP 1-1 DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.67	10.00		16.65
ANAEROBIC MIX PUMP 2-1 DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.95	10.00		19.50
ANAEROBIC MIX PUMP 3-1 DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.56	10.00		15.62

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Series Rating (kA)	Rating %
ANAEROBIC MIX PUMP 4-1 DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.99	10.00		19.93
ANAEROBIC MIX PUMP 5-1 DISC	Passed	UNKNOWN	LV DISCONNECT	480	2.76	10.00		27.65
ANEROBIC MIX PUMP 6-1 DISC	Passed	UNKNOWN	LV DISCONNECT	480	3.02	10.00		30.19
ANEROBIC MIX PUMP 7-1 DISC	Passed	UNKNOWN	LV DISCONNECT	480	2.18	10.00		21.79
ANEROBIC MIX PUMP 8-1 DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.71	10.00		17.08
ANEROBIC MIX PUMP 9-1 DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.41	10.00		14.08
ANOXIC MIX PUMP 1-2 DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.71	10.00		17.07
ANOXIC MIX PUMP 2-2 DISC	Passed	UNKNOWN	LV DISCONNECT	480	2.02	10.00		20.16
ANOXIC MIX PUMP 3-2 DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.63	10.00		16.31
ANOXIC MIX PUMP 4-2 DISC	Passed	UNKNOWN	LV DISCONNECT	480	2.12	10.00		21.21
ANOXIC MIX PUMP 5-2 DISC	Passed	UNKNOWN	LV DISCONNECT	480	3.06	10.00		30.63
ANOXIC MIX PUMP 6-2 DISC	Passed	UNKNOWN	LV DISCONNECT	480	3.36	10.00		33.58
ANOXIC MIX PUMP 7-2 DISC	Passed	UNKNOWN	LV DISCONNECT	480	2.35	10.00		23.49
ANOXIC MIX PUMP 8-2 DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.81	10.00		18.10
ANOXIC MIX PUMP 9-2 DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.48	10.00		14.76
AUGER #1	Passed	UNKNOWN	LV DISCONNECT	480	0.92	10.00		9.22
AUGER #2	Passed	UNKNOWN	LV DISCONNECT	480	1.00	10.00		9.99
AUGER #3	Passed	UNKNOWN	LV DISCONNECT	480	1.00	10.00		9.99

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Series Rating (kA)	Rating %
BANDSCREEN #1	Passed	UNKNOWN	LV DISCONNECT	480	0.92	10.00		9.23
BANDSCREEN #2	Passed	UNKNOWN	LV DISCONNECT	480	1.00	10.00		9.99
BANDSCREEN #3	Passed	UNKNOWN	LV DISCONNECT	480	1.00	10.00		9.99
BAR SCREEN #1 C.P.	Passed	UNKNOWN	CONTROL PANEL	480	0.86	14.00		6.16
BAR SCREEN #1 DISC	Passed	UNKNOWN	LV DISCONNECT	480	0.77	10.00		7.73
BAR SCREEN #2 C.P.	Passed	UNKNOWN	CONTROL PANEL	480	1.01	14.00		7.21
BAR SCREEN #2 DISC	Passed	UNKNOWN	LV DISCONNECT	480	0.89	10.00		8.89
BAR SCREEN #3 C.P.	Passed	UNKNOWN	CONTROL PANEL	480	1.01	14.00		7.21
BAR SCREEN #3 DISC	Passed	UNKNOWN	LV DISCONNECT	480	0.89	10.00		8.89
BAR SCREEN MTR STARTER	Passed	UNKNOWN	STARTER	480	1.60	14.00		11.44
BELT PRESS DISCHARGE COVEYOR	Passed	UNKNOWN	LV DISCONNECT	480	2.62	10.00		26.24
BLOWER #1	Passed	UNKNOWN	LV DISCONNECT	480	12.83	10.00	100.00	12.83
BLOWER #3	Passed	UNKNOWN	LV DISCONNECT	480	13.82	10.00	100.00	13.82
BLOWER #5	Passed	UNKNOWN	LV DISCONNECT	480	15.83	10.00	100.00	15.83
BLOWER 1 CP	Passed	UNKNOWN	LV DISCONNECT	480	2.83	10.00		28.32
BLOWER 2 CP	Passed	UNKNOWN	LV DISCONNECT	480	1.61	10.00		16.13
BLOWER 3 CP	Passed	UNKNOWN	LV DISCONNECT	480	1.95	10.00		19.53
BLOWER 4 CP	Passed	UNKNOWN	LV DISCONNECT	480	1.01	10.00		10.15

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Series Rating (kA)	Rating %
BLOWER ROOM	Passed	UNKNOWN	LV DISCONNECT	480	6.15	10.00		61.46
BOILER CIRC PUMP #1 DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.45	10.00		14.47
BOILER CIRC PUMP #2 DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.45	10.00		14.47
BOILER CTRL/GARAGE DOOR DIS	Passed	UNKNOWN	LV DISCONNECT	480	2.83	10.00		28.34
BOLIMO CONTROLS	Passed	UNKNOWN	LV DISCONNECT	480	2.96	10.00		29.62
BRIDGE CRANE	Passed	UNKNOWN	LV DISCONNECT	480	4.93	10.00		49.33
CAPACITOR DISC	Passed	UNKNOWN	LV DISCONNECT	480	16.15 (*N1)	10.00	100.00	16.15
CARBON FEED PUMP #1	Passed	UNKNOWN	LV DISCONNECT	480	1.40	10.00		14.00
CARBON FEED PUMP #2	Passed	UNKNOWN	LV DISCONNECT	480	1.40	10.00		14.00
CARBON SCRUBBER CS-BP-1	Passed	UNKNOWN	LV DISCONNECT	480	1.43	10.00		14.33
CARBON SLURRY MIXER	Passed	UNKNOWN	LV DISCONNECT	480	3.91	10.00		39.06
CENTER CELL	Passed	UNKNOWN	LV DISCONNECT	480	1.99	10.00		19.88
CENTRIFUGE #2	Failed	UNKNOWN	LV DISCONNECT	480	*14.10 (*N1)	10.00		*141.00
CENTRIFUGE #2 POLY SKID	Passed	UNKNOWN	LV DISCONNECT	480	0.98	10.00		9.79
CENTRIFUGE #4	Failed	UNKNOWN	LV DISCONNECT	480	*13.54 (*N1)	10.00		*135.35
CENTRIFUGE 1 POLY SKID	Passed	UNKNOWN	LV DISCONNECT	480	1.54	10.00		15.38
CENTRIFUGE 2 POLY SKID	Passed	UNKNOWN	LV DISCONNECT	480	1.54	10.00		15.38
CENTRIFUGE OVERHEAD CRANE	Passed	UNKNOWN	LV DISCONNECT	480	4.30	10.00		43.03

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Series Rating (kA)	Rating %
CENTRIFUGE OVERHEAD CRANE 3PDT	Passed	UNKNOWN	LV DISCONNECT	480	4.59	10.00		45.93
CENTRIFUGE# 1	Failed	UNKNOWN	LV DISCONNECT	480	*13.96 (*N1)	10.00		*139.58
CENTRIFUGE# 3	Failed	UNKNOWN	LV DISCONNECT	480	*13.64 (*N1)	10.00		*136.41
CHANEL MIX PUMP 10-3 DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.00	10.00		10.00
CHANEL MIX PUMP 10-4 DISC	Passed	UNKNOWN	LV DISCONNECT	480	0.64	10.00		6.40
CHANNEL MIX PUMP 10-1 DISC	Passed	UNKNOWN	LV DISCONNECT	480	0.71	10.00		7.12
CHANNEL MIX PUMP 10-2 DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.16	10.00		11.61
CHILL WATER CIRC PUMP P-5 DISC	Passed	UNKNOWN	LV DISCONNECT	480	9.49	10.00		94.92
CHILL WATER CIRC PUMP P-6 DISC	Passed	UNKNOWN	LV DISCONNECT	480	4.25	10.00		42.50
CHILLER #1	Passed	UNKNOWN	LV DISCONNECT	480	9.59	10.00		95.92
CHILLER #2	Failed	UNKNOWN	LV DISCONNECT	480	*15.52 (*N1)	10.00		*155.16
CP-MAU-BP-1	Passed	UNKNOWN	LV DISCONNECT	480	1.74	10.00		17.44
CS-BS-1	Passed	UNKNOWN	LV DISCONNECT	480	8.93	10.00		89.29
CTRL SCRN RM UNIT HEATERS	Passed	UNKNOWN	LV DISCONNECT	480	15.59	10.00	100.00	15.59
CW PUMP P-10	Passed	UNKNOWN	LV DISCONNECT	480	2.14	10.00		21.38
D-101	Passed	UNKNOWN	LV DISCONNECT	480	1.23	10.00		12.31
D-102	Passed	UNKNOWN	LV DISCONNECT	480	1.23	10.00		12.31
D-103	Passed	UNKNOWN	LV DISCONNECT	480	1.23	10.00		12.31

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Series Rating (kA)	Rating %
DIVERSION CHAMBER #1	Passed	UNKNOWN	LV DISCONNECT	480	1.02	10.00		10.25
DIVERSION CHAMBER #2	Passed	UNKNOWN	LV DISCONNECT	480	0.51	10.00		5.08
DOOR #1	Passed	UNKNOWN	LV DISCONNECT	480	0.78	10.00		7.84
DOOR #2	Passed	UNKNOWN	LV DISCONNECT	480	0.78	10.00		7.84
DOOR #3	Passed	UNKNOWN	LV DISCONNECT	480	0.78	10.00		7.84
DOOR OPENER	Passed	UNKNOWN	LV DISCONNECT	480	1.82	10.00		18.15
DOOR OPERATORS	Passed	UNKNOWN	LV DISCONNECT	480	6.33	10.00		63.27
DRILL PRESS #1	Passed	UNKNOWN	LV DISCONNECT	480	3.31	10.00		33.08
DRILL PRESS #2	Passed	UNKNOWN	LV DISCONNECT	480	3.31	10.00		33.10
DS CLARIFIERS	Passed	UNKNOWN	LV DISCONNECT	480	2.60	10.00		25.98
DS- CENT. FEED PUMPS	Passed	UNKNOWN	LV DISCONNECT	480	4.01	10.00		40.09
DS- NORTH BELT PRESS 1 AND 2	Passed	UNKNOWN	LV DISCONNECT	480	1.15	10.00		11.54
DS-3 AUX. INST. AIR COMP	Passed	UNKNOWN	LV DISCONNECT	480	0.74	10.00		7.35
DS-AIR COMPRESSOR	Passed	UNKNOWN	LV DISCONNECT	480	1.88	10.00		18.76
DS-AMMONIA REMOVING SYS 1	Passed	UNKNOWN	LV DISCONNECT	480	8.02	10.00		80.23
DS-AMMONIA REMOVING SYS 2	Passed	UNKNOWN	LV DISCONNECT	480	8.02	10.00		80.23
DS-ANOXIC TANK MIXER	Passed	UNKNOWN	LV DISCONNECT	480	2.60	10.00		25.99
DS-BASEMENT ELEC UNIT HTR	Passed	UNKNOWN	LV DISCONNECT	480	5.75	10.00		57.54

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Series Rating (kA)	Rating %
DS-BYPASS CONVEYOR	Passed	UNKNOWN	LV DISCONNECT	480	1.76	10.00		17.57
DS-BYPASS SLIDE GATE	Passed	UNKNOWN	LV DISCONNECT	480	1.96	10.00		19.55
DS-CENTRIFUGE FEED PUMP #1	Passed	UNKNOWN	LV DISCONNECT	480	1.65	10.00		16.50
DS-CF-SH-1	Passed	UNKNOWN	LV DISCONNECT	480	0.75	10.00		7.48
DS-CF-SH-2	Passed	UNKNOWN	LV DISCONNECT	480	0.85	10.00		8.49
DS-CLARIFIER 7, 8	Passed	UNKNOWN	LV DISCONNECT	480	1.95	10.00		19.51
DS-CP-CS-SH-1	Passed	UNKNOWN	LV DISCONNECT	480	4.13	10.00		41.33
DS-DRAIN PUMP #2	Passed	UNKNOWN	LV DISCONNECT	480	3.06	10.00		30.63
DS-DUCT HEATER	Passed	UNKNOWN	LV DISCONNECT	480	1.52	10.00		15.20
DS-EF-1 CAP	Passed	UNKNOWN	LV DISCONNECT	480	15.11 (*N1)	10.00	100.00	15.11
DS-EF-2A	Passed	UNKNOWN	LV DISCONNECT	480	1.67	10.00		16.70
DS-EF-2A CAP	Passed	UNKNOWN	LV DISCONNECT	480	11.68	10.00	100.00	11.68
DS-EF-2B	Passed	UNKNOWN	LV DISCONNECT	480	1.88	10.00		18.80
DS-EF-2B CAP	Failed	UNKNOWN	LV DISCONNECT	480	*11.68	10.00		*116.77
DS-EF-2C	Passed	UNKNOWN	LV DISCONNECT	480	2.15	10.00		21.51
DS-EF-2C CAP	Failed	UNKNOWN	LV DISCONNECT	480	*11.68	10.00		*116.77
DS-EF-5A	Passed	UNKNOWN	LV DISCONNECT	480	0.88	10.00		8.80
DS-EF-5A CAP	Passed	UNKNOWN	LV DISCONNECT	480	11.68	10.00	100.00	11.68

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Series Rating (kA)	Rating %
DS-EF-5B	Passed	UNKNOWN	LV DISCONNECT	480	1.03	10.00		10.33
DS-EF-5B CAP	Passed	UNKNOWN	LV DISCONNECT	480	11.68	10.00	100.00	11.68
DS-EF-SC-1	Passed	UNKNOWN	LV DISCONNECT	480	1.16	10.00		11.61
DS-ENG. RM. BOILER SUMP	Passed	UNKNOWN	LV DISCONNECT	480	7.22	10.00		72.18
DS-EXHAUST FAN F, G	Passed	UNKNOWN	LV DISCONNECT	480	1.47	10.00		14.70
DS-EXISTING CRANE	Passed	UNKNOWN	LV DISCONNECT	480	1.42	10.00		14.20
DS-FOUL AIR FANS	Passed	UNKNOWN	LV PANELBOARD	480	2.61	100.00		2.61
DS-GEN 1	Passed	UNKNOWN	LV DISCONNECT	480	9.33 (*N1)	10.00		93.28
DS-GEN 2	Passed	UNKNOWN	LV DISCONNECT	480	9.33 (*N1)	10.00		93.28
DS-GRINDER 1,2,3	Passed	UNKNOWN	LV DISCONNECT	480	4.62	10.00		46.17
DS-GROUND SLUDGE TANK 2	Passed	UNKNOWN	LV DISCONNECT	480	1.35	10.00		13.45
DS-GSST MIXER BLDG	Passed	UNKNOWN	LV DISCONNECT	480	4.04	10.00		40.41
DS-HOIST	Passed	UNKNOWN	LV DISCONNECT	480	1.31	10.00		13.11
DS-HOIST,EX FAN, HV UNIT	Passed	UNKNOWN	LV DISCONNECT	480	1.52	10.00		15.20
DS-HV UNIT	Passed	UNKNOWN	LV DISCONNECT	480	2.93	10.00		29.34
DS-HVAC #1	Passed	UNKNOWN	LV DISCONNECT	480	14.45	10.00	100.00	14.45
DS-HVAC #2	Passed	UNKNOWN	LV DISCONNECT	480	14.45	10.00	100.00	14.45
DS-HVAC 1	Passed	UNKNOWN	LV DISCONNECT	480	1.84	10.00		18.38

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Series Rating (kA)	Rating %
DS-INFLUENT VALVE #7	Passed	UNKNOWN	LV DISCONNECT	480	1.96	10.00		19.55
DS-INFLUENT VALVE #8	Passed	UNKNOWN	LV DISCONNECT	480	1.96	10.00		19.55
DS-MAU-SC-1	Passed	UNKNOWN	LV DISCONNECT	480	2.31	10.00		23.10
DS-MAU-SH-1	Passed	UNKNOWN	LV DISCONNECT	480	1.16	10.00		11.60
DS-MAU-SH-2	Passed	UNKNOWN	LV DISCONNECT	480	2.30	10.00		23.00
DS-MAU-SH-3	Passed	UNKNOWN	LV DISCONNECT	480	1.31	10.00		13.11
DS-MCC-15 AC UNIT	Passed	UNKNOWN	LV DISCONNECT	480	10.88 (*N1)	10.00	100.00	10.88
DS-MCC-15 BATT CHRG XFR SW	Passed	UNKNOWN	LV DISCONNECT	480	10.88 (*N1)	10.00	100.00	10.88
DS-MCC-25-SF-4	Passed	UNKNOWN	LV DISCONNECT	480	1.43	10.00		14.29
DS-MCC-7 AIR COMP	Passed	UNKNOWN	LV DISCONNECT	480	5.34	10.00	100.00	5.34
DS-MCC7 PUMP 1	Passed	UNKNOWN	LV DISCONNECT	480	15.66	10.00	100.00	15.66
DS-MCC7 PUMP 2	Passed	UNKNOWN	LV DISCONNECT	480	14.66	10.00	100.00	14.66
DS-MCC7 PUMP 3	Passed	UNKNOWN	LV DISCONNECT	480	13.74	10.00	100.00	13.74
DS-MCC7 PUMP 4	Passed	UNKNOWN	LV DISCONNECT	480	12.91	10.00	100.00	12.91
DS-MCC8 PRI THICKENER PUMP #1	Passed	UNKNOWN	LV DISCONNECT	480	2.61	10.00		26.13
DS-MCC8 PRI THICKENER PUMP #2	Passed	UNKNOWN	LV DISCONNECT	480	2.61	10.00		26.13
DS-MCC8 PRI THICKENER PUMP #3	Passed	UNKNOWN	LV DISCONNECT	480	2.35	10.00		23.54
DS-MCC8 RAS PUMP #1	Passed	UNKNOWN	LV DISCONNECT	480	2.32	10.00		23.22

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Series Rating (kA)	Rating %
DS-MCC8 RAS PUMP #2	Passed	UNKNOWN	LV DISCONNECT	480	2.57	10.00		25.73
DS-MCC8 RAS PUMP #3	Passed	UNKNOWN	LV DISCONNECT	480	2.72	10.00		27.21
DS-MCC8 RAS PUMP #4	Passed	UNKNOWN	LV DISCONNECT	480	3.07	10.00		30.71
DS-MCC8 SCUM PUMP #1	Passed	UNKNOWN	LV DISCONNECT	480	1.43	10.00		14.28
DS-MCC8 SCUM PUMP #2	Passed	UNKNOWN	LV DISCONNECT	480	1.43	10.00		14.28
DS-MCC8 THICKENERS AND CAF	Passed	UNKNOWN	LV DISCONNECT	480	6.03	10.00		60.30
DS-MCC8 WAS PUMP	Passed	UNKNOWN	LV DISCONNECT	480	1.43	10.00		14.28
DS-MIXED LIQUOR PUMP #2	Passed	UNKNOWN	LV DISCONNECT	480	3.39	10.00		33.86
DS-MOV SUMP	Passed	UNKNOWN	LV DISCONNECT	480	7.26	10.00		72.60
DS-MSP-12 TUMBULATOR	Passed	UNKNOWN	LV DISCONNECT	480	1.48	10.00		14.83
DS-NEW CRANE	Passed	UNKNOWN	LV DISCONNECT	480	1.42	10.00		14.20
DS-NORTH BELT PRESS 1	Passed	UNKNOWN	LV DISCONNECT	480	1.05	10.00		10.53
DS-NORTH BELT PRESS 2	Passed	UNKNOWN	LV DISCONNECT	480	1.05	10.00		10.53
DS-NORTH BOOSTER PUMP 1	Passed	UNKNOWN	LV DISCONNECT	480	5.47	10.00		54.75
DS-NORTH BOOSTER PUMP 2	Passed	UNKNOWN	LV DISCONNECT	480	5.47	10.00		54.75
DS-NORTH BOOSTER PUMPS	Passed	UNKNOWN	LV DISCONNECT	480	5.73	10.00		57.33
DS-OH DOOR	Passed	UNKNOWN	LV DISCONNECT	480	11.68	10.00	100.00	11.68
DS-POLYMER MIXER	Passed	UNKNOWN	LV DISCONNECT	480	2.60	10.00		25.99

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Series Rating (kA)	Rating %
DS-PRIM THICK PUMP #4	Passed	UNKNOWN	LV DISCONNECT	480	3.13	10.00		31.26
DS-Q1236	Passed	UNKNOWN	LV DISCONNECT	480	0.98	10.00		9.76
DS-Q1237	Passed	UNKNOWN	LV DISCONNECT	480	1.00	10.00		10.05
DS-Q1238	Passed	UNKNOWN	LV DISCONNECT	480	1.00	10.00		10.05
DS-Q1239	Passed	UNKNOWN	LV DISCONNECT	480	1.04	10.00		10.35
DS-Q1240	Passed	UNKNOWN	LV DISCONNECT	480	1.04	10.00		10.35
DS-Q1241	Passed	UNKNOWN	LV DISCONNECT	480	1.07	10.00		10.68
DS-Q1242	Passed	UNKNOWN	LV DISCONNECT	480	1.07	10.00		10.68
DS-Q1243	Passed	UNKNOWN	LV DISCONNECT	480	1.10	10.00		11.02
DS-RAS PUMP #1	Passed	UNKNOWN	LV DISCONNECT	480	3.25	10.00		32.53
DS-RAS PUMP #2	Passed	UNKNOWN	LV DISCONNECT	480	3.25	10.00		32.53
DS-RAS PUMP #3	Passed	UNKNOWN	LV DISCONNECT	480	3.25	10.00		32.53
DS-RECYCLE PUMP	Passed	UNKNOWN	LV DISCONNECT	480	20.86 (*N1)	10.00	100.00	20.86
DS-RETURN VALVE MOTORS	Passed	UNKNOWN	LV DISCONNECT	480	1.52	10.00		15.20
DS-SCUM PUMP #2	Passed	UNKNOWN	LV DISCONNECT	480	1.47	10.00		14.68
DS-SERV GARAGE	Passed	UNKNOWN	LV DISCONNECT	480	6.38	10.00		63.78
DS-SEWAGE PUMP #4	Passed	UNKNOWN	LV DISCONNECT	480	26.79 (*N1)	10.00	100.00	26.79
DS-SLIDE GATE #7	Passed	UNKNOWN	LV DISCONNECT	480	1.96	10.00		19.55

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Series Rating (kA)	Rating %
DS-SLIDE GATE #8	Passed	UNKNOWN	LV DISCONNECT	480	1.96	10.00		19.55
DS-SLUDGE PUMP 6, 7	Passed	UNKNOWN	LV DISCONNECT	480	3.06	10.00		30.60
DS-SLUDGE PUMPS	Passed	UNKNOWN	LV DISCONNECT	480	3.47	10.00		34.70
DS-SLUDGE TANK 1 MIXER	Passed	UNKNOWN	LV DISCONNECT	480	0.98	10.00		9.81
DS-SLUDGE THICKENER 1	Passed	UNKNOWN	LV DISCONNECT	480	2.87	10.00		28.67
DS-SLUDGE THICKENER 2	Passed	UNKNOWN	LV DISCONNECT	480	2.57	10.00		25.66
DS-SLUDGE THICKENER 3	Passed	UNKNOWN	LV DISCONNECT	480	1.48	10.00		14.75
DS-SLUDGE THICKENER 4	Passed	UNKNOWN	LV DISCONNECT	480	1.48	10.00		14.75
DS-SLUDGE THICKENERS 1 AND 2	Passed	UNKNOWN	LV DISCONNECT	480	3.04	10.00		30.44
DS-SLUDGE THICKENERS 3 AND 4	Passed	UNKNOWN	LV DISCONNECT	480	1.52	10.00		15.22
DS-SOUTH BELT PRESS 1	Passed	UNKNOWN	LV DISCONNECT	480	1.05	10.00		10.53
DS-SOUTH BELT PRESS 1 AND 2	Passed	UNKNOWN	LV DISCONNECT	480	1.15	10.00		11.54
DS-SOUTH BELT PRESS 2	Passed	UNKNOWN	LV DISCONNECT	480	1.05	10.00		10.53
DS-STREET LIGHT	Passed	UNKNOWN	LV DISCONNECT	480	2.23	10.00		22.34
DS-SUMP PUMP 1	Passed	UNKNOWN	LV DISCONNECT	480	1.27	10.00		12.68
DS-SUMP PUMP 1 AND 2	Passed	UNKNOWN	LV DISCONNECT	480	1.32	10.00		13.24
DS-SUMP PUMP 2	Passed	UNKNOWN	LV DISCONNECT	480	1.27	10.00		12.69
DS-SUMP PUMP A	Passed	UNKNOWN	LV DISCONNECT	480	1.31	10.00		13.12

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Series Rating (kA)	Rating %
DS-SUMP PUMP B	Passed	UNKNOWN	LV DISCONNECT	480	1.31	10.00		13.12
DS-SYSTEM AIR COMP CP-1	Passed	UNKNOWN	LV DISCONNECT	480	0.76	10.00		7.58
DS-SYSTEM AIR COMP CP-2	Passed	UNKNOWN	LV DISCONNECT	480	0.76	10.00		7.58
DS-UNIT HEATER	Passed	UNKNOWN	LV DISCONNECT	480	1.66	10.00		16.59
DS-WELDER PLUG	Passed	UNKNOWN	LV DISCONNECT	480	1.52	10.00		15.20
DS-XFMR 21 LP-01	Passed	UNKNOWN	LV DISCONNECT	480	6.23	10.00		62.31
DS-XFMR 21 LP-02	Passed	UNKNOWN	LV DISCONNECT	480	2.56	10.00		25.59
DUMBWATIER DISC	Passed	UNKNOWN	LV DISCONNECT	480	4.02	10.00		40.22
EAST FAN	Passed	UNKNOWN	LV DISCONNECT	480	0.75	10.00		7.47
EAST STORAGE DISCHARGE COVEYOR	Passed	UNKNOWN	LV DISCONNECT	480	1.05	10.00		10.48
EAST SUPPLY FAN	Passed	UNKNOWN	LV DISCONNECT	480	0.60	10.00		5.97
EF-1 DISC	Passed	UNKNOWN	LV DISCONNECT	480	2.89	10.00		28.87
EF-11 DISC	Passed	UNKNOWN	LV DISCONNECT	480	0.98	10.00		9.84
EF-12 DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.05	10.00		10.54
EF-13 DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.09	10.00		10.93
EF-14 DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.05	10.00		10.54
EF-15 DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.05	10.00		10.54
EF-16 DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.02	10.00		10.18

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Series Rating (kA)	Rating %
EF-18 DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.63	10.00		16.32
EF-2	Passed	UNKNOWN	LV DISCONNECT	480	1.88	10.00		18.84
EF-20 DISC	Passed	UNKNOWN	LV DISCONNECT	480	0.98	10.00		9.84
EF-5 DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.63	10.00		16.32
EF-7 DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.02	10.00		10.18
EF-9 DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.40	10.00		14.02
EF-BS-1	Passed	UNKNOWN	LV DISCONNECT	480	3.94	10.00		39.41
EHU-BS-3	Passed	UNKNOWN	LV DISCONNECT	480	2.61	10.00		26.06
EHU-BS-4	Passed	UNKNOWN	LV DISCONNECT	480	1.53	10.00		15.27
EHU-BS-5	Passed	UNKNOWN	LV DISCONNECT	480	1.53	10.00		15.27
ELEVATOR	Passed	UNKNOWN	LV DISCONNECT	480	3.40	10.00		34.05
ET CONVEYOR 1	Passed	UNKNOWN	LV DISCONNECT	480	1.05	10.00		10.48
ET CONVEYOR 2	Passed	UNKNOWN	LV DISCONNECT	480	0.72	10.00		7.24
EUH-001	Passed	UNKNOWN	LV DISCONNECT	480	2.98	10.00		29.78
EUH-002	Passed	UNKNOWN	LV DISCONNECT	480	1.96	10.00		19.57
EUH-003	Passed	UNKNOWN	LV DISCONNECT	480	1.46	10.00		14.56
EUH-004	Passed	UNKNOWN	LV DISCONNECT	480	1.56	10.00		15.56
EUH-BS-1	Passed	UNKNOWN	LV DISCONNECT	480	7.91	10.00		79.07

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Series Rating (kA)	Rating %
EUH-BS-2	Passed	UNKNOWN	LV DISCONNECT	480	3.72	10.00		37.20
EXHAUST FAN A	Passed	UNKNOWN	LV DISCONNECT	480	3.12	10.00		31.17
EXHAUST FAN B	Passed	UNKNOWN	LV DISCONNECT	480	6.50	10.00		64.97
EXHAUST FAN C	Passed	UNKNOWN	LV DISCONNECT	480	4.63	10.00		46.34
EXHAUST FAN D	Passed	UNKNOWN	LV DISCONNECT	480	3.34	10.00		33.37
EXHAUST FAN E	Passed	UNKNOWN	LV DISCONNECT	480	2.47	10.00		24.67
FAN CONTROL PANEL #1	Passed	UNKNOWN	LV DISCONNECT	480	2.19	10.00		21.85
FC-1	Passed	UNKNOWN	LV DISCONNECT	480	1.48	10.00		14.85
FC-1 DISC	Passed	UNKNOWN	LV DISCONNECT	480	2.89	10.00		28.87
FC-2	Passed	UNKNOWN	LV DISCONNECT	480	1.89	10.00		18.95
FC-2 DISC	Passed	UNKNOWN	LV DISCONNECT	480	6.43	10.00		64.28
FC-3 DISC	Passed	UNKNOWN	LV DISCONNECT	480	3.56	10.00		35.60
FC-4 DISC	Passed	UNKNOWN	LV DISCONNECT	480	0.98	10.00		9.84
FC-5 DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.05	10.00		10.54
FC-6 DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.28	10.00		12.81
FC-7 DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.55	10.00		15.47
FILTER DOOR OP	Passed	UNKNOWN	LV DISCONNECT	480	1.48	10.00		14.83
FINAL TANK AND UNDER DRN PUMP	Passed	UNKNOWN	LV DISCONNECT	480	3.17	10.00		31.75

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Series Rating (kA)	Rating %
FINAL TANK DRAIN PUMP	Passed	UNKNOWN	LV DISCONNECT	480	2.76	10.00		27.57
FINE SCREEN DUMPSTER CP-1	Passed	UNKNOWN	LV DISCONNECT	480	1.42	10.00		14.21
FINE SCREEN DUMPSTER CP-2	Passed	UNKNOWN	LV DISCONNECT	480	1.49	10.00		14.92
FINE SCREEN DUMPSTER CP-3	Passed	UNKNOWN	LV DISCONNECT	480	1.57	10.00		15.69
FUME EXTRACTOR	Passed	UNKNOWN	LV DISCONNECT	480	1.81	10.00		18.12
FUME FAN CONTACTOR	Passed	UNKNOWN	LV DISCONNECT	480	1.03	10.00		10.28
FUME HOOD EXHAUST	Passed	UNKNOWN	LV DISCONNECT	480	0.89	10.00		8.92
FUME HOODS VFD	Passed	UNKNOWN	LV DISCONNECT	480	0.58	10.00		5.82
GATE 1 CONTROLLER	Passed	UNKNOWN	LV DISCONNECT	480	0.83	10.00		8.29
GATE 2 CONTROLLER	Passed	UNKNOWN	LV DISCONNECT	480	0.70	10.00		7.04
GATE VALVE 1	Passed	UNKNOWN	LV DISCONNECT	480	1.19	10.00		11.90
GATE VALVE 2	Passed	UNKNOWN	LV DISCONNECT	480	1.19	10.00		11.90
GATE VALVE 4	Passed	UNKNOWN	LV DISCONNECT	480	1.19	10.00		11.90
GATE VALVE 5	Passed	UNKNOWN	LV DISCONNECT	480	1.19	10.00		11.90
GATE VALVE 7	Passed	UNKNOWN	LV DISCONNECT	480	1.19	10.00		11.90
GATE VALVE 8	Passed	UNKNOWN	LV DISCONNECT	480	1.19	10.00		11.90
GRINDER #1	Passed	UNKNOWN	LV DISCONNECT	480	0.93	10.00		9.33
GRINDER #2	Passed	UNKNOWN	LV DISCONNECT	480	1.01	10.00		10.11

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Series Rating (kA)	Rating %
GRINDER #3	Passed	UNKNOWN	LV DISCONNECT	480	1.01	10.00		10.11
GRIT REMOVAL HOIST	Passed	UNKNOWN	LV DISCONNECT	480	6.33	10.00		63.27
GRIT TANK #1	Passed	UNKNOWN	LV DISCONNECT	480	6.33	10.00		63.26
GRIT TANK #2	Passed	UNKNOWN	LV DISCONNECT	480	6.33	10.00		63.26
GRIT TANKS	Passed	UNKNOWN	LV DISCONNECT	480	6.70	10.00		66.99
HOT WATER CIR PUMP DISC	Passed	UNKNOWN	LV DISCONNECT	480	2.89	10.00		28.87
HOT WATER CIRC PUMP	Passed	UNKNOWN	LV DISCONNECT	480	0.60	10.00		5.97
HOT WATER CIRC PUMP P-3 DISC	Passed	UNKNOWN	LV DISCONNECT	480	5.41	10.00		54.14
HOT WATER CIRC PUMP P-4 DISC	Passed	UNKNOWN	LV DISCONNECT	480	5.04	10.00		50.40
HUMIDIFIER #1 DISC	Passed	UNKNOWN	LV DISCONNECT	480	7.65	10.00		76.52
HUMIDIFIER #2 DISC	Passed	UNKNOWN	LV DISCONNECT	480	7.65	10.00		76.52
HVAC UNIT A	Passed	UNKNOWN	LV DISCONNECT	480	2.08	10.00		20.83
HVAC UNIT B	Passed	UNKNOWN	LV DISCONNECT	480	2.67	10.00		26.66
HW PUMP #1 P-1	Passed	UNKNOWN	LV DISCONNECT	480	2.51	10.00		25.10
HYDRAULIC LIFT	Passed	UNKNOWN	LV DISCONNECT	480	2.92	10.00		29.15
INFLUENT PUMPS	Passed	UNKNOWN	LV DISCONNECT	480	3.47	10.00		34.70
INLET TANKS	Passed	UNKNOWN	LV DISCONNECT	208	0.52 (*N1)	10.00		5.24
INNER DOOR	Passed	UNKNOWN	LV DISCONNECT	480	1.10	10.00		10.97

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Series Rating (kA)	Rating %
LAB STILL	Passed	UNKNOWN	LV DISCONNECT	480	6.00	10.00		59.96
LC-2	Passed	UNKNOWN	LV SWITCHBOARD	480	23.81	65.00		36.62
LC-2A	Passed	UNKNOWN	LV SWITCHBOARD	480	6.34	65.00		9.76
LC-3	Passed	UNKNOWN	LV SWITCHBOARD	480	29.86 (*N1)	65.00		45.94
LC-3A	Passed	UNKNOWN	LV SWITCHBOARD	480	30.11 (*N1)	65.00		46.33
LC-4	Passed	UNKNOWN	LV SWITCHBOARD	480	18.54 (*N1)	200.00		9.27
LC-5	Passed	UNKNOWN	LV SWITCHBOARD	480	15.73	35.00		44.95
LC-5A	Passed	UNKNOWN	LV SWITCHBOARD	480	17.07	35.00		48.76
LC-8	Passed	UNKNOWN	LV SWITCHBOARD	480	18.59	200.00		9.29
LC-8A	Passed	UNKNOWN	LV SWITCHBOARD	480	20.46	200.00		10.23
LIME SCREW CONVEYOR	Passed	UNKNOWN	LV DISCONNECT	480	1.13	10.00		11.27
LIME SILO #2 TRUCK UNLOAD PNL	Passed	UNKNOWN	LV DISCONNECT	480	1.77	10.00		17.71
LIME SIO #1TRUCK UNLOAD	Passed	UNKNOWN	LV DISCONNECT	480	1.77	10.00		17.70
MAKE UP AIR UNIT	Passed	UNKNOWN	LV DISCONNECT	480	0.85	10.00		8.46
MAU HEATER	Passed	UNKNOWN	LV DISCONNECT	480	7.77	10.00		77.73
MAU-1	Passed	UNKNOWN	LV DISCONNECT	480	3.83	10.00		38.32
MAU-1 DISC	Passed	UNKNOWN	LV DISCONNECT	480	2.89	10.00		28.87
MAU-1 VFD	Passed	UNKNOWN	VFD	480	3.19	14.00		22.78

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Series Rating (kA)	Rating %
MCC 15 AIR COMP	Passed	UNKNOWN	LV DISCONNECT	480	2.37	10.00		23.73
MCC 15 ELEVATOR DISC	Passed	UNKNOWN	LV DISCONNECT	480	2.96	10.00		29.62
MCC 15 GATES	Passed	UNKNOWN	LV DISCONNECT	480	0.86	10.00		8.59
MCC 15 STRAINER DISC	Passed	UNKNOWN	LV DISCONNECT	480	2.64	10.00		26.36
MCC 15AA AIR COMPRESSOR DISC	Passed	UNKNOWN	LV DISCONNECT	480	2.89	10.00		28.87
MCC-00	Passed	WESTINGHOUSE	MCC	480	10.09	35.00		28.82
MCC-00 BACKWASH PUMPS	Passed	UNKNOWN	LV DISCONNECT	480	4.68	10.00		46.78
MCC-00 OHD DOOR	Passed	UNKNOWN	LV DISCONNECT	480	1.67	10.00		16.66
MCC-00-AIR COMPRESSOR	Passed	UNKNOWN	LV DISCONNECT	480	5.28	10.00		52.83
MCC-1	Passed	UNKNOWN	MCC	480	22.56	30.00		75.21
MCC-1 ATS	Failed	UNKNOWN	MTS	480	*29.48 (*N1)	10.00		*294.80
MCC-1 CRANE	Passed	UNKNOWN	LV DISCONNECT	480	7.01	10.00		70.15
MCC-10	Passed	UNKNOWN	MCC	480	14.30	65.00		21.99
MCC-12	Passed	UNKNOWN	MCC	480	18.94	65.00		29.14
MCC-13	Passed	UNKNOWN	MCC	480	26.11	30.00		87.02
MCC-13 AIR COMP	Passed	UNKNOWN	LV DISCONNECT	480	4.84	10.00		48.40
MCC-13 CRANE	Passed	UNKNOWN	LV DISCONNECT	480	25.02 (*N1)	10.00	100.00	25.02
MCC-13 OVERHEAD DOOR	Passed	UNKNOWN	LV DISCONNECT	480	4.38	10.00		43.79

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Series Rating (kA)	Rating %
MCC-14	Passed	UNKNOWN	MCC	480	20.00	65.00		30.76
MCC-14 HOIST	Passed	UNKNOWN	LV DISCONNECT	480	2.61	10.00		26.10
MCC-14 SUMP PUMPS	Passed	UNKNOWN	LV DISCONNECT	480	1.62	10.00		16.20
MCC-14 UNIT HEATERS	Passed	UNKNOWN	LV DISCONNECT	480	4.22	10.00		42.24
MCC-15	Passed	UNKNOWN	MCC	480	12.48	200.00		6.24
MCC-15A	Passed	UNKNOWN	MCC	480	14.28	65.00		21.97
MCC-15AA	Passed	Klockner-Moeller	MCC	480	11.84	25.00		47.37
MCC-19	Passed	WESTINGHOUSE	MCC	480	14.75	22.00		67.02
MCC-2	Passed	UNKNOWN	MCC	480	20.92	65.00		32.19
MCC-20	Passed	WESTINGHOUES	MCC	480	15.02	22.00		68.29
MCC-21	Passed	UNKNOWN	MCC	480	13.79	42.00		32.84
MCC-21 AC UNIT	Passed	UNKNOWN	LV DISCONNECT	480	8.67	10.00		86.72
MCC-21 PANEL #2	Passed	UNKNOWN	LV PANELBOARD	208	2.00 (*N1)	10.00		20.02
MCC-21 PANEL #3	Passed	UNKNOWN	LV PANELBOARD	208	2.18 (*N1)	10.00		21.79
MCC-22	Passed	UNKNOWN	MCC	480	9.75	42.00		23.20
MCC-24	Passed	UNKNOWN	MCC	480	7.55	200.00		3.77
MCC-25	Passed	SQUARE D	MCC	480	15.15 (*N1)	18.00		84.18
MCC-26	Passed	SQUARE D	MCC	480	29.74 (*N1)	65.00		45.75

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Series Rating (kA)	Rating %
MCC-27	Passed	SQUARE D	MCC	480	29.58 (*N1)	65.00		45.51
MCC-28	Passed	Square D	MCC	480	16.25	65.00		25.01
MCC-29	Passed	Square D	MCC	480	15.37	65.00		23.65
MCC-3	Passed	UNKNOWN	MCC	480	20.99	30.00		69.98
MCC-3 PURGE #1 DS	Passed	UNKNOWN	LV DISCONNECT	480	0.94	10.00		9.41
MCC-3 PURGE #2 DS	Passed	UNKNOWN	LV DISCONNECT	480	0.94	10.00		9.41
MCC-3 SUMP PUMP	Passed	UNKNOWN	LV DISCONNECT	480	1.19	10.00		11.91
MCC-3A	Passed	UNKNOWN	MCC	480	20.77	100.00		20.77
MCC-3COMPRESSOR #1	Passed	UNKNOWN	LV DISCONNECT	480	1.41	10.00		14.08
MCC-3COMPRESSOR #2	Passed	UNKNOWN	LV DISCONNECT	480	1.41	10.00		14.08
MCC-4	Failed	UNKNOWN	MCC	480	*18.36 (*N1)	18.00		*102.01
MCC-4A	Failed	UNKNOWN	MCC	480	*19.67 (*N1)	18.00		*109.26
MCC-4B	Passed	UNKNOWN	MCC	480	18.22	65.00		28.04
MCC-4C	Passed	UNKNOWN	MCC	480	10.93	65.00		16.82
MCC-5	Passed	UNKNOWN	MCC	480	4.55	200.00		2.28
MCC-6	Passed	UNKNOWN	MCC	480	5.60	200.00		2.80
MCC-7	Passed	UNKNOWN	MCC	480	21.28	65.00		32.74
MCC-7 ELEVATOR	Passed	UNKNOWN	LV DISCONNECT	480	2.47	10.00		24.68

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Series Rating (kA)	Rating %
MCC-7 VACUUM PUMP	Passed	UNKNOWN	LV DISCONNECT	480	2.88	10.00		28.83
MCC-8	Passed	EATON	MCC	480	17.81	65.00		27.40
MCC-8A	Passed	UNKNOWN	MCC	480	13.52	200.00		6.76
MCC7 480V RECEPT	Passed	UNKNOWN	LV DISCONNECT	480	5.34	10.00		53.36
MEGADOOR CONTROL PANEL	Passed	UNKNOWN	LV DISCONNECT	480	1.54	10.00		15.38
METAL LATHE	Passed	UNKNOWN	LV DISCONNECT	480	3.82	10.00		38.16
METER CHAMBER	Passed	UNKNOWN	LV DISCONNECT	480	13.59	10.00	100.00	13.59
MILL	Passed	UNKNOWN	LV DISCONNECT	480	3.10	10.00		30.97
MIX TANK DUST COLLECTOR EAST	Passed	UNKNOWN	LV DISCONNECT	480	1.47	10.00		14.65
MIX TANK DUST COLLECTOR WEST	Passed	UNKNOWN	LV DISCONNECT	480	1.34	10.00		13.37
MIXED LIQUER PUMP #1 DISC	Passed	UNKNOWN	LV DISCONNECT	480	7.82	10.00		78.17
MIXED LIQUER PUMP #2 DISC	Passed	UNKNOWN	LV DISCONNECT	480	7.82	10.00		78.17
MIXED LIQUER PUMP #3 DISC	Passed	UNKNOWN	LV DISCONNECT	480	7.82	10.00		78.17
MIXED LIQUER PUMP #3 VFD	Passed	UNKNOWN	VFD	480	7.30	10.00		73.00
MIXED LIQUER PUMP #4 DISC	Passed	UNKNOWN	LV DISCONNECT	480	7.82	10.00		78.17
MIXED LIQUER PUMP #4 VFD	Passed	UNKNOWN	VFD	480	7.30	10.00		73.00
MIXER #1	Passed	UNKNOWN	LV DISCONNECT	480	2.06	10.00		20.59
MIXER #2	Passed	UNKNOWN	LV DISCONNECT	480	2.25	10.00		22.51

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Series Rating (kA)	Rating %
MO GATE #1	Passed	UNKNOWN	LV DISCONNECT	480	0.94	10.00		9.36
MO GATE #2	Passed	UNKNOWN	LV DISCONNECT	480	0.94	10.00		9.36
MSP	Passed	UNKNOWN	LV DISCONNECT	480	4.65	10.00		46.45
MSP-12	Passed	UNKNOWN	LV PANELBOARD	480	4.31	100.00		4.31
MSP-14	Passed	UNKNOWN	LV PANELBOARD	480	3.80	100.00		3.80
MTS-MCC-5	Failed	UNKNOWN	MTS	480	*11.15	10.00		*111.51
MTS-MCC-6	Passed	UNKNOWN	MTS	480	9.07	10.00		90.73
MUA-1	Passed	UNKNOWN	LV DISCONNECT	480	2.49	14.00		17.82
N.W. HEAT	Passed	UNKNOWN	LV DISCONNECT	480	6.49	10.00		64.87
NEW AIR COMPRESSOR	Passed	UNKNOWN	LV DISCONNECT	480	4.55	10.00		45.52
NORTH BELT DISCHARGE CONVEYOR	Passed	UNKNOWN	LV DISCONNECT	480	2.41	10.00		24.11
NORTH BELT PRESS DIS CONVEYOR	Passed	UNKNOWN	LV DISCONNECT	480	2.41	10.00		24.11
NORTH CELL	Passed	UNKNOWN	LV DISCONNECT	480	1.99	10.00		19.88
NORTH LOT POWER STATION	Passed	UNKNOWN	LV DISCONNECT	480	3.37	10.00		33.69
NORTH SEC. PUMP #2	Passed	UNKNOWN	LV DISCONNECT	480	1.94	10.00		19.37
NORTH SHOP HTR	Passed	UNKNOWN	LV DISCONNECT	480	5.42	10.00		54.21
NW FUME HOOD EX FAN	Passed	UNKNOWN	LV DISCONNECT	480	0.60	10.00		5.97
NW FUME HOOD SUPPLY FAN	Passed	UNKNOWN	LV DISCONNECT	480	0.60	10.00		5.97

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Series Rating (kA)	Rating %
ODOR CTRL FAN #1	Passed	UNKNOWN	LV DISCONNECT	480	0.93	10.00		9.34
ODOR CTRL FAN #2	Passed	UNKNOWN	LV DISCONNECT	480	0.93	10.00		9.34
OUTSIDE DOOR(EAST)	Passed	UNKNOWN	LV DISCONNECT	480	1.28	10.00		12.76
OUTSIDE DOOR(NW)	Passed	UNKNOWN	LV DISCONNECT	480	0.90	10.00		9.00
OUTSIDE DOOR(SW)	Passed	UNKNOWN	LV DISCONNECT	480	0.81	10.00		8.07
OVERHEAD DOORS	Passed	UNKNOWN	LV DISCONNECT	480	1.81	10.00		18.13
PANEL LA	Passed	UNKNOWN	LV PANELBOARD	208	1.78 (*N1)	10.00		17.78
PANEL LB	Passed	UNKNOWN	LV PANELBOARD	208	1.77 (*N1)	10.00		17.67
PHOS ACID PUMP PNL	Passed	UNKNOWN	LV PANEL	120	0.82	10.00		8.23
PP-1 EXHAUST FANS	Passed	UNKNOWN	LV DISCONNECT	480	1.35	10.00		13.54
PP-1 TRANSFER PUMP #1	Passed	UNKNOWN	LV DISCONNECT	480	2.21	10.00		22.08
PP-1 TRANSFER PUMP #2	Passed	UNKNOWN	LV DISCONNECT	480	2.21	10.00		22.08
PP-1-EF-1	Passed	UNKNOWN	LV DISCONNECT	480	0.96	10.00		9.61
PP-1-EF-2	Passed	UNKNOWN	LV DISCONNECT	480	0.85	10.00		8.51
PP-1-EF-3	Passed	UNKNOWN	LV DISCONNECT	480	0.80	10.00		8.05
PP-12 LEFT TUB	Passed	SQUARE D	LV PANELBOARD	480	8.01	65.00		12.32
PP-12 RIGHT TUB	Passed	SQUARE D	LV PANELBOARD	480	7.93	65.00		12.20
PP-13	Passed	WESTINGHOUSE	LV PANEL BOARD	480	13.33	200.00		6.66

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Series Rating (kA)	Rating %
PP-SH-1	Passed	Square D	LV Panelboard	480	23.83	65.00		36.66
PP-SH-2	Passed	Square D	LV Panelboard	480	23.94	65.00		36.84
PRIM HEAT PUMP #1	Passed	UNKNOWN	LV DISCONNECT	480	1.06	10.00		10.57
PRIM HEAT PUMP #2	Passed	UNKNOWN	LV DISCONNECT	480	1.06	10.00		10.57
PRIM SLUDGE COLL 1 A&B	Passed	UNKNOWN	LV DISCONNECT	480	0.82	10.00		8.19
PRIM SLUDGE COLL 1 C&X	Passed	UNKNOWN	LV DISCONNECT	480	0.90	10.00		9.04
PRIM SLUDGE COLL 2 A&B	Passed	UNKNOWN	LV DISCONNECT	480	1.16	10.00		11.57
PRIM SLUDGE COLL 2 B&C	Passed	UNKNOWN	LV DISCONNECT	480	1.33	10.00		13.33
PRIM SLUDGE COLL 3 A&B	Passed	UNKNOWN	LV DISCONNECT	480	1.94	10.00		19.41
PRIM SLUDGE COLL 3 C&X	Passed	UNKNOWN	LV DISCONNECT	480	2.14	10.00		21.35
PRIM SLUDGE COLL 4 A&X	Passed	UNKNOWN	LV DISCONNECT	480	1.41	10.00		14.09
PRIM SLUDGE COLL 4 B&C	Passed	UNKNOWN	LV DISCONNECT	480	1.20	10.00		12.04
PRIM SLUDGE COLL 5 A&B	Passed	UNKNOWN	LV DISCONNECT	480	0.94	10.00		9.38
PRIM SLUDGE COLL 5 C&X	Passed	UNKNOWN	LV DISCONNECT	480	0.85	10.00		8.47
PRIM SLUDGE COLL 6 A&X	Passed	UNKNOWN	LV DISCONNECT	480	0.70	10.00		7.03
PRIM SLUDGE COLL 6 B&C	Passed	UNKNOWN	LV DISCONNECT	480	0.65	10.00		6.48
PUMP #5 MAIN DISC	Passed	UNKNOWN	LV DISCONNECT	480	24.34 (*N1)	10.00	100.00	24.34
PUMP #5 VFD	Failed	UNKNOWN	VFD	480	*19.53 (*N1)	14.00		*139.47

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Series Rating (kA)	Rating %
PUMP #7 VFD	Failed	UNKNOWN	VFD	480	*20.89 (*N1)	14.00		*149.25
PUMP CONTROL PANEL VFD	Passed	UNKNOWN	LV DISCONNECT	480	4.40	14.00		31.44
PUMP STATION #1	Passed	UNKNOWN	LV DISCONNECT	480	8.92	10.00		89.22
PUMP STATION #2	Passed	UNKNOWN	LV DISCONNECT	480	6.22	10.00		62.16
PURGE FAN #1 DISC	Passed	UNKNOWN	LV DISCONNECT	480	0.88	10.00		8.85
PURGE FAN #2 DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.26	10.00		12.59
PURGE FAN #3 DISC	Passed	UNKNOWN	LV DISCONNECT	480	2.55	10.00		25.54
PURGE FAN #4 DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.49	10.00		14.86
PURGE FAN #5 DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.00	10.00		10.04
PURGE FAN #6 DISC	Passed	UNKNOWN	LV DISCONNECT	480	0.72	10.00		7.25
RAS AND INFLUENT VALVE CONTROL	Passed	UNKNOWN	LV DISCONNECT	480	1.88	10.00		18.78
RAS PUMPS	Passed	UNKNOWN	LV DISCONNECT	480	4.68	10.00		46.78
RETURN SLUDGE PUMP #6	Failed	UNKNOWN	LV DISCONNECT	480	*17.50 (*N1)	10.00		*174.97
RETURN SLUDGE PUMP #7	Failed	UNKNOWN	LV DISCONNECT	480	*18.31 (*N1)	10.00		*183.10
RETURN SLUDGE PUMP #8	Failed	UNKNOWN	LV DISCONNECT	480	*18.31 (*N1)	10.00		*183.10
RETURN SLUDGE PUMP #9	Failed	UNKNOWN	LV DISCONNECT	480	*16.57 (*N1)	10.00		*165.70
S.E. HEAT	Passed	UNKNOWN	LV DISCONNECT	480	1.41	10.00		14.14
SCREW CONVEYOR DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.15	10.00		11.53

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Series Rating (kA)	Rating %
SCUM BLOWERS CLARIFIER #5	Passed	UNKNOWN	LV DISCONNECT	480	3.12	10.00		31.16
SCUM PUMP	Passed	UNKNOWN	LV DISCONNECT	480	2.76	10.00		27.57
SEC HEAT PUMP #1	Passed	UNKNOWN	LV DISCONNECT	480	1.06	10.00		10.57
SEC HEAT PUMP #2	Passed	UNKNOWN	LV DISCONNECT	480	1.06	10.00		10.57
SER FAN A	Passed	UNKNOWN	LV DISCONNECT	480	1.83	10.00		18.29
SER FAN B	Passed	UNKNOWN	LV DISCONNECT	480	1.48	10.00		14.83
SER FAN C	Passed	UNKNOWN	LV DISCONNECT	480	1.48	10.00		14.83
SER FAN D	Passed	UNKNOWN	LV DISCONNECT	480	1.83	10.00		18.29
SER FAN E	Passed	UNKNOWN	LV DISCONNECT	480	1.83	10.00		18.29
SER FAN F	Passed	UNKNOWN	LV DISCONNECT	480	1.48	10.00		14.83
SER FAN G	Passed	UNKNOWN	LV DISCONNECT	480	1.83	10.00		18.29
SER FAN H	Passed	UNKNOWN	LV DISCONNECT	480	1.83	10.00		18.29
SER FAN I	Passed	UNKNOWN	LV DISCONNECT	480	1.48	10.00		14.83
SER FAN J	Passed	UNKNOWN	LV DISCONNECT	480	1.48	10.00		14.83
SER FAN K	Passed	UNKNOWN	LV DISCONNECT	480	1.48	10.00		14.83
SER FAN L	Passed	UNKNOWN	LV DISCONNECT	480	1.83	10.00		18.29
SEWAGE PUMP #1	Passed	UNKNOWN	LV DISCONNECT	480	12.51	10.00	100.00	12.51
SEWAGE PUMP #2 VFD	Failed	UNKNOWN	VFD	480	*20.51 (*N1)	14.00		*146.47

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Series Rating (kA)	Rating %
SF-11 DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.28	10.00		12.81
SF-4 DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.63	10.00		16.32
SF-8 DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.05	10.00		10.54
SLUDE PUMP #4	Passed	UNKNOWN	LV DISCONNECT	480	5.54	10.00		55.39
SLUDGE CAKE PUMP #2	Failed	UNKNOWN	LV DISCONNECT	480	*15.70 (*N1)	10.00		*157.04
SLUDGE PUMP #1 DISC	Passed	UNKNOWN	LV DISCONNECT	480	7.64	10.00		76.39
SLUDGE PUMP #2 DISC	Passed	UNKNOWN	LV DISCONNECT	480	7.64	10.00		76.39
SLUDGE PUMP #3	Passed	UNKNOWN	LV DISCONNECT	480	5.54	10.00		55.39
SLUDGE PUMP #7 DISC	Passed	UNKNOWN	LV DISCONNECT	480	7.66	10.00		76.62
SLUDGE PUMP #8	Passed	UNKNOWN	LV DISCONNECT	480	5.56	10.00		55.56
SLUDGE VALVE HPU	Passed	UNKNOWN	LV DISCONNECT	480	4.71	10.00		47.12
SOUTH BELT DISCHARGE CONVEYOR	Passed	UNKNOWN	LV DISCONNECT	480	2.62	10.00		26.24
SOUTH BELT PUMP NO 1 & 2	Passed	UNKNOWN	LV DISCONNECT	480	1.10	10.00		11.02
SOUTH CELL	Passed	UNKNOWN	LV DISCONNECT	480	1.99	10.00		19.88
SOUTH SEC. CLARIFIER #1	Passed	UNKNOWN	LV DISCONNECT	480	1.82	10.00		18.17
SOUTH SEC. CLARIFIER #2	Passed	UNKNOWN	LV DISCONNECT	480	1.82	10.00		18.17
SOUTH SEC. INF. PUMP #1	Passed	UNKNOWN	LV DISCONNECT	480	1.62	10.00		16.25
SOUTH SEC. INF. PUMP #2	Passed	UNKNOWN	LV DISCONNECT	480	1.62	10.00		16.25

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Series Rating (kA)	Rating %
SOUTH SEC. PUMP #1	Passed	UNKNOWN	LV DISCONNECT	480	1.94	10.00		19.37
SOUTH SHOP HTR	Passed	UNKNOWN	LV DISCONNECT	480	5.42	10.00		54.21
STREET LIGHT	Passed	UNKNOWN	LV DISCONNECT	480	0.50	10.00		5.00
SUMP PUMP #1 DISC	Passed	UNKNOWN	LV DISCONNECT	480	7.64	10.00		76.37
SUMP PUMP #2	Passed	UNKNOWN	LV DISCONNECT	480	5.54	10.00		55.38
SUMP PUMP EAST	Passed	UNKNOWN	LV DISCONNECT	480	5.14	10.00		51.39
SUMP PUMP WEST	Passed	UNKNOWN	LV DISCONNECT	480	5.14	10.00		51.39
TRANSFER PUMP #1	Passed	UNKNOWN	LV DISCONNECT	480	3.58	10.00		35.81
TRANSFER PUMP #2	Passed	UNKNOWN	LV DISCONNECT	480	3.58	10.00		35.81
TRANSFER SWITCH	Failed	UNKNOWN	MTS	480	*18.05 (*N1)	10.00		*180.45
TUMBULATOR	Passed	UNKNOWN	LV DISCONNECT	480	1.79	10.00		17.90
UNIT HEATER #1	Passed	UNKNOWN	LV DISCONNECT	480	7.04	10.00		70.39
UNIT HEATER #2	Passed	UNKNOWN	LV DISCONNECT	480	2.95	10.00		29.48
UNIT HEATER #3	Passed	UNKNOWN	LV DISCONNECT	480	1.68	10.00		16.75
VACUUM PUMP	Passed	UNKNOWN	LV DISCONNECT	480	2.26	10.00		22.61
VALVE ACTUATORS	Passed	UNKNOWN	LV DISCONNECT	480	1.21	10.00		12.05
VFD-N. THICK SLUDGE PUMP #1	Passed	UNKNOWN	LV DISCONNECT	480	2.92	14.00		20.89
VFD-N. THICK SLUDGE PUMP #2	Passed	UNKNOWN	LV DISCONNECT	480	2.32	14.00		16.59

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Series Rating (kA)	Rating %
VFD-N. THICK SLUDGE PUMP #3	Passed	UNKNOWN	LV DISCONNECT	480	3.18	14.00		22.71
VFD-PUMP 4	Failed	UNKNOWN	VFD	480	*20.64 (*N1)	14.00		*147.40
VFD-S. THICK SLUDGE PUMP #1	Passed	UNKNOWN	LV DISCONNECT	480	2.81	14.00		20.08
VFD-S. THICK SLUDGE PUMP #2	Passed	UNKNOWN	LV DISCONNECT	480	2.03	14.00		14.51
VFD-S. THICK SLUDGE PUMP #3	Passed	UNKNOWN	LV DISCONNECT	480	2.61	14.00		18.63
VFD-SOUTH BELT PRESS FD PUMP 1	Passed	UNKNOWN	LV DISCONNECT	480	0.97	14.00		6.92
VFD-SOUTH BELT PRESS FD PUMP 2	Passed	UNKNOWN	LV DISCONNECT	480	0.97	14.00		6.92
WASTE MIXED LIQUOR PUMP 1 EAST	Failed	UNKNOWN	LV DISCONNECT	480	*15.32	10.00		*153.21
WASTE MIXED LIQUOR PUMP 1 WEST	Failed	UNKNOWN	LV DISCONNECT	480	*15.32	10.00		*153.21
WASTE SLUDGE PUMP #4	Passed	UNKNOWN	LV DISCONNECT	480	1.45	10.00		14.50
WASTE SLUDGE PUMP #5	Passed	UNKNOWN	LV DISCONNECT	480	1.45	10.00		14.50
WATER MAINT SHOP	Passed	UNKNOWN	LV DISCONNECT	480	3.51	10.00		35.11
WELDER RECEPT	Passed	UNKNOWN	LV DISCONNECT	480	3.91	10.00		39.14
WELDER-CARBON FLUSH PUMP	Passed	UNKNOWN	LV DISCONNECT	480	2.00	10.00		19.98
WEST FAN	Passed	UNKNOWN	LV DISCONNECT	480	0.92	10.00		9.15
WINCH #1	Passed	UNKNOWN	LV DISCONNECT	480	0.87	10.00		8.73
WINCH #2	Passed	UNKNOWN	LV DISCONNECT	480	0.94	10.00		9.42
WINCH #3	Passed	UNKNOWN	LV DISCONNECT	480	1.02	10.00		10.24

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Series Rating (kA)	Rating %
WT CONVEYOR 1 DISC	Passed	UNKNOWN	LV DISCONNECT	480	1.05	10.00		10.48

(*N1) System X/R higher than Test X/R, Calc Isc (kA) modified based on low voltage factor.

Table 2.2 – Medium-Voltage Equipment Evaluation

Bus I.D.	Status	Manufacturer	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Isc Rating %	Calc Mom (kA)	Equip Mom (kA)	Mom Rating %
DS-1500 HP BLOWER 2	Passed	UNKNOWN	MV DISC	4800	17.19	50.00	34.39	24.16	80.00	30.20
DS-1500 HP BLOWER 3	Passed	UNKNOWN	MV DISC	4800	17.27	50.00	34.54	24.28	80.00	30.36
DS-2500HP BLOWER 1	Passed	UNKNOWN	MV DISC	4800	17.34	63.00	27.52	25.28	100.00	25.28
DS-2500HP BLOWER 4	Passed	UNKNOWN	MV DISC	4800	17.41	63.00	27.63	25.11	100.00	25.11
EAST BANK-1A	Passed	EATON	MV SWITCHGEAR	4800	21.18	38.22 (*N2)	55.41	35.13	47.00	74.75
EAST BANK-1B	Passed	EATON	MV SWITCHGEAR	4800	21.23	38.22 (*N2)	55.54	35.24	47.00	74.99
EAST BANK-2A	Passed	EATON	MV SWITCHGEAR	4800	21.32	29.40	72.51	35.67	47.00	75.89
EAST BANK-2B	Passed	EATON	MV SWITCHGEAR	4800	21.27	29.40	72.36	35.58	47.00	75.71
MVUS-1A	Passed	EATON	MV SWITCHGEAR	4800	21.50	50.00	43.01	36.06	80.00	45.08
MVUS-1B	Passed	EATON	MV SWITCHGEAR	4800	16.55	50.00	33.09	24.03	80.00	30.04
WEST BANK-A	Passed	EATON	MV SWITCHGEAR	4800	21.24	29.40	72.24	35.27	47.00	75.05
WEST BANK-B	Passed	EATON	MV SWITCHGEAR	4800	16.42	29.40	55.84	23.68	47.00	50.39

3.0 PROTECTIVE DEVICE COORDINATION STUDY

3.1 General

The protective device coordination study determines overcurrent protective relay and circuit breaker settings in order to provide an optimal compromise between protection and selectivity.

3.2 Objectives

Using the appropriate maximum fault currents, the time-current coordination curves were plotted as operating time versus current magnitudes to show protective device tripping and/or clearing characteristics and coordination among these devices.

Consideration was given to provide both selective isolation of faults and maximum protection of equipment such as cables, transformers, motors, etc.

To achieve the optimum protection and selectivity, the following guidelines were followed throughout the study:

1. Ideally, the settings of any overcurrent device should be high enough to permit the continuous full-load operating capacity of the cables and the equipment they supply, and to ride through system temporary disturbances such as in-rush current. On the other hand, the settings should be low enough to provide overload and short-circuit protection under minimum fault conditions.
2. Considering any two protective devices in series:
   - The maximum available fault current at the downstream device determines the upper limit of the coordination range between these two devices.
   - The minimum available fault current at the downstream device or the pick-up setting of the upstream device determines the lower limit of the coordination range.
   - Series instantaneous devices do not coordinate unless there is sufficient impedance between the two devices.
   - When plotting coordination curves, certain time intervals must be maintained between the curves in order to ensure correct selectivity. These time intervals vary, depending on the device types. In general, however, the following must be taken into consideration when determining the appropriate time separation interval: Breaker clearing time, relay tolerances, induction disk over-travel, and a reasonable safety margin for error.

3.3 Codes and Standards

Protective device coordination was performed in accordance with IEEE Std 242™. Minimum guidelines for equipment protection, as outlined in the National Electrical Code (NEC) and applicable standards of the American National Standards Institute (ANSI), were followed.

Applicable requirements are summarized below.

1. <u>Cables</u>

Power cables require overload and short-circuit protection in order to meet the requirements stated in NEC Article 240, and IEEE Std 242. The NEC further requires that the ampacity of low voltage cable (0-2000 Volts) be determined by NEC Article 310.15. Cable de-rating based upon ambient temperature and the number of current carrying conductors in a raceway must also be applied. Medium voltage cable (2001-35,000 Volts) ampacity is defined by NEC Articles 240.100(A) and 310.60.

2. Transformers

A transformer is recommended to have protective devices on both primary and secondary side in order to meet the basic protection requirements for overloads and short-circuit withstand values. However, a transformer is permitted to be protected by only a primary side device if it meets the exceptions listed in NEC Article 240.4(F). In addition, the transformer protective devices must be able to withstand magnetizing inrush currents without tripping.

NEC protection requirements for transformers: Overcurrent devices should be selected, and settings should be recommended to provide overcurrent protection in accordance with NEC Article 450.3. Paragraph (A) specifies that transformers over 600 V comply with Table 450.3(A). Paragraph (B) specifies that transformers less than 600 V comply with Table 450.3(B).

Short-circuit thermal limits for transformers: The primary devices should be set on the basis that the transformers have short-circuit withstand capabilities as defined by IEEE Std C57.109™.

3. Motors

The motors should have appropriate protective devices to meet the basic protection requirements for overloads and fault current withstand values. In addition, the motor short-circuit and ground fault protective devices should be set to ride through motor starting current.

3.4 Coordination Data

Please see Section 6.0 for a complete list of data and assumptions that were used in modeling the power system to provide conservative, worst-case results. Please note that complete information regarding the system model used for the computer simulation is included in Section 7.0.

3.5 Coordination Results

As shown on the time-current plots, each device curve is tagged with an arrow and label referencing its location on the plot's individual representative one-line diagram. This label also references the device to its specific manufacturer information, including ratings and settings, as indicated in the text box on each plot. The device time-current characteristics are truncated at maximum through-fault current for a downstream fault.

Efforts were made to provide the best coordination possible with the protective devices supplied under this contract. Areas where breaker trip curves overlap indicate areas of possible non-selective breaker operation. Where possible, efforts were made to reduce non-selective breaker operation while maintaining adequate system protection. In some cases, because of device limitations, little can be done to improve device selectivity. Such device limitations include the fixed operating characteristic of a fuse, the built-in instantaneous or instantaneous “over-ride” elements of molded case circuit breakers, and the limited instantaneous trip range of trip units with an instantaneous trip function.

In cases involving redundant protective devices, non-selective breaker operation is of little or no concern. Protective devices are redundant if, regardless of which device opens, the same system outage occurs. Often, in order to improve overall system protection and coordination, redundant devices are intentionally set to overlap (i.e. non-selectively coordinate with) one another.

Adequate coordination is achieved using the recommended protective devices, with settings and ratings as listed in Section 4.0. The recommended adjustments would maximize coordination in an attempt to allow the various downstream devices to isolate faults without operation of the upstream devices. Although instantaneous trip devices provide the highest degree of protection, when applied in series they compromise selectivity at high-magnitude fault currents.

3.6 Time-Current Characteristic Plots

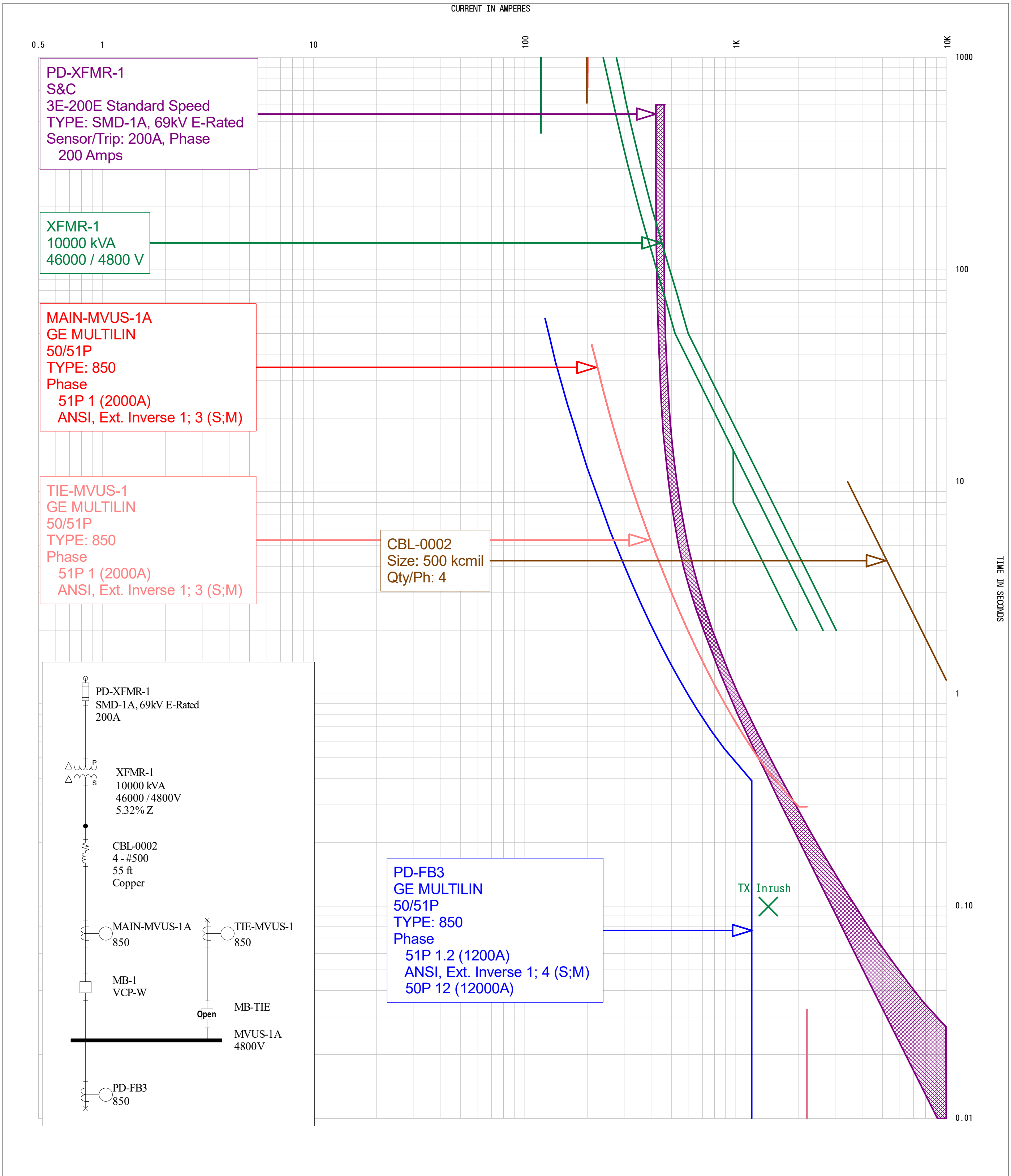
Refer to the following pages for the plotted coordination curves, which graphically indicate the degree of selectivity and protection obtained.

In some cases, a single time-current curve may be applicable to several locations in the system, where each location utilizes substantially similar devices, and serves similar loads.

The following list references the attached time-current curves for this report.

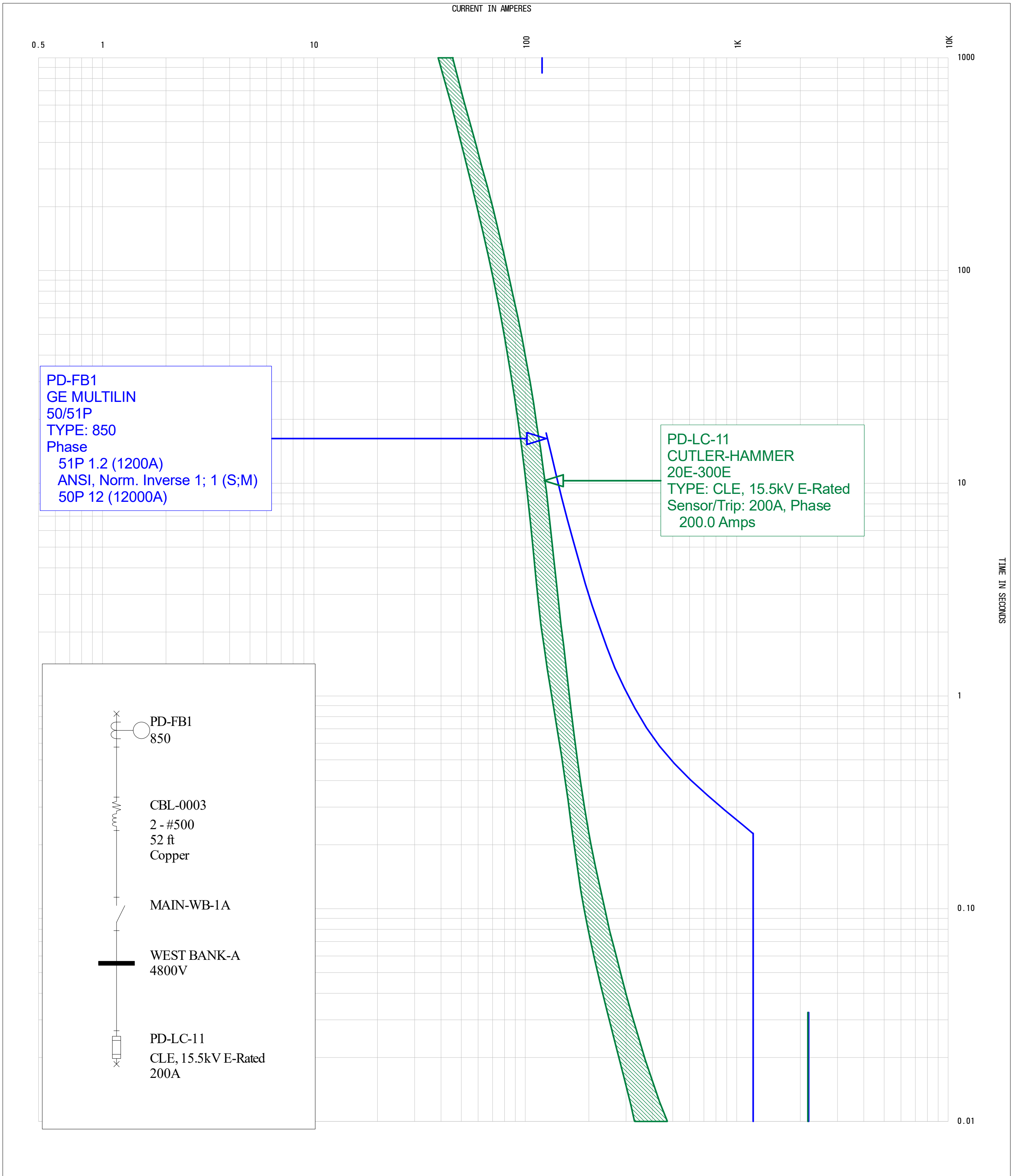
Table 3.1 – TCC Plots Index

Title	Page Number
01 MVUS-1A	Page 3-5
02 WEST BANK-A	Page 3-6
03 MCC-26	Page 3-7
04 PP-SH-2	Page 3-8
05 LC-2	Page 3-9
06 MCC-8	Page 3-10
07 12A-PP-01	Page 3-11
08 MCC-8A	Page 3-12
09 MCC-12	Page 3-13
10 MCC-7	Page 3-14
11 PP-13	Page 3-15
12 MCC-7 LTG PANELS	Page 3-16
13 PP-12	Page 3-17
14 MCC-10	Page 3-18
15 MCC-25	Page 3-19
16 LC-5	Page 3-20
17 MCC-15	Page 3-21
18 06-LP-01	Page 3-22

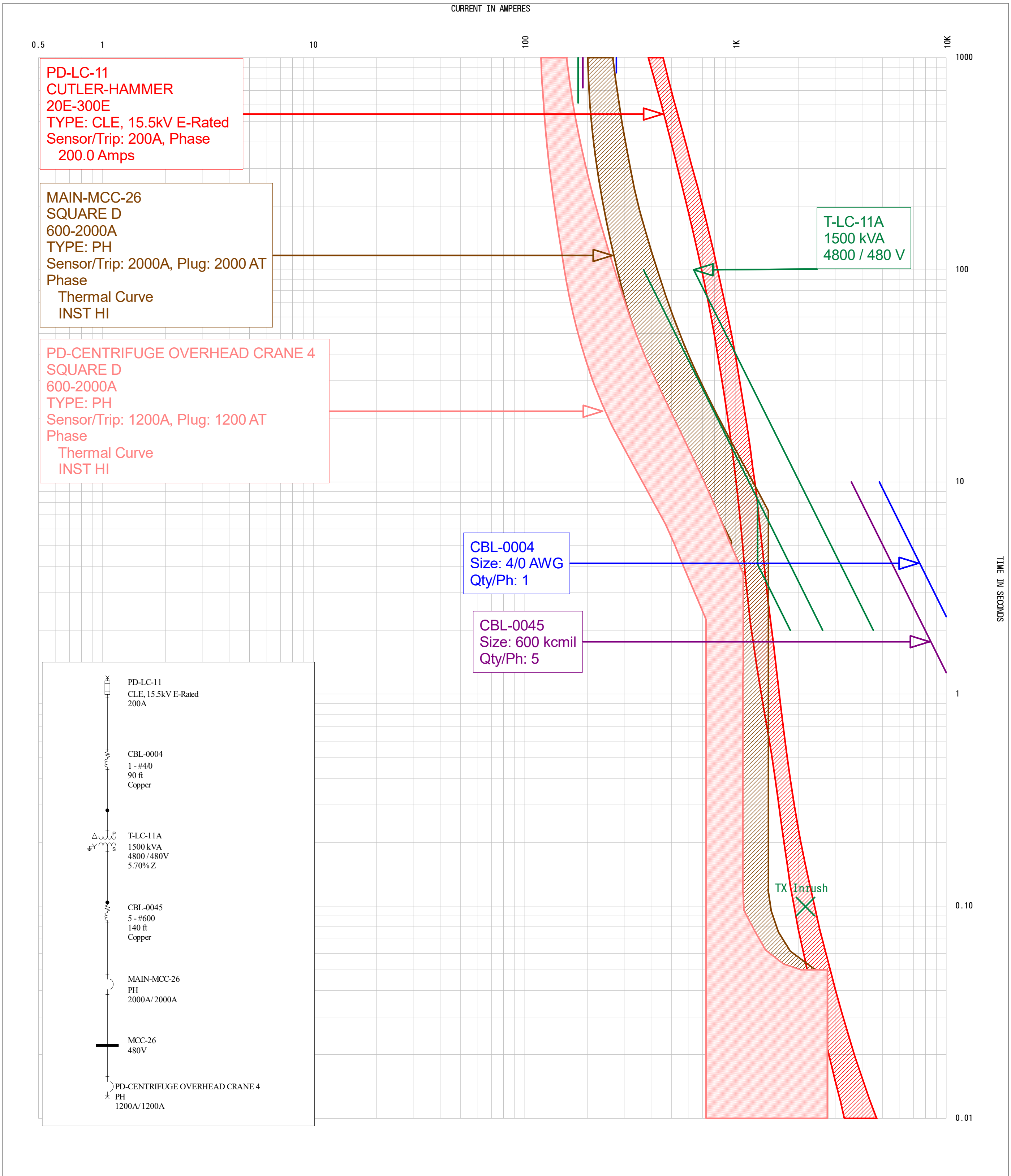


Eaton Electrical Services and Systems
May 11, 2023

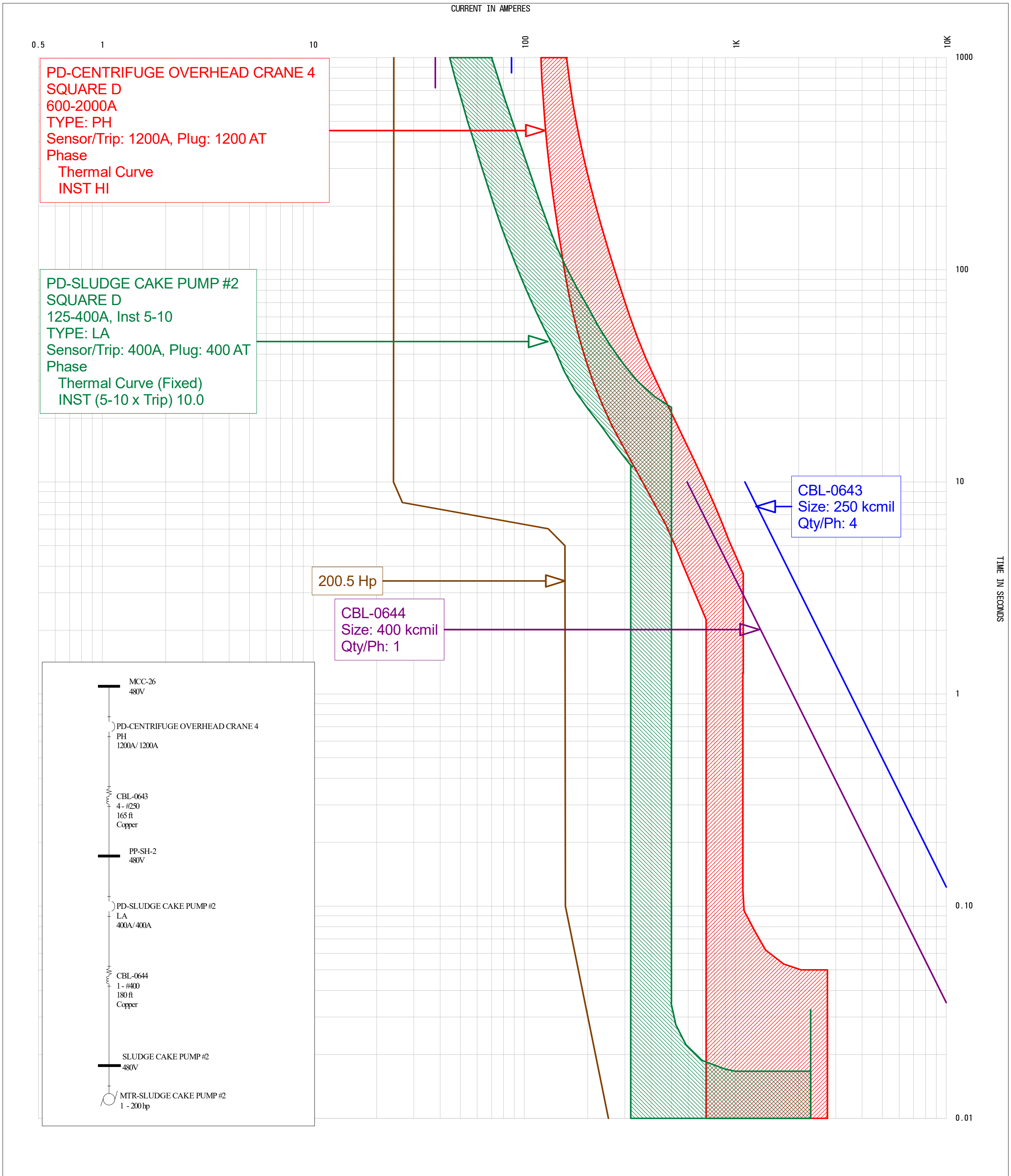
Plot name: 01 MVUS-1A
Ref. Voltage: 4800V
Current Scale: x 10



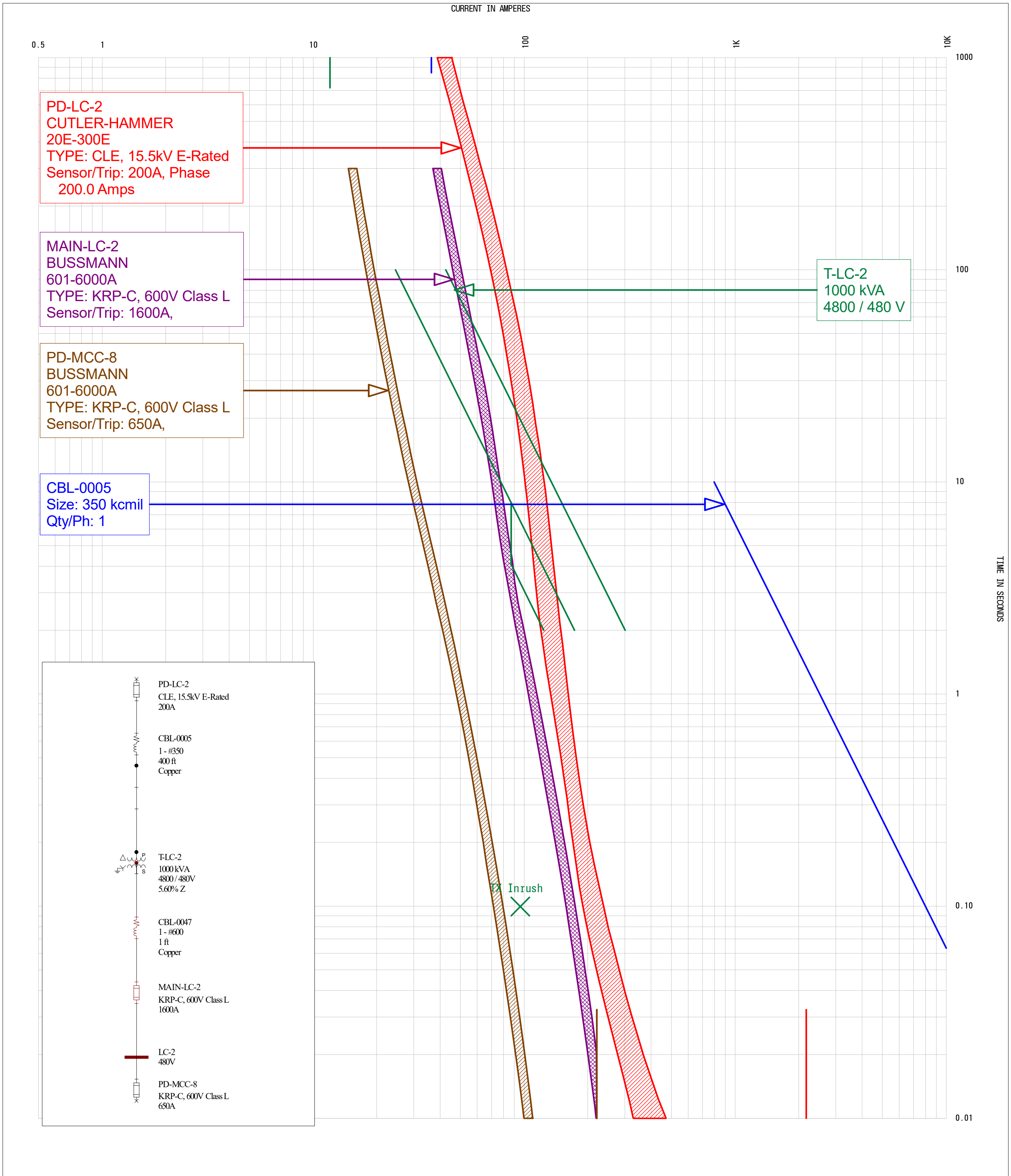
Eaton Electrical Services and Systems May 11, 2023	Plot name: 02 WEST BANK-A Ref. Voltage: 4800V Current Scale: x 10



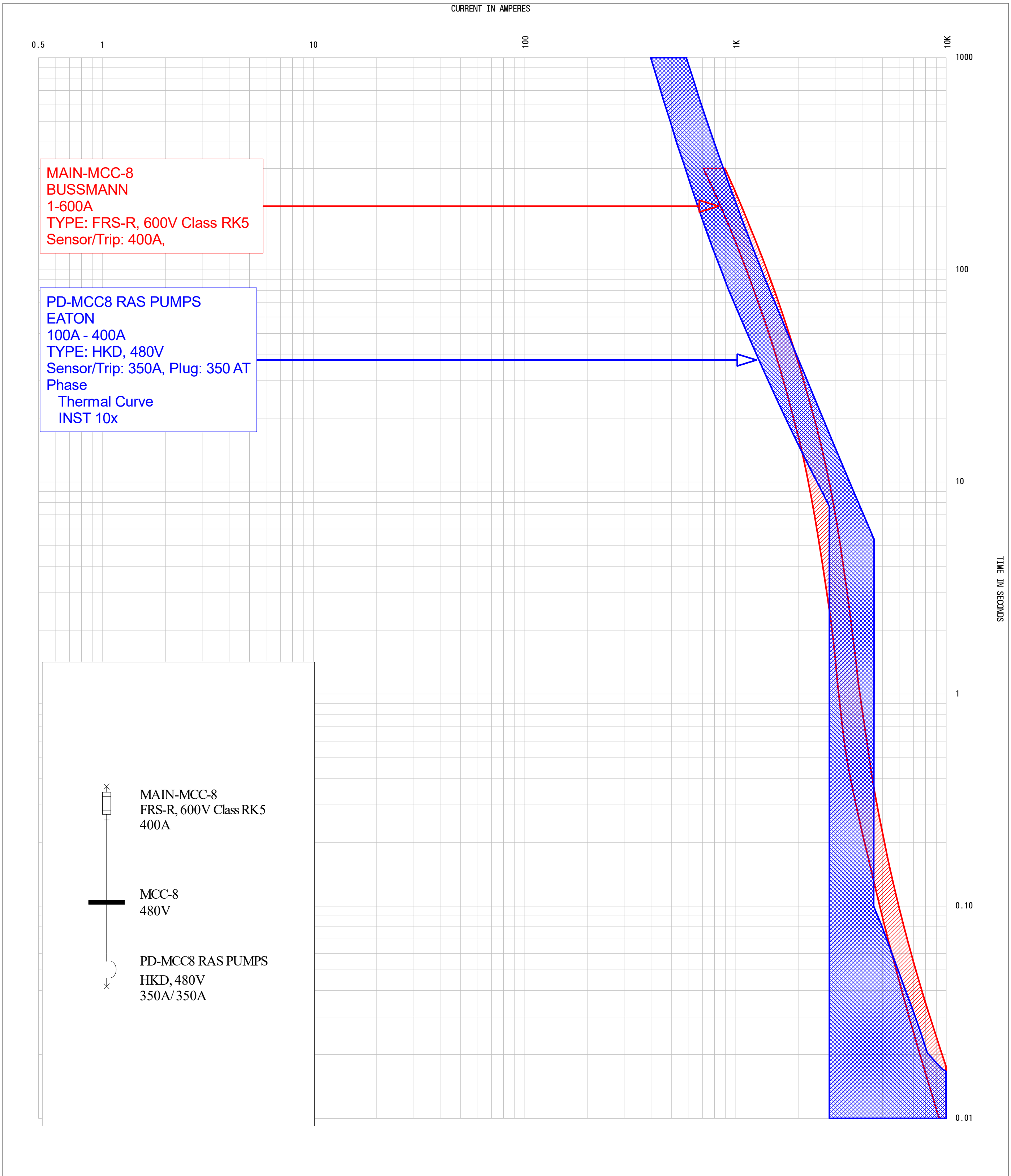
Eaton Electrical Services and Systems May 11, 2023	Plot name: 03 MCC-26 Ref. Voltage: 4800V Current Scale: x 1



Eaton Electrical Services and Systems May 11, 2023	Plot name: 04 PP-SH-2 Ref. Voltage: 480V Current Scale: x 10

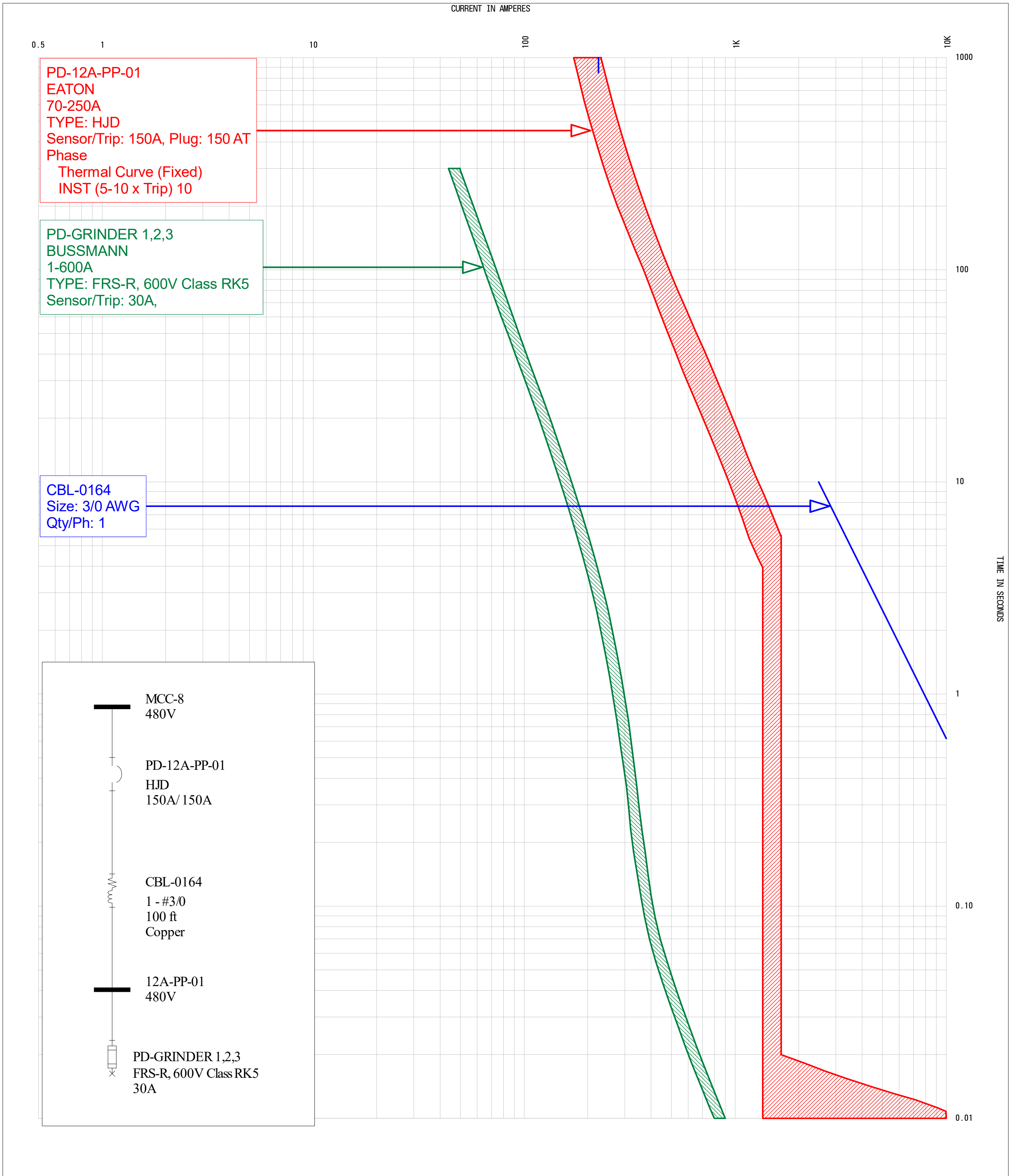


Eaton Electrical Services and Systems May 11, 2023	Plot name: 05 LC-2 Ref. Voltage: 4800V Current Scale: x 10



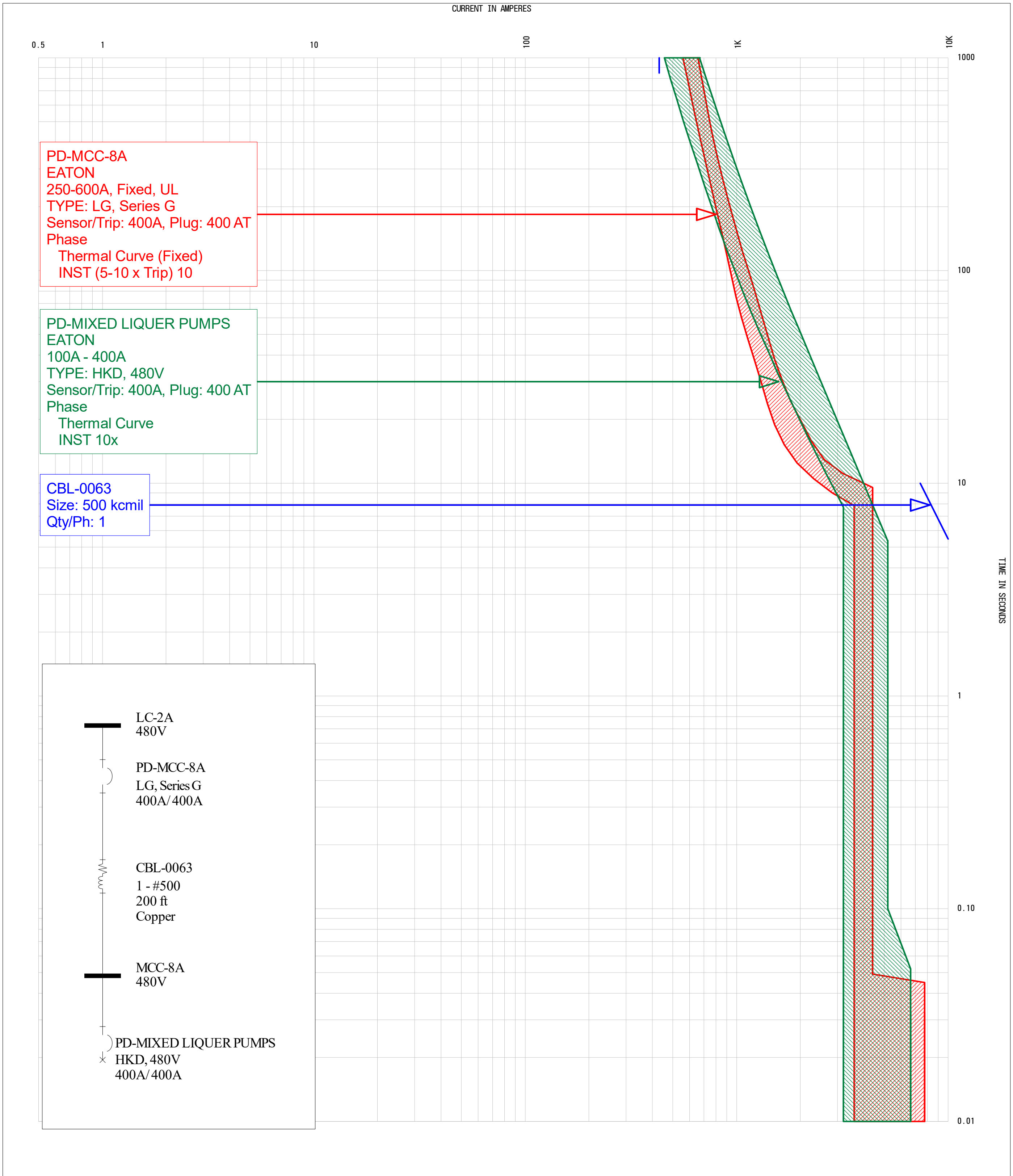
Eaton Electrical Services and Systems
May 11, 2023

Plot name: 06 MCC-8
Ref. Voltage: 480V
Current Scale: x 1

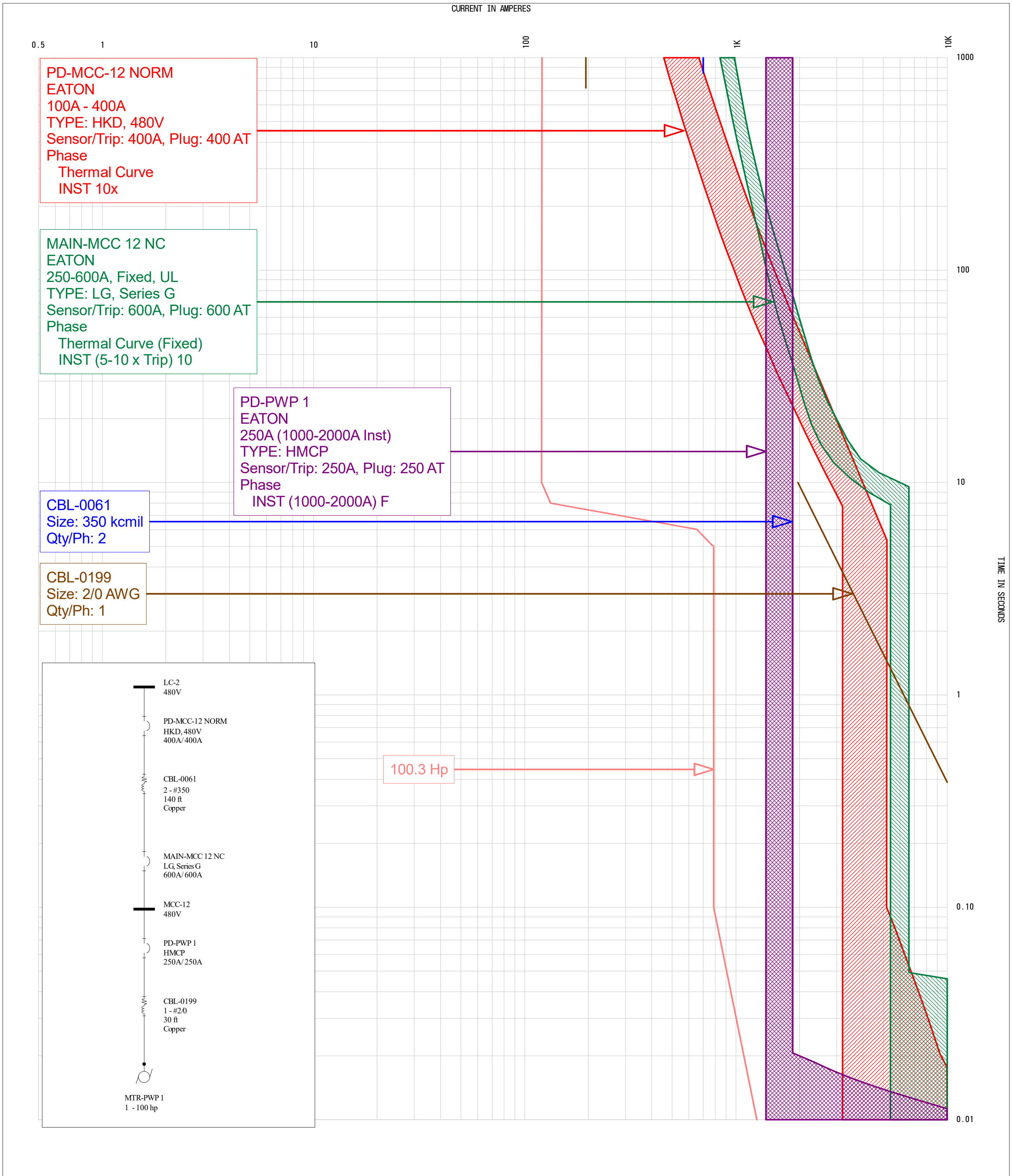


Eaton Electrical Services and Systems
May 11, 2023

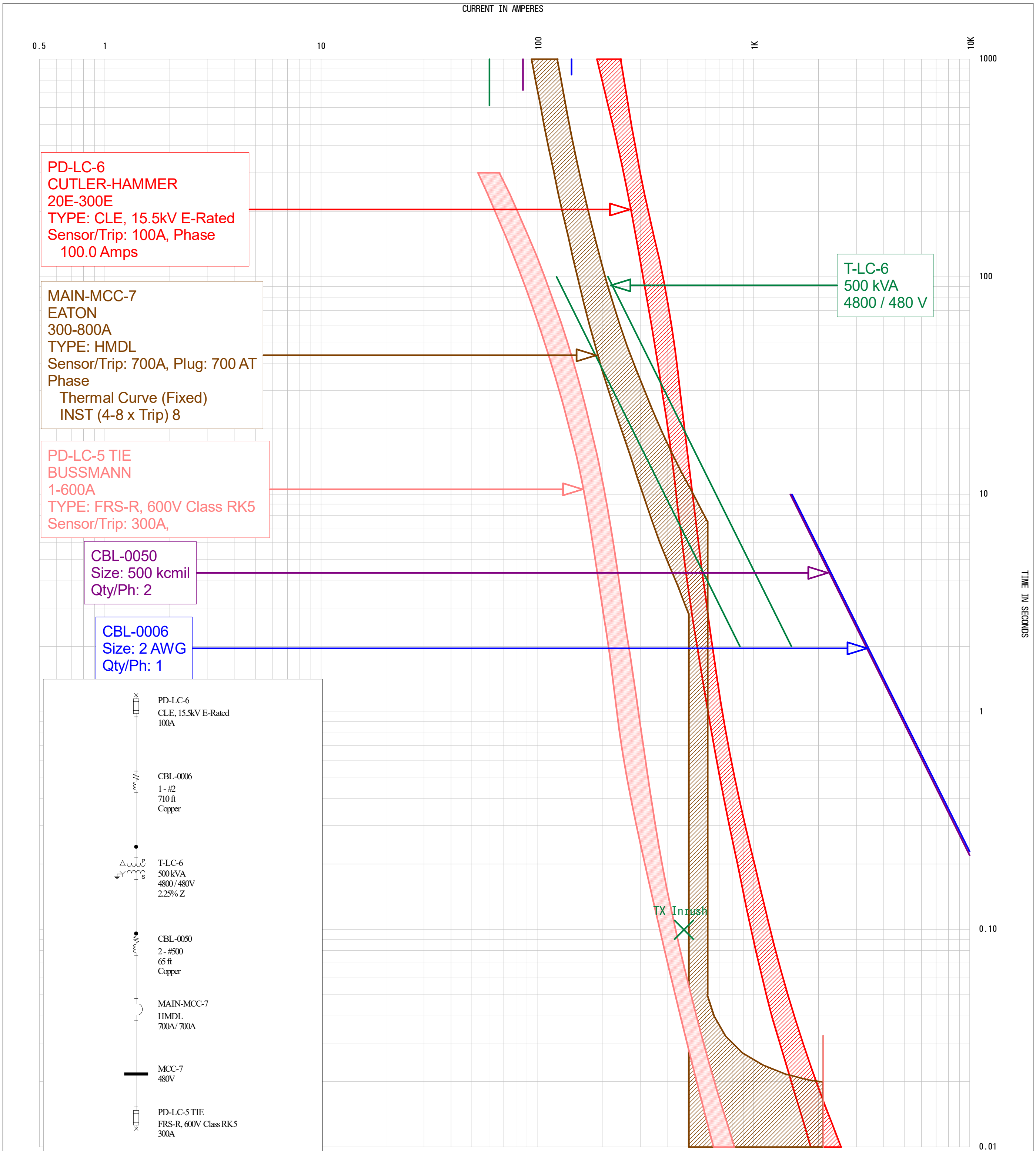
Plot name: 07 12A-PP-01
Ref. Voltage: 480V
Current Scale: x 1



Eaton Electrical Services and Systems May 11, 2023	Plot name: 08 MCC-8A Ref. Voltage: 480V Current Scale: x 1

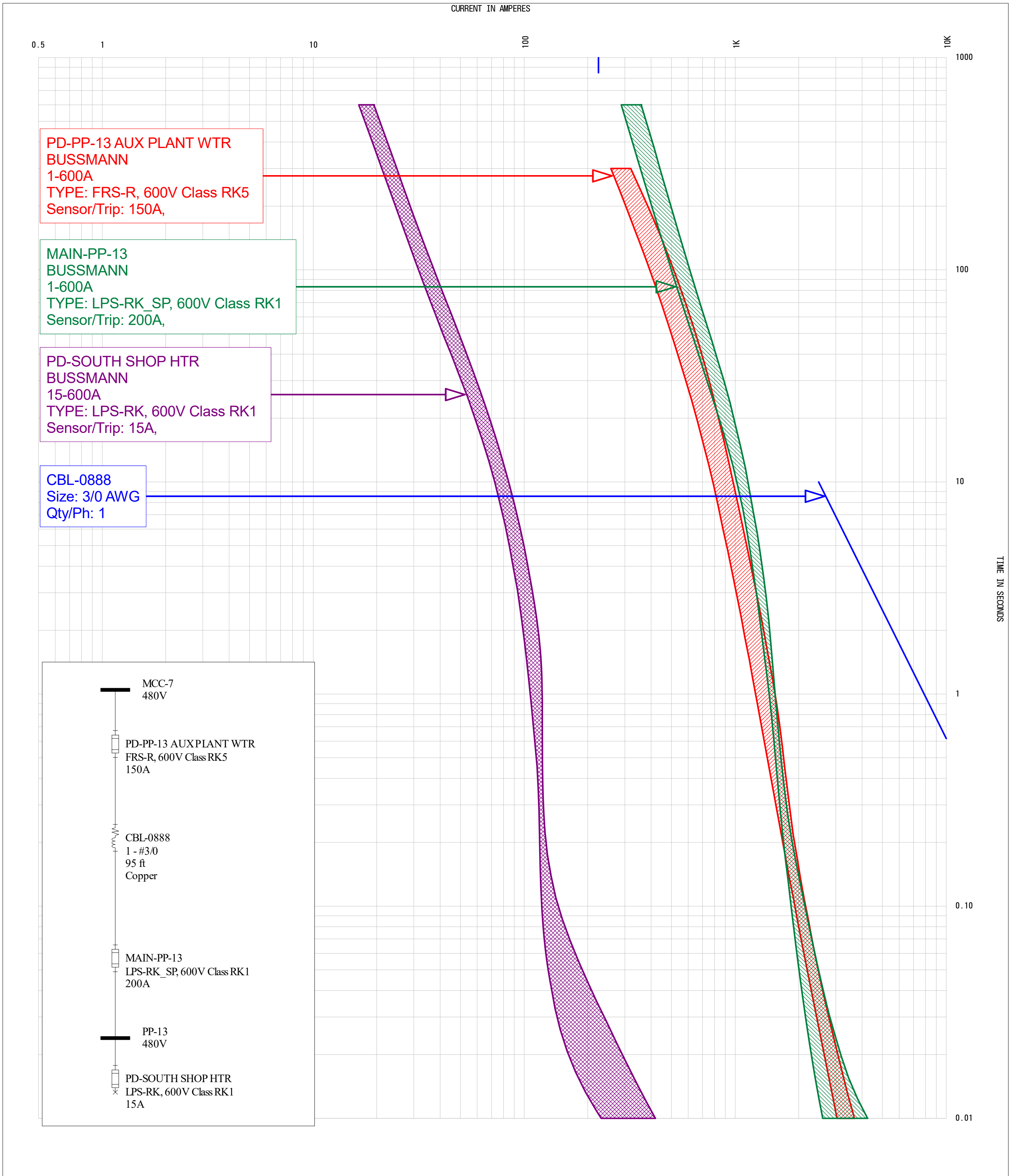


Eaton Electrical Services and Systems May 11, 2023	Plot name: 09 MCC-12 Ref. Voltage: 480V Current Scale: x 1

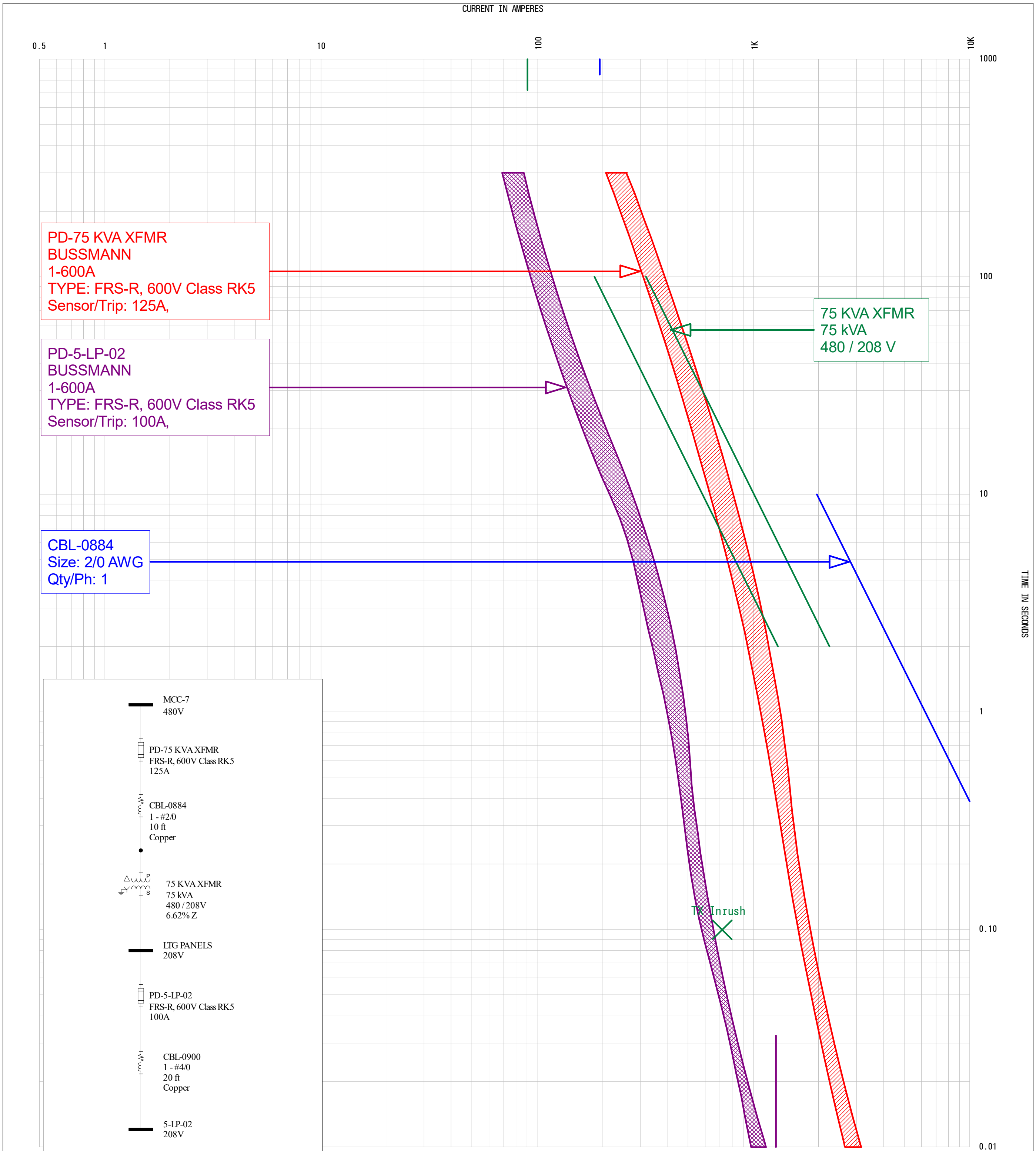


Eaton Electrical Services and Systems
May 11, 2023

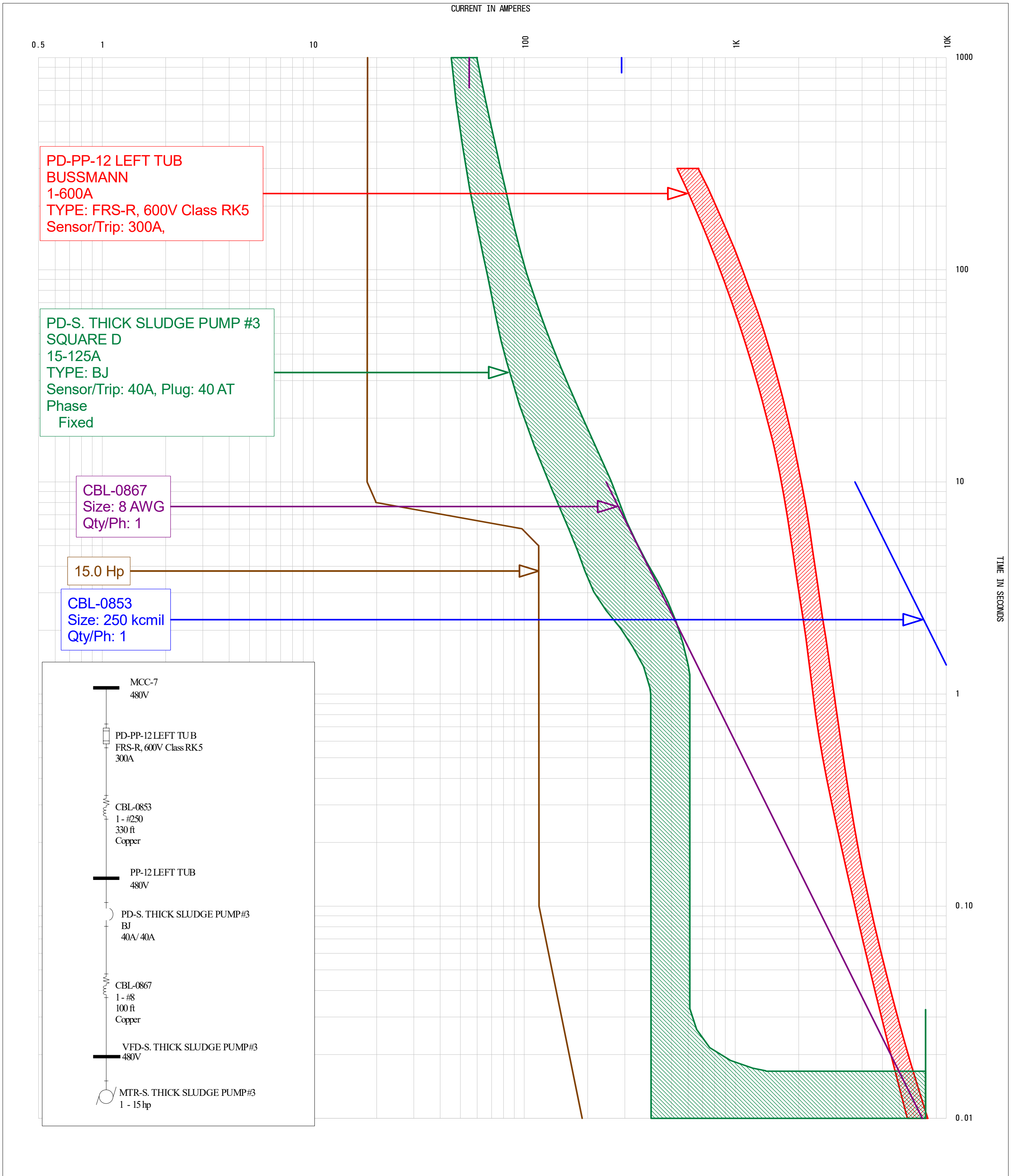
Plot name: 10 MCC-7
Ref. Voltage: 4800V
Current Scale: x 1



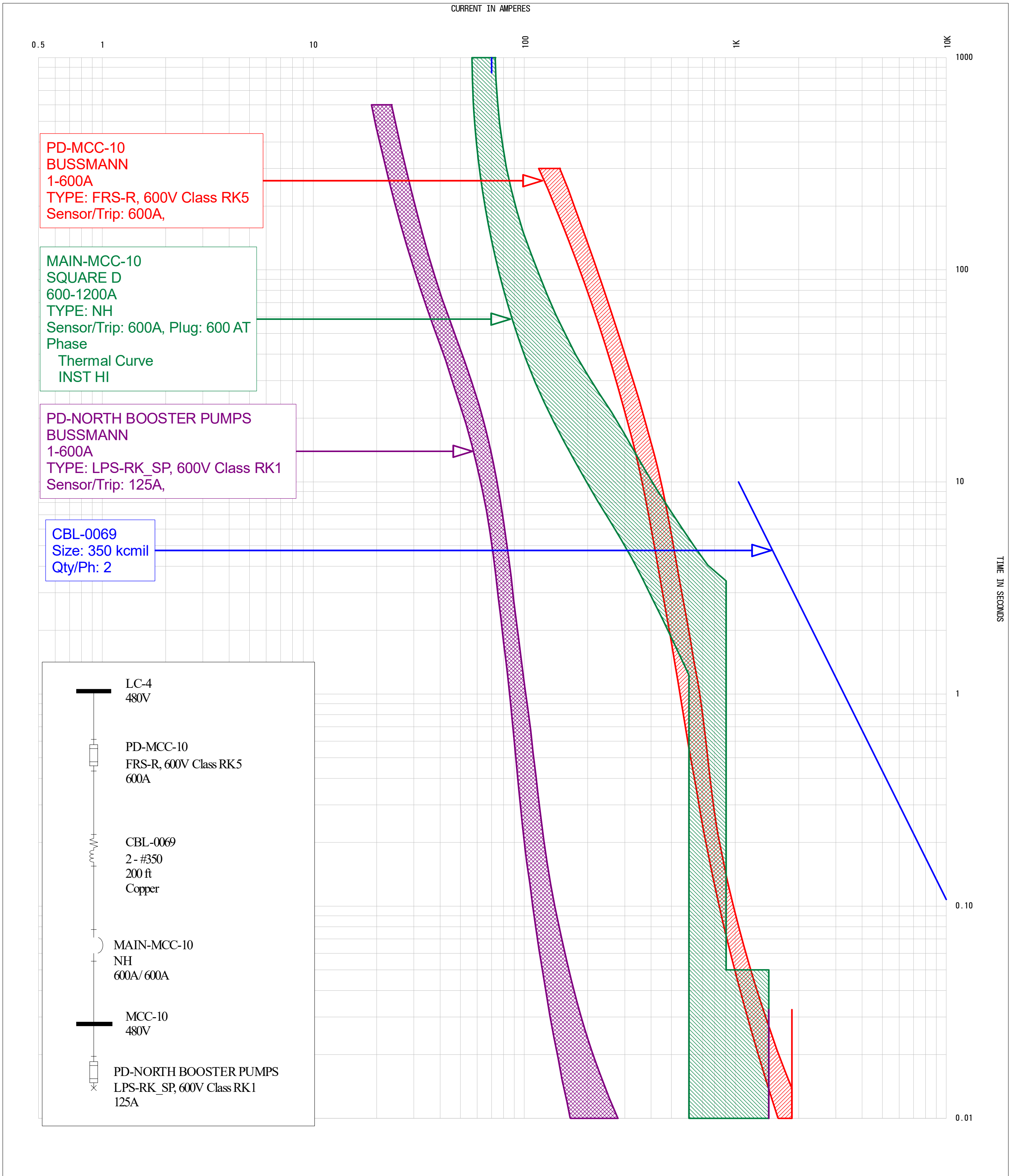
Eaton Electrical Services and Systems May 11, 2023	Plot name: 11 PP-13 Ref. Voltage: 480V Current Scale: x 1



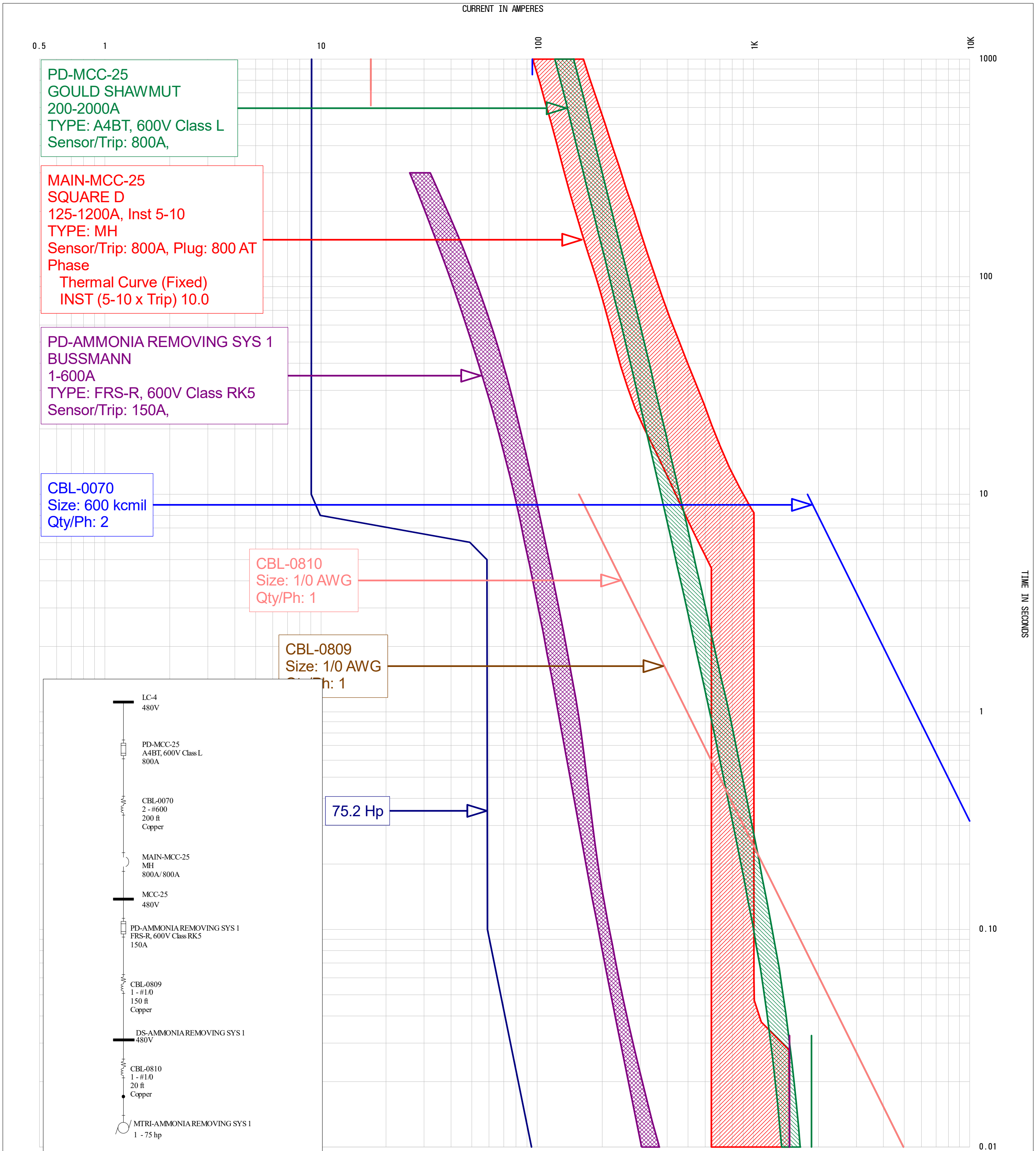
Eaton Electrical Services and Systems May 11, 2023	Plot name: 12 MCC-7 LTG PANELS Ref. Voltage: 480V Current Scale: x 1



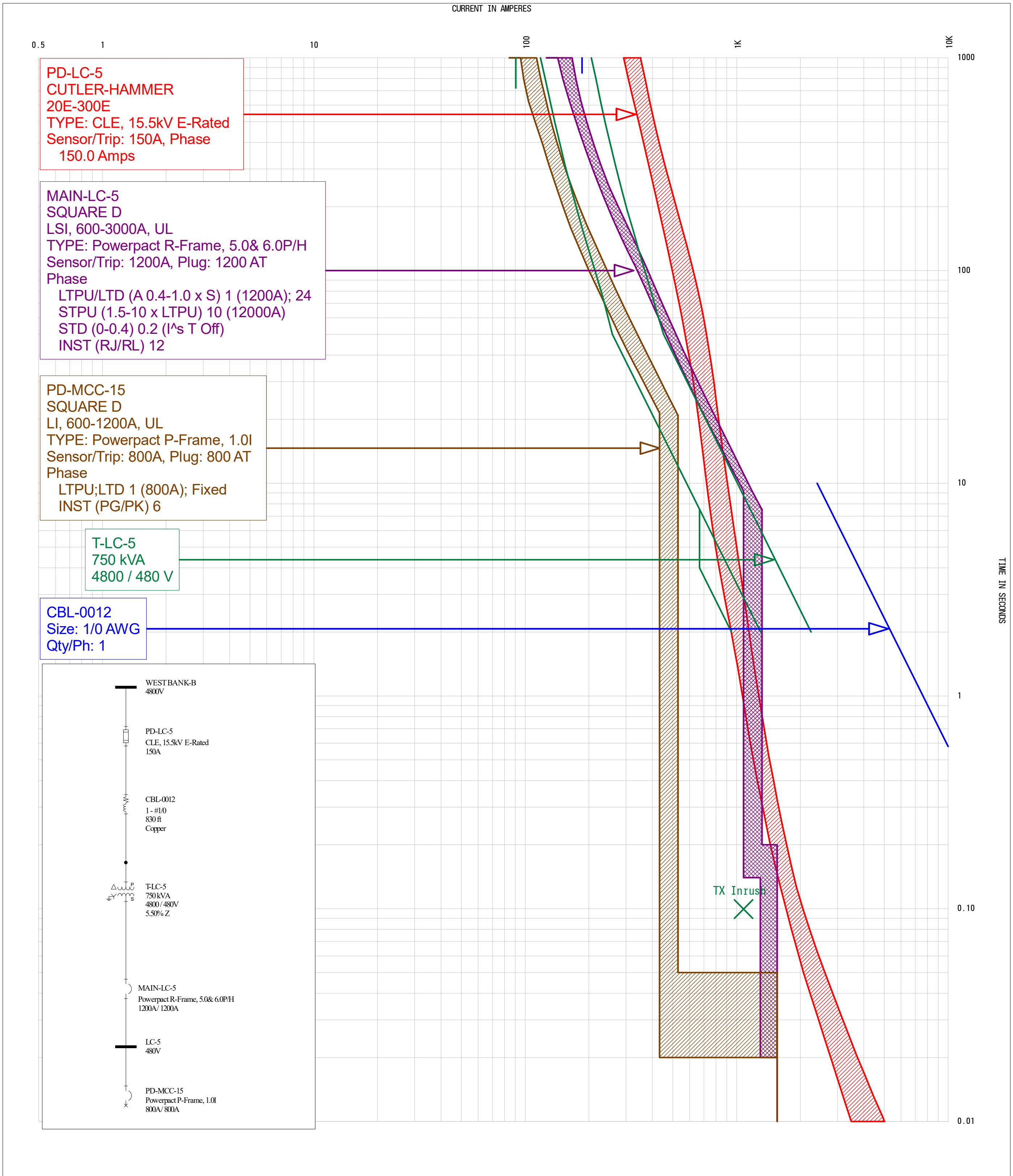
Eaton Electrical Services and Systems May 11, 2023	Plot name: 13 PP-12 Ref. Voltage: 480V Current Scale: x 1



Eaton Electrical Services and Systems May 11, 2023	Plot name: 14 MCC-10 Ref. Voltage: 480V Current Scale: x 10

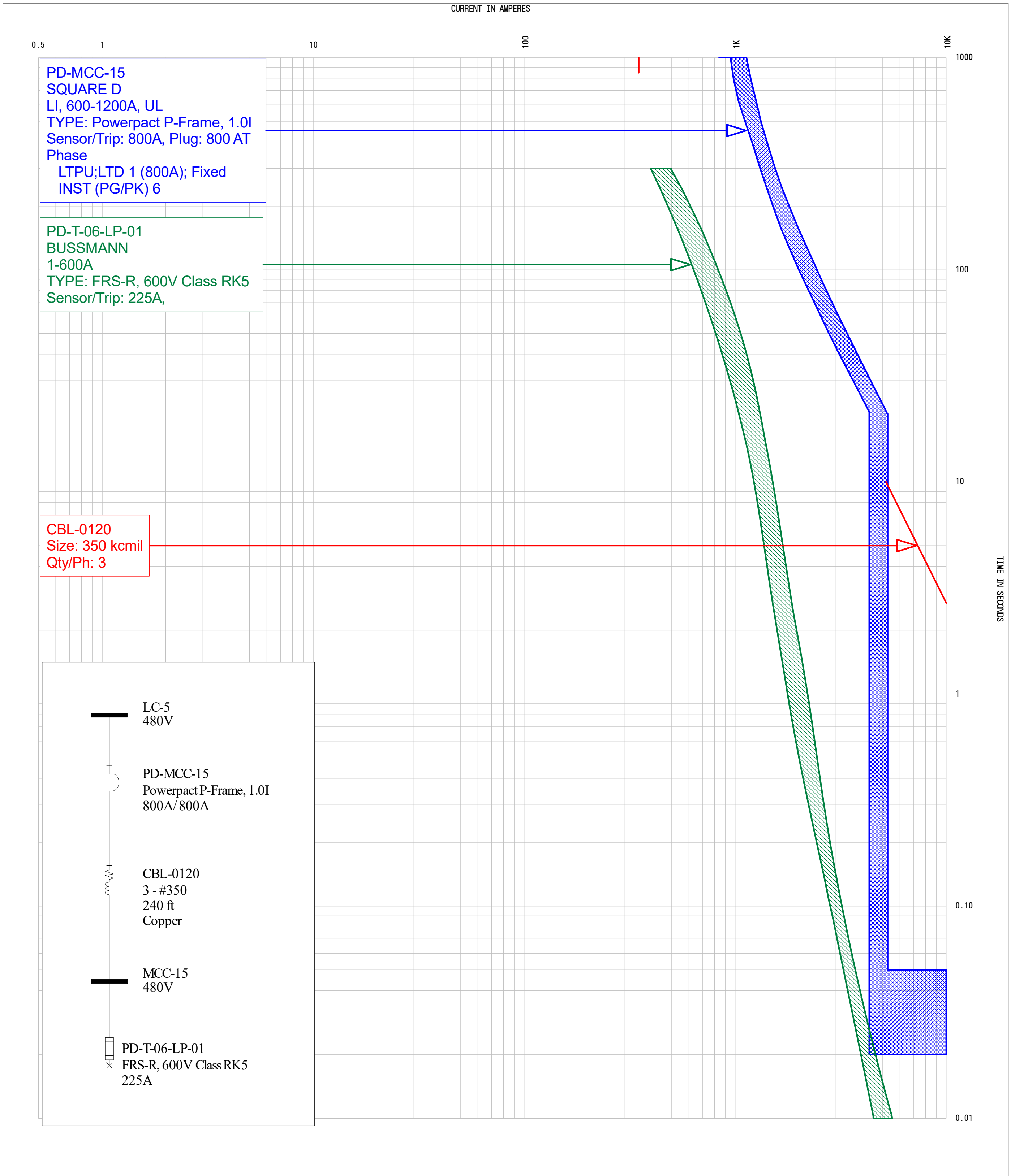


Eaton Electrical Services and Systems May 11, 2023	Plot name: 15 MCC-25 Ref. Voltage: 480V Current Scale: x 10

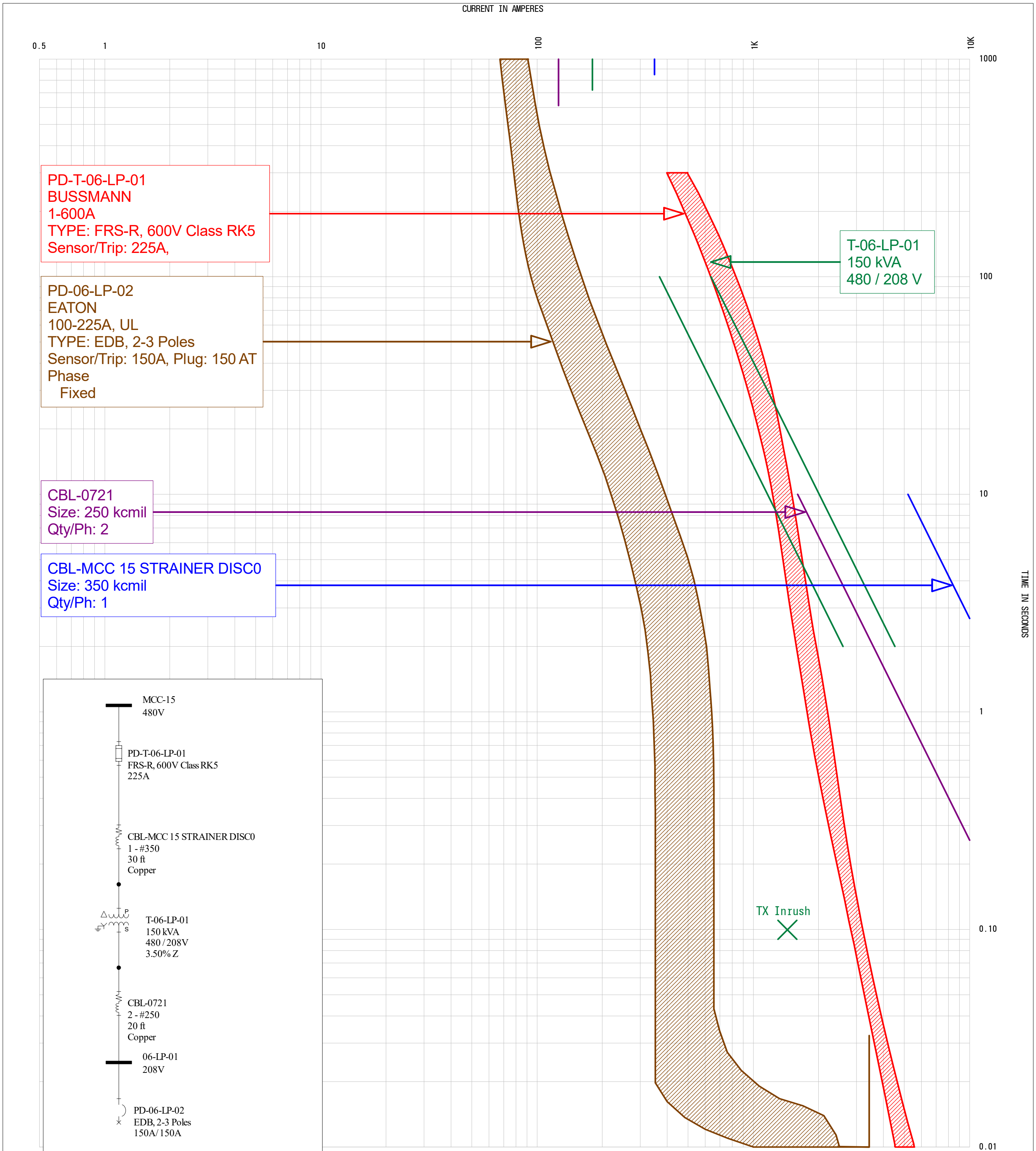


Eaton Electrical Services and Systems
May 11, 2023

Plot name: 16 LC-5
Ref. Voltage: 4800V
Current Scale: x 1

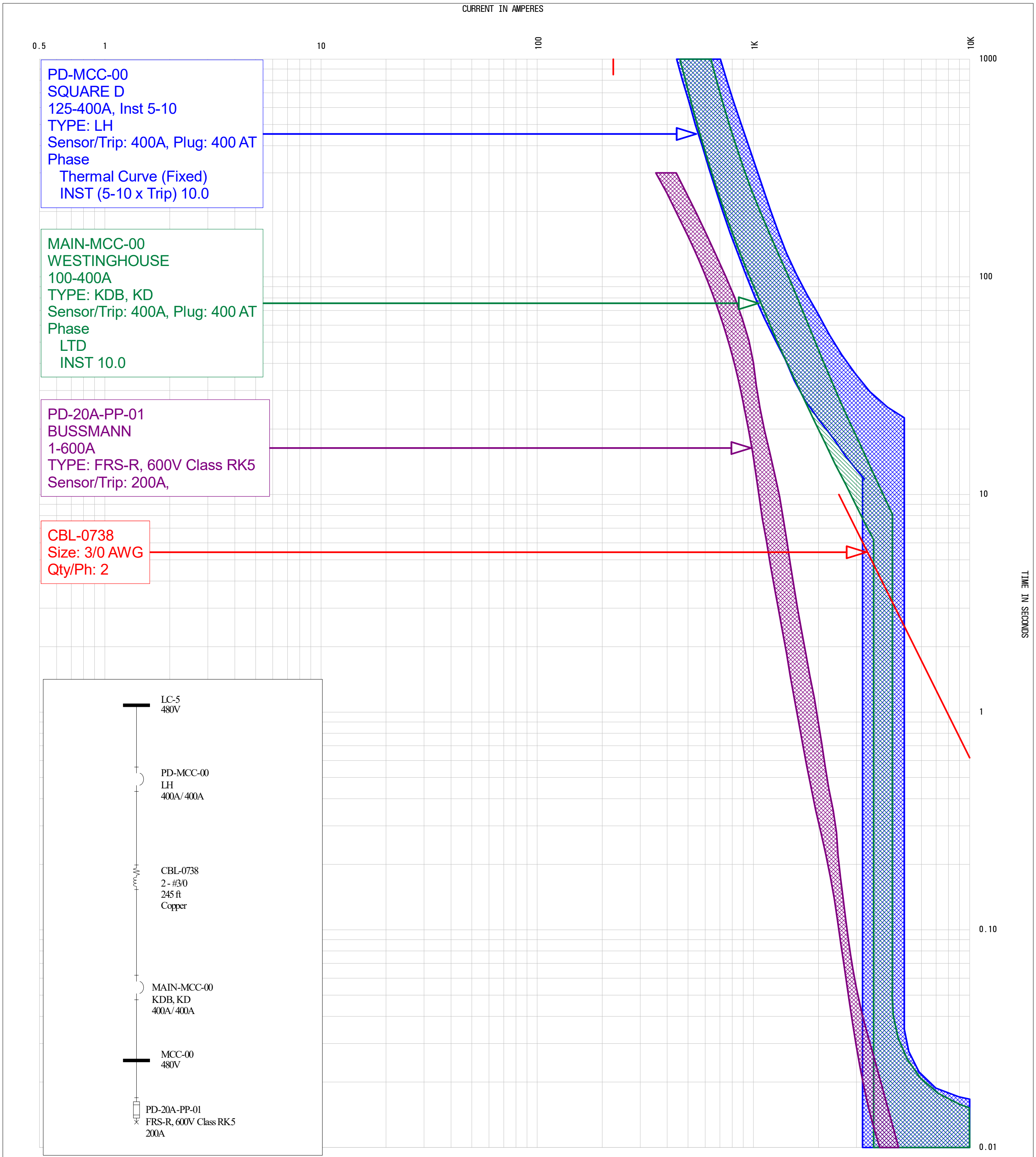


Eaton Electrical Services and Systems May 11, 2023	Plot name: 17 MCC-15 Ref. Voltage: 480V Current Scale: x 1

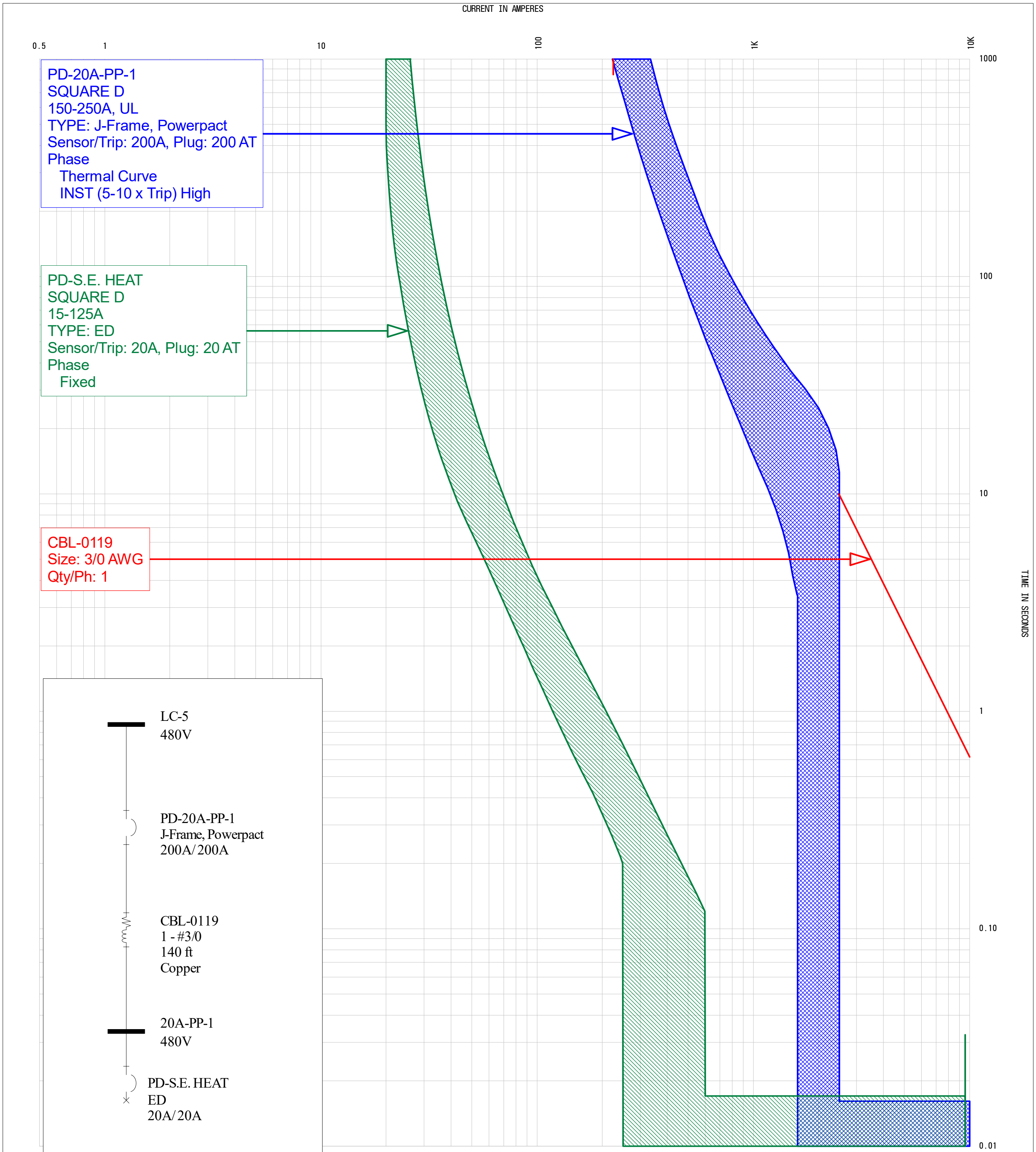


Eaton Electrical Services and Systems
May 11, 2023

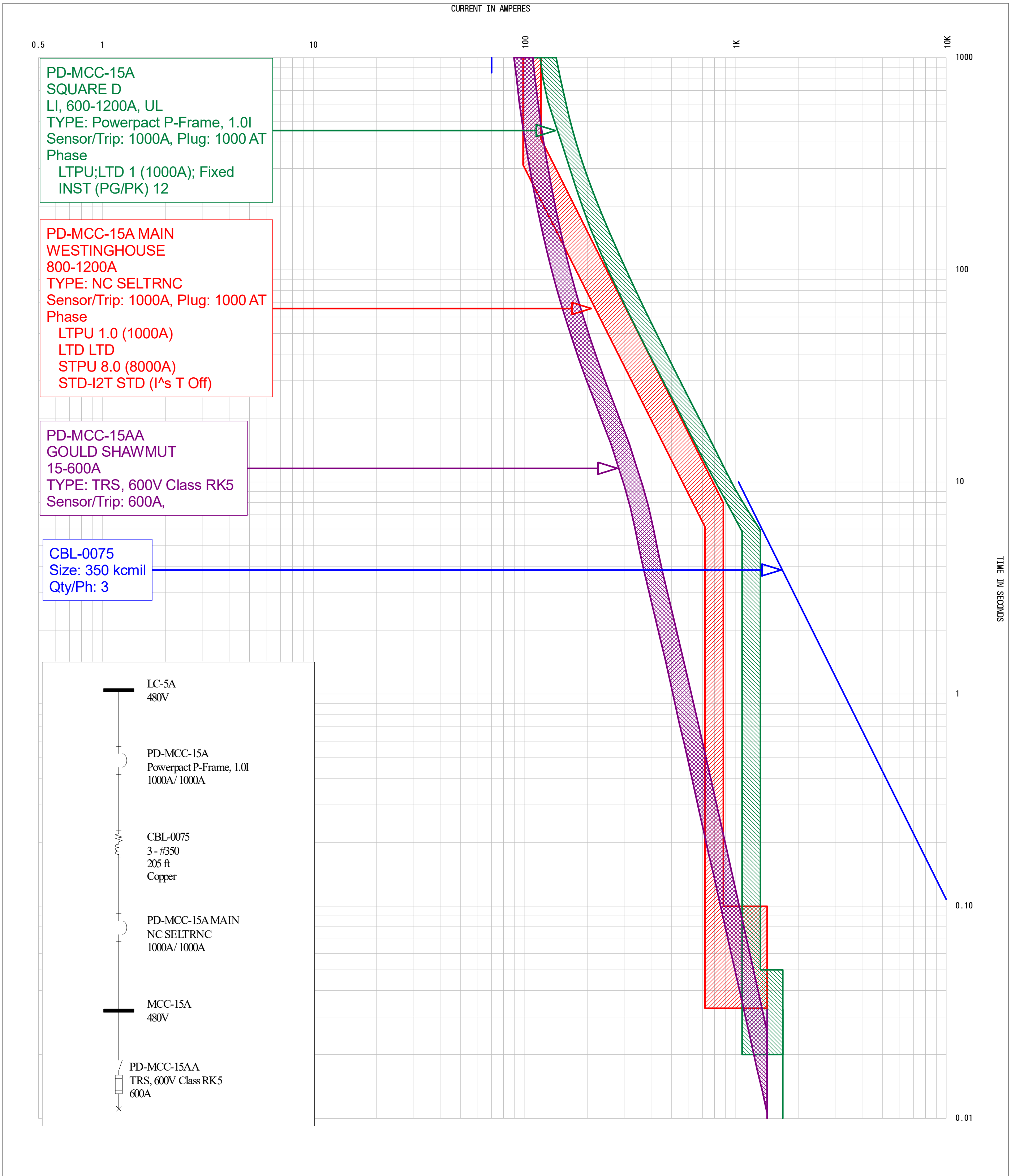
Plot name: 18 06-LP-01
Ref. Voltage: 480V
Current Scale: x 1



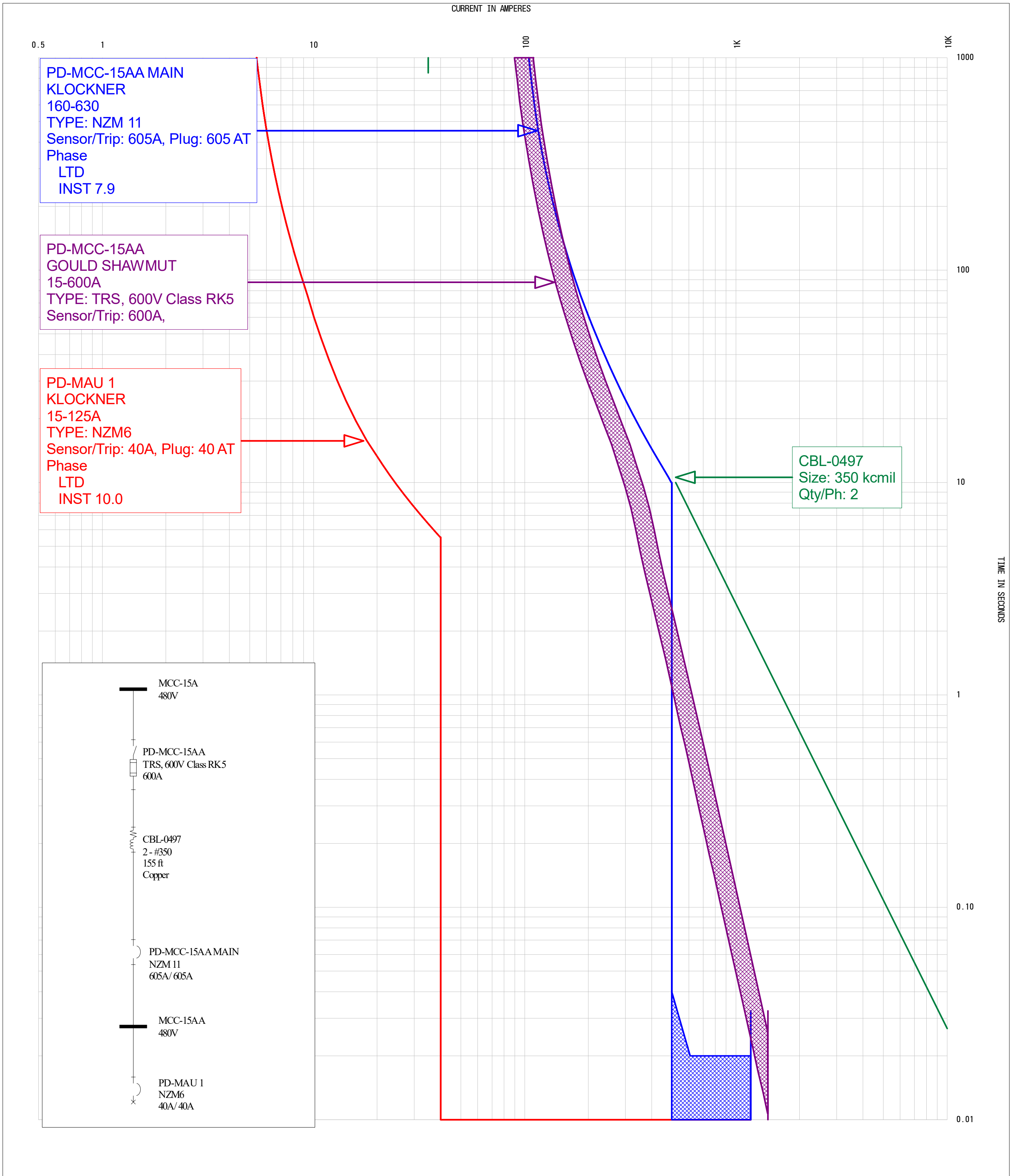
Eaton Electrical Services and Systems May 11, 2023	Plot name: 19 MCC-00 Ref. Voltage: 480V Current Scale: x 1



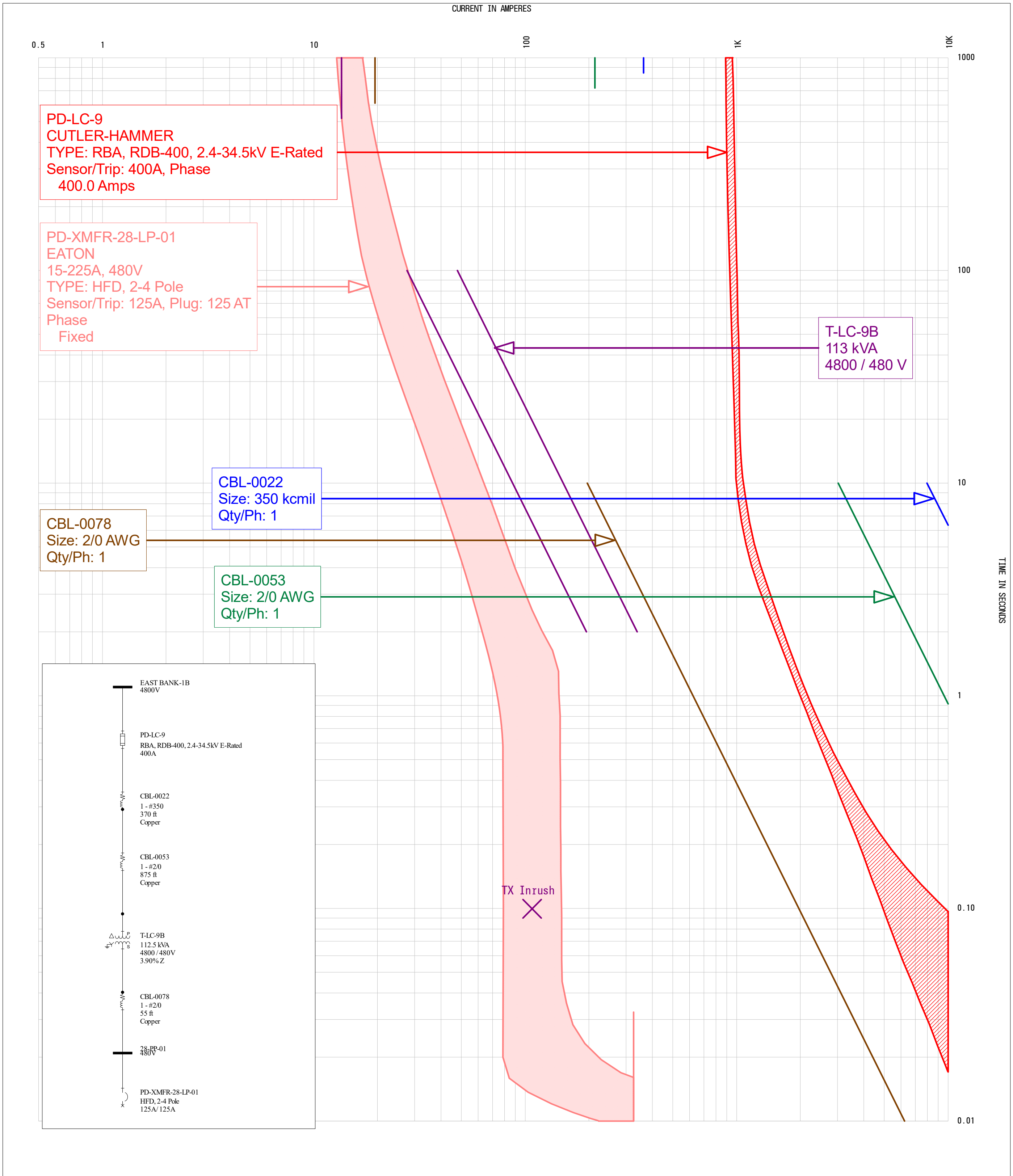
Eaton Electrical Services and Systems May 11, 2023	Plot name: 20 20A-PP-1 Ref. Voltage: 480V Current Scale: x 1



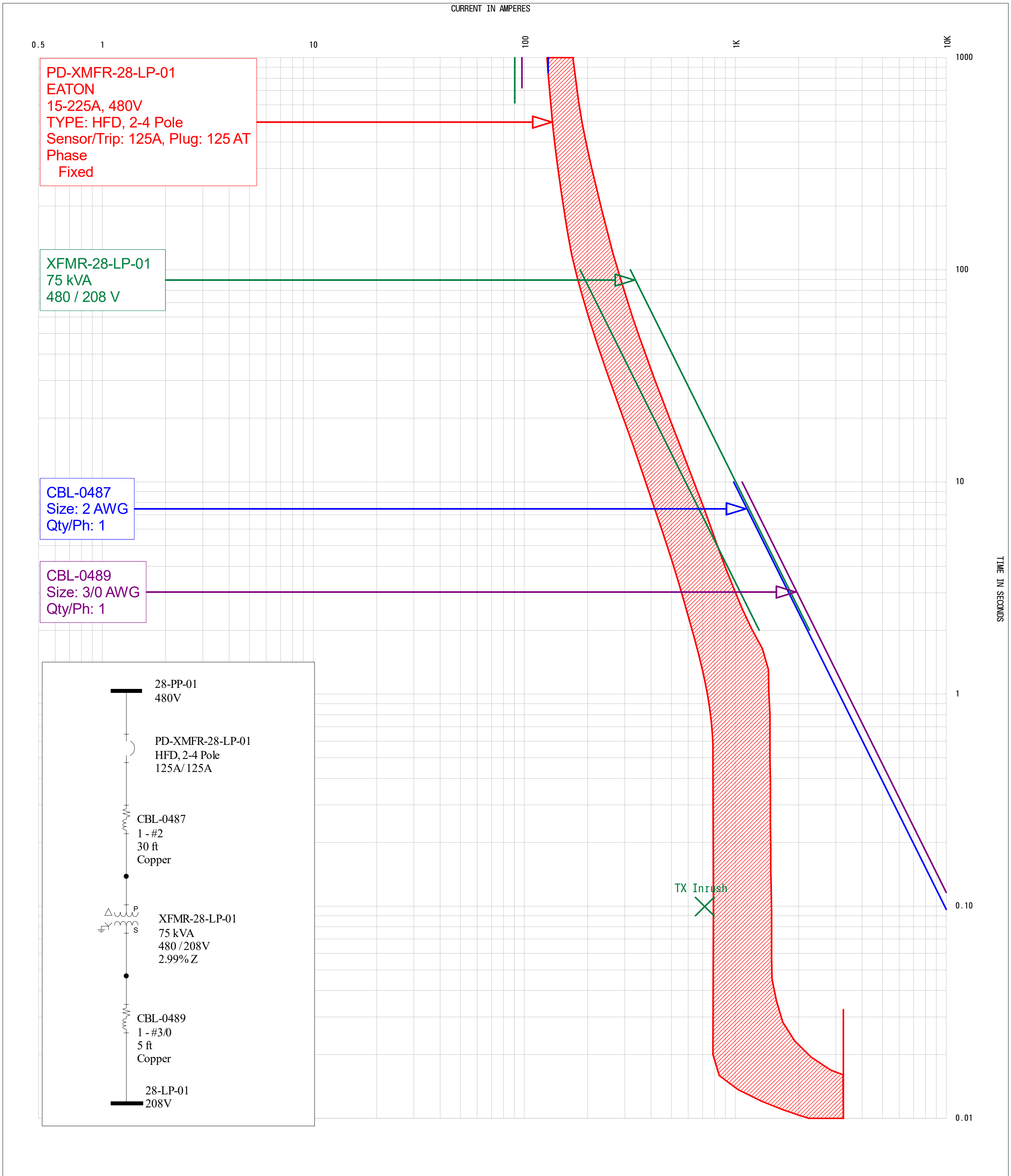
Eaton Electrical Services and Systems May 11, 2023	Plot name: 21 MCC-15A Ref. Voltage: 480V Current Scale: x 10



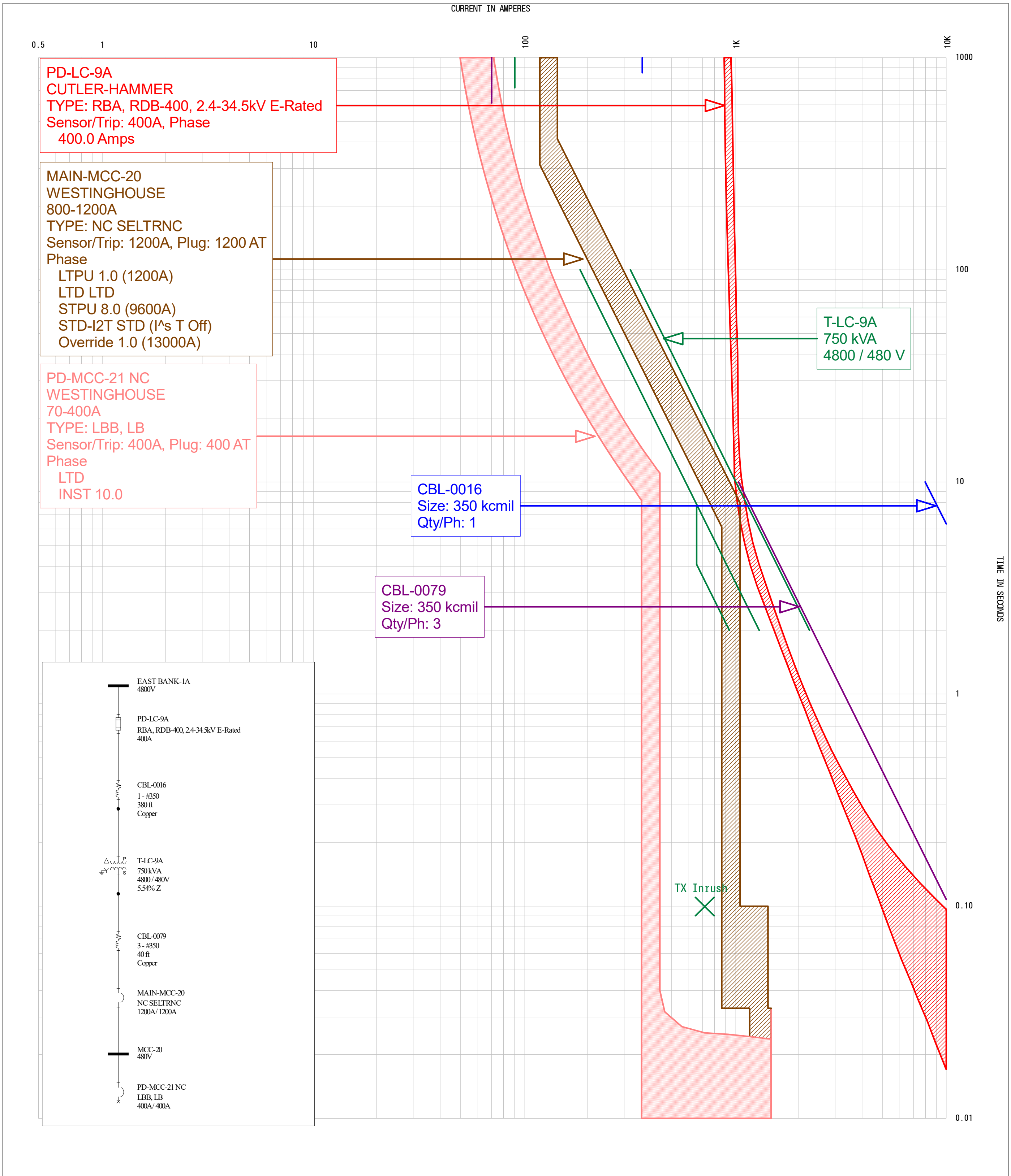
Eaton Electrical Services and Systems May 11, 2023	Plot name: 22 MCC-15AA Ref. Voltage: 480V Current Scale: x 10



Eaton Electrical Services and Systems May 11, 2023	Plot name: 23 28-PP-01 Ref. Voltage: 4800V Current Scale: x 1

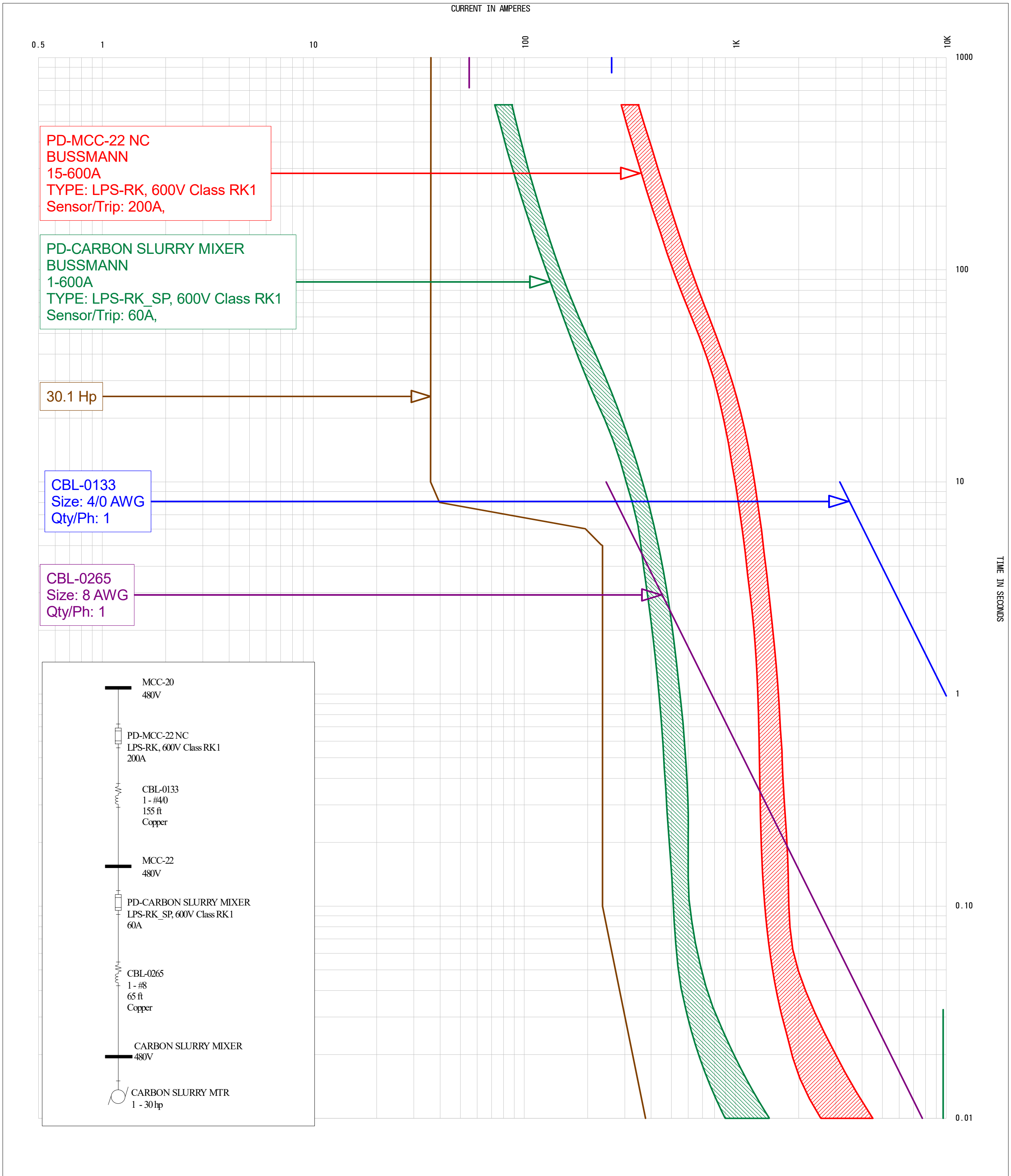


Eaton Electrical Services and Systems May 11, 2023	Plot name: 24 28-LP-01 Ref. Voltage: 480V Current Scale: x 1

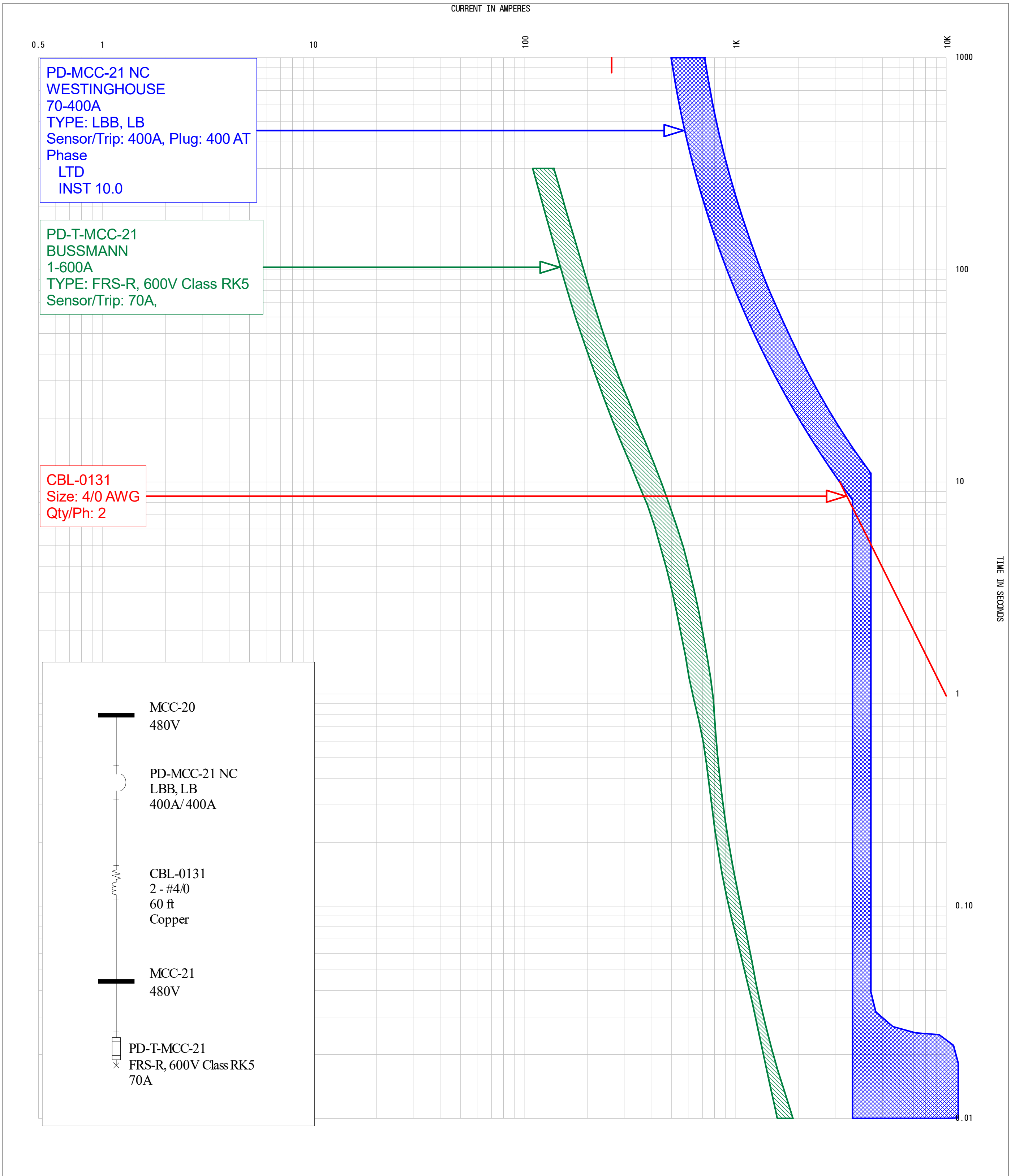


Eaton Electrical Services and Systems
May 11, 2023

Plot name: 25 MCC-20
Ref. Voltage: 4800V
Current Scale: x 1

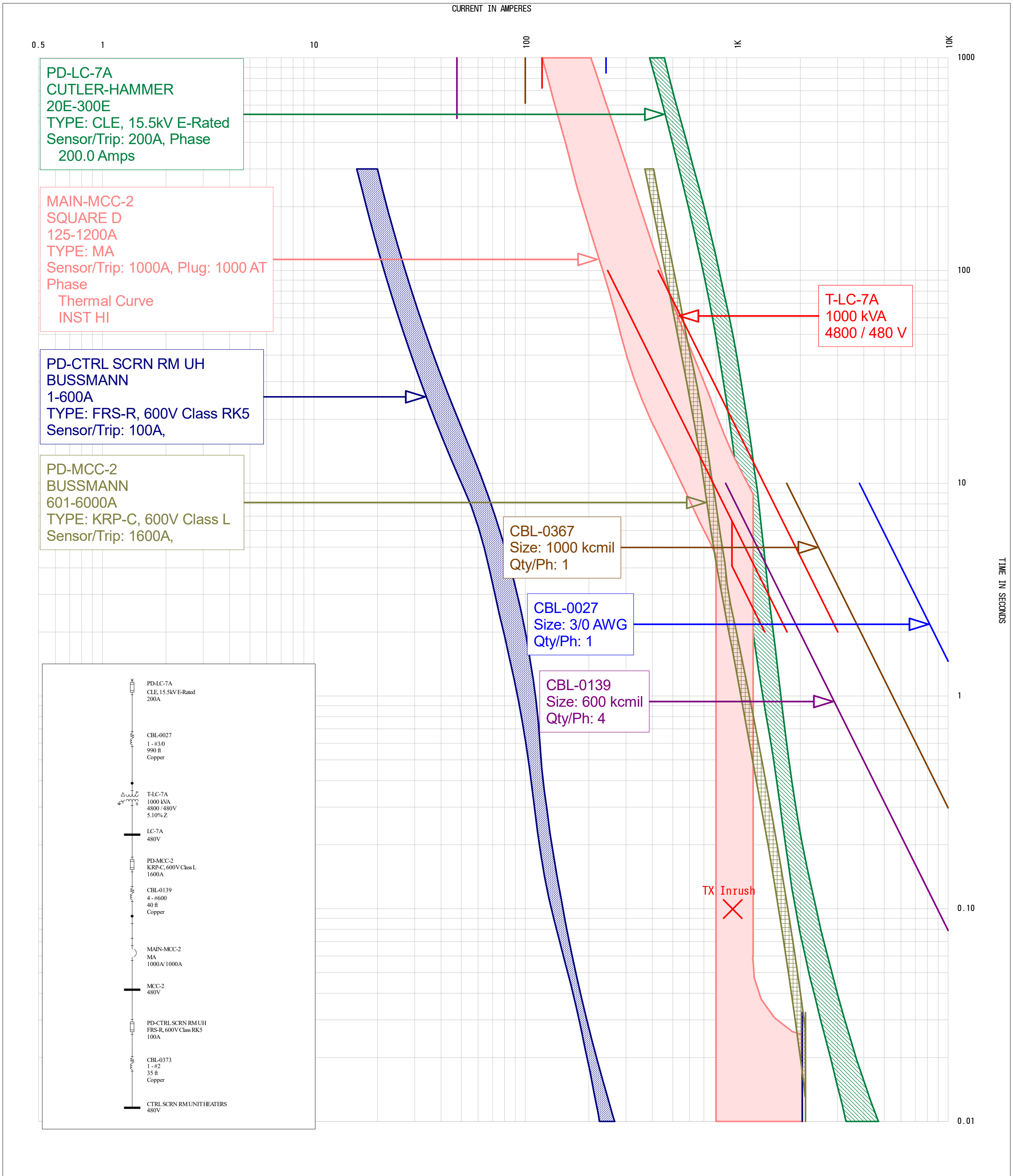


Eaton Electrical Services and Systems May 11, 2023	Plot name: 26 MCC-22 Ref. Voltage: 480V Current Scale: x 1

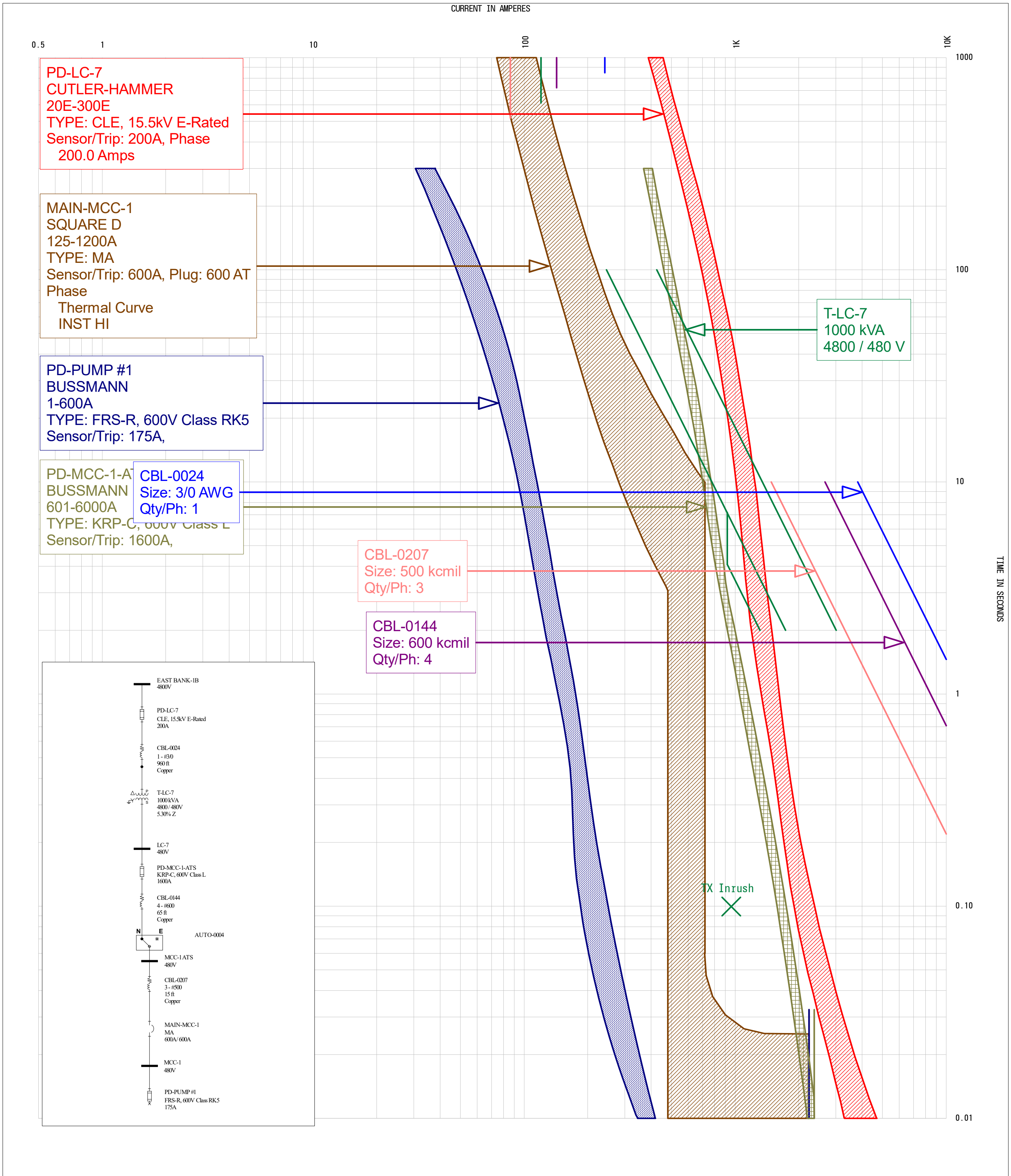


Eaton Electrical Services and Systems
May 11, 2023

Plot name: 27 MCC-21
Ref. Voltage: 480V
Current Scale: x 1

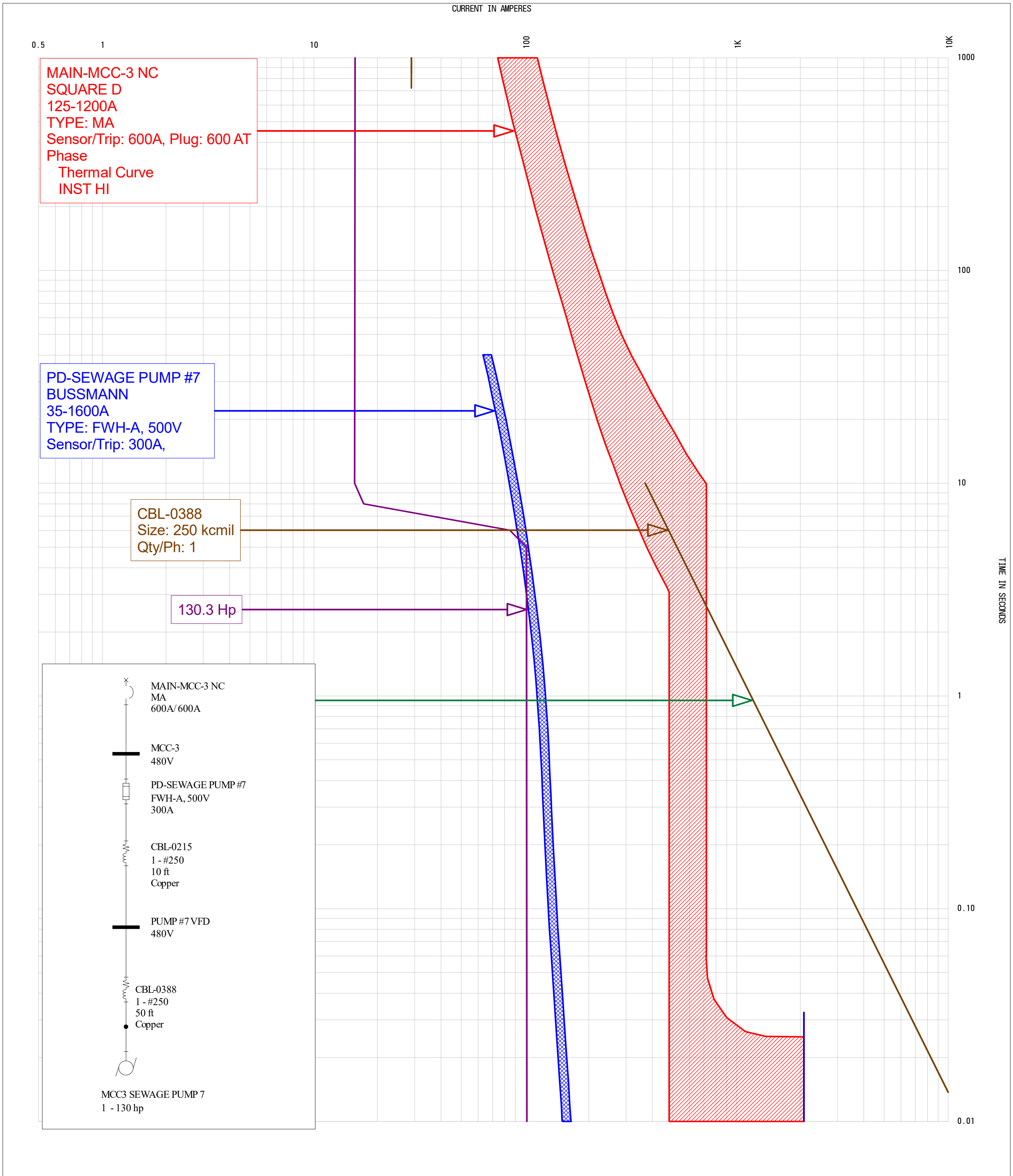


Eaton Electrical Services and Systems May 11, 2023	Plot name: 28 MCC-2 Ref. Voltage: 4800V Current Scale: x 1

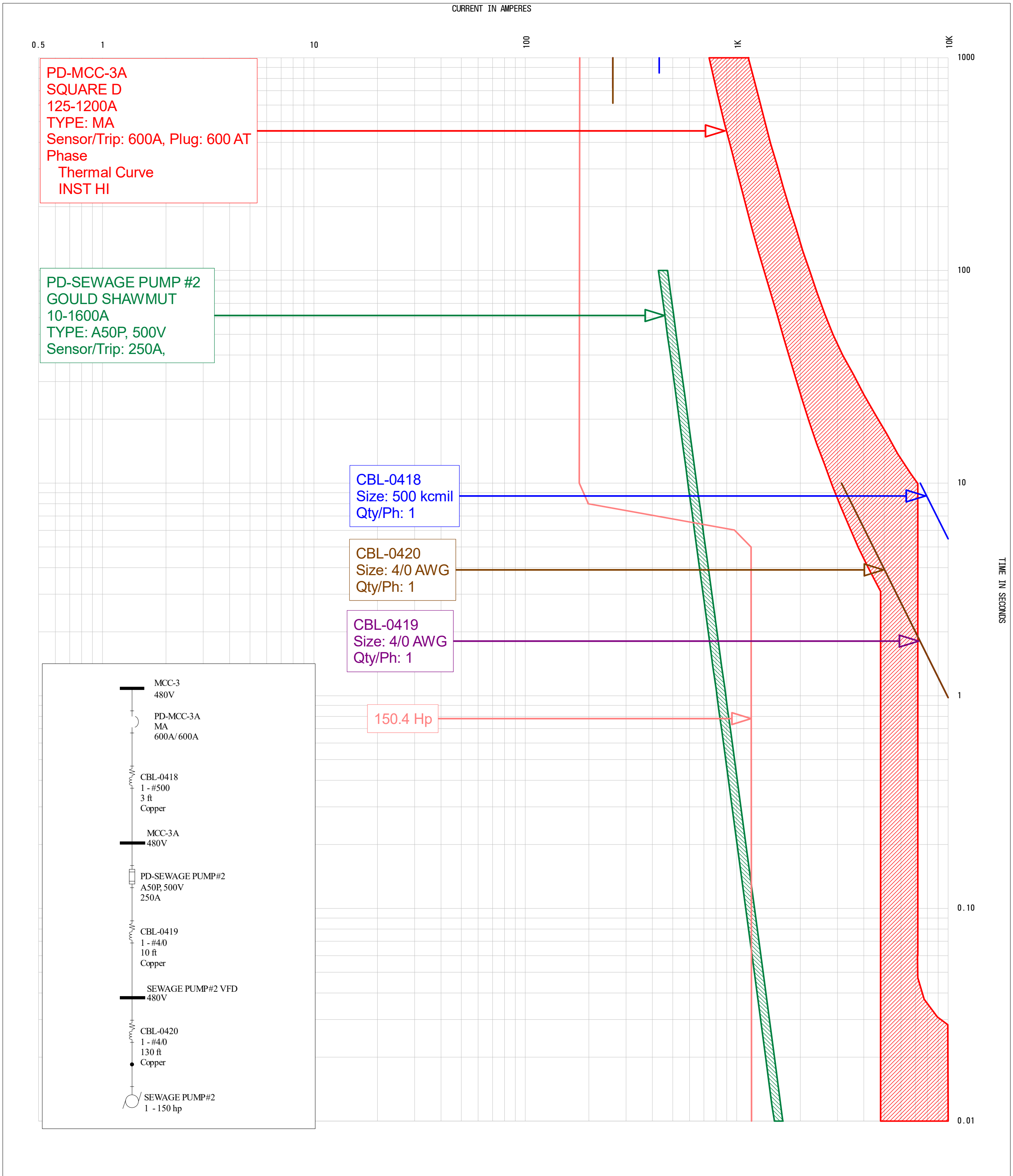


Eaton Electrical Services and Systems
May 11, 2023

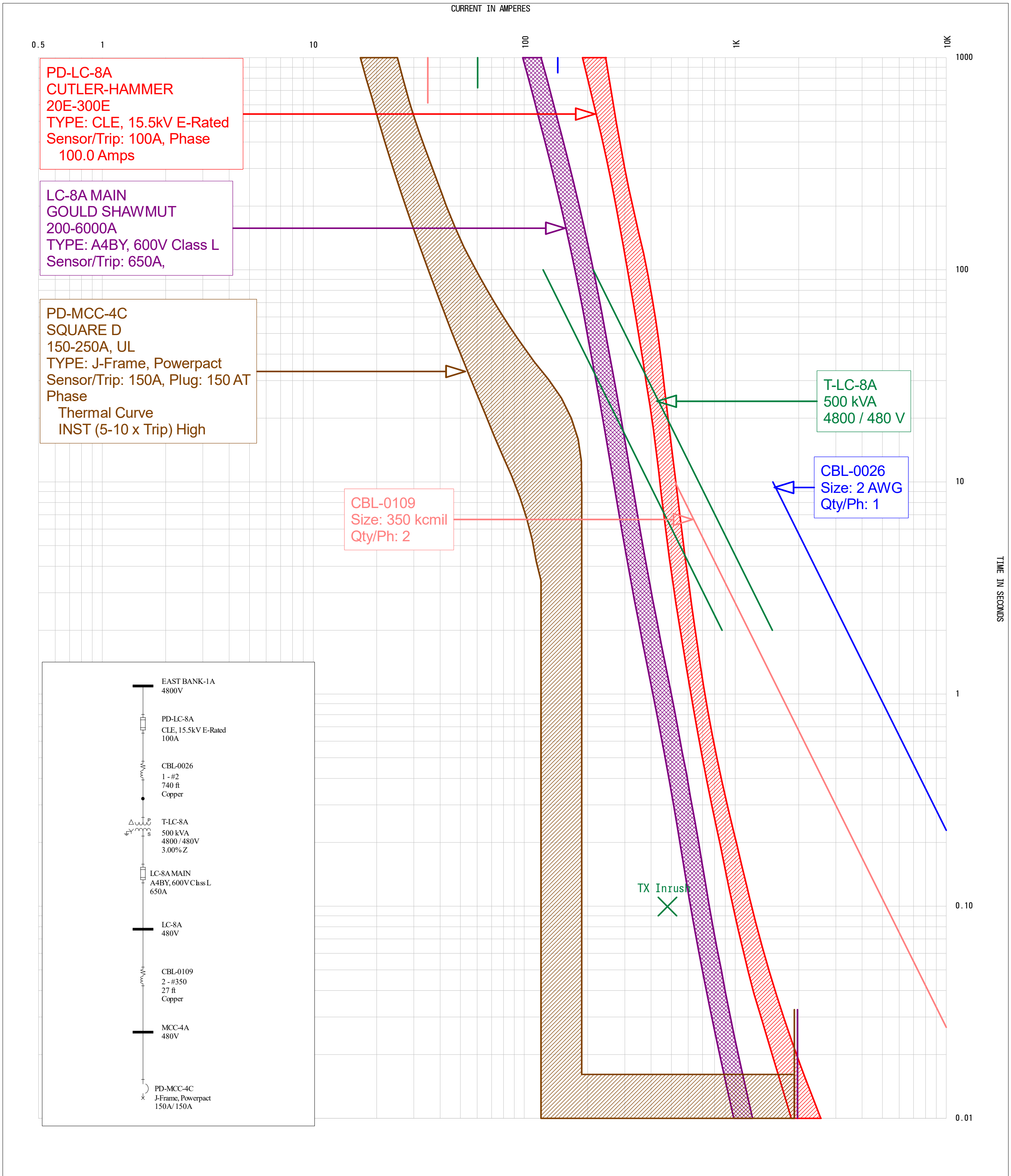
Plot name: 29 MCC-1
Ref. Voltage: 4800V
Current Scale: x 1



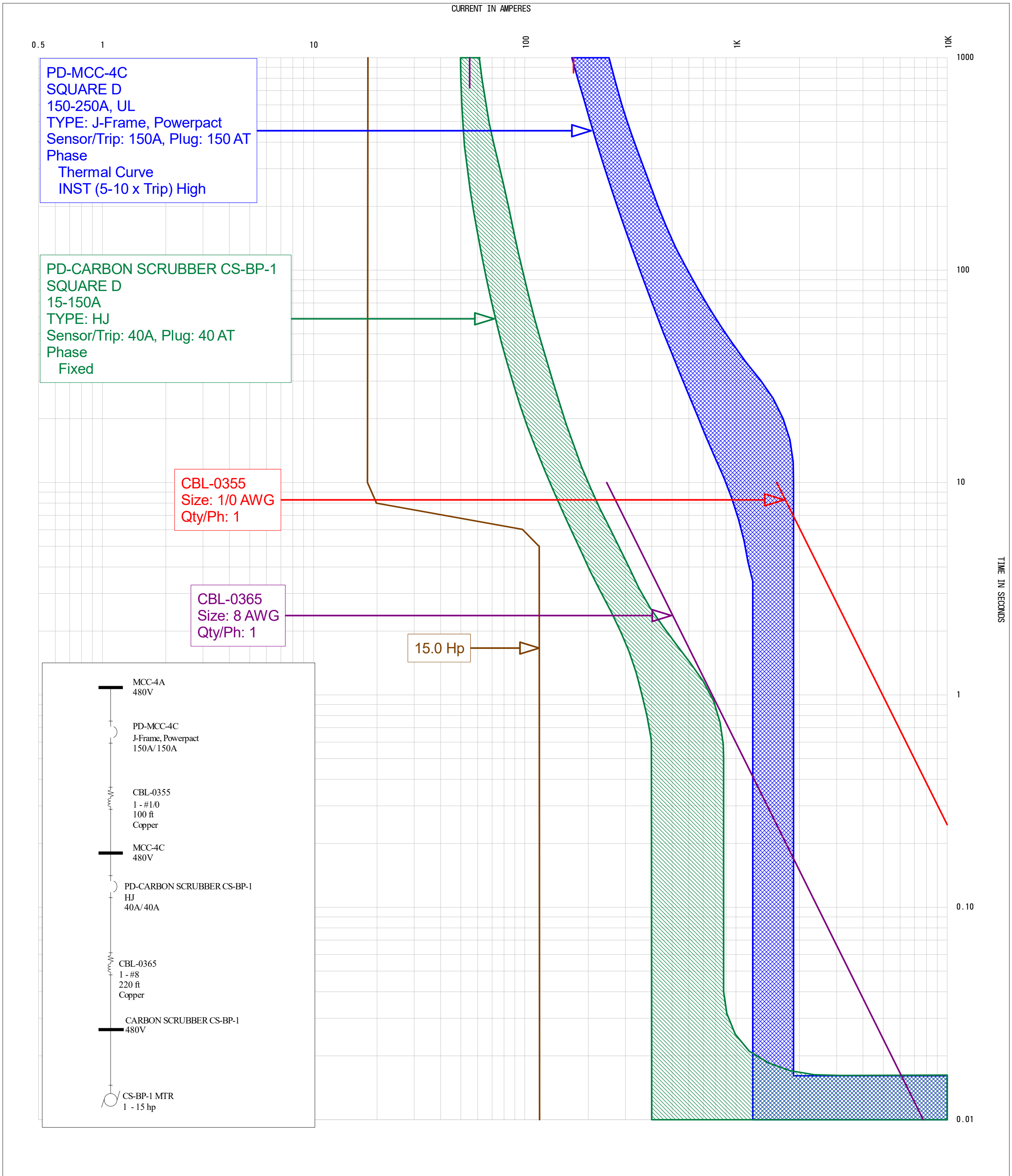
Eaton Electrical Services and Systems May 11, 2023	Plot name: 30 MCC-3 Ref. Voltage: 480V Current Scale: x 10



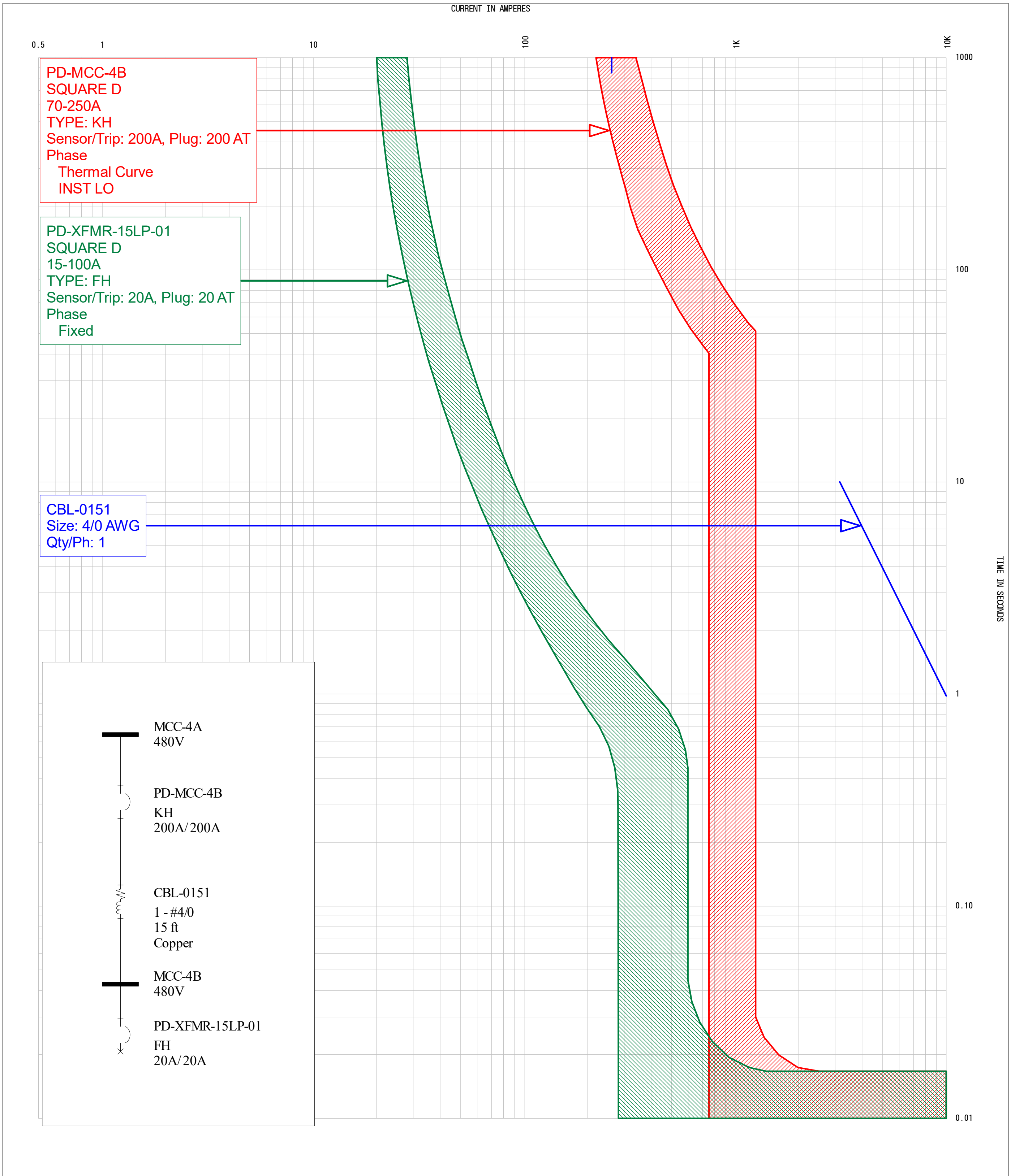
Eaton Electrical Services and Systems May 11, 2023	Plot name: 31 MCC-3A Ref. Voltage: 480V Current Scale: x 1



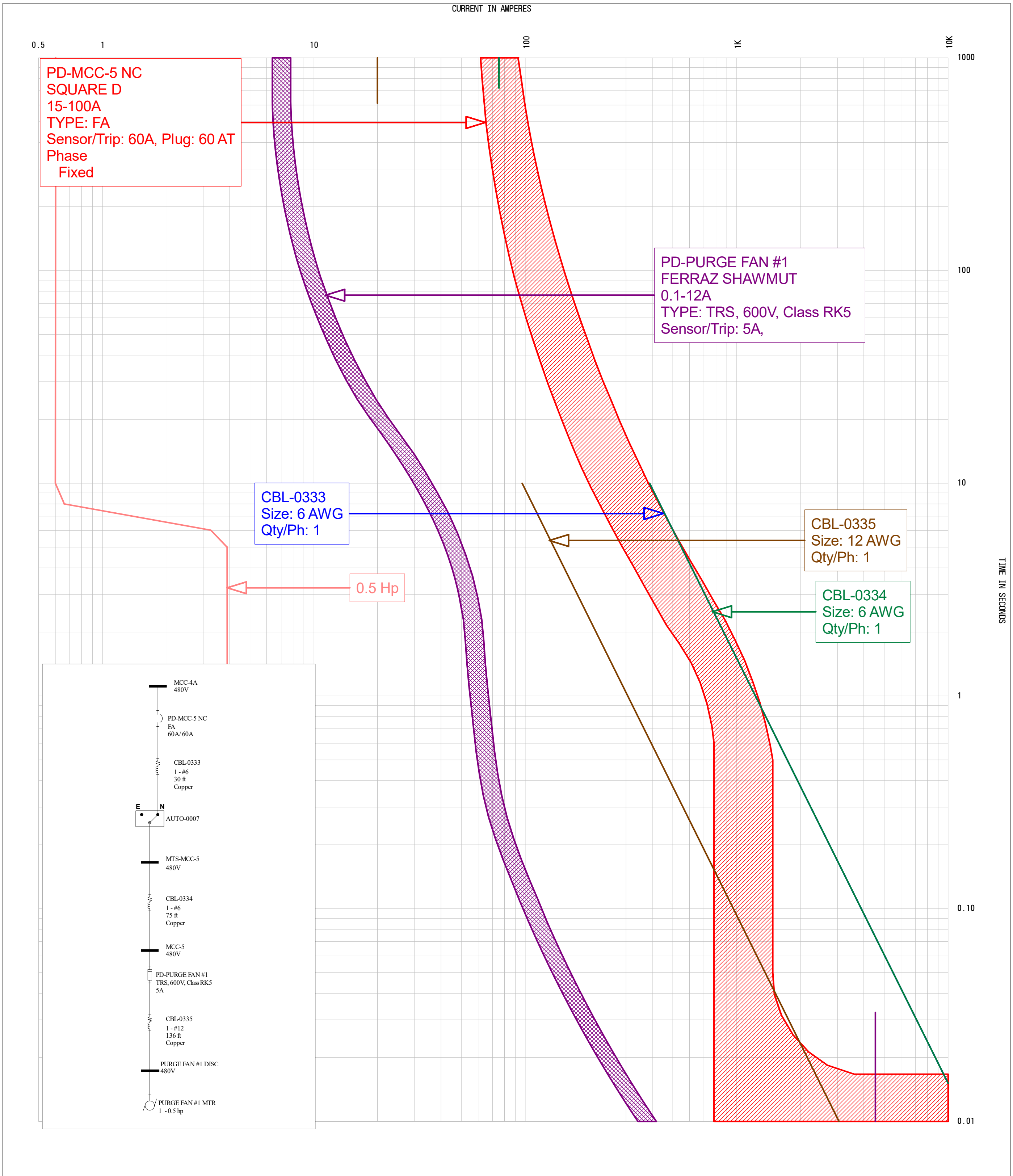
Eaton Electrical Services and Systems May 11, 2023	Plot name: 32 MCC-4A Ref. Voltage: 4800V Current Scale: x 1



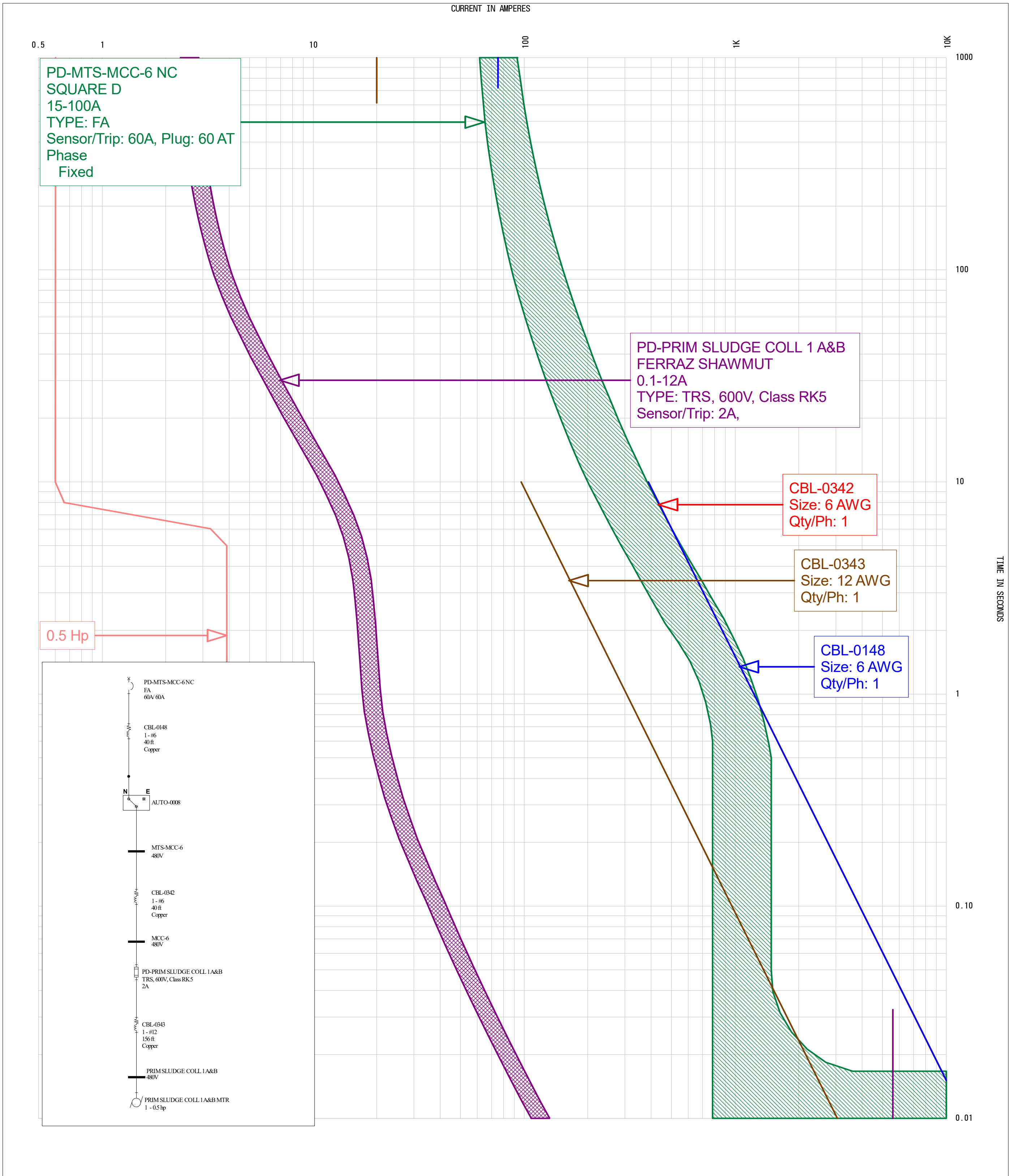
Eaton Electrical Services and Systems May 11, 2023	Plot name: 33 MCC-4C Ref. Voltage: 480V Current Scale: x 1



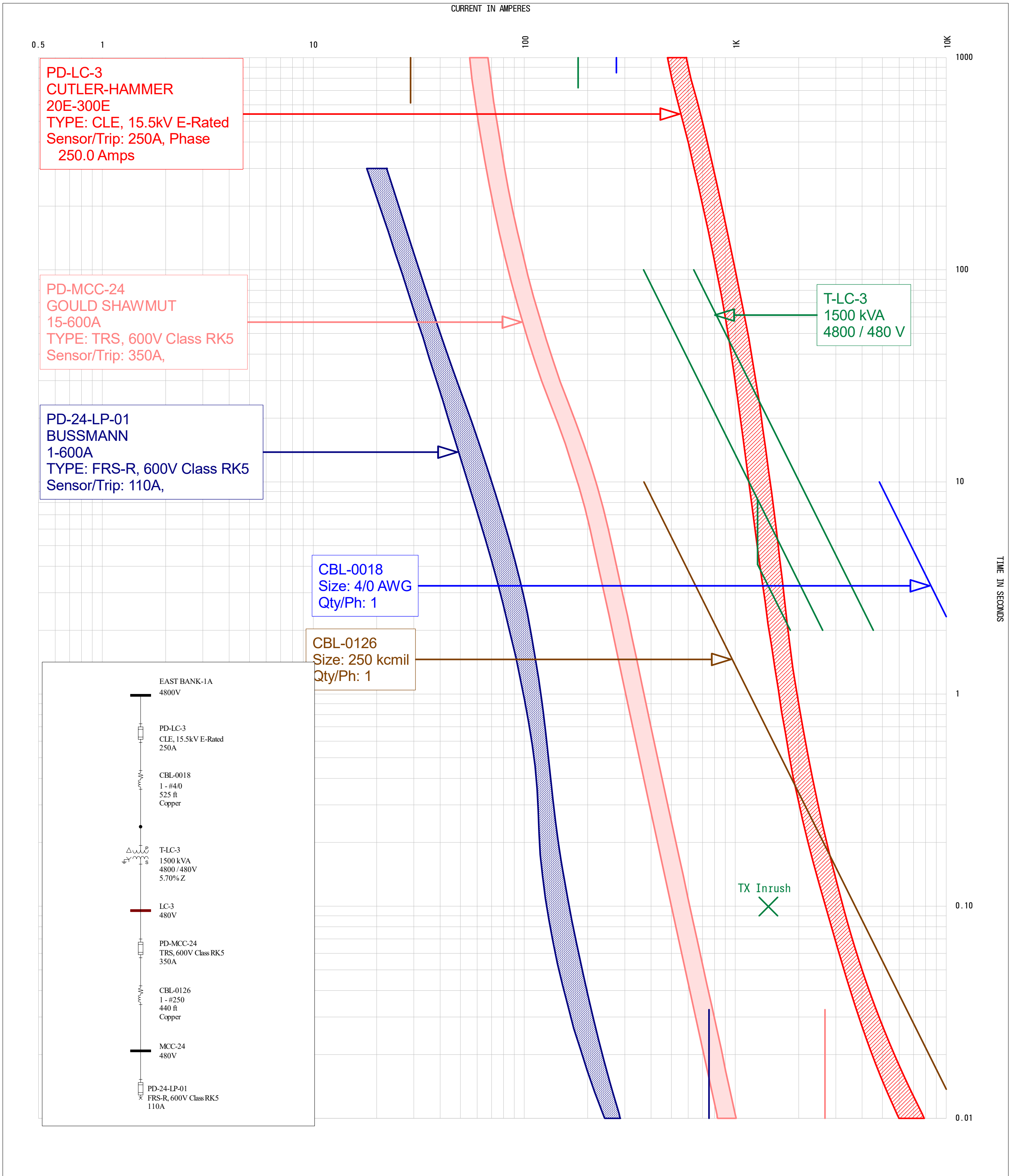
Eaton Electrical Services and Systems May 11, 2023	Plot name: 34 MCC-4B Ref. Voltage: 480V Current Scale: x 1



Eaton Electrical Services and Systems May 11, 2023	Plot name: 35 MCC-5 Ref. Voltage: 480V Current Scale: x 1

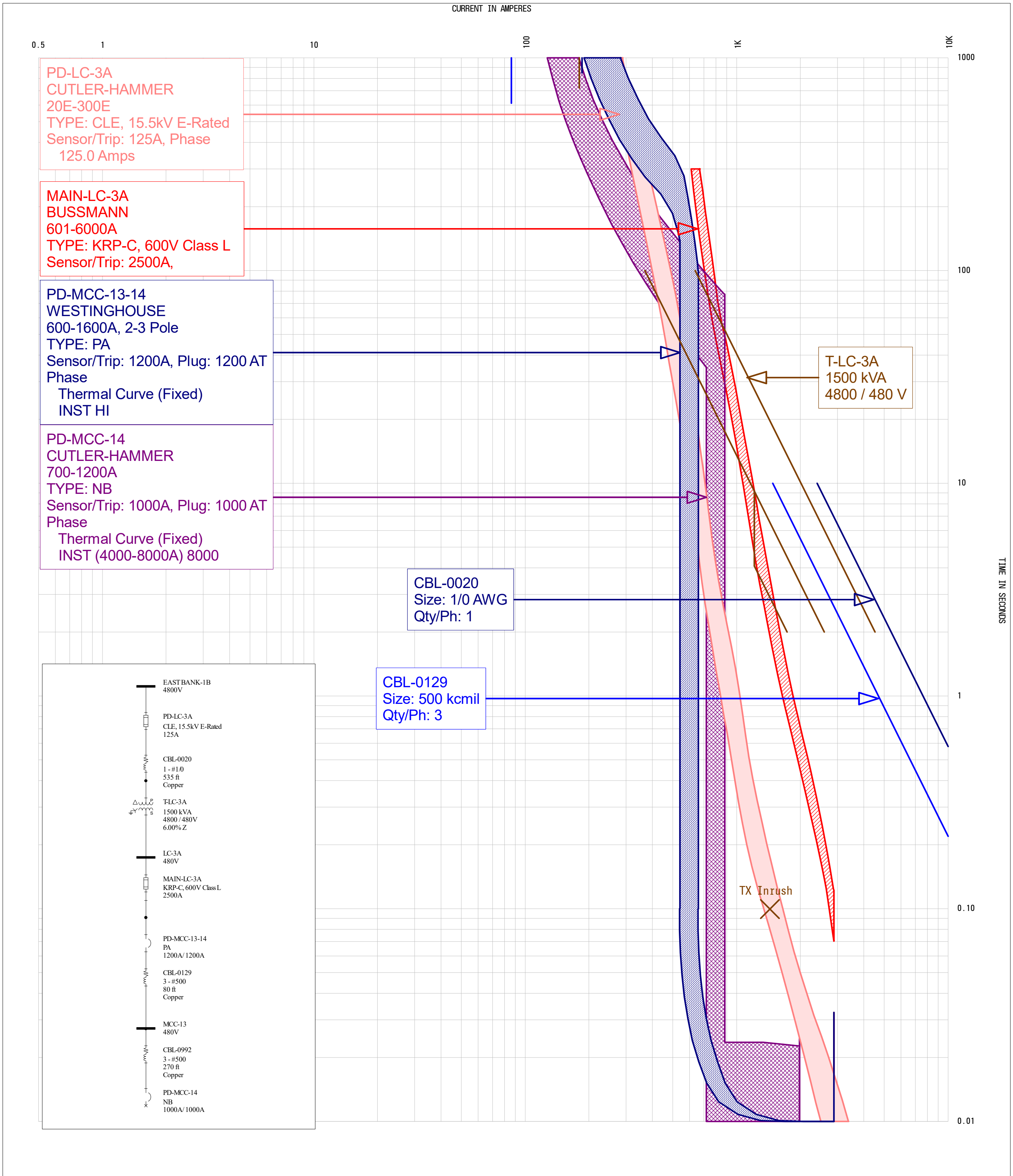


Eaton Electrical Services and Systems May 11, 2023	Plot name: 36 MCC-6 Ref. Voltage: 480V Current Scale: x 1

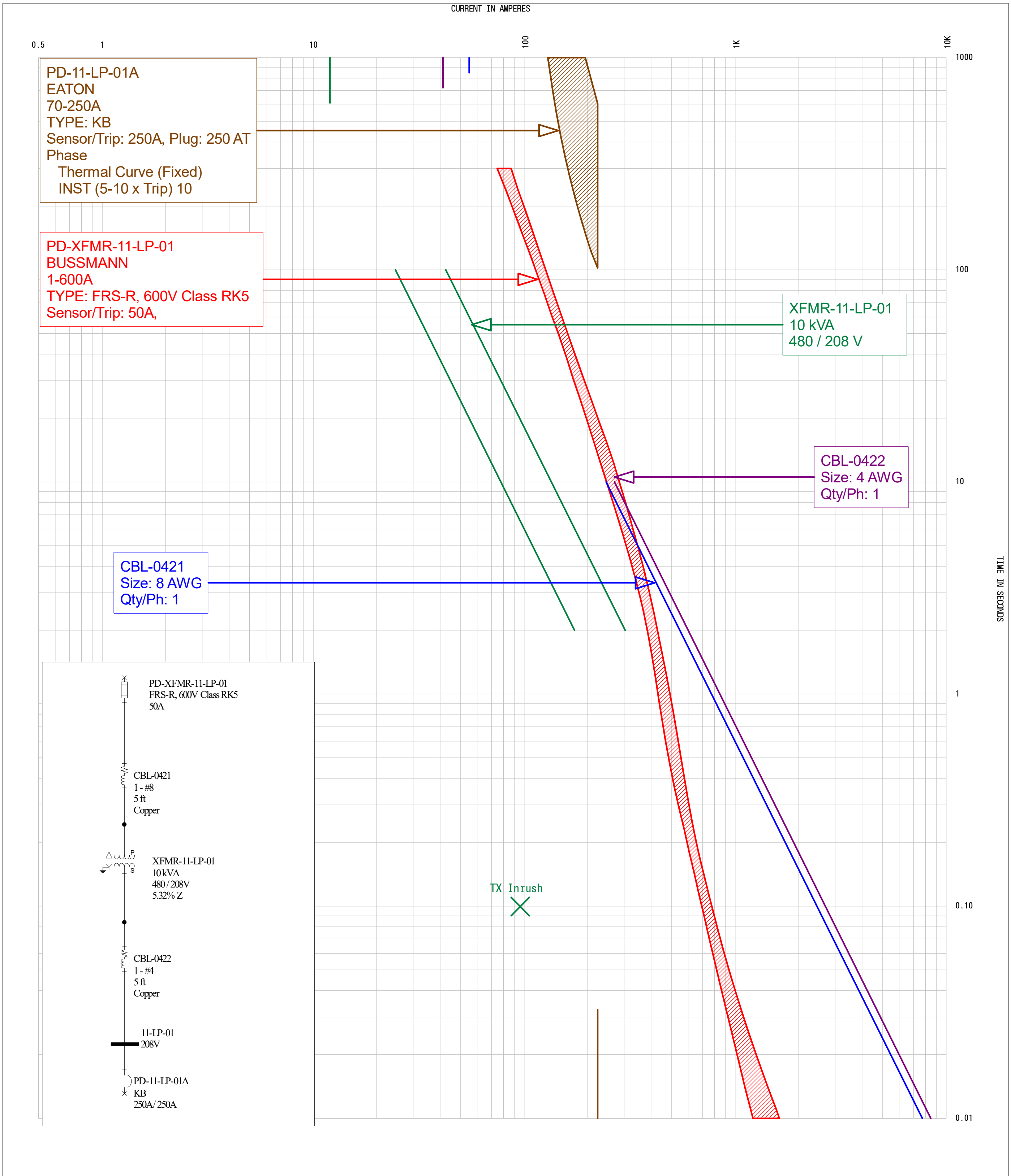


Eaton Electrical Services and Systems
May 11, 2023

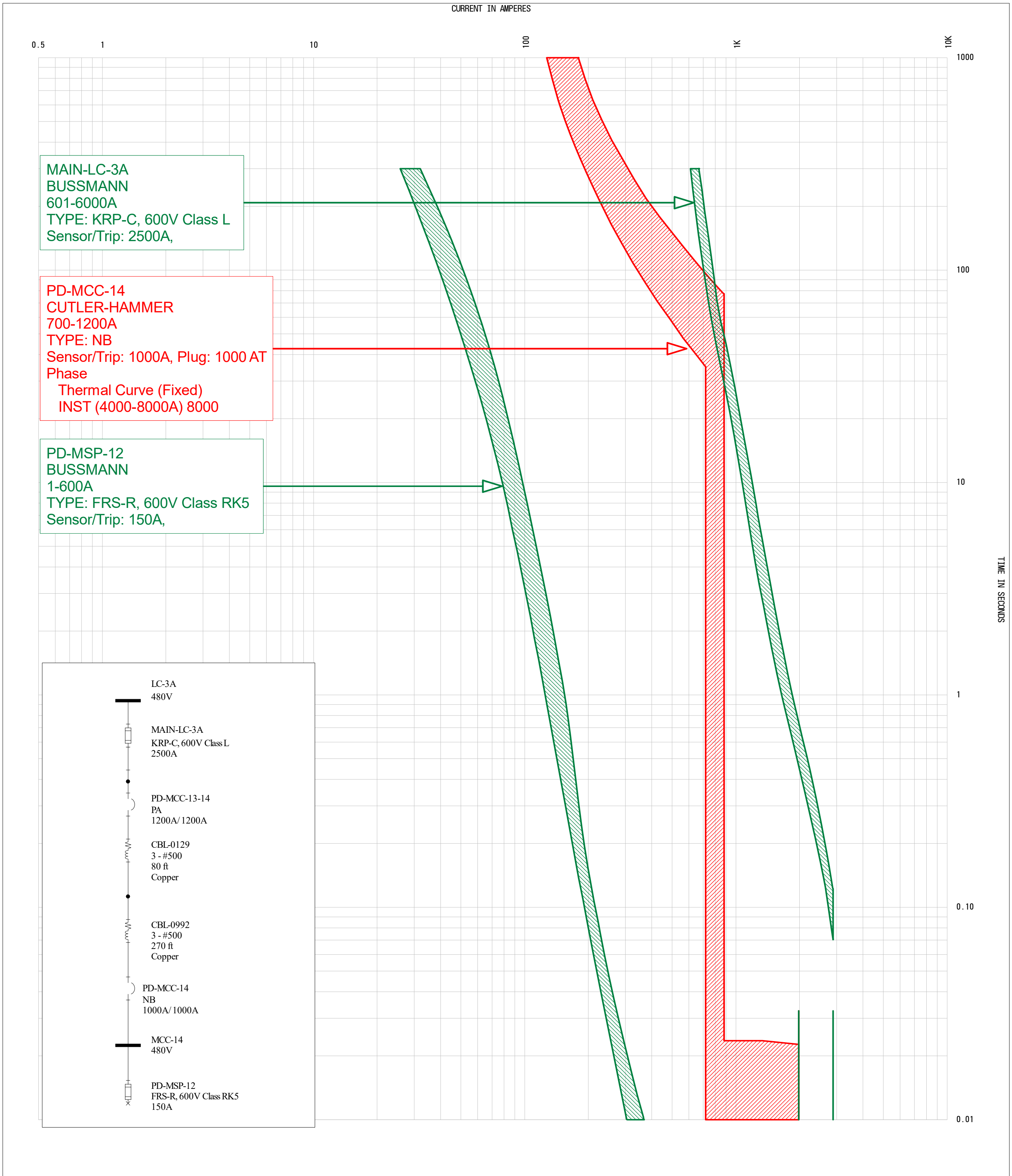
Plot name: 37 MCC-24
Ref. Voltage: 4800V
Current Scale: x 1



Eaton Electrical Services and Systems May 11, 2023	Plot name: 38 MCC-13 Ref. Voltage: 4800V Current Scale: x 1

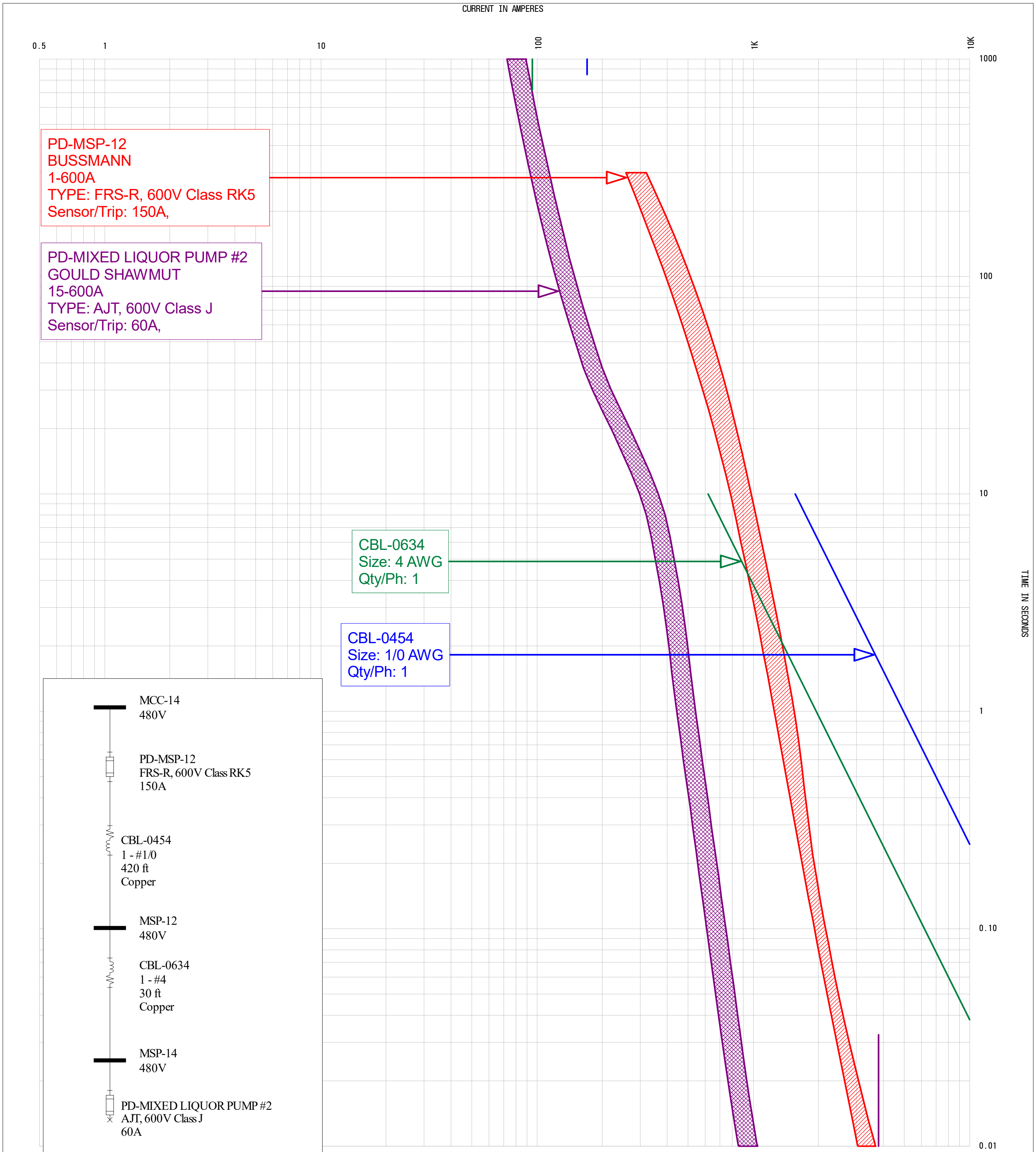


Eaton Electrical Services and Systems May 11, 2023	Plot name: 39 11-LP-01 Ref. Voltage: 480V Current Scale: x 1

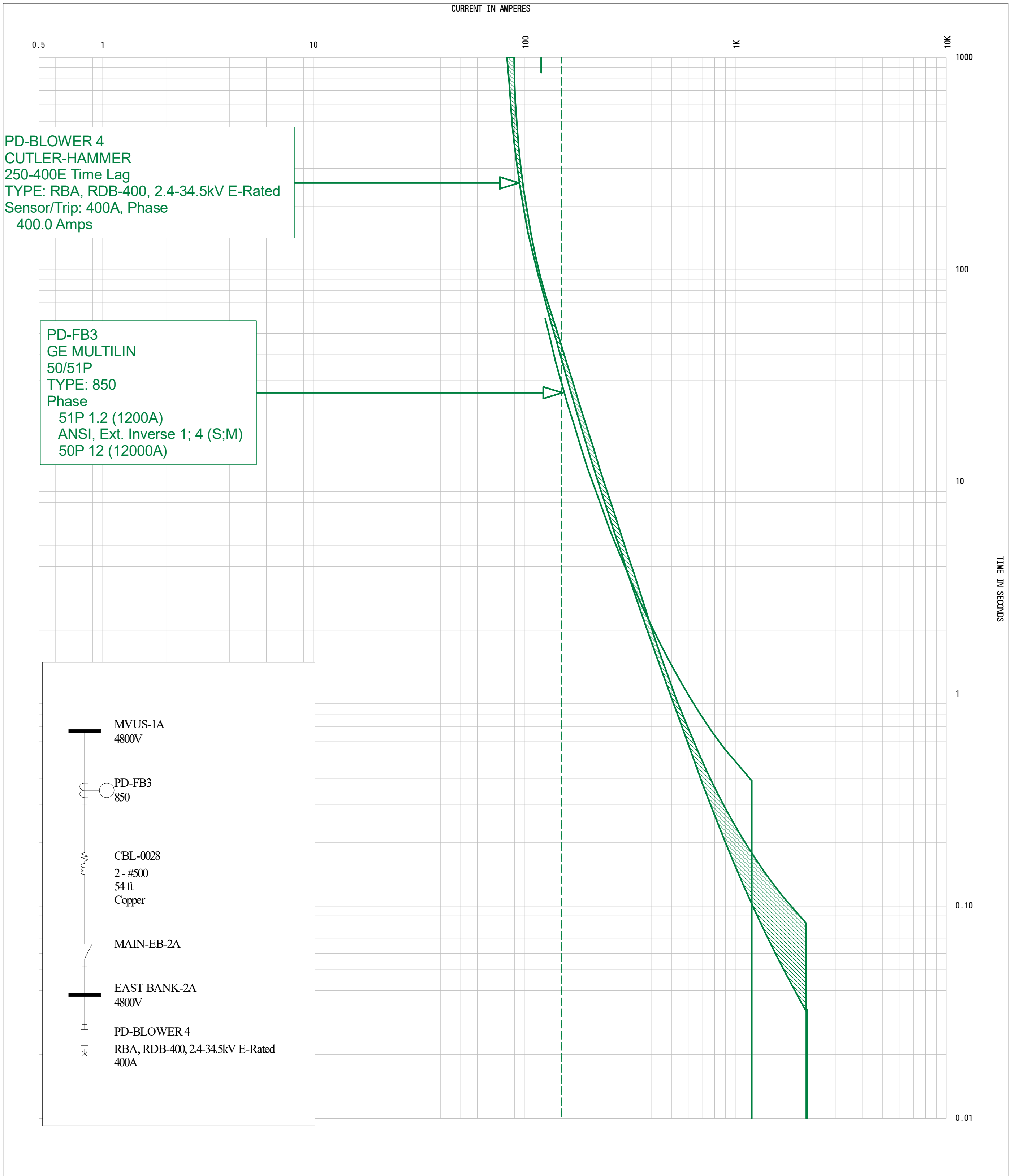


Eaton Electrical Services and Systems
May 11, 2023

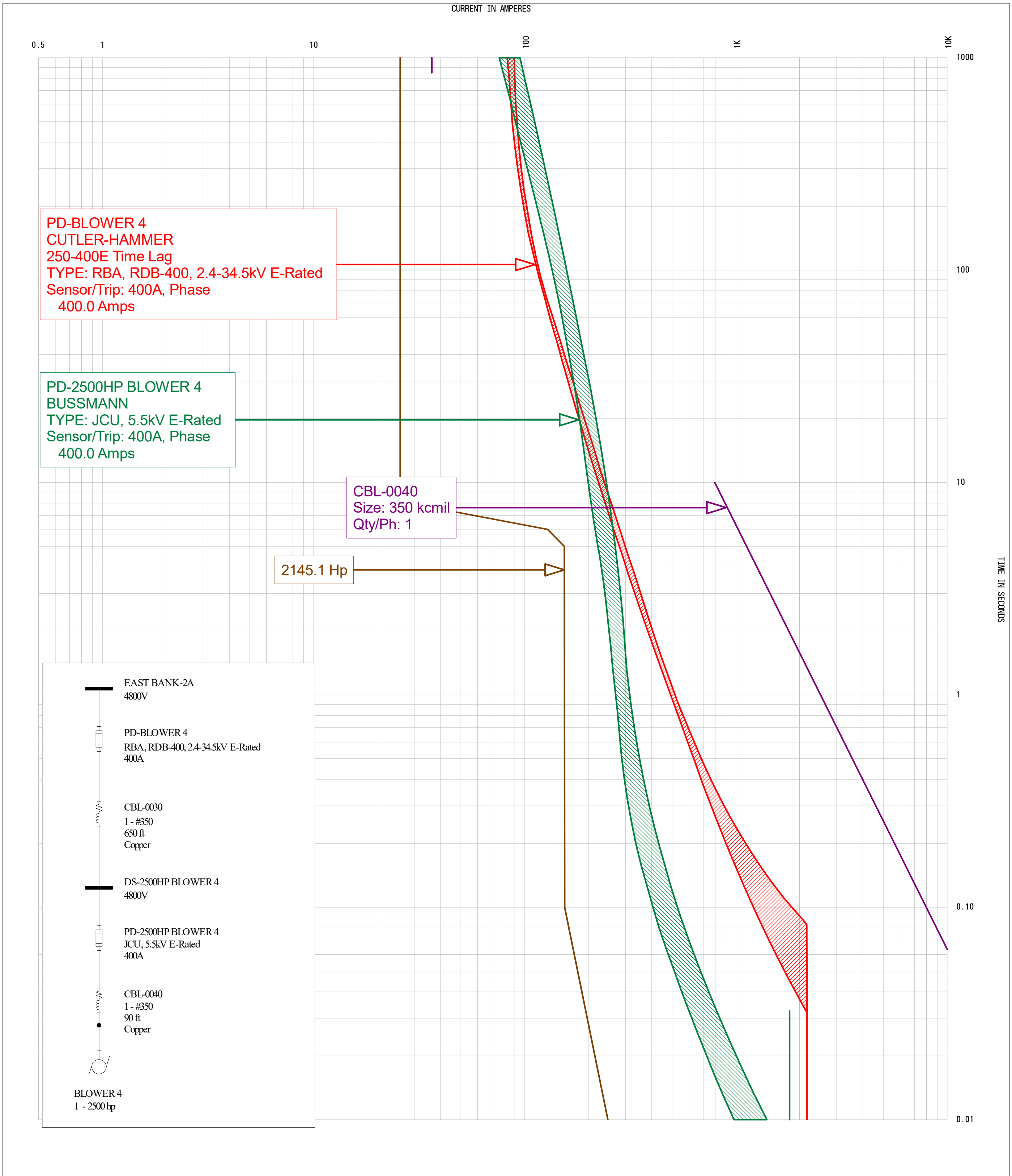
Plot name: 40 MCC-14
Ref. Voltage: 480V
Current Scale: x 10



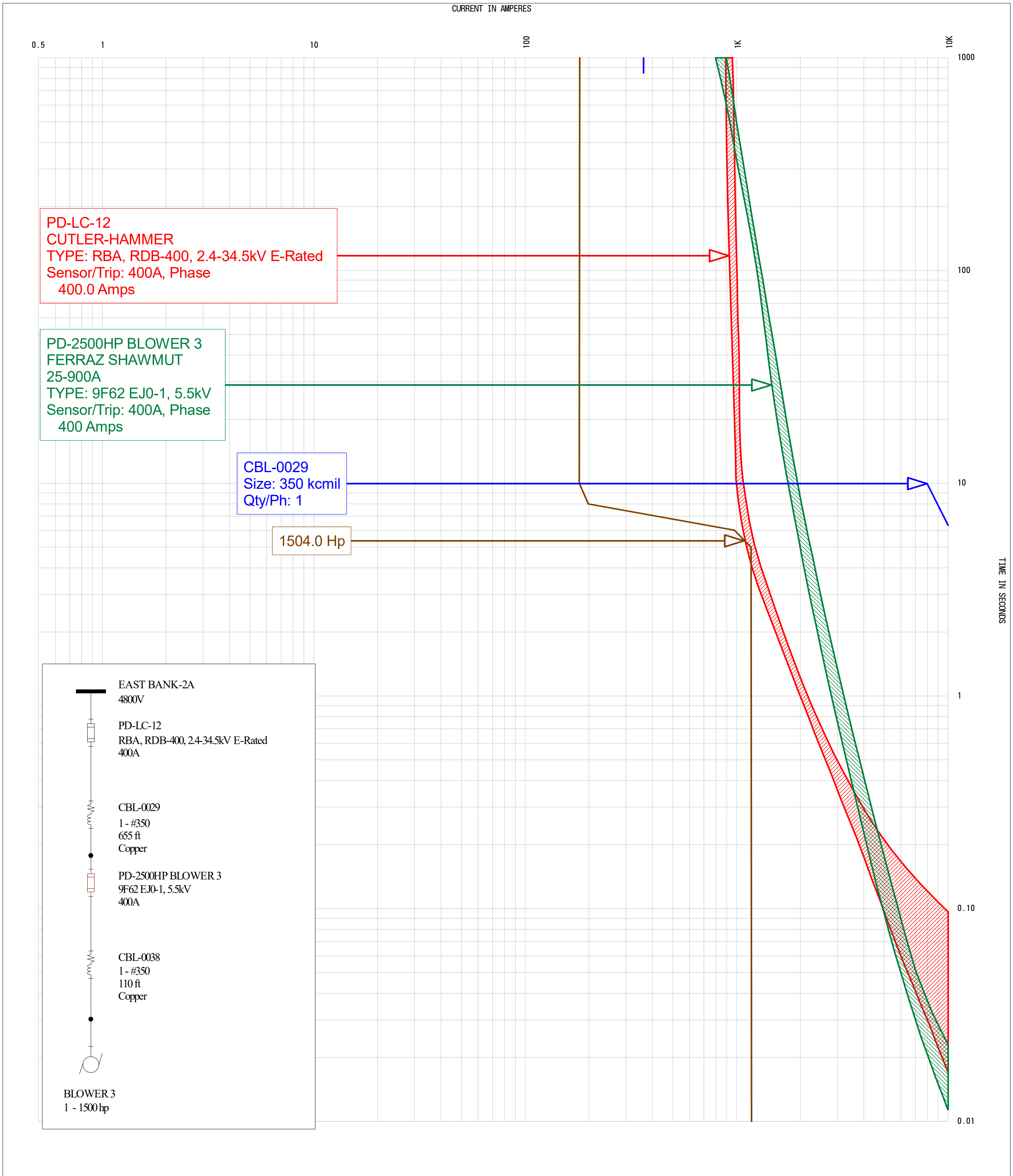
Eaton Electrical Services and Systems May 11, 2023	Plot name: 41 MSP-14 Ref. Voltage: 480V Current Scale: x 1



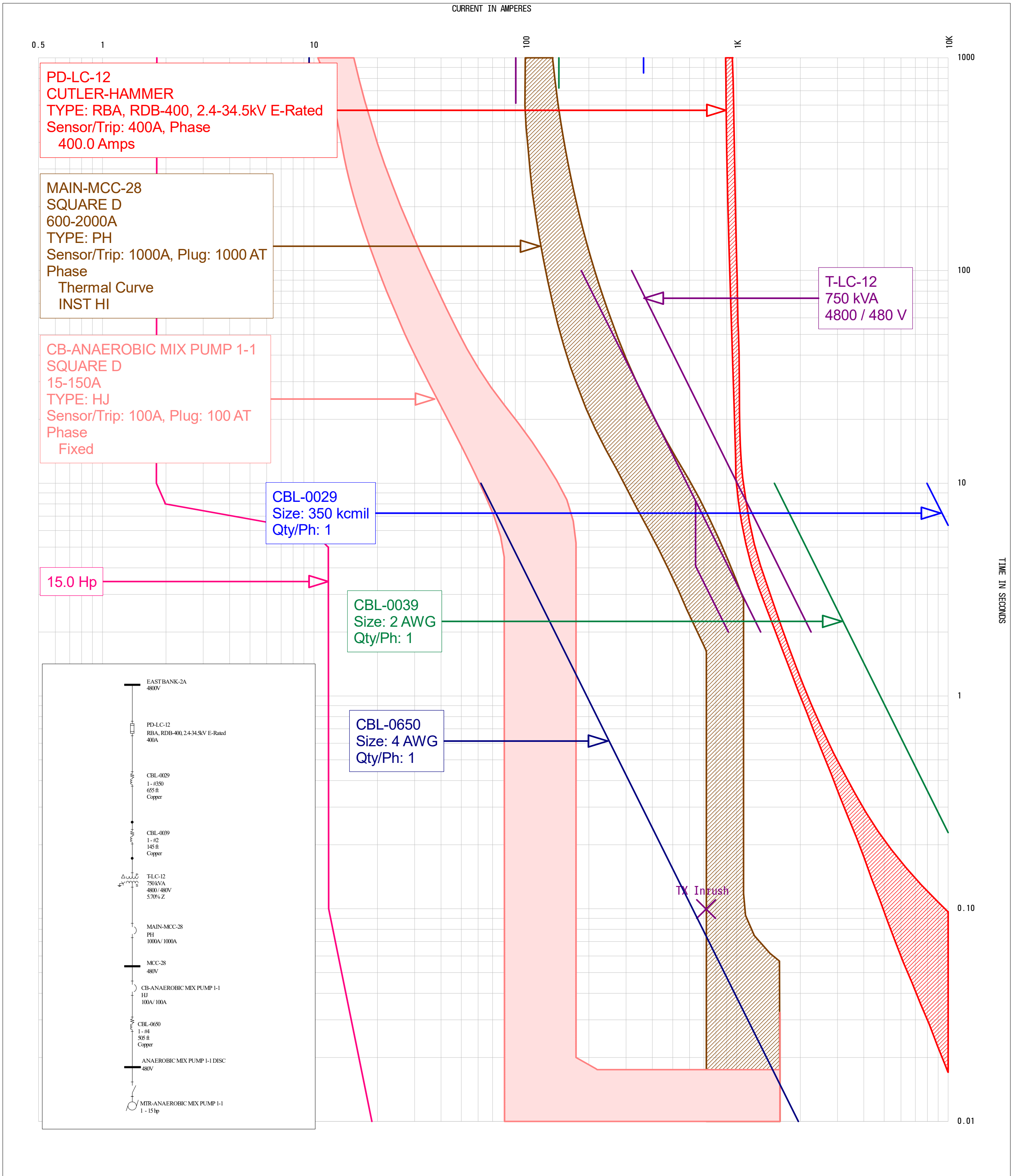
Eaton Electrical Services and Systems May 11, 2023	Plot name: 42 EAST BANK-2A Ref. Voltage: 4800V Current Scale: x 10



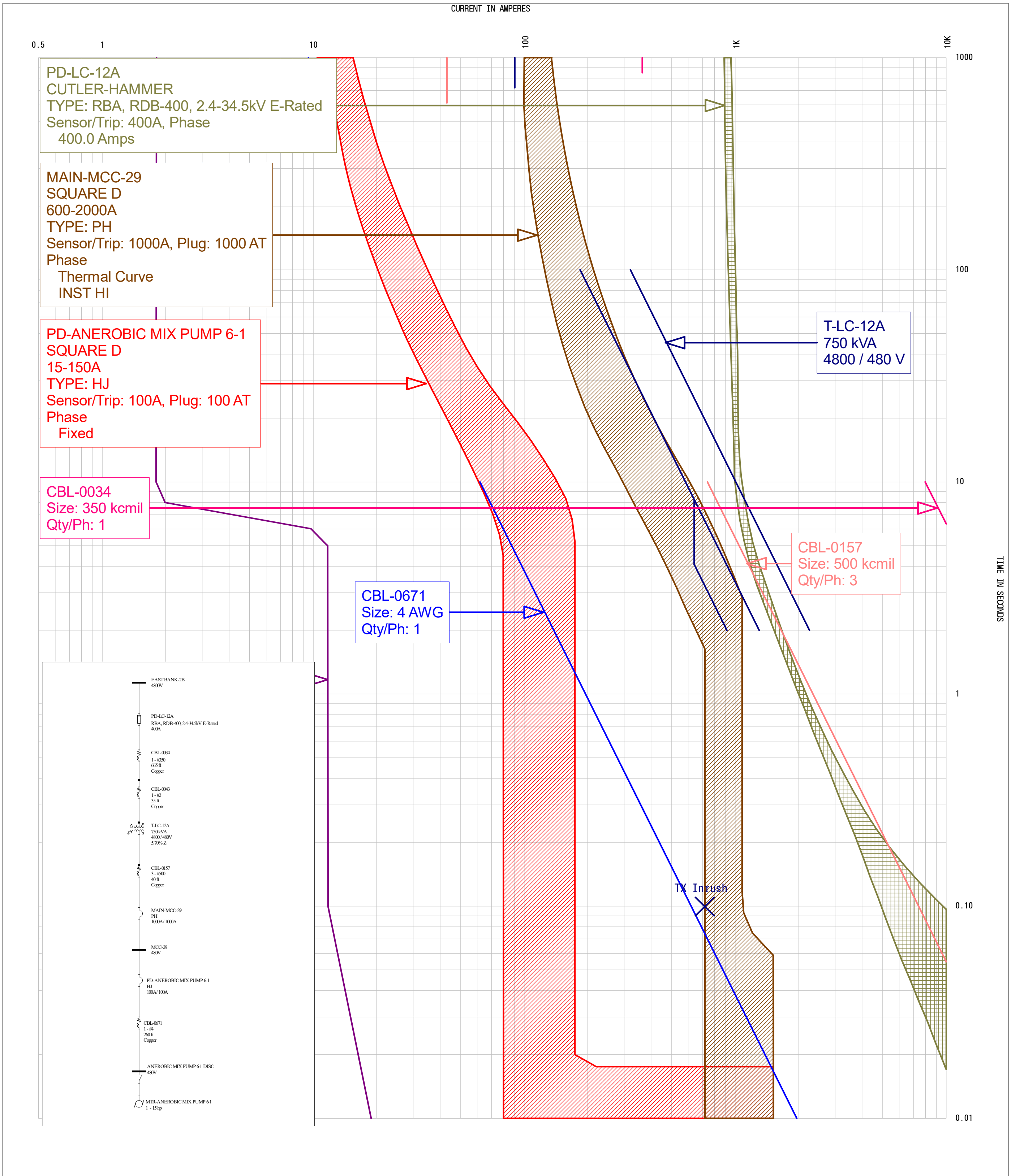
Eaton Electrical Services and Systems May 11, 2023	Plot name: 43 BLOWER 4 Ref. Voltage: 4800V Current Scale: x 10



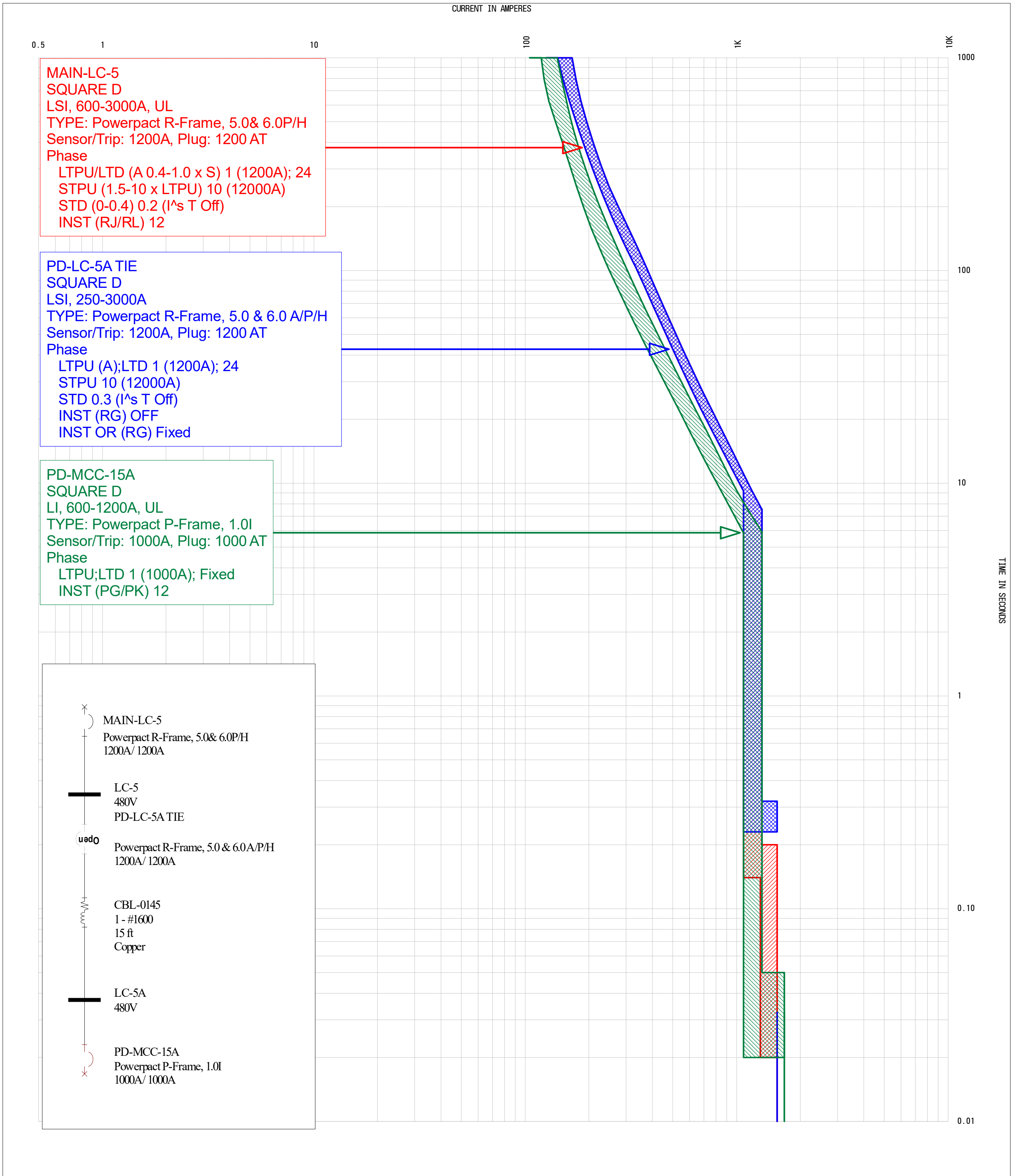
Eaton Electrical Services and Systems May 11, 2023	Plot name: 44 BLOWER 3 Ref. Voltage: 4800V Current Scale: x 1



Eaton Electrical Services and Systems May 11, 2023	Plot name: 45 MCC-28 Ref. Voltage: 4800V Current Scale: x 1



Eaton Electrical Services and Systems May 11, 2023	Plot name: 46 MCC-29 Ref. Voltage: 4800V Current Scale: x 1



Eaton Electrical Services and Systems May 11, 2023	Plot name: 47 LC-5 TIE Ref. Voltage: 480V Current Scale: x 10

4.0 RECOMMENDED PROTECTIVE DEVICE SETTINGS

The following tables shows a comprehensive summary of the recommended settings for the adjustable protective devices. The devices are grouped by system bus name/location. Refer to Section 11.0 for the system one-line diagrams.

Table 4.1 - Recommended Low-Voltage Protective Device Settings

Bus Connected	Device Name	Voltage (V)	Manufacturer	Model	Type	Sensor / Trip (A)	Plug (A)	Settings:	TCC:
11-LP-01	PD-11-LP-01A	208	EATON	KB	Thermal Magnetic Breaker	250	250	Thermal Curve (Fixed) INST (5-10 x Trip) 10	39 11-LP-01
LC-2	PD-LC4 TIE	480	EATON	HKD, 480V	Thermal Magnetic Breaker	400	400	Thermal Curve INST 10x	
LC-2	PD-MCC-12 NORM	480	EATON	HKD, 480V	Thermal Magnetic Breaker	400	400	Thermal Curve INST 10x	09 MCC-12
LC-2	PD-MCC8 TIE	480	EATON	HKD, 480V	Thermal Magnetic Breaker	400	400	Thermal Curve INST 10x	
LC-2A	PD-MCC-8A	480	EATON	LG, Series G	Thermal Magnetic Breaker	400	400	Thermal Curve (Fixed) INST (5-10 x Trip) 10	08 MCC-8A
LC-3	MAIN-LC-3	480	WESTINGHOUSE	PA	Thermal Magnetic Breaker	1200	1200	Thermal Curve (Fixed) INST HI	37 MCC-24
LC-5	MAIN-LC-5	480	SQUARE D	Powerpact R-Frame, 5.0& 6.0P/H	Static Trip Breaker	1200	1200	LTPU (A 0.4-1.0 x S) 1 (1200A) LTD 24 STPU (1.5-10 x LTPU) 10 (12000A) STD (0-0.4) 0.2 (I^s T Off) INST (RJ/RL) 12	16 LC-5
LC-5	PD-20A-PP-1	480	SQUARE D	J-Frame, Powerpact	Thermal Magnetic Breaker	200	200	Thermal Curve INST (5-10 x Trip) High	20 20A-PP-1

LC-5	PD-LC-5A TIE	480	SQUARE D	Powerpact R-Frame, 5.0 & 6.0 A/P/H	Static Trip Breaker	1200	1200	LTPU (A) 1 (1200A) LTD 24 STPU 10 (12000A) STD 0.3 (I^s T Off) INST (RG) OFF	
LC-5	PD-MCC-00	480	SQUARE D	LH	Thermal Magnetic Breaker	400	400	Thermal Curve (Fixed) INST (5-10 x Trip) 10.0	19 MCC-00
LC-5	PD-MCC-15	480	SQUARE D	Powerpact P-Frame, 1.0I	Static Trip Breaker	800	800	LTPU 1 (800A) LTD Fixed INST (PG/PK) 6	16 LC-5 17 MCC-15
LC-5	PD-MCC-7 ALT	480	SQUARE D	LH	Thermal Magnetic Breaker	400	400	Thermal Curve (Fixed) INST (5-10 x Trip) 10.0	
LC-5	PD-MCC-7 TRANSFER	480	SQUARE D	J-Frame, Powerpact	Thermal Magnetic Breaker	200	200	Thermal Curve INST (5-10 x Trip) High	
LC-5A	PD-MCC-15A	480	SQUARE D	Powerpact P-Frame, 1.0I	Static Trip Breaker	1000	1000	LTPU LTD 1 (1000A) Fixed INST (PG/PK) 12	21 MCC-15A
LC-8A	PD-0104	480	SQUARE D	PA	Thermal Magnetic Breaker	600	600	Thermal Curve INST HI	
MCC-00	MAIN-MCC-00	480	WESTINGHOUSE	KDB, KD	Thermal Magnetic Breaker	400	400	LTD INST 10.0	19 MCC-00
MCC-1	MAIN-MCC-1	480	SQUARE D	MA	Thermal Magnetic Breaker	600	600	Thermal Curve INST HI	29 MCC-1
MCC-10	MAIN-MCC-10	480	SQUARE D	NH	Thermal Magnetic Breaker	600	600	Thermal Curve INST HI	14 MCC-10

MCC-11	PD-MCC-11 MAIN	480	EATON	HKD, 480V	Thermal Magnetic Breaker	400	400	Thermal Curve INST 10x	
MCC-12	MAIN-MCC 12 NC	480	EATON	LG, Series G	Thermal Magnetic Breaker	600	600	Thermal Curve (Fixed) INST (5-10 x Trip) 10	09 MCC-12
MCC-12	MAIN-MCC 12 NO	480	EATON	HLD	Thermal Magnetic Breaker	600	600	Thermal Curve (Fixed) INST (5-10 x Trip) 10	
MCC-13	PD-MCC-14	480	CUTLER-HAMMER	NB	Thermal Magnetic Breaker	1000	1000	Thermal Curve (Fixed) INST (4000-8000A) 8000	38 MCC-13 40 MCC-14
MCC-15A	PD-CHILLER #2	480	WESTINGHOUSE	HJD	Thermal Magnetic Breaker	225	225	LTD INST 10.0	
MCC-15A	PD-MCC-15A MAIN	480	WESTINGHOUSE	NC SELTRNC	Static Trip Breaker	1000	1000	LTPU 1.0 (1000A) LTD LTD STPU 8.0 (8000A) STD-I2T STD (I^s T Off)	21 MCC-15A
MCC-15AA	PD-DUMBWATIER	480	KLOCKNER	NZM6	Thermal Magnetic Breaker	25	25	LTD INST 6.4	
MCC-15AA	PD-MAU 1	480	KLOCKNER	NZMH 6	Thermal Magnetic Breaker	100	100	LTD INST 6.0	22 MCC-15AA
MCC-15AA	PD-MCC-15AA MAIN	480	KLOCKNER	NZM 11	Thermal Magnetic Breaker	605	605	LTD INST 7.9	22 MCC-15AA
MCC-17A	PD-SUPPLY FAN SP1	480	EATON	HMCP	Motor Circuit Protector	15	15	INST (45-150A) A	
MCC-19	MCC-20-19 TIE0	480	WESTINGHOUSE	NC SELTRNC	Static Trip Breaker	1200	1200	LTPU 1.0 (1200A) LTD LTD STPU 8.0 (9600A) STD-I2T STD (I^s T Off) Override 1.0 (13000A)	

MCC-19	PD-MCC-21 NO	480	WESTINGHOUSE	LBB, LB	Thermal Magnetic Breaker	400	400	LTD INST 10.0	
MCC-2	MAIN-MCC-2	480	SQUARE D	MA	Thermal Magnetic Breaker	1000	1000	Thermal Curve INST HI	28 MCC-2
MCC-20	MAIN-MCC-20	480	WESTINGHOUSE	NC SELTRNC	Static Trip Breaker	1200	1200	LTPU 1.0 (1200A) LTD LTD STPU 8.0 (9600A) STD-I2T STD (I^s T Off) Override 1.0 (13000A)	25 MCC-20
MCC-20	MCC-20-19 TIE	480	WESTINGHOUSE	NC SELTRNC	Static Trip Breaker	1200	1200	LTPU 1.0 (1200A) LTD LTD STPU 8.0 (9600A) STD-I2T STD (I^s T Off) Override 1.0 (13000A)	
MCC-20	PD-MCC-21 NC	480	WESTINGHOUSE	LBB, LB	Thermal Magnetic Breaker	400	400	LTD INST 10.0	25 MCC-20 27 MCC-21
MCC-25	MAIN-MCC-25	480	SQUARE D	MH	Thermal Magnetic Breaker	800	800	Thermal Curve (Fixed) INST (5-10 x Trip) 10.0	15 MCC-25
MCC-26	MAIN-MCC-26	480	SQUARE D	PH	Thermal Magnetic Breaker	2000	2000	Thermal Curve INST HI	03 MCC-26
MCC-26	PD-CENTRIFUGE OVERHEAD CRANE 4	480	SQUARE D	PH	Thermal Magnetic Breaker	1200	1200	Thermal Curve INST HI	03 MCC-26 04 PP-SH-2
MCC-26	TIE-MCC 26-27	480	SQUARE D	PH	Thermal Magnetic Breaker	2000	2000	Thermal Curve INST HI	
MCC-27	MAIN-MCC-27	480	SQUARE D	PH	Thermal Magnetic Breaker	2000	2000	Thermal Curve INST HI	

MCC-27	PD-PP-SH-1	480	SQUARE D	PH	Thermal Magnetic Breaker	1200	1200	Thermal Curve INST HI	
MCC-28	MAIN-MCC-28	480	SQUARE D	PH	Thermal Magnetic Breaker	1000	1000	Thermal Curve INST HI	45 MCC-28
MCC-28	MCC-28-29 TIE	480	SQUARE D	PA	Thermal Magnetic Breaker	800	800	Thermal Curve INST HI	
MCC-29	MAIN-MCC-29	480	SQUARE D	PH	Thermal Magnetic Breaker	1000	1000	Thermal Curve INST HI	46 MCC-29
MCC-29	MCC-29-28 TIE	480	SQUARE D	PA	Thermal Magnetic Breaker	800	800	Thermal Curve INST HI	
MCC-3	MAIN-MCC-3 NC	480	SQUARE D	MA	Thermal Magnetic Breaker	600	600	Thermal Curve INST HI	30 MCC-3
MCC-3	PD-MCC-3A	480	SQUARE D	MA	Thermal Magnetic Breaker	600	600	Thermal Curve INST HI	31 MCC-3A
MCC-4A	PD-MCC-4B	480	SQUARE D	KH	Thermal Magnetic Breaker	200	200	Thermal Curve INST HI	34 MCC-4B
MCC-4A	PD-MCC-4C	480	SQUARE D	J-Frame, Powerpact	Thermal Magnetic Breaker	250	250	Thermal Curve INST (5-10 x Trip) High	32 MCC-4A 33 MCC-4C
MCC-7	MAIN-MCC-7	480	EATON	HMDL	Thermal Magnetic Breaker	700	700	Thermal Curve (Fixed) INST (4-8 x Trip) 8	10 MCC-7
MCC-8	PD-12A-PP-01	480	EATON	HJD	Thermal Magnetic Breaker	150	150	Thermal Curve (Fixed) INST (5-10 x Trip) 10	07 12A-PP-01
MCC-8	PD-MCC8 DRAIN PUMP	480	EATON	HJD	Thermal Magnetic Breaker	225	225	Thermal Curve (Fixed) INST (5-10 x Trip) 10	

MCC-8	PD-MCC8 MISC PUMPS	480	EATON	HJD	Thermal Magnetic Breaker	200	200	Thermal Curve (Fixed) INST (5-10 x Trip) 10	
MCC-8	PD-MCC8 RAS PUMPS	480	EATON	HKD, 480V	Thermal Magnetic Breaker	350	350	Thermal Curve INST 10x	06 MCC-8
PP-SH-1	PD-CENTRIFUGE# 1	480	SQUARE D	LH	Thermal Magnetic Breaker	400	400	Thermal Curve (Fixed) INST (5-10 x Trip) 10.0	
PP-SH-1	PD-CENTRIFUGE# 3	480	SQUARE D	LH	Thermal Magnetic Breaker	400	400	Thermal Curve (Fixed) INST (5-10 x Trip) 10.0	
PP-SH-2	PD-CENTRIFUGE #2	480	SQUARE D	LA	Thermal Magnetic Breaker	400	400	Thermal Curve (Fixed) INST (5-10 x Trip) 10.0	
PP-SH-2	PD-CENTRIFUGE #4	480	SQUARE D	LA	Thermal Magnetic Breaker	400	400	Thermal Curve (Fixed) INST (5-10 x Trip) 10.0	
PP-SH-2	PD-SLUDGE CAKE PUMP #2	480	SQUARE D	LA	Thermal Magnetic Breaker	400	400	Thermal Curve (Fixed) INST (5-10 x Trip) 10.0	04 PP-SH-2

Table 4.2 - Recommended Medium Voltage Relay Settings

Bus Connected	Device Name	Voltage (V)	Manufacturer	Model	Type	Sensor / Trip (A)	Settings:	TCC:
MVUS-1A	MAIN-MVUS-1A	4800	GE MULTILIN	850	Electronic Relay	CT Ratio: Phase: 2000 / 5	51P 1 (2000A) ANSI, Ext. Inverse 3	01 MVUS-1A
MVUS-1A	PD-FB1	4800	GE MULTILIN	850	Electronic Relay	CT Ratio: Phase: 1000 / 5	51P 1.2 (1200A) ANSI, Norm. Inverse 1 50P 12 (12000A)	02 WEST BANK-A
MVUS-1A	PD-FB2	4800	GE MULTILIN	850	Electronic Relay	CT Ratio: Phase: 1000 / 5	51P 1.2 (1200A) ANSI, Norm. Inverse 1 50P 12 (12000A)	
MVUS-1A	PD-FB3	4800	GE MULTILIN	850	Electronic Relay	CT Ratio: Phase: 1000 / 5	51P 1.2 (1200A) ANSI, Ext. Inverse 4 50P 12 (12000A)	01 MVUS-1A 42 EAST BANK-2A
MVUS-1A	TIE-MVUS-1	4800	GE MULTILIN	850	Electronic Relay	CT Ratio: Phase: 2000 / 5	51P 1 (2000A) ANSI, Ext. Inverse 3	

MVUS-1B	MAIN-MVUS-1B	4800	GE MULTILIN	850	Electronic Relay	CT Ratio: Phase: 2000 / 5	51P 1 (2000A) ANSI, Ext. Inverse 3	
MVUS-1B	PD-FB4	4800	GE MULTILIN	850	Electronic Relay	CT Ratio: Phase: 1000 / 5	51P 1.2 (1200A) ANSI, Norm. Inverse 1 50P 12 (12000A)	
MVUS-1B	PD-FB5	4800	GE MULTILIN	850	Electronic Relay	CT Ratio: Phase: 1000 / 5	51P 1.2 (1200A) ANSI, Norm. Inverse 1 50P 12 (12000A)	
MVUS-1B	PD-FB6	4800	GE MULTILIN	850	Electronic Relay	CT Ratio: Phase: 1000 / 5	51P 1.2 (1200A) ANSI, Ext. Inverse 4 50P 12 (12000A)	

Table 4.3 Recommended Voltage Relay Settings

Relay Name	Pickup	Tolerance Range	Time Delay
59G	20V	2% (10.6-20.4V)	5 Sec

5.0 ARC FLASH INCIDENT ENERGY ANALYSIS

This section of the report contains the interpretation for the arc flash incident energy analysis. The calculations made in this arc flash incident energy analysis conform to NFPA 70E-2018, and are based on the information provided by the customer. Actual heat and radiation exposure may be more or less than reflected in the analysis.

Only qualified electricians who are familiar with the installation and maintenance of electrical distribution equipment should perform work associated with such products. All recommendations of the manufacturer, warnings and cautions relating to the safety of personnel and equipment should be followed. All applicable health and safety laws, codes, standards, and procedures should be adhered to. All equipment should be de-energized prior to any maintenance or service. OSHA 1910.333 requirements should be adhered to. All guidelines of NFPA 70E-2018 should be followed, and in particular appropriate personal protective equipment must be provided and worn.

Eaton Corporation will not be responsible for the misuse or misapplication of the information contained in this analysis. Those providing service for electrical equipment should contact an Eaton Electrical Services and Systems representative, or other qualified individual, if any questions arise.

5.1 General

NFPA 70E-2018, Article 110.1(G) requires that an employer developed electrical safety program includes a risk assessment procedure that addresses worker exposure to electrical hazards. This procedure is meant to be used before performing work on or near any equipment at or above 50 volts or any time work is being performed where an electrical hazard exists. This analysis presents only the results of an incident energy evaluation conducted in accordance with 130.5(C)(1). Selection of personal protective equipment (PPE) should be made based on the incident energy level at the working distance which is presented in this report as part of an arc flash risk assessment to be made by the qualified person. Other components of an arc flash risk assessment including determination of whether or not an arc flash hazard exists for a given work task and the appropriate safe work practices to be employed should be completed by the qualified person performing the work. The risk of arc flash exposure when working on or near electrical equipment depends on a number of factors including the nature of the task being performed and the condition of the equipment. NFPA 70E-2018, Article 130.7(A) requires that employees use and employers provide proper PPE for the tasks being performed. NFPA 70E, Table 130.5(G) provides guidance for the selection of PPE based on calculated incident energy exposure.

NFPA 70E and IEEE Std 1584 provide equations and methods to calculate the arc flash boundary and incident energy at specific locations within a facility's electrical system. Any location where work may be performed on or near energized electrical conductors and circuit parts is subject to the arc flash standards. PPE used to guard against arc flash hazards should be considered the last line of defense. It is also important to note that the use of PPE is not intended to prevent all injuries from an arc flash. The goal of determining required PPE using the arc flash incident energy analysis is to identify the level of protection required to limit the injury to the onset of a second degree burn in the event of an arc flash while avoiding the use of more protection than is needed so as to minimize hazards of heat stress, reduced visibility and limited body movement.

Although the arc flash calculation procedure is based upon NFPA 70E and IEEE Std 1584 equations and methods, it is a relatively new approach to determining the degree of required PPE. The calculations are derived from theory and research involving arc current incident energy measurements conducted under a specific set of controlled test conditions. Therefore, calculation results may be more severe or less severe than the hazard presented by an actual arc flash exposure. Also, the arc flash incident energy calculations do not take into account hazards associated with the splattering of molten metal, explosively propelled pieces of equipment and air pressure shock waves.

The results of this arc flash incident energy analysis are not intended to imply that personnel be permitted to work on exposed energized equipment or circuits. OSHA 1910.333 restricts the situations in which work is to be performed near or on energized equipment or circuits by stating, “Live parts to which an employee may be exposed shall be deenergized before the employee works on or near them, unless the employer can demonstrate that deenergizing introduces additional or increased hazards or is infeasible due to equipment design or operational limitations.”

Even if work is not being performed directly on energized equipment, it is important that the proper PPE be used during some load interruption actions, during visual verification of the state of disconnecting devices, and during lockout/tagout procedures.

In accordance with NFPA 70E and IEEE Std 1584, the analysis software provides the calculation of these values. The equations used in these calculations are based on actual test values. These tests measured the calories per square centimeter (cal/cm^2) radiating from a simulated arcing fault at a theorized working distance of 18 inches.

5.2 Objectives

The intent of NFPA 70E and IEEE Std 1584 guidelines is to establish standard calculations to determine an approach boundary that will prevent the onset of a second-degree burn to the face and the torso of the worker. An incident energy of 1.2 cal/cm^2 represents the onset of a second-degree burn.

The arc flash incident energy analysis considers each medium and low voltage system location within the scope of the work. Before the arc flash equations can be applied, a detailed short-circuit and protective device coordination study must be completed to include all locations where work may be performed on or near energized components; e.g. motor control centers and power distribution panels. Since the short-circuit current must be calculated at every pertinent location and the clearing time of each location’s upstream protective device is required, the arc flash circuit model is more detailed and extends deeper into the facility electrical distribution system than is typical of a basic short-circuit and protective device coordination study.

Accurate fault currents and device clearing times are extremely important in deriving reliable results. A conservative (high) fault current value could yield a faster clearing time of a protective device, depending upon its curve shape, and the calculated incident energy may actually be less than the incident energy calculated for a lower magnitude of fault current and a longer clearing time.

<u>Arc Flash Scenarios</u>

Since the greatest arc flash hazards may not result from the highest fault current, multiple scenarios must be analyzed and compared. The following modes of operation have been evaluated in order to determine the worst-case incident energy at each location in the system. It is important to determine the available short-circuit current for modes of operation that provide both the maximum and minimum available short-circuit currents.

- Arc Flash Scenario S0 – *System normal operation, all motors running*
- Arc Flash Scenario S1 – *Utility Maximum contribution (all motors running), alternate ties used to provide highest available fault current*
- Arc Flash Scenario S2 – *Utility Minimum contribution (no motors running), alternate ties used to provide lowest available fault current*

5.3 Arc Flash Incident Energy Analysis Results

The incident energy associated with an arc flash is dependent upon the following parameters:

- The maximum “bolted fault” three-phase short-circuit current available at the equipment and the minimum fault level at which the arc will self-sustain.
- The total protective device clearing time (upstream of the prospective arc location) at the maximum short-circuit current and the minimum fault level at which the arc will self-sustain.
- The distance of the worker from the prospective arc for the task to be performed.
- The electrode configuration and enclosure dimensions at which the qualified person is exposed.

The arc flash incident energy analysis results shown in Table 5.1 are based on a protective device clearing time that is capped at 2 seconds. This is based on IEEE Std 1584-2018, 6.9.1, which states “If the total protective device clearing time is longer than two seconds (2s); consider how long a person is likely to remain in the location of the arc flash. It is likely that a person exposed to an arc flash will move away quickly if it is physically possible, and 2s usually is a reasonable assumption for the arc duration to determine the incident energy. However, this also depends on the specific task. A worker in a bucket truck, or inside an equipment enclosure, could need more time to move away. Use engineering judgement when applying any maximum arc duration time for incident energy exposure calculations, because there may be circumstances where a person’s egress may be blocked.”

1. <u>Line Side and Load Side</u>

Two calculations are typically provided for labels on locations where there is adequate separation between the line side terminals of the main protective device, and the work location. The “Load Side” calculation provides the incident energy based on the main protective device clearing in the event of an arc flash incident. If the work location or task is such that the main breaker may not trip in the event of an arc flash incident, then the “Line Side” calculation for incident energy should be observed. This could occur if the main breaker is being racked-out, and a fault occurred on the line terminals. For this case, the next upstream device is the one that must clear the fault.

One should always remember that the terms “Line Side” and “Load Side” are always in reference to the main protective device (see example below).’

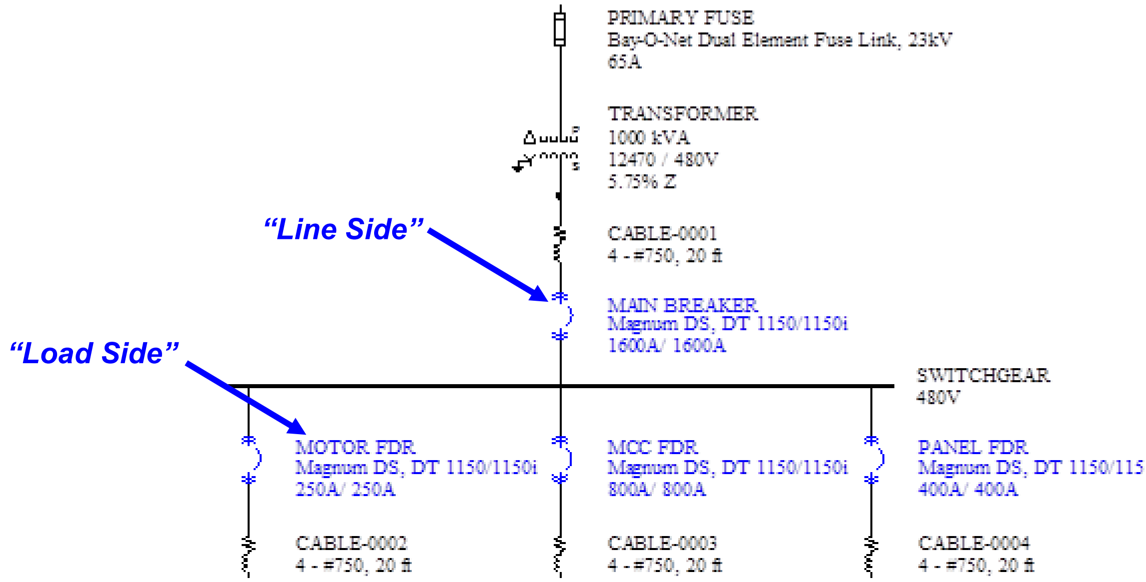


Figure 5.1: Example Line Side vs. Load Side

2. Electrode Configuration

IEEE 1584-2018 does not recommend which electrode configurations should be considered for each type of electrical equipment beyond what is listed in informative Annex C. To systematically evaluate possible electrode configurations found in each class of equipment, engineering reviews were conducted with Eaton's product engineering teams, who design and build the equipment in question. During these reviews, the product engineering teams provided feedback about which electrode configurations are most likely to be encountered in the products managed by that team. Using that information, engineering judgement was applied to determine the electrode configuration most likely found by a qualified worker in each class of equipment. Since electrical equipment is manufactured to specific industry standards, the determination of electrode configuration by equipment class, in most cases, applies to both new and existing electrical equipment regardless of manufacturer. When performing a risk assessment before energized work, it is important to consider where the qualified worker will be interacting with energized conductors and how the arc is likely to initiate. If the qualified person will be exposed to an electrode configuration different from the one identified in Table 5.1, it is recommended that the incident energy analysis be reviewed to ensure the results are appropriate for the task to be performed.

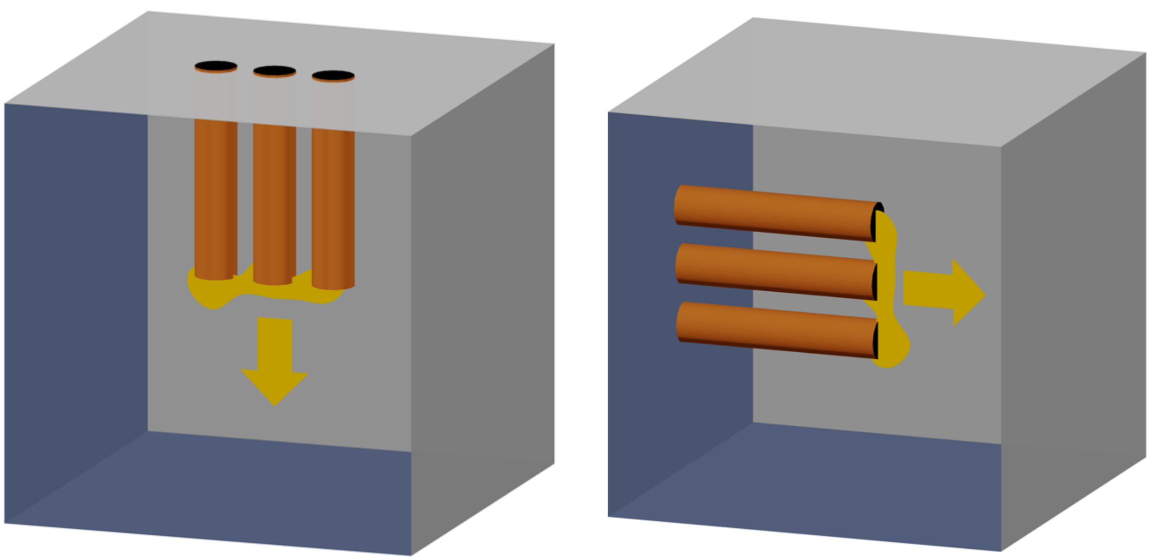
As part of the IEEE-1584-2018 calculation process, one or more of the following electrode configurations was selected for each equipment location and the worst case results depicted in Table 5.1. The electrode configurations selected for this analysis are based on typical construction of standard equipment classes. The electrode configuration selected in the analysis model is reported for each location in Table 5.1. If more than one electrode configuration is considered given the physical construction of the equipment, multiple calculations are performed to determine the worst case incident energy and arc flash boundary. If the selected electrode configuration does not produce the highest incident energy or most conservative arc flash boundary, an informational note is used to provide further clarification, and the more conservative results are reported in the table and on the arc flash label.

- VCB: Vertical conductors/electrodes inside a metal box/enclosure
- VCBB: Vertical conductors/electrodes terminated in an insulating barrier inside a metal box/enclosure
- HCB: Horizontal conductors/electrodes inside a metal box/enclosure
- VOA: Vertical conductors/electrodes in open air
- HOA: Horizontal conductors/electrodes in open air

VCB represents vertical conductors in a metal box or enclosure. An arc initiated on the vertical busbars will run down the bus away from the source and the plasma cloud will be directed off the ends of the conductors in a manner that is parallel to the enclosure opening. The direction of arc plasma is indicated by the arrow below.

Note: While the name implies that conductors are oriented vertically, from top to bottom, conductors that are traveling across the enclosure horizontally from left to right are also considered VCB. Any conductors that run across the enclosure opening, parallel to the opening plane are considered VCB. Similar to VCB, VOA represents vertical conductors in air as opposed to a metal box or enclosure.

Figure 5.2: Example VCB Electrode Configuration



VCBB represents vertical conductors in a metal box or enclosure ending at an insulating barrier. An arc initiated on the vertical busbars will run down the bus away from the source, but the plasma cloud will reach the insulating barrier, preventing it from being directed off the ends of the conductors. Some of the arc plasma will instead be directed towards the front of the enclosure, as indicated by the arrow below.

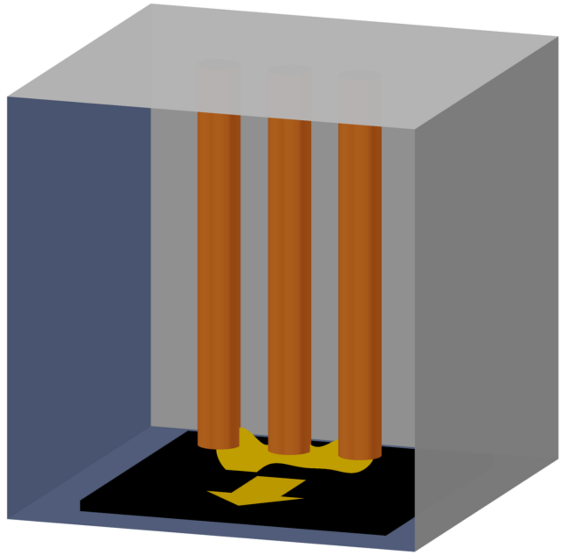


Figure 5.3: Example VCBB Electrode Configuration

HCB represents conductors that are pointed towards the enclosure opening and towards the worker. An arc initiated on the horizontal conductors will run down the bus away from the source and the plasma cloud will be directed off the ends of the conductors perpendicular to the enclosure opening, as indicated by the arrow in the diagram below. Similar to HCB, HOA represents horizontal conductors in air as opposed to a metal box or enclosure.

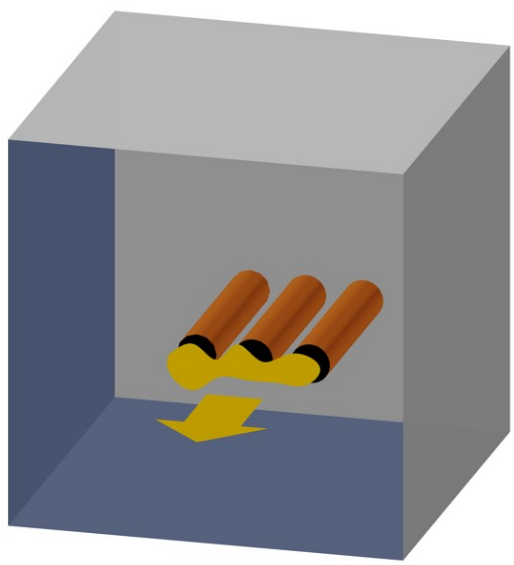


Figure 5.4: Example HCB Electrode Configuration

The fault current cannot easily be reduced nor can the working distance be easily increased to lessen the incident energy. In many locations the protective device setting can be adjusted or the trip unit upgraded to decrease the device interrupting time that will in turn decrease the incident energy.

Each location where the incident energy is determined to be unacceptable by the facility Owner must be individually evaluated to determine the most effective means of reducing the incident energy while maintaining the highest degree of reliability.

All adjustable protective devices must be set as recommended in Section 4.0 to achieve the incident energy levels shown in Table 5.1.

5.4 Arc Flash Summary Table Heading Descriptions

Table 5.1 shows results of the arc flash incident energy analysis. The following column headings describe the results.

Bus Name: The names in this column correlate to the names implemented in the software system model. These locations correspond to plant locations such as main switchboards, panelboards, enclosed breakers, etc.

Protective Device Name: This column lists the name of the device primarily responsible for clearing a potential fault at the associated bus. Again, these device names correlate to the system model.

Bus Voltage (kV): The values in this column show the nominal voltage of the bus location.

Bus Bolted Fault (kA): This column shows the bolted fault current available for the referenced bus location. This current value corresponds to the system operating conditions that will result in the worst-case calculated value for incident energy.

Prot Dev Bolted Fault (kA): This column displays the portion of calculated bolted fault currents that is contributed through the protective device.

Prot Dev Arcing Fault (kA): This column displays the portion of calculated arcing fault currents that is contributed through the protective device. These values demonstrate a reduction in available fault current due to the arc resistance.

Trip/Delay Time (sec): This column displays the length of time required by the protective device to trip in the presence of the calculated arcing fault current. For low voltage breakers and fuses, this time represents the total clearing time of the device.

Breaker Opening Time (sec): For circuit breakers tripped by a relay, this column shows the opening time of the breaker. This time is added to the Trip time to determine the total clearing time used in the calculation of incident energy.

Equip Type: This column indicates whether the equipment is Switchgear, Panel, Cable or Open Air. The equipment type provides a default Gap value, working distance, and typical enclosure sizes used in the IEEE incident energy equations.

Selected Electrode Config.: This column indicates the electrode configuration that was selected in the analysis model. If the selected electrode configuration does not produce the highest incident energy or most conservative arc flash boundary, an informational note is used to provide further clarification, and the more conservative results are reported in the table.

Arc Flash Boundary (ft & in): This column displays the distance within which a person must be clothed in the appropriate PPE (Personal Protection Equipment).

Working Distance (ft & in): This distance indicates the typical working distance associated with the system location.

Incident Energy (cal/cm^2): Based on the arcing fault current, the total clearing time of the protective device, the equipment type, the electrode configuration, and the typical working distance, the column displays the results of the arc flash calculations at the reference location. This energy level directly corresponds to the appropriate PPE required for each location. NFPA 70E provides guidance for the selection of PPE based on calculated incident energy exposure.

Notes: An informational note is used to provide further clarification if the selected electrode configuration does not produce the highest incident energy or most conservative arc flash boundary.

5.5 Arc Flash Labels

Arc flash warning labels are based on the Arc Flash Summary Table results. Labels are provided for each work location and will be machine printed, with no field markings. The label shall have an orange header with the wording, “WARNING, SHOCK & ARC FLASH HAZARD”, and shall include the following information (see example label below):

- Engineering report number, revision number and issue date.
- Location designation
- Arc flash boundary
- Incident energy
- Working distance
- Nominal system voltage
- Electrical Shock Boundaries

1. Electrical Shock Boundaries

Approach boundaries to energized electrical conductors or circuit parts for shock protection (AC systems) are provided on the AF label. For any given voltage potential, there is a minimum safe electrical distance needed to protect non-insulated body parts from electrical shock. Conditions such as moisture or dust in the air, or altitude affect this minimum distance to some degree. Additionally, depending on the working situation, it may be necessary to add some distance as a safety factor in case of inadvertent movement of a worker’s hand or tool.

a) Nominal System Voltage: The normal AC operating voltage of the equipment or conductors where the work is to take place.

b) Limited Approach Boundary: The closest distance from an exposed, energized (or potentially energized) conductor or part that an **unqualified** worker may approach, unless additional protective measures are used.

c) Restricted Approach Boundary: The distance from exposed, energized conductors or circuit parts where only qualified workers are allowed, unless additional protective measures are used.

The definitions above to determine the proper approach distances for Electrical Shock Hazards are based upon NFPA 70E. Refer to NFPA 70E, Article 130.4(B) for detailed information on approach boundaries to Energized Electrical Conductors or Circuit Parts for Shock Protection.

It is important to note that the shock protection boundaries and the arc flash boundary are independent of each other.

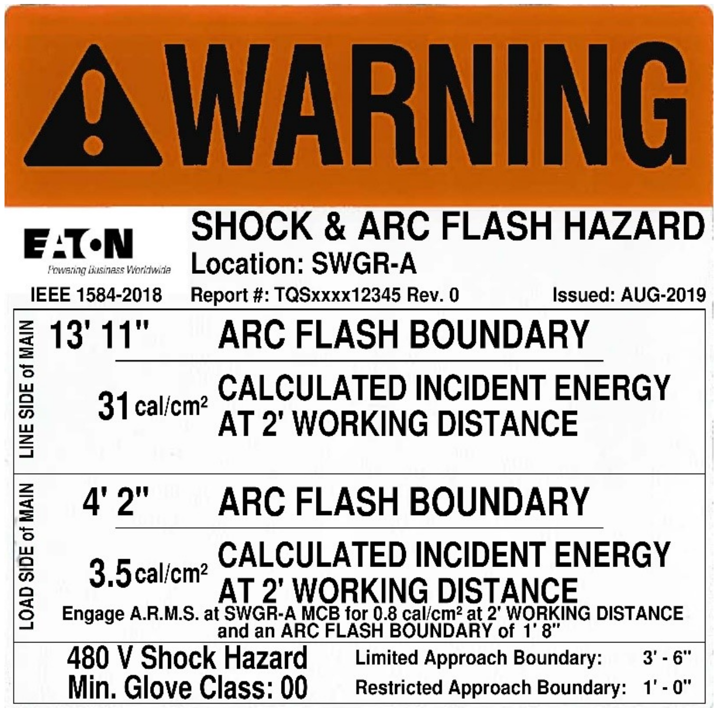


Figure 5.5: Example Arc Flash Label

5.6 Arc Flash Incident Energy Analysis Recommendations

1) All of the adjustable protective devices must be set as recommended in Section 4.0 to achieve the incident energy levels listed in Table 5.1.
2) Each location where the arc flash incident energy is unacceptable to the facility Owner should be individually evaluated to determine the most effective means of reducing the incident energy while maintaining the highest degree of reliability.

Table 5.1 – Arc Flash Incident Energy Analysis Summary Table

Bus Name	Protective Device Name	Bus kV	Bus Bolted Fault (kA)	Prot Dev Bolted Fault (kA)	Prot Dev Arcing Fault (kA)	Trip/ Delay Time (sec.)	Breaker Opening Time/Tol (sec.)	Equip Type	Selected Electrode Config.	Arc Flash Boundary (ft & in)	Working Distance (ft & in)	Incident Energy (cal/cm^2)	*Notes
04-LP-01 XFER SWITCH	PD-XFMR 04-LP-01	0.48	11.91	11.91	9.63	0.01	0.0000	PNL	VCBB	8"	1' 6"	0.3	
06-LP-01	PD-T-06-LP-01	0.208	7.91	7.91	3.90	2	0.0000	PNL	VCBB	7' 6"	1' 6"	18.2	(*N25d)
06-LP-02	PD-06-LP-02	0.208	6.74	6.74	3.28	0.0162	0.0000	PNL	VCBB	5"	1' 6"	0.1	
06-LP-03	PD-06-LP-03	0.208	6.09	6.09	2.94	0.017	0.0000	PNL	VCBB	5"	1' 6"	0.1	
06-LP-04	PD-06-LP-04	0.208	3.01	3.01	1.41	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
06-LP-05	PD-MAIN 06-LP-05	0.208	2.68	2.68	1.25	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
06-LP-06	PD-MAIN 06-LP-06	0.208	4.24	4.24	2.01	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.0	
06-LP-07	PD-MAIN 06-LP-07	0.208	2.01	2.01	0.94	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
11-LP-01	PD-XFMR-11-LP-01	0.208	0.51	0.51	0.25	2	0.0000	PNL	VCBB	1' 3"	1' 6"	0.8	
11-LP-01A	PD-XFMR-11-LP-01	0.208	0.41	0.41	0.41	2	0.0000	PNL	VCBB	11"	1' 6"	0.4	
12A-PP-01	PD-12A-PP-01	0.48	11.47	11.47	9.26	0.0111	0.0000	PNL	VCBB	8"	1' 6"	0.3	
15 KVAC CAP	PD-15 KVAC CAP	0.48	12.99	12.99	10.54	0.01	0.0000	PNL	VCBB	8"	1' 6"	0.3	
15-LP-01	PD-XFMR-15LP-01	0.208	0.85	0.85	0.40	2	0.0000	PNL	VCBB	1' 8"	1' 6"	1.4	
15-LP-02	PD-XFMR 15-LP-02	0.208	0.81	0.81	0.38	2	0.0000	PNL	VCBB	1' 7"	1' 6"	1.3	
20A-PP-01	PD-20A-PP-01	0.48	5.52	5.52	3.60	0.0268	0.0000	PNL	VCBB	7"	1' 6"	0.2	(*N25a)
20A-PP-1	PD-20A-PP-1	0.48	9.57	9.53	7.63	0.0161	0.0000	PNL	VCBB	9"	1' 6"	0.3	
21 LP-01	FUSE-XFMR 21 LP-01	0.208	3.05	3.05	1.08	1.443	0.0000	PNL	VCBB	2' 10"	1' 6"	3.4	(*N25a) (*N25d)
21 LP-02	FUSE-XFMR 21 LP-02	0.208	2.61	2.61	0.91	2	0.0000	PNL	VCBB	3' 1"	1' 6"	3.9	(*N25a) (*N25d)
24-LP-01	PD-24-LP-01	0.208	2.83	2.83	1.32	2	0.0000	PNL	VCBB	3' 8"	1' 6"	5.5	(*N25d)
24-LP-02	PD-24-LP-02	0.48	2.14	2.14	1.65	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.0	

Bus Name	Protective Device Name	Bus kV	Bus Bolted Fault (kA)	Prot Dev Bolted Fault (kA)	Prot Dev Arcing Fault (kA)	Trip/ Delay Time (sec.)	Breaker Opening Time/Tol (sec.)	Equip Type	Selected Electrode Config.	Arc Flash Boundary (ft & in)	Working Distance (ft & in)	Incident Energy (cal/cm²)	*Notes
28-LP-01	PD-XMFR-28-LP-01	0.208	3.51	3.51	1.65	2	0.0000	PNL	VCBB	4' 3"	1' 6"	7.0	(*N25d)
28-PP-01	PD-LC-9	0.48	3.27	3.23	2.50	2	0.0000	PNL	VCBB	5' 7"	1' 6"	11.5	(*N25d)
2A-LP-01	PD-XFMR-2A-LP-01	0.208	0.92	0.92	0.43	2	0.0000	PNL	VCBB	1' 9"	1' 6"	1.5	
2-LP-1	PD-XFMR 2-LP-1	0.208	1.03	1.03	0.48	2	0.0000	PNL	VCBB	1' 10"	1' 6"	1.7	
2-LP-2	PD-XFMR 2-LP-2	0.208	0.97	0.97	0.46	2	0.0000	PNL	VCBB	1' 9"	1' 6"	1.6	
2-LP-3	PD-XFMR 2-LP-3	0.208	0.97	0.97	0.46	2	0.0000	PNL	VCBB	1' 9"	1' 6"	1.6	
2-LP-4	PD-XFMR 2-LP-4	0.208	1.02	1.02	0.48	2	0.0000	PNL	VCBB	1' 10"	1' 6"	1.7	
45D WATER CIRC PUMP P-9 DISC	PD-45D WATER CIRC PUMP P-9	0.48	3.73	3.72	2.89	0.01	0.0000	PNL	VCBB	4"	1' 6"	0.1	
5-LP-02	PD-5-LP-02	0.208	2.81	2.81	0.99	2	0.0000	PNL	VCBB	3' 4"	1' 6"	4.3	(*N25a) (*N25d)
5-LP-03	PD-5-LP-03	0.208	1.58	1.58	0.61	2	0.0000	PNL	VCBB	2' 5"	1' 6"	2.5	(*N25a) (*N25d)
5-LP-04	PD-5-LP-04	0.208	2.82	2.82	0.99	1.964	0.0000	PNL	VCBB	3' 3"	1' 6"	4.2	(*N25a) (*N25d)
5-LP-05	PD-5-LP-05	0.208	2.01	2.01	0.94	2	0.0000	PNL	VCBB	2' 10"	1' 6"	3.7	(*N25d)
5-LP-06	PD-5-LP-06	0.208	2.01	2.01	0.94	2	0.0000	PNL	VCBB	2' 10"	1' 6"	3.7	(*N25d)
AER. TANK AND UNDERDRAIN PUMP	PD-AER. TANK AND UNDERDRAIN PU	0.48	1.96	1.95	1.51	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
AERATION RECIRC PUMP 1-3 DISC	CB-AERATION RECIRC PUMP 1-3	0.48	0.68	0.63	0.49	2	0.0000	PNL	VCBB	1' 11"	1' 6"	1.8	
AERATION RECIRC PUMP 2-3 DISC	CB-AERATION RECIRC PUMP 2-3	0.48	0.68	0.63	0.49	2	0.0000	PNL	VCBB	1' 11"	1' 6"	1.8	
AERATION RECIRC PUMP 3-3 DISC	CB-AERATION RECIRC PUMP 3-3	0.48	0.94	0.89	0.69	2	0.0000	PNL	VCBB	2' 4"	1' 6"	2.7	
AERATION RECIRC PUMP 4-3 DISC	CB-AERATION RECIRC PUMP 4-3	0.48	0.94	0.89	0.69	2	0.0000	PNL	VCBB	2' 4"	1' 6"	2.7	
AERATION RECIRC PUMP 5-3 DISC	CB-AERATION RECIRC PUMP 5-3	0.48	1.18	1.13	0.87	2	0.0000	PNL	VCBB	2' 9"	1' 6"	3.5	
AERATION RECIRC PUMP 6-3 DISC	PD-AERATION RECIRC PUMP 6-3	0.48	1.82	1.76	1.36	0.0225	0.0000	PNL	VCBB	4"	1' 6"	0.1	

Bus Name	Protective Device Name	Bus kV	Bus Bolted Fault (kA)	Prot Dev Bolted Fault (kA)	Prot Dev Arcing Fault (kA)	Trip/ Delay Time (sec.)	Breaker Opening Time/Tol (sec.)	Equip Type	Selected Electrode Config.	Arc Flash Boundary (ft & in)	Working Distance (ft & in)	Incident Energy (cal/cm^2)	*Notes
AERATION RECIRC PUMP 7-3 DISC	PD-AERATION RECIRC PUMP 7-3	0.48	1.22	1.22	0.74	1.022	0.0000	PNL	VCBB	1' 9"	1' 6"	1.5	(*N25a) (*N25d)
AERATION RECIRC PUMP 8-3 DISC	PD-AERATION RECIRC PUMP 8-3	0.48	0.94	0.94	0.56	1.569	0.0000	PNL	VCBB	1' 11"	1' 6"	1.7	(*N25a) (*N25d)
AERATION RECIRC PUMP 9-3 DISC	PD-AERATION RECIRC PUMP 9-3	0.48	0.76	0.76	0.51	1.791	0.0000	PNL	VCBB	1' 11"	1' 6"	1.8	(*N25d)
AERATION TANK PORT BLOWER RECP	PD-AERATION TANK BLOWER RECP	0.48	0.62	0.62	0.36	0.2325	0.0000	PNL	VCBB	5"	1' 6"	0.2	(*N25a) (*N25d)
AERATION VALVE #1	PD-AERATION 1-5	0.48	0.35	0.35	0.35	0.4203	0.0000	PNL	VCBB	7"	1' 6"	0.2	
AERATION VALVE #2	PD-AERATION 1-5	0.48	0.42	0.41	0.41	0.0963	0.0000	PNL	VCBB	4"	1' 6"	0.0	
AERATION VALVE #3	PD-AERATION 1-5	0.48	0.51	0.50	0.29	2	0.0000	PNL	VCBB	1' 5"	1' 6"	1.1	(*N25a) (*N25d)
AERATION VALVE #4	PD-AERATION 1-5	0.48	0.65	0.64	0.38	0.1879	0.0000	PNL	VCBB	5"	1' 6"	0.1	(*N25a) (*N25d)
AERATION VALVE #5	PD-AERATION 1-5	0.48	0.90	0.89	0.53	0.0405	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
AERATION VALVE #6	PD-AERATION 6-9	0.48	1.54	1.54	1.19	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
AERATION VALVE #7	PD-AERATION 6-9	0.48	1.03	1.03	0.61	0.0265	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
AERATION VALVE #8	PD-AERATION 6-9	0.48	0.77	0.77	0.46	0.0627	0.0000	PNL	VCBB	3"	1' 6"	0.1	(*N25a)
AERATION VALVE #9	PD-AERATION 6-9	0.48	0.62	0.62	0.36	0.235	0.0000	PNL	VCBB	5"	1' 6"	0.2	(*N25a) (*N25d)
AERATION VALVE HEADER	PD-AERATION 6-9	0.48	3.45	3.45	2.68	0.01	0.0000	PNL	VCBB	4"	1' 6"	0.1	
AIR COMPRESSOR	PD-AIR COMPRESSOR	0.48	1.76	1.74	1.35	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
AIR DUCT HEATER CONTACTOR	PD-AIR DUCT HEATER	0.48	12.15	12.15	9.83	0.01	0.0000	PNL	VCBB	8"	1' 6"	0.3	
AIR DUCT HEATER DISC	PD-AIR DUCT HEATER	0.48	7.15	7.15	5.65	0.01	0.0000	PNL	VCBB	6"	1' 6"	0.1	
ANAEROBIC MIX PUMP 1-1 DISC	CB-ANAEROBIC MIX PUMP 1-1	0.48	1.67	1.60	1.24	2	0.0000	PNL	VCBB	3' 5"	1' 6"	5.2	(*N25d)
ANAEROBIC MIX PUMP 2-1 DISC	CB-ANAEROBIC MIX PUMP 2-1	0.48	1.95	1.89	1.46	2	0.0000	PNL	VCBB	3' 10"	1' 6"	6.2	(*N25d)
ANAEROBIC MIX PUMP 3-1 DISC	CB-ANAEROBIC MIX PUMP 3-1	0.48	1.56	1.50	1.16	2	0.0000	PNL	VCBB	3' 3"	1' 6"	4.8	(*N25d)

Bus Name	Protective Device Name	Bus kV	Bus Bolted Fault (kA)	Prot Dev Bolted Fault (kA)	Prot Dev Arcing Fault (kA)	Trip/ Delay Time (sec.)	Breaker Opening Time/Tol (sec.)	Equip Type	Selected Electrode Config.	Arc Flash Boundary (ft & in)	Working Distance (ft & in)	Incident Energy (cal/cm^2)	*Notes
ANAEROBIC MIX PUMP 4-1 DISC	CB-ANAEROBIC MIX PUMP 4-1	0.48	1.99	1.93	1.49	2	0.0000	PNL	VCBB	3' 11"	1' 6"	6.4	(*N25d)
ANAEROBIC MIX PUMP 5-1 DISC	CB-ANAEROBIC MIX PUMP 5-1	0.48	2.76	2.70	1.70	2	0.0000	PNL	VCBB	4' 7"	1' 6"	7.1	(*N25a) (*N25d)
ANEROBIC MIX PUMP 6-1 DISC	PD-ANEROBIC MIX PUMP 6-1	0.48	3.02	2.95	2.28	0.0175	0.0000	PNL	VCBB	4"	1' 6"	0.1	
ANEROBIC MIX PUMP 7-1 DISC	PD-ANEROBIC MIX PUMP 7-1	0.48	2.18	2.11	1.63	2	0.0000	PNL	VCBB	4' 2"	1' 6"	7.1	(*N25d)
ANEROBIC MIX PUMP 8-1 DISC	PD-ANEROBIC MIX PUMP 8-1	0.48	1.71	1.64	1.27	2	0.0000	PNL	VCBB	3' 6"	1' 6"	5.4	(*N25d)
ANEROBIC MIX PUMP 9-1 DISC	PD-ANEROBIC MIX PUMP 9-1	0.48	1.41	1.35	1.04	2	0.0000	PNL	VCBB	3' 0"	1' 6"	4.3	(*N25d)
ANOXIC MIX PUMP 1-2 DISC	CB-ANOXIC MIX PUMP 1-2	0.48	1.71	1.66	1.29	0.023	0.0000	PNL	VCBB	4"	1' 6"	0.1	
ANOXIC MIX PUMP 2-2 DISC	CB-ANOXIC MIX PUMP 2-2	0.48	2.02	1.97	1.52	0.0217	0.0000	PNL	VCBB	4"	1' 6"	0.1	
ANOXIC MIX PUMP 3-2 DISC	CB-ANOXIC MIX PUMP 3-2	0.48	1.63	1.59	1.23	0.0233	0.0000	PNL	VCBB	3"	1' 6"	0.1	
ANOXIC MIX PUMP 4-2 DISC	CB-ANOXIC MIX PUMP 4-2	0.48	2.12	2.08	1.61	0.0213	0.0000	PNL	VCBB	4"	1' 6"	0.1	
ANOXIC MIX PUMP 5-2 DISC	CB-ANOXIC MIX PUMP 5-2	0.48	3.06	3.00	2.32	0.0188	0.0000	PNL	VCBB	5"	1' 6"	0.1	
ANOXIC MIX PUMP 6-2 DISC	PD-ANOXIC MIX PUMP 6-2	0.48	3.36	3.29	2.55	0.0175	0.0000	PNL	VCBB	5"	1' 6"	0.1	
ANOXIC MIX PUMP 7-2 DISC	PD-ANOXIC MIX PUMP 7-2	0.48	2.25	2.25	1.74	2	0.0000	PNL	VCBB	4' 5"	1' 6"	7.7	(*N25d)
ANOXIC MIX PUMP 8-2 DISC	PD-ANOXIC MIX PUMP 8-2	0.48	1.81	1.75	1.35	2	0.0000	PNL	VCBB	3' 8"	1' 6"	5.7	(*N25d)
ANOXIC MIX PUMP 9-2 DISC	PD-ANOXIC MIX PUMP 9-2	0.48	1.48	1.41	1.09	2	0.0000	PNL	VCBB	3' 2"	1' 6"	4.5	(*N25d)
AUGER #1	PD-SCREEN EQ #1	0.48	0.92	0.91	0.54	0.0378	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
AUGER #2	PD-SCREEN EQ #2	0.48	1.00	0.99	0.59	0.0298	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
AUGER #3	PD-SCREEN EQ #3	0.48	1.00	0.99	0.59	0.0298	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
BANDSCREEN #1	PD-SCREEN EQ #1	0.48	0.92	0.91	0.54	0.0377	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)

Bus Name	Protective Device Name	Bus kV	Bus Bolted Fault (kA)	Prot Dev Bolted Fault (kA)	Prot Dev Arcing Fault (kA)	Trip/ Delay Time (sec.)	Breaker Opening Time/Tol (sec.)	Equip Type	Selected Electrode Config.	Arc Flash Boundary (ft & in)	Working Distance (ft & in)	Incident Energy (cal/cm²)	*Notes
BANDSCREEN #2	PD-SCREEN EQ #2	0.48	1.00	0.99	0.59	0.0298	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
BANDSCREEN #3	PD-SCREEN EQ #3	0.48	1.00	0.99	0.59	0.0298	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
BAR SCREEN #1 C.P.	PD-BAR SCREENS 1, 2 ,3	0.48	0.84	0.84	0.50	0.0584	0.0000	PNL	VCBB	3"	1' 6"	0.1	(*N25a) (*N25d)
BAR SCREEN #1 DISC	PD-BAR SCREENS 1, 2 ,3	0.48	0.76	0.76	0.45	0.091	0.0000	PNL	VCBB	3"	1' 6"	0.1	(*N25a) (*N25d)
BAR SCREEN #2 C.P.	PD-BAR SCREENS 1, 2 ,3	0.48	0.98	0.98	0.58	0.0308	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
BAR SCREEN #2 DISC	PD-BAR SCREENS 1, 2 ,3	0.48	0.87	0.87	0.51	0.0514	0.0000	PNL	VCBB	3"	1' 6"	0.1	(*N25a) (*N25d)
BAR SCREEN #3 C.P.	PD-BAR SCREENS 1, 2 ,3	0.48	0.98	0.98	0.58	0.0308	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
BAR SCREEN #3 DISC	PD-BAR SCREENS 1, 2 ,3	0.48	0.87	0.87	0.51	0.0514	0.0000	PNL	VCBB	3"	1' 6"	0.1	(*N25a) (*N25d)
BAR SCREEN MTR STARTER	PD-SCREEN SCREW CONV	0.48	1.49	1.49	0.91	0.0244	0.0000	PNL	VCBB	3"	1' 6"	0.0	(*N25a)
BELT PRESS DISCHARGE COVEYOR	PD-BELT PRESS DISCHARGE COVEYO	0.48	2.62	2.62	2.03	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.0	
BLOWER #1	PD-BLOWER #1	0.48	12.83	12.42	10.07	0.01	0.0000	PNL	VCBB	8"	1' 6"	0.3	
BLOWER #3	PD-BLOWER #3	0.48	13.82	13.54	11.01	0.01	0.0000	PNL	VCBB	9"	1' 6"	0.3	
BLOWER #5	PD-BLOWER #5	0.48	15.67	15.37	12.56	0.01	0.0000	PNL	VCBB	9"	1' 6"	0.4	
BLOWER 1 CP	PD-BLOWER 1 CP	0.48	2.83	2.83	2.19	0.0162	0.0000	PNL	VCBB	4"	1' 6"	0.1	
BLOWER 2 CP	PD-BLOWER 2 CP	0.48	1.60	1.60	0.98	0.0327	0.0000	PNL	VCBB	3"	1' 6"	0.1	(*N25a)
BLOWER 3 CP	CB-BLOWER 3 CP	0.48	1.95	1.93	1.49	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
BLOWER 4 CP	CB-BLOWER 4 CP	0.48	1.00	1.00	0.60	0.0177	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
BLOWER ROOM	PD-BLOWER ROOM	0.48	6.17	6.14	4.83	0.01	0.0000	PNL	VCBB	5"	1' 6"	0.1	
BOILER CIRC PUMP #1 DISC	CB-BOILER CIRC PUMP #1	0.48	1.45	1.42	0.87	0.0311	0.0000	PNL	VCBB	3"	1' 6"	0.1	(*N25a)
BOILER CIRC PUMP #2 DISC	CB-BOILER CIRC PUMP #2	0.48	1.45	1.42	0.87	0.0311	0.0000	PNL	VCBB	3"	1' 6"	0.1	(*N25a)
BOILER CTRL/GARAGE DOOR DIS	PD-BOILER CTRL-GARAGE DOOR	0.48	2.83	2.83	2.19	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.0	

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BOLIMO CONTROLS	PD-BOLIMO CONTROLS	0.48	2.97	2.97	2.29	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.1	
BRIDGE CRANE	PD-BRIDGE CRANE	0.48	4.98	4.98	3.89	0.01	0.0000	PNL	VCBB	4"	1' 6"	0.1	
CAPACITOR DISC	PD-CAPACITOR DISC	0.48	13.95	13.95	11.35	0.01	0.0000	PNL	VCBB	9"	1' 6"	0.3	
CARBON FEED PUMP #1	PD-CARBON FEED PUMPS	0.48	1.40	1.36	1.05	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
CARBON FEED PUMP #2	PD-CARBON FEED PUMPS	0.48	1.40	1.36	1.05	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
CARBON SCRUBBER CS-BP-1	PD-CARBON SCRUBBER CS-BP-1	0.48	1.38	1.38	0.84	0.664	0.0000	PNL	VCBB	1' 5"	1' 6"	1.1	(*N25a) (*N25d)
CARBON SLURRY MIXER	PD-CARBON SLURRY MIXER	0.48	3.91	3.81	2.96	0.01	0.0000	PNL	VCBB	4"	1' 6"	0.1	
CENTER CELL	PD-MCC-00 BACKWASH PUMPS	0.48	1.99	1.97	1.52	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
CENTRIFUGE #2	PD-CENTRIFUGE #2	0.48	13.03	12.35	10.03	0.0167	0.0000	PNL	VCBB	11"	1' 6"	0.5	
CENTRIFUGE #2 POLY SKID	PD-CENTRIFUGE #2 POLY SKID	0.48	0.98	0.98	0.58	0.6637	0.0000	PNL	VCBB	1' 2"	1' 6"	0.8	(*N25a) (*N25d)
CENTRIFUGE #4	PD-CENTRIFUGE #4	0.48	12.54	11.87	9.62	0.0168	0.0000	PNL	VCBB	11"	1' 6"	0.5	
CENTRIFUGE 1 POLY SKID	PD-CENTRIFUGE 1 POLY SKID	0.48	1.53	1.53	0.93	0.0279	0.0000	PNL	VCBB	3"	1' 6"	0.1	(*N25a)
CENTRIFUGE 2 POLY SKID	PD-CENTRIFUGE 2 POLY SKID	0.48	1.53	1.53	0.93	0.0279	0.0000	PNL	VCBB	3"	1' 6"	0.1	(*N25a)
CENTRIFUGE OVERHEAD CRANE	PD-CENTRIFUGE OVERHEAD CRANE	0.48	4.30	4.30	3.35	0.0166	0.0000	PNL	VCBB	5"	1' 6"	0.1	
CENTRIFUGE OVERHEAD CRANE 3PDT	PD-CENTRIFUGE OVERHEAD CRANE 3	0.48	4.59	4.59	3.58	0.0162	0.0000	PNL	VCBB	6"	1' 6"	0.1	
CENTRIFUGE# 1	PD-CENTRIFUGE# 1	0.48	12.99	12.31	9.99	0.0167	0.0000	PNL	VCBB	11"	1' 6"	0.5	
CENTRIFUGE# 3	PD-CENTRIFUGE# 3	0.48	12.61	11.94	9.68	0.0168	0.0000	PNL	VCBB	11"	1' 6"	0.5	
CHANEL MIX PUMP 10-3 DISC	PD-CHANEL MIX PUMP 10-3	0.48	0.96	0.96	0.57	1.5	0.0000	PNL	VCBB	1' 10"	1' 6"	1.7	(*N25a) (*N25d)
CHANEL MIX PUMP 10-4 DISC	PD-CHANEL MIX PUMP 10-4	0.48	0.64	0.60	0.47	1.995	0.0000	PNL	VCBB	1' 10"	1' 6"	1.8	

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CHANNEL MIX PUMP 10-1 DISC	CB-CHANNEL MIX PUMP 10-1	0.48	0.71	0.68	0.53	2	0.0000	PNL	VCBB	2' 0"	1' 6"	2.0	
CHANNEL MIX PUMP 10-2 DISC	CB-CHANNEL MIX PUMP 10-2	0.48	1.12	1.12	0.67	1.622	0.0000	PNL	VCBB	2' 2"	1' 6"	2.2	(*N25a) (*N25d)
CHILL WATER CIRC PUMP P-5 DISC	PD-CHILL WATER CIRC PUMP P-5	0.48	9.49	9.15	7.32	0.01	0.0000	PNL	VCBB	7"	1' 6"	0.2	
CHILL WATER CIRC PUMP P-6 DISC	PD-CHILL WATER CIRC PUMP P-6	0.48	4.25	4.24	3.30	0.01	0.0000	PNL	VCBB	4"	1' 6"	0.1	
CHILLER #1	PD-CHILLER #1	0.48	9.66	9.22	7.38	0.01	0.0000	PNL	VCBB	7"	1' 6"	0.2	
CHILLER #2	PD-CHILLER #2	0.48	13.45	12.97	10.54	0.0158	0.0000	PNL	VCBB	11"	1' 6"	0.5	
CP-MAU-BP-1	PD-MAU-BP-1	0.48	1.74	1.72	1.33	0.0227	0.0000	PNL	VCBB	4"	1' 6"	0.1	
CS-BS-1	PD-CS-BS-1	0.48	8.93	8.85	7.06	0.0162	0.0000	PNL	VCBB	8"	1' 6"	0.3	
CTRL SCRN RM UNIT HEATERS	PD-CTRL SCRN RM UH	0.48	15.32	15.32	12.51	0.01	0.0000	PNL	VCBB	9"	1' 6"	0.4	
CW PUMP P-10	PD-CW PUMP P-10	0.48	2.14	2.06	1.59	0.0134	0.0000	PNL	VCBB	3"	1' 6"	0.0	
D-101	PD-D-101	0.48	1.23	1.23	0.95	0.0195	0.0000	PNL	VCBB	3"	1' 6"	0.0	
D-102	PD-D-102	0.48	1.23	1.23	0.95	0.0195	0.0000	PNL	VCBB	3"	1' 6"	0.0	
D-103	PD-D-103	0.48	1.23	1.23	0.95	0.0195	0.0000	PNL	VCBB	3"	1' 6"	0.0	
DIVERSION CHAMBER #1	PD-DIVERSION CHAMBER #1	0.48	1.03	1.03	0.79	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
DIVERSION CHAMBER #2	PD-DIVERSION CHAMBER #2	0.48	0.51	0.51	0.29	0.0372	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
DOOR #1	PD-MEGADOOR CONTROL PANEL	0.48	0.78	0.76	0.45	0.0656	0.0000	PNL	VCBB	3"	1' 6"	0.1	(*N25a)
DOOR #2	PD-MEGADOOR CONTROL PANEL	0.48	0.78	0.76	0.45	0.0656	0.0000	PNL	VCBB	3"	1' 6"	0.1	(*N25a)
DOOR #3	PD-MEGADOOR CONTROL PANEL	0.48	0.78	0.76	0.45	0.0656	0.0000	PNL	VCBB	3"	1' 6"	0.1	(*N25a)
DOOR OPENER	PD-DOOR OPENER	0.48	1.82	1.82	1.40	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
DOOR OPERATORS	PD-GRIT TANKS	0.48	6.33	6.29	4.95	0.0167	0.0000	PNL	VCBB	7"	1' 6"	0.2	

Bus Name	Protective Device Name	Bus kV	Bus Bolted Fault (kA)	Prot Dev Bolted Fault (kA)	Prot Dev Arcing Fault (kA)	Trip/ Delay Time (sec.)	Breaker Opening Time/Tol (sec.)	Equip Type	Selected Electrode Config.	Arc Flash Boundary (ft & in)	Working Distance (ft & in)	Incident Energy (cal/cm^2)	*Notes
DRILL PRESS #1	PD-DRILL PRESS #1	0.48	3.32	3.32	2.57	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.1	
DRILL PRESS #2	PD-DRILL PRES #2	0.48	3.32	3.32	2.57	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.1	
DS- CENT. FEED PUMPS	PD-CENTRIFUDE FEED PUMPS	0.48	4.01	3.92	3.04	0.0183	0.0000	PNL	VCBB	5"	1' 6"	0.1	
DS CLARIFIERS	PD-CLARIFIERS	0.48	2.60	2.60	2.01	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.0	
DS- NORTH BELT PRESS 1 AND 2	PD-NORTH BELT PRESS 1 AND 2	0.48	1.15	1.13	0.68	0.014	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
DS-1500 HP BLOWER 2	PD-LC-12A	4.80	19.47	18.29	16.12	0.097	0.0000	SWG	HCB	6' 2"	3' 0"	4.1	
DS-1500 HP BLOWER 3	PD-LC-12	4.80	19.58	18.38	16.19	0.097	0.0000	SWG	HCB	6' 2"	3' 0"	4.1	
DS-2500HP BLOWER 1	PD-BLOWER 1	4.80	7.60	7.60	6.60	0.5633	0.0000	SWG	HCB	9' 7"	3' 0"	8.8	
DS-2500HP BLOWER 4	PD-BLOWER 4	4.80	7.63	7.63	6.62	0.5598	0.0000	SWG	HCB	9' 7"	3' 0"	8.7	
DS-3 AUX. INST. AIR COMP	3 AUX. INST. AIR COMP DS	0.48	0.74	0.73	0.43	0.0445	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
DS-AIR COMPRESSOR	PD-MCC8 DRAIN PUMP	0.48	1.88	1.88	1.45	2	0.0000	PNL	VCBB	3' 10"	1' 6"	6.2	(*N25d)
DS-AMMONIA REMOVING SYS 1	PD-AMMONIA REMOVING SYS 1	0.48	8.06	7.61	6.05	0.01	0.0000	PNL	VCBB	6"	1' 6"	0.2	
DS-AMMONIA REMOVING SYS 2	PD-AMMONIA REMOVING SYS 2	0.48	8.06	7.61	6.05	0.01	0.0000	PNL	VCBB	6"	1' 6"	0.2	
DS-ANOXIC TANK MIXER	PD-ANOXIC TANK MIXER	0.48	2.60	2.60	2.01	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.0	
DS-BASEMENT ELEC UNIT HTR	PD-BASEMENT ELEC UNIT HTR	0.48	5.75	5.75	4.52	0.0167	0.0000	PNL	VCBB	6"	1' 6"	0.2	
DS-BYPASS CONVEYOR	3 AUX. INST. AIR COMP DS0	0.48	1.76	1.75	1.35	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
DS-BYPASS SLIDE GATE	PD-CONTROL VALVE OPERATORS	0.48	1.96	1.95	1.50	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
DS-CENTRIFUGE FEED PUMP #1	PD-CENTRIFUGE FEED PUMP #1	0.48	1.65	1.61	0.99	0.0151	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
DS-CF-SH-1	PD-CF-SH-1	0.48	0.72	0.72	0.43	0.948	0.0000	PNL	VCBB	1' 2"	1' 6"	0.8	(*N25a) (*N25d)
DS-CF-SH-2	PD-CF-SH-2	0.48	0.83	0.83	0.49	0.8184	0.0000	PNL	VCBB	1' 2"	1' 6"	0.8	(*N25a) (*N25d)

Bus Name	Protective Device Name	Bus kV	Bus Bolted Fault (kA)	Prot Dev Bolted Fault (kA)	Prot Dev Arcing Fault (kA)	Trip/ Delay Time (sec.)	Breaker Opening Time/Tol (sec.)	Equip Type	Selected Electrode Config.	Arc Flash Boundary (ft & in)	Working Distance (ft & in)	Incident Energy (cal/cm^2)	*Notes
DS-CLARIFIER 7, 8	PD-CLARIFIER 7,8	0.48	1.95	1.95	1.51	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
DS-CP-CS-SH-1	PD-CP-CS-SH-1	0.48	4.14	4.08	3.17	0.0169	0.0000	PNL	VCBB	5"	1' 6"	0.1	
DS-DRAIN PUMP #2	PD-DRAIN PUMP #2	0.48	3.06	3.01	2.33	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.1	
DS-DUCT HEATER	PD-DUCT HEATER	0.48	1.52	1.52	1.17	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
DS-EF-1 CAP	PD-EF-1 CAP	0.48	13.83	13.83	11.25	0.01	0.0000	PNL	VCBB	9"	1' 6"	0.3	
DS-EF-2A	PD-EF-2A	0.48	1.67	1.67	1.29	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
DS-EF-2A CAP	PD-EF-2A CAP	0.48	11.76	11.76	9.50	0.01	0.0000	PNL	VCBB	8"	1' 6"	0.3	
DS-EF-2B	PD-EF-2B	0.48	1.88	1.88	1.45	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
DS-EF-2B CAP	PD-EF-2B CAP	0.48	11.76	11.76	9.50	0.01	0.0000	PNL	VCBB	8"	1' 6"	0.3	
DS-EF-2C	PD-EF-2C	0.48	2.15	2.15	1.66	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.0	
DS-EF-2C CAP	PD-EF-2C CAP	0.48	11.76	11.76	9.50	0.01	0.0000	PNL	VCBB	8"	1' 6"	0.3	
DS-EF-5A	PD-EF-5A	0.48	0.87	0.87	0.52	0.0154	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
DS-EF-5A CAP	PD-EF-5A CAP	0.48	11.76	11.76	9.50	0.01	0.0000	PNL	VCBB	8"	1' 6"	0.3	
DS-EF-5B	PD-EF-5B	0.48	1.03	1.03	0.80	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
DS-EF-5B CAP	PD-EF-5B CAP	0.48	11.76	11.76	9.50	0.01	0.0000	PNL	VCBB	8"	1' 6"	0.3	
DS-EF-SC-1	PD-EF-SC-1	0.48	1.16	1.16	0.90	0.0192	0.0000	PNL	VCBB	3"	1' 6"	0.0	
DS-ENG. RM. BOILER SUMP	PD-ENG. RM. BOILER SUMP	0.48	7.22	7.20	5.70	0.01	0.0000	PNL	VCBB	6"	1' 6"	0.1	
DS-EXHAUST FAN F, G	PD-EXHAUST FAN F, G	0.48	1.47	1.47	1.13	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
DS-EXISTING CRANE	PD-EXISTING CRANE	0.48	1.42	1.42	1.10	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
DS-FOUL AIR FANS	PD-FOUL AIR FANS	0.48	2.61	2.60	2.01	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.0	
DS-GEN 1	MaxTripTime @2.0s	0.48	5.93	5.93	4.66	2	0.0000	PNL	VCBB	8' 6"	1' 6"	23.5	(*N25d)
DS-GEN 2	MaxTripTime @2.0s	0.48	5.93	5.93	4.66	2	0.0000	PNL	VCBB	8' 6"	1' 6"	23.5	(*N25d)

Bus Name	Protective Device Name	Bus kV	Bus Bolted Fault (kA)	Prot Dev Bolted Fault (kA)	Prot Dev Arcing Fault (kA)	Trip/ Delay Time (sec.)	Breaker Opening Time/Tol (sec.)	Equip Type	Selected Electrode Config.	Arc Flash Boundary (ft & in)	Working Distance (ft & in)	Incident Energy (cal/cm^2)	*Notes
DS-GRINDER 1,2,3	PD-GRINDER 1,2,3	0.48	4.62	4.62	3.60	0.01	0.0000	PNL	VCBB	4"	1' 6"	0.1	
DS-GROUND SLUDGE TANK 2	PD-GROUND SLUDGE TANK 2	0.48	1.35	1.32	1.02	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
DS-GSST MIXER BLDG	PD-GSST MIXER BUILDING	0.48	4.05	3.91	3.04	0.01	0.0000	PNL	VCBB	4"	1' 6"	0.1	
DS-HOIST	PD-SUMP PUMPS/HOIST	0.48	1.31	1.31	1.01	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
DS-HOIST,EX FAN, HV UNIT	PD-HOIST,EX FAN, HV UNIT	0.48	1.52	1.52	1.17	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
DS-HV UNIT	PD-MOV SUMP HV UNIT	0.48	2.93	2.93	2.27	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.1	
DS-HVAC #1	PD-HVAC #1	0.48	14.45	14.45	11.77	0.01	0.0000	PNL	VCBB	9"	1' 6"	0.3	
DS-HVAC #2	PD-HVAC #2	0.48	14.45	14.45	11.77	0.01	0.0000	PNL	VCBB	9"	1' 6"	0.3	
DS-HVAC 1	PD-HVAC 1	0.48	1.84	1.77	1.36	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
DS-INFLUENT VALVE #7	PD-CONTROL VALVE OPERATORS	0.48	1.96	1.95	1.50	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
DS-INFLUENT VALVE #8	PD-CONTROL VALVE OPERATORS	0.48	1.96	1.95	1.50	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
DS-MAU-SC-1	PD-MAU-SC-1	0.48	2.31	2.30	1.77	0.0166	0.0000	PNL	VCBB	4"	1' 6"	0.1	
DS-MAU-SH-1	PD-MAU-SH-1	0.48	1.13	1.13	0.68	0.6038	0.0000	PNL	VCBB	1' 2"	1' 6"	0.8	(*N25a) (*N25d)
DS-MAU-SH-2	PD-MAU-SH-2	0.48	2.18	2.18	1.36	0.7544	0.0000	PNL	VCBB	2' 2"	1' 6"	2.1	(*N25a) (*N25d)
DS-MAU-SH-3	PD-MAU-SH-3	0.48	1.28	1.28	0.78	0.3063	0.0000	PNL	VCBB	10"	1' 6"	0.5	(*N25a) (*N25d)
DS-MCC-15 AC UNIT	PD-MCC15 UPS FEED	0.48	10.93	10.93	8.80	0.01	0.0000	PNL	VCBB	7"	1' 6"	0.2	
DS-MCC-15 BATT CHRG XFR SW	PD-MCC15 UPS FEED	0.48	10.93	10.93	8.80	0.01	0.0000	PNL	VCBB	7"	1' 6"	0.2	
DS-MCC-25-SF-4	PD-MCC-25-SF-4	0.48	1.43	1.43	1.10	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
DS-MCC-7 AIR COMP	PD-XFMR 21 LP-01	0.48	5.34	5.32	4.17	0.01	0.0000	PNL	VCBB	5"	1' 6"	0.1	
DS-MCC7 PUMP 1	PD-RECYCLE PUMP	0.48	15.66	15.03	12.28	0.01	0.0000	PNL	VCBB	9"	1' 6"	0.4	
DS-MCC7 PUMP 2	PD-RECYCLE PUMP	0.48	14.66	14.06	11.46	0.01	0.0000	PNL	VCBB	9"	1' 6"	0.3	

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DS-MCC7 PUMP 3	PD-RECYCLE PUMP	0.48	13.74	13.18	10.72	0.01	0.0000	PNL	VCBB	9"	1' 6"	0.3	
DS-MCC7 PUMP 4	PD-RECYCLE PUMP	0.48	12.91	12.37	10.04	0.01	0.0000	PNL	VCBB	8"	1' 6"	0.3	
DS-MCC-8 DRAIN PUMP	PD-MCC8 DRAIN PUMP	0.48	9.48	9.48	7.58	0.0135	0.0000	PNL	VCBB	8"	1' 6"	0.3	
DS-MCC8 PRI THICKENER PUMP #1	PD-MCC8 MISC PUMPS	0.48	2.61	2.61	2.02	2	0.0000	PNL	VCBB	4' 9"	1' 6"	8.9	(*N25d)
DS-MCC8 PRI THICKENER PUMP #2	PD-MCC8 MISC PUMPS	0.48	2.61	2.61	2.02	2	0.0000	PNL	VCBB	4' 9"	1' 6"	8.9	(*N25d)
DS-MCC8 PRI THICKENER PUMP #3	PD-MCC8 MISC PUMPS	0.48	2.35	2.35	1.82	2	0.0000	PNL	VCBB	4' 5"	1' 6"	7.9	(*N25d)
DS-MCC8 RAS PUMP #1	PD-MCC8 RAS PUMPS	0.48	2.32	2.32	1.79	2	0.0000	PNL	VCBB	4' 5"	1' 6"	7.8	(*N25d)
DS-MCC8 RAS PUMP #2	MAIN-MCC-8	0.48	2.57	2.57	1.99	2	0.0000	PNL	VCBB	4' 9"	1' 6"	8.8	(*N25d)
DS-MCC8 RAS PUMP #3	MAIN-MCC-8	0.48	2.72	2.72	2.10	2	0.0000	PNL	VCBB	4' 11"	1' 6"	9.3	(*N25d)
DS-MCC8 RAS PUMP #4	MAIN-MCC-8	0.48	3.07	3.07	2.38	2	0.0000	PNL	VCBB	5' 4"	1' 6"	10.7	(*N25d)
DS-MCC8 SCUM PUMP #1	PD-MCC8 MISC PUMPS	0.48	1.43	1.43	1.10	2	0.0000	PNL	VCBB	3' 2"	1' 6"	4.5	(*N25d)
DS-MCC8 SCUM PUMP #2	PD-MCC8 MISC PUMPS	0.48	1.43	1.43	1.10	2	0.0000	PNL	VCBB	3' 2"	1' 6"	4.5	(*N25d)
DS-MCC8 THICKENERS AND CAF	PD-MCC8 MISC PUMPS	0.48	6.03	6.03	4.74	0.0151	0.0000	PNL	VCBB	6"	1' 6"	0.2	
DS-MCC8 WAS PUMP	PD-MCC8 MISC PUMPS	0.48	1.43	1.43	1.10	2	0.0000	PNL	VCBB	3' 2"	1' 6"	4.5	(*N25d)
DS-MIXED LIQUOR PUMP #2	PD-MIXED LIQUOR PUMP #2	0.48	3.39	3.28	2.54	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.1	
DS-MOV SUMP	PD-MOV SUMP HV UNIT	0.48	7.26	7.26	5.75	0.01	0.0000	PNL	VCBB	6"	1' 6"	0.1	
DS-MSP-12 TUMBULATOR	PD-MSP-12 TUMBULATOR	0.48	1.48	1.46	1.13	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
DS-NEW CRANE	PD-NEW CRANE	0.48	1.42	1.42	1.10	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
DS-NORTH BELT PRESS 1	PD-NORTH BELT PRESS 1 AND 2	0.48	1.05	1.03	0.62	0.0163	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
DS-NORTH BELT PRESS 2	PD-NORTH BELT PRESS 1 AND 2	0.48	1.05	1.03	0.62	0.0163	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)

Bus Name	Protective Device Name	Bus kV	Bus Bolted Fault (kA)	Prot Dev Bolted Fault (kA)	Prot Dev Arcing Fault (kA)	Trip/ Delay Time (sec.)	Breaker Opening Time/Tol (sec.)	Equip Type	Selected Electrode Config.	Arc Flash Boundary (ft & in)	Working Distance (ft & in)	Incident Energy (cal/cm^2)	*Notes
DS-NORTH BOOSTER PUMP 1	PD-NORTH BOOSTER PUMPS	0.48	5.49	5.45	4.27	0.01	0.0000	PNL	VCBB	5"	1' 6"	0.1	
DS-NORTH BOOSTER PUMP 2	PD-NORTH BOOSTER PUMPS	0.48	5.49	5.45	4.27	0.01	0.0000	PNL	VCBB	5"	1' 6"	0.1	
DS-NORTH BOOSTER PUMPS	PD-NORTH BOOSTER PUMPS	0.48	5.75	5.71	4.48	0.01	0.0000	PNL	VCBB	5"	1' 6"	0.1	
DS-OH DOOR	PD-OH DOOR	0.48	11.76	11.76	9.50	0.01	0.0000	PNL	VCBB	8"	1' 6"	0.3	
DS-POLYMER MIXER	PD-POLYMER MIXER	0.48	2.60	2.60	2.01	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.0	
DS-PRIM THICK PUMP #4	PD-PRIM THICK PUMP #4	0.48	3.13	3.13	2.42	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.1	
DS-Q1236	PD-RETURN VALVE MOTORS	0.48	0.93	0.93	0.56	0.0348	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
DS-Q1237	PD-RETURN VALVE MOTORS	0.48	0.96	0.96	0.57	0.0321	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
DS-Q1238	PD-RETURN VALVE MOTORS	0.48	0.96	0.96	0.57	0.0321	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
DS-Q1239	PD-RETURN VALVE MOTORS	0.48	0.99	0.99	0.59	0.0295	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
DS-Q1240	PD-RETURN VALVE MOTORS	0.48	0.99	0.99	0.59	0.0295	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
DS-Q1241	PD-RETURN VALVE MOTORS	0.48	1.02	1.02	0.61	0.0271	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
DS-Q1242	PD-RETURN VALVE MOTORS	0.48	1.02	1.02	0.61	0.0271	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
DS-Q1243	PD-RETURN VALVE MOTORS	0.48	1.05	1.05	0.63	0.0248	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
DS-RAS PUMP #1	PD-RAS PUMPS	0.48	3.26	3.23	2.50	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.1	
DS-RAS PUMP #2	PD-RAS PUMPS	0.48	3.26	3.23	2.50	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.1	
DS-RAS PUMP #3	PD-RAS PUMPS	0.48	3.26	3.23	2.50	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.1	
DS-RECYCLE PUMP	PD-RECYCLE PUMP	0.48	19.03	18.29	15.00	0.01	0.0000	PNL	VCBB	11"	1' 6"	0.5	
DS-RETURN VALVE MOTORS	PD-RETURN VALVE MOTORS	0.48	1.52	1.52	1.17	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
DS-SCUM PUMP #2	PD-SCUM PUMP #2	0.48	1.47	1.47	1.13	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	

Bus Name	Protective Device Name	Bus kV	Bus Bolted Fault (kA)	Prot Dev Bolted Fault (kA)	Prot Dev Arcing Fault (kA)	Trip/ Delay Time (sec.)	Breaker Opening Time/Tol (sec.)	Equip Type	Selected Electrode Config.	Arc Flash Boundary (ft & in)	Working Distance (ft & in)	Incident Energy (cal/cm^2)	*Notes
DS-SERV GARAGE	PD-XFMR 21 LP-01	0.48	6.38	6.36	5.01	0.01	0.0000	PNL	VCBB	5"	1' 6"	0.1	
DS-SEWAGE PUMP #4	PD-PUMP #4	0.48	21.32	20.35	16.69	0.01	0.0000	PNL	VCBB	11"	1' 6"	0.5	
DS-SLIDE GATE #7	PD-CONTROL VALVE OPERATORS	0.48	1.96	1.95	1.50	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
DS-SLIDE GATE #8	PD-CONTROL VALVE OPERATORS	0.48	1.96	1.95	1.50	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
DS-SLUDGE PUMP 6, 7	PD-SLUDGE PUMP 6, 7	0.48	3.06	3.02	2.34	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.1	
DS-SLUDGE PUMPS	PD-SLUDE PUMPS	0.48	3.48	3.46	2.68	0.01	0.0000	PNL	VCBB	4"	1' 6"	0.1	
DS-SLUDGE TANK 1 MIXER	PD-SLUDGE TANK 1 MIXER	0.48	0.98	0.96	0.74	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
DS-SLUDGE THICKENER 1	PD-SLUDGE THICKENERS 1 AND 2	0.48	2.87	2.84	2.20	0.0165	0.0000	PNL	VCBB	4"	1' 6"	0.1	
DS-SLUDGE THICKENER 2	PD-SLUDGE THICKENERS 1 AND 2	0.48	2.57	2.54	1.96	0.0165	0.0000	PNL	VCBB	4"	1' 6"	0.1	
DS-SLUDGE THICKENER 3	PD-SLUDGE THICKENERS 1 AND 3	0.48	1.48	1.46	1.12	0.0175	0.0000	PNL	VCBB	3"	1' 6"	0.0	
DS-SLUDGE THICKENER 4	PD-SLUDGE THICKENERS 1 AND 3	0.48	1.48	1.46	1.12	0.0175	0.0000	PNL	VCBB	3"	1' 6"	0.0	
DS-SLUDGE THICKENERS 1 AND 2	PD-SLUDGE THICKENERS 1 AND 2	0.48	3.04	3.02	2.34	0.0165	0.0000	PNL	VCBB	4"	1' 6"	0.1	
DS-SLUDGE THICKENERS 3 AND 4	PD-SLUDGE THICKENERS 1 AND 3	0.48	1.52	1.50	1.16	0.0174	0.0000	PNL	VCBB	3"	1' 6"	0.0	
DS-SOUTH BELT PRESS 1	PD-SOUTH BELT PRESS 1 AND 2	0.48	1.05	1.03	0.62	0.0163	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
DS-SOUTH BELT PRESS 1 AND 2	PD-SOUTH BELT PRESS 1 AND 2	0.48	1.15	1.13	0.68	0.014	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
DS-SOUTH BELT PRESS 2	PD-SOUTH BELT PRESS 1 AND 2	0.48	1.05	1.03	0.62	0.0163	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
DS-STREET LIGHT	PD-STREET LIGHT	0.48	2.24	2.24	1.73	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.0	
DS-SUMP PUMP 1	PD-SUMP PUMP 1 AND 2	0.48	1.27	1.26	0.97	0.0182	0.0000	PNL	VCBB	3"	1' 6"	0.0	
DS-SUMP PUMP 1 AND 2	PD-SUMP PUMP 1 AND 2	0.48	1.32	1.31	1.01	0.0178	0.0000	PNL	VCBB	3"	1' 6"	0.0	
DS-SUMP PUMP 2	PD-SUMP PUMP 1 AND 2	0.48	1.27	1.26	0.97	0.0182	0.0000	PNL	VCBB	3"	1' 6"	0.0	

Bus Name	Protective Device Name	Bus kV	Bus Bolted Fault (kA)	Prot Dev Bolted Fault (kA)	Prot Dev Arcing Fault (kA)	Trip/ Delay Time (sec.)	Breaker Opening Time/Tol (sec.)	Equip Type	Selected Electrode Config.	Arc Flash Boundary (ft & in)	Working Distance (ft & in)	Incident Energy (cal/cm^2)	*Notes
DS-SUMP PUMP A	PD-SUMP PUMPS/HOIST	0.48	1.31	1.31	1.01	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
DS-SUMP PUMP B	PD-SUMP PUMPS/HOIST	0.48	1.31	1.31	1.01	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
DS-SYSTEM AIR COMP CP-1	PD-SYSTEM AIR COMP CP-1	0.48	0.76	0.73	0.43	0.0225	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
DS-SYSTEM AIR COMP CP-2	PD-SYSTEM AIR COMP CP-2	0.48	0.76	0.73	0.43	0.0147	0.0000	PNL	VCBB	1"	1' 6"	0.0	(*N25a)
DS-UNIT HEATER	PD-UNIT HEATER	0.48	1.66	1.66	1.28	0.0175	0.0000	PNL	VCBB	3"	1' 6"	0.0	
DS-WELDER PLUG	PD-WELDER PLUG	0.48	1.52	1.52	1.17	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
DS-XFMR 21 LP-01	PD-XFMR 21 LP-01	0.48	6.23	6.21	4.89	0.01	0.0000	PNL	VCBB	5"	1' 6"	0.1	
DS-XFMR 21 LP-02	PD-XFMR 21 LP-01	0.48	2.52	2.52	1.58	0.0971	0.0000	PNL	VCBB	8"	1' 6"	0.3	(*N25a) (*N25d)
DUMBWATIER DISC	PD-DUMBWATIER	0.48	4.02	4.02	3.13	0.01	0.0000	PNL	VCBB	4"	1' 6"	0.1	
EAST BANK-1A	PD-FB5	4.80	8.34	8.32	7.38	0.3371	0.0833	SWG	HCB	8' 8"	3' 0"	7.3	
EAST BANK-1B	PD-FB2	4.80	8.35	8.34	7.39	0.3366	0.0833	SWG	HCB	8' 8"	3' 0"	7.3	
EAST BANK-2A	PD-FB3	4.80	24.76	18.94	16.61	0.0167	0.0833	SWG	HCB	17' 9"	3' 0"	5.4	
EAST BANK-2B	PD-FB3	4.80	24.71	18.90	16.57	0.0167	0.0833	SWG	HCB	21' 7"	3' 0"	5.4	
EAST FAN	PD-EAST FAN	0.48	0.74	0.74	0.44	0.8597	0.0000	PNL	VCBB	1' 1"	1' 6"	0.7	(*N25a) (*N25d)
EAST STORAGE DISCHARGE COVEYOR	PD-EAST STORAGE DISCHARGE COVE	0.48	1.05	1.05	0.81	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
EAST SUPPLY FAN	PD-FUME HOOD FANS	0.48	0.58	0.58	0.34	0.3861	0.0000	PNL	VCBB	7"	1' 6"	0.3	(*N25a) (*N25d)
EF-1 DISC	PD-MCC-15AA	0.48	2.89	2.68	2.08	2	0.0000	PNL	VCBB	5' 1"	1' 6"	9.9	(*N25d)
EF-11 DISC	PD-MCC-15AA	0.48	0.98	0.92	0.71	2	0.0000	PNL	VCBB	2' 6"	1' 6"	3.0	
EF-12 DISC	PD-MCC-15AA	0.48	1.05	0.98	0.76	2	0.0000	PNL	VCBB	2' 7"	1' 6"	3.2	
EF-13 DISC	PD-MCC-15AA	0.48	1.09	1.02	0.79	2	0.0000	PNL	VCBB	2' 8"	1' 6"	3.4	
EF-14 DISC	PD-MCC-15AA	0.48	1.05	0.98	0.76	2	0.0000	PNL	VCBB	2' 7"	1' 6"	3.2	

Bus Name	Protective Device Name	Bus kV	Bus Bolted Fault (kA)	Prot Dev Bolted Fault (kA)	Prot Dev Arcing Fault (kA)	Trip/ Delay Time (sec.)	Breaker Opening Time/Tol (sec.)	Equip Type	Selected Electrode Config.	Arc Flash Boundary (ft & in)	Working Distance (ft & in)	Incident Energy (cal/cm^2)	*Notes
EF-15 DISC	PD-MCC-15AA	0.48	1.05	0.98	0.76	2	0.0000	PNL	VCBB	2' 7"	1' 6"	3.2	
EF-16 DISC	PD-MCC-15AA	0.48	1.02	0.95	0.73	2	0.0000	PNL	VCBB	2' 6"	1' 6"	3.1	
EF-18 DISC	PD-MCC-15AA	0.48	1.63	1.52	1.17	2	0.0000	PNL	VCBB	3' 5"	1' 6"	5.3	(*N25d)
EF-2	PD-EF-2	0.48	1.88	1.88	1.45	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
EF-20 DISC	PD-MCC-15AA	0.48	0.98	0.92	0.71	2	0.0000	PNL	VCBB	2' 6"	1' 6"	3.0	
EF-5 DISC	PD-MCC-15AA	0.48	1.63	1.52	1.17	2	0.0000	PNL	VCBB	3' 5"	1' 6"	5.3	(*N25d)
EF-7 DISC	PD-MCC-15AA	0.48	1.02	0.95	0.73	2	0.0000	PNL	VCBB	2' 6"	1' 6"	3.1	
EF-9 DISC	PD-MCC-15AA	0.48	1.40	1.30	1.01	2	0.0000	PNL	VCBB	3' 1"	1' 6"	4.4	(*N25d)
EF-BS-1	PD-EF-BS-1	0.48	3.94	3.94	3.06	0.0162	0.0000	PNL	VCBB	5"	1' 6"	0.1	
EHU-BS-3	PD-EHU-BS-3	0.48	2.61	2.61	2.01	0.0185	0.0000	PNL	VCBB	4"	1' 6"	0.1	
EHU-BS-4	PD-EHU-BS-4	0.48	1.46	1.46	0.89	0.0296	0.0000	PNL	VCBB	3"	1' 6"	0.1	(*N25a)
EHU-BS-5	PD-EHU-BS-5	0.48	1.46	1.46	0.89	0.0296	0.0000	PNL	VCBB	3"	1' 6"	0.1	(*N25a)
ELEVATOR	PD-ELEVATOR	0.48	3.40	3.40	2.64	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.1	
ET CONVEYOR 1	PD-ET CONVEYOR 1	0.48	1.04	1.04	0.63	0.0218	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
ET CONVEYOR 2	PD-ET CONVEYOR 2	0.48	0.72	0.70	0.41	0.0218	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
EUH-001	PD-EUH-001	0.48	2.98	2.98	2.30	0.0167	0.0000	PNL	VCBB	4"	1' 6"	0.1	
EUH-002	PD-EUH-002	0.48	1.96	1.96	1.51	0.0172	0.0000	PNL	VCBB	3"	1' 6"	0.1	
EUH-003	PD-EUH-003	0.48	1.46	1.46	1.13	0.0188	0.0000	PNL	VCBB	3"	1' 6"	0.0	
EUH-004	PD-EUH-004	0.48	1.56	1.56	1.20	0.0183	0.0000	PNL	VCBB	3"	1' 6"	0.0	
EUH-BS-1	PD-EUH-BS-1	0.48	7.91	7.91	6.28	0.0162	0.0000	PNL	VCBB	8"	1' 6"	0.3	
EUH-BS-2	PD-EUH-BS-2	0.48	3.72	3.72	2.89	0.0174	0.0000	PNL	VCBB	5"	1' 6"	0.1	
EXHAUST FAN A	PD-EXHAUST FAN A	0.48	3.12	3.12	2.41	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.1	

Bus Name	Protective Device Name	Bus kV	Bus Bolted Fault (kA)	Prot Dev Bolted Fault (kA)	Prot Dev Arcing Fault (kA)	Trip/ Delay Time (sec.)	Breaker Opening Time/Tol (sec.)	Equip Type	Selected Electrode Config.	Arc Flash Boundary (ft & in)	Working Distance (ft & in)	Incident Energy (cal/cm^2)	*Notes
EXHAUST FAN B	PD-EXHAUST FAN B	0.48	6.50	6.50	5.12	0.01	0.0000	PNL	VCBB	5"	1' 6"	0.1	
EXHAUST FAN C	PD-EXHAUST FAN C	0.48	4.63	4.63	3.61	0.01	0.0000	PNL	VCBB	4"	1' 6"	0.1	
EXHAUST FAN D	PD-EXHAUST FAN D	0.48	3.34	3.34	2.58	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.1	
EXHAUST FAN E	PD-EXHAUST FAN E	0.48	2.47	2.47	1.90	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.0	
FAN CONTROL PANEL #1	PD-FAN CONTROL PANEL #1	0.48	2.14	2.14	1.33	0.0872	0.0000	PNL	VCBB	7"	1' 6"	0.2	(*N25a)
FC-1	PF-FC-1	0.48	1.48	1.47	1.14	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
FC-1 DISC	PD-MCC-15AA	0.48	2.89	2.68	2.08	2	0.0000	PNL	VCBB	5' 1"	1' 6"	9.9	(*N25d)
FC-2	PD-FC-2	0.48	1.89	1.88	1.45	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
FC-2 DISC	PD-MCC-15AA	0.48	6.43	5.98	4.71	2	0.0000	PNL	VCBB	8' 7"	1' 6"	23.7	(*N25d)
FC-3 DISC	PD-MCC-15AA	0.48	3.56	3.31	2.57	2	0.0000	PNL	VCBB	5' 10"	1' 6"	12.5	(*N25d)
FC-4 DISC	PD-MCC-15AA	0.48	0.98	0.92	0.71	2	0.0000	PNL	VCBB	2' 6"	1' 6"	3.0	
FC-5 DISC	PD-MCC-15AA	0.48	1.05	0.98	0.76	2	0.0000	PNL	VCBB	2' 7"	1' 6"	3.2	
FC-6 DISC	PD-MCC-15AA	0.48	1.28	1.19	0.92	2	0.0000	PNL	VCBB	2' 11"	1' 6"	4.0	(*N25d)
FC-7 DISC	PD-MCC-15AA	0.48	1.55	1.44	1.11	2	0.0000	PNL	VCBB	3' 4"	1' 6"	5.0	(*N25d)
FILTER DOOR OP	PD-FILTER DOOR OPERATORS	0.48	1.49	1.49	1.15	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
FINAL TANK AND UNDER DRN PUMP	PD-FINAL TANK AND UNDERDRAIN P	0.48	3.17	3.15	2.44	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.1	
FINAL TANK DRAIN PUMP	PD-FINAL TANK DRAIN PUMP	0.48	2.76	2.75	2.13	0.0176	0.0000	PNL	VCBB	4"	1' 6"	0.1	
FINE SCREEN DUMPSTER CP-1	PD-FINE SCREEN DUMPSTER CP-1	0.48	1.40	1.40	0.85	0.0356	0.0000	PNL	VCBB	3"	1' 6"	0.1	(*N25a)
FINE SCREEN DUMPSTER CP-2	PD-FINE SCREEN DUMPSTER CP-2	0.48	1.47	1.47	0.89	0.0323	0.0000	PNL	VCBB	3"	1' 6"	0.1	(*N25a)
FINE SCREEN DUMPSTER CP-3	PD-FINE SCREEN DUMPSTER CP-3	0.48	1.57	1.56	1.20	0.022	0.0000	PNL	VCBB	3"	1' 6"	0.1	
FUME EXTRACTOR	PD-FUME EXTRACTOR	0.48	1.81	1.81	1.40	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	

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FUME FAN CONTACTOR	PD-FUME HOOD FANS	0.48	0.98	0.98	0.59	0.0301	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
FUME HOOD EXHAUST	PD-FUME HOOD FANS	0.48	0.86	0.86	0.51	0.0449	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
FUME HOODS VFD	PD-FUME HOOD FANS	0.48	0.57	0.57	0.33	0.4685	0.0000	PNL	VCBB	8"	1' 6"	0.3	(*N25a) (*N25d)
GATE 1 CONTROLLER	PD-SUMP PUMPS	0.48	0.80	0.80	0.47	0.0559	0.0000	PNL	VCBB	3"	1' 6"	0.1	(*N25a)
GATE 2 CONTROLLER	PD-SUMP PUMPS	0.48	0.68	0.68	0.40	0.1124	0.0000	PNL	VCBB	4"	1' 6"	0.1	(*N25a) (*N25d)
GATE VALVE 1	PD-MCC3 COMPRESSORS	0.48	1.19	1.17	0.71	0.0132	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
GATE VALVE 2	PD-MCC3 COMPRESSORS	0.48	1.19	1.17	0.71	0.0132	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
GATE VALVE 4	PD-MCC3 COMPRESSORS	0.48	1.19	1.17	0.71	0.0132	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
GATE VALVE 5	PD-MCC3 COMPRESSORS	0.48	1.19	1.17	0.71	0.0132	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
GATE VALVE 7	PD-MCC3 COMPRESSORS	0.48	1.19	1.17	0.71	0.0132	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
GATE VALVE 8	PD-MCC3 COMPRESSORS	0.48	1.19	1.17	0.71	0.0132	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
GRINDER #1	PD-SCREEN EQ #1	0.48	0.93	0.92	0.55	0.0365	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
GRINDER #2	PD-SCREEN EQ #2	0.48	1.01	1.00	0.60	0.0288	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
GRINDER #3	PD-SCREEN EQ #3	0.48	1.01	1.00	0.60	0.0288	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
GRIT REMOVAL HOIST	PD-GRIT TANKS	0.48	6.33	6.29	4.95	0.0167	0.0000	PNL	VCBB	7"	1' 6"	0.2	
GRIT TANK #1	PD-GRIT TANKS	0.48	6.33	6.28	4.95	0.0167	0.0000	PNL	VCBB	7"	1' 6"	0.2	
GRIT TANK #2	PD-GRIT TANKS	0.48	6.33	6.28	4.95	0.0167	0.0000	PNL	VCBB	7"	1' 6"	0.2	
GRIT TANKS	PD-GRIT TANKS	0.48	6.70	6.66	5.25	0.0167	0.0000	PNL	VCBB	7"	1' 6"	0.2	
HOT WATER CIR PUMP DISC	PD-MCC-15AA	0.48	2.89	2.68	2.08	2	0.0000	PNL	VCBB	5' 1"	1' 6"	9.9	(*N25d)
HOT WATER CIRC PUMP	PD-FUME HOOD FANS	0.48	0.58	0.58	0.34	0.3861	0.0000	PNL	VCBB	7"	1' 6"	0.3	(*N25a) (*N25d)

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HOT WATER CIRC PUMP P-3 DISC	PD-HOT WATER CIRC PUMP P-3	0.48	5.41	5.39	4.22	0.0134	0.0000	PNL	VCBB	6"	1' 6"	0.1	
HOT WATER CIRC PUMP P-4 DISC	PD-HOT WATER CIRC PUMP P-4	0.48	5.04	5.02	3.92	0.01	0.0000	PNL	VCBB	4"	1' 6"	0.1	
HS-LC-2A	PD-LC-2	4.80	18.23	17.86	15.75	0.01	0.0000	SWG	HCB	1' 7"	3' 0"	0.4	
HUMIDIFIER #1 DISC	PD-MCC-15AA	0.48	7.65	7.00	4.89	2	0.0000	PNL	VCBB	9' 1"	1' 6"	23.6	(*N25d)
HUMIDIFIER #2 DISC	PD-MCC-15AA	0.48	7.65	7.00	4.89	2	0.0000	PNL	VCBB	9' 1"	1' 6"	23.6	(*N25d)
HVAC UNIT A	PD-HVAC UNIT A	0.48	2.08	2.06	1.59	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.0	
HVAC UNIT B	PD-HVAC UNIT B	0.48	2.67	2.64	2.04	0.0134	0.0000	PNL	VCBB	4"	1' 6"	0.1	
HW PUMP #1 P-1	PD-HW PUMP #1 P-1	0.48	2.51	2.50	1.93	0.0134	0.0000	PNL	VCBB	3"	1' 6"	0.1	
HYDRAULIC LIFT	PD-HYDRAULIC LIFT	0.48	2.92	2.92	2.26	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.1	
INFLUENT PUMPS	PD-DIVERSION CHAMBER #3	0.48	3.48	3.46	2.68	0.01	0.0000	PNL	VCBB	4"	1' 6"	0.1	
INLET TANKS	PD-T-INLET	0.208	0.51	0.51	0.24	2	0.0000	PNL	VCBB	1' 2"	1' 6"	0.8	
INNER DOOR	PD-0267	0.48	1.10	1.10	0.66	0.0144	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
LAB STILL	PD-LAB STILL	0.48	6.02	6.02	4.73	0.01	0.0000	PNL	VCBB	5"	1' 6"	0.1	
LC-2 (Line Side)	PD-LC-2	0.48	23.81	19.38	13.97	2	0.0000	PNL	VCBB	18' 10"	1' 6"	79.4	(*N25d)
LC-2A	PD-LC-2	0.48	7.76	6.25	4.96	2	0.0000	PNL	VCBB	8' 10"	1' 6"	25.1	(*N25d)
LC-3A (Line Side)	PD-LC3-3A TIE	0.48	34.63	17.68	11.05	0.3025	0.0000	PNL	VCBB	11' 6"	1' 6"	31.1	(*N25a) (*N25d)
LC-4	PD-LC-4	0.48	18.61	16.08	13.18	2	0.0000	PNL	VCBB	16' 9"	1' 6"	75.4	(*N25d)
LC-5	PD-LC-5	0.48	15.56	14.65	10.55	2	0.0000	PNL	VCBB	15' 9"	1' 6"	58.0	(*N25d)
LC-5 (Line Side)	PD-LC-5	0.48	15.56	14.65	10.55	2	0.0000	PNL	VCBB	15' 9"	1' 6"	58.0	(*N25d)
LC-5A	PD-LC-5A	0.48	16.91	15.12	12.38	2	0.0000	PNL	VCBB	16' 0"	1' 6"	69.3	(*N25d)
LC-7	PD-LC-7	0.48	17.19	17.19	14.08	2	0.0000	PNL	VCBB	19' 0"	1' 6"	82.1	(*N25d)

Bus Name	Protective Device Name	Bus kV	Bus Bolted Fault (kA)	Prot Dev Bolted Fault (kA)	Prot Dev Arcing Fault (kA)	Trip/ Delay Time (sec.)	Breaker Opening Time/Tol (sec.)	Equip Type	Selected Electrode Config.	Arc Flash Boundary (ft & in)	Working Distance (ft & in)	Incident Energy (cal/cm^2)	*Notes
LC-7A	PD-LC-7A	0.48	17.67	17.67	14.48	2	0.0000	PNL	VCBB	17' 11"	1' 6"	84.8	(*N25d)
LC-8	LC-8 MAIN	0.48	15.58	15.58	10.53	0.0192	0.0000	PNL	VCBB	10"	1' 6"	0.5	(*N25a)
LC-8 (Line Side)	PD-LC-8	0.48	15.58	15.58	11.22	0.1347	0.0000	PNL	VCBB	3' 3"	1' 6"	4.3	(*N25d)
LC-8A	LC-8A MAIN	0.48	20.02	17.64	14.47	0.01	0.0000	PNL	VCBB	11"	1' 6"	0.5	
LC-8A (Line Side)	PD-LC-8A	0.48	15.51	15.51	11.17	0.1371	0.0000	PNL	VCBB	3' 4"	1' 6"	4.3	(*N25d)
LIME SCREW CONVEYOR	PD-LIME SCREW CONVEYOR	0.48	1.13	1.13	0.87	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
LIME SILO #2 TRUCK UNLOAD PNL	PD-LIME SILO #2 TRUCK UNLOAD P	0.48	1.77	1.77	1.37	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
LIME SIO #1TRUCK UNLOAD	PD-LIME SIO #1TRUCK UNLOAD	0.48	1.77	1.77	1.37	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
MAKE UP AIR UNIT	PD-MAKE UP AIR UNIT	0.48	0.85	0.83	0.49	0.0443	0.0000	PNL	VCBB	3"	1' 6"	0.0	(*N25a)
MAU HEATER	PD-MCC-15AA	0.48	6.83	6.83	4.75	2	0.0000	PNL	VCBB	8' 11"	1' 6"	23.8	(*N25d)
MAU-1	PD-MAU-1	0.48	3.84	3.84	2.98	0.01	0.0000	PNL	VCBB	4"	1' 6"	0.1	
MAU-1 DISC	PD-MAU 1	0.48	2.89	2.89	2.23	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.1	
MAU-1 VFD	PD-MAU 1	0.48	3.19	3.19	2.47	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.1	
MAU-BP-1 VFD	PD-MAU-BP-1	0.48	1.49	1.49	0.91	0.0359	0.0000	PNL	VCBB	3"	1' 6"	0.1	(*N25a)
MCC 15 AIR COMP	PD-SUMP PUMPS	0.48	2.38	2.38	1.83	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.0	
MCC 15 ELEVATOR DISC	PD-MCC 15 ELEVATOR	0.48	2.97	2.97	2.29	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.1	
MCC 15 GATES	PD-SUMP PUMPS	0.48	0.83	0.83	0.49	0.0498	0.0000	PNL	VCBB	3"	1' 6"	0.0	(*N25a)
MCC 15 STRAINER DISC	PD-MCC 15 STRAINER	0.48	2.64	2.64	2.04	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.0	
MCC 15AA AIR COMPRESSOR DISC	PD-MCC-15AA	0.48	2.89	2.68	2.08	2	0.0000	PNL	VCBB	5' 1"	1' 6"	9.9	(*N25d)
MCC-00 (Line Side)	PD-MCC-00	0.48	7.48	7.48	4.95	2	0.0000	MCC	VCBB	9' 3"	1' 6"	22.0	(*N25a) (*N25d)
MCC-00 BACKWASH PUMPS	PD-MCC-00 BACKWASH PUMPS	0.48	4.69	4.66	3.63	0.01	0.0000	PNL	VCBB	4"	1' 6"	0.1	

Bus Name	Protective Device Name	Bus kV	Bus Bolted Fault (kA)	Prot Dev Bolted Fault (kA)	Prot Dev Arcing Fault (kA)	Trip/ Delay Time (sec.)	Breaker Opening Time/Tol (sec.)	Equip Type	Selected Electrode Config.	Arc Flash Boundary (ft & in)	Working Distance (ft & in)	Incident Energy (cal/cm^2)	*Notes
MCC-00 OHD DOOR	PD-MCC-00 OHD DOOR	0.48	1.67	1.67	1.29	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
MCC-00-AIR COMPRESSOR	PD-BLOWER ROOM	0.48	5.30	5.27	4.13	0.01	0.0000	PNL	VCBB	5"	1' 6"	0.1	
MCC-1	MAIN-MCC-1	0.48	5.91	5.91	4.64	2	0.0000	MCC	VCBB	8' 6"	1' 6"	23.4	(*N25d)
MCC-1 (Line Side)	MaxTripTime @2.0s	0.48	5.91	5.91	4.64	2	0.0000	MCC	VCBB	9' 0"	1' 6"	23.4	(*N25d)
MCC-1 ATS	MaxTripTime @2.0s	0.48	5.93	5.93	4.66	2	0.0000	PNL	VCBB	8' 9"	1' 6"	23.5	(*N25d)
MCC-1 CRANE	PD-MCC-1 CRANE	0.48	7.01	7.01	5.54	0.01	0.0000	PNL	VCBB	6"	1' 6"	0.1	
MCC-10	PD-MCC-10	0.48	11.61	11.61	7.82	0.3555	0.0000	MCC	VCBB	4' 3"	1' 6"	6.3	(*N25a) (*N25d)
MCC-10 (Line Side)	PD-MCC-10	0.48	11.61	11.61	7.82	0.3555	0.0000	MCC	VCBB	4' 3"	1' 6"	6.3	(*N25a) (*N25d)
MCC-12	PD-MCC-12 NORM	0.48	7.79	7.79	5.17	2	0.0000	PNL	VCBB	9' 6"	1' 6"	23.0	(*N25a) (*N25d)
MCC-12 (Line Side)	PD-MCC-12 NORM	0.48	7.79	7.79	5.17	2	0.0000	PNL	VCBB	9' 6"	1' 6"	23.0	(*N25a) (*N25d)
MCC-13	PD-MCC-13-14	0.48	29.24	29.24	23.58	0.01	0.0000	PNL	VCBB	1' 2"	1' 6"	0.7	
MCC-13 (Line Side)	PD-MCC-13-14	0.48	29.24	29.24	23.58	0.01	0.0000	PNL	VCBB	1' 2"	1' 6"	0.7	
MCC-13 AIR COMP	PD-MCC-13 AIR COMP	0.48	4.88	4.88	3.81	0.01	0.0000	PNL	VCBB	4"	1' 6"	0.1	
MCC-13 CRANE	PD-MCC-13 CRANE	0.48	26.35	26.35	21.43	0.01	0.0000	PNL	VCBB	1' 0"	1' 6"	0.7	
MCC-13 OVERHEAD DOOR	PD-OVERHEAD DOOR	0.48	4.42	4.42	3.45	0.01	0.0000	PNL	VCBB	4"	1' 6"	0.1	
MCC-14	PD-MCC-13-14	0.48	20.00	16.46	13.50	0.0113	0.0000	MCC	VCBB	1' 0"	1' 6"	0.6	
MCC-14 (Line Side)	PD-MCC-13-14	0.48	20.00	16.35	13.41	0.0113	0.0000	MCC	VCBB	1' 0"	1' 6"	0.6	
MCC-14 HOIST	PD-MCC-14 HOIST	0.48	2.61	2.60	2.01	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.0	
MCC-14 SUMP PUMPS	PD-RAS AND INFLUENT VALVE CON0	0.48	1.62	1.62	1.25	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
MCC-14 UNIT HEATERS	PD-MCC-14 UNIT HEATERS	0.48	4.22	4.22	3.29	0.01	0.0000	PNL	VCBB	4"	1' 6"	0.1	
MCC-15	PD-MCC-15	0.48	12.62	11.91	9.65	0.05	0.0000	MCC	VCBB	1' 8"	1' 6"	1.4	

Bus Name	Protective Device Name	Bus kV	Bus Bolted Fault (kA)	Prot Dev Bolted Fault (kA)	Prot Dev Arcing Fault (kA)	Trip/ Delay Time (sec.)	Breaker Opening Time/Tol (sec.)	Equip Type	Selected Electrode Config.	Arc Flash Boundary (ft & in)	Working Distance (ft & in)	Incident Energy (cal/cm^2)	*Notes
MCC-15A	PD-MCC-15A MAIN	0.48	11.36	11.36	8.08	2	0.0000	PNL	VCBB	13' 4"	1' 6"	43.5	(*N25d)
MCC-15A (Line Side)	PD-MCC-15A	0.48	14.28	12.45	10.14	2	0.0000	MCC	VCBB	14' 0"	1' 6"	55.5	(*N25d)
MCC-15AA	PD-MCC-15AA MAIN	0.48	11.84	11.01	8.90	0.02	0.0000	MCC	VCBB	11"	1' 6"	0.5	
MCC-15AA (Line Side)	PD-MCC-15AA	0.48	9.58	9.58	6.41	0.8723	0.0000	MCC	VCBB	6' 6"	1' 6"	12.6	(*N25a) (*N25d)
MCC-19	PD-LC-9	0.48	14.53	14.53	11.84	2	0.0000	MCC	VCBB	15' 6"	1' 6"	65.8	(*N25d)
MCC-2	PD-MCC-2	0.48	17.11	17.11	11.55	0.9755	0.0000	PNL	VCBB	10' 4"	1' 6"	26.3	(*N25a) (*N25d)
MCC-2 (Line Side)	PD-MCC-2	0.48	17.11	17.11	11.55	0.9755	0.0000	PNL	VCBB	10' 4"	1' 6"	26.3	(*N25a) (*N25d)
MCC-20	MAIN-MCC-20	0.48	15.02	14.62	10.52	2	0.0000	MCC	VCBB	14' 8"	1' 6"	57.1	(*N25d)
MCC-20 (Line Side)	PD-LC-9A	0.48	15.02	14.62	11.93	2	0.0000	MCC	VCBB	15' 7"	1' 6"	66.4	(*N25d)
MCC-21	PD-MCC-21 NC	0.48	13.60	13.60	11.05	0.0244	0.0000	MCC	VCBB	1' 2"	1' 6"	0.8	
MCC-21 AC UNIT	PD-PD-MCC-21 AC UNIT	0.48	8.67	8.67	6.91	0.01	0.0000	PNL	VCBB	6"	1' 6"	0.2	
MCC-21 PANEL #2	PD-T-MCC-21	0.208	1.84	1.84	0.85	2	0.0000	PNL	VCBB	2' 8"	1' 6"	3.3	(*N25d)
MCC-21 PANEL #3	PD-T-MCC-21	0.208	1.95	1.95	0.91	2	0.0000	PNL	VCBB	2' 9"	1' 6"	3.6	(*N25d)
MCC-22	PD-MCC-22 NC	0.48	9.75	9.34	7.48	0.01	0.0000	MCC	VCBB	7"	1' 6"	0.2	
MCC-24	PD-MCC-24	0.48	7.77	7.77	5.15	0.2193	0.0000	PNL	VCBB	2' 5"	1' 6"	2.5	(*N25a) (*N25d)
MCC-25	PD-MCC-25	0.48	11.44	11.44	7.70	1.002	0.0000	MCC	VCBB	8' 0"	1' 6"	17.5	(*N25a) (*N25d)
MCC-25 (Line Side)	PD-MCC-25	0.48	11.44	11.44	7.70	1.002	0.0000	MCC	VCBB	8' 0"	1' 6"	17.5	(*N25a) (*N25d)
MCC-26 (Line Side)	PD-LC-11	0.48	20.91	20.91	15.12	1.793	0.0000	MCC	VCBB	18' 5"	1' 6"	79.2	(*N25d)
MCC-27 (Line Side)	PD-LC-11A	0.48	20.92	20.92	15.12	1.791	0.0000	MCC	VCBB	18' 5"	1' 6"	79.1	(*N25d)
MCC-28	MAIN-MCC-28	0.48	13.02	13.02	10.57	2	0.0000	MCC	VCBB	14' 8"	1' 6"	59.3	(*N25d)
MCC-28 (Line Side)	PD-LC-12	0.48	16.12	14.53	11.88	2	0.0000	MCC	VCBB	15' 7"	1' 6"	66.0	(*N25d)
MCC-29	MAIN-MCC-29	0.48	12.67	12.67	10.27	2	0.0000	MCC	VCBB	15' 2"	1' 6"	57.5	(*N25d)

Bus Name	Protective Device Name	Bus kV	Bus Bolted Fault (kA)	Prot Dev Bolted Fault (kA)	Prot Dev Arcing Fault (kA)	Trip/ Delay Time (sec.)	Breaker Opening Time/Tol (sec.)	Equip Type	Selected Electrode Config.	Arc Flash Boundary (ft & in)	Working Distance (ft & in)	Incident Energy (cal/cm^2)	*Notes
MCC-29 (Line Side)	PD-LC-12A	0.48	15.37	14.10	11.51	2	0.0000	MCC	VCBB	15' 3"	1' 6"	63.7	(*N25d)
MCC-3	MAIN-MCC-3 NC	0.48	5.78	5.78	4.54	2	0.0000	MCC	VCBB	8' 4"	1' 6"	22.8	(*N25d)
MCC-3 (Line Side)	MAIN-MCC-1	0.48	5.78	5.78	4.54	2	0.0000	MCC	VCBB	8' 4"	1' 6"	22.8	(*N25d)
MCC-3 PURGE #1 DS	PD-PURGE FANS	0.48	0.90	0.90	0.54	0.0385	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
MCC-3 PURGE #2 DS	PD-PURGE FANS	0.48	0.90	0.90	0.54	0.0385	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
MCC-3 SUMP PUMP	PD-MCC3 COMPRESSORS	0.48	1.19	1.17	0.71	0.0132	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
MCC-3A	PD-MCC-3A	0.48	5.76	5.76	4.52	2	0.0000	PNL	VCBB	8' 4"	1' 6"	22.7	(*N25d)
MCC-3COMPRESSOR #1	PD-MCC3 COMPRESSORS	0.48	1.41	1.38	1.07	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
MCC-3COMPRESSOR #2	PD-MCC3 COMPRESSORS	0.48	1.41	1.38	1.07	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
MCC-4	LC-8 MAIN	0.48	15.32	15.32	10.35	0.0209	0.0000	PNL	VCBB	11"	1' 6"	0.5	(*N25a)
MCC-4A	LC-8A MAIN	0.48	14.97	14.97	10.12	0.0233	0.0000	PNL	VCBB	11"	1' 6"	0.5	(*N25a)
MCC-4B	LC-8A MAIN	0.48	17.99	15.73	11.36	0.0133	0.0000	MCC	VCBB	11"	1' 6"	0.5	
MCC-4C	PD-MCC-4C	0.48	10.93	10.77	8.68	0.0161	0.0000	MCC	VCBB	10"	1' 6"	0.4	
MCC-5	PD-MCC-5 NC	0.48	4.55	4.54	3.54	0.0168	0.0000	MCC	VCBB	6"	1' 6"	0.1	
MCC-6	PD-MTS-MCC-6 NC	0.48	5.60	5.58	4.38	0.0167	0.0000	MCC	VCBB	6"	1' 6"	0.2	
MCC-7 (Line Side)	PD-LC-6	0.48	17.21	17.21	12.43	0.0909	0.0000	MCC	VCBB	2' 9"	1' 6"	3.2	(*N25d)
MCC7 480V RECEPT	PD-XFMR 21 LP-01	0.48	5.34	5.32	4.17	0.01	0.0000	PNL	VCBB	5"	1' 6"	0.1	
MCC-7 ELEVATOR	PD-MCC-7-ELEVATOR	0.48	2.47	2.47	1.91	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.0	
MCC-7 VACUUM PUMP	PD-RECYCLE PUMP	0.48	2.88	2.77	2.14	2	0.0000	PNL	VCBB	5' 2"	1' 6"	10.1	(*N25d)
MCC-8 (Line Side)	PD-LC4 TIE	0.48	7.82	7.82	5.19	0.3385	0.0000	MCC	VCBB	3' 2"	1' 6"	3.9	(*N25a) (*N25d)
MCC-8A	PD-MCC-8A	0.48	6.64	5.05	3.98	2	0.0000	MCC	VCBB	7' 8"	1' 6"	19.6	(*N25d)

Bus Name	Protective Device Name	Bus kV	Bus Bolted Fault (kA)	Prot Dev Bolted Fault (kA)	Prot Dev Arcing Fault (kA)	Trip/ Delay Time (sec.)	Breaker Opening Time/Tol (sec.)	Equip Type	Selected Electrode Config.	Arc Flash Boundary (ft & in)	Working Distance (ft & in)	Incident Energy (cal/cm^2)	*Notes
MEGADOOR CONTROL PANEL	PD-MEGADOOR CONTROL PANEL	0.48	1.54	1.50	1.16	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
METAL LATHE	PD-METAL LATHE	0.48	3.84	3.84	2.98	0.01	0.0000	PNL	VCBB	4"	1' 6"	0.1	
METER CHAMBER	PD-METER CHAMBER	0.48	13.59	13.59	11.05	0.01	0.0000	PNL	VCBB	9"	1' 6"	0.3	
MILL	PD-METAL LATHE	0.48	3.11	3.11	2.41	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.1	
MIX TANK DUST COLLECTOR EAST	PD-DUST COLLECTORS	0.48	1.47	1.43	1.10	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
MIX TANK DUST COLLECTOR WEST	PD-DUST COLLECTORS	0.48	1.34	1.30	1.01	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
MIXED LIQUER PUMP #1 DISC	PD-MCC-8A	0.48	5.15	3.65	2.86	2	0.0000	PNL	VCBB	6' 3"	1' 6"	14.0	(*N25d)
MIXED LIQUER PUMP #1 VFD	PD-MCC-8A	0.48	5.27	3.74	2.93	2	0.0000	PNL	VCBB	6' 4"	1' 6"	14.3	(*N25d)
MIXED LIQUER PUMP #2 DISC	PD-MCC-8A	0.48	5.15	3.65	2.86	2	0.0000	PNL	VCBB	6' 3"	1' 6"	14.0	(*N25d)
MIXED LIQUER PUMP #2 VFD	PD-MCC-8A	0.48	5.27	3.74	2.93	2	0.0000	PNL	VCBB	6' 4"	1' 6"	14.3	(*N25d)
MIXED LIQUER PUMP #3 DISC	PD-MIXED LIQUER PUMPS	0.48	5.18	3.65	2.85	2	0.0000	PNL	VCBB	6' 3"	1' 6"	14.0	(*N25d)
MIXED LIQUER PUMP #3 VFD	PD-MCC-8A	0.48	5.27	3.74	2.93	2	0.0000	PNL	VCBB	6' 4"	1' 6"	14.3	(*N25d)
MIXED LIQUER PUMP #4 DISC	PD-MIXED LIQUER PUMPS	0.48	5.18	3.65	2.85	2	0.0000	PNL	VCBB	6' 3"	1' 6"	14.0	(*N25d)
MIXED LIQUER PUMP #4 VFD	PD-MCC-8A	0.48	5.27	3.74	2.93	2	0.0000	PNL	VCBB	6' 4"	1' 6"	14.3	(*N25d)
MIXER #1	PD-MIXER #1	0.48	2.06	2.05	1.58	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.0	
MIXER #2	PD-MIXER #2	0.48	2.25	2.24	1.73	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.0	
MO GATE #1	PD-PURGE FANS	0.48	0.90	0.90	0.54	0.0385	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
MO GATE #2	PD-PURGE FANS	0.48	0.90	0.90	0.54	0.0385	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
MSP	PD-MSP	0.48	4.65	4.65	3.62	0.01	0.0000	PNL	VCBB	4"	1' 6"	0.1	
MSP-12	PD-MSP-12	0.48	4.31	4.05	2.61	0.0487	0.0000	PNL	VCBB	8"	1' 6"	0.3	(*N25a)

Bus Name	Protective Device Name	Bus kV	Bus Bolted Fault (kA)	Prot Dev Bolted Fault (kA)	Prot Dev Arcing Fault (kA)	Trip/ Delay Time (sec.)	Breaker Opening Time/Tol (sec.)	Equip Type	Selected Electrode Config.	Arc Flash Boundary (ft & in)	Working Distance (ft & in)	Incident Energy (cal/cm^2)	*Notes
MSP-14	PD-MSP-12	0.48	3.79	3.56	2.27	0.0915	0.0000	PNL	VCBB	10"	1' 6"	0.5	(*N25a) (*N25d)
MTS-MCC-5	PD-MCC-5 NC	0.48	11.15	11.14	8.98	0.0167	0.0000	PNL	VCBB	10"	1' 6"	0.4	
MTS-MCC-6	PD-MTS-MCC-6 NC	0.48	9.07	9.05	7.23	0.0167	0.0000	PNL	VCBB	9"	1' 6"	0.3	
MUA-1	PD-0087	0.48	2.47	2.45	1.89	0.0188	0.0000	PNL	VCBB	4"	1' 6"	0.1	
MVUS-1A	MAIN-MVUS-1B	4.80	8.39	7.86	6.82	1.367	0.0833	SWG	HCB	17' 8"	3' 0"	25.0	
MVUS-1A (Line Side)	MAIN-MVUS-1A	4.80	24.97	7.66	6.72	0.0833	0.0000	SWG	HCB	34' 9"	3' 0"	79.1	
MVUS-1B	MAIN-MVUS-1B	4.80	8.40	8.27	7.18	1.365	0.0833	SWG	HCB	17' 8"	3' 0"	25.0	
MVUS-1B (Line Side)	MAIN-MVUS-1B	4.80	20.22	3.73	3.28	0.0833	0.0000	SWG	HCB	33' 7"	3' 0"	74.4	
N.W. HEAT	PD-20A-PP-1	0.48	6.51	6.51	5.13	0.0161	0.0000	PNL	VCBB	7"	1' 6"	0.2	
NEW AIR COMPRESSOR	PD-NEW AIR COMPRESSOR	0.48	4.55	4.53	3.53	0.01	0.0000	PNL	VCBB	4"	1' 6"	0.1	
NORTH BELT DISCHARGE CONVEYOR	PD-NORTH BELT DISCHARGE CONVEY	0.48	2.41	2.41	1.86	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.0	
NORTH BELT PRESS DIS CONVEYOR	PD-NORTH BELT PRESS DIS CONVEY	0.48	2.41	2.41	1.86	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.0	
NORTH CELL	PD-MCC-00 BACKWASH PUMPS	0.48	1.99	1.97	1.52	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
NORTH LOT POWER STATION	PD-NORTH LOT POWER STATION	0.48	3.37	3.37	2.61	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.1	
NORTH SEC. PUMP #2	PD-SLUDE PUMPS	0.48	1.94	1.93	1.49	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
NORTH SHOP HTR	PD-NORTH SHOP HTR	0.48	5.42	5.42	4.25	0.01	0.0000	PNL	VCBB	5"	1' 6"	0.1	
NW FUME HOOD EX FAN	PD-FUME HOOD FANS	0.48	0.58	0.58	0.34	0.3861	0.0000	PNL	VCBB	7"	1' 6"	0.3	(*N25a) (*N25d)
NW FUME HOOD SUPPLY FAN	PD-FUME HOOD FANS	0.48	0.58	0.58	0.34	0.3861	0.0000	PNL	VCBB	7"	1' 6"	0.3	(*N25a) (*N25d)
ODOR CTRL FAN #1	PD-PURGE FANS	0.48	0.90	0.90	0.54	0.0385	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
ODOR CTRL FAN #2	PD-PURGE FANS	0.48	0.90	0.90	0.54	0.0385	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
OUTSIDE DOOR(EAST)	PD-0267	0.48	1.28	1.27	0.99	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	

Bus Name	Protective Device Name	Bus kV	Bus Bolted Fault (kA)	Prot Dev Bolted Fault (kA)	Prot Dev Arcing Fault (kA)	Trip/ Delay Time (sec.)	Breaker Opening Time/Tol (sec.)	Equip Type	Selected Electrode Config.	Arc Flash Boundary (ft & in)	Working Distance (ft & in)	Incident Energy (cal/cm^2)	*Notes
OUTSIDE DOOR(NW)	PD-0267	0.48	0.90	0.90	0.54	0.0239	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
OUTSIDE DOOR(SW)	PD-0267	0.48	0.81	0.81	0.48	0.0314	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
OVERHEAD DOORS	PD-0267	0.48	1.81	1.81	1.40	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
PANEL LA	PD-XFMR 04-LP-01	0.208	1.67	1.67	0.78	2	0.0000	PNL	VCBB	2' 6"	1' 6"	3.0	(*N25d)
PANEL LB	PD-XFMR 04-LP-01	0.208	1.66	1.66	0.77	2	0.0000	PNL	VCBB	2' 6"	1' 6"	3.0	(*N25d)
PHOS ACID PUMP PNL	MAIN-MCC-13	0.120	0.80	0.80	0.80	2	0.0000	PNL	VCBB	11"	1' 6"	0.5	
PP-1 EXHAUST FANS	PD-PP-1 EXHAUST FANS	0.48	1.35	1.35	1.04	0.017	0.0000	PNL	VCBB	3"	1' 6"	0.0	
PP-1 TRANSFER PUMP #1	PD-PUMP CTRL PANEL VFD	0.48	2.21	2.20	1.70	0.017	0.0000	PNL	VCBB	4"	1' 6"	0.1	
PP-1 TRANSFER PUMP #2	PD-PUMP CTRL PANEL VFD	0.48	2.21	2.20	1.70	0.017	0.0000	PNL	VCBB	4"	1' 6"	0.1	
PP-12 LEFT TUB	PD-PP-12 LEFT TUB	0.48	7.07	7.07	4.67	0.0898	0.0000	PNL	VCBB	1' 3"	1' 6"	0.9	(*N25a)
PP-12 RIGHT TUB	PD-PP-12 LEFT TUB	0.48	7.00	7.00	4.62	0.0933	0.0000	PNL	VCBB	1' 4"	1' 6"	1.0	(*N25a)
PP-13	MAIN-PP-13	0.48	13.33	13.15	10.69	0.01	0.0000	PNL	VCBB	8"	1' 6"	0.3	
PP-13 (Line Side)	PD-PP-13 AUX PLANT WTR	0.48	13.33	13.15	10.69	0.01	0.0000	PNL	VCBB	8"	1' 6"	0.3	
PP-1-EF-1	PD-PP-1 EXHAUST FANS	0.48	0.92	0.92	0.55	0.0821	0.0000	PNL	VCBB	4"	1' 6"	0.1	(*N25a) (*N25d)
PP-1-EF-2	PD-PP-1 EXHAUST FANS	0.48	0.82	0.82	0.49	0.1053	0.0000	PNL	VCBB	4"	1' 6"	0.1	(*N25a)
PP-1-EF-3	PD-PP-1 EXHAUST FANS	0.48	0.78	0.78	0.46	0.1178	0.0000	PNL	VCBB	4"	1' 6"	0.1	(*N25a)
PP-SH-1	PD-PP-SH-1	0.48	23.83	22.46	18.36	0.0526	0.0000	PNL	VCBB	2' 8"	1' 6"	3.1	
PP-SH-2	PD-CENTRIFUGE OVERHEAD CRANE 4	0.48	17.56	17.56	11.85	0.1549	0.0000	PNL	VCBB	3' 4"	1' 6"	4.3	(*N25a) (*N25d)
PRIM HEAT PUMP #1	PD-MCC21 HEAT PUMPS	0.48	1.05	1.05	0.63	0.0245	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
PRIM HEAT PUMP #2	PD-MCC21 HEAT PUMPS	0.48	1.05	1.05	0.63	0.0245	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
PRIM SLUDGE COLL 1 A&B	PD-PRIM SLUDGE COLL 1 A&B	0.48	0.82	0.82	0.64	0.01	0.0000	PNL	VCBB	1"	1' 6"	0.0	

Bus Name	Protective Device Name	Bus kV	Bus Bolted Fault (kA)	Prot Dev Bolted Fault (kA)	Prot Dev Arcing Fault (kA)	Trip/ Delay Time (sec.)	Breaker Opening Time/Tol (sec.)	Equip Type	Selected Electrode Config.	Arc Flash Boundary (ft & in)	Working Distance (ft & in)	Incident Energy (cal/cm^2)	*Notes
PRIM SLUDGE COLL 1 C&X	PD-PRIM SLUDGE COLL 1 C&X	0.48	0.90	0.90	0.70	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
PRIM SLUDGE COLL 2 A&B	PD-PRIM SLUDGE COLL 2 A&B	0.48	1.16	1.16	0.89	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
PRIM SLUDGE COLL 2 B&C	PD-PRIM SLUDGE COLL 2 B&C	0.48	1.33	1.33	1.03	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
PRIM SLUDGE COLL 3 A&B	PD-PRIM SLUDGE COLL 3 A&B	0.48	1.94	1.94	1.50	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
PRIM SLUDGE COLL 3 C&X	PD-PRIM SLUDGE COLL 3 C&X	0.48	2.14	2.13	1.65	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.0	
PRIM SLUDGE COLL 4 A&X	PD-PRIM SLUDGE COLL 4 A&X	0.48	1.41	1.41	1.09	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
PRIM SLUDGE COLL 4 B&C	PD-PRIM SLUDGE COLL 4 B&C	0.48	1.20	1.20	0.93	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
PRIM SLUDGE COLL 5 A&B	PD-PRIM SLUDGE COLL 5 A&B	0.48	0.94	0.94	0.73	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
PRIM SLUDGE COLL 5 C&X	PD-PRIM SLUDGE COLL 5 C&X	0.48	0.85	0.85	0.66	0.01	0.0000	PNL	VCBB	1"	1' 6"	0.0	
PRIM SLUDGE COLL 6 A&X	PD-PRIM SLUDGE COLL 6 A&X	0.48	0.70	0.70	0.55	0.01	0.0000	PNL	VCBB	1"	1' 6"	0.0	
PRIM SLUDGE COLL 6 B&C	PD-PRIM SLUDGE COLL 6 B&C	0.48	0.65	0.65	0.50	0.01	0.0000	PNL	VCBB	1"	1' 6"	0.0	
PUMP #5 MAIN DISC	PD-VFD PUMP #5	0.48	19.40	18.52	15.19	0.01	0.0000	PNL	VCBB	11"	1' 6"	0.5	
PUMP #5 VFD	PD-VFD PUMP #5	0.48	18.88	18.00	14.76	0.01	0.0000	PNL	VCBB	11"	1' 6"	0.5	
PUMP #7 VFD	PD-SEWAGE PUMP #7	0.48	20.12	19.21	15.75	0.01	0.0000	PNL	VCBB	11"	1' 6"	0.5	
PUMP CONTROL PANEL VFD	PD-20A-PP-1	0.48	4.41	4.39	3.42	0.0161	0.0000	PNL	VCBB	5"	1' 6"	0.1	
PUMP STATION #1	PD-PUMP STATION #1	0.48	8.92	8.60	6.86	0.0167	0.0000	PNL	VCBB	9"	1' 6"	0.3	
PUMP STATION #2	PD-PUMP SATION #2	0.48	6.22	5.93	4.67	0.0167	0.0000	PNL	VCBB	7"	1' 6"	0.2	
PURGE FAN #1 DISC	PD-PURGE FAN #1	0.48	0.88	0.88	0.69	0.01	0.0000	PNL	VCBB	1"	1' 6"	0.0	
PURGE FAN #2 DISC	PD-PURGE FAN #2	0.48	1.26	1.26	0.97	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
PURGE FAN #3 DISC	PD-PURGE FAN #3	0.48	2.55	2.55	1.97	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.0	

Bus Name	Protective Device Name	Bus kV	Bus Bolted Fault (kA)	Prot Dev Bolted Fault (kA)	Prot Dev Arcing Fault (kA)	Trip/ Delay Time (sec.)	Breaker Opening Time/Tol (sec.)	Equip Type	Selected Electrode Config.	Arc Flash Boundary (ft & in)	Working Distance (ft & in)	Incident Energy (cal/cm^2)	*Notes
PURGE FAN #4 DISC	PD-PURGE FAN #4	0.48	1.49	1.48	1.15	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
PURGE FAN #5 DISC	PD-PURGE FAN #5	0.48	1.00	1.00	0.78	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
PURGE FAN #6 DISC	PD-PURGE FAN #6	0.48	0.72	0.72	0.43	0.028	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
RAS AND INFLUENT VALVE CONTROL	PD-RAS AND INFLUENT VALVE CONT	0.48	1.88	1.88	1.45	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
RAS PUMPS	PD-RAS PUMPS	0.48	4.69	4.66	3.63	0.01	0.0000	PNL	VCBB	4"	1' 6"	0.1	
RETURN SLUDGE PUMP #6	PD-RETURN SLUDGE PUMP #6	0.48	16.14	15.46	12.64	0.0112	0.0000	PNL	VCBB	10"	1' 6"	0.4	
RETURN SLUDGE PUMP #7	PD-RETURN SLUDGE PUMP #7	0.48	16.51	15.83	12.95	0.0111	0.0000	PNL	VCBB	10"	1' 6"	0.4	
RETURN SLUDGE PUMP #8	PD-RETURN SLUDGE PUMP #8	0.48	16.51	15.83	12.95	0.0111	0.0000	PNL	VCBB	10"	1' 6"	0.4	
RETURN SLUDGE PUMP #9	PD-RETURN SLUDGE PUMP #9	0.48	15.70	15.03	12.28	0.0113	0.0000	PNL	VCBB	10"	1' 6"	0.4	
S.E. HEAT	PD-S.E. HEAT	0.48	1.41	1.41	1.09	0.017	0.0000	PNL	VCBB	3"	1' 6"	0.0	
SCREW CONVEYOR DISC	PD-SCREEN SCREW CONV	0.48	1.09	1.09	0.65	0.0723	0.0000	PNL	VCBB	4"	1' 6"	0.1	(*N25a) (*N25d)
SCUM BLOWERS CLARIFIER #5	PD-SCUM BLOWERS CLARIFIER #5	0.48	3.12	3.12	2.41	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.1	
SCUM PUMP	PD-SCUM PUMP	0.48	2.76	2.75	2.13	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.0	
SEC HEAT PUMP #1	PD-MCC21 HEAT PUMPS	0.48	1.05	1.05	0.63	0.0245	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
SEC HEAT PUMP #2	PD-MCC21 HEAT PUMPS	0.48	1.05	1.05	0.63	0.0245	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)
SER FAN A	PD-SER FAN A	0.48	1.84	1.84	1.42	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
SER FAN B	PD-SER FAN B	0.48	1.49	1.49	1.15	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
SER FAN C	PD-SER FAN C	0.48	1.49	1.49	1.15	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
SER FAN D	PD-SER FAN D	0.48	1.84	1.84	1.42	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
SER FAN E	PD-SER FAN E	0.48	1.84	1.84	1.42	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
SER FAN F	PD-SER FAN F	0.48	1.49	1.49	1.15	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	

Bus Name	Protective Device Name	Bus kV	Bus Bolted Fault (kA)	Prot Dev Bolted Fault (kA)	Prot Dev Arcing Fault (kA)	Trip/ Delay Time (sec.)	Breaker Opening Time/Tol (sec.)	Equip Type	Selected Electrode Config.	Arc Flash Boundary (ft & in)	Working Distance (ft & in)	Incident Energy (cal/cm^2)	*Notes
SER FAN G	PD-SER FAN G	0.48	1.84	1.84	1.42	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
SER FAN H	PD-SER FAN H	0.48	1.84	1.84	1.42	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
SER FAN I	PD-SER FAN I	0.48	1.49	1.49	1.15	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
SER FAN J	PD-SER FAN J	0.48	1.49	1.49	1.15	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
SER FAN K	PD-SER FAN K	0.48	1.49	1.49	1.15	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
SER FAN L	PD-SER FAN L	0.48	1.84	1.84	1.42	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
SEWAGE PUMP #1	PD-PUMP #1	0.48	12.51	11.61	9.41	0.01	0.0000	PNL	VCBB	8"	1' 6"	0.3	
SEWAGE PUMP #2 VFD	PD-SEWAGE PUMP #2	0.48	19.88	18.85	15.46	0.01	0.0000	PNL	VCBB	11"	1' 6"	0.5	
SF-11 DISC	PD-MCC-15AA	0.48	1.28	1.19	0.92	2	0.0000	PNL	VCBB	2' 11"	1' 6"	4.0	(*N25d)
SF-4 DISC	PD-MCC-15AA	0.48	1.63	1.52	1.17	2	0.0000	PNL	VCBB	3' 5"	1' 6"	5.3	(*N25d)
SF-8 DISC	PD-MCC-15AA	0.48	1.05	0.98	0.76	2	0.0000	PNL	VCBB	2' 7"	1' 6"	3.2	
SLUDE PUMP #4	PD-PUMP SATION #2	0.48	5.54	5.28	4.14	0.0167	0.0000	PNL	VCBB	6"	1' 6"	0.2	
SLUDGE CAKE PUMP #2	PD-SLUDGE CAKE PUMP #2	0.48	13.45	12.10	9.84	0.0167	0.0000	PNL	VCBB	11"	1' 6"	0.5	
SLUDGE PUMP #1 DISC	PD-PUMP STATION #1	0.48	7.64	7.36	5.83	0.0167	0.0000	PNL	VCBB	8"	1' 6"	0.3	
SLUDGE PUMP #2 DISC	PD-PUMP STATION #1	0.48	7.64	7.36	5.83	0.0167	0.0000	PNL	VCBB	8"	1' 6"	0.3	
SLUDGE PUMP #3	PD-PUMP SATION #2	0.48	5.54	5.28	4.14	0.0167	0.0000	PNL	VCBB	6"	1' 6"	0.2	
SLUDGE PUMP #7 DISC	PD-PUMP STATION #1	0.48	7.66	7.37	5.84	0.0167	0.0000	PNL	VCBB	8"	1' 6"	0.3	
SLUDGE PUMP #8	PD-PUMP SATION #2	0.48	5.56	5.29	4.15	0.0167	0.0000	PNL	VCBB	6"	1' 6"	0.2	
SLUDGE VALVE HPU	PD-SLUDGE VALVE HPU	0.48	4.71	4.71	3.68	0.0175	0.0000	PNL	VCBB	6"	1' 6"	0.2	
SOUTH BELT DISCHARGE CONVEYOR	PD-SOUTH BELT DISCHARGE CONVEY	0.48	2.62	2.62	2.03	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.0	
SOUTH BELT PUMP NO 1 & 2	PD-SOUTH BELT PUMP NO 1 & 2	0.48	1.10	1.08	0.65	0.0455	0.0000	PNL	VCBB	3"	1' 6"	0.1	(*N25a)

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SOUTH CELL	PD-MCC-00 BACKWASH PUMPS	0.48	1.99	1.97	1.52	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
SOUTH SEC. CLARIFIER #1	PD-CLARIFIERS	0.48	1.82	1.82	1.40	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
SOUTH SEC. CLARIFIER #2	PD-CLARIFIERS	0.48	1.82	1.82	1.40	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
SOUTH SEC. INF. PUMP #1	PD-DIVERSION CHAMBER #3	0.48	1.63	1.61	1.25	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
SOUTH SEC. INF. PUMP #2	PD-DIVERSION CHAMBER #3	0.48	1.63	1.61	1.25	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
SOUTH SEC. PUMP #1	PD-SLUDE PUMPS	0.48	1.94	1.93	1.49	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
SOUTH SHOP HTR	PD-SOUTH SHOP HTR	0.48	5.42	5.42	4.25	0.01	0.0000	PNL	VCBB	5"	1' 6"	0.1	
STREET LIGHT	PD-STREET LIGHT	0.48	0.50	0.50	0.50	0.01	0.0000	PNL	VCBB	1"	1' 6"	0.0	
SUMP PUMP #1 DISC	PD-PUMP STATION #1	0.48	7.64	7.35	5.83	0.0167	0.0000	PNL	VCBB	8"	1' 6"	0.3	
SUMP PUMP #2	PD-PUMP SATION #2	0.48	5.54	5.28	4.14	0.0167	0.0000	PNL	VCBB	6"	1' 6"	0.2	
SUMP PUMP EAST	PD-SUMP PUMPS	0.48	5.15	5.15	4.03	0.01	0.0000	PNL	VCBB	5"	1' 6"	0.1	
SUMP PUMP WEST	PD-SUMP PUMPS	0.48	5.15	5.15	4.03	0.01	0.0000	PNL	VCBB	5"	1' 6"	0.1	
TRANSFER PUMP #1	PD-TRSF PUMP #1	0.48	3.58	3.55	2.75	0.01	0.0000	PNL	VCBB	4"	1' 6"	0.1	
TRANSFER PUMP #2	PD-TRSF PUMP #2	0.48	3.58	3.55	2.75	0.01	0.0000	PNL	VCBB	4"	1' 6"	0.1	
TRANSFER SWITCH	PD-RECYCLE PUMP	0.48	17.05	16.39	13.42	0.01	0.0000	PNL	VCBB	10"	1' 6"	0.4	
TUMBULATOR	PD-TUMBULATOR	0.48	1.79	1.79	1.38	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
UNIT HEATER #1	PD-MCC-1 UNIT HEATERS	0.48	7.04	7.04	5.56	0.01	0.0000	PNL	VCBB	6"	1' 6"	0.1	
UNIT HEATER #2	PD-MCC-1 UNIT HEATERS	0.48	2.53	2.53	1.58	0.1384	0.0000	PNL	VCBB	10"	1' 6"	0.5	(*N25a) (*N25d)
UNIT HEATER #3	PD-MCC-1 UNIT HEATERS	0.48	1.57	1.57	1.07	1.958	0.0000	PNL	VCBB	3' 3"	1' 6"	4.3	(*N25d)
VACUUM PUMP	PD-SUMP PUMPS	0.48	2.26	2.26	1.75	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.0	

Bus Name	Protective Device Name	Bus kV	Bus Bolted Fault (kA)	Prot Dev Bolted Fault (kA)	Prot Dev Arcing Fault (kA)	Trip/ Delay Time (sec.)	Breaker Opening Time/Tol (sec.)	Equip Type	Selected Electrode Config.	Arc Flash Boundary (ft & in)	Working Distance (ft & in)	Incident Energy (cal/cm^2)	*Notes
VALVE ACTUATORS	PD-VALVE ACTUATORS	0.48	1.21	1.21	0.93	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	
VFD-FOUL AIR FAN 1	PD-FOUL AIR FANS	0.48	2.47	2.47	1.91	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.0	
VFD-FOUL AIR FAN 2	PD-FOUL AIR FANS	0.48	2.47	2.47	1.91	0.01	0.0000	PNL	VCBB	3"	1' 6"	0.0	
VFD-N. THICK SLUDGE PUMP #1	PD-N. THICK SLUDGE PUMP #1	0.48	2.92	2.88	2.23	0.0167	0.0000	PNL	VCBB	4"	1' 6"	0.1	
VFD-N. THICK SLUDGE PUMP #2	PD-N. THICK SLUDGE PUMP #2	0.48	2.32	2.30	1.78	0.0166	0.0000	PNL	VCBB	4"	1' 6"	0.1	
VFD-N. THICK SLUDGE PUMP #3	PD-N. THICK SLUDGE PUMP #3	0.48	3.18	3.13	2.43	0.0167	0.0000	PNL	VCBB	4"	1' 6"	0.1	
VFD-PUMP 4	PD-PUMP #4	0.48	20.60	19.63	16.10	0.01	0.0000	PNL	VCBB	11"	1' 6"	0.5	
VFD-S. THICK SLUDGE PUMP #1	PD-S. THICK SLUDGE PUMP #1	0.48	2.81	2.77	2.14	0.0167	0.0000	PNL	VCBB	4"	1' 6"	0.1	
VFD-S. THICK SLUDGE PUMP #2	PD-S. THICK SLUDGE PUMP #2	0.48	2.03	2.01	1.55	0.0169	0.0000	PNL	VCBB	3"	1' 6"	0.1	
VFD-S. THICK SLUDGE PUMP #3	PD-S. THICK SLUDGE PUMP #3	0.48	2.61	2.56	1.98	0.0167	0.0000	PNL	VCBB	4"	1' 6"	0.1	
VFD-SOUTH BELT PRESS FD PUMP 1	PD-SOUTH BELT PUMP NO 1 & 2	0.48	0.97	0.95	0.57	0.0703	0.0000	PNL	VCBB	3"	1' 6"	0.1	(*N25a)
VFD-SOUTH BELT PRESS FD PUMP 2	PD-SOUTH BELT PUMP NO 1 & 2	0.48	0.97	0.95	0.57	0.0703	0.0000	PNL	VCBB	3"	1' 6"	0.1	(*N25a)
WASTE MIXED LIQUOR PUMP 1 EAST	PD-WASTE MIXED LIQUOR PUMP 1 E	0.48	15.32	15.19	12.40	0.01	0.0000	PNL	VCBB	9"	1' 6"	0.4	
WASTE MIXED LIQUOR PUMP 1 WEST	PD-WASTE MIXED LIQUOR PUMP 1 W	0.48	15.32	15.19	12.40	0.01	0.0000	PNL	VCBB	9"	1' 6"	0.4	
WASTE SLUDGE PUMP #4	PD-WASTE PUMP #4	0.48	1.45	1.44	1.11	0.0134	0.0000	PNL	VCBB	2"	1' 6"	0.0	
WASTE SLUDGE PUMP #5	PD-WASTE PUMP #5	0.48	1.45	1.44	1.11	0.0134	0.0000	PNL	VCBB	2"	1' 6"	0.0	
WATER MAINT SHOP	PD-WATER MAINT SHOP	0.48	3.54	3.54	2.74	0.01	0.0000	PNL	VCBB	4"	1' 6"	0.1	
WELDER RECEPT	PD-WELDER RECEPT	0.48	3.94	3.94	3.06	0.01	0.0000	PNL	VCBB	4"	1' 6"	0.1	
WELDER-CARBON FLUSH PUMP	PD-WELDER-CARBON FLSH PUMP	0.48	2.00	2.00	1.54	0.01	0.0000	PNL	VCBB	2"	1' 6"	0.0	

Bus Name	Protective Device Name	Bus kV	Bus Bolted Fault (kA)	Prot Dev Bolted Fault (kA)	Prot Dev Arcing Fault (kA)	Trip/ Delay Time (sec.)	Breaker Opening Time/Tol (sec.)	Equip Type	Selected Electrode Config.	Arc Flash Boundary (ft & in)	Working Distance (ft & in)	Incident Energy (cal/cm^2)	*Notes
WEST BANK-A	PD-FB1	4.80	8.35	8.23	7.30	0.3405	0.0833	SWG	HCB	8' 8"	3' 0"	7.4	
WEST BANK-B	PD-FB4	4.80	8.36	8.36	7.41	0.336	0.0833	SWG	HCB	8' 8"	3' 0"	7.3	
WEST FAN	PD-WEST FAN	0.48	0.91	0.91	0.54	0.5288	0.0000	PNL	VCBB	11"	1' 6"	0.6	(*N25a) (*N25d)
WINCH #1	PD-WINCH #1	0.48	0.86	0.86	0.51	0.7411	0.0000	PNL	VCBB	1' 1"	1' 6"	0.7	(*N25a) (*N25d)
WINCH #2	PD-WINCH #2	0.48	0.93	0.93	0.55	0.576	0.0000	PNL	VCBB	1' 0"	1' 6"	0.6	(*N25a) (*N25d)
WINCH #3	PD-WINCH #3	0.48	1.01	1.01	0.61	0.0438	0.0000	PNL	VCBB	3"	1' 6"	0.1	(*N25a)
WT CONVEYOR 1 DISC	PD-WT CONVEYOR 1	0.48	1.04	1.04	0.63	0.0218	0.0000	PNL	VCBB	2"	1' 6"	0.0	(*N25a)

*Notes:
- (*N25a) – The incident energy for VCB is reported because it is higher than the VCBB result.
- (*N25d) – The arc flash boundary for VCB is reported because it is higher than the VCBB result.

6.0 SYSTEM DATA

The following input data used in modeling the power system was obtained as follows:

- Tetra Tech Contract drawing: E-006 issued 8/2/2021.
- Eaton Bill of Material dated 5/23/2022.
- Utility data by Consumers Energy.
- Equipment and feeder data provided by Feyez Zelstra.
- LC-2 main fuse assumed to be KRP-C Class L 1600A fuse, fuse label not legible.
- Breaker feeding MCC-25, PD-MCC-25, assumed type, label was not legible.
- LC-5A breaker feeding feeding MCC-15A, PD-MCC-15A, trip unit assumed. No trip unit data provided.
- LC-3 main breaker, MAIN-LC-3 was assumed, no model in library.
- MCC-28 and 29 Main breaker, MAIN-MCC-28 and MAIN-MCC-29, assumed type, no similar model in library.
- Fuses feeding Blower 2 and Blower 3, PD-2500 HP Blower 2 and PD-2500HP Blower 2, assumed, no matching model in library.
- MCC-15AA breakers are unknown, no library file was associated therefore Arc Flash calculations max out at 2 seconds for worst case results.
- No data was provided for existing settings on adjustable breakers in the field, all adjustable breakers were assumed max settings for conservative arc flash results
- Available fault current information provided by the Utility service provider was used in the analysis. A copy of the utility data provided can be found for review under Section 9.0.
    - Location: South Feed
        - Voltage: 4800 Volts
        - Three-phase fault current: 17,400A, X/R=12.8
    - Location: North Feed
        - Voltage: 48000 Volts
        - Three-phase fault current: 16,600A, X/R=10.8
    - Ground fault assumed to be equivalent to Three-phase fault current.
    - System voltage is modeled at 100% nominal.
- All motors were assumed to be running.
- Motor subtransient reactance is assumed to be 16.7%.
- Generator subtransient reactances (X''_d, X_2, and X_0) are assumed to be 15%.
- Generator decrement curve is estimated based on assumed generator reactance values and constant short-circuit capability of 3X rated full load current.

- Single-phase panelboards were modeled as three-phase panelboards for the purposes of applying the three-phase arc flash equations. This model configuration also provides conservative results for the calculation of short-circuit currents.
- The following data was used in performing the arc flash incident energy analysis:
    - All equipment was modeled with typical bus gaps and box/enclosure sizes based on equipment class, per IEEE-1584-2018 Section 6.5, Table 8.
    - The minimum utility fault current is assumed to be 50% of the available fault current at the primary side (46 kV) of the service utility transformers.
    - Generator supplied fault current is reduced to 300% of rated current after 10 cycles.

Complete information regarding the system model used for the computer simulation is included in Section 7.0.

7.0 SHORT-CIRCUIT INPUT REPORT

Input Report Interpretation

Input Data Tables are provided on the following pages. The following is a guide for interpreting the input data.

- Feeder Data

  Feeder data includes the following cable and bus data: length, impedance in ohms per 1,000 feet, and per-unit impedance on a 100 MVA base. Impedance values for conductors were obtained from Tables 4A-7 and 4A-8 of IEEE Std 141 (Red Book).

- Transformer Data

  Transformer data includes the transformer kVA rating and per-unit impedance on a 100 MVA base.

- Generation Contribution Data

  - Utility contribution data includes the available fault current in MVA and amps, per unit impedance on a 100 MVA base, X/R, and the line-to-line bus voltage.

- Generator data includes the generator kW rating, X"d, X/R, line-to-line voltage and per unit impedance on a 100 MVA base. Motor Contribution Data

  Motor Contribution Data includes the horsepower rating (base kVA rating), speed, subtransient reactance adjusted per the *First Cycle Duty* multipliers described in IEEE Std 141 (Red Book), per-unit impedance on a 100 MVA base, and the bus voltage. X/R ratios for induction motors are obtained from IEEE Std C37.010.

Short-Circuit Input Report

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May 12, 2023     08:53:10                                              Page 1
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  ALL INFORMATION PRESENTED IS FOR REVIEW, APPROVAL
  INTERPRETATION AND APPLICATION BY A REGISTERED ENGINEER ONLY
  SKM DISCLAIMS ANY RESPONSIBILITY AND LIABILITY RESULTING
  FROM THE USE AND INTERPRETATION OF THIS SOFTWARE.
  ------------------------------------------------------------------------------
  SKM POWER*TOOLS FOR WINDOWS
  INPUT DATA REPORT
  COPYRIGHT SKM SYSTEMS ANALYSIS, INC. 1995-2021
 ------------------------------------------------------------------------------
  ALL PU VALUES ARE EXPRESSED ON A 100 MVA BASE.
```

```
                                          FEEDER  INPUT  DATA
==============================================================================================
CABLE          FEEDER FROM      FEEDER TO       QTY  VOLTS    LENGTH              FEEDER
NAME           NAME             NAME            /PH  L-L                     SIZE       TYPE
==============================================================================================
CBL-0002       BUS-1027         MVUS-1A           4   4800    55.0  FEET      500      Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.0276 + J  0.0311  Ohms/1000 ft      0.0016 + J  0.0019  PU
               Z0   Impedance: 0.0438 + J  0.0833  Ohms/1000 ft      0.0026 + J  0.0050  PU

CBL-0003       MVUS-1A          WEST BANK-A       2   4800    52.0  FEET      500      Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.0276 + J  0.0311  Ohms/1000 ft      0.0031 + J  0.0035  PU
               Z0   Impedance: 0.0438 + J  0.0833  Ohms/1000 ft      0.0049 + J  0.0094  PU

CBL-0004       WEST BANK-A      BUS-0020          1   4800    90.0  FEET      4/0      Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.0640 + J  0.0466  Ohms/1000 ft      0.0250 + J  0.0182  PU
               Z0   Impedance: 0.1017 + J  0.1185  Ohms/1000 ft      0.0397 + J  0.0463  PU

CBL-0005       WEST BANK-A      BUS-0017          1   4800   400.0  FEET      350      Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.0375 + J  0.0450  Ohms/1000 ft      0.0651 + J  0.0781  PU
               Z0   Impedance: 0.0596 + J  0.1144  Ohms/1000 ft      0.1035 + J  0.1986  PU

CBL-0006       WEST BANK-A      BUS-0031          1   4800   710.0  FEET        2      Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.2020 + J  0.0547  Ohms/1000 ft      0.6225 + J  0.1686  PU
               Z0   Impedance: 0.3211 + J  0.1392  Ohms/1000 ft      0.9895 + J  0.4290  PU

CBL-0008       BUS-1028         MVUS-1B           4   4800    65.0  FEET      500      Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.0276 + J  0.0311  Ohms/1000 ft      0.0019 + J  0.0022  PU
               Z0   Impedance: 0.0438 + J  0.0833  Ohms/1000 ft      0.0031 + J  0.0059  PU

CBL-0010       MVUS-1B          WEST BANK-B       2   4800    50.0  FEET      500      Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.0276 + J  0.0311  Ohms/1000 ft      0.0030 + J  0.0034  PU
               Z0   Impedance: 0.0438 + J  0.0833  Ohms/1000 ft      0.0048 + J  0.0090  PU

CBL-0011       WEST BANK-B      HS-LC-4           1   4800   245.0  FEET        2      Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.2020 + J  0.0547  Ohms/1000 ft      0.2148 + J  0.0582  PU
               Z0   Impedance: 0.3211 + J  0.1392  Ohms/1000 ft      0.3414 + J  0.1480  PU

CBL-0012       WEST BANK-B      BUS-0037          1   4800   830.0  FEET      1/0      Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.1280 + J  0.0507  Ohms/1000 ft      0.4611 + J  0.1826  PU
               Z0   Impedance: 0.2035 + J  0.1290  Ohms/1000 ft      0.7331 + J  0.4647  PU
```

FEEDER INPUT DATA

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===========================================================================================
CABLE          FEEDER FROM     FEEDER TO        QTY  VOLTS    LENGTH              FEEDER
NAME           NAME            NAME             /PH  L-L                     SIZE       TYPE
===========================================================================================
CBL-0013       WEST BANK-B     BUS-0021          1   4800   90.0  FEET     4/0     Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.0640 + J  0.0466  Ohms/1000 ft      0.0250 + J  0.0182  PU
               Z0   Impedance: 0.1017 + J  0.1185  Ohms/1000 ft      0.0397 + J  0.0463  PU

CBL-0015       MVUS-1B         EAST BANK-1A      2   4800   75.0  FEET     500     Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.0276 + J  0.0311  Ohms/1000 ft      0.0045 + J  0.0051  PU
               Z0   Impedance: 0.0438 + J  0.0833  Ohms/1000 ft      0.0071 + J  0.0136  PU

CBL-0016       EAST BANK-1A    MVS-9A            1   4800  380.0  FEET     350     Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.0375 + J  0.0450  Ohms/1000 ft      0.0618 + J  0.0742  PU
               Z0   Impedance: 0.0596 + J  0.1144  Ohms/1000 ft      0.0983 + J  0.1887  PU

CBL-0018       EAST BANK-1A    BUS-0050          1   4800  525.0  FEET     4/0     Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.0640 + J  0.0466  Ohms/1000 ft      0.1458 + J  0.1062  PU
               Z0   Impedance: 0.1017 + J  0.1185  Ohms/1000 ft      0.2317 + J  0.2700  PU

CBL-0019       MVUS-1A         EAST BANK-1B      2   4800   54.0  FEET     500     Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.0276 + J  0.0311  Ohms/1000 ft      0.0032 + J  0.0036  PU
               Z0   Impedance: 0.0438 + J  0.0833  Ohms/1000 ft      0.0051 + J  0.0098  PU

CBL-0020       EAST BANK-1B    BUS-0051          1   4800  535.0  FEET     1/0     Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.1280 + J  0.0507  Ohms/1000 ft      0.2972 + J  0.1177  PU
               Z0   Impedance: 0.2035 + J  0.1290  Ohms/1000 ft      0.4725 + J  0.2995  PU

CBL-0022       EAST BANK-1B    BUS-0519          1   4800  370.0  FEET     350     Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.0375 + J  0.0450  Ohms/1000 ft      0.0602 + J  0.0723  PU
               Z0   Impedance: 0.0596 + J  0.1144  Ohms/1000 ft      0.0957 + J  0.1837  PU

CBL-0024       EAST BANK-1B    BUS-0047          1   4800  960.0  FEET     3/0     Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.0805 + J  0.0484  Ohms/1000 ft      0.3354 + J  0.2017  PU
               Z0   Impedance: 0.1279 + J  0.1230  Ohms/1000 ft      0.5329 + J  0.5125  PU

CBL-0025       EAST BANK-1B    BUS-0049          1   4800  780.0  FEET       2     Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.2020 + J  0.0390  Ohms/1000 ft      0.6839 + J  0.1320  PU
               Z0   Impedance: 0.3211 + J  0.0992  Ohms/1000 ft        1.09 + J  0.3358  PU
```

```
                                    FEEDER  INPUT  DATA
=============================================================================================
CABLE         FEEDER FROM     FEEDER TO       QTY  VOLTS   LENGTH            FEEDER
NAME          NAME            NAME            /PH  L-L                  SIZE        TYPE
=============================================================================================
CBL-0026      EAST BANK-1A    BUS-0048         1   4800  740.0  FEET       2     Copper
              Duct Material: Non-Magnetic
              +/-  Impedance: 0.2020 + J  0.0547  Ohms/1000 ft      0.6488 + J  0.1757  PU
              Z0   Impedance: 0.3211 + J  0.1392  Ohms/1000 ft        1.03 + J  0.4471  PU

CBL-0027      EAST BANK-1A    BUS-0046         1   4800  990.0  FEET     3/0     Copper
              Duct Material: Non-Magnetic
              +/-  Impedance: 0.0805 + J  0.0484  Ohms/1000 ft      0.3459 + J  0.2080  PU
              Z0   Impedance: 0.1279 + J  0.1230  Ohms/1000 ft      0.5496 + J  0.5285  PU

CBL-0028      MVUS-1A         EAST BANK-2A     2   4800   54.0  FEET     500     Copper
              Duct Material: Non-Magnetic
              +/-  Impedance: 0.0276 + J  0.0311  Ohms/1000 ft      0.0032 + J  0.0036  PU
              Z0   Impedance: 0.0438 + J  0.0833  Ohms/1000 ft      0.0051 + J  0.0098  PU

CBL-0029      EAST BANK-2A    DS-1500 HP BLO   1   4800  655.0  FEET     350     Copper
              Duct Material: Non-Magnetic
              +/-  Impedance: 0.0375 + J  0.0450  Ohms/1000 ft      0.1066 + J  0.1279  PU
              Z0   Impedance: 0.0596 + J  0.1144  Ohms/1000 ft      0.1694 + J  0.3252  PU

CBL-0030      EAST BANK-2A    DS-2500HP BLOW   1   4800  650.0  FEET     350     Copper
              Duct Material: Non-Magnetic
              +/-  Impedance: 0.0375 + J  0.0450  Ohms/1000 ft      0.1058 + J  0.1270  PU
              Z0   Impedance: 0.0596 + J  0.1144  Ohms/1000 ft      0.1681 + J  0.3227  PU

CBL-0032      MVUS-1B         EAST BANK-2B     2   4800   85.0  FEET     500     Copper
              Duct Material: Non-Magnetic
              +/-  Impedance: 0.0276 + J  0.0311  Ohms/1000 ft      0.0051 + J  0.0057  PU
              Z0   Impedance: 0.0438 + J  0.0833  Ohms/1000 ft      0.0081 + J  0.0154  PU

CBL-0033      EAST BANK-2B    DS-2500HP BLOW   1   4800  670.0  FEET     350     Copper
              Duct Material: Non-Magnetic
              +/-  Impedance: 0.0375 + J  0.0450  Ohms/1000 ft      0.1090 + J  0.1309  PU
              Z0   Impedance: 0.0596 + J  0.1144  Ohms/1000 ft      0.1733 + J  0.3327  PU

CBL-0034      EAST BANK-2B    DS-1500 HP BLO   1   4800  665.0  FEET     350     Copper
              Duct Material: Non-Magnetic
              +/-  Impedance: 0.0375 + J  0.0450  Ohms/1000 ft      0.1082 + J  0.1299  PU
              Z0   Impedance: 0.0596 + J  0.1144  Ohms/1000 ft      0.1720 + J  0.3302  PU

CBL-0037      EAST BANK-2A    BUS-0038         1   4800  800.0  FEET     1/0     Copper
              Duct Material: Non-Magnetic
              +/-  Impedance: 0.1280 + J  0.0507  Ohms/1000 ft      0.4444 + J  0.1760  PU
              Z0   Impedance: 0.2035 + J  0.1290  Ohms/1000 ft      0.7066 + J  0.4479  PU
```

```
                                         FEEDER  INPUT  DATA
===================================================================================================
CABLE          FEEDER FROM     FEEDER TO        QTY  VOLTS    LENGTH            FEEDER
NAME           NAME            NAME             /PH  L-L                     SIZE       TYPE
===================================================================================================
CBL-0038       DS-1500 HP BLO  BUS-0054          1   4800  110.0  FEET     350      Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.0375 + J  0.0450  Ohms/1000 ft      0.0179 + J  0.0215  PU
               Z0   Impedance: 0.0596 + J  0.1144  Ohms/1000 ft      0.0285 + J  0.0546  PU

CBL-0039       DS-1500 HP BLO  LC-12 HS          1   4800  145.0  FEET       2      Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.2020 + J  0.0547  Ohms/1000 ft      0.1271 + J  0.0344  PU
               Z0   Impedance: 0.3211 + J  0.1392  Ohms/1000 ft      0.2021 + J  0.0876  PU

CBL-0040       DS-2500HP BLOW  BUS-0055          1   4800   90.0  FEET     350      Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.0375 + J  0.0450  Ohms/1000 ft      0.0146 + J  0.0176  PU
               Z0   Impedance: 0.0596 + J  0.1144  Ohms/1000 ft      0.0233 + J  0.0447  PU

CBL-0041       BUS-0017        HS-LC-2A          1   4800   40.0  FEET     1/0      Copper
               Duct Material: Non-Magnetic     Insulation Type:       XLPE     Insulation
Class:  100%/133%
               +/-  Impedance: 0.1278 + J  0.0514  Ohms/1000 ft      0.0222 + J  0.0089  PU
               Z0   Impedance: 0.4318 + J  0.1460  Ohms/1000 ft      0.0750 + J  0.0253  PU

CBL-0042       DS-1500 HP BLO  BUS-0057          1   4800   70.0  FEET     350      Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.0375 + J  0.0450  Ohms/1000 ft      0.0114 + J  0.0137  PU
               Z0   Impedance: 0.0596 + J  0.1144  Ohms/1000 ft      0.0181 + J  0.0348  PU

CBL-0043       DS-1500 HP BLO  DS-LC-12A HS      1   4800   35.0  FEET       2      Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.2020 + J  0.0547  Ohms/1000 ft      0.0307 + J  0.0083  PU
               Z0   Impedance: 0.3211 + J  0.1392  Ohms/1000 ft      0.0488 + J  0.0211  PU

CBL-0044       DS-2500HP BLOW  BUS-0056          1   4800   50.0  FEET     350      Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.0375 + J  0.0450  Ohms/1000 ft      0.0081 + J  0.0098  PU
               Z0   Impedance: 0.0596 + J  0.1144  Ohms/1000 ft      0.0129 + J  0.0248  PU

CBL-0045       BUS-0022        MCC-26            5    480  140.0  FEET     600      Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.0237 + J  0.0371  Ohms/1000 ft      0.2880 + J  0.4509  PU
               Z0   Impedance: 0.0376 + J  0.0943  Ohms/1000 ft      0.4569 + J    1.15  PU

CBL-0046       BUS-0023        MCC-27            5    480  140.0  FEET     600      Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.0237 + J  0.0371  Ohms/1000 ft      0.2880 + J  0.4509  PU
               Z0   Impedance: 0.0376 + J  0.0943  Ohms/1000 ft      0.4569 + J    1.15  PU
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                                   FEEDER  INPUT  DATA
=============================================================================================
CABLE         FEEDER FROM     FEEDER TO        QTY  VOLTS   LENGTH             FEEDER
NAME          NAME            NAME             /PH  L-L                    SIZE        TYPE
=============================================================================================
CBL-0047      BUS-0059        LC-2              1    480  1.000  FEET     600     Copper
              Duct Material:       Busway
              +/-  Impedance: 0.0119 + J  0.0619  Ohms/1000 ft      0.0052 + J  0.0269  PU
              Z0   Impedance: 0.0710 + J  0.3314  Ohms/1000 ft      0.0308 + J  0.1438  PU

CBL-0048      BUS-0017        HS-LC-2           1   4800  1.000  FEET     600     Copper
              Duct Material:       Busway
              +/-  Impedance: 0.0119 + J  0.0619  Ohms/1000 ft     0.00005 + J 0.00027  PU
              Z0   Impedance: 0.0710 + J  0.3314  Ohms/1000 ft     0.00031 + J  0.0014  PU

CBL-0050      BUS-0032        MCC-7             2    480   65.0  FEET     500     Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.0294 + J  0.0466  Ohms/1000 ft      0.4147 + J  0.6573  PU
              Z0   Impedance: 0.0926 + J  0.1147  Ohms/1000 ft        1.31 + J    1.62  PU

CBL-0053      BUS-0519        MVS-9B            1   4800  875.0  FEET     2/0     Copper
              Duct Material: Non-Magnetic
              +/-  Impedance: 0.1020 + J  0.0504  Ohms/1000 ft      0.3874 + J  0.1914  PU
              Z0   Impedance: 0.1621 + J  0.1281  Ohms/1000 ft      0.6156 + J  0.4865  PU

CBL-0058      LC-2            MCC-8             3    480  180.0  FEET     250     Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.0552 + J  0.0495  Ohms/1000 ft        1.44 + J    1.29  PU
              Z0   Impedance: 0.1739 + J  0.1219  Ohms/1000 ft        4.53 + J    3.17  PU

CBL-0061      LC-2            MCC-12            2    480  140.0  FEET     350     Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.0378 + J  0.0491  Ohms/1000 ft        1.15 + J    1.49  PU
              Z0   Impedance: 0.1191 + J  0.1209  Ohms/1000 ft        3.62 + J    3.67  PU

CBL-0063      LC-2A           MCC-8A            1    480  200.0  FEET     500     Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.0294 + J  0.0466  Ohms/1000 ft        2.55 + J    4.05  PU
              Z0   Impedance: 0.0926 + J  0.1147  Ohms/1000 ft        8.04 + J    9.96  PU

CBL-0069      LC-4            MCC-10            2    480  200.0  FEET     350     Copper
              Duct Material: Non-Magnetic
              +/-  Impedance: 0.0368 + J  0.0393  Ohms/1000 ft        1.60 + J    1.71  PU
              Z0   Impedance: 0.0585 + J  0.0999  Ohms/1000 ft        2.54 + J    4.34  PU

CBL-0070      LC-4            MCC-25            2    480  200.0  FEET     600     Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.0257 + J  0.0463  Ohms/1000 ft        1.12 + J    2.01  PU
              Z0   Impedance: 0.0809 + J  0.1140  Ohms/1000 ft        3.51 + J    4.95  PU
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FEEDER INPUT DATA

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==========================================================================================
CABLE          FEEDER FROM     FEEDER TO        QTY  VOLTS   LENGTH           FEEDER
NAME           NAME            NAME             /PH  L-L                   SIZE       TYPE
==========================================================================================
CBL-0073       BUS-0077        LC-5A              1    480  1.000  FEET     1000     Copper
               Duct Material:        Busway
               +/-  Impedance: 0.0142 + J  0.0066  Ohms/1000 ft      0.0062 + J  0.0029  PU
               Z0   Impedance: 0.0844 + J  0.0353  Ohms/1000 ft      0.0366 + J  0.0153  PU

CBL-0075       LC-5A           MCC-15A            3    480  205.0  FEET      350     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.0378 + J  0.0491  Ohms/1000 ft        1.12 + J    1.46  PU
               Z0   Impedance: 0.1191 + J  0.1209  Ohms/1000 ft        3.53 + J    3.59  PU

CBL-0078       BUS-0082        28-PP-01           1    480   55.0  FEET      2/0     Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.1010 + J  0.0426  Ohms/1000 ft        2.41 + J    1.02  PU
               Z0   Impedance: 0.1605 + J  0.1083  Ohms/1000 ft        3.83 + J    2.59  PU

CBL-0079       BUS-0088        MCC-20             3    480   40.0  FEET      350     Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.0368 + J  0.0393  Ohms/1000 ft      0.2130 + J  0.2274  PU
               Z0   Impedance: 0.0585 + J  0.0999  Ohms/1000 ft      0.3385 + J  0.5781  PU

CBL-0081       BUS-0089        MCC-19             3    480   40.0  FEET      350     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.0378 + J  0.0491  Ohms/1000 ft      0.2188 + J  0.2841  PU
               Z0   Impedance: 0.1191 + J  0.1209  Ohms/1000 ft      0.6892 + J  0.6997  PU

CBL-0108       LC-8            MCC-4              2    480   13.0  FEET      350     Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.0368 + J  0.0393  Ohms/1000 ft      0.1038 + J  0.1109  PU
               Z0   Impedance: 0.0585 + J  0.0999  Ohms/1000 ft      0.1650 + J  0.2818  PU

CBL-0109       LC-8A           MCC-4A             2    480   27.0  FEET      350     Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.0368 + J  0.0393  Ohms/1000 ft      0.2156 + J  0.2303  PU
               Z0   Impedance: 0.0585 + J  0.0999  Ohms/1000 ft      0.3428 + J  0.5854  PU

CBL-0119       LC-5            20A-PP-1           1    480  140.0  FEET      3/0     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.0805 + J  0.0519  Ohms/1000 ft        4.89 + J    3.15  PU
               Z0   Impedance: 0.2537 + J  0.1278  Ohms/1000 ft       15.42 + J    7.77  PU

CBL-0120       LC-5            MCC-15             3    480  240.0  FEET      350     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.0378 + J  0.0491  Ohms/1000 ft        1.31 + J    1.70  PU
               Z0   Impedance: 0.1191 + J  0.1209  Ohms/1000 ft        4.14 + J    4.20  PU
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                                         FEEDER  INPUT  DATA
=============================================================================================
CABLE          FEEDER FROM      FEEDER TO         QTY  VOLTS    LENGTH             FEEDER
NAME           NAME             NAME              /PH  L-L                     SIZE        TYPE
=============================================================================================
CBL-0126       LC-3             MCC-24             1    480  440.0  FEET     250     Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.0541 + J  0.0396  Ohms/1000 ft      10.33 + J    7.56  PU
               Z0   Impedance: 0.0860 + J  0.1007  Ohms/1000 ft      16.42 + J   19.23  PU

CBL-0129       BUS-1045         BUS-1043           3    480   80.0  FEET     500     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.0294 + J  0.0466  Ohms/1000 ft     0.3403 + J  0.5394  PU
               Z0   Impedance: 0.0926 + J  0.1147  Ohms/1000 ft       1.07 + J    1.33  PU

CBL-0131       MCC-20           MCC-21             2    480   60.0  FEET     4/0     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.0640 + J  0.0497  Ohms/1000 ft     0.8333 + J  0.6471  PU
               Z0   Impedance: 0.2017 + J  0.1224  Ohms/1000 ft       2.63 + J    1.59  PU

CBL-0133       MCC-20           MCC-22             1    480  155.0  FEET     4/0     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.0640 + J  0.0497  Ohms/1000 ft       4.31 + J    3.34  PU
               Z0   Impedance: 0.2017 + J  0.1224  Ohms/1000 ft      13.57 + J    8.23  PU

CBL-0139       LC-7A            BUS-0393           4    480   40.0  FEET     600     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.0257 + J  0.0463  Ohms/1000 ft     0.1115 + J  0.2010  PU
               Z0   Impedance: 0.0809 + J  0.1140  Ohms/1000 ft     0.3511 + J  0.4948  PU

CBL-0144       LC-7             BUS-0217           4    480   65.0  FEET     600     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.0257 + J  0.0463  Ohms/1000 ft     0.1813 + J  0.3266  PU
               Z0   Impedance: 0.0809 + J  0.1140  Ohms/1000 ft     0.5706 + J  0.8040  PU

CBL-0146       MCC-1            MCC-3              2    480   40.0  FEET     350     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.0378 + J  0.0491  Ohms/1000 ft     0.3281 + J  0.4262  PU
               Z0   Impedance: 0.1191 + J  0.1209  Ohms/1000 ft       1.03 + J    1.05  PU

CBL-0148       MCC-4            BUS-0366           1    480   40.0  FEET       6     Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.5100 + J  0.0548  Ohms/1000 ft       8.85 + J  0.9514  PU
               Z0   Impedance: 0.8123 + J  0.1394  Ohms/1000 ft      14.10 + J    2.42  PU

CBL-0149       MCC-4A           BUS-0329           1    480   35.0  FEET       8     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.8110 + J  0.0754  Ohms/1000 ft      12.32 + J    1.15  PU
               Z0   Impedance:   2.56 + J  0.1856  Ohms/1000 ft      38.83 + J    2.82  PU
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                                         FEEDER  INPUT  DATA
===========================================================================================
CABLE         FEEDER FROM     FEEDER TO        QTY  VOLTS   LENGTH              FEEDER
NAME          NAME            NAME             /PH  L-L                    SIZE        TYPE
===========================================================================================
CBL-0151      MCC-4A          MCC-4B            1    480    15.0  FEET      4/0     Copper
              Duct Material: Non-Magnetic
              +/-  Impedance: 0.0633 + J  0.0398  Ohms/1000 ft      0.4121 + J  0.2591  PU
              Z0   Impedance: 0.1006 + J  0.1012  Ohms/1000 ft      0.6549 + J  0.6589  PU

CBL-0153      MCC-4A          BUS-1036          1    480    40.0  FEET        6     Copper
              Duct Material: Non-Magnetic
              +/-  Impedance: 0.5100 + J  0.0548  Ohms/1000 ft        8.85 + J  0.9514  PU
              Z0   Impedance: 0.8123 + J  0.1394  Ohms/1000 ft       14.10 + J    2.42  PU

CBL-0157      BUS-0162        MCC-29            3    480    40.0  FEET      500     Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.0294 + J  0.0466  Ohms/1000 ft      0.1701 + J  0.2697  PU
              Z0   Impedance: 0.0926 + J  0.1147  Ohms/1000 ft      0.5359 + J  0.6638  PU

CBL-0159      MCC-8           DS-MCC-8 DRAIN    1    480   180.0  FEET      4/0     Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.0640 + J  0.0497  Ohms/1000 ft        5.00 + J    3.88  PU
              Z0   Impedance: 0.2017 + J  0.1224  Ohms/1000 ft       15.76 + J    9.56  PU

CBL-0160      DS-MCC-8 DRAIN  BUS-0982          1    480   125.0  FEET        8     Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.8110 + J  0.0754  Ohms/1000 ft       44.00 + J    4.09  PU
              Z0   Impedance:   2.56 + J  0.1856  Ohms/1000 ft      138.67 + J   10.07  PU

CBL-0161      MCC-8           MCC-8 SECTION     1    480   100.0  FEET      350     Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.0378 + J  0.0491  Ohms/1000 ft        1.64 + J    2.13  PU
              Z0   Impedance: 0.1191 + J  0.1209  Ohms/1000 ft        5.17 + J    5.25  PU

CBL-0162      MCC-8           DS-MCC-8-PUMPS    1    480   100.0  FEET      3/0     Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.0805 + J  0.0519  Ohms/1000 ft        3.49 + J    2.25  PU
              Z0   Impedance: 0.2537 + J  0.1278  Ohms/1000 ft       11.01 + J    5.55  PU

CBL-0163      BUS-0982        DS-AIR COMPRES    1    480    30.0  FEET        8     Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.8110 + J  0.0754  Ohms/1000 ft       10.56 + J  0.9818  PU
              Z0   Impedance:   2.56 + J  0.1856  Ohms/1000 ft       33.28 + J    2.42  PU

CBL-0164      MCC-8           12A-PP-01         1    480   100.0  FEET      3/0     Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.0805 + J  0.0519  Ohms/1000 ft        3.49 + J    2.25  PU
              Z0   Impedance: 0.2537 + J  0.1278  Ohms/1000 ft       11.01 + J    5.55  PU
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                                          FEEDER  INPUT  DATA
=============================================================================================
CABLE          FEEDER FROM     FEEDER TO         QTY  VOLTS   LENGTH              FEEDER
NAME           NAME            NAME              /PH  L-L                     SIZE        TYPE
=============================================================================================
CBL-0168       MCC-8 SECTION   DS-MCC8 RAS PU   1     480    90.0  FEET       10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       46.09 + J    3.34  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      145.27 + J    8.21  PU

CBL-0169       DS-MCC-8-PUMPS  DS-MCC8 SCUM P   1     480    95.0  FEET       12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       77.11 + J    3.75  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      243.00 + J    9.24  PU

CBL-0199       MCC-12          BUS-0206         1     480    30.0  FEET      2/0      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.1020 + J  0.0533  Ohms/1000 ft        1.33 + J  0.6940  PU
               Z0   Impedance: 0.3214 + J  0.1312  Ohms/1000 ft        4.18 + J    1.71  PU

CBL-0200       MCC-12          BUS-0207         1     480    30.0  FEET      2/0      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.1020 + J  0.0533  Ohms/1000 ft        1.33 + J  0.6940  PU
               Z0   Impedance: 0.3214 + J  0.1312  Ohms/1000 ft        4.18 + J    1.71  PU

CBL-0201       MCC-12          BUS-0208         1     480    40.0  FEET       12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       32.47 + J    1.58  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      102.32 + J    3.89  PU

CBL-0202       MCC-12          BUS-0209         1     480    40.0  FEET       12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       32.47 + J    1.58  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      102.32 + J    3.89  PU

CBL-0204       MCC-12          BUS-0211         1     480    40.0  FEET       12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       32.47 + J    1.58  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      102.32 + J    3.89  PU

CBL-0205       MCC-12          BUS-0212         1     480    50.0  FEET        2      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.2020 + J  0.0585  Ohms/1000 ft        4.38 + J    1.27  PU
               Z0   Impedance: 0.6366 + J  0.1440  Ohms/1000 ft       13.82 + J    3.13  PU

CBL-0206       MCC-12          BUS-0213         1     480    50.0  FEET      3/0      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.0805 + J  0.0519  Ohms/1000 ft        1.75 + J    1.13  PU
               Z0   Impedance: 0.2537 + J  0.1278  Ohms/1000 ft        5.51 + J    2.77  PU
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                                          FEEDER  INPUT  DATA
=============================================================================================
CABLE          FEEDER FROM     FEEDER TO       QTY  VOLTS   LENGTH            FEEDER
NAME           NAME            NAME            /PH  L-L                   SIZE       TYPE
=============================================================================================
CBL-0207       MCC-1 ATS       MCC-1             3   480   15.0  FEET     500      Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.0276 + J  0.0373  Ohms/1000 ft      0.0599 + J  0.0809  PU
               Z0   Impedance: 0.0438 + J  0.0999  Ohms/1000 ft      0.0951 + J  0.2168  PU

CBL-0208       MCC-1           SEWAGE PUMP #1    1   480  135.0  FEET     3/0      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.0805 + J  0.0519  Ohms/1000 ft        4.72 + J    3.04  PU
               Z0   Impedance: 0.2537 + J  0.1278  Ohms/1000 ft       14.87 + J    7.49  PU

CBL-0209       MCC-1           DS-SEWAGE PUMP    1   480   15.0  FEET     500      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.0294 + J  0.0466  Ohms/1000 ft      0.1914 + J  0.3034  PU
               Z0   Impedance: 0.0926 + J  0.1147  Ohms/1000 ft      0.6029 + J  0.7467  PU

CBL-0210       MCC-1           ELEVATOR          1   480   65.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       33.29 + J    2.41  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      104.91 + J    5.93  PU

CBL-0211       MCC-1           BUS-1046          1   480  140.0  FEET       2      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.2020 + J  0.0585  Ohms/1000 ft       12.27 + J    3.55  PU
               Z0   Impedance: 0.6366 + J  0.1440  Ohms/1000 ft       38.68 + J    8.75  PU

CBL-0212       MCC-1           MCC-1 CRANE       1   480   65.0  FEET       6      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.5100 + J  0.0685  Ohms/1000 ft       14.39 + J    1.93  PU
               Z0   Impedance:   1.61 + J  0.1687  Ohms/1000 ft       45.34 + J    4.76  PU

CBL-0213       BUS-0209        BUS-0980          1   480   20.0  FEET      12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       16.23 + J  0.7899  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft       51.16 + J    1.95  PU

CBL-0214       BUS-0209        BUS-0981          1   480   20.0  FEET      12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       16.23 + J  0.7899  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft       51.16 + J    1.95  PU

CBL-0215       MCC-3           PUMP #7 VFD       1   480   10.0  FEET     250      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.0552 + J  0.0495  Ohms/1000 ft      0.2396 + J  0.2148  PU
               Z0   Impedance: 0.1739 + J  0.1219  Ohms/1000 ft      0.7548 + J  0.5291  PU
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                                  FEEDER  INPUT  DATA
============================================================================================
CABLE         FEEDER FROM     FEEDER TO        QTY  VOLTS   LENGTH            FEEDER
NAME          NAME            NAME             /PH  L-L                   SIZE        TYPE
============================================================================================
CBL-0216      MCC-3           BUS-0227          1    480  180.0  FEET      12      Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft      146.09 + J    7.11  PU
              Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      460.42 + J   17.51  PU

CBL-0217      MCC-3           BUS-0228          1    480  180.0  FEET      12      Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft      146.09 + J    7.11  PU
              Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      460.42 + J   17.51  PU

CBL-0218      MCC-3           BUS-0229          1    480  100.0  FEET      12      Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       81.16 + J    3.95  PU
              Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      255.79 + J    9.73  PU

CBL-0219      MCC-3           BUS-0230          1    480  100.0  FEET      12      Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       81.16 + J    3.95  PU
              Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      255.79 + J    9.73  PU

CBL-0220      MCC-4A          BLOWER #1         1    480   50.0  FEET       2      Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.2020 + J  0.0585  Ohms/1000 ft        4.38 + J    1.27  PU
              Z0   Impedance: 0.6366 + J  0.1440  Ohms/1000 ft       13.82 + J    3.13  PU

CBL-0221      MCC-4A          BLOWER #3         1    480   40.0  FEET       2      Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.2020 + J  0.0585  Ohms/1000 ft        3.51 + J    1.02  PU
              Z0   Impedance: 0.6366 + J  0.1440  Ohms/1000 ft       11.05 + J    2.50  PU

CBL-0222      MCC-4A          BLOWER #5         1    480   25.0  FEET       2      Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.2020 + J  0.0585  Ohms/1000 ft        2.19 + J  0.6348  PU
              Z0   Impedance: 0.6366 + J  0.1440  Ohms/1000 ft        6.91 + J    1.56  PU

CBL-0223      MCC-4A          GRIT TANKS        1    480   65.0  FEET       6      Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.5100 + J  0.0685  Ohms/1000 ft       14.39 + J    1.93  PU
              Z0   Impedance:   1.61 + J  0.1687  Ohms/1000 ft       45.34 + J    4.76  PU

CBL-0224      GRIT TANKS      GRIT TANK #1      1    480    5.0  FEET       6      Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.5100 + J  0.0685  Ohms/1000 ft        1.11 + J  0.1487  PU
              Z0   Impedance:   1.61 + J  0.1687  Ohms/1000 ft        3.49 + J  0.3661  PU
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                                FEEDER  INPUT  DATA
=============================================================================================
CABLE         FEEDER FROM     FEEDER TO        QTY  VOLTS   LENGTH            FEEDER
NAME          NAME            NAME             /PH  L-L                   SIZE       TYPE
=============================================================================================
CBL-0225      GRIT TANKS      GRIT TANK #2      1    480     5.0   FEET        6      Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.5100 + J  0.0685  Ohms/1000 ft       1.11 + J  0.1487  PU
              Z0   Impedance:   1.61 + J  0.1687  Ohms/1000 ft       3.49 + J  0.3661  PU

CBL-0226      GRIT TANKS      DOOR OPERATORS    1    480     5.0   FEET        6      Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.5100 + J  0.0685  Ohms/1000 ft       1.11 + J  0.1487  PU
              Z0   Impedance:   1.61 + J  0.1687  Ohms/1000 ft       3.49 + J  0.3661  PU

CBL-0227      GRIT TANKS      GRIT REMOVAL H    1    480     5.0   FEET        6      Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.5100 + J  0.0685  Ohms/1000 ft       1.11 + J  0.1487  PU
              Z0   Impedance:   1.61 + J  0.1687  Ohms/1000 ft       3.49 + J  0.3661  PU

CBL-0228      MCC-4A          BUS-0239          1    480   245.0   FEET       10      Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft     125.48 + J    9.08  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft     395.45 + J   22.36  PU

CBL-0229      BUS-0239        AUGER #1          1    480     5.0   FEET       12      Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       4.06 + J  0.1975  PU
              Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      12.79 + J  0.4863  PU

CBL-0230      BUS-0239        GRINDER #1        1    480     5.0   FEET       10      Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       2.56 + J  0.1853  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       8.07 + J  0.4564  PU

CBL-0231      BUS-0239        BANDSCREEN #1     1    480     5.0   FEET       12      Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       4.06 + J  0.1975  PU
              Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      12.79 + J  0.4863  PU

CBL-0232      MCC-4A          BUS-0243          1    480   225.0   FEET       10      Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft     115.23 + J    8.34  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft     363.16 + J   20.54  PU

CBL-0233      BUS-0243        AUGER #2          1    480     5.0   FEET       12      Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       4.06 + J  0.1975  PU
              Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      12.79 + J  0.4863  PU
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FEEDER INPUT DATA

CABLE NAME	FEEDER FROM NAME	FEEDER TO NAME	QTY /PH	VOLTS L-L	LENGTH		FEEDER SIZE	FEEDER TYPE	
CBL-0234	BUS-0243	GRINDER #2	1	480	5.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			2.56 + J	0.1853	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			8.07 + J	0.4564	PU
CBL-0235	BUS-0243	BANDSCREEN #2	1	480	5.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			4.06 + J	0.1975	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			12.79 + J	0.4863	PU
CBL-0236	MCC-4A	BUS-0247	1	480	225.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			115.23 + J	8.34	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			363.16 + J	20.54	PU
CBL-0237	BUS-0247	AUGER #3	1	480	5.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			4.06 + J	0.1975	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			12.79 + J	0.4863	PU
CBL-0238	BUS-0247	GRINDER #3	1	480	5.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			2.56 + J	0.1853	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			8.07 + J	0.4564	PU
CBL-0239	BUS-0247	BANDSCREEN #3	1	480	5.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			4.06 + J	0.1975	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			12.79 + J	0.4863	PU
CBL-0240	MCC-21	BUS-0251	1	480	210.0	FEET	10	Copper	
	Duct Material:	Non-Magnetic							
	+/- Impedance:	1.18 + J	0.0823	Ohms/1000 ft			107.55 + J	7.50	PU
	Z0 Impedance:	1.88 + J	0.2093	Ohms/1000 ft			170.98 + J	19.08	PU
CBL-0241	BUS-0251	SEC HEAT PUMP	1	480	5.0	FEET	10	Copper	
	Duct Material:	Non-Magnetic							
	+/- Impedance:	1.18 + J	0.0823	Ohms/1000 ft			2.56 + J	0.1786	PU
	Z0 Impedance:	1.88 + J	0.2093	Ohms/1000 ft			4.07 + J	0.4542	PU
CBL-0242	BUS-0251	SEC HEAT PUMP	1	480	5.0	FEET	10	Copper	
	Duct Material:	Non-Magnetic							
	+/- Impedance:	1.18 + J	0.0823	Ohms/1000 ft			2.56 + J	0.1786	PU
	Z0 Impedance:	1.88 + J	0.2093	Ohms/1000 ft			4.07 + J	0.4542	PU

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                                      FEEDER  INPUT  DATA
=============================================================================================
CABLE         FEEDER FROM     FEEDER TO       QTY  VOLTS   LENGTH            FEEDER
NAME          NAME            NAME            /PH  L-L                   SIZE       TYPE
=============================================================================================
CBL-0243      BUS-0251        PRIM HEAT PUMP   1    480     5.0  FEET      10     Copper
              Duct Material: Non-Magnetic
              +/-  Impedance:   1.18 + J  0.0823  Ohms/1000 ft       2.56 + J  0.1786  PU
              Z0   Impedance:   1.88 + J  0.2093  Ohms/1000 ft       4.07 + J  0.4542  PU

CBL-0244      BUS-0251        PRIM HEAT PUMP   1    480     5.0  FEET      10     Copper
              Duct Material: Non-Magnetic
              +/-  Impedance:   1.18 + J  0.0823  Ohms/1000 ft       2.56 + J  0.1786  PU
              Z0   Impedance:   1.88 + J  0.2093  Ohms/1000 ft       4.07 + J  0.4542  PU

CBL-0245      MCC-21          BOILER CTRL/GA   1    480    75.0  FEET      10     Copper
              Duct Material: Non-Magnetic     Insulation Type:      ****     Insulation
Class:        -
              +/-  Impedance:   1.18 + J  0.0823  Ohms/1000 ft      38.41 + J    2.68  PU
              Z0   Impedance:   1.88 + J  0.2093  Ohms/1000 ft      61.06 + J    6.81  PU

CBL-0246      MCC-8 SECTION   DS-MCC8 RAS PU   1    480    80.0  FEET      10     Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft      40.97 + J    2.97  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft     129.13 + J    7.30  PU

CBL-0247      MCC-8 SECTION   DS-MCC8 RAS PU   1    480    75.0  FEET      10     Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft      38.41 + J    2.78  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft     121.05 + J    6.85  PU

CBL-0248      MCC-8 SECTION   DS-MCC8 RAS PU   1    480    65.0  FEET      10     Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft      33.29 + J    2.41  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft     104.91 + J    5.93  PU

CBL-0249      DS-MCC-8-PUMPS  DS-MCC8 SCUM P   1    480    95.0  FEET      12     Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft      77.11 + J    3.75  PU
              Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft     243.00 + J    9.24  PU

CBL-0250      MCC-21          WELDER-CARBON    1    480   160.0  FEET       8     Copper
              Duct Material: Non-Magnetic
              +/-  Impedance: 0.8110 + J  0.0603  Ohms/1000 ft      56.32 + J    4.19  PU
              Z0   Impedance:   1.29 + J  0.1534  Ohms/1000 ft      89.53 + J   10.65  PU

CBL-0251      MCC-21          MSP              1    480    95.0  FEET       6     Copper
              Duct Material: Non-Magnetic
              +/-  Impedance: 0.5100 + J  0.0548  Ohms/1000 ft      21.03 + J    2.26  PU
              Z0   Impedance: 0.8123 + J  0.1394  Ohms/1000 ft      33.49 + J    5.75  PU
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FEEDER INPUT DATA

CABLE NAME	FEEDER FROM NAME	FEEDER TO NAME	QTY /PH	VOLTS L-L	LENGTH		FEEDER SIZE	FEEDER TYPE	
CBL-0252	MSP	BUS-0263	1	480	5.0	FEET	10	Copper	
	Duct Material: Non-Magnetic								
	+/- Impedance: 1.18 + J	0.0823		Ohms/1000 ft			2.56 + J	0.1786	PU
	Z0 Impedance: 1.88 + J	0.2093		Ohms/1000 ft			4.07 + J	0.4542	PU
CBL-0258	BUS-0269	INLET TANKS	1	208	5.0	FEET	10	Copper	
	Duct Material: Non-Magnetic								
	+/- Impedance: 1.18 + J	0.0823		Ohms/1000 ft			13.64 + J	0.9511	PU
	Z0 Impedance: 1.88 + J	0.2093		Ohms/1000 ft			21.68 + J	2.42	PU
CBL-0259	MCC-21	MCC-21 AC UNIT	1	480	35.0	FEET	6	Copper	
	Duct Material: Non-Magnetic								
	+/- Impedance: 0.5100 + J	0.0548		Ohms/1000 ft			7.75 + J	0.8325	PU
	Z0 Impedance: 0.8123 + J	0.1394		Ohms/1000 ft			12.34 + J	2.12	PU
CBL-0260	MCC-21	BUS-0271	1	480	15.0	FEET	6	Copper	
	Duct Material: Non-Magnetic								
	+/- Impedance: 0.5100 + J	0.0548		Ohms/1000 ft			3.32 + J	0.3568	PU
	Z0 Impedance: 0.8123 + J	0.1394		Ohms/1000 ft			5.29 + J	0.9076	PU
CBL-0261	BUS-0272	MCC-21 PANEL #	1	208	75.0	FEET	4/0	Copper	
	Duct Material: Magnetic								
	+/- Impedance: 0.0640 + J	0.0497		Ohms/1000 ft			11.09 + J	8.62	PU
	Z0 Impedance: 0.2017 + J	0.1224		Ohms/1000 ft			34.97 + J	21.22	PU
CBL-0262	BUS-0272	MCC-21 PANEL #	1	208	5.0	FEET	6	Copper	
	Duct Material: Magnetic								
	+/- Impedance: 0.5100 + J	0.0685		Ohms/1000 ft			5.89 + J	0.7917	PU
	Z0 Impedance: 1.61 + J	0.1687		Ohms/1000 ft			18.57 + J	1.95	PU
CBL-0263	MCC-22	MIXER #1	1	480	100.0	FEET	10	Copper	
	Duct Material: Magnetic								
	+/- Impedance: 1.18 + J	0.0854		Ohms/1000 ft			51.22 + J	3.71	PU
	Z0 Impedance: 3.72 + J	0.2103		Ohms/1000 ft			161.41 + J	9.13	PU
CBL-0264	MCC-22	MIXER #2	1	480	90.0	FEET	10	Copper	
	Duct Material: Magnetic								
	+/- Impedance: 1.18 + J	0.0854		Ohms/1000 ft			46.09 + J	3.34	PU
	Z0 Impedance: 3.72 + J	0.2103		Ohms/1000 ft			145.27 + J	8.21	PU
CBL-0265	MCC-22	CARBON SLURRY	1	480	65.0	FEET	8	Copper	
	Duct Material: Magnetic								
	+/- Impedance: 0.8110 + J	0.0754		Ohms/1000 ft			22.88 + J	2.13	PU
	Z0 Impedance: 2.56 + J	0.1856		Ohms/1000 ft			72.11 + J	5.24	PU

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                                          FEEDER  INPUT  DATA
============================================================================================
CABLE          FEEDER FROM     FEEDER TO       QTY  VOLTS   LENGTH               FEEDER
NAME           NAME            NAME            /PH  L-L                     SIZE        TYPE
============================================================================================
CBL-0266       MCC-22          TRANSFER PUMP    1    480    50.0  FEET       10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       25.61 + J    1.85  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       80.70 + J    4.56  PU

CBL-0267       MCC-22          TRANSFER PUMP    1    480    50.0  FEET       10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       25.61 + J    1.85  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       80.70 + J    4.56  PU

CBL-0268       MCC-22          BUS-0280         1    480    15.0  FEET        6      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.5100 + J  0.0685  Ohms/1000 ft        3.32 + J  0.4460  PU
               Z0   Impedance:   1.61 + J  0.1687  Ohms/1000 ft       10.46 + J    1.10  PU

CBL-0269       MCC-22          CARBON PUMP DI   1    480    90.0  FEET       12      Copper
               Duct Material: Non-Magnetic
               +/-  Impedance:   1.87 + J  0.0892  Ohms/1000 ft       73.05 + J    3.48  PU
               Z0   Impedance:   2.97 + J  0.2269  Ohms/1000 ft      116.13 + J    8.86  PU

CBL-0270       CARBON PUMP DI  CARBON FEED PU   1    480    10.0  FEET       12      Copper
               Duct Material: Non-Magnetic
               +/-  Impedance:   1.87 + J  0.0892  Ohms/1000 ft        8.12 + J  0.3872  PU
               Z0   Impedance:   2.97 + J  0.2269  Ohms/1000 ft       12.90 + J  0.9848  PU

CBL-0271       CARBON PUMP DI  CARBON FEED PU   1    480    10.0  FEET       12      Copper
               Duct Material: Non-Magnetic
               +/-  Impedance:   1.87 + J  0.0892  Ohms/1000 ft        8.12 + J  0.3872  PU
               Z0   Impedance:   2.97 + J  0.2269  Ohms/1000 ft       12.90 + J  0.9848  PU

CBL-0272       MCC-22          DUST COLLECTOR   1    480    85.0  FEET       12      Copper
               Duct Material: Non-Magnetic
               +/-  Impedance:   1.87 + J  0.0892  Ohms/1000 ft       68.99 + J    3.29  PU
               Z0   Impedance:   2.97 + J  0.2269  Ohms/1000 ft      109.68 + J    8.37  PU

CBL-0273       DUST COLLECTOR  MIX TANK DUST    1    480    10.0  FEET       12      Copper
               Duct Material: Non-Magnetic
               +/-  Impedance:   1.87 + J  0.0892  Ohms/1000 ft        8.12 + J  0.3872  PU
               Z0   Impedance:   2.97 + J  0.2269  Ohms/1000 ft       12.90 + J  0.9848  PU

CBL-0274       DUST COLLECTOR  MIX TANK DUST    1    480    20.0  FEET       12      Copper
               Duct Material: Non-Magnetic
               +/-  Impedance:   1.87 + J  0.0892  Ohms/1000 ft       16.23 + J  0.7743  PU
               Z0   Impedance:   2.97 + J  0.2269  Ohms/1000 ft       25.81 + J    1.97  PU
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                                      FEEDER  INPUT  DATA
=============================================================================================
CABLE          FEEDER FROM     FEEDER TO       QTY  VOLTS   LENGTH             FEEDER
NAME           NAME            NAME            /PH  L-L                     SIZE       TYPE
=============================================================================================
CBL-0275       DS-GEN 1        BUS-0288          2   480    60.0  FEET      600     Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.0237 + J  0.0371  Ohms/1000 ft     0.3086 + J  0.4831  PU
               Z0   Impedance: 0.0376 + J  0.0943  Ohms/1000 ft     0.4896 + J    1.23  PU

CBL-0277       BUS-1046        BUS-1047          1   480   110.0  FEET        6     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.5100 + J  0.0685  Ohms/1000 ft      24.35 + J    3.27  PU
               Z0   Impedance:   1.61 + J  0.1687  Ohms/1000 ft      76.73 + J    8.05  PU

CBL-0278       BUS-1047        UNIT HEATER #3    1   480   145.0  FEET        6     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.5100 + J  0.0685  Ohms/1000 ft      32.10 + J    4.31  PU
               Z0   Impedance:   1.61 + J  0.1687  Ohms/1000 ft     101.15 + J   10.62  PU

CBL-0279       BUS-1046        UNIT HEATER #1    1   480     5.0  FEET        6     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.5100 + J  0.0685  Ohms/1000 ft       1.11 + J  0.1487  PU
               Z0   Impedance:   1.61 + J  0.1687  Ohms/1000 ft       3.49 + J  0.3661  PU

CBL-0288       MCC-24          WATER MAINT SH    1   480   215.0  FEET        2     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.2020 + J  0.0585  Ohms/1000 ft      18.85 + J    5.46  PU
               Z0   Impedance: 0.6366 + J  0.1440  Ohms/1000 ft      59.40 + J   13.44  PU

CBL-0289       MCC-24          BRIDGE CRANE      1   480    20.0  FEET       10     Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft      10.24 + J  0.7413  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      32.28 + J    1.83  PU

CBL-0290       MCC-24          MAU-1             1   480    35.0  FEET       10     Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft      17.93 + J    1.30  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      56.49 + J    3.19  PU

CBL-0291       MCC-24          METAL LATHE       1   480    35.0  FEET       10     Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft      17.93 + J    1.30  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      56.49 + J    3.19  PU

CBL-0292       MCC-24          DRILL PRESS #1    1   480    45.0  FEET       10     Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft      23.05 + J    1.67  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      72.63 + J    4.11  PU
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FEEDER INPUT DATA

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=============================================================================================
CABLE          FEEDER FROM     FEEDER TO       QTY  VOLTS   LENGTH            FEEDER
NAME           NAME            NAME            /PH  L-L                  SIZE        TYPE
=============================================================================================
CBL-0293       MCC-24          OVERHEAD DOORS   1    480  105.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       53.78 + J    3.89  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      169.48 + J    9.58  PU

CBL-0294       MCC-24          HYDRAULIC LIFT   1    480   55.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       28.17 + J    2.04  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       88.77 + J    5.02  PU

CBL-0295       MCC-24          EF-2             1    480  100.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       51.22 + J    3.71  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      161.41 + J    9.13  PU

CBL-0296       METAL LATHE     MILL             1    480   15.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft        7.68 + J  0.5560  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       24.21 + J    1.37  PU

CBL-0297       MCC-24          DRILL PRESS #2   1    480   45.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       23.05 + J    1.67  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       72.63 + J    4.11  PU

CBL-0298       OVERHEAD DOORS  OUTSIDE DOOR(E   1    480   55.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       28.17 + J    2.04  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       88.77 + J    5.02  PU

CBL-0299       OUTSIDE DOOR(E  INNER DOOR       1    480   30.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       15.36 + J    1.11  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       48.42 + J    2.74  PU

CBL-0300       OVERHEAD DOORS  OUTSIDE DOOR(N   1    480  132.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       67.60 + J    4.89  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      213.06 + J   12.05  PU

CBL-0301       OUTSIDE DOOR(N  OUTSIDE DOOR(S   1    480   30.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       15.36 + J    1.11  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       48.42 + J    2.74  PU
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FEEDER INPUT DATA

CABLE NAME	FEEDER FROM NAME	FEEDER TO NAME	QTY /PH	VOLTS L-L	LENGTH		FEEDER SIZE	FEEDER TYPE	
CBL-0302	MCC-24	WELDER RECEPT	1	480	75.0	FEET	6	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.5100 + J 0.0685		Ohms/1000 ft			16.60 + J	2.23	PU
	Z0 Impedance:	1.61 + J 0.1687		Ohms/1000 ft			52.32 + J	5.49	PU
CBL-0303	MCC-24	BUS-0326	1	480	15.0	FEET	2	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.2020 + J 0.0585		Ohms/1000 ft			1.32 + J	0.3809	PU
	Z0 Impedance:	0.6366 + J 0.1440		Ohms/1000 ft			4.14 + J	0.9375	PU
CBL-0304	MCC-24	FUME EXTRACTOR	1	480	105.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J 0.0854		Ohms/1000 ft			53.78 + J	3.89	PU
	Z0 Impedance:	3.72 + J 0.2103		Ohms/1000 ft			169.48 + J	9.58	PU
CBL-0305	MCC-24	AIR COMPRESSOR	1	480	110.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J 0.0854		Ohms/1000 ft			56.34 + J	4.08	PU
	Z0 Impedance:	3.72 + J 0.2103		Ohms/1000 ft			177.55 + J	10.04	PU
CBL-0306	MCC-24	FC-1	1	480	135.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J 0.0854		Ohms/1000 ft			69.14 + J	5.00	PU
	Z0 Impedance:	3.72 + J 0.2103		Ohms/1000 ft			217.90 + J	12.32	PU
CBL-0307	MCC-24	FC-2	1	480	100.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J 0.0854		Ohms/1000 ft			51.22 + J	3.71	PU
	Z0 Impedance:	3.72 + J 0.2103		Ohms/1000 ft			161.41 + J	9.13	PU
CBL-0308	MCC-24	24-LP-02	1	480	85.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J 0.0854		Ohms/1000 ft			43.53 + J	3.15	PU
	Z0 Impedance:	3.72 + J 0.2103		Ohms/1000 ft			137.20 + J	7.76	PU
CBL-0309	BUS-0327	24-LP-01	1	208	40.0	FEET	4/0	Copper	
	Duct Material:	Non-Magnetic							
	+/- Impedance:	0.0633 + J 0.0398		Ohms/1000 ft			5.85 + J	3.68	PU
	Z0 Impedance:	0.1006 + J 0.1012		Ohms/1000 ft			9.30 + J	9.36	PU
CBL-0310	BUS-0330	15-LP-02	1	208	5.0	FEET	8	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.8110 + J 0.0754		Ohms/1000 ft			9.37 + J	0.8714	PU
	Z0 Impedance:	2.56 + J 0.1856		Ohms/1000 ft			29.54 + J	2.14	PU

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                                             FEEDER  INPUT  DATA
=============================================================================================
CABLE         FEEDER FROM     FEEDER TO       QTY  VOLTS   LENGTH             FEEDER
NAME          NAME            NAME            /PH  L-L                    SIZE       TYPE
=============================================================================================
CBL-0311      MCC-4A          PUMP STATION #   1    480    45.0  FEET        6      Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.5100 + J  0.0685  Ohms/1000 ft       9.96 + J    1.34  PU
              Z0   Impedance:   1.61 + J  0.1687  Ohms/1000 ft      31.39 + J    3.29  PU

CBL-0312      PUMP STATION #  SLUDGE PUMP #1   1    480     5.0  FEET       10      Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       2.56 + J  0.1853  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       8.07 + J  0.4564  PU

CBL-0313      PUMP STATION #  SLUDGE PUMP #2   1    480     5.0  FEET       10      Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       2.56 + J  0.1853  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       8.07 + J  0.4564  PU

CBL-0314      PUMP STATION #  SLUDGE PUMP #7   1    480     5.0  FEET       10      Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       2.56 + J  0.1853  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       8.07 + J  0.4564  PU

CBL-0315      PUMP STATION #  SUMP PUMP #1 D   1    480     5.0  FEET       10      Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       2.56 + J  0.1853  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       8.07 + J  0.4564  PU

CBL-0316      MCC-4A          PUMP STATION #   1    480    75.0  FEET        6      Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.5100 + J  0.0685  Ohms/1000 ft      16.60 + J    2.23  PU
              Z0   Impedance:   1.61 + J  0.1687  Ohms/1000 ft      52.32 + J    5.49  PU

CBL-0317      PUMP STATION #  SLUDGE PUMP #3   1    480     5.0  FEET       10      Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       2.56 + J  0.1853  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       8.07 + J  0.4564  PU

CBL-0318      PUMP STATION #  SLUDE PUMP #4    1    480     5.0  FEET       10      Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       2.56 + J  0.1853  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       8.07 + J  0.4564  PU

CBL-0319      PUMP STATION #  SLUDGE PUMP #8   1    480     5.0  FEET       10      Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       2.56 + J  0.1853  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       8.07 + J  0.4564  PU
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FEEDER INPUT DATA

CABLE NAME	FEEDER FROM NAME	FEEDER TO NAME	QTY /PH	VOLTS L-L	LENGTH		FEEDER SIZE	FEEDER TYPE	
CBL-0320	PUMP STATION #	SUMP PUMP #2	1	480	5.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			2.56 + J	0.1853	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			8.07 + J	0.4564	PU
CBL-0321	MCC-4B	BUS-0342	1	480	5.0	FEET	2	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.2020 + J	0.0585	Ohms/1000 ft			0.4384 + J	0.1270	PU
	Z0 Impedance:	0.6366 + J	0.1440	Ohms/1000 ft			1.38 + J	0.3125	PU
CBL-0322	BUS-0343	15-LP-01	1	208	5.0	FEET	2	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.2020 + J	0.0585	Ohms/1000 ft			2.33 + J	0.6761	PU
	Z0 Impedance:	0.6366 + J	0.1440	Ohms/1000 ft			7.36 + J	1.66	PU
CBL-0323	MCC-4B	WINCH #1	1	480	265.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			135.72 + J	9.82	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			427.73 + J	24.19	PU
CBL-0324	MCC-4B	WINCH #2	1	480	245.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			125.48 + J	9.08	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			395.45 + J	22.36	PU
CBL-0325	MCC-4B	WINCH #3	1	480	225.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			115.23 + J	8.34	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			363.16 + J	20.54	PU
CBL-0326	MCC-4B	EUH-001	1	480	105.0	FEET	8	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.8110 + J	0.0754	Ohms/1000 ft			36.96 + J	3.44	PU
	Z0 Impedance:	2.56 + J	0.1856	Ohms/1000 ft			116.48 + J	8.46	PU
CBL-0327	MCC-4B	EUH-002	1	480	165.0	FEET	8	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.8110 + J	0.0754	Ohms/1000 ft			58.08 + J	5.40	PU
	Z0 Impedance:	2.56 + J	0.1856	Ohms/1000 ft			183.04 + J	13.29	PU
CBL-0328	MCC-4B	EUH-003	1	480	225.0	FEET	8	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.8110 + J	0.0754	Ohms/1000 ft			79.20 + J	7.36	PU
	Z0 Impedance:	2.56 + J	0.1856	Ohms/1000 ft			249.60 + J	18.13	PU

FEEDER INPUT DATA

CABLE NAME	FEEDER FROM NAME	FEEDER TO NAME	QTY /PH	VOLTS L-L	LENGTH		FEEDER SIZE	FEEDER TYPE	
CBL-0329	MCC-4B	EUH-004	1	480	210.0	FEET	8	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.8110 + J	0.0754	Ohms/1000 ft			73.92 + J	6.87	PU
	Z0 Impedance:	2.56 + J	0.1856	Ohms/1000 ft			232.96 + J	16.92	PU
CBL-0330	MCC-4B	D-101	1	480	185.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			94.75 + J	6.86	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			298.60 + J	16.89	PU
CBL-0331	MCC-4B	D-102	1	480	185.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			94.75 + J	6.86	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			298.60 + J	16.89	PU
CBL-0332	MCC-4B	D-103	1	480	185.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			94.75 + J	6.86	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			298.60 + J	16.89	PU
CBL-0333	MCC-4A	BUS-0363	1	480	30.0	FEET	6	Copper	
	Duct Material:	Non-Magnetic							
	+/- Impedance:	0.5100 + J	0.0548	Ohms/1000 ft			6.64 + J	0.7135	PU
	Z0 Impedance:	0.8123 + J	0.1394	Ohms/1000 ft			10.58 + J	1.82	PU
CBL-0334	MTS-MCC-5	MCC-5	1	480	75.0	FEET	6	Copper	
	Duct Material:	Non-Magnetic							
	+/- Impedance:	0.5100 + J	0.0548	Ohms/1000 ft			16.60 + J	1.78	PU
	Z0 Impedance:	0.8123 + J	0.1394	Ohms/1000 ft			26.44 + J	4.54	PU
CBL-0335	MCC-5	PURGE FAN #1 D	1	480	136.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			110.38 + J	5.37	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			347.87 + J	13.23	PU
CBL-0336	MCC-5	PURGE FAN #2 D	1	480	86.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			69.80 + J	3.40	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			219.98 + J	8.36	PU
CBL-0337	MCC-5	PURGE FAN #3 D	1	480	26.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			21.10 + J	1.03	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			66.51 + J	2.53	PU

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                                           FEEDER  INPUT  DATA
============================================================================================
CABLE          FEEDER FROM     FEEDER TO       QTY  VOLTS   LENGTH             FEEDER
NAME           NAME            NAME            /PH  L-L                   SIZE       TYPE
============================================================================================
CBL-0338       MCC-5           PURGE FAN #4 D   1    480    68.0  FEET      12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       55.19 + J    2.69  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      173.94 + J    6.61  PU

CBL-0339       MCC-5           PURGE FAN #5 D   1    480   116.0  FEET      12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       94.15 + J    4.58  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      296.72 + J   11.28  PU

CBL-0340       MCC-5           PURGE FAN #6 D   1    480   173.0  FEET      12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft      140.41 + J    6.83  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      442.52 + J   16.83  PU

CBL-0341       MCC-4           BUS-0365         1    480    30.0  FEET       6      Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.5100 + J  0.0548  Ohms/1000 ft        6.64 + J  0.7135  PU
               Z0   Impedance: 0.8123 + J  0.1394  Ohms/1000 ft       10.58 + J    1.82  PU

CBL-0342       MTS-MCC-6       MCC-6            1    480    40.0  FEET       6      Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.5100 + J  0.0548  Ohms/1000 ft        8.85 + J  0.9514  PU
               Z0   Impedance: 0.8123 + J  0.1394  Ohms/1000 ft       14.10 + J    2.42  PU

CBL-0343       MCC-6           PRIM SLUDGE CO   1    480   156.0  FEET      12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft      126.61 + J    6.16  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      399.03 + J   15.17  PU

CBL-0344       MCC-6           PRIM SLUDGE CO   1    480   139.0  FEET      12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft      112.82 + J    5.49  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      355.55 + J   13.52  PU

CBL-0345       MCC-6           PRIM SLUDGE CO   1    480   103.0  FEET      12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       83.60 + J    4.07  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      263.46 + J   10.02  PU

CBL-0346       MCC-6           PRIM SLUDGE CO   1    480    86.0  FEET      12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       69.80 + J    3.40  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      219.98 + J    8.36  PU
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                                             FEEDER  INPUT  DATA
==========================================================================================
CABLE          FEEDER FROM      FEEDER TO        QTY  VOLTS   LENGTH             FEEDER
NAME           NAME             NAME             /PH  L-L                    SIZE       TYPE
==========================================================================================
CBL-0347       MCC-6            PRIM SLUDGE CO    1    480    51.0  FEET       12      Copper
               Duct Material:      Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       41.39 + J    2.01  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      130.45 + J    4.96  PU

CBL-0348       MCC-6            PRIM SLUDGE CO    1    480    44.0  FEET       12      Copper
               Duct Material:      Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       35.71 + J    1.74  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      112.55 + J    4.28  PU

CBL-0349       MCC-6            PRIM SLUDGE CO    1    480    80.0  FEET       12      Copper
               Duct Material:      Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       64.93 + J    3.16  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      204.63 + J    7.78  PU

CBL-0350       MCC-6            PRIM SLUDGE CO    1    480    98.0  FEET       12      Copper
               Duct Material:      Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       79.54 + J    3.87  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      250.67 + J    9.53  PU

CBL-0351       MCC-6            PRIM SLUDGE CO    1    480   133.0  FEET       12      Copper
               Duct Material:      Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft      107.95 + J    5.25  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      340.20 + J   12.94  PU

CBL-0352       MCC-6            PRIM SLUDGE CO    1    480   150.0  FEET       12      Copper
               Duct Material:      Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft      121.74 + J    5.92  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      383.68 + J   14.59  PU

CBL-0353       MCC-6            PRIM SLUDGE CO    1    480   186.0  FEET       12      Copper
               Duct Material:      Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft      150.96 + J    7.35  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      475.77 + J   18.09  PU

CBL-0354       MCC-6            PRIM SLUDGE CO    1    480   204.0  FEET       12      Copper
               Duct Material:      Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft      165.57 + J    8.06  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      521.81 + J   19.84  PU

CBL-0355       MCC-4A           MCC-4C            1    480   100.0  FEET      1/0      Copper
               Duct Material:      Magnetic
               +/-  Impedance: 0.1280 + J  0.0540  Ohms/1000 ft        5.56 + J    2.34  PU
               Z0   Impedance: 0.4034 + J  0.1329  Ohms/1000 ft       17.51 + J    5.77  PU
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FEEDER INPUT DATA

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==========================================================================================
CABLE          FEEDER FROM     FEEDER TO        QTY  VOLTS   LENGTH            FEEDER
NAME           NAME            NAME             /PH  L-L                   SIZE        TYPE
==========================================================================================
CBL-0356       MCC-4C          FINE SCREEN DU   1     480    95.0  FEET     12       Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft      77.11 + J    3.75  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft     243.00 + J    9.24  PU

CBL-0357       FINE SCREEN DU  BUS-0383         1     480   235.0  FEET     12       Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft     190.73 + J    9.28  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft     601.11 + J   22.86  PU

CBL-0358       FINE SCREEN DU  BUS-0384         1     480   235.0  FEET     12       Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft     190.73 + J    9.28  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft     601.11 + J   22.86  PU

CBL-0359       MCC-4C          FINE SCREEN DU   1     480    90.0  FEET     12       Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft      73.05 + J    3.55  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft     230.21 + J    8.75  PU

CBL-0360       FINE SCREEN DU  BUS-0386         1     480   255.0  FEET     12       Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft     206.97 + J   10.07  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft     652.26 + J   24.80  PU

CBL-0361       FINE SCREEN DU  BUS-0387         1     480   255.0  FEET     12       Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft     206.97 + J   10.07  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft     652.26 + J   24.80  PU

CBL-0362       MCC-4C          FINE SCREEN DU   1     480    85.0  FEET     12       Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft      68.99 + J    3.36  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft     217.42 + J    8.27  PU

CBL-0363       FINE SCREEN DU  BUS-0389         1     480   285.0  FEET     12       Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft     231.32 + J   11.26  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft     729.00 + J   27.72  PU

CBL-0364       FINE SCREEN DU  BUS-0390         1     480   285.0  FEET     12       Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft     231.32 + J   11.26  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft     729.00 + J   27.72  PU
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                                        FEEDER  INPUT  DATA
=============================================================================================
CABLE         FEEDER FROM     FEEDER TO        QTY  VOLTS   LENGTH              FEEDER
NAME          NAME            NAME             /PH  L-L                    SIZE        TYPE
=============================================================================================
CBL-0365      MCC-4C          CARBON SCRUBBE   1     480  220.0  FEET       8      Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.8110 + J  0.0754  Ohms/1000 ft       77.44 + J    7.20  PU
              Z0   Impedance:   2.56 + J  0.1856  Ohms/1000 ft      244.05 + J   17.72  PU

CBL-0366      MCC-4C          CP-MAU-BP-1      1     480  120.0  FEET      10      Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       61.46 + J    4.45  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      193.69 + J   10.95  PU

CBL-0367      BUS-0393        MCC-2            1     480  1.000  FEET    1000      Copper
              Duct Material:       Busway
              +/-  Impedance: 0.0142 + J  0.0066  Ohms/1000 ft      0.0062 + J  0.0029  PU
              Z0   Impedance: 0.0844 + J  0.0353  Ohms/1000 ft      0.0366 + J  0.0153  PU

CBL-0368      MCC-2           CS-BS-1          1     480   30.0  FEET       8      Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.8110 + J  0.0754  Ohms/1000 ft       10.56 + J  0.9818  PU
              Z0   Impedance:   2.56 + J  0.1856  Ohms/1000 ft       33.28 + J    2.42  PU

CBL-0369      MCC-2           EUH-BS-1         1     480   35.0  FEET       8      Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.8110 + J  0.0754  Ohms/1000 ft       12.32 + J    1.15  PU
              Z0   Impedance:   2.56 + J  0.1856  Ohms/1000 ft       38.83 + J    2.82  PU

CBL-0370      MCC-2           EUH-BS-2         1     480   85.0  FEET       8      Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.8110 + J  0.0754  Ohms/1000 ft       29.92 + J    2.78  PU
              Z0   Impedance:   2.56 + J  0.1856  Ohms/1000 ft       94.29 + J    6.85  PU

CBL-0371      MCC-2           EF-BS-1          1     480   35.0  FEET      12      Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       28.41 + J    1.38  PU
              Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft       89.53 + J    3.40  PU

CBL-0373      MCC-2           CTRL SCRN RM U   1     480   35.0  FEET       2      Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.2020 + J  0.0585  Ohms/1000 ft        3.07 + J  0.8887  PU
              Z0   Impedance: 0.6366 + J  0.1440  Ohms/1000 ft        9.67 + J    2.19  PU

CBL-0374      MCC-2           NEW AIR COMPRE   1     480   30.0  FEET      12      Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       24.35 + J    1.18  PU
              Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft       76.74 + J    2.92  PU
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FEEDER INPUT DATA

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==============================================================================================
CABLE          FEEDER FROM      FEEDER TO        QTY  VOLTS   LENGTH             FEEDER
NAME           NAME             NAME             /PH  L-L                   SIZE        TYPE
==============================================================================================
CBL-0375       MCC-2            BUS-0403          1    480    65.0  FEET       2      Copper
               Duct Material:      Magnetic
               +/-  Impedance: 0.2020 + J  0.0585  Ohms/1000 ft        5.70 + J    1.65  PU
               Z0   Impedance: 0.6366 + J  0.1440  Ohms/1000 ft       17.96 + J    4.06  PU

CBL-0376       04-LP-01 XFER    BUS-0404          1    480    50.0  FEET       2      Copper
               Duct Material:      Magnetic
               +/-  Impedance: 0.2020 + J  0.0585  Ohms/1000 ft        4.38 + J    1.27  PU
               Z0   Impedance: 0.6366 + J  0.1440  Ohms/1000 ft       13.82 + J    3.13  PU

CBL-0377       BUS-0405         BUS-0407          1    208    15.0  FEET       2      Copper
               Duct Material:      Magnetic
               +/-  Impedance: 0.2020 + J  0.0585  Ohms/1000 ft        7.00 + J    2.03  PU
               Z0   Impedance: 0.6366 + J  0.1440  Ohms/1000 ft       22.07 + J    4.99  PU

CBL-0378       CP-MAU-BP-1      MAU-BP-1 VFD      1    480    20.0  FEET      10      Copper
               Duct Material:      Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       10.24 + J  0.7413  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       32.28 + J    1.83  PU

CBL-0379       BUS-0407         PANEL LA          1    208    10.0  FEET       2      Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.2020 + J  0.0467  Ohms/1000 ft        4.67 + J    1.08  PU
               Z0   Impedance: 0.3211 + J  0.1188  Ohms/1000 ft        7.42 + J    2.75  PU

CBL-0380       BUS-0407         PANEL LB          1    208    25.0  FEET     3/0      Copper
               Duct Material: Non-Magnetic
               +/-  Impedance: 0.0766 + J  0.0415  Ohms/1000 ft        4.43 + J    2.40  PU
               Z0   Impedance: 0.1217 + J  0.1055  Ohms/1000 ft        7.03 + J    6.10  PU

CBL-0381       MCC-2            PUMP #5 MAIN D    1    480    20.0  FEET     500      Copper
               Duct Material:      Magnetic
               +/-  Impedance: 0.0294 + J  0.0466  Ohms/1000 ft      0.2552 + J  0.4045  PU
               Z0   Impedance: 0.0926 + J  0.1147  Ohms/1000 ft      0.8038 + J  0.9957  PU

CBL-0382       PUMP #5 MAIN D   PUMP #5 VFD       2    480    10.0  FEET     1/0      Copper
               Duct Material:      Magnetic
               +/-  Impedance: 0.1280 + J  0.0540  Ohms/1000 ft      0.2778 + J  0.1172  PU
               Z0   Impedance: 0.4034 + J  0.1329  Ohms/1000 ft      0.8754 + J  0.2884  PU

CBL-0383       PUMP #5 VFD      BUS-0412          2    480    90.0  FEET     250      Copper
               Duct Material:      Magnetic
               +/-  Impedance: 0.0552 + J  0.0495  Ohms/1000 ft        1.08 + J  0.9668  PU
               Z0   Impedance: 0.1739 + J  0.1219  Ohms/1000 ft        3.40 + J    2.38  PU
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FEEDER INPUT DATA

CABLE NAME	FEEDER FROM NAME	FEEDER TO NAME	QTY /PH	VOLTS L-L	LENGTH		FEEDER SIZE	FEEDER TYPE	
CBL-0384	MCC-1	BUS-0413	1	480	65.0	FEET	2	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.2020 + J	0.0585	Ohms/1000 ft			5.70 + J	1.65	PU
	Z0 Impedance:	0.6366 + J	0.1440	Ohms/1000 ft			17.96 + J	4.06	PU
CBL-0385	DS-MCC-8-PUMPS	DS-MCC8 WAS PU	1	480	95.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			77.11 + J	3.75	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			243.00 + J	9.24	PU
CBL-0387	DS-MCC-8-PUMPS	DS-MCC8 PRI TH	1	480	75.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			38.41 + J	2.78	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			121.05 + J	6.85	PU
CBL-0388	PUMP #7 VFD	BUS-0416	1	480	50.0	FEET	250	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.0552 + J	0.0495	Ohms/1000 ft			1.20 + J	1.07	PU
	Z0 Impedance:	0.1739 + J	0.1219	Ohms/1000 ft			3.77 + J	2.65	PU
CBL-0389	MCC-3	METER CHAMBER	1	480	10.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			5.12 + J	0.3707	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			16.14 + J	0.9128	PU
CBL-0390	MCC-3	BUS-0418	1	480	135.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			69.14 + J	5.00	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			217.90 + J	12.32	PU
CBL-0391	BUS-0418	BAR SCREEN #1	1	480	135.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			69.14 + J	5.00	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			217.90 + J	12.32	PU
CBL-0392	BAR SCREEN #1	BAR SCREEN #1	1	480	20.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			16.23 + J	0.7899	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			51.16 + J	1.95	PU
CBL-0393	BUS-0418	BAR SCREEN #2	1	480	95.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			48.65 + J	3.52	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			153.34 + J	8.67	PU

FEEDER INPUT DATA

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==========================================================================================
CABLE          FEEDER FROM     FEEDER TO        QTY  VOLTS   LENGTH            FEEDER
NAME           NAME            NAME             /PH  L-L                   SIZE       TYPE
==========================================================================================
CBL-0394       BAR SCREEN #2   BAR SCREEN #2     1    480    20.0  FEET      12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       16.23 + J  0.7899  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft       51.16 + J    1.95  PU

CBL-0395       BUS-0418        BAR SCREEN #3     1    480    95.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       48.65 + J    3.52  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      153.34 + J    8.67  PU

CBL-0396       BAR SCREEN #3   BAR SCREEN #3     1    480    20.0  FEET      12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       16.23 + J  0.7899  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft       51.16 + J    1.95  PU

CBL-0397       MCC-3           BUS-0425          1    480    95.0  FEET       8      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.8110 + J  0.0754  Ohms/1000 ft       33.44 + J    3.11  PU
               Z0   Impedance:   2.56 + J  0.1856  Ohms/1000 ft      105.39 + J    7.65  PU

CBL-0398       BUS-0425        BAR SCREEN MTR    1    480    80.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       40.97 + J    2.97  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      129.13 + J    7.30  PU

CBL-0399       BAR SCREEN MTR  SCREW CONVEYOR    1    480    60.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       30.73 + J    2.22  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       96.84 + J    5.48  PU

CBL-0400       MCC-3           DOOR OPENER       1    480   125.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       64.02 + J    4.63  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      201.76 + J   11.41  PU

CBL-0401       MCC-3           BUS-0429          1    480   125.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       64.02 + J    4.63  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      201.76 + J   11.41  PU

CBL-0402       BUS-0429        MCC-3 PURGE #1    1    480   125.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       64.02 + J    4.63  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      201.76 + J   11.41  PU
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                                      FEEDER  INPUT  DATA
============================================================================================
CABLE          FEEDER FROM     FEEDER TO       QTY  VOLTS   LENGTH             FEEDER
NAME           NAME            NAME            /PH  L-L                      SIZE       TYPE
============================================================================================
CBL-0403       BUS-0429        MCC-3 PURGE #2   1    480  125.0  FEET       10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       64.02 + J    4.63  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      201.76 + J   11.41  PU

CBL-0404       BUS-0429        ODOR CTRL FAN    1    480  125.0  FEET       10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       64.02 + J    4.63  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      201.76 + J   11.41  PU

CBL-0405       BUS-0429        ODOR CTRL FAN    1    480  125.0  FEET       10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       64.02 + J    4.63  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      201.76 + J   11.41  PU

CBL-0406       BUS-0429        MO GATE #1       1    480  125.0  FEET       10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       64.02 + J    4.63  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      201.76 + J   11.41  PU

CBL-0407       BUS-0429        MO GATE #2       1    480  125.0  FEET       10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       64.02 + J    4.63  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      201.76 + J   11.41  PU

CBL-0408       BUS-0436        MCC-3COMPRESSO   1    480   40.0  FEET       10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       20.49 + J    1.48  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       64.56 + J    3.65  PU

CBL-0409       BUS-0436        MCC-3COMPRESSO   1    480   40.0  FEET       10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       20.49 + J    1.48  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       64.56 + J    3.65  PU

CBL-0410       BUS-0436        MCC-3 SUMP PUM   1    480   70.0  FEET       10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       35.85 + J    2.59  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      112.98 + J    6.39  PU

CBL-0411       BUS-0436        GATE VALVE 1     1    480   70.0  FEET       10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       35.85 + J    2.59  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      112.98 + J    6.39  PU
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FEEDER INPUT DATA

CABLE NAME	FEEDER FROM NAME	FEEDER TO NAME	QTY /PH	VOLTS L-L	LENGTH		FEEDER SIZE	FEEDER TYPE	
CBL-0412	BUS-0436	GATE VALVE 2	1	480	70.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			35.85 + J	2.59	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			112.98 + J	6.39	PU
CBL-0413	BUS-0436	GATE VALVE 4	1	480	70.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			35.85 + J	2.59	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			112.98 + J	6.39	PU
CBL-0414	MCC-3	BUS-0436	1	480	125.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			64.02 + J	4.63	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			201.76 + J	11.41	PU
CBL-0415	BUS-0436	GATE VALVE 5	1	480	70.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			35.85 + J	2.59	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			112.98 + J	6.39	PU
CBL-0416	BUS-0436	GATE VALVE 7	1	480	70.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			35.85 + J	2.59	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			112.98 + J	6.39	PU
CBL-0417	BUS-0436	GATE VALVE 8	1	480	70.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			35.85 + J	2.59	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			112.98 + J	6.39	PU
CBL-0418	MCC-3	MCC-3A	1	480	3.0	FEET	500	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.0294 + J	0.0466	Ohms/1000 ft			0.0383 + J	0.0607	PU
	Z0 Impedance:	0.0926 + J	0.1147	Ohms/1000 ft			0.1206 + J	0.1493	PU
CBL-0419	MCC-3A	SEWAGE PUMP #2	1	480	10.0	FEET	4/0	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.0640 + J	0.0497	Ohms/1000 ft			0.2778 + J	0.2157	PU
	Z0 Impedance:	0.2017 + J	0.1224	Ohms/1000 ft			0.8754 + J	0.5313	PU
CBL-0420	SEWAGE PUMP #2	BUS-0448	1	480	130.0	FEET	4/0	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.0640 + J	0.0497	Ohms/1000 ft			3.61 + J	2.80	PU
	Z0 Impedance:	0.2017 + J	0.1224	Ohms/1000 ft			11.38 + J	6.91	PU

FEEDER INPUT DATA

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CABLE          FEEDER FROM     FEEDER TO        QTY  VOLTS   LENGTH              FEEDER
NAME           NAME            NAME             /PH  L-L                      SIZE       TYPE
==============================================================================================
CBL-0421       MCC-13          BUS-0449          1    480     5.0  FEET        8       Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.8110 + J  0.0754  Ohms/1000 ft        1.76 + J  0.1636  PU
               Z0   Impedance:   2.56 + J  0.1856  Ohms/1000 ft        5.55 + J  0.4028  PU

CBL-0422       BUS-0450        11-LP-01          1    208     5.0  FEET        4       Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.3210 + J  0.0632  Ohms/1000 ft        3.71 + J  0.7304  PU
               Z0   Impedance:   1.01 + J  0.1556  Ohms/1000 ft       11.69 + J    1.80  PU

CBL-0423       11-LP-01        11-LP-01A         1    208   175.0  FEET        6       Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.5100 + J  0.0685  Ohms/1000 ft      206.29 + J   27.71  PU
               Z0   Impedance:   1.61 + J  0.1687  Ohms/1000 ft      650.10 + J   68.24  PU

CBL-0424       MCC-13          AERATION VALVE    1    480   260.0  FEET       10       Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft      133.16 + J    9.64  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      419.66 + J   23.73  PU

CBL-0425       AERATION VALVE  AERATION VALVE    1    480   100.0  FEET       10       Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       51.22 + J    3.71  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      161.41 + J    9.13  PU

CBL-0426       AERATION VALVE  AERATION VALVE    1    480   100.0  FEET       10       Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       51.22 + J    3.71  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      161.41 + J    9.13  PU

CBL-0427       AERATION VALVE  AERATION VALVE    1    480   100.0  FEET       10       Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       51.22 + J    3.71  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      161.41 + J    9.13  PU

CBL-0428       AERATION VALVE  AERATION VALVE    1    480   100.0  FEET       10       Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       51.22 + J    3.71  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      161.41 + J    9.13  PU

CBL-0429       MCC-13          AERATION VALVE    1    480    65.0  FEET       10       Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       33.29 + J    2.41  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      104.91 + J    5.93  PU
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                                 FEEDER  INPUT  DATA
=========================================================================================
CABLE          FEEDER FROM     FEEDER TO         QTY  VOLTS   LENGTH            FEEDER
NAME           NAME            NAME              /PH  L-L                   SIZE       TYPE
=========================================================================================
CBL-0430       AERATION VALVE  AERATION VALVE   1    480    85.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       43.53 + J    3.15  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      137.20 + J    7.76  PU

CBL-0431       AERATION VALVE  AERATION VALVE   1    480    75.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       38.41 + J    2.78  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      121.05 + J    6.85  PU

CBL-0432       AERATION VALVE  AERATION VALVE   1    480    75.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       38.41 + J    2.78  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      121.05 + J    6.85  PU

CBL-0433       AERATION VALVE  AERATION VALVE   1    480    75.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       38.41 + J    2.78  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      121.05 + J    6.85  PU

CBL-0434       MCC-13          FILTER DOOR OP   1    480   155.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       79.38 + J    5.75  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      250.18 + J   14.15  PU

CBL-0435       MCC-13          SER FAN F        1    480   155.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       79.38 + J    5.75  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      250.18 + J   14.15  PU

CBL-0436       MCC-13          SER FAN E        1    480   125.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       64.02 + J    4.63  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      201.76 + J   11.41  PU

CBL-0437       MCC-13          SER FAN J        1    480   155.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       79.38 + J    5.75  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      250.18 + J   14.15  PU

CBL-0438       MCC-13          SER FAN D        1    480   125.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       64.02 + J    4.63  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      201.76 + J   11.41  PU
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FEEDER INPUT DATA

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==============================================================================================
CABLE          FEEDER FROM     FEEDER TO        QTY  VOLTS   LENGTH             FEEDER
NAME           NAME            NAME             /PH  L-L                    SIZE       TYPE
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CBL-0439       MCC-13          SER FAN C         1    480  155.0  FEET       10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       79.38 + J    5.75  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      250.18 + J   14.15  PU

CBL-0440       MCC-13          SER FAN H         1    480  125.0  FEET       10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       64.02 + J    4.63  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      201.76 + J   11.41  PU

CBL-0441       MCC-13          SER FAN B         1    480  155.0  FEET       10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       79.38 + J    5.75  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      250.18 + J   14.15  PU

CBL-0442       MCC-13          SER FAN A         1    480  125.0  FEET       10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       64.02 + J    4.63  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      201.76 + J   11.41  PU

CBL-0443       MCC-13          SER FAN I         1    480  155.0  FEET       10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       79.38 + J    5.75  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      250.18 + J   14.15  PU

CBL-0444       MCC-13          SER FAN L         1    480  125.0  FEET       10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       64.02 + J    4.63  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      201.76 + J   11.41  PU

CBL-0445       MCC-13          SER FAN K         1    480  155.0  FEET       10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       79.38 + J    5.75  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      250.18 + J   14.15  PU

CBL-0446       MCC-13          SER FAN G         1    480  125.0  FEET       10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       64.02 + J    4.63  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      201.76 + J   11.41  PU

CBL-0447       MCC-13          MCC-13 CRANE      1    480    3.0  FEET        8      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.8110 + J  0.0754  Ohms/1000 ft        1.06 + J  0.0982  PU
               Z0   Impedance:   2.56 + J  0.1856  Ohms/1000 ft        3.33 + J  0.2417  PU
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                                    FEEDER  INPUT  DATA
============================================================================================
CABLE         FEEDER FROM     FEEDER TO        QTY  VOLTS   LENGTH              FEEDER
NAME          NAME            NAME             /PH  L-L                      SIZE       TYPE
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CBL-0448      MCC-13          MCC-13 OVERHEA   1     480    50.0  FEET       10     Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       25.61 + J    1.85  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       80.70 + J    4.56  PU

CBL-0449      MCC-13          AERATION TANK    1     480   375.0  FEET       10     Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft      192.06 + J   13.90  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      605.27 + J   34.23  PU

CBL-0450      MCC-13          MCC-13 AIR COM   1     480    45.0  FEET       10     Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       23.05 + J    1.67  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       72.63 + J    4.11  PU

CBL-0451      MCC-13          BUS-0481         1     480   165.0  FEET      250     Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.0552 + J  0.0495  Ohms/1000 ft        3.95 + J    3.54  PU
              Z0   Impedance: 0.1739 + J  0.1219  Ohms/1000 ft       12.45 + J    8.73  PU

CBL-0452      BUS-0482        PHOS ACID PUMP   1     120    30.0  FEET        6     Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.5100 + J  0.0685  Ohms/1000 ft      106.25 + J   14.27  PU
              Z0   Impedance:   1.61 + J  0.1687  Ohms/1000 ft      334.83 + J   35.15  PU

CBL-0453      BUS-1047        UNIT HEATER #2   1     480     5.0  FEET        6     Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.5100 + J  0.0685  Ohms/1000 ft        1.11 + J  0.1487  PU
              Z0   Impedance:   1.61 + J  0.1687  Ohms/1000 ft        3.49 + J  0.3661  PU

CBL-0454      MCC-14          MSP-12           1     480   420.0  FEET      1/0     Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.1280 + J  0.0540  Ohms/1000 ft       23.33 + J    9.84  PU
              Z0   Impedance: 0.4034 + J  0.1329  Ohms/1000 ft       73.54 + J   24.23  PU

CBL-0455      MCC-14          TUMBULATOR       1     480    80.0  FEET       12     Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       64.93 + J    3.16  PU
              Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      204.63 + J    7.78  PU

CBL-0456      MCC-14          WASTE SLUDGE P   1     480   100.0  FEET       12     Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       81.16 + J    3.95  PU
              Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      255.79 + J    9.73  PU
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FEEDER INPUT DATA

CABLE NAME	FEEDER FROM NAME	FEEDER TO NAME	QTY /PH	VOLTS L-L	LENGTH		FEEDER SIZE	FEEDER TYPE	
CBL-0457	MCC-14	WASTE SLUDGE P	1	480	100.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			81.16 + J	3.95	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			255.79 + J	9.73	PU
CBL-0458	MCC-14	FINAL TANK DRA	1	480	80.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			40.97 + J	2.97	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			129.13 + J	7.30	PU
CBL-0459	MCC-14	RETURN SLUDGE	1	480	45.0	FEET	3/0	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.0805 + J	0.0519	Ohms/1000 ft			1.57 + J	1.01	PU
	Z0 Impedance:	0.2537 + J	0.1278	Ohms/1000 ft			4.96 + J	2.50	PU
CBL-0460	MCC-14	RETURN SLUDGE	1	480	45.0	FEET	4/0	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.0640 + J	0.0497	Ohms/1000 ft			1.25 + J	0.9707	PU
	Z0 Impedance:	0.2017 + J	0.1224	Ohms/1000 ft			3.94 + J	2.39	PU
CBL-0461	MCC-14	RETURN SLUDGE	1	480	45.0	FEET	4/0	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.0640 + J	0.0497	Ohms/1000 ft			1.25 + J	0.9707	PU
	Z0 Impedance:	0.2017 + J	0.1224	Ohms/1000 ft			3.94 + J	2.39	PU
CBL-0462	MCC-14	RETURN SLUDGE	1	480	45.0	FEET	2/0	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.1020 + J	0.0533	Ohms/1000 ft			1.99 + J	1.04	PU
	Z0 Impedance:	0.3214 + J	0.1312	Ohms/1000 ft			6.28 + J	2.56	PU
CBL-0463	MCC-14	EXHAUST FAN A	1	480	70.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			35.85 + J	2.59	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			112.98 + J	6.39	PU
CBL-0464	MCC-14	EXHAUST FAN B	1	480	30.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			15.36 + J	1.11	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			48.42 + J	2.74	PU
CBL-0465	MCC-14	EXHAUST FAN C	1	480	45.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			23.05 + J	1.67	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			72.63 + J	4.11	PU

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                                  FEEDER  INPUT  DATA
============================================================================================
CABLE          FEEDER FROM     FEEDER TO        QTY  VOLTS   LENGTH              FEEDER
NAME           NAME            NAME             /PH  L-L                     SIZE       TYPE
============================================================================================
CBL-0466       MCC-14          EXHAUST FAN D    1    480    65.0  FEET       10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       33.29 + J    2.41  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      104.91 + J    5.93  PU

CBL-0467       MCC-14          EXHAUST FAN E    1    480    90.0  FEET       10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       46.09 + J    3.34  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      145.27 + J    8.21  PU

CBL-0468       MCC-14          SCUM PUMP        1    480    80.0  FEET       10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       40.97 + J    2.97  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      129.13 + J    7.30  PU

CBL-0469       MCC-14          VALVE ACTUATOR   1    480   120.0  FEET       12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       97.40 + J    4.74  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      306.95 + J   11.67  PU

CBL-0470       MCC-14          MAKE UP AIR UN   1    480   175.0  FEET       12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft      142.04 + J    6.91  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      447.63 + J   17.02  PU

CBL-0471       MCC-14          AER. TANK AND    1    480   115.0  FEET       10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       58.90 + J    4.26  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      185.62 + J   10.50  PU

CBL-0472       MCC-14          FINAL TANK AND   1    480   100.0  FEET        8      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.8110 + J  0.0754  Ohms/1000 ft       35.20 + J    3.27  PU
               Z0   Impedance:   2.56 + J  0.1856  Ohms/1000 ft      110.93 + J    8.06  PU

CBL-0473       MCC-14          15 KVAC CAP      1    480    10.0  FEET       10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft        5.12 + J  0.3707  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       16.14 + J  0.9128  PU

CBL-0474       MCC-14          MCC-14 UNIT HE   1    480    50.0  FEET       10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       25.61 + J    1.85  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       80.70 + J    4.56  PU
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FEEDER INPUT DATA

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=============================================================================================
CABLE          FEEDER FROM     FEEDER TO       QTY  VOLTS   LENGTH              FEEDER
NAME           NAME            NAME            /PH  L-L                     SIZE       TYPE
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CBL-0475       MCC-14          RAS AND INFLUE   1    480  120.0  FEET        10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       61.46 + J    4.45  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      193.69 + J   10.95  PU

CBL-0476       MCC-14          SCUM BLOWERS C   1    480   70.0  FEET        10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       35.85 + J    2.59  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      112.98 + J    6.39  PU

CBL-0477       MCC-14          MCC-14 SUMP PU   1    480  140.0  FEET        10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       71.70 + J    5.19  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      225.97 + J   12.78  PU

CBL-0478       MCC-14          MCC-14 HOIST     1    480   85.0  FEET        10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       43.53 + J    3.15  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      137.20 + J    7.76  PU

CBL-0479       MCC-14          WASTE MIXED LI   1    480   30.0  FEET         2      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.2020 + J  0.0585  Ohms/1000 ft        2.63 + J  0.7617  PU
               Z0   Impedance: 0.6366 + J  0.1440  Ohms/1000 ft        8.29 + J    1.88  PU

CBL-0480       MCC-14          WASTE MIXED LI   1    480   30.0  FEET         2      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.2020 + J  0.0585  Ohms/1000 ft        2.63 + J  0.7617  PU
               Z0   Impedance: 0.6366 + J  0.1440  Ohms/1000 ft        8.29 + J    1.88  PU

CBL-0481       MSP-12          DS-MSP-12 TUMB   1    480   70.0  FEET        12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       56.81 + J    2.76  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      179.05 + J    6.81  PU

CBL-0482       MSP-12          DS-SLUDGE PUMP   1    480   25.0  FEET        10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       12.80 + J  0.9266  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       40.35 + J    2.28  PU

CBL-0483       MSP-12          DS-EXHAUST FAN   1    480   70.0  FEET        12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       56.81 + J    2.76  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      179.05 + J    6.81  PU
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FEEDER INPUT DATA

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CABLE          FEEDER FROM      FEEDER TO        QTY  VOLTS   LENGTH            FEEDER
NAME           NAME             NAME             /PH  L-L                   SIZE        TYPE
==============================================================================================
CBL-0484       28-PP-01         MUA-1             1    480   40.0  FEET      10      Copper
               Duct Material:      Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       20.49 + J    1.48  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       64.56 + J    3.65  PU

CBL-0485       28-PP-01         EAST FAN          1    480  280.0  FEET      10      Copper
               Duct Material: Non-Magnetic
               +/-  Impedance:   1.18 + J  0.0823  Ohms/1000 ft      143.40 + J   10.00  PU
               Z0   Impedance:   1.88 + J  0.2093  Ohms/1000 ft      227.97 + J   25.44  PU

CBL-0486       28-PP-01         WEST FAN          1    480  220.0  FEET      10      Copper
               Duct Material: Non-Magnetic
               +/-  Impedance:   1.18 + J  0.0823  Ohms/1000 ft      112.67 + J    7.86  PU
               Z0   Impedance:   1.88 + J  0.2093  Ohms/1000 ft      179.12 + J   19.99  PU

CBL-0487       28-PP-01         BUS-0516          1    480   30.0  FEET       2      Copper
               Duct Material:      Magnetic
               +/-  Impedance: 0.2020 + J  0.0585  Ohms/1000 ft        2.63 + J  0.7617  PU
               Z0   Impedance: 0.6366 + J  0.1440  Ohms/1000 ft        8.29 + J    1.88  PU

CBL-0488       MSP-12           DS-DRAIN PUMP     1    480   25.0  FEET      10      Copper
               Duct Material:      Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       12.80 + J  0.9266  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       40.35 + J    2.28  PU

CBL-0489       BUS-0517         28-LP-01          1    208    5.0  FEET     3/0      Copper
               Duct Material:      Magnetic
               +/-  Impedance: 0.0805 + J  0.0519  Ohms/1000 ft      0.9303 + J  0.5998  PU
               Z0   Impedance: 0.2537 + J  0.1278  Ohms/1000 ft        2.93 + J    1.48  PU

CBL-0491       MSP-12           DS-CLARIFIER 7    1    480   70.0  FEET      10      Copper
               Duct Material:      Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       35.85 + J    2.59  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      112.98 + J    6.39  PU

CBL-0492       MSP-12           DS-CLARIFIER 7    1    480   65.0  FEET      10      Copper
               Duct Material:      Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       33.29 + J    2.41  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      104.91 + J    5.93  PU

CBL-0493       DS-CLARIFIER 7   DS-INFLUENT VA    1    480    5.0  FEET      10      Copper
               Duct Material:      Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft        2.56 + J  0.1853  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft        8.07 + J  0.4564  PU
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FEEDER INPUT DATA

CABLE NAME	FEEDER FROM NAME	FEEDER TO NAME	QTY /PH	VOLTS L-L	LENGTH		FEEDER SIZE	FEEDER TYPE	
CBL-0494	DS-CLARIFIER 7	DS-INFLUENT VA	1	480	5.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			2.56 + J	0.1853	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			8.07 + J	0.4564	PU
CBL-0495	DS-CLARIFIER 7	DS-BYPASS SLID	1	480	5.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			2.56 + J	0.1853	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			8.07 + J	0.4564	PU
CBL-0496	DS-CLARIFIER 7	DS-SLIDE GATE	1	480	5.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			2.56 + J	0.1853	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			8.07 + J	0.4564	PU
CBL-0497	MCC-15A	MCC-15AA	2	480	155.0	FEET	350	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.0378 + J	0.0491	Ohms/1000 ft			1.27 + J	1.65	PU
	Z0 Impedance:	0.1191 + J	0.1209	Ohms/1000 ft			4.01 + J	4.07	PU
CBL-0498	MCC-15A	CHILLER #2	1	480	20.0	FEET	250	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.0552 + J	0.0495	Ohms/1000 ft			0.4792 + J	0.4297	PU
	Z0 Impedance:	0.1739 + J	0.1219	Ohms/1000 ft			1.51 + J	1.06	PU
CBL-0499	MCC-15A	HOT WATER CIRC	1	480	50.0	FEET	8	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.8110 + J	0.0754	Ohms/1000 ft			17.60 + J	1.64	PU
	Z0 Impedance:	2.56 + J	0.1856	Ohms/1000 ft			55.47 + J	4.03	PU
CBL-0500	MCC-15A	HOT WATER CIRC	1	480	55.0	FEET	8	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.8110 + J	0.0754	Ohms/1000 ft			19.36 + J	1.80	PU
	Z0 Impedance:	2.56 + J	0.1856	Ohms/1000 ft			61.01 + J	4.43	PU
CBL-0501	MCC-15A	CHILL WATER CI	1	480	20.0	FEET	8	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.8110 + J	0.0754	Ohms/1000 ft			7.04 + J	0.6545	PU
	Z0 Impedance:	2.56 + J	0.1856	Ohms/1000 ft			22.19 + J	1.61	PU
CBL-0502	MCC-15A	CHILL WATER CI	1	480	30.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			24.35 + J	1.18	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			76.74 + J	2.92	PU

FEEDER INPUT DATA

CABLE NAME	FEEDER FROM NAME	FEEDER TO NAME	QTY /PH	VOLTS L-L	LENGTH		FEEDER SIZE		FEEDER TYPE	
CBL-0503	MCC-15A	45D WATER CIRC	1	480	35.0	FEET	12		Copper	
	Duct Material:	Magnetic								
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			28.41 + J		1.38	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			89.53 + J		3.40	PU
CBL-0504	MCC-15A	FAN CONTROL PA	1	480	145.0	FEET	8		Copper	
	Duct Material:	Magnetic								
	+/- Impedance:	0.8110 + J	0.0754	Ohms/1000 ft			51.04 + J		4.75	PU
	Z0 Impedance:	2.56 + J	0.1856	Ohms/1000 ft			160.85 + J		11.68	PU
CBL-0505	MCC-15A	CAPACITOR DISC	1	480	5.0	FEET	1/0		Copper	
	Duct Material:	Magnetic								
	+/- Impedance:	0.1280 + J	0.0540	Ohms/1000 ft			0.2778 + J		0.1172	PU
	Z0 Impedance:	0.4034 + J	0.1329	Ohms/1000 ft			0.8754 + J		0.2884	PU
CBL-0506	MCC-15AA	EF-1 DISC	1	480	45.0	FEET	12		Copper	
	Duct Material:	Magnetic								
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			36.52 + J		1.78	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			115.11 + J		4.38	PU
CBL-0507	MCC-15AA	EF-5 DISC	1	480	85.0	FEET	12		Copper	
	Duct Material:	Magnetic								
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			68.99 + J		3.36	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			217.42 + J		8.27	PU
CBL-0508	MCC-15AA	EF-7 DISC	1	480	140.0	FEET	12		Copper	
	Duct Material:	Magnetic								
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			113.63 + J		5.53	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			358.11 + J		13.62	PU
CBL-0509	MCC-15AA	EF-9 DISC	1	480	100.0	FEET	12		Copper	
	Duct Material:	Magnetic								
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			81.16 + J		3.95	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			255.79 + J		9.73	PU
CBL-0510	MCC-15AA	EF-11 DISC	1	480	145.0	FEET	12		Copper	
	Duct Material:	Magnetic								
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			117.69 + J		5.73	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			370.90 + J		14.10	PU
CBL-0511	MCC-15AA	EF-12 DISC	1	480	135.0	FEET	12		Copper	
	Duct Material:	Magnetic								
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			109.57 + J		5.33	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			345.32 + J		13.13	PU

FEEDER INPUT DATA

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===========================================================================================
CABLE          FEEDER FROM     FEEDER TO        QTY  VOLTS   LENGTH            FEEDER
NAME           NAME            NAME             /PH  L-L                   SIZE       TYPE
===========================================================================================
CBL-0512       MCC-15AA        EF-13 DISC        1    480  130.0  FEET       12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft      105.51 + J   5.13  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      332.53 + J  12.64  PU

CBL-0513       MCC-15AA        EF-14 DISC        1    480  135.0  FEET       12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft      109.57 + J   5.33  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      345.32 + J  13.13  PU

CBL-0514       MCC-15AA        EF-15 DISC        1    480  135.0  FEET       12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft      109.57 + J   5.33  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      345.32 + J  13.13  PU

CBL-0515       MCC-15AA        EF-16 DISC        1    480  140.0  FEET       12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft      113.63 + J   5.53  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      358.11 + J  13.62  PU

CBL-0516       MCC-15AA        EF-18 DISC        1    480   85.0  FEET       12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       68.99 + J   3.36  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      217.42 + J   8.27  PU

CBL-0517       MCC-15AA        EF-20 DISC        1    480  145.0  FEET       12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft      117.69 + J   5.73  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      370.90 + J  14.10  PU

CBL-0518       MCC-15AA        SF-4 DISC         1    480   85.0  FEET       12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       68.99 + J   3.36  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      217.42 + J   8.27  PU

CBL-0519       MCC-15AA        SF-8 DISC         1    480  135.0  FEET       12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft      109.57 + J   5.33  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      345.32 + J  13.13  PU

CBL-0520       MCC-15AA        SF-11 DISC        1    480  110.0  FEET       12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       89.28 + J   4.34  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      281.37 + J  10.70  PU
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FEEDER INPUT DATA

CABLE NAME	FEEDER FROM NAME	FEEDER TO NAME	QTY /PH	VOLTS L-L	LENGTH		FEEDER SIZE	FEEDER TYPE	
CBL-0521	MCC-15AA	FC-1 DISC	1	480	45.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			36.52 + J	1.78	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			115.11 + J	4.38	PU
CBL-0522	MCC-15AA	FC-3 DISC	1	480	35.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			28.41 + J	1.38	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			89.53 + J	3.40	PU
CBL-0523	MCC-15AA	FC-2 DISC	1	480	15.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			12.17 + J	0.5924	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			38.37 + J	1.46	PU
CBL-0524	MCC-15AA	FC-4 DISC	1	480	145.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			117.69 + J	5.73	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			370.90 + J	14.10	PU
CBL-0525	MCC-15AA	FC-5 DISC	1	480	135.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			109.57 + J	5.33	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			345.32 + J	13.13	PU
CBL-0526	MCC-15AA	FC-6 DISC	1	480	110.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			89.28 + J	4.34	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			281.37 + J	10.70	PU
CBL-0527	MCC-15AA	FC-7 DISC	1	480	90.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			73.05 + J	3.55	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			230.21 + J	8.75	PU
CBL-0528	MCC-15AA	MAU-1 VFD	1	480	40.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			32.47 + J	1.58	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			102.32 + J	3.89	PU
CBL-0529	MAU-1 VFD	MAU-1 DISC	1	480	5.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			4.06 + J	0.1975	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			12.79 + J	0.4863	PU

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                                   FEEDER  INPUT  DATA
=============================================================================================
CABLE          FEEDER FROM     FEEDER TO        QTY  VOLTS   LENGTH            FEEDER
NAME           NAME            NAME             /PH  L-L                   SIZE        TYPE
=============================================================================================
CBL-0530       MCC-15AA        MAU HEATER        1    480    35.0  FEET       6      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.5100 + J  0.0685  Ohms/1000 ft        7.75 + J    1.04  PU
               Z0   Impedance:   1.61 + J  0.1687  Ohms/1000 ft       24.41 + J    2.56  PU

CBL-0531       MCC-15AA        BUS-0565          1    480    30.0  FEET       4      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.3210 + J  0.0632  Ohms/1000 ft        4.18 + J  0.8229  PU
               Z0   Impedance:   1.01 + J  0.1556  Ohms/1000 ft       13.17 + J    2.03  PU

CBL-0532       BUS-0565        HUMIDIFIER #1     1    480    30.0  FEET       4      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.3210 + J  0.0632  Ohms/1000 ft        4.18 + J  0.8229  PU
               Z0   Impedance:   1.01 + J  0.1556  Ohms/1000 ft       13.17 + J    2.03  PU

CBL-0533       BUS-0565        HUMIDIFIER #2     1    480    30.0  FEET       4      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.3210 + J  0.0632  Ohms/1000 ft        4.18 + J  0.8229  PU
               Z0   Impedance:   1.01 + J  0.1556  Ohms/1000 ft       13.17 + J    2.03  PU

CBL-0534       MCC-15AA        MCC 15AA AIR C    1    480    45.0  FEET      12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       36.52 + J    1.78  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      115.11 + J    4.38  PU

CBL-0535       MCC-15AA        HOT WATER CIR     1    480    45.0  FEET      12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       36.52 + J    1.78  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      115.11 + J    4.38  PU

CBL-0536       MCC-15AA        DUMBWATIER DIS    1    480    30.0  FEET      12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       24.35 + J    1.18  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft       76.74 + J    2.92  PU

CBL-0615       DS-CLARIFIER 7  DS-SLIDE GATE     1    480     5.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft        2.56 + J  0.1853  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft        8.07 + J  0.4564  PU

CBL-0616       DS-CLARIFIER 7  DS-SUMP PUMP A    1    480    45.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       23.05 + J    1.67  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       72.63 + J    4.11  PU
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FEEDER INPUT DATA

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==========================================================================================
CABLE          FEEDER FROM     FEEDER TO       QTY  VOLTS    LENGTH              FEEDER
NAME           NAME            NAME            /PH  L-L                      SIZE       TYPE
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CBL-0617       MCC-27          WT CONVEYOR 1    1    480  140.0  FEET       12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft      113.63 + J    5.53  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      358.11 + J   13.62  PU

CBL-0618       MCC-27          CENTRIFUGE 1 P   1    480  150.0  FEET       10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       76.82 + J    5.56  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      242.11 + J   13.69  PU

CBL-0619       MCC-27          CENTRIFUGE 2 P   1    480  150.0  FEET       10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       76.82 + J    5.56  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      242.11 + J   13.69  PU

CBL-0620       MCC-27          LIME SCREW CON   1    480  130.0  FEET       12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft      105.51 + J    5.13  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      332.53 + J   12.64  PU

CBL-0621       MCC-27          LIME SIO #1TRU   1    480  130.0  FEET       10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       66.58 + J    4.82  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      209.83 + J   11.87  PU

CBL-0622       MCC-27          CENTRIFUGE OVE   1    480   75.0  FEET        8      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.8110 + J  0.0754  Ohms/1000 ft       26.40 + J    2.45  PU
               Z0   Impedance:   2.56 + J  0.1856  Ohms/1000 ft       83.20 + J    6.04  PU

CBL-0623       MCC-27          NORTH BELT DIS   1    480   60.0  FEET       12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       48.70 + J    2.37  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      153.47 + J    5.84  PU

CBL-0624       DS-CLARIFIER 7  DS-SUMP PUMP B   1    480   45.0  FEET       10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       23.05 + J    1.67  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       72.63 + J    4.11  PU

CBL-0625       MCC-27          NORTH BELT PRE   1    480   60.0  FEET       12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       48.70 + J    2.37  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      153.47 + J    5.84  PU
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FEEDER INPUT DATA

CABLE NAME	FEEDER FROM NAME	FEEDER TO NAME	QTY /PH	VOLTS L-L	LENGTH		FEEDER SIZE	FEEDER TYPE	
CBL-0626	MCC-27	PP-SH-1	4	480	150.0	FEET	250	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.0552 + J	0.0495	Ohms/1000 ft			0.8984 + J	0.8057	PU
	Z0 Impedance:	0.1739 + J	0.1219	Ohms/1000 ft			2.83 + J	1.98	PU
CBL-0627	PP-SH-1	CENTRIFUGE# 1	1	480	175.0	FEET	350	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.0378 + J	0.0491	Ohms/1000 ft			2.87 + J	3.73	PU
	Z0 Impedance:	0.1191 + J	0.1209	Ohms/1000 ft			9.05 + J	9.18	PU
CBL-0628	PP-SH-1	CENTRIFUGE# 3	1	480	190.0	FEET	400	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.0356 + J	0.0490	Ohms/1000 ft			2.94 + J	4.04	PU
	Z0 Impedance:	0.1122 + J	0.1206	Ohms/1000 ft			9.25 + J	9.95	PU
CBL-0631	MSP-12	DS-CLARIFIER 7	1	480	85.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			43.53 + J	3.15	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			137.20 + J	7.76	PU
CBL-0632	DS-CLARIFIER 7	DS-HOIST	1	480	45.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			23.05 + J	1.67	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			72.63 + J	4.11	PU
CBL-0633	MSP-12	DS-SCUM PUMP #	1	480	70.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			56.81 + J	2.76	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			179.05 + J	6.81	PU
CBL-0634	MSP-14	MSP-12	1	480	30.0	FEET	4	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.3210 + J	0.0632	Ohms/1000 ft			4.18 + J	0.8229	PU
	Z0 Impedance:	1.01 + J	0.1556	Ohms/1000 ft			13.17 + J	2.03	PU
CBL-0635	MCC-26	BELT PRESS DIS	1	480	55.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			44.64 + J	2.17	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			140.68 + J	5.35	PU
CBL-0636	MCC-26	EAST STORAGE D	1	480	140.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			113.63 + J	5.53	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			358.11 + J	13.62	PU

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                                     FEEDER  INPUT  DATA
=============================================================================================
CABLE          FEEDER FROM     FEEDER TO         QTY  VOLTS    LENGTH              FEEDER
NAME           NAME            NAME              /PH  L-L                      SIZE       TYPE
=============================================================================================
CBL-0637       MCC-26          ET CONVEYOR 2      1    480  210.0  FEET        12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft      170.44 + J    8.29  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      537.16 + J   20.43  PU

CBL-0638       MCC-26          ET CONVEYOR 1      1    480  140.0  FEET        12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft      113.63 + J    5.53  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      358.11 + J   13.62  PU

CBL-0639       MCC-26          SOUTH BELT DIS     1    480   55.0  FEET        12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       44.64 + J    2.17  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      140.68 + J    5.35  PU

CBL-0640       MCC-26          CENTRIFUGE #2      1    480  150.0  FEET        12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft      121.74 + J    5.92  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      383.68 + J   14.59  PU

CBL-0641       MCC-26          LIME SILO #2 T     1    480  130.0  FEET        10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       66.58 + J    4.82  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      209.83 + J   11.87  PU

CBL-0642       MCC-26          CENTRIFUGE OVE     1    480   70.0  FEET         8      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.8110 + J  0.0754  Ohms/1000 ft       24.64 + J    2.29  PU
               Z0   Impedance:   2.56 + J  0.1856  Ohms/1000 ft       77.65 + J    5.64  PU

CBL-0643       MCC-26          PP-SH-2            4    480  165.0  FEET       250      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.0552 + J  0.0495  Ohms/1000 ft      0.9883 + J  0.8862  PU
               Z0   Impedance: 0.1739 + J  0.1219  Ohms/1000 ft        3.11 + J    2.18  PU

CBL-0644       PP-SH-2         SLUDGE CAKE PU     1    480  180.0  FEET       400      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.0356 + J  0.0490  Ohms/1000 ft        2.78 + J    3.83  PU
               Z0   Impedance: 0.1122 + J  0.1206  Ohms/1000 ft        8.77 + J    9.42  PU

CBL-0645       PP-SH-2         CENTRIFUGE #2      1    480  175.0  FEET       350      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.0378 + J  0.0491  Ohms/1000 ft        2.87 + J    3.73  PU
               Z0   Impedance: 0.1191 + J  0.1209  Ohms/1000 ft        9.05 + J    9.18  PU
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FEEDER INPUT DATA

CABLE NAME	FEEDER FROM NAME	FEEDER TO NAME	QTY /PH	VOLTS L-L	LENGTH		FEEDER SIZE	FEEDER TYPE	
CBL-0646	PP-SH-2	CENTRIFUGE #4	1	480	190.0	FEET	350	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.0378 + J 0.0491		Ohms/1000 ft			3.12 + J	4.05	PU
	Z0 Impedance:	0.1191 + J 0.1209		Ohms/1000 ft			9.82 + J	9.97	PU
CBL-0647	PP-SH-2	SLUDGE VALVE H	1	480	160.0	FEET	4	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.3210 + J 0.0632		Ohms/1000 ft			22.29 + J	4.39	PU
	Z0 Impedance:	1.01 + J 0.1556		Ohms/1000 ft			70.25 + J	10.81	PU
CBL-0648	MCC-28	BLOWER 3 CP	1	480	265.0	FEET	6	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.5100 + J 0.0685		Ohms/1000 ft			58.66 + J	7.88	PU
	Z0 Impedance:	1.61 + J 0.1687		Ohms/1000 ft			184.86 + J	19.40	PU
CBL-0649	MCC-28	BLOWER 4 CP	1	480	230.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J 0.0854		Ohms/1000 ft			117.80 + J	8.53	PU
	Z0 Impedance:	3.72 + J 0.2103		Ohms/1000 ft			371.23 + J	20.99	PU
CBL-0650	MCC-28	ANAEROBIC MIX	1	480	505.0	FEET	4	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.3210 + J 0.0632		Ohms/1000 ft			70.36 + J	13.85	PU
	Z0 Impedance:	1.01 + J 0.1556		Ohms/1000 ft			221.73 + J	34.11	PU
CBL-0651	MCC-28	ANAEROBIC MIX	1	480	425.0	FEET	4	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.3210 + J 0.0632		Ohms/1000 ft			59.21 + J	11.66	PU
	Z0 Impedance:	1.01 + J 0.1556		Ohms/1000 ft			186.60 + J	28.70	PU
CBL-0652	MCC-28	ANAEROBIC MIX	1	480	345.0	FEET	6	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.5100 + J 0.0685		Ohms/1000 ft			76.37 + J	10.26	PU
	Z0 Impedance:	1.61 + J 0.1687		Ohms/1000 ft			240.66 + J	25.26	PU
CBL-0653	MCC-28	ANAEROBIC MIX	1	480	265.0	FEET	6	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.5100 + J 0.0685		Ohms/1000 ft			58.66 + J	7.88	PU
	Z0 Impedance:	1.61 + J 0.1687		Ohms/1000 ft			184.86 + J	19.40	PU
CBL-0654	MCC-28	ANAEROBIC MIX	1	480	185.0	FEET	6	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.5100 + J 0.0685		Ohms/1000 ft			40.95 + J	5.50	PU
	Z0 Impedance:	1.61 + J 0.1687		Ohms/1000 ft			129.05 + J	13.55	PU

FEEDER INPUT DATA

CABLE NAME	FEEDER FROM NAME	FEEDER TO NAME	QTY /PH	VOLTS L-L	LENGTH		FEEDER SIZE	FEEDER TYPE	
CBL-0655	MCC-28	ANOXIC MIX PUM	1	480	485.0	FEET	4	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.3210 + J	0.0632	Ohms/1000 ft			67.57 + J	13.30	PU
	Z0 Impedance:	1.01 + J	0.1556	Ohms/1000 ft			212.95 + J	32.75	PU
CBL-0656	MCC-28	ANOXIC MIX PUM	1	480	405.0	FEET	4	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.3210 + J	0.0632	Ohms/1000 ft			56.43 + J	11.11	PU
	Z0 Impedance:	1.01 + J	0.1556	Ohms/1000 ft			177.82 + J	27.35	PU
CBL-0657	MCC-28	ANOXIC MIX PUM	1	480	325.0	FEET	6	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.5100 + J	0.0685	Ohms/1000 ft			71.94 + J	9.66	PU
	Z0 Impedance:	1.61 + J	0.1687	Ohms/1000 ft			226.71 + J	23.80	PU
CBL-0658	MCC-28	ANOXIC MIX PUM	1	480	245.0	FEET	6	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.5100 + J	0.0685	Ohms/1000 ft			54.23 + J	7.28	PU
	Z0 Impedance:	1.61 + J	0.1687	Ohms/1000 ft			170.90 + J	17.94	PU
CBL-0659	MCC-28	ANOXIC MIX PUM	1	480	165.0	FEET	6	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.5100 + J	0.0685	Ohms/1000 ft			36.52 + J	4.91	PU
	Z0 Impedance:	1.61 + J	0.1687	Ohms/1000 ft			115.10 + J	12.08	PU
CBL-0660	MCC-28	AERATION RECIR	1	480	535.0	FEET	8	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.8110 + J	0.0754	Ohms/1000 ft			188.32 + J	17.51	PU
	Z0 Impedance:	2.56 + J	0.1856	Ohms/1000 ft			593.49 + J	43.10	PU
CBL-0661	MCC-28	AERATION RECIR	1	480	535.0	FEET	8	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.8110 + J	0.0754	Ohms/1000 ft			188.32 + J	17.51	PU
	Z0 Impedance:	2.56 + J	0.1856	Ohms/1000 ft			593.49 + J	43.10	PU
CBL-0662	MCC-28	AERATION RECIR	1	480	375.0	FEET	8	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.8110 + J	0.0754	Ohms/1000 ft			132.00 + J	12.27	PU
	Z0 Impedance:	2.56 + J	0.1856	Ohms/1000 ft			416.00 + J	30.21	PU
CBL-0663	MCC-28	AERATION RECIR	1	480	375.0	FEET	8	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.8110 + J	0.0754	Ohms/1000 ft			132.00 + J	12.27	PU
	Z0 Impedance:	2.56 + J	0.1856	Ohms/1000 ft			416.00 + J	30.21	PU

FEEDER INPUT DATA

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=============================================================================================
CABLE          FEEDER FROM     FEEDER TO        QTY  VOLTS   LENGTH             FEEDER
NAME           NAME            NAME             /PH  L-L                   SIZE       TYPE
=============================================================================================
CBL-0664       MCC-28          AERATION RECIR   1    480  295.0  FEET        8     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.8110 + J  0.0754  Ohms/1000 ft      103.84 + J   9.65  PU
               Z0   Impedance:   2.56 + J  0.1856  Ohms/1000 ft      327.25 + J  23.76  PU

CBL-0665       MCC-28          CHANNEL MIX PU   1    480  495.0  FEET        8     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.8110 + J  0.0754  Ohms/1000 ft      174.24 + J  16.20  PU
               Z0   Impedance:   2.56 + J  0.1856  Ohms/1000 ft      549.12 + J  39.88  PU

CBL-0666       MCC-28          CHANNEL MIX PU   1    480  295.0  FEET        8     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.8110 + J  0.0754  Ohms/1000 ft      103.84 + J   9.65  PU
               Z0   Impedance:   2.56 + J  0.1856  Ohms/1000 ft      327.25 + J  23.76  PU

CBL-0667       MCC-28          BOILER CIRC PU   1    480  160.0  FEET       10     Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       81.94 + J   5.93  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      258.25 + J  14.60  PU

CBL-0668       MCC-28          BOILER CIRC PU   1    480  160.0  FEET       10     Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       81.94 + J   5.93  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      258.25 + J  14.60  PU

CBL-0669       MCC-29          BLOWER 1 CP      1    480  175.0  FEET        6     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.5100 + J  0.0685  Ohms/1000 ft       38.74 + J   5.20  PU
               Z0   Impedance:   1.61 + J  0.1687  Ohms/1000 ft      122.07 + J  12.81  PU

CBL-0670       MCC-29          BLOWER 2 CP      1    480  140.0  FEET       10     Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       71.70 + J   5.19  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      225.97 + J  12.78  PU

CBL-0671       MCC-29          ANEROBIC MIX P   1    480  260.0  FEET        4     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.3210 + J  0.0632  Ohms/1000 ft       36.22 + J   7.13  PU
               Z0   Impedance:   1.01 + J  0.1556  Ohms/1000 ft      114.16 + J  17.56  PU

CBL-0672       MCC-29          ANEROBIC MIX P   1    480  375.0  FEET        4     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.3210 + J  0.0632  Ohms/1000 ft       52.25 + J  10.29  PU
               Z0   Impedance:   1.01 + J  0.1556  Ohms/1000 ft      164.65 + J  25.33  PU
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FEEDER INPUT DATA

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==========================================================================================
CABLE          FEEDER FROM     FEEDER TO       QTY  VOLTS   LENGTH             FEEDER
NAME           NAME            NAME            /PH  L-L                    SIZE      TYPE
==========================================================================================
CBL-0673       MCC-29          ANEROBIC MIX P   1    480  490.0  FEET        4     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.3210 + J  0.0632  Ohms/1000 ft       68.27 + J   13.44  PU
               Z0   Impedance:   1.01 + J  0.1556  Ohms/1000 ft      215.14 + J   33.09  PU

CBL-0674       MCC-29          ANEROBIC MIX P   1    480  605.0  FEET        4     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.3210 + J  0.0632  Ohms/1000 ft       84.29 + J   16.60  PU
               Z0   Impedance:   1.01 + J  0.1556  Ohms/1000 ft      265.63 + J   40.86  PU

CBL-0675       MCC-29          ANOXIC MIX PUM   1    480  230.0  FEET        4     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.3210 + J  0.0632  Ohms/1000 ft       32.04 + J    6.31  PU
               Z0   Impedance:   1.01 + J  0.1556  Ohms/1000 ft      100.98 + J   15.53  PU

CBL-0676       MCC-29          ANOXIC MIX PUM   1    480  345.0  FEET        4     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.3210 + J  0.0632  Ohms/1000 ft       48.07 + J    9.46  PU
               Z0   Impedance:   1.01 + J  0.1556  Ohms/1000 ft      151.48 + J   23.30  PU

CBL-0677       MCC-29          ANOXIC MIX PUM   1    480  460.0  FEET        4     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.3210 + J  0.0632  Ohms/1000 ft       64.09 + J   12.62  PU
               Z0   Impedance:   1.01 + J  0.1556  Ohms/1000 ft      201.97 + J   31.07  PU

CBL-0678       MCC-29          ANOXIC MIX PUM   1    480  575.0  FEET        4     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.3210 + J  0.0632  Ohms/1000 ft       80.11 + J   15.77  PU
               Z0   Impedance:   1.01 + J  0.1556  Ohms/1000 ft      252.46 + J   38.83  PU

CBL-0679       MCC-29          AERATION RECIR   1    480  185.0  FEET        8     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.8110 + J  0.0754  Ohms/1000 ft       65.12 + J    6.05  PU
               Z0   Impedance:   2.56 + J  0.1856  Ohms/1000 ft      205.23 + J   14.90  PU

CBL-0680       MCC-29          AERATION RECIR   1    480  270.0  FEET        8     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.8110 + J  0.0754  Ohms/1000 ft       95.04 + J    8.84  PU
               Z0   Impedance:   2.56 + J  0.1856  Ohms/1000 ft      299.52 + J   21.75  PU

CBL-0681       MCC-29          AERATION RECIR   1    480  355.0  FEET        8     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.8110 + J  0.0754  Ohms/1000 ft      124.96 + J   11.62  PU
               Z0   Impedance:   2.56 + J  0.1856  Ohms/1000 ft      393.81 + J   28.60  PU
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FEEDER INPUT DATA

CABLE NAME	FEEDER FROM NAME	FEEDER TO NAME	QTY /PH	VOLTS L-L	LENGTH		FEEDER SIZE	FEEDER TYPE	
CBL-0682	MCC-29	AERATION RECIR	1	480	440.0	FEET	8	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.8110 + J	0.0754	Ohms/1000 ft			154.88 + J	14.40	PU
	Z0 Impedance:	2.56 + J	0.1856	Ohms/1000 ft			488.11 + J	35.44	PU
CBL-0683	MCC-29	CHANEL MIX PUM	1	480	345.0	FEET	8	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.8110 + J	0.0754	Ohms/1000 ft			121.44 + J	11.29	PU
	Z0 Impedance:	2.56 + J	0.1856	Ohms/1000 ft			382.72 + J	27.79	PU
CBL-0684	MCC-29	CHANEL MIX PUM	1	480	555.0	FEET	8	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.8110 + J	0.0754	Ohms/1000 ft			195.36 + J	18.16	PU
	Z0 Impedance:	2.56 + J	0.1856	Ohms/1000 ft			615.68 + J	44.71	PU
CBL-0685	MCC-8A	BUS-0725	1	480	200.0	FEET	500	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.0294 + J	0.0466	Ohms/1000 ft			2.55 + J	4.05	PU
	Z0 Impedance:	0.0926 + J	0.1147	Ohms/1000 ft			8.04 + J	9.96	PU
CBL-0686	BUS-0725	MIXED LIQUER P	1	480	50.0	FEET	2	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.2020 + J	0.0585	Ohms/1000 ft			4.38 + J	1.27	PU
	Z0 Impedance:	0.6366 + J	0.1440	Ohms/1000 ft			13.82 + J	3.13	PU
CBL-0687	BUS-0725	MIXED LIQUER P	1	480	50.0	FEET	2	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.2020 + J	0.0585	Ohms/1000 ft			4.38 + J	1.27	PU
	Z0 Impedance:	0.6366 + J	0.1440	Ohms/1000 ft			13.82 + J	3.13	PU
CBL-0688	BUS-0725	MIXED LIQUER P	1	480	50.0	FEET	2	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.2020 + J	0.0585	Ohms/1000 ft			4.38 + J	1.27	PU
	Z0 Impedance:	0.6366 + J	0.1440	Ohms/1000 ft			13.82 + J	3.13	PU
CBL-0689	BUS-0725	MIXED LIQUER P	1	480	50.0	FEET	2	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.2020 + J	0.0585	Ohms/1000 ft			4.38 + J	1.27	PU
	Z0 Impedance:	0.6366 + J	0.1440	Ohms/1000 ft			13.82 + J	3.13	PU
CBL-0690	MCC-15	AIR DUCT HEATE	1	480	5.0	FEET	4	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.3210 + J	0.0632	Ohms/1000 ft			0.6966 + J	0.1372	PU
	Z0 Impedance:	1.01 + J	0.1556	Ohms/1000 ft			2.20 + J	0.3377	PU

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                                FEEDER  INPUT  DATA
=============================================================================================
CABLE         FEEDER FROM     FEEDER TO       QTY  VOLTS   LENGTH           FEEDER
NAME          NAME            NAME            /PH  L-L                 SIZE       TYPE
=============================================================================================
CBL-0691      AIR DUCT HEATE  AIR DUCT HEATE   1    480    65.0  FEET       4     Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.3210 + J  0.0632  Ohms/1000 ft       9.06 + J    1.78  PU
              Z0   Impedance:   1.01 + J  0.1556  Ohms/1000 ft      28.54 + J    4.39  PU

CBL-0692      MCC-15          CHILLER #1       1    480    50.0  FEET       2     Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.2020 + J  0.0585  Ohms/1000 ft       4.38 + J    1.27  PU
              Z0   Impedance: 0.6366 + J  0.1440  Ohms/1000 ft      13.82 + J    3.13  PU

CBL-0693      MCC-15          LAB STILL        1    480    95.0  FEET       4     Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.3210 + J  0.0632  Ohms/1000 ft      13.24 + J    2.61  PU
              Z0   Impedance:   1.01 + J  0.1556  Ohms/1000 ft      41.71 + J    6.42  PU

CBL-0694      MCC-15          HVAC UNIT A      1    480   105.0  FEET      10     Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft      53.78 + J    3.89  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft     169.48 + J    9.58  PU

CBL-0695      MCC-15          HVAC UNIT B      1    480    80.0  FEET      10     Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft      40.97 + J    2.97  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft     129.13 + J    7.30  PU

CBL-0696      MCC-15          BUS-0732         1    480    15.0  FEET       2     Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.2020 + J  0.0585  Ohms/1000 ft       1.32 + J  0.3809  PU
              Z0   Impedance: 0.6366 + J  0.1440  Ohms/1000 ft       4.14 + J  0.9375  PU

CBL-0697      BUS-0732        DS-MCC-15 AC U   1    480     5.0  FEET       6     Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.5100 + J  0.0685  Ohms/1000 ft       1.11 + J  0.1487  PU
              Z0   Impedance:   1.61 + J  0.1687  Ohms/1000 ft       3.49 + J  0.3661  PU

CBL-0698      BUS-0732        DS-MCC-15 BATT   1    480     5.0  FEET       6     Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.5100 + J  0.0685  Ohms/1000 ft       1.11 + J  0.1487  PU
              Z0   Impedance:   1.61 + J  0.1687  Ohms/1000 ft       3.49 + J  0.3661  PU

CBL-0699      MIXED LIQUER P  MIXED LIQUER P   1    480    15.0  FEET       2     Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.2020 + J  0.0585  Ohms/1000 ft       1.32 + J  0.3809  PU
              Z0   Impedance: 0.6366 + J  0.1440  Ohms/1000 ft       4.14 + J  0.9375  PU
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                                        FEEDER  INPUT  DATA
=============================================================================================
CABLE         FEEDER FROM     FEEDER TO       QTY  VOLTS   LENGTH             FEEDER
NAME          NAME            NAME            /PH  L-L                     SIZE      TYPE
=============================================================================================
CBL-0700      MSP-14          DS-MIXED LIQUO   1    480    30.0  FEET        4     Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.3210 + J  0.0632  Ohms/1000 ft       4.18 + J  0.8229  PU
              Z0   Impedance:   1.01 + J  0.1556  Ohms/1000 ft      13.17 + J    2.03  PU

CBL-0701      MSP-14          NORTH LOT POWE   1    480    30.0  FEET        4     Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.3210 + J  0.0632  Ohms/1000 ft       4.18 + J  0.8229  PU
              Z0   Impedance:   1.01 + J  0.1556  Ohms/1000 ft      13.17 + J    2.03  PU

CBL-0702      DS-MCC-8-PUMPS  DS-MCC8 PRI TH   1    480    75.0  FEET       10     Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft      38.41 + J    2.78  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft     121.05 + J    6.85  PU

CBL-0703      DS-MCC-8-PUMPS  DS-MCC8 PRI TH   1    480    85.0  FEET       10     Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft      43.53 + J    3.15  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft     137.20 + J    7.76  PU

CBL-0704      DS-MCC-8-PUMPS  DS-MCC8 THICKE   1    480    50.0  FEET        6     Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.5100 + J  0.0685  Ohms/1000 ft      11.07 + J    1.49  PU
              Z0   Impedance:   1.61 + J  0.1687  Ohms/1000 ft      34.88 + J    3.66  PU

CBL-0705      DS-GEN 2        BUS-0288         2    480    60.0  FEET      600     Copper
              Duct Material: Non-Magnetic
              +/-  Impedance: 0.0237 + J  0.0371  Ohms/1000 ft     0.3086 + J  0.4831  PU
              Z0   Impedance: 0.0376 + J  0.0943  Ohms/1000 ft     0.4896 + J    1.23  PU

CBL-0706      MCC-1           EHU-BS-3         1    480   125.0  FEET        8     Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.8110 + J  0.0754  Ohms/1000 ft      44.00 + J    4.09  PU
              Z0   Impedance:   2.56 + J  0.1856  Ohms/1000 ft     138.67 + J   10.07  PU

CBL-0707      MCC-1           EHU-BS-4         1    480   150.0  FEET       10     Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft      76.82 + J    5.56  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft     242.11 + J   13.69  PU

CBL-0708      MCC-1           EHU-BS-5         1    480   150.0  FEET       10     Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft      76.82 + J    5.56  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft     242.11 + J   13.69  PU
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FEEDER INPUT DATA

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==========================================================================================
CABLE          FEEDER FROM     FEEDER TO        QTY  VOLTS   LENGTH            FEEDER
NAME           NAME            NAME             /PH  L-L                    SIZE       TYPE
==========================================================================================
CBL-0709       DS-SEWAGE PUMP  VFD-PUMP 4        2    480    10.0  FEET      1/0    Aluminum
               Duct Material:     Magnetic
               +/-  Impedance: 0.2100 + J  0.0430  Ohms/1000 ft      0.4557 + J  0.0933  PU
               Z0   Impedance: 0.6618 + J  0.1059  Ohms/1000 ft        1.44 + J  0.2298  PU

CBL-0710       VFD-PUMP 4      BUS-1025          2    480    90.0  FEET      250      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.0552 + J  0.0495  Ohms/1000 ft        1.08 + J  0.9668  PU
               Z0   Impedance: 0.1739 + J  0.1219  Ohms/1000 ft        3.40 + J    2.38  PU

CBL-0711       MIXED LIQUER P  MIXED LIQUER P   1    480    15.0  FEET        2      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.2020 + J  0.0585  Ohms/1000 ft        1.32 + J  0.3809  PU
               Z0   Impedance: 0.6366 + J  0.1440  Ohms/1000 ft        4.14 + J  0.9375  PU

CBL-0712       MIXED LIQUER P  MIXED LIQUER P   1    480    10.0  FEET        2      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.2020 + J  0.0585  Ohms/1000 ft      0.8767 + J  0.2539  PU
               Z0   Impedance: 0.6366 + J  0.1440  Ohms/1000 ft        2.76 + J  0.6250  PU

CBL-0713       MIXED LIQUER P  MIXED LIQUER P   1    480    10.0  FEET        2      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.2020 + J  0.0585  Ohms/1000 ft      0.8767 + J  0.2539  PU
               Z0   Impedance: 0.6366 + J  0.1440  Ohms/1000 ft        2.76 + J  0.6250  PU

CBL-0721       BUS-0754        06-LP-01          2    208    20.0  FEET      250      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.0552 + J  0.0495  Ohms/1000 ft        1.28 + J    1.14  PU
               Z0   Impedance: 0.1739 + J  0.1219  Ohms/1000 ft        4.02 + J    2.82  PU

CBL-0722       20A-PP-1        S.E. HEAT         1    480    95.0  FEET       12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       77.11 + J    3.75  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      243.00 + J    9.24  PU

CBL-0723       20A-PP-1        N.W. HEAT         1    480    10.0  FEET       12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft        8.12 + J  0.3950  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft       25.58 + J  0.9727  PU

CBL-0724       20A-PP-1        PP-1 EXHAUST F   1    480   100.0  FEET       12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       81.16 + J    3.95  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      255.79 + J    9.73  PU
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FEEDER INPUT DATA

CABLE NAME	FEEDER FROM NAME	FEEDER TO NAME	QTY /PH	VOLTS L-L	LENGTH		FEEDER SIZE	FEEDER TYPE	
CBL-0725	PP-1 EXHAUST F	PP-1-EF-1	1	480	45.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			36.52 + J	1.78	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			115.11 + J	4.38	PU
CBL-0726	PP-1-EF-1	BUS-0766	1	480	45.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			36.52 + J	1.78	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			115.11 + J	4.38	PU
CBL-0727	PP-1 EXHAUST F	PP-1-EF-2	1	480	65.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			52.76 + J	2.57	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			166.26 + J	6.32	PU
CBL-0728	PP-1-EF-2	BUS-0767	1	480	25.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			20.29 + J	0.9874	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			63.95 + J	2.43	PU
CBL-0729	PP-1 EXHAUST F	PP-1-EF-3	1	480	75.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			60.87 + J	2.96	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			191.84 + J	7.29	PU
CBL-0730	PP-1-EF-3	BUS-0768	1	480	25.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			20.29 + J	0.9874	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			63.95 + J	2.43	PU
CBL-0731	20A-PP-1	BUS-0771	1	480	5.0	FEET	8	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.8110 + J	0.0754	Ohms/1000 ft			1.76 + J	0.1636	PU
	Z0 Impedance:	2.56 + J	0.1856	Ohms/1000 ft			5.55 + J	0.4028	PU
CBL-0732	20A-PP-1	PUMP CONTROL P	1	480	35.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			17.93 + J	1.30	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			56.49 + J	3.19	PU
CBL-0733	PUMP CONTROL P	PP-1 TRANSFER	1	480	35.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			28.41 + J	1.38	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			89.53 + J	3.40	PU

FEEDER INPUT DATA

CABLE NAME	FEEDER FROM NAME	FEEDER TO NAME	QTY /PH	VOLTS L-L	LENGTH		FEEDER SIZE	FEEDER TYPE	
CBL-0734	PP-1 TRANSFER	BUS-0769	1	480	30.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			24.35 + J	1.18	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			76.74 + J	2.92	PU
CBL-0735	PUMP CONTROL P	PP-1 TRANSFER	1	480	35.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			28.41 + J	1.38	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			89.53 + J	3.40	PU
CBL-0736	PP-1 TRANSFER	BUS-0770	1	480	25.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			20.29 + J	0.9874	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			63.95 + J	2.43	PU
CBL-0737	20A-PP-1	BUS-0772	1	480	25.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			20.29 + J	0.9874	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			63.95 + J	2.43	PU
CBL-0738	LC-5	MCC-00	2	480	245.0	FEET	3/0	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.0805 + J	0.0519	Ohms/1000 ft			4.28 + J	2.76	PU
	Z0 Impedance:	0.2537 + J	0.1278	Ohms/1000 ft			13.49 + J	6.79	PU
CBL-0739	MCC-00	BUS-0779	1	480	90.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			46.09 + J	3.34	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			145.27 + J	8.21	PU
CBL-0740	BUS-0779	BUS-0780	1	480	135.0	FEET	8	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.8110 + J	0.0754	Ohms/1000 ft			47.52 + J	4.42	PU
	Z0 Impedance:	2.56 + J	0.1856	Ohms/1000 ft			149.76 + J	10.88	PU
CBL-0741	BUS-0780	DIVERSION CHAM	1	480	20.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			16.23 + J	0.7899	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			51.16 + J	1.95	PU
CBL-0742	MCC-00	BUS-0781	1	480	90.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			46.09 + J	3.34	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			145.27 + J	8.21	PU

FEEDER INPUT DATA

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==============================================================================================
CABLE          FEEDER FROM     FEEDER TO        QTY  VOLTS   LENGTH            FEEDER
NAME           NAME            NAME             /PH  L-L                  SIZE        TYPE
==============================================================================================
CBL-0743       BUS-0781        BUS-0782          1    480  135.0  FEET       8      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.8110 + J  0.0754  Ohms/1000 ft      47.52 + J   4.42  PU
               Z0   Impedance:   2.56 + J  0.1856  Ohms/1000 ft     149.76 + J  10.88  PU

CBL-0744       BUS-0782        DIVERSION CHAM    1    480  265.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft     135.72 + J   9.82  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft     427.73 + J  24.19  PU

CBL-0745       MCC-00          BLOWER ROOM       1    480  145.0  FEET     1/0      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.1280 + J  0.0540  Ohms/1000 ft       8.06 + J   3.40  PU
               Z0   Impedance: 0.4034 + J  0.1329  Ohms/1000 ft      25.39 + J   8.36  PU

CBL-0746       BLOWER ROOM     BUS-0786          1    480    5.0  FEET      12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       4.06 + J 0.1975  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      12.79 + J 0.4863  PU

CBL-0747       BLOWER ROOM     MCC-00-AIR COM    1    480    5.0  FEET      12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       4.06 + J 0.1975  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      12.79 + J 0.4863  PU

CBL-0748       MCC-00          20A-PP-01         1    480  140.0  FEET     3/0      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.0805 + J  0.0519  Ohms/1000 ft       4.89 + J   3.15  PU
               Z0   Impedance: 0.2537 + J  0.1278  Ohms/1000 ft      15.42 + J   7.77  PU

CBL-0749       MCC-00          INFLUENT PUMPS    1    480   75.0  FEET       8      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.8110 + J  0.0754  Ohms/1000 ft      26.40 + J   2.45  PU
               Z0   Impedance:   2.56 + J  0.1856  Ohms/1000 ft      83.20 + J   6.04  PU

CBL-0750       INFLUENT PUMPS  SOUTH SEC. INF    1    480   50.0  FEET      12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft      40.58 + J   1.97  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft     127.89 + J   4.86  PU

CBL-0751       INFLUENT PUMPS  SOUTH SEC. INF    1    480   50.0  FEET      12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft      40.58 + J   1.97  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft     127.89 + J   4.86  PU
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FEEDER INPUT DATA

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==========================================================================================
CABLE          FEEDER FROM     FEEDER TO        QTY  VOLTS   LENGTH              FEEDER
NAME           NAME            NAME             /PH  L-L                    SIZE       TYPE
==========================================================================================
CBL-0752       MCC-00          MCC-00 BACKWAS    1    480   75.0  FEET        6     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.5100 + J  0.0685  Ohms/1000 ft       16.60 + J   2.23  PU
               Z0   Impedance:   1.61 + J  0.1687  Ohms/1000 ft       52.32 + J   5.49  PU

CBL-0753       MCC-00 BACKWAS  NORTH CELL        1    480   45.0  FEET       12     Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       36.52 + J   1.78  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      115.11 + J   4.38  PU

CBL-0754       MCC-00 BACKWAS  CENTER CELL       1    480   45.0  FEET       12     Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       36.52 + J   1.78  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      115.11 + J   4.38  PU

CBL-0755       MCC-00 BACKWAS  SOUTH CELL        1    480   45.0  FEET       12     Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       36.52 + J   1.78  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      115.11 + J   4.38  PU

CBL-0756       MCC-00          DS-ANOXIC TANK    1    480   75.0  FEET       10     Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       38.41 + J   2.78  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      121.05 + J   6.85  PU

CBL-0757       DS-ANOXIC TANK  BUS-0797          1    480   50.0  FEET       12     Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       40.58 + J   1.97  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      127.89 + J   4.86  PU

CBL-0758       MCC-00          DS-POLYMER MIX    1    480   75.0  FEET       10     Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       38.41 + J   2.78  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      121.05 + J   6.85  PU

CBL-0759       MCC-00          BUS-0800          1    480    5.0  FEET        4     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.3210 + J  0.0632  Ohms/1000 ft      0.6966 + J 0.1372  PU
               Z0   Impedance:   1.01 + J  0.1556  Ohms/1000 ft        2.20 + J 0.3377  PU

CBL-0760       MCC-00          MCC-00 OHD DOO    1    480   80.0  FEET       12     Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       64.93 + J   3.16  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      204.63 + J   7.78  PU
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                                         FEEDER  INPUT  DATA
===========================================================================================
CABLE         FEEDER FROM     FEEDER TO       QTY  VOLTS   LENGTH           FEEDER
NAME          NAME            NAME            /PH  L-L                  SIZE        TYPE
===========================================================================================
CBL-0761      MCC-00          DS-STREET LIGH   1    480    90.0  FEET      10     Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       46.09 + J    3.34  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      145.27 + J    8.21  PU

CBL-0762      DS-STREET LIGH  STREET LIGHT     1    480   530.0  FEET       8     Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.8110 + J  0.0754  Ohms/1000 ft      186.56 + J   17.34  PU
              Z0   Impedance:   2.56 + J  0.1856  Ohms/1000 ft      587.95 + J   42.69  PU

CBL-0763      MCC-00          DS CLARIFIERS    1    480    75.0  FEET      10     Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       38.41 + J    2.78  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      121.05 + J    6.85  PU

CBL-0764      DS CLARIFIERS   SOUTH SEC. CLA   1    480    25.0  FEET      12     Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       20.29 + J  0.9874  PU
              Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft       63.95 + J    2.43  PU

CBL-0765      DS CLARIFIERS   SOUTH SEC. CLA   1    480    25.0  FEET      12     Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       20.29 + J  0.9874  PU
              Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft       63.95 + J    2.43  PU

CBL-0766      MCC-00          RAS PUMPS        1    480    75.0  FEET       6     Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.5100 + J  0.0685  Ohms/1000 ft       16.60 + J    2.23  PU
              Z0   Impedance:   1.61 + J  0.1687  Ohms/1000 ft       52.32 + J    5.49  PU

CBL-0767      RAS PUMPS       DS-RAS PUMP #1   1    480    15.0  FEET      12     Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       12.17 + J  0.5924  PU
              Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft       38.37 + J    1.46  PU

CBL-0768      RAS PUMPS       DS-RAS PUMP #2   1    480    15.0  FEET      12     Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       12.17 + J  0.5924  PU
              Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft       38.37 + J    1.46  PU

CBL-0769      RAS PUMPS       DS-RAS PUMP #3   1    480    15.0  FEET      12     Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       12.17 + J  0.5924  PU
              Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft       38.37 + J    1.46  PU
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FEEDER INPUT DATA

CABLE NAME	FEEDER FROM NAME	FEEDER TO NAME	QTY /PH	VOLTS L-L	LENGTH		FEEDER SIZE	FEEDER TYPE
CBL-0770	DS-SLUDGE PUMP	SOUTH SEC. PUM	1	480	35.0	FEET	12	Copper
	Duct Material:	Magnetic						
	+/- Impedance:	1.87 + J 0.0910		Ohms/1000 ft			28.41 + J	1.38 PU
	Z0 Impedance:	5.89 + J 0.2241		Ohms/1000 ft			89.53 + J	3.40 PU
CBL-0771	DS-SLUDGE PUMP	NORTH SEC. PUM	1	480	35.0	FEET	12	Copper
	Duct Material:	Magnetic						
	+/- Impedance:	1.87 + J 0.0910		Ohms/1000 ft			28.41 + J	1.38 PU
	Z0 Impedance:	5.89 + J 0.2241		Ohms/1000 ft			89.53 + J	3.40 PU
CBL-0772	MCC-00	DS-SLUDGE PUMP	1	480	75.0	FEET	8	Copper
	Duct Material:	Magnetic						
	+/- Impedance:	0.8110 + J 0.0754		Ohms/1000 ft			26.40 + J	2.45 PU
	Z0 Impedance:	2.56 + J 0.1856		Ohms/1000 ft			83.20 + J	6.04 PU
CBL-0773	06-LP-01	06-LP-02	1	208	30.0	FEET	2/0	Copper
	Duct Material:	Magnetic						
	+/- Impedance:	0.1020 + J 0.0533		Ohms/1000 ft			7.07 + J	3.70 PU
	Z0 Impedance:	0.3214 + J 0.1312		Ohms/1000 ft			22.29 + J	9.10 PU
CBL-0774	MCC-10	DS-SLUDGE TANK	1	480	150.0	FEET	12	Copper
	Duct Material:	Magnetic						
	+/- Impedance:	1.87 + J 0.0910		Ohms/1000 ft			121.74 + J	5.92 PU
	Z0 Impedance:	5.89 + J 0.2241		Ohms/1000 ft			383.68 + J	14.59 PU
CBL-0775	MCC-10	DS-GSST MIXER	1	480	180.0	FEET	4	Copper
	Duct Material:	Magnetic						
	+/- Impedance:	0.3210 + J 0.0632		Ohms/1000 ft			25.08 + J	4.94 PU
	Z0 Impedance:	1.01 + J 0.1556		Ohms/1000 ft			79.03 + J	12.16 PU
CBL-0776	DS-GSST MIXER	BUS-0816	1	480	20.0	FEET	10	Copper
	Duct Material:	Magnetic						
	+/- Impedance:	1.18 + J 0.0854		Ohms/1000 ft			10.24 + J	0.7413 PU
	Z0 Impedance:	3.72 + J 0.2103		Ohms/1000 ft			32.28 + J	1.83 PU
CBL-0777	DS-GSST MIXER	BUS-0817	1	480	20.0	FEET	10	Copper
	Duct Material:	Magnetic						
	+/- Impedance:	1.18 + J 0.0854		Ohms/1000 ft			10.24 + J	0.7413 PU
	Z0 Impedance:	3.72 + J 0.2103		Ohms/1000 ft			32.28 + J	1.83 PU
CBL-0778	MCC-10	DS- CENT. FEED	1	480	180.0	FEET	4	Copper
	Duct Material:	Magnetic						
	+/- Impedance:	0.3210 + J 0.0632		Ohms/1000 ft			25.08 + J	4.94 PU
	Z0 Impedance:	1.01 + J 0.1556		Ohms/1000 ft			79.03 + J	12.16 PU

FEEDER INPUT DATA

CABLE NAME	FEEDER FROM NAME	FEEDER TO NAME	QTY /PH	VOLTS L-L	LENGTH		FEEDER SIZE		FEEDER TYPE	
CBL-0779	DS- CENT. FEED	BUS-0818	1	480	20.0	FEET	10		Copper	
	Duct Material:	Magnetic								
	+/- Impedance:	1.18 + J 0.0854			Ohms/1000 ft		10.24 + J		0.7413	PU
	Z0 Impedance:	3.72 + J 0.2103			Ohms/1000 ft		32.28 + J		1.83	PU
CBL-0780	DS- CENT. FEED	BUS-0819	1	480	20.0	FEET	10		Copper	
	Duct Material:	Magnetic								
	+/- Impedance:	1.18 + J 0.0854			Ohms/1000 ft		10.24 + J		0.7413	PU
	Z0 Impedance:	3.72 + J 0.2103			Ohms/1000 ft		32.28 + J		1.83	PU
CBL-0781	MCC-10	DS-3 AUX. INST	1	480	200.0	FEET	12		Copper	
	Duct Material:	Magnetic								
	+/- Impedance:	1.87 + J 0.0910			Ohms/1000 ft		162.33 + J		7.90	PU
	Z0 Impedance:	5.89 + J 0.2241			Ohms/1000 ft		511.58 + J		19.45	PU
CBL-0782	MCC-10	DS-BYPASS CONV	1	480	80.0	FEET	12		Copper	
	Duct Material:	Magnetic								
	+/- Impedance:	1.87 + J 0.0910			Ohms/1000 ft		64.93 + J		3.16	PU
	Z0 Impedance:	5.89 + J 0.2241			Ohms/1000 ft		204.63 + J		7.78	PU
CBL-0783	MCC-10	DS-SYSTEM AIR	1	480	200.0	FEET	12		Copper	
	Duct Material:	Magnetic								
	+/- Impedance:	1.87 + J 0.0910			Ohms/1000 ft		162.33 + J		7.90	PU
	Z0 Impedance:	5.89 + J 0.2241			Ohms/1000 ft		511.58 + J		19.45	PU
CBL-0784	MCC-10	DS-SYSTEM AIR	1	480	200.0	FEET	12		Copper	
	Duct Material:	Magnetic								
	+/- Impedance:	1.87 + J 0.0910			Ohms/1000 ft		162.33 + J		7.90	PU
	Z0 Impedance:	5.89 + J 0.2241			Ohms/1000 ft		511.58 + J		19.45	PU
CBL-0785	MCC-10	DS-CENTRIFUGE	1	480	200.0	FEET	8		Copper	
	Duct Material:	Magnetic								
	+/- Impedance:	0.8110 + J 0.0754			Ohms/1000 ft		70.40 + J		6.55	PU
	Z0 Impedance:	2.56 + J 0.1856			Ohms/1000 ft		221.87 + J		16.11	PU
CBL-0786	DS-CENTRIFUGE	BUS-0827	1	480	200.0	FEET	10		Copper	
	Duct Material:	Magnetic								
	+/- Impedance:	1.18 + J 0.0854			Ohms/1000 ft		102.43 + J		7.41	PU
	Z0 Impedance:	3.72 + J 0.2103			Ohms/1000 ft		322.81 + J		18.26	PU
CBL-0787	MCC-10	SOUTH BELT PUM	1	480	210.0	FEET	10		Copper	
	Duct Material:	Magnetic								
	+/- Impedance:	1.18 + J 0.0854			Ohms/1000 ft		107.55 + J		7.78	PU
	Z0 Impedance:	3.72 + J 0.2103			Ohms/1000 ft		338.95 + J		19.17	PU

FEEDER INPUT DATA

CABLE NAME	FEEDER FROM NAME	FEEDER TO NAME	QTY /PH	VOLTS L-L	LENGTH		FEEDER SIZE	FEEDER TYPE	
CBL-0788	SOUTH BELT PUM	VFD-SOUTH BELT	1	480	30.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J 0.0854			Ohms/1000 ft		15.36 + J	1.11	PU
	Z0 Impedance:	3.72 + J 0.2103			Ohms/1000 ft		48.42 + J	2.74	PU
CBL-0789	VFD-SOUTH BELT	BUS-0831	1	480	180.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J 0.0854			Ohms/1000 ft		92.19 + J	6.67	PU
	Z0 Impedance:	3.72 + J 0.2103			Ohms/1000 ft		290.53 + J	16.43	PU
CBL-0790	SOUTH BELT PUM	VFD-SOUTH BELT	1	480	30.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J 0.0854			Ohms/1000 ft		15.36 + J	1.11	PU
	Z0 Impedance:	3.72 + J 0.2103			Ohms/1000 ft		48.42 + J	2.74	PU
CBL-0791	VFD-SOUTH BELT	BUS-0832	1	480	180.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J 0.0854			Ohms/1000 ft		92.19 + J	6.67	PU
	Z0 Impedance:	3.72 + J 0.2103			Ohms/1000 ft		290.53 + J	16.43	PU
CBL-0792	MCC-10	DS- NORTH BELT	1	480	200.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J 0.0854			Ohms/1000 ft		102.43 + J	7.41	PU
	Z0 Impedance:	3.72 + J 0.2103			Ohms/1000 ft		322.81 + J	18.26	PU
CBL-0793	DS- NORTH BELT	DS-NORTH BELT	1	480	20.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J 0.0854			Ohms/1000 ft		10.24 + J	0.7413	PU
	Z0 Impedance:	3.72 + J 0.2103			Ohms/1000 ft		32.28 + J	1.83	PU
CBL-0794	DS- NORTH BELT	DS-NORTH BELT	1	480	20.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J 0.0854			Ohms/1000 ft		10.24 + J	0.7413	PU
	Z0 Impedance:	3.72 + J 0.2103			Ohms/1000 ft		32.28 + J	1.83	PU
CBL-0795	MCC-10	DS-SOUTH BELT	1	480	200.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J 0.0854			Ohms/1000 ft		102.43 + J	7.41	PU
	Z0 Impedance:	3.72 + J 0.2103			Ohms/1000 ft		322.81 + J	18.26	PU
CBL-0796	DS-SOUTH BELT	DS-SOUTH BELT	1	480	20.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J 0.0854			Ohms/1000 ft		10.24 + J	0.7413	PU
	Z0 Impedance:	3.72 + J 0.2103			Ohms/1000 ft		32.28 + J	1.83	PU

FEEDER INPUT DATA

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==========================================================================================
CABLE          FEEDER FROM     FEEDER TO        QTY  VOLTS   LENGTH            FEEDER
NAME           NAME            NAME             /PH  L-L                  SIZE       TYPE
==========================================================================================
CBL-0797       DS-SOUTH BELT   DS-SOUTH BELT     1    480    20.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       10.24 + J  0.7413  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       32.28 + J    1.83  PU

CBL-0798       MCC-10          DS-EXISTING CR    1    480   100.0  FEET      12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       81.16 + J    3.95  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      255.79 + J    9.73  PU

CBL-0799       MCC-10          DS-NEW CRANE      1    480   100.0  FEET      12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       81.16 + J    3.95  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      255.79 + J    9.73  PU

CBL-0800       MCC-10          DS-NORTH BOOST    1    480   165.0  FEET       2      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.2020 + J  0.0585  Ohms/1000 ft       14.47 + J    4.19  PU
               Z0   Impedance: 0.6366 + J  0.1440  Ohms/1000 ft       45.59 + J   10.31  PU

CBL-0801       DS-NORTH BOOST  DS-NORTH BOOST    1    480     5.0  FEET       6      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.5100 + J  0.0685  Ohms/1000 ft        1.11 + J  0.1487  PU
               Z0   Impedance:   1.61 + J  0.1687  Ohms/1000 ft        3.49 + J  0.3661  PU

CBL-0802       DS-NORTH BOOST  DS-NORTH BOOST    1    480     5.0  FEET       6      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.5100 + J  0.0685  Ohms/1000 ft        1.11 + J  0.1487  PU
               Z0   Impedance:   1.61 + J  0.1687  Ohms/1000 ft        3.49 + J  0.3661  PU

CBL-0803       MCC-10          DS-GROUND SLUD    1    480   170.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       87.07 + J    6.30  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      274.39 + J   15.52  PU

CBL-0804       06-LP-01        06-LP-03          1    208    50.0  FEET     2/0      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.1020 + J  0.0533  Ohms/1000 ft       11.79 + J    6.16  PU
               Z0   Impedance: 0.3214 + J  0.1312  Ohms/1000 ft       37.14 + J   15.16  PU

CBL-0805       06-LP-01        06-LP-04          1    208    60.0  FEET       6      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.5100 + J  0.0685  Ohms/1000 ft       70.73 + J    9.50  PU
               Z0   Impedance:   1.61 + J  0.1687  Ohms/1000 ft      222.89 + J   23.40  PU
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                                            FEEDER  INPUT  DATA
=============================================================================================
CABLE         FEEDER FROM     FEEDER TO        QTY  VOLTS   LENGTH             FEEDER
NAME          NAME            NAME             /PH  L-L                     SIZE       TYPE
=============================================================================================
CBL-0806      MCC-25          DS-MAU-SH-1       1    480  200.0  FEET       10      Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft      102.43 + J    7.41  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      322.81 + J   18.26  PU

CBL-0807      MCC-25          DS-MAU-SH-2       1    480  225.0  FEET        6      Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.5100 + J  0.0685  Ohms/1000 ft       49.80 + J    6.69  PU
              Z0   Impedance:   1.61 + J  0.1687  Ohms/1000 ft      156.95 + J   16.47  PU

CBL-0808      MCC-25          DS-MAU-SH-3       1    480  175.0  FEET       10      Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       89.63 + J    6.49  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      282.46 + J   15.97  PU

CBL-0809      MCC-25          DS-AMMONIA REM    1    480  150.0  FEET      1/0      Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.1280 + J  0.0540  Ohms/1000 ft        8.33 + J    3.52  PU
              Z0   Impedance: 0.4034 + J  0.1329  Ohms/1000 ft       26.26 + J    8.65  PU

CBL-0810      DS-AMMONIA REM  BUS-0850          1    480   20.0  FEET      1/0      Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.1280 + J  0.0540  Ohms/1000 ft        1.11 + J  0.4688  PU
              Z0   Impedance: 0.4034 + J  0.1329  Ohms/1000 ft        3.50 + J    1.15  PU

CBL-0811      MCC-25          DS-AMMONIA REM    1    480  150.0  FEET      1/0      Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.1280 + J  0.0540  Ohms/1000 ft        8.33 + J    3.52  PU
              Z0   Impedance: 0.4034 + J  0.1329  Ohms/1000 ft       26.26 + J    8.65  PU

CBL-0812      DS-AMMONIA REM  BUS-0851          1    480   20.0  FEET      1/0      Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.1280 + J  0.0540  Ohms/1000 ft        1.11 + J  0.4688  PU
              Z0   Impedance: 0.4034 + J  0.1329  Ohms/1000 ft        3.50 + J    1.15  PU

CBL-0813      MCC-25          DS-EF-2A          1    480   85.0  FEET       12      Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       68.99 + J    3.36  PU
              Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      217.42 + J    8.27  PU

CBL-0814      DS-EF-2A        BUS-0852          1    480   10.0  FEET       12      Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft        8.12 + J  0.3950  PU
              Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft       25.58 + J  0.9727  PU
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                                  FEEDER  INPUT  DATA
==========================================================================================
CABLE          FEEDER FROM     FEEDER TO        QTY  VOLTS   LENGTH             FEEDER
NAME           NAME            NAME             /PH  L-L                    SIZE      TYPE
==========================================================================================
CBL-0815       MCC-25          DS-EF-2A CAP      1    480     5.0  FEET      12     Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       4.06 + J  0.1975  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      12.79 + J  0.4863  PU

CBL-0816       MCC-25          DS-EF-2B          1    480    75.0  FEET      12     Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft      60.87 + J    2.96  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft     191.84 + J    7.29  PU

CBL-0817       DS-EF-2B        BUS-0853          1    480    10.0  FEET      12     Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       8.12 + J  0.3950  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      25.58 + J  0.9727  PU

CBL-0818       MCC-25          DS-EF-2B CAP      1    480     5.0  FEET      12     Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       4.06 + J  0.1975  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      12.79 + J  0.4863  PU

CBL-0819       MCC-25          DS-EF-1 CAP       1    480     5.0  FEET       6     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.5100 + J  0.0685  Ohms/1000 ft       1.11 + J  0.1487  PU
               Z0   Impedance:   1.61 + J  0.1687  Ohms/1000 ft       3.49 + J  0.3661  PU

CBL-0820       MCC-25          DS-EF-2C          1    480    65.0  FEET      12     Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft      52.76 + J    2.57  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft     166.26 + J    6.32  PU

CBL-0821       DS-EF-2C        BUS-0854          1    480    10.0  FEET      12     Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       8.12 + J  0.3950  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      25.58 + J  0.9727  PU

CBL-0822       MCC-25          DS-EF-2C CAP      1    480     5.0  FEET      12     Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       4.06 + J  0.1975  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      12.79 + J  0.4863  PU

CBL-0823       MCC-25          DS-MCC-25-SF-4    1    480   100.0  FEET      12     Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft      81.16 + J    3.95  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft     255.79 + J    9.73  PU
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FEEDER INPUT DATA

CABLE NAME	FEEDER FROM NAME	FEEDER TO NAME	QTY /PH	VOLTS L-L	LENGTH		FEEDER SIZE	FEEDER TYPE	
CBL-0824	MCC-25	BUS-0865	1	480	40.0	FEET	6	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.5100 + J	0.0685	Ohms/1000 ft			8.85 + J	1.19	PU
	Z0 Impedance:	1.61 + J	0.1687	Ohms/1000 ft			27.90 + J	2.93	PU
CBL-0825	BUS-0866	2-LP-1	1	208	5.0	FEET	4/0	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.0640 + J	0.0497	Ohms/1000 ft			0.7396 + J	0.5744	PU
	Z0 Impedance:	0.2017 + J	0.1224	Ohms/1000 ft			2.33 + J	1.41	PU
CBL-0826	MCC-25	BUS-0867	1	480	175.0	FEET	6	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.5100 + J	0.0685	Ohms/1000 ft			38.74 + J	5.20	PU
	Z0 Impedance:	1.61 + J	0.1687	Ohms/1000 ft			122.07 + J	12.81	PU
CBL-0827	BUS-0868	2-LP-2	1	208	5.0	FEET	4/0	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.0640 + J	0.0497	Ohms/1000 ft			0.7396 + J	0.5744	PU
	Z0 Impedance:	0.2017 + J	0.1224	Ohms/1000 ft			2.33 + J	1.41	PU
CBL-0828	MCC-25	DS-EF-5A	1	480	165.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			133.92 + J	6.52	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			422.05 + J	16.05	PU
CBL-0829	DS-EF-5A	BUS-0855	1	480	10.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			8.12 + J	0.3950	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			25.58 + J	0.9727	PU
CBL-0830	MCC-25	DS-EF-5A CAP	1	480	5.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			4.06 + J	0.1975	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			12.79 + J	0.4863	PU
CBL-0831	MCC-25	DS-EF-5B	1	480	140.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			113.63 + J	5.53	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			358.11 + J	13.62	PU
CBL-0832	DS-EF-5B	BUS-0856	1	480	10.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			8.12 + J	0.3950	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			25.58 + J	0.9727	PU

FEEDER INPUT DATA

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==============================================================================================
CABLE         FEEDER FROM     FEEDER TO        QTY  VOLTS   LENGTH              FEEDER
NAME          NAME            NAME             /PH  L-L                      SIZE      TYPE
==============================================================================================
CBL-0833      MCC-25          DS-EF-5B CAP      1    480      5.0  FEET        12      Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft       4.06 + J  0.1975  PU
              Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft      12.79 + J  0.4863  PU

CBL-0834      MCC-25          BUS-0869          1    480  175.0  FEET         6      Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.5100 + J  0.0685  Ohms/1000 ft      38.74 + J    5.20  PU
              Z0   Impedance:   1.61 + J  0.1687  Ohms/1000 ft     122.07 + J   12.81  PU

CBL-0835      BUS-0870        2-LP-3            1    208      5.0  FEET       4/0      Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.0640 + J  0.0497  Ohms/1000 ft     0.7396 + J  0.5744  PU
              Z0   Impedance: 0.2017 + J  0.1224  Ohms/1000 ft       2.33 + J    1.41  PU

CBL-0836      MCC-25          BUS-0871          1    480   40.0  FEET         6      Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.5100 + J  0.0685  Ohms/1000 ft       8.85 + J    1.19  PU
              Z0   Impedance:   1.61 + J  0.1687  Ohms/1000 ft      27.90 + J    2.93  PU

CBL-0837      BUS-0872        2-LP-4            1    208   30.0  FEET       4/0      Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.0640 + J  0.0497  Ohms/1000 ft       4.44 + J    3.45  PU
              Z0   Impedance: 0.2017 + J  0.1224  Ohms/1000 ft      13.99 + J    8.49  PU

CBL-0838      MCC-25          MEGADOOR CONTR    1    480  150.0  FEET        10      Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft      76.82 + J    5.56  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft     242.11 + J   13.69  PU

CBL-0839      MEGADOOR CONTR  DOOR #1           1    480  150.0  FEET        10      Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft      76.82 + J    5.56  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft     242.11 + J   13.69  PU

CBL-0840      MEGADOOR CONTR  DOOR #2           1    480  150.0  FEET        10      Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft      76.82 + J    5.56  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft     242.11 + J   13.69  PU

CBL-0841      MEGADOOR CONTR  DOOR #3           1    480  150.0  FEET        10      Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft      76.82 + J    5.56  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft     242.11 + J   13.69  PU
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FEEDER INPUT DATA

CABLE NAME	FEEDER FROM NAME	FEEDER TO NAME	QTY /PH	VOLTS L-L	LENGTH		FEEDER SIZE		FEEDER TYPE	
CBL-0842	MCC-25	DS-OH DOOR	1	480	5.0	FEET	12		Copper	
	Duct Material:	Magnetic								
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			4.06 + J		0.1975	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			12.79 + J		0.4863	PU
CBL-0843	MCC-25	DS-HVAC 1	1	480	80.0	FEET	12		Copper	
	Duct Material:	Magnetic								
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			64.93 + J		3.16	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			204.63 + J		7.78	PU
CBL-0844	DS-HVAC 1	BUS-0857	1	480	25.0	FEET	12		Copper	
	Duct Material:	Magnetic								
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			20.29 + J		0.9874	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			63.95 + J		2.43	PU
CBL-0845	MCC-25	DS-CF-SH-2	1	480	175.0	FEET	12		Copper	
	Duct Material:	Magnetic								
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			142.04 + J		6.91	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			447.63 + J		17.02	PU
CBL-0846	MCC-25	DS-CP-CS-SH-1	1	480	175.0	FEET	4		Copper	
	Duct Material:	Magnetic								
	+/- Impedance:	0.3210 + J	0.0632	Ohms/1000 ft			24.38 + J		4.80	PU
	Z0 Impedance:	1.01 + J	0.1556	Ohms/1000 ft			76.84 + J		11.82	PU
CBL-0847	DS-CP-CS-SH-1	BUS-0858	1	480	60.0	FEET	4		Copper	
	Duct Material:	Magnetic								
	+/- Impedance:	0.3210 + J	0.0632	Ohms/1000 ft			8.36 + J		1.65	PU
	Z0 Impedance:	1.01 + J	0.1556	Ohms/1000 ft			26.34 + J		4.05	PU
CBL-0848	MCC-25	DS-CF-SH-1	1	480	200.0	FEET	12		Copper	
	Duct Material:	Magnetic								
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			162.33 + J		7.90	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			511.58 + J		19.45	PU
CBL-0850	06-LP-01	06-LP-05	1	208	70.0	FEET	6		Copper	
	Duct Material:	Magnetic								
	+/- Impedance:	0.5100 + J	0.0685	Ohms/1000 ft			82.52 + J		11.08	PU
	Z0 Impedance:	1.61 + J	0.1687	Ohms/1000 ft			260.04 + J		27.30	PU
CBL-0851	MCC-7	DS-RECYCLE PUM	1	480	25.0	FEET	250		Copper	
	Duct Material:	Magnetic								
	+/- Impedance:	0.0552 + J	0.0495	Ohms/1000 ft			0.5990 + J		0.5371	PU
	Z0 Impedance:	0.1739 + J	0.1219	Ohms/1000 ft			1.89 + J		1.32	PU

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                                 FEEDER  INPUT  DATA
===========================================================================================
CABLE         FEEDER FROM     FEEDER TO       QTY  VOLTS   LENGTH           FEEDER
NAME          NAME            NAME            /PH  L-L                   SIZE       TYPE
===========================================================================================
CBL-0852      DS-RECYCLE PUM  TRANSFER SWITC   1    480    25.0  FEET     250      Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.0552 + J  0.0495  Ohms/1000 ft      0.5990 + J  0.5371  PU
              Z0   Impedance: 0.1739 + J  0.1219  Ohms/1000 ft        1.89 + J    1.32  PU

CBL-0853      MCC-7           PP-12 LEFT TUB   1    480   330.0  FEET     250      Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.0552 + J  0.0495  Ohms/1000 ft        7.91 + J    7.09  PU
              Z0   Impedance: 0.1739 + J  0.1219  Ohms/1000 ft       24.91 + J   17.46  PU

CBL-0854      DS-RECYCLE PUM  BUS-0897         1    480    10.0  FEET      10      Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft        5.12 + J  0.3707  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       16.14 + J  0.9128  PU

CBL-0856      DS-RECYCLE PUM  MCC-7 VACUUM P   1    480    75.0  FEET      10      Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       38.41 + J    2.78  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      121.05 + J    6.85  PU

CBL-0857      DS-RECYCLE PUM  DS-MCC7 PUMP 1   1    480    15.0  FEET       4      Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.3210 + J  0.0632  Ohms/1000 ft        2.09 + J  0.4115  PU
              Z0   Impedance:   1.01 + J  0.1556  Ohms/1000 ft        6.59 + J    1.01  PU

CBL-0858      DS-RECYCLE PUM  DS-MCC7 PUMP 2   1    480    20.0  FEET       4      Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.3210 + J  0.0632  Ohms/1000 ft        2.79 + J  0.5486  PU
              Z0   Impedance:   1.01 + J  0.1556  Ohms/1000 ft        8.78 + J    1.35  PU

CBL-0859      DS-RECYCLE PUM  DS-MCC7 PUMP 3   1    480    25.0  FEET       4      Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.3210 + J  0.0632  Ohms/1000 ft        3.48 + J  0.6858  PU
              Z0   Impedance:   1.01 + J  0.1556  Ohms/1000 ft       10.98 + J    1.69  PU

CBL-0860      DS-RECYCLE PUM  DS-MCC7 PUMP 4   1    480    30.0  FEET       4      Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.3210 + J  0.0632  Ohms/1000 ft        4.18 + J  0.8229  PU
              Z0   Impedance:   1.01 + J  0.1556  Ohms/1000 ft       13.17 + J    2.03  PU

CBL-0861      DS-SLUDGE THIC  DS-SLUDGE THIC   1    480    15.0  FEET      10      Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft        7.68 + J  0.5560  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       24.21 + J    1.37  PU
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FEEDER INPUT DATA

CABLE NAME	FEEDER FROM NAME	FEEDER TO NAME	QTY /PH	VOLTS L-L	LENGTH		FEEDER SIZE	FEEDER TYPE	
CBL-0862	PP-12 LEFT TUB	VFD-N. THICK S	1	480	85.0	FEET	8	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.8110 + J 0.0754		Ohms/1000 ft			29.92 + J	2.78	PU
	Z0 Impedance:	2.56 + J 0.1856		Ohms/1000 ft			94.29 + J	6.85	PU
CBL-0863	PP-12 LEFT TUB	VFD-N. THICK S	1	480	80.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J 0.0854		Ohms/1000 ft			40.97 + J	2.97	PU
	Z0 Impedance:	3.72 + J 0.2103		Ohms/1000 ft			129.13 + J	7.30	PU
CBL-0864	PP-12 LEFT TUB	VFD-N. THICK S	1	480	75.0	FEET	8	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.8110 + J 0.0754		Ohms/1000 ft			26.40 + J	2.45	PU
	Z0 Impedance:	2.56 + J 0.1856		Ohms/1000 ft			83.20 + J	6.04	PU
CBL-0865	PP-12 LEFT TUB	VFD-S. THICK S	1	480	90.0	FEET	8	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.8110 + J 0.0754		Ohms/1000 ft			31.68 + J	2.95	PU
	Z0 Impedance:	2.56 + J 0.1856		Ohms/1000 ft			99.84 + J	7.25	PU
CBL-0866	PP-12 LEFT TUB	VFD-S. THICK S	1	480	95.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J 0.0854		Ohms/1000 ft			48.65 + J	3.52	PU
	Z0 Impedance:	3.72 + J 0.2103		Ohms/1000 ft			153.34 + J	8.67	PU
CBL-0867	PP-12 LEFT TUB	VFD-S. THICK S	1	480	100.0	FEET	8	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.8110 + J 0.0754		Ohms/1000 ft			35.20 + J	3.27	PU
	Z0 Impedance:	2.56 + J 0.1856		Ohms/1000 ft			110.93 + J	8.06	PU
CBL-0868	PP-12 LEFT TUB	DS-BASEMENT EL	1	480	15.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J 0.0854		Ohms/1000 ft			7.68 + J	0.5560	PU
	Z0 Impedance:	3.72 + J 0.2103		Ohms/1000 ft			24.21 + J	1.37	PU
CBL-0869	PP-12 LEFT TUB	BUS-0912	1	480	15.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J 0.0854		Ohms/1000 ft			7.68 + J	0.5560	PU
	Z0 Impedance:	3.72 + J 0.2103		Ohms/1000 ft			24.21 + J	1.37	PU
CBL-0870	BUS-0913	2A-LP-01	1	208	10.0	FEET	6	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.5100 + J 0.0685		Ohms/1000 ft			11.79 + J	1.58	PU
	Z0 Impedance:	1.61 + J 0.1687		Ohms/1000 ft			37.15 + J	3.90	PU

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                                        FEEDER  INPUT  DATA
===========================================================================================
CABLE          FEEDER FROM     FEEDER TO        QTY  VOLTS   LENGTH              FEEDER
NAME           NAME            NAME             /PH  L-L                     SIZE       TYPE
===========================================================================================
CBL-0871       PP-12 LEFT TUB  DS-SLUDGE THIC    1    480    55.0  FEET       10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:    1.18 + J  0.0854  Ohms/1000 ft       28.17 + J    2.04  PU
               Z0   Impedance:    3.72 + J  0.2103  Ohms/1000 ft       88.77 + J    5.02  PU

CBL-0872       DS-SLUDGE THIC  DS-SLUDGE THIC    1    480     5.0  FEET       10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:    1.18 + J  0.0854  Ohms/1000 ft        2.56 + J  0.1853  PU
               Z0   Impedance:    3.72 + J  0.2103  Ohms/1000 ft        8.07 + J  0.4564  PU

CBL-0873       PP-12 LEFT TUB  DS-SLUDGE THIC    1    480   135.0  FEET       10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:    1.18 + J  0.0854  Ohms/1000 ft       69.14 + J    5.00  PU
               Z0   Impedance:    3.72 + J  0.2103  Ohms/1000 ft      217.90 + J   12.32  PU

CBL-0874       DS-SLUDGE THIC  DS-SLUDGE THIC    1    480     5.0  FEET       10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:    1.18 + J  0.0854  Ohms/1000 ft        2.56 + J  0.1853  PU
               Z0   Impedance:    3.72 + J  0.2103  Ohms/1000 ft        8.07 + J  0.4564  PU

CBL-0875       DS-SLUDGE THIC  DS-SLUDGE THIC    1    480     5.0  FEET       10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:    1.18 + J  0.0854  Ohms/1000 ft        2.56 + J  0.1853  PU
               Z0   Impedance:    3.72 + J  0.2103  Ohms/1000 ft        8.07 + J  0.4564  PU

CBL-0876       PP-12 RIGHT TU  DS-EF-SC-1        1    480   115.0  FEET       12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:    1.87 + J  0.0910  Ohms/1000 ft       93.34 + J    4.54  PU
               Z0   Impedance:    5.89 + J  0.2241  Ohms/1000 ft      294.16 + J   11.19  PU

CBL-0877       PP-12 RIGHT TU  PP-12 LEFT TUB    1    480     5.0  FEET      250      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.0552 + J  0.0495  Ohms/1000 ft      0.1198 + J  0.1074  PU
               Z0   Impedance: 0.1739 + J  0.1219  Ohms/1000 ft      0.3774 + J  0.2645  PU

CBL-0878       PP-12 RIGHT TU  DS-SUMP PUMP 1    1    480   100.0  FEET       12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:    1.87 + J  0.0910  Ohms/1000 ft       81.16 + J    3.95  PU
               Z0   Impedance:    5.89 + J  0.2241  Ohms/1000 ft      255.79 + J    9.73  PU

CBL-0879       DS-SUMP PUMP 1  DS-SUMP PUMP 1    1    480     5.0  FEET       12      Copper
               Duct Material:     Magnetic
               +/-  Impedance:    1.87 + J  0.0910  Ohms/1000 ft        4.06 + J  0.1975  PU
               Z0   Impedance:    5.89 + J  0.2241  Ohms/1000 ft       12.79 + J  0.4863  PU
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FEEDER INPUT DATA

CABLE NAME	FEEDER FROM NAME	FEEDER TO NAME	QTY /PH	VOLTS L-L	LENGTH		FEEDER SIZE	FEEDER TYPE	
CBL-0880	DS-SUMP PUMP 1	DS-SUMP PUMP 2	1	480	5.0	FEET	12	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.87 + J	0.0910	Ohms/1000 ft			4.06 + J	0.1975	PU
	Z0 Impedance:	5.89 + J	0.2241	Ohms/1000 ft			12.79 + J	0.4863	PU
CBL-0881	PP-12 RIGHT TU	DS-MAU-SC-1	1	480	80.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			40.97 + J	2.97	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			129.13 + J	7.30	PU
CBL-0882	PP-12 RIGHT TU	DS-UNIT HEATER	1	480	120.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			61.46 + J	4.45	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			193.69 + J	10.95	PU
CBL-0883	MCC-7	MCC-7 ELEVATOR	1	480	90.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			46.09 + J	3.34	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			145.27 + J	8.21	PU
CBL-0884	MCC-7	BUS-0929	1	480	10.0	FEET	2/0	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.1020 + J	0.0533	Ohms/1000 ft			0.4427 + J	0.2313	PU
	Z0 Impedance:	0.3214 + J	0.1312	Ohms/1000 ft			1.39 + J	0.5694	PU
CBL-0885	MCC-7	DS-HVAC #1	1	480	65.0	FEET	2/0	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.1020 + J	0.0533	Ohms/1000 ft			2.88 + J	1.50	PU
	Z0 Impedance:	0.3214 + J	0.1312	Ohms/1000 ft			9.07 + J	3.70	PU
CBL-0886	MCC-7	DS-HVAC #2	1	480	65.0	FEET	2/0	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.1020 + J	0.0533	Ohms/1000 ft			2.88 + J	1.50	PU
	Z0 Impedance:	0.3214 + J	0.1312	Ohms/1000 ft			9.07 + J	3.70	PU
CBL-0887	MCC-7	DS-ENG. RM. BO	1	480	140.0	FEET	2	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.2020 + J	0.0585	Ohms/1000 ft			12.27 + J	3.55	PU
	Z0 Impedance:	0.6366 + J	0.1440	Ohms/1000 ft			38.68 + J	8.75	PU
CBL-0888	MCC-7	PP-13	1	480	95.0	FEET	3/0	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.0805 + J	0.0519	Ohms/1000 ft			3.32 + J	2.14	PU
	Z0 Impedance:	0.2537 + J	0.1278	Ohms/1000 ft			10.46 + J	5.27	PU

FEEDER INPUT DATA

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=============================================================================================
CABLE          FEEDER FROM     FEEDER TO        QTY  VOLTS   LENGTH             FEEDER
NAME           NAME            NAME             /PH  L-L                    SIZE       TYPE
=============================================================================================
CBL-0889       PP-13           BUS-0934          1    480    50.0  FEET        8     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.8110 + J  0.0754  Ohms/1000 ft       17.60 + J    1.64  PU
               Z0   Impedance:   2.56 + J  0.1856  Ohms/1000 ft       55.47 + J    4.03  PU

CBL-0890       PP-13           BUS-0935          1    480    50.0  FEET        8     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.8110 + J  0.0754  Ohms/1000 ft       17.60 + J    1.64  PU
               Z0   Impedance:   2.56 + J  0.1856  Ohms/1000 ft       55.47 + J    4.03  PU

CBL-0891       DS-SERV GARAGE  DS-XFMR 21 LP-   1    480     5.0  FEET        2     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.2020 + J  0.0585  Ohms/1000 ft      0.4384 + J  0.1270  PU
               Z0   Impedance: 0.6366 + J  0.1440  Ohms/1000 ft        1.38 + J  0.3125  PU

CBL-0892       DS-XFMR 21 LP-  BUS-0937          1    480     5.0  FEET        2     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.2020 + J  0.0585  Ohms/1000 ft      0.4384 + J  0.1270  PU
               Z0   Impedance: 0.6366 + J  0.1440  Ohms/1000 ft        1.38 + J  0.3125  PU

CBL-0893       BUS-0938        21 LP-01          1    208    25.0  FEET      3/0     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.0805 + J  0.0519  Ohms/1000 ft        4.65 + J    3.00  PU
               Z0   Impedance: 0.2537 + J  0.1278  Ohms/1000 ft       14.66 + J    7.38  PU

CBL-0894       DS-SERV GARAGE  DS-XFMR 21 LP-   1    480   130.0  FEET        6     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.5100 + J  0.0685  Ohms/1000 ft       28.78 + J    3.87  PU
               Z0   Impedance:   1.61 + J  0.1687  Ohms/1000 ft       90.68 + J    9.52  PU

CBL-0895       DS-XFMR 21 LP-  BUS-0939          1    480     5.0  FEET        2     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.2020 + J  0.0585  Ohms/1000 ft      0.4384 + J  0.1270  PU
               Z0   Impedance: 0.6366 + J  0.1440  Ohms/1000 ft        1.38 + J  0.3125  PU

CBL-0896       BUS-0940        21 LP-02          1    208     5.0  FEET      3/0     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.0805 + J  0.0519  Ohms/1000 ft      0.9303 + J  0.5998  PU
               Z0   Impedance: 0.2537 + J  0.1278  Ohms/1000 ft        2.93 + J    1.48  PU

CBL-0897       DS-SERV GARAGE  DS-MCC-7 AIR C   1    480     5.0  FEET       12     Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft        4.06 + J  0.1975  PU
               Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft       12.79 + J  0.4863  PU
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                                          FEEDER  INPUT  DATA
=============================================================================================
CABLE         FEEDER FROM     FEEDER TO        QTY  VOLTS   LENGTH              FEEDER
NAME          NAME            NAME             /PH  L-L                     SIZE       TYPE
=============================================================================================
CBL-0898      DS-SERV GARAGE  MCC7 480V RECE    1    480     5.0  FEET       12     Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.87 + J  0.0910  Ohms/1000 ft        4.06 + J  0.1975  PU
              Z0   Impedance:   5.89 + J  0.2241  Ohms/1000 ft       12.79 + J  0.4863  PU

CBL-0899      MCC-7           DS-FOUL AIR FA    1    480    85.0  FEET       10     Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       43.53 + J    3.15  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      137.20 + J    7.76  PU

CBL-0900      LTG PANELS      5-LP-02           1    208    20.0  FEET      4/0     Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.0640 + J  0.0497  Ohms/1000 ft        2.96 + J    2.30  PU
              Z0   Impedance: 0.2017 + J  0.1224  Ohms/1000 ft        9.32 + J    5.66  PU

CBL-0901      DS-FOUL AIR FA  VFD-FOUL AIR F    1    480     5.0  FEET       10     Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft        2.56 + J  0.1853  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft        8.07 + J  0.4564  PU

CBL-0902      DS-FOUL AIR FA  VFD-FOUL AIR F    1    480     5.0  FEET       10     Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft        2.56 + J  0.1853  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft        8.07 + J  0.4564  PU

CBL-0903      LTG PANELS      5-LP-04           1    208    10.0  FEET        2     Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.2020 + J  0.0585  Ohms/1000 ft        4.67 + J    1.35  PU
              Z0   Impedance: 0.6366 + J  0.1440  Ohms/1000 ft       14.71 + J    3.33  PU

CBL-0904      LTG PANELS      5-LP-03           1    208    95.0  FEET        6     Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.5100 + J  0.0685  Ohms/1000 ft      111.99 + J   15.04  PU
              Z0   Impedance:   1.61 + J  0.1687  Ohms/1000 ft      352.91 + J   37.04  PU

CBL-0905      LTG PANELS      5-LP-05           1    208   125.0  FEET        2     Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.2020 + J  0.0585  Ohms/1000 ft       58.36 + J   16.90  PU
              Z0   Impedance: 0.6366 + J  0.1440  Ohms/1000 ft      183.93 + J   41.61  PU

CBL-0906      LTG PANELS      5-LP-06           1    208   125.0  FEET        2     Copper
              Duct Material:     Magnetic
              +/-  Impedance: 0.2020 + J  0.0585  Ohms/1000 ft       58.36 + J   16.90  PU
              Z0   Impedance: 0.6366 + J  0.1440  Ohms/1000 ft      183.93 + J   41.61  PU
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FEEDER INPUT DATA

CABLE NAME	FEEDER FROM NAME	FEEDER TO NAME	QTY /PH	VOLTS L-L	LENGTH		FEEDER SIZE	FEEDER TYPE	
CBL-0907	PP-13	SOUTH SHOP HTR	1	480	30.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			15.36 + J	1.11	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			48.42 + J	2.74	PU
CBL-0908	PP-13	NORTH SHOP HTR	1	480	30.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			15.36 + J	1.11	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			48.42 + J	2.74	PU
CBL-0909	PP-13	BUS-0959	1	480	5.0	FEET	8	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.8110 + J	0.0754	Ohms/1000 ft			1.76 + J	0.1636	PU
	Z0 Impedance:	2.56 + J	0.1856	Ohms/1000 ft			5.55 + J	0.4028	PU
CBL-0910	06-LP-01	06-LP-06	1	208	80.0	FEET	2	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.2020 + J	0.0585	Ohms/1000 ft			37.35 + J	10.82	PU
	Z0 Impedance:	0.6366 + J	0.1440	Ohms/1000 ft			117.71 + J	26.63	PU
CBL-0911	06-LP-01	06-LP-07	1	208	100.0	FEET	6	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.5100 + J	0.0685	Ohms/1000 ft			117.88 + J	15.83	PU
	Z0 Impedance:	1.61 + J	0.1687	Ohms/1000 ft			371.49 + J	38.99	PU
CBL-0949	12A-PP-01	DS-GRINDER 1,2	1	480	35.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			17.93 + J	1.30	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			56.49 + J	3.19	PU
CBL-0950	12A-PP-01	DS-WELDER PLUG	1	480	140.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			71.70 + J	5.19	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			225.97 + J	12.78	PU
CBL-0951	12A-PP-01	DS-HOIST,EX FA	1	480	140.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			71.70 + J	5.19	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			225.97 + J	12.78	PU
CBL-0952	12A-PP-01	DS-DUCT HEATER	1	480	140.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			71.70 + J	5.19	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			225.97 + J	12.78	PU

FEEDER INPUT DATA

CABLE NAME	FEEDER FROM NAME	FEEDER TO NAME	QTY /PH	VOLTS L-L	LENGTH		FEEDER SIZE	FEEDER TYPE	
CBL-0953	12A-PP-01	DS-RETURN VALV	1	480	140.0	FEET	10	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	1.18 + J	0.0854	Ohms/1000 ft			71.70 + J	5.19	PU
	Z0 Impedance:	3.72 + J	0.2103	Ohms/1000 ft			225.97 + J	12.78	PU
CBL-0954	DS-RETURN VALV	DS-Q1236	1	480	125.0	FEET	8	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.8110 + J	0.0754	Ohms/1000 ft			44.00 + J	4.09	PU
	Z0 Impedance:	2.56 + J	0.1856	Ohms/1000 ft			138.67 + J	10.07	PU
CBL-0955	DS-RETURN VALV	DS-Q1237	1	480	115.0	FEET	8	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.8110 + J	0.0754	Ohms/1000 ft			40.48 + J	3.76	PU
	Z0 Impedance:	2.56 + J	0.1856	Ohms/1000 ft			127.57 + J	9.26	PU
CBL-0956	DS-RETURN VALV	DS-Q1238	1	480	115.0	FEET	8	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.8110 + J	0.0754	Ohms/1000 ft			40.48 + J	3.76	PU
	Z0 Impedance:	2.56 + J	0.1856	Ohms/1000 ft			127.57 + J	9.26	PU
CBL-0957	DS-RETURN VALV	DS-Q1239	1	480	105.0	FEET	8	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.8110 + J	0.0754	Ohms/1000 ft			36.96 + J	3.44	PU
	Z0 Impedance:	2.56 + J	0.1856	Ohms/1000 ft			116.48 + J	8.46	PU
CBL-0958	DS-RETURN VALV	DS-Q1240	1	480	105.0	FEET	8	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.8110 + J	0.0754	Ohms/1000 ft			36.96 + J	3.44	PU
	Z0 Impedance:	2.56 + J	0.1856	Ohms/1000 ft			116.48 + J	8.46	PU
CBL-0959	DS-RETURN VALV	DS-Q1241	1	480	95.0	FEET	8	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.8110 + J	0.0754	Ohms/1000 ft			33.44 + J	3.11	PU
	Z0 Impedance:	2.56 + J	0.1856	Ohms/1000 ft			105.39 + J	7.65	PU
CBL-0960	DS-RETURN VALV	DS-Q1242	1	480	95.0	FEET	8	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.8110 + J	0.0754	Ohms/1000 ft			33.44 + J	3.11	PU
	Z0 Impedance:	2.56 + J	0.1856	Ohms/1000 ft			105.39 + J	7.65	PU
CBL-0961	DS-RETURN VALV	DS-Q1243	1	480	85.0	FEET	8	Copper	
	Duct Material:	Magnetic							
	+/- Impedance:	0.8110 + J	0.0754	Ohms/1000 ft			29.92 + J	2.78	PU
	Z0 Impedance:	2.56 + J	0.1856	Ohms/1000 ft			94.29 + J	6.85	PU

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                                        FEEDER  INPUT  DATA
==========================================================================================
CABLE          FEEDER FROM     FEEDER TO        QTY  VOLTS   LENGTH            FEEDER
NAME           NAME            NAME             /PH  L-L                   SIZE       TYPE
==========================================================================================
CBL-0962       12A-PP-01       DS-MOV SUMP       1    480   15.0  FEET      10     Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       7.68 + J  0.5560  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      24.21 + J    1.37  PU

CBL-0963       12A-PP-01       DS-PRIM THICK     1    480   60.0  FEET      10     Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft      30.73 + J    2.22  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      96.84 + J    5.48  PU

CBL-0964       DS-MOV SUMP     DS-HV UNIT        1    480   50.0  FEET      10     Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft      25.61 + J    1.85  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      80.70 + J    4.56  PU

CBL-0992       BUS-1043        MCC-14            3    480  270.0  FEET     500     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.0294 + J  0.0466  Ohms/1000 ft       1.15 + J    1.82  PU
               Z0   Impedance: 0.0926 + J  0.1147  Ohms/1000 ft       3.62 + J    4.48  PU

CBL-0993       BUS-1043        MCC-13            1    480    5.0  FEET     600     Copper
               Duct Material:       Busway
               +/-  Impedance: 0.0202 + J  0.0170  Ohms/1000 ft     0.0438 + J  0.0369  PU
               Z0   Impedance: 0.1201 + J  0.0910  Ohms/1000 ft     0.2606 + J  0.1975  PU

CBL-0995       LC-3A           BUS-1045          1    480  0.100  FEET    2500     Copper
               Duct Material:       Busway
               +/-  Impedance: 0.0049 + J  0.0030  Ohms/1000 ft    0.00021 + J 0.00013  PU
               Z0   Impedance: 0.0291 + J  0.0160  Ohms/1000 ft     0.0013 + J 0.00069  PU

CBL-0998       MCC-7           DS-SERV GARAGE    1    480  165.0  FEET       2     Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.2020 + J  0.0585  Ohms/1000 ft      14.47 + J    4.19  PU
               Z0   Impedance: 0.6366 + J  0.1440  Ohms/1000 ft      45.59 + J   10.31  PU

CBL-BOLIMO CONMCC-15           BOLIMO CONTROL    1    480   70.0  FEET      10     Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft      35.85 + J    2.59  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft     112.98 + J    6.39  PU

CBL-CW PUMP P-MCC-15           CW PUMP P-10      1    480  105.0  FEET      10     Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft      53.78 + J    3.89  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft     169.48 + J    9.58  PU
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                                                      FEEDER  INPUT  DATA
=============================================================================================
CABLE          FEEDER FROM     FEEDER TO       QTY  VOLTS   LENGTH            FEEDER
NAME           NAME            NAME            /PH  L-L                   SIZE        TYPE
=============================================================================================
CBL-EAST SUPPLFUME FAN CONTA  EAST SUPPLY FA   1    480  165.0  FEET      10       Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       84.51 + J    6.12  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      266.32 + J   15.06  PU

CBL-FUME FAN CMCC-15          FUME FAN CONTA   1    480  220.0  FEET      10       Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft      112.67 + J    8.15  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      355.09 + J   20.08  PU

CBL-FUME HOOD FUME FAN CONTA  FUME HOOD EXHA   1    480   35.0  FEET      10       Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       17.93 + J    1.30  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       56.49 + J    3.19  PU

CBL-FUME HOODSFUME FAN CONTA  FUME HOODS VFD   1    480  175.0  FEET      10       Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       89.63 + J    6.49  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      282.46 + J   15.97  PU

CBL-GATE 1 CONMCC 15 GATES    GATE 1 CONTROL   1    480   10.0  FEET      10       Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft        5.12 + J  0.3707  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       16.14 + J  0.9128  PU

CBL-GATE 2 CONMCC 15 GATES    GATE 2 CONTROL   1    480   60.0  FEET      10       Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       30.73 + J    2.22  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       96.84 + J    5.48  PU

CBL-HOT WATER FUME FAN CONTA  HOT WATER CIRC   1    480  165.0  FEET      10       Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       84.51 + J    6.12  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      266.32 + J   15.06  PU

CBL-HW PUMP #1MCC-15          HW PUMP #1 P-1   1    480   85.0  FEET      10       Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       43.53 + J    3.15  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      137.20 + J    7.76  PU

CBL-MCC 15 AIRBUS-0750        MCC 15 AIR COM   1    480   70.0  FEET      10       Copper
              Duct Material:     Magnetic
              +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       35.85 + J    2.59  PU
              Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      112.98 + J    6.39  PU
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                                          FEEDER  INPUT  DATA
=============================================================================================
CABLE          FEEDER FROM     FEEDER TO       QTY  VOLTS   LENGTH             FEEDER
NAME           NAME            NAME            /PH  L-L                    SIZE        TYPE
=============================================================================================
CBL-MCC 15 ELEMCC-15           MCC 15 ELEVATO   1    480    70.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       35.85 + J    2.59  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      112.98 + J    6.39  PU

CBL-MCC 15 GATBUS-0750         MCC 15 GATES     1    480   245.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft      125.48 + J    9.08  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      395.45 + J   22.36  PU

CBL-MCC 15 STRMCC-15           MCC 15 STRAINE   1    480    80.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       40.97 + J    2.97  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      129.13 + J    7.30  PU

CBL-MCC 15 STRMCC-15           BUS-0753         1    480    30.0  FEET     350      Copper
               Duct Material:     Magnetic
               +/-  Impedance: 0.0378 + J  0.0491  Ohms/1000 ft      0.4922 + J  0.6393  PU
               Z0   Impedance: 0.1191 + J  0.1209  Ohms/1000 ft        1.55 + J    1.57  PU

CBL-NW FUME HOFUME FAN CONTA   NW FUME HOOD E   1    480   165.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       84.51 + J    6.12  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      266.32 + J   15.06  PU

CBL-NW FUME HOFUME FAN CONTA   NW FUME HOOD S   1    480   165.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       84.51 + J    6.12  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft      266.32 + J   15.06  PU

CBL-SUMP PUMP BUS-0750         SUMP PUMP EAST   1    480    15.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft        7.68 + J  0.5560  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       24.21 + J    1.37  PU

CBL-SUMP PUMPSMCC-15           BUS-0750         1    480    20.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft       10.24 + J  0.7413  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       32.28 + J    1.83  PU

CBL-SUMP PUMP BUS-0750         SUMP PUMP WEST   1    480    15.0  FEET      10      Copper
               Duct Material:     Magnetic
               +/-  Impedance:   1.18 + J  0.0854  Ohms/1000 ft        7.68 + J  0.5560  PU
               Z0   Impedance:   3.72 + J  0.2103  Ohms/1000 ft       24.21 + J    1.37  PU
```

FEEDER INPUT DATA

CABLE NAME	FEEDER FROM NAME	FEEDER TO NAME	QTY /PH	VOLTS L-L	LENGTH		FEEDER SIZE	FEEDER TYPE
CBL-VACUUM	PUMBUS-0750	VACUUM PUMP	1	480	75.0	FEET	10	Copper

Duct Material: Magnetic
+/- Impedance: 1.18 + J 0.0854 Ohms/1000 ft 38.41 + J 2.78 PU
Z0 Impedance: 3.72 + J 0.2103 Ohms/1000 ft 121.05 + J 6.85 PU

EQUIVALENT PI DATA

PI NAME	FROM NAME	TO NAME	VOLTS

TRANSFORMER INPUT DATA

```
=============================================================================================
 TRANSFORMER    PRIMARY RECORD      VOLTS   * SECONDARY RECORD     VOLTS   FULL-LOAD   NOMINAL
 NAME           NO NAME             L-L       NO NAME              L-L     KVA          KVA

=============================================================================================
 75 KVA XFMR    BUS-0929       D   480.00   LTG PANELS     YG    208.00   75.00         75.00
                Pos. Seq. Z%:     2.00 + J   6.31    (Zpu  26.66 + j  84.14 )    Shell Type
                Zero Seq. Z%:     2.00 + J   6.31    (Sec  26.66 + j  84.14 Pri  Open)
                Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.

 T-06-LP-01     BUS-0753       D   480.00   BUS-0754       YG    208.00  150.00        150.00
                Pos. Seq. Z%:    0.940 + J   3.37    (Zpu   6.27 + j  22.48 )    Shell Type
                Zero Seq. Z%:    0.940 + J   3.37    (Sec   6.27 + j  22.48 Pri  Open)
                Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.

 T-INLET        BUS-0263       D   480.00   BUS-0269       YG    208.00    5.00          5.00
                Pos. Seq. Z%:     1.10 + J   2.36    (Zpu  219.2 + j  471.5 )    Shell Type
                Zero Seq. Z%:     1.10 + J   2.36    (Sec  219.2 + j  471.5 Pri  Open)
                Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.

 T-LC-11        BUS-0021       D  4800.00   BUS-0023       YG    480.00 1500.00       1500.00
                Pos. Seq. Z%:    0.861 + J   5.63    (Zpu  0.574 + j   3.76 )    Shell Type
                Zero Seq. Z%:    0.861 + J   5.63    (Sec  0.574 + j   3.76 Pri  Open)
                Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.

 T-LC-11A       BUS-0020       D  4800.00   BUS-0022       YG    480.00 1500.00       1500.00
                Pos. Seq. Z%:    0.861 + J   5.63    (Zpu  0.574 + j   3.76 )    Shell Type
                Zero Seq. Z%:    0.861 + J   5.63    (Sec  0.574 + j   3.76 Pri  Open)
                Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.

 T-LC-12        LC-12 HS       D  4800.00   MCC-28         YG    480.00  750.00        750.00
                Pos. Seq. Z%:     1.07 + J   5.60    (Zpu   1.42 + j   7.47 )    Shell Type
                Zero Seq. Z%:     1.07 + J   5.60    (Sec   1.42 + j   7.47 Pri  Open)
                Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.
```

TRANSFORMER INPUT DATA

```
=============================================================================================
TRANSFORMER    PRIMARY RECORD      VOLTS    * SECONDARY RECORD     VOLTS   FULL-LOAD   NOMINAL
NAME           NO NAME             L-L       NO NAME               L-L     KVA           KVA

=============================================================================================
T-LC-12A       DS-LC-12A HS   D  4800.00   BUS-0162       YG    480.00  750.00       750.00
               Pos. Seq. Z%:     1.07 + J   5.60    (Zpu   1.42 + j   7.47 )    Shell Type
               Zero Seq. Z%:     1.07 + J   5.60    (Sec   1.42 + j   7.47 Pri  Open)
               Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.

T-LC-2         HS-LC-2        D  4800.00   BUS-0059       YG    480.00 1000.00      1000.00
               Pos. Seq. Z%:     1.61 + J   5.36    (Zpu   1.61 + j   5.36 )    Shell Type
               Zero Seq. Z%:     1.61 + J   5.36    (Sec   1.61 + j   5.36 Pri  Open)
               Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.

T-LC-2A        HS-LC-2A       D  4800.00   LC-2A          YG    480.00  300.00       300.00
               Pos. Seq. Z%:     1.30 + J   5.41    (Zpu   4.35 + j  18.05 )    Shell Type
               Zero Seq. Z%:     1.30 + J   5.41    (Sec   4.35 + j  18.05 Pri  Open)
               Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.

T-LC-3         BUS-0050       D  4800.00   LC-3           YG    480.00 1500.00      1500.00
               Pos. Seq. Z%:    0.861 + J   5.63    (Zpu  0.574 + j   3.76 )    Shell Type
               Zero Seq. Z%:    0.861 + J   5.63    (Sec  0.574 + j   3.76 Pri  Open)
               Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.

T-LC-3A        BUS-0051       D  4800.00   LC-3A          YG    480.00 1500.00      1500.00
               Pos. Seq. Z%:    0.906 + J   5.93    (Zpu  0.604 + j   3.95 )    Shell Type
               Zero Seq. Z%:    0.906 + J   5.93    (Sec  0.604 + j   3.95 Pri  Open)
               Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.

T-LC-4         HS-LC-4        D  4800.00   LC-4           YG    480.00 1000.00      1000.00
               Pos. Seq. Z%:     1.17 + J   6.68    (Zpu   1.17 + j   6.68 )    Shell Type
               Zero Seq. Z%:     1.17 + J   6.68    (Sec   1.17 + j   6.68 Pri  Open)
               Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.
```

TRANSFORMER INPUT DATA

```
===============================================================================================
TRANSFORMER    PRIMARY RECORD      VOLTS    * SECONDARY RECORD     VOLTS   FULL-LOAD   NOMINAL
NAME           NO NAME             L-L       NO NAME               L-L     KVA           KVA

===============================================================================================
T-LC-5         BUS-0037       D  4800.00   LC-5           YG    480.00  750.00       750.00
               Pos. Seq. Z%:     1.03 + J   5.40    (Zpu   1.37 + j   7.20 )    Shell Type
               Zero Seq. Z%:     1.03 + J   5.40    (Sec   1.37 + j   7.20 Pri  Open)
               Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.

T-LC-5A        BUS-0038       D  4800.00   BUS-0077       YG    480.00  750.00       750.00
               Pos. Seq. Z%:     1.01 + J   5.30    (Zpu   1.35 + j   7.07 )    Shell Type
               Zero Seq. Z%:     1.01 + J   5.30    (Sec   1.35 + j   7.07 Pri  Open)
               Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.

T-LC-6         BUS-0031       D  4800.00   BUS-0032       YG    480.00  500.00       500.00
               Pos. Seq. Z%:    0.468 + J   2.20    (Zpu  0.937 + j   4.40 )    Shell Type
               Zero Seq. Z%:    0.468 + J   2.20    (Sec  0.937 + j   4.40 Pri  Open)
               Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.

T-LC-7         BUS-0047       D  4800.00   LC-7           YG    480.00 1000.00      1000.00
               Pos. Seq. Z%:    0.914 + J   5.22    (Zpu  0.914 + j   5.22 )    Shell Type
               Zero Seq. Z%:    0.914 + J   5.22    (Sec  0.914 + j   5.22 Pri  Open)
               Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.

T-LC-7A        BUS-0046       D  4800.00   LC-7A          YG    480.00 1000.00      1000.00
               Pos. Seq. Z%:    0.879 + J   5.02    (Zpu  0.879 + j   5.02 )    Shell Type
               Zero Seq. Z%:    0.879 + J   5.02    (Sec  0.879 + j   5.02 Pri  Open)
               Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.

T-LC-8         BUS-0049       D  4800.00   LC-8           YG    480.00  500.00       500.00
               Pos. Seq. Z%:    0.625 + J   2.93    (Zpu   1.25 + j   5.87 )    Shell Type
               Zero Seq. Z%:    0.625 + J   2.93    (Sec   1.25 + j   5.87 Pri  Open)
               Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.
```

TRANSFORMER INPUT DATA

```
===============================================================================================
 TRANSFORMER    PRIMARY RECORD      VOLTS    * SECONDARY RECORD     VOLTS    FULL-LOAD   NOMINAL
 NAME           NO NAME             L-L        NO NAME              L-L      KVA           KVA

===============================================================================================
 T-LC-8A        BUS-0048       D  4800.00   LC-8A          YG    480.00  500.00        500.00
                Pos. Seq. Z%:    0.625 + J   2.93    (Zpu   1.25 + j   5.87 )    Shell Type
                Zero Seq. Z%:    0.625 + J   2.93    (Sec   1.25 + j   5.87 Pri  Open)
                Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.

 T-LC-9         BUS-0519       D  4800.00   BUS-0089       YG    480.00  750.00        750.00
                Pos. Seq. Z%:     1.04 + J   5.44    (Zpu   1.38 + j   7.26 )    Shell Type
                Zero Seq. Z%:     1.04 + J   5.44    (Sec   1.38 + j   7.26 Pri  Open)
                Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.

 T-LC-9A        MVS-9A         D  4800.00   BUS-0088       YG    480.00  750.00        750.00
                Pos. Seq. Z%:     1.04 + J   5.44    (Zpu   1.38 + j   7.26 )    Shell Type
                Zero Seq. Z%:     1.04 + J   5.44    (Sec   1.38 + j   7.26 Pri  Open)
                Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.

 T-LC-9B        MVS-9B         D  4800.00   BUS-0082       YG    480.00  112.50        112.50
                Pos. Seq. Z%:     1.10 + J   3.74    (Zpu   9.80 + j  33.25 )    Shell Type
                Zero Seq. Z%:     1.10 + J   3.74    (Sec   9.80 + j  33.25 Pri  Open)
                Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.

 T-MCC-21       BUS-0271       D   480.00   BUS-0272       YG    208.00   45.00         45.00
                Pos. Seq. Z%:     1.89 + J   5.48    (Zpu  42.01 + j  121.8 )    Shell Type
                Zero Seq. Z%:     1.89 + J   5.48    (Sec  42.01 + j  121.8 Pri  Open)
                Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.

 XF2-0032       BUS-0329       D   480.00   BUS-0330       YG    208.00   15.00         15.00
                Pos. Seq. Z%:     1.84 + J   4.54    (Zpu  122.6 + j  302.7 )    Shell Type
                Zero Seq. Z%:     1.84 + J   4.54    (Sec  122.6 + j  302.7 Pri  Open)
                Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.
```

TRANSFORMER INPUT DATA

```
===============================================================================================
 TRANSFORMER     PRIMARY RECORD      VOLTS    * SECONDARY RECORD     VOLTS   FULL-LOAD   NOMINAL
 NAME            NO NAME             L-L        NO NAME              L-L     KVA           KVA

===============================================================================================
 XFMR 04-LP-01  BUS-0404       D   480.00   BUS-0405       YG    208.00   45.00        45.00
                Pos. Seq. Z%:     2.15 + J   6.24    (Zpu  47.81 + j  138.6 )   Shell Type
                Zero Seq. Z%:     2.15 + J   6.24    (Sec  47.81 + j  138.6 Pri  Open)
                Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.

 XFMR-11-LP-01  BUS-0449       D   480.00   BUS-0450       YG    208.00   10.00        10.00
                Pos. Seq. Z%:     2.09 + J   4.89    (Zpu  208.9 + j  489.2 )   Shell Type
                Zero Seq. Z%:     2.09 + J   4.89    (Sec  208.9 + j  489.2 Pri  Open)
                Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.

 XFMR-15LP-01   BUS-0342       D   480.00   BUS-0343       YG    208.00   15.00        15.00
                Pos. Seq. Z%:     1.80 + J   4.45    (Zpu  120.1 + j  296.6 )   Shell Type
                Zero Seq. Z%:     1.80 + J   4.45    (Sec  120.1 + j  296.6 Pri  Open)
                Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.

 XFMR 21 LP-01  BUS-0937       D   480.00   BUS-0938       YG    208.00   45.00        45.00
                Pos. Seq. Z%:     1.01 + J   2.93    (Zpu  22.46 + j  65.13 )   Shell Type
                Zero Seq. Z%:     1.01 + J   2.93    (Sec  22.46 + j  65.13 Pri  Open)
                Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.

 XFMR 21 LP-02  BUS-0939       D   480.00   BUS-0940       YG    208.00   45.00        30.00
                Pos. Seq. Z%:    0.723 + J   1.97    (Zpu  24.12 + j  65.71 )   Shell Type
                Zero Seq. Z%:    0.723 + J   1.97    (Sec  24.12 + j  65.71 Pri  Open)
                Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.

 XFMR-24-LP-01  BUS-0326       D   480.00   BUS-0327       YG    208.00   75.00        75.00
                Pos. Seq. Z%:     1.75 + J   5.53    (Zpu  23.36 + j  73.72 )   Shell Type
                Zero Seq. Z%:     1.75 + J   5.53    (Sec  23.36 + j  73.72 Pri  Open)
                Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.
```

TRANSFORMER INPUT DATA

```
============================================================================================
 TRANSFORMER    PRIMARY RECORD      VOLTS   * SECONDARY RECORD    VOLTS   FULL-LOAD   NOMINAL
 NAME           NO NAME             L-L       NO NAME             L-L     KVA           KVA

============================================================================================
 XFMR-28-LP-01  BUS-0516       D   480.00   BUS-0517       YG    208.00   75.00        75.00
                Pos. Seq. Z%:    0.903 + J   2.85    (Zpu  12.04 + j  38.01 )   Shell Type
                Zero Seq. Z%:    0.903 + J   2.85    (Sec  12.04 + j  38.01 Pri  Open)
                Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.

 XFMR-2A-LP-01  BUS-0912       D   480.00   BUS-0913       YG    208.00   15.00        15.00
                Pos. Seq. Z%:     1.57 + J   3.87    (Zpu  104.5 + j  258.2 )   Shell Type
                Zero Seq. Z%:     1.57 + J   3.87    (Sec  104.5 + j  258.2 Pri  Open)
                Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.

 XFMR-2-LP-1    BUS-0865       D   480.00   BUS-0866       YG    208.00   25.00        25.00
                Pos. Seq. Z%:     2.26 + J   5.99    (Zpu  90.30 + j  239.5 )   Shell Type
                Zero Seq. Z%:     2.26 + J   5.99    (Sec  90.30 + j  239.5 Pri  Open)
                Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.

 XFMR-2-LP-2    BUS-0867       D   480.00   BUS-0868       YG    208.00   25.00        25.00
                Pos. Seq. Z%:     2.26 + J   5.99    (Zpu  90.30 + j  239.5 )   Shell Type
                Zero Seq. Z%:     2.26 + J   5.99    (Sec  90.30 + j  239.5 Pri  Open)
                Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.

 XFMR-2-LP-3    BUS-0869       D   480.00   BUS-0870       YG    208.00   25.00        25.00
                Pos. Seq. Z%:     2.26 + J   5.99    (Zpu  90.30 + j  239.5 )   Shell Type
                Zero Seq. Z%:     2.26 + J   5.99    (Sec  90.30 + j  239.5 Pri  Open)
                Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.

 XFMR-2-LP-4    BUS-0871       D   480.00   BUS-0872       YG    208.00   25.00        25.00
                Pos. Seq. Z%:     2.26 + J   5.99    (Zpu  90.30 + j  239.5 )   Shell Type
                Zero Seq. Z%:     2.26 + J   5.99    (Sec  90.30 + j  239.5 Pri  Open)
                Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.
```

TRANSFORMER INPUT DATA

```
===============================================================================================
TRANSFORMER     PRIMARY RECORD      VOLTS   * SECONDARY RECORD     VOLTS   FULL-LOAD   NOMINAL
NAME            NO NAME             L-L       NO NAME              L-L     KVA           KVA

===============================================================================================
XFMR PHOS PUMP BUS-0481       D   480.00   BUS-0482       YG    120.00   10.00        10.00
               Pos. Seq. Z%:      2.09 + J   4.89    (Zpu  208.9 + j  489.2 )    Shell Type
               Zero Seq. Z%:      2.09 + J   4.89    (Sec  208.9 + j  489.2 Pri  Open)
               Taps  Pri. 0.000 %  Sec. 0.000 %  Phase Shift (Pri. Leads Sec.):  30.00 Deg.
```

```
                       GENERATION  CONTRIBUTION  DATA
=====================================================================================
BUS            CONTRIBUTION    VOLTAGE
NAME           NAME               L-L     MVA      X"d    X/R
=====================================================================================
BUS-1027       UTIL-0001       4800.00  144.66
                  Three Phase           Contribution:    17400.0 AMPS       12.80
                  Pos  Sequence Impedance (100 MVA Base)  0.0538 + J   0.6892 PU
                  Zero Sequence Impedance (100 MVA Base)10000000 + J 10000000 PU

BUS-1028       UTIL-0002       4800.00  138.01
                  Three Phase           Contribution:    16600.0 AMPS       10.80
                  Pos  Sequence Impedance (100 MVA Base)  0.0668 + J   0.7215 PU
                  Zero Sequence Impedance (100 MVA Base)10000000 + J 10000000 PU

DS-GEN 1       GEN-0001         480.00  0.375   0.1500    18.56
                  KG:  0.9386  xdsat:    1.60  Excitation Limit:    1.30  Ik -   ON
                  Pos  Sequence Impedance (100 MVA Base)   2.16 + J   40.00 PU
DS-GEN 2       GEN-0002         480.00  0.375   0.1500    18.56
                  KG:  0.9386  xdsat:    1.60  Excitation Limit:    1.30  Ik -   ON
                  Pos  Sequence Impedance (100 MVA Base)   2.16 + J   40.00 PU
```

MOTOR CONTRIBUTION DATA

```
=====================================================================================
BUS            CONTRIBUTION      VOLTAGE    BASE                                Motor
NAME           NAME                L-L      kVA        X"d    X/R          Number
=====================================================================================
45D WATER CIRC MTR-45D WATER        480    3.01       0.1670    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 2220.70 + j 5551.74 PU

AERATION RECIR MTR-ANAEROBIC        480   15.04       0.1670    2.60  1.00
                  Pos  Sequence Impedance (100 MVA Base)  427.53 + j 1110.35 PU

AERATION RECIR MTR-AERATION R       480   15.04       0.1670    2.60  1.00
                  Pos  Sequence Impedance (100 MVA Base)  427.53 + j 1110.35 PU

AERATION RECIR MTR-AERATION R       480   15.04       0.1670    2.60  1.00
                  Pos  Sequence Impedance (100 MVA Base)  427.53 + j 1110.35 PU

AERATION RECIR MTR-AERATION R       480   15.04       0.1670    2.60  1.00
                  Pos  Sequence Impedance (100 MVA Base)  427.53 + j 1110.35 PU

AERATION RECIR MTR-AERATION R       480   15.04       0.1670    2.60  1.00
                  Pos  Sequence Impedance (100 MVA Base)  427.53 + j 1110.35 PU

AERATION RECIR MTR-AERATION R       480   15.04       0.1670    2.60  1.00
                  Pos  Sequence Impedance (100 MVA Base)  427.53 + j 1110.35 PU

AERATION RECIR MTR-AERATION R       480   15.04       0.1670    2.60  1.00
                  Pos  Sequence Impedance (100 MVA Base)  427.53 + j 1110.35 PU

AERATION RECIR MTR-AERATION R       480   15.04       0.1670    2.60  1.00
                  Pos  Sequence Impedance (100 MVA Base)  427.53 + j 1110.35 PU

AERATION RECIR MTR-AERATION R       480   15.04       0.1670    2.60  1.00
                  Pos  Sequence Impedance (100 MVA Base)  427.53 + j 1110.35 PU
```

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                            MOTOR  CONTRIBUTION  DATA
=====================================================================================
BUS            CONTRIBUTION      VOLTAGE    BASE                              Motor
NAME           NAME                L-L      kVA         X"d    X/R           Number
=====================================================================================
AERATION VALVE AV #1-5             480  0.5013       0.2500    2.50  5.00
                  Pos  Sequence Impedance (100 MVA Base) 3989.28 + j 9973.19 PU

AERATION VALVE AV #6-9             480  0.5013       0.2500    2.50  5.00
                  Pos  Sequence Impedance (100 MVA Base) 3989.28 + j 9973.19 PU

AER. TANK AND  AER. TANK AND       480    2.01       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 4986.60 + j 12466.4 PU

AIR COMPRESSOR AIR COMP MTR        480    7.52       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 1329.76 + j 3324.40 PU

ANAEROBIC MIX  MTR-ANAEROBIC       480   15.04       0.1670    2.60  1.00
                  Pos  Sequence Impedance (100 MVA Base)  427.53 + j 1110.35 PU

ANAEROBIC MIX  MTR-ANAEROBIC       480   15.04       0.1670    2.60  1.00
                  Pos  Sequence Impedance (100 MVA Base)  427.53 + j 1110.35 PU

ANAEROBIC MIX  MTR-ANAEROBIC       480   15.04       0.1670    2.60  1.00
                  Pos  Sequence Impedance (100 MVA Base)  427.53 + j 1110.35 PU

ANAEROBIC MIX  MTR-ANAEROBIC       480   15.04       0.1670    2.60  1.00
                  Pos  Sequence Impedance (100 MVA Base)  427.53 + j 1110.35 PU

ANAEROBIC MIX  MTR-ANAEROBIC       480   15.04       0.1670    2.60  1.00
                  Pos  Sequence Impedance (100 MVA Base)  427.53 + j 1110.35 PU

ANEROBIC MIX P MTR-ANEROBIC M      480   15.04       0.1670    2.60  1.00
                  Pos  Sequence Impedance (100 MVA Base)  427.53 + j 1110.35 PU
```

MOTOR CONTRIBUTION DATA

BUS NAME	CONTRIBUTION NAME	VOLTAGE L-L	BASE kVA	X"d	X/R	Motor Number
ANEROBIC MIX P	MTR-ANEROBIC M	480	15.04	0.1670	2.60	1.00
	Pos Sequence Impedance (100 MVA Base) 427.53 + j 1110.35 PU					
ANEROBIC MIX P	MTR-ANEROBIC M	480	15.04	0.1670	2.60	1.00
	Pos Sequence Impedance (100 MVA Base) 427.53 + j 1110.35 PU					
ANEROBIC MIX P	MTR-ANEROBIC M	480	15.04	0.1670	2.60	1.00
	Pos Sequence Impedance (100 MVA Base) 427.53 + j 1110.35 PU					
ANOXIC MIX PUM	MTR-ANOXIC MIX	480	10.03	0.1670	2.61	1.00
	Pos Sequence Impedance (100 MVA Base) 638.82 + j 1665.52 PU					
ANOXIC MIX PUM	MTR-ANOXIC MIX	480	10.03	0.1670	2.61	1.00
	Pos Sequence Impedance (100 MVA Base) 638.82 + j 1665.52 PU					
ANOXIC MIX PUM	MTR-ANOXIC MIX	480	10.03	0.1670	2.61	1.00
	Pos Sequence Impedance (100 MVA Base) 638.82 + j 1665.52 PU					
ANOXIC MIX PUM	MTR-ANOXIC MIX	480	10.03	0.1670	2.61	1.00
	Pos Sequence Impedance (100 MVA Base) 638.82 + j 1665.52 PU					
ANOXIC MIX PUM	MTR-ANOXIC MIX	480	15.04	0.1670	2.60	1.00
	Pos Sequence Impedance (100 MVA Base) 427.53 + j 1110.35 PU					
ANOXIC MIX PUM	MTR-ANOXIC MIX	480	15.04	0.1670	2.60	1.00
	Pos Sequence Impedance (100 MVA Base) 427.53 + j 1110.35 PU					
ANOXIC MIX PUM	MTR-ANOXIC MIX	480	15.04	0.1670	2.60	1.00
	Pos Sequence Impedance (100 MVA Base) 427.53 + j 1110.35 PU					

MOTOR CONTRIBUTION DATA

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=====================================================================================
BUS            CONTRIBUTION      VOLTAGE    BASE                           Motor
NAME           NAME                L-L      kVA        X"d    X/R          Number
=====================================================================================
ANOXIC MIX PUM MTR-ANOXIC MIX      480   15.04       0.1670    2.60  1.00
                  Pos  Sequence Impedance (100 MVA Base)  427.53 + j 1110.35 PU

ANOXIC MIX PUM MTR-ANOXIC MIX      480   15.04       0.1670    2.60  1.00
                  Pos  Sequence Impedance (100 MVA Base)  427.53 + j 1110.35 PU

AUGER #1       AUGER #1 MTR        480  0.7520       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 13297.5 + j 33243.9 PU

AUGER #2       AUGER #2 MTR        480  0.7520       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 13297.5 + j 33243.9 PU

AUGER #3       AUGER #3 MTR        480  0.7520       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 13297.5 + j 33243.9 PU

BANDSCREEN #1  BANDSCREEN #1       480  0.5013       0.1507    4.90  8.00
                  Pos  Sequence Impedance (100 MVA Base)  767.17 + j 3758.34 PU

BANDSCREEN #2  BANDSCREEN #2       480  0.5013       0.1507    4.90  8.00
                  Pos  Sequence Impedance (100 MVA Base)  767.17 + j 3758.34 PU

BANDSCREEN #3  BANDSCREEN #3       480  0.5013       0.1507    4.90  8.00
                  Pos  Sequence Impedance (100 MVA Base)  767.17 + j 3758.34 PU

BAR SCREEN #1  BAR SCREEN #1       480    2.01       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 4986.60 + j 12466.4 PU

BAR SCREEN #2  BAR SCREEN #2       480    2.01       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 4986.60 + j 12466.4 PU
```

MOTOR CONTRIBUTION DATA

BUS NAME	CONTRIBUTION NAME	VOLTAGE L-L	BASE kVA	X"d	X/R	Motor Number
BAR SCREEN #3	BAR SCREEN #3	480	2.01	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 4986.60 + j 12466.4 PU					
BLOWER #1	BLOWER #1 MTR	480	60.16	0.1507	4.90	1.00
	Pos Sequence Impedance (100 MVA Base) 51.14 + j 250.56 PU					
BLOWER #3	BLOWER #3 MTR	480	40.11	0.1507	4.90	1.00
	Pos Sequence Impedance (100 MVA Base) 76.72 + j 375.83 PU					
BLOWER 3 CP	MTR-BLOWER 3 C	480	5.01	0.1670	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 1332.42 + j 3331.05 PU					
BLOWER 4 CP	MTR-BLOWER 4 C	480	5.01	0.1670	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 1332.42 + j 3331.05 PU					
BLOWER #5	BLOWER #5 MTR	480	40.11	0.1507	4.90	1.00
	Pos Sequence Impedance (100 MVA Base) 76.72 + j 375.83 PU					
BOILER CIRC PU	MTR-BOILER CIR	480	7.52	0.1670	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 888.28 + j 2220.70 PU					
BOILER CIRC PU	MTR-BOILER CIR	480	7.52	0.1670	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 888.28 + j 2220.70 PU					
BRIDGE CRANE	BRIDGE CRANE M	480	7.52	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 1329.76 + j 3324.40 PU					
BUS-0054	BLOWER 3	4800	1504.03	0.1670	24.6	1.00
	Pos Sequence Impedance (100 MVA Base) 0.4513 + j 11.10 PU					

MOTOR CONTRIBUTION DATA

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====================================================================================
BUS            CONTRIBUTION      VOLTAGE    BASE                             Motor
NAME           NAME                L-L      kVA         X"d    X/R           Number
====================================================================================
BUS-0055       BLOWER 4            4800 2145.06       0.1670    26.2  1.00
                  Pos  Sequence Impedance (100 MVA Base)  0.2965 + j    7.79 PU

BUS-0056       BLOWER 1            4800 2506.72       0.1670    26.2  1.00
                  Pos  Sequence Impedance (100 MVA Base)  0.2537 + j    6.66 PU

BUS-0057       BLOWER 2            4800 1504.03       0.1670    24.6  1.00
                  Pos  Sequence Impedance (100 MVA Base)  0.4513 + j   11.10 PU

BUS-0206       MTR-PWP 1            480  100.27       0.1670    8.56  1.00
                  Pos  Sequence Impedance (100 MVA Base)   19.46 + j  166.55 PU

BUS-0207       MTR-PWP 3            480  125.34       0.1670    8.56  1.00
                  Pos  Sequence Impedance (100 MVA Base)   15.57 + j  133.24 PU

BUS-0208       MTR-PW VALVE A       480  0.5013       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU

BUS-0211       MTR-MCC-12 HOI       480    5.01       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 1994.64 + j 4986.60 PU

BUS-0212       MTR-PWP #2           480   75.20       0.1670    8.56  1.00
                  Pos  Sequence Impedance (100 MVA Base)   25.95 + j  222.07 PU

BUS-0213       MTR-PWP #4           480  125.34       0.1670    8.56  1.00
                  Pos  Sequence Impedance (100 MVA Base)   15.57 + j  133.24 PU

BUS-0227       MCC3 WEF WEST        480  0.7520       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 13297.5 + j 33243.9 PU
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MOTOR CONTRIBUTION DATA

BUS NAME	CONTRIBUTION NAME	VOLTAGE L-L	BASE kVA	X"d	X/R	Motor Number
BUS-0228	MCC3 WEF EAST	480	0.7520	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 13297.5 + j 33243.9 PU					
BUS-0229	MCC3 SVF WEST	480	0.7520	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 13297.5 + j 33243.9 PU					
BUS-0230	MCC3 SVF EAST	480	0.7520	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 13297.5 + j 33243.9 PU					
BUS-0383	DUMPSTER 1 LID	480	1.50	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 6648.79 + j 16621.9 PU					
BUS-0384	DUMPSTER 1 LID	480	3.01	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 3324.40 + j 8310.99 PU					
BUS-0386	DUMPSTER 2 LID	480	1.50	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 6648.79 + j 16621.9 PU					
BUS-0387	DUMPSTER 2 LID	480	3.01	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 3324.40 + j 8310.99 PU					
BUS-0389	DUMPSTER 3 LID	480	1.50	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 6648.79 + j 16621.9 PU					
BUS-0390	DUMPSTER 3 LID	480	3.01	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 3324.40 + j 8310.99 PU					
BUS-0412	PUMP #5	480	125.34	0.1670	9.80	1.00
	Pos Sequence Impedance (100 MVA Base) 13.60 + j 133.24 PU					

MOTOR CONTRIBUTION DATA

BUS NAME	CONTRIBUTION NAME	VOLTAGE L-L	BASE kVA	X"d	X/R	Motor Number
BUS-0416	MCC3 SEWAGE PU	480	130.35	0.1670	10.0	1.00
	Pos Sequence Impedance (100 MVA Base) 12.78 + j 128.12 PU					
BUS-0448	SEWAGE PUMP #2	480	150.40	0.1670	10.8	1.00
	Pos Sequence Impedance (100 MVA Base) 10.20 + j 111.03 PU					
BUS-0766	MTR-EF-1	480	0.5013	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU					
BUS-0767	MTR-EF-2	480	0.5013	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU					
BUS-0768	MTR-EF-3	480	0.5013	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU					
BUS-0769	MTR-PP-1 TRANS	480	3.01	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 3324.40 + j 8310.99 PU					
BUS-0770	MTR-PP-1 TRANS	480	3.01	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 3324.40 + j 8310.99 PU					
BUS-0772	MTR-PP-1 OH DO	480	1.00	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 9973.19 + j 24932.9 PU					
BUS-0786	MCC-00-MAU-1	480	7.52	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 1329.76 + j 3324.40 PU					
BUS-0797	MTR-ANOXIC TAN	480	0.5013	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU					

MOTOR CONTRIBUTION DATA

BUS NAME	CONTRIBUTION NAME	VOLTAGE L-L	BASE kVA	X"d	X/R	Motor Number
BUS-0816	MTR-MIXER BLDG	480	20.16	0.2500	2.61	1.00
	Pos Sequence Impedance (100 MVA Base) 475.61 + j 1240.00 PU					
BUS-0817	MTR-MIXER BLDG	480	20.16	0.2500	2.61	1.00
	Pos Sequence Impedance (100 MVA Base) 475.61 + j 1240.00 PU					
BUS-0818	MTR-CENT. FEED	480	15.04	0.2500	2.61	1.00
	Pos Sequence Impedance (100 MVA Base) 637.54 + j 1662.20 PU					
BUS-0819	MTR-CENT. FEED	480	15.04	0.2500	2.61	1.00
	Pos Sequence Impedance (100 MVA Base) 637.54 + j 1662.20 PU					
BUS-0827	MTR-CENTRIFUGE	480	15.04	0.2500	2.61	1.00
	Pos Sequence Impedance (100 MVA Base) 637.54 + j 1662.20 PU					
BUS-0831	MTRI-SOUTH BEL	480	5.01	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 1994.64 + j 4986.60 PU					
BUS-0832	MTRI-SOUTH BEL	480	5.01	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 1994.64 + j 4986.60 PU					
BUS-0850	MTRI-AMMONIA R	480	75.20	0.1670	7.10	1.00
	Pos Sequence Impedance (100 MVA Base) 31.26 + j 222.07 PU					
BUS-0851	MTRI-AMMONIA R	480	75.20	0.1670	7.10	1.00
	Pos Sequence Impedance (100 MVA Base) 31.26 + j 222.07 PU					
BUS-0852	MTRI-EF-2A	480	0.5013	0.1670	7.10	1.00
	Pos Sequence Impedance (100 MVA Base) 4688.97 + j 33310.4 PU					

MOTOR CONTRIBUTION DATA

BUS NAME	CONTRIBUTION NAME	VOLTAGE L-L	BASE kVA	X"d	X/R	Motor Number
BUS-0853	MTRI-EF-2B	480	0.5013	0.1670	7.10	1.00
	Pos Sequence Impedance (100 MVA Base) 4688.97 + j 33310.4 PU					
BUS-0854	MTRI-EF-2C	480	0.5013	0.1670	7.10	1.00
	Pos Sequence Impedance (100 MVA Base) 4688.97 + j 33310.4 PU					
BUS-0855	MTRI-EF-5A	480	0.5013	0.1670	7.10	1.00
	Pos Sequence Impedance (100 MVA Base) 4688.97 + j 33310.4 PU					
BUS-0856	MTRI-EF-5B	480	1.00	0.1670	7.10	1.00
	Pos Sequence Impedance (100 MVA Base) 2344.49 + j 16655.2 PU					
BUS-0857	MTRI-HVAC 1	480	26.88	0.1670	7.10	1.00
	Pos Sequence Impedance (100 MVA Base) 87.45 + j 621.24 PU					
BUS-0858	MTRI-CP-CS-SH-	480	15.04	0.1670	7.10	1.00
	Pos Sequence Impedance (100 MVA Base) 156.30 + j 1110.35 PU					
BUS-0934	MTR-PLANT WATE	480	20.05	0.2500	2.60	1.00
	Pos Sequence Impedance (100 MVA Base) 480.02 + j 1246.65 PU					
BUS-0935	MTR-PLANT WATE	480	20.05	0.2500	2.60	1.00
	Pos Sequence Impedance (100 MVA Base) 480.02 + j 1246.65 PU					
BUS-0980	MTR-NORTH FAN	480	1.00	0.1507	4.90	1.00
	Pos Sequence Impedance (100 MVA Base) 3068.66 + j 15033.3 PU					
BUS-0981	MTR-SOUTH FAN	480	1.00	0.1507	4.90	1.00
	Pos Sequence Impedance (100 MVA Base) 3068.66 + j 15033.3 PU					

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                            MOTOR  CONTRIBUTION  DATA
=====================================================================================
BUS            CONTRIBUTION      VOLTAGE    BASE                             Motor
NAME           NAME                L-L      kVA         X"d    X/R          Number
=====================================================================================
BUS-1025       MCC1 PUMP 4           480  125.34       0.1507    4.90  1.00
                  Pos  Sequence Impedance (100 MVA Base)   24.55 + j  120.27 PU

CARBON FEED PU CARBON FEED PU        480    8.02       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 1246.65 + j 3116.62 PU

CARBON FEED PU CARBON FEED PU        480    8.02       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 1246.65 + j 3116.62 PU

CARBON SCRUBBE CS-BP-1 MTR           480   15.04       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base)  664.88 + j 1662.20 PU

CARBON SLURRY  CARBON SLURRY         480   30.08       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base)  332.44 + j  831.10 PU

CENTER CELL    MTR-CENTER CEL        480    3.01       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 3324.40 + j 8310.99 PU

CENTRIFUGE# 1  MTR-CENTRIFUGE        480  100.27       0.1670    8.56  1.00
                  Pos  Sequence Impedance (100 MVA Base)   19.46 + j  166.55 PU

CENTRIFUGE #2  MTR-CENTRIFUGE        480  100.27       0.1670    8.56  1.00
                  Pos  Sequence Impedance (100 MVA Base)   19.46 + j  166.55 PU

CENTRIFUGE# 3  MTR-CENTRIFUGE        480  100.27       0.1670    8.56  1.00
                  Pos  Sequence Impedance (100 MVA Base)   19.46 + j  166.55 PU

CENTRIFUGE #4  MTR-CENTRIFUGE        480  100.27       0.1670    8.56  1.00
                  Pos  Sequence Impedance (100 MVA Base)   19.46 + j  166.55 PU
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MOTOR CONTRIBUTION DATA

BUS NAME	CONTRIBUTION NAME	VOLTAGE L-L	BASE kVA	X"d	X/R	Motor Number
CHANEL MIX PUM	CHANEL MIX PUM	480	10.03	0.1670	2.61	1.00
	Pos Sequence Impedance (100 MVA Base) 638.82 + j 1665.52 PU					
CHANEL MIX PUM	MTR-CHANEL MIX	480	10.03	0.1670	2.61	1.00
	Pos Sequence Impedance (100 MVA Base) 638.82 + j 1665.52 PU					
CHANNEL MIX PU	MTR-AERATION R	480	10.03	0.1670	2.61	1.00
	Pos Sequence Impedance (100 MVA Base) 638.82 + j 1665.52 PU					
CHANNEL MIX PU	MTR-AERATION R	480	10.03	0.1670	2.61	1.00
	Pos Sequence Impedance (100 MVA Base) 638.82 + j 1665.52 PU					
CHILLER #1	MTR-CHILLER #1	480	34.00	0.1670	4.05	2.00
	Pos Sequence Impedance (100 MVA Base) 60.69 + j 245.59 PU					
CHILLER #2	MTR-CHILLER #2	480	34.00	0.1670	4.05	2.00
	Pos Sequence Impedance (100 MVA Base) 60.69 + j 245.59 PU					
CHILL WATER CI	MTR-CHILL WATE	480	60.16	0.1670	6.10	1.00
	Pos Sequence Impedance (100 MVA Base) 45.53 + j 277.59 PU					
CHILL WATER CI	MTR-CHILL WATE	480	3.01	0.1670	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 2220.70 + j 5551.74 PU					
CS-BS-1	CS-BS-1 MTR	480	25.07	0.2500	3.29	1.00
	Pos Sequence Impedance (100 MVA Base) 303.29 + j 997.32 PU					
CW PUMP P-10	MTR-CW PUMP P-	480	20.05	0.1670	2.89	1.00
	Pos Sequence Impedance (100 MVA Base) 287.75 + j 832.76 PU					

MOTOR CONTRIBUTION DATA

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=====================================================================================
BUS            CONTRIBUTION      VOLTAGE    BASE                             Motor
NAME           NAME                L-L      kVA        X"d    X/R          Number
=====================================================================================
D-101          D-101 MTR            480    1.00       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 9973.19 + j 24932.9 PU

D-102          D-102 MTR            480    1.00       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 9973.19 + j 24932.9 PU

D-103          D-103 MTR            480    1.00       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 9973.19 + j 24932.9 PU

DOOR #1        MTRI-DOOR 1          480    5.01       0.1670    7.10  1.00
                  Pos  Sequence Impedance (100 MVA Base)  468.90 + j 3331.05 PU

DOOR #2        MTRI-DOOR 2          480    5.01       0.1670    7.10  1.00
                  Pos  Sequence Impedance (100 MVA Base)  468.90 + j 3331.05 PU

DOOR #3        MTRI-DOOR 3          480    5.01       0.1670    7.10  1.00
                  Pos  Sequence Impedance (100 MVA Base)  468.90 + j 3331.05 PU

DOOR OPERATORS DOOR OPERATOR        480  0.5013       0.1507    4.90  8.00
                  Pos  Sequence Impedance (100 MVA Base)  767.17 + j 3758.34 PU

DRILL PRESS #1 DRILL PRESS #1       480  0.7520       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 13297.5 + j 33243.9 PU

DRILL PRESS #2 DRILL PRESS #2       480    1.50       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 6648.79 + j 16621.9 PU

DS-3 AUX. INST MTR-3 AUX. INS       480    5.01       0.2500    2.61  1.00
                  Pos  Sequence Impedance (100 MVA Base) 1912.62 + j 4986.60 PU
```

MOTOR CONTRIBUTION DATA

```
=====================================================================================
BUS            CONTRIBUTION      VOLTAGE    BASE                            Motor
NAME           NAME                L-L      kVA        X"d    X/R          Number
=====================================================================================
DS-BYPASS CONV MTR-BYPASS CON       480    2.01       0.2500    2.61  1.00
                  Pos  Sequence Impedance (100 MVA Base) 4781.56 + j 12466.4 PU

DS-BYPASS SLID MTR-BYPASS SLI       480  0.5013       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU

DS-CF-SH-1     MTRI-CF-SH-1         480   10.03       0.1670    7.10  1.00
                  Pos  Sequence Impedance (100 MVA Base)  234.45 + j 1665.52 PU

DS-CF-SH-2     MTRI-CF-SH-2         480   10.03       0.1670    7.10  1.00
                  Pos  Sequence Impedance (100 MVA Base)  234.45 + j 1665.52 PU

DS-DRAIN PUMP  MTR-DRAIN PUMP       480   15.04       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base)  664.88 + j 1662.20 PU

DS-EF-SC-1     MTR-EF-SC-1          480    1.00       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 9973.19 + j 24932.9 PU

DS-ENG. RM. BO MTR-BOILER SUM       480  0.5013       0.2500    2.60  1.00
                  Pos  Sequence Impedance (100 MVA Base) 19200.6 + j 49865.9 PU

DS-ENG. RM. BO MTR-UT COMP          480    5.01       0.2500    2.60  1.00
                  Pos  Sequence Impedance (100 MVA Base) 1920.06 + j 4986.60 PU

DS-EXHAUST FAN MTR-EXHAUST FA       480    1.00       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 9973.19 + j 24932.9 PU

DS-EXISTING CR MTRI-EXISTING        480  0.5013       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU
```

MOTOR CONTRIBUTION DATA

```
=====================================================================================
BUS            CONTRIBUTION      VOLTAGE    BASE                                Motor
NAME           NAME                L-L      kVA         X"d    X/R            Number
=====================================================================================
DS-GROUND SLUD MTRI-GROUND SL       480   10.03       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base)  997.32 + j 2493.30 PU

DS-INFLUENT VA MTR-INFLUENT V       480  0.5013       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU

DS-INFLUENT VA MTR-INFLUENT V       480  0.5013       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU

DS-MAU-SC-1    MTR-MAU-SC-1         480    5.01       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 1994.64 + j 4986.60 PU

DS-MAU-SH-1    MTRI-MAU-SH-1        480   10.03       0.2500    2.61  1.00
                  Pos  Sequence Impedance (100 MVA Base)  956.31 + j 2493.30 PU

DS-MAU-SH-2    MTRI-MAU-SH-2        480   30.08       0.2500    3.71  1.00
                  Pos  Sequence Impedance (100 MVA Base)  223.88 + j  831.10 PU

DS-MAU-SH-3    MTRI-MAU-SH-3        480    7.52       0.2500    2.61  1.00
                  Pos  Sequence Impedance (100 MVA Base) 1275.08 + j 3324.40 PU

DS-MCC-25-SF-4 MTRI-MCC-25-SF       480  0.5013       0.1670    7.10  1.00
                  Pos  Sequence Impedance (100 MVA Base) 4688.97 + j 33310.4 PU

DS-MCC-7 AIR C MTR-MCC-7 AIR        480    5.01       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 1994.64 + j 4986.60 PU

DS-MCC7 PUMP 1 MTR-MCC-7 PUMP       480   40.11       0.2500    4.56  1.00
                  Pos  Sequence Impedance (100 MVA Base)  136.74 + j  623.32 PU
```

```
                            MOTOR  CONTRIBUTION  DATA
=====================================================================================
BUS            CONTRIBUTION      VOLTAGE    BASE                             Motor
NAME           NAME                L-L      kVA        X"d    X/R          Number
=====================================================================================
DS-MCC7 PUMP 2 MTR-MCC-7 PUMP       480   40.11       0.2500    4.56  1.00
                  Pos  Sequence Impedance (100 MVA Base)  136.74 + j  623.32 PU

DS-MCC7 PUMP 3 MTR-MCC-7 PUMP       480   40.11       0.2500    4.56  1.00
                  Pos  Sequence Impedance (100 MVA Base)  136.74 + j  623.32 PU

DS-MCC7 PUMP 4 MTR-MCC-7 PUMP       480   40.11       0.2500    4.56  1.00
                  Pos  Sequence Impedance (100 MVA Base)  136.74 + j  623.32 PU

DS-MIXED LIQUO MTR-MIXED LIQU       480   30.08       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base)  332.44 + j  831.10 PU

DS-MSP-12 TUMB MTR-MSP-12 TUM       480    7.52       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 1329.76 + j 3324.40 PU

DS-NEW CRANE   MTRI-NEW CRANE       480  0.5013       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU

DS-NORTH BELT  MTRI-NORTH BEL       480    5.01       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 1994.64 + j 4986.60 PU

DS-NORTH BELT  MTRI-NORTH BEL       480    5.01       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 1994.64 + j 4986.60 PU

DS-NORTH BOOST MTRI-NORTH BOO       480    5.01       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 1994.64 + j 4986.60 PU

DS-NORTH BOOST MTRI-NORTH BOO       480    5.01       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 1994.64 + j 4986.60 PU
```

MOTOR CONTRIBUTION DATA

BUS NAME	CONTRIBUTION NAME	VOLTAGE L-L	BASE kVA	X"d	X/R	Motor Number
DS-POLYMER MIX	MTR-APOLYMER M	480	0.5013	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU					
DS-RAS PUMP #1	MTR-RAS PUMP #	480	3.01	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 3324.40 + j 8310.99 PU					
DS-RAS PUMP #2	MTR-RAS PUMP #	480	3.01	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 3324.40 + j 8310.99 PU					
DS-RAS PUMP #3	MTR-RAS PUMP #	480	3.01	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 3324.40 + j 8310.99 PU					
DS-SLIDE GATE	MTR-SLIDE GATE	480	0.5013	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU					
DS-SLIDE GATE	MTR-SLIDE GATE	480	0.5013	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU					
DS-SLUDGE PUMP	MTR-MSP-12 TUM	480	7.52	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 1329.76 + j 3324.40 PU					
DS-SLUDGE PUMP	MTR-SLUDGE PUM	480	5.01	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 1994.64 + j 4986.60 PU					
DS-SLUDGE TANK	MTR-SLUDGE TAN	480	10.03	0.2500	2.61	1.00
	Pos Sequence Impedance (100 MVA Base) 956.31 + j 2493.30 PU					
DS-SLUDGE THIC	MTR-SLUDGE THI	480	5.01	0.2500	4.56	1.00
	Pos Sequence Impedance (100 MVA Base) 1093.94 + j 4986.60 PU					

MOTOR CONTRIBUTION DATA

```
=====================================================================================
BUS            CONTRIBUTION      VOLTAGE    BASE                               Motor
NAME           NAME                L-L      kVA        X"d    X/R              Number
=====================================================================================
DS-SLUDGE THIC MTR-SLUDGE THI       480    5.01       0.2500    4.56  1.00
                  Pos  Sequence Impedance (100 MVA Base) 1093.94 + j 4986.60 PU

DS-SLUDGE THIC MTR-SLUDGE THI       480    5.01       0.2500    4.56  1.00
                  Pos  Sequence Impedance (100 MVA Base) 1093.94 + j 4986.60 PU

DS-SLUDGE THIC MTR-SLUDGE THI       480    5.01       0.2500    4.56  1.00
                  Pos  Sequence Impedance (100 MVA Base) 1093.94 + j 4986.60 PU

DS-SOUTH BELT  MTRI-SOUTH BEL       480    5.01       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 1994.64 + j 4986.60 PU

DS-SOUTH BELT  MTRI-SOUTH BEL       480    5.01       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 1994.64 + j 4986.60 PU

DS-SUMP PUMP 1 MTR-SUMP PUMP        480  0.5013       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU

DS-SUMP PUMP 2 MTR-SUMP PUMP        480    5.01       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 1994.64 + j 4986.60 PU

DS-SUMP PUMP A MTR-INFLUENT V       480    1.00       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 9973.19 + j 24932.9 PU

DS-SUMP PUMP B MTR-INFLUENT V       480    1.00       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 9973.19 + j 24932.9 PU

DS-SYSTEM AIR  MTR-SYSTEM AIR       480   15.04       0.2500    2.61  1.00
                  Pos  Sequence Impedance (100 MVA Base)  637.54 + j 1662.20 PU
```

MOTOR CONTRIBUTION DATA

BUS NAME	CONTRIBUTION NAME	VOLTAGE L-L	BASE kVA	X"d	X/R	Motor Number
DS-SYSTEM AIR	MTR-SYSTEM AIR	480	15.04	0.2500	2.61	1.00
	Pos Sequence Impedance (100 MVA Base) 637.54 + j 1662.20 PU					
EAST FAN	EAST FAN MTR	480	2.01	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 4986.60 + j 12466.4 PU					
EF-2	EF-2 MTR	480	0.5013	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU					
ET CONVEYOR 2	MTR-ET CONVEYO	480	7.52	0.1670	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 888.28 + j 2220.70 PU					
EXHAUST FAN A	EXHAUST FAN A	480	0.5013	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU					
EXHAUST FAN B	EXHAUST FAN B	480	0.5013	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU					
EXHAUST FAN C	EXHAUST FAN C	480	0.5013	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU					
EXHAUST FAN D	EXHAUST FAN D	480	0.5013	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU					
EXHAUST FAN E	EXHAUST FAN E	480	0.5013	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU					
FC-1	FC-1 MTR	480	5.01	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 1994.64 + j 4986.60 PU					

MOTOR CONTRIBUTION DATA

BUS NAME	CONTRIBUTION NAME	VOLTAGE L-L	BASE kVA	X"d	X/R	Motor Number
FC-2	FC-2 MTR	480	5.01	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 1994.64 + j 4986.60 PU					
FILTER DOOR OP	FILTER DOOR OP	480	0.5013	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU					
FINAL TANK AND	FINAL TANK UND	480	7.52	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 1329.76 + j 3324.40 PU					
FINAL TANK DRA	FINAL TANK DRA	480	1.50	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 6648.79 + j 16621.9 PU					
FUME EXTRACTOR	FUME EXT MTR	480	0.5013	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU					
GATE VALVE 1	GATE VALVE 1 M	480	0.2507	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 39892.7 + j 99731.9 PU					
GATE VALVE 2	GATE VALVE 2 M	480	0.2507	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 39892.7 + j 99731.9 PU					
GATE VALVE 4	GATE VALVE 4 M	480	0.2507	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 39892.7 + j 99731.9 PU					
GATE VALVE 5	GATE VALVE 5 M	480	0.2507	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 39892.7 + j 99731.9 PU					
GATE VALVE 7	GATE VALVE 7 M	480	0.2507	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 39892.7 + j 99731.9 PU					

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                            MOTOR  CONTRIBUTION  DATA
=====================================================================================
BUS            CONTRIBUTION      VOLTAGE    BASE                             Motor
NAME           NAME                L-L      kVA         X"d    X/R          Number
=====================================================================================
GATE VALVE 8   GATE VALVE 8 M       480  0.2507       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 39892.7 + j 99731.9 PU

GRINDER #1     GRINDER #1 MTR       480  0.7520       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 13297.5 + j 33243.9 PU

GRINDER #2     GRINDER #2 MTR       480  0.7520       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 13297.5 + j 33243.9 PU

GRINDER #3     GRINDER #3 MTR       480  0.7520       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 13297.5 + j 33243.9 PU

GRIT REMOVAL H GRIT REMOVAL H       480  0.5013       0.1507    4.90  8.00
                  Pos  Sequence Impedance (100 MVA Base)  767.17 + j 3758.34 PU

GRIT TANK #1   GRIT TANK #1 M       480  0.7520       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 13297.5 + j 33243.9 PU

GRIT TANK #2   GRIT TANK #2 M       480  0.7520       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 13297.5 + j 33243.9 PU

HOT WATER CIRC MTR-HOT WATER        480    5.01       0.1670    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 1332.42 + j 3331.05 PU

HOT WATER CIRC MTR-HOT WATER        480    5.01       0.1670    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 1332.42 + j 3331.05 PU

HUMIDIFIER #1  MTR-HUMIDIFIER       480   60.16       0.1670    6.10  1.00
                  Pos  Sequence Impedance (100 MVA Base)   45.53 + j  277.59 PU
```

MOTOR CONTRIBUTION DATA

BUS NAME	CONTRIBUTION NAME	VOLTAGE L-L	BASE kVA	X"d	X/R		Motor Number
HUMIDIFIER #2	MTR-HUMIDIFIER	480	60.16	0.1670	6.10	1.00	
	Pos Sequence Impedance (100 MVA Base) 45.53 + j 277.59 PU						
HVAC UNIT A	MTR-HVAC UNIT	480	5.01	0.1670	2.50	1.00	
	Pos Sequence Impedance (100 MVA Base) 1332.42 + j 3331.05 PU						
HVAC UNIT B	MTR-HVAC UNIT	480	7.52	0.1670	2.50	1.00	
	Pos Sequence Impedance (100 MVA Base) 888.28 + j 2220.70 PU						
HW PUMP #1 P-1	MTR-HW PUMP #1	480	3.01	0.1670	2.50	1.00	
	Pos Sequence Impedance (100 MVA Base) 2220.70 + j 5551.74 PU						
HYDRAULIC LIFT	HYD LIFT MTR	480	1.50	0.2500	2.50	1.00	
	Pos Sequence Impedance (100 MVA Base) 6648.79 + j 16621.9 PU						
MAKE UP AIR UN	MAKE UP AIR UN	480	6.52	0.2500	2.50	1.00	
	Pos Sequence Impedance (100 MVA Base) 1534.34 + j 3835.84 PU						
MAU-1	MAU-1 MTR	480	7.52	0.2500	2.50	1.00	
	Pos Sequence Impedance (100 MVA Base) 1329.76 + j 3324.40 PU						
MAU-BP-1 VFD	MAU-BP-1 MTR	480	10.03	0.2500	2.50	1.00	
	Pos Sequence Impedance (100 MVA Base) 997.32 + j 2493.30 PU						
MCC-13 AIR COM	MCC-13 AIR COM	480	7.52	0.2500	2.50	1.00	
	Pos Sequence Impedance (100 MVA Base) 1329.76 + j 3324.40 PU						
MCC-13 CRANE	MCC-13 CRANE M	480	15.04	0.2500	2.50	1.00	
	Pos Sequence Impedance (100 MVA Base) 664.88 + j 1662.20 PU						

```
                            MOTOR  CONTRIBUTION  DATA
=====================================================================================
BUS            CONTRIBUTION      VOLTAGE    BASE                           Motor
NAME           NAME                L-L      kVA        X"d    X/R          Number
=====================================================================================
MCC-13 OVERHEA MCC-13 OVERHEA       480    1.00       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 9973.19 + j 24932.9 PU

MCC-14 HOIST   MCC-14 HOIST M       480    3.49       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 2861.54 + j 7153.85 PU

MCC-14 SUMP PU SUMP PUMP EAST       480  0.5013       0.2500    2.50  2.00
                  Pos  Sequence Impedance (100 MVA Base) 9973.19 + j 24932.9 PU

MCC-3COMPRESSO COMP MTR #1          480    5.01       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 1994.64 + j 4986.60 PU

MCC-3COMPRESSO COMP MTR #2          480    5.01       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 1994.64 + j 4986.60 PU

MCC-3 PURGE #1 MCC-3 PURGE #1       480    5.01       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 1994.64 + j 4986.60 PU

MCC-3 PURGE #2 MCC-3 PURGE #2       480    5.01       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 1994.64 + j 4986.60 PU

MCC-3 SUMP PUM SUMP PUMP MTR        480  0.5013       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU

MIXED LIQUER P MTR-MIXED LIQU       480   60.16       0.1670    6.10  1.00
                  Pos  Sequence Impedance (100 MVA Base)   45.53 + j  277.59 PU

MIXED LIQUER P MTR-MIXED LIQU       480   60.16       0.1670    6.10  1.00
                  Pos  Sequence Impedance (100 MVA Base)   45.53 + j  277.59 PU
```

MOTOR CONTRIBUTION DATA

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=====================================================================================
BUS            CONTRIBUTION      VOLTAGE    BASE                            Motor
NAME           NAME                L-L      kVA        X"d    X/R          Number
=====================================================================================
MIXED LIQUER P MTR-MIXED LIQU       480   60.16       0.1670    6.10  1.00
                  Pos  Sequence Impedance (100 MVA Base)    45.53 + j  277.59 PU

MIXED LIQUER P MTR-MIXED LIQU       480   60.16       0.1670    6.10  1.00
                  Pos  Sequence Impedance (100 MVA Base)    45.53 + j  277.59 PU

MIXER #1       MIXER #1 MTR         480    5.01       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 1994.64 + j 4986.60 PU

MIXER #2       MIXER #2 MTR         480    5.01       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 1994.64 + j 4986.60 PU

MIX TANK DUST  MIX TANK DUST        480    8.02       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 1246.65 + j 3116.62 PU

MIX TANK DUST  MIX TANK DUST        480    8.02       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 1246.65 + j 3116.62 PU

MO GATE #1     MO GATE #1 MTR       480    2.26       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 4432.53 + j 11081.3 PU

MO GATE #2     MO GATE #2 MTR       480    2.26       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 4432.53 + j 11081.3 PU

MUA-1          MTRI-0210            480    5.01       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 1994.64 + j 4986.60 PU

NEW AIR COMPRE NEW AIR COMPRE       480    7.52       0.2500    2.60  1.00
                  Pos  Sequence Impedance (100 MVA Base) 1280.04 + j 3324.40 PU
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MOTOR CONTRIBUTION DATA

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=====================================================================================
BUS            CONTRIBUTION      VOLTAGE    BASE                            Motor
NAME           NAME               L-L       kVA        X"d    X/R          Number
=====================================================================================
NORTH CELL     MTR-NORTH CELL      480    3.01       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 3324.40 + j 8310.99 PU

NORTH SEC. PUM MTR-SOUTH SEC.      480    3.01       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 3324.40 + j 8310.99 PU

ODOR CTRL FAN  ODOR CTRL #1 M      480  0.5013       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU

ODOR CTRL FAN  ODOR CTRL #2 M      480  0.5013       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU

OVERHEAD DOORS DOOR MTR            480    1.00       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 9973.19 + j 24932.9 PU

PRIM SLUDGE CO PRIM SLUDGE CO      480  0.5013       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU

PRIM SLUDGE CO PRIM SLUDGE CO      480  0.5013       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU

PRIM SLUDGE CO PRIM SLUDGE CO      480  0.5013       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU

PRIM SLUDGE CO PRIM SLUDGE CO      480  0.5013       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU

PRIM SLUDGE CO PRIM SLUDGE CO      480  0.5013       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU
```

MOTOR CONTRIBUTION DATA

BUS NAME	CONTRIBUTION NAME	VOLTAGE L-L	BASE kVA	X"d	X/R	Motor Number
PRIM SLUDGE CO	PRIM SLUDGE CO	480	0.5013	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU					
PRIM SLUDGE CO	PRIM SLUDGE CO	480	0.5013	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU					
PRIM SLUDGE CO	PRIM SLUDGE CO	480	0.5013	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU					
PRIM SLUDGE CO	PRIM SLUDGE CO	480	0.5013	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU					
PRIM SLUDGE CO	PRIM SLUDGE CO	480	0.5013	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU					
PRIM SLUDGE CO	PRIM SLUDGE CO	480	0.5013	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU					
PRIM SLUDGE CO	PRIM SLUDGE CO	480	0.5013	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU					
PURGE FAN #1 D	PURGE FAN #1 M	480	0.5013	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU					
PURGE FAN #2 D	PURGE FAN #2 M	480	0.5013	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU					
PURGE FAN #3 D	PURGE FAN #3 M	480	0.5013	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU					

```
                            MOTOR  CONTRIBUTION  DATA
=====================================================================================
BUS            CONTRIBUTION      VOLTAGE    BASE                           Motor
NAME           NAME                L-L      kVA        X"d    X/R          Number
=====================================================================================
PURGE FAN #4 D PURGE FAN #4 M       480  0.5013       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU

PURGE FAN #5 D PURGE FAN #5 M       480  0.5013       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU

PURGE FAN #6 D PURGE FAN #6 M       480  0.5013       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU

RAS AND INFLUE RAS AND INFLUE       480  0.3810       0.2500    2.50  2.00
                  Pos  Sequence Impedance (100 MVA Base) 13122.6 + j 32806.5 PU

RETURN SLUDGE  RETURN SLUDGE        480  100.27       0.1670    8.56  1.00
                  Pos  Sequence Impedance (100 MVA Base)   19.46 + j  166.55 PU

RETURN SLUDGE  RETURN SLUDGE        480  100.27       0.1670    8.56  1.00
                  Pos  Sequence Impedance (100 MVA Base)   19.46 + j  166.55 PU

RETURN SLUDGE  RETURN SLUDGE        480  100.27       0.1670    8.56  1.00
                  Pos  Sequence Impedance (100 MVA Base)   19.46 + j  166.55 PU

RETURN SLUDGE  RETURN SLUDGE        480  100.27       0.1670    8.56  1.00
                  Pos  Sequence Impedance (100 MVA Base)   19.46 + j  166.55 PU

SCREW CONVEYOR SCREW CONVEYOR       480   15.04       0.2500    2.60  1.00
                  Pos  Sequence Impedance (100 MVA Base)  640.02 + j 1662.20 PU

SCUM PUMP      SCUM PUMP MTR        480    1.50       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 6648.79 + j 16621.9 PU
```

MOTOR CONTRIBUTION DATA

```
=====================================================================================
BUS            CONTRIBUTION      VOLTAGE    BASE                              Motor
NAME           NAME                L-L      kVA         X"d    X/R          Number
=====================================================================================
SER FAN A      SER FAN A MTR        480  0.5013       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU

SER FAN B      SER FAN B MTR        480  0.5013       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU

SER FAN C      SER FAN C MTR        480  0.5013       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU

SER FAN D      SER FAN D MTR        480  0.5013       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU

SER FAN E      SER FAN E MTR        480  0.5013       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU

SER FAN F      SER FAN F MTR        480  0.5013       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU

SER FAN G      SER FAN G MTR        480  0.5013       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU

SER FAN H      SER FAN H MTR        480  0.5013       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU

SER FAN I      SER FAN I MTR        480  0.5013       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU

SER FAN J      SER FAN J MTR        480  0.5013       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU
```

MOTOR CONTRIBUTION DATA

BUS NAME	CONTRIBUTION NAME	VOLTAGE L-L	BASE kVA	X"d	X/R	Motor Number
SER FAN K	SER FAN K MTR	480	0.5013	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU					
SER FAN L	SER FAN L MTR	480	0.5013	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 19946.3 + j 49865.9 PU					
SEWAGE PUMP #1	MCC1 PUMP 1	480	125.34	0.1507	4.90	1.00
	Pos Sequence Impedance (100 MVA Base) 24.55 + j 120.27 PU					
SLUDE PUMP #4	SLUDGE PUMP #4	480	10.03	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 997.32 + j 2493.30 PU					
SLUDGE CAKE PU	MTR-SLUDGE CAK	480	200.54	0.1670	12.7	1.00
	Pos Sequence Impedance (100 MVA Base) 6.55 + j 83.28 PU					
SLUDGE PUMP #1	SLUDGE PUMP #1	480	10.03	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 997.32 + j 2493.30 PU					
SLUDGE PUMP #2	SLUDGE PUMP #2	480	10.03	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 997.32 + j 2493.30 PU					
SLUDGE PUMP #3	SLUDGE PUMP #3	480	10.03	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 997.32 + j 2493.30 PU					
SLUDGE PUMP #7	SLUDGE PUMP #7	480	5.01	0.1507	4.90	8.00
	Pos Sequence Impedance (100 MVA Base) 76.72 + j 375.83 PU					
SLUDGE PUMP #8	SLUDGE PUMP #8	480	5.01	0.1507	4.90	8.00
	Pos Sequence Impedance (100 MVA Base) 76.72 + j 375.83 PU					

MOTOR CONTRIBUTION DATA

BUS NAME	CONTRIBUTION NAME	VOLTAGE L-L	BASE kVA	X"d	X/R	Motor Number
SOUTH CELL	MTR-SOUTH CELL	480	3.01	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 3324.40 + j 8310.99 PU					
SOUTH SEC. INF	MTR-SOUTH SEC.	480	3.01	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 3324.40 + j 8310.99 PU					
SOUTH SEC. INF	MTR-SOUTH SEC.	480	3.01	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 3324.40 + j 8310.99 PU					
SOUTH SEC. PUM	MTR-SOUTH SEC.	480	3.01	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 3324.40 + j 8310.99 PU					
SUMP PUMP #1 D	SUMP PUMP #1 M	480	0.7520	0.1507	4.90	8.00
	Pos Sequence Impedance (100 MVA Base) 511.44 + j 2505.56 PU					
SUMP PUMP #2	SUMP PUMP #2 M	480	0.7520	0.1507	4.90	8.00
	Pos Sequence Impedance (100 MVA Base) 511.44 + j 2505.56 PU					
TRANSFER PUMP	TRANSFER PUMP	480	10.03	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 997.32 + j 2493.30 PU					
TRANSFER PUMP	TRANSFER PUMP	480	10.03	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 997.32 + j 2493.30 PU					
TUMBULATOR	TUMBULATOR MTR	480	2.01	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 4986.60 + j 12466.4 PU					
VFD-FOUL AIR F	MTR-FOUL AIR F	480	1.00	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 9973.19 + j 24932.9 PU					

MOTOR CONTRIBUTION DATA

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====================================================================================
BUS            CONTRIBUTION      VOLTAGE    BASE                             Motor
NAME           NAME                L-L      kVA        X"d    X/R          Number
====================================================================================
VFD-FOUL AIR F MTR-FOUL AIR F       480    1.00       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 9973.19 + j 24932.9 PU

VFD-N. THICK S MTR-N. THICK S       480   15.04       0.2500    2.60  1.00
                  Pos  Sequence Impedance (100 MVA Base)  640.02 + j 1662.20 PU

VFD-N. THICK S MTR-N. THICK S       480    7.52       0.2500    2.60  1.00
                  Pos  Sequence Impedance (100 MVA Base) 1280.04 + j 3324.40 PU

VFD-N. THICK S MTR-N. THICK S       480   15.04       0.2500    2.60  1.00
                  Pos  Sequence Impedance (100 MVA Base)  640.02 + j 1662.20 PU

VFD-S. THICK S MTR-S. THICK S       480   15.04       0.2500    2.60  1.00
                  Pos  Sequence Impedance (100 MVA Base)  640.02 + j 1662.20 PU

VFD-S. THICK S MTR-S. THICK S       480    7.52       0.2500    2.60  1.00
                  Pos  Sequence Impedance (100 MVA Base) 1280.04 + j 3324.40 PU

VFD-S. THICK S MTR-S. THICK S       480   15.04       0.2500    2.60  1.00
                  Pos  Sequence Impedance (100 MVA Base)  640.02 + j 1662.20 PU

WASTE MIXED LI WASTE MIXED LI       480   30.08       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base)  332.44 + j  831.10 PU

WASTE MIXED LI WASTE MIXED LI       480   30.08       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base)  332.44 + j  831.10 PU

WASTE SLUDGE P WASTE PUMP #4        480    5.01       0.2500    2.50  1.00
                  Pos  Sequence Impedance (100 MVA Base) 1994.64 + j 4986.60 PU
```

MOTOR CONTRIBUTION DATA

BUS NAME	CONTRIBUTION NAME	VOLTAGE L-L	BASE kVA	X"d	X/R	Motor Number
WASTE SLUDGE P	WASTE PUMP #5	480	5.01	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 1994.64 + j 4986.60 PU					
WEST FAN	WEST FAN MTR	480	2.01	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 4986.60 + j 12466.4 PU					
WINCH #1	WINCH #1 MTR	480	3.51	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 2849.48 + j 7123.71 PU					
WINCH #2	WINCH #2 MTR	480	3.51	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 2849.48 + j 7123.71 PU					
WINCH #3	WINCH #3 MTR	480	3.51	0.2500	2.50	1.00
	Pos Sequence Impedance (100 MVA Base) 2849.48 + j 7123.71 PU					

8.0 SHORT-CIRCUIT RESULTS

May 12, 2023   08:53:10

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 ALL INFORMATION PRESENTED IS FOR REVIEW, APPROVAL
 INTERPRETATION AND APPLICATION BY A REGISTERED ENGINEER ONLY
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 SKM POWER*TOOLS FOR WINDOWS
 A_FAULT SHORT CIRCUIT ANALYSIS REPORT
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               T H R E E   P H A S E   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================

 04-LP-01 XFER  3P Duty: 11.813 KA AT  -46.50 DEG (     9.82 MVA) X/R:    1.06
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0161 + J  0.0170  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   11.813 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  11.813 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  11.813 KA
                AUTO-0009       BUS-0403          11.813 KA      ANG:  133.50

 06-LP-01       3P Duty:  7.912 KA AT  -71.65 DEG (     2.85 MVA) X/R:    3.02
                VOLTAGE:    208.   EQUIV. IMPEDANCE=  0.0048 + J  0.0144  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    7.912 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   9.206 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   7.912 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   7.912 KA
                CBL-0721        BUS-0754           7.912 KA      ANG:  -71.65

 06-LP-02       3P Duty:  6.738 KA AT  -63.91 DEG (     2.43 MVA) X/R:    2.04
                VOLTAGE:    208.   EQUIV. IMPEDANCE=  0.0078 + J  0.0160  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    6.738 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   7.039 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   6.738 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   6.738 KA
                CBL-0773        06-LP-01           6.738 KA      ANG: -243.90

 06-LP-03       3P Duty:  6.088 KA AT  -59.94 DEG (     2.19 MVA) X/R:    1.73
                VOLTAGE:    208.   EQUIV. IMPEDANCE=  0.0099 + J  0.0171  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    6.088 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   6.088 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   6.088 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   6.088 KA
                CBL-0804        06-LP-01           6.088 KA      ANG: -239.94

 06-LP-04       3P Duty:  3.007 KA AT  -27.63 DEG (     1.08 MVA) X/R:    0.52
                VOLTAGE:    208.   EQUIV. IMPEDANCE=  0.0354 + J  0.0185  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    3.007 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   3.007 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   3.007 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   3.007 KA
                CBL-0805        06-LP-01           3.007 KA      ANG:  152.37

 06-LP-05       3P Duty:  2.680 KA AT  -25.38 DEG (     0.97 MVA) X/R:    0.47
                VOLTAGE:    208.   EQUIV. IMPEDANCE=  0.0405 + J  0.0192  OHMS
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                THREE  PHASE  FAULT  REPORT
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.680 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.680 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.680 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.680 KA
                CBL-0850       06-LP-01          2.680 KA      ANG:  -205.38

 06-LP-06       3P Duty:  4.239 KA AT  -42.35 DEG (     1.53 MVA) X/R:    0.91
                VOLTAGE:    208.   EQUIV. IMPEDANCE=  0.0209 + J  0.0191  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    4.239 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   4.239 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   4.239 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   4.239 KA
                CBL-0910       06-LP-01          4.239 KA      ANG:   137.65

 06-LP-07       3P Duty:  2.012 KA AT  -20.86 DEG (     0.72 MVA) X/R:    0.38
                VOLTAGE:    208.   EQUIV. IMPEDANCE=  0.0558 + J  0.0213  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.012 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.012 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.012 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.012 KA
                CBL-0911       06-LP-01          2.012 KA      ANG:  -200.86

 11-LP-01       3P Duty:  0.514 KA AT  -66.45 DEG (     0.19 MVA) X/R:    2.30
                VOLTAGE:    208.   EQUIV. IMPEDANCE=  0.0933 + J  0.2140  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.514 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.555 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.514 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.514 KA
                CBL-0422       BUS-0450          0.514 KA      ANG:   -66.45

 11-LP-01A      3P Duty:  0.413 KA AT  -51.08 DEG (     0.15 MVA) X/R:    1.24
                VOLTAGE:    208.   EQUIV. IMPEDANCE=  0.1825 + J  0.2260  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.413 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.413 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.413 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.413 KA
                CBL-0423       11-LP-01          0.413 KA      ANG:   -51.08

 12A-PP-01      3P Duty: 11.085 KA AT  -54.19 DEG (     9.22 MVA) X/R:    1.40
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0146 + J  0.0203  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   11.085 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  11.085 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  11.085 KA
                CBL-0164       MCC-8            11.085 KA      ANG:   -54.19
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               T H R E E   P H A S E   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================

                CONTRIBUTIONS TO  12A-PP-01      (CONTINUED)

 15 KVAC CAP    3P Duty: 12.948 KA AT  -41.42 DEG (    10.76 MVA) X/R:    0.91
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0161 + J  0.0142  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   12.948 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  12.948 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  12.948 KA
                CBL-0473       MCC-14            12.948 KA      ANG:   -41.42

 15-LP-01       3P Duty:  0.845 KA AT  -67.60 DEG (     0.30 MVA) X/R:    2.43
                VOLTAGE:    208.   EQUIV. IMPEDANCE=  0.0541 + J  0.1314  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.845 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.926 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.845 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.845 KA
                CBL-0322       BUS-0343           0.845 KA      ANG:   -67.60

 15-LP-02       3P Duty:  0.808 KA AT  -64.82 DEG (     0.29 MVA) X/R:    2.13
                VOLTAGE:    208.   EQUIV. IMPEDANCE=  0.0632 + J  0.1345  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.808 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.853 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.808 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.808 KA
                CBL-0310       BUS-0330           0.808 KA      ANG:   -64.82

 2-LP-1         3P Duty:  1.031 KA AT  -67.73 DEG (     0.37 MVA) X/R:    2.44
                VOLTAGE:    208.   EQUIV. IMPEDANCE=  0.0442 + J  0.1078  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.031 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.131 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.031 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.031 KA
                CBL-0825       BUS-0866           1.031 KA      ANG:   -67.73

 2-LP-2         3P Duty:  0.972 KA AT  -62.48 DEG (     0.35 MVA) X/R:    1.92
                VOLTAGE:    208.   EQUIV. IMPEDANCE=  0.0571 + J  0.1096  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.972 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.999 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.972 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.972 KA
                CBL-0827       BUS-0868           0.972 KA      ANG:   -62.48

 2-LP-3         3P Duty:  0.972 KA AT  -62.48 DEG (     0.35 MVA) X/R:    1.92
                VOLTAGE:    208.   EQUIV. IMPEDANCE=  0.0571 + J  0.1096  OHMS
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
===============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.972 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.999 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.972 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.972 KA
                CBL-0835       BUS-0870          0.972 KA      ANG:   -62.48

 2-LP-4         3P Duty:  1.015 KA AT  -67.24 DEG (     0.37 MVA) X/R:    2.38
                VOLTAGE:    208.   EQUIV. IMPEDANCE=  0.0458 + J  0.1091  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.015 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.107 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.015 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.015 KA
                CBL-0837       BUS-0872          1.015 KA      ANG:   -67.24

 20A-PP-01      3P Duty:  6.985 KA AT  -50.83 DEG (     5.81 MVA) X/R:    1.23
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0251 + J  0.0308  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    6.985 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   6.985 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   6.985 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   6.985 KA
                CBL-0748       MCC-00            6.985 KA      ANG:   -50.83

 20A-PP-1       3P Duty:  9.569 KA AT  -57.87 DEG (     7.96 MVA) X/R:    1.60
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0154 + J  0.0245  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    9.569 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   9.569 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   9.569 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   9.569 KA
                CBL-0737       BUS-0772          0.004 KA      ANG:   111.84
                CBL-0732       PUMP CONTROL P    0.027 KA      ANG:   112.30
                CBL-0724       PP-1 EXHAUST F    0.007 KA      ANG:   112.11
                CBL-0119       LC-5              9.531 KA      ANG:   -57.83

 24-LP-01       3P Duty:  2.812 KA AT  -65.26 DEG (     1.01 MVA) X/R:    2.17
                VOLTAGE:    208.   EQUIV. IMPEDANCE=  0.0179 + J  0.0388  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.812 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.989 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.812 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.812 KA
                CBL-0309       BUS-0327          2.812 KA      ANG:   -65.26

 24-LP-02       3P Duty:  2.135 KA AT  -15.44 DEG (     1.77 MVA) X/R:    0.28
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1251 + J  0.0346  OHMS
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               T H R E E   P H A S E   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================
               LOW VOLTAGE POWER CIRCUIT BREAKER    2.135 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   2.135 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   2.135 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   2.135 KA
               CBL-0308       MCC-24             2.135 KA      ANG:   -15.44

 28-LP-01      3P Duty:  3.505 KA AT  -69.16 DEG (     1.26 MVA) X/R:    2.63
               VOLTAGE:    208.   EQUIV. IMPEDANCE=  0.0122 + J  0.0320  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    3.505 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   3.925 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   3.505 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   3.505 KA
               CBL-0489       BUS-0517           3.505 KA      ANG:   -69.16

 28-PP-01      3P Duty:  3.263 KA AT  -70.06 DEG (     2.71 MVA) X/R:    2.76
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0290 + J  0.0798  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    3.263 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   3.704 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   3.263 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   3.263 KA
               CBL-0484       MUA-1              0.022 KA      ANG:  -248.00
               CBL-0485       EAST FAN           0.009 KA      ANG:  -247.65
               CBL-0486       WEST FAN           0.009 KA      ANG:  -247.77
               CBL-0078       BUS-0082           3.223 KA      ANG:   -70.09

 2A-LP-01      3P Duty:  0.915 KA AT  -63.97 DEG (     0.33 MVA) X/R:    2.05
               VOLTAGE:    208.   EQUIV. IMPEDANCE=  0.0576 + J  0.1179  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    0.915 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   0.957 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   0.915 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   0.915 KA
               CBL-0870       BUS-0913           0.915 KA      ANG:   -63.97

 45D WATER CIRC 3P Duty:  3.733 KA AT  -17.32 DEG (     3.10 MVA) X/R:    0.31
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0709 + J  0.0221  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    3.733 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   3.733 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   3.733 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   3.733 KA
               CONTRIBUTIONS:  MTR-45D WATER     0.020 KA      ANG:   -68.20
               CBL-0503       MCC-15A            3.720 KA      ANG:   -17.08

 AER. TANK AND  3P Duty:  1.958 KA AT   -9.61 DEG (     1.63 MVA) X/R:    0.17
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1395 + J  0.0236  OHMS
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                 T H R E E   P H A S E   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
===============================================================================
                 LOW VOLTAGE POWER CIRCUIT BREAKER    1.958 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   1.958 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   1.958 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   1.958 KA
                 CONTRIBUTIONS:  AER. TANK AND      0.009 KA      ANG:  -68.20
                 CBL-0471        MCC-14             1.954 KA      ANG:   -9.39

 AERATION RECIR 3P Duty:  0.682 KA AT  -14.95 DEG (     0.57 MVA) X/R:    0.18
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.3927 + J  0.1048  OHMS
                 LOW VOLTAGE POWER CIRCUIT BREAKER    0.682 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   0.682 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   0.682 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   0.682 KA
                 CONTRIBUTIONS:  MTR-ANAEROBIC      0.101 KA      ANG:  -68.94
                 CBL-0660        MCC-28             0.628 KA      ANG:   -7.46

 AERATION RECIR 3P Duty:  0.682 KA AT  -14.95 DEG (     0.57 MVA) X/R:    0.18
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.3927 + J  0.1048  OHMS
                 LOW VOLTAGE POWER CIRCUIT BREAKER    0.682 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   0.682 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   0.682 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   0.682 KA
                 CONTRIBUTIONS:  MTR-AERATION R     0.101 KA      ANG:  -68.94
                 CBL-0661        MCC-28             0.628 KA      ANG:   -7.46

 AERATION RECIR 3P Duty:  0.944 KA AT  -13.71 DEG (     0.78 MVA) X/R:    0.19
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2852 + J  0.0696  OHMS
                 LOW VOLTAGE POWER CIRCUIT BREAKER    0.944 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   0.944 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   0.944 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   0.944 KA
                 CONTRIBUTIONS:  MTR-AERATION R     0.101 KA      ANG:  -68.94
                 CBL-0662        MCC-28             0.890 KA      ANG:   -8.36

 AERATION RECIR 3P Duty:  0.944 KA AT  -13.71 DEG (     0.78 MVA) X/R:    0.19
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2852 + J  0.0696  OHMS
                 LOW VOLTAGE POWER CIRCUIT BREAKER    0.944 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   0.944 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   0.944 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   0.944 KA
                 CONTRIBUTIONS:  MTR-AERATION R     0.101 KA      ANG:  -68.94
                 CBL-0663        MCC-28             0.890 KA      ANG:   -8.36

 AERATION RECIR 3P Duty:  1.179 KA AT  -13.41 DEG (     0.98 MVA) X/R:    0.20
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2286 + J  0.0545  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.179 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.179 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.179 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.179 KA
                CONTRIBUTIONS:  MTR-AERATION R     0.101 KA      ANG:  -68.94
                CBL-0664        MCC-28             1.125 KA      ANG:   -9.16

 AERATION RECIR 3P Duty:  1.818 KA AT  -14.36 DEG (     1.51 MVA) X/R:    0.24
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1477 + J  0.0378  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.818 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.818 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.818 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.818 KA
                CONTRIBUTIONS:  MTR-AERATION R     0.101 KA      ANG:  -68.94
                CBL-0679        MCC-29             1.761 KA      ANG:  -11.67

 AERATION RECIR 3P Duty:  1.279 KA AT  -13.62 DEG (     1.06 MVA) X/R:    0.21
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2105 + J  0.0510  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.279 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.279 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.279 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.279 KA
                CONTRIBUTIONS:  MTR-AERATION R     0.101 KA      ANG:  -68.94
                CBL-0680        MCC-29             1.225 KA      ANG:   -9.73

 AERATION RECIR 3P Duty:  0.992 KA AT  -13.77 DEG (     0.82 MVA) X/R:    0.19
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2713 + J  0.0665  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.992 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.992 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.992 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.992 KA
                CONTRIBUTIONS:  MTR-AERATION R     0.101 KA      ANG:  -68.94
                CBL-0681        MCC-29             0.938 KA      ANG:   -8.70

 AERATION RECIR 3P Duty:  0.814 KA AT  -14.28 DEG (     0.68 MVA) X/R:    0.19
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.3298 + J  0.0840  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.814 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.814 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.814 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.814 KA
                CONTRIBUTIONS:  MTR-AERATION R     0.101 KA      ANG:  -68.94
                CBL-0682        MCC-29             0.760 KA      ANG:   -8.05
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               T H R E E   P H A S E   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================

 AERATION TANK  3P Duty:  0.620 KA AT   -5.45 DEG (     0.52 MVA) X/R:    0.10
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.4451 + J  0.0424  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.620 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.620 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.620 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.620 KA
                CBL-0449        MCC-13             0.620 KA      ANG:    -5.45

 AERATION VALVE 3P Duty:  0.354 KA AT   -5.13 DEG (     0.29 MVA) X/R:    0.09
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.7792 + J  0.0700  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.354 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.354 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.354 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.354 KA
                CBL-0428        AERATION VALVE     0.354 KA      ANG:    -5.13

 AERATION VALVE 3P Duty:  0.417 KA AT   -5.31 DEG (     0.35 MVA) X/R:    0.09
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.6612 + J  0.0614  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.417 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.417 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.417 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.417 KA
                CBL-0427        AERATION VALVE     0.417 KA      ANG:    -5.31

 AERATION VALVE 3P Duty:  0.508 KA AT   -5.56 DEG (     0.42 MVA) X/R:    0.09
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.5432 + J  0.0529  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.508 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.508 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.508 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.508 KA
                CBL-0426        AERATION VALVE     0.508 KA      ANG:    -5.56

 AERATION VALVE 3P Duty:  0.648 KA AT   -5.96 DEG (     0.54 MVA) X/R:    0.10
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.4252 + J  0.0444  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.648 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.648 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.648 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.648 KA
                CBL-0425        AERATION VALVE     0.648 KA      ANG:    -5.96

 AERATION VALVE 3P Duty:  0.896 KA AT   -6.65 DEG (     0.74 MVA) X/R:    0.11
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.3072 + J  0.0358  OHMS
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               T H R E E   P H A S E   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================
               LOW VOLTAGE POWER CIRCUIT BREAKER    0.896 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   0.896 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   0.896 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   0.896 KA
               CONTRIBUTIONS:  AV #1-5            0.011 KA      ANG:   -68.20
               CBL-0424        MCC-13             0.891 KA      ANG:    -6.02

 AERATION VALVE 3P Duty:  1.531 KA AT   -7.43 DEG (     1.27 MVA) X/R:    0.13
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1794 + J  0.0234  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.531 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.531 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.531 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.531 KA
               CBL-0430        AERATION VALVE     1.531 KA      ANG:    -7.43

 AERATION VALVE 3P Duty:  1.028 KA AT   -6.35 DEG (     0.85 MVA) X/R:    0.11
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2679 + J  0.0298  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.028 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.028 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.028 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.028 KA
               CBL-0431        AERATION VALVE     1.028 KA      ANG:    -6.35

 AERATION VALVE 3P Duty:  0.773 KA AT   -5.80 DEG (     0.64 MVA) X/R:    0.10
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.3564 + J  0.0362  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    0.773 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   0.773 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   0.773 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   0.773 KA
               CBL-0432        AERATION VALVE     0.773 KA      ANG:    -5.80

 AERATION VALVE 3P Duty:  0.620 KA AT   -5.47 DEG (     0.52 MVA) X/R:    0.10
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.4449 + J  0.0426  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    0.620 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   0.620 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   0.620 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   0.620 KA
               CBL-0433        AERATION VALVE     0.620 KA      ANG:    -5.47

 AERATION VALVE 3P Duty:  3.431 KA AT  -11.54 DEG (     2.85 MVA) X/R:    0.20
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0791 + J  0.0162  OHMS
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              T H R E E   P H A S E   F A U L T   R E P O R T
                 (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                       PRE FAULT VOLTAGE: 1.0000
                       MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    3.431 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   3.431 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   3.431 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   3.431 KA
                CONTRIBUTIONS:  AV #6-9            0.011 KA      ANG:   -68.20
                CBL-0429        MCC-13             3.425 KA      ANG:   -11.38

 AIR COMPRESSOR 3P Duty:  1.761 KA AT  -14.26 DEG (     1.46 MVA) X/R:    0.25
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1525 + J  0.0387  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.761 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.761 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.761 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.761 KA
                CONTRIBUTIONS:  AIR COMP MTR       0.034 KA      ANG:   -68.20
                CBL-0305        MCC-24             1.742 KA      ANG:   -13.36

 AIR DUCT HEATE 3P Duty: 12.152 KA AT  -68.01 DEG (    10.10 MVA) X/R:    2.49
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0085 + J  0.0211  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   12.152 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  12.152 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  12.152 KA
                CBL-0690        MCC-15            12.152 KA      ANG:   -68.01

 AIR DUCT HEATE 3P Duty:  7.150 KA AT  -40.66 DEG (     5.94 MVA) X/R:    0.86
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0294 + J  0.0253  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    7.150 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   7.150 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   7.150 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   7.150 KA
                CBL-0691        AIR DUCT HEATE     7.150 KA      ANG:   -40.66

 ANAEROBIC MIX  3P Duty:  1.665 KA AT  -19.18 DEG (     1.38 MVA) X/R:    0.34
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1572 + J  0.0547  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.665 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.665 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.665 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.665 KA
                CONTRIBUTIONS:  MTR-ANAEROBIC      0.101 KA      ANG:   -68.94
                CBL-0650        MCC-28             1.601 KA      ANG:   -16.41

 ANAEROBIC MIX  3P Duty:  1.949 KA AT  -19.68 DEG (     1.62 MVA) X/R:    0.35
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1339 + J  0.0479  OHMS
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.949 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.949 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.949 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.949 KA
                CONTRIBUTIONS:  MTR-ANAEROBIC      0.101 KA      ANG:  -68.94
                CBL-0651        MCC-28             1.885 KA      ANG:  -17.35

 ANAEROBIC MIX  3P Duty:  1.561 KA AT  -15.81 DEG (     1.30 MVA) X/R:    0.26
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1708 + J  0.0484  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.561 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.561 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.561 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.561 KA
                CONTRIBUTIONS:  MTR-ANAEROBIC      0.101 KA      ANG:  -68.94
                CBL-0652        MCC-28             1.503 KA      ANG:  -12.73

 ANAEROBIC MIX  3P Duty:  1.992 KA AT  -16.56 DEG (     1.66 MVA) X/R:    0.28
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1333 + J  0.0396  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.992 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.992 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.992 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.992 KA
                CONTRIBUTIONS:  MTR-ANAEROBIC      0.101 KA      ANG:  -68.94
                CBL-0653        MCC-28             1.932 KA      ANG:  -14.18

 ANAEROBIC MIX  3P Duty:  2.763 KA AT  -18.45 DEG (     2.30 MVA) X/R:    0.33
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0951 + J  0.0317  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.763 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.763 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.763 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.763 KA
                CONTRIBUTIONS:  MTR-ANAEROBIC      0.101 KA      ANG:  -68.94
                CBL-0654        MCC-28             2.700 KA      ANG:  -16.80

 ANEROBIC MIX P 3P Duty:  3.016 KA AT  -22.83 DEG (     2.51 MVA) X/R:    0.42
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0847 + J  0.0356  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    3.016 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   3.016 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   3.016 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   3.016 KA
                CONTRIBUTIONS:  MTR-ANEROBIC M     0.101 KA      ANG:  -68.94
                CBL-0671        MCC-29             2.947 KA      ANG:  -21.41

 ANEROBIC MIX P 3P Duty:  2.178 KA AT  -20.53 DEG (     1.81 MVA) X/R:    0.37
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               T H R E E   P H A S E   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1192 + J  0.0446  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.178 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.178 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.178 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.178 KA
                CONTRIBUTIONS:  MTR-ANEROBIC M     0.101 KA      ANG:   -68.94
                CBL-0672        MCC-29             2.112 KA      ANG:   -18.48

 ANEROBIC MIX P 3P Duty:  1.708 KA AT  -19.52 DEG (     1.42 MVA) X/R:    0.35
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1530 + J  0.0542  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.708 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.708 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.708 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.708 KA
                CONTRIBUTIONS:  MTR-ANEROBIC M     0.101 KA      ANG:   -68.94
                CBL-0673        MCC-29             1.644 KA      ANG:   -16.85

 ANEROBIC MIX P 3P Duty:  1.408 KA AT  -19.10 DEG (     1.17 MVA) X/R:    0.33
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1860 + J  0.0644  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.408 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.408 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.408 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.408 KA
                CONTRIBUTIONS:  MTR-ANEROBIC M     0.101 KA      ANG:   -68.94
                CBL-0674        MCC-29             1.345 KA      ANG:   -15.81

 ANOXIC MIX PUM 3P Duty:  1.706 KA AT  -18.40 DEG (     1.42 MVA) X/R:    0.33
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1541 + J  0.0513  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.706 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.706 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.706 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.706 KA
                CONTRIBUTIONS:  MTR-ANOXIC MIX     0.067 KA      ANG:   -69.02
                CBL-0655        MCC-28             1.664 KA      ANG:   -16.61

 ANOXIC MIX PUM 3P Duty:  2.015 KA AT  -19.13 DEG (     1.68 MVA) X/R:    0.34
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1299 + J  0.0451  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.015 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.015 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.015 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.015 KA
                CONTRIBUTIONS:  MTR-ANOXIC MIX     0.067 KA      ANG:   -69.02
                CBL-0656        MCC-28             1.972 KA      ANG:   -17.63
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               T H R E E   P H A S E   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================

 ANOXIC MIX PUM 3P Duty:  1.630 KA AT  -14.98 DEG (     1.36 MVA) X/R:    0.25
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1642 + J  0.0439  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.630 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.630 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.630 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.630 KA
               CONTRIBUTIONS:  MTR-ANOXIC MIX     0.067 KA      ANG:   -69.02
               CBL-0657        MCC-28             1.592 KA      ANG:   -13.01

 ANOXIC MIX PUM 3P Duty:  2.121 KA AT  -16.15 DEG (     1.76 MVA) X/R:    0.28
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1255 + J  0.0364  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    2.121 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   2.121 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   2.121 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   2.121 KA
               CONTRIBUTIONS:  MTR-ANOXIC MIX     0.067 KA      ANG:   -69.02
               CBL-0658        MCC-28             2.081 KA      ANG:   -14.67

 ANOXIC MIX PUM 3P Duty:  3.061 KA AT  -19.28 DEG (     2.54 MVA) X/R:    0.35
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0855 + J  0.0299  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    3.061 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   3.061 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   3.061 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   3.061 KA
               CONTRIBUTIONS:  MTR-ANOXIC MIX     0.101 KA      ANG:   -68.94
               CBL-0659        MCC-28             2.996 KA      ANG:   -17.81

 ANOXIC MIX PUM 3P Duty:  3.354 KA AT  -23.85 DEG (     2.79 MVA) X/R:    0.44
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0756 + J  0.0334  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    3.354 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   3.354 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   3.354 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   3.354 KA
               CONTRIBUTIONS:  MTR-ANOXIC MIX     0.101 KA      ANG:   -68.94
               CBL-0675        MCC-29             3.283 KA      ANG:   -22.60

 ANOXIC MIX PUM 3P Duty:  2.347 KA AT  -20.96 DEG (     1.95 MVA) X/R:    0.38
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1103 + J  0.0422  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    2.347 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   2.347 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   2.347 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   2.347 KA
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              T H R E E   P H A S E   F A U L T   R E P O R T
                 (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                       PRE FAULT VOLTAGE: 1.0000
                       MODEL TRANSFORMER TAPS: NO
 ==============================================================================

               CONTRIBUTIONS TO  ANOXIC MIX PUM (CONTINUED)
               CONTRIBUTIONS:  MTR-ANOXIC MIX     0.101 KA      ANG:  -68.94
               CBL-0676        MCC-29             2.281 KA      ANG:  -19.07

 ANOXIC MIX PUM 3P Duty:  1.809 KA AT  -19.71 DEG (     1.50 MVA) X/R:    0.35
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1442 + J  0.0517  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.809 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.809 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.809 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.809 KA
               CONTRIBUTIONS:  MTR-ANOXIC MIX     0.101 KA      ANG:  -68.94
               CBL-0677        MCC-29             1.745 KA      ANG:  -17.20

 ANOXIC MIX PUM 3P Duty:  1.475 KA AT  -19.17 DEG (     1.23 MVA) X/R:    0.34
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1775 + J  0.0617  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.475 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.475 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.475 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.475 KA
               CONTRIBUTIONS:  MTR-ANOXIC MIX     0.101 KA      ANG:  -68.94
               CBL-0678        MCC-29             1.412 KA      ANG:  -16.04

 AUGER #1      3P Duty:  0.922 KA AT   -8.74 DEG (     0.77 MVA) X/R:    0.14
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2970 + J  0.0456  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    0.922 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   0.922 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   0.922 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   0.922 KA
               CONTRIBUTIONS:  AUGER #1 MTR       0.003 KA      ANG:  -68.20
               CBL-0229        BUS-0239           0.921 KA      ANG:   -8.56

 AUGER #2      3P Duty:  0.999 KA AT   -8.78 DEG (     0.83 MVA) X/R:    0.14
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2742 + J  0.0423  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    0.999 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   0.999 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   0.999 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   0.999 KA
               CONTRIBUTIONS:  AUGER #2 MTR       0.003 KA      ANG:  -68.20
               CBL-0233        BUS-0243           0.997 KA      ANG:   -8.61

 AUGER #3      3P Duty:  0.999 KA AT   -8.78 DEG (     0.83 MVA) X/R:    0.14
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2742 + J  0.0423  OHMS
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                 T H R E E   P H A S E   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================
                 LOW VOLTAGE POWER CIRCUIT BREAKER    0.999 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   0.999 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   0.999 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   0.999 KA
                 CONTRIBUTIONS:  AUGER #3 MTR       0.003 KA      ANG:  -68.20
                 CBL-0237        BUS-0247           0.997 KA      ANG:   -8.61

 BANDSCREEN #1   3P Duty:  0.923 KA AT   -8.84 DEG (     0.77 MVA) X/R:    0.14
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2968 + J  0.0462  OHMS
                 LOW VOLTAGE POWER CIRCUIT BREAKER    0.923 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   0.923 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   0.923 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   0.923 KA
                 CONTRIBUTIONS:  BANDSCREEN #1      0.031 KA      ANG:  -78.46
                 CBL-0231        BUS-0239           0.912 KA      ANG:   -7.00

 BANDSCREEN #2   3P Duty:  0.999 KA AT   -8.88 DEG (     0.83 MVA) X/R:    0.14
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2740 + J  0.0428  OHMS
                 LOW VOLTAGE POWER CIRCUIT BREAKER    0.999 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   0.999 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   0.999 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   0.999 KA
                 CONTRIBUTIONS:  BANDSCREEN #2      0.031 KA      ANG:  -78.46
                 CBL-0235        BUS-0243           0.989 KA      ANG:   -7.18

 BANDSCREEN #3   3P Duty:  0.999 KA AT   -8.88 DEG (     0.83 MVA) X/R:    0.14
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2740 + J  0.0428  OHMS
                 LOW VOLTAGE POWER CIRCUIT BREAKER    0.999 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   0.999 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   0.999 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   0.999 KA
                 CONTRIBUTIONS:  BANDSCREEN #3      0.031 KA      ANG:  -78.46
                 CBL-0239        BUS-0247           0.989 KA      ANG:   -7.18

 BAR SCREEN #1   3P Duty:  0.862 KA AT   -7.15 DEG (     0.72 MVA) X/R:    0.12
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.3189 + J  0.0400  OHMS
                 LOW VOLTAGE POWER CIRCUIT BREAKER    0.862 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   0.862 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   0.862 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   0.862 KA
                 CBL-0392        BAR SCREEN #1      0.009 KA      ANG:  111.86
                 CBL-0391        BUS-0418           0.858 KA      ANG:   -6.63

 BAR SCREEN #1   3P Duty:  0.773 KA AT   -6.82 DEG (     0.64 MVA) X/R:    0.11
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              T H R E E   P H A S E   F A U L T   R E P O R T
                 (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                       PRE FAULT VOLTAGE: 1.0000
                       MODEL TRANSFORMER TAPS: NO
==============================================================================
                VOLTAGE:    480.  EQUIV. IMPEDANCE=  0.3559 + J  0.0425  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.773 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.773 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.773 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.773 KA
                CONTRIBUTIONS:  BAR SCREEN #1      0.009 KA      ANG:  -68.20
                CBL-0392        BAR SCREEN #1      0.769 KA      ANG:   -6.23

 BAR SCREEN #2  3P Duty:  1.009 KA AT   -7.50 DEG (     0.84 MVA) X/R:    0.12
                VOLTAGE:    480.  EQUIV. IMPEDANCE=  0.2722 + J  0.0358  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.009 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.009 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.009 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.009 KA
                CBL-0394        BAR SCREEN #2      0.009 KA      ANG:  111.86
                CBL-0393        BUS-0418           1.005 KA      ANG:   -7.05

 BAR SCREEN #2  3P Duty:  0.889 KA AT   -7.05 DEG (     0.74 MVA) X/R:    0.11
                VOLTAGE:    480.  EQUIV. IMPEDANCE=  0.3092 + J  0.0383  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.889 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.889 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.889 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.889 KA
                CONTRIBUTIONS:  BAR SCREEN #2      0.009 KA      ANG:  -68.20
                CBL-0394        BAR SCREEN #2      0.885 KA      ANG:   -6.54

 BAR SCREEN #3  3P Duty:  1.009 KA AT   -7.50 DEG (     0.84 MVA) X/R:    0.12
                VOLTAGE:    480.  EQUIV. IMPEDANCE=  0.2722 + J  0.0358  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.009 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.009 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.009 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.009 KA
                CBL-0396        BAR SCREEN #3      0.009 KA      ANG:  111.86
                CBL-0395        BUS-0418           1.005 KA      ANG:   -7.05

 BAR SCREEN #3  3P Duty:  0.889 KA AT   -7.05 DEG (     0.74 MVA) X/R:    0.11
                VOLTAGE:    480.  EQUIV. IMPEDANCE=  0.3092 + J  0.0383  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.889 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.889 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.889 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.889 KA
                CONTRIBUTIONS:  BAR SCREEN #3      0.009 KA      ANG:  -68.20
                CBL-0396        BAR SCREEN #3      0.885 KA      ANG:   -6.54
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               T H R E E   P H A S E   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================

 BAR SCREEN MTR 3P Duty:  1.602 KA AT  -10.81 DEG (     1.33 MVA) X/R:    0.17
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1699 + J  0.0325  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.602 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.602 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.602 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.602 KA
                CBL-0399        SCREW CONVEYOR     0.067 KA      ANG:  111.95
                CBL-0398        BUS-0425           1.567 KA      ANG:   -8.75

 BELT PRESS DIS 3P Duty:  2.619 KA AT   -8.12 DEG (     2.18 MVA) X/R:    0.14
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1047 + J  0.0149  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.619 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.619 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.619 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.619 KA
                CBL-0635        MCC-26             2.619 KA      ANG:   -8.12

 BLOWER #1      3P Duty: 12.740 KA AT  -50.70 DEG (    10.59 MVA) X/R:    1.29
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0138 + J  0.0168  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   12.740 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  12.740 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  12.740 KA
                CONTRIBUTIONS:  BLOWER #1 MTR      0.470 KA      ANG:  -78.46
                CBL-0220        MCC-4A            12.326 KA      ANG:  -49.69

 BLOWER #3      3P Duty: 13.707 KA AT  -53.37 DEG (    11.40 MVA) X/R:    1.39
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0121 + J  0.0162  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   13.707 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  13.707 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  13.707 KA
                CONTRIBUTIONS:  BLOWER #3 MTR      0.314 KA      ANG:  -78.46
                CBL-0221        MCC-4A            13.423 KA      ANG:  -52.80

 BLOWER #5      3P Duty: 15.512 KA AT  -59.12 DEG (    12.90 MVA) X/R:    1.71
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0092 + J  0.0153  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   15.512 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  15.512 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  15.512 KA
                CONTRIBUTIONS:  BLOWER #5 MTR      0.314 KA      ANG:  -78.46
                CBL-0222        MCC-4A            15.216 KA      ANG:  -58.73

 BLOWER 1 CP    3P Duty:  2.829 KA AT  -17.69 DEG (     2.35 MVA) X/R:    0.32
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0933 + J  0.0298  OHMS
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.829 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.829 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.829 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.829 KA
                CBL-0669        MCC-29             2.829 KA      ANG:   -17.69

 BLOWER 2 CP    3P Duty:  1.612 KA AT   -9.96 DEG (     1.34 MVA) X/R:    0.18
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1693 + J  0.0297  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.612 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.612 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.612 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.612 KA
                CBL-0670        MCC-29             1.612 KA      ANG:    -9.96

 BLOWER 3 CP    3P Duty:  1.952 KA AT  -14.95 DEG (     1.62 MVA) X/R:    0.26
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1371 + J  0.0366  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.952 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.952 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.952 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.952 KA
                CONTRIBUTIONS:  MTR-BLOWER 3 C     0.034 KA      ANG:   -68.20
                CBL-0648        MCC-28             1.933 KA      ANG:   -14.15

 BLOWER 4 CP    3P Duty:  1.015 KA AT   -9.21 DEG (     0.84 MVA) X/R:    0.14
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2696 + J  0.0437  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.015 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.015 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.015 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.015 KA
                CONTRIBUTIONS:  MTR-BLOWER 4 C     0.034 KA      ANG:   -68.20
                CBL-0649        MCC-28             0.998 KA      ANG:    -7.56

 BLOWER ROOM    3P Duty:  6.173 KA AT  -44.21 DEG (     5.13 MVA) X/R:    0.98
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0322 + J  0.0313  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    6.173 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   6.173 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   6.173 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   6.173 KA
                CBL-0746        BUS-0786           0.034 KA      ANG:   111.86
                CBL-0745        MCC-00             6.142 KA      ANG:   -44.09

 BOILER CIRC PU 3P Duty:  1.447 KA AT  -10.73 DEG (     1.20 MVA) X/R:    0.17
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1882 + J  0.0357  OHMS
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                 T H R E E   P H A S E   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
 ==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.447 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.447 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.447 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.447 KA
                CONTRIBUTIONS:  MTR-BOILER CIR     0.050 KA      ANG:  -68.20
                CBL-0667        MCC-28             1.420 KA      ANG:   -9.02

  BOILER CIRC PU 3P Duty:  1.447 KA AT  -10.73 DEG (     1.20 MVA) X/R:    0.17
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1882 + J  0.0357  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.447 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.447 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.447 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.447 KA
                CONTRIBUTIONS:  MTR-BOILER CIR     0.050 KA      ANG:  -68.20
                CBL-0668        MCC-28             1.420 KA      ANG:   -9.02

  BOILER CTRL/GA 3P Duty:  2.831 KA AT  -15.36 DEG (     2.35 MVA) X/R:    0.27
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0944 + J  0.0259  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.831 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.831 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.831 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.831 KA
                CBL-0245        MCC-21             2.831 KA      ANG:  -15.36

  BOLIMO CONTROL 3P Duty:  2.965 KA AT  -16.67 DEG (     2.47 MVA) X/R:    0.30
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0895 + J  0.0268  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.965 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.965 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.965 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.965 KA
                CBL-BOLIMO CON  MCC-15             2.965 KA      ANG:  -16.67

  BRIDGE CRANE   3P Duty:  4.920 KA AT  -31.14 DEG (     4.09 MVA) X/R:    0.61
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0482 + J  0.0291  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    4.920 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   4.920 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   4.920 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   4.920 KA
                CONTRIBUTIONS:  BRIDGE CRANE M     0.034 KA      ANG:  -68.20
                CBL-0289        MCC-24             4.894 KA      ANG:  -30.91

  CAPACITOR DISC 3P Duty: 13.864 KA AT  -71.33 DEG (    11.53 MVA) X/R:    3.01
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0064 + J  0.0189  OHMS
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              T H R E E   P H A S E   F A U L T   R E P O R T
                 (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                       PRE FAULT VOLTAGE: 1.0000
                       MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER   13.864 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  13.864 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  13.864 KA
                CBL-0505       MCC-15A          13.864 KA      ANG:   -71.33

 CARBON FEED PU 3P Duty:  1.399 KA AT  -12.04 DEG (     1.16 MVA) X/R:    0.19
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1937 + J  0.0413  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.399 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.399 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.399 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.399 KA
                CONTRIBUTIONS:  CARBON FEED PU     0.036 KA      ANG:   -68.20
                CBL-0270       CARBON PUMP DI      1.380 KA      ANG:   -10.80

 CARBON FEED PU 3P Duty:  1.399 KA AT  -12.04 DEG (     1.16 MVA) X/R:    0.19
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1937 + J  0.0413  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.399 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.399 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.399 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.399 KA
                CONTRIBUTIONS:  CARBON FEED PU     0.036 KA      ANG:   -68.20
                CBL-0271       CARBON PUMP DI      1.380 KA      ANG:   -10.80

 CARBON SCRUBBE 3P Duty:  1.432 KA AT  -12.68 DEG (     1.19 MVA) X/R:    0.21
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1888 + J  0.0425  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.432 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.432 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.432 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.432 KA
                CONTRIBUTIONS:  CS-BP-1 MTR        0.067 KA      ANG:   -68.20
                CBL-0365       MCC-4C              1.395 KA      ANG:   -10.41

 CARBON SLURRY  3P Duty:  3.900 KA AT  -26.22 DEG (     3.24 MVA) X/R:    0.50
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0637 + J  0.0314  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    3.900 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   3.900 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   3.900 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   3.900 KA
                CONTRIBUTIONS:  CARBON SLURRY      0.134 KA      ANG:   -68.20
                CBL-0265       MCC-22              3.801 KA      ANG:   -24.87

 CENTER CELL    3P Duty:  1.990 KA AT  -13.91 DEG (     1.65 MVA) X/R:    0.25
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1352 + J  0.0335  OHMS
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                 T H R E E   P H A S E   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================
                 LOW VOLTAGE POWER CIRCUIT BREAKER    1.990 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   1.990 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   1.990 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   1.990 KA
                 CONTRIBUTIONS:  MTR-CENTER CEL     0.013 KA      ANG:   -68.20
                 CBL-0754        MCC-00 BACKWAS     1.982 KA      ANG:   -13.59

 CENTRIFUGE #2  3P Duty: 12.715 KA AT  -64.22 DEG (    10.57 MVA) X/R:    2.37
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0095 + J  0.0196  OHMS
                 LOW VOLTAGE POWER CIRCUIT BREAKER   12.715 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA  12.715 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA  12.715 KA
                 CONTRIBUTIONS:  MTR-CENTRIFUGE     0.717 KA      ANG:   -83.34
                 CBL-0645        PP-SH-2           12.040 KA      ANG:   -63.10

 CENTRIFUGE #2  3P Duty:  0.978 KA AT   -4.77 DEG (     0.81 MVA) X/R:    0.08
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2824 + J  0.0236  OHMS
                 LOW VOLTAGE POWER CIRCUIT BREAKER    0.978 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   0.978 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   0.978 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   0.978 KA
                 CBL-0640        MCC-26             0.978 KA      ANG:    -4.77

 CENTRIFUGE #4  3P Duty: 12.254 KA AT  -63.87 DEG (    10.19 MVA) X/R:    2.34
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0100 + J  0.0203  OHMS
                 LOW VOLTAGE POWER CIRCUIT BREAKER   12.254 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA  12.254 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA  12.254 KA
                 CONTRIBUTIONS:  MTR-CENTRIFUGE     0.717 KA      ANG:   -83.34
                 CBL-0646        PP-SH-2           11.580 KA      ANG:   -62.69

 CENTRIFUGE 1 P 3P Duty:  1.535 KA AT   -7.43 DEG (     1.28 MVA) X/R:    0.13
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1790 + J  0.0233  OHMS
                 LOW VOLTAGE POWER CIRCUIT BREAKER    1.535 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   1.535 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   1.535 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   1.535 KA
                 CBL-0618        MCC-27             1.535 KA      ANG:    -7.43

 CENTRIFUGE 2 P 3P Duty:  1.535 KA AT   -7.43 DEG (     1.28 MVA) X/R:    0.13
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1790 + J  0.0233  OHMS
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                 T H R E E   P H A S E   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================
                 LOW VOLTAGE POWER CIRCUIT BREAKER    1.535 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   1.535 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   1.535 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   1.535 KA
                 CBL-0619       MCC-27              1.535 KA      ANG:    -7.43

 CENTRIFUGE OVE 3P Duty:  4.269 KA AT  -14.43 DEG (     3.55 MVA) X/R:    0.26
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0629 + J  0.0162  OHMS
                 LOW VOLTAGE POWER CIRCUIT BREAKER    4.269 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   4.269 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   4.269 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   4.269 KA
                 CBL-0622       MCC-27              4.269 KA      ANG:   -14.43

 CENTRIFUGE OVE 3P Duty:  4.572 KA AT  -14.54 DEG (     3.80 MVA) X/R:    0.26
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0587 + J  0.0152  OHMS
                 LOW VOLTAGE POWER CIRCUIT BREAKER    4.572 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   4.572 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   4.572 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   4.572 KA
                 CBL-0642       MCC-26              4.572 KA      ANG:   -14.54

 CENTRIFUGE# 1  3P Duty: 12.374 KA AT  -64.42 DEG (    10.29 MVA) X/R:    2.35
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0097 + J  0.0202  OHMS
                 LOW VOLTAGE POWER CIRCUIT BREAKER   12.374 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA  12.374 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA  12.374 KA
                 CONTRIBUTIONS:  MTR-CENTRIFUGE      0.717 KA      ANG:   -83.34
                 CBL-0627       PP-SH-1            11.698 KA      ANG:   -63.28

 CENTRIFUGE# 3  3P Duty: 12.036 KA AT  -64.87 DEG (    10.01 MVA) X/R:    2.40
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0098 + J  0.0208  OHMS
                 LOW VOLTAGE POWER CIRCUIT BREAKER   12.036 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA  12.036 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA  12.036 KA
                 CONTRIBUTIONS:  MTR-CENTRIFUGE      0.717 KA      ANG:   -83.34
                 CBL-0628       PP-SH-1            11.358 KA      ANG:   -63.73

 CHANEL MIX PUM 3P Duty:  1.000 KA AT  -12.14 DEG (     0.83 MVA) X/R:    0.18
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2709 + J  0.0583  OHMS
                 LOW VOLTAGE POWER CIRCUIT BREAKER    1.000 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   1.000 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   1.000 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   1.000 KA
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               T H R E E   P H A S E   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================

               CONTRIBUTIONS TO  CHANEL MIX PUM (CONTINUED)
               CONTRIBUTIONS:  CHANEL MIX PUM     0.067 KA      ANG:   -69.02
               CBL-0683        MCC-29             0.965 KA      ANG:    -8.78

 CHANEL MIX PUM 3P Duty:  0.640 KA AT  -12.80 DEG (     0.53 MVA) X/R:    0.17
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.4223 + J  0.0960  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    0.640 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   0.640 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   0.640 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   0.640 KA
               CONTRIBUTIONS:  MTR-CHANEL MIX     0.067 KA      ANG:   -69.02
               CBL-0684        MCC-29             0.605 KA      ANG:    -7.49

 CHANNEL MIX PU 3P Duty:  0.712 KA AT  -12.39 DEG (     0.59 MVA) X/R:    0.17
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.3799 + J  0.0835  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    0.712 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   0.712 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   0.712 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   0.712 KA
               CONTRIBUTIONS:  MTR-AERATION R     0.067 KA      ANG:   -69.02
               CBL-0665        MCC-28             0.678 KA      ANG:    -7.63

 CHANNEL MIX PU 3P Duty:  1.161 KA AT  -12.04 DEG (     0.96 MVA) X/R:    0.19
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2335 + J  0.0498  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.161 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.161 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.161 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.161 KA
               CONTRIBUTIONS:  MTR-AERATION R     0.067 KA      ANG:   -69.02
               CBL-0666        MCC-28             1.125 KA      ANG:    -9.16

 CHILL WATER CI 3P Duty:  9.462 KA AT  -44.59 DEG (     7.87 MVA) X/R:    1.10
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0209 + J  0.0206  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    9.462 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   9.462 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   9.462 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   9.462 KA
               CONTRIBUTIONS:  MTR-CHILL WATE     0.428 KA      ANG:   -80.69
               CBL-0501        MCC-15A            9.120 KA      ANG:   -43.01

 CHILL WATER CI 3P Duty:  4.246 KA AT  -19.31 DEG (     3.53 MVA) X/R:    0.35
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0616 + J  0.0216  OHMS
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    4.246 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   4.246 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   4.246 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   4.246 KA
                CONTRIBUTIONS:  MTR-CHILL WATE     0.020 KA      ANG:   -68.20
                CBL-0502        MCC-15A            4.233 KA      ANG:   -19.10

 CHILLER #1     3P Duty:  9.664 KA AT  -55.76 DEG (     8.03 MVA) X/R:    1.53
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0161 + J  0.0237  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    9.664 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   9.664 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   9.664 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   9.664 KA
                CONTRIBUTIONS:  MTR-CHILLER #1     0.475 KA      ANG:   -76.12
                CBL-0692        MCC-15             9.219 KA      ANG:   -54.73

 CHILLER #2     3P Duty: 13.366 KA AT  -70.91 DEG (    11.11 MVA) X/R:    2.94
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0068 + J  0.0196  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   13.366 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  13.366 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  13.366 KA
                CONTRIBUTIONS:  MTR-CHILLER #2     0.475 KA      ANG:   -76.12
                CBL-0498        MCC-15A           12.892 KA      ANG:   -70.72

 CP-MAU-BP-1    3P Duty:  1.744 KA AT  -11.78 DEG (     1.45 MVA) X/R:    0.20
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1556 + J  0.0325  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.744 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.744 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.744 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.744 KA
                CBL-0378        MAU-BP-1 VFD       0.045 KA      ANG:   112.00
                CBL-0366        MCC-4C             1.719 KA      ANG:   -10.55

 CS-BS-1        3P Duty:  8.890 KA AT  -30.13 DEG (     7.39 MVA) X/R:    0.59
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0270 + J  0.0156  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    8.890 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   8.890 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   8.890 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   8.890 KA
                CONTRIBUTIONS:  CS-BS-1 MTR        0.115 KA      ANG:   -73.09
                CBL-0368        MCC-2              8.806 KA      ANG:   -29.62

 CTRL SCRN RM U 3P Duty: 15.148 KA AT  -56.54 DEG (    12.59 MVA) X/R:    1.52
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0101 + J  0.0153  OHMS
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER   15.148 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  15.148 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  15.148 KA
                CBL-0373       MCC-2             15.148 KA      ANG:   -56.54

 CW PUMP P-10   3P Duty:  2.139 KA AT  -16.02 DEG (     1.78 MVA) X/R:    0.27
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1245 + J  0.0358  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.139 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.139 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.139 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.139 KA
                CONTRIBUTIONS:  MTR-CW PUMP P-     0.137 KA      ANG:   -70.94
                CBL-CW PUMP P-  MCC-15             2.064 KA      ANG:   -12.92

 D-101          3P Duty:  1.231 KA AT   -7.89 DEG (     1.02 MVA) X/R:    0.14
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2231 + J  0.0309  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.231 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.231 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.231 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.231 KA
                CONTRIBUTIONS:  D-101 MTR          0.004 KA      ANG:   -68.20
                CBL-0330       MCC-4B              1.228 KA      ANG:    -7.71

 D-102          3P Duty:  1.231 KA AT   -7.89 DEG (     1.02 MVA) X/R:    0.14
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2231 + J  0.0309  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.231 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.231 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.231 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.231 KA
                CONTRIBUTIONS:  D-102 MTR          0.004 KA      ANG:   -68.20
                CBL-0331       MCC-4B              1.228 KA      ANG:    -7.71

 D-103          3P Duty:  1.231 KA AT   -7.89 DEG (     1.02 MVA) X/R:    0.14
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2231 + J  0.0309  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.231 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.231 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.231 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.231 KA
                CONTRIBUTIONS:  D-103 MTR          0.004 KA      ANG:   -68.20
                CBL-0332       MCC-4B              1.228 KA      ANG:    -7.71

 DIVERSION CHAM 3P Duty:  1.025 KA AT   -9.19 DEG (     0.85 MVA) X/R:    0.16
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2669 + J  0.0432  OHMS
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                 T H R E E   P H A S E   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
===============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.025 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.025 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.025 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.025 KA
                CBL-0741        BUS-0780           1.025 KA      ANG:    -9.19

 DIVERSION CHAM 3P Duty:  0.508 KA AT   -6.73 DEG (     0.42 MVA) X/R:    0.12
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.5422 + J  0.0640  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.508 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.508 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.508 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.508 KA
                CBL-0744        BUS-0782           0.508 KA      ANG:    -6.73

 DOOR #1        3P Duty:  0.784 KA AT  -10.74 DEG (     0.65 MVA) X/R:    0.18
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.3472 + J  0.0659  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.784 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.784 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.784 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.784 KA
                CONTRIBUTIONS:  MTRI-DOOR 1        0.036 KA      ANG:   -81.99
                CBL-0839        MEGADOOR CONTR     0.773 KA      ANG:    -8.23

 DOOR #2        3P Duty:  0.784 KA AT  -10.74 DEG (     0.65 MVA) X/R:    0.18
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.3472 + J  0.0659  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.784 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.784 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.784 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.784 KA
                CONTRIBUTIONS:  MTRI-DOOR 2        0.036 KA      ANG:   -81.99
                CBL-0840        MEGADOOR CONTR     0.773 KA      ANG:    -8.23

 DOOR #3        3P Duty:  0.784 KA AT  -10.74 DEG (     0.65 MVA) X/R:    0.18
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.3472 + J  0.0659  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.784 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.784 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.784 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.784 KA
                CONTRIBUTIONS:  MTRI-DOOR 3        0.036 KA      ANG:   -81.99
                CBL-0841        MEGADOOR CONTR     0.773 KA      ANG:    -8.23

 DOOR OPENER    3P Duty:  1.815 KA AT   -8.87 DEG (     1.51 MVA) X/R:    0.16
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1509 + J  0.0235  OHMS
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.815 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.815 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.815 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.815 KA
                CBL-0400        MCC-3              1.815 KA      ANG:    -8.87

 DOOR OPERATORS 3P Duty:  6.312 KA AT  -25.53 DEG (     5.25 MVA) X/R:    0.49
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0396 + J  0.0189  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    6.312 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   6.312 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   6.312 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   6.312 KA
                CONTRIBUTIONS:  DOOR OPERATOR      0.031 KA      ANG:   -78.46
                CBL-0226        GRIT TANKS         6.293 KA      ANG:   -25.30

 DRILL PRESS #1 3P Duty:  3.303 KA AT  -21.83 DEG (     2.75 MVA) X/R:    0.40
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0779 + J  0.0312  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    3.303 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   3.303 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   3.303 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   3.303 KA
                CONTRIBUTIONS:  DRILL PRESS #1     0.003 KA      ANG:   -68.20
                CBL-0292        MCC-24             3.301 KA      ANG:   -21.78

 DRILL PRESS #2 3P Duty:  3.305 KA AT  -21.87 DEG (     2.75 MVA) X/R:    0.40
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0778 + J  0.0312  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    3.305 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   3.305 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   3.305 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   3.305 KA
                CONTRIBUTIONS:  DRILL PRESS #2     0.007 KA      ANG:   -68.20
                CBL-0297        MCC-24             3.300 KA      ANG:   -21.78

 DS CLARIFIERS  3P Duty:  2.600 KA AT  -16.29 DEG (     2.16 MVA) X/R:    0.29
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1023 + J  0.0299  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.600 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.600 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.600 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.600 KA
                CBL-0763        MCC-00             2.600 KA      ANG:   -16.29

 DS- CENT. FEED 3P Duty:  4.015 KA AT  -26.08 DEG (     3.34 MVA) X/R:    0.49
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0620 + J  0.0303  OHMS
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               T H R E E   P H A S E   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================
               LOW VOLTAGE POWER CIRCUIT BREAKER    4.015 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   4.015 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   4.015 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   4.015 KA
               CBL-0779        BUS-0818           0.067 KA      ANG:  111.28
               CBL-0780        BUS-0819           0.067 KA      ANG:  111.28
               CBL-0778        MCC-10             3.917 KA      ANG:  -24.74

 DS- NORTH BELT 3P Duty:  1.154 KA AT  -10.18 DEG (     0.96 MVA) X/R:    0.16
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2363 + J  0.0424  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.154 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.154 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.154 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.154 KA
               CBL-0793        DS-NORTH BELT      0.022 KA      ANG:  111.90
               CBL-0794        DS-NORTH BELT      0.022 KA      ANG:  111.90
               CBL-0792        MCC-10             1.131 KA      ANG:    -8.26

 DS-1500 HP BLO 3P Duty: 16.586 KA AT  -77.75 DEG (   137.90 MVA) X/R:    5.73
               VOLTAGE:   4800.   EQUIV. IMPEDANCE=  0.0354 + J  0.1633  OHMS
               CBL-0042        BUS-0057           1.081 KA      ANG:   92.38
               CBL-0043        DS-LC-12A HS       0.120 KA      ANG: -246.73
               CBL-0034        EAST BANK-2B      15.404 KA      ANG:  -77.15

 DS-1500 HP BLO 3P Duty: 17.568 KA AT  -77.89 DEG (   146.06 MVA) X/R:    5.71
               VOLTAGE:   4800.   EQUIV. IMPEDANCE=  0.0331 + J  0.1542  OHMS
               CBL-0038        BUS-0054           1.080 KA      ANG:   92.42
               CBL-0029        EAST BANK-2A      16.359 KA      ANG:  -77.36
               CBL-0039        LC-12 HS           0.148 KA      ANG: -246.71

 DS-2500HP BLOW 3P Duty: 16.765 KA AT  -78.25 DEG (   139.38 MVA) X/R:    6.70
               VOLTAGE:   4800.   EQUIV. IMPEDANCE=  0.0337 + J  0.1618  OHMS
               CBL-0044        BUS-0056           1.801 KA      ANG:   92.25
               CBL-0033        EAST BANK-2B      14.991 KA      ANG:  -77.11

 DS-2500HP BLOW 3P Duty: 17.696 KA AT  -78.25 DEG (   147.12 MVA) X/R:    6.34
               VOLTAGE:   4800.   EQUIV. IMPEDANCE=  0.0319 + J  0.1533  OHMS
               CBL-0040        BUS-0055           1.540 KA      ANG:   92.28
               CBL-0030        EAST BANK-2A      16.178 KA      ANG:  -77.35

 DS-3 AUX. INST 3P Duty:  0.735 KA AT   -7.02 DEG (     0.61 MVA) X/R:    0.10
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.3740 + J  0.0461  OHMS
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                 T H R E E   P H A S E   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.735 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.735 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.735 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.735 KA
                CONTRIBUTIONS:  MTR-3 AUX. INS     0.023 KA      ANG:  -69.02
                CBL-0781        MCC-10             0.725 KA      ANG:   -5.45

 DS-AIR COMPRES 3P Duty:  1.870 KA AT  -13.95 DEG (     1.55 MVA) X/R:    0.25
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1438 + J  0.0357  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.870 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.870 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.870 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.870 KA
                CBL-0163        BUS-0982           1.870 KA      ANG:  -13.95

 DS-AMMONIA REM 3P Duty:  8.060 KA AT  -49.87 DEG (     6.70 MVA) X/R:    1.39
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0222 + J  0.0263  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    8.060 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   8.060 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   8.060 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   8.060 KA
                CBL-0810        BUS-0850           0.535 KA      ANG:   98.28
                CBL-0809        MCC-25             7.611 KA      ANG:  -47.75

 DS-AMMONIA REM 3P Duty:  8.060 KA AT  -49.87 DEG (     6.70 MVA) X/R:    1.39
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0222 + J  0.0263  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    8.060 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   8.060 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   8.060 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   8.060 KA
                CBL-0812        BUS-0851           0.535 KA      ANG:   98.28
                CBL-0811        MCC-25             7.611 KA      ANG:  -47.75

 DS-ANOXIC TANK 3P Duty:  2.602 KA AT  -16.33 DEG (     2.16 MVA) X/R:    0.29
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1022 + J  0.0300  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.602 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.602 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.602 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.602 KA
                CBL-0757        BUS-0797           0.002 KA      ANG:  111.84
                CBL-0756        MCC-00             2.600 KA      ANG:  -16.29

 DS-BASEMENT EL 3P Duty:  5.744 KA AT  -37.02 DEG (     4.78 MVA) X/R:    0.76
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0385 + J  0.0290  OHMS
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              T H R E E   P H A S E   F A U L T   R E P O R T
                 (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                       PRE FAULT VOLTAGE: 1.0000
                       MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    5.744 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   5.744 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   5.744 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   5.744 KA
                CBL-0868       PP-12 LEFT TUB     5.744 KA      ANG:   -37.02

 DS-BYPASS CONV 3P Duty:  1.758 KA AT   -9.49 DEG (     1.46 MVA) X/R:    0.16
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1555 + J  0.0260  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.758 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.758 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.758 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.758 KA
                CONTRIBUTIONS:  MTR-BYPASS CON     0.009 KA      ANG:   -69.02
                CBL-0782       MCC-10             1.753 KA      ANG:    -9.23

 DS-BYPASS SLID 3P Duty:  1.955 KA AT  -17.53 DEG (     1.63 MVA) X/R:    0.31
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1352 + J  0.0427  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.955 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.955 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.955 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.955 KA
                CONTRIBUTIONS:  MTR-BYPASS SLI     0.002 KA      ANG:   -68.20
                CBL-0495       DS-CLARIFIER 7     1.953 KA      ANG:   -17.48

 DS-CENTRIFUGE  3P Duty:  1.651 KA AT  -13.02 DEG (     1.37 MVA) X/R:    0.21
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1635 + J  0.0378  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.651 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.651 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.651 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.651 KA
                CBL-0786       BUS-0827           0.066 KA      ANG:   113.90
                CBL-0785       MCC-10             1.612 KA      ANG:   -11.15

 DS-CF-SH-1     3P Duty:  0.748 KA AT  -10.83 DEG (     0.62 MVA) X/R:    0.16
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.3640 + J  0.0697  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.748 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.748 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.748 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.748 KA
                CONTRIBUTIONS:  MTRI-CF-SH-1       0.072 KA      ANG:   -81.99
                CBL-0848       MCC-25             0.728 KA      ANG:    -5.50

 DS-CF-SH-2     3P Duty:  0.850 KA AT  -10.57 DEG (     0.71 MVA) X/R:    0.16
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.3207 + J  0.0598  OHMS
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
 ==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.850 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.850 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.850 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.850 KA
                CONTRIBUTIONS:  MTRI-CF-SH-2       0.072 KA      ANG:  -81.99
                CBL-0845        MCC-25             0.830 KA      ANG:   -5.88

  DS-CLARIFIER 7 3P Duty:  1.950 KA AT  -17.32 DEG (     1.62 MVA) X/R:    0.31
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1357 + J  0.0423  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.950 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.950 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.950 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.950 KA
                CBL-0491        MSP-12             1.950 KA      ANG:  -17.32

  DS-CP-CS-SH-1  3P Duty:  4.140 KA AT  -26.86 DEG (     3.44 MVA) X/R:    0.55
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0597 + J  0.0302  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    4.140 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   4.140 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   4.140 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   4.140 KA
                CBL-0847        BUS-0858           0.107 KA      ANG:   98.42
                CBL-0846        MCC-25             4.079 KA      ANG:  -25.63

  DS-DRAIN PUMP  3P Duty:  3.061 KA AT  -25.58 DEG (     2.55 MVA) X/R:    0.48
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0817 + J  0.0391  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    3.061 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   3.061 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   3.061 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   3.061 KA
                CONTRIBUTIONS:  MTR-DRAIN PUMP     0.067 KA      ANG:  -68.20
                CBL-0488        MSP-12             3.012 KA      ANG:  -24.71

  DS-DUCT HEATER 3P Duty:  1.517 KA AT  -10.16 DEG (     1.26 MVA) X/R:    0.18
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1798 + J  0.0322  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.517 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.517 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.517 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.517 KA
                CBL-0952        12A-PP-01          1.517 KA      ANG:  -10.16

  DS-EF-1 CAP    3P Duty: 13.833 KA AT  -67.76 DEG (    11.50 MVA) X/R:    2.49
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0076 + J  0.0185  OHMS
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER   13.833 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  13.833 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  13.833 KA
                CBL-0819       MCC-25           13.833 KA      ANG:   -67.76

 DS-EF-2A       3P Duty:  1.670 KA AT   -9.11 DEG (     1.39 MVA) X/R:    0.16
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1638 + J  0.0263  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.670 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.670 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.670 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.670 KA
                CBL-0814       BUS-0852          0.004 KA      ANG:    98.03
                CBL-0813       MCC-25            1.669 KA      ANG:    -8.99

 DS-EF-2A CAP   3P Duty: 11.764 KA AT  -52.37 DEG (     9.78 MVA) X/R:    1.31
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0144 + J  0.0187  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   11.764 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  11.764 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  11.764 KA
                CBL-0815       MCC-25           11.764 KA      ANG:   -52.37

 DS-EF-2B       3P Duty:  1.881 KA AT   -9.88 DEG (     1.56 MVA) X/R:    0.17
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1452 + J  0.0253  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.881 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.881 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.881 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.881 KA
                CBL-0817       BUS-0853          0.004 KA      ANG:    98.03
                CBL-0816       MCC-25            1.880 KA      ANG:    -9.77

 DS-EF-2B CAP   3P Duty: 11.764 KA AT  -52.37 DEG (     9.78 MVA) X/R:    1.31
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0144 + J  0.0187  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   11.764 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  11.764 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  11.764 KA
                CBL-0818       MCC-25           11.764 KA      ANG:   -52.37

 DS-EF-2C       3P Duty:  2.152 KA AT  -10.88 DEG (     1.79 MVA) X/R:    0.19
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1265 + J  0.0243  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.152 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.152 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.152 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.152 KA
                CBL-0821       BUS-0854          0.004 KA      ANG:    98.03
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               T H R E E   P H A S E   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================

               CONTRIBUTIONS TO  DS-EF-2C       (CONTINUED)
               CBL-0820        MCC-25            2.151 KA      ANG:   -10.79

 DS-EF-2C CAP  3P Duty: 11.764 KA AT  -52.37 DEG (     9.78 MVA) X/R:    1.31
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0144 + J  0.0187  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER   11.764 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA  11.764 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA  11.764 KA
               CBL-0822        MCC-25           11.764 KA      ANG:   -52.37

 DS-EF-5A      3P Duty:  0.880 KA AT   -6.27 DEG (     0.73 MVA) X/R:    0.11
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.3131 + J  0.0344  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    0.880 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   0.880 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   0.880 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   0.880 KA
               CBL-0829        BUS-0855          0.004 KA      ANG:    98.03
               CBL-0828        MCC-25            0.879 KA      ANG:    -6.05

 DS-EF-5A CAP  3P Duty: 11.764 KA AT  -52.37 DEG (     9.78 MVA) X/R:    1.31
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0144 + J  0.0187  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER   11.764 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA  11.764 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA  11.764 KA
               CBL-0830        MCC-25           11.764 KA      ANG:   -52.37

 DS-EF-5B      3P Duty:  1.033 KA AT   -7.00 DEG (     0.86 MVA) X/R:    0.12
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2662 + J  0.0327  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.033 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.033 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.033 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.033 KA
               CBL-0832        BUS-0856          0.007 KA      ANG:    98.04
               CBL-0831        MCC-25            1.032 KA      ANG:    -6.62

 DS-EF-5B CAP  3P Duty: 11.764 KA AT  -52.37 DEG (     9.78 MVA) X/R:    1.31
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0144 + J  0.0187  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER   11.764 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA  11.764 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA  11.764 KA
               CBL-0833        MCC-25           11.764 KA      ANG:   -52.37

 DS-EF-SC-1    3P Duty:  1.161 KA AT   -9.45 DEG (     0.96 MVA) X/R:    0.16
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2356 + J  0.0392  OHMS
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                 T H R E E   P H A S E   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.161 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.161 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.161 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.161 KA
                CONTRIBUTIONS:  MTR-EF-SC-1        0.004 KA      ANG:   -68.20
                CBL-0876        PP-12 RIGHT TU     1.158 KA      ANG:    -9.26

 DS-ENG. RM. BO 3P Duty:  7.202 KA AT  -32.46 DEG (     5.99 MVA) X/R:    0.64
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0325 + J  0.0206  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    7.202 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   7.202 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   7.202 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   7.202 KA
                CONTRIBUTIONS:  MTR-BOILER SUM     0.002 KA      ANG:   -68.94
                                MTR-UT COMP        0.023 KA      ANG:   -68.94
                CBL-0887        MCC-7              7.182 KA      ANG:   -32.34

 DS-EXHAUST FAN 3P Duty:  1.470 KA AT  -13.20 DEG (     1.22 MVA) X/R:    0.23
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1836 + J  0.0431  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.470 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.470 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.470 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.470 KA
                CONTRIBUTIONS:  MTR-EXHAUST FA     0.004 KA      ANG:   -68.20
                CBL-0483        MSP-12             1.467 KA      ANG:   -13.06

 DS-EXISTING CR 3P Duty:  1.420 KA AT   -8.07 DEG (     1.18 MVA) X/R:    0.14
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1932 + J  0.0274  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.420 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.420 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.420 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.420 KA
                CONTRIBUTIONS:  MTRI-EXISTING      0.002 KA      ANG:   -68.20
                CBL-0798        MCC-10             1.419 KA      ANG:    -8.00

 DS-FOUL AIR FA 3P Duty:  2.608 KA AT  -10.83 DEG (     2.17 MVA) X/R:    0.19
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1044 + J  0.0200  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.608 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.608 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.608 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.608 KA
                CBL-0901        VFD-FOUL AIR F     0.004 KA      ANG:   111.81
                CBL-0902        VFD-FOUL AIR F     0.004 KA      ANG:   111.81
                CBL-0899        MCC-7              2.603 KA      ANG:   -10.66
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               T H R E E   P H A S E   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================

 DS-GEN 1       3P Duty:  5.932 KA AT  -86.53 DEG (     4.93 MVA) X/R:   16.69
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0028 + J  0.0466  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    6.691 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   9.326 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   7.903 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   7.105 KA
                CONTRIBUTIONS:  GEN-0001           3.003 KA      ANG:   -86.92
                CBL-0275        BUS-0288           2.929 KA      ANG:   -86.13

 DS-GEN 2       3P Duty:  5.932 KA AT  -86.53 DEG (     4.93 MVA) X/R:   16.69
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0028 + J  0.0466  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    6.691 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   9.326 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   7.903 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   7.105 KA
                CONTRIBUTIONS:  GEN-0002           3.003 KA      ANG:   -86.92
                CBL-0705        BUS-0288           2.929 KA      ANG:   -86.13

 DS-GRINDER 1,2 3P Duty:  4.575 KA AT  -22.58 DEG (     3.80 MVA) X/R:    0.42
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0559 + J  0.0233  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    4.575 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   4.575 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   4.575 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   4.575 KA
                CBL-0949        12A-PP-01          4.575 KA      ANG:   -22.58

 DS-GROUND SLUD 3P Duty:  1.346 KA AT  -10.60 DEG (     1.12 MVA) X/R:    0.17
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2024 + J  0.0379  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.346 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.346 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.346 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.346 KA
                CONTRIBUTIONS:  MTRI-GROUND SL     0.045 KA      ANG:   -68.20
                CBL-0803        MCC-10             1.322 KA      ANG:    -8.96

 DS-GSST MIXER  3P Duty:  4.047 KA AT  -26.55 DEG (     3.36 MVA) X/R:    0.50
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0613 + J  0.0306  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    4.047 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   4.047 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   4.047 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   4.047 KA
                CBL-0776        BUS-0816           0.090 KA      ANG:   111.38
                CBL-0777        BUS-0817           0.090 KA      ANG:   111.38
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                 T H R E E   P H A S E   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================

               CONTRIBUTIONS TO  DS-GSST MIXER  (CONTINUED)
               CBL-0775        MCC-10            3.915 KA      ANG:   -24.78

 DS-HOIST      3P Duty:  1.311 KA AT  -13.10 DEG (     1.09 MVA) X/R:    0.23
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2059 + J  0.0479  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.311 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.311 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.311 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.311 KA
               CBL-0632        DS-CLARIFIER 7     1.311 KA      ANG:   -13.10

 DS-HOIST,EX FA 3P Duty:  1.517 KA AT  -10.16 DEG (     1.26 MVA) X/R:    0.18
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1798 + J  0.0322  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.517 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.517 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.517 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.517 KA
               CBL-0951        12A-PP-01          1.517 KA      ANG:   -10.16

 DS-HV UNIT    3P Duty:  2.920 KA AT  -15.79 DEG (     2.43 MVA) X/R:    0.28
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0913 + J  0.0258  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    2.920 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   2.920 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   2.920 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   2.920 KA
               CBL-0964        DS-MOV SUMP        2.920 KA      ANG:   -15.79

 DS-HVAC #1    3P Duty: 14.357 KA AT  -55.46 DEG (    11.94 MVA) X/R:    1.46
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0109 + J  0.0159  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER   14.357 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA  14.357 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA  14.357 KA
               CBL-0885        MCC-7             14.357 KA      ANG:   -55.46

 DS-HVAC #2    3P Duty: 14.357 KA AT  -55.46 DEG (    11.94 MVA) X/R:    1.46
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0109 + J  0.0159  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER   14.357 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA  14.357 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA  14.357 KA
               CBL-0886        MCC-7             14.357 KA      ANG:   -55.46

 DS-HVAC 1     3P Duty:  1.839 KA AT  -15.05 DEG (     1.53 MVA) X/R:    0.26
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1455 + J  0.0391  OHMS
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                 T H R E E   P H A S E   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================
                 LOW VOLTAGE POWER CIRCUIT BREAKER    1.839 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   1.839 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   1.839 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   1.839 KA
                 CBL-0844       BUS-0857            0.190 KA      ANG:    99.82
                 CBL-0843       MCC-25              1.767 KA      ANG:    -9.44

 DS-INFLUENT VA 3P Duty:  1.955 KA AT  -17.53 DEG (     1.63 MVA) X/R:    0.31
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1352 + J  0.0427  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.955 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.955 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.955 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.955 KA
                CONTRIBUTIONS:  MTR-INFLUENT V     0.002 KA      ANG:   -68.20
                CBL-0493        DS-CLARIFIER 7     1.953 KA      ANG:   -17.48

 DS-INFLUENT VA 3P Duty:  1.955 KA AT  -17.53 DEG (     1.63 MVA) X/R:    0.31
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1352 + J  0.0427  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.955 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.955 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.955 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.955 KA
                CONTRIBUTIONS:  MTR-INFLUENT V     0.002 KA      ANG:   -68.20
                CBL-0494        DS-CLARIFIER 7     1.953 KA      ANG:   -17.48

 DS-MAU-SC-1    3P Duty:  2.310 KA AT  -17.24 DEG (     1.92 MVA) X/R:    0.31
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1146 + J  0.0356  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.310 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.310 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.310 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.310 KA
                CONTRIBUTIONS:  MTR-MAU-SC-1       0.022 KA      ANG:   -68.20
                CBL-0881        PP-12 RIGHT TU     2.296 KA      ANG:   -16.81

 DS-MAU-SH-1    3P Duty:  1.160 KA AT  -10.28 DEG (     0.96 MVA) X/R:    0.16
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2350 + J  0.0426  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.160 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.160 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.160 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.160 KA
                CONTRIBUTIONS:  MTRI-MAU-SH-1      0.045 KA      ANG:   -69.02
                CBL-0806        MCC-25             1.138 KA      ANG:    -8.34

 DS-MAU-SH-2    3P Duty:  2.301 KA AT  -18.74 DEG (     1.91 MVA) X/R:    0.34
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               T H R E E   P H A S E   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1141 + J  0.0387  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.301 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.301 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.301 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.301 KA
                CONTRIBUTIONS:  MTRI-MAU-SH-2      0.140 KA      ANG:   -74.92
                CBL-0807        MCC-25             2.226 KA      ANG:   -15.75

 DS-MAU-SH-3    3P Duty:  1.311 KA AT  -10.20 DEG (     1.09 MVA) X/R:    0.17
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2080 + J  0.0374  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.311 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.311 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.311 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.311 KA
                CONTRIBUTIONS:  MTRI-MAU-SH-3      0.034 KA      ANG:   -69.02
                CBL-0808        MCC-25             1.294 KA      ANG:    -8.92

 DS-MCC-15 AC U 3P Duty: 10.931 KA AT  -60.42 DEG (     9.09 MVA) X/R:    1.77
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0125 + J  0.0220  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   10.931 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  10.931 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  10.931 KA
                CBL-0697        BUS-0732          10.931 KA      ANG:   -60.42

 DS-MCC-15 BATT 3P Duty: 10.931 KA AT  -60.42 DEG (     9.09 MVA) X/R:    1.77
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0125 + J  0.0220  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   10.931 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  10.931 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  10.931 KA
                CBL-0698        BUS-0732          10.931 KA      ANG:   -60.42

 DS-MCC-25-SF-4 3P Duty:  1.430 KA AT   -8.23 DEG (     1.19 MVA) X/R:    0.14
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1918 + J  0.0277  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.430 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.430 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.430 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.430 KA
                CONTRIBUTIONS:  MTRI-MCC-25-SF     0.004 KA      ANG:   -81.99
                CBL-0823        MCC-25             1.429 KA      ANG:    -8.09

 DS-MCC-7 AIR C 3P Duty:  5.332 KA AT  -25.80 DEG (     4.43 MVA) X/R:    0.48
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0468 + J  0.0226  OHMS
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                 T H R E E   P H A S E   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    5.332 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   5.332 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   5.332 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   5.332 KA
                CONTRIBUTIONS:  MTR-MCC-7 AIR      0.022 KA      ANG:  -68.20
                CBL-0897        DS-SERV GARAGE     5.316 KA      ANG: -205.64

 DS-MCC7 PUMP 1 3P Duty: 15.550 KA AT  -54.75 DEG (    12.93 MVA) X/R:    1.44
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0103 + J  0.0146  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   15.550 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  15.550 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  15.550 KA
                CONTRIBUTIONS:  MTR-MCC-7 PUMP     0.188 KA      ANG:  -77.63
                CBL-0857        DS-RECYCLE PUM    15.376 KA      ANG:  -54.47

 DS-MCC7 PUMP 2 3P Duty: 14.569 KA AT  -51.46 DEG (    12.11 MVA) X/R:    1.28
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0119 + J  0.0149  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   14.569 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  14.569 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  14.569 KA
                CONTRIBUTIONS:  MTR-MCC-7 PUMP     0.188 KA      ANG:  -77.63
                CBL-0858        DS-RECYCLE PUM    14.400 KA      ANG:  -51.13

 DS-MCC7 PUMP 3 3P Duty: 13.666 KA AT  -48.58 DEG (    11.36 MVA) X/R:    1.16
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0134 + J  0.0152  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   13.666 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  13.666 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  13.666 KA
                CONTRIBUTIONS:  MTR-MCC-7 PUMP     0.188 KA      ANG:  -77.63
                CBL-0859        DS-RECYCLE PUM    13.502 KA      ANG:  -48.19

 DS-MCC7 PUMP 4 3P Duty: 12.842 KA AT  -46.05 DEG (    10.68 MVA) X/R:    1.06
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0150 + J  0.0155  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   12.842 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  12.842 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  12.842 KA
                CONTRIBUTIONS:  MTR-MCC-7 PUMP     0.188 KA      ANG:  -77.63
                CBL-0860        DS-RECYCLE PUM    12.681 KA      ANG:  -45.61

 DS-MCC8 PRI TH 3P Duty:  2.602 KA AT  -14.50 DEG (     2.16 MVA) X/R:    0.26
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1031 + J  0.0267  OHMS
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.602 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.602 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.602 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.602 KA
                CBL-0387        DS-MCC-8-PUMPS     2.602 KA      ANG:   -14.50

 DS-MCC8 PRI TH 3P Duty:  2.602 KA AT  -14.50 DEG (     2.16 MVA) X/R:    0.26
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1031 + J  0.0267  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.602 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.602 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.602 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.602 KA
                CBL-0702        DS-MCC-8-PUMPS     2.602 KA      ANG:   -14.50

 DS-MCC8 PRI TH 3P Duty:  2.345 KA AT  -13.47 DEG (     1.95 MVA) X/R:    0.24
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1149 + J  0.0275  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.345 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.345 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.345 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.345 KA
                CBL-0703        DS-MCC-8-PUMPS     2.345 KA      ANG:   -13.47

 DS-MCC8 RAS PU 3P Duty:  2.313 KA AT  -13.36 DEG (     1.92 MVA) X/R:    0.24
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1166 + J  0.0277  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.313 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.313 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.313 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.313 KA
                CBL-0168        MCC-8 SECTION      2.313 KA      ANG:   -13.36

 DS-MCC8 RAS PU 3P Duty:  2.563 KA AT  -14.36 DEG (     2.13 MVA) X/R:    0.26
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1048 + J  0.0268  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.563 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.563 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.563 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.563 KA
                CBL-0246        MCC-8 SECTION      2.563 KA      ANG:   -14.36

 DS-MCC8 RAS PU 3P Duty:  2.708 KA AT  -14.95 DEG (     2.25 MVA) X/R:    0.27
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0989 + J  0.0264  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.708 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.708 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.708 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.708 KA
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               T H R E E   P H A S E   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================

               CONTRIBUTIONS TO  DS-MCC8 RAS PU (CONTINUED)
               CBL-0247       MCC-8 SECTION     2.708 KA     ANG:   -14.95

 DS-MCC8 RAS PU 3P Duty:  3.054 KA AT  -16.35 DEG (     2.54 MVA) X/R:    0.29
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0871 + J  0.0255  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    3.054 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   3.054 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   3.054 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   3.054 KA
               CBL-0248       MCC-8 SECTION     3.054 KA     ANG:   -16.35

 DS-MCC8 SCUM P 3P Duty:  1.425 KA AT   -8.55 DEG (     1.18 MVA) X/R:    0.15
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1923 + J  0.0289  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.425 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.425 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.425 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.425 KA
               CBL-0169       DS-MCC-8-PUMPS    1.425 KA     ANG:    -8.55

 DS-MCC8 SCUM P 3P Duty:  1.425 KA AT   -8.55 DEG (     1.18 MVA) X/R:    0.15
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1923 + J  0.0289  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.425 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.425 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.425 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.425 KA
               CBL-0249       DS-MCC-8-PUMPS    1.425 KA     ANG:    -8.55

 DS-MCC8 THICKE 3P Duty:  5.946 KA AT  -30.56 DEG (     4.94 MVA) X/R:    0.59
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0401 + J  0.0237  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    5.946 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   5.946 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   5.946 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   5.946 KA
               CBL-0704       DS-MCC-8-PUMPS    5.946 KA     ANG:   -30.56

 DS-MCC8 WAS PU 3P Duty:  1.425 KA AT   -8.55 DEG (     1.18 MVA) X/R:    0.15
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1923 + J  0.0289  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.425 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.425 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.425 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.425 KA
               CBL-0385       DS-MCC-8-PUMPS    1.425 KA     ANG:    -8.55

 DS-MIXED LIQUO 3P Duty:  3.384 KA AT  -29.80 DEG (     2.81 MVA) X/R:    0.58
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0711 + J  0.0407  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    3.384 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   3.384 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   3.384 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   3.384 KA
                CONTRIBUTIONS:  MTR-MIXED LIQU     0.134 KA      ANG:  -68.20
                CBL-0700        MSP-14             3.280 KA      ANG:  -28.34

 DS-MOV SUMP    3P Duty:  7.132 KA AT  -33.69 DEG (     5.93 MVA) X/R:    0.67
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0323 + J  0.0216  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    7.132 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   7.132 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   7.132 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   7.132 KA
                CBL-0962        12A-PP-01          7.132 KA      ANG:  -33.69

 DS-MSP-12 TUMB 3P Duty:  1.483 KA AT  -14.10 DEG (     1.23 MVA) X/R:    0.24
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1812 + J  0.0455  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.483 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.483 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.483 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.483 KA
                CONTRIBUTIONS:  MTR-MSP-12 TUM     0.034 KA      ANG:  -68.20
                CBL-0481        MSP-12             1.464 KA      ANG:  -13.03

 DS-NEW CRANE   3P Duty:  1.420 KA AT   -8.07 DEG (     1.18 MVA) X/R:    0.14
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1932 + J  0.0274  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.420 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.420 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.420 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.420 KA
                CONTRIBUTIONS:  MTRI-NEW CRANE     0.002 KA      ANG:  -68.20
                CBL-0799        MCC-10             1.419 KA      ANG:   -8.00

 DS-NORTH BELT  3P Duty:  1.053 KA AT   -9.83 DEG (     0.88 MVA) X/R:    0.15
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2593 + J  0.0449  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.053 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.053 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.053 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.053 KA
                CONTRIBUTIONS:  MTRI-NORTH BEL     0.022 KA      ANG:  -68.20
                CBL-0793        DS- NORTH BELT     1.041 KA      ANG:   -8.78

 DS-NORTH BELT  3P Duty:  1.053 KA AT   -9.83 DEG (     0.88 MVA) X/R:    0.15
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
                VOLTAGE:    480.  EQUIV. IMPEDANCE=  0.2593 + J  0.0449  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.053 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.053 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.053 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.053 KA
                CONTRIBUTIONS:  MTRI-NORTH BEL     0.022 KA      ANG:  -68.20
                CBL-0794        DS- NORTH BELT     1.041 KA      ANG:   -8.78

 DS-NORTH BOOST 3P Duty:  5.490 KA AT  -33.85 DEG (     4.56 MVA) X/R:    0.67
                VOLTAGE:    480.  EQUIV. IMPEDANCE=  0.0419 + J  0.0281  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    5.490 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   5.490 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   5.490 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   5.490 KA
                CONTRIBUTIONS:  MTRI-NORTH BOO     0.022 KA      ANG:  -68.20
                CBL-0801        DS-NORTH BOOST     5.471 KA      ANG:  -33.71

 DS-NORTH BOOST 3P Duty:  5.490 KA AT  -33.85 DEG (     4.56 MVA) X/R:    0.67
                VOLTAGE:    480.  EQUIV. IMPEDANCE=  0.0419 + J  0.0281  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    5.490 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   5.490 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   5.490 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   5.490 KA
                CONTRIBUTIONS:  MTRI-NORTH BOO     0.022 KA      ANG:  -68.20
                CBL-0802        DS-NORTH BOOST     5.471 KA      ANG:  -33.71

 DS-NORTH BOOST 3P Duty:  5.750 KA AT  -35.17 DEG (     4.78 MVA) X/R:    0.71
                VOLTAGE:    480.  EQUIV. IMPEDANCE=  0.0394 + J  0.0278  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    5.750 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   5.750 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   5.750 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   5.750 KA
                CBL-0801        DS-NORTH BOOST     0.022 KA      ANG:  111.81
                CBL-0802        DS-NORTH BOOST     0.022 KA      ANG:  111.81
                CBL-0800        MCC-10             5.713 KA      ANG:  -34.93

 DS-OH DOOR     3P Duty: 11.764 KA AT  -52.37 DEG (     9.78 MVA) X/R:    1.31
                VOLTAGE:    480.  EQUIV. IMPEDANCE=  0.0144 + J  0.0187  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   11.764 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  11.764 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  11.764 KA
                CBL-0842        MCC-25            11.764 KA      ANG:  -52.37

 DS-POLYMER MIX 3P Duty:  2.602 KA AT  -16.33 DEG (     2.16 MVA) X/R:    0.29
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               T H R E E   P H A S E   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1022 + J  0.0300  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    2.602 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   2.602 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   2.602 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   2.602 KA
               CONTRIBUTIONS:  MTR-APOLYMER M     0.002 KA      ANG:   -68.20
               CBL-0758        MCC-00             2.600 KA      ANG:   -16.29

 DS-PRIM THICK 3P Duty:  3.109 KA AT  -16.56 DEG (     2.59 MVA) X/R:    0.30
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0854 + J  0.0254  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    3.109 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   3.109 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   3.109 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   3.109 KA
               CBL-0963        12A-PP-01          3.109 KA      ANG:   -16.56

 DS-Q1236      3P Duty:  0.975 KA AT   -8.43 DEG (     0.81 MVA) X/R:    0.15
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2812 + J  0.0417  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    0.975 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   0.975 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   0.975 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   0.975 KA
               CBL-0954        DS-RETURN VALV     0.975 KA      ANG:    -8.43

 DS-Q1237      3P Duty:  1.004 KA AT   -8.52 DEG (     0.83 MVA) X/R:    0.15
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2731 + J  0.0409  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.004 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.004 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.004 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.004 KA
               CBL-0955        DS-RETURN VALV     1.004 KA      ANG:    -8.52

 DS-Q1238      3P Duty:  1.004 KA AT   -8.52 DEG (     0.83 MVA) X/R:    0.15
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2731 + J  0.0409  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.004 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.004 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.004 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.004 KA
               CBL-0956        DS-RETURN VALV     1.004 KA      ANG:    -8.52

 DS-Q1239      3P Duty:  1.034 KA AT   -8.61 DEG (     0.86 MVA) X/R:    0.15
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2650 + J  0.0401  OHMS
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               T H R E E   P H A S E   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
===============================================================================
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.034 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.034 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.034 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.034 KA
               CBL-0957        DS-RETURN VALV     1.034 KA      ANG:    -8.61

 DS-Q1240      3P Duty:  1.034 KA AT   -8.61 DEG (     0.86 MVA) X/R:    0.15
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2650 + J  0.0401  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.034 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.034 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.034 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.034 KA
               CBL-0958        DS-RETURN VALV     1.034 KA      ANG:    -8.61

 DS-Q1241      3P Duty:  1.066 KA AT   -8.72 DEG (     0.89 MVA) X/R:    0.15
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2569 + J  0.0394  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.066 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.066 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.066 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.066 KA
               CBL-0959        DS-RETURN VALV     1.066 KA      ANG:    -8.72

 DS-Q1242      3P Duty:  1.066 KA AT   -8.72 DEG (     0.89 MVA) X/R:    0.15
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2569 + J  0.0394  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.066 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.066 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.066 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.066 KA
               CBL-0960        DS-RETURN VALV     1.066 KA      ANG:    -8.72

 DS-Q1243      3P Duty:  1.101 KA AT   -8.83 DEG (     0.92 MVA) X/R:    0.16
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2488 + J  0.0386  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.101 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.101 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.101 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.101 KA
               CBL-0961        DS-RETURN VALV     1.101 KA      ANG:    -8.83

 DS-RAS PUMP #1 3P Duty:  3.257 KA AT  -20.86 DEG (     2.71 MVA) X/R:    0.38
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0795 + J  0.0303  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    3.257 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   3.257 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   3.257 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   3.257 KA
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                 T H R E E   P H A S E   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================

                CONTRIBUTIONS TO  DS-RAS PUMP #1 (CONTINUED)
                CONTRIBUTIONS:  MTR-RAS PUMP #     0.013 KA      ANG:   -68.20
                CBL-0767        RAS PUMPS          3.248 KA      ANG:   -20.69

 DS-RAS PUMP #2 3P Duty:  3.257 KA AT  -20.86 DEG (     2.71 MVA) X/R:    0.38
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0795 + J  0.0303  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    3.257 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   3.257 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   3.257 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   3.257 KA
                CONTRIBUTIONS:  MTR-RAS PUMP #     0.013 KA      ANG:   -68.20
                CBL-0768        RAS PUMPS          3.248 KA      ANG:   -20.69

 DS-RAS PUMP #3 3P Duty:  3.257 KA AT  -20.86 DEG (     2.71 MVA) X/R:    0.38
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0795 + J  0.0303  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    3.257 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   3.257 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   3.257 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   3.257 KA
                CONTRIBUTIONS:  MTR-RAS PUMP #     0.013 KA      ANG:   -68.20
                CBL-0769        RAS PUMPS          3.248 KA      ANG:   -20.69

 DS-RECYCLE PUM 3P Duty: 18.859 KA AT  -67.69 DEG (    15.68 MVA) X/R:    2.47
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0056 + J  0.0136  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   18.859 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  18.859 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  18.859 KA
                CBL-0857        DS-MCC7 PUMP 1     0.188 KA      ANG:   102.55
                CBL-0858        DS-MCC7 PUMP 2     0.188 KA      ANG:   102.61
                CBL-0859        DS-MCC7 PUMP 3     0.188 KA      ANG:   102.66
                CBL-0860        DS-MCC7 PUMP 4     0.188 KA      ANG:   102.72
                CBL-0851        MCC-7             18.118 KA      ANG:   -67.29

 DS-RETURN VALV 3P Duty:  1.517 KA AT  -10.16 DEG (     1.26 MVA) X/R:    0.18
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1798 + J  0.0322  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.517 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.517 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.517 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.517 KA
                CBL-0953        12A-PP-01          1.517 KA      ANG:   -10.16

 DS-SCUM PUMP # 3P Duty:  1.467 KA AT  -13.07 DEG (     1.22 MVA) X/R:    0.23
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1840 + J  0.0427  OHMS
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.467 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.467 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.467 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.467 KA
                CBL-0633        MSP-12             1.467 KA      ANG:   -13.07

 DS-SERV GARAGE 3P Duty:  6.366 KA AT  -30.54 DEG (     5.29 MVA) X/R:    0.59
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0375 + J  0.0221  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    6.366 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   6.366 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   6.366 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   6.366 KA
                CBL-0897        DS-MCC-7 AIR C     0.022 KA      ANG:   -68.16
                CBL-0998        MCC-7              6.348 KA      ANG:   -30.41

 DS-SEWAGE PUMP 3P Duty: 21.142 KA AT  -75.90 DEG (    17.58 MVA) X/R:    4.13
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0032 + J  0.0127  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   21.142 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  21.142 KA
                CBL-0709        VFD-PUMP 4         0.969 KA      ANG:   102.13
                CBL-0209        MCC-1             20.173 KA      ANG:   -75.81

 DS-SLIDE GATE  3P Duty:  1.955 KA AT  -17.53 DEG (     1.63 MVA) X/R:    0.31
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1352 + J  0.0427  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.955 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.955 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.955 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.955 KA
                CONTRIBUTIONS:  MTR-SLIDE GATE     0.002 KA      ANG:   -68.20
                CBL-0496        DS-CLARIFIER 7     1.953 KA      ANG:   -17.48

 DS-SLIDE GATE  3P Duty:  1.955 KA AT  -17.53 DEG (     1.63 MVA) X/R:    0.31
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1352 + J  0.0427  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.955 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.955 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.955 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.955 KA
                CONTRIBUTIONS:  MTR-SLIDE GATE     0.002 KA      ANG:   -68.20
                CBL-0615        DS-CLARIFIER 7     1.953 KA      ANG:   -17.48

 DS-SLUDGE PUMP 3P Duty:  3.058 KA AT  -25.48 DEG (     2.54 MVA) X/R:    0.48
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0818 + J  0.0390  OHMS
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    3.058 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   3.058 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   3.058 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   3.058 KA
                CONTRIBUTIONS:  MTR-MSP-12 TUM     0.034 KA      ANG:  -68.20
                                MTR-SLUDGE PUM     0.022 KA      ANG:  -68.20
                CBL-0482        MSP-12             3.017 KA      ANG:  -24.76

 DS-SLUDGE PUMP 3P Duty:  3.475 KA AT  -21.68 DEG (     2.89 MVA) X/R:    0.40
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0741 + J  0.0295  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    3.475 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   3.475 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   3.475 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   3.475 KA
                CBL-0771        NORTH SEC. PUM     0.013 KA      ANG:  111.97
                CBL-0770        SOUTH SEC. PUM     0.013 KA      ANG:  111.97
                CBL-0772        MCC-00             3.457 KA      ANG:  -21.36

 DS-SLUDGE TANK 3P Duty:  0.981 KA AT   -8.66 DEG (     0.82 MVA) X/R:    0.12
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2792 + J  0.0425  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.981 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.981 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.981 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.981 KA
                CONTRIBUTIONS:  MTR-SLUDGE TAN     0.045 KA      ANG:  -69.02
                CBL-0774        MCC-10             0.960 KA      ANG:   -6.32

 DS-SLUDGE THIC 3P Duty:  2.866 KA AT  -20.51 DEG (     2.38 MVA) X/R:    0.38
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0906 + J  0.0339  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.866 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.866 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.866 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.866 KA
                CONTRIBUTIONS:  MTR-SLUDGE THI     0.024 KA      ANG:  -77.63
                CBL-0872        DS-SLUDGE THIC     2.853 KA      ANG:  -20.11

 DS-SLUDGE THIC 3P Duty:  2.565 KA AT  -18.85 DEG (     2.13 MVA) X/R:    0.35
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1023 + J  0.0349  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.565 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.565 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.565 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.565 KA
                CONTRIBUTIONS:  MTR-SLUDGE THI     0.024 KA      ANG:  -77.63
                CBL-0861        DS-SLUDGE THIC     2.553 KA      ANG:  -18.40
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            T H R E E   P H A S E   F A U L T   R E P O R T
               (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                     PRE FAULT VOLTAGE: 1.0000
                     MODEL TRANSFORMER TAPS: NO
==============================================================================

 DS-SLUDGE THIC 3P Duty:  1.475 KA AT  -13.69 DEG (     1.23 MVA) X/R:    0.24
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1825 + J  0.0444  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.475 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.475 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.475 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.475 KA
                CONTRIBUTIONS:  MTR-SLUDGE THI     0.024 KA      ANG:   -77.63
                CBL-0874        DS-SLUDGE THIC     1.465 KA      ANG:   -12.86

 DS-SLUDGE THIC 3P Duty:  1.475 KA AT  -13.69 DEG (     1.23 MVA) X/R:    0.24
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1825 + J  0.0444  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.475 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.475 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.475 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.475 KA
                CONTRIBUTIONS:  MTR-SLUDGE THI     0.024 KA      ANG:   -77.63
                CBL-0875        DS-SLUDGE THIC     1.465 KA      ANG:   -12.86

 DS-SLUDGE THIC 3P Duty:  3.043 KA AT  -21.50 DEG (     2.53 MVA) X/R:    0.40
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0847 + J  0.0334  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    3.043 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   3.043 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   3.043 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   3.043 KA
                CBL-0872        DS-SLUDGE THIC     0.024 KA      ANG:   102.40
                CBL-0861        DS-SLUDGE THIC     0.024 KA      ANG:   102.46
                CBL-0871        PP-12 LEFT TUB     3.017 KA      ANG:   -20.76

 DS-SLUDGE THIC 3P Duty:  1.522 KA AT  -13.94 DEG (     1.27 MVA) X/R:    0.25
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1767 + J  0.0439  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.522 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.522 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.522 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.522 KA
                CBL-0874        DS-SLUDGE THIC     0.024 KA      ANG:   102.40
                CBL-0875        DS-SLUDGE THIC     0.024 KA      ANG:   102.40
                CBL-0873        PP-12 LEFT TUB     1.502 KA      ANG:   -12.33

 DS-SOUTH BELT  3P Duty:  1.053 KA AT   -9.83 DEG (     0.88 MVA) X/R:    0.15
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2593 + J  0.0449  OHMS
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                 T H R E E   P H A S E   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================
                 LOW VOLTAGE POWER CIRCUIT BREAKER    1.053 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   1.053 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   1.053 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   1.053 KA
                 CONTRIBUTIONS:  MTRI-SOUTH BEL     0.022 KA      ANG:  -68.20
                 CBL-0796        DS-SOUTH BELT      1.041 KA      ANG:   -8.78

 DS-SOUTH BELT   3P Duty:  1.154 KA AT  -10.18 DEG (     0.96 MVA) X/R:    0.16
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2363 + J  0.0424  OHMS
                 LOW VOLTAGE POWER CIRCUIT BREAKER    1.154 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   1.154 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   1.154 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   1.154 KA
                 CBL-0796        DS-SOUTH BELT      0.022 KA      ANG:  111.90
                 CBL-0797        DS-SOUTH BELT      0.022 KA      ANG:  111.90
                 CBL-0795        MCC-10             1.131 KA      ANG:   -8.26

 DS-SOUTH BELT   3P Duty:  1.053 KA AT   -9.83 DEG (     0.88 MVA) X/R:    0.15
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2593 + J  0.0449  OHMS
                 LOW VOLTAGE POWER CIRCUIT BREAKER    1.053 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   1.053 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   1.053 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   1.053 KA
                 CONTRIBUTIONS:  MTRI-SOUTH BEL     0.022 KA      ANG:  -68.20
                 CBL-0797        DS-SOUTH BELT      1.041 KA      ANG:   -8.78

 DS-STREET LIGH  3P Duty:  2.235 KA AT  -14.57 DEG (     1.86 MVA) X/R:    0.26
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1200 + J  0.0312  OHMS
                 LOW VOLTAGE POWER CIRCUIT BREAKER    2.235 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   2.235 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   2.235 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   2.235 KA
                 CBL-0761        MCC-00             2.235 KA      ANG:  -14.57

 DS-SUMP PUMP 1  3P Duty:  1.268 KA AT  -10.69 DEG (     1.05 MVA) X/R:    0.18
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2148 + J  0.0405  OHMS
                 LOW VOLTAGE POWER CIRCUIT BREAKER    1.268 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   1.268 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   1.268 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   1.268 KA
                 CONTRIBUTIONS:  MTR-SUMP PUMP      0.002 KA      ANG:  -68.20
                 CBL-0879        DS-SUMP PUMP 1     1.266 KA      ANG:  -10.60

 DS-SUMP PUMP 1  3P Duty:  1.324 KA AT  -11.03 DEG (     1.10 MVA) X/R:    0.19
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               T H R E E   P H A S E   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2055 + J  0.0401  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.324 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.324 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.324 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.324 KA
                CBL-0879        DS-SUMP PUMP 1     0.002 KA      ANG:   111.81
                CBL-0880        DS-SUMP PUMP 2     0.022 KA      ANG:   111.84
                CBL-0878        PP-12 RIGHT TU     1.310 KA      ANG:   -10.13

 DS-SUMP PUMP 2 3P Duty:  1.268 KA AT  -10.76 DEG (     1.05 MVA) X/R:    0.18
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2147 + J  0.0408  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.268 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.268 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.268 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.268 KA
                CONTRIBUTIONS:  MTR-SUMP PUMP      0.022 KA      ANG:   -68.20
                CBL-0880        DS-SUMP PUMP 1     1.256 KA      ANG:    -9.90

 DS-SUMP PUMP A 3P Duty:  1.312 KA AT  -13.17 DEG (     1.09 MVA) X/R:    0.23
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2057 + J  0.0482  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.312 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.312 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.312 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.312 KA
                CONTRIBUTIONS:  MTR-INFLUENT V     0.004 KA      ANG:   -68.20
                CBL-0616        DS-CLARIFIER 7     1.309 KA      ANG:   -13.01

 DS-SUMP PUMP B 3P Duty:  1.312 KA AT  -13.17 DEG (     1.09 MVA) X/R:    0.23
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2057 + J  0.0482  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.312 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.312 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.312 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.312 KA
                CONTRIBUTIONS:  MTR-INFLUENT V     0.004 KA      ANG:   -68.20
                CBL-0624        DS-CLARIFIER 7     1.309 KA      ANG:   -13.01

 DS-SYSTEM AIR  3P Duty:  0.758 KA AT  -10.04 DEG (     0.63 MVA) X/R:    0.12
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.3602 + J  0.0638  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.758 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.758 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.758 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.758 KA
                CONTRIBUTIONS:  MTR-SYSTEM AIR     0.068 KA      ANG:   -69.02
                CBL-0783       MCC-10              0.725 KA      ANG:    -5.46
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               T H R E E   P H A S E   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================

 DS-SYSTEM AIR  3P Duty:  0.758 KA AT  -10.04 DEG (     0.63 MVA) X/R:    0.12
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.3602 + J  0.0638  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.758 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.758 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.758 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.758 KA
                CONTRIBUTIONS:  MTR-SYSTEM AIR     0.068 KA      ANG:   -69.02
                CBL-0784        MCC-10             0.725 KA      ANG:    -5.46

 DS-UNIT HEATER 3P Duty:  1.658 KA AT  -13.23 DEG (     1.38 MVA) X/R:    0.23
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1627 + J  0.0383  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.658 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.658 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.658 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.658 KA
                CBL-0882        PP-12 RIGHT TU     1.658 KA      ANG:   -13.23

 DS-WELDER PLUG 3P Duty:  1.517 KA AT  -10.16 DEG (     1.26 MVA) X/R:    0.18
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1798 + J  0.0322  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.517 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.517 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.517 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.517 KA
                CBL-0950        12A-PP-01          1.517 KA      ANG:   -10.16

 DS-XFMR 21 LP- 3P Duty:  6.220 KA AT  -30.20 DEG (     5.17 MVA) X/R:    0.58
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0385 + J  0.0224  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    6.220 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   6.220 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   6.220 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   6.220 KA
                CBL-0891        DS-SERV GARAGE     6.220 KA      ANG:  -210.20

 DS-XFMR 21 LP- 3P Duty:  2.558 KA AT  -16.64 DEG (     2.13 MVA) X/R:    0.30
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1038 + J  0.0310  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.558 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.558 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.558 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.558 KA
                CBL-0894        DS-SERV GARAGE     2.558 KA      ANG:  -196.64

 DUMBWATIER DIS 3P Duty:  4.019 KA AT  -21.05 DEG (     3.34 MVA) X/R:    0.39
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0643 + J  0.0248  OHMS
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    4.019 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   4.019 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   4.019 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   4.019 KA
                CBL-0536        MCC-15AA           4.019 KA      ANG:   -21.05

 EAST BANK-1A   3P Duty: 20.099 KA AT  -84.07 DEG (   167.10 MVA) X/R:   10.53
                VOLTAGE:   4800.   EQUIV. IMPEDANCE=  0.0142 + J  0.1371  OHMS
                CBL-0016        MVS-9A             0.039 KA      ANG:  -246.60
                CBL-0018        BUS-0050           0.017 KA      ANG:  -247.33
                CBL-0026        BUS-0048           0.211 KA      ANG:  -254.54
                CBL-0027        BUS-0046           0.099 KA      ANG:  -261.60
                CBL-0015        MVUS-1B           19.739 KA      ANG:   -84.23

 EAST BANK-1B   3P Duty: 21.491 KA AT  -84.66 DEG (   178.67 MVA) X/R:   11.84
                VOLTAGE:   4800.   EQUIV. IMPEDANCE=  0.0120 + J  0.1284  OHMS
                CBL-0020        BUS-0051           0.309 KA      ANG:  -257.47
                CBL-0024        BUS-0047           0.339 KA      ANG:  -258.76
                CBL-0025        BUS-0049           0.003 KA      ANG:  -247.91
                CBL-0022        BUS-0519           0.004 KA      ANG:  -247.90
                CBL-0019        MVUS-1A           20.841 KA      ANG:   -84.87

 EAST BANK-2A   3P Duty: 21.521 KA AT  -84.73 DEG (   178.92 MVA) X/R:   12.12
                VOLTAGE:   4800.   EQUIV. IMPEDANCE=  0.0118 + J  0.1282  OHMS
                CBL-0030        DS-2500HP BLOW     1.515 KA      ANG:    93.01
                CBL-0037        BUS-0038           0.161 KA      ANG:  -256.47
                CBL-0029        DS-1500 HP BLO     1.203 KA      ANG:  -264.56
                CBL-0028        MVUS-1A           18.645 KA      ANG:   -84.62

 EAST BANK-2B   3P Duty: 20.126 KA AT  -84.14 DEG (   167.33 MVA) X/R:   10.85
                VOLTAGE:   4800.   EQUIV. IMPEDANCE=  0.0141 + J  0.1370  OHMS
                CBL-0033        DS-2500HP BLOW     1.766 KA      ANG:    93.12
                CBL-0034        DS-1500 HP BLO     1.178 KA      ANG:    94.99
                CBL-0032        MVUS-1B           17.185 KA      ANG:   -83.80

 EAST FAN       3P Duty:  0.747 KA AT  -16.55 DEG (     0.62 MVA) X/R:    0.29
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.3558 + J  0.1057  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.747 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.747 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.747 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.747 KA
                CONTRIBUTIONS:  EAST FAN MTR       0.009 KA      ANG:   -68.20
                CBL-0485        28-PP-01           0.741 KA      ANG:   -16.01
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                 T H R E E   P H A S E   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================

 EAST STORAGE D 3P Duty:  1.047 KA AT   -4.91 DEG (     0.87 MVA) X/R:    0.09
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2637 + J  0.0227  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.047 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.047 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.047 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.047 KA
                CBL-0636        MCC-26             1.047 KA      ANG:   -4.91

 EAST SUPPLY FA 3P Duty:  0.597 KA AT   -6.64 DEG (     0.50 MVA) X/R:    0.12
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.4612 + J  0.0537  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.597 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.597 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.597 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.597 KA
                CBL-EAST SUPPL  FUME FAN CONTA     0.597 KA      ANG:   -6.64

 EF-1 DISC      3P Duty:  2.886 KA AT  -15.79 DEG (     2.40 MVA) X/R:    0.28
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0924 + J  0.0261  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.886 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.886 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.886 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.886 KA
                CBL-0506        MCC-15AA           2.886 KA      ANG:  -15.79

 EF-11 DISC     3P Duty:  0.984 KA AT   -7.19 DEG (     0.82 MVA) X/R:    0.13
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2794 + J  0.0352  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.984 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.984 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.984 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.984 KA
                CBL-0510        MCC-15AA           0.984 KA      ANG:   -7.19

 EF-12 DISC     3P Duty:  1.054 KA AT   -7.50 DEG (     0.88 MVA) X/R:    0.13
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2607 + J  0.0343  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.054 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.054 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.054 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.054 KA
                CBL-0511        MCC-15AA           1.054 KA      ANG:   -7.50

 EF-13 DISC     3P Duty:  1.093 KA AT   -7.67 DEG (     0.91 MVA) X/R:    0.13
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2513 + J  0.0339  OHMS
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
 ==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.093 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.093 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.093 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.093 KA
                CBL-0512       MCC-15AA          1.093 KA      ANG:    -7.67

  EF-14 DISC    3P Duty:  1.054 KA AT   -7.50 DEG (     0.88 MVA) X/R:    0.13
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2607 + J  0.0343  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.054 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.054 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.054 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.054 KA
                CBL-0513       MCC-15AA          1.054 KA      ANG:    -7.50

  EF-15 DISC    3P Duty:  1.054 KA AT   -7.50 DEG (     0.88 MVA) X/R:    0.13
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2607 + J  0.0343  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.054 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.054 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.054 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.054 KA
                CBL-0514       MCC-15AA          1.054 KA      ANG:    -7.50

  EF-16 DISC    3P Duty:  1.018 KA AT   -7.34 DEG (     0.85 MVA) X/R:    0.13
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2700 + J  0.0348  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.018 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.018 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.018 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.018 KA
                CBL-0515       MCC-15AA          1.018 KA      ANG:    -7.34

  EF-18 DISC    3P Duty:  1.632 KA AT  -10.09 DEG (     1.36 MVA) X/R:    0.18
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1672 + J  0.0298  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.632 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.632 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.632 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.632 KA
                CBL-0516       MCC-15AA          1.632 KA      ANG:   -10.09

  EF-2          3P Duty:  1.883 KA AT  -14.14 DEG (     1.57 MVA) X/R:    0.25
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1427 + J  0.0360  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.883 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.883 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.883 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.883 KA
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               T H R E E   P H A S E   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================

               CONTRIBUTIONS TO  EF-2           (CONTINUED)
               CONTRIBUTIONS:  EF-2 MTR           0.002 KA      ANG:   -68.20
               CBL-0295        MCC-24             1.882 KA      ANG:   -14.09

 EF-20 DISC    3P Duty:  0.984 KA AT   -7.19 DEG (     0.82 MVA) X/R:    0.13
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2794 + J  0.0352  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    0.984 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   0.984 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   0.984 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   0.984 KA
               CBL-0517        MCC-15AA           0.984 KA      ANG:    -7.19

 EF-5 DISC     3P Duty:  1.632 KA AT  -10.09 DEG (     1.36 MVA) X/R:    0.18
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1672 + J  0.0298  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.632 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.632 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.632 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.632 KA
               CBL-0507        MCC-15AA           1.632 KA      ANG:   -10.09

 EF-7 DISC     3P Duty:  1.018 KA AT   -7.34 DEG (     0.85 MVA) X/R:    0.13
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2700 + J  0.0348  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.018 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.018 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.018 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.018 KA
               CBL-0508        MCC-15AA           1.018 KA      ANG:    -7.34

 EF-9 DISC     3P Duty:  1.402 KA AT   -9.06 DEG (     1.17 MVA) X/R:    0.16
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1952 + J  0.0311  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.402 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.402 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.402 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.402 KA
               CBL-0509        MCC-15AA           1.402 KA      ANG:    -9.06

 EF-BS-1       3P Duty:  3.936 KA AT  -13.47 DEG (     3.27 MVA) X/R:    0.24
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0685 + J  0.0164  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    3.936 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   3.936 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   3.936 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   3.936 KA
               CBL-0371        MCC-2              3.936 KA      ANG:   -13.47
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               T H R E E   P H A S E   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================

 EHU-BS-3       3P Duty:  2.605 KA AT  -11.66 DEG (     2.17 MVA) X/R:    0.21
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1042 + J  0.0215  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.605 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.605 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.605 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.605 KA
                CBL-0706        MCC-1              2.605 KA      ANG:   -11.66

 EHU-BS-4       3P Duty:  1.527 KA AT   -7.88 DEG (     1.27 MVA) X/R:    0.14
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1798 + J  0.0249  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.527 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.527 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.527 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.527 KA
                CBL-0707        MCC-1              1.527 KA      ANG:    -7.88

 EHU-BS-5       3P Duty:  1.527 KA AT   -7.88 DEG (     1.27 MVA) X/R:    0.14
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1798 + J  0.0249  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.527 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.527 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.527 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.527 KA
                CBL-0708        MCC-1              1.527 KA      ANG:    -7.88

 ELEVATOR       3P Duty:  3.404 KA AT  -12.50 DEG (     2.83 MVA) X/R:    0.22
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0795 + J  0.0176  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    3.404 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   3.404 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   3.404 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   3.404 KA
                CBL-0210        MCC-1              3.404 KA      ANG:   -12.50

 ET CONVEYOR 1  3P Duty:  1.047 KA AT   -4.91 DEG (     0.87 MVA) X/R:    0.09
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2637 + J  0.0227  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.047 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.047 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.047 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.047 KA
                CBL-0638        MCC-26             1.047 KA      ANG:    -4.91

 ET CONVEYOR 2  3P Duty:  0.724 KA AT   -7.79 DEG (     0.60 MVA) X/R:    0.09
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.3793 + J  0.0519  OHMS
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                 T H R E E   P H A S E   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================
                 LOW VOLTAGE POWER CIRCUIT BREAKER    0.724 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   0.724 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   0.724 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   0.724 KA
                 CONTRIBUTIONS:  MTR-ET CONVEYO     0.050 KA      ANG:  -68.20
                 CBL-0637        MCC-26             0.700 KA      ANG:   -4.21

 EUH-001         3P Duty:  2.975 KA AT  -13.91 DEG (     2.47 MVA) X/R:    0.25
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0904 + J  0.0224  OHMS
                 LOW VOLTAGE POWER CIRCUIT BREAKER    2.975 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   2.975 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   2.975 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   2.975 KA
                 CBL-0326        MCC-4B             2.975 KA      ANG:  -13.91

 EUH-002         3P Duty:  1.956 KA AT  -10.95 DEG (     1.63 MVA) X/R:    0.19
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1391 + J  0.0269  OHMS
                 LOW VOLTAGE POWER CIRCUIT BREAKER    1.956 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   1.956 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   1.956 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   1.956 KA
                 CBL-0327        MCC-4B             1.956 KA      ANG:  -10.95

 EUH-003         3P Duty:  1.456 KA AT   -9.51 DEG (     1.21 MVA) X/R:    0.17
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1877 + J  0.0314  OHMS
                 LOW VOLTAGE POWER CIRCUIT BREAKER    1.456 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   1.456 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   1.456 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   1.456 KA
                 CBL-0328        MCC-4B             1.456 KA      ANG:   -9.51

 EUH-004         3P Duty:  1.556 KA AT   -9.79 DEG (     1.29 MVA) X/R:    0.17
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1756 + J  0.0303  OHMS
                 LOW VOLTAGE POWER CIRCUIT BREAKER    1.556 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   1.556 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   1.556 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   1.556 KA
                 CBL-0329        MCC-4B             1.556 KA      ANG:   -9.79

 EUH-BS-1        3P Duty:  7.878 KA AT  -26.79 DEG (     6.55 MVA) X/R:    0.51
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0314 + J  0.0159  OHMS
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              T H R E E   P H A S E   F A U L T   R E P O R T
                 (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                       PRE FAULT VOLTAGE: 1.0000
                       MODEL TRANSFORMER TAPS: NO
==============================================================================
              LOW VOLTAGE POWER CIRCUIT BREAKER    7.878 KA
              MOLDED CASE CIRCUIT BREAKER < 10KA   7.878 KA
              MOLDED CASE CIRCUIT BREAKER < 20KA   7.878 KA
              MOLDED CASE CIRCUIT BREAKER > 20KA   7.878 KA
              CBL-0369       MCC-2               7.878 KA      ANG:   -26.79

 EUH-BS-2     3P Duty:  3.716 KA AT  -15.26 DEG (     3.09 MVA) X/R:    0.27
              VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0720 + J  0.0196  OHMS
              LOW VOLTAGE POWER CIRCUIT BREAKER    3.716 KA
              MOLDED CASE CIRCUIT BREAKER < 10KA   3.716 KA
              MOLDED CASE CIRCUIT BREAKER < 20KA   3.716 KA
              MOLDED CASE CIRCUIT BREAKER > 20KA   3.716 KA
              CBL-0370       MCC-2               3.716 KA      ANG:   -15.26

 EXHAUST FAN A  3P Duty:  3.116 KA AT  -12.55 DEG (     2.59 MVA) X/R:    0.22
              VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0868 + J  0.0193  OHMS
              LOW VOLTAGE POWER CIRCUIT BREAKER    3.116 KA
              MOLDED CASE CIRCUIT BREAKER < 10KA   3.116 KA
              MOLDED CASE CIRCUIT BREAKER < 20KA   3.116 KA
              MOLDED CASE CIRCUIT BREAKER > 20KA   3.116 KA
              CONTRIBUTIONS:  EXHAUST FAN A      0.002 KA      ANG:   -68.20
              CBL-0463       MCC-14              3.115 KA      ANG:   -12.52

 EXHAUST FAN B  3P Duty:  6.490 KA AT  -21.83 DEG (     5.40 MVA) X/R:    0.40
              VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0396 + J  0.0159  OHMS
              LOW VOLTAGE POWER CIRCUIT BREAKER    6.490 KA
              MOLDED CASE CIRCUIT BREAKER < 10KA   6.490 KA
              MOLDED CASE CIRCUIT BREAKER < 20KA   6.490 KA
              MOLDED CASE CIRCUIT BREAKER > 20KA   6.490 KA
              CONTRIBUTIONS:  EXHAUST FAN B      0.002 KA      ANG:   -68.20
              CBL-0464       MCC-14              6.489 KA      ANG:   -21.81

 EXHAUST FAN C  3P Duty:  4.631 KA AT  -16.67 DEG (     3.85 MVA) X/R:    0.30
              VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0573 + J  0.0172  OHMS
              LOW VOLTAGE POWER CIRCUIT BREAKER    4.631 KA
              MOLDED CASE CIRCUIT BREAKER < 10KA   4.631 KA
              MOLDED CASE CIRCUIT BREAKER < 20KA   4.631 KA
              MOLDED CASE CIRCUIT BREAKER > 20KA   4.631 KA
              CONTRIBUTIONS:  EXHAUST FAN C      0.002 KA      ANG:   -68.20
              CBL-0465       MCC-14              4.630 KA      ANG:   -16.65

 EXHAUST FAN D  3P Duty:  3.335 KA AT  -13.14 DEG (     2.77 MVA) X/R:    0.23
              VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0809 + J  0.0189  OHMS
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    3.335 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   3.335 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   3.335 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   3.335 KA
                CONTRIBUTIONS:  EXHAUST FAN D      0.002 KA      ANG:   -68.20
                CBL-0466        MCC-14             3.334 KA      ANG:   -13.11

 EXHAUST FAN E  3P Duty:  2.466 KA AT  -10.81 DEG (     2.05 MVA) X/R:    0.19
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1104 + J  0.0211  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.466 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.466 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.466 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.466 KA
                CONTRIBUTIONS:  EXHAUST FAN E      0.002 KA      ANG:   -68.20
                CBL-0467        MCC-14             2.465 KA      ANG:   -10.76

 FAN CONTROL PA 3P Duty:  2.185 KA AT  -13.49 DEG (     1.82 MVA) X/R:    0.24
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1234 + J  0.0296  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.185 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.185 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.185 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.185 KA
                CBL-0504        MCC-15A            2.185 KA      ANG:   -13.49

 FC-1           3P Duty:  1.484 KA AT  -12.64 DEG (     1.23 MVA) X/R:    0.22
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1822 + J  0.0408  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.484 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.484 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.484 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.484 KA
                CONTRIBUTIONS:  FC-1 MTR           0.022 KA      ANG:   -68.20
                CBL-0306        MCC-24             1.472 KA      ANG:   -11.92

 FC-1 DISC      3P Duty:  2.886 KA AT  -15.79 DEG (     2.40 MVA) X/R:    0.28
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0924 + J  0.0261  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.886 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.886 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.886 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.886 KA
                CBL-0521        MCC-15AA           2.886 KA      ANG:   -15.79

 FC-2           3P Duty:  1.894 KA AT  -14.65 DEG (     1.57 MVA) X/R:    0.26
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1416 + J  0.0370  OHMS
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.894 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.894 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.894 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.894 KA
                CONTRIBUTIONS:  FC-2 MTR           0.022 KA      ANG:   -68.20
                CBL-0307        MCC-24             1.880 KA      ANG:   -14.10

 FC-2 DISC      3P Duty:  6.417 KA AT  -32.80 DEG (     5.34 MVA) X/R:    0.65
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0363 + J  0.0234  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    6.417 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   6.417 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   6.417 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   6.417 KA
                CBL-0523        MCC-15AA           6.417 KA      ANG:   -32.80

 FC-3 DISC      3P Duty:  3.558 KA AT  -18.89 DEG (     2.96 MVA) X/R:    0.34
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0737 + J  0.0252  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    3.558 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   3.558 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   3.558 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   3.558 KA
                CBL-0522        MCC-15AA           3.558 KA      ANG:   -18.89

 FC-4 DISC      3P Duty:  0.984 KA AT   -7.19 DEG (     0.82 MVA) X/R:    0.13
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2794 + J  0.0352  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.984 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.984 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.984 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.984 KA
                CBL-0524        MCC-15AA           0.984 KA      ANG:    -7.19

 FC-5 DISC      3P Duty:  1.054 KA AT   -7.50 DEG (     0.88 MVA) X/R:    0.13
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2607 + J  0.0343  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.054 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.054 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.054 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.054 KA
                CBL-0525        MCC-15AA           1.054 KA      ANG:    -7.50

 FC-6 DISC      3P Duty:  1.281 KA AT   -8.52 DEG (     1.07 MVA) X/R:    0.15
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2139 + J  0.0320  OHMS
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.281 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.281 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.281 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.281 KA
                CBL-0526       MCC-15AA          1.281 KA      ANG:    -8.52

 FC-7 DISC      3P Duty:  1.547 KA AT   -9.71 DEG (     1.29 MVA) X/R:    0.17
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1765 + J  0.0302  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.547 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.547 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.547 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.547 KA
                CBL-0527       MCC-15AA          1.547 KA      ANG:    -9.71

 FILTER DOOR OP 3P Duty:  1.483 KA AT   -7.34 DEG (     1.23 MVA) X/R:    0.13
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1854 + J  0.0239  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.483 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.483 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.483 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.483 KA
                CONTRIBUTIONS:  FILTER DOOR OP     0.002 KA      ANG:   -68.20
                CBL-0434       MCC-13            1.482 KA      ANG:    -7.26

 FINAL TANK AND 3P Duty:  3.173 KA AT  -14.23 DEG (     2.64 MVA) X/R:    0.25
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0846 + J  0.0215  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    3.173 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   3.173 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   3.173 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   3.173 KA
                CONTRIBUTIONS:  FINAL TANK UND     0.034 KA      ANG:   -68.20
                CBL-0472       MCC-14            3.154 KA      ANG:   -13.74

 FINAL TANK DRA 3P Duty:  2.756 KA AT  -11.66 DEG (     2.29 MVA) X/R:    0.21
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0985 + J  0.0203  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.756 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.756 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.756 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.756 KA
                CONTRIBUTIONS:  FINAL TANK DRA     0.007 KA      ANG:   -68.20
                CBL-0458       MCC-14            2.752 KA      ANG:   -11.54

 FINE SCREEN DU 3P Duty:  1.421 KA AT   -8.85 DEG (     1.18 MVA) X/R:    0.15
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1927 + J  0.0300  OHMS
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                 T H R E E   P H A S E   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.421 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.421 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.421 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.421 KA
                CBL-0357       BUS-0383          0.007 KA      ANG:  112.35
                CBL-0358       BUS-0384          0.013 KA      ANG:  112.90
                CBL-0356       MCC-4C            1.411 KA      ANG:   -8.16

 FINE SCREEN DU 3P Duty:  1.491 KA AT   -9.08 DEG (     1.24 MVA) X/R:    0.15
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1835 + J  0.0293  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.491 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.491 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.491 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.491 KA
                CBL-0360       BUS-0386          0.007 KA      ANG:  112.40
                CBL-0361       BUS-0387          0.013 KA      ANG:  113.00
                CBL-0359       MCC-4C            1.481 KA      ANG:   -8.42

 FINE SCREEN DU 3P Duty:  1.569 KA AT   -9.34 DEG (     1.30 MVA) X/R:    0.16
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1743 + J  0.0287  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.569 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.569 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.569 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.569 KA
                CBL-0363       BUS-0389          0.007 KA      ANG:  112.47
                CBL-0364       BUS-0390          0.013 KA      ANG:  113.13
                CBL-0362       MCC-4C            1.558 KA      ANG:   -8.72

 FUME EXTRACTOR 3P Duty:  1.811 KA AT  -13.76 DEG (     1.51 MVA) X/R:    0.24
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1486 + J  0.0364  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.811 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.811 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.811 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.811 KA
                CONTRIBUTIONS:  FUME EXT MTR     0.002 KA      ANG:  -68.20
                CBL-0304       MCC-24            1.810 KA      ANG:  -13.71

 FUME FAN CONTA 3P Duty:  1.028 KA AT   -8.45 DEG (     0.86 MVA) X/R:    0.15
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2665 + J  0.0396  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.028 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.028 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.028 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.028 KA
                CBL-FUME FAN C  MCC-15           1.028 KA      ANG:   -8.45
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               T H R E E   P H A S E   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================

 FUME HOOD EXHA 3P Duty:  0.892 KA AT   -7.88 DEG (     0.74 MVA) X/R:    0.14
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.3078 + J  0.0426  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.892 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.892 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.892 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.892 KA
                CBL-FUME HOOD   FUME FAN CONTA     0.892 KA      ANG:   -7.88

 FUME HOODS VFD 3P Duty:  0.582 KA AT   -6.58 DEG (     0.48 MVA) X/R:    0.12
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.4730 + J  0.0546  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.582 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.582 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.582 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.582 KA
                CBL-FUME HOODS  FUME FAN CONTA     0.582 KA      ANG:   -6.58

 GATE 1 CONTROL 3P Duty:  0.829 KA AT   -7.62 DEG (     0.69 MVA) X/R:    0.13
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.3314 + J  0.0443  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.829 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.829 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.829 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.829 KA
                CBL-GATE 1 CON  MCC 15 GATES       0.829 KA      ANG:   -7.62

 GATE 2 CONTROL 3P Duty:  0.704 KA AT   -7.09 DEG (     0.59 MVA) X/R:    0.12
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.3904 + J  0.0486  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.704 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.704 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.704 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.704 KA
                CBL-GATE 2 CON  MCC 15 GATES       0.704 KA      ANG:   -7.09

 GATE VALVE 1   3P Duty:  1.190 KA AT   -8.15 DEG (     0.99 MVA) X/R:    0.13
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2305 + J  0.0330  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.190 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.190 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.190 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.190 KA
                CONTRIBUTIONS:  GATE VALVE 1 M     0.001 KA      ANG:  -68.20
                CBL-0411        BUS-0436           1.190 KA      ANG:   -8.10

 GATE VALVE 2   3P Duty:  1.190 KA AT   -8.15 DEG (     0.99 MVA) X/R:    0.13
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2305 + J  0.0330  OHMS
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                 T H R E E   P H A S E   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.190 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.190 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.190 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.190 KA
                CONTRIBUTIONS:  GATE VALVE 2 M     0.001 KA      ANG:  -68.20
                CBL-0412        BUS-0436           1.190 KA      ANG:   -8.10

 GATE VALVE 4   3P Duty:  1.190 KA AT   -8.15 DEG (     0.99 MVA) X/R:    0.13
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2305 + J  0.0330  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.190 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.190 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.190 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.190 KA
                CONTRIBUTIONS:  GATE VALVE 4 M     0.001 KA      ANG:  -68.20
                CBL-0413        BUS-0436           1.190 KA      ANG:   -8.10

 GATE VALVE 5   3P Duty:  1.190 KA AT   -8.15 DEG (     0.99 MVA) X/R:    0.13
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2305 + J  0.0330  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.190 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.190 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.190 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.190 KA
                CONTRIBUTIONS:  GATE VALVE 5 M     0.001 KA      ANG:  -68.20
                CBL-0415        BUS-0436           1.190 KA      ANG:   -8.10

 GATE VALVE 7   3P Duty:  1.190 KA AT   -8.15 DEG (     0.99 MVA) X/R:    0.13
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2305 + J  0.0330  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.190 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.190 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.190 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.190 KA
                CONTRIBUTIONS:  GATE VALVE 7 M     0.001 KA      ANG:  -68.20
                CBL-0416        BUS-0436           1.190 KA      ANG:   -8.10

 GATE VALVE 8   3P Duty:  1.190 KA AT   -8.15 DEG (     0.99 MVA) X/R:    0.13
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2305 + J  0.0330  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.190 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.190 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.190 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.190 KA
                CONTRIBUTIONS:  GATE VALVE 8 M     0.001 KA      ANG:  -68.20
                CBL-0417        BUS-0436           1.190 KA      ANG:   -8.10

 GRINDER #1     3P Duty:  0.933 KA AT   -8.83 DEG (     0.78 MVA) X/R:    0.14
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               T H R E E   P H A S E   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2936 + J  0.0456  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    0.933 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   0.933 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   0.933 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   0.933 KA
               CONTRIBUTIONS:  GRINDER #1 MTR     0.003 KA      ANG:   -68.20
               CBL-0230        BUS-0239           0.931 KA      ANG:    -8.65

 GRINDER #2    3P Duty:  1.011 KA AT   -8.88 DEG (     0.84 MVA) X/R:    0.14
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2708 + J  0.0423  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.011 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.011 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.011 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.011 KA
               CONTRIBUTIONS:  GRINDER #2 MTR     0.003 KA      ANG:   -68.20
               CBL-0234        BUS-0243           1.009 KA      ANG:    -8.71

 GRINDER #3    3P Duty:  1.011 KA AT   -8.88 DEG (     0.84 MVA) X/R:    0.14
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2708 + J  0.0423  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.011 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.011 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.011 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.011 KA
               CONTRIBUTIONS:  GRINDER #3 MTR     0.003 KA      ANG:   -68.20
               CBL-0238        BUS-0247           1.009 KA      ANG:    -8.71

 GRIT REMOVAL H 3P Duty:  6.312 KA AT  -25.53 DEG (     5.25 MVA) X/R:    0.49
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0396 + J  0.0189  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    6.312 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   6.312 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   6.312 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   6.312 KA
               CONTRIBUTIONS:  GRIT REMOVAL H     0.031 KA      ANG:   -78.46
               CBL-0227        GRIT TANKS         6.293 KA      ANG:   -25.30

 GRIT TANK #1  3P Duty:  6.311 KA AT  -25.51 DEG (     5.25 MVA) X/R:    0.49
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0396 + J  0.0189  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    6.311 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   6.311 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   6.311 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   6.311 KA
               CONTRIBUTIONS:  GRIT TANK #1 M     0.003 KA      ANG:   -68.20
               CBL-0224        GRIT TANKS         6.309 KA      ANG:   -25.48
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              T H R E E   P H A S E   F A U L T   R E P O R T
                 (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                       PRE FAULT VOLTAGE: 1.0000
                       MODEL TRANSFORMER TAPS: NO
==============================================================================

 GRIT TANK #2   3P Duty:  6.311 KA AT  -25.51 DEG (     5.25 MVA) X/R:    0.49
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0396 + J  0.0189  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    6.311 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   6.311 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   6.311 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   6.311 KA
                CONTRIBUTIONS:  GRIT TANK #2 M     0.003 KA      ANG:   -68.20
                CBL-0225        GRIT TANKS         6.309 KA      ANG:   -25.48

 GRIT TANKS     3P Duty:  6.682 KA AT  -26.59 DEG (     5.56 MVA) X/R:    0.51
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0371 + J  0.0186  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    6.682 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   6.682 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   6.682 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   6.682 KA
                CBL-0224        GRIT TANK #1       0.003 KA      ANG:   111.80
                CBL-0225        GRIT TANK #2       0.003 KA      ANG:   111.80
                CBL-0226        DOOR OPERATORS     0.031 KA      ANG:   101.55
                CBL-0227        GRIT REMOVAL H     0.031 KA      ANG:   101.55
                CBL-0223        MCC-4A             6.639 KA      ANG:   -26.13

 HOT WATER CIR  3P Duty:  2.886 KA AT  -15.79 DEG (     2.40 MVA) X/R:    0.28
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0924 + J  0.0261  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.886 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.886 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.886 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.886 KA
                CBL-0535        MCC-15AA           2.886 KA      ANG:   -15.79

 HOT WATER CIRC 3P Duty:  0.597 KA AT   -6.64 DEG (     0.50 MVA) X/R:    0.12
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.4612 + J  0.0537  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.597 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.597 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.597 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.597 KA
                CBL-HOT WATER   FUME FAN CONTA     0.597 KA      ANG:    -6.64

 HOT WATER CIRC 3P Duty:  5.408 KA AT  -26.13 DEG (     4.50 MVA) X/R:    0.49
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0460 + J  0.0226  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    5.408 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   5.408 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   5.408 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   5.408 KA
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================

                CONTRIBUTIONS TO  HOT WATER CIRC (CONTINUED)
                CONTRIBUTIONS:  MTR-HOT WATER      0.034 KA      ANG:   -68.20
                CBL-0499        MCC-15A            5.383 KA      ANG:   -25.89

 HOT WATER CIRC 3P Duty:  5.034 KA AT  -24.67 DEG (     4.19 MVA) X/R:    0.46
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0500 + J  0.0230  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    5.034 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   5.034 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   5.034 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   5.034 KA
                CONTRIBUTIONS:  MTR-HOT WATER      0.034 KA      ANG:   -68.20
                CBL-0500        MCC-15A            5.010 KA      ANG:   -24.41

 HUMIDIFIER #1  3P Duty:  7.634 KA AT  -46.43 DEG (     6.35 MVA) X/R:    1.23
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0250 + J  0.0263  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    7.634 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   7.634 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   7.634 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   7.634 KA
                CONTRIBUTIONS:  MTR-HUMIDIFIER     0.428 KA      ANG:   -80.69
                CBL-0532        BUS-0565           7.285 KA      ANG:  -224.54

 HUMIDIFIER #2  3P Duty:  7.634 KA AT  -46.43 DEG (     6.35 MVA) X/R:    1.23
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0250 + J  0.0263  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    7.634 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   7.634 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   7.634 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   7.634 KA
                CONTRIBUTIONS:  MTR-HUMIDIFIER     0.428 KA      ANG:   -80.69
                CBL-0533        BUS-0565           7.285 KA      ANG:  -224.54

 HVAC UNIT A    3P Duty:  2.084 KA AT  -13.61 DEG (     1.73 MVA) X/R:    0.24
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1292 + J  0.0313  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.084 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.084 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.084 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.084 KA
                CONTRIBUTIONS:  MTR-HVAC UNIT      0.034 KA      ANG:   -68.20
                CBL-0694        MCC-15             2.065 KA      ANG:   -12.85

 HVAC UNIT B    3P Duty:  2.668 KA AT  -16.17 DEG (     2.22 MVA) X/R:    0.29
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0998 + J  0.0289  OHMS
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                 T H R E E   P H A S E   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.668 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.668 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.668 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.668 KA
                CONTRIBUTIONS:  MTR-HVAC UNIT      0.050 KA      ANG:   -68.20
                CBL-0695        MCC-15             2.637 KA      ANG:   -15.31

 HW PUMP #1 P-1 3P Duty:  2.512 KA AT  -15.06 DEG (     2.09 MVA) X/R:    0.27
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1065 + J  0.0287  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.512 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.512 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.512 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.512 KA
                CONTRIBUTIONS:  MTR-HW PUMP #1     0.020 KA      ANG:   -68.20
                CBL-HW PUMP #1  MCC-15             2.500 KA      ANG:   -14.69

 HYDRAULIC LIFT 3P Duty:  2.912 KA AT  -19.73 DEG (     2.42 MVA) X/R:    0.36
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0896 + J  0.0321  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.912 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.912 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.912 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.912 KA
                CONTRIBUTIONS:  HYD LIFT MTR       0.007 KA      ANG:   -68.20
                CBL-0294        MCC-24             2.908 KA      ANG:   -19.63

 INFLUENT PUMPS 3P Duty:  3.475 KA AT  -21.68 DEG (     2.89 MVA) X/R:    0.40
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0741 + J  0.0295  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    3.475 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   3.475 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   3.475 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   3.475 KA
                CBL-0750        SOUTH SEC. INF     0.013 KA      ANG:   112.04
                CBL-0751        SOUTH SEC. INF     0.013 KA      ANG:   112.04
                CBL-0749        MCC-00             3.457 KA      ANG:   -21.36

 INLET TANKS    3P Duty:  0.506 KA AT  -61.82 DEG (     0.18 MVA) X/R:    1.87
                VOLTAGE:    208.   EQUIV. IMPEDANCE=  0.1121 + J  0.2092  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.506 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.516 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.506 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.506 KA
                CBL-0258        BUS-0269           0.506 KA      ANG:   -61.82

 INNER DOOR     3P Duty:  1.097 KA AT   -9.98 DEG (     0.91 MVA) X/R:    0.18
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2488 + J  0.0438  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.097 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.097 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.097 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.097 KA
                CBL-0299       OUTSIDE DOOR(E     1.097 KA      ANG:   -9.98

 LAB STILL      3P Duty:  6.017 KA AT  -35.64 DEG (     5.00 MVA) X/R:    0.72
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0374 + J  0.0268  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    6.017 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   6.017 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   6.017 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   6.017 KA
                CBL-0693       MCC-15             6.017 KA      ANG:  -35.64

 LC-2           3P Duty: 22.090 KA AT  -74.91 DEG (    18.36 MVA) X/R:    3.88
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0033 + J  0.0121  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   22.090 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  22.090 KA
                CBL-0047       BUS-0059          19.168 KA      ANG: -253.94
                CBL-0061       MCC-12             2.943 KA      ANG:   98.77

 LC-2A          3P Duty:  7.761 KA AT  -76.62 DEG (     6.45 MVA) X/R:    4.21
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0083 + J  0.0347  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    7.761 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   9.836 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   8.336 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   7.761 KA
                T-LC-2A        HS-LC-2A           6.256 KA      ANG: -256.50
                CBL-0063       MCC-8A             1.505 KA      ANG:  102.91

 LC-3           3P Duty: 26.738 KA AT  -79.97 DEG (    22.23 MVA) X/R:    5.72
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0018 + J  0.0102  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   26.738 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  27.624 KA
                T-LC-3         BUS-0050          26.574 KA      ANG:   99.95
                CBL-0126       MCC-24             0.168 KA      ANG: -247.26

 LC-3A          3P Duty: 28.866 KA AT  -78.27 DEG (    24.00 MVA) X/R:    4.95
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0020 + J  0.0094  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   28.866 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  28.927 KA
                CBL-0995       BUS-1045           3.460 KA      ANG: -257.47
                T-LC-3A        BUS-0051          25.407 KA      ANG:  101.62
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                 T H R E E   P H A S E   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================

 LC-4           3P Duty: 18.620 KA AT  -78.17 DEG (    15.48 MVA) X/R:    4.92
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0031 + J  0.0146  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   18.620 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  18.642 KA
                T-LC-4         HS-LC-4          16.086 KA      ANG:  101.13
                CBL-0069       MCC-10            0.792 KA      ANG: -245.94
                CBL-0070       MCC-25            1.761 KA      ANG: -257.27

 LC-5           3P Duty: 15.563 KA AT  -76.33 DEG (    12.94 MVA) X/R:    4.15
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0042 + J  0.0173  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   15.563 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  16.663 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  15.563 KA
                T-LC-5         BUS-0037         14.661 KA      ANG:  103.36
                CBL-0119       20A-PP-1          0.038 KA      ANG: -247.73
                CBL-0120       MCC-15            0.698 KA      ANG: -252.45
                CBL-0738       MCC-00            0.171 KA      ANG: -247.58

 LC-5A          3P Duty: 16.771 KA AT  -76.65 DEG (    13.94 MVA) X/R:    4.24
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0038 + J  0.0161  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   16.771 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  18.042 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  16.771 KA
                CBL-0073       BUS-0077         14.982 KA      ANG:   -76.67
                CBL-0075       MCC-15A           1.789 KA      ANG:   -76.52

 LC-8           3P Duty: 17.581 KA AT  -73.14 DEG (    14.62 MVA) X/R:    3.31
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0046 + J  0.0151  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   17.581 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  17.768 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  17.581 KA
                CBL-0108       MCC-4             0.027 KA      ANG: -247.90
                T-LC-8         BUS-0049         17.555 KA      ANG:  106.85

 LC-8A          3P Duty: 19.737 KA AT  -73.71 DEG (    16.41 MVA) X/R:    3.46
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0039 + J  0.0135  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   19.737 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  19.737 KA
                T-LC-8A        BUS-0048         17.360 KA      ANG: -253.57
                CBL-0109       MCC-4A            2.378 KA      ANG:  105.22

 LIME SCREW CON 3P Duty:  1.126 KA AT   -5.21 DEG (     0.94 MVA) X/R:    0.09
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2451 + J  0.0224  OHMS
```

```
               T H R E E   P H A S E   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.126 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.126 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.126 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.126 KA
               CBL-0620        MCC-27             1.126 KA      ANG:    -5.21

 LIME SILO #2 T 3P Duty:  1.768 KA AT   -7.71 DEG (     1.47 MVA) X/R:    0.14
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1553 + J  0.0210  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.768 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.768 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.768 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.768 KA
               CBL-0641        MCC-26             1.768 KA      ANG:    -7.71

 LIME SIO #1TRU 3P Duty:  1.766 KA AT   -7.92 DEG (     1.47 MVA) X/R:    0.14
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1554 + J  0.0216  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.766 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.766 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.766 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.766 KA
               CBL-0621        MCC-27             1.766 KA      ANG:    -7.92

 MAKE UP AIR UN 3P Duty:  0.846 KA AT   -6.80 DEG (     0.70 MVA) X/R:    0.10
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.3252 + J  0.0388  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    0.846 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   0.846 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   0.846 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   0.846 KA
               CONTRIBUTIONS:  MAKE UP AIR UN     0.029 KA      ANG:   -68.20
               CBL-0470        MCC-14             0.833 KA      ANG:    -5.04

 MAU HEATER     3P Duty:  7.753 KA AT  -43.11 DEG (     6.45 MVA) X/R:    0.94
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0261 + J  0.0244  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    7.753 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   7.753 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   7.753 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   7.753 KA
               CBL-0530        MCC-15AA           7.753 KA      ANG:   -43.11

 MAU-1          3P Duty:  3.825 KA AT  -24.96 DEG (     3.18 MVA) X/R:    0.47
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0657 + J  0.0306  OHMS
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              T H R E E   P H A S E   F A U L T   R E P O R T
                 (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                       PRE FAULT VOLTAGE: 1.0000
                       MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    3.825 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   3.825 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   3.825 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   3.825 KA
                CONTRIBUTIONS:  MAU-1 MTR         0.034 KA      ANG:   -68.20
                CBL-0290        MCC-24            3.801 KA      ANG:   -24.61

 MAU-1 DISC     3P Duty:  2.886 KA AT  -15.79 DEG (     2.40 MVA) X/R:    0.28
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0924 + J  0.0261  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.886 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.886 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.886 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.886 KA
                CBL-0529        MAU-1 VFD         2.886 KA      ANG:   -15.79

 MAU-1 VFD      3P Duty:  3.188 KA AT  -17.18 DEG (     2.65 MVA) X/R:    0.31
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0830 + J  0.0257  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    3.188 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   3.188 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   3.188 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   3.188 KA
                CBL-0528        MCC-15AA          3.188 KA      ANG:   -17.18

 MCC 15 AIR COM 3P Duty:  2.375 KA AT  -14.15 DEG (     1.97 MVA) X/R:    0.25
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1131 + J  0.0285  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.375 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.375 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.375 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.375 KA
                CBL-MCC 15 AIR  BUS-0750          2.375 KA      ANG:   165.85

 MCC 15 ELEVATO 3P Duty:  2.965 KA AT  -16.67 DEG (     2.47 MVA) X/R:    0.30
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0895 + J  0.0268  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.965 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.965 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.965 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.965 KA
                CBL-MCC 15 ELE  MCC-15            2.965 KA      ANG:   -16.67

 MCC 15 GATES   3P Duty:  0.859 KA AT   -7.74 DEG (     0.71 MVA) X/R:    0.14
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.3196 + J  0.0435  OHMS
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.859 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.859 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.859 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.859 KA
                CBL-MCC 15 GAT  BUS-0750           0.859 KA      ANG:  -187.74

 MCC 15 STRAINE 3P Duty:  2.638 KA AT  -15.27 DEG (     2.19 MVA) X/R:    0.27
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1013 + J  0.0277  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.638 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.638 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.638 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.638 KA
                CBL-MCC 15 STR  MCC-15             2.638 KA      ANG:   -15.27

 MCC 15AA AIR C 3P Duty:  2.886 KA AT  -15.79 DEG (     2.40 MVA) X/R:    0.28
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0924 + J  0.0261  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.886 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.886 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.886 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.886 KA
                CBL-0534        MCC-15AA           2.886 KA      ANG:   -15.79

 MCC-00         3P Duty: 10.173 KA AT  -59.58 DEG (     8.46 MVA) X/R:    1.71
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0138 + J  0.0235  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   10.173 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  10.173 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  10.173 KA
                CBL-0758        DS-POLYMER MIX     0.002 KA      ANG:   111.84
                CBL-0756        DS-ANOXIC TANK     0.002 KA      ANG:   111.88
                CBL-0749        INFLUENT PUMPS     0.027 KA      ANG:   112.34
                CBL-0745        BLOWER ROOM        0.034 KA      ANG:   111.96
                CBL-0772        DS-SLUDGE PUMP     0.027 KA      ANG:   112.27
                CBL-0766        RAS PUMPS          0.040 KA      ANG:   112.15
                CBL-0752        MCC-00 BACKWAS     0.040 KA      ANG:   112.29
                CBL-0738        LC-5              10.003 KA      ANG:   -59.44

 MCC-00 BACKWAS 3P Duty:  4.689 KA AT  -29.17 DEG (     3.90 MVA) X/R:    0.56
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0516 + J  0.0288  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    4.689 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   4.689 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   4.689 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   4.689 KA
                CBL-0753        NORTH CELL         0.013 KA      ANG:   112.01
                CBL-0754        CENTER CELL        0.013 KA      ANG:   112.01
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                 T H R E E   P H A S E   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================

                 CONTRIBUTIONS TO  MCC-00 BACKWAS (CONTINUED)
                 CBL-0755       SOUTH CELL        0.013 KA      ANG:  112.01
                 CBL-0752       MCC-00            4.658 KA      ANG:  -28.86

 MCC-00 OHD DOO 3P Duty:  1.667 KA AT  -10.67 DEG (     1.39 MVA) X/R:    0.19
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1634 + J  0.0308  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.667 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.667 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.667 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.667 KA
                CBL-0760        MCC-00            1.667 KA      ANG:  -10.67

 MCC-00-AIR COM 3P Duty:  5.301 KA AT  -37.41 DEG (     4.41 MVA) X/R:    0.77
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0415 + J  0.0318  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    5.301 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   5.301 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   5.301 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   5.301 KA
                CBL-0747        BLOWER ROOM       5.301 KA      ANG:  -37.41

 MCC-1          3P Duty: 22.359 KA AT  -76.98 DEG (    18.59 MVA) X/R:    4.51
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0028 + J  0.0121  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   22.359 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  22.359 KA
                CBL-0208        SEWAGE PUMP #1    0.949 KA      ANG: -256.65
                CBL-0209        DS-SEWAGE PUMP    0.967 KA      ANG:  102.19
                CBL-0207        MCC-1 ATS        18.281 KA      ANG: -256.44
                CBL-0146        MCC-3             2.169 KA      ANG:  -81.31

 MCC-1 ATS      3P Duty: 22.609 KA AT  -77.24 DEG (    18.80 MVA) X/R:    4.59
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0027 + J  0.0120  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   22.609 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  22.609 KA
                AUTO-0004       BUS-0217         18.542 KA      ANG:  -76.79
                CBL-0207        MCC-1             4.070 KA      ANG:  -79.31

 MCC-1 CRANE    3P Duty:  7.005 KA AT  -24.70 DEG (     5.82 MVA) X/R:    0.46
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0359 + J  0.0165  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    7.005 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   7.005 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   7.005 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   7.005 KA
                CBL-0212        MCC-1             7.005 KA      ANG:  -24.70
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              T H R E E   P H A S E   F A U L T   R E P O R T
                 (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                       PRE FAULT VOLTAGE: 1.0000
                       MODEL TRANSFORMER TAPS: NO
==============================================================================

 MCC-10         3P Duty: 14.452 KA AT  -70.42 DEG (    12.01 MVA) X/R:    2.83
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0064 + J  0.0181  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   14.452 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  14.452 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  14.452 KA
                CBL-0774        DS-SLUDGE TANK     0.044 KA      ANG:  -246.67
                CBL-0799        DS-NEW CRANE       0.002 KA      ANG:  -248.12
                CBL-0798        DS-EXISTING CR     0.002 KA      ANG:  -248.12
                CBL-0781        DS-3 AUX. INST     0.022 KA      ANG:  -247.44
                CBL-0782        DS-BYPASS CONV     0.009 KA      ANG:  -248.76
                CBL-0783        DS-SYSTEM AIR      0.065 KA      ANG:  -244.41
                CBL-0784        DS-SYSTEM AIR      0.065 KA      ANG:  -244.41
                CBL-0803        DS-GROUND SLUD     0.044 KA      ANG:  -246.55
                CBL-0785        DS-CENTRIFUGE      0.065 KA      ANG:  -244.20
                CBL-0792        DS- NORTH BELT     0.044 KA      ANG:  -246.17
                CBL-0795        DS-SOUTH BELT      0.044 KA      ANG:  -246.17
                CBL-0787        SOUTH BELT PUM     0.044 KA      ANG:  -245.18
                CBL-0778        DS- CENT. FEED     0.133 KA      ANG:  -247.35
                CBL-0800        DS-NORTH BOOST     0.045 KA      ANG:  -247.94
                CBL-0775        DS-GSST MIXER      0.177 KA      ANG:  -246.80
                CBL-0069        LC-4              13.650 KA      ANG:   -70.67

 MCC-12         3P Duty: 17.925 KA AT  -71.31 DEG (    14.90 MVA) X/R:    3.44
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0050 + J  0.0146  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   17.925 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  18.307 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  17.925 KA
                CBL-0199        BUS-0206           0.714 KA      ANG:    97.09
                CBL-0200        BUS-0207           0.891 KA      ANG:    97.19
                CBL-0201        BUS-0208           0.002 KA      ANG:  -248.17
                CBL-0205        BUS-0212           0.534 KA      ANG:    97.73
                CBL-0204        BUS-0211           0.022 KA      ANG:  -247.88
                CBL-0206        BUS-0213           0.888 KA      ANG:    97.34
                CBL-0202        BUS-0209           0.016 KA      ANG:   101.83
                CBL-0061        LC-2              14.930 KA      ANG:   -69.02

 MCC-13         3P Duty: 25.805 KA AT  -75.81 DEG (    21.45 MVA) X/R:    4.10
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0026 + J  0.0104  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   25.805 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  25.805 KA
                CBL-0448        MCC-13 OVERHEA     0.004 KA      ANG:  -248.15
                CBL-0434        FILTER DOOR OP     0.002 KA      ANG:  -248.12
                CBL-0435        SER FAN F          0.002 KA      ANG:  -248.12
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               T H R E E   P H A S E   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                       PRE FAULT VOLTAGE: 1.0000
                       MODEL TRANSFORMER TAPS: NO
==============================================================================

               CONTRIBUTIONS TO  MCC-13         (CONTINUED)
               CBL-0436        SER FAN E         0.002 KA      ANG:  -248.14
               CBL-0437        SER FAN J         0.002 KA      ANG:  -248.12
               CBL-0438        SER FAN D         0.002 KA      ANG:  -248.14
               CBL-0439        SER FAN C         0.002 KA      ANG:  -248.12
               CBL-0440        SER FAN H         0.002 KA      ANG:  -248.14
               CBL-0441        SER FAN B         0.002 KA      ANG:  -248.12
               CBL-0442        SER FAN A         0.002 KA      ANG:  -248.14
               CBL-0443        SER FAN I         0.002 KA      ANG:  -248.12
               CBL-0444        SER FAN L         0.002 KA      ANG:  -248.14
               CBL-0445        SER FAN K         0.002 KA      ANG:  -248.12
               CBL-0446        SER FAN G         0.002 KA      ANG:  -248.14
               CBL-0447        MCC-13 CRANE      0.067 KA      ANG:  -248.17
               CBL-0450        MCC-13 AIR COM    0.033 KA      ANG:  -247.87
               CBL-0429        AERATION VALVE    0.011 KA      ANG:  -248.04
               CBL-0424        AERATION VALVE    0.011 KA      ANG:  -247.56
               CBL-0993        BUS-1043         25.649 KA      ANG:   104.15

MCC-13 AIR COM 3P Duty:  4.837 KA AT  -14.68 DEG (     4.02 MVA) X/R:    0.26
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0554 + J  0.0145  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    4.837 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   4.837 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   4.837 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   4.837 KA
               CONTRIBUTIONS:  MCC-13 AIR COM    0.034 KA      ANG:   -68.20
               CBL-0450        MCC-13            4.817 KA      ANG:   -14.36

MCC-13 CRANE   3P Duty: 23.534 KA AT  -64.59 DEG (    19.57 MVA) X/R:    2.14
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0051 + J  0.0106  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER   23.534 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA  23.534 KA
               CONTRIBUTIONS:  MCC-13 CRANE M    0.067 KA      ANG:   -68.20
               CBL-0447        MCC-13           23.467 KA      ANG:   -64.58

MCC-13 OVERHEA 3P Duty:  4.377 KA AT  -13.45 DEG (     3.64 MVA) X/R:    0.24
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0616 + J  0.0147  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    4.377 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   4.377 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   4.377 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   4.377 KA
               CONTRIBUTIONS:  MCC-13 OVERHEA    0.004 KA      ANG:   -68.20
               CBL-0448        MCC-13            4.374 KA      ANG:   -13.40

MCC-14         3P Duty: 19.841 KA AT  -72.28 DEG (    16.50 MVA) X/R:    3.54
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T H R E E   P H A S E   F A U L T   R E P O R T
(FOR APPLICATION OF LOW VOLTAGE BREAKERS)
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

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===============================================================================
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0043 + J  0.0133  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   19.841 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  19.841 KA
                CBL-0455       TUMBULATOR          0.009 KA      ANG:  -247.95
                CBL-0456       WASTE SLUDGE P      0.022 KA      ANG:  -247.42
                CBL-0457       WASTE SLUDGE P      0.022 KA      ANG:  -247.42
                CBL-0458       FINAL TANK DRA      0.007 KA      ANG:  -248.08
                CBL-0459       RETURN SLUDGE       0.712 KA      ANG:    97.15
                CBL-0460       RETURN SLUDGE       0.713 KA      ANG:    97.05
                CBL-0461       RETURN SLUDGE       0.713 KA      ANG:    97.05
                CBL-0462       RETURN SLUDGE       0.712 KA      ANG:    97.29
                CBL-0463       EXHAUST FAN A       0.002 KA      ANG:  -248.16
                CBL-0464       EXHAUST FAN B       0.002 KA      ANG:  -248.18
                CBL-0465       EXHAUST FAN C       0.002 KA      ANG:  -248.18
                CBL-0466       EXHAUST FAN D       0.002 KA      ANG:  -248.17
                CBL-0467       EXHAUST FAN E       0.002 KA      ANG:  -248.15
                CBL-0468       SCUM PUMP           0.007 KA      ANG:  -248.08
                CBL-0470       MAKE UP AIR UN      0.029 KA      ANG:  -246.43
                CBL-0471       AER. TANK AND       0.009 KA      ANG:  -247.97
                CBL-0472       FINAL TANK AND      0.033 KA      ANG:  -247.70
                CBL-0475       RAS AND INFLUE      0.003 KA      ANG:  -248.11
                CBL-0477       MCC-14 SUMP PU      0.004 KA      ANG:  -248.06
                CBL-0478       MCC-14 HOIST        0.016 KA      ANG:  -247.91
                CBL-0479       WASTE MIXED LI      0.134 KA      ANG:  -248.06
                CBL-0480       WASTE MIXED LI      0.134 KA      ANG:  -248.06
                CBL-0992       BUS-1043           16.309 KA      ANG:  -250.69
                CBL-0454       MSP-12              0.300 KA      ANG:  -245.22

 MCC-14 HOIST   3P Duty:  2.609 KA AT  -11.42 DEG (     2.17 MVA) X/R:    0.20
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1041 + J  0.0210  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.609 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.609 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.609 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.609 KA
                CONTRIBUTIONS:  MCC-14 HOIST M     0.016 KA      ANG:   -68.20
                CBL-0478       MCC-14              2.601 KA      ANG:   -11.13

 MCC-14 SUMP PU 3P Duty:  1.620 KA AT   -8.62 DEG (     1.35 MVA) X/R:    0.15
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1692 + J  0.0256  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.620 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.620 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.620 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.620 KA
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               T H R E E   P H A S E   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================

               CONTRIBUTIONS TO  MCC-14 SUMP PU (CONTINUED)
               CONTRIBUTIONS:  SUMP PUMP EAST     0.004 KA      ANG:   -68.20
               CBL-0477        MCC-14             1.618 KA      ANG:    -8.48

 MCC-14 UNIT HE 3P Duty:  4.221 KA AT  -15.53 DEG (     3.51 MVA) X/R:    0.28
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0633 + J  0.0176  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    4.221 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   4.221 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   4.221 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   4.221 KA
               CBL-0474        MCC-14             4.221 KA      ANG:   -15.53

 MCC-15        3P Duty: 12.624 KA AT  -71.58 DEG (    10.50 MVA) X/R:    3.02
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0069 + J  0.0208  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER   12.624 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA  12.624 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA  12.624 KA
               CBL-HW PUMP #1  HW PUMP #1 P-1     0.020 KA      ANG:  -247.82
               CBL-0692        CHILLER #1         0.471 KA      ANG:   104.77
               CBL-0694        HVAC UNIT A        0.033 KA      ANG:  -247.43
               CBL-0695        HVAC UNIT B        0.050 KA      ANG:  -247.32
               CBL-CW PUMP P-  CW PUMP P-10       0.133 KA      ANG:  -247.79
               CBL-0120        LC-5              11.918 KA      ANG:   -71.52

 MCC-15A       3P Duty: 14.186 KA AT  -72.86 DEG (    11.79 MVA) X/R:    3.30
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0058 + J  0.0187  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER   14.186 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA  14.327 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA  14.186 KA
               CBL-0498        CHILLER #2         0.474 KA      ANG:   103.96
               CBL-0499        HOT WATER CIRC     0.033 KA      ANG:  -247.95
               CBL-0500        HOT WATER CIRC     0.033 KA      ANG:  -247.92
               CBL-0501        CHILL WATER CI     0.425 KA      ANG:   100.70
               CBL-0502        CHILL WATER CI     0.020 KA      ANG:  -247.99
               CBL-0503        45D WATER CIRC     0.020 KA      ANG:  -247.95
               CBL-0075        LC-5A             12.358 KA      ANG:  -252.22
               CBL-0497        MCC-15AA           0.830 KA      ANG:   102.07

 MCC-15AA      3P Duty: 11.781 KA AT  -69.47 DEG (     9.79 MVA) X/R:    2.75
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0082 + J  0.0220  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER   11.781 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA  11.781 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA  11.781 KA
               CBL-0531        BUS-0565           0.841 KA      ANG:   101.71
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               T H R E E   P H A S E   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
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               CONTRIBUTIONS TO  MCC-15AA       (CONTINUED)
               CBL-0497        MCC-15A          10.951 KA      ANG:   -68.80

 MCC-19        3P Duty: 14.409 KA AT  -78.14 DEG (    11.98 MVA) X/R:    4.78
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0040 + J  0.0188  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER   14.409 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA  15.938 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA  14.409 KA
               CBL-0081        BUS-0089         14.409 KA      ANG:   -78.14

 MCC-2         3P Duty: 20.445 KA AT  -77.14 DEG (    17.00 MVA) X/R:    4.49
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0030 + J  0.0132  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER   20.445 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA  20.445 KA
               CBL-0368        CS-BS-1           0.115 KA      ANG:  -252.55
               CBL-0374        NEW AIR COMPRE    0.034 KA      ANG:  -248.58
               CBL-0381        PUMP #5 MAIN D    0.887 KA      ANG:    96.44
               CBL-0367        BUS-0393         19.416 KA      ANG:  -256.89

 MCC-20        3P Duty: 14.826 KA AT  -77.77 DEG (    12.33 MVA) X/R:    4.68
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0040 + J  0.0183  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER   14.826 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA  16.325 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA  14.826 KA
               CBL-0079        BUS-0088         14.434 KA      ANG:   -78.08
               CBL-0133        MCC-22            0.401 KA      ANG:  -246.31

 MCC-21        3P Duty: 13.443 KA AT  -73.42 DEG (    11.18 MVA) X/R:    3.39
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0059 + J  0.0198  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER   13.443 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA  13.675 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA  13.443 KA
               CBL-0131        MCC-20           13.443 KA      ANG:   -73.42

 MCC-21 AC UNIT 3P Duty:  8.622 KA AT  -42.41 DEG (     7.17 MVA) X/R:    0.91
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0237 + J  0.0217  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    8.622 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   8.622 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   8.622 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   8.622 KA
               CBL-0259        MCC-21            8.622 KA      ANG:   -42.41

 MCC-21 PANEL # 3P Duty:  1.834 KA AT  -67.07 DEG (     0.66 MVA) X/R:    2.36
               VOLTAGE:    208.   EQUIV. IMPEDANCE=  0.0255 + J  0.0603  OHMS
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                 T H R E E   P H A S E   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.834 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.994 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.834 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.834 KA
                CBL-0261       BUS-0272          1.834 KA      ANG:   -67.07

 MCC-21 PANEL # 3P Duty:  1.953 KA AT  -67.77 DEG (     0.70 MVA) X/R:    2.45
                VOLTAGE:    208.   EQUIV. IMPEDANCE=  0.0233 + J  0.0569  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.953 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.144 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.953 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.953 KA
                CBL-0262       BUS-0272          1.953 KA      ANG:   -67.77

 MCC-22         3P Duty:  9.672 KA AT  -62.53 DEG (     8.04 MVA) X/R:    1.93
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0132 + J  0.0254  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    9.672 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   9.944 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   9.672 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   9.672 KA
                CBL-0263       MIXER #1          0.022 KA      ANG:  112.29
                CBL-0264       MIXER #2          0.022 KA      ANG:  112.24
                CBL-0265       CARBON SLURRY     0.133 KA      ANG:  113.10
                CBL-0266       TRANSFER PUMP     0.045 KA      ANG:  112.29
                CBL-0267       TRANSFER PUMP     0.045 KA      ANG:  112.29
                CBL-0269       CARBON PUMP DI    0.070 KA      ANG:  114.15
                CBL-0272       DUST COLLECTOR    0.070 KA      ANG:  114.09
                CBL-0133       MCC-20            9.266 KA      ANG:   -62.34

 MCC-24         3P Duty:  7.507 KA AT  -47.70 DEG (     6.24 MVA) X/R:    1.11
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0248 + J  0.0273  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    7.507 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   7.507 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   7.507 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   7.507 KA
                CBL-0289       BRIDGE CRANE      0.034 KA      ANG:  111.95
                CBL-0290       MAU-1             0.034 KA      ANG:  112.06
                CBL-0306       FC-1              0.022 KA      ANG:  112.46
                CBL-0292       DRILL PRESS #1    0.003 KA      ANG:  111.83
                CBL-0294       HYDRAULIC LIFT    0.007 KA      ANG:  111.88
                CBL-0295       EF-2              0.002 KA      ANG:  111.85
                CBL-0297       DRILL PRESS #2    0.007 KA      ANG:  111.87
                CBL-0305       AIR COMPRESSOR    0.033 KA      ANG:  112.61
                CBL-0304       FUME EXTRACTOR    0.002 KA      ANG:  111.85
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================

                CONTRIBUTIONS TO  MCC-24         (CONTINUED)
                CBL-0307       FC-2               0.022 KA      ANG:  112.29
                CBL-0126       LC-3               7.347 KA      ANG:  -47.25
                CBL-0293       OVERHEAD DOORS     0.004 KA      ANG:  111.90

 MCC-25         3P Duty: 14.675 KA AT  -74.54 DEG (    12.20 MVA) X/R:    3.72
                VOLTAGE:    480.  EQUIV. IMPEDANCE=  0.0050 + J  0.0182  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   14.675 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  15.292 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  14.675 KA
                CBL-0806       DS-MAU-SH-1        0.044 KA      ANG: -247.05
                CBL-0807       DS-MAU-SH-2        0.136 KA      ANG: -251.91
                CBL-0808       DS-MAU-SH-3        0.033 KA      ANG: -247.72
                CBL-0848       DS-CF-SH-1         0.070 KA      ANG:  103.34
                CBL-0823       DS-MCC-25-SF-4     0.004 KA      ANG:   98.15
                CBL-0845       DS-CF-SH-2         0.070 KA      ANG:  102.69
                CBL-0828       DS-EF-5A           0.004 KA      ANG:   98.25
                CBL-0820       DS-EF-2C           0.004 KA      ANG:   98.11
                CBL-0831       DS-EF-5B           0.007 KA      ANG:   98.42
                CBL-0816       DS-EF-2B           0.004 KA      ANG:   98.13
                CBL-0813       DS-EF-2A           0.004 KA      ANG:   98.14
                CBL-0811       DS-AMMONIA REM     0.524 KA      ANG:  100.21
                CBL-0843       DS-HVAC 1          0.185 KA      ANG:  105.43
                CBL-0809       DS-AMMONIA REM     0.524 KA      ANG:  100.21
                CBL-0846       DS-CP-CS-SH-1      0.106 KA      ANG:   99.61
                CBL-0070       LC-4              12.859 KA      ANG:  -74.07
                CBL-0838       MEGADOOR CONTR     0.105 KA      ANG:  103.03

 MCC-26         3P Duty: 27.399 KA AT  -79.19 DEG (    22.78 MVA) X/R:    5.32
                VOLTAGE:    480.  EQUIV. IMPEDANCE=  0.0019 + J  0.0099  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   27.399 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  27.895 KA
                CBL-0637       ET CONVEYOR 2      0.049 KA      ANG: -244.59
                CBL-0045       BUS-0022          24.646 KA      ANG:  -78.90
                CBL-0643       PP-SH-2            2.709 KA      ANG:   97.95

 MCC-27         3P Duty: 25.854 KA AT  -79.05 DEG (    21.49 MVA) X/R:    5.22
                VOLTAGE:    480.  EQUIV. IMPEDANCE=  0.0020 + J  0.0105  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   25.854 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  26.215 KA
                CBL-0046       BUS-0023          24.471 KA      ANG:  -78.88
                CBL-0626       PP-SH-1            1.385 KA      ANG:   97.99

 MCC-28         3P Duty: 15.998 KA AT  -77.00 DEG (    13.30 MVA) X/R:    4.60
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0039 + J  0.0169  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   15.998 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  17.550 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  15.998 KA
                CBL-0649        BLOWER 4 CP        0.033 KA      ANG:  -246.53
                CBL-0650        ANAEROBIC MIX      0.098 KA      ANG:  -246.11
                CBL-0651        ANAEROBIC MIX      0.098 KA      ANG:  -246.55
                CBL-0652        ANAEROBIC MIX      0.098 KA      ANG:  -245.79
                CBL-0653        ANAEROBIC MIX      0.099 KA      ANG:  -246.50
                CBL-0654        ANAEROBIC MIX      0.099 KA      ANG:  -247.23
                CBL-0655        ANOXIC MIX PUM     0.066 KA      ANG:  -247.18
                CBL-0656        ANOXIC MIX PUM     0.066 KA      ANG:  -247.48
                CBL-0657        ANOXIC MIX PUM     0.066 KA      ANG:  -247.01
                CBL-0658        ANOXIC MIX PUM     0.066 KA      ANG:  -247.50
                CBL-0659        ANOXIC MIX PUM     0.100 KA      ANG:  -247.41
                CBL-0660        AERATION RECIR     0.094 KA      ANG:  -241.36
                CBL-0661        AERATION RECIR     0.094 KA      ANG:  -241.36
                CBL-0662        AERATION RECIR     0.096 KA      ANG:  -243.51
                CBL-0663        AERATION RECIR     0.096 KA      ANG:  -243.51
                CBL-0664        AERATION RECIR     0.097 KA      ANG:  -244.62
                CBL-0665        CHANNEL MIX PU     0.064 KA      ANG:  -244.20
                CBL-0666        CHANNEL MIX PU     0.066 KA      ANG:  -246.09
                CBL-0667        BOILER CIRC PU     0.050 KA      ANG:  -246.46
                CBL-0668        BOILER CIRC PU     0.050 KA      ANG:  -246.46
                CBL-0648        BLOWER 3 CP        0.033 KA      ANG:  -247.38
                T-LC-12         LC-12 HS          14.407 KA      ANG:   101.72

 MCC-29         3P Duty: 15.193 KA AT  -77.07 DEG (    12.63 MVA) X/R:    4.60
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0041 + J  0.0178  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   15.193 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  16.659 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  15.193 KA
                CBL-0671        ANEROBIC MIX P     0.099 KA      ANG:  -247.46
                CBL-0672        ANEROBIC MIX P     0.099 KA      ANG:  -246.82
                CBL-0673        ANEROBIC MIX P     0.098 KA      ANG:  -246.19
                CBL-0674        ANEROBIC MIX P     0.097 KA      ANG:  -245.57
                CBL-0675        ANOXIC MIX PUM     0.100 KA      ANG:  -247.63
                CBL-0676        ANOXIC MIX PUM     0.099 KA      ANG:  -246.99
                CBL-0677        ANOXIC MIX PUM     0.098 KA      ANG:  -246.36
                CBL-0678        ANOXIC MIX PUM     0.097 KA      ANG:  -245.73
                CBL-0679        AERATION RECIR     0.099 KA      ANG:  -246.19
                CBL-0680        AERATION RECIR     0.097 KA      ANG:  -244.97
                CBL-0681        AERATION RECIR     0.096 KA      ANG:  -243.78
                CBL-0682        AERATION RECIR     0.095 KA      ANG:  -242.62
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
 ==============================================================================

                CONTRIBUTIONS TO  MCC-29         (CONTINUED)
                CBL-0683        CHANEL MIX PUM     0.065 KA      ANG:  -245.61
                CBL-0684        CHANEL MIX PUM     0.064 KA      ANG:  -243.64
                CBL-0157        BUS-0162          13.917 KA      ANG:   -78.12

  MCC-3         3P Duty: 20.821 KA AT  -75.30 DEG (    17.31 MVA) X/R:    4.07
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0034 + J  0.0129  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   20.821 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  20.821 KA
                CBL-0216        BUS-0227           0.003 KA      ANG:  -247.99
                CBL-0217        BUS-0228           0.003 KA      ANG:  -247.99
                CBL-0218        BUS-0229           0.003 KA      ANG:  -248.08
                CBL-0219        BUS-0230           0.003 KA      ANG:  -248.08
                CBL-0215        PUMP #7 VFD        0.924 KA      ANG:    96.27
                CBL-0397        BUS-0425           0.066 KA      ANG:  -245.96
                CBL-0418        MCC-3A             1.046 KA      ANG:    97.06
                CBL-0390        BUS-0418           0.027 KA      ANG:  -247.13
                CBL-0401        BUS-0429           0.068 KA      ANG:  -245.86
                CBL-0414        BUS-0436           0.053 KA      ANG:  -246.58
                CBL-0146        MCC-1             18.648 KA      ANG:  -254.56

  MCC-3 PURGE #1 3P Duty:  0.941 KA AT   -8.36 DEG (     0.78 MVA) X/R:    0.13
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2915 + J  0.0428  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.941 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.941 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.941 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.941 KA
                CONTRIBUTIONS:  MCC-3 PURGE #1     0.022 KA      ANG:   -68.20
                CBL-0402        BUS-0429           0.930 KA      ANG:    -7.17

  MCC-3 PURGE #2 3P Duty:  0.941 KA AT   -8.36 DEG (     0.78 MVA) X/R:    0.13
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2915 + J  0.0428  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.941 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.941 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.941 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.941 KA
                CONTRIBUTIONS:  MCC-3 PURGE #2     0.022 KA      ANG:   -68.20
                CBL-0403        BUS-0429           0.930 KA      ANG:    -7.17

  MCC-3 SUMP PUM 3P Duty:  1.191 KA AT   -8.18 DEG (     0.99 MVA) X/R:    0.13
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2304 + J  0.0331  OHMS
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               T H R E E   P H A S E   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.191 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.191 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.191 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.191 KA
               CONTRIBUTIONS:  SUMP PUMP MTR      0.002 KA      ANG:  -68.20
               CBL-0410        BUS-0436           1.189 KA      ANG:   -8.09

 MCC-3A        3P Duty: 20.600 KA AT  -75.12 DEG (    17.13 MVA) X/R:    4.02
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0035 + J  0.0130  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER   20.600 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA  20.600 KA
               CBL-0419        SEWAGE PUMP #2     1.047 KA      ANG:   97.04
               CBL-0418        MCC-3             19.564 KA      ANG:  -74.70

 MCC-3COMPRESSO 3P Duty:  1.407 KA AT   -9.18 DEG (     1.17 MVA) X/R:    0.15
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1944 + J  0.0314  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.407 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.407 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.407 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.407 KA
               CONTRIBUTIONS:  COMP MTR #1        0.022 KA      ANG:  -68.20
               CBL-0408        BUS-0436           1.396 KA      ANG:   -8.40

 MCC-3COMPRESSO 3P Duty:  1.407 KA AT   -9.18 DEG (     1.17 MVA) X/R:    0.15
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1944 + J  0.0314  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.407 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.407 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.407 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.407 KA
               CONTRIBUTIONS:  COMP MTR #2        0.022 KA      ANG:  -68.20
               CBL-0409        BUS-0436           1.396 KA      ANG:   -8.40

 MCC-4         3P Duty: 17.238 KA AT  -72.59 DEG (    14.33 MVA) X/R:    3.20
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0048 + J  0.0153  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER   17.238 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA  17.263 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA  17.238 KA
               CBL-0148        BUS-0366           0.027 KA      ANG: -247.90
               CBL-0108        LC-8              17.212 KA      ANG:  -72.60

 MCC-4A        3P Duty: 19.067 KA AT  -72.76 DEG (    15.85 MVA) X/R:    3.26
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0043 + J  0.0139  OHMS
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              T H R E E   P H A S E   F A U L T   R E P O R T
                 (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                       PRE FAULT VOLTAGE: 1.0000
                       MODEL TRANSFORMER TAPS: NO
==============================================================================
               LOW VOLTAGE POWER CIRCUIT BREAKER   19.067 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA  19.200 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA  19.067 KA
               CBL-0221       BLOWER #3          0.312 KA      ANG:  102.02
               CBL-0220       BLOWER #1          0.466 KA      ANG:  102.43
               CBL-0222       BLOWER #5          0.313 KA      ANG:  101.84
               CBL-0333       BUS-0363           0.013 KA      ANG: -247.99
               CBL-0109       LC-8A             16.678 KA      ANG:  -72.44
               CBL-0228       BUS-0239           0.038 KA      ANG:  105.54
               CBL-0232       BUS-0243           0.038 KA      ANG:  105.36
               CBL-0236       BUS-0247           0.038 KA      ANG:  105.36
               CBL-0311       PUMP STATION #     0.442 KA      ANG:  105.82
               CBL-0316       PUMP STATION #     0.438 KA      ANG:  107.10
               CBL-0223       GRIT TANKS         0.069 KA      ANG:  102.99
               CBL-0355       MCC-4C             0.169 KA      ANG: -246.09
               CBL-0151       MCC-4B             0.060 KA      ANG: -247.50

 MCC-4B        3P Duty: 17.998 KA AT  -70.05 DEG (    14.96 MVA) X/R:    2.78
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0053 + J  0.0145  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER   17.998 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA  17.998 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA  17.998 KA
               CBL-0331       D-102              0.004 KA      ANG: -248.02
               CBL-0323       WINCH #1           0.016 KA      ANG: -247.29
               CBL-0324       WINCH #2           0.016 KA      ANG: -247.36
               CBL-0325       WINCH #3           0.016 KA      ANG: -247.43
               CBL-0330       D-101              0.004 KA      ANG: -248.02
               CBL-0332       D-103              0.004 KA      ANG: -248.02
               CBL-0151       MCC-4A            17.938 KA      ANG:  -70.06

 MCC-4C        3P Duty: 10.866 KA AT  -48.84 DEG (     9.03 MVA) X/R:    1.15
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0168 + J  0.0192  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER   10.866 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA  10.866 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA  10.866 KA
               CBL-0365       CARBON SCRUBBE     0.066 KA      ANG:  113.97
               CBL-0366       CP-MAU-BP-1        0.044 KA      ANG:  113.16
               CBL-0362       FINE SCREEN DU     0.020 KA      ANG:  113.50
               CBL-0359       FINE SCREEN DU     0.020 KA      ANG:  113.42
               CBL-0356       FINE SCREEN DU     0.020 KA      ANG:  113.38
               CBL-0355       MCC-4A            10.705 KA      ANG:  -48.56

 MCC-5         3P Duty:  4.544 KA AT  -18.88 DEG (     3.78 MVA) X/R:    0.34
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0577 + J  0.0197  OHMS
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    4.544 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   4.544 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   4.544 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   4.544 KA
                CBL-0335        PURGE FAN #1 D     0.002 KA      ANG:  111.91
                CBL-0336        PURGE FAN #2 D     0.002 KA      ANG:  111.87
                CBL-0337        PURGE FAN #3 D     0.002 KA      ANG:  111.82
                CBL-0338        PURGE FAN #4 D     0.002 KA      ANG:  111.85
                CBL-0339        PURGE FAN #5 D     0.002 KA      ANG:  111.89
                CBL-0340        PURGE FAN #6 D     0.002 KA      ANG:  111.94
                CBL-0334        MTS-MCC-5          4.535 KA      ANG: -198.75

 MCC-6          3P Duty:  5.594 KA AT  -23.60 DEG (     4.65 MVA) X/R:    0.44
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0454 + J  0.0198  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    5.594 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   5.594 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   5.594 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   5.594 KA
                CBL-0343        PRIM SLUDGE CO     0.002 KA      ANG:  111.92
                CBL-0344        PRIM SLUDGE CO     0.002 KA      ANG:  111.91
                CBL-0345        PRIM SLUDGE CO     0.002 KA      ANG:  111.88
                CBL-0346        PRIM SLUDGE CO     0.002 KA      ANG:  111.87
                CBL-0347        PRIM SLUDGE CO     0.002 KA      ANG:  111.84
                CBL-0348        PRIM SLUDGE CO     0.002 KA      ANG:  111.84
                CBL-0349        PRIM SLUDGE CO     0.002 KA      ANG:  111.86
                CBL-0350        PRIM SLUDGE CO     0.002 KA      ANG:  111.88
                CBL-0351        PRIM SLUDGE CO     0.002 KA      ANG:  111.91
                CBL-0352        PRIM SLUDGE CO     0.002 KA      ANG:  111.92
                CBL-0353        PRIM SLUDGE CO     0.002 KA      ANG:  111.95
                CBL-0354        PRIM SLUDGE CO     0.002 KA      ANG:  111.96
                CBL-0342        MTS-MCC-6          5.575 KA      ANG:   -23.41

 MCC-7          3P Duty: 21.055 KA AT  -70.86 DEG (    17.50 MVA) X/R:    2.91
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0043 + J  0.0124  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   21.055 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  21.055 KA
                CBL-0887        DS-ENG. RM. BO     0.025 KA      ANG: -248.82
                CBL-0050        BUS-0032          19.615 KA      ANG:   -70.70
                CBL-0899        DS-FOUL AIR FA     0.009 KA      ANG: -248.03
                CBL-0998        DS-SERV GARAGE     0.022 KA      ANG: -248.03
                CBL-0888        PP-13              0.178 KA      ANG: -248.07
                CBL-0851        DS-RECYCLE PUM     0.749 KA      ANG:  102.80
                CBL-0853        PP-12 LEFT TUB     0.462 KA      ANG: -248.60
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               T H R E E   P H A S E   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================

 MCC-7 ELEVATOR 3P Duty:  2.467 KA AT  -10.32 DEG (     2.05 MVA) X/R:    0.18
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1105 + J  0.0201  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.467 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.467 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.467 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.467 KA
                CBL-0883        MCC-7              2.467 KA      ANG:   -10.32

 MCC-7 VACUUM P 3P Duty:  2.881 KA AT  -12.00 DEG (     2.40 MVA) X/R:    0.21
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0941 + J  0.0200  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.881 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.881 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.881 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.881 KA
                CBL-0856        DS-RECYCLE PUM     2.881 KA      ANG:   -12.00

 MCC-8          3P Duty: 16.841 KA AT  -66.43 DEG (    14.00 MVA) X/R:    2.34
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0066 + J  0.0151  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   16.841 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  16.841 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  16.841 KA
                CBL-0058        LC-2              16.841 KA      ANG:   -66.43

 MCC-8A         3P Duty:  6.642 KA AT  -74.12 DEG (     5.52 MVA) X/R:    3.61
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0114 + J  0.0401  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    6.642 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   8.102 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   6.866 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   6.642 KA
                CBL-0063        LC-2A              5.053 KA      ANG:   -72.80
                CBL-0685        BUS-0725           1.595 KA      ANG:   101.71

 MCC7 480V RECE 3P Duty:  5.329 KA AT  -25.73 DEG (     4.43 MVA) X/R:    0.48
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0468 + J  0.0226  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    5.329 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   5.329 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   5.329 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   5.329 KA
                CBL-0898        DS-SERV GARAGE     5.329 KA      ANG:   154.27

 MEGADOOR CONTR 3P Duty:  1.538 KA AT  -13.47 DEG (     1.28 MVA) X/R:    0.24
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1752 + J  0.0420  OHMS
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                THREE PHASE FAULT REPORT
            (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                  PRE FAULT VOLTAGE: 1.0000
                  MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.538 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.538 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.538 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.538 KA
                CBL-0839        DOOR #1            0.036 KA      ANG:    99.29
                CBL-0840        DOOR #2            0.036 KA      ANG:    99.29
                CBL-0841        DOOR #3            0.036 KA      ANG:    99.29
                CBL-0838        MCC-25             1.500 KA      ANG:    -9.71

 METAL LATHE    3P Duty:  3.809 KA AT  -24.61 DEG (     3.17 MVA) X/R:    0.46
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0661 + J  0.0303  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    3.809 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   3.809 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   3.809 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   3.809 KA
                CBL-0291        MCC-24             3.809 KA      ANG:   -24.61

 METER CHAMBER  3P Duty: 13.541 KA AT  -42.13 DEG (    11.26 MVA) X/R:    0.92
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0152 + J  0.0137  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   13.541 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  13.541 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  13.541 KA
                CBL-0389        MCC-3             13.541 KA      ANG:   -42.13

 MILL           3P Duty:  3.093 KA AT  -20.64 DEG (     2.57 MVA) X/R:    0.38
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0838 + J  0.0316  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    3.093 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   3.093 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   3.093 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   3.093 KA
                CBL-0296        METAL LATHE        3.093 KA      ANG:   -20.64

 MIX TANK DUST  3P Duty:  1.465 KA AT  -12.26 DEG (     1.22 MVA) X/R:    0.20
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1849 + J  0.0402  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.465 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.465 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.465 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.465 KA
                CONTRIBUTIONS:  MIX TANK DUST      0.036 KA      ANG:   -68.20
                CBL-0273        DUST COLLECTOR     1.445 KA      ANG:   -11.08

 MIX TANK DUST  3P Duty:  1.337 KA AT  -11.64 DEG (     1.11 MVA) X/R:    0.19
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2030 + J  0.0418  OHMS
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.337 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.337 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.337 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.337 KA
                CONTRIBUTIONS:  MIX TANK DUST      0.036 KA      ANG:   -68.20
                CBL-0274        DUST COLLECTOR     1.318 KA      ANG:   -10.34

 MIXED LIQUER P 3P Duty:  5.147 KA AT  -63.63 DEG (     4.28 MVA) X/R:    2.27
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0239 + J  0.0482  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    5.147 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   5.533 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   5.147 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   5.147 KA
                CONTRIBUTIONS:  MTR-MIXED LIQU     0.428 KA      ANG:   -80.69
                CBL-0713        MIXED LIQUER P     4.740 KA      ANG:  -242.11

 MIXED LIQUER P 3P Duty:  5.270 KA AT  -64.98 DEG (     4.38 MVA) X/R:    2.38
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0222 + J  0.0477  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    5.270 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   5.745 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   5.270 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   5.270 KA
                CBL-0713        MIXED LIQUER P     0.427 KA      ANG:   -80.52
                CBL-0686        BUS-0725           4.860 KA      ANG:   -63.63

 MIXED LIQUER P 3P Duty:  5.147 KA AT  -63.63 DEG (     4.28 MVA) X/R:    2.27
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0239 + J  0.0482  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    5.147 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   5.533 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   5.147 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   5.147 KA
                CONTRIBUTIONS:  MTR-MIXED LIQU     0.428 KA      ANG:   -80.69
                CBL-0712        MIXED LIQUER P     4.740 KA      ANG:  -242.11

 MIXED LIQUER P 3P Duty:  5.270 KA AT  -64.98 DEG (     4.38 MVA) X/R:    2.38
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0222 + J  0.0477  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    5.270 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   5.745 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   5.270 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   5.270 KA
                CBL-0712        MIXED LIQUER P     0.427 KA      ANG:   -80.52
                CBL-0687        BUS-0725           4.860 KA      ANG:   -63.63

 MIXED LIQUER P 3P Duty:  5.087 KA AT  -62.97 DEG (     4.23 MVA) X/R:    2.21
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               T H R E E   P H A S E   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0248 + J  0.0485  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    5.087 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   5.431 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   5.087 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   5.087 KA
               CONTRIBUTIONS:  MTR-MIXED LIQU     0.428 KA      ANG:   -80.69
               CBL-0711        MIXED LIQUER P     4.681 KA      ANG:  -241.38

 MIXED LIQUER P 3P Duty:  5.270 KA AT  -64.97 DEG (     4.38 MVA) X/R:    2.38
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0222 + J  0.0476  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    5.270 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   5.743 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   5.270 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   5.270 KA
               CBL-0711        MIXED LIQUER P     0.427 KA      ANG:   -80.43
               CBL-0688        BUS-0725           4.860 KA      ANG:   -63.63

 MIXED LIQUER P 3P Duty:  5.087 KA AT  -62.97 DEG (     4.23 MVA) X/R:    2.21
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0248 + J  0.0485  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    5.087 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   5.431 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   5.087 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   5.087 KA
               CONTRIBUTIONS:  MTR-MIXED LIQU     0.428 KA      ANG:   -80.69
               CBL-0699        MIXED LIQUER P     4.681 KA      ANG:  -241.38

 MIXED LIQUER P 3P Duty:  5.270 KA AT  -64.97 DEG (     4.38 MVA) X/R:    2.38
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0222 + J  0.0476  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    5.270 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   5.743 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   5.270 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   5.270 KA
               CBL-0699        MIXED LIQUER P     0.427 KA      ANG:   -80.43
               CBL-0689        BUS-0725           4.860 KA      ANG:   -63.63

 MIXER #1      3P Duty:  2.057 KA AT  -15.03 DEG (     1.71 MVA) X/R:    0.27
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1301 + J  0.0349  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    2.057 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   2.057 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   2.057 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   2.057 KA
               CONTRIBUTIONS:  MIXER #1 MTR       0.022 KA      ANG:   -68.20
               CBL-0263        MCC-22             2.044 KA      ANG:   -14.53
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           T H R E E   P H A S E   F A U L T   R E P O R T
              (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                    PRE FAULT VOLTAGE: 1.0000
                    MODEL TRANSFORMER TAPS: NO
==============================================================================

 MIXER #2      3P Duty:  2.249 KA AT  -15.97 DEG (     1.87 MVA) X/R:    0.28
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1185 + J  0.0339  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    2.249 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   2.249 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   2.249 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   2.249 KA
               CONTRIBUTIONS:  MIXER #2 MTR       0.022 KA      ANG:   -68.20
               CBL-0264        MCC-22             2.235 KA      ANG:   -15.52

 MO GATE #1    3P Duty:  0.936 KA AT   -7.86 DEG (     0.78 MVA) X/R:    0.12
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2932 + J  0.0405  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    0.936 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   0.936 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   0.936 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   0.936 KA
               CONTRIBUTIONS:  MO GATE #1 MTR     0.010 KA      ANG:   -68.20
               CBL-0406        BUS-0429           0.931 KA      ANG:    -7.32

 MO GATE #2    3P Duty:  0.936 KA AT   -7.86 DEG (     0.78 MVA) X/R:    0.12
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2932 + J  0.0405  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    0.936 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   0.936 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   0.936 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   0.936 KA
               CONTRIBUTIONS:  MO GATE #2 MTR     0.010 KA      ANG:   -68.20
               CBL-0407        BUS-0429           0.931 KA      ANG:    -7.32

 MSP           3P Duty:  4.635 KA AT  -24.68 DEG (     3.85 MVA) X/R:    0.46
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0543 + J  0.0250  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    4.635 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   4.635 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   4.635 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   4.635 KA
               CBL-0251        MCC-21             4.635 KA      ANG:   -24.68

 MSP-12        3P Duty:  4.310 KA AT  -34.39 DEG (     3.58 MVA) X/R:    0.70
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0531 + J  0.0363  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    4.310 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   4.310 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   4.310 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   4.310 KA
               CBL-0481        DS-MSP-12 TUMB     0.033 KA      ANG:   112.62
               CBL-0482        DS-SLUDGE PUMP     0.056 KA      ANG:   112.11
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                 T H R E E   P H A S E   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
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                 CONTRIBUTIONS TO  MSP-12         (CONTINUED)
                 CBL-0483       DS-EXHAUST FAN     0.004 KA      ANG:   111.91
                 CBL-0488       DS-DRAIN PUMP      0.067 KA      ANG:   112.17
                 CBL-0634       MSP-14             0.134 KA      ANG:   112.26
                 CBL-0631       DS-CLARIFIER 7     0.009 KA      ANG:   112.01
                 CBL-0492       DS-CLARIFIER 7     0.011 KA      ANG:   111.96
                 CBL-0454       MCC-14             4.051 KA      ANG:   -31.94

 MSP-14          3P Duty:  3.794 KA AT  -31.79 DEG (     3.15 MVA) X/R:    0.63
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0621 + J  0.0385  OHMS
                 LOW VOLTAGE POWER CIRCUIT BREAKER    3.794 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   3.794 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   3.794 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   3.794 KA
                 CBL-0700       DS-MIXED LIQUO     0.134 KA      ANG:   112.03
                 CBL-0634       MSP-12             3.686 KA      ANG:   -30.56

 MTS-MCC-5       3P Duty: 11.088 KA AT  -38.42 DEG (     9.22 MVA) X/R:    0.80
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0196 + J  0.0155  OHMS
                 LOW VOLTAGE POWER CIRCUIT BREAKER   11.088 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA  11.088 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA  11.088 KA
                 CBL-0334       MCC-5              0.013 KA      ANG:   -68.02
                 AUTO-0007      BUS-0363          11.077 KA      ANG:   -38.39

 MTS-MCC-6       3P Duty:  9.042 KA AT  -34.94 DEG (     7.52 MVA) X/R:    0.70
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0251 + J  0.0176  OHMS
                 LOW VOLTAGE POWER CIRCUIT BREAKER    9.042 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   9.042 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   9.042 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   9.042 KA
                 AUTO-0008      BUS-0366           9.020 KA      ANG:   -34.85
                 CBL-0342       MCC-6              0.027 KA      ANG:   112.00

 MUA-1           3P Duty:  2.465 KA AT  -47.86 DEG (     2.05 MVA) X/R:    1.11
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0754 + J  0.0833  OHMS
                 LOW VOLTAGE POWER CIRCUIT BREAKER    2.465 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   2.465 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   2.465 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   2.465 KA
                 CONTRIBUTIONS:  MTRI-0210         0.022 KA      ANG:   -68.20
                 CBL-0484       28-PP-01           2.444 KA      ANG:   -47.67

 MVUS-1A         3P Duty: 21.632 KA AT  -84.94 DEG (   179.85 MVA) X/R:   12.62
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               T H R E E   P H A S E   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================
               VOLTAGE:   4800.   EQUIV. IMPEDANCE=  0.0113 + J  0.1276  OHMS
               CBL-0002        BUS-1027          17.350 KA      ANG:    94.59
               CBL-0028        EAST BANK-2A       2.873 KA      ANG:    94.65
               CBL-0003        WEST BANK-A        0.765 KA      ANG:  -258.74
               CBL-0019        EAST BANK-1B       0.654 KA      ANG:  -258.04

 MVUS-1B       3P Duty: 20.277 KA AT  -84.44 DEG (   168.58 MVA) X/R:   11.33
               VOLTAGE:   4800.   EQUIV. IMPEDANCE=  0.0132 + J  0.1360  OHMS
               CBL-0008        BUS-1028          16.546 KA      ANG:    95.43
               CBL-0032        EAST BANK-2B       2.939 KA      ANG:    93.93
               CBL-0010        WEST BANK-B        0.439 KA      ANG:  -256.05
               CBL-0015        EAST BANK-1A       0.364 KA      ANG:  -255.26

 N.W. HEAT     3P Duty:  6.514 KA AT  -36.72 DEG (     5.42 MVA) X/R:    0.75
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0341 + J  0.0254  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    6.514 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   6.514 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   6.514 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   6.514 KA
               CBL-0723        20A-PP-1           6.514 KA      ANG:   -36.72

 NEW AIR COMPRE 3P Duty:  4.546 KA AT  -15.46 DEG (     3.78 MVA) X/R:    0.28
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0588 + J  0.0162  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    4.546 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   4.546 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   4.546 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   4.546 KA
               CONTRIBUTIONS:  NEW AIR COMPRE     0.034 KA      ANG:   -68.94
               CBL-0374        MCC-2              4.526 KA      ANG:   -15.11

 NORTH BELT DIS 3P Duty:  2.403 KA AT   -7.97 DEG (     2.00 MVA) X/R:    0.14
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1142 + J  0.0160  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    2.403 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   2.403 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   2.403 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   2.403 KA
               CBL-0623        MCC-27             2.403 KA      ANG:    -7.97

 NORTH BELT PRE 3P Duty:  2.403 KA AT   -7.97 DEG (     2.00 MVA) X/R:    0.14
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1142 + J  0.0160  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    2.403 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   2.403 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   2.403 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   2.403 KA
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================

                CONTRIBUTIONS TO  NORTH BELT PRE (CONTINUED)
                CBL-0625        MCC-27            2.403 KA      ANG:    -7.97

  NORTH CELL    3P Duty:  1.990 KA AT  -13.91 DEG (     1.65 MVA) X/R:    0.25
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1352 + J  0.0335  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.990 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.990 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.990 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.990 KA
                CONTRIBUTIONS:  MTR-NORTH CELL     0.013 KA      ANG:   -68.20
                CBL-0753        MCC-00 BACKWAS     1.982 KA      ANG:   -13.59

  NORTH LOT POWE 3P Duty:  3.367 KA AT  -29.38 DEG (     2.80 MVA) X/R:    0.57
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0717 + J  0.0404  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    3.367 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   3.367 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   3.367 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   3.367 KA
                CBL-0701        MSP-14            3.367 KA      ANG:   -29.38

  NORTH SEC. PUM 3P Duty:  1.938 KA AT  -13.42 DEG (     1.61 MVA) X/R:    0.24
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1391 + J  0.0332  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.938 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.938 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.938 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.938 KA
                CONTRIBUTIONS:  MTR-SOUTH SEC.     0.013 KA      ANG:   -68.20
                CBL-0771        DS-SLUDGE PUMP     1.930 KA      ANG:   -13.09

  NORTH SHOP HTR 3P Duty:  5.414 KA AT  -22.81 DEG (     4.50 MVA) X/R:    0.42
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0472 + J  0.0198  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    5.414 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   5.414 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   5.414 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   5.414 KA
                CBL-0908        PP-13             5.414 KA      ANG:   -22.81

  NW FUME HOOD E 3P Duty:  0.597 KA AT   -6.64 DEG (     0.50 MVA) X/R:    0.12
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.4612 + J  0.0537  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.597 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.597 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.597 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.597 KA
                CBL-NW FUME HO  FUME FAN CONTA     0.597 KA      ANG:    -6.64
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              T H R E E   P H A S E   F A U L T   R E P O R T
                 (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                       PRE FAULT VOLTAGE: 1.0000
                       MODEL TRANSFORMER TAPS: NO
==============================================================================

 NW FUME HOOD S 3P Duty:  0.597 KA AT   -6.64 DEG (     0.50 MVA) X/R:    0.12
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.4612 + J  0.0537  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.597 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.597 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.597 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.597 KA
                CBL-NW FUME HO  FUME FAN CONTA     0.597 KA      ANG:    -6.64

 ODOR CTRL FAN  3P Duty:  0.934 KA AT   -7.54 DEG (     0.78 MVA) X/R:    0.12
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2943 + J  0.0390  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.934 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.934 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.934 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.934 KA
                CONTRIBUTIONS:  ODOR CTRL #1 M     0.002 KA      ANG:   -68.20
                CBL-0404        BUS-0429           0.933 KA      ANG:    -7.42

 ODOR CTRL FAN  3P Duty:  0.934 KA AT   -7.54 DEG (     0.78 MVA) X/R:    0.12
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2943 + J  0.0390  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.934 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.934 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.934 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.934 KA
                CONTRIBUTIONS:  ODOR CTRL #2 M     0.002 KA      ANG:   -68.20
                CBL-0405        BUS-0429           0.933 KA      ANG:    -7.42

 OUTSIDE DOOR(E 3P Duty:  1.275 KA AT  -10.94 DEG (     1.06 MVA) X/R:    0.19
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2134 + J  0.0412  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.275 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.275 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.275 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.275 KA
                CBL-0298        OVERHEAD DOORS     1.275 KA      ANG:   -10.94

 OUTSIDE DOOR(N 3P Duty:  0.900 KA AT   -8.93 DEG (     0.75 MVA) X/R:    0.16
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.3042 + J  0.0478  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.900 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.900 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.900 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.900 KA
                CBL-0300        OVERHEAD DOORS     0.900 KA      ANG:    -8.93

 OUTSIDE DOOR(S 3P Duty:  0.807 KA AT   -8.43 DEG (     0.67 MVA) X/R:    0.15
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.3396 + J  0.0504  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.807 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.807 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.807 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.807 KA
                CBL-0301       OUTSIDE DOOR(N     0.807 KA      ANG:    -8.43

 OVERHEAD DOORS 3P Duty:  1.812 KA AT  -13.82 DEG (     1.51 MVA) X/R:    0.25
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1485 + J  0.0365  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.812 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.812 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.812 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.812 KA
                CONTRIBUTIONS:  DOOR MTR          0.004 KA      ANG:   -68.20
                CBL-0293       MCC-24             1.810 KA      ANG:   -13.71

 PANEL LA       3P Duty:  1.669 KA AT  -64.77 DEG (     0.60 MVA) X/R:    2.12
                VOLTAGE:    208.   EQUIV. IMPEDANCE=  0.0307 + J  0.0651  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.669 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.762 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.669 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.669 KA
                CBL-0379       BUS-0407           1.669 KA      ANG:   -64.77

 PANEL LB       3P Duty:  1.658 KA AT  -65.04 DEG (     0.60 MVA) X/R:    2.15
                VOLTAGE:    208.   EQUIV. IMPEDANCE=  0.0306 + J  0.0656  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.658 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.757 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.658 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.658 KA
                CBL-0380       BUS-0407           1.658 KA      ANG:   -65.04

 PHOS ACID PUMP 3P Duty:  0.797 KA AT  -57.95 DEG (     0.17 MVA) X/R:    1.60
                VOLTAGE:    120.   EQUIV. IMPEDANCE=  0.0461 + J  0.0737  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.797 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.797 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.797 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.797 KA
                CBL-0452       BUS-0482           0.797 KA      ANG:   -57.95

 PP-1 EXHAUST F 3P Duty:  1.354 KA AT   -9.68 DEG (     1.13 MVA) X/R:    0.17
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2018 + J  0.0344  OHMS
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                 T H R E E   P H A S E   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
 ==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.354 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.354 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.354 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.354 KA
                CBL-0725        PP-1-EF-1          0.002 KA      ANG:  111.87
                CBL-0727        PP-1-EF-2          0.002 KA      ANG:  111.87
                CBL-0729        PP-1-EF-3          0.002 KA      ANG:  111.88
                CBL-0724        20A-PP-1           1.351 KA      ANG:   -9.44

  PP-1 TRANSFER  3P Duty:  2.210 KA AT  -14.45 DEG (     1.84 MVA) X/R:    0.26
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1214 + J  0.0313  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.210 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.210 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.210 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.210 KA
                CBL-0734        BUS-0769           0.013 KA      ANG:  -68.06
                CBL-0733        PUMP CONTROL P     2.202 KA      ANG:  -14.17

  PP-1 TRANSFER  3P Duty:  2.210 KA AT  -14.45 DEG (     1.84 MVA) X/R:    0.26
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1214 + J  0.0313  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.210 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.210 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.210 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.210 KA
                CBL-0736        BUS-0770           0.013 KA      ANG:  111.92
                CBL-0735        PUMP CONTROL P     2.202 KA      ANG:  -14.17

  PP-1-EF-1      3P Duty:  0.961 KA AT   -7.73 DEG (     0.80 MVA) X/R:    0.13
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2857 + J  0.0388  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.961 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.961 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.961 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.961 KA
                CBL-0726        BUS-0766           0.002 KA      ANG:  111.84
                CBL-0725        PP-1 EXHAUST F     0.960 KA      ANG:   -7.61

  PP-1-EF-2      3P Duty:  0.851 KA AT   -7.19 DEG (     0.71 MVA) X/R:    0.12
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.3230 + J  0.0408  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.851 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.851 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.851 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.851 KA
                CBL-0728        BUS-0767           0.002 KA      ANG:  111.82
                CBL-0727        PP-1 EXHAUST F     0.850 KA      ANG:   -7.06
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            T H R E E   P H A S E   F A U L T   R E P O R T
               (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                     PRE FAULT VOLTAGE: 1.0000
                     MODEL TRANSFORMER TAPS: NO
==============================================================================

 PP-1-EF-3      3P Duty:  0.805 KA AT   -6.97 DEG (     0.67 MVA) X/R:    0.12
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.3417 + J  0.0418  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.805 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.805 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.805 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.805 KA
                CBL-0730        BUS-0768           0.002 KA      ANG:   111.82
                CBL-0729        PP-1 EXHAUST F     0.804 KA      ANG:    -6.83

 PP-12 LEFT TUB 3P Duty:  7.985 KA AT  -53.14 DEG (     6.64 MVA) X/R:    1.36
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0208 + J  0.0278  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    7.985 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   7.985 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   7.985 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   7.985 KA
                CBL-0862        VFD-N. THICK S     0.067 KA      ANG:   111.92
                CBL-0863        VFD-N. THICK S     0.034 KA      ANG:   111.65
                CBL-0864        VFD-N. THICK S     0.067 KA      ANG:   111.82
                CBL-0865        VFD-S. THICK S     0.067 KA      ANG:   111.97
                CBL-0866        VFD-S. THICK S     0.034 KA      ANG:   111.76
                CBL-0867        VFD-S. THICK S     0.067 KA      ANG:   112.07
                CBL-0871        DS-SLUDGE THIC     0.047 KA      ANG:   103.03
                CBL-0873        DS-SLUDGE THIC     0.047 KA      ANG:   103.88
                CBL-0877        PP-12 RIGHT TU     0.051 KA      ANG:   112.42
                CBL-0853        MCC-7              7.527 KA      ANG:   -52.10

 PP-12 RIGHT TU 3P Duty:  7.903 KA AT  -53.02 DEG (     6.57 MVA) X/R:    1.36
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0211 + J  0.0280  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    7.903 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   7.903 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   7.903 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   7.903 KA
                CBL-0881        DS-MAU-SC-1        0.022 KA      ANG:   112.19
                CBL-0876        DS-EF-SC-1         0.004 KA      ANG:   111.98
                CBL-0878        DS-SUMP PUMP 1     0.024 KA      ANG:   112.70
                CBL-0877        PP-12 LEFT TUB     7.854 KA      ANG:   -52.93

 PP-13          3P Duty: 13.251 KA AT  -55.70 DEG (    11.02 MVA) X/R:    1.47
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0118 + J  0.0173  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   13.251 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  13.251 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  13.251 KA
                CBL-0889        BUS-0934           0.090 KA      ANG:   111.73
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                 T H R E E   P H A S E   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================

               CONTRIBUTIONS TO  PP-13          (CONTINUED)
               CBL-0890       BUS-0935            0.090 KA      ANG:  111.73
               CBL-0888       MCC-7              13.076 KA      ANG:  -55.53

 PP-SH-1       3P Duty: 21.682 KA AT  -72.52 DEG (    18.03 MVA) X/R:    3.34
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0038 + J  0.0122  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER   21.682 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA  21.682 KA
               CBL-0627        CENTRIFUGE# 1      0.700 KA      ANG:   97.47
               CBL-0628        CENTRIFUGE# 3      0.699 KA      ANG:   97.48
               CBL-0626        MCC-27            20.305 KA      ANG:  -71.84

 PP-SH-2       3P Duty: 22.817 KA AT  -72.65 DEG (    18.97 MVA) X/R:    3.59
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0036 + J  0.0116  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER   22.817 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA  22.817 KA
               CBL-0644        SLUDGE CAKE PU     1.373 KA      ANG:   96.12
               CBL-0645        CENTRIFUGE #2      0.700 KA      ANG:   97.47
               CBL-0646        CENTRIFUGE #4      0.699 KA      ANG:   97.54
               CBL-0643        MCC-26            20.098 KA      ANG:  -71.20

 PRIM HEAT PUMP 3P Duty:  1.057 KA AT   -8.21 DEG (     0.88 MVA) X/R:    0.14
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2596 + J  0.0375  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.057 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.057 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.057 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.057 KA
               CBL-0243        BUS-0251           1.057 KA      ANG:   -8.21

 PRIM HEAT PUMP 3P Duty:  1.057 KA AT   -8.21 DEG (     0.88 MVA) X/R:    0.14
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2596 + J  0.0375  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.057 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.057 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.057 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.057 KA
               CBL-0244        BUS-0251           1.057 KA      ANG:   -8.21

 PRIM SLUDGE CO 3P Duty:  0.819 KA AT   -5.90 DEG (     0.68 MVA) X/R:    0.10
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.3366 + J  0.0348  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    0.819 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   0.819 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   0.819 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   0.819 KA
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================

                CONTRIBUTIONS TO  PRIM SLUDGE CO (CONTINUED)
                CONTRIBUTIONS:  PRIM SLUDGE CO     0.002 KA      ANG:   -68.20
                CBL-0343        MCC-6              0.818 KA      ANG:    -5.76

 PRIM SLUDGE CO 3P Duty:  0.904 KA AT   -6.20 DEG (     0.75 MVA) X/R:    0.11
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.3049 + J  0.0331  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.904 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.904 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.904 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.904 KA
                CONTRIBUTIONS:  PRIM SLUDGE CO     0.002 KA      ANG:   -68.20
                CBL-0344        MCC-6              0.903 KA      ANG:    -6.07

 PRIM SLUDGE CO 3P Duty:  1.157 KA AT   -7.09 DEG (     0.96 MVA) X/R:    0.12
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2377 + J  0.0296  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.157 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.157 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.157 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.157 KA
                CONTRIBUTIONS:  PRIM SLUDGE CO     0.002 KA      ANG:   -68.20
                CBL-0345        MCC-6              1.156 KA      ANG:    -6.99

 PRIM SLUDGE CO 3P Duty:  1.333 KA AT   -7.72 DEG (     1.11 MVA) X/R:    0.13
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2060 + J  0.0279  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.333 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.333 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.333 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.333 KA
                CONTRIBUTIONS:  PRIM SLUDGE CO     0.002 KA      ANG:   -68.20
                CBL-0346        MCC-6              1.332 KA      ANG:    -7.64

 PRIM SLUDGE CO 3P Duty:  1.941 KA AT   -9.92 DEG (     1.61 MVA) X/R:    0.17
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1407 + J  0.0246  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.941 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.941 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.941 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.941 KA
                CONTRIBUTIONS:  PRIM SLUDGE CO     0.002 KA      ANG:   -68.20
                CBL-0347        MCC-6              1.939 KA      ANG:    -9.86

 PRIM SLUDGE CO 3P Duty:  2.135 KA AT  -10.62 DEG (     1.77 MVA) X/R:    0.19
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1276 + J  0.0239  OHMS
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                 T H R E E   P H A S E   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
===============================================================================
                 LOW VOLTAGE POWER CIRCUIT BREAKER    2.135 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   2.135 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   2.135 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   2.135 KA
                 CONTRIBUTIONS:  PRIM SLUDGE CO     0.002 KA      ANG:  -68.20
                 CBL-0348        MCC-6              2.133 KA      ANG:  -10.57

 PRIM SLUDGE CO 3P Duty:  1.409 KA AT   -7.99 DEG (     1.17 MVA) X/R:    0.14
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1948 + J  0.0274  OHMS
                 LOW VOLTAGE POWER CIRCUIT BREAKER    1.409 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   1.409 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   1.409 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   1.409 KA
                 CONTRIBUTIONS:  PRIM SLUDGE CO     0.002 KA      ANG:  -68.20
                 CBL-0349        MCC-6              1.408 KA      ANG:   -7.91

 PRIM SLUDGE CO 3P Duty:  1.204 KA AT   -7.26 DEG (     1.00 MVA) X/R:    0.13
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2284 + J  0.0291  OHMS
                 LOW VOLTAGE POWER CIRCUIT BREAKER    1.204 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   1.204 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   1.204 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   1.204 KA
                 CONTRIBUTIONS:  PRIM SLUDGE CO     0.002 KA      ANG:  -68.20
                 CBL-0350        MCC-6              1.202 KA      ANG:   -7.16

 PRIM SLUDGE CO 3P Duty:  0.938 KA AT   -6.32 DEG (     0.78 MVA) X/R:    0.11
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2937 + J  0.0325  OHMS
                 LOW VOLTAGE POWER CIRCUIT BREAKER    0.938 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   0.938 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   0.938 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   0.938 KA
                 CONTRIBUTIONS:  PRIM SLUDGE CO     0.002 KA      ANG:  -68.20
                 CBL-0351        MCC-6              0.937 KA      ANG:   -6.20

 PRIM SLUDGE CO 3P Duty:  0.847 KA AT   -6.00 DEG (     0.70 MVA) X/R:    0.10
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.3254 + J  0.0342  OHMS
                 LOW VOLTAGE POWER CIRCUIT BREAKER    0.847 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   0.847 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   0.847 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   0.847 KA
                 CONTRIBUTIONS:  PRIM SLUDGE CO     0.002 KA      ANG:  -68.20
                 CBL-0352        MCC-6              0.846 KA      ANG:   -5.86

 PRIM SLUDGE CO 3P Duty:  0.703 KA AT   -5.50 DEG (     0.58 MVA) X/R:    0.09
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.3926 + J  0.0378  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.703 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.703 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.703 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.703 KA
                CONTRIBUTIONS:  PRIM SLUDGE CO     0.002 KA      ANG:  -68.20
                CBL-0353        MCC-6              0.702 KA      ANG:   -5.34

 PRIM SLUDGE CO 3P Duty:  0.648 KA AT   -5.32 DEG (     0.54 MVA) X/R:    0.09
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.4261 + J  0.0396  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.648 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.648 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.648 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.648 KA
                CONTRIBUTIONS:  PRIM SLUDGE CO     0.002 KA      ANG:  -68.20
                CBL-0354        MCC-6              0.647 KA      ANG:   -5.14

 PUMP #5 MAIN D 3P Duty: 19.100 KA AT  -75.87 DEG (    15.88 MVA) X/R:    4.11
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0035 + J  0.0141  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   19.100 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  19.100 KA
                CBL-0382        PUMP #5 VFD        0.890 KA      ANG:   96.35
                CBL-0381        MCC-2             18.219 KA      ANG:  -75.49

 PUMP #5 VFD    3P Duty: 18.594 KA AT  -73.96 DEG (    15.46 MVA) X/R:    3.65
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0041 + J  0.0143  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   18.594 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  19.274 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  18.594 KA
                CBL-0383        BUS-0412           0.891 KA      ANG:   96.24
                CBL-0382        PUMP #5 MAIN D    17.716 KA      ANG:  -73.47

 PUMP #7 VFD    3P Duty: 19.960 KA AT  -73.80 DEG (    16.59 MVA) X/R:    3.70
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0039 + J  0.0133  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   19.960 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  19.960 KA
                CBL-0388        BUS-0416           0.926 KA      ANG:   96.17
                CBL-0215        MCC-3             19.049 KA      ANG:  -73.32

 PUMP CONTROL P 3P Duty:  4.412 KA AT  -26.14 DEG (     3.67 MVA) X/R:    0.49
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0564 + J  0.0277  OHMS
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                 T H R E E   P H A S E   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================
                 LOW VOLTAGE POWER CIRCUIT BREAKER    4.412 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   4.412 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   4.412 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   4.412 KA
                 CBL-0733        PP-1 TRANSFER      0.013 KA      ANG:   112.11
                 CBL-0735        PP-1 TRANSFER      0.013 KA      ANG:   112.08
                 CBL-0732        20A-PP-1           4.392 KA      ANG:   -25.91

 PUMP STATION # 3P Duty:  8.889 KA AT  -34.29 DEG (     7.39 MVA) X/R:    0.74
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0258 + J  0.0176  OHMS
                 LOW VOLTAGE POWER CIRCUIT BREAKER    8.889 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   8.889 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   8.889 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   8.889 KA
                 CBL-0312        SLUDGE PUMP #1     0.045 KA      ANG:   111.85
                 CBL-0313        SLUDGE PUMP #2     0.045 KA      ANG:   111.85
                 CBL-0314        SLUDGE PUMP #7     0.313 KA      ANG:   101.91
                 CBL-0315        SUMP PUMP #1 D     0.047 KA      ANG:   101.59
                 CBL-0311        MCC-4A             8.560 KA      ANG:   -32.28

 PUMP STATION # 3P Duty:  6.204 KA AT  -27.65 DEG (     5.16 MVA) X/R:    0.57
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0396 + J  0.0207  OHMS
                 LOW VOLTAGE POWER CIRCUIT BREAKER    6.204 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   6.204 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   6.204 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   6.204 KA
                 CBL-0317        SLUDGE PUMP #3     0.045 KA      ANG:   111.85
                 CBL-0318        SLUDE PUMP #4      0.045 KA      ANG:   111.85
                 CBL-0319        SLUDGE PUMP #8     0.313 KA      ANG:   101.91
                 CBL-0320        SUMP PUMP #2       0.047 KA      ANG:   101.59
                 CBL-0316        MCC-4A             5.916 KA      ANG:   -24.39

 PURGE FAN #1 D 3P Duty:  0.884 KA AT   -6.00 DEG (     0.74 MVA) X/R:    0.10
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.3116 + J  0.0328  OHMS
                 LOW VOLTAGE POWER CIRCUIT BREAKER    0.884 KA
                 MOLDED CASE CIRCUIT BREAKER < 10KA   0.884 KA
                 MOLDED CASE CIRCUIT BREAKER < 20KA   0.884 KA
                 MOLDED CASE CIRCUIT BREAKER > 20KA   0.884 KA
                 CONTRIBUTIONS:  PURGE FAN #1 M     0.002 KA      ANG:   -68.20
                 CBL-0335        MCC-5              0.883 KA      ANG:    -5.87

 PURGE FAN #2 D 3P Duty:  1.259 KA AT   -7.27 DEG (     1.05 MVA) X/R:    0.13
                 VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2183 + J  0.0279  OHMS
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                 T H R E E   P H A S E   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.259 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.259 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.259 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.259 KA
                CONTRIBUTIONS:  PURGE FAN #2 M     0.002 KA      ANG:  -68.20
                CBL-0336        MCC-5              1.258 KA      ANG:   -7.18

 PURGE FAN #3 D 3P Duty:  2.553 KA AT  -11.77 DEG (     2.12 MVA) X/R:    0.21
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1063 + J  0.0222  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.553 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.553 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.553 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.553 KA
                CONTRIBUTIONS:  PURGE FAN #3 M     0.002 KA      ANG:  -68.20
                CBL-0337        MCC-5              2.551 KA      ANG:  -11.73

 PURGE FAN #4 D 3P Duty:  1.485 KA AT   -8.05 DEG (     1.24 MVA) X/R:    0.14
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1847 + J  0.0261  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.485 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.485 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.485 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.485 KA
                CONTRIBUTIONS:  PURGE FAN #4 M     0.002 KA      ANG:  -68.20
                CBL-0338        MCC-5              1.484 KA      ANG:   -7.98

 PURGE FAN #5 D 3P Duty:  1.004 KA AT   -6.40 DEG (     0.83 MVA) X/R:    0.11
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2743 + J  0.0308  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.004 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.004 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.004 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.004 KA
                CONTRIBUTIONS:  PURGE FAN #5 M     0.002 KA      ANG:  -68.20
                CBL-0339        MCC-5              1.003 KA      ANG:   -6.29

 PURGE FAN #6 D 3P Duty:  0.725 KA AT   -5.47 DEG (     0.60 MVA) X/R:    0.09
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.3806 + J  0.0365  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.725 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.725 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.725 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.725 KA
                CONTRIBUTIONS:  PURGE FAN #6 M     0.002 KA      ANG:  -68.20
                CBL-0340        MCC-5              0.724 KA      ANG:   -5.31

 RAS AND INFLUE 3P Duty:  1.878 KA AT   -9.26 DEG (     1.56 MVA) X/R:    0.16
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              T H R E E   P H A S E   F A U L T   R E P O R T
                 (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                       PRE FAULT VOLTAGE: 1.0000
                       MODEL TRANSFORMER TAPS: NO
==============================================================================
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1457 + J  0.0238  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.878 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.878 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.878 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.878 KA
                CONTRIBUTIONS:  RAS AND INFLUE     0.003 KA      ANG:   -68.20
                CBL-0475        MCC-14             1.876 KA      ANG:    -9.17

 RAS PUMPS      3P Duty:  4.689 KA AT  -29.17 DEG (     3.90 MVA) X/R:    0.56
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0516 + J  0.0288  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    4.689 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   4.689 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   4.689 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   4.689 KA
                CBL-0767        DS-RAS PUMP #1     0.013 KA      ANG:   111.87
                CBL-0768        DS-RAS PUMP #2     0.013 KA      ANG:   111.87
                CBL-0769        DS-RAS PUMP #3     0.013 KA      ANG:   111.87
                CBL-0766        MCC-00             4.658 KA      ANG:   -28.86

 RETURN SLUDGE  3P Duty: 16.046 KA AT  -64.10 DEG (    13.34 MVA) X/R:    2.35
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0075 + J  0.0155  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   16.046 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  16.046 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  16.046 KA
                CONTRIBUTIONS:  RETURN SLUDGE      0.717 KA      ANG:   -83.34
                CBL-0459        MCC-14            15.370 KA      ANG:   -63.22

 RETURN SLUDGE  3P Duty: 16.413 KA AT  -66.01 DEG (    13.65 MVA) X/R:    2.55
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0069 + J  0.0154  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   16.413 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  16.413 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  16.413 KA
                CONTRIBUTIONS:  RETURN SLUDGE      0.717 KA      ANG:   -83.34
                CBL-0460        MCC-14            15.730 KA      ANG:   -65.23

 RETURN SLUDGE  3P Duty: 16.413 KA AT  -66.01 DEG (    13.65 MVA) X/R:    2.55
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0069 + J  0.0154  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   16.413 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  16.413 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  16.413 KA
                CONTRIBUTIONS:  RETURN SLUDGE      0.717 KA      ANG:   -83.34
                CBL-0461        MCC-14            15.730 KA      ANG:   -65.23

 RETURN SLUDGE  3P Duty: 15.611 KA AT  -61.66 DEG (    12.98 MVA) X/R:    2.13
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               T H R E E   P H A S E   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
===============================================================================
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0084 + J  0.0156  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   15.611 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  15.611 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  15.611 KA
                CONTRIBUTIONS:  RETURN SLUDGE      0.717 KA      ANG:   -83.34
                CBL-0462        MCC-14            14.947 KA      ANG:   -60.64

 S.E. HEAT      3P Duty:  1.415 KA AT   -9.75 DEG (     1.18 MVA) X/R:    0.17
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1931 + J  0.0332  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.415 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.415 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.415 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.415 KA
                CBL-0722        20A-PP-1           1.415 KA      ANG:    -9.75

 SCREW CONVEYOR 3P Duty:  1.153 KA AT  -10.38 DEG (     0.96 MVA) X/R:    0.15
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2365 + J  0.0433  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.153 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.153 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.153 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.153 KA
                CONTRIBUTIONS:  SCREW CONVEYOR     0.068 KA      ANG:   -68.94
                CBL-0399        BAR SCREEN MTR     1.119 KA      ANG:    -7.43

 SCUM BLOWERS C 3P Duty:  3.115 KA AT  -12.52 DEG (     2.59 MVA) X/R:    0.22
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0869 + J  0.0193  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    3.115 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   3.115 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   3.115 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   3.115 KA
                CBL-0476        MCC-14             3.115 KA      ANG:   -12.52

 SCUM PUMP      3P Duty:  2.756 KA AT  -11.66 DEG (     2.29 MVA) X/R:    0.21
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0985 + J  0.0203  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.756 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.756 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.756 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.756 KA
                CONTRIBUTIONS:  SCUM PUMP MTR      0.007 KA      ANG:   -68.20
                CBL-0468        MCC-14             2.752 KA      ANG:   -11.54

 SEC HEAT PUMP  3P Duty:  1.057 KA AT   -8.21 DEG (     0.88 MVA) X/R:    0.14
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2596 + J  0.0375  OHMS
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              T H R E E   P H A S E   F A U L T   R E P O R T
                 (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                       PRE FAULT VOLTAGE: 1.0000
                       MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.057 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.057 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.057 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.057 KA
                CBL-0242       BUS-0251          1.057 KA      ANG:    -8.21

 SEC HEAT PUMP  3P Duty:  1.057 KA AT   -8.21 DEG (     0.88 MVA) X/R:    0.14
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2596 + J  0.0375  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.057 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.057 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.057 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.057 KA
                CBL-0241       BUS-0251          1.057 KA      ANG:    -8.21

 SER FAN A      3P Duty:  1.829 KA AT   -8.06 DEG (     1.52 MVA) X/R:    0.14
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1500 + J  0.0212  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.829 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.829 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.829 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.829 KA
                CONTRIBUTIONS:  SER FAN A MTR     0.002 KA      ANG:   -68.20
                CBL-0442       MCC-13            1.828 KA      ANG:    -8.00

 SER FAN B      3P Duty:  1.483 KA AT   -7.34 DEG (     1.23 MVA) X/R:    0.13
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1854 + J  0.0239  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.483 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.483 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.483 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.483 KA
                CONTRIBUTIONS:  SER FAN B MTR     0.002 KA      ANG:   -68.20
                CBL-0441       MCC-13            1.482 KA      ANG:    -7.26

 SER FAN C      3P Duty:  1.483 KA AT   -7.34 DEG (     1.23 MVA) X/R:    0.13
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1854 + J  0.0239  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.483 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.483 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.483 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.483 KA
                CONTRIBUTIONS:  SER FAN C MTR     0.002 KA      ANG:   -68.20
                CBL-0439       MCC-13            1.482 KA      ANG:    -7.26

 SER FAN D      3P Duty:  1.829 KA AT   -8.06 DEG (     1.52 MVA) X/R:    0.14
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1500 + J  0.0212  OHMS
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.829 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.829 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.829 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.829 KA
                CONTRIBUTIONS:  SER FAN D MTR      0.002 KA      ANG:  -68.20
                CBL-0438        MCC-13             1.828 KA      ANG:   -8.00

 SER FAN E      3P Duty:  1.829 KA AT   -8.06 DEG (     1.52 MVA) X/R:    0.14
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1500 + J  0.0212  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.829 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.829 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.829 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.829 KA
                CONTRIBUTIONS:  SER FAN E MTR      0.002 KA      ANG:  -68.20
                CBL-0436        MCC-13             1.828 KA      ANG:   -8.00

 SER FAN F      3P Duty:  1.483 KA AT   -7.34 DEG (     1.23 MVA) X/R:    0.13
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1854 + J  0.0239  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.483 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.483 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.483 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.483 KA
                CONTRIBUTIONS:  SER FAN F MTR      0.002 KA      ANG:  -68.20
                CBL-0435        MCC-13             1.482 KA      ANG:   -7.26

 SER FAN G      3P Duty:  1.829 KA AT   -8.06 DEG (     1.52 MVA) X/R:    0.14
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1500 + J  0.0212  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.829 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.829 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.829 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.829 KA
                CONTRIBUTIONS:  SER FAN G MTR      0.002 KA      ANG:  -68.20
                CBL-0446        MCC-13             1.828 KA      ANG:   -8.00

 SER FAN H      3P Duty:  1.829 KA AT   -8.06 DEG (     1.52 MVA) X/R:    0.14
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1500 + J  0.0212  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.829 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.829 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.829 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.829 KA
                CONTRIBUTIONS:  SER FAN H MTR      0.002 KA      ANG:  -68.20
                CBL-0440        MCC-13             1.828 KA      ANG:   -8.00

 SER FAN I      3P Duty:  1.483 KA AT   -7.34 DEG (     1.23 MVA) X/R:    0.13
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                THREE   PHASE   FAULT   REPORT
                (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                      PRE FAULT VOLTAGE: 1.0000
                      MODEL TRANSFORMER TAPS: NO
================================================================================
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1854 + J  0.0239  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.483 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.483 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.483 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.483 KA
                CONTRIBUTIONS:  SER FAN I MTR      0.002 KA      ANG:  -68.20
                CBL-0443        MCC-13             1.482 KA      ANG:   -7.26

 SER FAN J      3P Duty:  1.483 KA AT   -7.34 DEG (     1.23 MVA) X/R:    0.13
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1854 + J  0.0239  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.483 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.483 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.483 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.483 KA
                CONTRIBUTIONS:  SER FAN J MTR      0.002 KA      ANG:  -68.20
                CBL-0437        MCC-13             1.482 KA      ANG:   -7.26

 SER FAN K      3P Duty:  1.483 KA AT   -7.34 DEG (     1.23 MVA) X/R:    0.13
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1854 + J  0.0239  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.483 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.483 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.483 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.483 KA
                CONTRIBUTIONS:  SER FAN K MTR      0.002 KA      ANG:  -68.20
                CBL-0445        MCC-13             1.482 KA      ANG:   -7.26

 SER FAN L      3P Duty:  1.829 KA AT   -8.06 DEG (     1.52 MVA) X/R:    0.14
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1500 + J  0.0212  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.829 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.829 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.829 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.829 KA
                CONTRIBUTIONS:  SER FAN L MTR      0.002 KA      ANG:  -68.20
                CBL-0444        MCC-13             1.828 KA      ANG:   -8.00

 SEWAGE PUMP #1 3P Duty: 12.464 KA AT  -56.71 DEG (    10.36 MVA) X/R:    1.66
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0122 + J  0.0186  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   12.464 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  12.464 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  12.464 KA
                CONTRIBUTIONS:  MCC1 PUMP 1        0.980 KA      ANG:  -78.46
                CBL-0208        MCC-1             11.559 KA      ANG:  -54.91

 SEWAGE PUMP #2 3P Duty: 19.731 KA AT  -73.36 DEG (    16.40 MVA) X/R:    3.60
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               T H R E E   P H A S E   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0040 + J  0.0135  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER   19.731 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA  19.731 KA
               CBL-0420       BUS-0448           1.049 KA      ANG:   96.92
               CBL-0419       MCC-3A            18.698 KA      ANG:  -72.82

 SF-11 DISC    3P Duty:  1.281 KA AT   -8.52 DEG (     1.07 MVA) X/R:    0.15
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2139 + J  0.0320  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.281 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.281 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.281 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.281 KA
               CBL-0520       MCC-15AA           1.281 KA      ANG:   -8.52

 SF-4 DISC     3P Duty:  1.632 KA AT  -10.09 DEG (     1.36 MVA) X/R:    0.18
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1672 + J  0.0298  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.632 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.632 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.632 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.632 KA
               CBL-0518       MCC-15AA           1.632 KA      ANG:  -10.09

 SF-8 DISC     3P Duty:  1.054 KA AT   -7.50 DEG (     0.88 MVA) X/R:    0.13
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2607 + J  0.0343  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.054 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.054 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.054 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.054 KA
               CBL-0519       MCC-15AA           1.054 KA      ANG:   -7.50

 SLUDE PUMP #4 3P Duty:  5.531 KA AT  -25.04 DEG (     4.60 MVA) X/R:    0.50
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0454 + J  0.0212  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    5.531 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   5.531 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   5.531 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   5.531 KA
               CONTRIBUTIONS:  SLUDGE PUMP #4     0.045 KA      ANG:  -68.20
               CBL-0318        PUMP STATION #     5.498 KA      ANG:  -24.72

 SLUDGE CAKE PU 3P Duty: 13.131 KA AT  -66.06 DEG (    10.92 MVA) X/R:    3.12
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0086 + J  0.0193  OHMS
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           T H R E E   P H A S E   F A U L T   R E P O R T
              (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                    PRE FAULT VOLTAGE: 1.0000
                    MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER   13.131 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  13.131 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  13.131 KA
                CONTRIBUTIONS:  MTR-SLUDGE CAK     1.440 KA      ANG:   -85.50
                CBL-0644        PP-SH-2          11.783 KA      ANG:   -63.73

 SLUDGE PUMP #1 3P Duty:  7.617 KA AT  -29.70 DEG (     6.33 MVA) X/R:    0.60
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0316 + J  0.0180  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    7.617 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   7.617 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   7.617 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   7.617 KA
                CONTRIBUTIONS:  SLUDGE PUMP #1     0.045 KA      ANG:   -68.20
                CBL-0312        PUMP STATION #     7.582 KA      ANG:   -29.49

 SLUDGE PUMP #2 3P Duty:  7.617 KA AT  -29.70 DEG (     6.33 MVA) X/R:    0.60
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0316 + J  0.0180  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    7.617 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   7.617 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   7.617 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   7.617 KA
                CONTRIBUTIONS:  SLUDGE PUMP #2     0.045 KA      ANG:   -68.20
                CBL-0313        PUMP STATION #     7.582 KA      ANG:   -29.49

 SLUDGE PUMP #3 3P Duty:  5.531 KA AT  -25.04 DEG (     4.60 MVA) X/R:    0.50
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0454 + J  0.0212  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    5.531 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   5.531 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   5.531 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   5.531 KA
                CONTRIBUTIONS:  SLUDGE PUMP #3     0.045 KA      ANG:   -68.20
                CBL-0317        PUMP STATION #     5.498 KA      ANG:   -24.72

 SLUDGE PUMP #7 3P Duty:  7.640 KA AT  -30.28 DEG (     6.35 MVA) X/R:    0.63
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0313 + J  0.0183  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    7.640 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   7.640 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   7.640 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   7.640 KA
                CONTRIBUTIONS:  SLUDGE PUMP #7     0.314 KA      ANG:   -78.46
                CBL-0314        PUMP STATION #     7.435 KA      ANG:   -28.48

 SLUDGE PUMP #8 3P Duty:  5.547 KA AT  -25.64 DEG (     4.61 MVA) X/R:    0.53
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0450 + J  0.0216  OHMS
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               T H R E E   P H A S E   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    5.547 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   5.547 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   5.547 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   5.547 KA
                CONTRIBUTIONS:  SLUDGE PUMP #8     0.314 KA      ANG:   -78.46
                CBL-0319        PUMP STATION #     5.363 KA      ANG:   -22.97

 SLUDGE VALVE H 3P Duty:  4.688 KA AT  -21.54 DEG (     3.90 MVA) X/R:    0.40
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0550 + J  0.0217  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    4.688 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   4.688 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   4.688 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   4.688 KA
                CBL-0647        PP-SH-2            4.688 KA      ANG:   -21.54

 SOUTH BELT DIS 3P Duty:  2.619 KA AT   -8.12 DEG (     2.18 MVA) X/R:    0.14
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1047 + J  0.0149  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.619 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.619 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.619 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.619 KA
                CBL-0639        MCC-26             2.619 KA      ANG:    -8.12

 SOUTH BELT PUM 3P Duty:  1.103 KA AT  -10.05 DEG (     0.92 MVA) X/R:    0.16
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2475 + J  0.0439  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.103 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.103 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.103 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.103 KA
                CBL-0788        VFD-SOUTH BELT     0.022 KA      ANG:   112.83
                CBL-0790        VFD-SOUTH BELT     0.022 KA      ANG:   112.83
                CBL-0787        MCC-10             1.079 KA      ANG:    -8.07

 SOUTH CELL     3P Duty:  1.990 KA AT  -13.91 DEG (     1.65 MVA) X/R:    0.25
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1352 + J  0.0335  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.990 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.990 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.990 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.990 KA
                CONTRIBUTIONS:  MTR-SOUTH CELL     0.013 KA      ANG:   -68.20
                CBL-0755        MCC-00 BACKWAS     1.982 KA      ANG:   -13.59

 SOUTH SEC. CLA 3P Duty:  1.818 KA AT  -12.18 DEG (     1.51 MVA) X/R:    0.22
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1490 + J  0.0322  OHMS
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.818 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.818 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.818 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.818 KA
                CBL-0764        DS CLARIFIERS      1.818 KA      ANG:   -12.18

 SOUTH SEC. CLA 3P Duty:  1.818 KA AT  -12.18 DEG (     1.51 MVA) X/R:    0.22
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1490 + J  0.0322  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.818 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.818 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.818 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.818 KA
                CBL-0765        DS CLARIFIERS      1.818 KA      ANG:   -12.18

 SOUTH SEC. INF 3P Duty:  1.626 KA AT  -11.81 DEG (     1.35 MVA) X/R:    0.21
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1669 + J  0.0349  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.626 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.626 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.626 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.626 KA
                CONTRIBUTIONS:  MTR-SOUTH SEC.     0.013 KA      ANG:   -68.20
                CBL-0750        INFLUENT PUMPS     1.618 KA      ANG:   -11.41

 SOUTH SEC. INF 3P Duty:  1.626 KA AT  -11.81 DEG (     1.35 MVA) X/R:    0.21
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1669 + J  0.0349  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.626 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.626 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.626 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.626 KA
                CONTRIBUTIONS:  MTR-SOUTH SEC.     0.013 KA      ANG:   -68.20
                CBL-0751        INFLUENT PUMPS     1.618 KA      ANG:   -11.41

 SOUTH SEC. PUM 3P Duty:  1.938 KA AT  -13.42 DEG (     1.61 MVA) X/R:    0.24
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1391 + J  0.0332  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.938 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.938 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.938 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.938 KA
                CONTRIBUTIONS:  MTR-SOUTH SEC.     0.013 KA      ANG:   -68.20
                CBL-0770        DS-SLUDGE PUMP     1.930 KA      ANG:   -13.09

 SOUTH SHOP HTR 3P Duty:  5.414 KA AT  -22.81 DEG (     4.50 MVA) X/R:    0.42
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0472 + J  0.0198  OHMS
```

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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    5.414 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   5.414 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   5.414 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   5.414 KA
                CBL-0907        PP-13              5.414 KA      ANG:   -22.81

 STREET LIGHT   3P Duty:  0.500 KA AT   -7.37 DEG (     0.42 MVA) X/R:    0.13
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.5498 + J  0.0711  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.500 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.500 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.500 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.500 KA
                CBL-0762        DS-STREET LIGH     0.500 KA      ANG:    -7.37

 SUMP PUMP #1 D 3P Duty:  7.615 KA AT  -29.71 DEG (     6.33 MVA) X/R:    0.60
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0316 + J  0.0180  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    7.615 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   7.615 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   7.615 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   7.615 KA
                CONTRIBUTIONS:  SUMP PUMP #1 M     0.047 KA      ANG:   -78.46
                CBL-0315        PUMP STATION #     7.584 KA      ANG:   -29.44

 SUMP PUMP #2   3P Duty:  5.529 KA AT  -25.05 DEG (     4.60 MVA) X/R:    0.50
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0454 + J  0.0212  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    5.529 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   5.529 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   5.529 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   5.529 KA
                CONTRIBUTIONS:  SUMP PUMP #2 M     0.047 KA      ANG:   -78.46
                CBL-0320        PUMP STATION #     5.501 KA      ANG:   -24.66

 SUMP PUMP EAST 3P Duty:  5.152 KA AT  -26.28 DEG (     4.28 MVA) X/R:    0.49
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0482 + J  0.0238  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    5.152 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   5.152 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   5.152 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   5.152 KA
                CBL-SUMP PUMP   BUS-0750           5.152 KA      ANG:   153.72

 SUMP PUMP WEST 3P Duty:  5.152 KA AT  -26.28 DEG (     4.28 MVA) X/R:    0.49
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0482 + J  0.0238  OHMS
```

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              T H R E E   P H A S E   F A U L T   R E P O R T
                 (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                       PRE FAULT VOLTAGE: 1.0000
                       MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    5.152 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   5.152 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   5.152 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   5.152 KA
                CBL-SUMP PUMP   BUS-0750           5.152 KA      ANG:   153.72

 TRANSFER PUMP  3P Duty:  3.576 KA AT  -22.92 DEG (     2.97 MVA) X/R:    0.42
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0714 + J  0.0302  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    3.576 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   3.576 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   3.576 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   3.576 KA
                CONTRIBUTIONS:  TRANSFER PUMP      0.045 KA      ANG:   -68.20
                CBL-0266        MCC-22             3.544 KA      ANG:   -22.40

 TRANSFER PUMP  3P Duty:  3.576 KA AT  -22.92 DEG (     2.97 MVA) X/R:    0.42
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0714 + J  0.0302  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    3.576 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   3.576 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   3.576 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   3.576 KA
                CONTRIBUTIONS:  TRANSFER PUMP      0.045 KA      ANG:   -68.20
                CBL-0267        MCC-22             3.544 KA      ANG:   -22.40

 TRANSFER SWITC 3P Duty: 16.915 KA AT  -64.86 DEG (    14.06 MVA) X/R:    2.16
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0070 + J  0.0148  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   16.915 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  16.915 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  16.915 KA
                CBL-0852        DS-RECYCLE PUM    16.915 KA      ANG:   -64.86

 TUMBULATOR     3P Duty:  1.790 KA AT   -7.87 DEG (     1.49 MVA) X/R:    0.14
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1534 + J  0.0212  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.790 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.790 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.790 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.790 KA
                CONTRIBUTIONS:  TUMBULATOR MTR     0.009 KA      ANG:   -68.20
                CBL-0455        MCC-14             1.785 KA      ANG:    -7.62

 UNIT HEATER #1 3P Duty:  7.027 KA AT  -31.51 DEG (     5.84 MVA) X/R:    0.61
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0336 + J  0.0206  OHMS
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER    7.027 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   7.027 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   7.027 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   7.027 KA
                CBL-0279        BUS-1046           7.027 KA      ANG:  -211.51

 UNIT HEATER #2 3P Duty:  2.947 KA AT  -17.42 DEG (     2.45 MVA) X/R:    0.31
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0897 + J  0.0281  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.947 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.947 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.947 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.947 KA
                CBL-0453        BUS-1047           2.947 KA      ANG:   162.58

 UNIT HEATER #3 3P Duty:  1.675 KA AT  -13.18 DEG (     1.39 MVA) X/R:    0.23
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1611 + J  0.0377  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.675 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.675 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.675 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.675 KA
                CBL-0278        BUS-1047           1.675 KA      ANG:   166.82

 VACUUM PUMP    3P Duty:  2.262 KA AT  -13.67 DEG (     1.88 MVA) X/R:    0.24
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1190 + J  0.0289  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.262 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.262 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.262 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.262 KA
                CBL-VACUUM PUM  BUS-0750           2.262 KA      ANG:   166.33

 VALVE ACTUATOR 3P Duty:  1.205 KA AT   -6.05 DEG (     1.00 MVA) X/R:    0.11
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2287 + J  0.0242  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.205 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.205 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.205 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.205 KA
                CBL-0469        MCC-14             1.205 KA      ANG:    -6.05

 VFD-N. THICK S 3P Duty:  2.923 KA AT  -21.88 DEG (     2.43 MVA) X/R:    0.40
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0880 + J  0.0353  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.923 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.923 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.923 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.923 KA
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================

                CONTRIBUTIONS TO  VFD-N. THICK S (CONTINUED)
                CONTRIBUTIONS:  MTR-N. THICK S     0.068 KA      ANG:  -68.94
                CBL-0862        PP-12 LEFT TUB     2.877 KA      ANG:  -20.90

 VFD-N. THICK S 3P Duty:  2.322 KA AT  -17.40 DEG (     1.93 MVA) X/R:    0.31
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1139 + J  0.0357  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.322 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.322 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.322 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.322 KA
                CONTRIBUTIONS:  MTR-N. THICK S     0.034 KA      ANG:  -68.94
                CBL-0863        PP-12 LEFT TUB     2.301 KA      ANG:  -16.74

 VFD-N. THICK S 3P Duty:  3.178 KA AT  -23.20 DEG (     2.64 MVA) X/R:    0.43
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0802 + J  0.0344  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    3.178 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   3.178 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   3.178 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   3.178 KA
                CONTRIBUTIONS:  MTR-N. THICK S     0.068 KA      ANG:  -68.94
                CBL-0864        PP-12 LEFT TUB     3.131 KA      ANG:  -22.31

 VFD-PUMP 4     3P Duty: 20.432 KA AT  -72.21 DEG (    16.99 MVA) X/R:    3.22
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0041 + J  0.0129  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   20.432 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  20.432 KA
                CBL-0710        BUS-1025           0.971 KA      ANG:  101.94
                CBL-0709        DS-SEWAGE PUMP    19.467 KA      ANG:  -71.92

 VFD-S. THICK S 3P Duty:  2.809 KA AT  -21.31 DEG (     2.34 MVA) X/R:    0.39
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0919 + J  0.0358  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.809 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.809 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.809 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.809 KA
                CONTRIBUTIONS:  MTR-S. THICK S     0.068 KA      ANG:  -68.94
                CBL-0865        PP-12 LEFT TUB     2.764 KA      ANG:  -20.27

 VFD-S. THICK S 3P Duty:  2.031 KA AT  -15.90 DEG (     1.69 MVA) X/R:    0.28
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1312 + J  0.0374  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.031 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.031 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.031 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.031 KA
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
 ==============================================================================

                CONTRIBUTIONS TO  VFD-S. THICK S (CONTINUED)
                CONTRIBUTIONS:  MTR-S. THICK S     0.034 KA      ANG:   -68.94
                CBL-0866        PP-12 LEFT TUB     2.011 KA      ANG:   -15.13

 VFD-S. THICK S 3P Duty:  2.607 KA AT  -20.29 DEG (     2.17 MVA) X/R:    0.37
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0997 + J  0.0369  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    2.607 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   2.607 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   2.607 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   2.607 KA
                CONTRIBUTIONS:  MTR-S. THICK S     0.068 KA      ANG:   -68.94
                CBL-0867        PP-12 LEFT TUB     2.563 KA      ANG:   -19.16

 VFD-SOUTH BELT 3P Duty:  0.969 KA AT   -9.59 DEG (     0.81 MVA) X/R:    0.15
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2820 + J  0.0477  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.969 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.969 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.969 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.969 KA
                CBL-0789        BUS-0831           0.022 KA      ANG:  112.68
                CBL-0788        SOUTH BELT PUM     0.957 KA      ANG:    -8.47

 VFD-SOUTH BELT 3P Duty:  0.969 KA AT   -9.59 DEG (     0.81 MVA) X/R:    0.15
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2820 + J  0.0477  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    0.969 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   0.969 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   0.969 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   0.969 KA
                CBL-0791        BUS-0832           0.022 KA      ANG:  112.68
                CBL-0790        SOUTH BELT PUM     0.957 KA      ANG:    -8.47

 WASTE MIXED LI 3P Duty: 15.241 KA AT  -55.82 DEG (    12.67 MVA) X/R:    1.54
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0102 + J  0.0150  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER   15.241 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  15.241 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  15.241 KA
                CONTRIBUTIONS:  WASTE MIXED LI     0.134 KA      ANG:   -68.20
                CBL-0480        MCC-14            15.110 KA      ANG:   -55.71

 WASTE MIXED LI 3P Duty: 15.241 KA AT  -55.82 DEG (    12.67 MVA) X/R:    1.54
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0102 + J  0.0150  OHMS
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                T H R E E   P H A S E   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
                LOW VOLTAGE POWER CIRCUIT BREAKER   15.241 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA  15.241 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA  15.241 KA
                CONTRIBUTIONS:  WASTE MIXED LI     0.134 KA      ANG:   -68.20
                CBL-0479        MCC-14            15.110 KA      ANG:   -55.71

 WASTE SLUDGE P 3P Duty:  1.450 KA AT   -7.46 DEG (     1.21 MVA) X/R:    0.12
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1895 + J  0.0248  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.450 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.450 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.450 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.450 KA
                CONTRIBUTIONS:  WASTE PUMP #4      0.022 KA      ANG:   -68.20
                CBL-0456        MCC-14             1.439 KA      ANG:    -6.69

 WASTE SLUDGE P 3P Duty:  1.450 KA AT   -7.46 DEG (     1.21 MVA) X/R:    0.12
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1895 + J  0.0248  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    1.450 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   1.450 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   1.450 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   1.450 KA
                CONTRIBUTIONS:  WASTE PUMP #5      0.022 KA      ANG:   -68.20
                CBL-0457        MCC-14             1.439 KA      ANG:    -6.69

 WATER MAINT SH 3P Duty:  3.505 KA AT  -30.29 DEG (     2.91 MVA) X/R:    0.58
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0683 + J  0.0399  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    3.505 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   3.505 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   3.505 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   3.505 KA
                CBL-0288        MCC-24             3.505 KA      ANG:   -30.29

 WELDER RECEPT  3P Duty:  3.906 KA AT  -27.21 DEG (     3.25 MVA) X/R:    0.51
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.0631 + J  0.0324  OHMS
                LOW VOLTAGE POWER CIRCUIT BREAKER    3.906 KA
                MOLDED CASE CIRCUIT BREAKER < 10KA   3.906 KA
                MOLDED CASE CIRCUIT BREAKER < 20KA   3.906 KA
                MOLDED CASE CIRCUIT BREAKER > 20KA   3.906 KA
                CBL-0302        MCC-24             3.906 KA      ANG:   -27.21

 WELDER-CARBON  3P Duty:  1.997 KA AT  -12.23 DEG (     1.66 MVA) X/R:    0.22
                VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.1356 + J  0.0294  OHMS
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             T H R E E   P H A S E   F A U L T   R E P O R T
                (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                      PRE FAULT VOLTAGE: 1.0000
                      MODEL TRANSFORMER TAPS: NO
==============================================================================
              LOW VOLTAGE POWER CIRCUIT BREAKER    1.997 KA
              MOLDED CASE CIRCUIT BREAKER < 10KA   1.997 KA
              MOLDED CASE CIRCUIT BREAKER < 20KA   1.997 KA
              MOLDED CASE CIRCUIT BREAKER > 20KA   1.997 KA
              CBL-0250       MCC-21            1.997 KA      ANG:   -12.23

 WEST BANK-A  3P Duty: 21.498 KA AT  -84.68 DEG (   178.73 MVA) X/R:   11.87
              VOLTAGE:   4800.   EQUIV. IMPEDANCE=  0.0120 + J  0.1284  OHMS
              CBL-0004       BUS-0020          0.251 KA      ANG:  -261.42
              CBL-0006       BUS-0031          0.135 KA      ANG:  -252.75
              CBL-0005       BUS-0017          0.380 KA      ANG:  -259.12
              CBL-0003       MVUS-1A          20.737 KA      ANG:   -84.89

 WEST BANK-B  3P Duty: 20.159 KA AT  -84.19 DEG (   167.60 MVA) X/R:   10.78
              VOLTAGE:   4800.   EQUIV. IMPEDANCE=  0.0139 + J  0.1368  OHMS
              CBL-0011       HS-LC-4           0.222 KA      ANG:  -254.34
              CBL-0013       BUS-0021          0.132 KA      ANG:  -261.82
              CBL-0012       BUS-0037          0.086 KA      ANG:  -251.59
              CBL-0010       MVUS-1B          19.725 KA      ANG:   -84.37

 WEST FAN     3P Duty:  0.915 KA AT  -19.21 DEG (     0.76 MVA) X/R:    0.35
              VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2860 + J  0.0997  OHMS
              LOW VOLTAGE POWER CIRCUIT BREAKER    0.915 KA
              MOLDED CASE CIRCUIT BREAKER < 10KA   0.915 KA
              MOLDED CASE CIRCUIT BREAKER < 20KA   0.915 KA
              MOLDED CASE CIRCUIT BREAKER > 20KA   0.915 KA
              CONTRIBUTIONS:  WEST FAN MTR     0.009 KA      ANG:   -68.20
              CBL-0486       28-PP-01          0.909 KA      ANG:   -18.78

 WINCH #1     3P Duty:  0.873 KA AT   -7.56 DEG (     0.73 MVA) X/R:    0.12
              VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.3146 + J  0.0418  OHMS
              LOW VOLTAGE POWER CIRCUIT BREAKER    0.873 KA
              MOLDED CASE CIRCUIT BREAKER < 10KA   0.873 KA
              MOLDED CASE CIRCUIT BREAKER < 20KA   0.873 KA
              MOLDED CASE CIRCUIT BREAKER > 20KA   0.873 KA
              CONTRIBUTIONS:  WINCH #1 MTR     0.016 KA      ANG:   -68.20
              CBL-0323       MCC-4B            0.866 KA      ANG:    -6.66

 WINCH #2     3P Duty:  0.942 KA AT   -7.70 DEG (     0.78 MVA) X/R:    0.13
              VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2914 + J  0.0394  OHMS
              LOW VOLTAGE POWER CIRCUIT BREAKER    0.942 KA
              MOLDED CASE CIRCUIT BREAKER < 10KA   0.942 KA
              MOLDED CASE CIRCUIT BREAKER < 20KA   0.942 KA
              MOLDED CASE CIRCUIT BREAKER > 20KA   0.942 KA
```

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           T H R E E   P H A S E   F A U L T   R E P O R T
              (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                   PRE FAULT VOLTAGE: 1.0000
                   MODEL TRANSFORMER TAPS: NO
==============================================================================

               CONTRIBUTIONS TO  WINCH #2       (CONTINUED)
               CONTRIBUTIONS:  WINCH #2 MTR      0.016 KA      ANG:   -68.20
               CBL-0324        MCC-4B            0.935 KA      ANG:    -6.86

 WINCH #3      3P Duty:  1.023 KA AT   -7.86 DEG (     0.85 MVA) X/R:    0.13
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2683 + J  0.0371  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.023 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.023 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.023 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.023 KA
               CONTRIBUTIONS:  WINCH #3 MTR      0.016 KA      ANG:   -68.20
               CBL-0325        MCC-4B            1.016 KA      ANG:    -7.10

 WT CONVEYOR 1 3P Duty:  1.046 KA AT   -5.04 DEG (     0.87 MVA) X/R:    0.09
               VOLTAGE:    480.   EQUIV. IMPEDANCE=  0.2638 + J  0.0233  OHMS
               LOW VOLTAGE POWER CIRCUIT BREAKER    1.046 KA
               MOLDED CASE CIRCUIT BREAKER < 10KA   1.046 KA
               MOLDED CASE CIRCUIT BREAKER < 20KA   1.046 KA
               MOLDED CASE CIRCUIT BREAKER > 20KA   1.046 KA
               CBL-0617        MCC-27            1.046 KA      ANG:    -5.04
```

```
                 U N B A L A N C E D   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
===============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
===============================================================================

04-LP-01 XFER  3P Duty:  11.813  1.06 Z1=  10.1818        11.845    11.829
              SLG DUTY:   8.754  0.73 Z2=  10.1818         8.756
   480. VOLTS    LN/LN:  10.231       Z0=  21.4887
             LN/LN/GND: 11.660 (  6.852 GND RETURN KA)

06-LP-01       3P Duty:   7.912  3.02 Z1=  35.0836         8.844     8.385
              SLG DUTY:   8.547  2.84 Z2=  35.0836         9.436
   208. VOLTS    LN/LN:   6.852       Z0=  27.3053
             LN/LN/GND:  8.431 (  9.289 GND RETURN KA)

06-LP-02       3P Duty:   6.738  2.04 Z1=  41.1941         7.043     6.891
              SLG DUTY:   6.486  1.58 Z2=  41.1941         6.605
   208. VOLTS    LN/LN:   5.835       Z0=  47.3689
             LN/LN/GND:  7.155 (  6.186 GND RETURN KA)

06-LP-03       3P Duty:   6.088  1.73 Z1=  45.5899         6.247     6.168
              SLG DUTY:   5.501  1.28 Z2=  45.5899         5.541
   208. VOLTS    LN/LN:   5.273       Z0=  62.3416
             LN/LN/GND:  6.353 (  4.946 GND RETURN KA)

06-LP-04       3P Duty:   3.007  0.52 Z1=  92.2982         3.007     3.007
              SLG DUTY:   1.988  0.34 Z2=  92.2982         1.988
   208. VOLTS    LN/LN:   2.604       Z0= 238.2092
             LN/LN/GND:  2.864 (  1.472 GND RETURN KA)

06-LP-05       3P Duty:   2.680  0.47 Z1= 103.5562         2.680     2.680
              SLG DUTY:   1.739  0.31 Z2= 103.5562         1.739
   208. VOLTS    LN/LN:   2.321       Z0= 275.3964
             LN/LN/GND:  2.534 (  1.278 GND RETURN KA)

06-LP-06       3P Duty:   4.239  0.91 Z1=  65.4882         4.243     4.241
              SLG DUTY:   3.143  0.62 Z2=  65.4882         3.144
   208. VOLTS    LN/LN:   3.671       Z0= 138.1318
             LN/LN/GND:  4.188 (  2.460 GND RETURN KA)

06-LP-07       3P Duty:   2.012  0.38 Z1= 137.9722         2.012     2.012
              SLG DUTY:   1.262  0.25 Z2= 137.9722         1.262
   208. VOLTS    LN/LN:   1.742       Z0= 387.1495
             LN/LN/GND:  1.874 (  0.915 GND RETURN KA)
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                U N B A L A N C E D   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                       PRE FAULT VOLTAGE: 1.0000
                       MODEL TRANSFORMER TAPS: NO
===============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
===============================================================================

11-LP-01       3P Duty:   0.514  2.30 Z1= 539.5913        0.547     0.531
              SLG DUTY:   0.515  2.27 Z2= 539.5913        0.546
   208. VOLTS    LN/LN:   0.445       Z0= 538.3408
             LN/LN/GND:  0.516 (  0.515 GND RETURN KA)

11-LP-01A      3P Duty:   0.413  1.24 Z1= 671.4405        0.413     0.415
              SLG DUTY:   0.355  0.94 Z2= 671.4405        0.355
   208. VOLTS    LN/LN:   0.358       Z0=1034.8884
             LN/LN/GND:  0.422 (  0.307 GND RETURN KA)

12A-PP-01      3P Duty:  11.085  1.40 Z1=  10.8506       11.209    11.147
              SLG DUTY:   8.266  1.07 Z2=  10.8506        8.289
   480. VOLTS    LN/LN:   9.600       Z0=  22.3103
             LN/LN/GND: 10.752 (  6.538 GND RETURN KA)

15 KVAC CAP    3P Duty:  12.948  0.91 Z1=   9.2898       12.960    12.954
              SLG DUTY:   8.557  0.66 Z2=   9.2898        8.557
   480. VOLTS    LN/LN:  11.213       Z0=  23.9467
             LN/LN/GND: 12.296 (  6.340 GND RETURN KA)

15-LP-01       3P Duty:   0.845  2.43 Z1= 328.4690        0.906     0.876
              SLG DUTY:   0.849  2.40 Z2= 328.4690        0.908
   208. VOLTS    LN/LN:   0.732       Z0= 324.3622
             LN/LN/GND:  0.850 (  0.852 GND RETURN KA)

15-LP-02       3P Duty:   0.808  2.13 Z1= 343.4790        0.849     0.829
              SLG DUTY:   0.810  2.08 Z2= 343.4790        0.849
   208. VOLTS    LN/LN:   0.700       Z0= 340.7776
             LN/LN/GND:  0.815 (  0.812 GND RETURN KA)

2-LP-1         3P Duty:   1.031  2.44 Z1= 269.3055        1.107     1.069
              SLG DUTY:   1.045  2.49 Z2= 269.3055        1.126
   208. VOLTS    LN/LN:   0.893       Z0= 258.1525
             LN/LN/GND:  1.045 (  1.060 GND RETURN KA)

2-LP-2         3P Duty:   0.972  1.92 Z1= 285.5445        1.008     0.990
              SLG DUTY:   1.006  2.10 Z2= 285.5445        1.055
   208. VOLTS    LN/LN:   0.842       Z0= 258.1525
             LN/LN/GND:  1.021 (  1.040 GND RETURN KA)
```

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                 U N B A L A N C E D   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
===============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
===============================================================================

2-LP-3         3P Duty:   0.972  1.92 Z1= 285.5445        1.008     0.990
              SLG DUTY:   1.006  2.10 Z2= 285.5445        1.055
   208. VOLTS    LN/LN:   0.842       Z0= 258.1525
             LN/LN/GND:  1.021 (  1.040 GND RETURN KA)

2-LP-4         3P Duty:   1.015  2.38 Z1= 273.3749        1.086     1.051
              SLG DUTY:   1.021  2.38 Z2= 273.3749        1.091
   208. VOLTS    LN/LN:   0.879       Z0= 269.0657
             LN/LN/GND:  1.018 (  1.026 GND RETURN KA)

20A-PP-01      3P Duty:   6.985  1.23 Z1=  17.2205        7.027     7.006
              SLG DUTY:   5.075  0.93 Z2=  17.2205        5.081
   480. VOLTS    LN/LN:   6.049       Z0=  37.2894
             LN/LN/GND:  6.752 (  3.952 GND RETURN KA)

20A-PP-1       3P Duty:   9.569  1.60 Z1=  12.5704        9.754     9.661
              SLG DUTY:   7.651  1.20 Z2=  12.5704        7.692
   480. VOLTS    LN/LN:   8.287       Z0=  22.4942
             LN/LN/GND:  9.491 (  6.312 GND RETURN KA)

24-LP-01       3P Duty:   2.812  2.17 Z1=  98.6930        2.965     2.889
              SLG DUTY:   2.906  2.28 Z2=  98.6930        3.085
   208. VOLTS    LN/LN:   2.436       Z0=  89.2664
             LN/LN/GND:  2.909 (  3.005 GND RETURN KA)

24-LP-02       3P Duty:   2.135  0.28 Z1=  56.3488        2.135     2.135
              SLG DUTY:   1.338  0.23 Z2=  56.3488        1.338
   480. VOLTS    LN/LN:   1.849       Z0= 157.2287
             LN/LN/GND:  1.940 (  0.973 GND RETURN KA)

28-LP-01       3P Duty:   3.505  2.63 Z1=  79.1996        3.812     3.660
              SLG DUTY:   4.151  2.63 Z2=  79.1996        4.515
   208. VOLTS    LN/LN:   3.035       Z0=  42.2262
             LN/LN/GND:  3.962 (  5.088 GND RETURN KA)

28-PP-01       3P Duty:   3.263  2.76 Z1=  36.8623        3.582     3.424
              SLG DUTY:   3.220  2.71 Z2=  36.8623        3.523
   480. VOLTS    LN/LN:   2.826       Z0=  38.3428
             LN/LN/GND:  3.256 (  3.178 GND RETURN KA)
```

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                  U N B A L A N C E D   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

2A-LP-01       3P Duty:   0.915  2.05 Z1= 303.2516        0.957     0.936
              SLG DUTY:   0.921  1.98 Z2= 303.2516        0.959
   208. VOLTS    LN/LN:   0.793       Z0= 298.0501
             LN/LN/GND:  0.929 (  0.926 GND RETURN KA)

45D WATER CIRC 3P Duty:   3.733  0.31 Z1=  32.2248        3.733     3.733
              SLG DUTY:   2.263  0.21 Z2=  32.2248        2.263
   480. VOLTS    LN/LN:   3.233       Z0=  95.4885
             LN/LN/GND:  3.434 (  1.619 GND RETURN KA)

AER. TANK AND  3P Duty:   1.958  0.17 Z1=  61.4211        1.958     1.958
              SLG DUTY:   1.147  0.13 Z2=  61.4211        1.147
   480. VOLTS    LN/LN:   1.696       Z0= 191.9839
             LN/LN/GND:  1.765 (  0.810 GND RETURN KA)

AERATION RECIR 3P Duty:   0.682  0.18 Z1= 176.4295        0.682     0.682
              SLG DUTY:   0.381  0.12 Z2= 176.4295        0.381
   480. VOLTS    LN/LN:   0.590       Z0= 597.0615
             LN/LN/GND:  0.624 (  0.264 GND RETURN KA)

AERATION RECIR 3P Duty:   0.682  0.18 Z1= 176.4295        0.682     0.682
              SLG DUTY:   0.381  0.12 Z2= 176.4295        0.381
   480. VOLTS    LN/LN:   0.590       Z0= 597.0615
             LN/LN/GND:  0.624 (  0.264 GND RETURN KA)

AERATION RECIR 3P Duty:   0.944  0.19 Z1= 127.4281        0.944     0.944
              SLG DUTY:   0.537  0.12 Z2= 127.4281        0.537
   480. VOLTS    LN/LN:   0.817       Z0= 419.1205
             LN/LN/GND:  0.862 (  0.374 GND RETURN KA)

AERATION RECIR 3P Duty:   0.944  0.19 Z1= 127.4281        0.944     0.944
              SLG DUTY:   0.537  0.12 Z2= 127.4281        0.537
   480. VOLTS    LN/LN:   0.817       Z0= 419.1205
             LN/LN/GND:  0.862 (  0.374 GND RETURN KA)

AERATION RECIR 3P Duty:   1.179  0.20 Z1= 101.9899        1.179     1.179
              SLG DUTY:   0.677  0.13 Z2= 101.9899        0.677
   480. VOLTS    LN/LN:   1.021       Z0= 330.1577
             LN/LN/GND:  1.076 (  0.474 GND RETURN KA)
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              U N B A L A N C E D   F A U L T   R E P O R T
                (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                     PRE FAULT VOLTAGE: 1.0000
                     MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

AERATION RECIR 3P Duty:  1.818  0.24 Z1=  66.1771        1.818     1.818
              SLG DUTY:  1.061  0.16 Z2=  66.1771        1.061
   480. VOLTS    LN/LN:  1.574       Z0= 208.4631
            LN/LN/GND:  1.661 (  0.748 GND RETURN KA)

AERATION RECIR 3P Duty:  1.279  0.21 Z1=  94.0251        1.279     1.279
              SLG DUTY:  0.737  0.14 Z2=  94.0251        0.737
   480. VOLTS    LN/LN:  1.108       Z0= 302.9570
            LN/LN/GND:  1.167 (  0.516 GND RETURN KA)

AERATION RECIR 3P Duty:  0.992  0.19 Z1= 121.2194        0.992     0.992
              SLG DUTY:  0.565  0.13 Z2= 121.2194        0.565
   480. VOLTS    LN/LN:  0.859       Z0= 397.4735
            LN/LN/GND:  0.906 (  0.394 GND RETURN KA)

AERATION RECIR 3P Duty:  0.814  0.19 Z1= 147.7195        0.814     0.814
              SLG DUTY:  0.460  0.12 Z2= 147.7195        0.460
   480. VOLTS    LN/LN:  0.705       Z0= 491.9995
            LN/LN/GND:  0.744 (  0.319 GND RETURN KA)

AERATION TANK  3P Duty:  0.620  0.10 Z1= 194.0763        0.620     0.620
              SLG DUTY:  0.362  0.08 Z2= 194.0763        0.362
   480. VOLTS    LN/LN:  0.537       Z0= 608.5087
            LN/LN/GND:  0.555 (  0.256 GND RETURN KA)

AERATION VALVE 3P Duty:  0.354  0.09 Z1= 339.5701        0.354     0.354
              SLG DUTY:  0.206  0.07 Z2= 339.5701        0.206
   480. VOLTS    LN/LN:  0.307       Z0=1069.2411
            LN/LN/GND:  0.317 (  0.146 GND RETURN KA)

AERATION VALVE 3P Duty:  0.417  0.09 Z1= 288.2300        0.417     0.417
              SLG DUTY:  0.243  0.07 Z2= 288.2300        0.243
   480. VOLTS    LN/LN:  0.361       Z0= 907.5793
            LN/LN/GND:  0.374 (  0.172 GND RETURN KA)

AERATION VALVE 3P Duty:  0.508  0.09 Z1= 236.8938        0.508     0.508
              SLG DUTY:  0.296  0.07 Z2= 236.8938        0.296
   480. VOLTS    LN/LN:  0.440       Z0= 745.9187
            LN/LN/GND:  0.455 (  0.209 GND RETURN KA)
```

```
               U N B A L A N C E D   F A U L T   R E P O R T
                 (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                       PRE FAULT VOLTAGE: 1.0000
                       MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

AERATION VALVE 3P Duty:   0.648  0.10 Z1= 185.5647        0.648     0.648
              SLG DUTY:   0.378  0.08 Z2= 185.5647        0.378
   480. VOLTS    LN/LN:   0.561       Z0= 584.2599
             LN/LN/GND:  0.581 (  0.267 GND RETURN KA)

AERATION VALVE 3P Duty:   0.896  0.11 Z1= 134.2512        0.896     0.896
              SLG DUTY:   0.522  0.08 Z2= 134.2512        0.522
   480. VOLTS    LN/LN:   0.776       Z0= 422.6051
             LN/LN/GND:  0.805 (  0.368 GND RETURN KA)

AERATION VALVE 3P Duty:   1.531  0.13 Z1=  78.5457        1.531     1.531
              SLG DUTY:   0.898  0.10 Z2=  78.5457        0.898
   480. VOLTS    LN/LN:   1.326       Z0= 244.7995
             LN/LN/GND:  1.377 (  0.635 GND RETURN KA)

AERATION VALVE 3P Duty:   1.028  0.11 Z1= 117.0149        1.028     1.028
              SLG DUTY:   0.601  0.09 Z2= 117.0149        0.601
   480. VOLTS    LN/LN:   0.890       Z0= 366.0281
             LN/LN/GND:  0.922 (  0.425 GND RETURN KA)

AERATION VALVE 3P Duty:   0.773  0.10 Z1= 155.5052        0.773     0.773
              SLG DUTY:   0.452  0.08 Z2= 155.5052        0.452
   480. VOLTS    LN/LN:   0.670       Z0= 487.2664
             LN/LN/GND:  0.693 (  0.319 GND RETURN KA)

AERATION VALVE 3P Duty:   0.620  0.10 Z1= 194.0042        0.620     0.620
              SLG DUTY:   0.362  0.08 Z2= 194.0042        0.362
   480. VOLTS    LN/LN:   0.537       Z0= 608.5087
             LN/LN/GND:  0.555 (  0.256 GND RETURN KA)

AERATION VALVE 3P Duty:   3.431  0.20 Z1=  35.0608        3.431     3.431
              SLG DUTY:   2.034  0.14 Z2=  35.0608        2.034
   480. VOLTS    LN/LN:   2.971       Z0= 107.4601
             LN/LN/GND:  3.114 (  1.444 GND RETURN KA)

AIR COMPRESSOR 3P Duty:   1.761  0.25 Z1=  68.2854        1.761     1.761
              SLG DUTY:   1.082  0.20 Z2=  68.2854        1.082
   480. VOLTS    LN/LN:   1.525       Z0= 197.3284
             LN/LN/GND:  1.600 (  0.780 GND RETURN KA)
```

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                  U N B A L A N C E D   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

AIR DUCT HEATE 3P Duty:  12.152  2.49 Z1=   9.8977       13.088    12.625
              SLG DUTY:  10.715  1.99 Z2=   9.8977       11.164
   480. VOLTS    LN/LN:  10.524       Z0=  14.0419
             LN/LN/GND: 12.169 (  9.536 GND RETURN KA)

AIR DUCT HEATE 3P Duty:   7.150  0.86 Z1=  16.8231        7.155     7.152
              SLG DUTY:   4.974  0.62 Z2=  16.8231        4.974
   480. VOLTS    LN/LN:   6.192       Z0=  39.6711
             LN/LN/GND:  6.890 (  3.775 GND RETURN KA)

ANAEROBIC MIX  3P Duty:   1.665  0.34 Z1=  72.2505        1.665     1.665
              SLG DUTY:   0.974  0.24 Z2=  72.2505        0.974
   480. VOLTS    LN/LN:   1.442       Z0= 226.9902
             LN/LN/GND:  1.525 (  0.687 GND RETURN KA)

ANAEROBIC MIX  3P Duty:   1.949  0.35 Z1=  61.7014        1.949     1.949
              SLG DUTY:   1.149  0.25 Z2=  61.7014        1.149
   480. VOLTS    LN/LN:   1.688       Z0= 191.4731
             LN/LN/GND:  1.788 (  0.813 GND RETURN KA)

ANAEROBIC MIX  3P Duty:   1.561  0.26 Z1=  77.0295        1.561     1.561
              SLG DUTY:   0.908  0.18 Z2=  77.0295        0.908
   480. VOLTS    LN/LN:   1.352       Z0= 244.2881
             LN/LN/GND:  1.427 (  0.639 GND RETURN KA)

ANAEROBIC MIX  3P Duty:   1.992  0.28 Z1=  60.3738        1.992     1.992
              SLG DUTY:   1.171  0.19 Z2=  60.3738        1.171
   480. VOLTS    LN/LN:   1.725       Z0= 188.2083
             LN/LN/GND:  1.824 (  0.827 GND RETURN KA)

ANAEROBIC MIX  3P Duty:   2.763  0.33 Z1=  43.5270        2.763     2.763
              SLG DUTY:   1.651  0.22 Z2=  43.5270        1.651
   480. VOLTS    LN/LN:   2.393       Z0= 132.1559
             LN/LN/GND:  2.542 (  1.174 GND RETURN KA)

ANEROBIC MIX P 3P Duty:   3.016  0.42 Z1=  39.8796        3.016     3.016
              SLG DUTY:   1.823  0.30 Z2=  39.8796        1.823
   480. VOLTS    LN/LN:   2.612       Z0= 118.9243
             LN/LN/GND:  2.788 (  1.302 GND RETURN KA)
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                U N B A L A N C E D   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

ANEROBIC MIX P 3P Duty:   2.178  0.37 Z1=  55.2377        2.178     2.178
              SLG DUTY:   1.291  0.26 Z2=  55.2377        1.291
   480. VOLTS    LN/LN:   1.886       Z0= 169.9346
             LN/LN/GND:  2.001 (  0.915 GND RETURN KA)

ANEROBIC MIX P 3P Duty:   1.708  0.35 Z1=  70.4409        1.708     1.708
              SLG DUTY:   1.000  0.25 Z2=  70.4409        1.000
   480. VOLTS    LN/LN:   1.479       Z0= 220.9798
             LN/LN/GND:  1.565 (  0.705 GND RETURN KA)

ANEROBIC MIX P 3P Duty:   1.408  0.33 Z1=  85.4441        1.408     1.408
              SLG DUTY:   0.817  0.24 Z2=  85.4441        0.817
   480. VOLTS    LN/LN:   1.219       Z0= 272.0404
             LN/LN/GND:  1.289 (  0.574 GND RETURN KA)

ANOXIC MIX PUM 3P Duty:   1.706  0.33 Z1=  70.5028        1.706     1.706
              SLG DUTY:   1.007  0.24 Z2=  70.5028        1.007
   480. VOLTS    LN/LN:   1.477       Z0= 218.1103
             LN/LN/GND:  1.560 (  0.713 GND RETURN KA)

ANOXIC MIX PUM 3P Duty:   2.015  0.34 Z1=  59.6885        2.015     2.015
              SLG DUTY:   1.198  0.25 Z2=  59.6885        1.198
   480. VOLTS    LN/LN:   1.745       Z0= 182.5951
             LN/LN/GND:  1.846 (  0.850 GND RETURN KA)

ANOXIC MIX PUM 3P Duty:   1.630  0.25 Z1=  73.7826        1.630     1.630
              SLG DUTY:   0.957  0.18 Z2=  73.7826        0.957
   480. VOLTS    LN/LN:   1.412       Z0= 230.2667
             LN/LN/GND:  1.487 (  0.676 GND RETURN KA)

ANOXIC MIX PUM 3P Duty:   2.121  0.28 Z1=  56.7196        2.121     2.121
              SLG DUTY:   1.257  0.20 Z2=  56.7196        1.257
   480. VOLTS    LN/LN:   1.837       Z0= 174.1916
             LN/LN/GND:  1.940 (  0.892 GND RETURN KA)

ANOXIC MIX PUM 3P Duty:   3.061  0.35 Z1=  39.2968        3.061     3.061
              SLG DUTY:   1.840  0.23 Z2=  39.2968        1.840
   480. VOLTS    LN/LN:   2.651       Z0= 118.1517
             LN/LN/GND:  2.822 (  1.312 GND RETURN KA)
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                 U N B A L A N C E D   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
===============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
===============================================================================

ANOXIC MIX PUM 3P Duty:   3.354  0.44 Z1=  35.8613        3.354     3.354
              SLG DUTY:   2.044  0.31 Z2=  35.8613        2.044
   480. VOLTS    LN/LN:   2.905       Z0= 105.6293
             LN/LN/GND:  3.108 (  1.463 GND RETURN KA)

ANOXIC MIX PUM 3P Duty:   2.347  0.38 Z1=  51.2431        2.347     2.347
              SLG DUTY:   1.397  0.27 Z2=  51.2431        1.397
   480. VOLTS    LN/LN:   2.033       Z0= 156.6228
             LN/LN/GND:  2.159 (  0.992 GND RETURN KA)

ANOXIC MIX PUM 3P Duty:   1.809  0.35 Z1=  66.4930        1.809     1.809
              SLG DUTY:   1.062  0.25 Z2=  66.4930        1.062
   480. VOLTS    LN/LN:   1.567       Z0= 207.6617
             LN/LN/GND:  1.658 (  0.750 GND RETURN KA)

ANOXIC MIX PUM 3P Duty:   1.475  0.34 Z1=  81.5507        1.475     1.475
              SLG DUTY:   0.858  0.24 Z2=  81.5507        0.858
   480. VOLTS    LN/LN:   1.277       Z0= 258.7192
             LN/LN/GND:  1.350 (  0.603 GND RETURN KA)

AUGER #1       3P Duty:   0.922  0.14 Z1= 130.4199        0.922     0.922
              SLG DUTY:   0.538  0.09 Z2= 130.4199        0.538
   480. VOLTS    LN/LN:   0.799       Z0= 410.8733
             LN/LN/GND:  0.834 (  0.379 GND RETURN KA)

AUGER #2       3P Duty:   0.999  0.14 Z1= 120.4355        0.999     0.999
              SLG DUTY:   0.583  0.10 Z2= 120.4355        0.583
   480. VOLTS    LN/LN:   0.865       Z0= 378.5444
             LN/LN/GND:  0.903 (  0.411 GND RETURN KA)

AUGER #3       3P Duty:   0.999  0.14 Z1= 120.4355        0.999     0.999
              SLG DUTY:   0.583  0.10 Z2= 120.4355        0.583
   480. VOLTS    LN/LN:   0.865       Z0= 378.5444
             LN/LN/GND:  0.903 (  0.411 GND RETURN KA)

BANDSCREEN #1  3P Duty:   0.923  0.14 Z1= 130.3642        0.923     0.923
              SLG DUTY:   0.538  0.09 Z2= 130.3642        0.538
   480. VOLTS    LN/LN:   0.799       Z0= 410.8733
             LN/LN/GND:  0.834 (  0.379 GND RETURN KA)
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                 U N B A L A N C E D   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
===============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
===============================================================================

BANDSCREEN #2  3P Duty:   0.999  0.14 Z1= 120.3841         0.999     0.999
              SLG DUTY:   0.583  0.10 Z2= 120.3841         0.583
   480. VOLTS    LN/LN:   0.865       Z0= 378.5444
             LN/LN/GND:  0.903 (  0.411 GND RETURN KA)

BANDSCREEN #3  3P Duty:   0.999  0.14 Z1= 120.3841         0.999     0.999
              SLG DUTY:   0.583  0.10 Z2= 120.3841         0.583
   480. VOLTS    LN/LN:   0.865       Z0= 378.5444
             LN/LN/GND:  0.903 (  0.411 GND RETURN KA)

BAR SCREEN #1  3P Duty:   0.862  0.12 Z1= 139.5040         0.862     0.862
              SLG DUTY:   0.502  0.09 Z2= 139.5040         0.502
   480. VOLTS    LN/LN:   0.747       Z0= 439.5718
             LN/LN/GND:  0.775 (  0.354 GND RETURN KA)

BAR SCREEN #1  3P Duty:   0.773  0.11 Z1= 155.5637         0.773     0.773
              SLG DUTY:   0.450  0.08 Z2= 155.5637         0.450
   480. VOLTS    LN/LN:   0.670       Z0= 490.7391
             LN/LN/GND:  0.695 (  0.317 GND RETURN KA)

BAR SCREEN #2  3P Duty:   1.009  0.12 Z1= 119.1701         1.009     1.009
              SLG DUTY:   0.589  0.09 Z2= 119.1701         0.589
   480. VOLTS    LN/LN:   0.874       Z0= 374.9162
             LN/LN/GND:  0.908 (  0.415 GND RETURN KA)

BAR SCREEN #2  3P Duty:   0.889  0.11 Z1= 135.2440         0.889     0.889
              SLG DUTY:   0.518  0.09 Z2= 135.2440         0.518
   480. VOLTS    LN/LN:   0.770       Z0= 426.0794
             LN/LN/GND:  0.800 (  0.366 GND RETURN KA)

BAR SCREEN #3  3P Duty:   1.009  0.12 Z1= 119.1701         1.009     1.009
              SLG DUTY:   0.589  0.09 Z2= 119.1701         0.589
   480. VOLTS    LN/LN:   0.874       Z0= 374.9162
             LN/LN/GND:  0.908 (  0.415 GND RETURN KA)

BAR SCREEN #3  3P Duty:   0.889  0.11 Z1= 135.2440         0.889     0.889
              SLG DUTY:   0.518  0.09 Z2= 135.2440         0.518
   480. VOLTS    LN/LN:   0.770       Z0= 426.0794
             LN/LN/GND:  0.800 (  0.366 GND RETURN KA)
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                  U N B A L A N C E D   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

BAR SCREEN MTR 3P Duty:   1.602  0.17 Z1=  75.0837        1.602     1.602
              SLG DUTY:   0.930  0.12 Z2=  75.0837        0.930
   480. VOLTS    LN/LN:   1.387       Z0= 238.1663
             LN/LN/GND:  1.451 (  0.655 GND RETURN KA)

BELT PRESS DIS 3P Duty:   2.619  0.14 Z1=  45.9235        2.619     2.619
              SLG DUTY:   1.543  0.10 Z2=  45.9235        1.543
   480. VOLTS    LN/LN:   2.268       Z0= 142.0861
             LN/LN/GND:  2.365 (  1.093 GND RETURN KA)

BLOWER #1      3P Duty:  12.740  1.29 Z1=   9.4412       12.837    12.789
              SLG DUTY:   9.879  0.90 Z2=   9.4412        9.888
   480. VOLTS    LN/LN:  11.033       Z0=  18.1426
             LN/LN/GND: 12.660 (  7.962 GND RETURN KA)

BLOWER #3      3P Duty:  13.707  1.39 Z1=   8.7754       13.854    13.781
              SLG DUTY:  11.056  1.01 Z2=   8.7754       11.078
   480. VOLTS    LN/LN:  11.870       Z0=  15.4939
             LN/LN/GND: 13.723 (  9.153 GND RETURN KA)

BLOWER #5      3P Duty:  15.512  1.71 Z1=   7.7541       15.902    15.708
              SLG DUTY:  13.395  1.31 Z2=   7.7541       13.505
   480. VOLTS    LN/LN:  13.434       Z0=  11.6840
             LN/LN/GND: 15.712 ( 11.677 GND RETURN KA)

BLOWER 1 CP    3P Duty:   2.829  0.32 Z1=  42.5192        2.829     2.829
              SLG DUTY:   1.716  0.23 Z2=  42.5192        1.716
   480. VOLTS    LN/LN:   2.450       Z0= 125.7908
             LN/LN/GND:  2.597 (  1.228 GND RETURN KA)

BLOWER 2 CP    3P Duty:   1.612  0.18 Z1=  74.5982        1.612     1.612
              SLG DUTY:   0.955  0.12 Z2=  74.5982        0.955
   480. VOLTS    LN/LN:   1.396       Z0= 228.8862
             LN/LN/GND:  1.460 (  0.678 GND RETURN KA)

BLOWER 3 CP    3P Duty:   1.952  0.26 Z1=  61.6077        1.952     1.952
              SLG DUTY:   1.161  0.19 Z2=  61.6077        1.161
   480. VOLTS    LN/LN:   1.691       Z0= 188.2083
             LN/LN/GND:  1.780 (  0.824 GND RETURN KA)
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                 U N B A L A N C E D   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

BLOWER 4 CP    3P Duty:   1.015  0.14 Z1= 118.5337        1.015     1.015
              SLG DUTY:   0.591  0.10 Z2= 118.5337        0.591
   480. VOLTS    LN/LN:   0.879       Z0= 373.7440
             LN/LN/GND:  0.918 (  0.417 GND RETURN KA)

BLOWER ROOM    3P Duty:   6.173  0.98 Z1=  19.4860        6.183     6.178
              SLG DUTY:   4.281  0.73 Z2=  19.4860        4.282
   480. VOLTS    LN/LN:   5.346       Z0=  46.0458
             LN/LN/GND:  5.915 (  3.250 GND RETURN KA)

BOILER CIRC PU 3P Duty:   1.447  0.17 Z1=  83.1390        1.447     1.447
              SLG DUTY:   0.846  0.12 Z2=  83.1390        0.846
   480. VOLTS    LN/LN:   1.253       Z0= 260.6108
             LN/LN/GND:  1.313 (  0.597 GND RETURN KA)

BOILER CIRC PU 3P Duty:   1.447  0.17 Z1=  83.1390        1.447     1.447
              SLG DUTY:   0.846  0.12 Z2=  83.1390        0.846
   480. VOLTS    LN/LN:   1.253       Z0= 260.6108
             LN/LN/GND:  1.313 (  0.597 GND RETURN KA)

BOILER CTRL/GA 3P Duty:   2.831  0.27 Z1=  42.4820        2.831     2.831
              SLG DUTY:   2.368  0.26 Z2=  42.4820        2.368
   480. VOLTS    LN/LN:   2.452       Z0=  67.3999
             LN/LN/GND:  2.673 (  2.036 GND RETURN KA)

BOLIMO CONTROL 3P Duty:   2.965  0.30 Z1=  40.5651        2.965     2.965
              SLG DUTY:   1.800  0.21 Z2=  40.5651        1.800
   480. VOLTS    LN/LN:   2.568       Z0= 119.8225
             LN/LN/GND:  2.722 (  1.289 GND RETURN KA)

BRIDGE CRANE   3P Duty:   4.920  0.61 Z1=  24.4457        4.921     4.920
              SLG DUTY:   3.470  0.55 Z2=  24.4457        3.470
   480. VOLTS    LN/LN:   4.261       Z0=  55.1735
             LN/LN/GND:  4.546 (  2.678 GND RETURN KA)

CAPACITOR DISC 3P Duty:  13.864  3.01 Z1=   8.6756       15.485    14.686
              SLG DUTY:  12.167  2.43 Z2=   8.6756       13.054
   480. VOLTS    LN/LN:  12.007       Z0=  12.3989
             LN/LN/GND: 13.739 ( 10.807 GND RETURN KA)
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                  U N B A L A N C E D   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

CARBON FEED PU 3P Duty:   1.399  0.19 Z1=  85.9563        1.399     1.399
              SLG DUTY:   1.133  0.19 Z2=  85.9563        1.133
   480. VOLTS    LN/LN:   1.212       Z0= 146.6329
             LN/LN/GND:  1.313 (  0.952 GND RETURN KA)

CARBON FEED PU 3P Duty:   1.399  0.19 Z1=  85.9563        1.399     1.399
              SLG DUTY:   1.133  0.19 Z2=  85.9563        1.133
   480. VOLTS    LN/LN:   1.212       Z0= 146.6329
             LN/LN/GND:  1.313 (  0.952 GND RETURN KA)

CARBON SCRUBBE 3P Duty:   1.432  0.21 Z1=  83.9768        1.432     1.432
              SLG DUTY:   0.835  0.15 Z2=  83.9768        0.835
   480. VOLTS    LN/LN:   1.240       Z0= 264.8525
             LN/LN/GND:  1.301 (  0.588 GND RETURN KA)

CARBON SLURRY  3P Duty:   3.900  0.50 Z1=  30.8412        3.900     3.900
              SLG DUTY:   2.393  0.34 Z2=  30.8412        2.393
   480. VOLTS    LN/LN:   3.378       Z0=  89.9581
             LN/LN/GND:  3.636 (  1.717 GND RETURN KA)

CENTER CELL    3P Duty:   1.990  0.25 Z1=  60.4568        1.990     1.990
              SLG DUTY:   1.186  0.18 Z2=  60.4568        1.186
   480. VOLTS    LN/LN:   1.723       Z0= 183.8424
             LN/LN/GND:  1.813 (  0.843 GND RETURN KA)

CENTRIFUGE #2  3P Duty:  12.715  2.37 Z1=   9.4596       13.582    13.152
              SLG DUTY:   9.113  1.63 Z2=   9.4596        9.304
   480. VOLTS    LN/LN:  11.012       Z0=  20.9437
             LN/LN/GND: 12.178 (  7.056 GND RETURN KA)

CENTRIFUGE #2  3P Duty:   0.978  0.08 Z1= 122.9951        0.978     0.978
              SLG DUTY:   0.572  0.06 Z2= 122.9951        0.572
   480. VOLTS    LN/LN:   0.847       Z0= 385.2097
             LN/LN/GND:  0.876 (  0.404 GND RETURN KA)

CENTRIFUGE #4  3P Duty:  12.254  2.34 Z1=   9.8155       13.066    12.663
              SLG DUTY:   8.716  1.61 Z2=   9.8155        8.891
   480. VOLTS    LN/LN:  10.612       Z0=  22.0437
             LN/LN/GND: 11.716 (  6.721 GND RETURN KA)
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                  U N B A L A N C E D   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
 ==============================================================================
   LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
   VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
 ==============================================================================

 CENTRIFUGE 1 P 3P Duty:   1.535  0.13 Z1=  78.3640         1.535     1.535
               SLG DUTY:   0.901  0.10 Z2=  78.3640         0.901
    480. VOLTS    LN/LN:   1.329       Z0= 243.8506
              LN/LN/GND:  1.381 (  0.638 GND RETURN KA)

 CENTRIFUGE 2 P 3P Duty:   1.535  0.13 Z1=  78.3640         1.535     1.535
               SLG DUTY:   0.901  0.10 Z2=  78.3640         0.901
    480. VOLTS    LN/LN:   1.329       Z0= 243.8506
              LN/LN/GND:  1.381 (  0.638 GND RETURN KA)

 CENTRIFUGE OVE 3P Duty:   4.269  0.26 Z1=  28.1728         4.269     4.269
               SLG DUTY:   2.559  0.18 Z2=  28.1728         2.559
    480. VOLTS    LN/LN:   3.697       Z0=  84.9391
              LN/LN/GND:  3.900 (  1.824 GND RETURN KA)

 CENTRIFUGE OVE 3P Duty:   4.572  0.26 Z1=  26.3055         4.572     4.572
               SLG DUTY:   2.738  0.18 Z2=  26.3055         2.738
    480. VOLTS    LN/LN:   3.960       Z0=  79.3875
              LN/LN/GND:  4.175 (  1.951 GND RETURN KA)

 CENTRIFUGE# 1  3P Duty:  12.374  2.35 Z1=   9.7207        13.199    12.790
               SLG DUTY:   9.069  1.65 Z2=   9.7207         9.267
    480. VOLTS    LN/LN:  10.716       Z0=  20.6116
              LN/LN/GND: 11.900 (  7.112 GND RETURN KA)

 CENTRIFUGE# 3  3P Duty:  12.036  2.40 Z1=   9.9932        12.882    12.463
               SLG DUTY:   8.787  1.69 Z2=   9.9932         8.997
    480. VOLTS    LN/LN:  10.424       Z0=  21.3375
              LN/LN/GND: 11.550 (  6.878 GND RETURN KA)

 CHANEL MIX PUM 3P Duty:   1.000  0.18 Z1= 120.2863         1.000     1.000
               SLG DUTY:   0.577  0.12 Z2= 120.2863         0.577
    480. VOLTS    LN/LN:   0.866       Z0= 386.3533
              LN/LN/GND:  0.909 (  0.404 GND RETURN KA)

 CHANEL MIX PUM 3P Duty:   0.640  0.17 Z1= 187.9817         0.640     0.640
               SLG DUTY:   0.363  0.11 Z2= 187.9817         0.363
    480. VOLTS    LN/LN:   0.554       Z0= 619.8951
              LN/LN/GND:  0.583 (  0.253 GND RETURN KA)
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                  U N B A L A N C E D   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION      FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE       DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

CHANNEL MIX PU 3P Duty:   0.712  0.17 Z1= 168.8414         0.712     0.712
              SLG DUTY:   0.406  0.11 Z2= 168.8414         0.406
   480. VOLTS    LN/LN:   0.617       Z0= 552.5751
             LN/LN/GND:  0.648 (  0.284 GND RETURN KA)

CHANNEL MIX PU 3P Duty:   1.161  0.19 Z1= 103.6407         1.161     1.161
              SLG DUTY:   0.672  0.13 Z2= 103.6407         0.672
   480. VOLTS    LN/LN:   1.005       Z0= 330.1577
             LN/LN/GND:  1.055 (  0.473 GND RETURN KA)

CHILL WATER CI 3P Duty:   9.462  1.10 Z1=  12.7119         9.493     9.477
              SLG DUTY:   6.641  0.69 Z2=  12.7119         6.642
   480. VOLTS    LN/LN:   8.194       Z0=  29.7591
             LN/LN/GND:  9.239 (  5.041 GND RETURN KA)

CHILL WATER CI 3P Duty:   4.246  0.35 Z1=  28.3266         4.246     4.246
              SLG DUTY:   2.597  0.24 Z2=  28.3266         2.597
   480. VOLTS    LN/LN:   3.677       Z0=  82.7789
             LN/LN/GND:  3.924 (  1.865 GND RETURN KA)

CHILLER #1     3P Duty:   9.664  1.53 Z1=  12.4467         9.820     9.742
              SLG DUTY:   7.454  1.07 Z2=  12.4467         7.475
   480. VOLTS    LN/LN:   8.369       Z0=  24.1759
             LN/LN/GND:  9.590 (  5.987 GND RETURN KA)

CHILLER #2     3P Duty:  13.366  2.94 Z1=   8.9994        14.858    14.122
              SLG DUTY:  11.541  2.35 Z2=   8.9994        12.313
   480. VOLTS    LN/LN:  11.575       Z0=  13.3773
             LN/LN/GND: 13.202 ( 10.119 GND RETURN KA)

CP-MAU-BP-1    3P Duty:   1.744  0.20 Z1=  68.9829         1.744     1.744
              SLG DUTY:   1.026  0.14 Z2=  68.9829         1.026
   480. VOLTS    LN/LN:   1.510       Z0= 214.0472
             LN/LN/GND:  1.582 (  0.726 GND RETURN KA)

CS-BS-1        3P Duty:   8.890  0.59 Z1=  13.5295         8.891     8.890
              SLG DUTY:   5.837  0.37 Z2=  13.5295         5.837
   480. VOLTS    LN/LN:   7.699       Z0=  35.4503
             LN/LN/GND:  8.494 (  4.300 GND RETURN KA)
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                 U N B A L A N C E D   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

CTRL SCRN RM U 3P Duty:  15.148  1.52 Z1=   7.9403        15.392    15.270
              SLG DUTY:  12.543  1.07 Z2=   7.9403        12.578
   480. VOLTS    LN/LN:  13.119       Z0=  13.3886
             LN/LN/GND: 15.458 ( 10.522 GND RETURN KA)

CW PUMP P-10   3P Duty:   2.139  0.27 Z1=  56.2312         2.139     2.139
              SLG DUTY:   1.254  0.17 Z2=  56.2312         1.254
   480. VOLTS    LN/LN:   1.852       Z0= 176.2405
             LN/LN/GND:  1.963 (  0.884 GND RETURN KA)

D-101          3P Duty:   1.231  0.14 Z1=  97.7383         1.231     1.231
              SLG DUTY:   0.726  0.10 Z2=  97.7383         0.726
   480. VOLTS    LN/LN:   1.066       Z0= 301.8049
             LN/LN/GND:  1.109 (  0.515 GND RETURN KA)

D-102          3P Duty:   1.231  0.14 Z1=  97.7383         1.231     1.231
              SLG DUTY:   0.726  0.10 Z2=  97.7383         0.726
   480. VOLTS    LN/LN:   1.066       Z0= 301.8049
             LN/LN/GND:  1.109 (  0.515 GND RETURN KA)

D-103          3P Duty:   1.231  0.14 Z1=  97.7383         1.231     1.231
              SLG DUTY:   0.726  0.10 Z2=  97.7383         0.726
   480. VOLTS    LN/LN:   1.066       Z0= 301.8049
             LN/LN/GND:  1.109 (  0.515 GND RETURN KA)

DIVERSION CHAM 3P Duty:   1.025  0.16 Z1= 117.3384         1.025     1.025
              SLG DUTY:   0.604  0.12 Z2= 117.3384         0.604
   480. VOLTS    LN/LN:   0.888       Z0= 362.7426
             LN/LN/GND:  0.925 (  0.428 GND RETURN KA)

DIVERSION CHAM 3P Duty:   0.508  0.12 Z1= 236.9533         0.508     0.508
              SLG DUTY:   0.297  0.09 Z2= 236.9533         0.297
   480. VOLTS    LN/LN:   0.440       Z0= 739.8359
             LN/LN/GND:  0.456 (  0.210 GND RETURN KA)

DOOR #1        3P Duty:   0.784  0.18 Z1= 153.3800         0.784     0.784
              SLG DUTY:   0.453  0.11 Z2= 153.3800         0.453
   480. VOLTS    LN/LN:   0.679       Z0= 490.4527
             LN/LN/GND:  0.712 (  0.318 GND RETURN KA)
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                 U N B A L A N C E D   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
===============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
===============================================================================

DOOR #2        3P Duty:   0.784  0.18 Z1= 153.3800        0.784     0.784
              SLG DUTY:   0.453  0.11 Z2= 153.3800        0.453
   480. VOLTS    LN/LN:   0.679       Z0= 490.4527
             LN/LN/GND:  0.712 (  0.318 GND RETURN KA)

DOOR #3        3P Duty:   0.784  0.18 Z1= 153.3800        0.784     0.784
              SLG DUTY:   0.453  0.11 Z2= 153.3800        0.453
   480. VOLTS    LN/LN:   0.679       Z0= 490.4527
             LN/LN/GND:  0.712 (  0.318 GND RETURN KA)

DOOR OPENER    3P Duty:   1.815  0.16 Z1=  66.2780        1.815     1.815
              SLG DUTY:   1.069  0.12 Z2=  66.2780        1.069
   480. VOLTS    LN/LN:   1.572       Z0= 205.2252
             LN/LN/GND:  1.637 (  0.757 GND RETURN KA)

DOOR OPERATORS 3P Duty:   6.312  0.49 Z1=  19.0560        6.312     6.312
              SLG DUTY:   4.040  0.33 Z2=  19.0560        4.040
   480. VOLTS    LN/LN:   5.466       Z0=  51.7351
             LN/LN/GND:  5.920 (  2.954 GND RETURN KA)

DRILL PRESS #1 3P Duty:   3.303  0.40 Z1=  36.4119        3.303     3.303
              SLG DUTY:   2.170  0.34 Z2=  36.4119        2.170
   480. VOLTS    LN/LN:   2.861       Z0=  93.6365
             LN/LN/GND:  3.029 (  1.614 GND RETURN KA)

DRILL PRESS #2 3P Duty:   3.305  0.40 Z1=  36.3934        3.305     3.305
              SLG DUTY:   2.170  0.34 Z2=  36.3934        2.170
   480. VOLTS    LN/LN:   2.862       Z0=  93.6365
             LN/LN/GND:  3.031 (  1.614 GND RETURN KA)

DS CLARIFIERS  3P Duty:   2.600  0.29 Z1=  46.2553        2.600     2.600
              SLG DUTY:   1.572  0.21 Z2=  46.2553        1.572
   480. VOLTS    LN/LN:   2.252       Z0= 137.5072
             LN/LN/GND:  2.382 (  1.124 GND RETURN KA)

DS- CENT. FEED 3P Duty:   4.015  0.49 Z1=  29.9580        4.015     4.015
              SLG DUTY:   2.484  0.36 Z2=  29.9580        2.484
   480. VOLTS    LN/LN:   3.477       Z0=  85.9227
             LN/LN/GND:  3.722 (  1.792 GND RETURN KA)
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                  U N B A L A N C E D   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

DS- NORTH BELT 3P Duty:   1.154  0.16 Z1= 104.1987         1.154     1.154
              SLG DUTY:   0.674  0.12 Z2= 104.1987         0.674
   480. VOLTS    LN/LN:   1.000       Z0= 327.8299
             LN/LN/GND:  1.045 (  0.475 GND RETURN KA)

DS-1500 HP BLO 3P Duty:  16.586  5.73 Z1=    0.7252       21.419    19.085
              SLG DUTY:   0.000  0.00 Z2=    0.7252        0.000
  4800. VOLTS    LN/LN:  14.364       Z0= INFINITE
             LN/LN/GND: 14.364 (  0.000 GND RETURN KA)

DS-1500 HP BLO 3P Duty:  17.568  5.71 Z1=    0.6846       22.670    20.205
              SLG DUTY:   0.000  0.00 Z2=    0.6846        0.000
  4800. VOLTS    LN/LN:  15.215       Z0= INFINITE
             LN/LN/GND: 15.215 (  0.000 GND RETURN KA)

DS-2500HP BLOW 3P Duty:  16.765  6.70 Z1=    0.7175       22.388    19.685
              SLG DUTY:   0.000  0.00 Z2=    0.7175        0.000
  4800. VOLTS    LN/LN:  14.519       Z0= INFINITE
             LN/LN/GND: 14.519 (  0.000 GND RETURN KA)

DS-2500HP BLOW 3P Duty:  17.696  6.34 Z1=    0.6797       23.359    20.632
              SLG DUTY:   0.000  0.00 Z2=    0.6797        0.000
  4800. VOLTS    LN/LN:  15.325       Z0= INFINITE
             LN/LN/GND: 15.325 (  0.000 GND RETURN KA)

DS-3 AUX. INST 3P Duty:   0.735  0.10 Z1= 163.5453         0.735     0.735
              SLG DUTY:   0.428  0.08 Z2= 163.5453         0.428
   480. VOLTS    LN/LN:   0.637       Z0= 516.1879
             LN/LN/GND:  0.663 (  0.302 GND RETURN KA)

DS-AIR COMPRES 3P Duty:   1.870  0.25 Z1=  64.3110         1.870     1.870
              SLG DUTY:   1.112  0.19 Z2=  64.3110         1.112
   480. VOLTS    LN/LN:   1.620       Z0= 196.2983
             LN/LN/GND:  1.695 (  0.790 GND RETURN KA)

DS-AMMONIA REM 3P Duty:   8.060  1.39 Z1=  14.9237         8.148     8.104
              SLG DUTY:   5.455  0.91 Z2=  14.9237         5.460
   480. VOLTS    LN/LN:   6.980       Z0=  36.9964
             LN/LN/GND:  7.727 (  4.082 GND RETURN KA)
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                  U N B A L A N C E D   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

DS-AMMONIA REM 3P Duty:   8.060  1.39 Z1=  14.9237         8.148     8.104
              SLG DUTY:   5.455  0.91 Z2=  14.9237         5.460
   480. VOLTS    LN/LN:   6.980       Z0=  36.9964
             LN/LN/GND:  7.727 (  4.082 GND RETURN KA)

DS-ANOXIC TANK 3P Duty:   2.602  0.29 Z1=  46.2328         2.602     2.602
              SLG DUTY:   1.572  0.21 Z2=  46.2328         1.572
   480. VOLTS    LN/LN:   2.253       Z0= 137.5071
             LN/LN/GND:  2.383 (  1.124 GND RETURN KA)

DS-BASEMENT EL 3P Duty:   5.744  0.76 Z1=  20.9394         5.746     5.745
              SLG DUTY:   3.664  0.59 Z2=  20.9394         3.664
   480. VOLTS    LN/LN:   4.975       Z0=  57.0570
             LN/LN/GND:  5.360 (  2.679 GND RETURN KA)

DS-BYPASS CONV 3P Duty:   1.758  0.16 Z1=  68.4320         1.758     1.758
              SLG DUTY:   1.043  0.12 Z2=  68.4320         1.043
   480. VOLTS    LN/LN:   1.522       Z0= 209.1864
             LN/LN/GND:  1.590 (  0.742 GND RETURN KA)

DS-BYPASS SLID 3P Duty:   1.955  0.31 Z1=  61.5322         1.955     1.955
              SLG DUTY:   1.132  0.25 Z2=  61.5322         1.132
   480. VOLTS    LN/LN:   1.693       Z0= 196.0193
             LN/LN/GND:  1.772 (  0.796 GND RETURN KA)

DS-CENTRIFUGE  3P Duty:   1.651  0.21 Z1=  72.8553         1.651     1.651
              SLG DUTY:   0.969  0.16 Z2=  72.8553         0.969
   480. VOLTS    LN/LN:   1.430       Z0= 227.1997
             LN/LN/GND:  1.501 (  0.685 GND RETURN KA)

DS-CF-SH-1     3P Duty:   0.748  0.16 Z1= 160.8739         0.748     0.748
              SLG DUTY:   0.431  0.09 Z2= 160.8739         0.431
   480. VOLTS    LN/LN:   0.648       Z0= 517.1948
             LN/LN/GND:  0.681 (  0.302 GND RETURN KA)

DS-CF-SH-2     3P Duty:   0.850  0.16 Z1= 141.5803         0.850     0.850
              SLG DUTY:   0.491  0.09 Z2= 141.5803         0.491
   480. VOLTS    LN/LN:   0.736       Z0= 453.2191
             LN/LN/GND:  0.773 (  0.345 GND RETURN KA)
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                  U N B A L A N C E D   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

DS-CLARIFIER 7 3P Duty:   1.950  0.31 Z1=  61.6761        1.950     1.950
              SLG DUTY:   1.131  0.25 Z2=  61.6761        1.131
   480. VOLTS    LN/LN:   1.689       Z0= 196.0195
             LN/LN/GND:  1.767 (  0.796 GND RETURN KA)

DS-CP-CS-SH-1  3P Duty:   4.140  0.55 Z1=  29.0561        4.140     4.140
              SLG DUTY:   2.535  0.38 Z2=  29.0561        2.535
   480. VOLTS    LN/LN:   3.585       Z0=  84.8210
             LN/LN/GND:  3.838 (  1.820 GND RETURN KA)

DS-DRAIN PUMP  3P Duty:   3.061  0.48 Z1=  39.2898        3.061     3.061
              SLG DUTY:   1.781  0.37 Z2=  39.2898        1.781
   480. VOLTS    LN/LN:   2.651       Z0= 124.5798
             LN/LN/GND:  2.802 (  1.253 GND RETURN KA)

DS-DUCT HEATER 3P Duty:   1.517  0.18 Z1=  79.2942        1.517     1.517
              SLG DUTY:   0.895  0.14 Z2=  79.2942        0.895
   480. VOLTS    LN/LN:   1.314       Z0= 244.6491
             LN/LN/GND:  1.369 (  0.635 GND RETURN KA)

DS-EF-1 CAP    3P Duty:  13.833  2.49 Z1=   8.6954       14.901    14.372
              SLG DUTY:  11.373  1.92 Z2=   8.6954       11.796
   480. VOLTS    LN/LN:  11.980       Z0=  14.5100
             LN/LN/GND: 13.604 (  9.605 GND RETURN KA)

DS-EF-2A       3P Duty:   1.670  0.16 Z1=  72.0142        1.670     1.670
              SLG DUTY:   0.984  0.12 Z2=  72.0142        0.984
   480. VOLTS    LN/LN:   1.446       Z0= 222.9912
             LN/LN/GND:  1.508 (  0.697 GND RETURN KA)

DS-EF-2A CAP   3P Duty:  11.764  1.31 Z1=  10.2244       11.860    11.812
              SLG DUTY:   8.755  0.95 Z2=  10.2244        8.767
   480. VOLTS    LN/LN:  10.188       Z0=  21.2584
             LN/LN/GND: 11.530 (  6.893 GND RETURN KA)

DS-EF-2B       3P Duty:   1.881  0.17 Z1=  63.9498        1.881     1.881
              SLG DUTY:   1.110  0.13 Z2=  63.9498        1.110
   480. VOLTS    LN/LN:   1.629       Z0= 197.4318
             LN/LN/GND:  1.701 (  0.787 GND RETURN KA)
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                 U N B A L A N C E D   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
 ==============================================================================
   LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
   VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
 ==============================================================================

 DS-EF-2B CAP   3P Duty:  11.764  1.31 Z1=  10.2244        11.860    11.812
               SLG DUTY:   8.755  0.95 Z2=  10.2244         8.767
    480. VOLTS    LN/LN:  10.188       Z0=  21.2584
             LN/LN/GND: 11.530 (  6.893 GND RETURN KA)

 DS-EF-2C       3P Duty:   2.152  0.19 Z1=  55.9003         2.152     2.152
               SLG DUTY:   1.273  0.14 Z2=  55.9003         1.273
    480. VOLTS    LN/LN:   1.863       Z0= 171.8837
             LN/LN/GND:  1.949 (  0.903 GND RETURN KA)

 DS-EF-2C CAP   3P Duty:  11.764  1.31 Z1=  10.2244        11.860    11.812
               SLG DUTY:   8.755  0.95 Z2=  10.2244         8.767
    480. VOLTS    LN/LN:  10.188       Z0=  21.2584
             LN/LN/GND: 11.530 (  6.893 GND RETURN KA)

 DS-EF-5A       3P Duty:   0.880  0.11 Z1= 136.7303         0.880     0.880
               SLG DUTY:   0.515  0.08 Z2= 136.7303         0.515
    480. VOLTS    LN/LN:   0.762       Z0= 427.6302
             LN/LN/GND:  0.790 (  0.364 GND RETURN KA)

 DS-EF-5A CAP   3P Duty:  11.764  1.31 Z1=  10.2244        11.860    11.812
               SLG DUTY:   8.755  0.95 Z2=  10.2244         8.767
    480. VOLTS    LN/LN:  10.188       Z0=  21.2584
             LN/LN/GND: 11.530 (  6.893 GND RETURN KA)

 DS-EF-5B       3P Duty:   1.033  0.12 Z1= 116.3847         1.033     1.033
               SLG DUTY:   0.605  0.09 Z2= 116.3847         0.605
    480. VOLTS    LN/LN:   0.895       Z0= 363.6635
             LN/LN/GND:  0.930 (  0.428 GND RETURN KA)

 DS-EF-5B CAP   3P Duty:  11.764  1.31 Z1=  10.2244        11.860    11.812
               SLG DUTY:   8.755  0.95 Z2=  10.2244         8.767
    480. VOLTS    LN/LN:  10.188       Z0=  21.2584
             LN/LN/GND: 11.530 (  6.893 GND RETURN KA)

 DS-EF-SC-1     3P Duty:   1.161  0.16 Z1= 103.6435         1.161     1.161
               SLG DUTY:   0.680  0.13 Z2= 103.6435         0.680
    480. VOLTS    LN/LN:   1.005       Z0= 323.5778
             LN/LN/GND:  1.045 (  0.481 GND RETURN KA)
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                   U N B A L A N C E D   F A U L T   R E P O R T
                     (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                           PRE FAULT VOLTAGE: 1.0000
                           MODEL TRANSFORMER TAPS: NO
===============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
===============================================================================

DS-ENG. RM. BO 3P Duty:   7.202  0.64 Z1=  16.7004        7.203     7.203
              SLG DUTY:   4.720  0.47 Z2=  16.7004        4.720
   480. VOLTS    LN/LN:   6.237       Z0=  43.5095
             LN/LN/GND:  6.779 (  3.490 GND RETURN KA)

DS-EXHAUST FAN 3P Duty:   1.470  0.23 Z1=  81.8509        1.470     1.470
              SLG DUTY:   0.850  0.18 Z2=  81.8509        0.850
   480. VOLTS    LN/LN:   1.273       Z0= 261.0912
             LN/LN/GND:  1.326 (  0.598 GND RETURN KA)

DS-EXISTING CR 3P Duty:   1.420  0.14 Z1=  84.7102        1.420     1.420
              SLG DUTY:   0.840  0.10 Z2=  84.7102        0.840
   480. VOLTS    LN/LN:   1.230       Z0= 260.3258
             LN/LN/GND:  1.280 (  0.596 GND RETURN KA)

DS-FOUL AIR FA 3P Duty:   2.608  0.19 Z1=  46.1192        2.608     2.608
              SLG DUTY:   1.555  0.13 Z2=  46.1192        1.555
   480. VOLTS    LN/LN:   2.259       Z0= 140.1181
             LN/LN/GND:  2.367 (  1.106 GND RETURN KA)

DS-GEN 1       3P Duty:   5.932 16.69 Z1=  20.2769        9.137     7.629
              SLG DUTY:   5.897 16.49 Z2=  20.2769        9.071
   480. VOLTS    LN/LN:   5.137       Z0=  20.6392
             LN/LN/GND:  5.919 (  5.862 GND RETURN KA)

DS-GEN 2       3P Duty:   5.932 16.69 Z1=  20.2769        9.137     7.629
              SLG DUTY:   5.897 16.49 Z2=  20.2769        9.071
   480. VOLTS    LN/LN:   5.137       Z0=  20.6392
             LN/LN/GND:  5.919 (  5.862 GND RETURN KA)

DS-GRINDER 1,2 3P Duty:   4.575  0.42 Z1=  26.2905        4.575     4.575
              SLG DUTY:   2.822  0.31 Z2=  26.2905        2.822
   480. VOLTS    LN/LN:   3.962       Z0=  75.7093
             LN/LN/GND:  4.224 (  2.034 GND RETURN KA)

DS-GROUND SLUD 3P Duty:   1.346  0.17 Z1=  89.3858        1.346     1.346
              SLG DUTY:   0.788  0.12 Z2=  89.3858        0.788
   480. VOLTS    LN/LN:   1.165       Z0= 279.3616
             LN/LN/GND:  1.219 (  0.557 GND RETURN KA)
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                 U N B A L A N C E D   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

DS-GSST MIXER  3P Duty:   4.047  0.50 Z1=  29.7213         4.047     4.047
              SLG DUTY:   2.493  0.36 Z2=  29.7213         2.493
   480. VOLTS    LN/LN:   3.505       Z0=  85.9227
            LN/LN/GND:  3.756 (  1.794 GND RETURN KA)

DS-HOIST       3P Duty:   1.311  0.23 Z1=  91.7673         1.311     1.311
              SLG DUTY:   0.759  0.18 Z2=  91.7673         0.759
   480. VOLTS    LN/LN:   1.135       Z0= 292.2787
            LN/LN/GND:  1.182 (  0.534 GND RETURN KA)

DS-HOIST,EX FA 3P Duty:   1.517  0.18 Z1=  79.2942         1.517     1.517
              SLG DUTY:   0.895  0.14 Z2=  79.2942         0.895
   480. VOLTS    LN/LN:   1.314       Z0= 244.6491
            LN/LN/GND:  1.369 (  0.635 GND RETURN KA)

DS-HV UNIT     3P Duty:   2.920  0.28 Z1=  41.1933         2.920     2.920
              SLG DUTY:   1.753  0.21 Z2=  41.1933         1.753
   480. VOLTS    LN/LN:   2.529       Z0= 123.7525
            LN/LN/GND:  2.662 (  1.251 GND RETURN KA)

DS-HVAC #1     3P Duty:  14.357  1.46 Z1=   8.3778        14.548    14.453
              SLG DUTY:  11.489  1.13 Z2=   8.3778        11.534
   480. VOLTS    LN/LN:  12.434       Z0=  14.9141
            LN/LN/GND: 14.171 (  9.499 GND RETURN KA)

DS-HVAC #2     3P Duty:  14.357  1.46 Z1=   8.3778        14.548    14.453
              SLG DUTY:  11.489  1.13 Z2=   8.3778        11.534
   480. VOLTS    LN/LN:  12.434       Z0=  14.9141
            LN/LN/GND: 14.171 (  9.499 GND RETURN KA)

DS-HVAC 1      3P Duty:   1.839  0.26 Z1=  65.4128         1.839     1.839
              SLG DUTY:   1.062  0.14 Z2=  65.4128         1.062
   480. VOLTS    LN/LN:   1.592       Z0= 210.2103
            LN/LN/GND:  1.688 (  0.744 GND RETURN KA)

DS-INFLUENT VA 3P Duty:   1.955  0.31 Z1=  61.5322         1.955     1.955
              SLG DUTY:   1.132  0.25 Z2=  61.5322         1.132
   480. VOLTS    LN/LN:   1.693       Z0= 196.0193
            LN/LN/GND:  1.772 (  0.796 GND RETURN KA)
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               U N B A L A N C E D   F A U L T   R E P O R T
                 (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

DS-INFLUENT VA 3P Duty:   1.955  0.31 Z1=  61.5322        1.955     1.955
              SLG DUTY:   1.132  0.25 Z2=  61.5322        1.132
   480. VOLTS    LN/LN:   1.693       Z0= 196.0193
             LN/LN/GND:  1.772 (  0.796 GND RETURN KA)

DS-MAU-SC-1    3P Duty:   2.310  0.31 Z1=  52.0795        2.310     2.310
              SLG DUTY:   1.369  0.24 Z2=  52.0795        1.369
   480. VOLTS    LN/LN:   2.000       Z0= 159.7003
             LN/LN/GND:  2.101 (  0.972 GND RETURN KA)

DS-MAU-SH-1    3P Duty:   1.160  0.16 Z1= 103.6663        1.160     1.160
              SLG DUTY:   0.674  0.12 Z2= 103.6663        0.674
   480. VOLTS    LN/LN:   1.005       Z0= 328.8534
             LN/LN/GND:  1.050 (  0.474 GND RETURN KA)

DS-MAU-SH-2    3P Duty:   2.301  0.34 Z1=  52.2794        2.301     2.301
              SLG DUTY:   1.347  0.23 Z2=  52.2794        1.347
   480. VOLTS    LN/LN:   1.993       Z0= 164.0583
             LN/LN/GND:  2.109 (  0.950 GND RETURN KA)

DS-MAU-SH-3    3P Duty:   1.311  0.17 Z1=  91.7210        1.311     1.311
              SLG DUTY:   0.765  0.12 Z2=  91.7210        0.765
   480. VOLTS    LN/LN:   1.136       Z0= 288.4648
             LN/LN/GND:  1.186 (  0.540 GND RETURN KA)

DS-MCC-15 AC U 3P Duty:  10.931  1.77 Z1=  11.0040       11.238    11.085
              SLG DUTY:   9.048  1.33 Z2=  11.0040        9.128
   480. VOLTS    LN/LN:   9.466       Z0=  18.2794
             LN/LN/GND: 10.955 (  7.642 GND RETURN KA)

DS-MCC-15 BATT 3P Duty:  10.931  1.77 Z1=  11.0040       11.238    11.085
              SLG DUTY:   9.048  1.33 Z2=  11.0040        9.128
   480. VOLTS    LN/LN:   9.466       Z0=  18.2794
             LN/LN/GND: 10.955 (  7.642 GND RETURN KA)

DS-MCC-25-SF-4 3P Duty:   1.430  0.14 Z1=  84.1286        1.430     1.430
              SLG DUTY:   0.840  0.11 Z2=  84.1286        0.840
   480. VOLTS    LN/LN:   1.238       Z0= 261.3442
             LN/LN/GND:  1.289 (  0.595 GND RETURN KA)
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                  U N B A L A N C E D   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION      FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE       DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

DS-MCC-7 AIR C 3P Duty:   5.332  0.48 Z1=  22.5564         5.332     5.332
              SLG DUTY:   3.354  0.36 Z2=  22.5564         3.354
   480. VOLTS    LN/LN:   4.618       Z0=  62.9127
             LN/LN/GND:  4.952 (  2.437 GND RETURN KA)

DS-MCC7 PUMP 1 3P Duty:  15.550  1.44 Z1=   7.7352        15.747    15.649
              SLG DUTY:  12.552  1.08 Z2=   7.7352        12.588
   480. VOLTS    LN/LN:  13.467       Z0=  13.5886
             LN/LN/GND: 15.500 ( 10.413 GND RETURN KA)

DS-MCC7 PUMP 2 3P Duty:  14.569  1.28 Z1=   8.2562        14.676    14.622
              SLG DUTY:  11.382  0.94 Z2=   8.2562        11.396
   480. VOLTS    LN/LN:  12.617       Z0=  15.5653
             LN/LN/GND: 14.436 (  9.233 GND RETURN KA)

DS-MCC7 PUMP 3 3P Duty:  13.666  1.16 Z1=   8.8015        13.726    13.696
              SLG DUTY:  10.374  0.84 Z2=   8.8015        10.380
   480. VOLTS    LN/LN:  11.835       Z0=  17.6004
             LN/LN/GND: 13.458 (  8.263 GND RETURN KA)

DS-MCC7 PUMP 4 3P Duty:  12.842  1.06 Z1=   9.3666        12.876    12.859
              SLG DUTY:   9.507  0.76 Z2=   9.3666         9.509
   480. VOLTS    LN/LN:  11.121       Z0=  19.6758
             LN/LN/GND: 12.571 (  7.461 GND RETURN KA)

DS-MCC8 PRI TH 3P Duty:   2.602  0.26 Z1=  46.2341         2.602     2.602
              SLG DUTY:   1.555  0.19 Z2=  46.2341         1.555
   480. VOLTS    LN/LN:   2.253       Z0= 139.8369
             LN/LN/GND:  2.367 (  1.108 GND RETURN KA)

DS-MCC8 PRI TH 3P Duty:   2.602  0.26 Z1=  46.2341         2.602     2.602
              SLG DUTY:   1.555  0.19 Z2=  46.2341         1.555
   480. VOLTS    LN/LN:   2.253       Z0= 139.8369
             LN/LN/GND:  2.367 (  1.108 GND RETURN KA)

DS-MCC8 PRI TH 3P Duty:   2.345  0.24 Z1=  51.2936         2.345     2.345
              SLG DUTY:   1.397  0.18 Z2=  51.2936         1.397
   480. VOLTS    LN/LN:   2.031       Z0= 155.9382
             LN/LN/GND:  2.129 (  0.994 GND RETURN KA)
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                 U N B A L A N C E D   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

DS-MCC8 RAS PU 3P Duty:   2.313  0.24 Z1=  51.9965        2.313     2.313
              SLG DUTY:   1.378  0.18 Z2=  51.9965        1.378
   480. VOLTS    LN/LN:   2.003       Z0= 158.1665
          LN/LN/GND:  2.100 (  0.980 GND RETURN KA)

DS-MCC8 RAS PU 3P Duty:   2.563  0.26 Z1=  46.9351        2.563     2.563
              SLG DUTY:   1.531  0.19 Z2=  46.9351        1.531
   480. VOLTS    LN/LN:   2.219       Z0= 142.0635
          LN/LN/GND:  2.331 (  1.091 GND RETURN KA)

DS-MCC8 RAS PU 3P Duty:   2.708  0.27 Z1=  44.4108        2.708     2.708
              SLG DUTY:   1.621  0.20 Z2=  44.4108        1.621
   480. VOLTS    LN/LN:   2.346       Z0= 134.0177
          LN/LN/GND:  2.466 (  1.156 GND RETURN KA)

DS-MCC8 RAS PU 3P Duty:   3.054  0.29 Z1=  39.3788        3.054     3.054
              SLG DUTY:   1.837  0.22 Z2=  39.3788        1.837
   480. VOLTS    LN/LN:   2.645       Z0= 117.9416
          LN/LN/GND:  2.788 (  1.312 GND RETURN KA)

DS-MCC8 SCUM P 3P Duty:   1.425  0.15 Z1=  84.3928        1.425     1.425
              SLG DUTY:   0.839  0.11 Z2=  84.3928        0.839
   480. VOLTS    LN/LN:   1.234       Z0= 261.2419
          LN/LN/GND:  1.284 (  0.595 GND RETURN KA)

DS-MCC8 SCUM P 3P Duty:   1.425  0.15 Z1=  84.3928        1.425     1.425
              SLG DUTY:   0.839  0.11 Z2=  84.3928        0.839
   480. VOLTS    LN/LN:   1.234       Z0= 261.2419
          LN/LN/GND:  1.284 (  0.595 GND RETURN KA)

DS-MCC8 THICKE 3P Duty:   5.946  0.59 Z1=  20.2273        5.947     5.947
              SLG DUTY:   3.797  0.44 Z2=  20.2273        3.797
   480. VOLTS    LN/LN:   5.150       Z0=  55.0511
          LN/LN/GND:  5.557 (  2.776 GND RETURN KA)

DS-MCC8 WAS PU 3P Duty:   1.425  0.15 Z1=  84.3928        1.425     1.425
              SLG DUTY:   0.839  0.11 Z2=  84.3928        0.839
   480. VOLTS    LN/LN:   1.234       Z0= 261.2419
          LN/LN/GND:  1.284 (  0.595 GND RETURN KA)
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                U N B A L A N C E D   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

DS-MIXED LIQUO 3P Duty:   3.384  0.58 Z1=  35.5441        3.384     3.384
              SLG DUTY:   1.980  0.44 Z2=  35.5441        1.980
   480. VOLTS    LN/LN:   2.931       Z0= 111.8432
             LN/LN/GND:  3.112 (  1.394 GND RETURN KA)

DS-MOV SUMP    3P Duty:   7.132  0.67 Z1=  16.8642        7.133     7.133
              SLG DUTY:   4.658  0.49 Z2=  16.8642        4.658
   480. VOLTS    LN/LN:   6.177       Z0=  44.2368
             LN/LN/GND:  6.719 (  3.438 GND RETURN KA)

DS-MSP-12 TUMB 3P Duty:   1.483  0.24 Z1=  81.1010        1.483     1.483
              SLG DUTY:   0.853  0.19 Z2=  81.1010        0.853
   480. VOLTS    LN/LN:   1.284       Z0= 261.0912
             LN/LN/GND:  1.341 (  0.598 GND RETURN KA)

DS-NEW CRANE   3P Duty:   1.420  0.14 Z1=  84.7102        1.420     1.420
              SLG DUTY:   0.840  0.10 Z2=  84.7102        0.840
   480. VOLTS    LN/LN:   1.230       Z0= 260.3258
             LN/LN/GND:  1.280 (  0.596 GND RETURN KA)

DS-NORTH BELT  3P Duty:   1.053  0.15 Z1= 114.2319        1.053     1.053
              SLG DUTY:   0.614  0.11 Z2= 114.2319        0.614
   480. VOLTS    LN/LN:   0.912       Z0= 360.1468
             LN/LN/GND:  0.953 (  0.433 GND RETURN KA)

DS-NORTH BELT  3P Duty:   1.053  0.15 Z1= 114.2319        1.053     1.053
              SLG DUTY:   0.614  0.11 Z2= 114.2319        0.614
   480. VOLTS    LN/LN:   0.912       Z0= 360.1468
             LN/LN/GND:  0.953 (  0.433 GND RETURN KA)

DS-NORTH BOOST 3P Duty:   5.490  0.67 Z1=  21.9103        5.490     5.490
              SLG DUTY:   3.594  0.52 Z2=  21.9103        3.594
   480. VOLTS    LN/LN:   4.754       Z0=  57.0697
             LN/LN/GND:  5.147 (  2.660 GND RETURN KA)

DS-NORTH BOOST 3P Duty:   5.490  0.67 Z1=  21.9103        5.490     5.490
              SLG DUTY:   3.594  0.52 Z2=  21.9103        3.594
   480. VOLTS    LN/LN:   4.754       Z0=  57.0697
             LN/LN/GND:  5.147 (  2.660 GND RETURN KA)
```

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                   U N B A L A N C E D   F A U L T   R E P O R T
                     (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
===============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
===============================================================================

DS-NORTH BOOST 3P Duty:   5.750  0.71 Z1=  20.9184         5.751     5.750
              SLG DUTY:   3.796  0.54 Z2=  20.9184         3.796
   480. VOLTS    LN/LN:   4.980       Z0=  53.7136
             LN/LN/GND:  5.403 (  2.820 GND RETURN KA)

DS-OH DOOR     3P Duty:  11.764  1.31 Z1=  10.2244        11.860    11.812
              SLG DUTY:   8.755  0.95 Z2=  10.2244         8.767
   480. VOLTS    LN/LN:  10.188       Z0=  21.2584
             LN/LN/GND: 11.530 (  6.893 GND RETURN KA)

DS-POLYMER MIX 3P Duty:   2.602  0.29 Z1=  46.2328         2.602     2.602
              SLG DUTY:   1.572  0.21 Z2=  46.2328         1.572
   480. VOLTS    LN/LN:   2.253       Z0= 137.5071
             LN/LN/GND:  2.383 (  1.124 GND RETURN KA)

DS-PRIM THICK  3P Duty:   3.109  0.30 Z1=  38.6822         3.109     3.109
              SLG DUTY:   1.872  0.22 Z2=  38.6822         1.872
   480. VOLTS    LN/LN:   2.693       Z0= 115.7189
             LN/LN/GND:  2.839 (  1.337 GND RETURN KA)

DS-Q1236       3P Duty:   0.975  0.15 Z1= 123.3819         0.975     0.975
              SLG DUTY:   0.573  0.12 Z2= 123.3819         0.573
   480. VOLTS    LN/LN:   0.844       Z0= 383.6163
             LN/LN/GND:  0.877 (  0.405 GND RETURN KA)

DS-Q1237       3P Duty:   1.004  0.15 Z1= 119.8521         1.004     1.004
              SLG DUTY:   0.590  0.12 Z2= 119.8521         0.590
   480. VOLTS    LN/LN:   0.869       Z0= 372.4971
             LN/LN/GND:  0.903 (  0.417 GND RETURN KA)

DS-Q1238       3P Duty:   1.004  0.15 Z1= 119.8521         1.004     1.004
              SLG DUTY:   0.590  0.12 Z2= 119.8521         0.590
   480. VOLTS    LN/LN:   0.869       Z0= 372.4971
             LN/LN/GND:  0.903 (  0.417 GND RETURN KA)

DS-Q1239       3P Duty:   1.034  0.15 Z1= 116.3227         1.034     1.034
              SLG DUTY:   0.608  0.12 Z2= 116.3227         0.608
   480. VOLTS    LN/LN:   0.895       Z0= 361.3782
             LN/LN/GND:  0.930 (  0.430 GND RETURN KA)
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                 U N B A L A N C E D   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

DS-Q1240       3P Duty:   1.034  0.15 Z1= 116.3227        1.034     1.034
              SLG DUTY:   0.608  0.12 Z2= 116.3227        0.608
   480. VOLTS    LN/LN:   0.895       Z0= 361.3782
             LN/LN/GND:  0.930 (  0.430 GND RETURN KA)

DS-Q1241       3P Duty:   1.066  0.15 Z1= 112.7936        1.066     1.066
              SLG DUTY:   0.627  0.12 Z2= 112.7936        0.627
   480. VOLTS    LN/LN:   0.924       Z0= 350.2595
             LN/LN/GND:  0.960 (  0.444 GND RETURN KA)

DS-Q1242       3P Duty:   1.066  0.15 Z1= 112.7936        1.066     1.066
              SLG DUTY:   0.627  0.12 Z2= 112.7936        0.627
   480. VOLTS    LN/LN:   0.924       Z0= 350.2595
             LN/LN/GND:  0.960 (  0.444 GND RETURN KA)

DS-Q1243       3P Duty:   1.101  0.16 Z1= 109.2649        1.101     1.101
              SLG DUTY:   0.647  0.12 Z2= 109.2649        0.647
   480. VOLTS    LN/LN:   0.953       Z0= 339.1411
             LN/LN/GND:  0.991 (  0.458 GND RETURN KA)

DS-RAS PUMP #1 3P Duty:   3.257  0.38 Z1=  36.9298        3.257     3.257
              SLG DUTY:   1.995  0.27 Z2=  36.9298        1.995
   480. VOLTS    LN/LN:   2.821       Z0= 107.6085
             LN/LN/GND:  3.008 (  1.434 GND RETURN KA)

DS-RAS PUMP #2 3P Duty:   3.257  0.38 Z1=  36.9298        3.257     3.257
              SLG DUTY:   1.995  0.27 Z2=  36.9298        1.995
   480. VOLTS    LN/LN:   2.821       Z0= 107.6085
             LN/LN/GND:  3.008 (  1.434 GND RETURN KA)

DS-RAS PUMP #3 3P Duty:   3.257  0.38 Z1=  36.9298        3.257     3.257
              SLG DUTY:   1.995  0.27 Z2=  36.9298        1.995
   480. VOLTS    LN/LN:   2.821       Z0= 107.6085
             LN/LN/GND:  3.008 (  1.434 GND RETURN KA)

DS-RECYCLE PUM 3P Duty:  18.859  2.47 Z1=   6.3779       20.290    19.581
              SLG DUTY:  17.068  2.15 Z2=   6.3779       17.963
   480. VOLTS    LN/LN:  16.332       Z0=   8.4241
             LN/LN/GND: 18.707 ( 15.560 GND RETURN KA)
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                 U N B A L A N C E D   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

DS-RETURN VALV 3P Duty:   1.517  0.18 Z1=  79.2942         1.517     1.517
              SLG DUTY:   0.895  0.14 Z2=  79.2942         0.895
   480. VOLTS    LN/LN:   1.314       Z0= 244.6491
            LN/LN/GND:  1.369 (  0.635 GND RETURN KA)

DS-SCUM PUMP # 3P Duty:   1.467  0.23 Z1=  81.9657         1.467     1.467
              SLG DUTY:   0.850  0.18 Z2=  81.9657         0.850
   480. VOLTS    LN/LN:   1.271       Z0= 261.0913
            LN/LN/GND:  1.323 (  0.597 GND RETURN KA)

DS-SERV GARAGE 3P Duty:   6.366  0.59 Z1=  18.8955         6.366     6.366
              SLG DUTY:   4.106  0.44 Z2=  18.8955         4.106
   480. VOLTS    LN/LN:   5.513       Z0=  50.5448
            LN/LN/GND:  5.959 (  3.016 GND RETURN KA)

DS-SEWAGE PUMP 3P Duty:  21.142  4.13 Z1=   5.6893        25.343    23.292
              SLG DUTY:  19.304  3.71 Z2=   5.6893        22.580
   480. VOLTS    LN/LN:  18.309       Z0=   7.3211
            LN/LN/GND: 20.671 ( 17.754 GND RETURN KA)

DS-SLIDE GATE  3P Duty:   1.955  0.31 Z1=  61.5322         1.955     1.955
              SLG DUTY:   1.132  0.25 Z2=  61.5322         1.132
   480. VOLTS    LN/LN:   1.693       Z0= 196.0193
            LN/LN/GND:  1.772 (  0.796 GND RETURN KA)

DS-SLIDE GATE  3P Duty:   1.955  0.31 Z1=  61.5322         1.955     1.955
              SLG DUTY:   1.132  0.25 Z2=  61.5322         1.132
   480. VOLTS    LN/LN:   1.693       Z0= 196.0193
            LN/LN/GND:  1.772 (  0.796 GND RETURN KA)

DS-SLUDGE PUMP 3P Duty:   3.058  0.48 Z1=  39.3299         3.058     3.058
              SLG DUTY:   1.780  0.37 Z2=  39.3299         1.780
   480. VOLTS    LN/LN:   2.649       Z0= 124.5797
            LN/LN/GND:  2.799 (  1.252 GND RETURN KA)

DS-SLUDGE PUMP 3P Duty:   3.475  0.40 Z1=  34.6113         3.475     3.475
              SLG DUTY:   2.139  0.28 Z2=  34.6113         2.139
   480. VOLTS    LN/LN:   3.010       Z0= 100.0900
            LN/LN/GND:  3.217 (  1.540 GND RETURN KA)
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                  U N B A L A N C E D   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
===============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
===============================================================================

DS-SLUDGE TANK 3P Duty:   0.981  0.12 Z1= 122.5598         0.981     0.981
              SLG DUTY:   0.570  0.09 Z2= 122.5598         0.570
   480. VOLTS    LN/LN:   0.850       Z0= 388.2383
             LN/LN/GND:  0.888 (  0.402 GND RETURN KA)

DS-SLUDGE THIC 3P Duty:   2.866  0.38 Z1=  41.9755         2.866     2.866
              SLG DUTY:   1.711  0.29 Z2=  41.9755         1.711
   480. VOLTS    LN/LN:   2.482       Z0= 127.3310
             LN/LN/GND:  2.620 (  1.218 GND RETURN KA)

DS-SLUDGE THIC 3P Duty:   2.565  0.35 Z1=  46.8978         2.565     2.565
              SLG DUTY:   1.525  0.26 Z2=  46.8978         1.525
   480. VOLTS    LN/LN:   2.221       Z0= 143.2833
             LN/LN/GND:  2.339 (  1.083 GND RETURN KA)

DS-SLUDGE THIC 3P Duty:   1.475  0.24 Z1=  81.5390         1.475     1.475
              SLG DUTY:   0.863  0.18 Z2=  81.5390         0.863
   480. VOLTS    LN/LN:   1.278       Z0= 255.7036
             LN/LN/GND:  1.338 (  0.609 GND RETURN KA)

DS-SLUDGE THIC 3P Duty:   1.475  0.24 Z1=  81.5390         1.475     1.475
              SLG DUTY:   0.863  0.18 Z2=  81.5390         0.863
   480. VOLTS    LN/LN:   1.278       Z0= 255.7036
             LN/LN/GND:  1.338 (  0.609 GND RETURN KA)

DS-SLUDGE THIC 3P Duty:   3.043  0.40 Z1=  39.5301         3.043     3.043
              SLG DUTY:   1.822  0.30 Z2=  39.5301         1.822
   480. VOLTS    LN/LN:   2.635       Z0= 119.3765
             LN/LN/GND:  2.785 (  1.298 GND RETURN KA)

DS-SLUDGE THIC 3P Duty:   1.522  0.25 Z1=  79.0310         1.522     1.522
              SLG DUTY:   0.890  0.18 Z2=  79.0310         0.890
   480. VOLTS    LN/LN:   1.318       Z0= 247.6511
             LN/LN/GND:  1.381 (  0.629 GND RETURN KA)

DS-SOUTH BELT  3P Duty:   1.053  0.15 Z1= 114.2319         1.053     1.053
              SLG DUTY:   0.614  0.11 Z2= 114.2319         0.614
   480. VOLTS    LN/LN:   0.912       Z0= 360.1468
             LN/LN/GND:  0.953 (  0.433 GND RETURN KA)
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                  U N B A L A N C E D   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

DS-SOUTH BELT  3P Duty:   1.154  0.16 Z1= 104.1987        1.154     1.154
              SLG DUTY:   0.674  0.12 Z2= 104.1987        0.674
   480. VOLTS    LN/LN:   1.000       Z0= 327.8299
             LN/LN/GND:  1.045 (  0.475 GND RETURN KA)

DS-SOUTH BELT  3P Duty:   1.053  0.15 Z1= 114.2319        1.053     1.053
              SLG DUTY:   0.614  0.11 Z2= 114.2319        0.614
   480. VOLTS    LN/LN:   0.912       Z0= 360.1468
             LN/LN/GND:  0.953 (  0.433 GND RETURN KA)

DS-STREET LIGH 3P Duty:   2.235  0.26 Z1=  53.8095        2.235     2.235
              SLG DUTY:   1.342  0.19 Z2=  53.8095        1.342
   480. VOLTS    LN/LN:   1.936       Z0= 161.6625
             LN/LN/GND:  2.040 (  0.958 GND RETURN KA)

DS-SUMP PUMP 1 3P Duty:   1.268  0.18 Z1=  94.8852        1.268     1.268
              SLG DUTY:   0.740  0.14 Z2=  94.8852        0.740
   480. VOLTS    LN/LN:   1.098       Z0= 298.0486
             LN/LN/GND:  1.144 (  0.522 GND RETURN KA)

DS-SUMP PUMP 1 3P Duty:   1.324  0.19 Z1=  90.8683        1.324     1.324
              SLG DUTY:   0.773  0.14 Z2=  90.8683        0.773
   480. VOLTS    LN/LN:   1.146       Z0= 285.2886
             LN/LN/GND:  1.195 (  0.546 GND RETURN KA)

DS-SUMP PUMP 2 3P Duty:   1.268  0.18 Z1=  94.8322        1.268     1.268
              SLG DUTY:   0.740  0.14 Z2=  94.8322        0.740
   480. VOLTS    LN/LN:   1.098       Z0= 298.0486
             LN/LN/GND:  1.145 (  0.522 GND RETURN KA)

DS-SUMP PUMP A 3P Duty:   1.312  0.23 Z1=  91.7040        1.312     1.312
              SLG DUTY:   0.759  0.18 Z2=  91.7040        0.759
   480. VOLTS    LN/LN:   1.136       Z0= 292.2787
             LN/LN/GND:  1.183 (  0.534 GND RETURN KA)

DS-SUMP PUMP B 3P Duty:   1.312  0.23 Z1=  91.7040        1.312     1.312
              SLG DUTY:   0.759  0.18 Z2=  91.7040        0.759
   480. VOLTS    LN/LN:   1.136       Z0= 292.2787
             LN/LN/GND:  1.183 (  0.534 GND RETURN KA)
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                 U N B A L A N C E D   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

DS-SYSTEM AIR  3P Duty:   0.758  0.12 Z1= 158.7595         0.758     0.758
              SLG DUTY:   0.434  0.08 Z2= 158.7595         0.434
   480. VOLTS    LN/LN:   0.656       Z0= 516.1879
             LN/LN/GND:  0.688 (  0.303 GND RETURN KA)

DS-SYSTEM AIR  3P Duty:   0.758  0.12 Z1= 158.7595         0.758     0.758
              SLG DUTY:   0.434  0.08 Z2= 158.7595         0.434
   480. VOLTS    LN/LN:   0.656       Z0= 516.1879
             LN/LN/GND:  0.688 (  0.303 GND RETURN KA)

DS-UNIT HEATER 3P Duty:   1.658  0.23 Z1=  72.5386         1.658     1.658
              SLG DUTY:   0.979  0.19 Z2=  72.5386         0.979
   480. VOLTS    LN/LN:   1.436       Z0= 223.9207
             LN/LN/GND:  1.499 (  0.694 GND RETURN KA)

DS-WELDER PLUG 3P Duty:   1.517  0.18 Z1=  79.2942         1.517     1.517
              SLG DUTY:   0.895  0.14 Z2=  79.2942         0.895
   480. VOLTS    LN/LN:   1.314       Z0= 244.6491
             LN/LN/GND:  1.369 (  0.635 GND RETURN KA)

DS-XFMR 21 LP- 3P Duty:   6.220  0.58 Z1=  19.3379         6.220     6.220
              SLG DUTY:   4.001  0.44 Z2=  19.3379         4.001
   480. VOLTS    LN/LN:   5.387       Z0=  51.9534
             LN/LN/GND:  5.817 (  2.936 GND RETURN KA)

DS-XFMR 21 LP- 3P Duty:   2.558  0.30 Z1=  47.0202         2.558     2.558
              SLG DUTY:   1.538  0.23 Z2=  47.0202         1.538
   480. VOLTS    LN/LN:   2.215       Z0= 140.9091
             LN/LN/GND:  2.330 (  1.098 GND RETURN KA)

DUMBWATIER DIS 3P Duty:   4.019  0.39 Z1=  29.9250         4.019     4.019
              SLG DUTY:   2.457  0.28 Z2=  29.9250         2.457
   480. VOLTS    LN/LN:   3.481       Z0=  87.4628
             LN/LN/GND:  3.709 (  1.764 GND RETURN KA)

EAST BANK-1A   3P Duty:  20.099 10.53 Z1=   0.5985        29.133    24.842
              SLG DUTY:   0.000  0.00 Z2=   0.5985         0.000
  4800. VOLTS    LN/LN:  17.406       Z0= INFINITE
             LN/LN/GND: 17.406 (  0.000 GND RETURN KA)
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                U N B A L A N C E D   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

EAST BANK-1B   3P Duty:  21.491 11.84 Z1=   0.5597        31.706    26.868
              SLG DUTY:   0.000  0.00 Z2=   0.5597         0.000
  4800. VOLTS    LN/LN:  18.612       Z0= INFINITE
             LN/LN/GND: 18.612 (  0.000 GND RETURN KA)

EAST BANK-2A   3P Duty:  21.521 12.12 Z1=   0.5589        31.854    26.962
              SLG DUTY:   0.000  0.00 Z2=   0.5589         0.000
  4800. VOLTS    LN/LN:  18.638       Z0= INFINITE
             LN/LN/GND: 18.638 (  0.000 GND RETURN KA)

EAST BANK-2B   3P Duty:  20.126 10.85 Z1=   0.5976        29.308    24.950
              SLG DUTY:   0.000  0.00 Z2=   0.5976         0.000
  4800. VOLTS    LN/LN:  17.430       Z0= INFINITE
             LN/LN/GND: 17.430 (  0.000 GND RETURN KA)

EAST FAN       3P Duty:   0.747  0.29 Z1= 161.0931         0.747     0.747
              SLG DUTY:   0.632  0.28 Z2= 161.0931         0.632
   480. VOLTS    LN/LN:   0.647       Z0= 249.2525
             LN/LN/GND:   0.710 (  0.547 GND RETURN KA)

EAST STORAGE D 3P Duty:   1.047  0.09 Z1= 114.8744         1.047     1.047
              SLG DUTY:   0.612  0.06 Z2= 114.8744         0.612
   480. VOLTS    LN/LN:   0.907       Z0= 359.6144
             LN/LN/GND:   0.938 (  0.433 GND RETURN KA)

EAST SUPPLY FA 3P Duty:   0.597  0.12 Z1= 201.5415         0.597     0.597
              SLG DUTY:   0.350  0.09 Z2= 201.5415         0.350
   480. VOLTS    LN/LN:   0.517       Z0= 628.6495
             LN/LN/GND:   0.536 (  0.247 GND RETURN KA)

EF-1 DISC      3P Duty:   2.886  0.28 Z1=  41.6755         2.886     2.886
              SLG DUTY:   1.731  0.20 Z2=  41.6755         1.731
   480. VOLTS    LN/LN:   2.499       Z0= 125.4949
             LN/LN/GND:   2.637 (  1.234 GND RETURN KA)

EF-11 DISC     3P Duty:   0.984  0.13 Z1= 122.2265         0.984     0.984
              SLG DUTY:   0.577  0.10 Z2= 122.2265         0.577
   480. VOLTS    LN/LN:   0.852       Z0= 380.9138
             LN/LN/GND:   0.885 (  0.408 GND RETURN KA)
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               U N B A L A N C E D   F A U L T   R E P O R T
                 (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                       PRE FAULT VOLTAGE: 1.0000
                       MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

EF-12 DISC     3P Duty:   1.054  0.13 Z1= 114.1262         1.054     1.054
              SLG DUTY:   0.619  0.10 Z2= 114.1262         0.619
   480. VOLTS    LN/LN:   0.913       Z0= 355.3359
             LN/LN/GND:  0.948 (  0.438 GND RETURN KA)

EF-13 DISC     3P Duty:   1.093  0.13 Z1= 110.0775         1.093     1.093
              SLG DUTY:   0.641  0.10 Z2= 110.0775         0.641
   480. VOLTS    LN/LN:   0.946       Z0= 342.5481
             LN/LN/GND:  0.983 (  0.454 GND RETURN KA)

EF-14 DISC     3P Duty:   1.054  0.13 Z1= 114.1262         1.054     1.054
              SLG DUTY:   0.619  0.10 Z2= 114.1262         0.619
   480. VOLTS    LN/LN:   0.913       Z0= 355.3359
             LN/LN/GND:  0.948 (  0.438 GND RETURN KA)

EF-15 DISC     3P Duty:   1.054  0.13 Z1= 114.1262         1.054     1.054
              SLG DUTY:   0.619  0.10 Z2= 114.1262         0.619
   480. VOLTS    LN/LN:   0.913       Z0= 355.3359
             LN/LN/GND:  0.948 (  0.438 GND RETURN KA)

EF-16 DISC     3P Duty:   1.018  0.13 Z1= 118.1759         1.018     1.018
              SLG DUTY:   0.597  0.10 Z2= 118.1759         0.597
   480. VOLTS    LN/LN:   0.881       Z0= 368.1245
             LN/LN/GND:  0.915 (  0.422 GND RETURN KA)

EF-18 DISC     3P Duty:   1.632  0.18 Z1=  73.7096         1.632     1.632
              SLG DUTY:   0.963  0.13 Z2=  73.7096         0.963
   480. VOLTS    LN/LN:   1.413       Z0= 227.5126
             LN/LN/GND:  1.475 (  0.683 GND RETURN KA)

EF-2           3P Duty:   1.883  0.25 Z1=  63.8797         1.883     1.883
              SLG DUTY:   1.168  0.21 Z2=  63.8797         1.168
   480. VOLTS    LN/LN:   1.631       Z0= 181.2717
             LN/LN/GND:  1.708 (  0.846 GND RETURN KA)

EF-20 DISC     3P Duty:   0.984  0.13 Z1= 122.2265         0.984     0.984
              SLG DUTY:   0.577  0.10 Z2= 122.2265         0.577
   480. VOLTS    LN/LN:   0.852       Z0= 380.9138
             LN/LN/GND:  0.885 (  0.408 GND RETURN KA)
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                 U N B A L A N C E D   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

EF-5 DISC      3P Duty:   1.632  0.18 Z1=  73.7096         1.632     1.632
              SLG DUTY:   0.963  0.13 Z2=  73.7096         0.963
   480. VOLTS    LN/LN:   1.413       Z0= 227.5126
             LN/LN/GND:  1.475 (  0.683 GND RETURN KA)

EF-7 DISC      3P Duty:   1.018  0.13 Z1= 118.1759         1.018     1.018
              SLG DUTY:   0.597  0.10 Z2= 118.1759         0.597
   480. VOLTS    LN/LN:   0.881       Z0= 368.1245
             LN/LN/GND:  0.915 (  0.422 GND RETURN KA)

EF-9 DISC      3P Duty:   1.402  0.16 Z1=  85.8135         1.402     1.402
              SLG DUTY:   0.825  0.12 Z2=  85.8135         0.825
   480. VOLTS    LN/LN:   1.214       Z0= 265.8430
             LN/LN/GND:  1.265 (  0.585 GND RETURN KA)

EF-BS-1        3P Duty:   3.936  0.24 Z1=  30.5571         3.936     3.936
              SLG DUTY:   2.374  0.15 Z2=  30.5571         2.374
   480. VOLTS    LN/LN:   3.409       Z0=  91.2327
             LN/LN/GND:  3.608 (  1.696 GND RETURN KA)

EHU-BS-3       3P Duty:   2.605  0.21 Z1=  46.1646         2.605     2.605
              SLG DUTY:   1.547  0.15 Z2=  46.1646         1.547
   480. VOLTS    LN/LN:   2.256       Z0= 141.1915
             LN/LN/GND:  2.362 (  1.099 GND RETURN KA)

EHU-BS-4       3P Duty:   1.527  0.14 Z1=  78.7789         1.527     1.527
              SLG DUTY:   0.898  0.10 Z2=  78.7789         0.898
   480. VOLTS    LN/LN:   1.322       Z0= 244.5030
             LN/LN/GND:  1.375 (  0.636 GND RETURN KA)

EHU-BS-5       3P Duty:   1.527  0.14 Z1=  78.7789         1.527     1.527
              SLG DUTY:   0.898  0.10 Z2=  78.7789         0.898
   480. VOLTS    LN/LN:   1.322       Z0= 244.5030
             LN/LN/GND:  1.375 (  0.636 GND RETURN KA)

ELEVATOR       3P Duty:   3.404  0.22 Z1=  35.3400         3.404     3.404
              SLG DUTY:   2.031  0.16 Z2=  35.3400         2.031
   480. VOLTS    LN/LN:   2.948       Z0= 107.1874
             LN/LN/GND:  3.097 (  1.446 GND RETURN KA)
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                  U N B A L A N C E D   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

ET CONVEYOR 1  3P Duty:   1.047  0.09 Z1= 114.8744         1.047     1.047
              SLG DUTY:   0.612  0.06 Z2= 114.8744         0.612
   480. VOLTS    LN/LN:   0.907       Z0= 359.6144
             LN/LN/GND:  0.938 (  0.433 GND RETURN KA)

ET CONVEYOR 2  3P Duty:   0.724  0.09 Z1= 166.1621         0.724     0.724
              SLG DUTY:   0.415  0.06 Z2= 166.1621         0.415
   480. VOLTS    LN/LN:   0.627       Z0= 538.7855
             LN/LN/GND:  0.654 (  0.290 GND RETURN KA)

EUH-001        3P Duty:   2.975  0.25 Z1=  40.4249         2.975     2.975
              SLG DUTY:   1.802  0.18 Z2=  40.4249         1.802
   480. VOLTS    LN/LN:   2.577       Z0= 119.7442
             LN/LN/GND:  2.716 (  1.290 GND RETURN KA)

EUH-002        3P Duty:   1.956  0.19 Z1=  61.4792         1.956     1.956
              SLG DUTY:   1.167  0.14 Z2=  61.4792         1.167
   480. VOLTS    LN/LN:   1.694       Z0= 186.4075
             LN/LN/GND:  1.773 (  0.831 GND RETURN KA)

EUH-003        3P Duty:   1.456  0.17 Z1=  82.6137         1.456     1.456
              SLG DUTY:   0.863  0.13 Z2=  82.6137         0.863
   480. VOLTS    LN/LN:   1.261       Z0= 253.1087
             LN/LN/GND:  1.314 (  0.613 GND RETURN KA)

EUH-004        3P Duty:   1.556  0.17 Z1=  77.3261         1.556     1.556
              SLG DUTY:   0.923  0.13 Z2=  77.3261         0.923
   480. VOLTS    LN/LN:   1.347       Z0= 236.4316
             LN/LN/GND:  1.405 (  0.656 GND RETURN KA)

EUH-BS-1       3P Duty:   7.878  0.51 Z1=  15.2678         7.878     7.878
              SLG DUTY:   5.090  0.33 Z2=  15.2678         5.090
   480. VOLTS    LN/LN:   6.823       Z0=  40.9549
             LN/LN/GND:  7.457 (  3.730 GND RETURN KA)

EUH-BS-2       3P Duty:   3.716  0.27 Z1=  32.3698         3.716     3.716
              SLG DUTY:   2.245  0.19 Z2=  32.3698         2.245
   480. VOLTS    LN/LN:   3.218       Z0=  96.3593
             LN/LN/GND:  3.407 (  1.605 GND RETURN KA)
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                 U N B A L A N C E D   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
===============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES     (RMS)       FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
===============================================================================

EXHAUST FAN A  3P Duty:   3.116  0.22 Z1=  38.5983        3.116     3.116
              SLG DUTY:   1.837  0.17 Z2=  38.5983        1.837
   480. VOLTS    LN/LN:   2.699       Z0= 119.3769
             LN/LN/GND:  2.821 (  1.302 GND RETURN KA)

EXHAUST FAN B  3P Duty:   6.490  0.40 Z1=  18.5324        6.490     6.490
              SLG DUTY:   3.924  0.30 Z2=  18.5324        3.924
   480. VOLTS    LN/LN:   5.621       Z0=  55.1521
             LN/LN/GND:  5.967 (  2.805 GND RETURN KA)

EXHAUST FAN C  3P Duty:   4.631  0.30 Z1=  25.9733        4.631     4.631
              SLG DUTY:   2.757  0.23 Z2=  25.9733        2.757
   480. VOLTS    LN/LN:   4.011       Z0=  79.1524
             LN/LN/GND:  4.221 (  1.960 GND RETURN KA)

EXHAUST FAN D  3P Duty:   3.335  0.23 Z1=  36.0620        3.335     3.335
              SLG DUTY:   1.969  0.18 Z2=  36.0620        1.969
   480. VOLTS    LN/LN:   2.889       Z0= 111.3209
             LN/LN/GND:  3.022 (  1.395 GND RETURN KA)

EXHAUST FAN E  3P Duty:   2.466  0.19 Z1=  48.7733        2.466     2.466
              SLG DUTY:   1.449  0.15 Z2=  48.7733        1.449
   480. VOLTS    LN/LN:   2.136       Z0= 151.6299
             LN/LN/GND:  2.226 (  1.025 GND RETURN KA)

FAN CONTROL PA 3P Duty:   2.185  0.24 Z1=  55.0583        2.185     2.185
              SLG DUTY:   1.302  0.18 Z2=  55.0583        1.302
   480. VOLTS    LN/LN:   1.892       Z0= 167.2721
             LN/LN/GND:  1.987 (  0.927 GND RETURN KA)

FC-1           3P Duty:   1.484  0.22 Z1=  81.0356        1.484     1.484
              SLG DUTY:   0.904  0.18 Z2=  81.0356        0.904
   480. VOLTS    LN/LN:   1.285       Z0= 237.5354
             LN/LN/GND:  1.345 (  0.649 GND RETURN KA)

FC-1 DISC      3P Duty:   2.886  0.28 Z1=  41.6755        2.886     2.886
              SLG DUTY:   1.731  0.20 Z2=  41.6755        1.731
   480. VOLTS    LN/LN:   2.499       Z0= 125.4949
             LN/LN/GND:  2.637 (  1.234 GND RETURN KA)
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                 U N B A L A N C E D   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
===============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
===============================================================================

FC-2          3P Duty:   1.894  0.26 Z1=  63.5195         1.894     1.894
             SLG DUTY:   1.171  0.21 Z2=  63.5195         1.171
   480. VOLTS   LN/LN:   1.640       Z0= 181.2717
            LN/LN/GND:  1.721 (  0.847 GND RETURN KA)

FC-2 DISC      3P Duty:   6.417  0.65 Z1=  18.7430         6.418     6.418
             SLG DUTY:   4.155  0.46 Z2=  18.7430         4.155
   480. VOLTS   LN/LN:   5.558       Z0=  49.9906
            LN/LN/GND:  6.055 (  3.051 GND RETURN KA)

FC-3 DISC      3P Duty:   3.558  0.34 Z1=  33.8073         3.558     3.558
             SLG DUTY:   2.157  0.25 Z2=  33.8073         2.157
   480. VOLTS   LN/LN:   3.081       Z0= 100.1093
            LN/LN/GND:  3.269 (  1.544 GND RETURN KA)

FC-4 DISC      3P Duty:   0.984  0.13 Z1= 122.2265         0.984     0.984
             SLG DUTY:   0.577  0.10 Z2= 122.2265         0.577
   480. VOLTS   LN/LN:   0.852       Z0= 380.9138
            LN/LN/GND:  0.885 (  0.408 GND RETURN KA)

FC-5 DISC      3P Duty:   1.054  0.13 Z1= 114.1262         1.054     1.054
             SLG DUTY:   0.619  0.10 Z2= 114.1262         0.619
   480. VOLTS   LN/LN:   0.913       Z0= 355.3359
            LN/LN/GND:  0.948 (  0.438 GND RETURN KA)

FC-6 DISC      3P Duty:   1.281  0.15 Z1=  93.8949         1.281     1.281
             SLG DUTY:   0.753  0.11 Z2=  93.8949         0.753
   480. VOLTS   LN/LN:   1.109       Z0= 291.4063
            LN/LN/GND:  1.155 (  0.533 GND RETURN KA)

FC-7 DISC      3P Duty:   1.547  0.17 Z1=  77.7412         1.547     1.547
             SLG DUTY:   0.912  0.13 Z2=  77.7412         0.912
   480. VOLTS   LN/LN:   1.340       Z0= 240.2870
            LN/LN/GND:  1.398 (  0.647 GND RETURN KA)

FILTER DOOR OP 3P Duty:   1.483  0.13 Z1=  81.1187         1.483     1.483
             SLG DUTY:   0.870  0.10 Z2=  81.1187         0.870
   480. VOLTS   LN/LN:   1.284       Z0= 252.8808
            LN/LN/GND:  1.333 (  0.615 GND RETURN KA)
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                  U N B A L A N C E D   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
===============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
===============================================================================

FINAL TANK AND 3P Duty:  3.173  0.25 Z1=  37.9020         3.173     3.173
              SLG DUTY:  1.868  0.19 Z2=  37.9020         1.868
   480. VOLTS    LN/LN:  2.748       Z0= 117.5858
             LN/LN/GND:  2.879 (  1.322 GND RETURN KA)

FINAL TANK DRA 3P Duty:  2.756  0.21 Z1=  43.6424         2.756     2.756
              SLG DUTY:  1.621  0.16 Z2=  43.6424         1.621
   480. VOLTS    LN/LN:  2.387       Z0= 135.4987
             LN/LN/GND:  2.492 (  1.147 GND RETURN KA)

FINE SCREEN DU 3P Duty:  1.421  0.15 Z1=  84.6480         1.421     1.421
              SLG DUTY:  0.835  0.11 Z2=  84.6480         0.835
   480. VOLTS    LN/LN:  1.231       Z0= 262.9790
             LN/LN/GND:  1.283 (  0.591 GND RETURN KA)

FINE SCREEN DU 3P Duty:  1.491  0.15 Z1=  80.6563         1.491     1.491
              SLG DUTY:  0.877  0.11 Z2=  80.6563         0.877
   480. VOLTS    LN/LN:  1.291       Z0= 250.1931
             LN/LN/GND:  1.348 (  0.621 GND RETURN KA)

FINE SCREEN DU 3P Duty:  1.569  0.16 Z1=  76.6639         1.569     1.569
              SLG DUTY:  0.924  0.11 Z2=  76.6639         0.924
   480. VOLTS    LN/LN:  1.359       Z0= 237.4086
             LN/LN/GND:  1.418 (  0.655 GND RETURN KA)

FUME EXTRACTOR 3P Duty:  1.811  0.24 Z1=  66.4069         1.811     1.811
              SLG DUTY:  1.121  0.20 Z2=  66.4069         1.121
   480. VOLTS    LN/LN:  1.569       Z0= 189.2977
             LN/LN/GND:  1.643 (  0.811 GND RETURN KA)

FUME FAN CONTA 3P Duty:  1.028  0.15 Z1= 116.9546         1.028     1.028
              SLG DUTY:  0.606  0.11 Z2= 116.9546         0.606
   480. VOLTS    LN/LN:  0.891       Z0= 361.9755
             LN/LN/GND:  0.927 (  0.429 GND RETURN KA)

FUME HOOD EXHA 3P Duty:  0.892  0.14 Z1= 134.8826         0.892     0.892
              SLG DUTY:  0.524  0.10 Z2= 134.8826         0.524
   480. VOLTS    LN/LN:  0.772       Z0= 418.5350
             LN/LN/GND:  0.803 (  0.371 GND RETURN KA)
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                 U N B A L A N C E D   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
===============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
===============================================================================

FUME HOODS VFD 3P Duty:  0.582  0.12 Z1= 206.6717         0.582     0.582
              SLG DUTY:  0.341  0.09 Z2= 206.6717         0.341
   480. VOLTS    LN/LN:  0.504       Z0= 644.8135
             LN/LN/GND: 0.522 (  0.241 GND RETURN KA)

GATE 1 CONTROL 3P Duty:  0.829  0.13 Z1= 145.1321         0.829     0.829
              SLG DUTY:  0.487  0.10 Z2= 145.1321         0.487
   480. VOLTS    LN/LN:  0.718       Z0= 450.8574
             LN/LN/GND: 0.746 (  0.345 GND RETURN KA)

GATE 2 CONTROL 3P Duty:  0.704  0.12 Z1= 170.7666         0.704     0.704
              SLG DUTY:  0.413  0.10 Z2= 170.7666         0.413
   480. VOLTS    LN/LN:  0.610       Z0= 531.6688
             LN/LN/GND: 0.633 (  0.292 GND RETURN KA)

GATE VALVE 1   3P Duty:  1.190  0.13 Z1= 101.0558         1.190     1.190
              SLG DUTY:  0.694  0.10 Z2= 101.0558         0.694
   480. VOLTS    LN/LN:  1.031       Z0= 318.3456
             LN/LN/GND: 1.072 (  0.489 GND RETURN KA)

GATE VALVE 2   3P Duty:  1.190  0.13 Z1= 101.0558         1.190     1.190
              SLG DUTY:  0.694  0.10 Z2= 101.0558         0.694
   480. VOLTS    LN/LN:  1.031       Z0= 318.3456
             LN/LN/GND: 1.072 (  0.489 GND RETURN KA)

GATE VALVE 4   3P Duty:  1.190  0.13 Z1= 101.0558         1.190     1.190
              SLG DUTY:  0.694  0.10 Z2= 101.0558         0.694
   480. VOLTS    LN/LN:  1.031       Z0= 318.3456
             LN/LN/GND: 1.072 (  0.489 GND RETURN KA)

GATE VALVE 5   3P Duty:  1.190  0.13 Z1= 101.0558         1.190     1.190
              SLG DUTY:  0.694  0.10 Z2= 101.0558         0.694
   480. VOLTS    LN/LN:  1.031       Z0= 318.3456
             LN/LN/GND: 1.072 (  0.489 GND RETURN KA)

GATE VALVE 7   3P Duty:  1.190  0.13 Z1= 101.0558         1.190     1.190
              SLG DUTY:  0.694  0.10 Z2= 101.0558         0.694
   480. VOLTS    LN/LN:  1.031       Z0= 318.3456
             LN/LN/GND: 1.072 (  0.489 GND RETURN KA)
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                  U N B A L A N C E D   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

GATE VALVE 8   3P Duty:   1.190  0.13 Z1= 101.0558        1.190     1.190
              SLG DUTY:   0.694  0.10 Z2= 101.0558        0.694
   480. VOLTS    LN/LN:   1.031       Z0= 318.3456
             LN/LN/GND:  1.072 (  0.489 GND RETURN KA)

GRINDER #1     3P Duty:   0.933  0.14 Z1= 128.9423        0.933     0.933
              SLG DUTY:   0.544  0.10 Z2= 128.9423        0.544
   480. VOLTS    LN/LN:   0.808       Z0= 406.1642
             LN/LN/GND:  0.843 (  0.384 GND RETURN KA)

GRINDER #2     3P Duty:   1.011  0.14 Z1= 118.9578        1.011     1.011
              SLG DUTY:   0.590  0.10 Z2= 118.9578        0.590
   480. VOLTS    LN/LN:   0.876       Z0= 373.8357
             LN/LN/GND:  0.914 (  0.417 GND RETURN KA)

GRINDER #3     3P Duty:   1.011  0.14 Z1= 118.9578        1.011     1.011
              SLG DUTY:   0.590  0.10 Z2= 118.9578        0.590
   480. VOLTS    LN/LN:   0.876       Z0= 373.8357
             LN/LN/GND:  0.914 (  0.417 GND RETURN KA)

GRIT REMOVAL H 3P Duty:   6.312  0.49 Z1=  19.0560        6.312     6.312
              SLG DUTY:   4.040  0.33 Z2=  19.0560        4.040
   480. VOLTS    LN/LN:   5.466       Z0=  51.7351
             LN/LN/GND:  5.920 (  2.954 GND RETURN KA)

GRIT TANK #1   3P Duty:   6.311  0.49 Z1=  19.0591        6.311     6.311
              SLG DUTY:   4.040  0.33 Z2=  19.0591        4.040
   480. VOLTS    LN/LN:   5.465       Z0=  51.7351
             LN/LN/GND:  5.919 (  2.954 GND RETURN KA)

GRIT TANK #2   3P Duty:   6.311  0.49 Z1=  19.0591        6.311     6.311
              SLG DUTY:   4.040  0.33 Z2=  19.0591        4.040
   480. VOLTS    LN/LN:   5.465       Z0=  51.7351
             LN/LN/GND:  5.919 (  2.954 GND RETURN KA)

GRIT TANKS     3P Duty:   6.682  0.51 Z1=  18.0000        6.682     6.682
              SLG DUTY:   4.311  0.35 Z2=  18.0000        4.311
   480. VOLTS    LN/LN:   5.787       Z0=  48.2556
             LN/LN/GND:  6.286 (  3.162 GND RETURN KA)
```

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                 U N B A L A N C E D   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
===============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
===============================================================================

HOT WATER CIR  3P Duty:   2.886  0.28 Z1=  41.6755        2.886     2.886
              SLG DUTY:   1.731  0.20 Z2=  41.6755        1.731
   480. VOLTS    LN/LN:   2.499       Z0= 125.4949
             LN/LN/GND:  2.637 (  1.234 GND RETURN KA)

HOT WATER CIRC 3P Duty:   0.597  0.12 Z1= 201.5415        0.597     0.597
              SLG DUTY:   0.350  0.09 Z2= 201.5415        0.350
   480. VOLTS    LN/LN:   0.517       Z0= 628.6495
             LN/LN/GND:  0.536 (  0.247 GND RETURN KA)

HOT WATER CIRC 3P Duty:   5.408  0.49 Z1=  22.2434        5.408     5.408
              SLG DUTY:   3.403  0.34 Z2=  22.2434        3.403
   480. VOLTS    LN/LN:   4.683       Z0=  62.1489
             LN/LN/GND:  5.057 (  2.470 GND RETURN KA)

HOT WATER CIRC 3P Duty:   5.034  0.46 Z1=  23.8932        5.034     5.034
              SLG DUTY:   3.142  0.32 Z2=  23.8932        3.142
   480. VOLTS    LN/LN:   4.360       Z0=  67.6397
             LN/LN/GND:  4.693 (  2.273 GND RETURN KA)

HUMIDIFIER #1  3P Duty:   7.634  1.23 Z1=  15.7557        7.680     7.657
              SLG DUTY:   5.113  0.77 Z2=  15.7557        5.115
   480. VOLTS    LN/LN:   6.611       Z0=  39.9627
             LN/LN/GND:  7.347 (  3.798 GND RETURN KA)

HUMIDIFIER #2  3P Duty:   7.634  1.23 Z1=  15.7557        7.680     7.657
              SLG DUTY:   5.113  0.77 Z2=  15.7557        5.115
   480. VOLTS    LN/LN:   6.611       Z0=  39.9627
             LN/LN/GND:  7.347 (  3.798 GND RETURN KA)

HVAC UNIT A    3P Duty:   2.084  0.24 Z1=  57.7136        2.084     2.084
              SLG DUTY:   1.239  0.16 Z2=  57.7136        1.239
   480. VOLTS    LN/LN:   1.805       Z0= 176.2405
             LN/LN/GND:  1.901 (  0.880 GND RETURN KA)

HVAC UNIT B    3P Duty:   2.668  0.29 Z1=  45.0861        2.668     2.668
              SLG DUTY:   1.600  0.20 Z2=  45.0861        1.600
   480. VOLTS    LN/LN:   2.310       Z0= 135.9280
             LN/LN/GND:  2.447 (  1.140 GND RETURN KA)
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                  U N B A L A N C E D   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

HW PUMP #1 P-1 3P Duty:   2.512  0.27 Z1=  47.8903         2.512     2.512
              SLG DUTY:   1.508  0.19 Z2=  47.8903         1.508
   480. VOLTS    LN/LN:   2.175       Z0= 143.9858
             LN/LN/GND:  2.298 (  1.075 GND RETURN KA)

HYDRAULIC LIFT 3P Duty:   2.912  0.36 Z1=  41.3040         2.912     2.912
              SLG DUTY:   1.881  0.30 Z2=  41.3040         1.881
   480. VOLTS    LN/LN:   2.522       Z0= 109.4166
             LN/LN/GND:  2.663 (  1.388 GND RETURN KA)

INFLUENT PUMPS 3P Duty:   3.475  0.40 Z1=  34.6111         3.475     3.475
              SLG DUTY:   2.139  0.28 Z2=  34.6111         2.139
   480. VOLTS    LN/LN:   3.010       Z0= 100.0900
             LN/LN/GND:  3.217 (  1.540 GND RETURN KA)

INLET TANKS    3P Duty:   0.506  1.87 Z1= 548.5062         0.523     0.515
              SLG DUTY:   0.511  1.90 Z2= 548.5062         0.530
   208. VOLTS    LN/LN:   0.438       Z0= 531.6671
             LN/LN/GND:  0.512 (  0.517 GND RETURN KA)

INNER DOOR     3P Duty:   1.097  0.18 Z1= 109.6349         1.097     1.097
              SLG DUTY:   0.662  0.14 Z2= 109.6349         0.662
   480. VOLTS    LN/LN:   0.950       Z0= 326.1727
             LN/LN/GND:  0.989 (  0.474 GND RETURN KA)

LAB STILL      3P Duty:   6.017  0.72 Z1=  19.9889         6.018     6.018
              SLG DUTY:   4.023  0.52 Z2=  19.9889         4.023
   480. VOLTS    LN/LN:   5.211       Z0=  50.4705
             LN/LN/GND:  5.726 (  2.998 GND RETURN KA)

LC-2           3P Duty:  22.090  3.88 Z1=   5.4452        26.100    24.138
              SLG DUTY:  21.691  3.68 Z2=   5.4452        25.318
   480. VOLTS    LN/LN:  19.130       Z0=   5.7466
             LN/LN/GND: 22.066 ( 21.305 GND RETURN KA)

LC-2A          3P Duty:   7.761  4.21 Z1=  15.4974         9.343     8.572
              SLG DUTY:   7.281  4.19 Z2=  15.4974         8.754
   480. VOLTS    LN/LN:   6.722       Z0=  18.5667
             LN/LN/GND:  7.551 (  6.856 GND RETURN KA)
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                  U N B A L A N C E D   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
===============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
===============================================================================

LC-3          3P Duty:  26.738  5.72 Z1=   4.4985        34.515    30.758
             SLG DUTY:  28.199  5.94 Z2=   4.4985        36.706
   480. VOLTS    LN/LN:  23.156       Z0=   3.8000
            LN/LN/GND: 27.726 ( 29.827 GND RETURN KA)

LC-3A         3P Duty:  28.866  4.95 Z1=   4.1669        36.071    32.574
             SLG DUTY:  29.266  5.37 Z2=   4.1669        37.264
   480. VOLTS    LN/LN:  24.999       Z0=   4.0000
            LN/LN/GND: 29.510 ( 29.667 GND RETURN KA)

LC-4          3P Duty:  18.620  4.92 Z1=   6.4598        23.244    21.000
             SLG DUTY:  18.320  5.17 Z2=   6.4598        23.125
   480. VOLTS    LN/LN:  16.125       Z0=   6.7800
            LN/LN/GND: 18.649 ( 18.027 GND RETURN KA)

LC-5          3P Duty:  15.563  4.15 Z1=   7.7285        18.679    17.158
             SLG DUTY:  15.838  4.45 Z2=   7.7285        19.317
   480. VOLTS    LN/LN:  13.478       Z0=   7.3333
            LN/LN/GND: 15.928 ( 16.117 GND RETURN KA)

LC-5A         3P Duty:  16.771  4.24 Z1=   7.1720        20.221    18.538
             SLG DUTY:  16.735  4.50 Z2=   7.1720        20.457
   480. VOLTS    LN/LN:  14.524       Z0=   7.2220
            LN/LN/GND: 16.944 ( 16.696 GND RETURN KA)

LC-8          3P Duty:  17.581  3.31 Z1=   6.8415        20.041    18.832
             SLG DUTY:  18.347  3.64 Z2=   6.8415        21.366
   480. VOLTS    LN/LN:  15.226       Z0=   6.0001
            LN/LN/GND: 18.421 ( 19.167 GND RETURN KA)

LC-8A         3P Duty:  19.737  3.46 Z1=   6.0943        22.719    21.255
             SLG DUTY:  19.851  3.79 Z2=   6.0943        23.332
   480. VOLTS    LN/LN:  17.093       Z0=   6.0001
            LN/LN/GND: 20.212 ( 19.955 GND RETURN KA)

LIME SCREW CON 3P Duty:   1.126  0.09 Z1= 106.8375         1.126     1.126
             SLG DUTY:   0.659  0.07 Z2= 106.8375         0.659
   480. VOLTS    LN/LN:   0.975       Z0= 334.0194
            LN/LN/GND:  1.010 (  0.466 GND RETURN KA)
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                U N B A L A N C E D   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

LIME SILO #2 T 3P Duty:   1.768  0.14 Z1=  68.0191        1.768     1.768
              SLG DUTY:   1.039  0.10 Z2=  68.0191        1.039
   480. VOLTS    LN/LN:   1.531       Z0= 211.5251
             LN/LN/GND:  1.592 (  0.735 GND RETURN KA)

LIME SIO #1TRU 3P Duty:   1.766  0.14 Z1=  68.1136        1.766     1.766
              SLG DUTY:   1.038  0.10 Z2=  68.1136        1.038
   480. VOLTS    LN/LN:   1.529       Z0= 211.5251
             LN/LN/GND:  1.591 (  0.735 GND RETURN KA)

MAKE UP AIR UN 3P Duty:   0.846  0.10 Z1= 142.1295        0.846     0.846
              SLG DUTY:   0.489  0.07 Z2= 142.1295        0.489
   480. VOLTS    LN/LN:   0.733       Z0= 453.7182
             LN/LN/GND:  0.761 (  0.344 GND RETURN KA)

MAU HEATER     3P Duty:   7.753  0.94 Z1=  15.5148        7.763     7.758
              SLG DUTY:   5.310  0.69 Z2=  15.5148        5.310
   480. VOLTS    LN/LN:   6.714       Z0=  37.5623
             LN/LN/GND:  7.425 (  4.002 GND RETURN KA)

MAU-1          3P Duty:   3.825  0.47 Z1=  31.4451        3.825     3.825
              SLG DUTY:   2.564  0.40 Z2=  31.4451        2.564
   480. VOLTS    LN/LN:   3.313       Z0=  78.0147
             LN/LN/GND:  3.521 (  1.926 GND RETURN KA)

MAU-1 DISC     3P Duty:   2.886  0.28 Z1=  41.6755        2.886     2.886
              SLG DUTY:   1.731  0.20 Z2=  41.6755        1.731
   480. VOLTS    LN/LN:   2.499       Z0= 125.4949
             LN/LN/GND:  2.637 (  1.234 GND RETURN KA)

MAU-1 VFD      3P Duty:   3.188  0.31 Z1=  37.7278        3.188     3.188
              SLG DUTY:   1.921  0.22 Z2=  37.7278        1.921
   480. VOLTS    LN/LN:   2.761       Z0= 112.7901
             LN/LN/GND:  2.920 (  1.372 GND RETURN KA)

MCC 15 AIR COM 3P Duty:   2.375  0.25 Z1=  50.6395        2.375     2.375
              SLG DUTY:   1.427  0.18 Z2=  50.6395        1.427
   480. VOLTS    LN/LN:   2.057       Z0= 152.0464
             LN/LN/GND:  2.168 (  1.018 GND RETURN KA)
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                 U N B A L A N C E D   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT       KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES     (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

MCC 15 ELEVATO 3P Duty:   2.965  0.30 Z1=  40.5651         2.965     2.965
              SLG DUTY:   1.800  0.21 Z2=  40.5651         1.800
   480. VOLTS    LN/LN:   2.568       Z0= 119.8225
             LN/LN/GND:  2.722 (  1.289 GND RETURN KA)

MCC 15 GATES   3P Duty:   0.859  0.14 Z1= 140.0070         0.859     0.859
              SLG DUTY:   0.505  0.10 Z2= 140.0070         0.505
   480. VOLTS    LN/LN:   0.744       Z0= 434.6960
             LN/LN/GND:  0.773 (  0.358 GND RETURN KA)

MCC 15 STRAINE 3P Duty:   2.638  0.27 Z1=  45.5914         2.638     2.638
              SLG DUTY:   1.592  0.19 Z2=  45.5914         1.592
   480. VOLTS    LN/LN:   2.285       Z0= 135.9280
             LN/LN/GND:  2.414 (  1.138 GND RETURN KA)

MCC 15AA AIR C 3P Duty:   2.886  0.28 Z1=  41.6755         2.886     2.886
              SLG DUTY:   1.731  0.20 Z2=  41.6755         1.731
   480. VOLTS    LN/LN:   2.499       Z0= 125.4949
             LN/LN/GND:  2.637 (  1.234 GND RETURN KA)

MCC-00         3P Duty:  10.173  1.71 Z1=  11.8237        10.427    10.300
              SLG DUTY:   8.272  1.28 Z2=  11.8237         8.334
   480. VOLTS    LN/LN:   8.810       Z0=  20.4175
             LN/LN/GND: 10.141 (  6.901 GND RETURN KA)

MCC-00 BACKWAS 3P Duty:   4.689  0.56 Z1=  25.6512         4.689     4.689
              SLG DUTY:   2.995  0.40 Z2=  25.6512         2.995
   480. VOLTS    LN/LN:   4.061       Z0=  69.9511
             LN/LN/GND:  4.402 (  2.187 GND RETURN KA)

MCC-00 OHD DOO 3P Duty:   1.667  0.19 Z1=  72.1637         1.667     1.667
              SLG DUTY:   0.990  0.13 Z2=  72.1637         0.990
   480. VOLTS    LN/LN:   1.443       Z0= 220.5733
             LN/LN/GND:  1.511 (  0.703 GND RETURN KA)

MCC-00-AIR COM 3P Duty:   5.301  0.77 Z1=  22.6922         5.302     5.301
              SLG DUTY:   3.525  0.57 Z2=  22.6922         3.525
   480. VOLTS    LN/LN:   4.590       Z0=  57.7525
             LN/LN/GND:  5.025 (  2.622 GND RETURN KA)
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              U N B A L A N C E D   F A U L T   R E P O R T
                (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                     PRE FAULT VOLTAGE: 1.0000
                     MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

MCC-1         3P Duty:  22.359  4.51 Z1=   5.3795       27.351    24.921
             SLG DUTY:  20.984  4.28 Z2=   5.3795       25.365
   480. VOLTS    LN/LN:  19.364       Z0=   6.4383
           LN/LN/GND: 21.868 ( 19.767 GND RETURN KA)

MCC-1 ATS     3P Duty:  22.609  4.59 Z1=   5.3201       27.766    25.257
             SLG DUTY:  21.422  4.38 Z2=   5.3201       26.026
   480. VOLTS    LN/LN:  19.580       Z0=   6.2049
           LN/LN/GND: 22.186 ( 20.353 GND RETURN KA)

MCC-1 CRANE   3P Duty:   7.005  0.46 Z1=  17.1704        7.005     7.005
             SLG DUTY:   4.394  0.32 Z2=  17.1704        4.394
   480. VOLTS    LN/LN:   6.067       Z0=  48.1941
           LN/LN/GND:  6.528 (  3.186 GND RETURN KA)

MCC-10        3P Duty:  14.452  2.83 Z1=   8.3230       15.942    15.206
             SLG DUTY:  12.766  2.88 Z2=   8.3230       14.138
   480. VOLTS    LN/LN:  12.516       Z0=  11.6219
           LN/LN/GND: 13.824 ( 11.431 GND RETURN KA)

MCC-12        3P Duty:  17.925  3.44 Z1=   6.7102       20.614    19.294
             SLG DUTY:  15.104  2.44 Z2=   6.7102       16.215
   480. VOLTS    LN/LN:  15.524       Z0=  10.5814
           LN/LN/GND: 17.688 ( 12.991 GND RETURN KA)

MCC-13        3P Duty:  25.805  4.10 Z1=   4.6612       30.872    28.398
             SLG DUTY:  23.866  3.50 Z2=   4.6612       27.549
   480. VOLTS    LN/LN:  22.347       Z0=   5.8125
           LN/LN/GND: 25.592 ( 22.176 GND RETURN KA)

MCC-13 AIR COM 3P Duty:   4.837  0.26 Z1=  24.8680        4.837     4.837
             SLG DUTY:   2.894  0.18 Z2=  24.8680        2.894
   480. VOLTS    LN/LN:   4.189       Z0=  75.1848
           LN/LN/GND:  4.422 (  2.061 GND RETURN KA)

MCC-13 CRANE  3P Duty:  23.534  2.14 Z1=   5.1109       24.753    24.148
             SLG DUTY:  20.273  1.56 Z2=   5.1109       20.632
   480. VOLTS    LN/LN:  20.381       Z0=   7.7761
           LN/LN/GND: 23.949 ( 17.611 GND RETURN KA)
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                U N B A L A N C E D   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

MCC-13 OVERHEA 3P Duty:  4.377  0.24 Z1=  27.4832        4.377     4.377
              SLG DUTY:  2.615  0.17 Z2=  27.4832        2.615
   480. VOLTS    LN/LN:  3.790       Z0=  83.2495
             LN/LN/GND:  3.990 (  1.862 GND RETURN KA)

MCC-14         3P Duty: 19.841  3.54 Z1=   6.0624       22.963    21.432
              SLG DUTY: 15.601  2.49 Z2=   6.0624       16.805
   480. VOLTS    LN/LN: 17.182       Z0=  11.1062
             LN/LN/GND: 19.197 ( 12.800 GND RETURN KA)

MCC-14 HOIST   3P Duty:  2.609  0.20 Z1=  46.0984        2.609     2.609
              SLG DUTY:  1.532  0.15 Z2=  46.0984        1.532
   480. VOLTS    LN/LN:  2.260       Z0= 143.5633
             LN/LN/GND:  2.358 (  1.083 GND RETURN KA)

MCC-14 SUMP PU 3P Duty:  1.620  0.15 Z1=  74.2558        1.620     1.620
              SLG DUTY:  0.948  0.12 Z2=  74.2558        0.948
   480. VOLTS    LN/LN:  1.403       Z0= 232.3595
             LN/LN/GND:  1.457 (  0.670 GND RETURN KA)

MCC-14 UNIT HE 3P Duty:  4.221  0.28 Z1=  28.4928        4.221     4.221
              SLG DUTY:  2.506  0.21 Z2=  28.4928        2.506
   480. VOLTS    LN/LN:  3.656       Z0=  87.1831
             LN/LN/GND:  3.841 (  1.780 GND RETURN KA)

MCC-15         3P Duty: 12.624  3.02 Z1=   9.5282       14.112    13.379
              SLG DUTY: 11.399  2.56 Z2=   9.5282       12.343
   480. VOLTS    LN/LN: 10.932       Z0=  12.6629
             LN/LN/GND: 12.530 ( 10.370 GND RETURN KA)

MCC-15A        3P Duty: 14.186  3.30 Z1=   8.4786       16.161    15.191
              SLG DUTY: 12.596  2.73 Z2=   8.4786       13.803
   480. VOLTS    LN/LN: 12.286       Z0=  11.7522
             LN/LN/GND: 14.014 ( 11.302 GND RETURN KA)

MCC-15AA       3P Duty: 11.781  2.75 Z1=  10.2095       12.924    12.359
              SLG DUTY:  9.625  2.13 Z2=  10.2095       10.118
   480. VOLTS    LN/LN: 10.203       Z0=  17.2315
             LN/LN/GND: 11.504 (  8.102 GND RETURN KA)
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                 U N B A L A N C E D   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

MCC-19         3P Duty:  14.409  4.78 Z1=   8.3476        17.861    16.184
              SLG DUTY:  14.486  4.42 Z2=   8.3476        17.639
   480. VOLTS    LN/LN:  12.479       Z0=   8.2213
             LN/LN/GND: 14.646 ( 14.560 GND RETURN KA)

MCC-2          3P Duty:  20.445  4.49 Z1=   5.8832        24.990    22.777
              SLG DUTY:  20.687  4.45 Z2=   5.8832        25.230
   480. VOLTS    LN/LN:  17.706       Z0=   5.6770
             LN/LN/GND: 20.572 ( 20.934 GND RETURN KA)

MCC-20         3P Duty:  14.826  4.68 Z1=   8.1128        18.293    16.607
              SLG DUTY:  14.882  4.63 Z2=   8.1128        18.321
   480. VOLTS    LN/LN:  12.840       Z0=   8.0211
             LN/LN/GND: 14.867 ( 14.939 GND RETURN KA)

MCC-21         3P Duty:  13.443  3.39 Z1=   8.9476        15.408    14.443
              SLG DUTY:  12.791  2.83 Z2=   8.9476        14.107
   480. VOLTS    LN/LN:  11.642       Z0=  10.3826
             LN/LN/GND: 13.664 ( 12.171 GND RETURN KA)

MCC-21 AC UNIT 3P Duty:   8.622  0.91 Z1=  13.9500         8.631     8.627
              SLG DUTY:   7.504  0.81 Z2=  13.9500         7.507
   480. VOLTS    LN/LN:   7.467       Z0=  20.2933
             LN/LN/GND:  8.468 (  6.628 GND RETURN KA)

MCC-21 PANEL # 3P Duty:   1.834  2.36 Z1= 151.3615         1.958     1.897
              SLG DUTY:   1.792  2.16 Z2= 151.3615         1.888
   208. VOLTS    LN/LN:   1.588       Z0= 162.4624
             LN/LN/GND:  1.861 (  1.750 GND RETURN KA)

MCC-21 PANEL # 3P Duty:   1.953  2.45 Z1= 142.1400         2.097     2.026
              SLG DUTY:   1.974  2.30 Z2= 142.1400         2.099
   208. VOLTS    LN/LN:   1.691       Z0= 137.8294
             LN/LN/GND:  2.001 (  1.994 GND RETURN KA)

MCC-22         3P Duty:   9.672  1.93 Z1=  12.4362        10.036     9.855
              SLG DUTY:   7.745  1.43 Z2=  12.4362         7.839
   480. VOLTS    LN/LN:   8.376       Z0=  22.1821
             LN/LN/GND:  9.596 (  6.396 GND RETURN KA)
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                 U N B A L A N C E D   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

MCC-24        3P Duty:   7.507  1.11 Z1=  16.0218         7.533     7.520
             SLG DUTY:   5.959  1.22 Z2=  16.0218         5.993
   480. VOLTS    LN/LN:   6.502       Z0=  28.5892
            LN/LN/GND:  7.134 (  4.934 GND RETURN KA)

MCC-25        3P Duty:  14.675  3.72 Z1=   8.1962        17.176    15.951
             SLG DUTY:  12.494  3.07 Z2=   8.1962        14.018
   480. VOLTS    LN/LN:  12.709       Z0=  12.5331
            LN/LN/GND: 14.239 ( 10.861 GND RETURN KA)

MCC-26        3P Duty:  27.399  5.32 Z1=   4.3900        34.812    31.223
             SLG DUTY:  26.169  5.10 Z2=   4.3900        32.932
   480. VOLTS    LN/LN:  23.728       Z0=   5.0096
            LN/LN/GND: 26.972 ( 25.043 GND RETURN KA)

MCC-27        3P Duty:  25.854  5.22 Z1=   4.6523        32.708    29.387
             SLG DUTY:  25.209  5.05 Z2=   4.6523        31.649
   480. VOLTS    LN/LN:  22.390       Z0=   5.0096
            LN/LN/GND: 25.664 ( 24.595 GND RETURN KA)

MCC-28        3P Duty:  15.998  4.60 Z1=   7.5187        19.665    17.881
             SLG DUTY:  15.943  4.80 Z2=   7.5187        19.787
   480. VOLTS    LN/LN:  13.854       Z0=   7.6001
            LN/LN/GND: 16.146 ( 15.886 GND RETURN KA)

MCC-29        3P Duty:  15.193  4.60 Z1=   7.9169        18.667    16.977
             SLG DUTY:  14.914  4.43 Z2=   7.9169        18.169
   480. VOLTS    LN/LN:  13.158       Z0=   8.3622
            LN/LN/GND: 15.105 ( 14.644 GND RETURN KA)

MCC-3         3P Duty:  20.821  4.07 Z1=   5.7769        24.870    22.892
             SLG DUTY:  18.715  3.44 Z2=   5.7769        21.523
   480. VOLTS    LN/LN:  18.031       Z0=   7.7452
            LN/LN/GND: 20.414 ( 16.980 GND RETURN KA)

MCC-3 PURGE #1 3P Duty:   0.941  0.13 Z1= 127.8832         0.941     0.941
             SLG DUTY:   0.545  0.09 Z2= 127.8832         0.545
   480. VOLTS    LN/LN:   0.815       Z0= 407.2434
            LN/LN/GND:  0.848 (  0.383 GND RETURN KA)
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               U N B A L A N C E D   F A U L T   R E P O R T
                 (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                       PRE FAULT VOLTAGE: 1.0000
                       MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

MCC-3 PURGE #2 3P Duty:   0.941  0.13 Z1= 127.8832         0.941     0.941
              SLG DUTY:   0.545  0.09 Z2= 127.8832         0.545
   480. VOLTS    LN/LN:   0.815       Z0= 407.2434
             LN/LN/GND:  0.848 (  0.383 GND RETURN KA)

MCC-3 SUMP PUM 3P Duty:   1.191  0.13 Z1= 101.0307         1.191     1.191
              SLG DUTY:   0.694  0.10 Z2= 101.0307         0.694
   480. VOLTS    LN/LN:   1.031       Z0= 318.3456
             LN/LN/GND:  1.073 (  0.489 GND RETURN KA)

MCC-3A         3P Duty:  20.600  4.02 Z1=   5.8388        24.536    22.613
              SLG DUTY:  18.425  3.38 Z2=   5.8388        21.098
   480. VOLTS    LN/LN:  17.840       Z0=   7.9267
             LN/LN/GND: 20.190 ( 16.649 GND RETURN KA)

MCC-3COMPRESSO 3P Duty:   1.407  0.15 Z1=  85.4613         1.407     1.407
              SLG DUTY:   0.819  0.11 Z2=  85.4613         0.819
   480. VOLTS    LN/LN:   1.219       Z0= 269.8607
             LN/LN/GND:  1.271 (  0.577 GND RETURN KA)

MCC-3COMPRESSO 3P Duty:   1.407  0.15 Z1=  85.4613         1.407     1.407
              SLG DUTY:   0.819  0.11 Z2=  85.4613         0.819
   480. VOLTS    LN/LN:   1.219       Z0= 269.8607
             LN/LN/GND:  1.271 (  0.577 GND RETURN KA)

MCC-4          3P Duty:  17.238  3.20 Z1=   6.9776        19.505    18.390
              SLG DUTY:  17.817  3.49 Z2=   6.9776        20.549
   480. VOLTS    LN/LN:  14.929       Z0=   6.3109
             LN/LN/GND: 17.930 ( 18.424 GND RETURN KA)

MCC-4A         3P Duty:  19.067  3.26 Z1=   6.3085        21.670    20.390
              SLG DUTY:  18.739  3.50 Z2=   6.3085        21.630
   480. VOLTS    LN/LN:  16.512       Z0=   6.6474
             LN/LN/GND: 19.225 ( 18.414 GND RETURN KA)

MCC-4B         3P Duty:  17.998  2.78 Z1=   6.6830        19.793    18.907
              SLG DUTY:  17.331  2.91 Z2=   6.6830        19.228
   480. VOLTS    LN/LN:  15.587       Z0=   7.4593
             LN/LN/GND: 17.897 ( 16.708 GND RETURN KA)
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                  U N B A L A N C E D   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

MCC-4C         3P Duty:  10.866  1.15 Z1=  11.0693       10.912    10.889
              SLG DUTY:   8.133  0.86 Z2=  11.0693        8.139
   480. VOLTS    LN/LN:   9.410       Z0=  22.6769
             LN/LN/GND: 10.611 (  6.436 GND RETURN KA)

MCC-5          3P Duty:   4.544  0.34 Z1=  26.4703        4.544     4.544
              SLG DUTY:   3.854  0.34 Z2=  26.4703        3.854
   480. VOLTS    LN/LN:   3.935       Z0=  40.6801
             LN/LN/GND:   4.287 (  3.346 GND RETURN KA)

MCC-6          3P Duty:   5.594  0.44 Z1=  21.5002        5.594     5.594
              SLG DUTY:   4.839  0.41 Z2=  21.5002        4.839
   480. VOLTS    LN/LN:   4.845       Z0=  31.5932
             LN/LN/GND:   5.375 (  4.262 GND RETURN KA)

MCC-7          3P Duty:  21.055  2.91 Z1=   5.7127       23.353    22.219
              SLG DUTY:  20.217  2.82 Z2=   5.7127       22.292
   480. VOLTS    LN/LN:  18.234       Z0=   6.4238
             LN/LN/GND: 20.799 ( 19.443 GND RETURN KA)

MCC-7 ELEVATOR 3P Duty:   2.467  0.18 Z1=  48.7552        2.467     2.467
              SLG DUTY:   1.470  0.13 Z2=  48.7552        1.470
   480. VOLTS    LN/LN:   2.137       Z0= 148.1946
             LN/LN/GND:   2.236 (  1.046 GND RETURN KA)

MCC-7 VACUUM P 3P Duty:   2.881  0.21 Z1=  41.7454        2.881     2.881
              SLG DUTY:   1.725  0.15 Z2=  41.7454        1.725
   480. VOLTS    LN/LN:   2.495       Z0= 125.9868
             LN/LN/GND:   2.619 (  1.229 GND RETURN KA)

MCC-8          3P Duty:  16.841  2.34 Z1=   7.1420       17.957    17.404
              SLG DUTY:  14.547  1.85 Z2=   7.1420       15.027
   480. VOLTS    LN/LN:  14.585       Z0=  10.6522
             LN/LN/GND: 16.792 ( 12.736 GND RETURN KA)

MCC-8A         3P Duty:   6.642  3.61 Z1=  18.1084        7.719     7.191
              SLG DUTY:   5.412  2.85 Z2=  18.1084        5.979
   480. VOLTS    LN/LN:   5.752       Z0=  30.6240
             LN/LN/GND:   6.410 (  4.555 GND RETURN KA)
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                  U N B A L A N C E D   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

MCC7 480V RECE 3P Duty:   5.329  0.48 Z1=  22.5705         5.329     5.329
              SLG DUTY:   3.352  0.36 Z2=  22.5705         3.352
   480. VOLTS    LN/LN:   4.615       Z0=  62.9127
             LN/LN/GND:  4.948 (  2.437 GND RETURN KA)

MEGADOOR CONTR 3P Duty:   1.538  0.24 Z1=  78.1903         1.538     1.538
              SLG DUTY:   0.894  0.15 Z2=  78.1903         0.894
   480. VOLTS    LN/LN:   1.332       Z0= 248.0850
             LN/LN/GND:  1.403 (  0.629 GND RETURN KA)

METAL LATHE    3P Duty:   3.809  0.46 Z1=  31.5753         3.809     3.809
              SLG DUTY:   2.559  0.40 Z2=  31.5753         2.559
   480. VOLTS    LN/LN:   3.299       Z0=  78.0147
             LN/LN/GND:  3.503 (  1.924 GND RETURN KA)

METER CHAMBER  3P Duty:  13.541  0.92 Z1=   8.8826        13.555    13.548
              SLG DUTY:   9.561  0.63 Z2=   8.8826         9.562
   480. VOLTS    LN/LN:  11.727       Z0=  20.4700
             LN/LN/GND: 13.165 (  7.298 GND RETURN KA)

MILL           3P Duty:   3.093  0.38 Z1=  38.8848         3.093     3.093
              SLG DUTY:   2.015  0.32 Z2=  38.8848         2.015
   480. VOLTS    LN/LN:   2.679       Z0= 101.5114
             LN/LN/GND:  2.832 (  1.492 GND RETURN KA)

MIX TANK DUST  3P Duty:   1.465  0.20 Z1=  82.1149         1.465     1.465
              SLG DUTY:   1.185  0.19 Z2=  82.1149         1.185
   480. VOLTS    LN/LN:   1.269       Z0= 140.1974
             LN/LN/GND:  1.374 (  0.995 GND RETURN KA)

MIX TANK DUST  3P Duty:   1.337  0.19 Z1=  89.9619         1.337     1.337
              SLG DUTY:   1.084  0.18 Z2=  89.9619         1.084
   480. VOLTS    LN/LN:   1.158       Z0= 153.0714
             LN/LN/GND:  1.254 (  0.911 GND RETURN KA)

MIXED LIQUER P 3P Duty:   5.147  2.27 Z1=  23.3687         5.460     5.305
              SLG DUTY:   3.551  1.50 Z2=  23.3687         3.605
   480. VOLTS    LN/LN:   4.458       Z0=  55.7611
             LN/LN/GND:  4.928 (  2.689 GND RETURN KA)
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                  U N B A L A N C E D   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

MIXED LIQUER P 3P Duty:   5.270  2.38 Z1=  22.8243        5.635     5.454
              SLG DUTY:   3.670  1.60 Z2=  22.8243        3.741
   480. VOLTS    LN/LN:   4.564       Z0=  53.4855
             LN/LN/GND:  5.047 (  2.794 GND RETURN KA)

MIXED LIQUER P 3P Duty:   5.147  2.27 Z1=  23.3687        5.460     5.305
              SLG DUTY:   3.551  1.50 Z2=  23.3687        3.605
   480. VOLTS    LN/LN:   4.458       Z0=  55.7611
             LN/LN/GND:  4.928 (  2.689 GND RETURN KA)

MIXED LIQUER P 3P Duty:   5.270  2.38 Z1=  22.8243        5.635     5.454
              SLG DUTY:   3.670  1.60 Z2=  22.8243        3.741
   480. VOLTS    LN/LN:   4.564       Z0=  53.4855
             LN/LN/GND:  5.047 (  2.794 GND RETURN KA)

MIXED LIQUER P 3P Duty:   5.087  2.21 Z1=  23.6455        5.376     5.232
              SLG DUTY:   3.494  1.46 Z2=  23.6455        3.541
   480. VOLTS    LN/LN:   4.405       Z0=  56.9177
             LN/LN/GND:  4.870 (  2.638 GND RETURN KA)

MIXED LIQUER P 3P Duty:   5.270  2.38 Z1=  22.8236        5.634     5.454
              SLG DUTY:   3.670  1.59 Z2=  22.8236        3.741
   480. VOLTS    LN/LN:   4.564       Z0=  53.4855
             LN/LN/GND:  5.047 (  2.794 GND RETURN KA)

MIXED LIQUER P 3P Duty:   5.087  2.21 Z1=  23.6455        5.376     5.232
              SLG DUTY:   3.494  1.46 Z2=  23.6455        3.541
   480. VOLTS    LN/LN:   4.405       Z0=  56.9177
             LN/LN/GND:  4.870 (  2.638 GND RETURN KA)

MIXED LIQUER P 3P Duty:   5.270  2.38 Z1=  22.8236        5.634     5.454
              SLG DUTY:   3.670  1.59 Z2=  22.8236        3.741
   480. VOLTS    LN/LN:   4.564       Z0=  53.4855
             LN/LN/GND:  5.047 (  2.794 GND RETURN KA)

MIXER #1       3P Duty:   2.057  0.27 Z1=  58.4686        2.057     2.057
              SLG DUTY:   1.224  0.19 Z2=  58.4686        1.224
   480. VOLTS    LN/LN:   1.782       Z0= 178.4860
             LN/LN/GND:  1.877 (  0.869 GND RETURN KA)
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                 U N B A L A N C E D   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
===============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
===============================================================================

MIXER #2       3P Duty:   2.249  0.28 Z1=  53.4812         2.249     2.249
              SLG DUTY:   1.342  0.20 Z2=  53.4812         1.342
   480. VOLTS    LN/LN:   1.948       Z0= 162.3840
             LN/LN/GND:  2.056 (  0.955 GND RETURN KA)

MO GATE #1     3P Duty:   0.936  0.12 Z1= 128.4665         0.936     0.936
              SLG DUTY:   0.544  0.09 Z2= 128.4665         0.544
   480. VOLTS    LN/LN:   0.811       Z0= 407.2434
             LN/LN/GND:  0.843 (  0.383 GND RETURN KA)

MO GATE #2     3P Duty:   0.936  0.12 Z1= 128.4665         0.936     0.936
              SLG DUTY:   0.544  0.09 Z2= 128.4665         0.544
   480. VOLTS    LN/LN:   0.811       Z0= 407.2434
             LN/LN/GND:  0.843 (  0.383 GND RETURN KA)

MSP            3P Duty:   4.635  0.46 Z1=  25.9514         4.635     4.635
              SLG DUTY:   3.895  0.43 Z2=  25.9514         3.895
   480. VOLTS    LN/LN:   4.014       Z0=  40.7722
             LN/LN/GND:  4.408 (  3.358 GND RETURN KA)

MSP-12         3P Duty:   4.310  0.70 Z1=  27.9084         4.310     4.310
              SLG DUTY:   2.559  0.53 Z2=  27.9084         2.559
   480. VOLTS    LN/LN:   3.732       Z0=  85.8465
             LN/LN/GND:  3.984 (  1.812 GND RETURN KA)

MSP-14         3P Duty:   3.794  0.63 Z1=  31.7058         3.794     3.794
              SLG DUTY:   2.233  0.48 Z2=  31.7058         2.233
   480. VOLTS    LN/LN:   3.285       Z0=  98.8011
             LN/LN/GND:  3.496 (  1.577 GND RETURN KA)

MTS-MCC-5      3P Duty:  11.088  0.80 Z1=  10.8475        11.093    11.090
              SLG DUTY:   9.918  0.75 Z2=  10.8475         9.920
   480. VOLTS    LN/LN:   9.603       Z0=  14.7130
             LN/LN/GND: 10.814 (  8.965 GND RETURN KA)

MTS-MCC-6      3P Duty:   9.042  0.70 Z1=  13.3023         9.043     9.043
              SLG DUTY:   8.151  0.64 Z2=  13.3023         8.151
   480. VOLTS    LN/LN:   7.831       Z0=  17.7269
             LN/LN/GND:  8.915 (  7.409 GND RETURN KA)
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                  U N B A L A N C E D   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
===============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
===============================================================================

MUA-1         3P Duty:   2.465  1.11 Z1=  48.7864        2.474     2.470
             SLG DUTY:   1.982  0.78 Z2=  48.7864        1.983
   480. VOLTS    LN/LN:   2.135       Z0=  87.5982
            LN/LN/GND:  2.492 (  1.630 GND RETURN KA)

MVUS-1A       3P Duty:  21.632 12.62 Z1=   0.5560       32.199    27.201
             SLG DUTY:   0.000  0.00 Z2=   0.5560        0.000
  4800. VOLTS    LN/LN:  18.734       Z0= INFINITE
            LN/LN/GND: 18.734 (  0.000 GND RETURN KA)

MVUS-1B       3P Duty:  20.277 11.33 Z1=   0.5932       29.722    25.244
             SLG DUTY:   0.000  0.00 Z2=   0.5932        0.000
  4800. VOLTS    LN/LN:  17.560       Z0= INFINITE
            LN/LN/GND: 17.560 (  0.000 GND RETURN KA)

N.W. HEAT     3P Duty:   6.514  0.75 Z1=  18.4658        6.515     6.514
             SLG DUTY:   4.433  0.53 Z2=  18.4658        4.433
   480. VOLTS    LN/LN:   5.641       Z0=  45.2693
            LN/LN/GND:  6.240 (  3.329 GND RETURN KA)

NEW AIR COMPRE 3P Duty:   4.546  0.28 Z1=  26.4615        4.546     4.546
             SLG DUTY:   2.755  0.17 Z2=  26.4615        2.755
   480. VOLTS    LN/LN:   3.937       Z0=  78.4609
            LN/LN/GND:  4.188 (  1.971 GND RETURN KA)

NORTH BELT DIS 3P Duty:   2.403  0.14 Z1=  50.0648        2.403     2.403
             SLG DUTY:   1.416  0.10 Z2=  50.0648        1.416
   480. VOLTS    LN/LN:   2.081       Z0= 154.8780
            LN/LN/GND:  2.169 (  1.003 GND RETURN KA)

NORTH BELT PRE 3P Duty:   2.403  0.14 Z1=  50.0648        2.403     2.403
             SLG DUTY:   1.416  0.10 Z2=  50.0648        1.416
   480. VOLTS    LN/LN:   2.081       Z0= 154.8780
            LN/LN/GND:  2.169 (  1.003 GND RETURN KA)

NORTH CELL    3P Duty:   1.990  0.25 Z1=  60.4568        1.990     1.990
             SLG DUTY:   1.186  0.18 Z2=  60.4568        1.186
   480. VOLTS    LN/LN:   1.723       Z0= 183.8424
            LN/LN/GND:  1.813 (  0.843 GND RETURN KA)
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                 U N B A L A N C E D   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

NORTH LOT POWE 3P Duty:   3.367  0.57 Z1=  35.7237        3.367     3.367
              SLG DUTY:   1.975  0.44 Z2=  35.7237        1.975
   480. VOLTS    LN/LN:   2.916       Z0= 111.8432
             LN/LN/GND:  3.093 (  1.393 GND RETURN KA)

NORTH SEC. PUM 3P Duty:   1.938  0.24 Z1=  62.0623        1.938     1.938
              SLG DUTY:   1.154  0.17 Z2=  62.0623        1.154
   480. VOLTS    LN/LN:   1.678       Z0= 189.0491
             LN/LN/GND:  1.765 (  0.820 GND RETURN KA)

NORTH SHOP HTR 3P Duty:   5.414  0.42 Z1=  22.2163        5.414     5.414
              SLG DUTY:   3.380  0.31 Z2=  22.2163        3.380
   480. VOLTS    LN/LN:   4.689       Z0=  62.7152
             LN/LN/GND:  5.016 (  2.449 GND RETURN KA)

NW FUME HOOD E 3P Duty:   0.597  0.12 Z1= 201.5415        0.597     0.597
              SLG DUTY:   0.350  0.09 Z2= 201.5415        0.350
   480. VOLTS    LN/LN:   0.517       Z0= 628.6495
             LN/LN/GND:  0.536 (  0.247 GND RETURN KA)

NW FUME HOOD S 3P Duty:   0.597  0.12 Z1= 201.5415        0.597     0.597
              SLG DUTY:   0.350  0.09 Z2= 201.5415        0.350
   480. VOLTS    LN/LN:   0.517       Z0= 628.6495
             LN/LN/GND:  0.536 (  0.247 GND RETURN KA)

ODOR CTRL FAN  3P Duty:   0.934  0.12 Z1= 128.8361        0.934     0.934
              SLG DUTY:   0.543  0.09 Z2= 128.8361        0.543
   480. VOLTS    LN/LN:   0.809       Z0= 407.2434
             LN/LN/GND:  0.840 (  0.383 GND RETURN KA)

ODOR CTRL FAN  3P Duty:   0.934  0.12 Z1= 128.8361        0.934     0.934
              SLG DUTY:   0.543  0.09 Z2= 128.8361        0.543
   480. VOLTS    LN/LN:   0.809       Z0= 407.2434
             LN/LN/GND:  0.840 (  0.383 GND RETURN KA)

OUTSIDE DOOR(E 3P Duty:   1.275  0.19 Z1=  94.3232        1.275     1.275
              SLG DUTY:   0.774  0.16 Z2=  94.3232        0.774
   480. VOLTS    LN/LN:   1.104       Z0= 277.8030
             LN/LN/GND:  1.151 (  0.555 GND RETURN KA)
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                 U N B A L A N C E D   F A U L T   R E P O R T
                  (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
===============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
===============================================================================

OUTSIDE DOOR(N 3P Duty:   0.900  0.16 Z1= 133.6663         0.900     0.900
              SLG DUTY:   0.539  0.13 Z2= 133.6663         0.539
   480. VOLTS    LN/LN:   0.779       Z0= 402.0146
             LN/LN/GND:  0.810 (  0.385 GND RETURN KA)

OUTSIDE DOOR(S 3P Duty:   0.807  0.15 Z1= 149.0228         0.807     0.807
              SLG DUTY:   0.482  0.12 Z2= 149.0228         0.482
   480. VOLTS    LN/LN:   0.699       Z0= 450.4490
             LN/LN/GND:  0.726 (  0.344 GND RETURN KA)

OVERHEAD DOORS 3P Duty:   1.812  0.25 Z1=  66.3638         1.812     1.812
              SLG DUTY:   1.121  0.20 Z2=  66.3638         1.121
   480. VOLTS    LN/LN:   1.570       Z0= 189.2977
             LN/LN/GND:  1.644 (  0.811 GND RETURN KA)

PANEL LA       3P Duty:   1.669  2.12 Z1= 166.2784         1.754     1.712
              SLG DUTY:   1.672  2.04 Z2= 166.2784         1.748
   208. VOLTS    LN/LN:   1.446       Z0= 165.5491
             LN/LN/GND:  1.692 (  1.675 GND RETURN KA)

PANEL LB       3P Duty:   1.658  2.15 Z1= 167.3697         1.745     1.702
              SLG DUTY:   1.656  2.08 Z2= 167.3697         1.734
   208. VOLTS    LN/LN:   1.436       Z0= 168.3408
             LN/LN/GND:  1.675 (  1.652 GND RETURN KA)

PHOS ACID PUMP 3P Duty:   0.797  1.60 Z1= 603.5797         0.813     0.805
              SLG DUTY:   0.741  1.31 Z2= 603.5797         0.747
   120. VOLTS    LN/LN:   0.690       Z0= 755.4411
             LN/LN/GND:  0.823 (  0.687 GND RETURN KA)

PP-1 EXHAUST F 3P Duty:   1.354  0.17 Z1=  88.8298         1.354     1.354
              SLG DUTY:   0.800  0.12 Z2=  88.8298         0.800
   480. VOLTS    LN/LN:   1.173       Z0= 273.6966
             LN/LN/GND:  1.225 (  0.567 GND RETURN KA)

PP-1 TRANSFER  3P Duty:   2.210  0.26 Z1=  54.4281         2.210     2.210
              SLG DUTY:   1.324  0.18 Z2=  54.4281         1.324
   480. VOLTS    LN/LN:   1.914       Z0= 164.2315
             LN/LN/GND:  2.018 (  0.943 GND RETURN KA)
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                  U N B A L A N C E D   F A U L T   R E P O R T
                   (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
===============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
===============================================================================

PP-1 TRANSFER  3P Duty:   2.210  0.26 Z1=  54.4281        2.210     2.210
              SLG DUTY:   1.324  0.18 Z2=  54.4281        1.324
   480. VOLTS    LN/LN:   1.914       Z0= 164.2315
             LN/LN/GND:  2.018 (  0.943 GND RETURN KA)

PP-1-EF-1      3P Duty:   0.961  0.13 Z1= 125.1465        0.961     0.961
              SLG DUTY:   0.565  0.10 Z2= 125.1465        0.565
   480. VOLTS    LN/LN:   0.832       Z0= 388.7741
             LN/LN/GND:  0.866 (  0.400 GND RETURN KA)

PP-1-EF-2      3P Duty:   0.851  0.12 Z1= 141.3109        0.851     0.851
              SLG DUTY:   0.500  0.09 Z2= 141.3109        0.500
   480. VOLTS    LN/LN:   0.737       Z0= 439.9383
             LN/LN/GND:  0.766 (  0.353 GND RETURN KA)

PP-1-EF-3      3P Duty:   0.805  0.12 Z1= 149.3957        0.805     0.805
              SLG DUTY:   0.472  0.09 Z2= 149.3957        0.472
   480. VOLTS    LN/LN:   0.697       Z0= 465.5229
             LN/LN/GND:  0.724 (  0.334 GND RETURN KA)

PP-12 LEFT TUB 3P Duty:   7.985  1.36 Z1=  15.0630        8.064     8.025
              SLG DUTY:   5.497  1.06 Z2=  15.0630        5.512
   480. VOLTS    LN/LN:   6.915       Z0=  35.8950
             LN/LN/GND:  7.567 (  4.168 GND RETURN KA)

PP-12 RIGHT TU 3P Duty:   7.903  1.36 Z1=  15.2190        7.980     7.942
              SLG DUTY:   5.433  1.06 Z2=  15.2190        5.447
   480. VOLTS    LN/LN:   6.845       Z0=  36.3535
             LN/LN/GND:  7.486 (  4.117 GND RETURN KA)

PP-13          3P Duty:  13.251  1.47 Z1=   9.0774       13.436    13.343
              SLG DUTY:  10.344  1.15 Z2=   9.0774       10.387
   480. VOLTS    LN/LN:  11.475       Z0=  16.9953
             LN/LN/GND: 12.964 (  8.421 GND RETURN KA)

PP-SH-1        3P Duty:  21.682  3.34 Z1=   5.5476       24.766    23.250
              SLG DUTY:  19.100  2.48 Z2=   5.5476       20.565
   480. VOLTS    LN/LN:  18.777       Z0=   7.8952
             LN/LN/GND: 21.752 ( 16.980 GND RETURN KA)
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                  U N B A L A N C E D   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

PP-SH-2       3P Duty:  22.817  3.59 Z1=   5.2717        26.480    24.684
             SLG DUTY:  19.366  2.46 Z2=   5.2717        20.824
   480. VOLTS    LN/LN:  19.760       Z0=   8.2081
            LN/LN/GND: 22.732 ( 16.717 GND RETURN KA)

PRIM HEAT PUMP 3P Duty:   1.057  0.14 Z1= 113.8321        1.057     1.057
             SLG DUTY:   0.881  0.15 Z2= 113.8321        0.881
   480. VOLTS    LN/LN:   0.915       Z0= 181.7232
            LN/LN/GND:  0.995 (  0.756 GND RETURN KA)

PRIM HEAT PUMP 3P Duty:   1.057  0.14 Z1= 113.8321        1.057     1.057
             SLG DUTY:   0.881  0.15 Z2= 113.8321        0.881
   480. VOLTS    LN/LN:   0.915       Z0= 181.7232
            LN/LN/GND:  0.995 (  0.756 GND RETURN KA)

PRIM SLUDGE CO 3P Duty:   0.819  0.10 Z1= 146.8808        0.819     0.819
             SLG DUTY:   0.499  0.08 Z2= 146.8808        0.499
   480. VOLTS    LN/LN:   0.709       Z0= 429.4498
            LN/LN/GND:  0.738 (  0.359 GND RETURN KA)

PRIM SLUDGE CO 3P Duty:   0.904  0.11 Z1= 133.1191        0.904     0.904
             SLG DUTY:   0.553  0.08 Z2= 133.1191        0.553
   480. VOLTS    LN/LN:   0.783       Z0= 385.9469
            LN/LN/GND:  0.815 (  0.399 GND RETURN KA)

PRIM SLUDGE CO 3P Duty:   1.157  0.12 Z1= 103.9849        1.157     1.157
             SLG DUTY:   0.719  0.09 Z2= 103.9849        0.719
   480. VOLTS    LN/LN:   1.002       Z0= 293.8355
            LN/LN/GND:  1.046 (  0.522 GND RETURN KA)

PRIM SLUDGE CO 3P Duty:   1.333  0.13 Z1=  90.2363        1.333     1.333
             SLG DUTY:   0.838  0.10 Z2=  90.2363        0.838
   480. VOLTS    LN/LN:   1.154       Z0= 250.3485
            LN/LN/GND:  1.208 (  0.611 GND RETURN KA)

PRIM SLUDGE CO 3P Duty:   1.941  0.17 Z1=  61.9811        1.941     1.941
             SLG DUTY:   1.268  0.13 Z2=  61.9811        1.268
   480. VOLTS    LN/LN:   1.681       Z0= 160.8655
            LN/LN/GND:  1.773 (  0.941 GND RETURN KA)
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                  U N B A L A N C E D   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

PRIM SLUDGE CO 3P Duty:   2.135  0.19 Z1=  56.3466        2.135     2.135
              SLG DUTY:   1.412  0.14 Z2=  56.3466        1.412
   480. VOLTS    LN/LN:   1.849       Z0= 142.9852
             LN/LN/GND:  1.955 (  1.055 GND RETURN KA)

PRIM SLUDGE CO 3P Duty:   1.409  0.14 Z1=  85.3864        1.409     1.409
              SLG DUTY:   0.890  0.10 Z2=  85.3864        0.890
   480. VOLTS    LN/LN:   1.220       Z0= 235.0027
             LN/LN/GND:  1.278 (  0.650 GND RETURN KA)

PRIM SLUDGE CO 3P Duty:   1.204  0.13 Z1=  99.9402        1.204     1.204
              SLG DUTY:   0.751  0.09 Z2=  99.9402        0.751
   480. VOLTS    LN/LN:   1.042       Z0= 281.0443
             LN/LN/GND:  1.089 (  0.545 GND RETURN KA)

PRIM SLUDGE CO 3P Duty:   0.938  0.11 Z1= 128.2624        0.938     0.938
              SLG DUTY:   0.576  0.08 Z2= 128.2624        0.576
   480. VOLTS    LN/LN:   0.812       Z0= 370.5936
             LN/LN/GND:  0.846 (  0.415 GND RETURN KA)

PRIM SLUDGE CO 3P Duty:   0.847  0.10 Z1= 142.0236        0.847     0.847
              SLG DUTY:   0.517  0.08 Z2= 142.0236        0.517
   480. VOLTS    LN/LN:   0.733       Z0= 414.0955
             LN/LN/GND:  0.763 (  0.372 GND RETURN KA)

PRIM SLUDGE CO 3P Duty:   0.703  0.09 Z1= 171.1670        0.703     0.703
              SLG DUTY:   0.425  0.07 Z2= 171.1670        0.425
   480. VOLTS    LN/LN:   0.609       Z0= 506.2250
             LN/LN/GND:  0.632 (  0.305 GND RETURN KA)

PRIM SLUDGE CO 3P Duty:   0.648  0.09 Z1= 185.7378        0.648     0.648
              SLG DUTY:   0.391  0.07 Z2= 185.7378        0.391
   480. VOLTS    LN/LN:   0.561       Z0= 552.2924
             LN/LN/GND:  0.582 (  0.280 GND RETURN KA)

PUMP #5 MAIN D 3P Duty:  19.100  4.11 Z1=   6.2974       22.870    21.029
              SLG DUTY:  18.565  3.72 Z2=   6.2974       21.721
   480. VOLTS    LN/LN:  16.541       Z0=   6.8500
             LN/LN/GND: 19.169 ( 18.052 GND RETURN KA)
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                  U N B A L A N C E D   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
===============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
===============================================================================

PUMP #5 VFD    3P Duty:  18.594  3.65 Z1=   6.4690        21.660    20.157
              SLG DUTY:  17.752  3.03 Z2=   6.4690        19.857
   480. VOLTS    LN/LN:  16.102       Z0=   7.4273
             LN/LN/GND: 18.853 ( 16.952 GND RETURN KA)

PUMP #7 VFD    3P Duty:  19.960  3.70 Z1=   6.0261        23.327    21.677
              SLG DUTY:  17.578  2.98 Z2=   6.0261        19.601
   480. VOLTS    LN/LN:  17.286       Z0=   8.5146
             LN/LN/GND: 19.622 ( 15.674 GND RETURN KA)

PUMP CONTROL P 3P Duty:   4.412  0.49 Z1=  27.2644         4.412     4.412
              SLG DUTY:   2.791  0.34 Z2=  27.2644         2.791
   480. VOLTS    LN/LN:   3.821       Z0=  75.5001
             LN/LN/GND:  4.126 (  2.030 GND RETURN KA)

PUMP STATION # 3P Duty:   8.889  0.74 Z1=  13.5314         8.891     8.890
              SLG DUTY:   5.942  0.46 Z2=  13.5314         5.942
   480. VOLTS    LN/LN:   7.698       Z0=  34.3939
             LN/LN/GND:  8.537 (  4.413 GND RETURN KA)

PUMP STATION # 3P Duty:   6.204  0.57 Z1=  19.3882         6.204     6.204
              SLG DUTY:   3.872  0.34 Z2=  19.3882         3.872
   480. VOLTS    LN/LN:   5.373       Z0=  55.2180
             LN/LN/GND:  5.845 (  2.792 GND RETURN KA)

PURGE FAN #1 D 3P Duty:   0.884  0.10 Z1= 135.9931         0.884     0.884
              SLG DUTY:   0.547  0.08 Z2= 135.9931         0.547
   480. VOLTS    LN/LN:   0.766       Z0= 387.3617
             LN/LN/GND:  0.797 (  0.396 GND RETURN KA)

PURGE FAN #2 D 3P Duty:   1.259  0.13 Z1=  95.5254         1.259     1.259
              SLG DUTY:   0.801  0.10 Z2=  95.5254         0.801
   480. VOLTS    LN/LN:   1.090       Z0= 259.4562
             LN/LN/GND:  1.140 (  0.587 GND RETURN KA)

PURGE FAN #3 D 3P Duty:   2.553  0.21 Z1=  47.1216         2.553     2.553
              SLG DUTY:   1.801  0.17 Z2=  47.1216         1.801
   480. VOLTS    LN/LN:   2.211       Z0= 106.2298
             LN/LN/GND:  2.350 (  1.390 GND RETURN KA)
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                  U N B A L A N C E D   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

PURGE FAN #4 D 3P Duty:   1.485  0.14 Z1=  80.9714         1.485     1.485
              SLG DUTY:   0.962  0.11 Z2=  80.9714         0.962
   480. VOLTS    LN/LN:   1.286       Z0= 213.4342
            LN/LN/GND:  1.349 (  0.711 GND RETURN KA)

PURGE FAN #5 D 3P Duty:   1.004  0.11 Z1= 119.8023         1.004     1.004
              SLG DUTY:   0.627  0.09 Z2= 119.8023         0.627
   480. VOLTS    LN/LN:   0.869       Z0= 336.1920
            LN/LN/GND:  0.906 (  0.456 GND RETURN KA)

PURGE FAN #6 D 3P Duty:   0.725  0.09 Z1= 165.9491         0.725     0.725
              SLG DUTY:   0.443  0.07 Z2= 165.9491         0.443
   480. VOLTS    LN/LN:   0.628       Z0= 482.0397
            LN/LN/GND:  0.652 (  0.319 GND RETURN KA)

RAS AND INFLUE 3P Duty:   1.878  0.16 Z1=  64.0640         1.878     1.878
              SLG DUTY:   1.100  0.13 Z2=  64.0640         1.100
   480. VOLTS    LN/LN:   1.626       Z0= 200.0577
            LN/LN/GND:  1.691 (  0.778 GND RETURN KA)

RAS PUMPS      3P Duty:   4.689  0.56 Z1=  25.6514         4.689     4.689
              SLG DUTY:   2.995  0.40 Z2=  25.6514         2.995
   480. VOLTS    LN/LN:   4.061       Z0=  69.9511
            LN/LN/GND:  4.402 (  2.187 GND RETURN KA)

RETURN SLUDGE  3P Duty:  16.046  2.35 Z1=   7.4961        17.117    16.586
              SLG DUTY:  11.738  1.61 Z2=   7.4961        11.972
   480. VOLTS    LN/LN:  13.896       Z0=  15.9794
            LN/LN/GND: 15.471 (  9.188 GND RETURN KA)

RETURN SLUDGE  3P Duty:  16.413  2.55 Z1=   7.3284        17.753    17.090
              SLG DUTY:  12.141  1.76 Z2=   7.3284        12.478
   480. VOLTS    LN/LN:  14.214       Z0=  15.2636
            LN/LN/GND: 15.817 (  9.572 GND RETURN KA)

RETURN SLUDGE  3P Duty:  16.413  2.55 Z1=   7.3284        17.753    17.090
              SLG DUTY:  12.141  1.76 Z2=   7.3284        12.478
   480. VOLTS    LN/LN:  14.214       Z0=  15.2636
            LN/LN/GND: 15.817 (  9.572 GND RETURN KA)
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                  U N B A L A N C E D   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

RETURN SLUDGE  3P Duty:  15.611  2.13 Z1=   7.7048       16.413    16.015
              SLG DUTY:  11.260  1.44 Z2=   7.7048       11.403
   480. VOLTS    LN/LN:  13.520       Z0=  16.9064
             LN/LN/GND: 15.055 (  8.736 GND RETURN KA)

S.E. HEAT      3P Duty:   1.415  0.17 Z1=  85.0189        1.415     1.415
              SLG DUTY:   0.838  0.12 Z2=  85.0189        0.838
   480. VOLTS    LN/LN:   1.225       Z0= 260.9165
             LN/LN/GND:  1.280 (  0.595 GND RETURN KA)

SCREW CONVEYOR 3P Duty:   1.153  0.15 Z1= 104.3642        1.153     1.153
              SLG DUTY:   0.664  0.11 Z2= 104.3642        0.664
   480. VOLTS    LN/LN:   0.998       Z0= 335.1174
             LN/LN/GND:  1.044 (  0.466 GND RETURN KA)

SCUM BLOWERS C 3P Duty:   3.115  0.22 Z1=  38.6137        3.115     3.115
              SLG DUTY:   1.837  0.17 Z2=  38.6137        1.837
   480. VOLTS    LN/LN:   2.698       Z0= 119.3770
             LN/LN/GND:  2.820 (  1.301 GND RETURN KA)

SCUM PUMP      3P Duty:   2.756  0.21 Z1=  43.6424        2.756     2.756
              SLG DUTY:   1.621  0.16 Z2=  43.6424        1.621
   480. VOLTS    LN/LN:   2.387       Z0= 135.4987
             LN/LN/GND:  2.492 (  1.147 GND RETURN KA)

SEC HEAT PUMP  3P Duty:   1.057  0.14 Z1= 113.8321        1.057     1.057
              SLG DUTY:   0.881  0.15 Z2= 113.8321        0.881
   480. VOLTS    LN/LN:   0.915       Z0= 181.7232
             LN/LN/GND:  0.995 (  0.756 GND RETURN KA)

SEC HEAT PUMP  3P Duty:   1.057  0.14 Z1= 113.8321        1.057     1.057
              SLG DUTY:   0.881  0.15 Z2= 113.8321        0.881
   480. VOLTS    LN/LN:   0.915       Z0= 181.7232
             LN/LN/GND:  0.995 (  0.756 GND RETURN KA)

SER FAN A      3P Duty:   1.829  0.14 Z1=  65.7617        1.829     1.829
              SLG DUTY:   1.075  0.11 Z2=  65.7617        1.075
   480. VOLTS    LN/LN:   1.584       Z0= 204.3950
             LN/LN/GND:  1.647 (  0.761 GND RETURN KA)
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              U N B A L A N C E D   F A U L T   R E P O R T
                (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                     PRE FAULT VOLTAGE: 1.0000
                     MODEL TRANSFORMER TAPS: NO
===============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
===============================================================================

SER FAN B      3P Duty:   1.483  0.13 Z1=  81.1187         1.483     1.483
              SLG DUTY:   0.870  0.10 Z2=  81.1187         0.870
   480. VOLTS    LN/LN:   1.284       Z0= 252.8808
             LN/LN/GND:  1.333 (  0.615 GND RETURN KA)

SER FAN C      3P Duty:   1.483  0.13 Z1=  81.1187         1.483     1.483
              SLG DUTY:   0.870  0.10 Z2=  81.1187         0.870
   480. VOLTS    LN/LN:   1.284       Z0= 252.8808
             LN/LN/GND:  1.333 (  0.615 GND RETURN KA)

SER FAN D      3P Duty:   1.829  0.14 Z1=  65.7617         1.829     1.829
              SLG DUTY:   1.075  0.11 Z2=  65.7617         1.075
   480. VOLTS    LN/LN:   1.584       Z0= 204.3950
             LN/LN/GND:  1.647 (  0.761 GND RETURN KA)

SER FAN E      3P Duty:   1.829  0.14 Z1=  65.7617         1.829     1.829
              SLG DUTY:   1.075  0.11 Z2=  65.7617         1.075
   480. VOLTS    LN/LN:   1.584       Z0= 204.3950
             LN/LN/GND:  1.647 (  0.761 GND RETURN KA)

SER FAN F      3P Duty:   1.483  0.13 Z1=  81.1187         1.483     1.483
              SLG DUTY:   0.870  0.10 Z2=  81.1187         0.870
   480. VOLTS    LN/LN:   1.284       Z0= 252.8808
             LN/LN/GND:  1.333 (  0.615 GND RETURN KA)

SER FAN G      3P Duty:   1.829  0.14 Z1=  65.7617         1.829     1.829
              SLG DUTY:   1.075  0.11 Z2=  65.7617         1.075
   480. VOLTS    LN/LN:   1.584       Z0= 204.3950
             LN/LN/GND:  1.647 (  0.761 GND RETURN KA)

SER FAN H      3P Duty:   1.829  0.14 Z1=  65.7617         1.829     1.829
              SLG DUTY:   1.075  0.11 Z2=  65.7617         1.075
   480. VOLTS    LN/LN:   1.584       Z0= 204.3950
             LN/LN/GND:  1.647 (  0.761 GND RETURN KA)

SER FAN I      3P Duty:   1.483  0.13 Z1=  81.1187         1.483     1.483
              SLG DUTY:   0.870  0.10 Z2=  81.1187         0.870
   480. VOLTS    LN/LN:   1.284       Z0= 252.8808
             LN/LN/GND:  1.333 (  0.615 GND RETURN KA)
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              U N B A L A N C E D   F A U L T   R E P O R T
                (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                      PRE FAULT VOLTAGE: 1.0000
                      MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

SER FAN J      3P Duty:   1.483  0.13 Z1=  81.1187        1.483     1.483
              SLG DUTY:   0.870  0.10 Z2=  81.1187        0.870
   480. VOLTS    LN/LN:   1.284       Z0= 252.8808
             LN/LN/GND:  1.333 (  0.615 GND RETURN KA)

SER FAN K      3P Duty:   1.483  0.13 Z1=  81.1187        1.483     1.483
              SLG DUTY:   0.870  0.10 Z2=  81.1187        0.870
   480. VOLTS    LN/LN:   1.284       Z0= 252.8808
             LN/LN/GND:  1.333 (  0.615 GND RETURN KA)

SER FAN L      3P Duty:   1.829  0.14 Z1=  65.7617        1.829     1.829
              SLG DUTY:   1.075  0.11 Z2=  65.7617        1.075
   480. VOLTS    LN/LN:   1.584       Z0= 204.3950
             LN/LN/GND:  1.647 (  0.761 GND RETURN KA)

SEWAGE PUMP #1 3P Duty:  12.464  1.66 Z1=   9.6505       12.746    12.605
              SLG DUTY:   8.957  1.14 Z2=   9.6505        8.993
   480. VOLTS    LN/LN:  10.794       Z0=  21.4229
             LN/LN/GND: 12.094 (  6.918 GND RETURN KA)

SEWAGE PUMP #2 3P Duty:  19.731  3.60 Z1=   6.0961       22.914    21.353
              SLG DUTY:  17.268  2.87 Z2=   6.0961       19.098
   480. VOLTS    LN/LN:  17.087       Z0=   8.7507
             LN/LN/GND: 19.411 ( 15.318 GND RETURN KA)

SF-11 DISC     3P Duty:   1.281  0.15 Z1=  93.8949        1.281     1.281
              SLG DUTY:   0.753  0.11 Z2=  93.8949        0.753
   480. VOLTS    LN/LN:   1.109       Z0= 291.4063
             LN/LN/GND:  1.155 (  0.533 GND RETURN KA)

SF-4 DISC      3P Duty:   1.632  0.18 Z1=  73.7096        1.632     1.632
              SLG DUTY:   0.963  0.13 Z2=  73.7096        0.963
   480. VOLTS    LN/LN:   1.413       Z0= 227.5126
             LN/LN/GND:  1.475 (  0.683 GND RETURN KA)

SF-8 DISC      3P Duty:   1.054  0.13 Z1= 114.1262        1.054     1.054
              SLG DUTY:   0.619  0.10 Z2= 114.1262        0.619
   480. VOLTS    LN/LN:   0.913       Z0= 355.3359
             LN/LN/GND:  0.948 (  0.438 GND RETURN KA)
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                  U N B A L A N C E D   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

SLUDE PUMP #4  3P Duty:   5.531  0.50 Z1=  21.7487        5.531     5.531
              SLG DUTY:   3.405  0.30 Z2=  21.7487        3.405
   480. VOLTS    LN/LN:   4.790       Z0=  63.2093
             LN/LN/GND:  5.178 (  2.444 GND RETURN KA)

SLUDGE CAKE PU 3P Duty:  13.131  3.12 Z1=   9.1603       14.779    13.967
              SLG DUTY:   9.257  1.81 Z2=   9.1603        9.542
   480. VOLTS    LN/LN:  11.372       Z0=  20.9558
             LN/LN/GND: 12.574 (  7.097 GND RETURN KA)

SLUDGE PUMP #1 3P Duty:   7.617  0.60 Z1=  15.7911        7.617     7.617
              SLG DUTY:   4.929  0.38 Z2=  15.7911        4.929
   480. VOLTS    LN/LN:   6.597       Z0=  42.3031
             LN/LN/GND:  7.228 (  3.612 GND RETURN KA)

SLUDGE PUMP #2 3P Duty:   7.617  0.60 Z1=  15.7911        7.617     7.617
              SLG DUTY:   4.929  0.38 Z2=  15.7911        4.929
   480. VOLTS    LN/LN:   6.597       Z0=  42.3031
             LN/LN/GND:  7.228 (  3.612 GND RETURN KA)

SLUDGE PUMP #3 3P Duty:   5.531  0.50 Z1=  21.7487        5.531     5.531
              SLG DUTY:   3.405  0.30 Z2=  21.7487        3.405
   480. VOLTS    LN/LN:   4.790       Z0=  63.2093
             LN/LN/GND:  5.178 (  2.444 GND RETURN KA)

SLUDGE PUMP #7 3P Duty:   7.640  0.63 Z1=  15.7437        7.640     7.640
              SLG DUTY:   4.939  0.39 Z2=  15.7437        4.939
   480. VOLTS    LN/LN:   6.616       Z0=  42.3031
             LN/LN/GND:  7.262 (  3.615 GND RETURN KA)

SLUDGE PUMP #8 3P Duty:   5.547  0.53 Z1=  21.6858        5.547     5.547
              SLG DUTY:   3.411  0.31 Z2=  21.6858        3.411
   480. VOLTS    LN/LN:   4.803       Z0=  63.2093
             LN/LN/GND:  5.202 (  2.446 GND RETURN KA)

SLUDGE VALVE H 3P Duty:   4.688  0.40 Z1=  25.6560        4.688     4.688
              SLG DUTY:   2.830  0.30 Z2=  25.6560        2.830
   480. VOLTS    LN/LN:   4.060       Z0=  76.5156
             LN/LN/GND:  4.300 (  2.022 GND RETURN KA)
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                  U N B A L A N C E D   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

SOUTH BELT DIS 3P Duty:   2.619  0.14 Z1=  45.9235        2.619     2.619
              SLG DUTY:   1.543  0.10 Z2=  45.9235        1.543
   480. VOLTS    LN/LN:   2.268       Z0= 142.0861
             LN/LN/GND:  2.365 (  1.093 GND RETURN KA)

SOUTH BELT PUM 3P Duty:   1.103  0.16 Z1= 109.0807        1.103     1.103
              SLG DUTY:   0.642  0.11 Z2= 109.0807        0.642
   480. VOLTS    LN/LN:   0.955       Z0= 343.9880
             LN/LN/GND:  0.998 (  0.453 GND RETURN KA)

SOUTH CELL     3P Duty:   1.990  0.25 Z1=  60.4568        1.990     1.990
              SLG DUTY:   1.186  0.18 Z2=  60.4568        1.186
   480. VOLTS    LN/LN:   1.723       Z0= 183.8424
             LN/LN/GND:  1.813 (  0.843 GND RETURN KA)

SOUTH SEC. CLA 3P Duty:   1.818  0.22 Z1=  66.1786        1.818     1.818
              SLG DUTY:   1.083  0.16 Z2=  66.1786        1.083
   480. VOLTS    LN/LN:   1.574       Z0= 201.2164
             LN/LN/GND:  1.651 (  0.770 GND RETURN KA)

SOUTH SEC. CLA 3P Duty:   1.818  0.22 Z1=  66.1786        1.818     1.818
              SLG DUTY:   1.083  0.16 Z2=  66.1786        1.083
   480. VOLTS    LN/LN:   1.574       Z0= 201.2164
             LN/LN/GND:  1.651 (  0.770 GND RETURN KA)

SOUTH SEC. INF 3P Duty:   1.626  0.21 Z1=  73.9962        1.626     1.626
              SLG DUTY:   0.962  0.15 Z2=  73.9962        0.962
   480. VOLTS    LN/LN:   1.408       Z0= 227.3264
             LN/LN/GND:  1.476 (  0.683 GND RETURN KA)

SOUTH SEC. INF 3P Duty:   1.626  0.21 Z1=  73.9962        1.626     1.626
              SLG DUTY:   0.962  0.15 Z2=  73.9962        0.962
   480. VOLTS    LN/LN:   1.408       Z0= 227.3264
             LN/LN/GND:  1.476 (  0.683 GND RETURN KA)

SOUTH SEC. PUM 3P Duty:   1.938  0.24 Z1=  62.0623        1.938     1.938
              SLG DUTY:   1.154  0.17 Z2=  62.0623        1.154
   480. VOLTS    LN/LN:   1.678       Z0= 189.0491
             LN/LN/GND:  1.765 (  0.820 GND RETURN KA)
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              U N B A L A N C E D   F A U L T   R E P O R T
                (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                      PRE FAULT VOLTAGE: 1.0000
                      MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

SOUTH SHOP HTR 3P Duty:   5.414  0.42 Z1=  22.2163         5.414     5.414
              SLG DUTY:   3.380  0.31 Z2=  22.2163         3.380
   480. VOLTS    LN/LN:   4.689       Z0=  62.7152
             LN/LN/GND:  5.016 (  2.449 GND RETURN KA)

STREET LIGHT   3P Duty:   0.500  0.13 Z1= 240.6275         0.500     0.500
              SLG DUTY:   0.293  0.10 Z2= 240.6275         0.293
   480. VOLTS    LN/LN:   0.433       Z0= 750.8855
             LN/LN/GND:  0.449 (  0.207 GND RETURN KA)

SUMP PUMP #1 D 3P Duty:   7.615  0.60 Z1=  15.7953         7.615     7.615
              SLG DUTY:   4.929  0.38 Z2=  15.7953         4.929
   480. VOLTS    LN/LN:   6.595       Z0=  42.3031
             LN/LN/GND:  7.227 (  3.612 GND RETURN KA)

SUMP PUMP #2   3P Duty:   5.529  0.50 Z1=  21.7547         5.529     5.529
              SLG DUTY:   3.405  0.31 Z2=  21.7547         3.405
   480. VOLTS    LN/LN:   4.788       Z0=  63.2093
             LN/LN/GND:  5.177 (  2.444 GND RETURN KA)

SUMP PUMP EAST 3P Duty:   5.152  0.49 Z1=  23.3486         5.152     5.152
              SLG DUTY:   3.289  0.34 Z2=  23.3486         3.289
   480. VOLTS    LN/LN:   4.461       Z0=  63.6971
             LN/LN/GND:  4.837 (  2.402 GND RETURN KA)

SUMP PUMP WEST 3P Duty:   5.152  0.49 Z1=  23.3486         5.152     5.152
              SLG DUTY:   3.289  0.34 Z2=  23.3486         3.289
   480. VOLTS    LN/LN:   4.461       Z0=  63.6971
             LN/LN/GND:  4.837 (  2.402 GND RETURN KA)

TRANSFER PUMP  3P Duty:   3.576  0.42 Z1=  33.6403         3.576     3.576
              SLG DUTY:   2.190  0.30 Z2=  33.6403         2.190
   480. VOLTS    LN/LN:   3.096       Z0=  98.1877
             LN/LN/GND:  3.315 (  1.572 GND RETURN KA)

TRANSFER PUMP  3P Duty:   3.576  0.42 Z1=  33.6403         3.576     3.576
              SLG DUTY:   2.190  0.30 Z2=  33.6403         2.190
   480. VOLTS    LN/LN:   3.096       Z0=  98.1877
             LN/LN/GND:  3.315 (  1.572 GND RETURN KA)
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                  U N B A L A N C E D   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

TRANSFER SWITC 3P Duty:  16.915  2.16 Z1=   7.1108        17.809    17.365
              SLG DUTY:  14.618  1.80 Z2=   7.1108        15.054
   480. VOLTS    LN/LN:  14.649       Z0=  10.5493
            LN/LN/GND: 16.713 ( 12.826 GND RETURN KA)

TUMBULATOR     3P Duty:   1.790  0.14 Z1=  67.2053         1.790     1.790
              SLG DUTY:   1.046  0.10 Z2=  67.2053         1.046
   480. VOLTS    LN/LN:   1.550       Z0= 210.6585
            LN/LN/GND:  1.610 (  0.739 GND RETURN KA)

UNIT HEATER #1 3P Duty:   7.027  0.61 Z1=  17.1161         7.028     7.027
              SLG DUTY:   4.502  0.46 Z2=  17.1161         4.502
   480. VOLTS    LN/LN:   6.086       Z0=  46.3671
            LN/LN/GND:  6.582 (  3.295 GND RETURN KA)

UNIT HEATER #2 3P Duty:   2.947  0.31 Z1=  40.8128         2.947     2.947
              SLG DUTY:   1.768  0.24 Z2=  40.8128         1.768
   480. VOLTS    LN/LN:   2.552       Z0= 122.7361
            LN/LN/GND:  2.687 (  1.261 GND RETURN KA)

UNIT HEATER #3 3P Duty:   1.675  0.23 Z1=  71.8237         1.675     1.675
              SLG DUTY:   0.991  0.19 Z2=  71.8237         0.991
   480. VOLTS    LN/LN:   1.450       Z0= 220.7243
            LN/LN/GND:  1.515 (  0.703 GND RETURN KA)

VACUUM PUMP    3P Duty:   2.262  0.24 Z1=  53.1697         2.262     2.262
              SLG DUTY:   1.356  0.17 Z2=  53.1697         1.356
   480. VOLTS    LN/LN:   1.959       Z0= 160.1092
            LN/LN/GND:  2.063 (  0.967 GND RETURN KA)

VALVE ACTUATOR 3P Duty:   1.205  0.11 Z1=  99.7963         1.205     1.205
              SLG DUTY:   0.704  0.08 Z2=  99.7963         0.704
   480. VOLTS    LN/LN:   1.044       Z0= 312.9776
            LN/LN/GND:  1.081 (  0.497 GND RETURN KA)

VFD-N. THICK S 3P Duty:   2.923  0.40 Z1=  41.1540         2.923     2.923
              SLG DUTY:   1.743  0.31 Z2=  41.1540         1.743
   480. VOLTS    LN/LN:   2.531       Z0= 125.1736
            LN/LN/GND:  2.676 (  1.239 GND RETURN KA)
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                  U N B A L A N C E D   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

VFD-N. THICK S 3P Duty:   2.322  0.31 Z1=  51.8043         2.322     2.322
              SLG DUTY:   1.375  0.24 Z2=  51.8043         1.375
   480. VOLTS    LN/LN:   2.011       Z0= 159.2788
             LN/LN/GND:  2.113 (  0.975 GND RETURN KA)

VFD-N. THICK S 3P Duty:   3.178  0.43 Z1=  37.8477         3.178     3.178
              SLG DUTY:   1.905  0.33 Z2=  37.8477         1.905
   480. VOLTS    LN/LN:   2.752       Z0= 114.2315
             LN/LN/GND:  2.914 (  1.357 GND RETURN KA)

VFD-PUMP 4     3P Duty:  20.432  3.22 Z1=   5.8869        23.159    21.818
              SLG DUTY:  18.232  2.60 Z2=   5.8869        19.787
   480. VOLTS    LN/LN:  17.695       Z0=   8.0744
             LN/LN/GND: 20.328 ( 16.414 GND RETURN KA)

VFD-S. THICK S 3P Duty:   2.809  0.39 Z1=  42.8133         2.809     2.809
              SLG DUTY:   1.672  0.30 Z2=  42.8133         1.672
   480. VOLTS    LN/LN:   2.433       Z0= 130.6561
             LN/LN/GND:  2.570 (  1.188 GND RETURN KA)

VFD-S. THICK S 3P Duty:   2.031  0.28 Z1=  59.2215         2.031     2.031
              SLG DUTY:   1.197  0.22 Z2=  59.2215         1.197
   480. VOLTS    LN/LN:   1.759       Z0= 183.3283
             LN/LN/GND:  1.845 (  0.848 GND RETURN KA)

VFD-S. THICK S 3P Duty:   2.607  0.37 Z1=  46.1409         2.607     2.607
              SLG DUTY:   1.546  0.28 Z2=  46.1409         1.546
   480. VOLTS    LN/LN:   2.258       Z0= 141.6395
             LN/LN/GND:  2.382 (  1.097 GND RETURN KA)

VFD-SOUTH BELT 3P Duty:   0.969  0.15 Z1= 124.1101         0.969     0.969
              SLG DUTY:   0.564  0.11 Z2= 124.1101         0.564
   480. VOLTS    LN/LN:   0.839       Z0= 392.4663
             LN/LN/GND:  0.876 (  0.397 GND RETURN KA)

VFD-SOUTH BELT 3P Duty:   0.969  0.15 Z1= 124.1101         0.969     0.969
              SLG DUTY:   0.564  0.11 Z2= 124.1101         0.564
   480. VOLTS    LN/LN:   0.839       Z0= 392.4663
             LN/LN/GND:  0.876 (  0.397 GND RETURN KA)
```

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                  U N B A L A N C E D   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

WASTE MIXED LI 3P Duty:  15.241  1.54 Z1=   7.8917       15.499    15.371
              SLG DUTY:  10.812  1.12 Z2=   7.8917       10.851
   480. VOLTS    LN/LN:  13.199       Z0=  17.8874
             LN/LN/GND: 14.670 (  8.307 GND RETURN KA)

WASTE MIXED LI 3P Duty:  15.241  1.54 Z1=   7.8917       15.499    15.371
              SLG DUTY:  10.812  1.12 Z2=   7.8917       10.851
   480. VOLTS    LN/LN:  13.199       Z0=  17.8874
             LN/LN/GND: 14.670 (  8.307 GND RETURN KA)

WASTE SLUDGE P 3P Duty:   1.450  0.12 Z1=  82.9548        1.450     1.450
              SLG DUTY:   0.844  0.09 Z2=  82.9548        0.844
   480. VOLTS    LN/LN:   1.256       Z0= 261.8111
             LN/LN/GND:  1.304 (  0.595 GND RETURN KA)

WASTE SLUDGE P 3P Duty:   1.450  0.12 Z1=  82.9548        1.450     1.450
              SLG DUTY:   0.844  0.09 Z2=  82.9548        0.844
   480. VOLTS    LN/LN:   1.256       Z0= 261.8111
             LN/LN/GND:  1.304 (  0.595 GND RETURN KA)

WATER MAINT SH 3P Duty:   3.505  0.58 Z1=  34.3175        3.505     3.505
              SLG DUTY:   2.356  0.52 Z2=  34.3175        2.356
   480. VOLTS    LN/LN:   3.035       Z0=  84.6414
             LN/LN/GND:  3.221 (  1.773 GND RETURN KA)

WELDER RECEPT  3P Duty:   3.906  0.51 Z1=  30.7918        3.906     3.906
              SLG DUTY:   2.645  0.46 Z2=  30.7918        2.646
   480. VOLTS    LN/LN:   3.383       Z0=  74.9380
             LN/LN/GND:  3.594 (  1.998 GND RETURN KA)

WELDER-CARBON  3P Duty:   1.997  0.22 Z1=  60.2397        1.997     1.997
              SLG DUTY:   1.667  0.22 Z2=  60.2397        1.667
   480. VOLTS    LN/LN:   1.729       Z0=  96.0077
             LN/LN/GND:  1.873 (  1.430 GND RETURN KA)

WEST BANK-A    3P Duty:  21.498 11.87 Z1=   0.5595       31.728    26.882
              SLG DUTY:   0.000  0.00 Z2=   0.5595        0.000
  4800. VOLTS    LN/LN:  18.617       Z0= INFINITE
             LN/LN/GND: 18.617 (  0.000 GND RETURN KA)
```

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                  U N B A L A N C E D   F A U L T   R E P O R T
                    (FOR APPLICATION OF LOW VOLTAGE BREAKERS)
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================
  LOCATION     FAULT      KA     X/R  EQUIVALENT (PU)  ASYM. KA AT 0.5 CYCLES
  VOLTAGE      DUTIES    (RMS)        FAULT IMPEDANCE  * MAX. RMS  AVG. RMS *
==============================================================================

WEST BANK-B    3P Duty:  20.159 10.78 Z1=   0.5967        29.329    24.976
              SLG DUTY:   0.000  0.00 Z2=   0.5967         0.000
  4800. VOLTS    LN/LN:  17.458       Z0= INFINITE
             LN/LN/GND: 17.458 (  0.000 GND RETURN KA)

WEST FAN       3P Duty:   0.915  0.35 Z1= 131.4743         0.915     0.915
              SLG DUTY:   0.779  0.32 Z2= 131.4743         0.779
   480. VOLTS    LN/LN:   0.792       Z0= 200.6729
             LN/LN/GND:  0.874 (  0.677 GND RETURN KA)

WINCH #1       3P Duty:   0.873  0.12 Z1= 137.7332         0.873     0.873
              SLG DUTY:   0.511  0.09 Z2= 137.7332         0.511
   480. VOLTS    LN/LN:   0.756       Z0= 431.1119
             LN/LN/GND:  0.786 (  0.361 GND RETURN KA)

WINCH #2       3P Duty:   0.942  0.13 Z1= 127.6395         0.942     0.942
              SLG DUTY:   0.552  0.09 Z2= 127.6395         0.552
   480. VOLTS    LN/LN:   0.816       Z0= 398.7837
             LN/LN/GND:  0.849 (  0.390 GND RETURN KA)

WINCH #3       3P Duty:   1.023  0.13 Z1= 117.5354         1.023     1.023
              SLG DUTY:   0.600  0.10 Z2= 117.5354         0.600
   480. VOLTS    LN/LN:   0.886       Z0= 366.4562
             LN/LN/GND:  0.922 (  0.424 GND RETURN KA)

WT CONVEYOR 1  3P Duty:   1.046  0.09 Z1= 114.9567         1.046     1.046
              SLG DUTY:   0.612  0.07 Z2= 114.9567         0.612
   480. VOLTS    LN/LN:   0.906       Z0= 359.6144
             LN/LN/GND:  0.938 (  0.433 GND RETURN KA)
```

F A U L T S T U D Y S U M M A R Y
(FOR APPLICATION OF LOW VOLTAGE BREAKERS)
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

BUS RECORD NO NAME	VOLTAGE L-L	AVAILABLE FAULT DUTIES (KA) 3 PHASE	X/R	LINE/GRND	X/R
04-LP-01 XFER	480.	11.813	1.06	8.754	0.73
06-LP-01	208.	7.912	3.02	8.547	2.84
06-LP-02	208.	6.738	2.04	6.486	1.58
06-LP-03	208.	6.088	1.73	5.501	1.28
06-LP-04	208.	3.007	0.52	1.988	0.34
06-LP-05	208.	2.680	0.47	1.739	0.31
06-LP-06	208.	4.239	0.91	3.143	0.62
06-LP-07	208.	2.012	0.38	1.262	0.25
11-LP-01	208.	0.514	2.30	0.515	2.27
11-LP-01A	208.	0.413	1.24	0.355	0.94
12A-PP-01	480.	11.085	1.40	8.266	1.07
15 KVAC CAP	480.	12.948	0.91	8.557	0.66
15-LP-01	208.	0.845	2.43	0.849	2.40
15-LP-02	208.	0.808	2.13	0.810	2.08
2-LP-1	208.	1.031	2.44	1.045	2.49
2-LP-2	208.	0.972	1.92	1.006	2.10
2-LP-3	208.	0.972	1.92	1.006	2.10
2-LP-4	208.	1.015	2.38	1.021	2.38
20A-PP-01	480.	6.985	1.23	5.075	0.93
20A-PP-1	480.	9.569	1.60	7.651	1.20
24-LP-01	208.	2.812	2.17	2.906	2.28
24-LP-02	480.	2.135	0.28	1.338	0.23
28-LP-01	208.	3.505	2.63	4.151	2.63
28-PP-01	480.	3.263	2.76	3.220	2.71
2A-LP-01	208.	0.915	2.05	0.921	1.98
45D WATER CIRC	480.	3.733	0.31	2.263	0.21
AER. TANK AND	480.	1.958	0.17	1.147	0.13
AERATION RECIR	480.	0.682	0.18	0.381	0.12
AERATION RECIR	480.	0.682	0.18	0.381	0.12
AERATION RECIR	480.	0.944	0.19	0.537	0.12
AERATION RECIR	480.	0.944	0.19	0.537	0.12
AERATION RECIR	480.	1.179	0.20	0.677	0.13
AERATION RECIR	480.	1.818	0.24	1.061	0.16
AERATION RECIR	480.	1.279	0.21	0.737	0.14
AERATION RECIR	480.	0.992	0.19	0.565	0.13
AERATION RECIR	480.	0.814	0.19	0.460	0.12
AERATION TANK	480.	0.620	0.10	0.362	0.08
AERATION VALVE	480.	0.354	0.09	0.206	0.07
AERATION VALVE	480.	0.417	0.09	0.243	0.07
AERATION VALVE	480.	0.508	0.09	0.296	0.07
AERATION VALVE	480.	0.648	0.10	0.378	0.08
AERATION VALVE	480.	0.896	0.11	0.522	0.08
AERATION VALVE	480.	1.531	0.13	0.898	0.10
AERATION VALVE	480.	1.028	0.11	0.601	0.09

F A U L T S T U D Y S U M M A R Y
(FOR APPLICATION OF LOW VOLTAGE BREAKERS)
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

BUS RECORD NO NAME	VOLTAGE L-L	AVAILABLE FAULT DUTIES (KA) 3 PHASE	X/R	LINE/GRND	X/R
AERATION VALVE	480.	0.773	0.10	0.452	0.08
AERATION VALVE	480.	0.620	0.10	0.362	0.08
AERATION VALVE	480.	3.431	0.20	2.034	0.14
AIR COMPRESSOR	480.	1.761	0.25	1.082	0.20
AIR DUCT HEATE	480.	12.152	2.49	10.715	1.99
AIR DUCT HEATE	480.	7.150	0.86	4.974	0.62
ANAEROBIC MIX	480.	1.665	0.34	0.974	0.24
ANAEROBIC MIX	480.	1.949	0.35	1.149	0.25
ANAEROBIC MIX	480.	1.561	0.26	0.908	0.18
ANAEROBIC MIX	480.	1.992	0.28	1.171	0.19
ANAEROBIC MIX	480.	2.763	0.33	1.651	0.22
ANEROBIC MIX P	480.	3.016	0.42	1.823	0.30
ANEROBIC MIX P	480.	2.178	0.37	1.291	0.26
ANEROBIC MIX P	480.	1.708	0.35	1.000	0.25
ANEROBIC MIX P	480.	1.408	0.33	0.817	0.24
ANOXIC MIX PUM	480.	1.706	0.33	1.007	0.24
ANOXIC MIX PUM	480.	2.015	0.34	1.198	0.25
ANOXIC MIX PUM	480.	1.630	0.25	0.957	0.18
ANOXIC MIX PUM	480.	2.121	0.28	1.257	0.20
ANOXIC MIX PUM	480.	3.061	0.35	1.840	0.23
ANOXIC MIX PUM	480.	3.354	0.44	2.044	0.31
ANOXIC MIX PUM	480.	2.347	0.38	1.397	0.27
ANOXIC MIX PUM	480.	1.809	0.35	1.062	0.25
ANOXIC MIX PUM	480.	1.475	0.34	0.858	0.24
AUGER #1	480.	0.922	0.14	0.538	0.09
AUGER #2	480.	0.999	0.14	0.583	0.10
AUGER #3	480.	0.999	0.14	0.583	0.10
BANDSCREEN #1	480.	0.923	0.14	0.538	0.09
BANDSCREEN #2	480.	0.999	0.14	0.583	0.10
BANDSCREEN #3	480.	0.999	0.14	0.583	0.10
BAR SCREEN #1	480.	0.862	0.12	0.502	0.09
BAR SCREEN #1	480.	0.773	0.11	0.450	0.08
BAR SCREEN #2	480.	1.009	0.12	0.589	0.09
BAR SCREEN #2	480.	0.889	0.11	0.518	0.09
BAR SCREEN #3	480.	1.009	0.12	0.589	0.09
BAR SCREEN #3	480.	0.889	0.11	0.518	0.09
BAR SCREEN MTR	480.	1.602	0.17	0.930	0.12
BELT PRESS DIS	480.	2.619	0.14	1.543	0.10
BLOWER #1	480.	12.740	1.29	9.879	0.90
BLOWER #3	480.	13.707	1.39	11.056	1.01
BLOWER #5	480.	15.512	1.71	13.395	1.31

F A U L T   S T U D Y   S U M M A R Y
(FOR APPLICATION OF LOW VOLTAGE BREAKERS)
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

BUS RECORD NO NAME	VOLTAGE L-L	AVAILABLE FAULT DUTIES (KA) 3 PHASE	X/R	LINE/GRND	X/R
BLOWER 1 CP	480.	2.829	0.32	1.716	0.23
BLOWER 2 CP	480.	1.612	0.18	0.955	0.12
BLOWER 3 CP	480.	1.952	0.26	1.161	0.19
BLOWER 4 CP	480.	1.015	0.14	0.591	0.10
BLOWER ROOM	480.	6.173	0.98	4.281	0.73
BOILER CIRC PU	480.	1.447	0.17	0.846	0.12
BOILER CIRC PU	480.	1.447	0.17	0.846	0.12
BOILER CTRL/GA	480.	2.831	0.27	2.368	0.26
BOLIMO CONTROL	480.	2.965	0.30	1.800	0.21
BRIDGE CRANE	480.	4.920	0.61	3.470	0.55
CAPACITOR DISC	480.	13.864	3.01	12.167	2.43
CARBON FEED PU	480.	1.399	0.19	1.133	0.19
CARBON FEED PU	480.	1.399	0.19	1.133	0.19
CARBON SCRUBBE	480.	1.432	0.21	0.835	0.15
CARBON SLURRY	480.	3.900	0.50	2.393	0.34
CENTER CELL	480.	1.990	0.25	1.186	0.18
CENTRIFUGE #2	480.	12.715	2.37	9.113	1.63
CENTRIFUGE #2	480.	0.978	0.08	0.572	0.06
CENTRIFUGE #4	480.	12.254	2.34	8.716	1.61
CENTRIFUGE 1 P	480.	1.535	0.13	0.901	0.10
CENTRIFUGE 2 P	480.	1.535	0.13	0.901	0.10
CENTRIFUGE OVE	480.	4.269	0.26	2.559	0.18
CENTRIFUGE OVE	480.	4.572	0.26	2.738	0.18
CENTRIFUGE# 1	480.	12.374	2.35	9.069	1.65
CENTRIFUGE# 3	480.	12.036	2.40	8.787	1.69
CHANEL MIX PUM	480.	1.000	0.18	0.577	0.12
CHANEL MIX PUM	480.	0.640	0.17	0.363	0.11
CHANNEL MIX PU	480.	0.712	0.17	0.406	0.11
CHANNEL MIX PU	480.	1.161	0.19	0.672	0.13
CHILL WATER CI	480.	9.462	1.10	6.641	0.69
CHILL WATER CI	480.	4.246	0.35	2.597	0.24
CHILLER #1	480.	9.664	1.53	7.454	1.07
CHILLER #2	480.	13.366	2.94	11.541	2.35
CP-MAU-BP-1	480.	1.744	0.20	1.026	0.14
CS-BS-1	480.	8.890	0.59	5.837	0.37
CTRL SCRN RM U	480.	15.148	1.52	12.543	1.07
CW PUMP P-10	480.	2.139	0.27	1.254	0.17
D-101	480.	1.231	0.14	0.726	0.10
D-102	480.	1.231	0.14	0.726	0.10
D-103	480.	1.231	0.14	0.726	0.10
DIVERSION CHAM	480.	1.025	0.16	0.604	0.12

F A U L T S T U D Y S U M M A R Y
(FOR APPLICATION OF LOW VOLTAGE BREAKERS)
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

BUS RECORD NO NAME	VOLTAGE L-L	A V A I L A B L E 3 PHASE	X/R	F A U L T LINE/GRND	D U T I E S (KA) X/R
DIVERSION CHAM	480.	0.508	0.12	0.297	0.09
DOOR #1	480.	0.784	0.18	0.453	0.11
DOOR #2	480.	0.784	0.18	0.453	0.11
DOOR #3	480.	0.784	0.18	0.453	0.11
DOOR OPENER	480.	1.815	0.16	1.069	0.12
DOOR OPERATORS	480.	6.312	0.49	4.040	0.33
DRILL PRESS #1	480.	3.303	0.40	2.170	0.34
DRILL PRESS #2	480.	3.305	0.40	2.170	0.34
DS CLARIFIERS	480.	2.600	0.29	1.572	0.21
DS- CENT. FEED	480.	4.015	0.49	2.484	0.36
DS- NORTH BELT	480.	1.154	0.16	0.674	0.12
DS-1500 HP BLO	4800.	16.586	5.73	0.000	0.00
DS-1500 HP BLO	4800.	17.568	5.71	0.000	0.00
DS-2500HP BLOW	4800.	16.765	6.70	0.000	0.00
DS-2500HP BLOW	4800.	17.696	6.34	0.000	0.00
DS-3 AUX. INST	480.	0.735	0.10	0.428	0.08
DS-AIR COMPRES	480.	1.870	0.25	1.112	0.19
DS-AMMONIA REM	480.	8.060	1.39	5.455	0.91
DS-AMMONIA REM	480.	8.060	1.39	5.455	0.91
DS-ANOXIC TANK	480.	2.602	0.29	1.572	0.21
DS-BASEMENT EL	480.	5.744	0.76	3.664	0.59
DS-BYPASS CONV	480.	1.758	0.16	1.043	0.12
DS-BYPASS SLID	480.	1.955	0.31	1.132	0.25
DS-CENTRIFUGE	480.	1.651	0.21	0.969	0.16
DS-CF-SH-1	480.	0.748	0.16	0.431	0.09
DS-CF-SH-2	480.	0.850	0.16	0.491	0.09
DS-CLARIFIER 7	480.	1.950	0.31	1.131	0.25
DS-CP-CS-SH-1	480.	4.140	0.55	2.535	0.38
DS-DRAIN PUMP	480.	3.061	0.48	1.781	0.37
DS-DUCT HEATER	480.	1.517	0.18	0.895	0.14
DS-EF-1 CAP	480.	13.833	2.49	11.373	1.92
DS-EF-2A	480.	1.670	0.16	0.984	0.12
DS-EF-2A CAP	480.	11.764	1.31	8.755	0.95
DS-EF-2B	480.	1.881	0.17	1.110	0.13
DS-EF-2B CAP	480.	11.764	1.31	8.755	0.95
DS-EF-2C	480.	2.152	0.19	1.273	0.14
DS-EF-2C CAP	480.	11.764	1.31	8.755	0.95
DS-EF-5A	480.	0.880	0.11	0.515	0.08
DS-EF-5A CAP	480.	11.764	1.31	8.755	0.95
DS-EF-5B	480.	1.033	0.12	0.605	0.09
DS-EF-5B CAP	480.	11.764	1.31	8.755	0.95

F A U L T S T U D Y S U M M A R Y
(FOR APPLICATION OF LOW VOLTAGE BREAKERS)
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

BUS RECORD NO NAME	VOLTAGE L-L	AVAILABLE FAULT DUTIES (KA) 3 PHASE	X/R	LINE/GRND	X/R
DS-EF-SC-1	480.	1.161	0.16	0.680	0.13
DS-ENG. RM. BO	480.	7.202	0.64	4.720	0.47
DS-EXHAUST FAN	480.	1.470	0.23	0.850	0.18
DS-EXISTING CR	480.	1.420	0.14	0.840	0.10
DS-FOUL AIR FA	480.	2.608	0.19	1.555	0.13
DS-GEN 1	480.	5.932	16.69	5.897	16.49
DS-GEN 2	480.	5.932	16.69	5.897	16.49
DS-GRINDER 1,2	480.	4.575	0.42	2.822	0.31
DS-GROUND SLUD	480.	1.346	0.17	0.788	0.12
DS-GSST MIXER	480.	4.047	0.50	2.493	0.36
DS-HOIST	480.	1.311	0.23	0.759	0.18
DS-HOIST,EX FA	480.	1.517	0.18	0.895	0.14
DS-HV UNIT	480.	2.920	0.28	1.753	0.21
DS-HVAC #1	480.	14.357	1.46	11.489	1.13
DS-HVAC #2	480.	14.357	1.46	11.489	1.13
DS-HVAC 1	480.	1.839	0.26	1.062	0.14
DS-INFLUENT VA	480.	1.955	0.31	1.132	0.25
DS-INFLUENT VA	480.	1.955	0.31	1.132	0.25
DS-MAU-SC-1	480.	2.310	0.31	1.369	0.24
DS-MAU-SH-1	480.	1.160	0.16	0.674	0.12
DS-MAU-SH-2	480.	2.301	0.34	1.347	0.23
DS-MAU-SH-3	480.	1.311	0.17	0.765	0.12
DS-MCC-15 AC U	480.	10.931	1.77	9.048	1.33
DS-MCC-15 BATT	480.	10.931	1.77	9.048	1.33
DS-MCC-25-SF-4	480.	1.430	0.14	0.840	0.11
DS-MCC-7 AIR C	480.	5.332	0.48	3.354	0.36
DS-MCC7 PUMP 1	480.	15.550	1.44	12.552	1.08
DS-MCC7 PUMP 2	480.	14.569	1.28	11.382	0.94
DS-MCC7 PUMP 3	480.	13.666	1.16	10.374	0.84
DS-MCC7 PUMP 4	480.	12.842	1.06	9.507	0.76
DS-MCC8 PRI TH	480.	2.602	0.26	1.555	0.19
DS-MCC8 PRI TH	480.	2.602	0.26	1.555	0.19
DS-MCC8 PRI TH	480.	2.345	0.24	1.397	0.18
DS-MCC8 RAS PU	480.	2.313	0.24	1.378	0.18
DS-MCC8 RAS PU	480.	2.563	0.26	1.531	0.19
DS-MCC8 RAS PU	480.	2.708	0.27	1.621	0.20
DS-MCC8 RAS PU	480.	3.054	0.29	1.837	0.22
DS-MCC8 SCUM P	480.	1.425	0.15	0.839	0.11
DS-MCC8 SCUM P	480.	1.425	0.15	0.839	0.11
DS-MCC8 THICKE	480.	5.946	0.59	3.797	0.44
DS-MCC8 WAS PU	480.	1.425	0.15	0.839	0.11

F A U L T S T U D Y S U M M A R Y
(FOR APPLICATION OF LOW VOLTAGE BREAKERS)
PRE FAULT VOLTAGE: 1.0000
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BUS RECORD NO NAME	VOLTAGE L-L	AVAILABLE FAULT DUTIES (KA) 3 PHASE	X/R	LINE/GRND	X/R
DS-MIXED LIQUO	480.	3.384	0.58	1.980	0.44
DS-MOV SUMP	480.	7.132	0.67	4.658	0.49
DS-MSP-12 TUMB	480.	1.483	0.24	0.853	0.19
DS-NEW CRANE	480.	1.420	0.14	0.840	0.10
DS-NORTH BELT	480.	1.053	0.15	0.614	0.11
DS-NORTH BELT	480.	1.053	0.15	0.614	0.11
DS-NORTH BOOST	480.	5.490	0.67	3.594	0.52
DS-NORTH BOOST	480.	5.490	0.67	3.594	0.52
DS-NORTH BOOST	480.	5.750	0.71	3.796	0.54
DS-OH DOOR	480.	11.764	1.31	8.755	0.95
DS-POLYMER MIX	480.	2.602	0.29	1.572	0.21
DS-PRIM THICK	480.	3.109	0.30	1.872	0.22
DS-Q1236	480.	0.975	0.15	0.573	0.12
DS-Q1237	480.	1.004	0.15	0.590	0.12
DS-Q1238	480.	1.004	0.15	0.590	0.12
DS-Q1239	480.	1.034	0.15	0.608	0.12
DS-Q1240	480.	1.034	0.15	0.608	0.12
DS-Q1241	480.	1.066	0.15	0.627	0.12
DS-Q1242	480.	1.066	0.15	0.627	0.12
DS-Q1243	480.	1.101	0.16	0.647	0.12
DS-RAS PUMP #1	480.	3.257	0.38	1.995	0.27
DS-RAS PUMP #2	480.	3.257	0.38	1.995	0.27
DS-RAS PUMP #3	480.	3.257	0.38	1.995	0.27
DS-RECYCLE PUM	480.	18.859	2.47	17.068	2.15
DS-RETURN VALV	480.	1.517	0.18	0.895	0.14
DS-SCUM PUMP #	480.	1.467	0.23	0.850	0.18
DS-SERV GARAGE	480.	6.366	0.59	4.106	0.44
DS-SEWAGE PUMP	480.	21.142	4.13	19.304	3.71
DS-SLIDE GATE	480.	1.955	0.31	1.132	0.25
DS-SLIDE GATE	480.	1.955	0.31	1.132	0.25
DS-SLUDGE PUMP	480.	3.058	0.48	1.780	0.37
DS-SLUDGE PUMP	480.	3.475	0.40	2.139	0.28
DS-SLUDGE TANK	480.	0.981	0.12	0.570	0.09
DS-SLUDGE THIC	480.	2.866	0.38	1.711	0.29
DS-SLUDGE THIC	480.	2.565	0.35	1.525	0.26
DS-SLUDGE THIC	480.	1.475	0.24	0.863	0.18
DS-SLUDGE THIC	480.	1.475	0.24	0.863	0.18
DS-SLUDGE THIC	480.	3.043	0.40	1.822	0.30
DS-SLUDGE THIC	480.	1.522	0.25	0.890	0.18
DS-SOUTH BELT	480.	1.053	0.15	0.614	0.11
DS-SOUTH BELT	480.	1.154	0.16	0.674	0.12

F A U L T S T U D Y S U M M A R Y
(FOR APPLICATION OF LOW VOLTAGE BREAKERS)
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

BUS RECORD NO NAME	VOLTAGE L-L	A V A I L A B L E 3 PHASE	X/R	F A U L T LINE/GRND	D U T I E S (KA) X/R
DS-SOUTH BELT	480.	1.053	0.15	0.614	0.11
DS-STREET LIGH	480.	2.235	0.26	1.342	0.19
DS-SUMP PUMP 1	480.	1.268	0.18	0.740	0.14
DS-SUMP PUMP 1	480.	1.324	0.19	0.773	0.14
DS-SUMP PUMP 2	480.	1.268	0.18	0.740	0.14
DS-SUMP PUMP A	480.	1.312	0.23	0.759	0.18
DS-SUMP PUMP B	480.	1.312	0.23	0.759	0.18
DS-SYSTEM AIR	480.	0.758	0.12	0.434	0.08
DS-SYSTEM AIR	480.	0.758	0.12	0.434	0.08
DS-UNIT HEATER	480.	1.658	0.23	0.979	0.19
DS-WELDER PLUG	480.	1.517	0.18	0.895	0.14
DS-XFMR 21 LP-	480.	6.220	0.58	4.001	0.44
DS-XFMR 21 LP-	480.	2.558	0.30	1.538	0.23
DUMBWATIER DIS	480.	4.019	0.39	2.457	0.28
EAST BANK-1A	4800.	20.099	10.53	0.000	0.00
EAST BANK-1B	4800.	21.491	11.84	0.000	0.00
EAST BANK-2A	4800.	21.521	12.12	0.000	0.00
EAST BANK-2B	4800.	20.126	10.85	0.000	0.00
EAST FAN	480.	0.747	0.29	0.632	0.28
EAST STORAGE D	480.	1.047	0.09	0.612	0.06
EAST SUPPLY FA	480.	0.597	0.12	0.350	0.09
EF-1 DISC	480.	2.886	0.28	1.731	0.20
EF-11 DISC	480.	0.984	0.13	0.577	0.10
EF-12 DISC	480.	1.054	0.13	0.619	0.10
EF-13 DISC	480.	1.093	0.13	0.641	0.10
EF-14 DISC	480.	1.054	0.13	0.619	0.10
EF-15 DISC	480.	1.054	0.13	0.619	0.10
EF-16 DISC	480.	1.018	0.13	0.597	0.10
EF-18 DISC	480.	1.632	0.18	0.963	0.13
EF-2	480.	1.883	0.25	1.168	0.21
EF-20 DISC	480.	0.984	0.13	0.577	0.10
EF-5 DISC	480.	1.632	0.18	0.963	0.13
EF-7 DISC	480.	1.018	0.13	0.597	0.10
EF-9 DISC	480.	1.402	0.16	0.825	0.12
EF-BS-1	480.	3.936	0.24	2.374	0.15
EHU-BS-3	480.	2.605	0.21	1.547	0.15
EHU-BS-4	480.	1.527	0.14	0.898	0.10
EHU-BS-5	480.	1.527	0.14	0.898	0.10
ELEVATOR	480.	3.404	0.22	2.031	0.16
ET CONVEYOR 1	480.	1.047	0.09	0.612	0.06
ET CONVEYOR 2	480.	0.724	0.09	0.415	0.06

F A U L T S T U D Y S U M M A R Y
(FOR APPLICATION OF LOW VOLTAGE BREAKERS)
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

BUS RECORD NO NAME	VOLTAGE L-L	A V A I L A B L E F A U L T D U T I E S (KA) 3 PHASE	X/R	LINE/GRND	X/R
EUH-001	480.	2.975	0.25	1.802	0.18
EUH-002	480.	1.956	0.19	1.167	0.14
EUH-003	480.	1.456	0.17	0.863	0.13
EUH-004	480.	1.556	0.17	0.923	0.13
EUH-BS-1	480.	7.878	0.51	5.090	0.33
EUH-BS-2	480.	3.716	0.27	2.245	0.19
EXHAUST FAN A	480.	3.116	0.22	1.837	0.17
EXHAUST FAN B	480.	6.490	0.40	3.924	0.30
EXHAUST FAN C	480.	4.631	0.30	2.757	0.23
EXHAUST FAN D	480.	3.335	0.23	1.969	0.18
EXHAUST FAN E	480.	2.466	0.19	1.449	0.15
FAN CONTROL PA	480.	2.185	0.24	1.302	0.18
FC-1	480.	1.484	0.22	0.904	0.18
FC-1 DISC	480.	2.886	0.28	1.731	0.20
FC-2	480.	1.894	0.26	1.171	0.21
FC-2 DISC	480.	6.417	0.65	4.155	0.46
FC-3 DISC	480.	3.558	0.34	2.157	0.25
FC-4 DISC	480.	0.984	0.13	0.577	0.10
FC-5 DISC	480.	1.054	0.13	0.619	0.10
FC-6 DISC	480.	1.281	0.15	0.753	0.11
FC-7 DISC	480.	1.547	0.17	0.912	0.13
FILTER DOOR OP	480.	1.483	0.13	0.870	0.10
FINAL TANK AND	480.	3.173	0.25	1.868	0.19
FINAL TANK DRA	480.	2.756	0.21	1.621	0.16
FINE SCREEN DU	480.	1.421	0.15	0.835	0.11
FINE SCREEN DU	480.	1.491	0.15	0.877	0.11
FINE SCREEN DU	480.	1.569	0.16	0.924	0.11
FUME EXTRACTOR	480.	1.811	0.24	1.121	0.20
FUME FAN CONTA	480.	1.028	0.15	0.606	0.11
FUME HOOD EXHA	480.	0.892	0.14	0.524	0.10
FUME HOODS VFD	480.	0.582	0.12	0.341	0.09
GATE 1 CONTROL	480.	0.829	0.13	0.487	0.10
GATE 2 CONTROL	480.	0.704	0.12	0.413	0.10
GATE VALVE 1	480.	1.190	0.13	0.694	0.10
GATE VALVE 2	480.	1.190	0.13	0.694	0.10
GATE VALVE 4	480.	1.190	0.13	0.694	0.10
GATE VALVE 5	480.	1.190	0.13	0.694	0.10
GATE VALVE 7	480.	1.190	0.13	0.694	0.10
GATE VALVE 8	480.	1.190	0.13	0.694	0.10
GRINDER #1	480.	0.933	0.14	0.544	0.10
GRINDER #2	480.	1.011	0.14	0.590	0.10

F A U L T S T U D Y S U M M A R Y
(FOR APPLICATION OF LOW VOLTAGE BREAKERS)
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

BUS RECORD NO NAME	VOLTAGE L-L	A V A I L A B L E 3 PHASE	X/R	F A U L T LINE/GRND	D U T I E S (KA) X/R
GRINDER #3	480.	1.011	0.14	0.590	0.10
GRIT REMOVAL H	480.	6.312	0.49	4.040	0.33
GRIT TANK #1	480.	6.311	0.49	4.040	0.33
GRIT TANK #2	480.	6.311	0.49	4.040	0.33
GRIT TANKS	480.	6.682	0.51	4.311	0.35
HOT WATER CIR	480.	2.886	0.28	1.731	0.20
HOT WATER CIRC	480.	0.597	0.12	0.350	0.09
HOT WATER CIRC	480.	5.408	0.49	3.403	0.34
HOT WATER CIRC	480.	5.034	0.46	3.142	0.32
HUMIDIFIER #1	480.	7.634	1.23	5.113	0.77
HUMIDIFIER #2	480.	7.634	1.23	5.113	0.77
HVAC UNIT A	480.	2.084	0.24	1.239	0.16
HVAC UNIT B	480.	2.668	0.29	1.600	0.20
HW PUMP #1 P-1	480.	2.512	0.27	1.508	0.19
HYDRAULIC LIFT	480.	2.912	0.36	1.881	0.30
INFLUENT PUMPS	480.	3.475	0.40	2.139	0.28
INLET TANKS	208.	0.506	1.87	0.511	1.90
INNER DOOR	480.	1.097	0.18	0.662	0.14
LAB STILL	480.	6.017	0.72	4.023	0.52
LC-2	480.	22.090	3.88	21.691	3.68
LC-2A	480.	7.761	4.21	7.281	4.19
LC-3	480.	26.738	5.72	28.199	5.94
LC-3A	480.	28.866	4.95	29.266	5.37
LC-4	480.	18.620	4.92	18.320	5.17
LC-5	480.	15.563	4.15	15.838	4.45
LC-5A	480.	16.771	4.24	16.735	4.50
LC-8	480.	17.581	3.31	18.347	3.64
LC-8A	480.	19.737	3.46	19.851	3.79
LIME SCREW CON	480.	1.126	0.09	0.659	0.07
LIME SILO #2 T	480.	1.768	0.14	1.039	0.10
LIME SIO #1TRU	480.	1.766	0.14	1.038	0.10
MAKE UP AIR UN	480.	0.846	0.10	0.489	0.07
MAU HEATER	480.	7.753	0.94	5.310	0.69
MAU-1	480.	3.825	0.47	2.564	0.40
MAU-1 DISC	480.	2.886	0.28	1.731	0.20
MAU-1 VFD	480.	3.188	0.31	1.921	0.22
MCC 15 AIR COM	480.	2.375	0.25	1.427	0.18
MCC 15 ELEVATO	480.	2.965	0.30	1.800	0.21
MCC 15 GATES	480.	0.859	0.14	0.505	0.10
MCC 15 STRAINE	480.	2.638	0.27	1.592	0.19
MCC 15AA AIR C	480.	2.886	0.28	1.731	0.20

FAULT STUDY SUMMARY
(FOR APPLICATION OF LOW VOLTAGE BREAKERS)
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

BUS RECORD NO NAME	VOLTAGE L-L	AVAILABLE FAULT DUTIES (KA) 3 PHASE	X/R	LINE/GRND	X/R
MCC-00	480.	10.173	1.71	8.272	1.28
MCC-00 BACKWAS	480.	4.689	0.56	2.995	0.40
MCC-00 OHD DOO	480.	1.667	0.19	0.990	0.13
MCC-00-AIR COM	480.	5.301	0.77	3.525	0.57
MCC-1	480.	22.359	4.51	20.984	4.28
MCC-1 ATS	480.	22.609	4.59	21.422	4.38
MCC-1 CRANE	480.	7.005	0.46	4.394	0.32
MCC-10	480.	14.452	2.83	12.766	2.88
MCC-12	480.	17.925	3.44	15.104	2.44
MCC-13	480.	25.805	4.10	23.866	3.50
MCC-13 AIR COM	480.	4.837	0.26	2.894	0.18
MCC-13 CRANE	480.	23.534	2.14	20.273	1.56
MCC-13 OVERHEA	480.	4.377	0.24	2.615	0.17
MCC-14	480.	19.841	3.54	15.601	2.49
MCC-14 HOIST	480.	2.609	0.20	1.532	0.15
MCC-14 SUMP PU	480.	1.620	0.15	0.948	0.12
MCC-14 UNIT HE	480.	4.221	0.28	2.506	0.21
MCC-15	480.	12.624	3.02	11.399	2.56
MCC-15A	480.	14.186	3.30	12.596	2.73
MCC-15AA	480.	11.781	2.75	9.625	2.13
MCC-19	480.	14.409	4.78	14.486	4.42
MCC-2	480.	20.445	4.49	20.687	4.45
MCC-20	480.	14.826	4.68	14.882	4.63
MCC-21	480.	13.443	3.39	12.791	2.83
MCC-21 AC UNIT	480.	8.622	0.91	7.504	0.81
MCC-21 PANEL #	208.	1.834	2.36	1.792	2.16
MCC-21 PANEL #	208.	1.953	2.45	1.974	2.30
MCC-22	480.	9.672	1.93	7.745	1.43
MCC-24	480.	7.507	1.11	5.959	1.22
MCC-25	480.	14.675	3.72	12.494	3.07
MCC-26	480.	27.399	5.32	26.169	5.10
MCC-27	480.	25.854	5.22	25.209	5.05
MCC-28	480.	15.998	4.60	15.943	4.80
MCC-29	480.	15.193	4.60	14.914	4.43
MCC-3	480.	20.821	4.07	18.715	3.44
MCC-3 PURGE #1	480.	0.941	0.13	0.545	0.09
MCC-3 PURGE #2	480.	0.941	0.13	0.545	0.09
MCC-3 SUMP PUM	480.	1.191	0.13	0.694	0.10
MCC-3A	480.	20.600	4.02	18.425	3.38
MCC-3COMPRESSO	480.	1.407	0.15	0.819	0.11
MCC-3COMPRESSO	480.	1.407	0.15	0.819	0.11

F A U L T S T U D Y S U M M A R Y
(FOR APPLICATION OF LOW VOLTAGE BREAKERS)
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

BUS RECORD NO NAME	VOLTAGE L-L	AVAILABLE FAULT DUTIES (KA) 3 PHASE	X/R	LINE/GRND	X/R
MCC-4	480.	17.238	3.20	17.817	3.49
MCC-4A	480.	19.067	3.26	18.739	3.50
MCC-4B	480.	17.998	2.78	17.331	2.91
MCC-4C	480.	10.866	1.15	8.133	0.86
MCC-5	480.	4.544	0.34	3.854	0.34
MCC-6	480.	5.594	0.44	4.839	0.41
MCC-7	480.	21.055	2.91	20.217	2.82
MCC-7 ELEVATOR	480.	2.467	0.18	1.470	0.13
MCC-7 VACUUM P	480.	2.881	0.21	1.725	0.15
MCC-8	480.	16.841	2.34	14.547	1.85
MCC-8A	480.	6.642	3.61	5.412	2.85
MCC7 480V RECE	480.	5.329	0.48	3.352	0.36
MEGADOOR CONTR	480.	1.538	0.24	0.894	0.15
METAL LATHE	480.	3.809	0.46	2.559	0.40
METER CHAMBER	480.	13.541	0.92	9.561	0.63
MILL	480.	3.093	0.38	2.015	0.32
MIX TANK DUST	480.	1.465	0.20	1.185	0.19
MIX TANK DUST	480.	1.337	0.19	1.084	0.18
MIXED LIQUER P	480.	5.147	2.27	3.551	1.50
MIXED LIQUER P	480.	5.270	2.38	3.670	1.60
MIXED LIQUER P	480.	5.147	2.27	3.551	1.50
MIXED LIQUER P	480.	5.270	2.38	3.670	1.60
MIXED LIQUER P	480.	5.087	2.21	3.494	1.46
MIXED LIQUER P	480.	5.270	2.38	3.670	1.59
MIXED LIQUER P	480.	5.087	2.21	3.494	1.46
MIXED LIQUER P	480.	5.270	2.38	3.670	1.59
MIXER #1	480.	2.057	0.27	1.224	0.19
MIXER #2	480.	2.249	0.28	1.342	0.20
MO GATE #1	480.	0.936	0.12	0.544	0.09
MO GATE #2	480.	0.936	0.12	0.544	0.09
MSP	480.	4.635	0.46	3.895	0.43
MSP-12	480.	4.310	0.70	2.559	0.53
MSP-14	480.	3.794	0.63	2.233	0.48
MTS-MCC-5	480.	11.088	0.80	9.918	0.75
MTS-MCC-6	480.	9.042	0.70	8.151	0.64
MUA-1	480.	2.465	1.11	1.982	0.78
MVUS-1A	4800.	21.632	12.62	0.000	0.00
MVUS-1B	4800.	20.277	11.33	0.000	0.00
N.W. HEAT	480.	6.514	0.75	4.433	0.53
NEW AIR COMPRE	480.	4.546	0.28	2.755	0.17
NORTH BELT DIS	480.	2.403	0.14	1.416	0.10

F A U L T S T U D Y S U M M A R Y
(FOR APPLICATION OF LOW VOLTAGE BREAKERS)
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

BUS RECORD NO NAME	VOLTAGE L-L	AVAILABLE FAULT DUTIES (KA) 3 PHASE	X/R	LINE/GRND	X/R
NORTH BELT PRE	480.	2.403	0.14	1.416	0.10
NORTH CELL	480.	1.990	0.25	1.186	0.18
NORTH LOT POWE	480.	3.367	0.57	1.975	0.44
NORTH SEC. PUM	480.	1.938	0.24	1.154	0.17
NORTH SHOP HTR	480.	5.414	0.42	3.380	0.31
NW FUME HOOD E	480.	0.597	0.12	0.350	0.09
NW FUME HOOD S	480.	0.597	0.12	0.350	0.09
ODOR CTRL FAN	480.	0.934	0.12	0.543	0.09
ODOR CTRL FAN	480.	0.934	0.12	0.543	0.09
OUTSIDE DOOR(E	480.	1.275	0.19	0.774	0.16
OUTSIDE DOOR(N	480.	0.900	0.16	0.539	0.13
OUTSIDE DOOR(S	480.	0.807	0.15	0.482	0.12
OVERHEAD DOORS	480.	1.812	0.25	1.121	0.20
PANEL LA	208.	1.669	2.12	1.672	2.04
PANEL LB	208.	1.658	2.15	1.656	2.08
PHOS ACID PUMP	120.	0.797	1.60	0.741	1.31
PP-1 EXHAUST F	480.	1.354	0.17	0.800	0.12
PP-1 TRANSFER	480.	2.210	0.26	1.324	0.18
PP-1 TRANSFER	480.	2.210	0.26	1.324	0.18
PP-1-EF-1	480.	0.961	0.13	0.565	0.10
PP-1-EF-2	480.	0.851	0.12	0.500	0.09
PP-1-EF-3	480.	0.805	0.12	0.472	0.09
PP-12 LEFT TUB	480.	7.985	1.36	5.497	1.06
PP-12 RIGHT TU	480.	7.903	1.36	5.433	1.06
PP-13	480.	13.251	1.47	10.344	1.15
PP-SH-1	480.	21.682	3.34	19.100	2.48
PP-SH-2	480.	22.817	3.59	19.366	2.46
PRIM HEAT PUMP	480.	1.057	0.14	0.881	0.15
PRIM HEAT PUMP	480.	1.057	0.14	0.881	0.15
PRIM SLUDGE CO	480.	0.819	0.10	0.499	0.08
PRIM SLUDGE CO	480.	0.904	0.11	0.553	0.08
PRIM SLUDGE CO	480.	1.157	0.12	0.719	0.09
PRIM SLUDGE CO	480.	1.333	0.13	0.838	0.10
PRIM SLUDGE CO	480.	1.941	0.17	1.268	0.13
PRIM SLUDGE CO	480.	2.135	0.19	1.412	0.14
PRIM SLUDGE CO	480.	1.409	0.14	0.890	0.10
PRIM SLUDGE CO	480.	1.204	0.13	0.751	0.09
PRIM SLUDGE CO	480.	0.938	0.11	0.576	0.08
PRIM SLUDGE CO	480.	0.847	0.10	0.517	0.08
PRIM SLUDGE CO	480.	0.703	0.09	0.425	0.07
PRIM SLUDGE CO	480.	0.648	0.09	0.391	0.07

F A U L T S T U D Y S U M M A R Y
(FOR APPLICATION OF LOW VOLTAGE BREAKERS)
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

BUS RECORD NO NAME	VOLTAGE L-L	AVAILABLE FAULT DUTIES (KA) 3 PHASE	X/R	LINE/GRND	X/R
PUMP #5 MAIN D	480.	19.100	4.11	18.565	3.72
PUMP #5 VFD	480.	18.594	3.65	17.752	3.03
PUMP #7 VFD	480.	19.960	3.70	17.578	2.98
PUMP CONTROL P	480.	4.412	0.49	2.791	0.34
PUMP STATION #	480.	8.889	0.74	5.942	0.46
PUMP STATION #	480.	6.204	0.57	3.872	0.34
PURGE FAN #1 D	480.	0.884	0.10	0.547	0.08
PURGE FAN #2 D	480.	1.259	0.13	0.801	0.10
PURGE FAN #3 D	480.	2.553	0.21	1.801	0.17
PURGE FAN #4 D	480.	1.485	0.14	0.962	0.11
PURGE FAN #5 D	480.	1.004	0.11	0.627	0.09
PURGE FAN #6 D	480.	0.725	0.09	0.443	0.07
RAS AND INFLUE	480.	1.878	0.16	1.100	0.13
RAS PUMPS	480.	4.689	0.56	2.995	0.40
RETURN SLUDGE	480.	16.046	2.35	11.738	1.61
RETURN SLUDGE	480.	16.413	2.55	12.141	1.76
RETURN SLUDGE	480.	16.413	2.55	12.141	1.76
RETURN SLUDGE	480.	15.611	2.13	11.260	1.44
S.E. HEAT	480.	1.415	0.17	0.838	0.12
SCREW CONVEYOR	480.	1.153	0.15	0.664	0.11
SCUM BLOWERS C	480.	3.115	0.22	1.837	0.17
SCUM PUMP	480.	2.756	0.21	1.621	0.16
SEC HEAT PUMP	480.	1.057	0.14	0.881	0.15
SEC HEAT PUMP	480.	1.057	0.14	0.881	0.15
SER FAN A	480.	1.829	0.14	1.075	0.11
SER FAN B	480.	1.483	0.13	0.870	0.10
SER FAN C	480.	1.483	0.13	0.870	0.10
SER FAN D	480.	1.829	0.14	1.075	0.11
SER FAN E	480.	1.829	0.14	1.075	0.11
SER FAN F	480.	1.483	0.13	0.870	0.10
SER FAN G	480.	1.829	0.14	1.075	0.11
SER FAN H	480.	1.829	0.14	1.075	0.11
SER FAN I	480.	1.483	0.13	0.870	0.10
SER FAN J	480.	1.483	0.13	0.870	0.10
SER FAN K	480.	1.483	0.13	0.870	0.10
SER FAN L	480.	1.829	0.14	1.075	0.11
SEWAGE PUMP #1	480.	12.464	1.66	8.957	1.14
SEWAGE PUMP #2	480.	19.731	3.60	17.268	2.87
SF-11 DISC	480.	1.281	0.15	0.753	0.11
SF-4 DISC	480.	1.632	0.18	0.963	0.13
SF-8 DISC	480.	1.054	0.13	0.619	0.10

F A U L T S T U D Y S U M M A R Y
(FOR APPLICATION OF LOW VOLTAGE BREAKERS)
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

BUS RECORD NO NAME	VOLTAGE L-L	A V A I L A B L E 3 PHASE	F A U L T X/R	D U T I E S (KA) LINE/GRND	X/R
SLUDE PUMP #4	480.	5.531	0.50	3.405	0.30
SLUDGE CAKE PU	480.	13.131	3.12	9.257	1.81
SLUDGE PUMP #1	480.	7.617	0.60	4.929	0.38
SLUDGE PUMP #2	480.	7.617	0.60	4.929	0.38
SLUDGE PUMP #3	480.	5.531	0.50	3.405	0.30
SLUDGE PUMP #7	480.	7.640	0.63	4.939	0.39
SLUDGE PUMP #8	480.	5.547	0.53	3.411	0.31
SLUDGE VALVE H	480.	4.688	0.40	2.830	0.30
SOUTH BELT DIS	480.	2.619	0.14	1.543	0.10
SOUTH BELT PUM	480.	1.103	0.16	0.642	0.11
SOUTH CELL	480.	1.990	0.25	1.186	0.18
SOUTH SEC. CLA	480.	1.818	0.22	1.083	0.16
SOUTH SEC. CLA	480.	1.818	0.22	1.083	0.16
SOUTH SEC. INF	480.	1.626	0.21	0.962	0.15
SOUTH SEC. INF	480.	1.626	0.21	0.962	0.15
SOUTH SEC. PUM	480.	1.938	0.24	1.154	0.17
SOUTH SHOP HTR	480.	5.414	0.42	3.380	0.31
STREET LIGHT	480.	0.500	0.13	0.293	0.10
SUMP PUMP #1 D	480.	7.615	0.60	4.929	0.38
SUMP PUMP #2	480.	5.529	0.50	3.405	0.31
SUMP PUMP EAST	480.	5.152	0.49	3.289	0.34
SUMP PUMP WEST	480.	5.152	0.49	3.289	0.34
TRANSFER PUMP	480.	3.576	0.42	2.190	0.30
TRANSFER PUMP	480.	3.576	0.42	2.190	0.30
TRANSFER SWITC	480.	16.915	2.16	14.618	1.80
TUMBULATOR	480.	1.790	0.14	1.046	0.10
UNIT HEATER #1	480.	7.027	0.61	4.502	0.46
UNIT HEATER #2	480.	2.947	0.31	1.768	0.24
UNIT HEATER #3	480.	1.675	0.23	0.991	0.19
VACUUM PUMP	480.	2.262	0.24	1.356	0.17
VALVE ACTUATOR	480.	1.205	0.11	0.704	0.08
VFD-N. THICK S	480.	2.923	0.40	1.743	0.31
VFD-N. THICK S	480.	2.322	0.31	1.375	0.24
VFD-N. THICK S	480.	3.178	0.43	1.905	0.33
VFD-PUMP 4	480.	20.432	3.22	18.232	2.60
VFD-S. THICK S	480.	2.809	0.39	1.672	0.30
VFD-S. THICK S	480.	2.031	0.28	1.197	0.22
VFD-S. THICK S	480.	2.607	0.37	1.546	0.28
VFD-SOUTH BELT	480.	0.969	0.15	0.564	0.11
VFD-SOUTH BELT	480.	0.969	0.15	0.564	0.11
WASTE MIXED LI	480.	15.241	1.54	10.812	1.12

F A U L T S T U D Y S U M M A R Y
(FOR APPLICATION OF LOW VOLTAGE BREAKERS)
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

BUS RECORD NO NAME	VOLTAGE L-L	AVAILABLE FAULT DUTIES (KA) 3 PHASE	X/R	LINE/GRND	X/R
WASTE MIXED LI	480.	15.241	1.54	10.812	1.12
WASTE SLUDGE P	480.	1.450	0.12	0.844	0.09
WASTE SLUDGE P	480.	1.450	0.12	0.844	0.09
WATER MAINT SH	480.	3.505	0.58	2.356	0.52
WELDER RECEPT	480.	3.906	0.51	2.645	0.46
WELDER-CARBON	480.	1.997	0.22	1.667	0.22
WEST BANK-A	4800.	21.498	11.87	0.000	0.00
WEST BANK-B	4800.	20.159	10.78	0.000	0.00
WEST FAN	480.	0.915	0.35	0.779	0.32
WINCH #1	480.	0.873	0.12	0.511	0.09
WINCH #2	480.	0.942	0.13	0.552	0.09
WINCH #3	480.	1.023	0.13	0.600	0.10
WT CONVEYOR 1	480.	1.046	0.09	0.612	0.07

765 FAULTED BUSES, 1081 BRANCHES, 319 CONTRIBUTIONS
UNBALANCED FAULTS REQUESTED

*** SHORT CIRCUIT STUDY COMPLETE ***

T H R E E   P H A S E   M O M E N T A R Y   D U T Y   R E P O R T

PRE FAULT VOLTAGE: 1.0000

MODEL TRANSFORMER TAPS: NO

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04-LP-01 XFER	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
06-LP-01	VOLTAGE:	208.	(SEE LOW VOLTAGE REPORT)
06-LP-02	VOLTAGE:	208.	(SEE LOW VOLTAGE REPORT)
06-LP-03	VOLTAGE:	208.	(SEE LOW VOLTAGE REPORT)
06-LP-04	VOLTAGE:	208.	(SEE LOW VOLTAGE REPORT)
06-LP-05	VOLTAGE:	208.	(SEE LOW VOLTAGE REPORT)
06-LP-06	VOLTAGE:	208.	(SEE LOW VOLTAGE REPORT)
06-LP-07	VOLTAGE:	208.	(SEE LOW VOLTAGE REPORT)
11-LP-01	VOLTAGE:	208.	(SEE LOW VOLTAGE REPORT)
11-LP-01A	VOLTAGE:	208.	(SEE LOW VOLTAGE REPORT)
12A-PP-01	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
15 KVAC CAP	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
15-LP-01	VOLTAGE:	208.	(SEE LOW VOLTAGE REPORT)
15-LP-02	VOLTAGE:	208.	(SEE LOW VOLTAGE REPORT)
2-LP-1	VOLTAGE:	208.	(SEE LOW VOLTAGE REPORT)
2-LP-2	VOLTAGE:	208.	(SEE LOW VOLTAGE REPORT)
2-LP-3	VOLTAGE:	208.	(SEE LOW VOLTAGE REPORT)
2-LP-4	VOLTAGE:	208.	(SEE LOW VOLTAGE REPORT)
20A-PP-01	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
20A-PP-1	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
24-LP-01	VOLTAGE:	208.	(SEE LOW VOLTAGE REPORT)
24-LP-02	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)

T H R E E   P H A S E   M O M E N T A R Y   D U T Y   R E P O R T

PRE FAULT VOLTAGE: 1.0000

MODEL TRANSFORMER TAPS: NO

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28-LP-01        VOLTAGE:    208.  ( SEE LOW VOLTAGE REPORT )

28-PP-01        VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

2A-LP-01        VOLTAGE:    208.  ( SEE LOW VOLTAGE REPORT )

45D WATER CIRC VOLTAGE:     480.  ( SEE LOW VOLTAGE REPORT )

AER. TANK AND  VOLTAGE:     480.  ( SEE LOW VOLTAGE REPORT )

AERATION RECIR VOLTAGE:     480.  ( SEE LOW VOLTAGE REPORT )

AERATION RECIR VOLTAGE:     480.  ( SEE LOW VOLTAGE REPORT )

AERATION RECIR VOLTAGE:     480.  ( SEE LOW VOLTAGE REPORT )

AERATION RECIR VOLTAGE:     480.  ( SEE LOW VOLTAGE REPORT )

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AERATION RECIR VOLTAGE:     480.  ( SEE LOW VOLTAGE REPORT )

AERATION RECIR VOLTAGE:     480.  ( SEE LOW VOLTAGE REPORT )

AERATION RECIR VOLTAGE:     480.  ( SEE LOW VOLTAGE REPORT )

AERATION RECIR VOLTAGE:     480.  ( SEE LOW VOLTAGE REPORT )

AERATION TANK  VOLTAGE:     480.  ( SEE LOW VOLTAGE REPORT )

AERATION VALVE VOLTAGE:     480.  ( SEE LOW VOLTAGE REPORT )

AERATION VALVE VOLTAGE:     480.  ( SEE LOW VOLTAGE REPORT )

AERATION VALVE VOLTAGE:     480.  ( SEE LOW VOLTAGE REPORT )

AERATION VALVE VOLTAGE:     480.  ( SEE LOW VOLTAGE REPORT )

AERATION VALVE VOLTAGE:     480.  ( SEE LOW VOLTAGE REPORT )

AERATION VALVE VOLTAGE:     480.  ( SEE LOW VOLTAGE REPORT )

AERATION VALVE VOLTAGE:     480.  ( SEE LOW VOLTAGE REPORT )
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T H R E E   P H A S E   M O M E N T A R Y   D U T Y   R E P O R T
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

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AERATION VALVE VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

AERATION VALVE VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

AERATION VALVE VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

AIR COMPRESSOR VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

AIR DUCT HEATE VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

AIR DUCT HEATE VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

ANAEROBIC MIX  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

ANAEROBIC MIX  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

ANAEROBIC MIX  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

ANAEROBIC MIX  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

ANAEROBIC MIX  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

ANEROBIC MIX P VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

ANEROBIC MIX P VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

ANEROBIC MIX P VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

ANEROBIC MIX P VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

ANOXIC MIX PUM VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

ANOXIC MIX PUM VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

ANOXIC MIX PUM VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

ANOXIC MIX PUM VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

ANOXIC MIX PUM VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

ANOXIC MIX PUM VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

ANOXIC MIX PUM VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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T H R E E   P H A S E   M O M E N T A R Y   D U T Y   R E P O R T
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

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ANOXIC MIX PUM VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

ANOXIC MIX PUM VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

AUGER #1       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

AUGER #2       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

AUGER #3       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BANDSCREEN #1  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BANDSCREEN #2  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BANDSCREEN #3  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BAR SCREEN #1  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BAR SCREEN #1  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BAR SCREEN #2  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BAR SCREEN #2  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BAR SCREEN #3  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BAR SCREEN #3  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BAR SCREEN MTR VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BELT PRESS DIS VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BLOWER #1      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BLOWER #3      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BLOWER #5      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BLOWER 1 CP    VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BLOWER 2 CP    VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BLOWER 3 CP    VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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T H R E E   P H A S E   M O M E N T A R Y   D U T Y   R E P O R T

PRE FAULT VOLTAGE: 1.0000

MODEL TRANSFORMER TAPS: NO

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BLOWER 4 CP    VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BLOWER ROOM    VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BOILER CIRC PU VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BOILER CIRC PU VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BOILER CTRL/GA VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BOLIMO CONTROL VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BRIDGE CRANE   VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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T H R E E   P H A S E   M O M E N T A R Y   D U T Y   R E P O R T
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

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CAPACITOR DISC VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

CARBON FEED PU VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

CARBON FEED PU VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

CARBON SCRUBBE VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

CARBON SLURRY  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

CENTER CELL    VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

CENTRIFUGE #2  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

CENTRIFUGE #2  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

CENTRIFUGE #4  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

CENTRIFUGE 1 P VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

CENTRIFUGE 2 P VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

CENTRIFUGE OVE VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

CENTRIFUGE OVE VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

CENTRIFUGE# 1  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

CENTRIFUGE# 3  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

CHANEL MIX PUM VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

CHANEL MIX PUM VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

CHANNEL MIX PU VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

CHANNEL MIX PU VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

CHILL WATER CI VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

CHILL WATER CI VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

CHILLER #1     VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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     T H R E E   P H A S E   M O M E N T A R Y   D U T Y   R E P O R T
                           PRE FAULT VOLTAGE: 1.0000
                           MODEL TRANSFORMER TAPS: NO
==============================================================================

 CHILLER #2     VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 CP-MAU-BP-1    VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 CS-BS-1        VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 CTRL SCRN RM U VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 CW PUMP P-10   VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 D-101          VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 D-102          VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 D-103          VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DIVERSION CHAM VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DIVERSION CHAM VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DOOR #1        VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DOOR #2        VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DOOR #3        VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DOOR OPENER    VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DOOR OPERATORS VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DRILL PRESS #1 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DRILL PRESS #2 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS CLARIFIERS  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS- CENT. FEED VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS- NORTH BELT VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-1500 HP BLO E/Z:     16.161 KA AT  -78.23 DEG (   134.36 MVA) X/R:    5.87
                SYM*1.6:   25.857 KA       MOMENTARY BASED ON X/R:   20.980 KA
                SYM*2.7:   43.634 KA           CREST BASED ON X/R:   36.233 KA
                VOLTAGE:   4800.   EQUIV. IMPEDANCE=  0.0350 + J  0.1679  OHMS
                CBL-0042        BUS-0057           1.081 KA      ANG:    92.38
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    T H R E E   P H A S E   M O M E N T A R Y   D U T Y   R E P O R T
                      PRE FAULT VOLTAGE: 1.0000
                      MODEL TRANSFORMER TAPS: NO
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               CONTRIBUTIONS TO  DS-1500 HP BLO (CONTINUED)
               CBL-0034       EAST BANK-2B      15.095 KA      ANG:   -77.56

 DS-1500 HP BLO E/Z:     17.144 KA AT  -78.33 DEG (   142.54 MVA) X/R:    5.83
               SYM*1.6:   27.431 KA       MOMENTARY BASED ON X/R:   22.231 KA
               SYM*2.7:   46.290 KA           CREST BASED ON X/R:   38.397 KA
               VOLTAGE:   4800.  EQUIV. IMPEDANCE=  0.0327 + J  0.1583  OHMS
               CBL-0038       BUS-0054           1.080 KA      ANG:    92.42
               CBL-0029       EAST BANK-2A      16.079 KA      ANG:   -77.71

 DS-2500HP BLOW E/Z:     16.384 KA AT  -78.77 DEG (   136.21 MVA) X/R:    6.87
               SYM*1.6:   26.214 KA       MOMENTARY BASED ON X/R:   21.990 KA
               SYM*2.7:   44.236 KA           CREST BASED ON X/R:   37.837 KA
               VOLTAGE:   4800.  EQUIV. IMPEDANCE=  0.0329 + J  0.1659  OHMS
               CBL-0044       BUS-0056           1.801 KA      ANG:    92.25
               CBL-0033       EAST BANK-2B      14.607 KA      ANG:   -77.66

 DS-2500HP BLOW E/Z:     17.329 KA AT  -78.73 DEG (   144.07 MVA) X/R:    6.49
               SYM*1.6:   27.727 KA       MOMENTARY BASED ON X/R:   22.985 KA
               SYM*2.7:   46.789 KA           CREST BASED ON X/R:   39.607 KA
               VOLTAGE:   4800.  EQUIV. IMPEDANCE=  0.0313 + J  0.1568  OHMS
               CBL-0040       BUS-0055           1.540 KA      ANG:    92.28
               CBL-0030       EAST BANK-2A      15.810 KA      ANG:   -77.85

 DS-3 AUX. INST VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-AIR COMPRES VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-AMMONIA REM VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-AMMONIA REM VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-ANOXIC TANK VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-BASEMENT EL VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-BYPASS CONV VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-BYPASS SLID VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-CENTRIFUGE  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-CF-SH-1     VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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T H R E E P H A S E M O M E N T A R Y D U T Y R E P O R T
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

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DS-CF-SH-2      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-CLARIFIER 7 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-CP-CS-SH-1  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-DRAIN PUMP  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-DUCT HEATER VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-EF-1 CAP    VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-EF-2A       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-EF-2A CAP   VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-EF-2B       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-EF-2B CAP   VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-EF-2C       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-EF-2C CAP   VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-EF-5A       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-EF-5A CAP   VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-EF-5B       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-EF-5B CAP   VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-EF-SC-1     VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-ENG. RM. BO VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-EXHAUST FAN VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-EXISTING CR VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-FOUL AIR FA VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-GEN 1       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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T H R E E   P H A S E   M O M E N T A R Y   D U T Y   R E P O R T
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

DS-GEN 2	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
DS-GRINDER 1,2	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
DS-GROUND SLUD	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
DS-GSST MIXER	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
DS-HOIST	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
DS-HOIST,EX FA	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
DS-HV UNIT	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
DS-HVAC #1	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
DS-HVAC #2	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
DS-HVAC 1	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
DS-INFLUENT VA	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
DS-INFLUENT VA	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
DS-MAU-SC-1	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
DS-MAU-SH-1	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
DS-MAU-SH-2	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
DS-MAU-SH-3	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
DS-MCC-15 AC U	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
DS-MCC-15 BATT	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
DS-MCC-25-SF-4	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
DS-MCC-7 AIR C	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
DS-MCC7 PUMP 1	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)

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     T H R E E   P H A S E   M O M E N T A R Y   D U T Y   R E P O R T
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
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 DS-MCC7 PUMP 2 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-MCC7 PUMP 3 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-MCC7 PUMP 4 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-MCC8 PRI TH VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-MCC8 PRI TH VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-MCC8 PRI TH VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-MCC8 RAS PU VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-MCC8 RAS PU VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-MCC8 RAS PU VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-MCC8 RAS PU VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-MCC8 SCUM P VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-MCC8 SCUM P VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-MCC8 THICKE VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-MCC8 WAS PU VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-MIXED LIQUO VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-MOV SUMP    VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-MSP-12 TUMB VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-NEW CRANE   VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-NORTH BELT  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-NORTH BELT  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-NORTH BOOST VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-NORTH BOOST VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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T H R E E   P H A S E   M O M E N T A R Y   D U T Y   R E P O R T
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

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DS-NORTH BOOST VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-OH DOOR     VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-POLYMER MIX VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-PRIM THICK  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-Q1236       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-Q1237       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-Q1238       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-Q1239       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-Q1240       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-Q1241       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-Q1242       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-Q1243       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-RAS PUMP #1 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-RAS PUMP #2 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-RAS PUMP #3 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-RECYCLE PUM VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-RETURN VALV VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-SCUM PUMP # VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-SERV GARAGE VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-SEWAGE PUMP VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-SLIDE GATE  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-SLIDE GATE  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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T H R E E   P H A S E   M O M E N T A R Y   D U T Y   R E P O R T

PRE FAULT VOLTAGE: 1.0000

MODEL TRANSFORMER TAPS: NO

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DS-SLUDGE PUMP VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-SLUDGE PUMP VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-SLUDGE TANK VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-SLUDGE THIC VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-SLUDGE THIC VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-SLUDGE THIC VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-SLUDGE THIC VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-SLUDGE THIC VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-SLUDGE THIC VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-SOUTH BELT VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-SOUTH BELT VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-SOUTH BELT VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-STREET LIGH VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-SUMP PUMP 1 VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-SUMP PUMP 1 VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-SUMP PUMP 2 VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-SUMP PUMP A VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-SUMP PUMP B VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-SYSTEM AIR VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-SYSTEM AIR VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-UNIT HEATER VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-WELDER PLUG VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

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      T H R E E   P H A S E   M O M E N T A R Y   D U T Y   R E P O R T
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
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  DS-XFMR 21 LP- VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

  DS-XFMR 21 LP- VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

  DUMBWATIER DIS VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

  EAST BANK-1A   E/Z:     19.504 KA AT  -84.49 DEG (   162.15 MVA) X/R:   10.78
                 SYM*1.6:   31.207 KA       MOMENTARY BASED ON X/R:   28.377 KA
                 SYM*2.7:   52.661 KA           CREST BASED ON X/R:   48.195 KA
                 VOLTAGE:   4800.  EQUIV. IMPEDANCE=  0.0137 + J  0.1414  OHMS
                 CBL-0016       MVS-9A               0.000 KA      ANG:  -201.05
                 CBL-0026       BUS-0048             0.038 KA      ANG:  -257.58
                 CBL-0027       BUS-0046             0.072 KA      ANG:  -263.41
                 CBL-0015       MVUS-1B             19.395 KA      ANG:   -84.50

  EAST BANK-1B   E/Z:     20.910 KA AT  -85.05 DEG (   173.85 MVA) X/R:   12.12
                 SYM*1.6:   33.457 KA       MOMENTARY BASED ON X/R:   30.952 KA
                 SYM*2.7:   56.458 KA           CREST BASED ON X/R:   52.392 KA
                 VOLTAGE:   4800.  EQUIV. IMPEDANCE=  0.0114 + J  0.1320  OHMS
                 CBL-0020       BUS-0051             0.210 KA      ANG:  -261.36
                 CBL-0024       BUS-0047             0.279 KA      ANG:  -259.74
                 CBL-0019       MVUS-1A             20.424 KA      ANG:   -85.16

  EAST BANK-2A   E/Z:     20.939 KA AT  -85.12 DEG (   174.08 MVA) X/R:   12.40
                 SYM*1.6:   33.503 KA       MOMENTARY BASED ON X/R:   31.094 KA
                 SYM*2.7:   56.535 KA           CREST BASED ON X/R:   52.599 KA
                 VOLTAGE:   4800.  EQUIV. IMPEDANCE=  0.0113 + J  0.1319  OHMS
                 CBL-0030       DS-2500HP BLOW       1.515 KA      ANG:    93.01
                 CBL-0037       BUS-0038             0.097 KA      ANG:  -258.22
                 CBL-0029       DS-1500 HP BLO       1.067 KA      ANG:    92.93
                 CBL-0028       MVUS-1A             18.262 KA      ANG:   -84.88

  EAST BANK-2B   E/Z:     19.534 KA AT  -84.56 DEG (   162.40 MVA) X/R:   11.11
                 SYM*1.6:   31.254 KA       MOMENTARY BASED ON X/R:   28.552 KA
                 SYM*2.7:   52.742 KA           CREST BASED ON X/R:   48.449 KA
                 VOLTAGE:   4800.  EQUIV. IMPEDANCE=  0.0135 + J  0.1412  OHMS
                 CBL-0033       DS-2500HP BLOW       1.766 KA      ANG:    93.12
                 CBL-0034       DS-1500 HP BLO       1.068 KA      ANG:    92.91
                 CBL-0032       MVUS-1B             16.703 KA      ANG:   -84.15

  EAST FAN       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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T H R E E P H A S E M O M E N T A R Y D U T Y R E P O R T
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

EAST STORAGE D	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EAST SUPPLY FA	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EF-1 DISC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EF-11 DISC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EF-12 DISC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EF-13 DISC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EF-14 DISC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EF-15 DISC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EF-16 DISC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EF-18 DISC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EF-2	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EF-20 DISC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EF-5 DISC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EF-7 DISC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EF-9 DISC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EF-BS-1	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EHU-BS-3	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EHU-BS-4	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EHU-BS-5	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
ELEVATOR	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
ET CONVEYOR 1	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
ET CONVEYOR 2	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)

T H R E E   P H A S E   M O M E N T A R Y   D U T Y   R E P O R T

PRE FAULT VOLTAGE: 1.0000

MODEL TRANSFORMER TAPS: NO

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EUH-001	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EUH-002	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EUH-003	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EUH-004	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EUH-BS-1	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EUH-BS-2	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EXHAUST FAN A	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EXHAUST FAN B	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EXHAUST FAN C	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EXHAUST FAN D	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EXHAUST FAN E	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
FAN CONTROL PA	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
FC-1	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
FC-1 DISC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
FC-2	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
FC-2 DISC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
FC-3 DISC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
FC-4 DISC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
FC-5 DISC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
FC-6 DISC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
FC-7 DISC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
FILTER DOOR OP	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)

T H R E E   P H A S E   M O M E N T A R Y   D U T Y   R E P O R T

PRE FAULT VOLTAGE: 1.0000

MODEL TRANSFORMER TAPS: NO

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FINAL TANK AND VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
FINAL TANK DRA VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
FINE SCREEN DU VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
FINE SCREEN DU VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
FINE SCREEN DU VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
FUME EXTRACTOR VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
FUME FAN CONTA VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
FUME HOOD EXHA VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
FUME HOODS VFD VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
GATE 1 CONTROL VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
GATE 2 CONTROL VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
GATE VALVE 1   VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
GATE VALVE 2   VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
GATE VALVE 4   VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
GATE VALVE 5   VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
GATE VALVE 7   VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
GATE VALVE 8   VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
GRINDER #1     VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
GRINDER #2     VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
GRINDER #3     VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
GRIT REMOVAL H VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
GRIT TANK #1   VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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T H R E E   P H A S E   M O M E N T A R Y   D U T Y   R E P O R T
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

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GRIT TANK #2	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
GRIT TANKS	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
HOT WATER CIR	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
HOT WATER CIRC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
HOT WATER CIRC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
HOT WATER CIRC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
HUMIDIFIER #1	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
HUMIDIFIER #2	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
HVAC UNIT A	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
HVAC UNIT B	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
HW PUMP #1 P-1	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
HYDRAULIC LIFT	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
INFLUENT PUMPS	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
INLET TANKS	VOLTAGE:	208.	(SEE LOW VOLTAGE REPORT)
INNER DOOR	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
LAB STILL	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
LC-2	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
LC-2A	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)

T H R E E P H A S E M O M E N T A R Y D U T Y R E P O R T
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

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LC-3           VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

LC-3A          VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

LC-4           VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

LC-5           VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

LC-5A          VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

LC-8           VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

LC-8A          VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

LIME SCREW CON VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

LIME SILO #2 T VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

LIME SIO #1TRU VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MAKE UP AIR UN VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MAU HEATER     VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MAU-1          VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MAU-1 DISC     VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MAU-1 VFD      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC 15 AIR COM VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC 15 ELEVATO VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC 15 GATES   VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC 15 STRAINE VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC 15AA AIR C VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-00         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-00 BACKWAS VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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T H R E E   P H A S E   M O M E N T A R Y   D U T Y   R E P O R T
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

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MCC-00 OHD DOO VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-00-AIR COM VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-1          VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-1 ATS      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-1 CRANE    VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-10         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-12         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-13         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-13 AIR COM VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-13 CRANE   VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-13 OVERHEA VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-14         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-14 HOIST   VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-14 SUMP PU VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-14 UNIT HE VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-15         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-15A        VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-15AA       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-19         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-2          VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-20         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-21         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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T H R E E P H A S E M O M E N T A R Y D U T Y R E P O R T
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

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MCC-21 AC UNIT VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-21 PANEL # VOLTAGE:    208.  ( SEE LOW VOLTAGE REPORT )

MCC-21 PANEL # VOLTAGE:    208.  ( SEE LOW VOLTAGE REPORT )

MCC-22         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-24         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-25         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-26         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-27         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-28         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-29         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-3          VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-3 PURGE #1 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-3 PURGE #2 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-3 SUMP PUM VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-3A         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-3COMPRESSO VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-3COMPRESSO VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-4          VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-4A         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-4B         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-4C         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-5          VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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T H R E E P H A S E M O M E N T A R Y D U T Y R E P O R T
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

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MCC-6          VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-7          VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-7 ELEVATOR VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-7 VACUUM P VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-8          VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-8A         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC7 480V RECE VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MEGADOOR CONTR VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

METAL LATHE    VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

METER CHAMBER  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MILL           VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MIX TANK DUST  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MIX TANK DUST  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MIXED LIQUER P VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MIXED LIQUER P VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MIXED LIQUER P VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MIXED LIQUER P VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MIXED LIQUER P VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MIXED LIQUER P VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MIXED LIQUER P VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MIXED LIQUER P VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MIXER #1       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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    T H R E E   P H A S E   M O M E N T A R Y   D U T Y   R E P O R T
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================

 MIXER #2       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MO GATE #1     VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MO GATE #2     VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MSP            VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MSP-12         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MSP-14         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MTS-MCC-5      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MTS-MCC-6      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MUA-1          VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MVUS-1A        E/Z:     21.046 KA AT  -85.33 DEG (   174.98 MVA) X/R:   12.91
                SYM*1.6:   33.674 KA       MOMENTARY BASED ON X/R:   31.424 KA
                SYM*2.7:   56.825 KA           CREST BASED ON X/R:   53.099 KA
                VOLTAGE:   4800.  EQUIV. IMPEDANCE=  0.0107 + J  0.1312  OHMS
                CBL-0002        BUS-1027          17.350 KA      ANG:    94.59
                CBL-0028        EAST BANK-2A       2.676 KA      ANG:    93.33
                CBL-0003        WEST BANK-A        0.536 KA      ANG:  -260.60
                CBL-0019        EAST BANK-1B       0.488 KA      ANG:  -260.43

 MVUS-1B        E/Z:     19.676 KA AT  -84.85 DEG (   163.58 MVA) X/R:   11.60
                SYM*1.6:   31.482 KA       MOMENTARY BASED ON X/R:   28.944 KA
                SYM*2.7:   53.126 KA           CREST BASED ON X/R:   49.053 KA
                VOLTAGE:   4800.  EQUIV. IMPEDANCE=  0.0126 + J  0.1403  OHMS
                CBL-0008        BUS-1028          16.546 KA      ANG:  -264.57
                CBL-0032        EAST BANK-2B       2.830 KA      ANG:    93.10
                CBL-0010        WEST BANK-B        0.194 KA      ANG:  -261.09
                CBL-0015        EAST BANK-1A       0.110 KA      ANG:  -261.38

 N.W. HEAT      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 NEW AIR COMPRE VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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T H R E E   P H A S E   M O M E N T A R Y   D U T Y   R E P O R T
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

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NORTH BELT DIS VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

NORTH BELT PRE VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

NORTH CELL     VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

NORTH LOT POWE VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

NORTH SEC. PUM VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

NORTH SHOP HTR VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

NW FUME HOOD E VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

NW FUME HOOD S VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

ODOR CTRL FAN  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

ODOR CTRL FAN  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

OUTSIDE DOOR(E VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

OUTSIDE DOOR(N VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

OUTSIDE DOOR(S VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

OVERHEAD DOORS VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

PANEL LA       VOLTAGE:    208.  ( SEE LOW VOLTAGE REPORT )

PANEL LB       VOLTAGE:    208.  ( SEE LOW VOLTAGE REPORT )

PHOS ACID PUMP VOLTAGE:    120.  ( SEE LOW VOLTAGE REPORT )

PP-1 EXHAUST F VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

PP-1 TRANSFER  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

PP-1 TRANSFER  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

PP-1-EF-1      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

PP-1-EF-2      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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T H R E E   P H A S E   M O M E N T A R Y   D U T Y   R E P O R T

PRE FAULT VOLTAGE: 1.0000

MODEL TRANSFORMER TAPS: NO

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PP-1-EF-3       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

PP-12 LEFT TUB  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

PP-12 RIGHT TU  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

PP-13           VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

PP-SH-1         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

PP-SH-2         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

PRIM HEAT PUMP  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

PRIM HEAT PUMP  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

PRIM SLUDGE CO  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

PRIM SLUDGE CO  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

PRIM SLUDGE CO  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

PRIM SLUDGE CO  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

PRIM SLUDGE CO  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

PRIM SLUDGE CO  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

PRIM SLUDGE CO  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

PRIM SLUDGE CO  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

PRIM SLUDGE CO  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

PRIM SLUDGE CO  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

PRIM SLUDGE CO  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

PRIM SLUDGE CO  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

PUMP #5 MAIN D  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

PUMP #5 VFD     VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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T H R E E   P H A S E   M O M E N T A R Y   D U T Y   R E P O R T
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

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PUMP #7 VFD    VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

PUMP CONTROL P VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

PUMP STATION # VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

PUMP STATION # VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

PURGE FAN #1 D VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

PURGE FAN #2 D VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

PURGE FAN #3 D VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

PURGE FAN #4 D VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

PURGE FAN #5 D VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

PURGE FAN #6 D VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

RAS AND INFLUE VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

RAS PUMPS      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

RETURN SLUDGE  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

RETURN SLUDGE  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

RETURN SLUDGE  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

RETURN SLUDGE  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

S.E. HEAT      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SCREW CONVEYOR VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SCUM BLOWERS C VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SCUM PUMP      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SEC HEAT PUMP  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SEC HEAT PUMP  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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T H R E E   P H A S E   M O M E N T A R Y   D U T Y   R E P O R T

PRE FAULT VOLTAGE: 1.0000

MODEL TRANSFORMER TAPS: NO

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SER FAN A      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SER FAN B      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SER FAN C      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SER FAN D      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SER FAN E      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SER FAN F      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SER FAN G      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SER FAN H      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SER FAN I      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SER FAN J      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SER FAN K      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SER FAN L      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SEWAGE PUMP #1 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SEWAGE PUMP #2 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SF-11 DISC     VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SF-4 DISC      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SF-8 DISC      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SLUDE PUMP #4  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SLUDGE CAKE PU VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SLUDGE PUMP #1 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SLUDGE PUMP #2 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SLUDGE PUMP #3 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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T H R E E   P H A S E   M O M E N T A R Y   D U T Y   R E P O R T
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

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SLUDGE PUMP #7 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SLUDGE PUMP #8 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SLUDGE VALVE H VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SOUTH BELT DIS VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SOUTH BELT PUM VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SOUTH CELL     VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SOUTH SEC. CLA VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SOUTH SEC. CLA VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SOUTH SEC. INF VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SOUTH SEC. INF VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SOUTH SEC. PUM VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SOUTH SHOP HTR VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

STREET LIGHT   VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SUMP PUMP #1 D VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SUMP PUMP #2   VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SUMP PUMP EAST VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SUMP PUMP WEST VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

TRANSFER PUMP  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

TRANSFER PUMP  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

TRANSFER SWITC VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

TUMBULATOR     VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

UNIT HEATER #1 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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     T H R E E   P H A S E   M O M E N T A R Y   D U T Y   R E P O R T
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================

 UNIT HEATER #2 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 UNIT HEATER #3 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 VACUUM PUMP    VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 VALVE ACTUATOR VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 VFD-N. THICK S VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 VFD-N. THICK S VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 VFD-N. THICK S VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 VFD-PUMP 4     VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 VFD-S. THICK S VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 VFD-S. THICK S VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 VFD-S. THICK S VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 VFD-SOUTH BELT VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 VFD-SOUTH BELT VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 WASTE MIXED LI VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 WASTE MIXED LI VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 WASTE SLUDGE P VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 WASTE SLUDGE P VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 WATER MAINT SH VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 WELDER RECEPT  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 WELDER-CARBON  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 WEST BANK-A    E/Z:     20.916 KA AT  -85.06 DEG (   173.89 MVA) X/R:   12.15
                SYM*1.6:   33.466 KA       MOMENTARY BASED ON X/R:   30.971 KA
                SYM*2.7:   56.474 KA           CREST BASED ON X/R:   52.420 KA
                VOLTAGE:   4800.   EQUIV. IMPEDANCE=  0.0114 + J  0.1320  OHMS
                CBL-0004        BUS-0020           0.211 KA      ANG:  -262.10
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    T H R E E   P H A S E   M O M E N T A R Y   D U T Y   R E P O R T
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================

               CONTRIBUTIONS TO  WEST BANK-A    (CONTINUED)
               CBL-0005       BUS-0017           0.325 KA      ANG:  -259.64
               CBL-0003       MVUS-1A           20.382 KA      ANG:   -85.18

 WEST BANK-B   E/Z:      19.562 KA AT  -84.61 DEG (   162.64 MVA) X/R:   11.04
               SYM*1.6:   31.300 KA       MOMENTARY BASED ON X/R:   28.566 KA
               SYM*2.7:   52.818 KA           CREST BASED ON X/R:   48.481 KA
               VOLTAGE:   4800.   EQUIV. IMPEDANCE=  0.0133 + J  0.1410  OHMS
               CBL-0011       HS-LC-4            0.082 KA      ANG:  -259.77
               CBL-0013       BUS-0021           0.111 KA      ANG:  -262.06
               CBL-0010       MVUS-1B           19.369 KA      ANG:   -84.64

 WEST FAN      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 WINCH #1      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 WINCH #2      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 WINCH #3      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 WT CONVEYOR 1 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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      U N B A L A N C E D   M O M E N T A R Y   D U T Y   R E P O R T
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
 ==============================================================================
   LOCATION     FAULT       E/Z    X/R  EQUIVALENT       MOMENTARY FAULT DUTIES
   VOLTAGE      TYPE        KA          IMPEDANCE (PU)   E/Z * 1.6  @ 0.5 CYCLE
 ==============================================================================

                 3P Duty:  16.16    5.9 Z1=  0.7443       25.86      20.98
 DS-1500 HP BLO SLG DUTY:   0.00    0.0 Z2=  0.7443        0.00       0.00
   4800.     VOLTS LN/LN: 13.995        Z0= INFINITE
              LN/LN/GND:  14.00 (    0.00 GND RETURN KA)

                 3P Duty:  17.14    5.8 Z1=  0.7016       27.43      22.23
 DS-1500 HP BLO SLG DUTY:   0.00    0.0 Z2=  0.7016        0.00       0.00
   4800.     VOLTS LN/LN: 14.847        Z0= INFINITE
              LN/LN/GND:  14.85 (    0.00 GND RETURN KA)

                 3P Duty:  16.38    6.9 Z1=  0.7341       26.21      21.99
 DS-2500HP BLOW SLG DUTY:   0.00    0.0 Z2=  0.7341        0.00       0.00
   4800.     VOLTS LN/LN: 14.189        Z0= INFINITE
              LN/LN/GND:  14.19 (    0.00 GND RETURN KA)

                 3P Duty:  17.33    6.5 Z1=  0.6941       27.73      22.98
 DS-2500HP BLOW SLG DUTY:   0.00    0.0 Z2=  0.6941        0.00       0.00
   4800.     VOLTS LN/LN: 15.008        Z0= INFINITE
              LN/LN/GND:  15.01 (    0.00 GND RETURN KA)

                 3P Duty:  19.50   10.8 Z1=  0.6167       31.21      28.38
 EAST BANK-1A   SLG DUTY:   0.00    0.0 Z2=  0.6167        0.00       0.00
   4800.     VOLTS LN/LN: 16.891        Z0= INFINITE
              LN/LN/GND:  16.89 (    0.00 GND RETURN KA)

                 3P Duty:  20.91   12.1 Z1=  0.5752       33.46      30.95
 EAST BANK-1B   SLG DUTY:   0.00    0.0 Z2=  0.5752        0.00       0.00
   4800.     VOLTS LN/LN: 18.109        Z0= INFINITE
              LN/LN/GND:  18.11 (    0.00 GND RETURN KA)

                 3P Duty:  20.94   12.4 Z1=  0.5744       33.50      31.09
 EAST BANK-2A   SLG DUTY:   0.00    0.0 Z2=  0.5744        0.00       0.00
   4800.     VOLTS LN/LN: 18.134        Z0= INFINITE
              LN/LN/GND:  18.13 (    0.00 GND RETURN KA)

                 3P Duty:  19.53   11.1 Z1=  0.6158       31.25      28.55
 EAST BANK-2B   SLG DUTY:   0.00    0.0 Z2=  0.6158        0.00       0.00
   4800.     VOLTS LN/LN: 16.917        Z0= INFINITE
              LN/LN/GND:  16.92 (    0.00 GND RETURN KA)
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      U N B A L A N C E D   M O M E N T A R Y   D U T Y   R E P O R T
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
 ==============================================================================
   LOCATION     FAULT       E/Z    X/R  EQUIVALENT       MOMENTARY FAULT DUTIES
   VOLTAGE      TYPE        KA          IMPEDANCE (PU)   E/Z * 1.6  @ 0.5 CYCLE
 ==============================================================================

               3P Duty:  21.05   12.9 Z1=   0.5715       33.67      31.42
 MVUS-1A      SLG DUTY:   0.00    0.0 Z2=   0.5715        0.00       0.00
   4800.     VOLTS LN/LN: 18.227       Z0= INFINITE
              LN/LN/GND:  18.23 (    0.00 GND RETURN KA)

               3P Duty:  19.68   11.6 Z1=   0.6113       31.48      28.94
 MVUS-1B      SLG DUTY:   0.00    0.0 Z2=   0.6113        0.00       0.00
   4800.     VOLTS LN/LN: 17.040       Z0= INFINITE
              LN/LN/GND:  17.04 (    0.00 GND RETURN KA)

               3P Duty:  20.92   12.2 Z1=   0.5751       33.47      30.97
 WEST BANK-A  SLG DUTY:   0.00    0.0 Z2=   0.5751        0.00       0.00
   4800.     VOLTS LN/LN: 18.114       Z0= INFINITE
              LN/LN/GND:  18.11 (    0.00 GND RETURN KA)

               3P Duty:  19.56   11.0 Z1=   0.6149       31.30      28.57
 WEST BANK-B  SLG DUTY:   0.00    0.0 Z2=   0.6149        0.00       0.00
   4800.     VOLTS LN/LN: 16.941       Z0= INFINITE
              LN/LN/GND:  16.94 (    0.00 GND RETURN KA)
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M O M E N T A R Y   D U T Y   S U M M A R Y   R E P O R T

PRE FAULT VOLTAGE: 1.0000

MODEL TRANSFORMER TAPS: NO

SOLUTION METHOD   : E/Z

BUS RECORD NO NAME	VOLTAGE L-L	* 3 PHASE * KA	X/R	* * * SLG * * * KA	X/R
DS-1500 HP BLO	4800.	20.980	5.87	0.000	0.00
DS-1500 HP BLO	4800.	22.231	5.83	0.000	0.00
DS-2500HP BLOW	4800.	21.990	6.87	0.000	0.00
DS-2500HP BLOW	4800.	22.985	6.49	0.000	0.00
EAST BANK-1A	4800.	28.377	10.78	0.000	0.00
EAST BANK-1B	4800.	30.952	12.12	0.000	0.00
EAST BANK-2A	4800.	31.094	12.40	0.000	0.00
EAST BANK-2B	4800.	28.552	11.11	0.000	0.00
MVUS-1A	4800.	31.424	12.91	0.000	0.00
MVUS-1B	4800.	28.944	11.60	0.000	0.00
WEST BANK-A	4800.	30.971	12.15	0.000	0.00
WEST BANK-B	4800.	28.566	11.04	0.000	0.00

38 FAULTED BUSES, 1081 BRANCHES, 319 CONTRIBUTIONS

UNBALANCED FAULTS REQUESTED

*** SHORT CIRCUIT STUDY COMPLETE ***

T H R E E   P H A S E   I N T E R R U P U T I N G   D U T Y   R E P O R T

PRE FAULT VOLTAGE: 1.0000

MODEL TRANSFORMER TAPS: NO

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04-LP-01 XFER	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
06-LP-01	VOLTAGE:	208.	(SEE LOW VOLTAGE REPORT)
06-LP-02	VOLTAGE:	208.	(SEE LOW VOLTAGE REPORT)
06-LP-03	VOLTAGE:	208.	(SEE LOW VOLTAGE REPORT)
06-LP-04	VOLTAGE:	208.	(SEE LOW VOLTAGE REPORT)
06-LP-05	VOLTAGE:	208.	(SEE LOW VOLTAGE REPORT)
06-LP-06	VOLTAGE:	208.	(SEE LOW VOLTAGE REPORT)
06-LP-07	VOLTAGE:	208.	(SEE LOW VOLTAGE REPORT)
11-LP-01	VOLTAGE:	208.	(SEE LOW VOLTAGE REPORT)
11-LP-01A	VOLTAGE:	208.	(SEE LOW VOLTAGE REPORT)
12A-PP-01	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
15 KVAC CAP	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
15-LP-01	VOLTAGE:	208.	(SEE LOW VOLTAGE REPORT)
15-LP-02	VOLTAGE:	208.	(SEE LOW VOLTAGE REPORT)
2-LP-1	VOLTAGE:	208.	(SEE LOW VOLTAGE REPORT)
2-LP-2	VOLTAGE:	208.	(SEE LOW VOLTAGE REPORT)
2-LP-3	VOLTAGE:	208.	(SEE LOW VOLTAGE REPORT)
2-LP-4	VOLTAGE:	208.	(SEE LOW VOLTAGE REPORT)
20A-PP-01	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
20A-PP-1	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
24-LP-01	VOLTAGE:	208.	(SEE LOW VOLTAGE REPORT)
24-LP-02	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)

T H R E E   P H A S E   I N T E R R U P U T I N G   D U T Y   R E P O R T
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

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28-LP-01        VOLTAGE:    208.  ( SEE LOW VOLTAGE REPORT )

28-PP-01        VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

2A-LP-01        VOLTAGE:    208.  ( SEE LOW VOLTAGE REPORT )

45D WATER CIRC  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

AER. TANK AND   VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

AERATION RECIR  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

AERATION RECIR  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

AERATION RECIR  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

AERATION RECIR  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

AERATION RECIR  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

AERATION RECIR  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

AERATION RECIR  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

AERATION RECIR  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

AERATION RECIR  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

AERATION TANK   VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

AERATION VALVE  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

AERATION VALVE  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

AERATION VALVE  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

AERATION VALVE  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

AERATION VALVE  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

AERATION VALVE  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

AERATION VALVE  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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T H R E E   P H A S E   I N T E R R U P U T I N G   D U T Y   R E P O R T
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO
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AERATION VALVE VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

AERATION VALVE VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

AERATION VALVE VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

AIR COMPRESSOR VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

AIR DUCT HEATE VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

AIR DUCT HEATE VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

ANAEROBIC MIX VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

ANAEROBIC MIX VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

ANAEROBIC MIX VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

ANAEROBIC MIX VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

ANAEROBIC MIX VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

ANEROBIC MIX P VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

ANEROBIC MIX P VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

ANEROBIC MIX P VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

ANEROBIC MIX P VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

ANOXIC MIX PUM VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

ANOXIC MIX PUM VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

ANOXIC MIX PUM VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

ANOXIC MIX PUM VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

ANOXIC MIX PUM VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

ANOXIC MIX PUM VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

ANOXIC MIX PUM VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

T H R E E P H A S E I N T E R R U P U T I N G D U T Y R E P O R T
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

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ANOXIC MIX PUM VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

ANOXIC MIX PUM VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

AUGER #1       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

AUGER #2       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

AUGER #3       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BANDSCREEN #1  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BANDSCREEN #2  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BANDSCREEN #3  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BAR SCREEN #1  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BAR SCREEN #1  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BAR SCREEN #2  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BAR SCREEN #2  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BAR SCREEN #3  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BAR SCREEN #3  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BAR SCREEN MTR VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BELT PRESS DIS VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BLOWER #1      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BLOWER #3      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BLOWER #5      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BLOWER 1 CP    VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BLOWER 2 CP    VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

BLOWER 3 CP    VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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      T H R E E   P H A S E   I N T E R R U P U T I N G   D U T Y   R E P O R T
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================

 BLOWER 4 CP    VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 BLOWER ROOM    VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 BOILER CIRC PU VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 BOILER CIRC PU VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 BOILER CTRL/GA VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 BOLIMO CONTROL VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 BRIDGE CRANE   VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 CAPACITOR DISC VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 CARBON FEED PU VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 CARBON FEED PU VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 CARBON SCRUBBE VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 CARBON SLURRY  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 CENTER CELL    VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 CENTRIFUGE #2  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 CENTRIFUGE #2  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 CENTRIFUGE #4  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 CENTRIFUGE 1 P VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 CENTRIFUGE 2 P VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 CENTRIFUGE OVE VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 CENTRIFUGE OVE VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 CENTRIFUGE# 1  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 CENTRIFUGE# 3  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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T H R E E   P H A S E   I N T E R R U P U T I N G   D U T Y   R E P O R T
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

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CHANEL MIX PUM VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

CHANEL MIX PUM VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

CHANNEL MIX PU VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

CHANNEL MIX PU VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

CHILL WATER CI VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

CHILL WATER CI VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

CHILLER #1     VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

CHILLER #2     VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

CP-MAU-BP-1    VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

CS-BS-1        VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

CTRL SCRN RM U VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

CW PUMP P-10   VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

D-101          VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

D-102          VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

D-103          VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DIVERSION CHAM VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DIVERSION CHAM VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DOOR #1        VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DOOR #2        VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DOOR #3        VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DOOR OPENER    VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DOOR OPERATORS VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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    T H R E E   P H A S E   I N T E R R U P U T I N G   D U T Y   R E P O R T
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================

  DRILL PRESS #1 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

  DRILL PRESS #2 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

  DS CLARIFIERS  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

  DS- CENT. FEED VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

  DS- NORTH BELT VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

  DS-1500 HP BLO E/Z:     15.302 KA AT  -78.24 DEG (   127.22 MVA) X/R:    5.58
                 VOLTAGE:   4800.   EQUIV. IMPEDANCE=  0.0369 + J  0.1773  OHMS
                 CBL-0042        BUS-0057           0.721 KA      ANG:    92.36
                 CBL-0034        EAST BANK-2B      14.591 KA      ANG:   -77.78

                 GENERATOR NAME -- AT BUS --    KA    VOLTS PU  LOCAL/REMOTE
             UTIL-0002                      13.513     0.22         R
                 TOTAL REMOTE:    13.513 KA  NACD RATIO:  0.8831

                                SYM2     SYM3     SYM5     SYM8
                 MULT. FACT:    1.000    1.000    1.000    1.000
                 DUTY (KA) :   15.302   15.302   15.302   15.302

                                TOT2     TOT3     TOT5     TOT8
                 MULT. FACT:    1.066    1.000    1.000    1.000
                 DUTY (KA) :   16.311   15.302   15.302   15.302

  DS-1500 HP BLO E/Z:     16.060 KA AT  -78.60 DEG (   133.52 MVA) X/R:    5.66
                 VOLTAGE:   4800.   EQUIV. IMPEDANCE=  0.0341 + J  0.1692  OHMS
                 CBL-0038        BUS-0054           0.721 KA      ANG:    92.39
                 CBL-0029        EAST BANK-2A      15.349 KA      ANG:   -78.18

                 GENERATOR NAME -- AT BUS --    KA    VOLTS PU  LOCAL/REMOTE
             UTIL-0001                      14.119     0.22         R
                 TOTAL REMOTE:    14.119 KA  NACD RATIO:  0.8791

                                SYM2     SYM3     SYM5     SYM8
                 MULT. FACT:    1.000    1.000    1.000    1.000
                 DUTY (KA) :   16.060   16.060   16.060   16.060

                                TOT2     TOT3     TOT5     TOT8
                 MULT. FACT:    1.069    1.000    1.000    1.000
                 DUTY (KA) :   17.163   16.060   16.060   16.060
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  T H R E E   P H A S E   I N T E R R U P T I N G   D U T Y   R E P O R T
                       PRE FAULT VOLTAGE: 1.0000
                       MODEL TRANSFORMER TAPS: NO
                       NACD OPTION:  INTERPOLATED
==============================================================================

 DS-2500HP BLOW E/Z:     15.437 KA AT  -78.59 DEG (   128.34 MVA) X/R:    6.28
               VOLTAGE:   4800.   EQUIV. IMPEDANCE=  0.0355 + J  0.1760  OHMS
               CBL-0044       BUS-0056           1.202 KA      ANG:    92.23
               CBL-0033       EAST BANK-2B      14.252 KA      ANG:   -77.82

               GENERATOR NAME -- AT BUS --    KA    VOLTS PU  LOCAL/REMOTE
           UTIL-0002                      13.559     0.21         R
               TOTAL REMOTE:    13.559 KA  NACD RATIO:  0.8783

                               SYM2     SYM3     SYM5     SYM8
               MULT. FACT:    1.000    1.000    1.000    1.000
               DUTY (KA) :   15.437   15.437   15.437   15.437

                               TOT2     TOT3     TOT5     TOT8
               MULT. FACT:    1.089    1.001    1.000    1.000
               DUTY (KA) :   16.814   15.451   15.437   15.437

 DS-2500HP BLOW E/Z:     16.183 KA AT  -78.88 DEG (   134.54 MVA) X/R:    6.14
               VOLTAGE:   4800.   EQUIV. IMPEDANCE=  0.0330 + J  0.1680  OHMS
               CBL-0040       BUS-0055           1.028 KA      ANG:    92.25
               CBL-0030       EAST BANK-2A      15.169 KA      ANG:   -78.29

               GENERATOR NAME -- AT BUS --    KA    VOLTS PU  LOCAL/REMOTE
           UTIL-0001                      14.181     0.22         R
               TOTAL REMOTE:    14.181 KA  NACD RATIO:  0.8763

                               SYM2     SYM3     SYM5     SYM8
               MULT. FACT:    1.000    1.000    1.000    1.000
               DUTY (KA) :   16.183   16.183   16.183   16.183

                               TOT2     TOT3     TOT5     TOT8
               MULT. FACT:    1.084    1.001    1.000    1.000
               DUTY (KA) :   17.550   16.195   16.183   16.183

 DS-3 AUX. INST VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-AIR COMPRES VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-AMMONIA REM VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-AMMONIA REM VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-ANOXIC TANK VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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T H R E E P H A S E I N T E R R U P U T I N G D U T Y R E P O R T
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

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DS-BASEMENT EL VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-BYPASS CONV VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-BYPASS SLID VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-CENTRIFUGE  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-CF-SH-1     VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-CF-SH-2     VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-CLARIFIER 7 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-CP-CS-SH-1  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-DRAIN PUMP  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-DUCT HEATER VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-EF-1 CAP    VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-EF-2A       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-EF-2A CAP   VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-EF-2B       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-EF-2B CAP   VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-EF-2C       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-EF-2C CAP   VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-EF-5A       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-EF-5A CAP   VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-EF-5B       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-EF-5B CAP   VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-EF-SC-1     VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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T H R E E   P H A S E   I N T E R R U P U T I N G   D U T Y   R E P O R T
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

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DS-ENG. RM. BO VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-EXHAUST FAN VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-EXISTING CR VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-FOUL AIR FA VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-GEN 1   VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-GEN 2   VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-GRINDER 1,2 VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-GROUND SLUD VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-GSST MIXER VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-HOIST   VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-HOIST,EX FA VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-HV UNIT   VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-HVAC #1   VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-HVAC #2   VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-HVAC 1   VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-INFLUENT VA VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-INFLUENT VA VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-MAU-SC-1   VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-MAU-SH-1   VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-MAU-SH-2   VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-MAU-SH-3   VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

DS-MCC-15 AC U VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

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     T H R E E   P H A S E   I N T E R R U P U T I N G   D U T Y   R E P O R T
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================

 DS-MCC-15 BATT VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-MCC-25-SF-4 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-MCC-7 AIR C VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-MCC7 PUMP 1 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-MCC7 PUMP 2 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-MCC7 PUMP 3 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-MCC7 PUMP 4 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-MCC8 PRI TH VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-MCC8 PRI TH VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-MCC8 PRI TH VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-MCC8 RAS PU VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-MCC8 RAS PU VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-MCC8 RAS PU VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-MCC8 RAS PU VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-MCC8 SCUM P VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-MCC8 SCUM P VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-MCC8 THICKE VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-MCC8 WAS PU VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-MIXED LIQUO VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-MOV SUMP    VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-MSP-12 TUMB VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-NEW CRANE   VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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     T H R E E   P H A S E   I N T E R R U P U T I N G   D U T Y   R E P O R T
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================

  DS-NORTH BELT  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

  DS-NORTH BELT  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

  DS-NORTH BOOST VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

  DS-NORTH BOOST VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

  DS-NORTH BOOST VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

  DS-OH DOOR     VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

  DS-POLYMER MIX VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

  DS-PRIM THICK  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

  DS-Q1236       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

  DS-Q1237       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

  DS-Q1238       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

  DS-Q1239       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

  DS-Q1240       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

  DS-Q1241       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

  DS-Q1242       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

  DS-Q1243       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

  DS-RAS PUMP #1 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

  DS-RAS PUMP #2 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

  DS-RAS PUMP #3 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

  DS-RECYCLE PUM VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

  DS-RETURN VALV VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

  DS-SCUM PUMP # VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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T H R E E   P H A S E   I N T E R R U P U T I N G   D U T Y   R E P O R T
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

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DS-SERV GARAGE VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-SEWAGE PUMP VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-SLIDE GATE  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-SLIDE GATE  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-SLUDGE PUMP VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-SLUDGE PUMP VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-SLUDGE TANK VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-SLUDGE THIC VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-SLUDGE THIC VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-SLUDGE THIC VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-SLUDGE THIC VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-SLUDGE THIC VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-SLUDGE THIC VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-SOUTH BELT  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-SOUTH BELT  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-SOUTH BELT  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-STREET LIGH VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-SUMP PUMP 1 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-SUMP PUMP 1 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-SUMP PUMP 2 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-SUMP PUMP A VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

DS-SUMP PUMP B VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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    T H R E E   P H A S E   I N T E R R U P U T I N G   D U T Y   R E P O R T
                      PRE FAULT VOLTAGE: 1.0000
                      MODEL TRANSFORMER TAPS: NO
==============================================================================

 DS-SYSTEM AIR  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-SYSTEM AIR  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-UNIT HEATER VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-WELDER PLUG VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-XFMR 21 LP- VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DS-XFMR 21 LP- VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 DUMBWATIER DIS VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 EAST BANK-1A   E/Z:     18.414 KA AT  -84.47 DEG (   153.09 MVA) X/R:   10.74
                VOLTAGE:   4800.   EQUIV. IMPEDANCE=  0.0145 + J  0.1498  OHMS
                CONTRIBUTIONS:  BUS-0048          0.016 KA      ANG:  -258.10
                CBL-0027        BUS-0046          0.029 KA      ANG:  -263.86
                CBL-0015        MVUS-1B          18.370 KA      ANG:   -84.48

                GENERATOR NAME -- AT BUS --   KA    VOLTS PU  LOCAL/REMOTE
            UTIL-0002                     16.408     0.01         R
                TOTAL REMOTE:    16.408 KA  NACD RATIO:  0.8910

                                SYM2     SYM3     SYM5     SYM8
                MULT. FACT:    1.000    1.000    1.000    1.009
                DUTY (KA) :   18.414   18.414   18.414   18.574

                                TOT2     TOT3     TOT5     TOT8
                MULT. FACT:    1.230    1.069    1.014    1.000
                DUTY (KA) :   22.659   19.682   18.674   18.414

 EAST BANK-1B   E/Z:     19.449 KA AT  -85.21 DEG (   161.70 MVA) X/R:   12.29
                VOLTAGE:   4800.   EQUIV. IMPEDANCE=  0.0119 + J  0.1420  OHMS
                CBL-0020        BUS-0051          0.091 KA      ANG:  -262.48
                CBL-0024        BUS-0047          0.123 KA      ANG:  -260.74
                CBL-0019        MVUS-1A          19.236 KA      ANG:   -85.25

                GENERATOR NAME -- AT BUS --   KA    VOLTS PU  LOCAL/REMOTE
            UTIL-0001                     17.242     0.01         R
                TOTAL REMOTE:    17.242 KA  NACD RATIO:  0.8865
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   T H R E E   P H A S E   I N T E R R U P T I N G   D U T Y   R E P O R T
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
                         NACD OPTION:  INTERPOLATED
==============================================================================

                              SYM2     SYM3     SYM5     SYM8
                MULT. FACT:   1.000    1.000    1.000    1.019
                DUTY (KA) :  19.449   19.449   19.449   19.826

                              TOT2     TOT3     TOT5     TOT8
                MULT. FACT:   1.268    1.100    1.031    1.000
                DUTY (KA) :  24.668   21.387   20.044   19.449

 EAST BANK-2A   E/Z:     19.468 KA AT  -85.25 DEG (   161.86 MVA) X/R:   12.50
                VOLTAGE:   4800.   EQUIV. IMPEDANCE=  0.0118 + J  0.1419  OHMS
                CBL-0030       DS-2500HP BLOW     1.016 KA      ANG:    92.74
                CBL-0037       BUS-0038           0.041 KA      ANG:  -259.64
                CBL-0029       DS-1500 HP BLO     0.715 KA      ANG:    92.73
                CBL-0028       MVUS-1A           17.697 KA      ANG:   -85.07

                GENERATOR NAME -- AT BUS --    KA    VOLTS PU  LOCAL/REMOTE
            UTIL-0001                      17.251     0.01         R
                TOTAL REMOTE:    17.251 KA  NACD RATIO:  0.8861

                              SYM2     SYM3     SYM5     SYM8
                MULT. FACT:   1.000    1.000    1.000    1.021
                DUTY (KA) :  19.468   19.468   19.468   19.874

                              TOT2     TOT3     TOT5     TOT8
                MULT. FACT:   1.273    1.104    1.033    1.000
                DUTY (KA) :  24.793   21.490   20.107   19.468

 EAST BANK-2B   E/Z:     18.428 KA AT  -84.51 DEG (   153.21 MVA) X/R:   10.96
                VOLTAGE:   4800.   EQUIV. IMPEDANCE=  0.0144 + J  0.1497  OHMS
                CBL-0033       DS-2500HP BLOW     1.186 KA      ANG:    92.81
                CBL-0034       DS-1500 HP BLO     0.715 KA      ANG:    92.71
                CBL-0032       MVUS-1B           16.530 KA      ANG:   -84.20

                GENERATOR NAME -- AT BUS --    KA    VOLTS PU  LOCAL/REMOTE
            UTIL-0002                      16.405     0.01         R
                TOTAL REMOTE:    16.405 KA  NACD RATIO:  0.8902

                              SYM2     SYM3     SYM5     SYM8
                MULT. FACT:   1.000    1.000    1.000    1.010
                DUTY (KA) :  18.428   18.428   18.428   18.616
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T H R E E   P H A S E   I N T E R R U P T I N G   D U T Y   R E P O R T

PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO
NACD OPTION: INTERPOLATED

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		TOT2	TOT3	TOT5	TOT8
	MULT. FACT:	1.236	1.073	1.016	1.000
	DUTY (KA) :	22.776	19.778	18.732	18.428
EAST FAN	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)		
EAST STORAGE D	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)		
EAST SUPPLY FA	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)		
EF-1 DISC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)		
EF-11 DISC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)		
EF-12 DISC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)		
EF-13 DISC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)		
EF-14 DISC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)		
EF-15 DISC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)		
EF-16 DISC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)		
EF-18 DISC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)		
EF-2	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)		
EF-20 DISC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)		
EF-5 DISC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)		
EF-7 DISC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)		
EF-9 DISC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)		
EF-BS-1	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)		
EHU-BS-3	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)		
EHU-BS-4	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)		

T H R E E   P H A S E   I N T E R R U P U T I N G   D U T Y   R E P O R T

PRE FAULT VOLTAGE: 1.0000

MODEL TRANSFORMER TAPS: NO

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EHU-BS-5	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
ELEVATOR	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
ET CONVEYOR 1	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
ET CONVEYOR 2	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EUH-001	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EUH-002	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EUH-003	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EUH-004	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EUH-BS-1	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EUH-BS-2	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EXHAUST FAN A	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EXHAUST FAN B	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EXHAUST FAN C	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EXHAUST FAN D	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
EXHAUST FAN E	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
FAN CONTROL PA	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
FC-1	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
FC-1 DISC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
FC-2	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
FC-2 DISC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
FC-3 DISC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
FC-4 DISC	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)

T H R E E P H A S E I N T E R R U P U T I N G D U T Y R E P O R T
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

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FC-5 DISC       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

FC-6 DISC       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

FC-7 DISC       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

FILTER DOOR OP  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

FINAL TANK AND  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

FINAL TANK DRA  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

FINE SCREEN DU  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

FINE SCREEN DU  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

FINE SCREEN DU  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

FUME EXTRACTOR  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

FUME FAN CONTA  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

FUME HOOD EXHA  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

FUME HOODS VFD  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

GATE 1 CONTROL  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

GATE 2 CONTROL  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

GATE VALVE 1    VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

GATE VALVE 2    VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

GATE VALVE 4    VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

GATE VALVE 5    VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

GATE VALVE 7    VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

GATE VALVE 8    VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

GRINDER #1      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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T H R E E   P H A S E   I N T E R R U P U T I N G   D U T Y   R E P O R T

PRE FAULT VOLTAGE: 1.0000

MODEL TRANSFORMER TAPS: NO

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GRINDER #2      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

GRINDER #3      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

GRIT REMOVAL H  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

GRIT TANK #1    VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

GRIT TANK #2    VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

GRIT TANKS      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

HOT WATER CIR   VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

HOT WATER CIRC  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

HOT WATER CIRC  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

HOT WATER CIRC  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

HUMIDIFIER #1   VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

HUMIDIFIER #2   VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

HVAC UNIT A     VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

HVAC UNIT B     VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

HW PUMP #1 P-1  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

HYDRAULIC LIFT  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

INFLUENT PUMPS  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

INLET TANKS     VOLTAGE:    208.  ( SEE LOW VOLTAGE REPORT )

INNER DOOR      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

LAB STILL       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

LC-2            VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

LC-2A           VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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    T H R E E   P H A S E   I N T E R R U P U T I N G   D U T Y   R E P O R T
                        PRE FAULT VOLTAGE: 1.0000
                        MODEL TRANSFORMER TAPS: NO
==============================================================================

 LC-3           VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 LC-3A          VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 LC-4           VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 LC-5           VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 LC-5A          VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 LC-8           VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 LC-8A          VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 LIME SCREW CON VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 LIME SILO #2 T VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 LIME SIO #1TRU VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MAKE UP AIR UN VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MAU HEATER     VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MAU-1          VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MAU-1 DISC     VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MAU-1 VFD      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MCC 15 AIR COM VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MCC 15 ELEVATO VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MCC 15 GATES   VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MCC 15 STRAINE VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MCC 15AA AIR C VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MCC-00         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MCC-00 BACKWAS VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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T H R E E   P H A S E   I N T E R R U P U T I N G   D U T Y   R E P O R T
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

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MCC-00 OHD DOO VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-00-AIR COM VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-1          VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-1 ATS      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-1 CRANE    VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-10         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-12         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-13         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-13 AIR COM VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-13 CRANE   VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-13 OVERHEA VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-14         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-14 HOIST   VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-14 SUMP PU VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-14 UNIT HE VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-15         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-15A        VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-15AA       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-19         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-2          VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-20         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-21         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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    T H R E E   P H A S E   I N T E R R U P U T I N G   D U T Y   R E P O R T
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================

 MCC-21 AC UNIT VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MCC-21 PANEL # VOLTAGE:    208.  ( SEE LOW VOLTAGE REPORT )

 MCC-21 PANEL # VOLTAGE:    208.  ( SEE LOW VOLTAGE REPORT )

 MCC-22         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MCC-24         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MCC-25         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MCC-26         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MCC-27         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MCC-28         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MCC-29         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MCC-3          VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MCC-3 PURGE #1 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MCC-3 PURGE #2 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MCC-3 SUMP PUM VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MCC-3A         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MCC-3COMPRESSO VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MCC-3COMPRESSO VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MCC-4          VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MCC-4A         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MCC-4B         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MCC-4C         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MCC-5          VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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T H R E E   P H A S E   I N T E R R U P U T I N G   D U T Y   R E P O R T
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

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MCC-6          VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-7          VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-7 ELEVATOR VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-7 VACUUM P VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-8          VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC-8A         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MCC7 480V RECE VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MEGADOOR CONTR VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

METAL LATHE    VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

METER CHAMBER  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MILL           VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MIX TANK DUST  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MIX TANK DUST  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MIXED LIQUER P VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MIXED LIQUER P VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MIXED LIQUER P VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MIXED LIQUER P VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MIXED LIQUER P VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MIXED LIQUER P VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MIXED LIQUER P VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MIXED LIQUER P VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

MIXER #1       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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    T H R E E   P H A S E   I N T E R R U P U T I N G   D U T Y   R E P O R T
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
==============================================================================

 MIXER #2       VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MO GATE #1     VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MO GATE #2     VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MSP            VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MSP-12         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MSP-14         VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MTS-MCC-5      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MTS-MCC-6      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MUA-1          VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 MVUS-1A        E/Z:     19.570 KA AT  -85.47 DEG (   162.70 MVA) X/R:   13.05
                VOLTAGE:   4800.  EQUIV. IMPEDANCE=  0.0112 + J  0.1412  OHMS
                CBL-0002        BUS-1027         17.350 KA      ANG:  -265.41
                CBL-0028        EAST BANK-2A      1.771 KA      ANG:    92.94
                CBL-0003        WEST BANK-A       0.237 KA      ANG:  -262.01
                CBL-0019        EAST BANK-1B      0.214 KA      ANG:  -261.48

                GENERATOR NAME -- AT BUS --    KA    VOLTS PU  LOCAL/REMOTE
            UTIL-0001                      17.350     0.00         R
                TOTAL REMOTE:    17.350 KA  NACD RATIO:  0.8866

                                SYM2     SYM3     SYM5     SYM8
                MULT. FACT:    1.000    1.000    1.000    1.025
                DUTY (KA) :   19.570   19.570   19.570   20.052

                                TOT2     TOT3     TOT5     TOT8
                MULT. FACT:    1.287    1.115    1.039    1.003
                DUTY (KA) :   25.182   21.815   20.326   19.626

 MVUS-1B        E/Z:     18.569 KA AT  -84.82 DEG (   154.38 MVA) X/R:   11.50
                VOLTAGE:   4800.  EQUIV. IMPEDANCE=  0.0135 + J  0.1486  OHMS
                CBL-0008        BUS-1028         16.546 KA      ANG:  -264.57
                CBL-0032        EAST BANK-2B      1.899 KA      ANG:    92.82
                CBL-0010        WEST BANK-B       0.081 KA      ANG:  -262.06
                CBL-0015        EAST BANK-1A      0.045 KA      ANG:  -261.87
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T H R E E   P H A S E   I N T E R R U P T I N G   D U T Y   R E P O R T

PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO
NACD OPTION: INTERPOLATED

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GENERATOR NAME -- AT BUS --	KA	VOLTS PU	LOCAL/REMOTE
UTIL-0002	16.546	0.00	R

TOTAL REMOTE: 16.546 KA NACD RATIO: 0.8911

	SYM2	SYM3	SYM5	SYM8
MULT. FACT:	1.000	1.000	1.000	1.014
DUTY (KA) :	18.569	18.569	18.569	18.829

	TOT2	TOT3	TOT5	TOT8
MULT. FACT:	1.249	1.084	1.022	1.000
DUTY (KA) :	23.195	20.130	18.983	18.569

N.W. HEAT   VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

NEW AIR COMPRE VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

NORTH BELT DIS VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

NORTH BELT PRE VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

NORTH CELL   VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

NORTH LOT POWE VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

NORTH SEC. PUM VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

NORTH SHOP HTR VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

NW FUME HOOD E VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

NW FUME HOOD S VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

ODOR CTRL FAN VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

ODOR CTRL FAN VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

OUTSIDE DOOR(E VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

OUTSIDE DOOR(N VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

OUTSIDE DOOR(S VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

OVERHEAD DOORS VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

T H R E E   P H A S E   I N T E R R U P U T I N G   D U T Y   R E P O R T

PRE FAULT VOLTAGE: 1.0000

MODEL TRANSFORMER TAPS: NO

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PANEL LA	VOLTAGE:	208.	(SEE LOW VOLTAGE REPORT)
PANEL LB	VOLTAGE:	208.	(SEE LOW VOLTAGE REPORT)
PHOS ACID PUMP	VOLTAGE:	120.	(SEE LOW VOLTAGE REPORT)
PP-1 EXHAUST F	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
PP-1 TRANSFER	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
PP-1 TRANSFER	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
PP-1-EF-1	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
PP-1-EF-2	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
PP-1-EF-3	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
PP-12 LEFT TUB	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
PP-12 RIGHT TU	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
PP-13	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
PP-SH-1	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
PP-SH-2	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
PRIM HEAT PUMP	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
PRIM HEAT PUMP	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
PRIM SLUDGE CO	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
PRIM SLUDGE CO	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
PRIM SLUDGE CO	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
PRIM SLUDGE CO	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
PRIM SLUDGE CO	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
PRIM SLUDGE CO	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)

T H R E E   P H A S E   I N T E R R U P U T I N G   D U T Y   R E P O R T
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

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PRIM SLUDGE CO VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
PRIM SLUDGE CO VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
PRIM SLUDGE CO VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
PRIM SLUDGE CO VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
PRIM SLUDGE CO VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
PRIM SLUDGE CO VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
PUMP #5 MAIN D VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
PUMP #5 VFD    VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
PUMP #7 VFD    VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
PUMP CONTROL P VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
PUMP STATION # VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
PUMP STATION # VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
PURGE FAN #1 D VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
PURGE FAN #2 D VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
PURGE FAN #3 D VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
PURGE FAN #4 D VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
PURGE FAN #5 D VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
PURGE FAN #6 D VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
RAS AND INFLUE VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
RAS PUMPS      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
RETURN SLUDGE  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
RETURN SLUDGE  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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T H R E E P H A S E I N T E R R U P U T I N G D U T Y R E P O R T
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

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RETURN SLUDGE  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

RETURN SLUDGE  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

S.E. HEAT      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SCREW CONVEYOR VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SCUM BLOWERS C VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SCUM PUMP      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SEC HEAT PUMP  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SEC HEAT PUMP  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SER FAN A      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SER FAN B      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SER FAN C      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SER FAN D      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SER FAN E      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SER FAN F      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SER FAN G      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SER FAN H      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SER FAN I      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SER FAN J      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SER FAN K      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SER FAN L      VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SEWAGE PUMP #1 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

SEWAGE PUMP #2 VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )
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T H R E E P H A S E I N T E R R U P U T I N G D U T Y R E P O R T
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

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SF-11 DISC VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

SF-4 DISC VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

SF-8 DISC VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

SLUDE PUMP #4 VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

SLUDGE CAKE PU VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

SLUDGE PUMP #1 VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

SLUDGE PUMP #2 VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

SLUDGE PUMP #3 VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

SLUDGE PUMP #7 VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

SLUDGE PUMP #8 VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

SLUDGE VALVE H VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

SOUTH BELT DIS VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

SOUTH BELT PUM VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

SOUTH CELL VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

SOUTH SEC. CLA VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

SOUTH SEC. CLA VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

SOUTH SEC. INF VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

SOUTH SEC. INF VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

SOUTH SEC. PUM VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

SOUTH SHOP HTR VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

STREET LIGHT VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

SUMP PUMP #1 D VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

T H R E E   P H A S E   I N T E R R U P U T I N G   D U T Y   R E P O R T
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

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SUMP PUMP #2   VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

SUMP PUMP EAST VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

SUMP PUMP WEST VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

TRANSFER PUMP VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

TRANSFER PUMP VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

TRANSFER SWITC VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

TUMBULATOR   VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

UNIT HEATER #1 VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

UNIT HEATER #2 VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

UNIT HEATER #3 VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

VACUUM PUMP   VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

VALVE ACTUATOR VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

VFD-N. THICK S VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

VFD-N. THICK S VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

VFD-N. THICK S VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

VFD-PUMP 4   VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

VFD-S. THICK S VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

VFD-S. THICK S VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

VFD-S. THICK S VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

VFD-SOUTH BELT VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

VFD-SOUTH BELT VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

WASTE MIXED LI VOLTAGE: 480. (SEE LOW VOLTAGE REPORT)

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    T H R E E   P H A S E   I N T E R R U P U T I N G   D U T Y   R E P O R T
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
==============================================================================

 WASTE MIXED LI VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 WASTE SLUDGE P VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 WASTE SLUDGE P VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 WATER MAINT SH VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 WELDER RECEPT  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 WELDER-CARBON  VOLTAGE:    480.  ( SEE LOW VOLTAGE REPORT )

 WEST BANK-A    E/Z:     19.454 KA AT  -85.22 DEG (   161.74 MVA) X/R:   12.32
                VOLTAGE:   4800.   EQUIV. IMPEDANCE=  0.0119 + J  0.1420  OHMS
                CBL-0004        BUS-0020           0.091 KA      ANG:  -263.42
                CBL-0005        BUS-0017           0.146 KA      ANG:  -261.14
                CBL-0003        MVUS-1A           19.218 KA      ANG:   -85.26

                GENERATOR NAME -- AT BUS --    KA    VOLTS PU  LOCAL/REMOTE
            UTIL-0001                      17.246     0.01         R
                TOTAL REMOTE:    17.246 KA  NACD RATIO:  0.8865

                                SYM2     SYM3     SYM5     SYM8
                MULT. FACT:    1.000    1.000    1.000    1.020
                DUTY (KA) :   19.454   19.454   19.454   19.835

                                TOT2     TOT3     TOT5     TOT8
                MULT. FACT:    1.269    1.100    1.031    1.000
                DUTY (KA) :   24.687   21.403   20.054   19.454

 WEST BANK-B    E/Z:     18.466 KA AT  -84.59 DEG (   153.52 MVA) X/R:   10.98
                VOLTAGE:   4800.   EQUIV. IMPEDANCE=  0.0142 + J  0.1494  OHMS
                CBL-0011        HS-LC-4            0.035 KA      ANG:  -261.06
                CBL-0013        BUS-0021           0.046 KA      ANG:  -262.80
                CBL-0010        MVUS-1B           18.385 KA      ANG:   -84.60

                GENERATOR NAME -- AT BUS --    KA    VOLTS PU  LOCAL/REMOTE
            UTIL-0002                      16.454     0.01         R
                TOTAL REMOTE:    16.454 KA  NACD RATIO:  0.8910

                                SYM2     SYM3     SYM5     SYM8
                MULT. FACT:    1.000    1.000    1.000    1.010
                DUTY (KA) :   18.466   18.466   18.466   18.658
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T H R E E   P H A S E   I N T E R R U P T I N G   D U T Y   R E P O R T

PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO
NACD OPTION: INTERPOLATED

===

	TOT2	TOT3	TOT5	TOT8
MULT. FACT:	1.236	1.074	1.017	1.000
DUTY (KA) :	22.832	19.826	18.775	18.466

WEST FAN	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
WINCH #1	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
WINCH #2	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
WINCH #3	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)
WT CONVEYOR 1	VOLTAGE:	480.	(SEE LOW VOLTAGE REPORT)

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   U N B A L A N C E D   I N T E R R U P T I N G   D U T Y   R E P O R T
                          PRE FAULT VOLTAGE: 1.0000
                          MODEL TRANSFORMER TAPS: NO
                          NACD OPTION:  INTERPOLATED
==============================================================================
 LOCATION        FAULT   E/Z    X/R        ANSI AC/DC        INTERRUPTING
                 TYPE    KA                DECREMENT FACT.   DUTIES  (KA)
                                           3 PHASE    SLG    3 PHASE  SLG
==============================================================================

DS-1500 HP BLO 3P Duty:  15.30    5.6 SYM2:    1.00          15.30
 VOLTS:  4800.0    SLG:               SYM3:    1.00          15.30
  NACD:  0.883   LN/LN:  13.25        SYM5:    1.00          15.30
             LN/LN/GND:  13.25        SYM8:    1.00          15.30
            GND RETURN:               TOT2:    1.07          16.31
                Z1(PU):      0.78607 TOT3:    1.00          15.30
                Z2(PU):      0.78607 TOT5:    1.00          15.30
                Z0(PU):               TOT8:    1.00          15.30

DS-1500 HP BLO 3P Duty:  16.06    5.7 SYM2:    1.00          16.06
 VOLTS:  4800.0    SLG:               SYM3:    1.00          16.06
  NACD:  0.879   LN/LN:  13.91        SYM5:    1.00          16.06
             LN/LN/GND:  13.91        SYM8:    1.00          16.06
            GND RETURN:               TOT2:    1.07          17.16
                Z1(PU):      0.74894 TOT3:    1.00          16.06
                Z2(PU):      0.74894 TOT5:    1.00          16.06
                Z0(PU):               TOT8:    1.00          16.06

DS-2500HP BLOW 3P Duty:  15.44    6.3 SYM2:    1.00          15.44
 VOLTS:  4800.0    SLG:               SYM3:    1.00          15.44
  NACD:  0.878   LN/LN:  13.37        SYM5:    1.00          15.44
             LN/LN/GND:  13.37        SYM8:    1.00          15.44
            GND RETURN:               TOT2:    1.09          16.81
                Z1(PU):      0.77919 TOT3:    1.00          15.45
                Z2(PU):      0.77919 TOT5:    1.00          15.44
                Z0(PU):               TOT8:    1.00          15.44

DS-2500HP BLOW 3P Duty:  16.18    6.1 SYM2:    1.00          16.18
 VOLTS:  4800.0    SLG:               SYM3:    1.00          16.18
  NACD:  0.876   LN/LN:  14.02        SYM5:    1.00          16.18
             LN/LN/GND:  14.02        SYM8:    1.00          16.18
            GND RETURN:               TOT2:    1.08          17.55
                Z1(PU):      0.74325 TOT3:    1.00          16.19
                Z2(PU):      0.74325 TOT5:    1.00          16.18
                Z0(PU):               TOT8:    1.00          16.18
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  U N B A L A N C E D   I N T E R R U P T I N G   D U T Y   R E P O R T
                      PRE FAULT VOLTAGE: 1.0000
                      MODEL TRANSFORMER TAPS: NO
                      NACD OPTION:  INTERPOLATED
==============================================================================
 LOCATION        FAULT   E/Z    X/R         ANSI AC/DC         INTERRUPTING
                 TYPE    KA                 DECREMENT FACT.   DUTIES  (KA)
                                            3 PHASE    SLG    3 PHASE  SLG
==============================================================================

 EAST BANK-1A   3P Duty:  18.41    10.7 SYM2:    1.00           18.41
  VOLTS:  4800.0     SLG:                 SYM3:    1.00           18.41
   NACD:  0.891   LN/LN:  15.95           SYM5:    1.00           18.41
             LN/LN/GND:  15.95           SYM8:    1.01           18.57
            GND RETURN:                  TOT2:    1.23           22.66
                Z1(PU):       0.65319 TOT3:    1.07           19.68
                Z2(PU):       0.65319 TOT5:    1.01           18.67
                Z0(PU):               TOT8:    1.00           18.41

 EAST BANK-1B   3P Duty:  19.45    12.3 SYM2:    1.00           19.45
  VOLTS:  4800.0     SLG:                 SYM3:    1.00           19.45
   NACD:  0.887   LN/LN:  16.84           SYM5:    1.00           19.45
             LN/LN/GND:  16.84           SYM8:    1.02           19.83
            GND RETURN:                  TOT2:    1.27           24.67
                Z1(PU):       0.61843 TOT3:    1.10           21.39
                Z2(PU):       0.61843 TOT5:    1.03           20.04
                Z0(PU):               TOT8:    1.00           19.45

 EAST BANK-2A   3P Duty:  19.47    12.5 SYM2:    1.00           19.47
  VOLTS:  4800.0     SLG:                 SYM3:    1.00           19.47
   NACD:  0.886   LN/LN:  16.86           SYM5:    1.00           19.47
             LN/LN/GND:  16.86           SYM8:    1.02           19.87
            GND RETURN:                  TOT2:    1.27           24.79
                Z1(PU):       0.61783 TOT3:    1.10           21.49
                Z2(PU):       0.61783 TOT5:    1.03           20.11
                Z0(PU):               TOT8:    1.00           19.47

 EAST BANK-2B   3P Duty:  18.43    11.0 SYM2:    1.00           18.43
  VOLTS:  4800.0     SLG:                 SYM3:    1.00           18.43
   NACD:  0.890   LN/LN:  15.96           SYM5:    1.00           18.43
             LN/LN/GND:  15.96           SYM8:    1.01           18.62
            GND RETURN:                  TOT2:    1.24           22.78
                Z1(PU):       0.65272 TOT3:    1.07           19.78
                Z2(PU):       0.65272 TOT5:    1.02           18.73
                Z0(PU):               TOT8:    1.00           18.43
```

```
   U N B A L A N C E D   I N T E R R U P T I N G   D U T Y   R E P O R T
                         PRE FAULT VOLTAGE: 1.0000
                         MODEL TRANSFORMER TAPS: NO
                         NACD OPTION:  INTERPOLATED
==============================================================================
  LOCATION        FAULT   E/Z    X/R        ANSI AC/DC        INTERRUPTING
                  TYPE    KA                DECREMENT FACT.   DUTIES  (KA)
                                            3 PHASE    SLG    3 PHASE  SLG
==============================================================================

 MVUS-1A       3P Duty:  19.57   13.1 SYM2:    1.00           19.57
  VOLTS:  4800.0    SLG:                SYM3:    1.00           19.57
   NACD:  0.887   LN/LN:  16.95         SYM5:    1.00           19.57
              LN/LN/GND:  16.95         SYM8:    1.02           20.05
             GND RETURN:                TOT2:    1.29           25.18
                 Z1(PU):       0.61463 TOT3:    1.11           21.81
                 Z2(PU):       0.61463 TOT5:    1.04           20.33
                 Z0(PU):               TOT8:    1.00           19.63

 MVUS-1B       3P Duty:  18.57   11.5 SYM2:    1.00           18.57
  VOLTS:  4800.0    SLG:                SYM3:    1.00           18.57
   NACD:  0.891   LN/LN:  16.08         SYM5:    1.00           18.57
              LN/LN/GND:  16.08         SYM8:    1.01           18.83
             GND RETURN:                TOT2:    1.25           23.19
                 Z1(PU):       0.64776 TOT3:    1.08           20.13
                 Z2(PU):       0.64776 TOT5:    1.02           18.98
                 Z0(PU):               TOT8:    1.00           18.57

 WEST BANK-A   3P Duty:  19.45   12.3 SYM2:    1.00           19.45
  VOLTS:  4800.0    SLG:                SYM3:    1.00           19.45
   NACD:  0.887   LN/LN:  16.85         SYM5:    1.00           19.45
              LN/LN/GND:  16.85         SYM8:    1.02           19.83
             GND RETURN:                TOT2:    1.27           24.69
                 Z1(PU):       0.61828 TOT3:    1.10           21.40
                 Z2(PU):       0.61828 TOT5:    1.03           20.05
                 Z0(PU):               TOT8:    1.00           19.45

 WEST BANK-B   3P Duty:  18.47   11.0 SYM2:    1.00           18.47
  VOLTS:  4800.0    SLG:                SYM3:    1.00           18.47
   NACD:  0.891   LN/LN:  15.99         SYM5:    1.00           18.47
              LN/LN/GND:  15.99         SYM8:    1.01           18.66
             GND RETURN:                TOT2:    1.24           22.83
                 Z1(PU):       0.65136 TOT3:    1.07           19.83
                 Z2(PU):       0.65136 TOT5:    1.02           18.77
                 Z0(PU):               TOT8:    1.00           18.47
```

I N T E R R U P T I N G D U T Y S U M M A R Y R E P O R T
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO
NACD OPTION: INTERPOLATED

BUS RECORD NO NAME	VOLTAGE L-L	NACD RATIO	* 3 PHASE * E/Z KA	* 3 PHASE * X/R	* * * S L G * * * E/Z KA	* * * S L G * * * X/R
DS-1500 HP BLO	4800.	0.883	15.302	5.58		
DS-1500 HP BLO	4800.	0.879	16.060	5.66		
DS-2500HP BLOW	4800.	0.878	15.437	6.28		
DS-2500HP BLOW	4800.	0.876	16.183	6.14		
EAST BANK-1A	4800.	0.891	18.414	10.74		
EAST BANK-1B	4800.	0.887	19.449	12.29		
EAST BANK-2A	4800.	0.886	19.468	12.50		
EAST BANK-2B	4800.	0.890	18.428	10.96		
MVUS-1A	4800.	0.887	19.570	13.05		
MVUS-1B	4800.	0.891	18.569	11.50		
WEST BANK-A	4800.	0.887	19.454	12.32		
WEST BANK-B	4800.	0.891	18.466	10.98		

38 FAULTED BUSES, 1081 BRANCHES, 319 CONTRIBUTIONS
UNBALANCED FAULTS REQUESTED

*** SHORT CIRCUIT STUDY COMPLETE ***

9.0 UTILITY DATA

See email from Mr. Kral at Consumers Energy stating available fault current information and X/R ratios on the attached sheet.

Swartz, Kyle

From: Tom Kovalak <Tom.KovalakJr@cmsenergy.com>
Sent: Monday, August 2, 2021 7:42 AM
To: Koporetz, Tom
Cc: Jones, Gene; Swartz, Kyle
Subject: [External Email] FW: Short Circuit Information - Kalamazoo Treatment Substation

Good morning. The information below is from our senior engineer of substation planning, Greg Kral. Let me know if you need anything else. TK

From: Gregory E. Kral <GREGORY.KRAL@cmsenergy.com>
Sent: Monday, August 2, 2021 7:14 AM
To: Tom Kovalak <Tom.KovalakJr@cmsenergy.com>
Cc: Robert W. Wallace <ROBERT.WALLACE@cmsenergy.com>
Subject: Short Circuit Information - Kalamazoo Treatment Substation

Kalamazoo Treatment Substation (WD 968) calculated fault values at the 4.8kV substation bus:

Transformer No. 1
Nameplate: 10,000 kVA
46kV Fuse: S&C SMD-2C 200E
Nominal Voltage: 4.8kV Delta
Three-phase Symmetrical Fault = 17,400 Amps, X/R = 12.8

Transformer No. 2
Nameplate: 10,000 kVA
46kV Fuse: S&C SMD-2C 200E
Nominal Voltage: 4.8kV Delta
Three-phase Symmetrical Fault = 16,600 Amps, X/R = 10.8

The values provided are based on calculations and information currently available to Consumers Energy. It is based on current circuit configuration and equipment that has not been field verified and is subject to change without notice. Consumers Energy specifically disclaims any liability or warranty that the values or calculations are correct or apply to any particular application. This calculation does not take into account equipment and/or facilities that are owned or operated by anyone other than Consumers Energy.

From: Koporetz, Tom <koporetzt@kalamazoocity.org>
Sent: Thursday, July 29, 2021 2:24 PM
To: Tom Kovalak <Tom.KovalakJr@cmsenergy.com>
Cc: Jones, Gene <Gene.Jones@tetratech.com>; kylekswartz@eaton.com
Subject: Plant Transformer Information

Tom,

We need info for both sources feeding our treatment plant.
Consumers fuse number 199 for our South Feed and fuse 299 for the North Feed.

- X/R Ratio
- Three phase and single line to ground fault current
- Transformer nameplate KVA and impedance.

- Fuse
    - Manufacture
    - Size
    - Type

Thanks,

Tom Koporetz
Process Controls Supervisor
City of Kalamazoo Public Services Dept
1415 North Harrison Street
Kalamazoo MI 49007
Office: 269-337-8319
Cell: 269-993-5147
Fax: 269-337-8699

10.0 APPLICABLE CODES AND STANDARDS

These standards and codes are referenced and followed where appropriate:

American National Standards Institute (ANSI)
- IEEE/ANSI C37.09-1979
- IEEE/ANSI C37.20.3-2013
- IEEE/ANSI C37.20.4-2013
- IEEE/ANSI C37.59-2007
- IEEE Std C37.010-1999

National Fire Protection Association (NFPA)
- NFPA-70®-2017: National Electrical Code (NEC)
- NFPA-70E®-2018: Standard for Electrical Safety in the Workplace

Institute of Electrical and Electronics Engineers (IEEE)
- IEEE Std C37.010™-1999
- IEEE Std C37.5™-1979
- IEEE Std C37.13™-2008
- IEEE Std C37.41™-2008
- IEEE Std C57.12.00™-2006
- IEEE Std C57.12.01™-2015
- IEEE Std 141™-1993 (Red Book)
- IEEE Std 242™-2001 (Buff Book)
- IEEE Std 399™-1997 (Brown Book)
- IEEE Std 551™-2006 (Violet Book)
- IEEE Std 946™-2004
- IEEE Std 1584™-2018
- IEEE Std 1015™-2006 (Blue Book)

Occupational Safety and Health Administration (OSHA)
- Standards – 29 CFR
  - 1910.333 - Selection and use of work practices

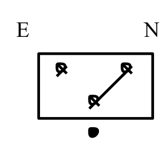
11.0 ONE-LINE DIAGRAM INDEX

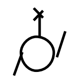
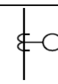
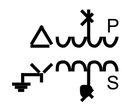
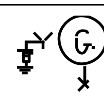
See power system study one-line diagrams, drawing abbreviations and symbols.

Table 11.1 – ONE-LINE DIAGRAM INDEX

One-Line Diagram Name	Page Number	One-Line Diagram Description
Main SWGR and Load Centers	1 of 20	Main System One Line
MCC-1 MCC-2 MCC-3	2 of 20	MCC-1, -2, -3 One Line
MCC-10	3 of 20	MCC-10 One Line
MCC-11	4 of 20	MCC-11 One Line
MCC-12	5 Of 20	MCC-12 One Line
MCC-13	6 Of 20	MCC-13 One Line
MCC-15	7 of 20	MCC-15 One Line
MCC-15A	8 of 20	MCC-15A One Line
MCC-17	9 of 20	MCC-17 One Line
MCC-21	10 of 20	MCC-21 One Line
MCC-24	11 of 20	MCC-24 One Line
MCC-25	12 of 20	MCC-25 One Line
MCC-26	13 of 20	MCC-26 One Line
MCC-27	14 of 20	MCC-27 One Line
MCC-28	15 of 20	MCC-28 One Line
MCC-29	16 of 20	MCC-29 One Line
MCC-4A	17 of 20	MCC-4A One Line
MCC-6	18 of 20	MCC-6 One Line
MCC-7	19 of 20	MCC-7 One Line
MCC-8	20 of 20	MCC-8 One Line

Attached one-line diagram(s) may include the following abbreviations and symbols.

Abbreviations	Description	Symbol
ATS MTS	Automatic Transfer Switch Manual Transfer Switch	
CBL	Cable / Feeder	

MCB / MN FCB CB / BKR	Main Circuit Breaker Feeder Circuit Breaker Circuit Breaker	
FU	Fuse	
B / BUS DSC / DISC PNL SWBD SWGR	Equipment Bus Disconnect Panel / Distribution Panel Switchboard Switchgear	—
MTR	Motor	
R / RLY	Relay	
TX	Transformer	
UTIL	Utility Source	
SW BPS	Disconnect Switch Bolted Pressure Switch	
GEN	Generator	

REV 1
K. SWARTZ
5/12/2023

DFTR: K. SWARTZ

ENGR: K. SWARTZ

Main SWGR and Load Centers

SCALE: NONE

POWER SYSTEM STUDY

ONE-LINE

PRODUCT CODE	REVISION	DATE		SHEET
<U0160>	01	5/12/2023	G.O.MGR0010731	1 OF 20

REV 1
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ENGR: K. SWARTZ	MCC-1 MCC-2 MCC-3		
SCALE: NONE	POWER SYSTEM STUDY	ONE-LINE	
PRODUCT CODE <U0160>	REVISION 01	DATE 5/12/2023	G.O.MGR0010731	SHEET 2 OF 20

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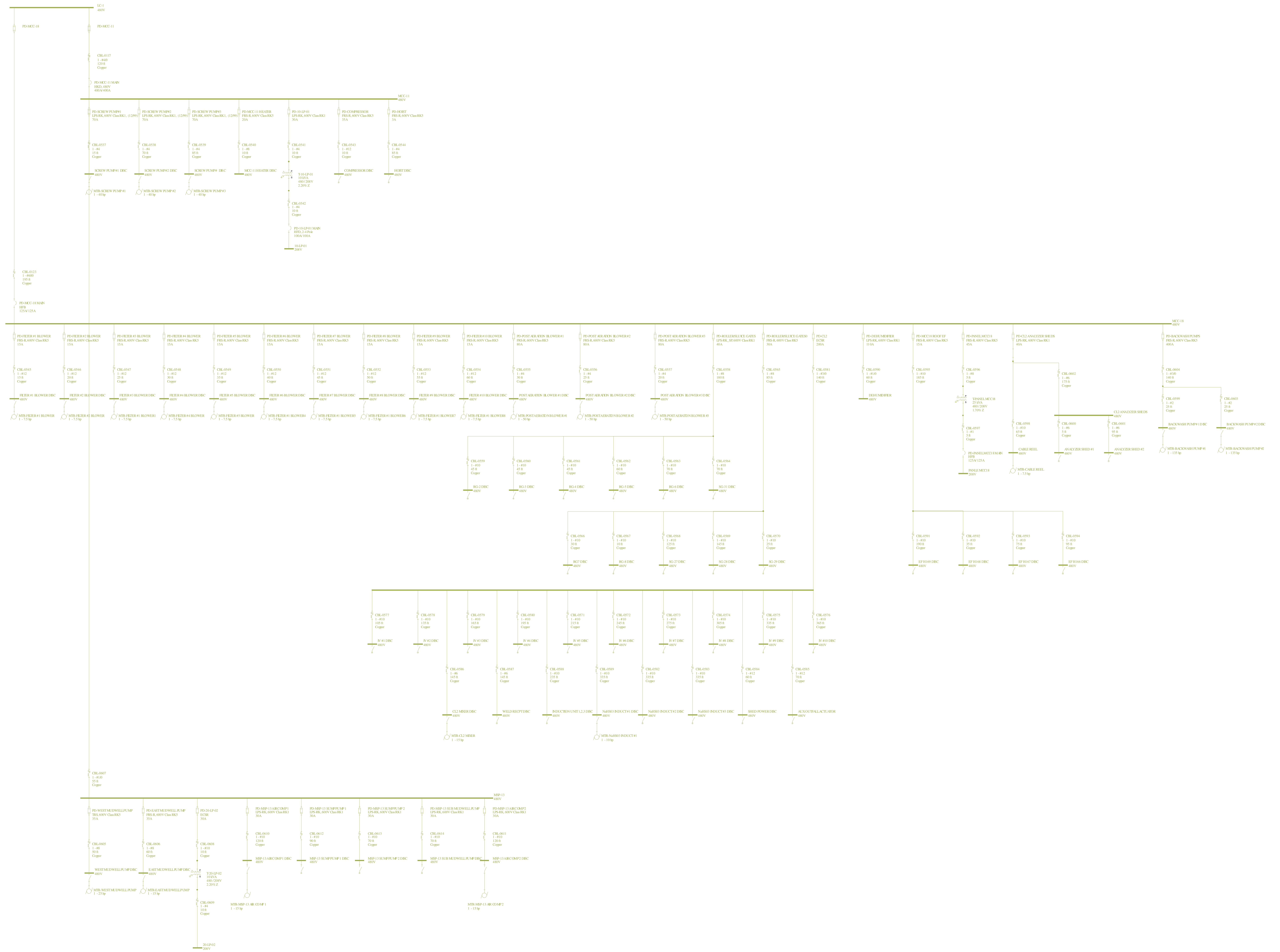

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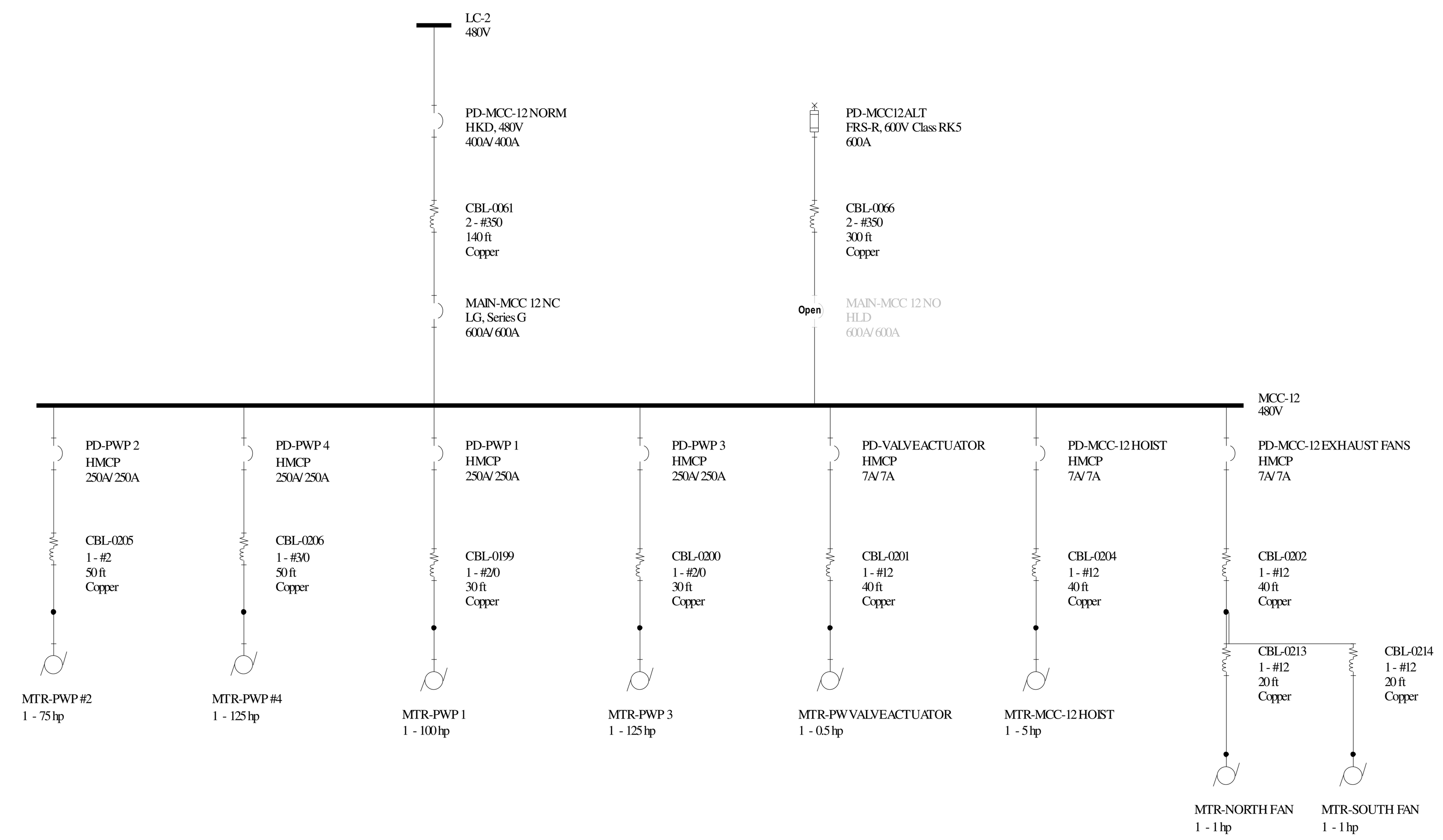

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PRODUCT CODE <U0160>	REVISION 01	DATE 5/12/2023	G.O.MGR0010731

SHEET 7 OF 20

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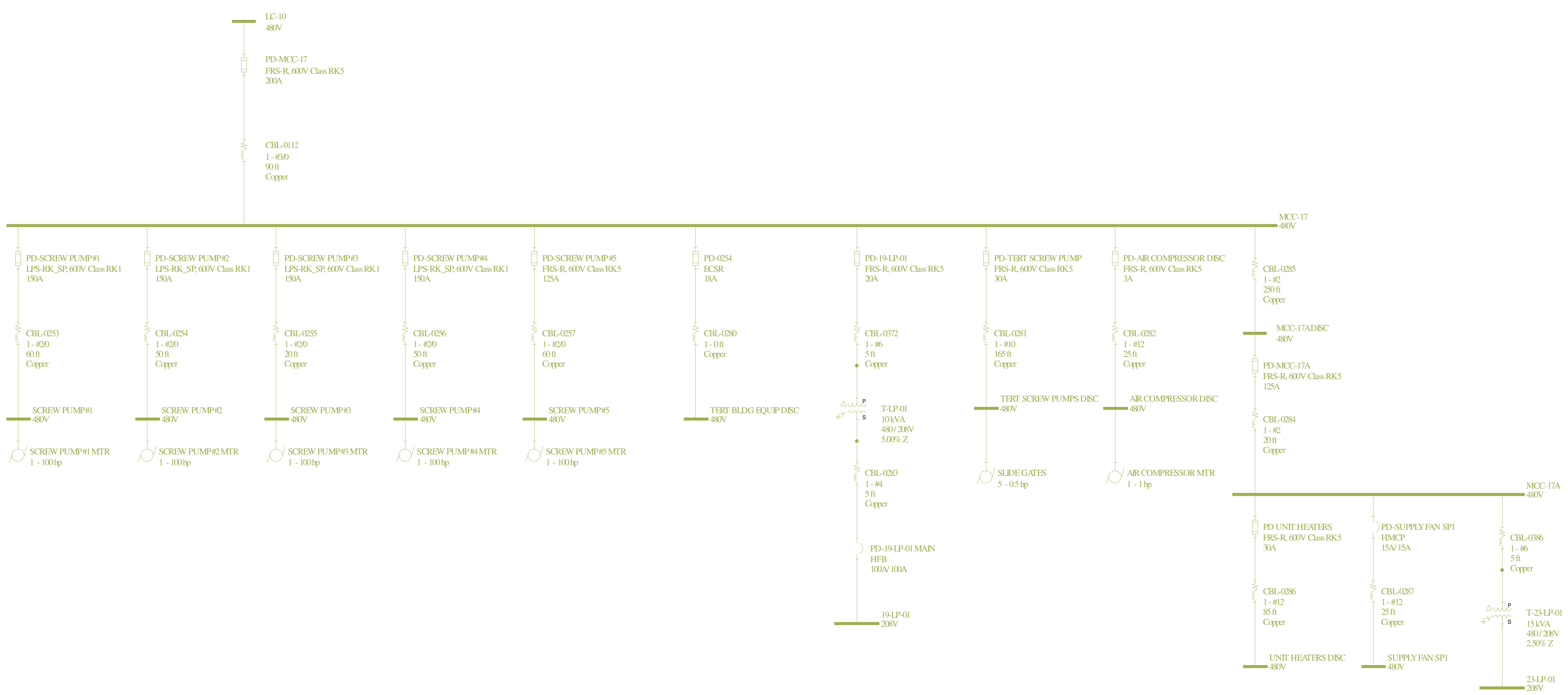

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K. SWARTZ
5/12/2023

DFTR: K. SWARTZ

ENGR: K. SWARTZ

MCC-17

SCALE: NONE

POWER SYSTEM STUDY

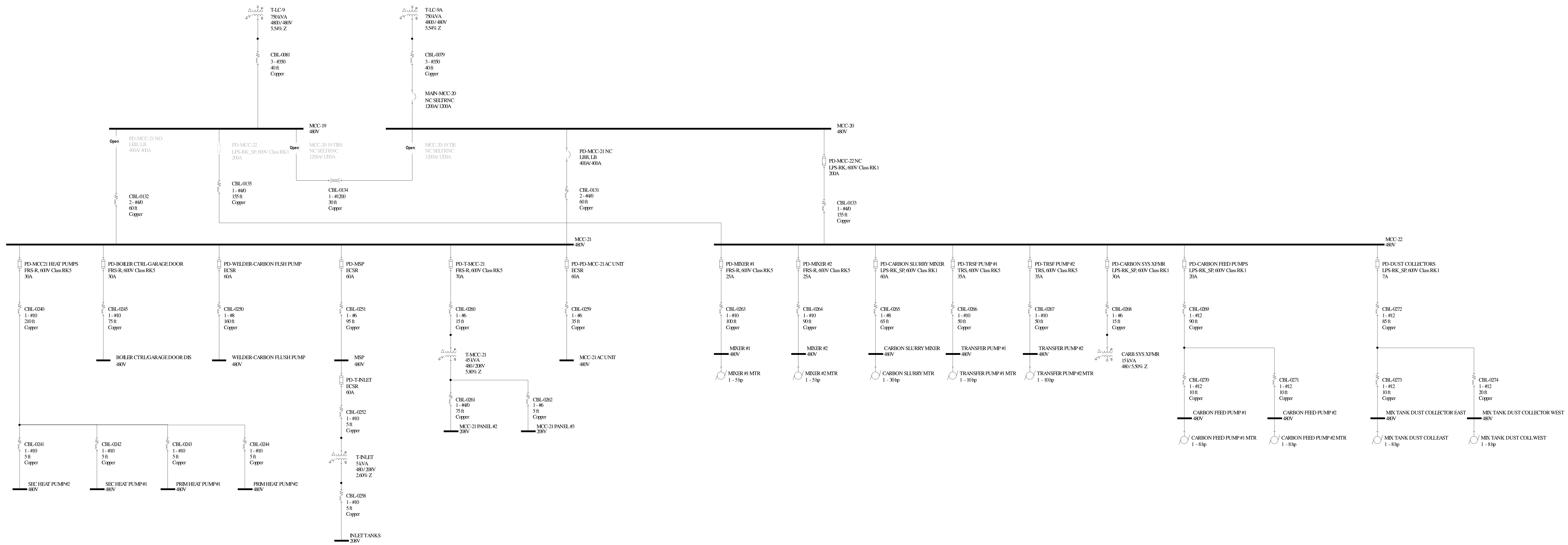
ONE-LINE

PRODUCT CODE
<U0160>

REVISION
01

DATE
5/12/2023

G.O.MGR0010731



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K. SWARTZ
5/12/2023

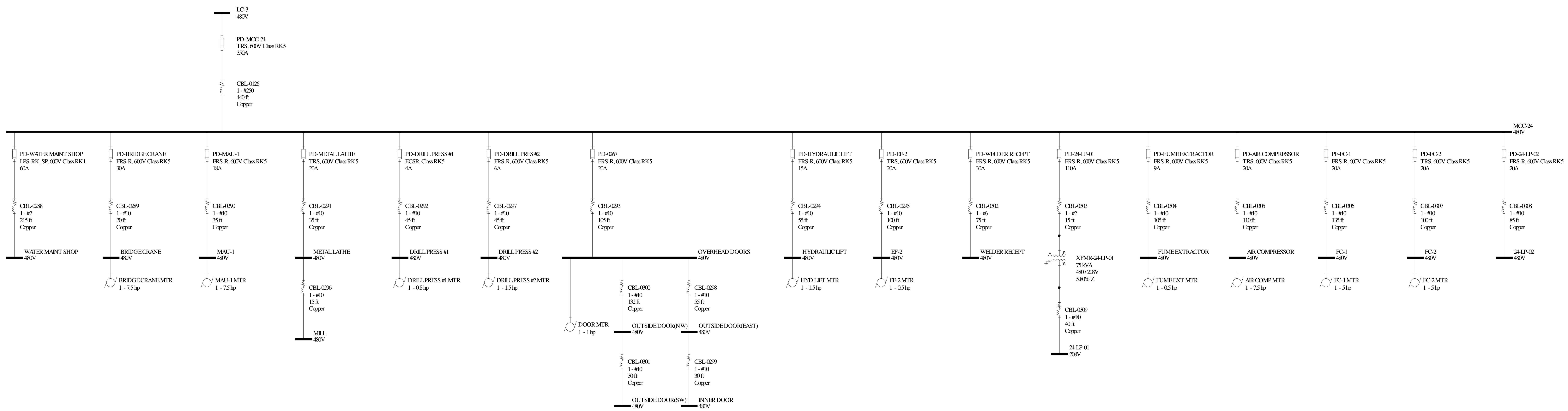
DFTR: K. SWARTZ

ENGR: K. SWARTZ

MCC-21

SCALE: NONE | POWER SYSTEM STUDY | ONE-LINE

PRODUCT CODE <U0160> | REVISION 01 | DATE 5/12/2023 | G.O.MGR0010731



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K. SWARTZ
5/12/2023

DFTR: K. SWARTZ

ENGR: K. SWARTZ

MCC-24

SCALE: NONE

POWER SYSTEM STUDY

ONE-LINE

PRODUCT CODE	REVISION	DATE			SHEET
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ENGR: K. SWARTZ	MCC-25		
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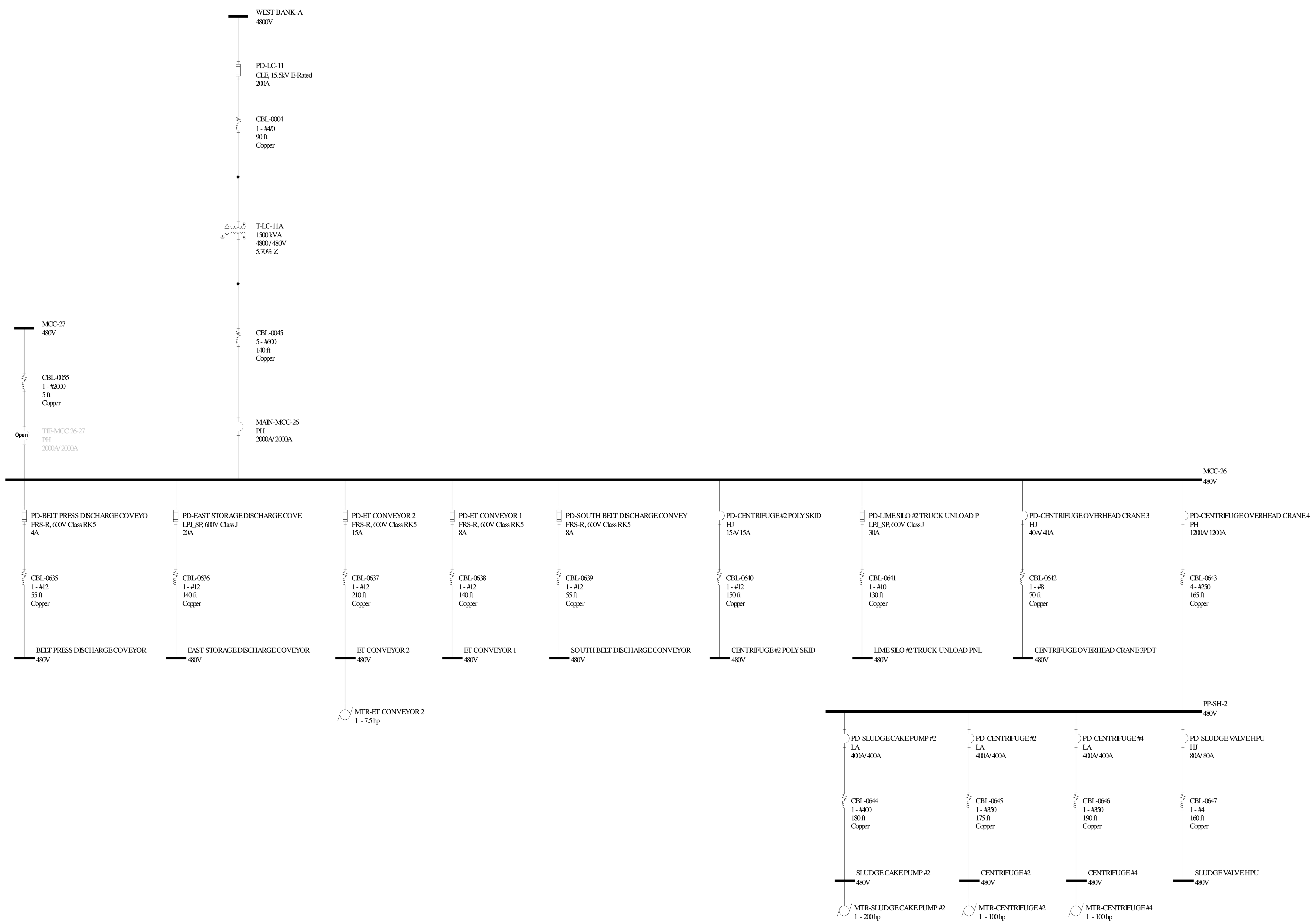

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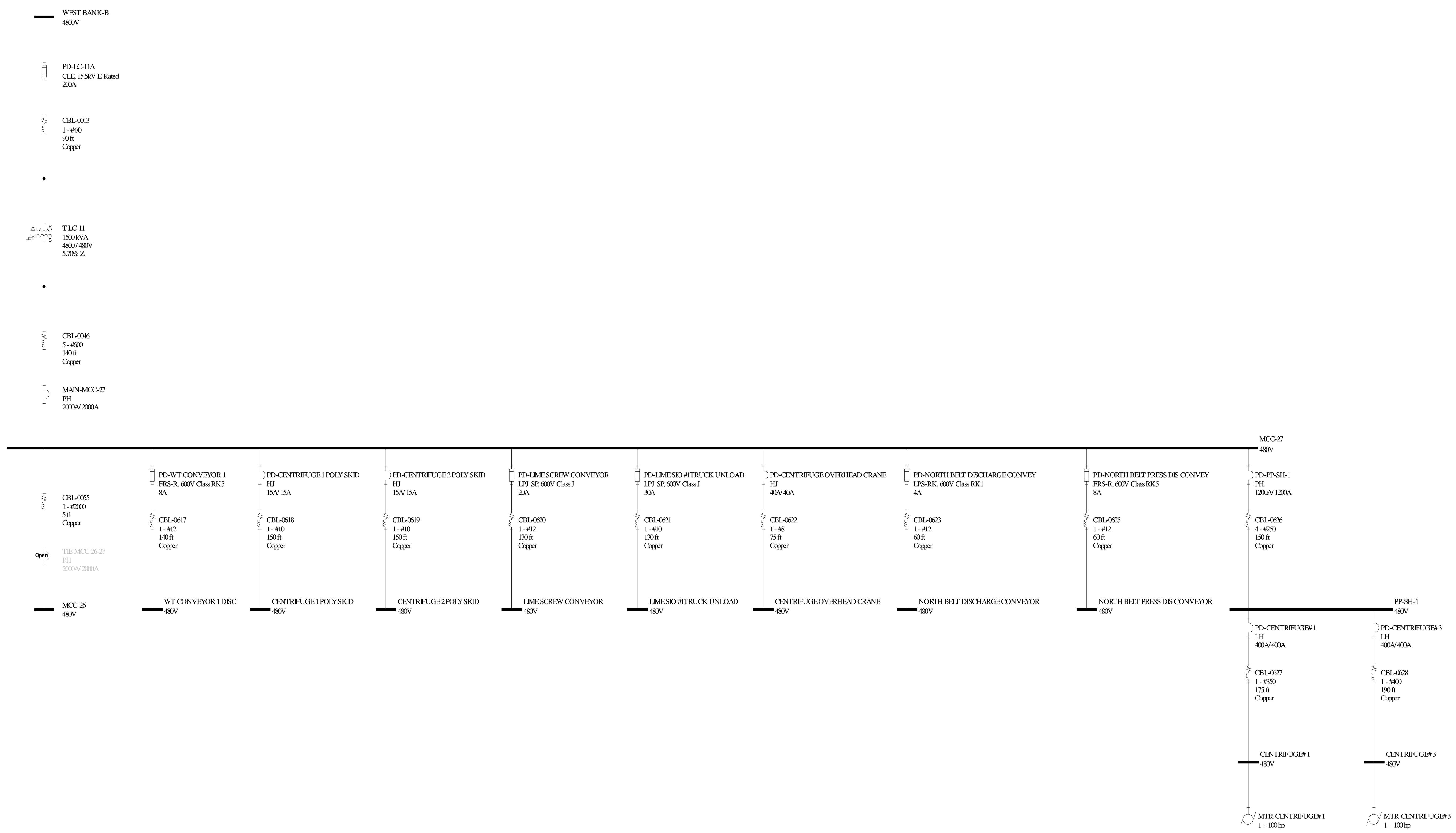

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PRODUCT CODE <U0160>	REVISION 01	DATE 5/12/2023	G.O.MGR0010731
			SHEET 15 OF 20

REV 1
K. SWARTZ
5/12/2023

DFTR: K. SWARTZ

ENGR: K. SWARTZ

MCC-29

SCALE: NONE

POWER SYSTEM STUDY

ONE-LINE

PRODUCT CODE	REVISION	DATE		
<U0160>	01	5/12/2023	G.O.MGR0010731	SHEET 16 OF 20

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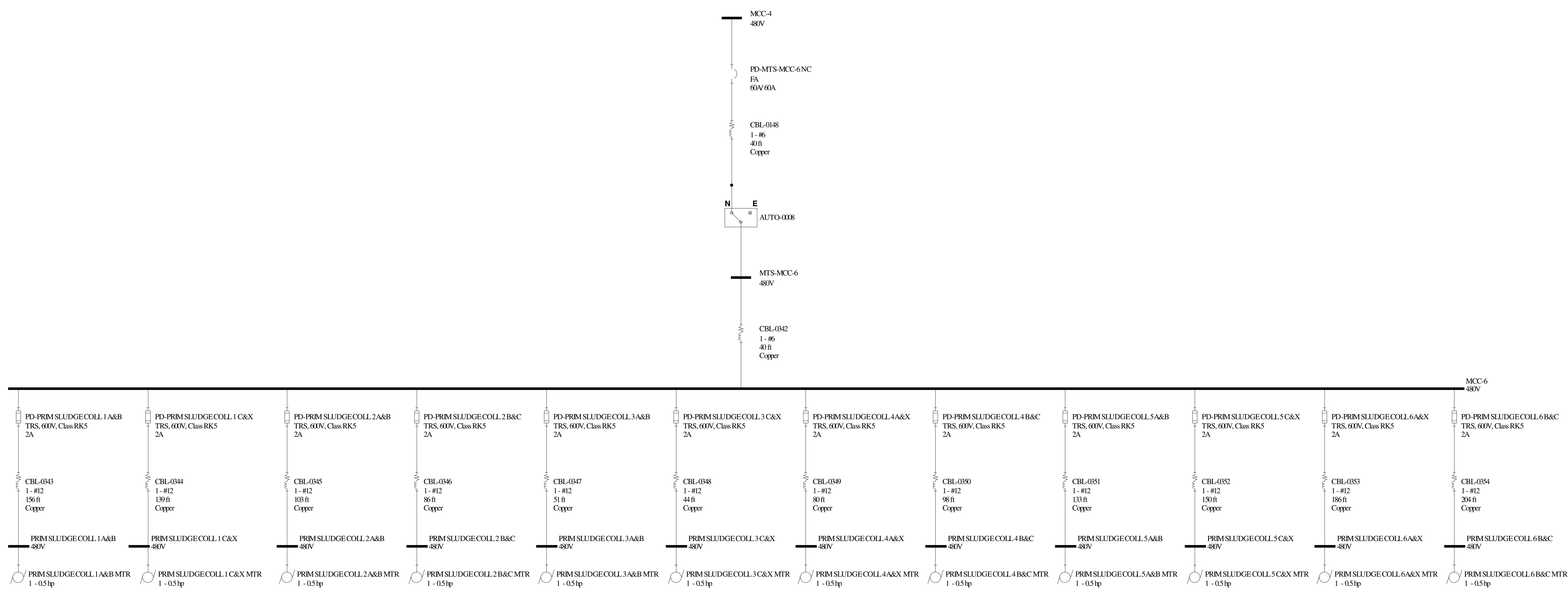

REV 1
K. SWARTZ
5/12/2023

DFTR: K. SWARTZ

ENGR: K. SWARTZ

MCC-6

SCALE: NONE

POWER SYSTEM STUDY

ONE-LINE

PRODUCT CODE <U0160>

REVISION 01

DATE 5/12/2023

G.O.MGR0010731

REV 1
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5/12/2023

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	ENGR: K. SWARTZ	MCC-7		
	SCALE: NONE	POWER SYSTEM STUDY	ONE-LINE	
PRODUCT CODE <U0160>	REVISION 01	DATE 5/12/2023	G.O.MGR0010731	SHEET 19 OF 20

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5/12/2023

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ENGR: K. SWARTZ		MCC-8	
SCALE: NONE		POWER SYSTEM STUDY	ONE-LINE
PRODUCT CODE <U0160>	REVISION 01	DATE 5/12/2023	G.O.MGR0010731	SHEET 20 OF 20

Jones & Henry
ENGINEERS, LTD.

APPENDIX E

DISCOUNT RATE

APPENDIX C
(Revised December 28, 2023)

DISCOUNT RATES FOR COST-EFFECTIVENESS, LEASE PURCHASE, AND RELATED ANALYSES

Effective Dates. This appendix is updated annually. This version of the appendix is valid for calendar year 2024. A copy of the updated appendix can be obtained in electronic form through the OMB home page at https://www.whitehouse.gov/wp-content/uploads/2023/12/CircularA-94AppendixC.pdf. The text of the Circular is found at https://www.whitehouse.gov/wp-content/uploads/2023/11/CircularA-94.pdf, and a table of past years' rates is located at https://www.whitehouse.gov/wp-content/uploads/2023/12/CircularA-94DiscountHistory.pdf. Updates of the appendix are also available upon request from OMB's Office of Economic Policy (a94@omb.eop.gov).

Nominal Discount Rates. A forecast of nominal or market interest rates for calendar year 2024 based on the economic assumptions for the 2025 Budget is presented below. These nominal rates are to be used for discounting nominal flows, which are often encountered in lease-purchase analysis.

Nominal Interest Rates on Treasury Notes and Bonds of Specified Maturities (in percent)

3-Year	5-Year	7-Year	10-Year	20-Year	30-Year
4.5	4.4	4.4	4.4	4.7	4.7

Real Discount Rates. A forecast of real interest rates from which the inflation premium has been removed and based on the economic assumptions from the 2025 Budget is presented below. These real rates are to be used for discounting constant-dollar flows, as is often required in cost-effectiveness analysis.

Real Interest Rates on Treasury Notes and Bonds of Specified Maturities (in percent)

3-Year	5-Year	7-Year	10-Year	20-Year	30-Year
2.2	2.2	2.2	2.3	2.5	2.5

Analyses of projects with terms different from those presented above may use a linear interpolation. For example, a four-year project can be evaluated with a rate equal to the average of the three-year and five-year rates. Projects with durations longer than 30 years may use the 30-year interest rate.

Jones & Henry
ENGINEERS, LTD.

APPENDIX F

PUBLIC PARTICIPATION

If you have any questions regarding
this report, please contact:

Aaron J Davenport, PE
Senior Vice President, Office Director
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