Electrification Study Update
Audit Committee

May 25, 2023

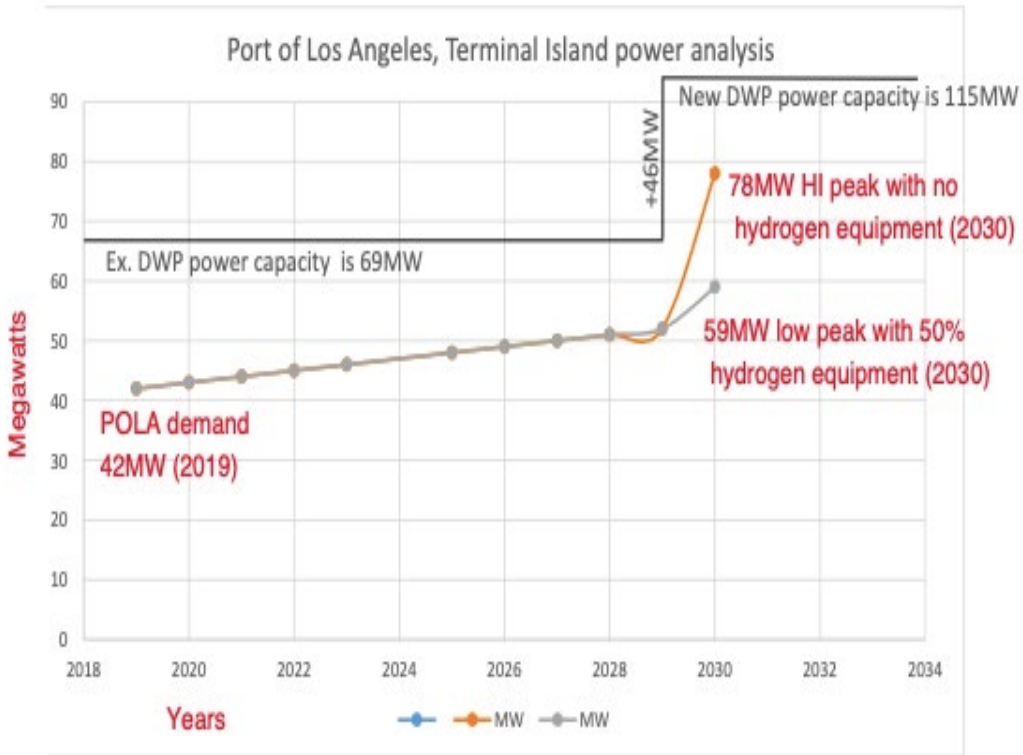
Two Studies:

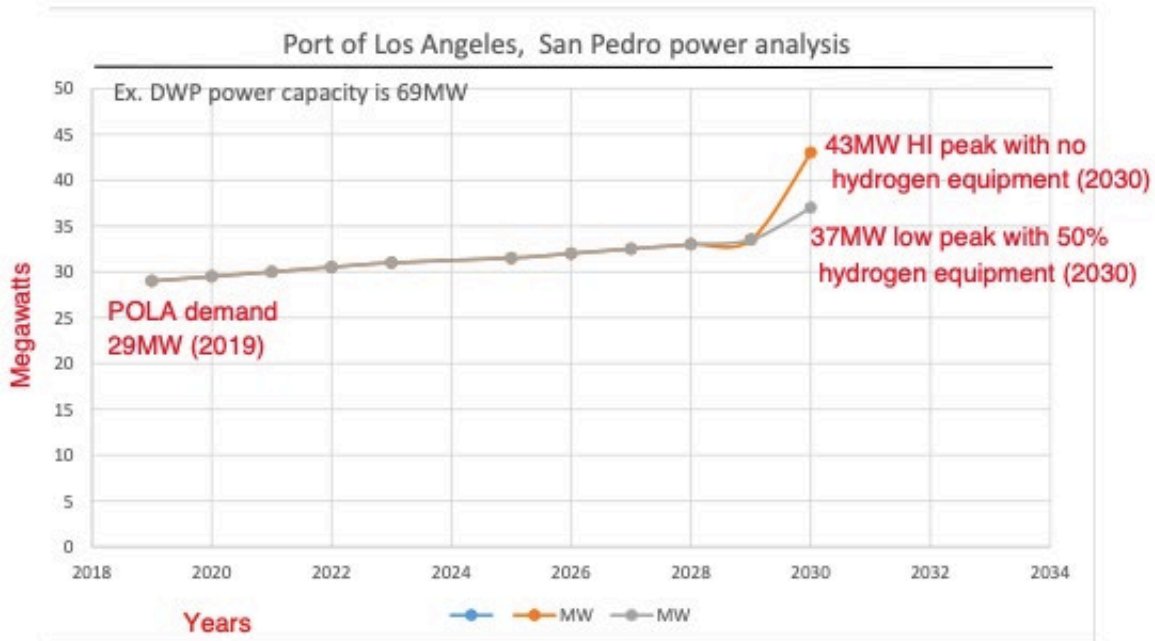
- Customer side of meter (POLA)
- Utility side of the meter (DWP)

Customer Side of Meter
(completed 2019)
Electrical load

– high 121MW

- low 96 MW





DWP currently feeds San Pedro with (3) 34.5KV lines with total capacity of 69MW
DWP did not mention the need for any added 34.5KV circuits to San Pedro area

Calculate Existing Load:
Review each meter existing peak load
Negotiate with DWP for appropriate reduction

Terminal Island = 42 MW
San Pedro = 29 MW
POLA total. = 71 MW

Electrify Equipment for Future Load

(from 2017 CAAP)

yard tractors	1030
top handlers	192
18T forklifts.	34
2.5 T forklift	68
RTG	113
Total	1437

Reductions:

- LED lighting
- Peaks not occurring at same time
- Charging times &
- Battery storage and load balancing
- Future Technology

Customer Side of Meter
Completed 2019

Location	From DWP Existing peak load (MW); 1	estimated DWP demand; 5	**estimated DWP real peak demand (MW)**	conversion LED lights, and Peak shave; 7,10	Battery equip Future load (MW); 2	future battery load power factor for all terminals; 4	Hi Range Battery equip Net future load (MW)	future RTG electrification (MW); 3	Hi Range Total present and future load (MW)	DWP estimated demand;5	**Hi range final Total present and future load (MW);8**	Reduction of future hydrogen trucks, 50% use; 6	Low Range Battery equipment Net future load (MW)	Low Range Total present and reduced future load (MW)	estimated DWP demand;5	**Low range final Total present and reduced future load (MW);8**
Terminal Island	61	0.7	**42**	-19	106	0.5	53	16	111	0.7	**78**	-27	27	85	0.7	**59**
San Pedro	41	0.7	**29**	-5	39	0.5	20	6	62	0.7	**43**	-10	10	52	0.7	**37**
Total	102		**71**	-24	145		73	23	173		**121**	-36	36	137		**96**

Customer Side of Meter
Completed 2019

Conclusions:

Add two new 34.5 KV circuits from RSQ (Wilmington) to Terminal Island

Estimate cost: $

Estimated time: months

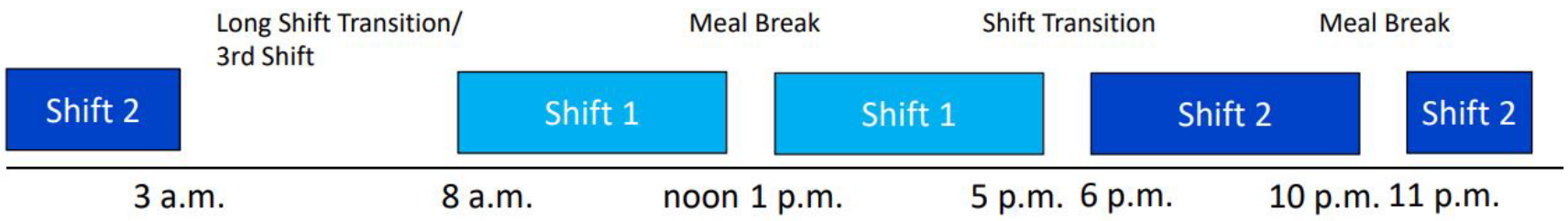
Utility Side of Meter
(draft report March 2023)
Electrical load
– high 135 MW managed
- low 108 MW managed

Summary of Energy and Power for All Terminals

Scenario	Incremental Diversified Power Demand (MW)[1]	Energy Consumption (GWh)[2]
50 % Electrified by 2025 Unmanaged	116	252
50% Electrified by 2025 Managed	108	252
100% Electrified by 2030 Unmanaged	201	358
100% Electrified by 2030 Managed	135	358

Utility Side of Meter
(draft report March 2023)
Electrical load
– high 201 MW unmanaged
- low 135 MW managed

Managed Charging



- Battery Equipment
  - Charges in between working hours
  - Charging can be controlled as long as vehicles have enough charge to complete their duties

Container and Non-Container Terminals

ALL Terminals

All POLA CHE Equipment

2021 Inventory (ALL terminals)

Source: 2021 POLA EI

Equipment by Engine Type	Count
Diesel	***1393***
Bulldozer	3
Cone Vehicle	21
Crane	7
Forklift	100
Hybrid RTG	16
Hybrid Straddle Carrier	82
Loader	14
Man Lift	20
Material Handler	12
Miscellaneous	0
Rail Pusher	1
Reach Stacker	1
Rub-trd Gantry Crane	86
Side pick	18
Skid Steer Loader	5
Straddle Carriers	28
Sweeper	6
Telehandler	7
Top handler	205
Truck (ie mobile fuelers, water trucks)	24
Yard tractor UTR	737
Electric	***162***
Automatic Stacking Crane	29
Crane (mobile)	3
Electric wharf crane (STS crane)	88
Forklift	28
Loader	2
Man Lift	5
Miscellaneous	0
Top handler	2
Yard tractor UTR	5
Gasoline	***10***
Forklift	6
Man Lift	1
Sweeper	3
LNG	***22***
Yard tractor UTR	22
LPG	***339***
Forklift	180
Truck	1
Yard tractor UTR	158
Grand Total	***1926***

Non-Container Terminals

2021 Emissions Inventory

Equipment Count at Non container terminals (includes bulk/general cargo/liquid/others)

Source: 2021 POLA EI

Equipment by Engine Type	Count
Diesel	***194***
Bulldozer	3
Cone Vehicle	6
Crane	7
Forklift	49
Hybrid RTG	1
Hybrid Straddle Carrier	0
Loader	14
Man Lift	7
Material Handler	12
Miscellaneous	0
Rail Pusher	1
Reach Stacker	0
Rub-trd Gantry Crane	5
Side pick	4
Skid Steer Loader	5
Straddle Carriers	0
Sweeper	3
Telehandler	7
Top handler	5
Truck (ie mobile fuelers, water trucks)	10
Yard tractor UTR	55
Electric	***41***
Automatic Stacking Crane	0
Crane (mobile)	0
Electric wharf crane (STS crane)	8
Forklift	28
Loader	2
Man Lift	3
Miscellaneous	0
Top handler	0
Yard tractor UTR	0
Gasoline	***2***
Forklift	2
Man Lift	0
Sweeper	0
LNG	***0***
Yard tractor UTR	0
LPG	***111***
Forklift	111
Truck	0
Yard tractor UTR	0
Grand Total	***348***

Container Terminals

2021 Emissions Inventory

Equipment Count at Container Terminals

Source: 2021 POLA EI

Equipment by Engine Type	Count
Diesel	***1199***
Bulldozer	0
Cone Vehicle	15
Crane	0
Forklift	51
Hybrid RTG	15
Hybrid Straddle Carrier	82
Loader	0
Man Lift	13
Material Handler	0
Miscellaneous	0
Rail Pusher	0
Reach Stacker	1
Rub-trd Gantry Crane	81
Side pick	14
Skid Steer Loader	0
Straddle Carriers	28
Sweeper	3
Telehandler	0
Top handler	200
Truck (ie mobile fuelers, water trucks)	14
Yard tractor UTR	682
Electric	***121***
Automatic Stacking Crane	29
Crane	3
Electric wharf crane	80
Forklift	0
Loader	0
Man Lift	2
Miscellaneous	0
Top handler	2
Yard tractor UTR	5
Gasoline	***8***
Forklift	4
Man Lift	1
Sweeper	3
LNG	***22***
Yard tractor UTR	22
LPG	***228***
Forklift	69
Truck	1
Yard tractor UTR	158
Total	**1578**

Six Container Terminals (Site Visits)

Equipment Count at 6 Container terminals

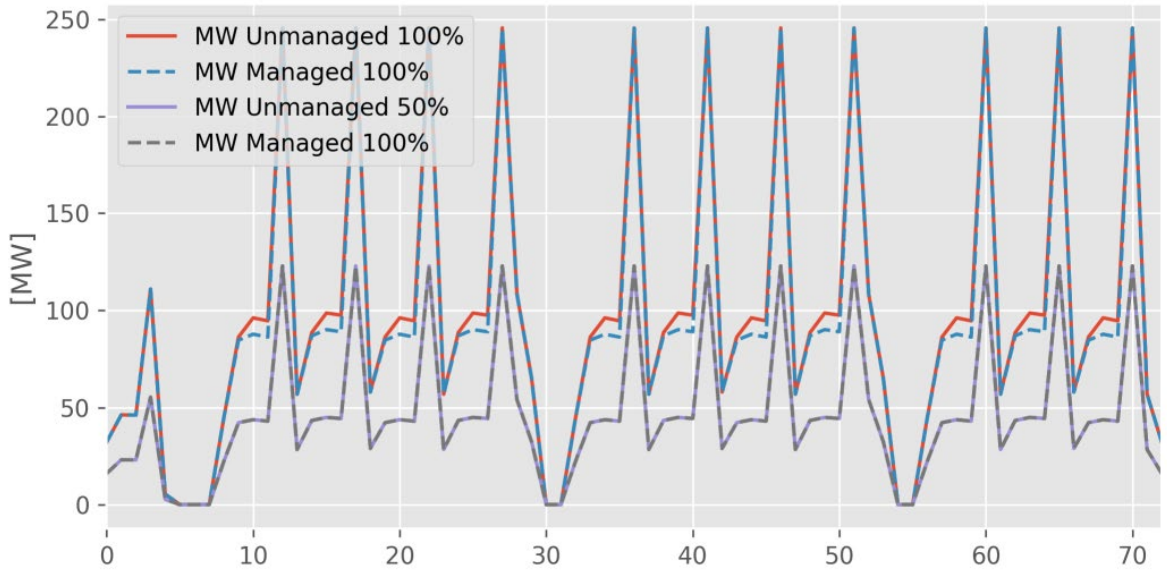
Source: EPRI/LADWP Site Visits 2022

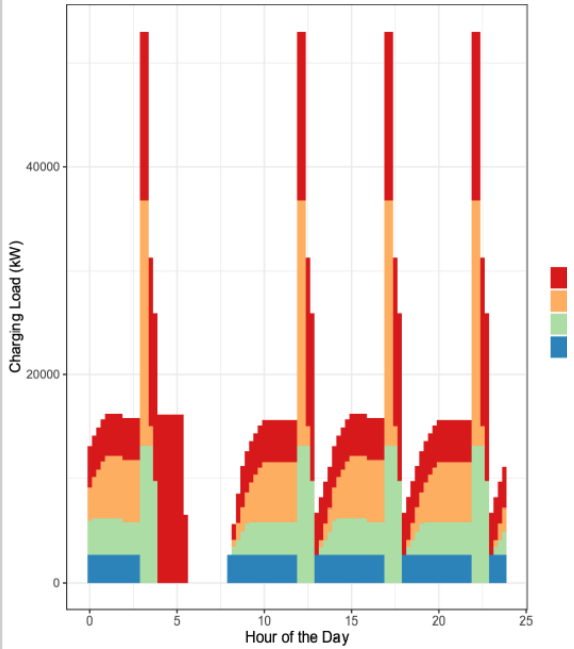
Equipment by Engine Type	Count
Diesel	***1234***
Bulldozer	0
Cone Vehicle	29
Crane	0
Forklift	52
Hybrid RTG	21
Hybrid Straddle Carrier	82
Loader	0
Man Lift	10
Material Handler	0
Miscellaneous	0
Rail Pusher	0
Reach Stacker	0
Rub-trd Gantry Crane	95
Side pick	9
Skid Steer Loader	0
Straddle Carriers	28
Sweeper	7
Telehandler	0
Top handler	223
Trucks	880
Yard tractor UTR	678
Electric	***141***
Automatic Stacking Crane	29
Crane (RMG)	3
Electric wharf crane	79
Forklift	2
Loader	0
Man Lift	0
Miscellaneous	0
Top handler	2
Yard tractor UTR	26
Gasoline	***0***
Forklift	0
Man Lift	0
Sweeper	0
LNG	***22***
Yard tractor UTR	22
LPG	***237***
Forklift	78
Truck	0
Yard tractor UTR	159
Total	**1634**

Power (hp) and Annual Activity (hrs)

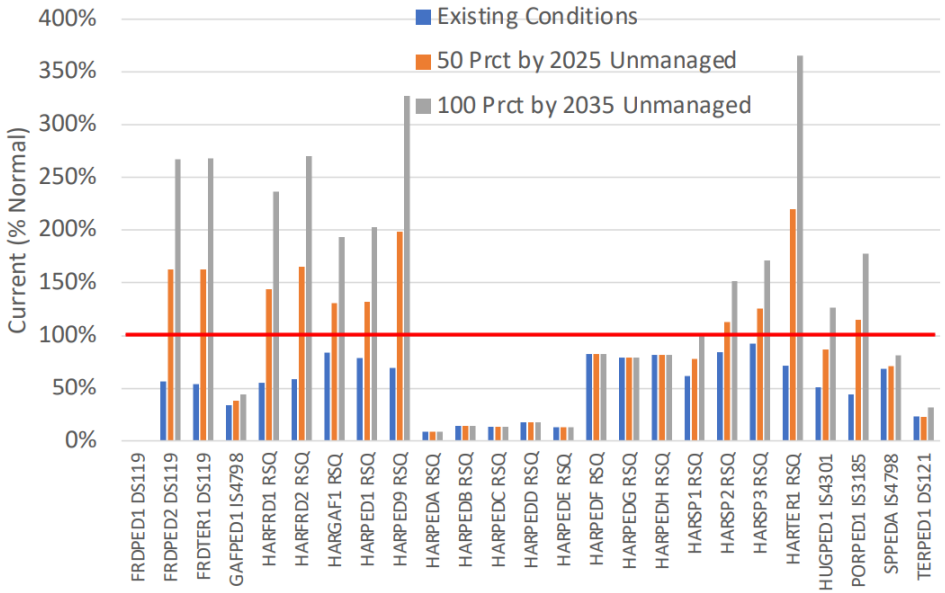
Equipment by Engine Type	Count	Power (hp)			Annual Activity (hrs)		
Diesel (Future Loads)	***1234***	***Min***	***Max***	***Average***	***Min***	***Max***	***Average***
Bulldozer	0	200	310	237	137	591	326
Cone Vehicle	29	25	35	33	1	5,071	1,196
Crane	0	130	751	268	25	1,131	409
Forklift	52	56	388	180	0	2,501	507
Hybrid RTG	21	137	302	255	174	5,493	2,541
Hybrid Straddle Carrier	82	102	103	103	117	3,775	2,142
Loader	0	55	527	311	0	3,921	1,418
Man Lift	10	49	110	81	0	461	167
Material Handler	0	268	475	390	598	3,379	1,885
Rail Pusher	0	194	194	194	2,421	2,421	2,421
Reach Stacker	0	250	250	250	31	31	31
Rub-trd Gantry Crane (RTG)	95	320	779	632	0	4,611	2,517
Side pick	9	152	275	236	0	3,721	533
Skid Steer Loader	0	56	75	69	18	955	525
Straddle Carriers	28	425	425	425	869	6,323	5,256
Sweeper	7	96	210	175	227	887	396
Telehandler	0	74	130	82	51	532	230
Top handler	223	250	400	337	0	4,499	2,419
Truck (Yard Trucks)	880	185	598	373	18	2,434	685
Yard tractor UTR	678	158	250	228	0	5,286	2,038
Electric (Existing Loads)	***141***						
Automatic Stacking Crane	29	na	na	na	961	2,869	2,151
Crane (RMG) (Automated rail mounted gantry cranes)	3	na	na	na	929	1,045	975
Electric wharf crane (STS)	79	na	na	na	0	5,044	1,627
Forklift	2	na	na	na	0	432	194
Loader	0	na	na	na	na	na	na
Man Lift	0	na	na	na	na	na	na
Top handler	2	na	na	na	0	4,499	2,419
Yard tractor UTR	26	na	na	na	0	5,286	2,038
Gasoline (Future Loads)	***0***						
Forklift	0	45	45	45	55	494	274
Man Lift	0	60	60	60	102	102	102
Sweeper	0	205	205	205	na	na	na
LNG (Future Loads)	***22***						
Yard tractor UTR	22	250	250	250	391	1,807	1,085
LPG (Future Loads)	***237***						
Forklift	78	42	200	81	0	2,179	387
Truck	0	na	na	na	266	266	266
Yard tractor UTR	159	174	231	200	0	3,756	1,663

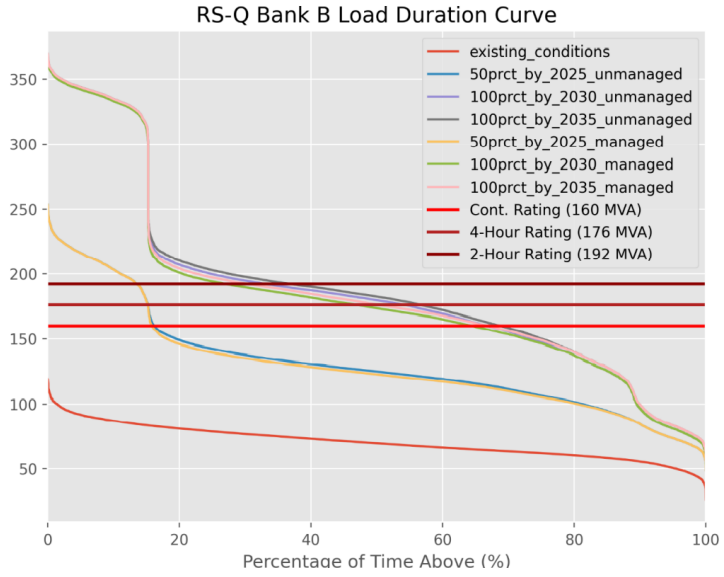
EPRI Model





Unmanaged Charging





Power Demand (MW)

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
POLA Tenants	Current Nameplate Rated Load Capacity[1]				Aggregated Maximum Monthly Electric Demand (non-coincidental) of meters for each terminals (including AMP meters) [5]	Current Aggregated Transformer Nameplate of ISs Supplying the Tenant[6]	Incremental Future Connected Load[7]				Total Future Connected Load[8]				Incremental Future Diversified Peak Demand[9]				Demand Factor[9]			
	Total[2]		AMP + Reefer Load[3]	Other Loads[4]			50% by 2025		100% by 2030		50% by 2025		100% by 2030		50% by 2025 – Unmngd	100% by 2030 – Unmngd	50% by 2025 – Managed	100% by 2030 – Managed	50% by 2025 – Unmngd	100% by 2030 – Unmngd	50% by 2025 – Managed	100% by 2030 – Managed
	Battery (MW)	Grid (MW)	MW	MW	MW	MVA	Battery (MW)	Grid (MW)	Battery (MW)	Grid (MW)	Battery (MW)	Grid (MW)	Battery (MW)	Grid (MW)	MW	MW	MW	MW	no units	no units	no units	no units
TraPac	0.19	41.34	13.23	28.31	14.20	26.25	20.21	0.00	40.42	0.00	20.40	41.34	40.61	41.34	28.06	28.04	28.06	28.04	0.45	0.34	0.45	0.34
Everport	1.06	12.41	6.58	6.89	8.60	17.25	18.22	2.62	36.43	5.23	19.28	15.03	37.50	17.64	11.36	22.67	8.34	10.95	0.33	0.41	0.24	0.20
Fenix	-	23.75	12.11	11.65	13.41	15	30.03	5.89	60.07	11.78	30.03	29.64	60.07	35.53	18.66	37.23	17.37	23.14	0.31	0.39	0.29	0.24
West Basin	-	25.15	14.23	10.92	11.02	22.5	27.54	4.58	55.09	9.16	27.54	29.73	55.09	34.31	16.88	33.62	15.35	19.83	0.29	0.38	0.27	0.22
Yusin	0.03	17.07	9.06	8.04	8.63	21	20.68	3.05	41.36	6.11	20.71	20.12	41.39	23.18	12.22	24.83	11.02	13.96	0.30	0.38	0.27	0.22
APM	1.92	28.58	14.75	15.75	16.36	55	53.95	9.36	107.91	18.72	55.87	37.94	109.83	47.31	23.03	45.04	23.03	32.31	0.25	0.29	0.25	0.21
Six Terminals Total	**3.20**	148.30	**69.96**	**81.55**	**72.22**	**157**	**170.64**	**25.50**	**341.27**	**51.01**	173.84	173.81	344.48	199.31	**110.22**	**191.44**	**103.17**	**128.23**	**0.32**	**0.35**	**0.30**	**0.24**
Non-Container Terminals	0.38	5.82	-	6.20			9.46	1.32	18.91	2.64	9.84	7.14	19.29	8.46	5.38	9.77	5.04	6.54	0.32	0.35	0.30	0.24
POLA (ALL Terminals)	3.58	154.13	69.96	87.76			180.09	26.82	360.18	53.64	183.68	180.95	363.77	207.77	115.60	201.21	108.20	134.77				

Notes and assumptions:

1) Connected load is the aggregated nameplate rating of all the electric equipment. It is typically much higher than the electric supply capacity since not all electric equipment of all customers are used simultaneously.
2) Established based on the terminal Inventory. Includes the AMP and reefer loads.
3) Assumes 2.5 MW/AMP connector, 6 kW/reefer @ 0.5 demand factor. This also includes the maximum AMP loads that can be connected per terminal at a given time.
4) Other loads is calculated as column (B+C) minus column D (Other loads include CHE loads including yard trucks, cone vehicles, and sweepers but not the building loads).
5) Actual measured data from each terminal obtained from LADWP meter data
6) Excludes ISs marked as dedicated for AMP loads
7) Calculated based on the equipment inventory and assumed kW demand by equipment type. These incremental future loads do not include AMP, Reefer, and terminal expansion loads.
8) Sum of the total current connected load (column B+C) and the incremental future connected load (columns (H+I) or (J+K)).
9) The peak demand of the CHE load profiles based on the DEFT tool simulation.

Utility Side of Meter
(draft report March 2023)
Electrical load
– high 201 MW unmanaged
- low 135 MW managed

Conclusions:

1. Terminal Island Extension
2. New Bank at RQP
3. New Outer Harbor Circuits

Terminal Island – 34.5kV Extension

- EPRI: ~250MVA peak demand
- Circuits to Terminal Island
- Reeves Field (consider contingency)
  - 34.5kV Switch Rack
  - New RS

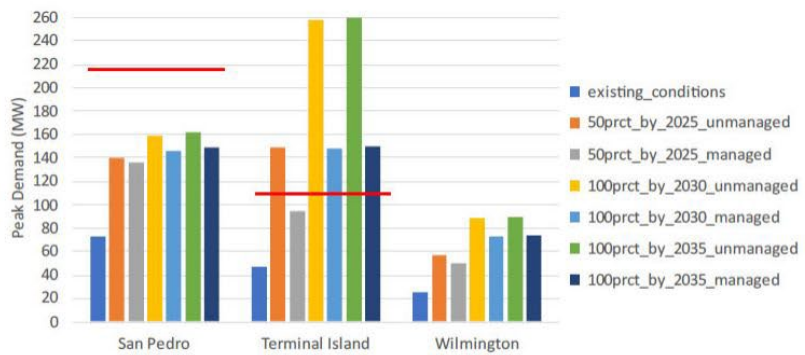


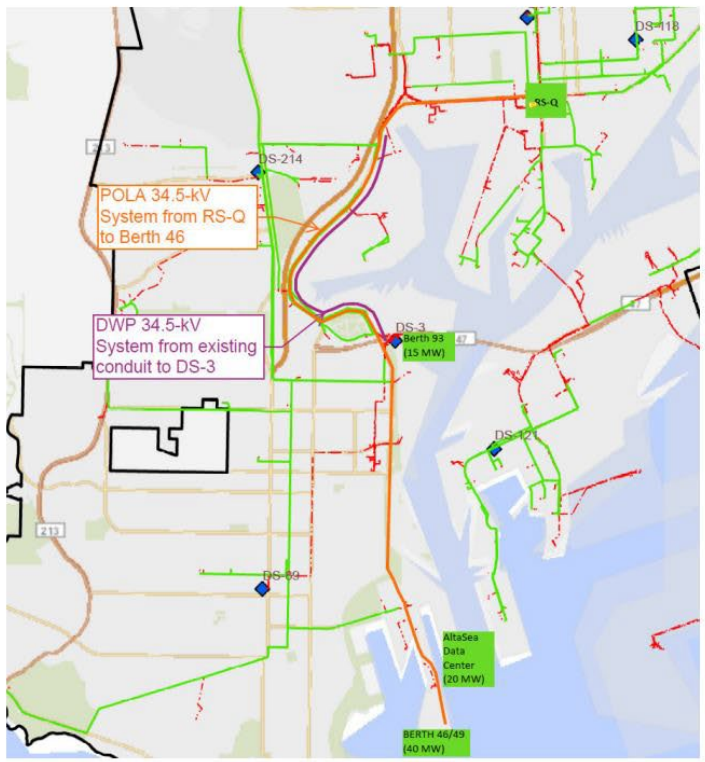
Figure 7-5
Peak demand of the three grid areas with the future upgrades that LADWP plans

RS-Q Rack D Feasibility Study

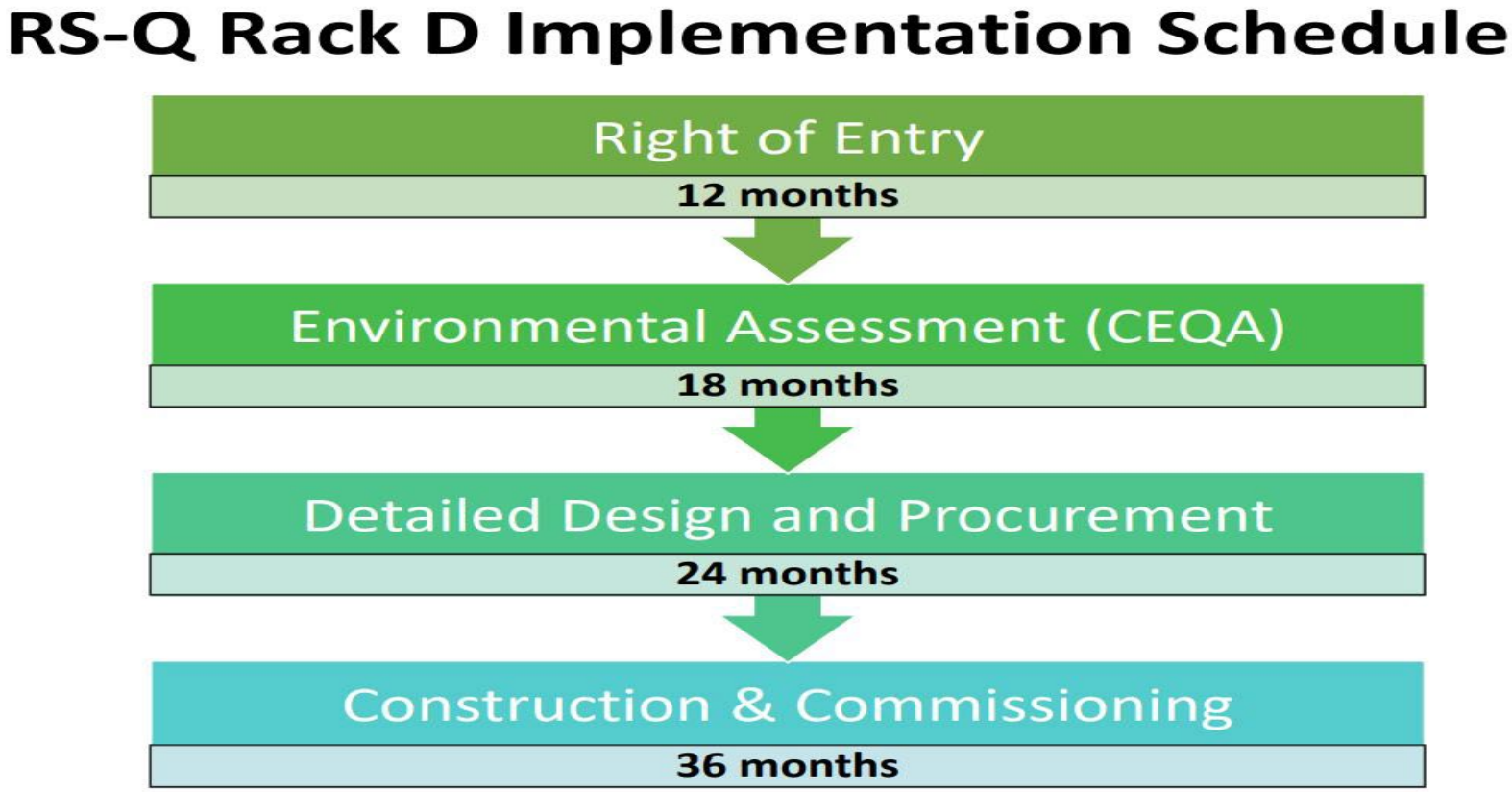
- To accommodate future POLA loads, new RS-Q Rack D will:
  - Add a 160-MVA Bank D
  - 8 to 10 new circuits
  - Transfer circuits from existing bank B
- Substation feasibility indicate Parcel 'L' is most feasible
- Recommend to use 'Y' Parcel
- Parcel Z and HGS Warehouse also reviewed
- Pending:
  - Clear of all easements and quitclaims
  - Environmental remediation

San Pedro Outer Harbor – 34.5kV Extension

- 60 MVA: Cruise Terminal & Alta Sea
- Distribution Extension
  - 5 new 34.5kV circuits
  - 5-6 miles* of new conduit systems
- Estimated Cost: $100M+
- Cost Considerations:
  - UG infrastructure congestion
  - High water table
  - Construction on nights and weekends
  - Environmental reports and permits
  - 3rd party contract for conduit work



Next Steps


RS-Q Rack D Implementation Schedule
Right of Entry
12 months
Environmental Assessment (CEQA)
18 months
Detailed Design and Procurement
24 months
Construction & Commissioning
36 months

Questions

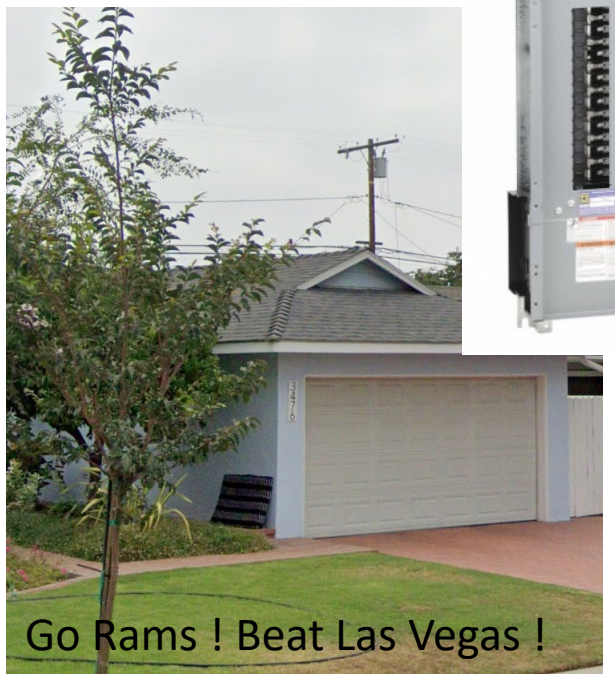
Kurt House

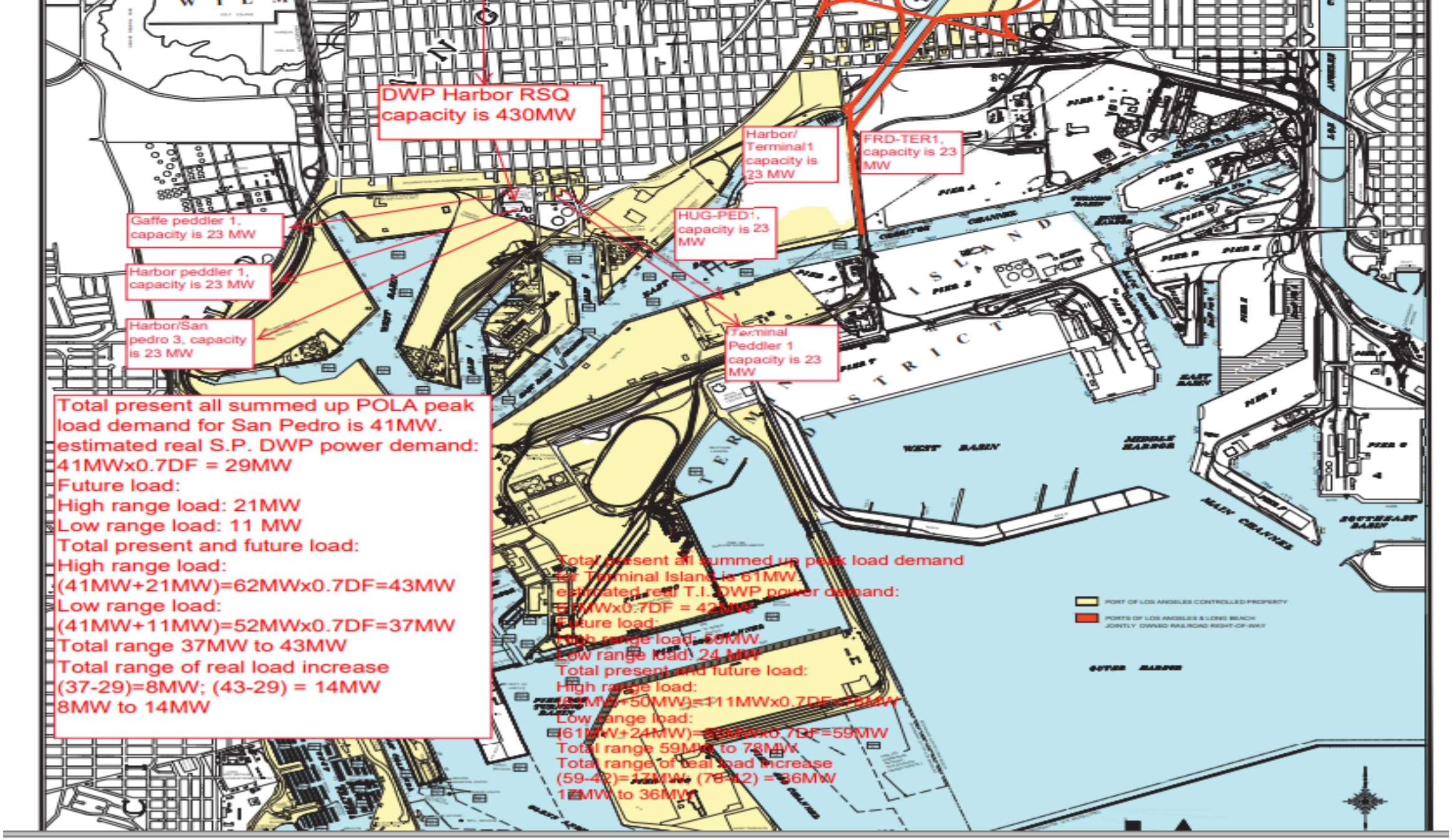
45 outlets at 15 amp each = 675amp
Lighting 10 lights at 15 amps = 150 amps
Air conditioner = 30 amps
Pool = 45 amps
Total connected load = 900 amps

Kurt's panel = 200 amps

Houses connected to SCE transformer
8 houses at 200 amps =1,600 amps

SCE transformer = 600 amps




DWP Harbor RSQ capacity is 430MW
Harbor/ Terminal1 capacity is 23 MW
FRD-TER1, capacity is 23 MW
HUG-PED1, capacity is 23 MW
Gaffe peddler 1, capacity is 23 MW
Harbor peddler 1, capacity is 23 MW
Harbor/San pedro 3, capacity is 23 MW
Terminal Peddler 1 capacity is 23 MW
Total present all summed up POLA peak load demand for San Pedro is 41MW.
estimated real S.P. DWP power demand:
41MWx0.7DF = 29MW
Future load:
High range load: 21MW
Low range load: 11 MW
Total present and future load:
High range load:
(41MW+21MW)=62MWx0.7DF=43MW
Low range load:
(41MW+11MW)=52MWx0.7DF=37MW
Total range 37MW to 43MW
Total range of real load increase
(37-29)=8MW; (43-29) = 14MW
8MW to 14MW
Total present all summed up peak load demand for Terminal Island is 61MW.
estimated real T.I. DWP power demand:
61MWx0.7DF = 42MW
Future load:
High range load: 50MW
Low range load: 24 MW
Total present and future load:
High range load:
(61MW+50MW)=111MWx0.7DF=78MW
Low range load:
(61MW+24MW)=85MWx0.7DF=59MW
Total range 59MW to 78MW
Total range of real load increase
(59-42)=17MW; (78-42) =36MW
17MW to 36MW
TERMINAL ISLAND
WEST BASIN
MIDDLE BASIN
EAST BASIN
MAIN CHANNEL
SOUTHEAST BASIN
OUTER BASIN
PORT OF LOS ANGELES CONTROLLED PROPERTY
PORTS OF LOS ANGELES & LONG BEACH JOINTLY OWNED RAILROAD RIGHT-OF-WAY

List of Industrial Stations for LAHD

IS Number	ECC Name	Terminal Island	Revised POLA Demand (kW)	Peak Demand (kW)	Bank Capacity (kVA)	Address	Circuit Names (Preferred or alternate)	Circuit Names (Emergency)	POLA Load? (Y/N, if not specify tenant if known)
117	Mobil Oil Corp.	X		828	1000	622 EARLE ST.	FRD-TER 1	--	
340	U.S. Navy/Marine Reserve Tng Ctr	X		135	500	802 N. SEASIDE AVE.	HUG PED 1	FRD-TER 1	
561	Mobil Oil-West Coast Pipe Lines	X		880	3750	799 S. SEASIDE AVE.	FRD-TER 1	--	
760	U.S. Federal Correctional Inst	X		648	1500	1700 RESERVATION PT.	HAR-TER 1	--	
881	STARKIST FOODS INC.	X		880.128	1500	936 BARRACUDA ST.	FRD-TER 1	--	
1135	U.S. Customs Service - Customs	X		86.4	2000	300 N FERRY ST.	HUG PED 1	--	
1588	Port of LA - Matson Navigation	X		352	6150	BERTH 207-209	FRD PED 2	FRD PED 2	
1650	Port of LA - Matson Terminal	X		0	3750	207 BERTH	FRD-TER 1	--	
1772	L.A. Dept.Public Works (Sewage)	X		344	1500	45 TERMINAL WAY	HAR-TER 1	FRD-TER 1	
1848	TRI-UNION INTERNATIONAL	X		556.8	1500	815 BARRACUDA ST.	TER PED 1	--	
1852	Terminal Island Treatment Plant	X		4860	25000	445 Ferry St.	POR PED 1	HAR PED 9	
1948	STARKIST FOODS INC.	X		8	3750	1090 WAYS ST.	TER PED 1	--	
2004	DLM FOODS LLC	X		38.4	1000	1038 BARRACUDA ST.	FRD-TER 1	--	
2010	EVERGREEN AMERICA CORP.	X		32	3750	743 S. SEASIDE AVE (BERTH 236)	FRD-TER 1	--	
2094	STARKIST FOODS, INC.	X		174.4	500	212 TERMINAL WAY	FRD-TER 1	--	
2188	EVERGREEN TERMINAL CRANES, BACKLAND	X		2640.5	13500	BERTHS 225-229 TERMINAL ISLAND	HAR-TER 1	FRD-TER 1	
2370	U.S. COAST GUARD	X		288	1500	400 SEASIDE AVE T.I.	HAR-TER 1	--	
2641	YUSEN TERMINAL INC.	X		1992	3750	855 NEW DOCK ST. BERTHS 212-215	HUG PED 1	FRD-TER 1	
2645	YUSEN TERMINAL INC. Berth 216, AMP	X		4100	7500	849 NEW DOCK ST. BERTHS 212-215	FRD-TER 1	HUG PED 1	
2696	HEINZ PET PRODUCTS	X		8	2000	1050 WAYS ST.	TER PED 1	--	
2741	Western Seafood Co.	X		97.92	500	740 S. Seaside Ave.	HAR-TER 1	--	
2807	U.S. Dept. Of Homeland Security, I.C.E.	X		184.32	1000	2001 RESERVATION POINT	HAR-TER 1	--	
3035	L.A. Harbor Dept.	X		43.2	750	225 S HENRY FORD AVE	FRD-TER 1	--	
3041	Los Angeles Export Terminal Inc	X		42	10000	1600 BARRACUDA STREET	TER PED 1	FRD-TER 1	
3124	Eagle Marines, Pier 300	X		2856	10000	626 TERMINAL WAY	FRD-TER 1	TER PED 1	
3125	Eagle Marines, Pier 300	X		3120	5000	626 Terminal Way, Berths 302-305	TER PED 1	FRD-TER 1	
3185	Los Angeles Export Terminal Inc	X		4	20000	750 E. Eldridge St.	HAR PED 9 / HUG PED 1 / POR PED 1	--	
3247	US Coast Guard Support Center	X		362.88	500	1701 RESERVATION POINT	HAR-TER 1	--	
3342	World Port Administration			132.8	500	500 PIER A PL	HAR-TER 1	--	
3722	EVERGREEN TERMINAL M & R BLDG	X		84	1000	227 EARLE STREET	HAR-TER 1	FRD-TER 1	
3752	TRI-MARINE FISH CO.	X		2032	2000	220 CANNERY ST.	FRD-TER 1	--	
4007	San Pedro Red Car Line			35.6	750	164 E 22ND ST	GAF PED 1	--	
4036	APMT pier 400	X		4032	20000	PIER 400, Berth 403	HUG PED 1	FRD-TER 1	
4048	APMT pier 400	X		2184	15000	PIER 400, BERTH 401	FRD-TER 1	HUG PED 1	
4144	YUSEN TERMINAL INC.	X		1307.9	3750	851-853 NEW DOCK ST. BERTHS 212-215	HAR PED 9	HAR-TER 1	
4301	Hugo Neu Proler	X		10219.2	15000	901 New Dock Street, Terminal Island	FRD-TER 1 / HUG PED 1 / FRD PED 2	FRD-TER 1	
4453	Terminal Island Prison (FBOP)	X		780	--	1299 South Seaside Avenue	HAR-TER 1	--	
4861	Evergreen Berth 230 - Port of LA AMP	X		3096	6000	501 E. Terminal Way	FRD-TER 1	HAR-TER 1	
5120	Port of LA Berths 302-306 AMP	X		4464	9000	614 Terminal Way	TER PED 1	POR PED 1	
5258	Port of Los Angeles-Berth 401-402 AMP	X		2676	6000	2500 S. Navy Way	FRD-TER 1	HUG PED 1	
5261	Port of Los Angeles Berth 403-405 AMP	X		4168.8	9000	2500 N. Navy Way	HUG PED 1	FRD-TER 1	

2/14/2018 Terminal Island Sub total peak KW 60,774