4.2.2.3 Engineering Requirements for Offshore Tunnel

The final depth of the tunnel below seabed and its alignment would be based on an evaluation of local geological conditions. The tunnel would extend from the inner side of the eastern breakwater to the offshore wedge wire screen assemblies. Drop shafts would connect the assemblies to the tunnel. To connect the drop shafts to the assemblies, 10-foot-diameter horizontal pipe manifolds would be buried in trenches 15 feet below the seabed. The alternative to trenching would be to anchor the 10-foot-diameter pipe manifolds to the seabed (secured and covered with a rock mound on top). This alternative would have to take the following, at a minimum, into consideration: minimum available water depth, seabed movement sediment and debris (kelp), seabed geology, and wave action. For the purpose of the estimate, the tunnel option was considered. The 6-mm wedge wire screen assemblies would require a footprint of about 220 feet by 240 feet in which the multiple trenches would be opened to a depth of 15 feet below the seabed. The 2-mm wedge wire system would require a footprint of approximately 300 feet by 300 feet.

For the tunneling concept, depending on the site conditions evaluation, various remediation techniques can be considered to deal with fault zones involving soil/rock under water pressure. One solution may be to seal and strengthen the ground ahead of the working face. In deep tunnels, a permanent strengthening and sealing is often required and can be obtained by grouting. Injecting grout that subsequently hardens into the ground increases the ground's strength, stiffness, and imperviousness. The result is a treated region of ground with improved properties surrounding the opening. After a TBM is used to excavate a hollow cylinder, the inner surface of the excavated area is supported by a temporary or permanent lining. In practice, grouted bodies with a diameter corresponding to two or at most three times the tunnel diameter have proved adequate. To minimize the impact of a potential shear and consequent disruption of water flow to the plant, installing a pipe inside the tunnel can also be considered.

Warning buoys would be installed in the area of the wedge wire screen array to avoid shipping impacts on the screens.

General Arrangement Drawing 25762-110-P1K-WL-00060 was developed to aid in obtaining budgetary information from specialty contractors for the installation of the offshore work.

4.2.3 Alternative Concept B: Multiple Offshore Buried Pipes

4.2.3.1 Offshore Buried Pipe System Description

The buried pipe alternative consists of multiple offshore buried pipes that collectively supply water to the shoreline basin formed by the breakwater enclosure. Each buried pipe would be connected to its own dedicated offshore wedge wire assembly.

Figures 4.2-11 through 4.2-18 show the schematic arrangement of the buried pipe alternative. The pipes would pass underneath the new breakwater to supply filtered water to the enclosed basin. On the discharge side, each pipe would have a headwall to mitigate erosion concerns and minimize pipe movement.

The shoreline basin would be constructed by extending the existing inner breakwater westward to close the intake cove from direct contact with the open sea. The only connection of this basin to the sea would be through the buried pipes. Similar to the tunnel alternative, emergency gates would be provided to ensure the continued supply of water to the intake to maintain the safe operation of the service water pumps if screen clogging is imminent under high-debris load conditions.

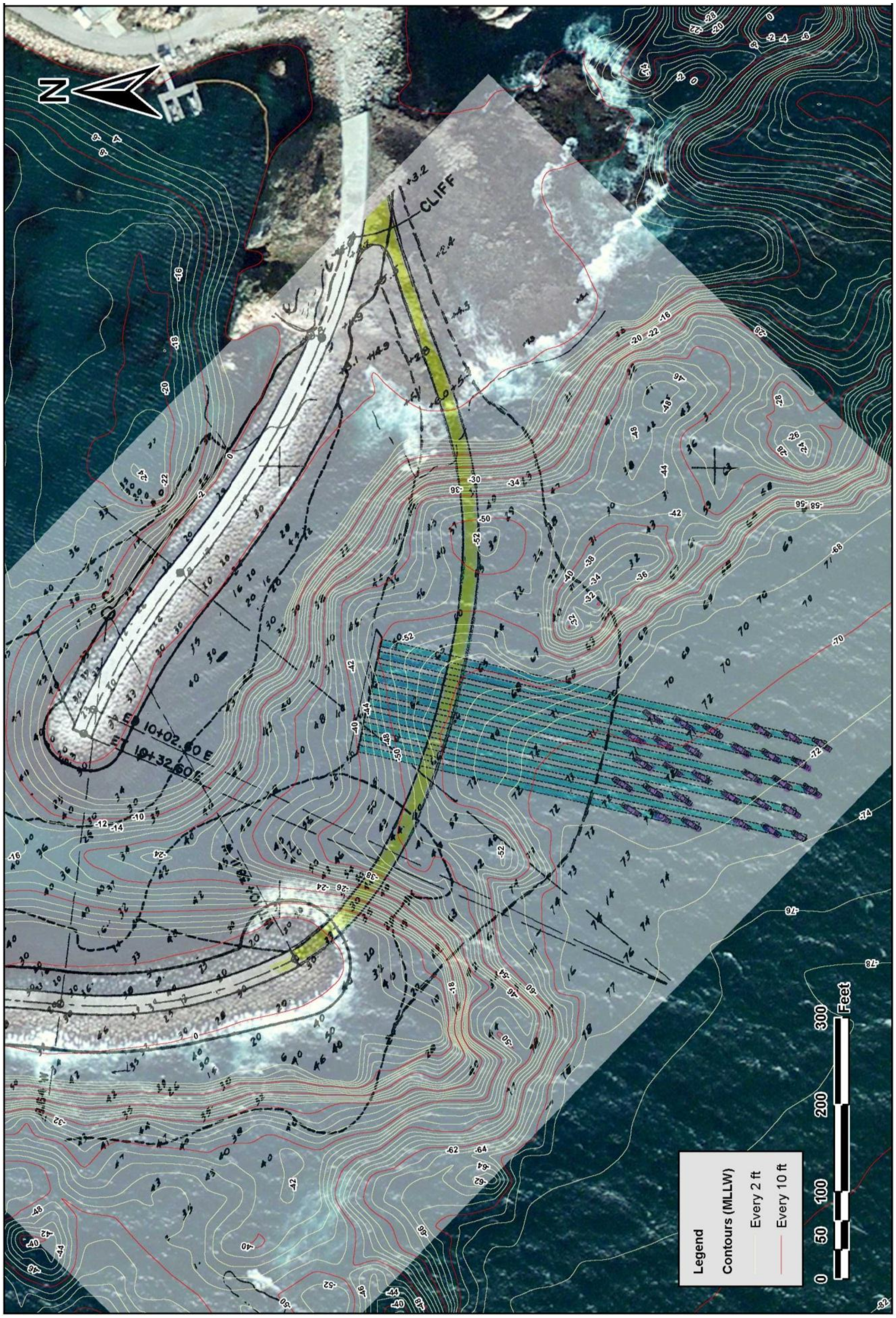


Figure 4.2-11. DCPP Bathymetry/Buried Pipe Layout with 6-mm-Slot Screens (Contour elevations = feet below MLLW)

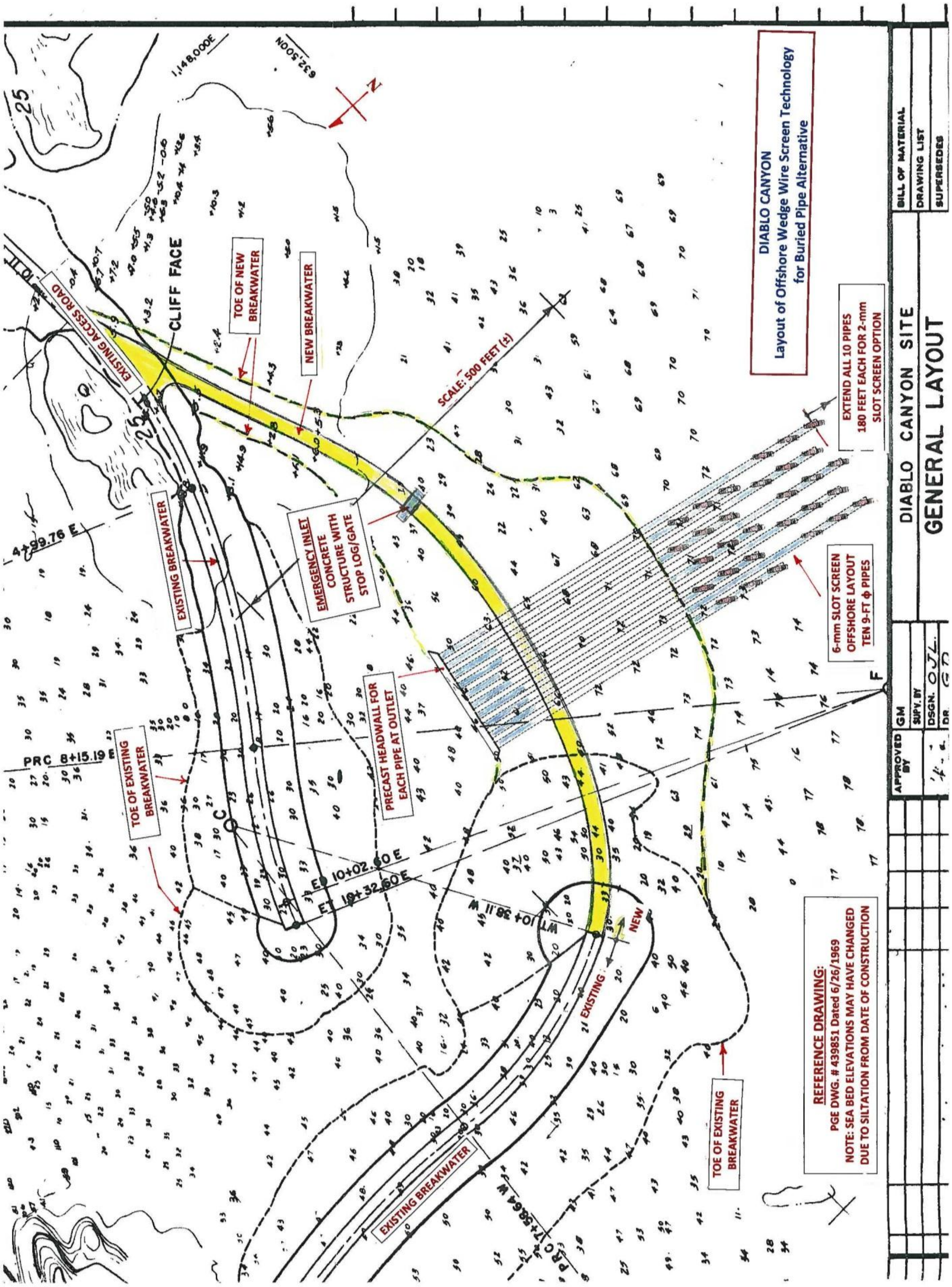


Figure 4.2-12. DCPP Layout of Offshore Modular Wedge Wire Screen Technology (Buried Pipe Alternative)

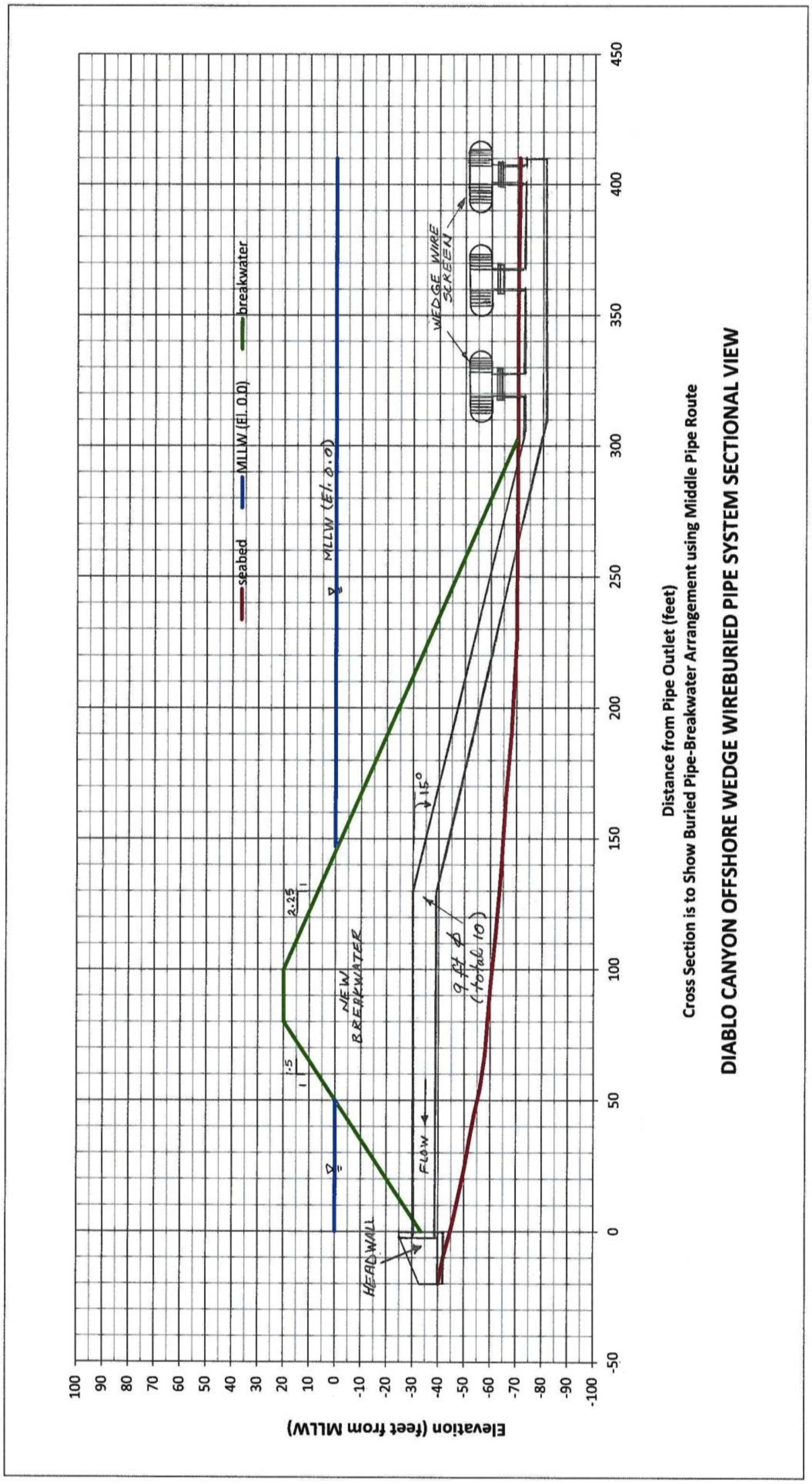
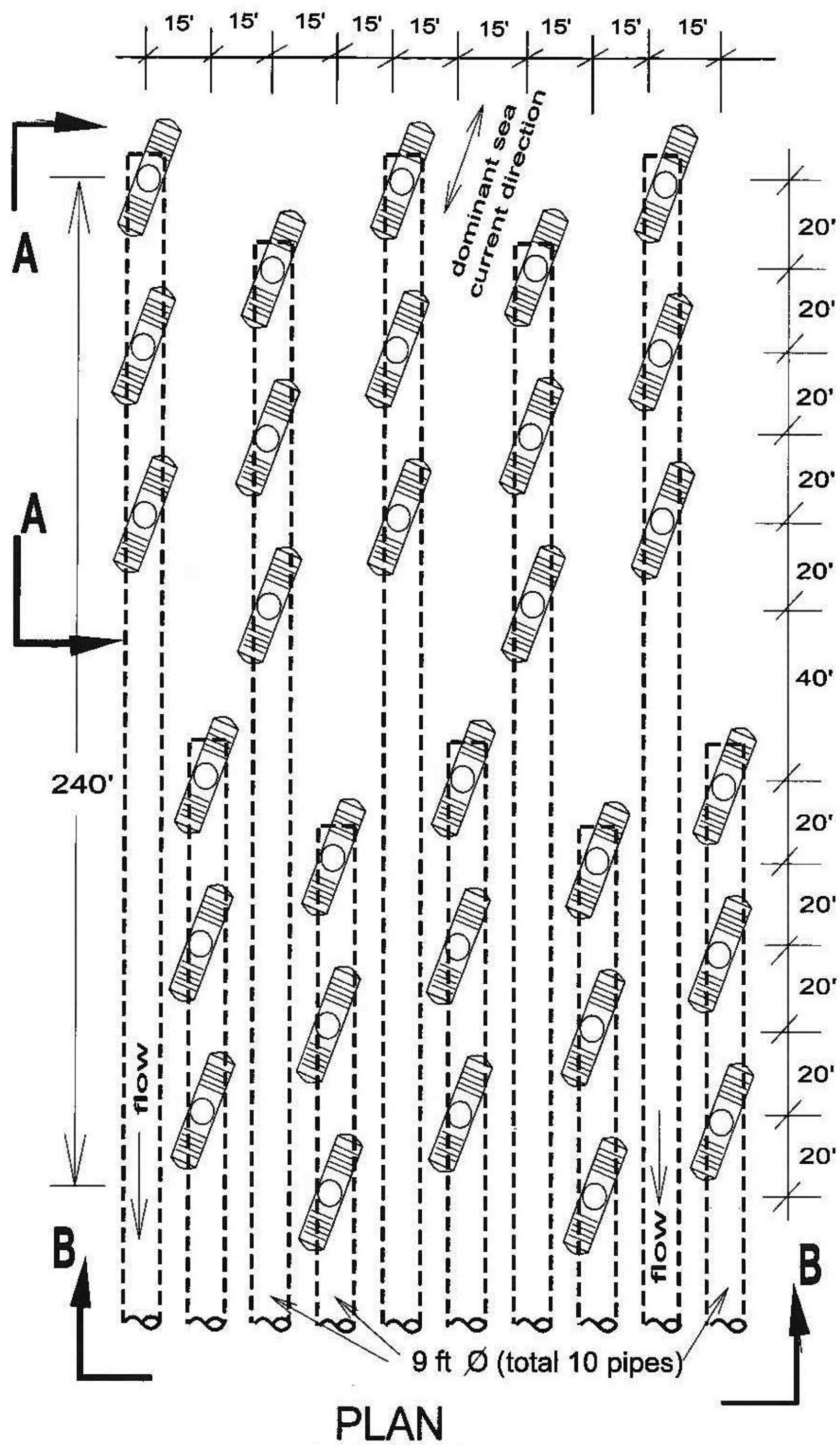


Figure 4.2-13. DCPP Offshore Modular Wedge Wire Buried Pipe System (Sectional View)



Notes:

1. Total Thirty (30) 8-ft diameter 6-mm Slot Wedge-Wire Tee-Screens
2. 6-mm Wedge Wire Screens, Z-Alloy Material, with End Cones
3. The total design flow is 1.753 million gpm.
4. Riprap placement on area over buried pipes and under the screens.

Figure 4.2-14. DCPP 6-mm-Slot Modular Wedge Wire Screen Intake System (Plan View)

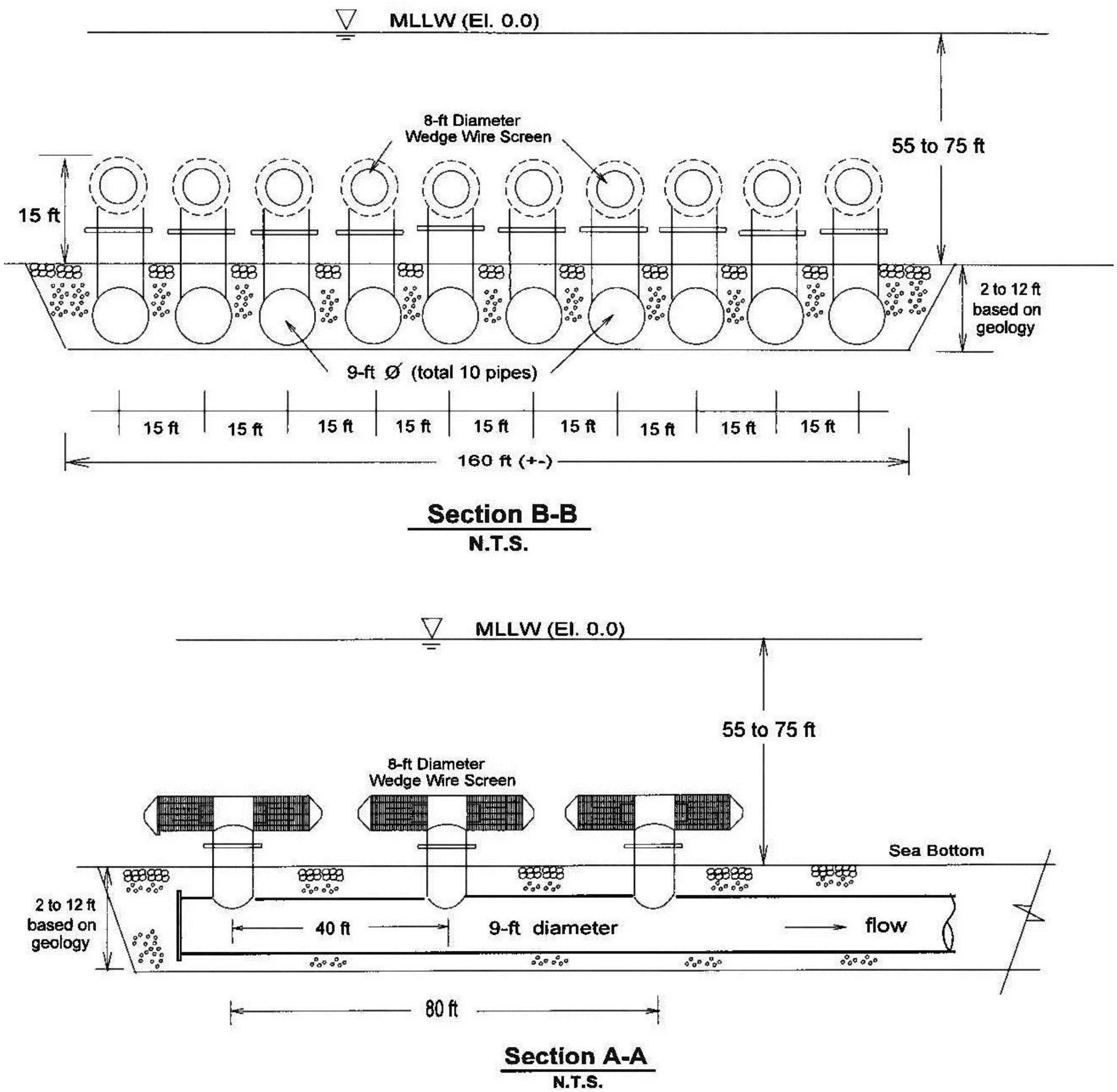
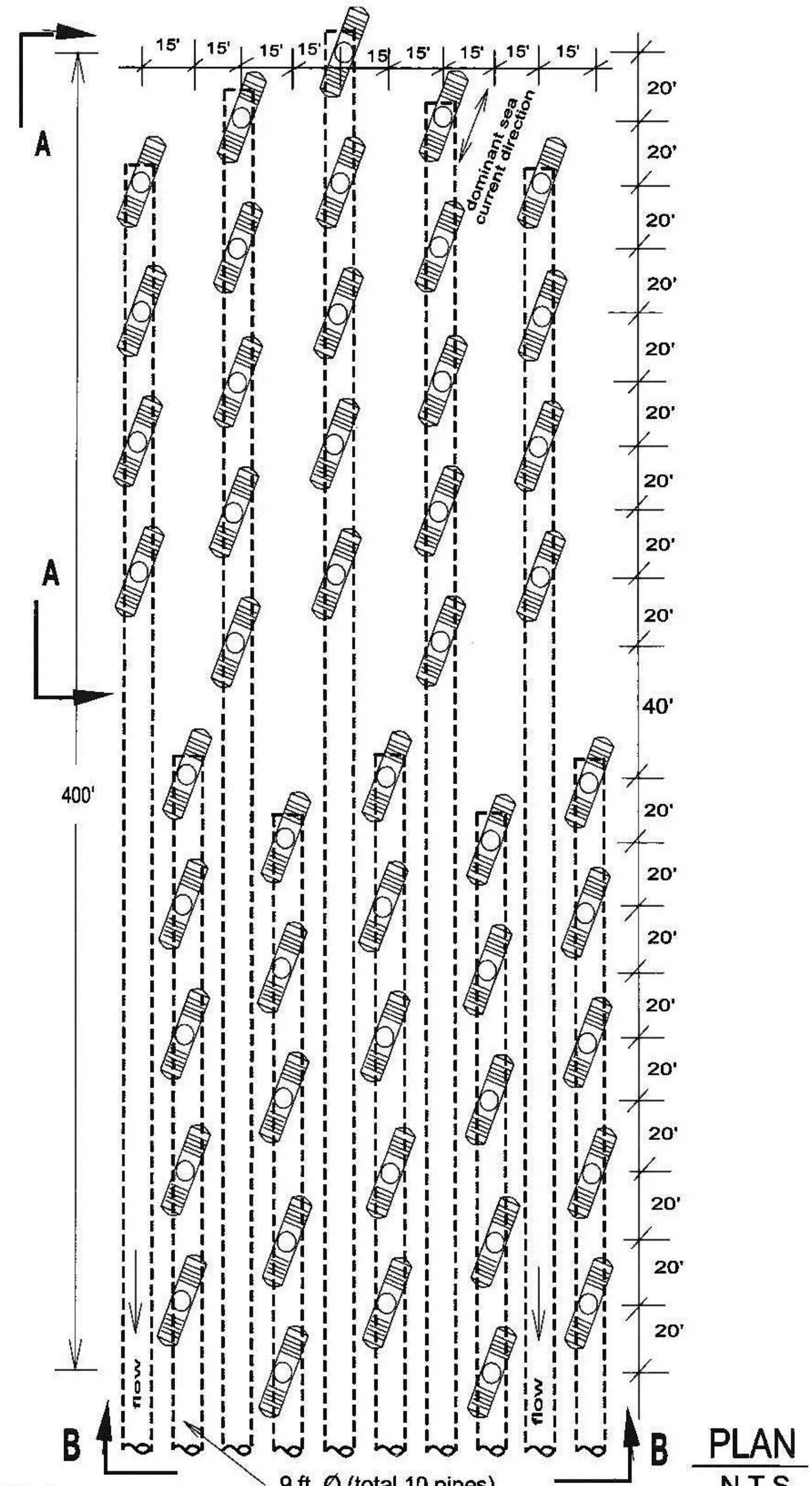


Figure 4.2-15. DCPP 6-mm-Slot Modular Wedge Wire Screen Intake Assembly (Sectional Views)



Notes:

1. Total Forty Eight (48) 8-ft diameter 2-mm Slot Wedge-Wire Tee-Screens
2. 2-mm Wedge Wire Screens, Z-Alloy Material, with End Cones
3. The total design flow is 1.753 million gpm.
4. Riprap placement on area over buried pipes and under the screens.

Figure 4.2-16. DCPP 2-mm-Slot Modular Wedge Wire Screen Intake System (Plan View)

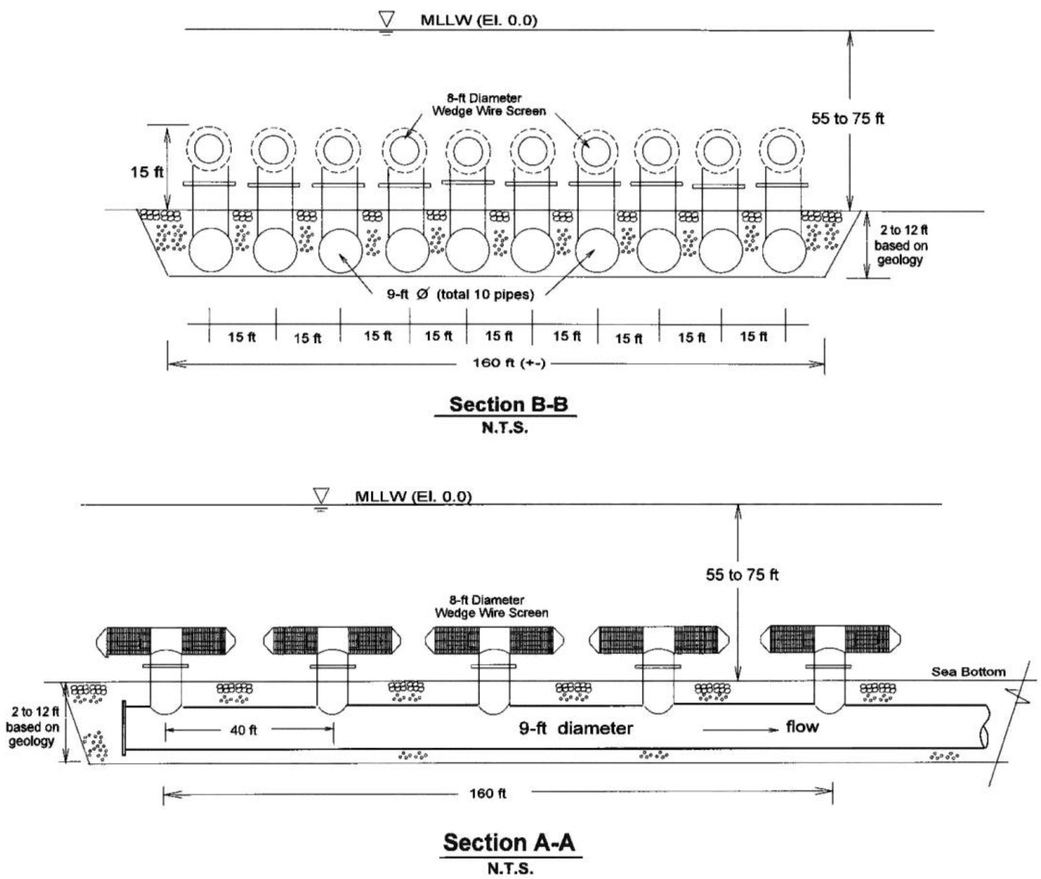


Figure 4.2-17. DCPP 2-mm-Slot Modular Wedge Wire Screen Intake Assembly (Sectional Views)

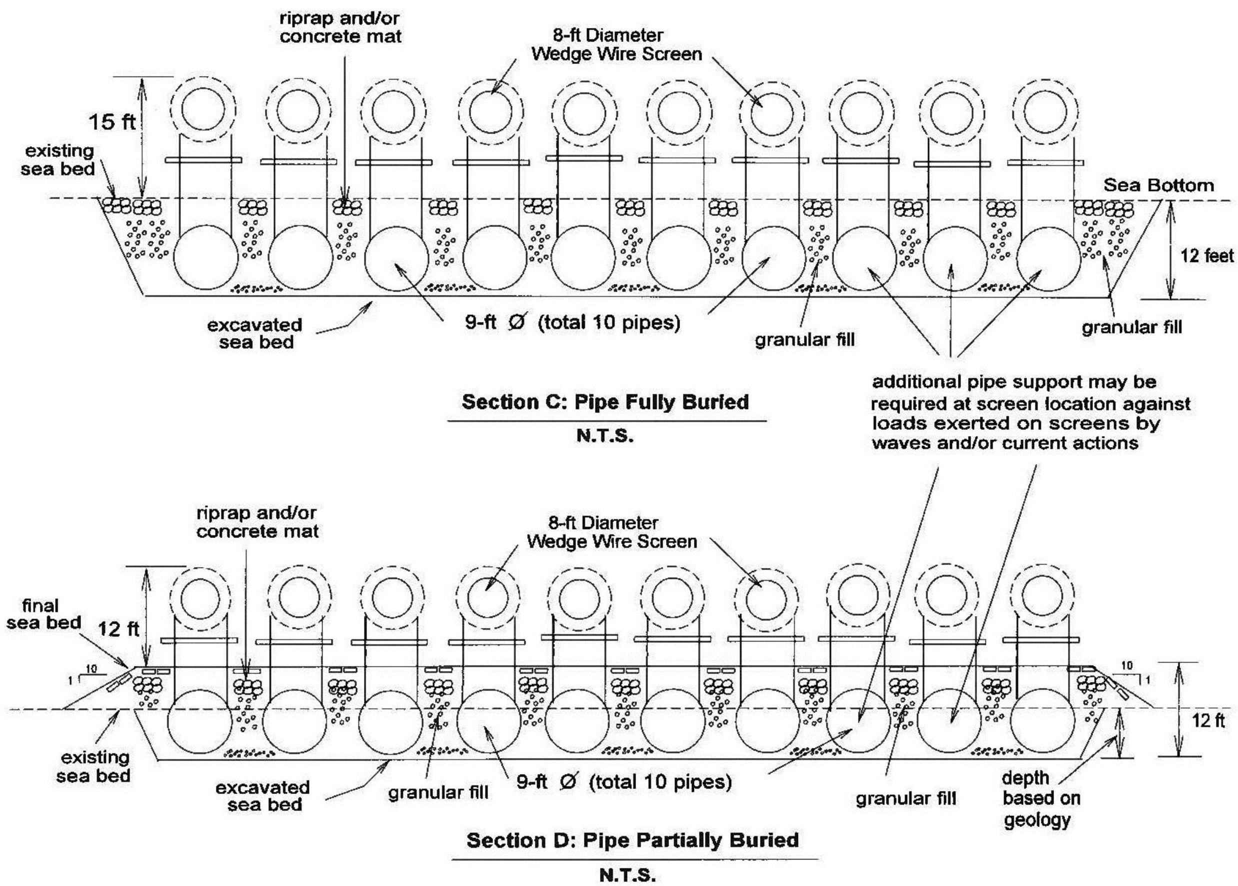


Figure 4.2-18. DCPP Potential Buried Pipe Trench Scenarios (Based on Seabed Geology)

4.2.3.2 System Components for Offshore Buried Pipes Alternative

Wedge wire screen assemblies (see Figures 4.2-14 through 4.2-18) – Wedge wire assemblies would be used as the intake water source for the system and would be designed to restrict the intake water velocity and mitigate potential impingement. The total design flow is 1.753 million gpm. The screen assemblies would use a system design intended for applications consistent with the project environmental conditions:

a. 6-mm-slot-opening screens – Installation of the wedge wire screens would include designing, furnishing, and installing wedge wire screens at each of the vertical pipe flanges above the seabed. The conceptual design requires thirty 8-foot-nominal-diameter, 35-foot-long wedge wire screens. Three wedge wire screens would be connected to each 9-foot-diameter pipe via a flanged connection.

b. 2-mm-slot-opening screens – Installation of the wedge wire screens would include designing, furnishing, and installing wedge wire screens at each of the vertical pipe flanges above the seabed. The preliminary design requires forty-eight 8-foot-nominal-diameter 35-foot-long wedge wire screens. Four or five wedge wire screens would be connected to each 9-foot-diameter pipe via a flanged connection.

Pipes – Ten 9-foot-diameter pipes with an average length of 450 feet for 6-mm-slot screens and 600 feet for 2-mm-slot screens would be designed, procured, and installed to convey water from the screens to the enclosed shoreline basin. Whether the pipes were trenched or anchored would depend on location, seabed profile, geotechnical conditions, and which would cause the least environmental impact. Pipe material would be FRP.

New breakwater – The new breakwater, located west of the existing one, would be designed and constructed to provide an enclosure to the shoreline basin (intake cove). Design and construction would be based on duplicating the existing breakwater.

The existing and new breakwaters would be sealed on the basin side to exclude fish, eggs, and larvae from entering the basin. Engineering evaluations would be made to provide assurance that such measure would not undermine the stability of the breakwater during wave attacks, since pervious breakwaters are designed to reduce the magnitude of the impact force.

Emergency backup water supply – Precast reinforced concrete box culverts, including vertical concrete walls and stop logs, would be designed and installed within the new portion of breakwater. Their design would facilitate stop log installation and removal. The conceptual sketch of this structure is shown on Figure 4.2-10.

Headwalls – Ten precast reinforced concrete headwalls would be designed and installed at each pipe outlet located on the inner side of the new breakwater.

It would be necessary to stockpile excavated/dredged tunnel, shaft, and lateral-placement material either on the DCPP site or within a maximum of 5 miles offsite. An access road to the existing east breakwater would also need to be constructed. Dredging activities should have minimal impact on the aquatic life.

4.2.3.3 Engineering Requirements for Offshore Buried Pipes Alternative

For the offshore buried pipe alternative, the wedge wire assembly requirements are the same as those discussed for the offshore tunnel concept, with the exception of pipe manifold size and flow conveyance system to the intake cove. The 2-mm or 6-mm wedge wire screen assemblies would be buried in trenches (or anchored to the seabed) depending on the minimum available water depth, seabed geology, and wave action. The alignment of the buried pipes can be adjusted based on local geological conditions. Based on the geotechnical information, the pipes could be either clustered in two groups of five, with each group buried in a trench approximately 80 feet wide, or all placed together in a single 160-foot-wide trench. The trench(es) would terminate at the shoreline basin (intake cove), the pipes would be installed, and then the new breakwater would be constructed over them. The portion of the pipes running beneath the breakwater would be supported above the seabed, after suitable bedding is prepared, rather than being placed in a trench.

To create a suitable support system for either the buried pipes or the wedge wire assembly trenches, seabed strengthening may be required, depending on the extent of the fracture zone. This is expected to be a relatively minimal effort, compared to the concept involving tunnel grouting.

Warning buoys would be installed in the area of the wedge wire screen array to avoid shipping impacts on the screens.

General Arrangement Drawing 25762-110-P1K-WL-00061 was developed to aid in obtaining budgetary information from specialty contractors for the installation of the offshore work.

4.2.4 Modular Wedge Wire Screening Technology and Design Requirements

4.2.4.1 Wedge Wire Screens Details

The wedge wire screens considered for this evaluation are T-type circular cylinder screens that are 8 feet in diameter (Figures 4.2-19 through 4.2-21). The 8-foot screen is currently the largest size commercially available with operating experience. Considering the large cooling water withdrawal flow requirement, the high-capacity/high-performance screens are recommended to achieve a more evenly distributed flow across the screen face. The design would be based on a maximum slot flow-through velocity of 0.5 fps. Potential debris loading in a marine environment favors larger screen slot sizes, while fish, egg, and larvae exclusion favors smaller slot sizes that increase the blockage potential. Due to this conflicting requirement, two slot sizes (6 mm and 2 mm) are being considered for in-situ testing at the site. The smaller the screen slot size, the higher the number of screens required. To meet DCPP flow requirements, forty-eight 2-mm-slot screens or thirty 6-mm-slot screens would be needed. In-situ screen testing would be conducted for both slot sizes to evaluate entrainment and impingement performance versus debris clogging and biofouling.

The screen arrays would be located on the seabed at approximately the location shown on Figures 4.2-3 and 4.2-11. The bottom faces of the screens would be 7 feet above the finished seabed level. The distances shown on Figures 4.2-6 through 4.2-9 and 4.2-14 through 4.2-18 are centerline distances. As shown in the conceptual sketches for the tunnel, the screens would be grouped into five or six assemblies connected to five or six 12-foot-diameter drop shafts via 10-foot-diameter laterals. Most likely, it would be necessary to install orifice plates fabricated from biofouling-resistant material at the outlet flanges of each screen to balance flow. No air-burst system or other means of removing aquatic debris, aquatic organisms, and sediment that may accumulate on the screen surfaces would be required. The screens would be bolted to the manifold risers using frangible bolts designed to break on impact from ship hulls or anchors. The laterals would be either trenched or anchored to the seabed, depending on location and geological condition of the seabed. Adequate rip-rap or concrete mats would be provided around the completed installation to prevent erosion. The entire screen assembly would be constructed of copper-nickel alloys that resist biofouling and would be field tested before final selection.

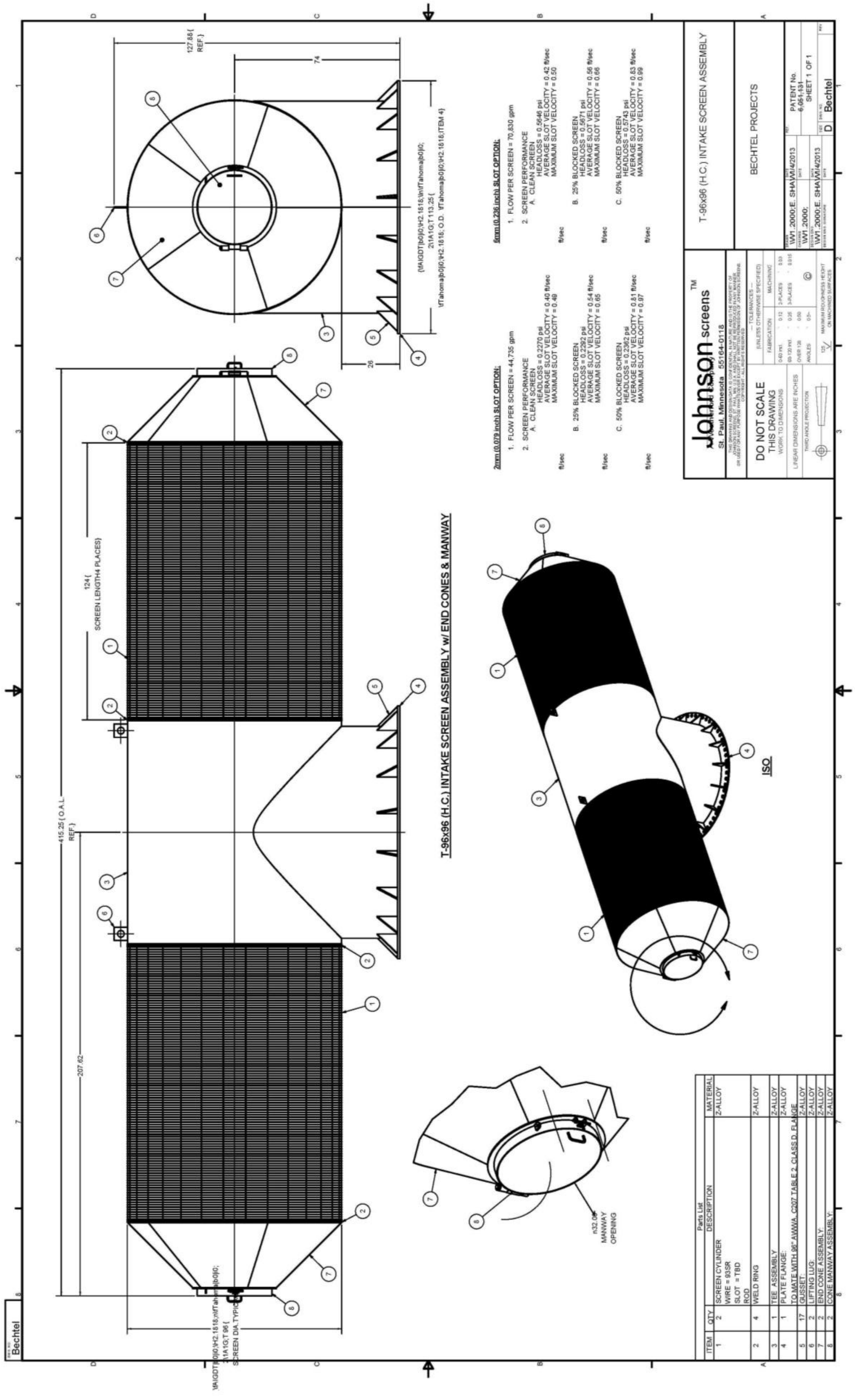
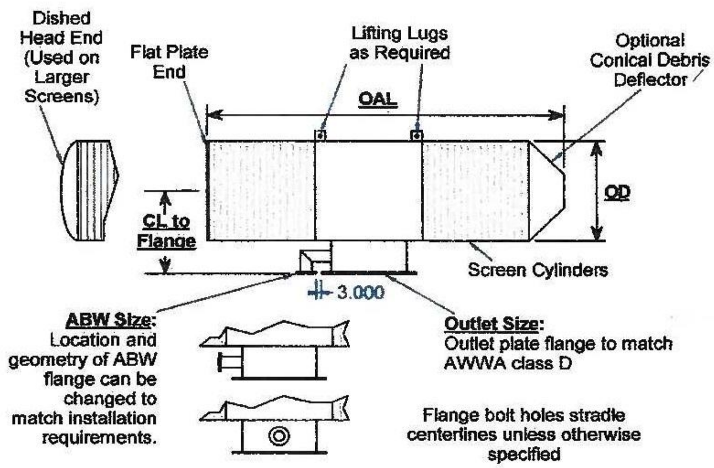


Figure 4.2-19. DCPP Intake Screen Assembly



Dimension/Sizes	Value	Unit	Comments
Model	T96HCE		
OD	96.00	in	Nominal See note 1
OAL	416.00	in	Nominal See note 1
CL to Flange	96.00	in	Nominal See note 1
Outlet Connection Size	96PS		See note 2
ABW Connection Size	none		See note 2
Estimated Weight	28080	lbs	
Left End Closure	Cone		
Right End Closure	Cone		

Screen Specifications			
Slot Opening	0.236	in	
Open Area Percentage	72.62%		
L/D Ratio	1.300		
Effective Screen Length	125.00	in	
Wire Type	93		

Design:			
Depth	40	Ft	Hydrostatic Load
Collapse Rating	17.34	psi	
Material	ZALLOY		SS or Z-Alloy

Flow Capacities:			
Flow/Screen	70833.33333	GPM	See note 3
Maximum Slot Velocity	0.50	fps	See note 3
Average Slot Velocity	0.42	fps	See note 3
Estimated DP/Screen	0.0032	psi	Thru clean screen surface only-See note 4
Estimated DP/Assy	0.5646	psi	Through entire clean assembly - See note 4

PATENT # #6,051,131

Notes:

1 Dimensions shown are nominal. All screens are made to order, and can be adapted to a wide variety of installation requirements.

2 These are based on the size of the connecting and abw pipe and may vary from the values listed in the technical brochure.

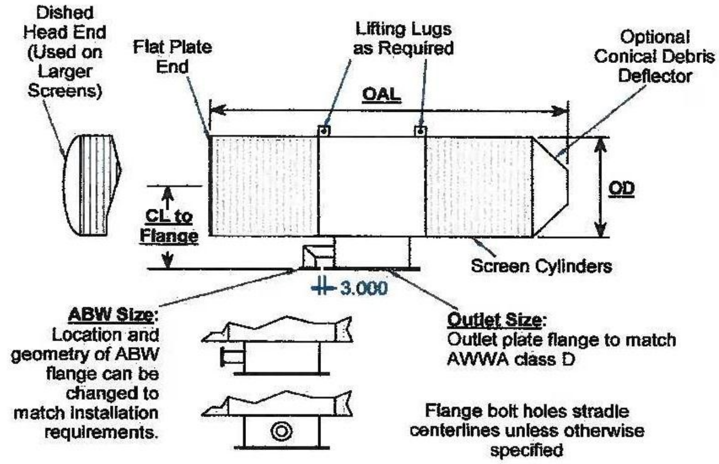
3 Capacities based on use of patented Johnson flow modifier design.

4 Pressure drops below .1 psi should be considered an order of magnitude only, as testing date for these low values is not available.

The concepts and assemblies shown should be considered proprietary and should not be copied, redistributed without the permission of US Filter/Johnson Screens. All dimensions are preliminary, changes may be made and can effect final price and configurati

Johnson screens A Weatherford Company 1950 Old Hwy. 8, New Brighton, MN 55112 (651)-638-3218 (Phone), (651)-638-3177 (Fax)	**Model T96HCE** **Preliminary Intake Screen Specification** **SONGS/Diablo Canyon Projects** **6 mm slot**	**Date:** **1/3/2013**

Figure 4.2-20. DCPP Preliminary Intake Screen Specifications (6-mm Slots)



Dimension/Sizes	Value	Unit	Comments
Model	T96HCE		
OD	96.00	in	Nominal See note 1
OAL	416.00	in	Nominal See note 1
CL to Flange	96.00	in	Nominal See note 1
Outlet Connection Size	96PS		See note 2
ABW Connection Size	none		See note 2
Estimated Weight	28670	lbs	
Left End Closure	Cone		
Right End Closure	Cone		

Screen Specifications			
Slot Opening	0.079	in	
Open Area Percentage	47.02%		
L/D Ratio	1.300		
Effective Screen Length	125.00	in	
Wire Type	93		

Design:			
Depth	40	Ft	Hydrostatic Load
Collapse Rating	17.34	psi	
Material	ZALLOY		SS or Z-Alloy

Flow Capacities:			
Flow/Screen	44736.84211	GPM	See note 3
Maximum Slot Velocity	0.49	fps	See note 3
Average Slot Velocity	0.40	fps	See note 3
Estimated DP/Screen	0.0031	psi	Thru clean screen surface only-See note 4
Estimated DP/Assy	0.2270	psi	Through entire clean assembly - See note 4

PATENT #
#6,051,131

Notes:

1 Dimensions shown are nominal. All screens are made to order, and can be adapted to a wide variety of installation requirements.

2 These are based on the size of the connecting and abw pipe and may vary from the values listed in the technical brochure.

3 Capacities based on use of patented Johnson flow modifier design.

4 Pressure drops below .1 psi should be considered an order of magnitude only, as testing date for these low values is not available.

The concepts and assemblies shown should be considered proprietary and should not be copied, redistributed without the permission of US Filter/Johnson Screens. All dimensions are preliminary, changes may be made and can effect final price and configurati

Johnson screens A Weatherford Company 1950 Old Hwy. 8, New Brighton, MN 55112 (651)-638-3218 (Phone), (651)-638-3177 (Fax)	Model T96HCE Preliminary Intake Screen Specification SONGS/Diablo Canyon Projects - 2 mm slot	Date: 1/3/2013

Figure 4.2-21. DCPP Preliminary Intake Screen Specifications (2-mm Slots)

4.2.4.2 Wedge Wire Screen Performance

The inherent engineering design features of wedge wire screens give them the ability to effectively minimize impingement mortality and reduce entrainment. These features include:

- Wedge wire screens provide passive screening with no moving parts.
- Screen surface velocity is uniform across the entire screen surface.
- A decelerating inward screen velocity avoids suction force.
- Screen flow-through velocity is on the order of sea current velocity.
- The screen design avoids the formation of swirling flows around the screen.
- Screens are installed above the sea bottom with no impact to benthic life.
- The screen cylindrical shape prevents attachment of debris to lower parts of the screen surface.
- Installing the screens in deeper seas (about 70-foot water depth) helps them experience substantially reduced wave action, resulting in a nearly uniform sea current velocity field around them most of the time.
- Cylindrical T-shaped wedge wire screens with end cones installed parallel to the sea currents assist in diverting floating debris from the screen surface.

4.2.5 Comparison of Offshore Modular Wedge Wire System Alternatives

Constructability and installation cost will determine the preferred alternative since the operational reliability would be the same for either tunnel or buried pipes. Screen performance and maintenance requirements are identical for both. Plant downtime during construction would be about the same since the existing system would remain operational until either alternative is constructed and in place.

Both alternatives would have the same environmental compliance.

The DCPP site has a fractured rocky shoreline with a bathymetry characterized by a sloping bedrock bottom with steep relief, rocky pinnacles, and prominent rocky ridges. These features may limit sea-bottom excavation for the pipe alternative. Similarly, the near-shore seismic fault zones would affect tunnel construction and, thus, the feasibility of the tunnel alternative. Detailed offshore geotechnical investigations and construction-method evaluations should be pursued to select the most viable alternative, considering the effect of a hypothetical offshore seismic event effect on either.

4.2.6 Final Offshore Modular Wedge Wire Screening Technology Selection

The use of offshore wedge wire screens at the DCPP site would require a due diligence survey and field testing investigation before implementation. The following efforts should be considered as part of this multidisciplinary investigation:

- Collect historic operating plant data—records, photos, reports, and fact sheets—to understand 20-plus years of operating experience.
- Collect and evaluate nearby plant experiences using wedge wire screens.
- Perform an aquatic field survey of the sea bottom to identify a suitable location for screen placement and to minimize biologically sensitive and production areas.

- If a hydrographic survey is not available, perform one to properly evaluate the local hydrodynamics of the source water to facilitate the effectiveness of reduction mechanisms afforded by the screens.
- Perform in-situ pilot testing of the two screen slot sizes (2 mm and 6 mm) to evaluate entrainment, impingement, and debris effects on screen performance. This pilot testing is essential to evaluate both the biological and engineering feasibility of the 2.0-mm and 6.0-mm cylindrical wedge wire screens to determine their biological exclusion efficiency in comparison to an open port and their performance in controlling biofouling and debris clogging. The study phases would include (i) the development of the study plan, (ii) the engineering design of the wedge wire screen deployments and biological sampling facilities, (iii) the development of the biological sampling plan, and (iv) the analyses of collected data to determine the debris biofouling potential and the screen cleaning techniques/frequency for each of the two screen slot sizes, with the objective of determining which of the two is more suitable. The preliminary field pilot test plan is provided in Attachment 2.
- Field test screen construction material and slot size.
- Perform geological and geotechnical investigations of the affected offshore areas.
- Evaluate the constructability and safety of the proposed system.
- Develop an operational inspection plan. The current plan is that the screens would require an inspection and possible external cleaning twice a year. This plan would be adjusted based on the testing program.

Following the complete due diligence survey, including its evaluations, physical field testing, and engineering and constructability investigations, the suitable slot size and material can be finalized and impacts on aquatic life can be evaluated.

4.2.7 Future Actions

Potential variations of the wedge wire screen concept could involve using different alignments, sizes, or both, for the connecting conduits. Also, further assessment of detailed engineering data and permitting requirements would be needed to establish the optimal arrangement of the wedge wire screens.

4.2.8 Permitting

The initial Phase 1 permitting assessment focused on identifying the applicable (required) permits and approvals for construction and operation of the offshore modular wedge wire screening technology. A comprehensive list was developed of potentially applicable permits and approvals at the federal, California, county, and municipal levels (as applicable). The applicability of each permit/approval to the wedge wire screen system was evaluated. Those permits and approvals that were deemed applicable were subsequently scrutinized to characterize the expected duration and complexity of the regulatory review process. Ultimately, the offshore modular wedge wire screening technology was one option selected for the Phase 2 assessment.

The subsequent permitting assessment focused on identifying the critical path (longest duration) initial preconstruction permitting processes and the associated project costs. The preconstruction permits are those approvals that directly support site mobilization, physical site access, and initial earthwork/foundations for the subject cooling system technology option. The costs include the direct permit filing, impact mitigation, and permitting application development (services) costs.

This assessment also addresses the permitting program associated with the wedge wire pilot study, which is designed to evaluate entrainment, impingement, and debris effects on screen performance. Further information on the pilot study can be found in Attachment 2: *DCPP Offshore Modular Wedge Wire Screen Field Pilot Testing Plan*.

4.2.8.1 Cost and Schedule Evaluation

The cost and schedule to secure the following major applicable permits were developed based on discussions with key relevant regulatory authorities and from associated website resources:

- CEQA – Final Notice of Determination
- Section 404/10 Permit, USACE
- CPUC
- Coastal Development Permit, CCC
- Coastal Development Lease, CSLC
- NPDES Industrial Discharge Permit, CCRWQCB and SWRCB
- Letter of Authorization, National Marine Fisheries Service (NMFS)
- Scientific Collecting Permit and Consultations, NMFS
- Dust Control Plan, SLO-APCD
- Local Approvals, SLO

Table WW-1 summarizes the key cost and schedule details and assumptions for the offshore modular wedge wire screening system. Legal costs associated managing appeal processes and related litigation have not been included. The bulk of the potential mitigation costs would be developed through negotiation process and are, consequently, not included in the cost estimate.

Table WW-1. DCPP Environmental Permit/Approval Cost Assessment:
Offshore Modular Wedge Wire Screening System

Permit/ Approval	Cost Discussion	Responsibility	Permit Review Period	Filing Costs	Remediation or Mitigation Costs	Permitting Service Costs
Section 404/10 Permit – USACE	No filing fees are associated with the Section 404 permit application, although there is a nominal fee ($10–$100) associated with preparing an EA. Labor costs for preparing an individual permit application = 3,000 hours @ $150/hr.	Owner	120 days from complete application (goal); 12 months (expected but aligned with CEQA)	$100	Undetermined	$450,000

Permit/ Approval	Cost Discussion	Responsibility	Permit Review Period	Filing Costs	Remediation or Mitigation Costs	Permitting Service Costs
Section 401 Water Quality Certificate – CCRWQCB	Fill & Excavation Discharges: $944 + $4,059 x disturbed area (acres) Dredging Discharges: $944 + $0.15 x cy Channel and Shoreline Discharges: $944 + $9.44 x discharge length (ft) (CCR Title 23§2200) Assumption: 2,000 ft of shoreline impacts. Labor costs: contained in Section 404/10.	Owner	Aligned with Section 404/10 Permits	$19,284	Undetermined	$0
Section 7 Consultation with USFWS, and NMFS Endangered Species Act of 1973	By virtue of its Section 404/10 Permit, the project would have sufficient "federal nexus" (federal funding, federal lands) to trigger USFWS consultation. Associated costs will be inherent in the CEQA process.	Owner	May be part of CEQA review	$0	Undetermined	$0
Magnuson-Stevens Fishery Conservation and Management Act – NMFS	Consultation with NMFS regarding essential fish habitat conservation and related impacts. Associated costs are inherent in the CEQA process.	Owner	Part of CEQA review	$0	Undetermined	$0
Letter of Authorization – Marine Mammal Protection Act – NMFS	Relocation of harbor seal population resident in the cove may require approval from NMFS. Labor costs for preparing associated documentation and relocation = 200 hours @ $150/hr.	Owner	While review can take 8 to 18 months, approval would parallel the CEQA review process.	$30,000	Undetermined	$0

Permit/ Approval	Cost Discussion	Responsibility	Permit Review Period	Filing Costs	Remediation or Mitigation Costs	Permitting Service Costs
Scientific Collecting Permit (Section 10 (a)(1)(A) permit) - NMFS	Potentially applicable permit to support wedge-wire pilot study, if there is the potential to directly take a listed marine species. Labor costs for preparing associated documentation and relocation = 200 hours @ $150/hr.	Contractor	Probable 6-month review (separate from CEQA process)	$30,000	Undetermined	$0
CDFW Review	CDFW consultation will be conducted in parallel with the Section 7 review. CEQA document filing related fee ($2,995.50 and county clerk processing fee $50). (CDFW, 2013)	Owner	Part of CEQA Review	$3,050	Undetermined	$0
CPUC Approval	While formal CPUC review and approval may prove necessary, the primary costs of this process are associated with the CEQA review process. The CPUC could be the lead CEQA agency or share this role with another regulatory organization (e.g., CCC, SLO). These CEQA costs are addressed in the County Conditional Use Plan Approval Process.	Owner	About 20–24 months if required	$0	Undetermined	$0

Permit/ Approval	Cost Discussion	Responsibility	Permit Review Period	Filing Costs	Remediation or Mitigation Costs	Permitting Service Costs
Coastal Development Permit – CCC/Local Coastal Programs	The CCC indicates that the filing fee for non-residential development is $265,000 (CCC, 2008). There may be additional fees for reimbursement of reasonable expenses, including public notice costs. CEQA costs are covered in the County Condition Use Plan Approval Process. Labor costs for preparing/submitting related forms and documentation = 2,000 hours @ $150/hr.	Owner	A 3–9 month process is advertised, but it would be aligned with the CEQA review process	$265,000	Undetermined	$300,000
Coastal Development Lease – CSLC and potential CEQA Lead Agency	The Commission lease-related fees include (CSLC, 2011): Industrial Lease: $25,000 Dredge Lease Fee: $1,500 Filing Fee: $25 Labor costs for preparing/submitting related forms and documentation = 5,000 hours @ $150/hr.	Owner	Depends on duration of CEQA/EIR review process; about 2 years	$26,525	Undetermined	$750,000

Permit/ Approval	Cost Discussion	Responsibility	Permit Review Period	Filing Costs	Remediation or Mitigation Costs	Permitting Service Costs
Dust Control Plan or CAMP – SLO-APCD	While SLO-APCD does not list any specific fee for the Dust Control Plan, other CARB entities are known to charge $300 to reimburse review costs. If the construction ozone precursor emissions (ROG + NOx) exceed the SLO-APCD quarterly significance threshold of 6.3 tons, the SLO County CEQA Handbook (SLO-APCD, 2012) defined mitigation rate is $16,000 per ton of ozone precursor plus 15% administrative fee. The current assumption is that precursor emissions are below this threshold. Labor costs for preparing/submitting the plan = 80 hours @ $150/hr.	Contractor	1-month plan development process	$0	Undetermined	$12,000
NPDES Industrial Discharge Permit – CCRWQCB and SWRCB	The operating project is incurring annual fees based on its current discharge rate, which is not expected to change appreciably with the addition of this modified intake system. Consequently, any associated fee structure is not expected to change. Labor costs for revising NPDES permit to reflect new intake structure = 500 hours @ $150/hr.	Owner	About 6 months	$0	Undetermined	$75,000

Permit/ Approval	Cost Discussion	Responsibility	Permit Review Period	Filing Costs	Remediation or Mitigation Costs	Permitting Service Costs
Conditional Use Plan Amendment – SLO-DPB and Potential CEQA Lead Agency	As the CEQA lead agency or co-lead, the county would assess fees for development of the Initial Study, environmental coordination fees, and EIR processing fees (SLO-DPB, 2012). Initial Study Cost: $14,603 Other fees include: CalFire Review: $603 Health Department Review: $600 Geological Review: $2,671 (minimum) Resource Conservation District Review: $375 (minimum) Labor costs for EIR consultant + 50% premium = 4,000 hours @ $150/hr x 1.5.	Contractor	Depends on duration of CEQA review process; about 2 years	$20,000	Undetermined	$900,000
Notification of Waste Activity – RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Construction Phase – Department of Toxic Substance Control, USEPA, SLO-EHS – California Unified Program Agency	Securing the Construction Phase Hazardous Waste ID (if necessary) does not demand a filing fee. Labor costs for preparing/submitting related forms = 4 hours @ $150/hr.	Contractor	1–2 weeks if required	$0	Undetermined	$600
Building Permits – SLO-DPB and SLO-DPW: Grading Site Plan Reviews/Checks Mechanical, Plumbing, and Electrical Tanks Fire Inspections	SLO-DPB has a complex fee schedule (SLO-DPB, 2012). Recent SLO County experience on a significant solar PV project indicates that overall building permit and inspection fees could total $750,000. Labor costs for preparing/submitting related engineering packages = 2,000 hours @ $150/hr.	Contractor	4–6 weeks for initial permits following completion of CEQA review and conditional use permit	$750,000	Undetermined	$300,000

Permit/ Approval	Cost Discussion	Responsibility	Permit Review Period	Filing Costs	Remediation or Mitigation Costs	Permitting Service Costs
California Department of Transportation (Caltrans) – Oversize/Overweight Vehicles	Caltrans Transportation Annual or Repetitive Permit (oversize/overweight loads): $90 (Caltrans – FAQ, 2013) Labor costs for preparing/submitting related forms = 4 hours @ $150/hr.	Contractor	About 1 month	$90	Undetermined	$600
Caltrans Heavy Haul Report (transport and delivery of heavy and oversized loads)	No direct costs. Labor costs for preparing/submitting related forms = 16 hours @ $150/hr.	Contractor	About 1 month	$0	Undetermined	$2,400
Fire Safety Plan Approval, Certificate of Occupancy, Flammable Storage – SLO Fire Department	Revisions to the existing Fire Safety Plan are not expected to result in additional filing or direct regulatory fees. The initial filing fee of $408 would probably not apply. Labor costs for revising Fire Safety Plan = 20 hours @ $150/hr.	Contractor	1 month for plan approval	$0	Undetermined	$3,000
TOTAL				**$1,144,049.00**	**Undetermined**	**$2,793,600**

4.2.8.2 Summary

The list of potentially applicable federal, state, and local permits for the offshore modular wedge wire screening system reflects the potentially significant impacts to the onshore and near-shore marine environment. The efforts to conduct a successful CEQA review would be the primary critical path permitting process. The CEQA lead agency may be a shared responsibility among a number of key regulatory departments (e.g., SLO, CSLC). The requisite USACE Section 404 permit, CCC Coastal Development Permit, CSLC Lease, and NPDES permit modification would have potentially lengthy review processes but would all be essentially bounded by the critical path CEQA/EIR review process.

The CEQA review process duration varies. The shortest path appears to be a nominal 210-day (7-month) period that would include the minimum 30-day period of review to determine that the initial CEQA application is complete. This process culminates in a Negative Declaration and does not involve developing a comprehensive EIR. The wedge wire screening system review process would likely demand preparation of an EIR, which would serve to significantly extend this review process. The process—inclusive of the initial 30-day completeness review, a 1-year EIR review, and a so-called 90-day “reasonable extension” triggered by compelling circumstances recognized by both the applicant and lead agency—would then extend out to 16 months. (CEQA Flowchart)

The CEQA review process would be extended even further by conservatively adding an additional 8 months to cover “unreasonable delays” ostensibly associated with the applicant’s difficulty in supplying requested information. Collectively, this longer and probably more applicable 2-year CEQA review process would likely follow a 1-year period of permit application development. The other permitting processes are assumed to proceed in parallel to the critical path CEQA review process.

The total permit filing and permitting service costs associated with this 3-year permitting process would be approximately $3.9 million. As noted earlier, this 3-year period does not reflect the impact of permit appeals, litigation, or potentially negotiated CEQA-related mitigation fees. In recognition that such complications may occur, the project execution schedule adds a 12-month appeal period following the CEQA final decision.

4.2.9 Sources

1. California Coastal Commission (CCC) Permit Application Instructions, Appendix E Filing Fee Schedule (3/17/2008).

2. California Code of Regulations (CCR) Title 23§2200 Annual Fee Schedules – Subpart a(3) Dredge and Fill Materials.

3. California State Lands Commission (CSLC), Land Management Division Application Guidelines (10/12/2011).

4. California Department of Fish and Wildlife CEQA Document Filing Fees, 2013 http://www.dfg.ca.gov/habcon/ceqa/ceqa_changes.html.

5. California State Water Resources Control Board (SWRCB) Fee Schedule 2012–2013, 2012http://www.swrcb.ca.gov/resources/fees/docs/fy12_13_fee_schedule_npdes_permit.pdf.

6. California Environmental Quality Act (CEQA) Flowchart for Local Agencies: California Code – Section 21151.5, http://www.ceres.ca.gov/planning/ceqa/flowchart.html.

7. San Luis Obispo County Air Pollution Control District (SLO-APCD) CEQA Air Quality Handbook – A Guide for Assessing the Air Quality Impacts for Projects Subject to CEQA Review, April 2012.

8. San Luis Obispo County Department of Planning and Building (SLO-DPB) – Fee Schedule 2012–2013, 2012.

4.3 Closed-Cycle Cooling Technology

The closed-cycle cooling technologies considered herein would replace only the non-safety-related portions of each unit's existing once-through cooling system. The portion of the existing system identified as "auxiliary saltwater cooling" would remain a once-through cooling system. The following five variants of the closed-cycle cooling technology were evaluated; two use dry cooling, two use wet cooling, and one uses a combination of wet/dry cooling:

- Passive draft dry/air cooling
- Mechanical (forced) draft dry/air cooling
- Wet natural draft cooling
- Wet mechanical (forced) draft cooling
- Hybrid wet/dry cooling

Each variant would significantly reduce the quantity of water withdrawn from the ocean as summarized in Table 4.3-1.

Table 4.3-1. DCPP Intake Structure Seawater Intake Flows

	Once-Through Cooling System (Existing)	Dry Cooling, Natural Draft, or Mechanical Draft	Natural Draft Wet Cooling System	Mechanical Draft Wet Cooling System	Hybrid, Wet/Dry Cooling System
CW System Flow (gpm)	1,734,000	0	0	0	0
ASW Cooling System Flow (gpm)	22,000	22,000	22,000	22,000	22,000
Desalination Saltwater Supply System Flow (gpm)	0	0	77,300	77,300	69,500
Saltwater Cooling System Flow (gpm)	0	20,400	0	0	0
Total (gpm)	1,756,000	42,400	99,300	99,300	91,500
Reduction (%)	0	97.6	94.3	94.3	94.8

Plant cooling water temperatures created by the closed-cycle cooling systems would be higher than the temperature provided by the existing once-through system. Cooling water temperatures created by closed-cycle cooling systems are primarily governed by the ambient wet and dry bulb temperatures, the cooling tower surface (heat exchange area), and the air flow across the cooling tower cooling surface. The thermal performance of the dry technologies is governed by dry bulb temperatures, while the performance of wet technologies is governed by wet-bulb temperatures. Therefore, the resulting cooling water temperatures are higher for dry technology than for wet technology. The design temperatures used for DCPP are provided in Table 4.3-2.

Table 4.3-2. DCPP Design Ambient Temperatures

Parameter	Temperature (°F)
Design Wet Bulb Temperature	64.5
Design Dry Bulb Temperature	77.8
Site Maximum Wet Bulb Temperature	76.1
Site Maximum Dry Bulb Temperature	97.0
Site Minimum Wet Bulb Temperature	21.0
Site Minimum Dry Bulb Temperature	33.0

Warmer cooling water temperatures to the plant’s condensers would decrease the associated turbine generator system’s electrical power output. In addition, using mechanical (forced) draft dry/air fans in lieu of natural draft would increase the plant auxiliary (parasitical) electrical load, further reducing the facility’s electrical output usable to consumers. An analysis was performed to estimate the effect on plant electrical generation of the various cooling system options under consideration. Local weather data (dry bulb and wet bulb temperature hourly data from the San Luis Obispo airport for 2001–2003) and oceanographic data (ocean water temperature

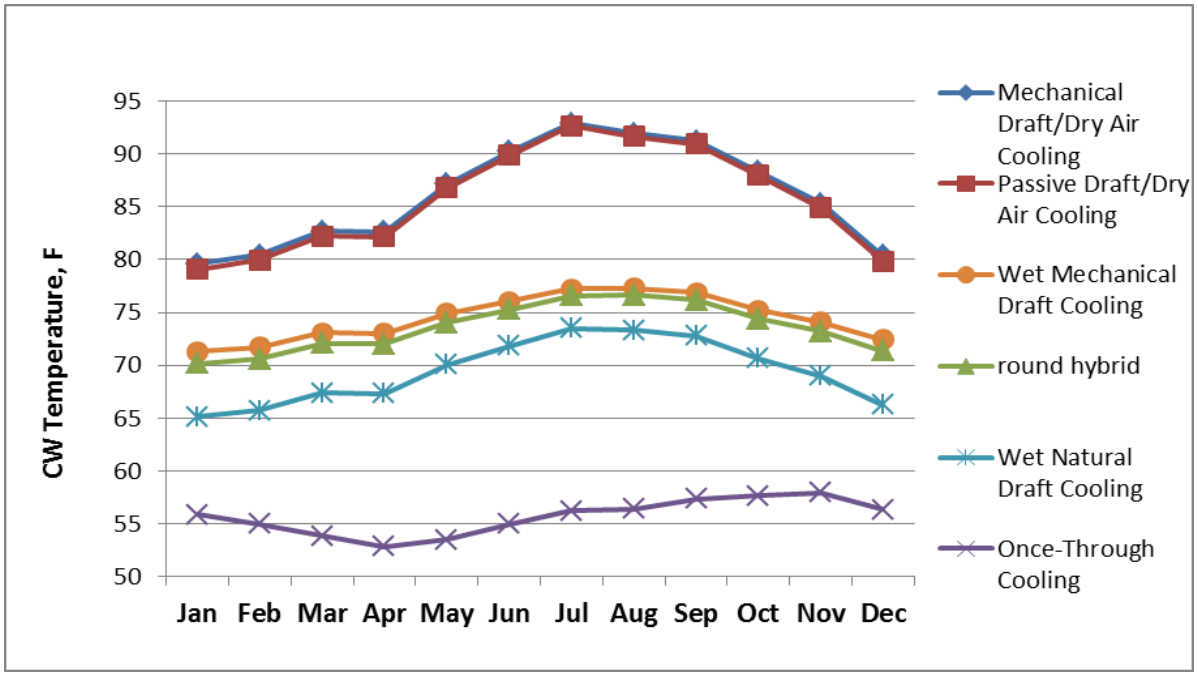


Figure 4.3-1. Average Circulating Water Temperature per Month

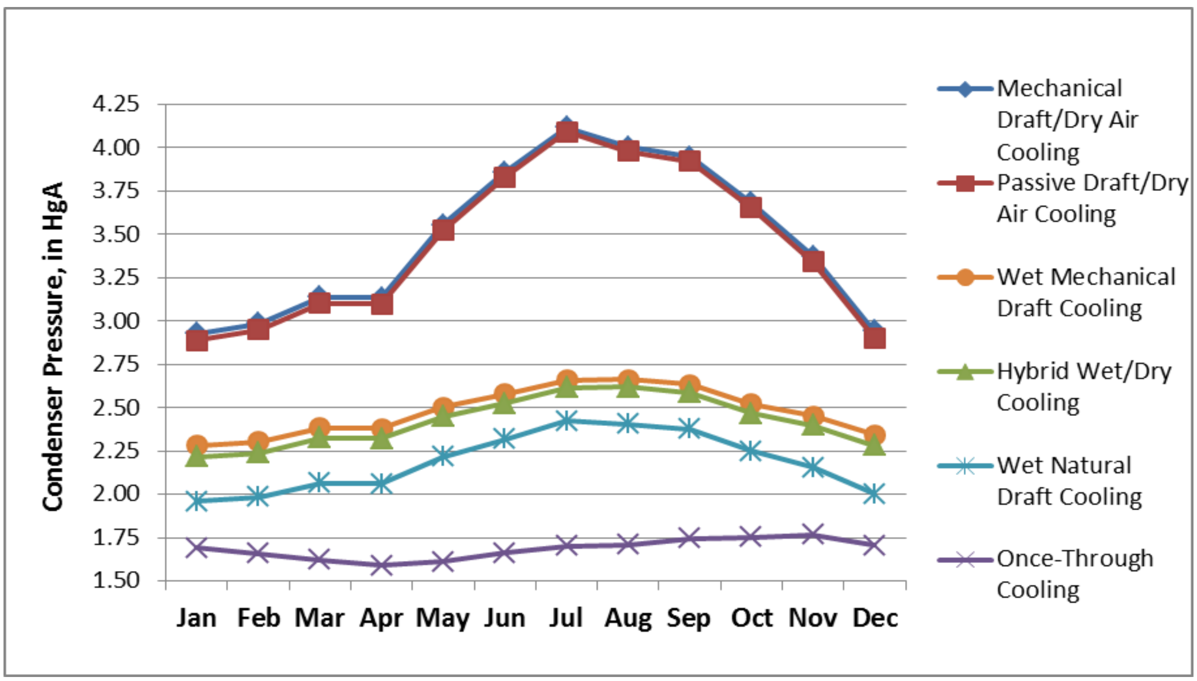


Figure 4.3-2. Average Condenser Backpressure per Month

half-hourly data obtained from the Costal Data Information Program for Station 076 for 2001–2003) were used in the analysis. For simplicity, condenser and cooling tower performance is based on 100-percent duty for all operating points. For base load operation, this is a reasonable assumption, because duty over the range of ambient temperatures would only change by a few percentage points. Figure 4.3-1 provides a graphic representation of how the monthly average cooling water temperature varies annually for the existing once-through cooling system and the various closed-cycle cooling technologies being considered. Average temperatures vary within the range of 10°F to 40°F above the existing temperature, based on the technology and time of year. Figure 4.3-2 graphically indicates the corresponding average-month condenser backpressure associated with the cooling water temperatures.

As previously stated, increased condenser pressure results in reduced turbine output. In addition, the additional auxiliary loads of some of the cooling system options (fans, additional pumping power, etc.) also lead to a reduction in plant net output. Figure 4.3-3 shows estimated loss of generation by month for the different cooling options compared to the current once-through system. The average yearly lost generation (assuming 90 percent capacity factor) is shown in Table 4.3-3.

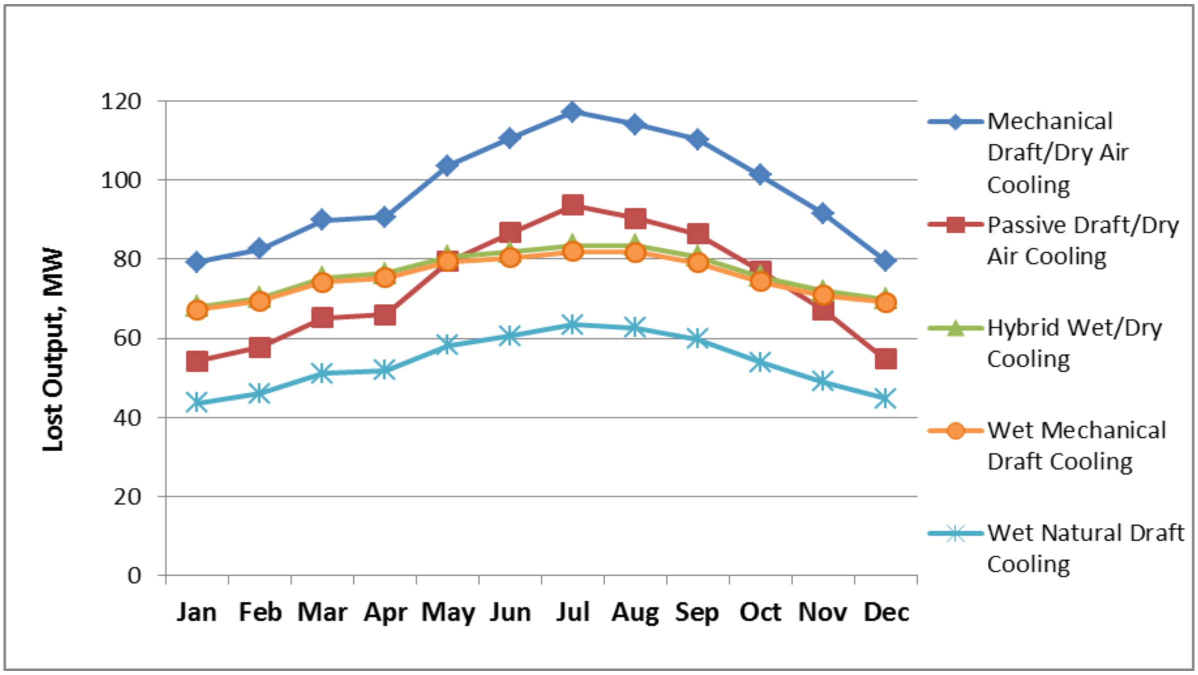


Figure 4.3-3. Average Lost Output per Month

Table 4.3-3. Average Yearly Lost Generation

Technology	Yearly Lost Generation MWh (per Unit)
Mechanical Draft/Dry Air Cooling	769,514
Passive Draft/Dry Air Cooling	578,031
Wet Natural Draft Cooling	424,016
Wet Mechanical Draft Cooling	593,516
Hybrid Wet/Dry Cooling	603,086

Table 4.3-4 itemizes the sources of lost generation. The largest source of lost generation is, as expected, due to reduction in the gross output of a unit due to higher backpressure operation.

However, additional auxiliary loads of the various alternative cooling technologies also contribute to lost generation.

Table 4.3-4. Average Unit MW Derating per Year

	Mechanical Draft/Dry Air Cooling	Passive Draft/Dry Air Cooling	Hybrid Wet/Dry Cooling	Wet Mechanical Draft Cooling	Wet Natural Draft Cooling
Unit Lost Gross Output	69.9	68.7	33.1	35.5	22.7
Cooling System Fan Power	23.1	0.0	14.6	8.8	0.0
Delta CW Pumping Power	4.0	4.0	3.3	3.3	3.3
Saltwater Cooling Pumps	0.2	0.2	0	0	0
Desalinization Supply Pumps	0	0	4.6	4.6	4.6
Desalination/Water Treatment	0.0	0.0	20.7	23.0	23.0
Total Generation Loss	97.3	73.0	76.4	75.2	53.6

The cost of the derated output resulting from the installation of these technologies has not been included as part of the installation cost estimate for the technologies.

Selected major equipment suppliers (cooling towers, pumps, water treatment equipment, large valves, large piping, transformers, and offshore specialty contractors) were consulted to validate technical data and cost estimates included herein.

To avoid repeating information about similar features applicable to several technologies, the variant technologies within each category (dry and wet) are discussed together.

Figure 4.3-4 is a rendering of the wet natural draft technology provided as an example of the visual effect of the installation of the closed-cycle cooling systems at DCPP. The tower pictured was supplied courtesy of SPX Cooling Technologies Inc.

4.3.1 Dry/Air Cooling Systems—Overview

4.3.1.1 Mechanical Design

Dry/air cooling systems (passive draft and mechanical [forced] draft) are primarily used when water for more traditional solutions is not available or is cost prohibitive. The cold water temperatures achievable from dry/air cooling systems are the highest of the closed-cycle cooling technologies considered and thus have the highest impact on the electrical output that can be generated. In addition, the achievable cold water temperatures do not meet the cooling requirements of secondary components at DCPP that support plant operations and are currently cooled from the CWS. It was considered impractical to redesign these secondary systems, so one much-smaller independent once-though cooling system per unit would be included to support these secondary components. Two new saltwater cooling pumps per unit would be provided, located in the existing seawater intake structure, for the new once-through cooling system. The system would be capable of providing 10,200 gpm per unit. New piping would be routed from these pumps to interface with the existing supply piping to the service water heat exchangers and component cooler. Return flow would be through the existing plant outfall.

Figure 4.3-4. Plant Site Rendering Showing Wet Natural Draft Technology

A dry/air cooling system needs small amounts of makeup water to replace water lost due to leakage. The system requires no blowdown, nor does it have any evaporative losses. Water would be required to periodically wash the outside of the dry heat exchangers to maintain their performance. The cooling tower manufacturer recommends washing the dry heat exchangers once or twice a year. On this basis, the annual wash water requirement would be 2 to 4 million gallons. The existing plant water system would be capable of providing the initial fill of water, wash water, and leakage makeup.

Cooling towers would be located northeast of the turbine building and east of the SLO-2 archeological site. The existing portion of the mountain at this location would be lowered to an elevation of 115 feet to accommodate the towers. The 115-foot elevation was selected because it matched the elevation where the cooling water piping crossed the SLO-2 archeological site and was the highest elevation that was determined to result in an acceptable pressure for the cooling water ducts within the turbine buildings. If a closed-cycle cooling technology were selected, a study would be completed early in the final design to optimize the cost impact of increasing the design pressure of the closed-cycle cooling system (piping, ductwork, condenser modification, and equipment) versus reducing the excavation costs by raising the base elevation of the towers. This study would establish the optimum base elevation of the cooling towers; such design optimization studies were not performed as part of the Phase 2 effort. A new pumphouse would be furnished for each unit. The Unit 1 pumphouse would be located northeast of the turbine building and south of the SLO-2 archeological site. The Unit 2 pumphouse would be located west of the Unit 1 turbine building. Refer to General Arrangement Drawing 25762-110-P1K-WK-00011 and the additional general arrangement drawings included for each closed-cycle cooling technology variant.

A hydraulic analysis of the dry/air cooling variant was performed based on providing the design coolant flow to the CWS components using the proposed configuration to validate pipe sizes and to determine required system design pressures and pumping parameters. Four 25-percent-capacity CW pumps with common suction and discharge headers would be provided per unit. As shown on the general arrangement drawings, a combination of 12-foot-in-diameter FRP piping and 16-foot-by-16-foot concrete conduits per unit would be connected to the modified condenser outlet concrete conduits and routed to the associated unit’s CW pumphouse. Similar piping and concrete conduits would be routed to/from all of the cooling towers along the north and west sides of the turbine building to connect the towers to the new pumphouses and existing condensers. Refer to General Arrangement Drawing 25762-110-P1K-WL-00011 and the additional general arrangement drawings included for each closed-cycle cooling technology variant. The routing and pipe/conduit sizes would be very similar for all variant technologies except in the local area of the towers.

The ability of the steam turbine to operate at higher condenser backpressures resulting from a dry cooling system was reviewed. The DCPP-specific protection diagram provided by PG&E for the ND56R blade provides the allowable condenser pressure for load operation. This diagram indicates that, for full-load operation, the high backpressure alarm point is 9 inches HgA and the high backpressure trip point is 10.5 inches HgA. In its response to Bechtel questions regarding high backpressure operation, turbine supplier indicated that there has been an “evolution” in its protection diagrams. On a fairly recent proposal for a large nuclear project using the same ND56R last-stage blade, the turbine supplier indicated the recommended alarm setting was 6 inches HgA and the recommended trip setting was 7.5 inches HgA. Maximum backpressures with wet cooling options will not approach the alarm setting. However, based on site weather data, it is estimated that backpressures for the dry cooling options will exceed the alarm level almost 300 hours per year. Restricting plant load during these hours would result in significant lost generation (during periods of high ambient temperatures when this generation is typically needed the most). The other option would be to modify the LP section of the turbine to allow higher backpressure operation. the turbine supplier has indicated that removal of the last (L-0) stage of the turbine could be a solution; however, further work would be required to assess the feasibility of this option. For the dry cooling options, modification of the steam turbines is considered necessary.

Significant demolition/modification of the existing CW concrete conduits west of the turbine building would be required for each of the variant technologies. The extent of this demolition is shown on General Arrangement Drawing 25762-110-P1K-WL-00013. The modifications necessary on the west side of the turbine building are shown in Figure 4.3-5.

A closed-cycle cooling system would require an increase in the overall design pressure of the CWS since the towers are located at the 115-foot elevation. The tube side of the main condensers would be modified to increase the tube-side pressure design from 25 psig to 50 psig. This pressure increase would account for the system losses and the increased hydrodynamic loading that result from the modified CWS arrangement.

Access/maintenance roads would be provided. The existing fire loop would be extended to the cooling tower area. It has been assumed that the existing fire system can provide the required fire water flows and pressures required at the cooling tower area.

The existing CW pump motors and pump internals (two per unit) would be decommissioned and removed as necessary. The existing shoreline intake structure would be modified to accommodate the two new saltwater cooling pumps per unit to supply cooling water to the SCW and condensate cooler heat exchangers.

4.3.1.2 Control System Design

The philosophy used to develop the control systems approach is similar for each dry technology variant. Control systems and equipment were estimated in accordance with P&I schematics, the mechanical equipment lists, and the equipment described in the mechanical section of this report. The cooling tower control systems and equipment were estimated based on preliminary information received from cooling tower suppliers. A distributed control system (DCS) would be provided to control and monitor equipment. DCS input/output (I/O) cabinets would be located in the existing electrical building at the intake area for the new saltwater pumps, the new Unit 1 and Unit 2 cooling tower electrical buildings located in the area of the cooling towers, the new CW pump electrical building, and the new main switchgear building. It is expected that an operator workstation (OWS) human-machine interface (HMI) would be provided in each cooling tower building and in the main control room. It is assumed that there is enough space in the existing intake area electrical building to accommodate the new DCS I/O cabinet(s). The DCS would have redundant processors and communications networks. Separate and independent DCS networks would be provided for each of the two units. Hardware for the DCS would include functionally and geographically distributed I/O cabinets, I/O modules (analog and digital), OWSs, and the connective computer hardware modules. One engineering workstation (EWS) HMI and the software needed to develop control logic and graphic displays would be provided for each unit. The EWS would have the capability to upload and download configuration information and logic display changes into the OWSs and processors. The DCS would annunciate, indicate, time stamp, and track the status of critical parameters. Alarm histories would be available on the alarm summary display screen. A color laser printer would be provided to print DCS graphic displays, logic configurations, log reports, and alarm summaries.

As part of these modifications, the controls associated with the plant's existing CW pumps would be decommissioned and removed. New CW pumps and valves would be installed at a new pumphouse to circulate the cooling water from the condenser outlet to the new cooling towers. Local instrumentation and control panels for existing CW pumps would be removed and decommissioned. This estimate includes the demolition costs for these panels and instrumentation. The estimate also includes necessary revisions to plant drawings and documents (such as logic diagrams, instrument installation details, instrument list, and instrument data sheets).

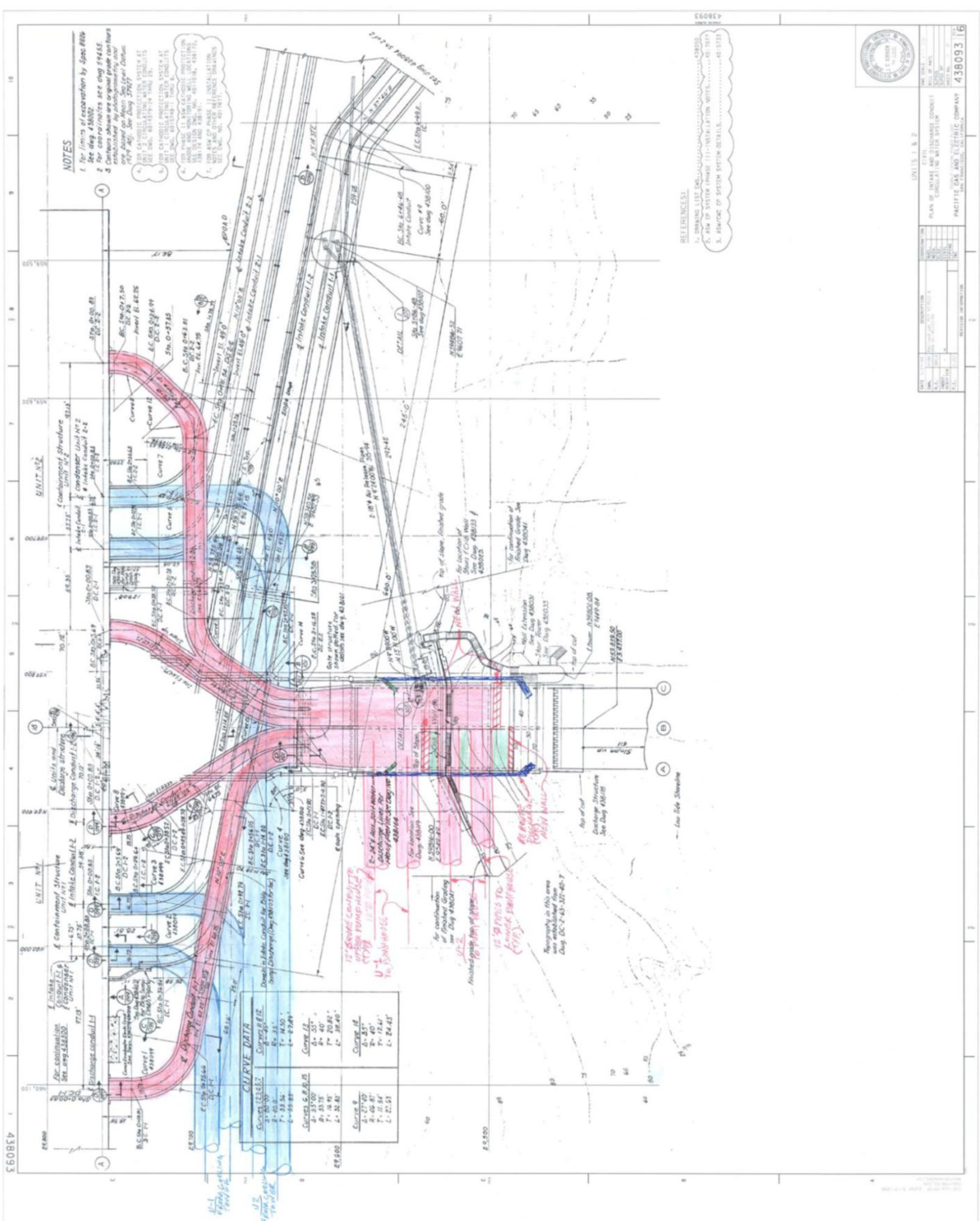


Figure 4.3-5. Circulating Water System

Custom-built DCS graphics would be provided to show overview and group or detailed information to assist the operator in any type of control action required. Other DCS features are:

- Annunciation would be predominantly in the main DCS. Major alarms and protections would be time tagged.
- Positive indications would be provided for plant status (e.g., run/stop, open/close), and these indications would be fed back to the DCS and indicated using an appropriate graphic display.
- Plant personnel would be able to modify and tune control loops, create or change displays, and make database changes without training in high-level programming languages.

The DCS network would have a redundant Ethernet data highway and Ethernet links to the medium voltage (MV) switchgear multifunction relays and to the existing plant computer system. Redundant DCS Ethernet switches and cabling would be provided for the connection between the DCS local/remote I/O cabinets and the DCS HMIs to permit data transfer. All DCS printers and HMIs, including the historian, would also be interconnected via Ethernet. All DCS communication cabling between plant buildings would be fiber optic. All DCS communication cabling within the same room would be Category V/VI copper.

The DCS would control each new MV switchgear main, tie, and load center feeder breakers. The status of each MV bus would be monitored from the DCS via data link to MV meters/relays.

4.3.1.3 Civil Design

With respect to the major civil/structural effort, the five alternative closed-cycle cooling technologies can be divided into two groups: wet (includes natural draft, mechanical [forced] draft, and hybrid variants) and dry (includes natural draft and mechanical [forced] draft variants). Preliminary civil designs were prepared to size major structures such as cooling tower foundations, new pumphouses and header boxes, storage pond, desalination and water treatment plant foundations, and mountain excavation quantities.

The wet technology options have similar general arrangements, and all include a makeup water system (storage pond, desalination plant, water treatment plant, offsite reclaimed water system, and cooling tower water basin). The dry technology options do not include the makeup water system, but have general arrangements otherwise similar to those of the wet technology variants with respect to cooling towers, pumphouses, CW piping, and box conduits. The other major difference among the five alternative technologies lies in cooling tower foundation designs, shapes, and dimensions. The preliminary cooling tower foundations were sized based on the data provided by the cooling tower suppliers (GEA and SPX) and in keeping with the historic information for similar projects previously designed by Bechtel.

It would be necessary to excavate the mountain to an elevation of 115 feet to provide the space needed to build the new cooling towers and, for the wet technologies, the makeup water storage pond. The number of cooling towers needed is technology specific. The location of the new cooling towers has been chosen carefully to provide the most economical solution and to preclude impact to the nearby archeological site. Tower locations are shown on the general arrangement drawings identified in the mechanical design sections. The preliminary drawings depicting excavation plans and sections were developed to determine the excavation quantities needed to accommodate the two-cooling-tower and four-cooling-tower general arrangement options (refer to Drawings 25762-110-7200-00001, -00002, -00003, -00004, and -00005). The leveled area required at elevation 115 feet for the two-cooling-tower arrangement is approximately 62 acres; for the four-cooling-tower arrangement, it is approximately 109 acres. The shape and elevation contours of the mountain terrain were traced from the topographic quadrangle maps available from the U.S. Geological Survey (USGS) official website. A stepped configuration as shown on the above-referenced drawings is proposed, assuming that the material excavated is strong sound rock with minimal fractures and horizontal bedding. A sloped excavation with a 2:1 angle of repose was also investigated; however, the stepped configuration is proposed because it reduces the excavation quantities and limits the disturbed area. The preliminary cut and fill excavation quantities for the two-tower and four-tower general arrangements, with 7-percent haul ramps, were determined using InRoads design software and are as shown in Table 4.3-5.

Table 4.3-5. Mountain Excavation Quantities

General Arrangement	Bank Earthwork Quantities (cubic yards)		
	Cut		Net
Two Cooling Towers	190,000,000		190,000,000
Four Cooling Towers	316,000,000		316,000,000

The excess excavated soil would be disposed of using the proposed haul roads to the potential spoil area sites located further north as shown on Drawings 25762-110-CEK-7200-00001 and -00002. The disposal areas were selected considering their proximity to the excavation site (i.e., within 5 miles) and their capacities to accommodate excavated soil quantities. Additional information regarding mountain excavation and disposal of the excavated soil is provided in Section 5.0.

Existing plant buildings 102, 518, 519, 520, 521, 527, and 528 (refer to Figure 4.3-6, Site Development Plan [Plant Site Area]) would need to be demolished to provide space for the new pumphouses, CW pipes, and conduits. The estimate considers replacement costs for buildings 102, 519, and 527.

The existing plant north perimeter security infrastructure, including several substantial structures, would have to be removed during the course of the project and either replaced in the same location or relocated with a similar configuration to an alternative location in the immediate vicinity. The integrity of the plant protected area boundary would need to be reestablished by project completion. The exact orientation and nature of this infrastructure cannot be incorporated in this report; therefore, a more detailed description of the equipment and structures involved is not provided or otherwise depicted on the provided drawings and site layouts.

Two CW pumphouses would be required (one for each unit), and two each supply and return headers would be required for each pumphouse. Preliminary engineering has been performed to provide material and excavation quantities for the two pumphouses and headers. These quantities are in addition to the mountain excavation quantities noted in Table 4.3-3. Refer to the general arrangement drawings included for each variant technology to see the configuration of the headers for that technology.

The proposed closed-cycle cooling system CW piping consists of new concrete box conduits and FRP piping to get the water to and from the condenser. Inside the power block and nearby where space is restricted, concrete box conduits that can be designed to fit the restricted space would be used to carry the CW. For the rest of the CW pipe route toward the cooling towers, where adequate space is available, FRP pipes have been proposed in this estimate. FRP piping material was selected considering its advantages (such as hydraulic characteristics, resistance to biological attack, resistance to corrosion and a seawater environment, low maintenance, ease of handling and transportation, construction productivity, and long-term reliability) over other piping material like steel and concrete. Refer to General Arrangement Drawings

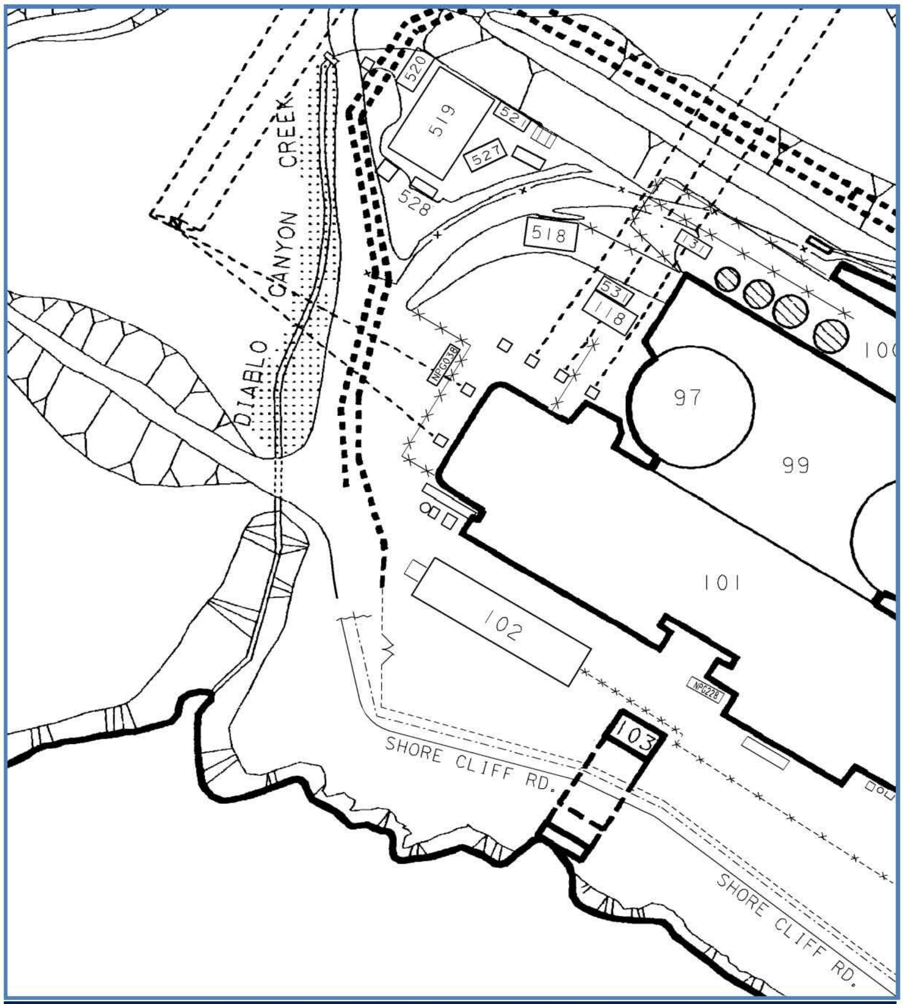
25762-110-P1K-WL-00010, -00011, -00020, -00030, -00031, -00040 and -00050 for CW piping/conduit layouts and to Section A-A on General Arrangement Drawings 25762-110-P1K-WL-00010, -00020, -00030, -00040 and -00050 for FRP pipe spacing requirements. Note that the stringent requirements for quality backfill around the FRP pipes require a larger space to accommodate the installation of the multiple FRP pipes needed to supply and return the cooling water to the main condensers.

The existing concrete intake and discharge conduits outside the turbine building were evaluated for the proposed CW pipe tie-ins based on the existing plant calculated design pressure and the design pressure determined for the new system configuration. Based on the tower evaluations, it was concluded that the existing conduits outside the turbine building would not be adequate for the new design pressure; therefore, they would be demolished and replaced with new concrete conduits to meet the new design pressure requirements. The excavation is planned for the space in front of the turbine building in order to demolish and remove the existing concrete conduits and provide space for the new pumphouse, valve pits, header boxes, and concrete box conduits. Refer to General Arrangement Drawing 25782-110-P1K-WL-00013 for the extent of the proposed demolition area. The existing concrete intake and discharge conduits within the turbine building were assessed based on a comparison of their structural configurations to those of the existing conduits outside the turbine building, a comparison of the existing plant calculated normal operating and extreme design pressures to the normal operating and extreme design pressures determined for the new system configuration, and a review of the available design margins and conservatism in existing Plant Calculation No. 52.27.100.523, Rev. 0, for the existing discharge conduits outside the turbine building. Based on the assessment, the conduits within the turbine building were determined to be able to accept the new design pressure; however, their capability was one of the determining factors in selecting the tower basin elevation of 115 feet.

Each cooling tower option has specific requirements for electrical buildings to house the required electrical equipment and cable raceways. The preliminary foundation engineering for the buildings has been developed to determine excavation and concrete quantities.

New roads are planned to be 24 feet wide. The new access road layouts and lengths vary with each cooling tower option. Refer to the cooling tower and piping general arrangement drawings for the proposed road layouts.

The development plan for the plant site area is shown in Figure 4.3-6.



DCPP Industrial Site Northwest Area Development (Buildings/Facilities)

#	Building Facility Function	Closed-Cycle Design Impact
97	Containment Structure Unit-1	No impact
101	Unit-1 & Unit-2 Turbine Building	Interior equipment replacement and alteration
102	I&C/Telecom Building & Medical-Facility	Remove and relocate/replace on-site
103	Discharge Structure	Significant modification
518	Craft & Facilities Maintenance	Demo (currently partially demolished)
519	Warehouse-A Maintenance Storage	Remove and relocate-replace onsite
520	Craft & Outage Office Building	Remove no-replacement
521	Craft & Outage Office Building	Remove no-replacement
527	Auxiliary Craft Fabrication Shop	Remove and relocate-replace onsite
528	Restroom Facility	Relocate (transportable trailer facility only)

Figure 4.3-6. Site Development Plan (Plant Site Area)

The earthwork operations would affect an existing two-circuit 230 kV transmission line as well as one circuit of the 500 kV line, which are the main offsite power feeds to Units 1 and 2. In addition, more offsite power would be required to energize the proposed cooling tower equipment, so four additional circuits of 500 kV must also be factored into the design.

The available margin in the site 230 kV system is insufficient to support the loads projected for cooling tower operations. Additionally, the 230 kV system provides the primary source of emergency offsite power for the facility, a nuclear safety function. These factors led to the selection of the existing 500 kV system as the viable auxiliary power source for the closed cycle cooling alternatives.

This transmission line rerouting would be divided into two categories: (1) reroute of the two-circuit 230 kV transmission line and the single-circuit 500 kV offsite feed and (2) installation of a new tap consisting of four 500 kV circuits to supply offsite power to the proposed cooling towers.

4.3.1.3.1 230 kV Line Relocation

The existing two-circuit 230 kV line that provides the main source of offsite power for DCPP and the northernmost 500 kV circuit that transmits DCPP Units 1 and 2 electrical output offsite via the Gates transmission intertie would need to be rerouted. Three double-circuit high voltage transmission towers of the existing 230 kV line and one single-circuit high voltage tower of the existing 500 kV single-circuit line would have to be moved. In accordance with DCPP Operating License Specifications, the maximum allowable outage time for the 230 kV offsite power source to accommodate the relocation work is 72 hours if either site reactor is operating in modes 1–4.

This requirement would demand a phased approach to completing the construction and re-energizing the lines in the allotted time. These three existing 230 kV double-circuit structures would need to be relocated to avoid anticipated earthwork operations that would be necessary to prepare a site for the proposed cooling towers. The relocated line would consist of four new towers, the first being just outside the 230 kV substation on the opposite side of Pecho Valley Road. The grading plan in this area would require special consideration because a small pad must be retained just outside the substation to accommodate the first structure. Other considerations that would be addressed in final design would require that the limits of work provide ample room (per the grading plan) to achieve the electrical clearances required by California General Order (GO) 95 and the National Electrical Safety Code (NESC) (both horizontal and vertical).

The westernmost circuit of the existing 500 kV offsite power line would also be affected by the grading. The first structures beyond the substation would require relocation because they are located within the proposed graded area. Currently configured as three single-phase lattice towers, the proposed replacement structures would be monopoles, and their location would be adjacent to the other 500 kV circuits located to the east.

Figure 4.3-7 depicts how the existing 230 kV and 500 kV lines would be rerouted.

Figure 4.3-7. Existing 230 kV and 500 kV Power Line Rerouting

4.3.1.3.2 New 500 kV Line Tap

To energize the required equipment for the proposed cooling towers, four new 500 kV circuits would be brought in from a new expansion on the west side of the existing 500 kV substation (see Figure 4.3-8). Four circuits would leave the substation on the north side and traverse the site on single-circuit monopole dead-end structures. This work would be sequenced at the end of the earthwork operations because cooling tower earthwork must be completed prior to structure erection and stringing. The structures immediately outside the 500 kV substations are proposed to be 150 feet tall; this height provides clearance over the rerouted 230 kV lines. All other 500 kV tap structures are assumed to be 110-foot-tall monopoles. Foundations are currently proposed as caissons because these are usually quick to install using an excavator-mounted Lo-Drill.

Figure 4.3-8. 500 kV Power Supply to the Cooling Towers

It is anticipated that construction would follow a sequence similar to the following:

- Perform grading in areas to which the existing lines would be relocated (existing lines still energized)
- Place foundations in the newly graded areas (existing lines still energized)
- Erect structures
  - 230 kV structures - erect lattice towers (existing lines still energized)
  - 500 kV structures – erect steel monopoles (existing lines de-energized due to proximity of construction)
- String conductor between dead-end towers (lines de-energized)
- After connections have been completed and checked off, re-energize lines

4.3.2 Passive Draft Dry/Air Cooling

4.3.2.1 General Design Considerations

P&I Schematic 25762-110-M6K-WL-00001 represents the piping arrangement for the CWS for the passive draft dry/air cooling arrangement as well as the piping arrangement for the new once-through saltwater cooling system. Two metal hyperbolic natural draft towers, approximately 590 feet in diameter by 590 feet high, would be required to support each unit, resulting in a total of four towers. The towers would provide a cold water temperature of 107.9°F at the design dry bulb temperature of 77.8°F. Refer to General Arrangement Drawings 25762-110-P1K-WL-00010, -00011, and -00012 for tower locations, pump locations, and pipe routings.

Four new volute-style CW pumps would be provided per unit, each capable of a design CW flow of 215,700 gpm. Two vertical turbine saltwater cooling pumps would be provided per unit, each capable of a design flow rate of 10,200 gpm.

Equipment List 25762-110-M0X-YA-00001 provides specific details about the new mechanical equipment that would be furnished, and Valve List 25762-110-M6X-YA-00001 lists the new major valves that would be furnished. A rendering of the passive draft dry/air-cooling site configuration is shown in Figure 4.3-9.

Figure 4.3-9. Passive Draft Dry/Air-Cooling Site Configuration

4.3.2.2 Control System Design

The control system design approach for passive draft dry/air cooling is discussed in Section 4.3.1.2. The quantity of equipment required is adjusted to support the control needs of the given technology.

4.3.2.3 Civil Design

The civil design approach for passive draft dry/air cooling is discussed in Section 4.3.1.3. The quantities differ for each technology based on the size and spacing of the towers and the amount of support equipment required. The spacing and the equipment are shown on the general arrangement drawings referenced in each section. The tower foundation design for the dry natural draft tower is provided based on preliminary vendor input. Four circular steel cooling towers (two per unit) would be provided. The foundation design would consist of two concrete ring foundations, one to support the outside tower base and the other to support the tower throat (steel structure). For the cooling tower and piping general arrangement, refer to General Arrangement Drawing 25762-110-P1K-WL-00010.

4.3.2.4 Electrical Design

The electrical load for passive draft dry/air cooling is estimated to be approximately 32 MVA per unit. The load MVA numbers mentioned in this report are approximate and assume a power factor of 0.85. In each unit, two new three-winding, 40 MVA transformers would feed the auxiliary loads (new CW pumps). The existing 500 kV DCPP switchyard would be expanded by two additional bays (breaker-and-a-half scheme) to provide the four circuits for the transformers. Refer to One Line Diagram 25762-110-E1K-0000-00001.

The four CW pumps would be fed from each of the secondary windings. The new electrical distribution voltage levels would be 12 kV (in line with the existing MV level at DCPP) for the large CW motors (11.5 kV), 480 V for the cooling tower/CW pumphouse auxiliary equipment, and 120 V ac for smaller loads. There would be dedicated 125 V dc batteries (along with an associated battery charger) for critical uninterruptible power supply (UPS) loads and control power for distribution equipment. The batteries would be sized for 2-hour duration, and the charger would be sized to recharge the batteries in 8 hours.

The existing 13,000 hp condenser CW pumps fed from 12 kV Bus D and 12 kV Bus E as well as from farther upstream transformer UAT 11 would be decommissioned. The new 350 hp saltwater cooling pumps would be fed from 4.16 kV Bus D (fed from the X winding of UAT 12) and 4.16 kV Bus E (fed from the Y winding of UAT 12). There would be four saltwater cooling pumps, two fed from each unit of the plant.

Per available worst-case transformer loading data, the loading on transformer UAT 12, even after considering the load addition on its X and Y windings, is less than 80 percent, which is acceptable. Also, there is a load reduction of 26,000 hp on UAT11 and a load addition of 700 HP on UAT 12. Therefore, there is an overall load reduction in the system and the load change is acceptable.

Based on the auxiliary system single-line design for the passive draft dry/air cooling system, the quantity and sizes of electrical equipment were estimated and used to develop the associated building sizes. Based on the number and sizes of conductors from the single-line drawing, the raceway system was designed and the quantities and sizes were estimated (trays/conduits within building, interconnecting duct banks). Supplier drawings showing the layout of the passive draft dry/air cooling towers were used to develop physical design quantity estimates. Seven electrical buildings would be provided: one for the main switchgear, one at each of the four towers, and one at each of the two CW pumphouses. Refer to Raceway Layout Drawing 25762-110-ERK-WL-00010.

Figures 4.3-10 and 4.3-11 depict the layouts of the electrical buildings for the passive draft dry/air cooling option.

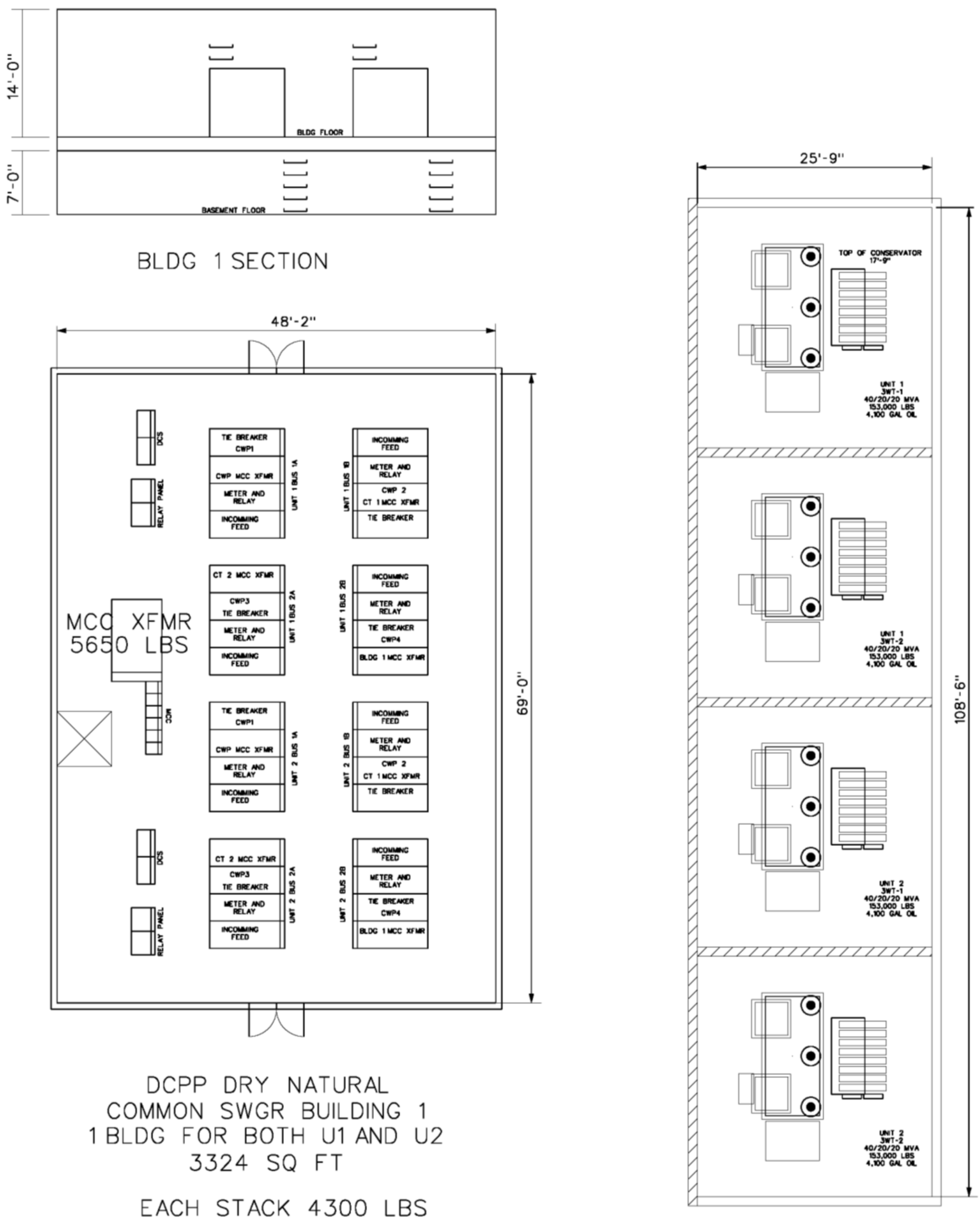


Figure 4.3-10. Passive Draft Dry/Air Cooling—Main Switchgear Electrical Building

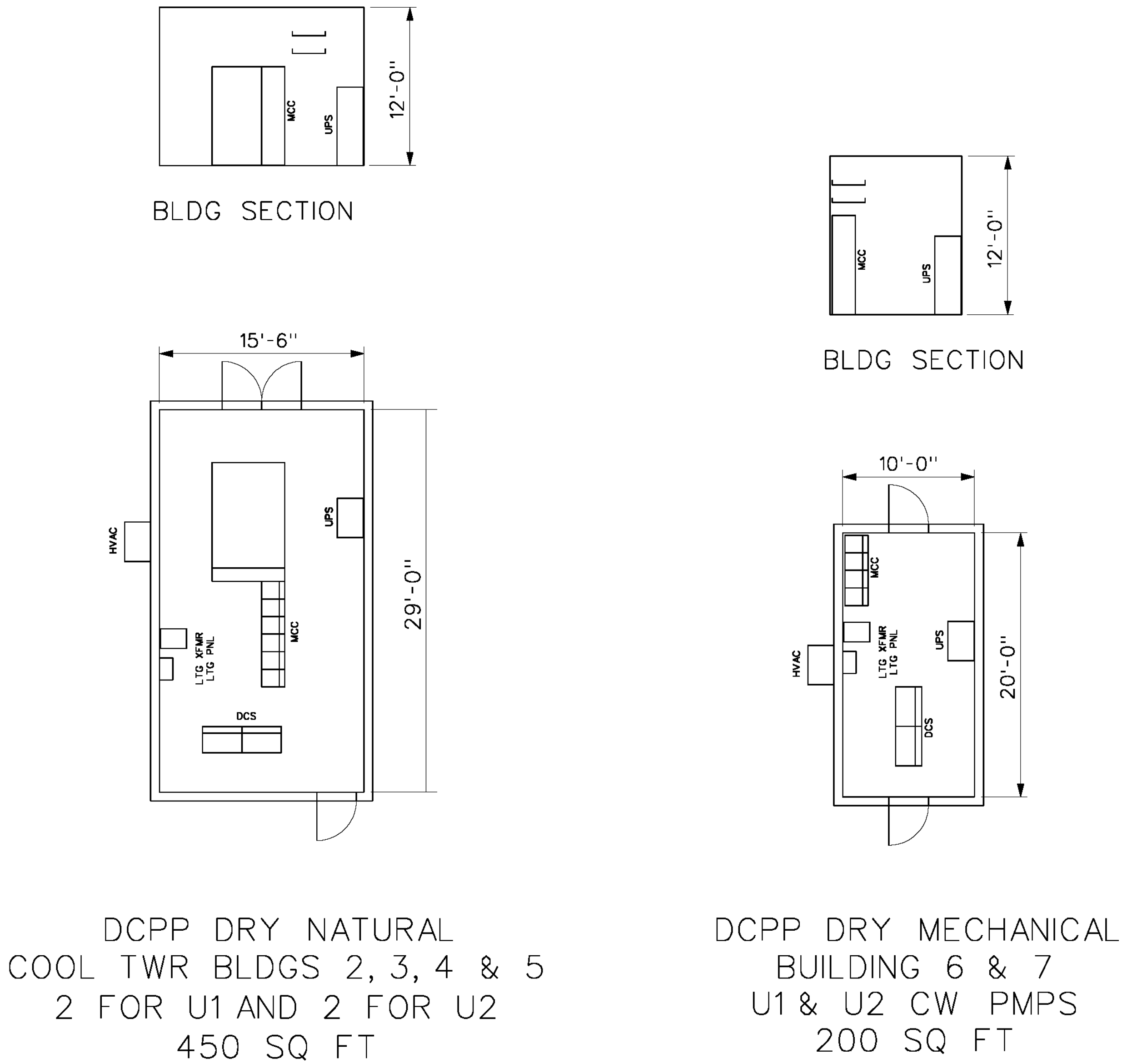


Figure 4.3-11. Passive Draft Dry/Air Cooling—Cooling Tower and Pumphouse Electrical Buildings

Quantity estimates were determined for the following items: tray, duct bank conduit, grounding, lighting, MV cable, non-segregated phase bus duct, communication equipment, aboveground conduit length per circuit, and average circuit length.

4.3.3 Mechanical (Forced) Draft Dry/Air Cooling

4.3.3.1 Mechanical Design

P&I Schematic 25762-110-M6K-WL-00002 represents the CWS piping arrangement for the mechanical (forced) draft dry/air cooling arrangement as well as the piping arrangement for the new once-through saltwater cooling system. Two rectangular mechanical (forced) draft dry/air cooling towers, each approximately 1,200 feet long, 100 feet wide, and 100 feet high, would be required to support each unit, resulting in a total of four towers. Each tower would have 60 fans. Each fan would be driven by a 250 hp motor to provide the required air flow through the tower. The towers would provide a cold water temperature of 107.9°F at the design dry bulb temperature of 77.8°F. Refer to General Arrangement Drawings 25762-110-P1K-WL-00020, -00011, -00012, and -00013 for tower locations, pump locations, and pipe routings.

Four new volute-style CW pumps would be provided per unit, each capable of a design CW flow of 215,700 gpm. Two vertical turbine saltwater cooling pumps would be provided per unit, each capable of a design flow rate of 10,200 gpm, to supply cooling water to the SCW and condensate cooler heat exchangers.

Equipment List 25762-110-M0X-YA-00002 provides additional details about the equipment that would be furnished, and Valve List 25762-110-M6X-YA-00002 lists the new major valves that would be furnished. A rendering of the mechanical (forced) draft dry/air-cooling site configuration is shown in Figure 4.3-12.

Performance, except for the additional electrical consumption, would be identical to that of the passive draft dry/air cooling towers, and the piping would be the same except in the immediate vicinity of the towers due to round versus rectangular geometry.

Figure 4.3-12. Mechanical (Forced) Draft Dry/Air-Cooling Site Configuration

4.3.3.2 Control System Design

The control system design approach for mechanical (forced) draft dry/air cooling is discussed in Section 4.3.1.2. The quantity of equipment required is adjusted to support the control needs of the given technology.

4.3.3.3 Civil Design

The method used to develop quantities for the variant technologies is discussed in Section 4.3.1.3. The quantities differ for each technology based on the size and spacing of the towers and the amount of support equipment required. The spacing and the equipment are shown on the general arrangement drawings referenced in each section.

The tower foundation designs for the mechanical (forced) draft dry/air cooling tower are based on preliminary vendor input. Four rectangular, steel-framed cooling towers (two per unit) are proposed. Foundations would be a grid of multiple spread-footing foundations of two different sizes. For the cooling tower and piping general arrangement, refer to General Arrangement Drawing 25762-110-P1K-WL-00020.

4.3.3.4 Electrical Design

The electrical load for mechanical (forced) draft dry/air cooling is estimated to be approximately 61 MVA per unit. In each unit, two new three-winding, 70 MVA transformers would feed the auxiliary loads (cooling tower fans, CW pumps, etc.). The existing 500 kV DCPP switchyard would be expanded by two additional bays (breaker-and-a-half scheme) to provide the four circuits for the transformers. Refer to One Line Diagram 25762-110-E1K-0000-00002.

The four CW pumps would be fed from each of the secondary windings. The new electrical distribution voltage levels would be 12 kV (in line with the existing MV level at DCPP) for the large CW motors (11.5 kV), 480 V for the cooling tower fans and other cooling tower/CW pumphouse auxiliary equipment, and 120 V ac for smaller loads. There would be dedicated 125 V dc batteries (along with an associated battery charger) for critical UPS loads and control power for distribution equipment. The batteries would be sized for 2-hour duration, and the charger would be sized to recharge the batteries in 8 hours.

The existing 13,000 hp condenser CW pumps fed from 12 kV Bus D and 12 kV Bus E as well as from farther upstream transformer UAT 11 would be decommissioned. The new 350 hp saltwater cooling pumps would be fed from 4.16 kV Bus D (fed from the X winding of UAT 12) and 4.16 kV Bus E (fed from the Y winding of UAT 12). There would be four saltwater cooling pumps, two fed from each unit of the plant.

Per available worst-case transformer loading data, the loading on transformer UAT 12, even after considering the load addition on its X and Y windings, is less than 80 percent, which is acceptable. Also, there is a load reduction of 26,000 hp on UAT11 and a load addition of 700 hp on UAT 12. Therefore, there is an overall load reduction in the system and the load change is acceptable.

Based on the auxiliary system single-line design for the mechanical (forced) draft dry/air cooling system, the quantity and sizes of electrical equipment were estimated and used to develop the building sizes. Based on the number and sizes of conductors from the single-line drawing, the raceway system was designed and the quantities and sizes were estimated (trays/conduits within building, interconnecting duct banks). Supplier vendor drawings showing the layout of the dry mechanical cooling tower were used to develop physical design quantity estimates. Seven electrical buildings would be provided: one for the main switchgear, one at each of the four towers, and one at each of the two CW pumphouses. Refer to Raceway Layout Drawing 25762-110-ERK-WL-00020.

Quantity estimates were determined for the following items: tray, duct bank conduit, grounding, lighting, MV cable, non-segregated phase bus duct, communication equipment, aboveground conduit length per circuit, and average circuit length.

Figures 4.3-13 and 4.3-14 depict the layouts of the electrical buildings for the mechanical (forced) draft dry/air cooling option.

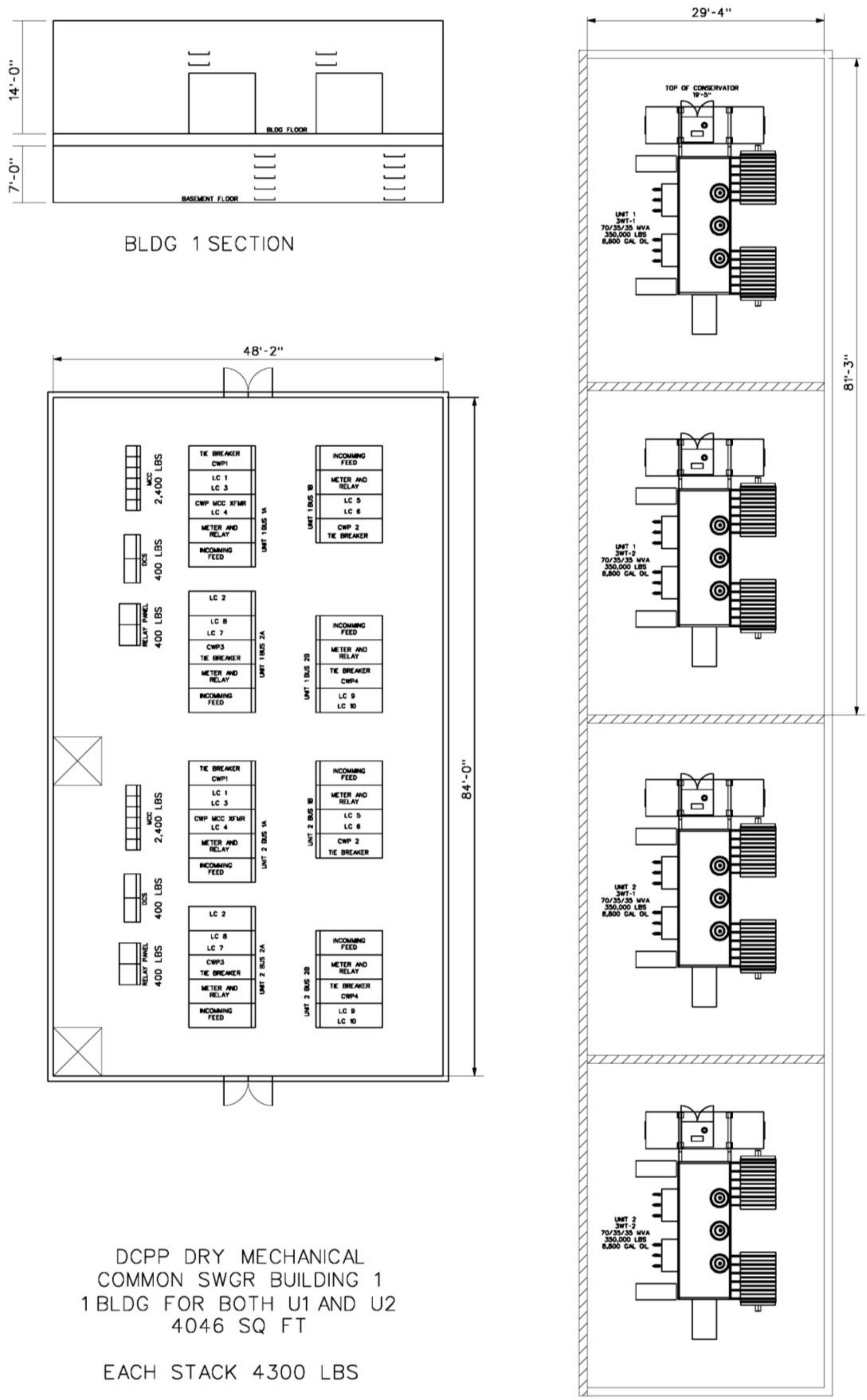


Figure 4.3-13. Mechanical (Forced) Draft Dry/Air Cooling—Main Switchgear Electrical Building

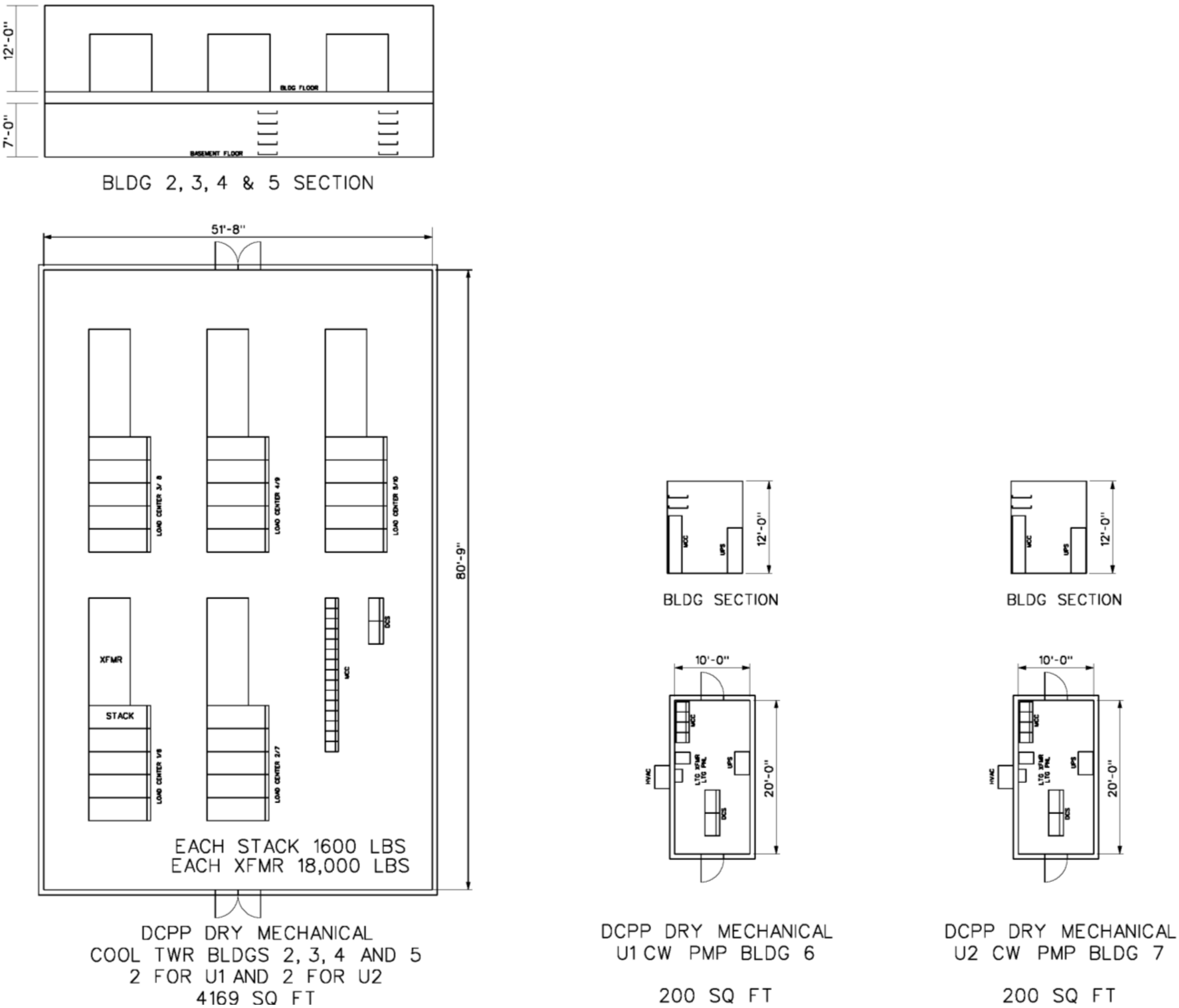


Figure 4.3-14. Mechanical (Forced) Draft Dry/Air Cooling—
Cooling Tower and Pumphouse Electrical Buildings

4.3.4 Wet Cooling Technologies—Overview

4.3.4.1 Mechanical Design

The primary differences between wet cooling towers and dry cooling towers are that a wet cooling tower consumes water due to evaporation, drift, and blowdown and achieves lower cold water temperatures because of the difference between wet and dry bulb temperatures. Currently, DCPP does not have the resources to produce water of adequate quality needed for the proposed cooling towers. Therefore, water required for the towers would be obtained from a new onsite desalination plant and from processed reclaimed water obtained from the surrounding communities. A water balance was performed for the wet cooling tower variants to determine the quantity of water required (refer to Water Balance 2562-110-M5K-YA-00001). The towers for each unit would consume approximately 16,550 gpm.

It should be noted that the State Water Board is currently developing amendments to the Water Quality Control Plan for Ocean Waters of California. The amended Plan, once adopted, may include requirements for intake and/or brine discharges that could result in restrictions or additional requirements on the use of desalination at the site.

Based on preliminary discussions, it is estimated that a maximum of 2,800 gpm of reclaimed water could be obtained from the following wastewater treatment plants, both within a 20-mile radius of DCPP:

- San Luis Obispo
- Morro Bay/Cayucos

Because this quantity is insufficient to support DCPP operation, a supplementary desalinization plant has been included, designed to supply 100 percent of the required makeup water. Refer to Figure 4.3-15 for proposed reclaimed water routing.

The desalination facility would be located north of the turbine building and north of the SLO-2 archeological site. Three desalination seawater supply pumps would be installed in the existing plant shoreline intake structure. Piping would be routed from the intake structure around the SLO-2 archeological site to the desalination facility (refer to General Arrangement Drawing 25762-110-P1K-WL-00032). The new proposed seawater supply piping would be routed entirely below grade except in the screen house, where it would be within the building. No piping would be exposed as it crosses the protected area. A second line would be routed from the desalination facility to discharge the brine produced by the desalination process back to near the CW discharge (refer to General Arrangement Drawing 25762-110-P1K-WL-00030) and further extended offshore to a sufficient depth and non-stagnant ambient location. A multiport diffuser would be fitted at the end of the effluent discharge to achieve the dilution needed to comply with state discharge requirements. The offshore discharge pipe would be buried and protected against current- and wave-induced erosive forces. The water produced by the desalination facility would be pumped to an approximately 5-million-gallon HDPE-lined storage pond located adjacent to the cooling towers. The storage pond size would allow 2 hours of operation of both units upon loss of both the reclaimed source and the desalinization system, to allow for an orderly shutdown if the makeup source cannot be restored. Tower blowdown would be accomplished via a connection from the CW piping supply line to the condensers that would be routed to the plant outfall (refer to P&I Schematic 25762-110-M6K-WO-00001). The existing CW pump motors and pump internals (two per unit) would be decommissioned and removed from the existing shoreline intake structure, and modifications would be made to accommodate three new desalination saltwater supply pumps.

Figure 4.3-15. Proposed Reclaimed Water Routing

Two offsite pump stations would be provided to pump water from the reclaimed water sources to an onsite storage tank. The reclaimed water would need to be pretreated before use in the cooling towers. Reclaimed water treatment equipment would be located adjacent to the new onsite desalination facility. Treated reclaimed water would be blended with desalinated water and stored in the pond. Refer to P&I Schematic 25762-110-M6K-WR-00001.

The cooling towers would be located northeast of the turbine building and east of the SLO-2 archeological site. The existing portion of the mountain at this location would be lowered to an elevation of 115 feet to accommodate the towers as with the other closed-cycle cooling technologies. New pumphouses would be furnished for each unit. The Unit 1 pumphouse would be located northeast of the turbine building and south of the SLO-2 archeological site. The Unit 2 pumphouse would be located west of the Unit 1 turbine building. Refer to General Arrangement Drawing 25762-110-P1K-WI-00031 and the additional general arrangement drawings included for each variant.

Four 25-percent-capacity CW pumps with common suction and discharge headers would be provided per unit. A combination of 12-foot-in-diameter FRP pipes and 16-foot-by-16-foot concrete conduits per unit would be connected to modified condenser outlet concrete conduits and routed to the associated unit's CW pumphouse. Similar piping and concrete conduits would be routed to/from the cooling towers by the west side of the turbine building and connect the towers to the new pumphouses and existing condensers. Refer to General Arrangement Drawing 25762-110-P1K-WL-00031 and the additional general arrangement drawings included for each variant. The routing and pipe/conduit sizes are very similar for all closed-cycle cooling technology variants except in the local area of the towers due to different tower geometry.

Significant demolition/modification of the existing CW concrete conduits west of the turbine building would be required. Refer to General Arrangement Drawing 25762-110-P1K-00013. The modifications necessary on the west side of the turbine building are shown in Figure 4.3-5.

A closed-cycle cooling system would require an increase in the overall design pressure of the CWS. The tube side of the main condensers would be modified to increase the tube-side pressure design from 25 psig to 50 psig. This pressure increase would account for the system losses and the increased hydrodynamic loadings that result from the CWS modified arrangement.

The increase in cold water temperature from the original 76°F would require that the service water heat exchanger and component coolers be replaced with larger surface area heat exchangers to provide the same hot-side cold water temperatures as provided in the original system.

The existing fire water and potable water systems would be extended to the cooling tower and desalination plant areas. A sanitary lift station would be installed at the desalination plant and piped to the plant existing sanitary system.

Access/maintenance roads would be provided to service the cooling towers and desalination facility.

The existing CW pump motors and pump internals would be decommissioned and removed as necessary and the existing shoreline intake structure would be modified to accommodate the three desalination saltwater supply pumps.

Drift is an important consideration when siting wet cooling towers at a power station. When the cooling towers are in operation, water droplets become entrained in the air flow being induced through the tower and exiting through the tower discharge. These droplets are known as drift. The drift rate for the different wet cooling tower technologies being considered for DCPP would be limited to 0.0005 percent of the CW flow rate by using drift eliminators in the cooling towers. The sizes of the drift droplets would range from 0.1–300 µm, depending on the drift eliminator manufacturer and type being used. This range is the lowest achievable from a single layer of the most efficient drift eliminators available in the industry at this time, and it equates to a total drift loss of approximately 5 gallons per minute from all of the cooling towers collectively (per unit).

The drift droplets would be of the same water quality as the CW and would contain any water treatment chemicals being used at the site. Based on the estimated CW quality for DCPP, the 0.0005-percent drift rate would result in the emission of approximately 30 tons of solids per year from the towers. After drift droplets leave a tower and land on surrounding areas and structures, the contaminants in the droplets are deposited when the droplets evaporate. Different tower design considerations, including tower discharge height and air exit velocity, affect how far the drift droplets travel and thus the area on which the drift can land, as well as the concentration of contaminants deposited on the affected surfaces.

One concern is that the presence of salts and chemicals in the drift droplets could result in a conductive film being left on insulators if the droplets land on the switchyard. This film could cause electrical arcing and other safety and operational issues. Based on the conceptual plot plans, the wet cooling technologies would be located approximately 1,300–1,700 feet from the nearest boundary of the 500 kV switchyard. The predominant wind direction for the site is from the NW about 30–40 percent of the time. This wind direction results in tower discharge air being blown toward the switchyard. Wind directions of NNW and WNW would also drive tower discharge air in the general direction of the switchyard. A review of site wind roses indicates that consideration of all three of these directions accounts for approximately 60 percent of the year. Thus, this is considered as the length of time that tower air and drift discharges would be directed toward the switchyard This does not necessarily mean that all of the drift would deposit on the switchyard area and contaminate the insulators and other equipment; the actual volume of solids deposition on the switchyard area (in acres per month) can be quantified by using the Electric Power Research Institute's Seasonal/Annual Cooling Tower Impact (SACTI) model or a similar program. During the detailed design and execution of the project, this type of analysis would be completed for the selected cooling tower design. Quantifying the deposition on the switchyard would help to determine appropriate equipment and maintenance requirements to minimize the potential for arcing. This includes correct selection of insulator type and planning for site personnel to wash the insulators frequently enough to avoid significant solids buildup.

4.3.4.2 Control System Design

The philosophy used to develop the control systems approach is similar for each wet technology variant. Control systems and equipment were estimated in accordance with the equipment shown on P&I schematics, the mechanical equipment lists, and the equipment described in the mechanical section of this report. The cooling tower control systems and equipment were estimated based on preliminary information received from cooling tower suppliers. Information from the water treatment suppliers was used to estimate the cost for the controls and instrumentation associated with adding the desalination plant, and a P&I schematic and preliminary information from the reclaimed water treatment equipment supplier were used to estimate the cost for the controls and instrumentation associated with adding the reclaimed water clarifier facility.

As with the dry technologies, a DCS would be provided to control and monitor equipment. DCS I/O cabinets would be located at the intake area (for new desalination seawater supply pump control/monitoring), in the electrical building near the new CW pumps (each unit), at each cooling tower, in the desalination plant/reclaimed water treatment electrical building/room, and in the existing main control room (to house network switches to tie in new controllers to the existing network). It is assumed that an OWS HMI would be provided at each cooling tower building and that two OWSs (per unit) would be added to the main control room to control and monitor the new equipment added by each option. The desalination equipment vendor would provide PLC control and HMI with the equipment for desalination control. The reclaimed water treatment equipment vendor would provide PLC control and HMI with the equipment for reclaimed water treatment. The DCS would be data-linked via Ethernet to PLCs for the desalination equipment and reclaimed water equipment to allow supervisory control and monitoring from the main control room via the DCS. It is assumed that there is enough space in the existing plant areas (intake area electrical building, control room) to accommodate these new DCS I/O cabinet(s) and HMIs.

The DCS would have redundant processors and communications networks. Separate and independent DCS networks would be provided for each of the two units. Hardware for the DCS would include functionally and geographically distributed I/O cabinets, I/O modules (analog and digital), OWSs, and the connective computer hardware modules. One EWS and the software needed to develop control logic and graphic displays would be provided for each unit. The EWS would have the capability to upload and download configuration information and logic display changes into the OWSs and processors. The DCS would annunciate, indicate, time stamp, and track the status of critical parameters. Alarm history would be available on the alarm summary display screen. A color laser printer would be provided to print DCS graphic displays, logic configurations, log reports, and alarm summaries.

As part of these modifications, controls associated with the plant's existing CW pumps would be decommissioned and removed. New CW pumps and valves would be installed at a new pumphouse to circulate the cooling water from the condenser outlet to the new cooling towers. Some of the existing traveling screens at the intake would remain in operation to be used for the new desalination plant seawater supply pumps. The costs associated with removing the unused screens' instrumentation and controls and control panels have been included in the estimate. Local instrumentation and control panels for existing CW pumps would be decommissioned and removed. The estimate includes the demolition costs for these panels and instrumentation. The estimate also includes necessary revisions to plant drawings and documents (such as logic diagrams, instrument installation details, instrument list, and instrument data sheets).

Custom-built DCS graphics would show overview and group or detailed information to assist the operator in any type of control action required. Other DCS features are:

- Annunciation would be predominantly in the main DCS. Major alarms and protections would be time tagged.
- Positive indications would be provided for plant status (e.g., run/stop, open/close), and these indications would be fed back to the DCS and indicated using an appropriate graphic display.
- Plant personnel would be able to modify and tune control loops, create or change displays, and make database changes without training in high-level programming languages.

The DCS network would have a redundant Ethernet data highway and Ethernet links to the MV switchgear multifunction relays and to the existing plant computer system. Redundant DCS Ethernet switches and cabling would be provided for the connection between the DCS local/remote I/O cabinets and the DCS HMIs to permit data transfer. All DCS printers and HMIs, including the historian, would be interconnected via Ethernet. All DCS communication cabling between plant buildings would be fiber optic. All DCS communication cabling within the same room would be Category V/VI copper.

The DCS would control each new MV switchgear main, tie, and load center feeder breaker. The status of each MV bus would be monitored from the DCS via data link to MV meters/relays.

4.3.4.3 Civil Design

The philosophy used to develop the civil design approach is similar for each wet technology variant, with the primary difference occurring at the cooling towers.

The designs for the CW main piping and pumps are virtually identical to those described for the variant dry technologies in Section 4.3.1. The major differences are the inclusion of cooling tower blowdown piping and valve, the makeup water supply systems, the storage pond, and the cooling tower foundations.

The makeup water system would only be required for the wet cooling tower variants, and it would consist of the following structures and components:

a. A desalination plant to provide treated makeup water to the CWS through the cooling tower basin. Based on cooling tower supplier data, preliminary engineering has been performed to provide foundation and excavation quantities.

b. A reclaimed water treatment plant with a 90-minute contact basin to treat reclaimed water from off site for use as makeup to the cooling towers. Based on water treatment vendor preliminary design data, preliminary engineering has been performed to provide foundation and excavation quantities. The water treatment plant footprint is estimated to be approximately 2.5 acres.

c. A 5,000,000-gallon-capacity storage pond to store treated water for the units. The proposed storage pond would have an HDPE liner with a layer of protective sand over it. The water would be discharged to the cooling tower basins by gravity (no need for pumps). A concrete discharge structure with screens and a discharge outfall would be provided for the gravity-fed water supply to the cooling towers.

d. Two offsite reclaimed water sources, each requiring a pumphouse, an electrical building, and buried cement-lined ductile iron pipes routed to the onsite pumphouse grey water storage tank. Preliminary engineering has been performed to provide structural and excavation quantities for these facilities.

4.3.5 Wet Natural Draft Cooling

4.3.5.1 Mechanical Design

P&I Schematic 25762-110-M6K-WL-00003 represents the piping arrangement for the CWS for the wet natural draft cooling arrangement. Two concrete hyperbolic natural draft towers approximately 590 feet in diameter by 590 feet high would be required to support each unit, resulting in a total of four towers. The towers would provide a design cold water temperature of 80.6°F. Refer to General Arrangement Drawings 25762-110-P1K-WL-00030 and -00031 for tower locations, pump locations, and pipe routings. A rendering of the wet natural draft cooling site configuration is shown in Figure 4.3-16.

Two new shell-and-tube service water heat exchangers and one new condensate cooler per unit, all with increased surface areas, would be provided. Each would provide a hot-side cold water temperature of 95°F at the original design duty.

Four new volute-style CW pumps would be provided per unit, each capable of a design CW flow of 218,250 gpm. Three vertical turbine saltwater supply pumps would be provided, each capable of a design flow rate of 36,800 gpm.

Equipment List 25762-110-M0X-YA-00003 provides additional details about the new mechanical equipment that would be furnished, and Valve List 25762-110-M6X-YA-00003 lists the new major valves that would be furnished.

Figure 4.3-16. Wet Natural Draft Cooling Site Configuration

4.3.5.2 Control System Design

The control system design approach for the wet natural draft cooling technology is discussed in Section 4.3.2. The quantity of equipment required is adjusted to support the control needs of the given technology.

4.3.5.3 Civil Design

The method used to develop quantities for the various variant technologies is discussed in Section 4.3.2. The quantities differ for each technology based on the size and spacing of the towers and the amount of support equipment required. The spacing and equipment are shown on the general arrangement drawings referenced in each section. The tower foundations for the wet natural draft cooling tower are based on preliminary supplier input. Four hyperbolic cooling towers (two per unit) are proposed. Foundations would include one concrete ring foundation to support the tower shell, a concrete slab on grade for a water basin, and an outfall concrete structure for the makeup water. For the cooling tower and piping general arrangement, refer to General Arrangement Drawing 25762-110- P1K-WL-00040.

4.3.5.4 Electrical Design

The electrical load for this option is estimated to be approximately 64 MVA per unit. In each unit, two new three-winding, 70 MVA transformers would feed the auxiliary loads (CW pumps, desalination loads, and cooling tower instrumentation). The existing DCPP 500 kV switchyard would be expanded by two additional bays (breaker-and-a-half scheme) to provide the four circuits for the transformers (refer to One Line Diagram 25762-110-E1K-0000-00003). The four CW pumps would be fed from each of the secondary windings. The new electrical distribution voltage levels would be 12 kV (in line with the existing MV level at DCPP) for the large CW motors (11.5 kV), and desalination and water reclaimed systems, 480 V for the cooling tower fans and other cooling tower/CW pumphouse auxiliary equipment, and 120 V ac for smaller loads. There would be dedicated 125 V dc batteries (along with an associated battery charger) for critical UPS loads and control power for distribution equipment. The batteries would be sized for a 2-hour duration, and the charger would be sized to recharge them in 8 hours.

The existing 13,000 hp condenser CW pumps fed from 12 kV Bus D and 12 kV Bus E as well as from farther upstream transformer UAT 11 would be decommissioned and new 6,800 hp desalination seawater supply pumps would be fed from the same 12 kV Bus D and 12 kV Bus E, respectively. In all, there would be three desalination seawater supply pumps, two fed from one unit from the buses mentioned above and the third from the second unit. Because there is a net load reduction on upstream transformer UAT11, the load change is acceptable.

Based on the auxiliary system single-line design for the wet natural draft cooling system, the quantity and sizes of electrical equipment were estimated and used to develop the building sizes. Based on the number and size of conductors from the single-line drawing, the raceway system was designed and the quantities were estimated (trays/conduits within building, interconnecting duct banks). Supplier vendor drawings showing the layout of the wet natural cooling tower were used as appropriate for physical design quantity estimates. Eight electrical buildings would be provided: one for the main switchgear, one at each of the four towers, one at each of the two CW pumphouses, and one at the desalination plant. Refer to Raceway Layout Drawing 25762-110-ERK-WL-00040.

The desalination and water reclaimed vendors have provided estimates for the electrical equipment required for power distribution for their supplied equipment. The desalination vendor provided a typical single-line diagram showing the electrical equipment configuration. The desalination/reclaimed area electrical building size, tray quantity, and duct bank quantity were estimated from the desalination vendor typical single-line diagram, mechanical equipment lists, and vendor-supplied conceptual plant general arrangement drawings.

Quantity estimates were determined for the following items: tray, duct bank conduit, grounding, lighting, MV cable, non-segregated phase bus duct, communication equipment, aboveground conduit length per circuit, and average circuit length.

Figures 4.3-17 through 4.3-19 depict the layouts of the electrical buildings for the wet natural draft cooling option.

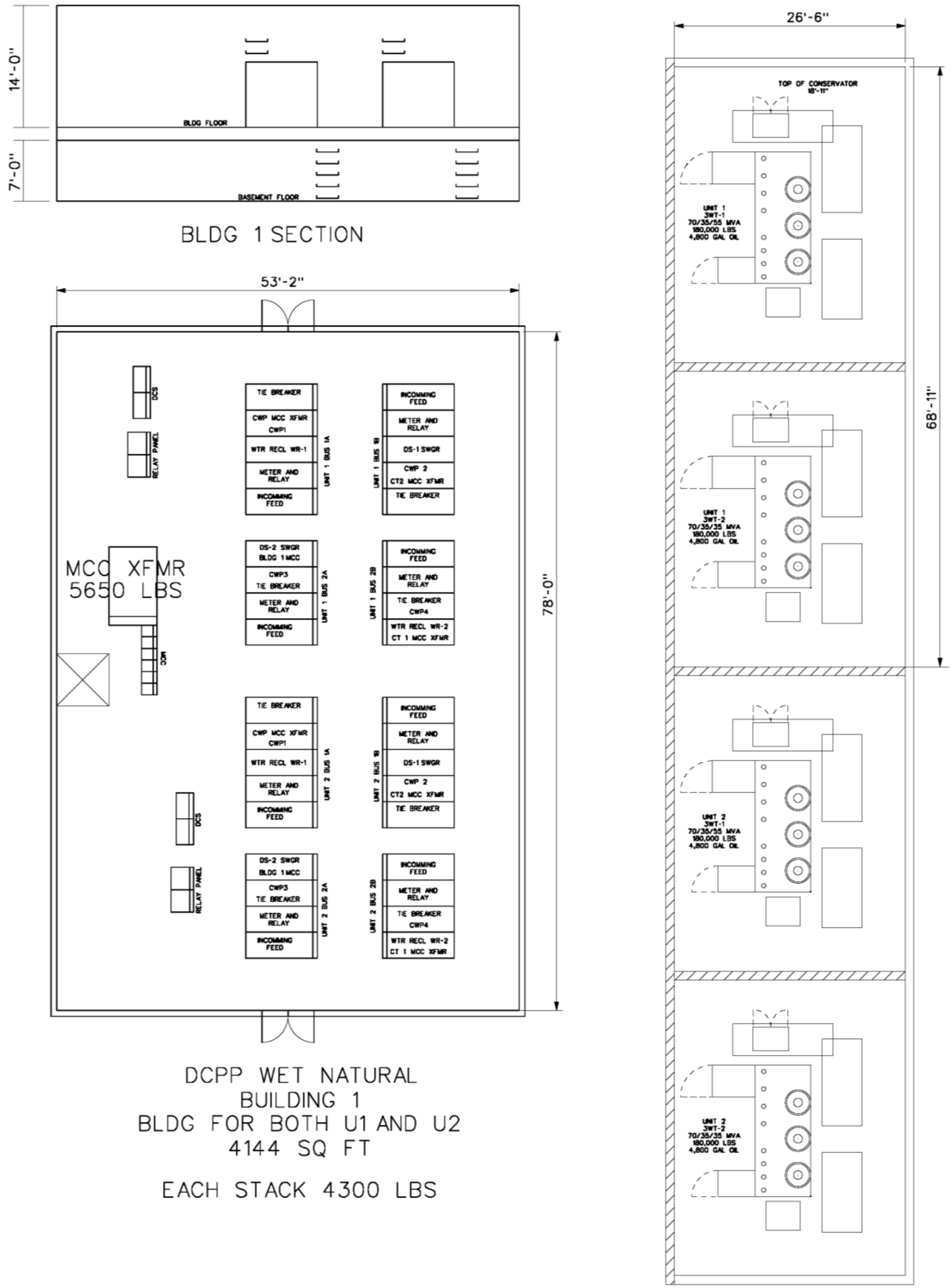


Figure 4.3-17. Wet Natural Draft Cooling—Main Switchgear Electrical Building

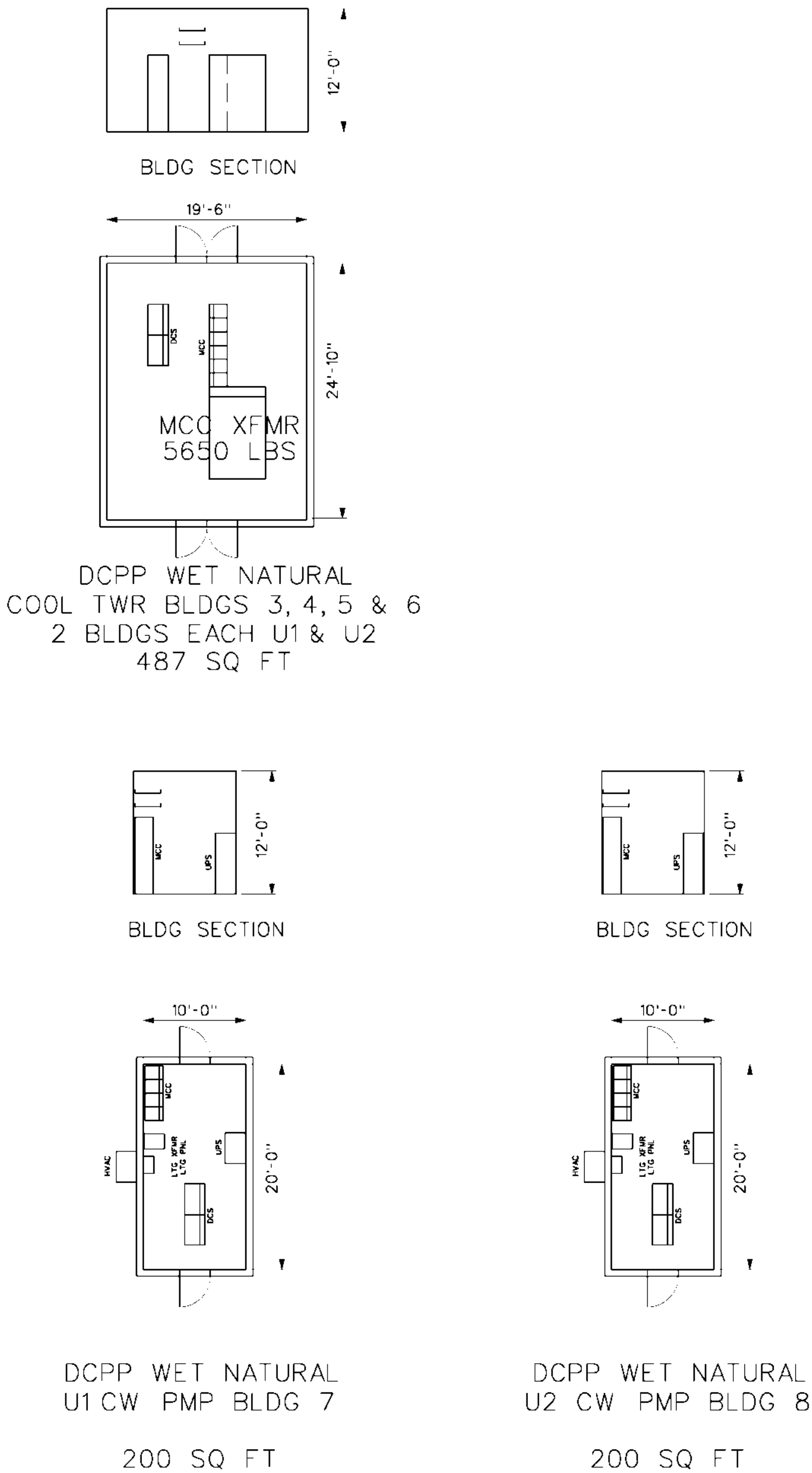


Figure 4.3-18. Wet Natural Draft Cooling—Cooling Tower and Pumphouse Electrical Buildings

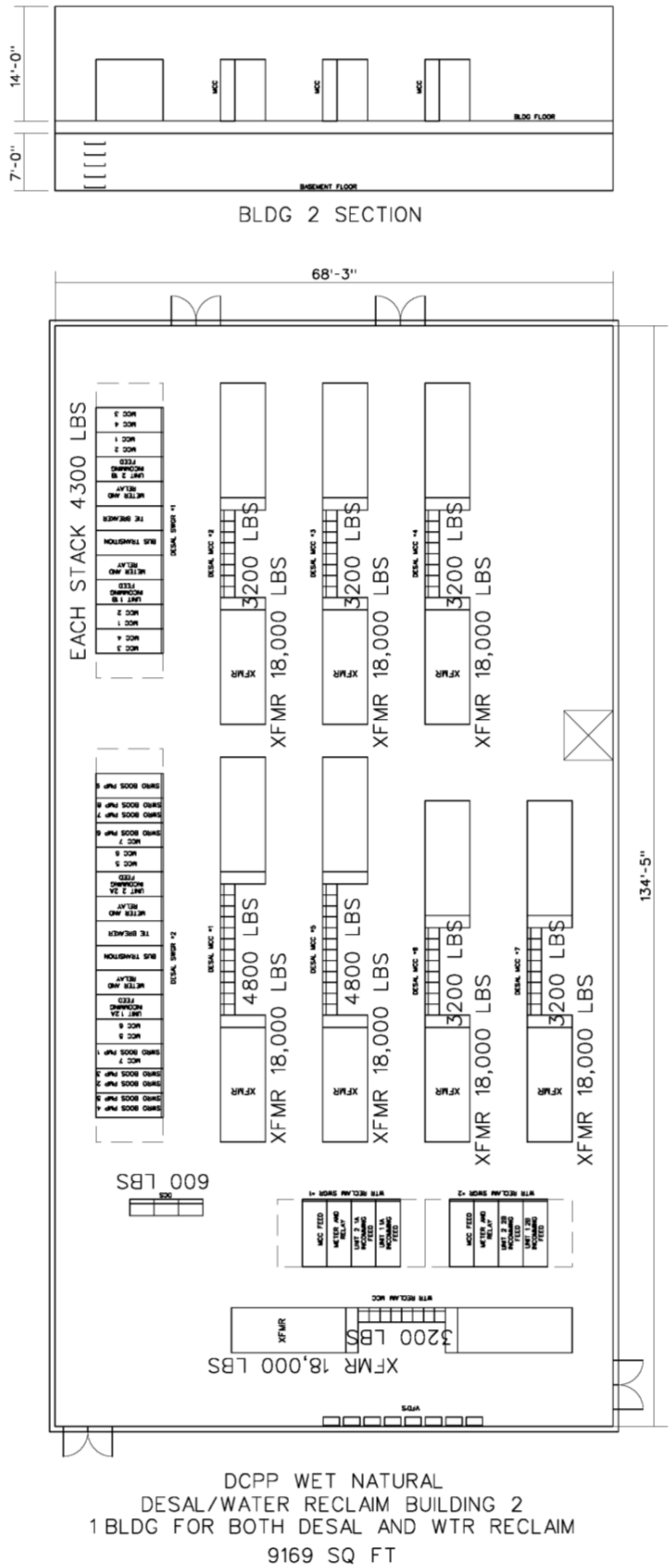


Figure 4.3-19. Wet Natural Draft Cooling—Desalination/Water Reclaimed Electrical Building

4.3.6 Wet Mechanical (Forced) Draft Cooling

P&I Schematic 25762-110-M6K-WL-00004 represents the CWS piping arrangement for the wet natural draft cooling arrangement. One circular concrete mechanical (forced) draft dry/air cooling tower 542 feet in diameter by 180 feet high would be required for each unit, for a total of two towers. Each tower would have 40 fans, each driven by a 300 hp motor, to provide the required air flow through the tower (refer to General Arrangement Drawing 25762-110-P1K-WL-00050). The towers would be capable of maintaining a design cold CW temperature of 80.6°F. Refer to General Arrangement Drawings 25762-110-P1K-WL-00013, -00030, and -00031 for tower locations, pump locations, and pipe routings. A rendering of the wet mechanical (forced) draft cooling site configuration is shown in Figure 4.3-20.

Figure 4.3-20. Wet Mechanical (Forced) Draft Cooling Site Configuration

Two new shell-and-tube service water heat exchangers and one new condensate cooler per unit, all with increased surface areas, would be provided. Each would provide a hot-side cold water temperature of 95°F at the original design duty.

Four new volute-style CW pumps would be provided per unit, each capable of a design CW flow of 218,250 gpm. Three vertical turbine saltwater supply pumps would be provided, each capable of a design flow rate of 36,800 gpm.

Equipment List 25762-110-M0X-YA-00004 provides additional details about the new mechanical equipment that would be furnished, and Valve List 25762-110-M6X-YA-00004 lists the new major valves that would be furnished.

4.3.6.1 Control System Design

The control system design approach for the wet mechanical (forced) draft cooling technology is discussed Section 4.3.2. The quantity of equipment required is adjusted to support the control needs of the given technology.

4.3.6.2 Civil Design

The method used to develop quantities for the variant technologies is discussed in Section 4.3.2. The quantities differ for each variant based on the size and spacing of the towers and the amount of support equipment required. The spacing and equipment are shown on the general arrangement drawings referenced in each section. The tower foundations for the wet mechanical (forced) draft tower are based on preliminary supplier input. Two concrete, circular cooling towers (one per unit) are proposed. Per the preliminary foundation design, there would be one concrete ring foundation to support the tower shell, a concrete slab on grade for a water basin, and an outfall concrete structure for the makeup water. For the cooling towers and piping general arrangement, refer to General Arrangement Drawing 25762-110-P1K-WL-00050.

4.3.6.3 Electrical Design

The electrical load for this option is estimated to be approximately 74 MVA per unit. In each unit, two new three-winding, 80 MVA transformers would feed the auxiliary loads (cooling tower fans, CW pumps, and desalination loads). The existing DCPP 500 kV switchyard would be expanded by two additional bays (breaker-and-a-half scheme) to provide the four circuits for the transformers. Refer to One Line Diagram 25762-110-E1K-0000-00004.

The four CW pumps would be fed from each of the secondary windings. The new electrical distribution voltage levels would be 12 kV (in line with the existing MV level at DCPP) for the large CW motors (11.5 kV) and the desalination and water reclaim systems, 480 V for the cooling tower fans and other cooling tower/CW pumphouse auxiliary equipment, and 120 V ac for smaller loads. There would be dedicated 125 V dc batteries (along with an associated battery charger) for critical UPS loads and control power for distribution equipment. The batteries would be sized for a 2-hour duration, and the charger would be sized to recharge them in 8 hours.

The existing 13,000 hp condenser CW pumps fed from 12 kV Bus D and 12 kV Bus E as well as from farther upstream transformer UAT 11 would be decommissioned and new 6,800 hp desalination seawater supply pumps would be fed from the same 12 kV Bus D and 12 kV Bus E, respectively. In all, there would be three desalination seawater supply pumps, two fed from one unit from the buses mentioned above and the third from the second unit. Because there is a net load reduction on upstream transformer UAT11, the load change is acceptable.

Based on the auxiliary system single-line design for the wet mechanical (forced) draft cooling system, the number and size of electrical equipment were estimated and used to develop building sizes. Based on the number and size of conductors from the single-line drawing, the raceway system was designed and the quantities were estimated (trays/conduits within building, interconnecting duct banks). Supplier vendor drawings showing the layout of the wet mechanical cooling tower were used as appropriate for physical design quantity estimates. Five electrical buildings would be provided: one for the main switchgear and a cooling tower, one at the second cooling tower, one at each of the two CW pumphouses, and one at the desalination plant. Refer to Raceway Layout Drawing 25762-110-ERK-WL-00050.

The desalination and water reclaimed vendors have provided estimates for the electrical equipment required for power distribution for their supplied equipment. The desalination vendor provided a typical single-line diagram showing the electrical equipment configuration. The desalination/reclaimed area electrical building size, tray quantity, and duct bank quantity were estimated from the desalination vendor typical single-line diagram, mechanical equipment lists, and vendor-supplied conceptual plant general arrangement drawings.

Quantity estimates were determined for the following items: tray, duct bank conduit, grounding, lighting, MV cable, non-segregated phase bus duct, communication equipment, aboveground conduit length per circuit, and average circuit length.

Figures 4.3-21 through 4.3-23 depict the layouts of the electrical buildings for the wet mechanical (forced) draft cooling option.

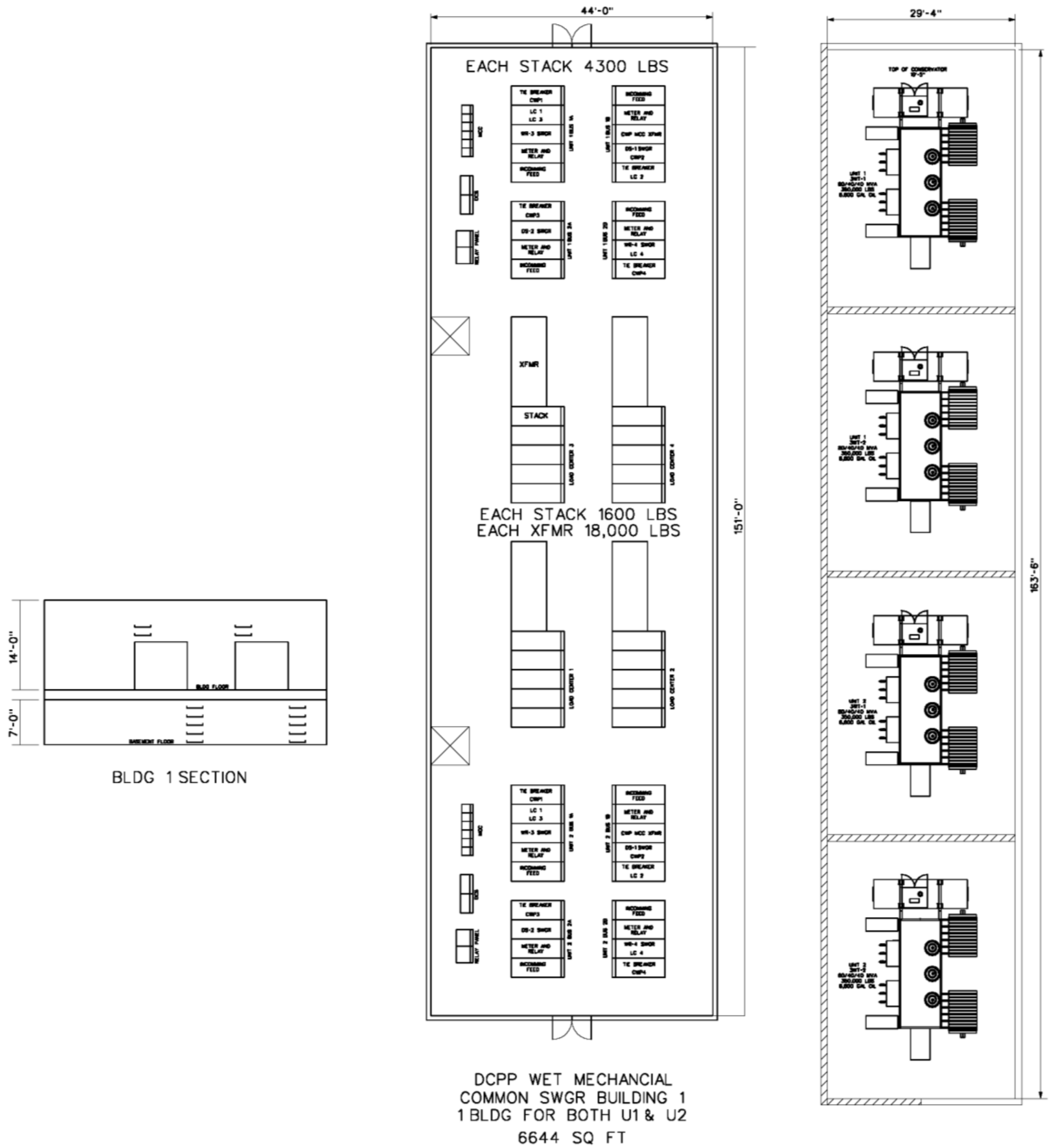
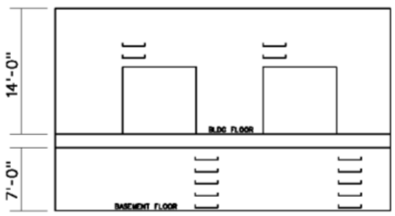
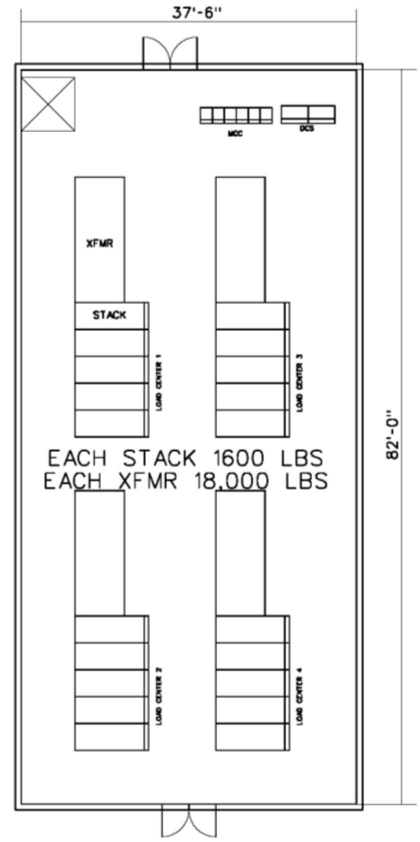


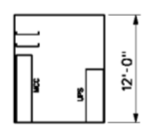
Figure 4.3-21. Wet Mechanical (Forced) Draft Cooling—Main Switchgear Electrical Building



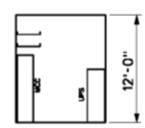
BLDG 5 SECTION



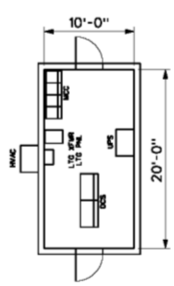
DCPP WET MECHANICAL
U2 TOWER LC BUILDING 5
3067 SQ FT



BLDG SECTION

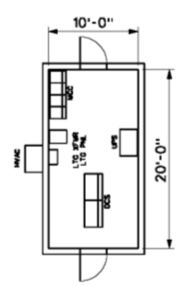


BLDG SECTION



DCPP WET MECHANICAL
U1 CW PMP BLDG 3

200 SQ FT



DCPP WET MECHANICAL
U2 CW PMP BLDG 4

200 SQ FT

Figure 4.3-22. Wet Mechanical (Forced) Draft Cooling—Cooling Tower and Pumphouse Electrical Buildings

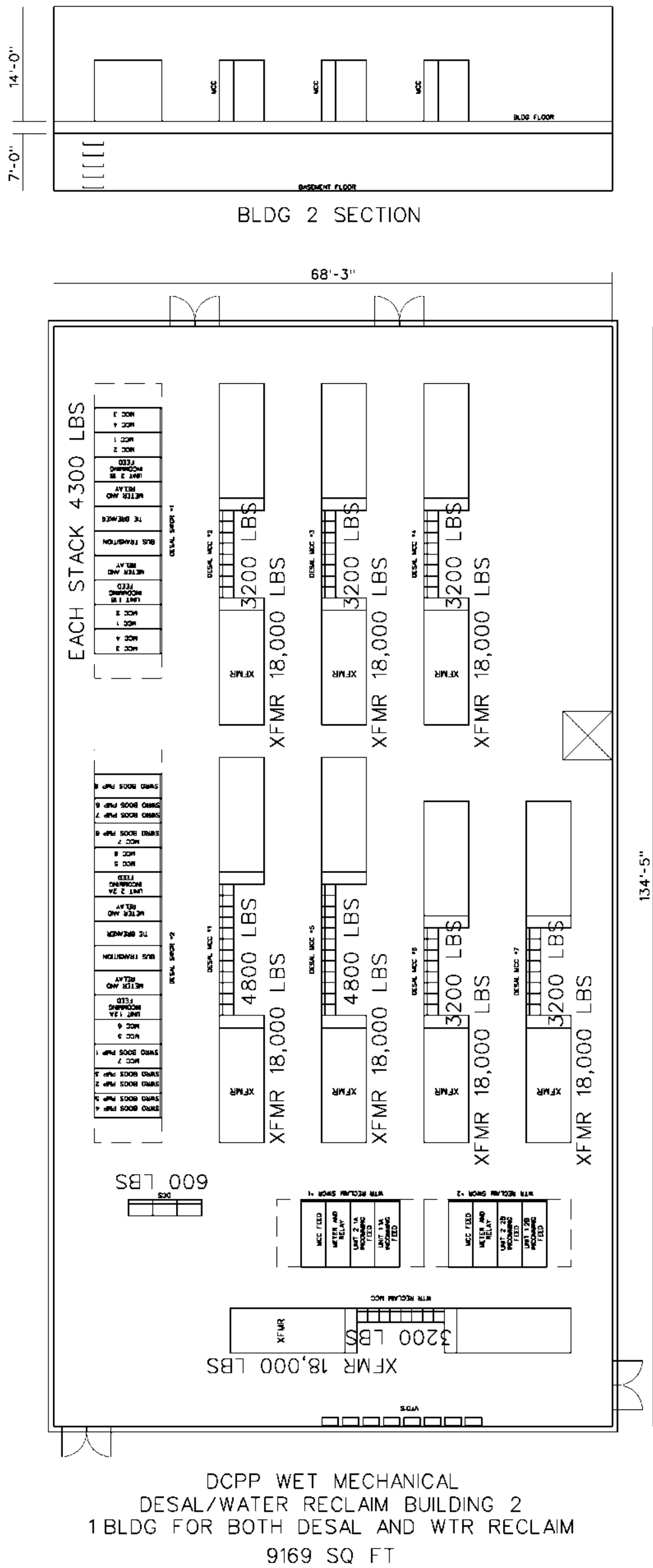


Figure 4.3-23. Wet Mechanical (Forced) Draft Cooling—Desalination/Water Reclaimed Electrical Building

4.3.7 Hybrid Wet/Dry Cooling

P&I Schematic 25762-110-M6K-WL-00005 represents the CW piping arrangement for the hybrid wet/dry cooling arrangement. The hybrid wet/dry cooling variant is identical to the wet mechanical (forced) draft cooling variant except for the tower design. The tower would be fitted with an additional set of fans that would draw ambient air through fin-tube heat exchangers located above the cooling tower fill section to change the state of the air exiting the tower to minimize/eliminate the tower plume. One circular concrete hybrid wet/dry cooling tower 576 feet in diameter by 180 feet high would be required for each unit, resulting in a total of two towers. To provide the required air flow through the tower, each would have 40 fans associated with the wet section, each driven by a 300 hp motor, and 40 fans associated with the dry section, each driven by a 200 hp motor. The towers would be capable of maintaining a design cold CW temperature of 80.3°F. Refer to General Arrangement Drawings 25762-110-P1K-WL-00013, -00030, and -00031 for tower locations, pump locations, and pipe routings. A rendering of the hybrid wet/dry cooling site configuration is shown in Figure 4.3-24.

Figure 4.3-24. Hybrid Wet/Dry Cooling Site Configuration

Two new shell-and-tube service water heat exchangers and one new condensate cooler per unit, all with increased surface area, would be provided. Each would provide a hot-side cold water temperature of 95°F at the original design duty.

Four new volute-style CW pumps would be provided per unit, each capable of a design CW flow of 218,250 gpm. Three vertical turbine saltwater supply pumps would be provided, each capable of a design flow rate of 36,800 gpm.

Equipment List 25762-110-M0X-YA-00005 provides additional details on the new mechanical equipment that would be furnished, and Valve List 25762-110-M6X-YA-00005 lists the new major valves that would be furnished.

4.3.7.1 Control System Design

The control system design approach for the hybrid wet/dry cooling technology is discussed in Section 4.3.2. The quantity of equipment required is adjusted to support the control needs of the given technology.

4.3.7.2 Civil Design

The method used to develop quantities for the variant technologies is discussed in Section 4.3.2. The quantities differ for each variant based on the size and spacing of the towers and the amount of support equipment required. The spacing and the equipment are shown on the general arrangement drawings referenced in each section. The tower foundations for the hybrid wet/dry cooling tower are based on preliminary supplier input. Two circular concrete cooling towers are proposed. The foundation design would consist of one concrete ring foundation to support the tower shell, a concrete slab on grade for a water basin, and an outfall concrete structure for the makeup water. For the cooling tower and piping general arrangement, refer to General Arrangement Drawing 25762-110-P1K-WL-00030.

4.3.7.3 Electrical Design

The electrical load for this option is estimated to be approximately 86 MVA per unit. In each unit, two new three-winding, 90 MVA transformers would feed the auxiliary loads (cooling tower fans, CW pumps, and desalination loads). The existing DCPP 500 kV switchyard would be expanded by two additional bays (breaker-and-a-half scheme) to provide the four circuits for the transformers. Refer to One Line Diagram 25762-110-E1K-0000-00005.

The four CW pumps would be fed from each of the secondary windings. The new electrical distribution voltage levels would be 12 kV (in line with the existing MV level at DCPP) for the large CW motors (11.5 kV) and the desalination and water reclaimed systems, 480 V for the cooling tower fans and other cooling tower/CW pumphouse auxiliary equipment, and 120 V ac for smaller loads. There would be dedicated 125 V dc batteries (along with an associated battery charger) for critical UPS loads and control power for distribution equipment. The batteries would be sized for a 2-hour duration, and the charger would be sized to recharge them in 8 hours.

Mechanical equipment lists depicting the pumphouse power requirements, P&I schematics depicting the system components for the various options, general arrangement drawings depicting the plant design, and instrumentation list and quantities (by control system) were primarily the inputs for electrical design.

The existing 13,000 hp condenser CW pumps fed from 12 kV Bus D and 12 kV Bus E as well as from farther upstream transformer UAT 11 would be decommissioned and new 6,800 hp desalination seawater supply pumps would be fed from the same 12 kV Bus D and 12 kV Bus E, respectively. In all, there would be three desalination seawater supply pumps, two fed from one unit from the buses mentioned above and the third from the second unit. Because there is a net load reduction on upstream transformer UAT11, the load change is acceptable.

Based on the auxiliary system single-line design for hybrid wet/dry cooling, the number and size of electrical equipment were estimated and used to develop building sizes. Based on the number and size of conductors from the single-line drawing, the raceway system was designed and the quantities were estimated (trays/conduits within building, interconnecting duct banks). Supplier vendor drawings showing the layout of the hybrid cooling tower were used as appropriate for physical design quantity estimates. Five electrical buildings would be provided: one for the main switchgear and a cooling tower, one at the second cooling tower, one at each of the two CW pumphouses, and one at the desalination plant. Refer to Raceway Layout Drawing 25762-110-ERK-WL-00030.

The desalination and water reclaimed vendors have provided estimates for the electrical equipment required for power distribution for their equipment. The desalination vendor provided a typical single-line diagram showing its electrical equipment configuration. The desalination/reclaimed area electrical building size, tray quantity, and duct bank quantity were estimated from the desalination vendor typical single-line diagram, mechanical equipment lists, and vendor-supplied conceptual plant general arrangement drawings.

Quantity estimates were determined for the following items: tray, duct bank conduit, grounding, lighting, MV cable, non-segregated phase bus duct, communication equipment, aboveground conduit length per circuit, and average circuit length.

Figures 4.3-25 through 4.3-27 depict the layouts of the electrical buildings for the hybrid cooling option.

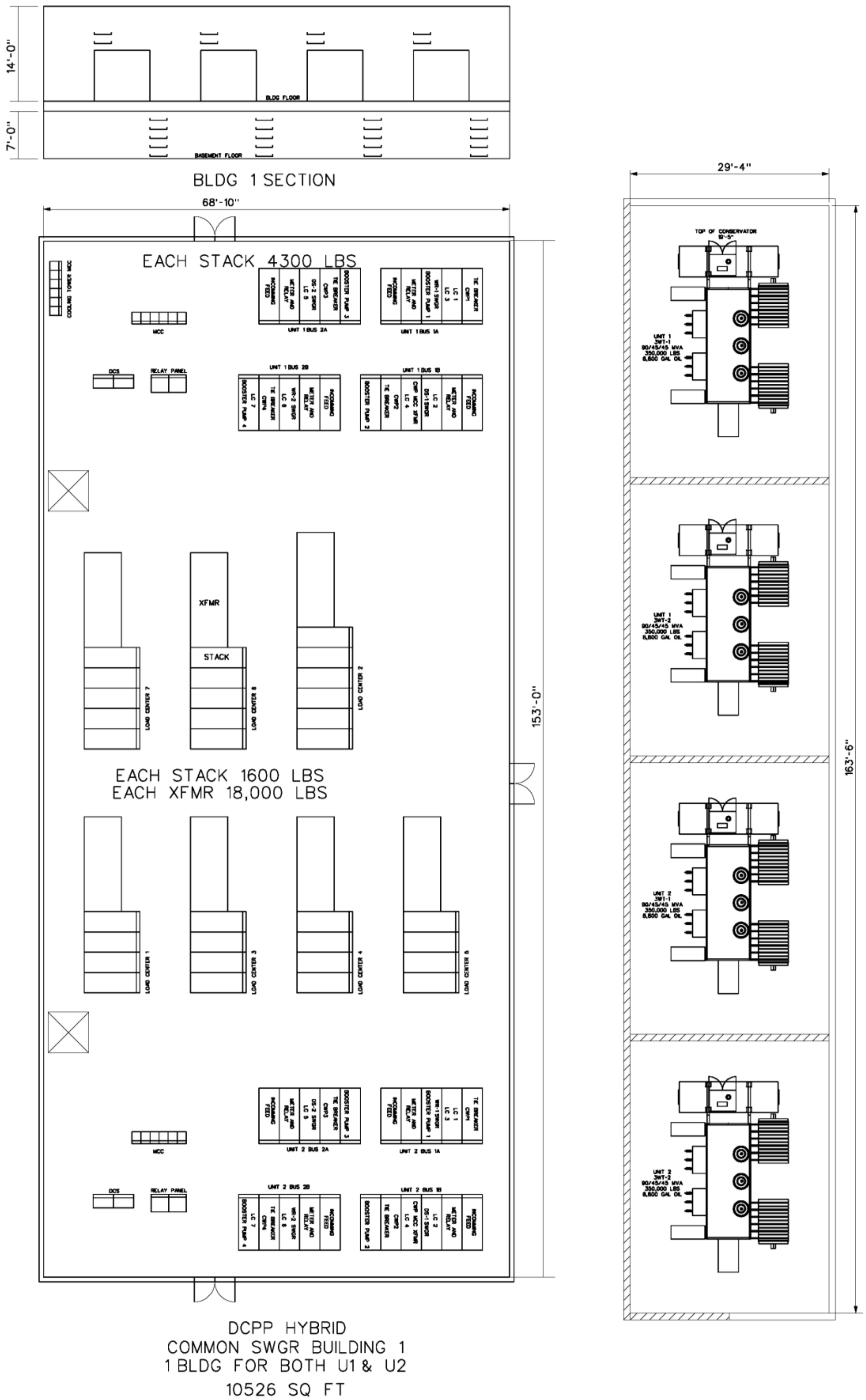


Figure 4.3-25. Hybrid Wet/Dry Cooling—Main Switchgear Electrical Building

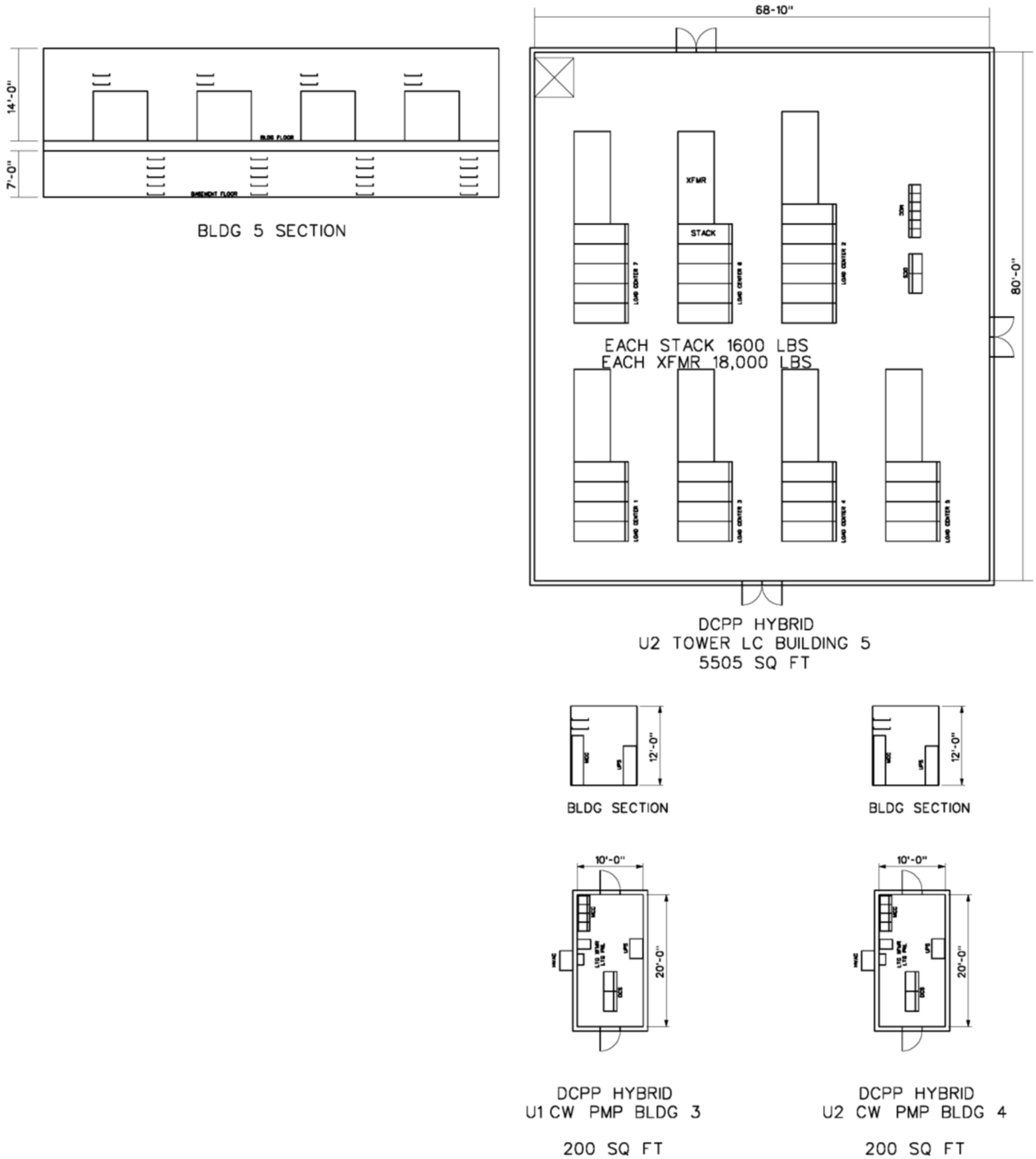


Figure 4.3-26. Hybrid Wet/Dry Cooling—Cooling Tower and Pumphouse Electrical Buildings

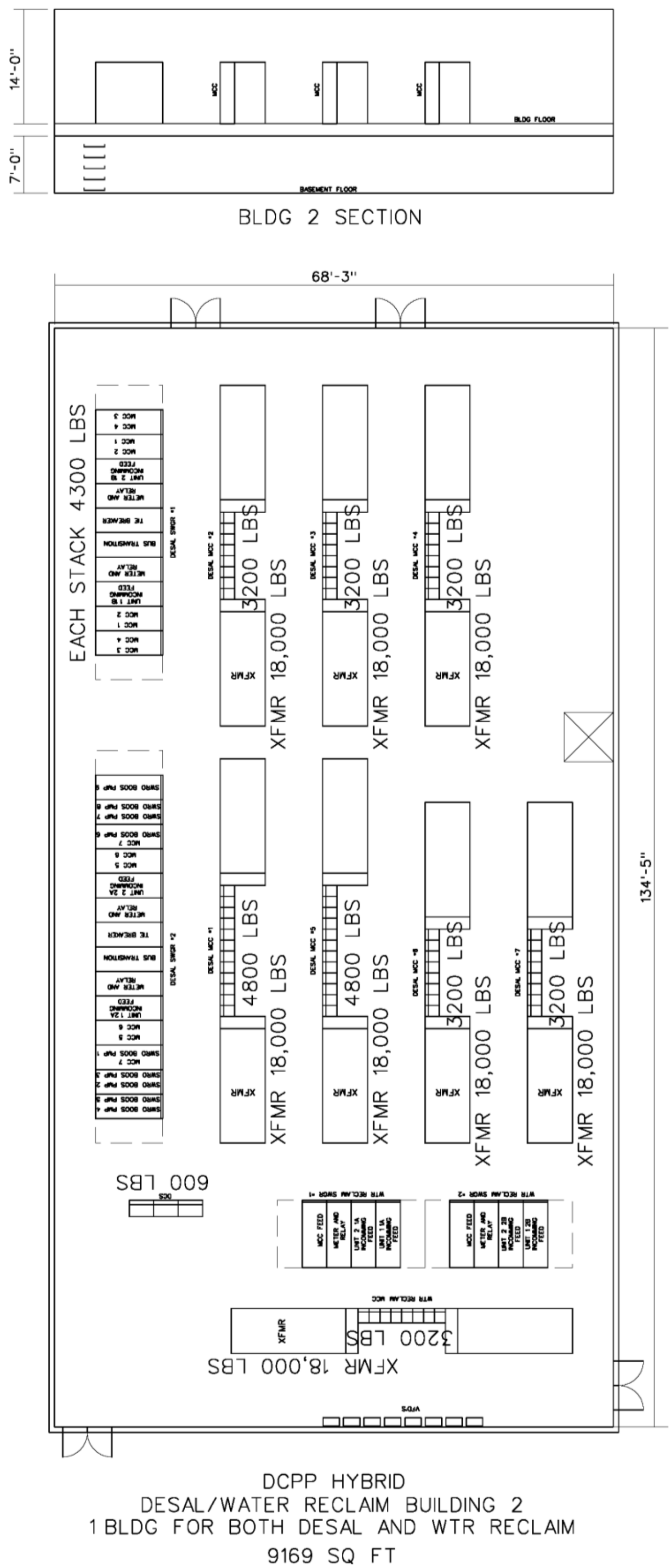


Figure 4.3-27. Hybrid Wet/Dry Cooling—Desalination/Water Reclaimed Electrical Building

4.3.8 Permitting

The initial Phase 1 permitting assessment focused on identifying the applicable (required) permits and approvals for constructing and operating the various closed-cycle cooling technology options (passive draft dry/air, mechanical [forced] draft dry/air, wet natural draft, wet mechanical [forced] draft, and hybrid wet/dry). A comprehensive list of potentially applicable permits and approvals at the federal, California, county, and municipal levels (as applicable) was developed for each technology. The applicability of each permit/approval to the various options was evaluated. Those permits and approvals deemed applicable were subsequently scrutinized to characterize the expected duration and complexity of the regulatory review process. Ultimately, most of the closed-cycle cooling system options (except the saltwater-based systems) were selected for the Phase 2 assessment.

The subsequent permitting assessment focused on identifying the critical path (longest duration) initial preconstruction permitting processes and the associated project costs. The preconstruction permits are those approvals that directly support site mobilization, physical site access, and initial earthwork/foundations for the subject cooling system technology. The costs include direct permit filing, impact mitigation, and permitting application development (services).

4.3.8.1 Cost and Schedule Evaluation

The cost and schedule to secure the following major applicable permits were developed based on discussions with key relevant regulatory authorities and from associated website resources:

- CEQA – Final Notice of Determination
- Nationwide or Section 404/10 Permit, USACE
- Determination of No Hazard to Air Navigation, Federal Aviation Administration (FAA)
- CPUC
- Coastal Development Permit, CCC
- Coastal Development Lease, CSLC
- Notice of Intent, General Permit for Stormwater Discharges Associated with Construction Activity, CCRWQCB
- NPDES Industrial Discharge Permit, CCRWQCB and SWRCB
- 2081 Permit for California Endangered Species Act of 1984, CDFW
- Lake and Streambed Alteration (LSA) Agreement, CDFW
- Waste Discharge Requirements, CCRWQCB
- Dust Control Plan, SLO-APCD
- Road Crossing or Encroachment Permit, Caltrans
- Local Approvals, SLO

Tables CC-1 and CC-2 summarize the key cost and schedule details and assumptions for the selected closed-cycle cooling system options. Legal costs associated with managing appeal processes and related litigation have not been included. The bulk of the potential mitigation costs would be developed through negotiation and are consequently not included in the cost estimate.

Table CC-1. DCPP Environmental Permit/Approval Cost Assessment:
Dry/Air Cooling Technologies—Passive Draft and Mechanical (Forced) Draft

Permit/Approval	Cost Discussion	Responsibility	Permit Review Period	Filing Costs	Remediation or Mitigation Costs	Permitting Service Costs
Nationwide Permit – USACE	If applicable. There are no filing fees for the USACE permits and no EA document fees for nationwide form of the permit, which generally is not associated with a formal EA. Labor costs for preparing/submitting related forms = 20 hours @ $150/hr.	Owner	1–3 months if required	$0	Undetermined	$3,000
Section 7 Consultation with USFWS, Endangered Species Act of 1973	The USACE permit would provide sufficient “federal nexus” (federal funding, federal lands) to trigger USFWS consultation. Associated costs are inherent in the CEQA process.	Owner	May be part of CEQA review	$0	Undetermined	$0
CDFW Review	CDFW consultation will be conducted in parallel with the Section 7 review. CEQA document filing related fee ($2,995.50 and county clerk processing fee $50). (CDFW, 2013)	Owner	Part of CEQA Review	$3,050	Undetermined	$0
For Passive Draft Dry/Air Cooling only: Notice of Determination of No Hazard to Air Navigation – FAA	There are no formal filing fees associated with this Notice. Labor costs for preparing/submitting related forms = 4 hours @ $150/hr.	Owner	1–2 months	$0	Undetermined	$600
For Passive Draft Dry/Air Cooling only: Notice of Determination of No Hazard to Air Navigation – FAA, Temporary Construction Facilities	There are no formal filing fees associated with this Notice. Labor costs for preparing/submitting related forms = 4 hours @ $150/hr.	Contractor	1–2 months	$0	Undetermined	$600
CPUC Approval	While formal CPUC review and approval may prove necessary, the primary costs of this process are associated with the CEQA review process. The CPUC could be the lead CEQA agency or share this role with another regulatory organization (e.g., SLO). These CEQA costs are addressed in the County Conditional Use Plan Approval Process.	Owner	About 20–24 months if required	$0	Undetermined	$0

Permit/Approval	Cost Discussion	Responsibility	Permit Review Period	Filing Costs	Remediation or Mitigation Costs	Permitting Service Costs
Coastal Development Permit – CCC/Local Coastal Programs	The CCC indicates that the filing fee for non-residential development is $265,000 (CCC, 2008). There may be additional fees for reimbursement of reasonable expenses, including public notice costs. CEQA costs are covered in the County Condition Use Plan Approval Process. Labor costs for preparing/submitting related forms and documentation = 2,000 hours @ $150/hr.	Owner	A 3–9 month process is advertised, but it would be aligned with the CEQA review process	$265,000	Undetermined	$300,000
Coastal Development Lease – CSLC and potential CEQA Lead Agency	The Commission lease-related fees include (CSLC, 2011): Industrial Lease: $25,000 Dredge Lease Fee: $1,500 Filing Fee: $25 Labor costs for preparing/submitting related forms and documentation = 2,000 hours @ $150/hr.	Owner	Depends on duration of CEQA/EIR process; about 2 years	$26,525	Undetermined	$300,000
Dust Control Plan or CAMP – SLO-APCD	While SLO-APCD does not list any specific fee for the Dust Control Plan, other CARB entities are known to charge $300 to reimburse review costs. If the construction ozone precursor emissions (ROG + NO_x) exceed the SLO-APCD quarterly significance threshold of 6.3 tons, the SLO County CEQA Handbook (SLO-APCD, 2012) defined mitigation rate is $16,000 per ton of ozone precursor plus 15% administrative fee. The current assumption is that precursor emissions are below this threshold. Labor costs for preparing/submitting the plan = 80 hours @ $150/hr.	Contractor	1-month plan development process	$0	Undetermined	$12,000

Permit/Approval	Cost Discussion	Responsibility	Permit Review Period	Filing Costs	Remediation or Mitigation Costs	Permitting Service Costs
NPDES Industrial Discharge Permit – CCRWQCB and SWRCB	The operating project is incurring annual fees based on its current discharge process. Fee structure: $1,606 + $2,840 x flow (mgd) Maximum fee: $410,568 + surcharges ($5,000 to $15,000) (SWRCB, 2012) The fee would drop dramatically with the removal of the current substantial once–through discharge rate (about $400,000 savings). Labor costs for preparing/submitting related permit forms = 1,000 hours @ $150/hr.	Owner	About 6 months	–$400,000	Undetermined	$150,000
Notice of Intent – NPDES General Permit for Storm Water Discharges Associated with Construction Activity – CCRWQCB	Construction stormwater fee for disturbed areas > 100 acres is $2,618 + 21% fee ($550). Labor costs for preparing/submitting related forms = 40 hours @ $150/hr.	Owner	1 week – electronic submittal	$3,192	Undetermined	$6,000
Storm Water Pollution Prevention Plan (SWPPP) – NPDES General Permit for Storm Water Discharges Associated with Construction Activity – CCRWQCB	There are no direct filing fees or regulatory charges associated with the SWPPP. Labor costs for preparing plan = 120 hours @ $150/hr.	Contractor	3 months for SWPPP development process	$0	Undetermined	$18,000
2081 Permit for California Endangered Species Act of 1984 – CDFW	While there does not appear to be a direct filing fee for this permit, there are related CEQA review services: Negative or Mitigated Negative: $2,156.25 Environmental Impact Review: $2,995.25 Certified Regulatory Program Fee: $1,018.50 County Clerk Processing Fee: $50 (CDFW–CEQA, 2013) Labor costs for preparing/submitting related forms, documentation, and field work = 500 hours @ $150/hr.	Owner	Potentially part of CEQA review	$3,049.50	Undetermined	$75,000

Permit/Approval	Cost Discussion	Responsibility	Permit Review Period	Filing Costs	Remediation or Mitigation Costs	Permitting Service Costs
LSA Agreement – CDFW	If project costs > $500,000, then fees are $4,482.75 + $2,689.50. If there is a separate Master Agreement, the supplemental fees could total $33,620 + $2,801.50 + $280.25. (CDFW-LSA, 2013) Labor costs for preparing/submitting related forms, documentation, and field work = 500 hours @ $150/hr.	Owner	1–2 months (if application complete) Could extend to 4–6 months	$44,000	Undetermined	$75,000
Waste Discharge Requirements – CCRWQCB	Fill & Excavation Discharges: $944 + $4,059 x disturbed area (acres) Dredging Discharges: $944 + $0.15 x cy Channel and Shoreline Discharges: $944 + Discharge Length (ft) x $9.44 – not to exceed $59,000 + surcharges (CCR Title 23§2200) Assumed 100 acres of jurisdictional lands (state waters) are affected – triggers maximum fee (no extra surcharges). Labor costs for preparing/submitting related forms, documentation, and field work = 120 hours @ $150/hr.	Owner	4–6 months	$944	$59,000	$18,000
California Office of Historic Preservation (OHP) Review	OHP review is part of the CEQA process and does not demand any additional fees or pose direct regulatory costs. Labor costs are captured in CEQA discussion.	Owner	Integral to CEQA review process	$0	Undetermined	$0
Notification of Waste Activity – RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Construction Phase – Department of Toxic Substance Control, USEPA, SLO-EHS – California Unified Program Agency	Securing the Construction Phase Hazardous Waste ID (if necessary) does not demand a filing fee. Labor costs for preparing/submitting related forms = 4 hours @ $150/hr.	Contractor	1–2 weeks if required	$0	Undetermined	$600

Permit/Approval	Cost Discussion	Responsibility	Permit Review Period	Filing Costs	Remediation or Mitigation Costs	Permitting Service Costs
Spill Prevention, Control, and Countermeasure (SPCC) Plan – 40 CFR 112 and Aboveground Petroleum Storage Act – SLO-EHS – California Unified Program Agency and USEPA	SPCC modification process would not demand any additional filing fees. Aboveground storage tank annual renewal fee ($288/facility) should remain unchanged – no new fee. (SLO-EHS, 2013) Labor costs for preparing/submitting related plan = 120 hours @ $150/hr.	Owner	1–2 months for plan revision	$0	Undetermined	$18,000
Underground Storage Tank Permit – SLO-EHS – California Unified Program Agency and SWRCB	The new cooling tower system could force the relocation of underground tanks, mandating new permits from the county and a revised inspection program. The associated fees may apply, primarily facility modification fee ($1,725/facility) and closure fee ($2,216/facility) (SLO-EHS, 2013). The maintenance fee ($0.14/gallon of oil) should remain unchanged (California Board of Equalization [CBOE], 2011). Labor costs for securing underground tank permits (modification/closure) = 40 hours @ $150/hr.	Owner	1–2 months	$3,941	Undetermined	$6,000
Conditional Use Plan Amendment – SLO-DPB and Potential CEQA Lead Agency	As the CEQA lead agency or co-lead, the county would assess fees for development of the Initial Study, environmental coordination fees, and EIR processing fees (SLO-DPB, 2012). Initial Study Cost: $14,603 Other fees include: CalFire Review: $603 Health Department Review: $600 Geological Review: $2,671 (minimum) Resource Conservation District Review: $375 (minimum) Labor costs for EIR consultant + 50% premium = 4,000 hours @ 150/hr x 1.5.	Owner	Depends on duration of CEQA review process; about 2 years	$20,000	Undetermined	$900,000
Erosion and Sediment Control Plan (Rain Event Action Plan) – SLO-DPW	No filing fee for this plan. Development costs are included in the SWPPP section.	Contractor	Parallel to SWPPP development 3 months	$0	Undetermined	$0

Permit/Approval	Cost Discussion	Responsibility	Permit Review Period	Filing Costs	Remediation or Mitigation Costs	Permitting Service Costs
Building Permits – SLO-DPB and SLO-DPW: Grading Site Plan Reviews/Checks Mechanical, Plumbing, and Electrical Tanks Roads Septic Systems Fences Fire inspections	SLO-DPB has a complex fee schedule (SLO-DPB, 2012). Recent SLO County experience on a significant solar PV project indicates that overall building permit and inspection fees could total $750,000. Labor costs for preparing/submitting related engineering packages = 2,000 hours @ $150/hr.	Contractor	4–6 weeks for initial permits following completion of CEQA and conditional use permit	$750,000	Undetermined	$300,000
Fire Safety Plan Approval, Certificate of Occupancy, Flammable Storage – SLO Fire Department	Revisions to the existing Fire Safety Plan are not expected to result in additional filing or direct regulatory fees. The initial filing fee of $408 would probably not apply. Labor costs for revising Fire Safety Plan = 20 hours @ $150/hr.	Contractor	1 month for plan approval	$0	Undetermined	$3,000
Road Crossing or Encroachment Permit – Caltrans, SLO	If needed. Caltrans fees vary by type of encroachment and are based on $82/hr review-and-approval fee. County encroachment permits are: Driveway review and encroachment: $607 General encroachment: $338 Utility non-franchise: $597 (Caltrans Encroachment, 2013) (Caltrans FAQ, 2013) Labor costs for preparing/submitting related engineering information and forms = 40 hours @ $150/hr.	Owner	1–3 months	$5,000	Undetermined	$6,000
SLO Well Water Permit – SLO-EHS	If needed. New well installation: $433 Abandonment of existing wells: $121 (SLO-EHS, 2013) Well-related costs assumed to be $1,000. Labor costs for preparing/submitting well packages = 8 hours @ $150/hr.	Contractor	1–2 weeks if required	$1,000	Undetermined	$1,200
Passive Draft Dry/Air TOTAL				**$725,701.50**	**$59,000.00**	**$2,193,000.00**
Mechanical (Forced) Draft Dry/Air TOTAL				**$725,701.50**	**$59,000.00**	**$2,191,800.00**

Table CC-2. DCPP Environmental Permit/Approval Cost Assessment:
Wet Cooling Technologies—Natural Draft, Mechanical (Forced) Draft, and Hybrid Wet/Dry
(Fresh and Reclaimed Water)

Permit/Approval	Cost Discussion	Responsibility	Permit Review Period	Filing Costs	Remediation or Mitigation Costs	Permitting Service Costs
Nationwide Permit –USACE	If applicable. There are no filing fees for the USACE permits and no EA document fees for nationwide form of the permit, which generally is not associated with a formal EA. Labor costs for preparing/submitting related forms – 20 hours @ $150/hr.	Owner	1–3 months if required	$0	Undetermined	$3,000
Section 7 Consultation with USFWS, Endangered Species Act of 1973	The USACE permit would provide sufficient “federal nexus” (federal funding, federal lands) to trigger USFWS consultation. Associated costs are inherent in the CEQA process.	Owner	May be part of CEQA review	$0	Undetermined	$0
For Wet Natural Draft Cooling Towers only: Notice of Determination of No Hazard to Air Navigation – FAA	There are no formal filing fees associated with this Notice. Labor costs for preparing/submitting related forms = 4 hours @ $150/hr.	Owner	1–2 months	$0	Undetermined	$600
For Wet Natural Draft Cooling Towers only: Notice of Determination of No Hazard to Air Navigation – FAA, Temporary Construction Facilities	There are no formal filing fees associated with this Notice. Labor costs for preparing/submitting related forms = 4 hours @ $150/hr.	Owner	1–2 months	$0	Undetermined	$600
CPUC Commission Approval	While formal CPUC review and approval may prove necessary, the primary costs of this process are associated with the CEQA review process. The CPUC could be the lead CEQA agency or share this role with another regulatory organization (e.g., CCC, SLO). These CEQA costs are addressed in the County Conditional Use Plan Approval Process.	Owner	About 20–24 months if required	$0	Undetermined	$0

Permit/Approval	Cost Discussion	Responsibility	Permit Review Period	Filing Costs	Remediation or Mitigation Costs	Permitting Service Costs
Coastal Development Permit – CCC/Local Coastal Programs	The CCC indicates that the filing fee for non-residential development is $265,000 (CCC, 2008). There may be additional fees for reimbursement of reasonable expenses, including public notice costs. CEQA costs are covered in the County Condition Use Plan Approval Process. Labor costs for preparing/submitting related forms and documentation = 2,000 hours @ $150/hr.	Owner	A 3–9 month process is advertised, but it would be aligned with CEQA review process	$265,000	Undetermined	$300,000
Coastal Development Lease – CSLC and potential CEQA Lead Agency	The Commission lease related fees include (CSLC-2011): Industrial Lease: $25,000 Dredge Lease Fee: $1,500 Filing Fee: $25 Labor costs for preparing/submitting related forms and documentation = 2,000 hours @ $150/hr.	Owner	Depends on duration of CEQA/EIR process; about 2 years	$26,525	Undetermined	$300,000
Regional Pollution Control District Permit to Construct (ATC) – SLO-APCD	The SLO-APCD standard filing fee ($195) is somewhat incidental (SLO-APCD, 2011). The evaluation fee is on a time-and-materials basis and can be in the order of $20,000 to $30,000 ($115/hr). Additionally, the fees associated with securing the necessary PM-10 credits have a recent average price of $20,000/ton in the Santa Barbara APCD (CARB, 2011). Cooling tower PM-10 emissions are estimated to total about 30 tons annually, which is less than the current local 31-ton emission offset bank. There have not been any recent PM-10 ERC sales in SLO-APCD. Labor costs for preparing/submitting related forms and documentation = 500 hours @ $150/hr.	Owner	6–12 months	$31,000	$480,000	$75,000

Permit/Approval	Cost Discussion	Responsibility	Permit Review Period	Filing Costs	Remediation or Mitigation Costs	Permitting Service Costs
Regional Control District Permit to Operate (PTC) – SLO-APCD	The SLO-APCD standard filing fee ($195) is somewhat incidental (SLO-APCD, 2011). The evaluation fee is on a time-and-materials basis and can be in the order of $20,000 to $30,000 (115/hr). The emission reduction credits fees associated with PM-10 are paid in the ATC phase of air permitting. Labor costs for preparing/submitting related forms and documentation = 200 hours @ $150/hr.	Owner	Not preconstruction permit	$31,000	Undetermined	$30,000
Title V Federal Operating Permit – SLO-APCD and USEPA	Assuming 7,000 mg/l TDS from freshwater application, the total particulate emissions (132 tpy) exceed 100 tpy, which makes this a major source if one conservatively assumes all PM is PM-10. Federal Presumptive Fee: $46.73/ton for Title V permits Labor costs for preparing/submitting related forms and documentation = 200 hours @ $150/hr.	Owner	Not preconstruction permit	$6,170	Undetermined	$30,000
Dust Control Plan or CAMP – SLO-APCD	While SLO-APCD does not list any specific fee for the Dust Control Plan, other CARB entities are known to charge $300 to reimburse review costs. If the construction ozone precursor emissions (ROG + NO_x) exceed the SLO-APCD quarterly significance threshold of 6.3 tons, the SLO County CEQA Handbook (SLO-APCD, 2012) defined mitigation rate is $16,000 per ton of ozone precursor, plus 15% administrative fee. The current assumption is that precursor emissions are below this threshold. Labor costs for preparing/submitting the plan = 80 hours @ $150/hr.	Contractor	1-month plan development process	$0	Undetermined	$12,000

Permit/Approval	Cost Discussion	Responsibility	Permit Review Period	Filing Costs	Remediation or Mitigation Costs	Permitting Service Costs
NPDES Industrial Discharge Permit – CCRWQCB and SWRCB	The operating project is incurring annual fees based on its current discharge process. Fee structure: $1,606 + $2,840 x flow (mgd) Maximum fee: $410,568 + surcharges ($5,000 to $15,000) (SWRCB, 2012) The fee would drop dramatically with the removal of the current substantial once–through discharge rate (about $400,000 savings). Labor costs for preparing/submitting related permit forms = 1,000 hours @ $150/hr.	Owner	About 6 months	–$400,000	Undetermined	$150,000
Notice of Intent – NPDES General Permit for Storm Water Discharges Associated with Construction Activity – CCRWQCB	Construction stormwater fees for disturbed areas > 100 acres is $2,618 + 21% fee ($550). Labor costs for preparing/submitting related forms = 40 hours @ $150/hr.	Owner	1 week – electronic submittal	$3,192	Undetermined	$6,000
SWPPP – NPDES General Permit for Storm Water Discharges Associated with Construction Activity – CCRWQCB	There are no direct filing fees or regulatory charges associated with the SWPPP. Labor costs for preparing plan = 120 hours @ $150/hr.	Contractor	3 months for SWPPP development process	$0	Undetermined	$18,000
2081 Permit for California Endangered Species Act of 1984 – CDFW	While there does not appear to be a direct filing fee for this permit, there are related CEQA review services: Negative or Mitigated Negative: $2,156.25 Environmental Impact Review: $2,995.25 Certified Regulatory Program Fee: $1,018.50 County Clerk Processing Fee: $50 (CDFW–CEQA, 2013) Labor costs for preparing/submitting related forms, documentation, and field work = 500 hours @ $150/hr.	Owner	Potentially part of CEQA review	$3,049.50	Undetermined	$75,000

Permit/Approval	Cost Discussion	Responsibility	Permit Review Period	Filing Costs	Remediation or Mitigation Costs	Permitting Service Costs
LSA Agreement – CDFW	If project costs > $500,000, then fees are $4,482.75 + $2,689.50. If a separate Master Agreement, the supplemental fees could total $33,620 + $2,801.50 + $280.25. (CDFW, 2013) Labor costs for preparing/submitting related forms, documentation, and field work = 500 hours @ $150/hr.	Owner	1–2 months (if application complete) Could extend to 4–6 months	$44,000	Undetermined	$75,000
Waste Discharge Requirements – CCRWQCB	Fill & Excavation Discharges: $944 + $4,059 x disturbed area (acres) Dredging Discharges: $944 + $0.15 x cy Channel and Shoreline Discharges: $944 + Discharge Length (ft) x $9.44 – not to exceed $59,000 + surcharges (CCR Title 23§2200) Assumed 100 acres of jurisdictional lands (state waters) are affected – triggers maximum fee (no extra surcharges). Labor costs for preparing/submitting related forms, documentation, and field work = 120 hours @ $150/hr.	Owner	4–6 months	$944	$59,000	$18,000
California OHP Review	OHP review is part of the CEQA process and does not demand any additional fees or pose direct regulatory costs. Labor costs are captured in CEQA discussion.	Owner	Integral to CEQA review process	$0	Undetermined	$0
Notification of Waste Activity – RCRA Hazardous Waste Identification Number (Small Quantity Generator) – Construction Phase – Department of Toxic Substance Control, USEPA, SLO-EHS – California Unified Program Agency	Securing the Construction Phase Hazardous Waste ID (if necessary) does not demand a filing fee. Labor costs for preparing/submitting related forms = 4 hours @ $150/hr.	Contractor	1–2 weeks if required	$0	Undetermined	$600

Permit/Approval	Cost Discussion	Responsibility	Permit Review Period	Filing Costs	Remediation or Mitigation Costs	Permitting Service Costs
SPCC Plan – 40 CFR 112 and Aboveground Petroleum Storage Act – SLO-EHS – California Unified Program Agency and USEPA	SPCC modification process would not demand any additional filing fees. Aboveground storage tank annual renewal fee ($288/facility) should remain unchanged – no new fee. (SLO-EHS, 2013) Labor costs for preparing/submitting related plan = 120 hours @ $150/hr.	Owner	1–2 months for plan revision	$0	Undetermined	$18,000
Underground Storage Tank Permit – SLO-EHS – California Unified Program Agency and SWRCB	The new cooling tower system could force the relocation of underground tanks, mandating new permits from the county and a revised inspection program. The associated fees may apply, primarily the facility modification fee ($1,725/facility) and closure fee ($2,216 per facility) may apply (SLO-EHS, 2013). The maintenance fee ($0.14/gallon of oil) should remain unchanged (CBOE, 2011). Labor costs for securing underground tank permits (modification/closure) = 40 hours @ $150/hr.	Owner	1–2 months	$3,941	Undetermined	$6,000
Conditional Use Plan Amendment – SLO-DPB and Potential CEQA Lead Agency	As the CEQA lead agency or co-lead, the county would assess fees for development of the Initial Study, environmental coordination fees, and EIR processing fees (SLO-DPB, 2012). Initial Study Cost: $14,603 Other fees include: CalFire Review: $600 Health Department Review: $600 Geological Review: $2,671 (minimum) Resource Conservation District Review: $375 (minimum) Labor costs for EIR consultant + 50% premium = 4,000 hours @ $150/hr x 1.5.	Owner	Depends on duration of CEQA review process; about 2 years	$20,000	Undetermined	$900,000
Erosion and Sediment Control Plan (Rain Event Action Plan) – SLO-DPW	No filing fee for this plan. Development costs are included in the SWPPP section.	Contractor	Parallel to SWPPP development 3 months	$0	Undetermined	$0

Permit/Approval	Cost Discussion	Responsibility	Permit Review Period	Filing Costs	Remediation or Mitigation Costs	Permitting Service Costs
Building Permits – SLO-DPB and SLO-DPW: Grading Site Plan Reviews/Checks Mechanical, Plumbing, and Electrical Tanks Roads Septic Systems Fences Fire inspections	SLO-DPB has a complex fee schedule (SLO-DPB, 2012). Recent SLO County experience on a significant solar PV project indicates that overall building permit and inspection fees could total $750,000 for onsite work. Offsite fresh or reclaimed water pipeline building permits would add substantial costs (about $500,000). Labor costs for preparing/submitting related engineering packages = 3,000 hours @ $150/hr.	Contractor	6 months for initial permits following completion of CEQA and conditional use permit	$1,250,000	Undetermined	$450,000
Fire Safety Plan Approval, Certificate of Occupancy, Flammable Storage – SLO Fire Department	Revisions to the existing Fire Safety Plan are not expected to result in additional filing or direct regulatory fees. The initial filing fee of $408 would probably not apply. Labor costs for revising Fire Safety Plan = 20 hours @ $150/hr.	Contractor	1 month for plan approval	$0	Undetermined	$3,000
Road Crossing or Encroachment Permit (Caltrans, SLO)	If needed. Caltrans fees vary by type of encroachment and are based on $82/hr review-and-approval fee. County encroachment permits are: Driveway review and encroachment: $607 General encroachment: $338 Utility non-franchise: $597 (Caltrans Encroachment, 2013) (Caltrans FAQ, 2013) Labor costs for preparing/submitting related engineering information and forms = 40 hours @ $150/hr.	Owner	1–3 months	$5,000	Undetermined	$6,000
SLO Well Water Permit – SLO-EHS	If needed. New well installation: $433 Abandonment of existing wells: $121 (SLO-EHS, 2013) Well related costs assumed to be $1,000. Labor costs for preparing/submitting well packages = 8 hours @ $150/hr.	Contractor	1–2 weeks if required	$1,000	Undetermined	$1,200

Permit/Approval	Cost Discussion	Responsibility	Permit Review Period	Filing Costs	Remediation or Mitigation Costs	Permitting Service Costs
Wet Natural Draft TOTAL				$1,290,821.50	$539,000.00	$2,478,000.00
Wet Mechanical (Forced) Draft TOTAL				$1,290,821.50	$539,000.00	$2,476,800.00
Hybrid Wet/Dry TOTAL				$1,290,821.50	$539,000.00	$2,476,800.00

4.3.8.2 Summary

The list of potentially applicable federal, state, and local permits for the closed-cycle cooling system options reflects the expected significant impacts to the onshore and near-shore environment. The efforts to conduct a successful CEQA review would be the primary critical path permitting process. The CEQA lead agency may be a shared responsibility among a number of key regulatory departments (e.g., SLO, CSLC). The requisite USACE Section 404 permit, CCC Coastal Development Permit, CSLC Lease, and NPDES permit modification would have potentially lengthy review processes but would all be essentially bounded by the critical path CEQA/EIR review process.

The CEQA review process duration varies. The shortest path appears to be a nominal 210-day (7-month) period that would include the minimum 30-day review period to determine that the initial CEQA application is complete. This process culminates in a Negative Declaration and does not involve developing a comprehensive EIR. However, all of the closed-cycle cooling processes under consideration would likely demand preparation of an EIR, which would further extend this review process. The process—inclusive of the initial 30-day completeness review, a 1-year EIR review, and a so-called 90-day “reasonable extension” triggered by compelling circumstances recognized by both the applicant and lead agency—would then extend out to 16 months. (CEQA Flowchart)

The CEQA review process would be extended even further by conservatively adding an additional 8 months to cover “unreasonable delays” ostensibly associated with the applicant’s difficulty in supplying requested information. Collectively, this longer and probably more applicable 2-year CEQA review process would likely follow a 1-year period of permit application development. The other permitting processes are assumed to proceed in parallel to the critical path CEQA review process. While there could be some variation on the permitting timeline for the various closed-cycle cooling systems under consideration, such variation would be effectively enveloped by the lengthened CEQA review process.

The total permit filing and permitting service costs associated with the various closed-cycle cooling system options does vary. The permitting costs for the dry cooling options total about $3.0 million. The permitting costs for the wet cooling options increase to $4.3 million in response to the additional costs associated with the offsite reclaimed water pipelines. As noted earlier, the overall 3-year permitting process and associated costs do not reflect the impact of permit appeals, litigation, or potentially negotiated CEQA-related mitigation fees. In recognition that such complications may occur, the project execution schedule includes a 1-year appeal period following the CEQA final decision.

4.3.8.3 Sources

1. California Air Resources Board (CARB) Emission Reduction Offset Transaction Costs Summary Report for 2011.

2. California Board of Equalization (CBOE) Underground Storage Tank Maintenance Fee – as of June 30, 2011 (http://www.boe.ca.gov/info/fact_sheets/underground_strg_tank_maint.htm).

3. California Coastal Commission (CCC) Permit Application Instructions, Appendix E Filing Fee Schedule (3/17/2008).

4. California Department of Fish and Wildlife CEQA Document Filing Fees, 2013 http://www.dfg.ca.gov/habcon/ceqa/ceqa_changes.html.

5. California Code of Regulations (CCR) Title 23§2200 Annual Fee Schedules - Subpart a(3) Dredge and Fill Materials.

6. California Department of Fish and Wildlife (CDFW) Document Filing Fees (www.dfg.ca.gov/habcon/ceqa/ceqa_changes.html), April 3, 2013.

7. California Department of Fish and Wildlife (CDFW) Lake and Streambed Alteration Agreements and Fees (http://www.nrm.dfg.ca.gov/FileHandler.ashx?DocumentID37872), April 3, 2013.

8. California Department of Transportation (Caltrans) Encroachment Permits (www.dot.ca.gov/hq/traffops/developserv/permits), April 3, 2013.

9. California Department of Transportation (Caltrans) FAQ #2 (www.dot.ca.gov/hq/traffops/permits/faq.htm). April 3, 2013.

10. California State Lands Commission (CSLC), Land Management Division Application Guidelines (10/12/2011).

11. California State Water Resources Control Board (SWRCB) Fee Schedule 2012–2013, 2012 http://www.swrcb.ca.gov/resources/fees/docs/fy12_13_fee_schedule_npdes_permit.pdf.

12. California Environmental Quality Act (CEQA) Flowchart for Local Agencies: California Code - Section 21151.5, http://www.ceres.ca.gov/planning/ceqa/flowchart.html.

13. San Luis Obispo County Air Pollution Control District (SLO-APCD) CEQA Air Quality Handbook – A Guide For Assessing the Air Quality Impacts for Projects Subject to CEQA Review, April 2012.

14. San Luis Obispo County Air Pollution Control District (SLO-APCD) Rule 302 Schedule of Fees, July 27, 2011.

15. San Luis Obispo County Department of Planning and Building (SLO-DPB) – Fee Schedule 2012–2013, 2012.

16. San Luis Obispo County Environmental Health Services (SLO-EHS) Fees – Aboveground and Underground Storage Tanks (http://www.slocounty.ca.gov/Assets/AD/Fees/12-13+Fees/Schedule+B+Fees/160+PH+-+Environmental+Hlt+fee+workbook+FY12-13.pdf), April, 3 2013.