Appendix 3-1: Benefit Calculations

This appendix includes copies of the calculation tables used to quantify the benefits for each project as described in Attachment 3. Tables are presented by project, and may reference earlier tables within a given project.

Reynolds Groundwater Desalination Facility Expansion

Table 3-3: Primary Physical Benefit – Increase Brackish Groundwater Desalination for Potable Use

Project Life	**30 years**
Project Completion	**September 2016**
Benefits Accrue	**October 2016 - September 2046**
Annual Total Benefit (AFY)*	**5,200**

Project Phasing	
2016 [3 months ÷ 12 months]	**25%**
2017 - 2045	**100%**
2046 [9 months ÷ 12 months]	**75%**

Year	Current Capacity of Reynolds Facility (AFY)	Project Phasing	Expanded Capacity of Reynolds Facility (AFY)	Primary Physical Benefit Total (AFY) [Expanded Capacity - Current Capacity]	Benefit to Sweetwater Water Authority (AFY) [50%** x Annual Total Benefit x Project Phasing]	Benefit to City of San Diego (AFY) [50%** x Annual Total Benefit x Project Phasing]
2016	3,600	25%	4,900	1,300	650	650
2017	3,600	100%	8,800	5,200	2,600	2,600
2018 - 2045***	100,800	100%	246,400	145,600	72,800	72,800
2046	3,600	75%	7,500	3,900	1,950	1,950
Total (2016 through 2046)	**111,600 AF**	**-**	**267,600 AFY**	**156,000 AF**	**78,000 AF**	**78,000 AF**

Comments: *Sweetwater Authority. 2014. WaterSMART: Title XVI Water Reclamation and Reuse Program Technical Proposal. January. Pg. 13
**Sweetwater Authority and City of San Diego. 2013. Settlement Agreement Between Sweetwater Authority and City of San Diego Regarding Joint Expansion of Richard A. Reynolds Desalination Facility. August 28. Pg. 10
***Multiply Annual Total Benefit by (2045 - 2018 + 1) = 28 years.

Reynolds Groundwater Desalination Facility Expansion

Table 3-4: Physical Benefit A-Avoid Imported Water Supply Purchases

Project Life	**30 years**
Project Completion	**September 2016**
Benefits Begin to Accrue	**October 2016 - September 2046**
Annual Total Benefit (AFY)	**5,200**

Project Phasing	
2016 [3 months ÷ 12 months]	**25%**
2017 - 2045	**100%**
2046 [9 months ÷ 12 months]	**75%**

Year	Primary Benefit (AFY)	Offset Imported Water Supply Purchases as % of Water Produced*	Physical Benefit A Total (AFY) [% Offset x Primary Benefit]	Benefit to Sweetwater Water Authority (AFY) [50% x Benefit A]	Benefit to City of San Diego (AFY) [50% x Benefit A]
2016	1,300	100%	1,300	650	650
2017	5,200	100%	5,200	2,600	2,600
2018 - 2045**	145,600	100%	145,600	72,800	72,800
2046	3,900	100%	3,900	1,950	1,950
Total (2016 through 2046)	**156,000 AF**	-	**156,000 AF**	**78,000 AF**	**78,000 AF**

Comment: *SDCWA supplies are purchased only to meet demand that cannot be met with local supplies by member agencies, per in SDCWA's demand projection methods described in its UWMP (SDCWA. 2011. 2010 Urban Water Management Plan. Pg. 2-13.), thus, any new supplies that are available in the region (such as recycled water) will be used to offset purchase of imported water supplies.
**Multiply Annual Total Benefit by (2045 - 2018 + 1) = 28 years.

Reynolds Groundwater Desalination Facility Expansion

Table 3-5: Physical Benefit B-Reduce Demand for Net Diversions from the Bay-Delta

Project Life	**30 years**
Project Completion	**September 2016**
Benefits Accrue	**October 2016 - September 2046**
Annual Total Benefit (AFY)	**5,200**

State Water Project (SWP) Proportion of Imported Supplies	
2014*	**15%**
2015*	**15%**
2016 - 2046**	**67%**

Year	Physical Benefit A (AFY) [Offset Imported Water Supply Purchases]	SWP Proportion	Physical Benefit B Total [Benefit A x SWP Proportion of Imported Supplies]
2016	1,300	67%	867
2017	5,200	67%	3,467
2018 - 2045**	145,600	67%	97,067
2046	3,900	67%	2,600
Total (2016 through 2046)	**156,000 AF**	**-**	**104,000 AF**

Comment: *During the drought, 15% of SDCWA's imported supplies are anticipated to be sourced from the SWP (Pers. Comm. Tim Bombardier, SDCWA, Senior Water Resources Specialist. June 27, 2014. Available: 858-522-6600.).

**In normal years, SDCWA's imported water mix is approximately two-thirds SWP and one-third Colorado River water (Equinox Report. 2010. San Diego's Water Sources: Assessing the Options. July. Pg. 8).

**Multiply Annual Total Benefit by (2045 - 2018 + 1) = 28 years.

Reynolds Groundwater Desalination Facility Expansion

Table 3-6: Physical Benefit C-Local Supply Development to Decrease Vulnerabilities

Project Life	**30 years**
Project Completion	**September 2016**
Benefits Accrue	**October 2016 - September 2046**
Annual Total Benefit (AFY)	**5,200**

Project Phasing	
2016	**25%**
2017 - 2045	**100%**
2046	**75%**

Year	Water Produced by the Project (AFY) [Primary Benefit]	% of Water Produced by Project that Develops Local Supply*	Physical Benefit C Total (AFY) [Primary Benefit x % Developing Local Supply]
2016	1,300	100%	1,300
2017	5,200	100%	5,200
2018 - 2045**	145,600	100%	145,600
2046	3,900	100%	3,900
Total (2016 through 2046)	**156,000 AF**	**-**	**156,000 AF**

Comments: *All water produced by this project constitutes local supply development to reduce the Region's vulnerability to supply interruptions (SDCWA. 2011. 2010 Urban Water Management Plan. Pg. 9-9.).
**Multiply Annual Total Benefit by (2045 - 2018 + 1) = 28 years.

Reynolds Groundwater Desalination Facility Expansion

Table 3-7: Physical Benefit D-Reduce Net Production of Greenhouse Gases

Use	Energy (MWh/AF)
Energy to Treat and Convey Imported Water*	2.65
Reynolds Facility Energy Use**	1.3
Energy Savings of Reynolds Facility over Imported Water [Imported Water - Reynolds Facility]	1.35

Project Life	30 years
Project Completion	September 2016
Benefits Accrue	October 2016 - September 2046
Annual Total Benefit (AFY)	5,200
Average Carbon Emissions for California*** (MT CO2e/MWh)	0.341
GHG Emissions Savings for Reynolds versus Imported Water (MT CO2e/AF) [Energy Savings x Average Carbon Emissions]	0.46035

Year	Water from Project (AFY) [Primary Benefit]	GHG Emissions of Imported Water (MT CO2e) [Primary Benefit x Energy Imported Water x Average Carbon Emissions]	GHG Emissions With Project (MT CO2e) [Primary Benefit x Reynolds Facility Energy Use x Average Carbon Emissions]	Physical Benefit D Total (MT CO2e) [GHG Emissions Without Project - GHG Emissions With Project]
2016	1,300	1,175	576	598
2017	5,200	4,699	2,305	2,394
2018 - 2045†	145,600	131,571	64,544	67,027
2046	3,900	3,524	1,729	1,795
Total = 2016 through 2046	**156,000 AF**	**140,969 MT CO2e**	**69,155 MT CO2e**	**71,815 MT CO2e**

Comments: *Equinox Center. 2010. San Diego's Water Sources: Assessing the Options. July. Table 1a (pg. 10).
**WateReuse. 2011. Seawater Desalination Power Consumption White Paper. November. Table 2 (pg. 15).
***Average of greenhouse gas emissions from CA energy production and imported energy (CEC. 2013. California Electrical Energy Generation Total Production, by Resource Type (Gigawatt hours). Accessed 24 June 2014. Available: http://energyalmanac.ca.gov/electricity/electricity_generation.html) and (U.S. Environmental Protection Agency (USEPA). 2014. eGRID 9th edition Version 1.0 Year 2010 Summary Tables. February. Available: http://www.epa.gov/cleanenergy/energy-resources/egrid/)
†Multiply Annual Total Benefit by (2045 - 2018 + 1) = 28 years.

Reynolds Groundwater Desalination Facility Expansion

Table 3-8: Physical Benefit E-Avoid Social Costs of Greenhouse Gases

Project Life	**30 years**
Project Completion	**September 2016**
Benefits Begin to Accrue	**October 2016 - September 2046**
Annual Greenhouse Gas (GHG) Emissions Reduction from Project (MT CO2e)	**2,394**
Social Cost of GHG ($/MT CO2e)*	**$24.55**
Social Costs Avoided by Project [Project GHG Savings x Social Cost of GHG]	**$58,768**

Project Phasing	
2016 [3 months ÷ 12 months]	**25%**
2017 - 2045	**100%**
2046 [9 months ÷ 12 months]	**75%**

Year	GHG Emissions Reduction from Project (MT CO2) [Benefit D]	Physical Benefit E Total [Benefit D x Social Cost of GHG]
2016	598	$14,692
2017	2,394	$58,768
2018 - 2045	67,027	$1,645,512
2046	1,795	$44,076
Total (2016 through 2046)	**71,815 MT CO2e**	**$1,763,048**

Comments: *Social Cost of Carbon (Interagency Working Group on Social Cost of Carbon, United States Government. 2010. Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866. February. Table 4 (pg. 28)) converted to 2014 dollars from 2007 dollars (U.S. Bureau of Labor Statistics. CPI Inflation Calculator. Available: http://www.bls.gov/data/inflation_calculator.htm)

Reynolds Groundwater Desalination Facility Expansion

Table 3-9: Physical Benefit G-Reduce Water Costs to Customers, Including DACs

Project Life	30 years
Project Completion	September 2016
Benefits Accrue	October 2016 - September 2046
Annual Primary Physical Benefit (AFY)	5,200
CPI Cost Index [conversion factor for 2012 $ -> 2014 $]	1.04

Project Phasing	
2016 [3 months ÷ 12 months]	25%
2017 - 2045	100%
2046 [9 months ÷ 12 months]	75%

Year	Potable Water Production (AFY) [Primary Benefit**]	Imported Water Cost in 2012 $ (2012 $ per AF)	Imported Treated Water Cost Converted to 2014 Dollars*** (2014 $ per AF)	Total Imported Treated Water Costs in 2014 $ [Primary Benefit x Imported Water Costs in 2014 $/AF]	Reynolds Facility Water Costs in 2012 $ (2012 $ per AF)	2012 Reynolds Facility Water Cost Converted to 2014 Dollars† (2014 $ per AF)	Total Reynolds Facility Water Costs in 2014 $ (2014 $) [Primary Benefit x Reynolds Facility Water Costs in 2014 $ per AF]	Physical Benefit F Total [Total Imported Water Costs - Total Reynolds Costs] (2014 $)
2016	1,300	$1,396	$1,452	$1,887,392	$292	$303	$394,333	$1,493,059
2017	5,200	$1,445	$1,503	$7,814,560	$391	$406	$2,113,019	$5,701,541
2018	5,200	$1,495	$1,555	$8,084,960	$391	$406	$2,113,019	$5,971,941
2019	5,200	$1,548	$1,610	$8,371,584	$436	$454	$2,358,837	$6,012,747
2020	5,200	$1,602	$1,666	$8,663,616	$391	$406	$2,113,019	$6,550,597
2021	5,200	$1,626	$1,691	$8,793,408	$391	$406	$2,113,019	$6,680,389
2022	5,200	$1,650	$1,716	$8,923,200	$391	$406	$2,113,019	$6,810,181
2023	5,200	$1,675	$1,742	$9,058,400	$391	$406	$2,113,019	$6,945,381
2024	5,200	$1,700	$1,768	$9,193,600	$391	$406	$2,113,019	$7,080,581
2025	5,200	$1,726	$1,795	$9,334,208	$391	$406	$2,113,019	$7,221,189
2026	5,200	$1,751	$1,821	$9,469,408	$391	$406	$2,113,019	$7,356,389
2027	5,200	$1,778	$1,849	$9,615,424	$448	$465	$2,420,291	$7,195,133
2028	5,200	$1,804	$1,876	$9,756,032	$391	$406	$2,113,019	$7,643,013
2029	5,200	$1,831	$1,904	$9,902,048	$470	$489	$2,543,200	$7,358,848
2030	5,200	$1,859	$1,933	$10,053,472	$391	$406	$2,113,019	$7,940,453
2031	5,200	$1,887	$1,962	$10,204,896	$391	$406	$2,113,019	$8,091,877
2032	5,200	$1,915	$1,992	$10,356,320	$391	$406	$2,113,019	$8,243,301
2033	5,200	$1,944	$2,022	$10,513,152	$391	$406	$2,113,019	$8,400,133
2034	5,200	$1,973	$2,052	$10,669,984	$391	$406	$2,113,019	$8,556,965
2035	5,200	$2,003	$2,083	$10,832,224	$391	$406	$2,113,019	$8,719,205
2036	5,200	$2,033	$2,114	$10,994,464	$391	$406	$2,113,019	$8,881,445
2037	5,200	$2,063	$2,146	$11,156,704	$482	$501	$2,604,655	$8,552,049
2038	5,200	$2,094	$2,178	$11,324,352	$391	$406	$2,113,019	$9,211,333
2039	5,200	$2,126	$2,211	$11,497,408	$459	$477	$2,481,746	$9,015,662
2040	5,200	$2,157	$2,243	$11,665,056	$391	$406	$2,113,019	$9,552,037
2041	5,200	$2,190	$2,278	$11,843,520	$391	$406	$2,113,019	$9,730,501
2042	5,200	$2,223	$2,312	$12,021,984	$391	$406	$2,113,019	$9,908,965
2043	5,200	$2,256	$2,346	$12,200,448	$391	$406	$2,113,019	$10,087,429
2044	5,200	$2,290	$2,382	$12,384,320	$391	$406	$2,113,019	$10,271,301
2045	5,200	$2,324	$2,417	$12,568,192	$391	$406	$2,113,019	$10,455,173
2046	3,900	$2,359	$2,453	$9,568,104	$391	$406	$1,584,764	$7,983,340
Total (2016 through 2046)	**156,000 AF**	**$58,723**	**$61,072**	**$308,722,440**	**$12,354**	**$12,848**	**$65,100,273**	**$243,622,167**

Comments: *Bureau of Labor Statistics. CPI Inflation Calculator. Accessed 24 June 2014. Available: http://www.bls.gov/data/inflation_calculator.htm
**Note phasing
***Sweetwater Authority. 2014. WaterSMART: Title XVI Water Reclamation and Reuse Program Technical Proposal. January. Table 3-18 (pg. 44). Converted by multiplying by CPI Cost index.
†Sweetwater Authority. 2014. WaterSMART: Title XVI Water Reclamation and Reuse Program Technical Proposal. January. Table 3-17 (pg. 43). Converted by multiplying by CPI Cost index.

Fallbrook Plant Nurseries Recycled Water Distribution System Expansion

Table 3-13: Primary Physical Benefit - Increase Recycled Water Use and Reduce Imported Water

Customer	Recycled Water Demand* (AFY)	Date Connected	% Annual Benefit Realized in Year 1**		% Annual Benefit Realized in Year 2 - 75**		% Annual Benefit Realized in Year 76**	
Premier Color	48.4	November 1, 2014	17%	(2014)	100%	(2015-2088)	83%	(2089)
SD Growers	22.3	June 1, 2015	58%	(2015)	100%	(2016-2089)	42%	(2090)
DM Color	17.3	June 1, 2015	58%	(2015)	100%	(2016-2089)	42%	(2090)
Rosalyn Nursery	130	January 1, 2016	100%	(2016)	100%	(2017-2090)	0%	(2091)
Olivehill Greenhouses	193	January 1, 2016	100%	(2016)	100%	(2017-2090)	0%	(2091)
Property Conversion	231	January 1, 2016	100%	(2016)	100%	(2017-2090)	0%	(2091)

Project Life***	75 Years

Year	Premier Color [Demand x % Annual Benefit] (AFY)	SD Growers [Demand x % Annual Benefit] (AFY)	DM Color [Demand x % Annual Benefit] (AFY)	Rosalyn Nursery [Demand x % Annual Benefit] (AFY)	Olivehill Greenhouses [Demand x % Annual Benefit] (AFY)	Property Conversion [Demand x % Annual Benefit] (AFY)	Primary Physical Benefit Total (AFY)
2014	8	0	0	0	0	0	8
2015	48	13	10	0	0	0	72
2016	48	22	17	130	193	231	642
2017 - 2088[†]	3,485	1,606	1,246	9,360	13,896	16,632	46,224
2089	40	22	17	130	193	231	634
2090	0	9	7	130	193	231	571
Total (2014 through 2090)	**3,630 AF**	**1,673 AF**	**1,298 AF**	**9,750 AF**	**14,475 AF**	**17,325 AF**	**48,150 AF**

Comments: *Fallbrook Public Utilities Department. 2014. Preliminary Assessment Report (Recycled Water System East Expansion Planning) Technical Memorandum. April 15. Pg. 1.
**Based on explanation in Project Phasing.
***Pipe life in the western U.S. range between 60 and 130 years, with typical range between 75 and 100 years. American Water Works Association. 2013. Buried No Longer: Confronting America's Water Infrastructure Challenge. Pg. 8. This project assumes a 75-year life.
[†]Multiply Annual Total Benefit by (2088 - 2017 + 1) = 72 years.

Fallbrook Plant Nurseries Recycled Water Distribution System Expansion

Table 3-14: Physical Benefit A-Avoid Imported Water Supply Purchase

Customer	Recycled Water Demand* (AFY)	Date Connected	% Annual Benefit Realized in Year 1**		% Annual Benefit Realized in Year 2 - 75**		% Annual Benefit Realized in Year 76**	
Premier Color	48.4	November 1, 2014	17%	(2014)	100%	(2015-2088)	83%	(2089)
SD Growers	22.3	June 1, 2015	58%	(2015)	100%	(2016-2089)	42%	(2090)
DM Color	17.3	June 1, 2015	58%	(2015)	100%	(2016-2089)	42%	(2090)
Rosalyn Nursery	130	January 1, 2016	100%	(2016)	100%	(2017-2090)	0%	(2091)
Olivehill Greenhouses	193	January 1, 2016	100%	(2016)	100%	(2017-2090)	0%	(2091)
Property Conversion	231	January 1, 2016	100%	(2016)	100%	(2017-2090)	0%	(2091)

Project Life	75 Years

Year	Primary Physical Benefit (AFY)	Offset Imported Water Supply Purchases as % of Water Produced*	Physical Benefit A Total (AFY)
2014	8	100%	8
2015	72	100%	72
2016	642	100%	642
2017 - 2088**	46,224	100%	46,224
2089	634	100%	634
2090	571	100%	571
Total (2014 through 2090)	48,150 AF	-	48,150 AF

Comment: *Fallbrook purchases 90% of potable supplies from SDCWA (Fallbrook Public Utilities Department. 2010. 2010 Urban Water Management Plan. Pg. 10.) and SDCWA uses local supplies before imported supplies (SDCWA. 2011. 2010 Urban Water Management Plan. Pg. 2-13.), which indicates that any potable water offset will be used to directly offset imported supply purchases from SDCWA.
**Multiply Annual Total Benefit by (2088 - 2017 + 1) = 72 years.

Fallbrook Plant Nurseries Recycled Water Distribution System Expansion

Table 3-15: Physical Benefit B-Reduce Demand for Net Diversions from the Bay-Delta

Customer	Recycled Water Demand* (AFY)	Date Connected	% Annual Benefit Realized in Year 1**		% Annual Benefit Realized in Year 2 - 75**		% Annual Benefit Realized in Year 76** [100% - % Year in 1]	
Premier Color	48.4	November 1, 2014	17%	(2014)	100%	(2015-2088)	83%	(2089)
SD Growers	22.3	June 1, 2015	58%	(2015)	100%	(2016-2089)	42%	(2090)
DM Color	17.3	June 1, 2015	58%	(2015)	100%	(2016-2089)	42%	(2090)
Rosalyn Nursery	130	January 1, 2016	100%	(2016)	100%	(2017-2090)	0%	(2091)
Olivehill Greenhouses	193	January 1, 2016	100%	(2016)	100%	(2017-2090)	0%	(2091)
Property Conversion	231	January 1, 2016	100%	(2016)	100%	(2017-2090)	0%	(2091)

Project Life	75 Years

State Water Project (SWP) Proportion of Imported Supplies*	
2014*	15%
2015*	15%
2016 - 2090**	67%

Year	Water Produced (AFY) [Primary Benefit]	Offset Imported Water Supply Purchases as % of Water Produced*	Offset Imported Water Supply Purchases (AFY)	SWP Offset as % of Water Produced	Physical Benefit B Total [Offset Imported Water Supply Purchases x SWP Proportion of Imported Supplies]
2014	8	100%	8	15%	1
2015	72	100%	72	15%	11
2016	642	100%	642	67%	428
2017 - 2088	46,224	100%	46,224	67%	30,816
2089	634	100%	634	67%	423
2090	571	100%	571	67%	380
Total (2014 through 2090)	**48,150 AF**	**-**	**48,150 AF**	**-**	**32,059 AF**

Comment: *During the drought, 15% of SDCWA's imported supplies are anticipated to be sourced from the SWP (Pers. Comm. Tim Bombardier, SDCWA, Senior Water Resources Specialist. June 27, 2014. Available: 858-522-6600.).
**In normal years, SDCWA's imported water mix is approximately two-thirds SWP and one-third Colorado River water (Equinox Report. 2010. San Diego's Water Sources: Assessing the Options. July. Pg. 8).

Fallbrook Plant Nurseries Recycled Water Distribution System Expansion

Table 3-16: Physical Benefit C-Local Supply Development to Decrease Vulnerabilities

Customer	Recycled Water Demand* (AFY)	Date Connected	% Annual Benefit Realized in Year 1**		% Annual Benefit Realized in Year 2 - 75**		% Annual Benefit Realized in Year 76** [100% - % Year in 1]	
Premier Color	48.4	November 1, 2014	17%	(2014)	100%	(2015-2088)	83%	(2089)
SD Growers	22.3	June 1, 2015	58%	(2015)	100%	(2016-2089)	42%	(2090)
DM Color	17.3	June 1, 2015	58%	(2015)	100%	(2016-2089)	42%	(2090)
Rosalyn Nursery	130	January 1, 2016	100%	(2016)	100%	(2017-2090)	0%	(2091)
Olivehill Greenhouses	193	January 1, 2016	100%	(2016)	100%	(2017-2090)	0%	(2091)
Property Conversion	231	January 1, 2016	100%	(2016)	100%	(2017-2090)	0%	(2091)

Project Life	75 Years

Year	Water from Project (AFY) [Primary Benefit]	% of Water Produced by Project that Develops Local Supply*	Physical Benefit C Total (AFY) [Water form Project x % Local Supply]
2014	8	100%	8
2015	72	100%	72
2016	642	100%	642
2017 - 2088**	46,224	100%	46,224
2089	634	100%	634
2090	571	100%	571
Total (2014 through 2090)	**48,150 AF**	-	48,150 AF

Comment: *All water produced by this project constitutes local supply development to reduce the Region's vulnerability to supply interruptions (SDCWA. 2011. 2010 Urban Water Management Plan. Pg. 9-9.).

**Multiply Annual Total Benefit by (2088 - 2017 + 1) = 72 years.

Fallbrook Plant Nurseries Recycled Water Distribution System Expansion

Table 3-17: Physical Benefit D-Reduce Net Production of Greenhouse Gases (GHGs)

Energy Intensity of Imported Water* (MWh/AF)	**2.65**
Energy Intensity of Project (MWh/AF)**	**0**
Energy Savings of Project Water over Imported Water [Imported Water - Project Water]	**2.65**
Average GHG Emissions for California* (MT CO2e/MWh)**	**0.341**
GHG Emissions Savings of Project per AF [Energy Savings x Average Carbon Emissions] (MT CO2e/AF)	**0.904**
Project Life	**75 Years**

Year	Water from Project (AFY) [Primary Physical Benefit]	Imported Water Offset by Project (AFY) [Benefit A]	GHG Emissions of Imported Water (MT CO2e) [Offset Imported x Energy Imported Water x Average Carbon Emissions]	GHG Emissions With Project (MT CO2e) [Water from Project x Energy Project Water x Average Carbon Emissions]	Physical Benefit D Total (MT CO2e) [Imported Water GHG - Project Water GHG]
2014	8	8	7	0	7
2015	72	72	65	0	65
2016	642	642	580	0	580
2017 - 2088	46,224	46,224	41,770	0	41,770
2089	634	634	573	0	573
2090	571	571	516	0	516
Total (2014 through 2090)	**48,150 AF**	**48,150 AF**	**43,511 MT CO2e**	**0 MT CO2e**	**43,511 MT CO2e**

Comments: *Equinox Center. 2010. San Diego's Water Sources: Assessing the Options. July. Table 1a (pg. 10).
**The project will be utilizing recycled water that is already treated to tertiary levels, therefore there will be no increased energy use to utilize the water that is currently unused (Fallbrook Public Utilities Department. 2014. Preliminary Assessment Report (Recycled Water System East Expansion Planning) Technical Memorandum. April 15. Pg. 1.)
***Average of greenhouse gas emissions from CA energy production and imported energy (CEC. 2013. California Electrical Energy Generation Total Production, by Resource Type (Gigawatt hours). Accessed 24 June 2014. Available: http://energyalmanac.ca.gov/electricity/electricity_generation.html) and (U.S. Environmental Protection Agency (USEPA). 2014. eGRID 9th edition Version 1.0 Year 2010 Summary Tables. February. Available: http://www.epa.gov/cleanenergy/energy-resources/egrid/)

Fallbrook Plant Nurseries Recycled Water Distribution System Expansion

Table 3-18: Physical Benefit E-Avoid Social Costs of Greenhouse Gases (GHGs)

Social Cost of GHGs ($/MTCO2)*
$24.55

Year	GHG Emissions Reduction from Project (MT CO2e) [Benefit D]	Physical Benefit E Total ($) [GHG Emissions Reduction from Project x Social Cost of GHG]
2014	7	$179
2015	65	$1,586
2016	580	$14,243
2017 - 2088	41,770	$1,025,461
2089	573	$14,064
2090	516	$12,656
Total (2014 through 2090)	**43,511 MT CO2e**	**$1,068,189**

Comments: *Social Cost of Carbon (Interagency Working Group on Social Cost of Carbon, United States Government. 2010. Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866. February. Table 4 (pg. 28)) converted to 2014 dollars from 2007 dollars (U.S. Bureau of Labor Statistics. CPI Inflation Calculator. Available: http://www.bls.gov/data/inflation_calculator.htm)

Fallbrook Plant Nurseries Recycled Water Distribution System Expansion

Table 3-19: Physical Benefit F-Contribute to 20x2020 Goals

FPUD Base Numbers		
Reduced Potable Use in 2020 [Primary Physical Benefit]	642	AFY
20x2020 Goal*	374	gallons per capita per day (gpcd)
20x2020 Baseline [Goal ÷ 0.8]	467.5	gpcd
Reduction Target [20 x 2020 Baseline - 20 x 2020 Goal]	93.5	gpcd
2020 Population Estimate**	35,917	persons

Conversion Factors		
Gal/AF	325,851	gal/AF
Days per year	365	day/yr
AFY to gpd conversion	892.74	gpd***/AFY

Potable Water Reduction from Project in 2020 (gpd) [Reduced Potable Use in 2020 x AFY to gpd conversion]	Potable Water Reduction in 2020 from Project per Person (gpcd) [Reduction from Project ÷ 2020 Population Estimate]	Physical Benefit F Total [Per Capital Potable Reduction from Project ÷ Reduction Target]
573,141	16	17%

Comments: *FPUD. 2011. 2010 Urban Water Management Plan. Pg. 19.
**FPUD. 2011. 2010 Urban Water Management Plan. Table 2 (pg. 5).
***Gallons per day = gpd

Fallbrook Plant Nurseries Recycled Water Distribution System Expansion

Table 3-20: Physical Benefit G-Reduce Water Costs for Agricultural Users

Source	Cost in 2014 ($ per 1,000 gallons)
Potable*	$4.06
Recycled*	$3.47
Savings of Recycled over Potable [Potable - Recycled]	$0.59

Cost Ratio of Recycled Water : Potable Water [Recycled Cost ÷ Potable Cost]	0.85
Physical Benefit G Total [Savings ÷ Potable]	14.5%

Comments: *Fallbrook Public Utility District. 2013. Customer Billing Information. July 1. Refer to Recycled Water and Com Ag (CA) rates.

Fallbrook Plant Nurseries Recycled Water Distribution System Expansion

Table 3-21: Physical Benefit H-Reduce Discharge to Outfall and Increase Available Capacity

Current and Future Recycled Water Production* (AFY)	**2,000**
Current Recycled Water Deliveries* (AFY)	**600**

Year	Recycled Water Production (AFY)	Current Recycled Water Deliveries (AFY)	Current Outfall Discharge (AFY) [Recycled Water Production - Current Recycled Water Deliveries]	Reycled Water Delivered by Project (AFY) [Primary Benefit]	Outfall Discharge with Project (AFY) [Current Outfall Discharge - RW Delivered by Project]	Physical Benefit H Total [Current Outfall Discharg - Outfall Discharge with Project] (AFY)
2014	2,000	600	1,400	8	1,392	8
2015	2,000	600	1,400	72	1,329	72
2016	2,000	600	1,400	642	758	642
2017 - 2088**	144,000	43,200	100,800	46,224	54,576	46,224
2089	2,000	600	1,400	634	766	634
2090	2,000	600	1,400	571	830	571
Total (2014 through 2090)	**154,000 AF**	**46,200 AF**	**107,800 AF**	**48,150 AF**	**59,650 AF**	**48,150 AF**

Comments: *Fallbrook Public Utilities Department. 2014. Preliminary Assessment Report (Recycled Water System East Expansion Planning) Technical Memorandum. April 15. Pg. 1.
**Multiply Annual Total Benefit by (2088 - 2017 + 1) = 72 years.

Fallbrook Plant Nurseries Recycled Water Distribution System Expansion

Table 3-22: Physical Benefit J-Reduce Need for Fertilizer Application

Nitrate Calculation	
Nitrate in Potable Water (mg/L)	0
Allowable Concentration of Nitrates in Recycled Water* (mg/L)	55.5
Allowable Concentration of Nitrates in Recycled Water (lbs/AF)	150.92

Conversion Factors			
Liters/AF			1,233,482
mg/lb			453,592

Year	Potable Water Delivered Without Project (AFY)	Nitrate Delivered via Irrigation Without Project (lbs/year) [Potable Water without Project x Concentration of Nitrate in Potable Water]	Recycled Water Delivered by Project (AFY) [Primary Benefit]	Nitrate Delivered by Project via Irrigation with Recycled Water (lbs/yr) [Water from Project x Nitrates in Recycled Water]	Physical Benefit J Total (lbs/year) [RW Delivered x Concentration of Nitrates]
2014	8	0	8	1,217	1,217
2015	72	0	72	10,791	10,791
2016	642	0	642	96,894	96,894
2017 - 2088	46,224	0	46,224	6,976,344	6,976,344
2089	634	0	634	95,676	95,676
2090	571	0	571	86,103	86,103
Total (2014 through 2090)	**48,150 AF**	**0 lbs**	**48,150 AF**	**7,267,025 lbs**	**7,267,025 lbs**

Comments: *California Regional Water Quality Control Board San Diego Region. Waste Discharge Requirements for the Fallbrook Public Utility District Plant No. 1 and 2 Reclamation Projects, San Diego County (Order No. 91-93), as amended. Pg. 5 (of original permit).

Carlsbad Recycled Water Plant and Distribution System Expansion

Table 3-29: Primary Physical Benefit – Reduce Potable Demand through Recycled Water Use

Project Life	**60 years**
Project Completion	**June 2017**
Benefits Accrue*	**July 2017 - June 2077**

Project Phasing	
2017 [6 months ÷ 12 months]	**50%**
2018 - 2076	**100%**
2077 [6 months ÷ 12 months]	**50%**

Recycled Water Delivery Project Component	Recycled Water Demand (AFY)
Segment 1a**	**99**
Segment 7**	**98**
Adjacent-to-Existing**	**126**
Increase to Existing Users***	**30**
Annual Total Benefit	**353**

Year	Project Phasing	Segment 1a (AFY) [Segment 1a Demand x Project Phasing]	Segment 7 (AFY) [Segment 7 Demand x Project Phasing]	Adjacent-to-Existing (AFY) [Adjacent-to-Existing Demand x Project Phasing]	Existing Users (AFY) [Existing Users Demand x Project Phasing]	Primary Physical Benefit Total (AFY)
2014	0%	0	0	0	0	0
2015	0%	0	0	0	0	0
2016	0%	0	0	0	0	0
2017	50%	49.5	49	63	15	177
2018	100%	99	98	126	30	353
2019 - 2076[†]	100%	5,742	5,684	7,308	1,740	20,474
2077	50%	49.5	49	63	15	177
Total (2014 through 2077)	**-**	**5,940 AF**	**5,880 AF**	**7,560 AF**	**1,800 AF**	**21,180 AF**

Comments: *Based on project schedule.
**CMWD. 2012. Phase II Recycled Water Project Feasibility Study. June. Pp. 44, 55, 56, 63, and 64.
***CMWD. 2012. Recycled Water Master Plan. January. Table 4.2 (pg. 4-3).
[†]Multiply Annual Total Benefit by (2076 - 2019 + 1) = 58 years.

Carlsbad Recycled Water Plant and Distribution System Expansion

Table 3-30: Physical Benefit A-Avoid Imported Water Supply Purchases

Project Life	**60 years**
Project Completion	**June 2017**
Benefits Accrue	**July 2017 - June 2077**
Annual Total Benefit (AFY)	**353**

Project Phasing	
2017 [6 months ÷ 12 months]	**50%**
2018 - 2076	**100%**
2077 [6 months ÷ 12 months]	**50%**

Year	Recycled Water from Project (AFY) [Primary Benefit]	Offset Imported Water Supply Purchases as % of Water from Project*	Benefit A Total (AFY) [Water from Project x Offset %]
2014	0	100%	0
2015	0	100%	0
2016	0	100%	0
2017	177	100%	177
2018	353	100%	353
2019 - 2076**	20,474	100%	20,474
2077	177	100%	177
Total (2014 through 2077)	**21,180 AF**	-	**21,180 AF**

Comment: *The entirety of Carlsbad's potable water supply is purchased from SDCWA (CMWD. 2011. 2010 Urban Water Management Plan. Pg. 4-1.) and SDCWA supplies are purchased only to meet demand that cannot be met with local supplies by member agencies, per in SDCWA's demand projection methods described in its UWMP (SDCWA. 2011. 2010 Urban Water Management Plan. Pg. 2-13.), thus, any new supplies that are available in the region (such as recycled water) will be used to offset purchase of imported water supplies.
**Multiply Annual Total Benefit by (2076 - 2019 + 1) = 58 years.

Carlsbad Recycled Water Plant and Distribution System Expansion

Table 3-31: Physical Benefit B-Reduce Demand for Net Diversions from the Bay-Delta

Project Life	**60 years**
Project Completion	**June 2017**
Benefits Accrue	**July 2017 - June 2077**
Annual Primary Physical Benefit (AFY)	**353**

State Water Project (SWP) Proportion of Imported Supplies	
2014*	**15%**
2015*	**15%**
2016 - 2077**	**67%**

Year	Offset Imported Water Supply Purchases (AFY) [Benefit A]	SWP Proportion	Physical Benefit B (AFY) [Offset Imported Water Supply Purchases x SWP Proportion of Imported Supplies]
2014	0	15%	0
2015	0	15%	0
2016	0	67%	0
2017	177	67%	118
2018	353	67%	235
2019 - 2076***	20,474	67%	13,649
2077	177	67%	118
Total (2014 through 2077)	**21,180 AF**	**-**	**14,120 AF**

Comment: During the drought, 15% of SDCWA's imported supplies are anticipated to be sourced from the SWP (Pers. Comm. Tim Bombardier, SDCWA, Senior Water Resources Specialist. June 27, 2014. Available: 858-522-6600.).

**In normal years, SDCWA's imported water mix is approximately two-thirds SWP and one-third Colorado River water (Equinox Report. 2010. San Diego's Water Sources: Assessing the Options. July. Pg. 8).

***Multiply Annual Total Benefit by (2076 - 2019 + 1) = 58 years.

Carlsbad Recycled Water Plant and Distribution System Expansion

Table 3-32: Physical Benefit C-Local Supply Development to Decrease Vulnerabilities

Project Life	**60 years**
Project Completion	**June 2017**
Benefits Accrue	**July 2017 - June 2077**
Annual Primary Physical Benefit (AFY)	**353**

Project Phasing	
2017 [6 months ÷ 12 months]	**50%**
2018 - 2076	**100%**
2077 [6 months ÷ 12 months]	**50%**

Year	Water from Project (AFY) [Primary Benefit]	% of Water from Project that Develops Local Supply*	Physical Benefit C Total (AFY) [Water from Project x % Local Supply Development]
2014	0	100%	0
2015	0	100%	0
2016	0	100%	0
2017	177	100%	177
2018	353	100%	353
2019 - 2076**	20,474	100%	20,474
2077	177	100%	177
Total (2014 through 2077)	**21,180 AF**	**-**	**21,180 AF**

Comments: *All water produced by this project constitutes local supply development to reduce the Region's vulnerability to supply interruptions (SDCWA. 2011. 2010 Urban Water Management Plan. Pg. 9-9.).
**Multiply Annual Total Benefit by (2076 - 2019 + 1) = 58 years.

Carlsbad Recycled Water Plant and Distribution System Expansion

Table 3-33: Physical Benefit D-Reduce Net Production of Greenhouse Gases

Use	Energy (MWh/AF)
Energy to Treat and Convey Imported Water*	2.65
Energy to Treat and Convey Recycled Water**	0.8
Energy Savings of Recycled over Imported Water [Imported Water - Recycled Water]	1.85

Project Life	60 years
Project Completion	June 2017
Benefits Accrue	July 2017 - June 2077
Annual Primary Physical Benefit (AFY)	353
Average GHG Emissions for Energy Used in California*** (MT CO2e/MWh)	0.341
GHG Emissions Savings for Recycled Water versus Imported Water (MT CO2e/AF) [Energy Savings x Average Carbon Emissions]	0.63085

Year	Imported Water Use without Project (AFY) [Benefit A]	Recycled Water from Project (AFY) [Primary Benefit]	GHG Emissions of Imported Water (MT CO2e/yr) [Imported Water without Project x Energy Imported Water x Average Carbon Emissions]	GHG Emissions With Project (MT CO2e/yr) [Primary Benefit x Recycled Water Energy Use x Average Carbon Emissions]	Physical Benefit D Total (MT CO2e/yr) [Imported Water GHG without Project - Recycled Water GHG from Project]
2014	0	0	0	0	0
2015	0	0	0	0	0
2016	0	0	0	0	0
2017	177	177	159	48	111
2018	353	353	319	96	223
2019 - 2076†	20,474	20,474	18,501	5,585	12,916
2077	177	177	159	48	111
Total (2014 through 2077)	**21,180 AF**	**21,180 AF**	**19,139 MT CO2e**	**5,778 MT CO2e**	**13,361 MT CO2e**

Comments: *Equinox Center. 2010. San Diego's Water Sources: Assessing the Options. July. Table 1a (pg. 10).
**WateReuse. 2011. Seawater Desalination Power Consumption White Paper. November. Table 2 (pg. 15).
***Average of greenhouse gas emissions from CA energy production and imported energy (CEC. 2013. California Electrical Energy Generation Total Production, by Resource Type (Gigawatt hours). Accessed 24 June 2014. Available: http://energyalmanac.ca.gov/electricity/electricity_generation.html) and (U.S. Environmental Protection Agency (USEPA). 2014. eGRID 9th edition Version 1.0 Year 2010 Summary Tables. February. Available: http://www.epa.gov/cleanenergy/energy-resources/egrid/)
†Multiply Annual Total Benefit by (2076 - 2019 + 1) = 58 years.

Carlsbad Recycled Water Plant and Distribution System Expansion

Table 3-34: Physical Benefit E-Avoid Social Costs of Greenhouse Gases (GHGs)

Social Cost of GHGs ($/MTCO2)*
$24.55

Year	GHG Emissions Reduction from Project (MT CO2e/yr) [Benefit D]	Physical Benefit E Total ($) [GHG Emissions Reduction from Project x Social Cost of Greenhouse Gases]
2014	0	$0
2015	0	$0
2016	0	$0
2017	111	$2,734
2018	223	$5,467
2019 - 2076	12,916	$317,088
2077	111	$2,734
Total (2014 through 2077)	**13,361 MT CO2e**	**$328,022**

Comments: *Social Cost of Carbon (Interagency Working Group on Social Cost of Carbon, United States Government. 2010. Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866. February. Table 4 (pg. 28)) converted to 2014 dollars from 2007 dollars (U.S. Bureau of Labor Statistics. CPI Inflation Calculator. Available: http://www.bls.gov/data/inflation_calculator.htm)

Carlsbad Recycled Water Plant and Distribution System Expansion

Table 3-35: Physical Benefit F-Contribute to 20x2020 Goals

Carlsbad Base Numbers		
Potable Water Offset by Project in 2020 [Primary Benefit]	353	AFY
20x2020 Goal*	207.1	gallons per capita per day (gpcd)
20x2020 Baseline [Goal ÷ 0.8]	258.9	gpcd
Reduction Target [20x2020 Baseline - 20x2020 Goal]	51.8	gpcd
2020 Population Estimate**	94,101	persons

Conversion Factors		
Gal/AF	325,851	gal/AF
Days per year	365	day/yr
AFY to gpd conversion	892.74	gpd***/AFY

Potable Use Reduction in 2020 from Project (gpd) [Primary Physical Benefit x AFY to gpd conversion]	Reduction in Potable Use in 2020 from Project per Person (gpcd) [Reduction from Project ÷ 2020 Population Estimate]	Physical Benefit F Total [Reduction from Project per Person ÷ Reduction Target]
315,138	3.3	6.5%

Comments: *CMWD. 2011. 2010 Urban Water Management Plan. Pg. 3-8.
**CMWD. 2011. 2010 Urban Water Management Plan. Table 3-1 (pg. 3-1).
***Gallons per day = gpd

Carlsbad Recycled Water Plant and Distribution System Expansion

Table 3-36: Physical Benefit G-Reduce Water Costs for Agricultural Users

Source	2014 Cost $ per hundred cubic feet
Potable*	$4.22
Recycled*	$3.53
Savings of Recycled over Potable [Potable - Recycled]	$0.69

Ratio of Recycled Water : Potable Water Costs in 2014	0.84
Physical Benefit G Total [Savings ÷ Potable]	16.4%

Comments: *Carlsbad Municipal Water District. 2014. Water Rates. Refer to 2014 rates for Irrigation and for Recycled Water.

Carlsbad Recycled Water Plant and Distribution System Expansion

Table 3-37: Physical Benefit H-Reduce Discharge to Outfall and Increase Available Capacity

Project Life	**60 years**
Project Completion	**July 2017**
Benefits Accrue	**July 2017 - June 2077**

Year	Recycled Water From Project (AFY) [Primary Benefit]	% of Influent Received from Encinal Water Pollution Control Facility (EWPCF)	Physical Benefit H Total [Recycled Water from Project x % of Influent Received from EWPCF] (AFY)
2014	0	100%	0
2015	0	100%	0
2016	0	100%	0
2017	177	100%	177
2018	353	100%	353
2019 - 2076	20,474	100%	20,474
2077	177	100%	177
Total (2014 through 2077)	**21,180 AF**	**-**	**21,180 AF**

Comments: *The Carlsbad Water Reclamanation Facility (WRF) purchases influent from Encina Water Pollution Control Facility (EWPCF), which discharges any secondary effluent it cannot sell to the Encina Ocean Outfall (EOO) (Carlsbad Municipal Water District. 2012. Recycled Water Master Plan. Pg. 4-1.). 100% of the water purchased for water recycling by Carlsbad WRF will be diverted from being discharged at EOO.

Carlsbad Recycled Water Plant and Distribution System Expansion

Table 3-38: Physical Benefit J-Reduce Need for Fertilizer Application

Nitrate Calculation	
Concentration of Nitrates in Potable Water (lbs/AF)	0.0
Concentration of Nitrates in Recycled Water* (mg/L)	16.1
Concentration of Nitrates in Recycled Water (lbs/AF)	43.8
Conversion Factors	
Liters/AF	1,233,482
mg/lb	453,592

Year	Potable Water Use without Project (AFY) [Benefit A]	Recycled Water from Project (AFY) [Primary Benefit]	Nitrate in Potable Water (lbs/year) [Potable Water Use without Project x Concentration of Nitrates in Potable Water]	Nitrate in Recycled Water (lbs/year) [Recycled Water from Project x Nitrate in Recycled Water]	Physical Benefit J Total (lbs/year) [Nitrates in Potable Water - Nitrates in Recycled Water]
2014	0	0	0	0	0
2015	0	0	0	0	0
2016	0	0	0	0	0
2017	177	177	0	7,727	7,727
2018	353	353	0	15,455	15,455
2019 - 2076	20,474	20,474	0	896,388	896,388
2077	177	177	0	7,727	7,727
Total (2014 through 2077)	**21,180 AF**	**21,180 AF**	**0 lbs**	**927,298 lbs**	**927,298 lbs**

Comments: *Carlsbad Municipal Water District. 2012. Recycled Water Master Plan. January. Table 4.3 (pg. 4-7).

Carlsbad Recycled Water Plant and Distribution System Expansion

Table 3-39: Physical Benefit K-Increase Local Treatment Capacity for Future Recycled Water Delivery

Project Life	**60 years**
Project Completion	**July 2017**
Benefits Accrue	**July 2017 - June 2077**

Current Capacity* (Million gallons per day (MGD))	**4**
Current Capacity (AFY)	**4,481**
Expanded Capacity* (MGD)	**6**
Expanded Capacity (AFY)	**6,721**
Increase in Capacity [Expanded - Current] (AFY)	**2,240**

Year	Capacity without Project (AFY)	Project Phasing	Additional Capacity from Project (AFY) [Increase in Capacity x Project Phasing]	Capacity with Project (AFY) [Additional Capacity with Project + Current Capacity]	Recycled Water Use of Project (AFY) [Primary Benefit]	Benefit K Total (AFY) [Additional Capacity from Project - Recycled Water Use of Project]
2014	4,481	0%	0	4,481	0	0
2015	4,481	0%	0	4,481	0	0
2016	4,481	0%	0	4,481	0	0
2017	4,481	50%	1,120	5,601	177	944
2018	4,481	100%	2,240	6,721	353	1,887
2019 - 2076**	259,873	100%	129,937	389,810	20,474	109,463
2077	4,481	50%	1,120	5,601	177	944
Total (2014 through 2077)	**286,757 AF**	**-**	**134,417 AF**	**421,174 AF**	**21,180 AF**	**113,237 AF**

Comments: *CMWD. 2012. Phase II Recycled Water Project Feasibility Study. June. Pgs. 71 and 72.
**Multiply Annual Total Benefit by (2076 - 2019 + 1) = 58 years.

Regional Demand Management Program Expansion
Calculations for Basis of Primary Physical Benefit

WaterSmart Landscape Efficiency Program (WSLEP)*		Detention Facility Retrofit**			Turf Replacement Rebate Program***		
Pilot Program Conservation Rate	35%	No. of Toilets at Bailey Facility (pilot project)	64	toilet	Area Converted by Pilot Program	2,439,025	square feet
WSLEP Goal Conservation Rate	20%	No. of Aerators at Bailey Facility	38	aerator	Total Water Savings in Pilot Program	2,745	AF
Total Pilot Program Conservation (HCF/year)	69,215	Water Savings from Toilets at Bailey	1,615,260	gal/year	Pilot Program Assement Period	10	years
No. of Sites in Pilot Program	13	Water Savings from Aerators at Bailey	115,083	gal/year	Annual Water Savings in Pilot Program [Total Water Savings ÷ Assessment Period]	275	AFY
Pilot Program Conservation (HCF/Site) [Total Pilot Conservation ÷ No. of Sites]	5,324.2	Water Savings per Toilet [Water Savings from Toilets ÷ No. of Toilets]	25,238	gal/year per toilet	Annual Savings per Area in Pilot Program [Water Savings ÷ Area Converted]	0.00011	AFY/square foot
HCF per AF	435.6	Water Savings per Aerator [Water Savings from Aerators ÷ No. of Aerators]	3,029	gal/year per aerator	Area to be Converted by Turf Replacement Rebate	202,667	square feet
Pilot Program Conservation (AFY/Site) [Pilot Program Conservation in HCF/Site ÷ HCF/AF]	12.2	Water Savings per Toilet + Aerator "Package" [Water Savings per Toilet + Water Savings per Aerator]	28,267	gal/year per package	Annual Savings from Turf Replacement Rebates [Area to be Converted x Annual Savings per Area from Pilot]	22.8	AFY
WSLEP Conservation (AFY/Site) [Pilot Program Conservation ÷ (WSLEP Conservation Rate ÷ Pilot Program Conservation Rate)]	7.0	No. of Packages for Detention Facility Retrofit	188	package	**Comments:** *WSLEP calculations based on results from similar program described in: CPUC Energy Division. 2011. Embedded Energy in Water Pilot programs Impact Evaluation Final Report. March 9. Table ES-1 (pg. vi) **Detention Facility Retrofit calculations based on results from similar program described in: Otay Water District. 2010. From Report to Reality; One Agency's Delayed Success Story. Presented at the WaterSmart Innovations Conference and Exposition. 6 October. Presented by Rhianna Pensa, Water Conservation Specialist. Slide 19 ***Turf Replacement Rebates calculations based on results from similar program described in: MWD. 2013. California Friendly Turf Replacement Incentive Program Southern California Final Project Report. September 30. Pg. 5.		
No. of Sites in WSLEP	20.0	Total Annual Savings for Detention Facility Retrofit	5,314,184	gal/year			
Annual Savings from WSLEP (AFY)	139.7	Total Annual Savings for Detention Facility Retrofit [converted to AFY using 325,851.4 gal/AF]	16.3	AFY			

Regional Demand Management Program Expansion

Table 3-43: Primary Physical Benefit - Reduce Potable Water Demand through Conservation

Project Component	Potable Water Demand Reduction* (AFY)	Date Benefits Begin to Accrue**	% Annual Benefit Realized in Year 1***		% Annual Benefit Realized in Year 2***		% Annual Benefit Realized in Years 3-5***		% Annual Benefit Realized in Year 6*** [100% - % Year 1 for WSLEP; 100% for Detention Facility and Turf Replacement]		% Annual Benefit Realized in Years 7-10		% Annual Benefit Realized in Year 11*** [100% - % Year 1 for Turf Replacement and Detention Facility]		% Annual Benefit Realized in Year 12*** [100% - % Year 2 for Turf Replacement and Detention Facility]	
WSLEP	139.7	July 1, 2015	50%	(2015)	100%	(2016)	100%	(2017-2019)	50%	(2020)	0%	(2021-2024)	0%	(2025)	0%	(2026)
Detention Facility Retrofit	16.3	March 1, 2016	75%	(2016)	100%	(2017)	100%	(2018-2020)	100%	(2021)	100%	(2022-2025)	25%	(2026)	0%	(2027)
Turf Replacement Rebate***	22.8	January 1, 2016	33%	(2016)	67%	(2017)	100%	(2018-2020)	100%	(2021)	100%	(2022-2025)	67%	(2026)	33%	(2027)

Project Life†	
WSELP	5 years
Detention Facility	10 years
Turf Replacement Rebate	10 years

Year	WSLEP [Demand Reduction x % Annual Benefit] (AFY)	Detention Facility Retrofit [Demand Reduction x % Annual Benefit] (AFY)	Turf Replacement Rebate [Demand Reduction x % Annual Benefit] (AFY)	Primary Physical Benefit Total (AFY)
2014	0	0	0	0
2015	70	0	0	70
2016	140	12	8	160
2017	140	16	15	171
2018	140	16	23	179
2019	140	16	23	179
2020	70	16	23	109
2021-2024††	0	65	91	156
2025	0	16	23	39
2026	0	4	15	19
2027	0	0	8	8
Total††† (2014 through 2027)	**698 AF**	**163 AF**	**228 AF**	**1,090 AF**

Comments: *Calculations for annual project component benefits based on pilot or similar programs, as cited under the Calculations for Basis of Primary Benefit Table (see previous page).

**Based on Project Schedule.

***The benefits for the Turf Replacement Rebate Program will phase in over time according to the explanation in Program Phasing.

†Based on description in Technical Basis of the Project.

††Multiply Annual Total Benefit by (2024 - 2021 + 1) = 4 years.

†††Some differences may result from rounding

Regional Demand Management Program Expansion

Table 3-44: Physical Benefit A-Avoid Imported Water Supply Purchase

Project Component	Potable Water Demand Reduction* (AFY)	Date Benefits Begin to Accrue**	% Annual Benefit Realized in Year 1***		% Annual Benefit Realized in Year 2***		% Annual Benefit Realized in Years 3-5***		% Annual Benefit Realized in Year 6*** [100% - % Year 1 for WSLEP; 100% for Detention Facility and Turf Replacement]		% Annual Benefit Realized in Years 7-10		% Annual Benefit Realized in Year 11*** [100% - % Year 1 for Turf Replacement and Detention Facility]		% Annual Benefit Realized in Year 12*** [100% - % Year 2 for Turf Replacement and Detention Facility]	
WSLEP	139.7	July 1, 2015	50%	(2015)	100%	(2016)	100%	(2017-2019)	50%	(2020)	0%	(2021-2024)	0%	(2025)	0%	(2026)
Detention Facility Retrofit	16.3	March 1, 2016	75%	(2016)	100%	(2017)	100%	(2018-2020)	100%	(2021)	100%	(2022-2025)	25%	(2026)	0%	(2027)
Turf Replacement Rebate***	22.8	January 1, 2016	33%	(2016)	67%	(2017)	100%	(2018-2020)	100%	(2021)	100%	(2022-2025)	67%	(2026)	33%	(2027)

Year	WSLEP (AFY) [Primary Benefit]	Detention Facility Retrofit (AFY) [Primary Benefit]	Turf Replacement Rebate (AFY) [Primary Benefit]	Total Water Conserved by Project (AFY) [Sum of Components]	Offset Imported Water Supply Purchases as % of Water Produced*	Physical Benefit A Total (AFY)
2014	0	0	0	0	100%	0
2015	70	0	0	70	100%	70
2016	140	12	8	160	100%	160
2017	140	16	15	171	100%	171
2018	140	16	23	179	100%	179
2019	140	16	23	179	100%	179
2020	70	16	23	109	100%	109
2021-2024††	0	65	91	156	100%	156
2025	0	16	23	39	100%	39
2026	0	4	15	19	100%	19
2027	0	0	8	8	100%	8
Total (2014 through 2027)	**698 AF**	**163 AF**	**228 AF**	**1,090 AF**	**-**	**1,090 AF**

Project Life†	
WSELP	5 years
Detention Facility	10 years
Turf Replacement Rebate	10 years

Comment: *Although SDCWA and its member agencies use a mix of imported water and local sources to supply their customers, imported water is more expensive to provide and is considered to be the marginal water source (Equinox Center. 2010. San Diego's Water Sources: Assessing the Options, July 2010. Pg. 10. Note that despite desalinated water's high cost, the San Diego IRWM region's priority is to reduce dependence on imported water (IRWM Plan, 2007).), thus, any reduction in demand in the Region will be used to offset purchases of imported water supplies.
**Multiply Annual Total Benefit by (2024 - 2021 + 1) = 4 years.

Regional Demand Management Program Expansion

Table 3-45: Physical Benefit B-Reduce Demand for Net Diversions from the Bay-Delta

State Water Project (SWP) Proportion of Imported Supplies*	
2014*	15%
2015*	15%
2016 - 2027**	67%

Year	Offset Imported Water Supply Purchases (AFY) [Benefit A]	SWP Offset as % of Water Produced	Physical Benefit B Total [Offset Imported Water Supply Purchases x SWP Proportion of Imported Supplies]
2014	0	15%	0
2015	70	15%	10
2016	160	67%	106
2017	171	67%	114
2018	179	67%	119
2019	179	67%	119
2020	109	67%	73
2021-2024***	156	67%	104
2025	39	67%	26
2026	19	67%	13
2027	8	67%	5
Total (2014 through 2027)	**1,090 AF**	**-**	**690 AF**

Comment: *During the drought, 15% of SDCWA's imported supplies are anticipated to be sourced from the SWP (Pers. Comm. Tim Bombardier, SDCWA, Senior Water Resources Specialist. June 27, 2014. Available: 858-522-6600.).
**In normal years, SDCWA's imported water mix is approximately two-thirds SWP and one-third Colorado River water (Equinox Report. 2010. San Diego's Water Sources: Assessing the Options. July. Pg. 8).
***Annual Benefit x (2024-2021+1) = 4 years

Regional Demand Management Program Expansion

Table 3-46: Physical Benefit C-Local Supply Development to Decrease Vulnerabilities

Year	Water Conserved by Project (AFY) [Primary Benefit]	% of Water Conserved by Project that Develops Local Supply*	Physical Benefit C Total (AFY) [Water Conserved by Project x % That Develops Local Supply]
2014	0	100%	0
2015	70	100%	70
2016	160	100%	160
2017	171	100%	171
2018	179	100%	179
2019	179	100%	179
2020	109	100%	109
2021-2024**	156	100%	156
2025	39	100%	39
2026	19	100%	19
2027	8	100%	8
Total (2014 through 2027)	**1,090 AF**	**-**	**1,090 AF**

Comment: *All water produced by this project constitutes local supply development to reduce the Region's vulnerability to supply interruptions (SDCWA. 2011. 2010 Urban Water Management Plan. Pg. 9-9.).
**Multiply Annual Total Benefit by (2024 - 2021 + 1) = 4 years.

Regional Demand Management Program Expansion

Table 3-47: Physical Benefit D-Reduce Net Production of Greenhouse Gases (GHGs)

Use	Energy
Energy Intensity of Imported Water* (MWh/AF)	2.65
Energy Intensity of Conserved Water from Project** (MWh/AF)	0
Energy Offset by Project over Imported Water [Imported Water - Conserved Water]	2.65
Average GHG Emissions for Energy Use in California*** (MT CO2e/MWh)	0.341
GHG Emissions Savings of Project [Energy Savings x Average Carbon Emissions] (MT CO2e/AF)	0.904

Year	Water Conserved by Project (AFY) [Primary Physical Benefit]	Imported Water without Project (AFY) [Benefit A]	GHG Emissions of Imported Water (MT CO2e) [Imported Water without Project x Energy Imported Water x Average Carbon Emissions]	GHG Emissions of Project (MT CO2e) [Water Conserved by Project x Energy Water Conservation x Average Carbon Emissions]	Physical Benefit D Total (MT CO2e) [GHG of Imported - GHG of Project]
2014	0	0	0	0	0
2015	70	70	63	0	63
2016	160	160	144	0	144
2017	171	171	155	0	155
2018	179	179	162	0	162
2019	179	179	162	0	162
2020	109	109	98	0	98
2021-2024	156	156	141	0	141
2025	39	39	35	0	35
2026	19	19	17	0	17
2027	8	8	7	0	7
Total (2014 through 2027)	**1,090 AF**	**1,090 AF**	**985 MT CO2e**	**0 MT CO2e**	**985 MT CO2e**

Comments: *Equinox Center. 2010. San Diego's Water Sources: Assessing the Options. July. Table 1a (pg. 10).
**Conserving water will offset demand for imported water, energy intensity of 0 MWh/AF, thereby saving the energy required to convey and treat the water.
***Average of greenhouse gas emissions from CA energy production and imported energy (CEC. 2013. California Electrical Energy Generation Total Production, by Resource Type (Gigawatt hours). Accessed 24 June 2014. Available: http://energyalmanac.ca.gov/electricity/electricity_generation.html) and (U.S. Environmental Protection Agency (USEPA). 2014. eGRID 9th edition Version 1.0 Year 2010 Summary Tables. February. Available: http://www.epa.gov/cleanenergy/energy-resources/egrid/)

Regional Demand Management Program Expansion

Table 3-48: Physical Benefit E-Avoid Social Costs of Greenhouse Gases (GHGs)

Social Cost of GHGs ($/MT CO2e)*
$24.55

Year	GHG Emissions Reduction from Project (MT CO2e) [Benefit D]	Physical Benefit E Total ($) [GHG Emissions Reduction from Project x Social Cost of GHGs]
2014	0	$0
2015	63	$1,549
2016	144	$3,539
2017	155	$3,798
2018	162	$3,967
2019	162	$3,967
2020	98	$2,417
2021-2024	141	$3,471
2025	35	$868
2026	17	$428
2027	7	$169
Total (2014 through 2027)	**985 MT CO2e**	**$24,172**

Comments: *Social Cost of Carbon (Interagency Working Group on Social Cost of Carbon, United States Government. 2010. Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866. February. Table 4 (pg. 28)) converted to 2014 dollars from 2007 dollars (U.S. Bureau of Labor Statistics. CPI Inflation Calculator. Available: http://www.bls.gov/data/inflation_calculator.htm)

Regional Demand Management Program Expansion

Table 3-49: Physical Benefit F-Contribute to 20x2020 Goals

San Diego County Water Authority Base Numbers		
Water Conserved by Project in 2020 (AFY) [Primary Benefit]	109	AFY
20x2020 Goal*	167	gallons per capita per day (gpcd)
20x2020 Baseline [Goal ÷ 0.8]	209	gpcd
Reduction Target [20x2020 Baseline - 20x2020 Goal]	42	gpcd
2020 Population Estimate**	3,438,837	persons

Conversion Factors		
Gal/AF	325,851	gal/AF
Days per year	365	day/yr
AFY to gpd conversion	892.74	gpd***/AFY

Water Conserved by Project in 2020 (gpd) [Water Conserved x AFY to gpd conversion]	Water Conserved by Project in 2020 per Person (gpcd) [Reduction from Project ÷ 2020 Population Estimate]	Physical Benefit F Total [Conservation from Project per Person ÷ Reduction Target]
97,271	0.028	0.1%

Comments: *SDCWA. 2011. 2010 Urban Water Management Plan. Table 2-6 (pg. 2-10).
**SDCWA. 2011. 2010 Urban Water Management Plan. Table 1-6 (pg. 1-19).
***Gallons per day = gpd

Regional Demand Management Program Expansion

Table 3-50: Physical Benefit G-Reduce Water Costs to Customers, Including DACs

CPI Cost Index to Convert from 2012 $ to 2014 $*	1.04

Year	Offset Imported Water (AFY) [Benefit A]	Imported Water Costs in 2012 $** ($ per AF)	Imported Water Cost Converted to 2014 Dollars ($ per AF)	Physical Benefit G Total (2014 $) [Imported Water Cost x Offset Imported Water]
2015	70	$1,349	$1,403	$97,958
2016	160	$1,396	$1,452	$231,588
2017	171	$1,445	$1,503	$257,270
2018	179	$1,495	$1,555	$277,993
2019	179	$1,548	$1,610	$287,848
2020	109	$1,602	$1,666	$181,531
2021	39	$1,626	$1,691	$66,150
2022	39	$1,650	$1,716	$67,126
2023	39	$1,675	$1,742	$68,143
2024	39	$1,700	$1,768	$69,160
2025	39	$1,726	$1,795	$70,218
2026	19	$1,751	$1,821	$35,116
2027	8	$1,778	$1,849	$14,059
Total (2016 through 2046)	**1,090 AF**	**$20,741**	**$21,570**	**$1,724,160**

Comments: *Bureau of Labor Statistics. CPI Inflation Calculator. Accessed 24 June 2014. Available: http://www.bls.gov/data/inflation_calculator.htm

**Sweetwater Authority. 2014. WaterSMART: Title XVI Water Reclamation and Reuse Program Technical Proposal. January. Table 3-18 (pg. 44). Converted by multiplying by CPI Cost index.

Regional Demand Management Program Expansion

Table 3-51: Physical Benefit M-Reduce Production of Green Waste

The Case for Sustainable Landscape: Santa Monica Case Study*	
Case Study Area (Square Feet = sqft)	1,900
Turf Green Waste (lbs/year)	647.5
Native Landscape Green Waste (lbs/year)	219
Turf Green Waste (lbs/sqft per year) [Turf Green Waste ÷ Study Area]	0.341
Native Green Waste (lbs/sqft per year) [Native Green Waste ÷ Study Area]	0.115
Project Green Waste Savings [Turf Waste - Native Waste] (lbs/year)	428.5
Green Waste Savings per Unit Area [Project Savings ÷ Case Study Area] (lbs/sqft/year)	0.226

Total Turf Converted as a Result of Project** (sqft)	202,667

Year	% Annual Benefit Realized Based on Turf Replacement Rebate Program Component Phasing	Annual Area of Turf Converted [% Annual Benefit Realized x Total Turf Converted] (sqft)	Green Waste Produced from Turf without Project (lbs/year) [Turf Green Waste x Area to be Converted]	Green Waste Produced from Native Landscape with Project (lbs/year) [Native Green Waste x Area to be Converted]	Physical Benefit M Total [Annual Area Converted x Green Waste Savings per Unit Area] (lbs/year)
2014	0%	0	0	0	0
2015	0%	0	0	0	0
2016	33%	67,556	23,022	7,787	15,236
2017	67%	135,111	46,045	15,573	30,471
2018	100%	202,667	69,067	23,360	45,707
2019	100%	202,667	69,067	23,360	45,707
2020	100%	202,667	69,067	23,360	45,707
2021-2024***	100%	810,668	276,267	93,440	182,827
2025	100%	202,667	69,067	23,360	45,707
2026	67%	135,111	46,045	15,573	30,471
2027	33%	67,556	23,022	7,787	15,236
Total (2014 through 2027)	**-**	**2,026,670 sqft**	**690,668 lbs**	**233,600 lbs**	**457,067 lbs**

Comments: *The Sustainable Sites Initiative. 2009. The Case for Sustainable Landscapes. Pp. 36-37.
**As described in Attachment 4.
***Multiply Annual Total Benefit by (2024 - 2021 + 1) = 4 years.

San Diego Water Use Reduction Program

Table 3-55: Primary Physical Benefit - Decrease Potable Water Demand through Conservation and Recycled Water Use

Pressure Regulator Incentive Pilot Program* (PRIP)	
Valve Savings (gallons/day/valve)	61.5
Number of Valves	5,000
Water Conservation from Valves (AFY)	344.4
Project Life	10 years

Recycled Water Filling Station** (RWFS)	
Number of Meters	6
Number of Trucks per Meter	400
Truck Capacity (gallons/truck/year)	5,000
Recycled Water Use from Filling Station (AFY)	36.8
Project Life	10 years

Project Component	Date Benefits Begin to Accrue***	% Annual Benefit Realized in Year 1†	% Annual Benefit Realized in Year 2†	% Annual Benefit Realized in Year 3†	% Annual Benefit Realized in Years 4 - 10†	% Annual Benefit Realized in Year 11† [100% - % Year 1]	% Annual Benefit Realized in Year 12† [100% - % Year 2]	% Annual Benefit Realized in Year 13† [100% - % Year 3]
PRIP	January 1, 2015	25%	50%	75%	100%	75%	50%	25%
RWFS	July 1, 2016	50%	100%	100%	100%	50%	0%	0%

Project Component	Year 1	Year 2	Year 3	Years 4 - 10	Year 11	Year 12	Year 13
PRIP	2015	2016	2017	2018-2024	2025	2026	2027
RWFS	2016	2017	2018	2019-2025	2026	2027	2028

Year	Conservation from PRIP (AFY) [Water Conservation x % Annual Benefit]	Recycled Water Use from RWFS (AFY) [Recycled Water Use x % Annual Benefit]	Primary Physical Benefit Total (AFY)
2014	0	0	0
2015	86	18	105
2016	172	37	209
2017	258	37	295
2018	344	37	381
2019-2024††	2,067	221	2,288
2025	258	18	277
2026	172	0	172
2027	86	0	86
Total (2014 through 2027)	**3,444 AF**	**368 AF**	**3,813 AF**

Comments: *Valve savings are based on the average between savings determined by City of San Diego Home Pressure Regulation research (Pers. Comm. Joey Jacoby, Conservation Analyst, City of San Diego Public Utilities Department. 2013. Available: 619-533-7548) and savings determined by Watts Regulator Company reports (Watts. 2010. 23 Questions and Answers About Water Pressure Reducing Valves. Pg. 3). Project life and number of valves installed are based on the Work Plan in Attachment 4.

**The program will install one filling station with six meters at the City's North City Water Reclamation Plant ; the City estimates that each meter will serve 400 trucks per year (Kyrsten Burr-Rosenthal, Senior Management Analyst, City of San Diego Public Utilities Department. 2014. Pers. Comm. Available: 619-533-5380). It is estimated that the trucks using the filling station will average 5,000 gals capacity: 7,000 gals for tanker trucks, and 3,000 gals for support trucks (Geosyntec. 2011.Revised Final Engineering Report for Distribution and Use of Reclaimed Water Sunrise Powerlink Project, San Diego County, California. August. Pg. 7).

***Based on Project Schedule.

†The benefits for the project will phase in over time according to the explanation in Program Phasing.

††Multiply Annual Total Benefit by (2024 - 2019 + 1) = 6 years.

San Diego Water Use Reduction Program

Table 3-56: Physical Benefit A-Avoid Imported Water Supply Purchases

PRIP	
Water Conservation from Valves (AFY)	344.4

RWFS	
Recycled Water Use from Filling Station (AFY)	36.8

Project Component	Date Benefits Begin to Accrue	% Annual Benefit Realized in Year 1	% Annual Benefit Realized in Year 2	% Annual Benefit Realized in Year 3	% Annual Benefit Realized in Years 4 - 10	% Annual Benefit Realized in Year 11 [100% - % Year 1]	% Annual Benefit Realized in Year 12 [100% - % Year 2]	% Annual Benefit Realized in Year 13 [100% - % Year 3]
PRIP	January 1, 2015	25%	50%	75%	100%	75%	50%	25%
RWFS	July 1, 2016	50%	100%	100%	100%	50%	0%	0%

Project Component	Year 1	Year 2	Year 3	Years 4 - 10	Year 11	Year 12	Year 13
PRIP	2015	2016	2017	2018-2024	2025	2026	2027
RWFS	2016	2017	2018	2019-2025	2026	2027	2028

Year	Water Conserved by PRIP (AFY) [PRIP Portion of Primary Benefit]	Recycled Water from RWFS (AFY) [RWFS Portion of Primary Benefit]	Water Conserved by PRIP and Recycled Water Used by RWFS (AFY) [Primary Benefit]	Offset Imported Water Supply Purchases as % of Water Produced*	Physical Benefit A Total (AFY)
2014	0	0	0	100%	0
2015	86	18	105	100%	105
2016	172	37	209	100%	209
2017	258	37	295	100%	295
2018	344	37	381	100%	381
2019-2024**	2,067	221	2,288	100%	2,288
2025	258	18	277	100%	277
2026	172	0	172	100%	172
2027	86	0	86	100%	86
Total (2014 through 2027)	**3,444 AF**	**368 AF**	**16,158 AF**	**-**	**3,813 AF**

Comment: *Per SDCWA's demand project methods described in its UWMP, the City of San Diego only purchases water from SDCWA to meet demand that cannot be met by local supplies (SDCWA. 2011. 2010 Urban Water Management Plan. Pg. 2-13.). Although SDCWA and its member agencies use a mix of imported water and local sources to supply their customers, imported water is more expensive to provide and is considered the marginal water source (Equinox Center. 2010. San Diego's Water Sources: Assessing the Options, July 2010. Pg. 10), thus, all water conservation and new supplies in the Region will be used to offset purchase of imported water supplies.

**Multiply Annual Total Benefit by (2024 - 2019 + 1) = 6 years.

San Diego Water Use Reduction Program

Table 3-57: Physical Benefit B-Reduce Demand for Net Diversions from the Bay-Delta

State Water Project (SWP) Proportion of Imported Supplies*	
2014*	**15%**
2015*	**15%**
2016 - 2090**	**67%**

Year	Offset Imported Water Supply Purchases (AFY) [Benefit A]	SWP Offset as % of Water Produced	Physical Benefit B Total (AFY) [Offset Imported Water x SWP Proportion of Imported Supplies]
2014	0	15%	0
2015	105	15%	16
2016	209	67%	139
2017	295	67%	197
2018	381	67%	254
2019-2024	2,288	67%	1,525
2025	277	67%	184
2026	172	67%	115
2027	86	67%	57
Total (2014 through 2027)	**3,813 AF**	**-**	**2,488 AF**

Comment: *During the drought, 15% of SDCWA's imported supplies are anticipated to be sourced from the SWP (Pers. Comm. Tim Bombardier, SDCWA, Senior Water Resources Specialist. June 27, 2014. Available: 858-522-6600.).
**In normal years, SDCWA's imported water mix is approximately two-thirds SWP and one-third Colorado River water (Equinox Report. 2010. San Diego's Water Sources: Assessing the Options. July. Pg. 8).

San Diego Water Use Reduction Program

Table 3-58: Physical Benefit C-Local Supply Development to Decrease Vulnerabilities

PRIP		RWFS	
Water Conservation from Valves (AFY)	**344.4**	**Recycled Water Use from Filling Station (AFY)**	**36.8**

Year	Conserved and Recycled Water from Project (AFY) [Primary Benefit]	% of Water Conserved and Recycled Water Used by Project that Develops Local Supply*	Physical Benefit C Total (AFY) [Water from Project x % Local Supply Development]
2014	0	100%	0
2015	105	100%	105
2016	209	100%	209
2017	295	100%	295
2018	381	100%	381
2019-2024**	2,288	100%	2,288
2025	277	100%	277
2026	172	100%	172
2027	86	100%	86
Total (2014 through 2027)	3,813 AF	**-**	**3,813 AF**

Comment: *All water produced by this project constitutes local supply development to reduce the Region's vulnerability to supply interruptions (SDCWA. 2011. 2010 Urban Water Management Plan. Pg. 9-9.).
**Multiply Annual Total Benefit by (2024 - 9 + 1) = 6 years.

San Diego Water Use Reduction Program

Table 3-59: Physical Benefit D-Reduce Net Production of Greenhouse Gases (GHGs)

Energy Intensity of Imported Water* (MWh/AF)	**2.65**	**Average GHG Emissions for Energy Use in California** (MT CO2e/MWh)**	**0.341**

Use	Energy (MWh/AF)	Project Offset [Energy Imported Water - Energy Project] (MWh/AF)	Annual GHG Emissions Savings of Project per AF [Project Offset x Average Carbon Emissions] (MT CO2/AF)
Energy Intensity of Water Conservation***	**0**	**2.65**	**0.904**
Energy Intensity of Recycled Water*	**0.8**	**1.85**	**0.631**

Year	Offest Imported Water (AFY) [Benefit A]	GHG Emissions of Imported Water [(PRIP + RWFS) x Energy Imported Water x Average Carbon Emissions] (MT CO2)	Water Conserved by PRIP (AFY) [PRIP Portion of Primary Benefit]	GHG Emissions from PRIP Component (MT CO2e) [PRIP x Energy for Conservation x CA GHG Emissions]	Recycled Water from RWFS (AFY) [RWFS Portion of Primary Benefit]	GHG Emissions from RWFS Component (MT CO2e) [RWFS x Energy for Recycled Water x CA GHG Emissions]	GHG Emissions of Project (MT CO2e) [PRIP GHG + RWFS PRP]	Physical Benefit D Total (MT CO2e) [GHG Imported Water - GHG Project]
2014	0	0	0	0	0	0	0	0
2015	105	94	86	0	18	5	5	89
2016	209	189	172	0	37	10	10	179
2017	295	267	258	0	37	10	10	257
2018	381	345	344	0	37	10	10	334
2019-2024	2,288	2,067	2,067	0	221	60	60	2,007
2025	277	250	258	0	18	5	5	245
2026	172	156	172	0	0	0	0	156
2027	86	78	86	0	0	0	0	78
Total (2014 through 2027)	**3,813 AF**	**3,445 MT CO2e**	**3,444 AF**	**MT CO2e**	**368 AF**	**100 MT CO2e**	**100 MT CO2e**	**3,345 MT CO2e**

Comments: *Equinox Center. 2010. San Diego's Water Sources: Assessing the Options. July. Table 1a (pg. 10).
**Average of greenhouse gas emissions from CA energy production and imported energy (CEC. 2013. California Electrical Energy Generation Total Production, by Resource Type (Gigawatt hours). Accessed 24 June 2014. Available: http://energyalmanac.ca.gov/electricity/electricity_generation.html) and (U.S. Environmental Protection Agency (USEPA). 2014. eGRID 9th edition Version 1.0 Year 2010 Summary Tables. February. Available: http://www.epa.gov/cleanenergy/energy-resources/egrid/)
***Conserving water will offset demand for imported water, energy intensity of 0 MWh/AF, thereby saving the energy required to convey and treat the water.

San Diego Water Use Reduction Program

Table 3-60: Physical Benefit E-Avoid Social Costs of Greenhouse Gases (GHGs)

Social Cost of GHGs ($/MT CO2e)*
$24.55

Year	GHG Emissions Reduction from Project (MT CO2e) [Benefit D]	Physical Benefit E Total [GHG Emissions Reduction from Project x Social Cost of GHGs]
2014	0	$0
2015	89	$2,196
2016	179	$4,391
2017	257	$6,301
2018	334	$8,212
2019-2024	2,007	$49,270
2025	245	$6,016
2026	156	$3,821
2027	78	$1,910
Total (2014 through 2027)	**3,345 MT CO2e**	**$82,117**

Comments: *Social Cost of Carbon (Interagency Working Group on Social Cost of Carbon, United States Government. 2010. Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866. February. Table 4 (pg. 28)) converted to 2014 dollars from 2007 dollars (U.S. Bureau of Labor Statistics. CPI Inflation Calculator. Available: http://www.bls.gov/data/inflation_calculator.htm)

San Diego Water Use Reduction Program

Table 3-61: Physical Benefit F-Contribute to 20x2020 Goals

City of San Diego Base Numbers		
Potable Water Offset by Project in 2020 through Conservation and Recycled Water (AF) [Primary Benefit]	381	AFY
20x2020 Goal*	142	gallons per capita per day (gpcd)
20x2020 Baseline [Goal ÷ 0.8]	177.5	gpcd
Reduction Target [20x2020 Baseline - 20x2020 Goal]	35.5	gpcd
2020 Population Estimate**	1,483,986	persons

Conversion Factors		
Gal/AF	325,851	gal/AF
Days per year	365	day/yr
AFY to gpd conversion	892.74	gpd***/AFY

Potable Water Reduction from Project (gpd) [Primary Physical Benefit x AFY to gpd conversion]	Potable Water Reduction in 2020 from Project per Person (gpcd) [Reduction from Project ÷ 2020 Population Estimate]	Physical Benefit F Total [Potable Water Reduction from Project per Person ÷ Reduction Target]
340,376	0.229	0.6%

Comments: *City of San Diego. 2011. 2010 Urban Water Management Plan. Pg. 3-10.
**City of San Diego. 2011. 2010 Urban Water Management Plan. Table 3-1 (pg. 3-1).
***Gallons per day = gpd

San Diego Water Use Reduction Program

Table 3-62: Physical Benefit G-Reduce Water Costs to Customers, Including DACs

Project Component	2015	2016	2017	2018-2024	2025	2026	2027
PRIP	25%	50%	75%	100%	75%	50%	25%

CPI Cost Index* to Convert from 2012 $ to 2014 $	1.04

Year	Offset Imported Water from Conservation** (AFY) [PRIP Portion of Primary Benefit]	Imported Water Costs in 2012 $ (2012 $/AF)	2012 Imported Water Cost Converted to 2014 $*** ($ per AF) [Imported Water Costs x CPI Conversion Factor]	Physical Benefit G Total in 2014 $ ($/AF) [Imported Water Cost x Offset Imported Water from Conservation]
2015	86	$1,349	$1,403	$120,810
2016	172	$1,396	$1,452	$250,039
2017	258	$1,445	$1,503	$388,223
2018	344	$1,495	$1,555	$535,541
2019	344	$1,548	$1,610	$554,527
2020	344	$1,602	$1,666	$573,871
2021	344	$1,626	$1,691	$582,468
2022	344	$1,650	$1,716	$591,066
2023	344	$1,675	$1,742	$600,021
2024	344	$1,700	$1,768	$608,977
2025	258	$1,726	$1,795	$463,718
2026	172	$1,751	$1,821	$313,623
2027	86	$1,778	$1,849	$159,229
Total (2016 through 2046)	**3,444 AF**	**$20,741**	**$21,571**	**$5,742,112**

Comments: *Bureau of Labor Statistics. CPI Inflation Calculator. Accessed 24 June 2014. Available: http://www.bls.gov/data/inflation_calculator.htm

**Although recycled water is cheaper than potable - $0.80 per HCF for recycled water compared to $4.014 per HCF for potable water in December 2011 (City of San Diego. Recycled Water Rate – Future Recycled Water Rate Increase. Accessed July 2, 2014. Available: http://www.sandiego.gov/water/recycled/recycledrates/rateincrease.shtml) – cost savings to customers using the RWFSs are not included in this benefit analysis because use of recycled water available only at the North City WRF may incur additional costs that would have been avoided if customers were able to use potable water, therefore only PRIP water savings were included in this analysis.

***Sweetwater Authority. 2014. WaterSMART: Title XVI Water Reclamation and Reuse Program Technical Proposal. January. Table 3-18 (pg. 44). Converted by multiplying by CPI Cost index.

San Diego Water Use Reduction Program

Table 3-63: Physical Benefit H-Reduce Discharge to Outfall

Project Component	2016	2017	2018	2019-2025	2026	2027	2028
RWFS	50%	100%	100%	100%	50%	0%	0%

Year	Recycled Water Use from Project (AFY) [RWFS Portion of Primary Benefit]	Reduced Discharge to Outfall as % of Recycled Water Used**	Physical Benefit H Total (AFY) [Recyceld Water from Project x % Outfall]
2014	0	100%	0
2015	18	100%	18
2016	37	100%	37
2017	37	100%	37
2018	37	100%	37
2019-2024	221	100%	221
2025	18	100%	18
2026	0	100%	0
2027	0	100%	0
Total (2014 through 2027)	**368 AF**	**-**	**368 AF**

Comment: *The PRIM component will conserve indoor water use, which will also reduce flows to the Point Loma Wastewater Treatment Plant (PLWTP), but it is not possible to determine how much of the water conserved by the PRV component will be outdoor water use and how much is indoor, therefore, the PRIM component is not included in this analysis.
**Recycled water is sourced from City of San Diego treated wastewater, which is discharged to the ocean through PLWTP (City of San Diego. 2012. San Diego Recycled Water Study. May. Pg. 2-2.); therefore any increase in recycled water use will reduce the amount of wastewater discharged through the ocean outfall by an equal volume.

Rincon Customer-Driven Demand Management Program

Table 3-69: Primary Physical Benefit – Reduce Water Demand through Conservation

Project Life*	**20 years**
Project Completion	**April 2015**
Benefits Accrue	**October 16, 2015 - October 15, 2035**
Annual Total Benefit (AFY)**	**400**
Potable Water Conserved by Project* (AFY)**	**300**
Recycled Water Conserved by Project* (AFY)**	**100**

Project Phasing	
2016 [2.5 months ÷ 12 months]	**21%**
2017 - 2045	**100%**
2046 [9.5 months ÷ 12 months]	**79%**

Year	Project Phasing	Potable Water Conserved by Project (AFY) [Potable Water Conserved x Project Phasing]	Recycled Water Conserved by Project (AFY) [Recycled Water x Project Phasing]	Primary Physical Benefit Total (AFY)
2014	0%	0	0	0
2015	21%	62.5	21	83
2016	100%	300	100	400
2017 - 2034[†]	100%	5,400	1,800	7,200
2035	79%	237.5	79	317
Total (2014 through 2035)	**-**	**6,000 AF**	**2,000 AF**	**8,000 AF**

Comments: *Based on advance metering infrastructure (AMI) product warranty (Pers. Comm. Julia Escamilla, Public Services Information Officer, Rincon del Diablo MWD. July 15, 2014. Available: 760-745-522x503.).

**A similar pilot program was implemented by East Bay Municipal Utility District, which found that water use decreased by 3.5% - 6.5% (EBMUD. 2013. Evaluation of East Bay Municipal Utility District's Pilot of WaterSmart Home Water Reports. December. Pg. 56.). By applying the average of this range (5%) to Rincon's FY 2013-2014 and 2014-2015 water sales, 10,020 AFY (Rincon. 2013. Rincon del Diablo Municipal Water District Budget: Fiscal Years 2013-14 and 2014-15. Pp. 4 - 5.), Rincon can expect 501 AFY reduction in demand, but for the purpose of this analysis, this has been revised down to 400 AFY to be conservative.

***The anticipated savings expected to be achieved is a reduction in potable used of 300 AFY and a reduction in recycled water use of 100 AFY (Pers. Comm. Julia Escamilla, Public Services Information Officer, Rincon del Diablo MWD. May 28, 2014. Available: 760-745-522x503.).

[†]Multiply Annual Total Benefit by (2034 - 2017 + 1) = 18 years.

Rincon Customer-Driven Demand Management Program

Table 3-70: Physical Benefit A-Avoid Imported Water Supply Purchases

Project Life	**20 years**
Project Completion	**April 2015**
Benefits Accrue	**October 16, 2015 - October 15, 2035**
Annual Total Benefit (AFY)**	**400**
Potable Water Conserved by Project* (AFY)**	**300**
Recycled Water Conserved by Project* (AFY)**	**100**

Project Phasing	
2016 [2.5 months ÷ 12 months]	**21%**
2017 - 2045	**100%**
2046 [9.5 months ÷ 12 months]	**79%**

Year	Potable Water Conserved by Project (AFY) [Potable Component of Primary Benefit]	Offset Imported Water Supply Purchases as % Potable Water Conservation*	Offset Imported Water from Potable Component (AFY) [Potable Conserved x % Offset Imported from Potable]	Recycled Water Conserved by Project (AFY) [Recycled Water Component of Primary Benefit]	Offset Imported Water Supply Purchases as % of Recycled Water Conservation**	Offset Imported Water from Recycled Water Component (AFY) [Recycled Conserved x % Offset Imported from Recycled]	Physical Benefit A Total (AFY) [Imported Offset by Potable + Imported Offset by Recycled]
2014	0	100%	0	0	0%	0	0
2015	62.5	100%	63	21	0%	0	63
2016	300	100%	300	100	0%	0	300
2017 - 2034***	5,400	100%	5,400	1,800	0%	0	5,400
2035	237.5	100%	238	79	0%	0	238
Total (2014 through 2035)	**6,000 AF**	**-**	**6,000 AF**	**2,000 AF**	**-**	**0 AF**	**6,000 AF**

Comment: *Rincon purchases the entirety of its potable water from SDCWA. SDCWA supplies are purchased only to meet demand that cannot be met with local supplies by member agencies, per in SDCWA's demand projection methods described in its UWMP (SDCWA. 2011. 2010 Urban Water Management Plan. Pg. 2-13.), thus, any conserved water by the project will be used to offset purchase of imported water supplies.
**Rincon purchases its recycled water from the City of Escondido's HARRF (Rincon. 2014. 2013 Urban Water Management Plan. February. Pp. 7-8.). At the moment, there is no additional recycled water demand within Rincon's service area that cannot be met with its current recycled water supply, therefore, there are no anticipated potable water offsets from the conserved recycled water from the project, and thus no imported water offsets from this portion of the project's primary benefit.
***Multiply Annual Total Benefit by (2034 - 2017 + 1) = 18 years.

Rincon Customer-Driven Demand Management Program

Table 3-71: Physical Benefit B-Reduce Demand for Net Diversions from the Bay-Delta

Project Life*	**20 years**
Project Completion	**April 2015**
Benefits Accrue	**October 16, 2015 - October 15, 2035**

State Water Project (SWP) Proportion of Imported Supplies	
2014*	**15%**
2015*	**15%**
2016 - 2046**	**67%**

Year	Offset Imported Water Supply Purchases (AFY) [Benefit A]	SWP Proportion	Physical Benefit B Total (AFY) [Offset Imported Water x SWP Proportion]
2014	0	15%	0
2015	63	15%	9
2016	300	67%	200
2017 - 2034***	5,400	67%	3,600
2035	238	67%	158
Total (2014 through 2035)	**6,000 AF**	**-**	**3,968 AF**

Comment: During the drought, 15% of SDCWA's imported supplies are anticipated to be sourced from the SWP (Pers. Comm. Tim Bombardier, SDCWA, Senior Water Resources Specialist. June 27, 2014. Available: 858-522-6600.).

**In normal years, SDCWA's imported water mix is approximately two-thirds SWP and one-third Colorado River water (Equinox Report. 2010. San Diego's Water Sources: Assessing the Options. July. Pg. 8).

***Multiply Annual Total Benefit by (2034 - 2017 + 1) = 18 years.

Rincon Customer-Driven Demand Management Program

Table 3-72: Physical Benefit C-Local Supply Development to Decrease Vulnerabilities

Project Life	**20 years**
Project Completion	**April 2015**
Benefits Accrue	**October 16, 2015 - October 15, 2035**
Annual Total Benefit (AFY)**	**400**
Potable Water Conserved by Project (AFY)	**300**
Recycled Water Conserved by Project (AFY)	**100**

Project Phasing	
2016 [2.5 months ÷ 12 months]	**21%**
2017 - 2045	**100%**
2046 [9.5 months ÷ 12 months]	**79%**

Year	Potable Water Conserved by Project (AFY) [Potable Component of Primary Benefit]	Local Supply Development as % Potable Water Conservation*	Local Development through Potable Conservation (AFY) [Potable Water Conserved x % Potable Local Development]	Recycled Water Conserved by Project (AFY) [Recycled Component of Primary Benefit]	Local Supply Development as % of Recycled Water Conservation**	Local Development through Recycled Conservation (AFY) [Recycled Water Conserved x % Recycled Local Development]	Physical Benefit C Total (AFY) [Potable Local Development + Recycled Local Development]
2014	0	100%	0	0	0%	0	0
2015	63	100%	63	21	0%	0	63
2016	300	100%	300	100	0%	0	300
2017 - 2034***	5,400	100%	5,400	1,800	0%	0	5400
2035	238	100%	238	79	0%	0	238
Total (2014 through 2035)	6,000 AF	**-**	**6,000 AF**	**2,000 AF**	**-**	**0 AF**	**6,000 AF**

Comment: *All potable water conserved by this project constitutes local supply development to reduce the Region's vulnerability to supply interruptions (SDCWA. 2011. 2010 Urban Water Management Plan. Pg. 9-9.).
**Recycled water is not being counted towards local supply development because Rincon is able to meet all of its existing recycled water demands with current supplies. For this reason, recycled water conserved by this program will not be used to offset potable (and therefore imported) water demand. Further, recycled water is a drought-proof local supply, and does not represent a vulnerable supply.
***Multiply Annual Total Benefit by (2034 - 2017 + 1) = 18 years.

Rincon Customer-Driven Demand Management Program

Table 3-73: Physical Benefit D-Reduce Net Production of Greenhouse Gases (GHGs)

Energy Intensity of Imported Water* (MWh/AF)	**2.65**	**Average Carbon Emissions for California** (MT CO2e/MWh)**	**0.341**
Energy Intensity of Recycled Water* (MWh/AF)	**0.8**	**Energy Intensity of Water Conservation (MWh/AF)**	**0**

Year	Imported Water Offset by Potable Component of Project (AFY) [Potable Component of Benefit A]	GHG Emissions of Imported Water offset by Potable (MT CO2e/year) [Imported Offset by Potable x Energy Intensity of Imported]	Potable Water Conservation (AFY) [Potable Component of Primary Benefit]	GHG Emissions of Potable Water Conservation (MT CO2e/year) [Potable Conservation x Energy Intensity of Conservation] (MT CO2)	Imported Water Offset by Recycled Component of Project (AFY) [Recycled Component of Benefit A]	GHG Emissions of Imported Water offset by Recycled (MT CO2e/year) [Imported Offset by Recycled x Energy Intensity of Imported]	Recycled Water Conservation (AFY) [Recycled Component of Primary Benefit]	GHG Emissions of Offset Recycled Water (MT CO2e/year) [Recycled x Energy Intensity of Recycled]	GHG Offset Imported (MT CO2e) [GHG Offset Imported from Potable + GHG Offset Imported from Recycled]	Physical Benefit D Total [Offset Imported GHGs + Offest Recycled Water GHGs] (MT CO2)
2014	0	0	0	0	0	0	0	0	0	0
2015	63	56	63	0	0	0	21	6	56	62
2016	300	271	300	0	0	0	100	27	271	298
2017 - 2034	5,400	4,880	5,400	0	0	0	1,800	491	4,880	5,371
2035	238	215	238	0	0	0	79	22	215	236
Total (2014 through 2035)	**6,000 AF**	**5,422**	**6,000 AF**	**0 MT CO2e**	**0 AF**	**0 MT CO2e**	**2,000 AF**	**546 MT CO2e**	**5,422 MT CO2e**	**5,968 MT CO2e**

Comments: *Equinox Center. 2010. San Diego's Water Sources: Assessing the Options. July. Table 1a (pg. 10).
**Average of greenhouse gas emissions from CA energy production and imported energy (CEC. 2013. California Electrical Energy Generation Total Production, by Resource Type (Gigawatt hours). Accessed 24 June 2014. Available: http://energyalmanac.ca.gov/electricity/electricity_generation.html) and (U.S. Environmental Protection Agency (USEPA). 2014. eGRID 9th edition Version 1.0 Year 2010 Summary Tables. February. Available: http://www.epa.gov/cleanenergy/energy-resources/egrid/)
***Conserving water will offset demand for imported water or recycled water, energy intensity of 0 MWh/AF, thereby saving the energy required to convey and/or treat the water.

Rincon Customer-Driven Demand Management Program

Table 3-74: Physical Benefit E-Avoid Social Costs of Greenhouse Gases

Social Cost of Greenhouse Gases ($/MT CO2e)*
$24.55

Year	GHG Emissions Reduction from Project (MT CO2e/year) [Benefit D]	Physical Benefit E Total [GHG Emissions Reduction from Project x Social Cost of GHGs]
2014	0	$0
2015	62	$1,526
2016	298	$7,325
2017 - 2034	5,371	$131,852
2035	236	$5,799
Total (2014 through 2035)	**5,968 MT CO2e**	**$146,502**

Comments: *Social Cost of Carbon (Interagency Working Group on Social Cost of Carbon, United States Government. 2010. Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866. February. Table 4 (pg. 28)) converted to 2014 dollars from 2007 dollars (U.S. Bureau of Labor Statistics. CPI Inflation Calculator. Available: http://www.bls.gov/data/inflation_calculator.htm)

Rincon Customer-Driven Demand Management Program

Table 3-75: Physical Benefit F-Contribute to 20x2020 Goals

Rincon Base Numbers		
Potable Water Conservation in 2020 [Potable Component of Primary Benefit]	300	AFY
20x2020 Goal*	218	gallons per capita per day (gpcd)
20x2020 Baseline [Goal ÷ 0.8]	272.5	gpcd
Reduction Target [20x2020 Baseline - 20x2020 Goal]	54.5	gpcd
2020 Population Estimate**	7,390	persons

Conversion Factors		
Gal/AF	325,851	gal/AF
Days per year	365	day/yr
AFY to gpd conversion	892.74	gpd***/AFY

Potable Use Reduction in 2020 from Project (gpd) [Potable Primary Benefit x AFY to gpd conversion]	Potable Use Reduction in 2020 from Project per Person (gpcd) [Reduction from Project ÷ 2020 Population Estimate]	Physical Benefit F Total [Reduction from Project per Person ÷ Reduction Target]
267,823	36.2	66%

Comments: *Rincon. 2014. 2013 Urban Water Management Plan. Pg. 13
**Rincon. 2014. 2013 Urban Water Management Plan. Table 11 (pg. 13).
***Gallons per day = gpd

Rincon Customer-Driven Demand Management Program

Table 3-76: Physical Benefit G-Reduce Water Costs to Customers, Including DACs

CPI Cost Index* Conversion from 2012 $ to 2014 $	1.04

Year	Imported Water Offset by Project (AFY) [Benefit A]	Imported Water Costs*** (2012 $/AF)	Imported Treated Water Cost Converted to 2014 Dollars ($ per AF) [Imported Water Costs x CPI Conversion Factor]	Physical Benefit G Total in 2014 Dollars [Imported Water Cost in 2014 $ x Imported Water Offset] ($ per AF)
2015	63	$1,349	$1,403	$87,664
2016	300	$1,396	$1,452	$435,552
2017	300	$1,445	$1,503	$450,840
2018	300	$1,495	$1,555	$466,440
2019	300	$1,548	$1,610	$482,976
2020	300	$1,602	$1,666	$499,824
2021	300	$1,626	$1,691	$507,312
2022	300	$1,650	$1,716	$514,800
2023	300	$1,675	$1,742	$522,600
2024	300	$1,700	$1,768	$530,400
2025	300	$1,726	$1,795	$538,512
2026	300	$1,751	$1,821	$546,312
2027	300	$1,778	$1,849	$554,736
2028	300	$1,804	$1,876	$562,848
2029	300	$1,831	$1,904	$571,272
2030	300	$1,859	$1,933	$580,008
2031	300	$1,887	$1,962	$588,744
2032	300	$1,915	$1,992	$597,480
2033	300	$1,944	$2,022	$606,528
2034	300	$1,973	$2,052	$615,576
2035	238	$2,003	$2,083	$494,741
Total (2016 through 2046)	**6,000 AF**	**$35,957**	**$37,395**	**$10,755,165**

Comments: *Bureau of Labor Statistics. CPI Inflation Calculator. Accessed 24 June 2014. Available: http://www.bls.gov/data/inflation_calculator.htm

**The project will offset imported water supply purchases (Benefit A, Table 3-72), avoiding the cost of imported water. Additional water savings from conservation of recycled water will be realized by recycled water customers, however, projected costs for recycled water is not available for the project life, therefore these benefits are not included in this calculation.

***Sweetwater Authority. 2014. WaterSMART: Title XVI Water Reclamation and Reuse Program Technical Proposal. January. Table 3-18 (pg. 44). Converted by multiplying by CPI Cost index.

Regional Emergency Storage and Conveyance System Intertie Optimization

Table 3-79: Primary Physical Benefit - Increase Surface Water Capture for Potable Use

Annualized Benefit (AFY)	
Short Term*	3,889
Long Term**	5,377

Project Phase	Date Benefits Begin to Accrue***	% Annual Benefit Realized in 2017†	% Annual Benefit Realized in 2018†	% Annual Benefit Realized in Year 2019 - 2036†
Short Term	August 2017	100%	0%	0%
Long Term	January 2018	0%	100%	100%

Year	Short Term [Annualized Benefit x % Annual Benefit] (AFY)	Long Term [Annualized Benefit x % Annual Benefit] (AFY)	Primary Physical Benefit Total (AFY)
2017	3,889	0	3,889
2018	0	5,377	5,377
2019-2036††	0	96,786	96,786
Total (2015 through 2036)	**3,889 AF**	**102,163 AF**	**106,052 AF**

Comments: *Production of new potable supply under short term conditions was derived from calculations based on historical data from the City of San Diego (Water Authority. 2008. Lake Hodges Projects Reservoir Regulation Manual. April. Page 6-31-2), knowledge of the configuration and constraints in the system (Pers. Comm. Jeffery Pasek. Watershed Manager, City of San Diego. Pers. Comm. "Hodges Hydrology through April 2014" excel file. June 2, 2014. Available: 619-533-7599), and modeling results from the City of San Diego SDSIM model. The short-term benefit was based on current reservoir conditions, and projected similar conditions of natural inflows and outflows in the near future. An initial storage of 11,613 AF results in the short term benefit of 3,889 AF after accounting for dead storage in the reservoir, rights to the water from other agencies, pumping capacity to serve the water and elevation constraints to pump.

**Long-term benefits were estimated as 5,377 AFY, based on a calibrated model of Hodges Reservoir from the City's long-term water supply planning tool (SDSIM model), dynamically simulating the reservoir operation with and without the HOS project under multiple hydrology conditions. This model is discussed in detail in the Background for Benefits Claimed.

***Based on Project Schedule.

†The benefits for the project will occur over a 2 month period each year in the Short Term phase and over a 4 month period each year in the Long-Term phase according to the explanation in Program Phasing.

††Multiply Annual Total Benefit by (2036 - 2019 + 1) = 18 years.

Regional Emergency Storage and Conveyance System Intertie Optimization

Table 3-80: Physical Benefit A-Avoid Imported Water Supply Purchases

Annualized Benefit (AFY)	
Short Term	3,889
Long Term	5,377

Project Phase	Date Benefits Begin to Accrue	% Annual Benefit Realized in 2017	% Annual Benefit Realized in 2018	% Annual Benefit Realized in Year 2019 - 2036
Short Term	August 2017	100%	0%	0%
Long Term	January 2018	0%	100%	100%

Year	Water from Project [Primary Benefit] (AFY)	Offset Imported Water Supply Purchases as % of Water Captured*	Physical Benefit A Total (AFY)
2017	3,889	100%	3,889
2018	5,377	100%	5,377
2019-2036**	96,786	100%	96,786
Total (2015 through 2036)	**106,052 AF**	**-**	**106,052 AF**

Comments: *Per SDCWA's demand project methods described in its UWMP, the City of San Diego only purchases water from SDCWA to meet demand that cannot be met by local supplies (SDCWA. 2011. 2010 Urban Water Management Plan. Pg. 2-13.). Although SDCWA and its member agencies use a mix of imported water and local sources to supply their customers, imported water is more expensive to provide and is considered the marginal water source (Equinox Center. 2010. San Diego's Water Sources: Assessing the Options, July 2010. Pg. 10), thus, all water conservation and new supplies in the Region will be used to offset purchase of imported water supplies.
**Multiply Annual Total Benefit by (2036 - 2019 + 1) = 18 years.

Regional Emergency Storage and Conveyance System Intertie Optimization

Table 3-81: Physical Benefit B-Reduce Demand for Net Diversions from the Bay-Delta

Annualized Benefit (AFY)	
Short Term	3,889
Long Term	5,377

State Water Project (SWP) Proportion of Imported Supplies*	
2014*	15%
2015*	15%
2016 - 2037**	67%

Project Phase	Date Benefits Begin to Accrue	% Annual Benefit Realized in 2017	% Annual Benefit Realized in 2018	% Annual Benefit Realized in Year 2019 - 2036
Short Term	August 2017	100%	0%	0%
Long Term	January 2018	0%	100%	100%

Year	Offset Imported Water [Benefit A] (AFY)	SWP Offset as % of Water Produced	Physical Benefit B Total [Offset Imported Water x SWP Proportion of Imported Supplies] (AFY)
2017	3,889	67%	2,593
2018	5,377	67%	3,585
2019-2036	96,786	67%	64,524
Total (2015 through 2036)	**106,052 AF**	**-**	**70,701 AF**

Comment: *During the drought, 15% of SDCWA's imported supplies are anticipated to be sourced from the SWP (Pers. Comm. Tim Bombardier, SDCWA, Senior Water Resources Specialist. June 27, 2014. Available: 858-522-6600.).
**In normal years, SDCWA's imported water mix is approximately two-thirds SWP and one-third Colorado River water (Equinox Report. 2010. San Diego's Water Sources: Assessing the Options. July. Pg. 8).

Regional Emergency Storage and Conveyance System Intertie Optimization

Table 3-82: Physical Benefit C-Local Supply Development to Decrease Vulnerabilities

Annualized Benefit (AFY)	
Short Term	**3,889**
Long Term	**5,377**

Project Phase	Date Benefits Begin to Accrue	% Annual Benefit Realized in 2017	% Annual Benefit Realized in 2018	% Annual Benefit Realized in Year 2019 - 2036
Short Term	**August 2017**	**100%**	**0%**	**0%**
Long Term	**January 2018**	**0%**	**100%**	**100%**

Year	Water Captured by Project [Primary Benefit] (AFY)	% of Water Captured by Project that Develops Local Supply*	Physical Benefit C Total [Water from Project x % Local Development] (AFY)
2017	3,889	100%	3,889
2018	5,377	100%	5,377
2019-2036**	96,786	100%	96,786
Total (2015 through 2036)	**106,052 AF**	**-**	**106,052 AF**

Comment: *All water captured and made available by this project constitutes local supply development to reduce the Region's vulnerability to supply interruptions (SDCWA. 2008. Strategic Plan. April. Pg. 9.).
**Multiply Annual Total Benefit by (2036 - 2019 + 1) = 18 years.

Regional Emergency Storage and Conveyance System Intertie Optimization

Table 3-83: Physical Benefit D-Reduce Net Production of Greenhouse Gases (GHGs)

Horsepower Conversion Factor	1 horsepower (hp) = 746 watts = 0.746 kw = 3,960 gpm/ft
Horsepower to MWh	1 hp = 746 watts = 0.746 kw = 0.000746

Project Phase	Date Benefits Begin to Accrue***	% Annual Benefit Realized in 2017†	% Annual Benefit Realized in 2018†	% Annual Benefit Realized in Year 2019 - 2036†
Short Term	August 2017	100%	0%	0%
Long Term	January 2018	0%	100%	100%

Energy Use Calculations			
Speece Cone*			
Average Dissolved Oxygen Demand (Tons of Dissolved Oxygen per Day (TDO))	1.8	Energy Required per Unit TDO (kWh/TDO)	300
Daily Energy Use (kWh/day)	540	Annual Energy Use (MWh/year)	197
Pumping Energy**			
Pump Efficiency	80%	Short Term	Long Term
Total System Head (feet)	997		
Flow [Annualized Primary Benefit] (AFY)		3,889	5,377
Pumping Term (months)		2	4
Monthly Flow [Flow ÷ Pumping Term] (AF per month)		1,945	1,344
Pump Flow (gallons per minute)		14,468	10,002
Annual Pumping Energy Use [(Pump Flow x Head) ÷ (Efficiency x HP Conversion Factor)] (horsepower)		4,553	3,148
Annual Pumping Energy Use (MWh/year)		4,957	6,854
Total Energy Use			
Annual System Energy Use [Speece Cone + Pumping] (MWh/year)		5,154	7,051

Energy Intensity of Imported Water*** (MWh/AF)	2.65	Average Carbon Emissions for Energy Use in California† (MT CO2e/MWh)	0.341

Year	Offset Imported Water [Benefit A] (AFY)	GHG Emissions of Imported Water [Offset Imported Water x Energy Imported Water x Average Carbon Emissions] (MT CO2e)	Total GHG Emissions Short Term [Short Term Phasing x Short Term Annual Energy Use x Average Carbon Emissions] (MT CO2e)	Total GHG Emissions Long Term [Long Term Phasing x Long Term Annual Energy Use x Average Carbon Emissions] (MT CO2e)	Total GHG of Project [GHG Short Term + GHG Long Term] (MT CO2e)	Physical Benefit D Total [Imported Water - (Short Term + Long Term)] (MT CO2e)
2017	3,889	3,514	1,758	0	1,758	1,757
2018	5,377	4,859	0	2,404	2,404	2,455
2019-2036††	96,786	87,461	0	43,279	43,279	44,182
Total (2015 through 2036)	**106,052 AF**	**95,834 MT CO2e**	**1,758 MT CO2e**	**45,683 MT CO2e**	**47,441 MT CO2e**	**48,393 MT CO2e**

Comments: *The Lake Hodges Reservoir Water Quality Assessment Draft Conceptual Report states that the energy requirement for the Speece Cone is dependent on the amount of DO delivered by the cone per day, the midpoint in DO from the cone is equal to 1.8 TDO/day (City of San Diego Public Utilities Department. 2014. Lake Hodges Reservoir Water Quality Assessment Draft Conceptual Report. March 19. Pg. 4-4.).
**Pumping energy demands will vary in the system depending on the water levels in Lake Hodges and Olivenhain Reservoir. High operating limits: 314 ft. in Lake Hodges and 1,078 ft. in Olivenhain Reservoir; low operating limits: 290 ft. in Lake Hodges and 1,040 ft. in Olivenhain Reservoir. This analysis uses the average elevation difference of the mid-point of high and low operating limits, which corresponds to 757 ft (SDCWA. 2008. Lake Hodges Projects Reservoir Regulation Manual. April. Pg. 6-7). In addition to the pumping required between the reservoirs, additional pumping is required to feed Olivenhain Reservoir water into Pipeline 5. The pump station at Olivenhain serving this purpose has a total dynamic head of 240 ft (SDCWA. 2013. Capital Improvement Program. Water System Planning Schematic. Aqueducts, Flow Control Facilities and Gradient Control Structures. April.), giving a total system head (TSH) of 997 ft.
***Equinox Center. 2010. San Diego's Water Sources: Assessing the Options. July. Table 1a (pg. 10).
†Average of greenhouse gas emissions from CA energy production and imported energy (CEC. 2013. California Electrical Energy Generation Total Production, by Resource Type (Gigawatt hours). Accessed 24 June 2014. Available: http://energyalmanac.ca.gov/electricity/electricity_generation.html) and (U.S. Environmental Protection Agency (USEPA). 2014. eGRID 9th edition Version 1.0 Year 2010 Summary Tables. February. Available: http://www.epa.gov/cleanenergy/energy-resources/egrid/).
††Multiply Annual Total Benefit by (2036 - 2019 + 1) = 18 years.

Regional Emergency Storage and Conveyance System Intertie Optimization

Table 3-84: Physical Benefit E-Avoid Social Costs of Greenhouse Gases (GHGs)

Social Cost of GHGs ($/MT CO2e)*
$24.55

Year	GHG Emissions Reduction from Project [Benefit G] (MT CO2e)	Physical Benefit E Total [GHG Emissions Reduction from Project x Social Cost of GHGs]
2017	1,757	$43,127
2018	2,455	$60,259
2019-2036	44,182	$1,084,659
Total (2015 through 2036)	**48,393 MT CO2e**	**$1,188,045**

Comments: *Social Cost of Carbon (Interagency Working Group on Social Cost of Carbon, United States Government. 2010. Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866. February. Table 4 (pg. 28)) converted to 2014 dollars from 2007 dollars (U.S. Bureau of Labor Statistics. CPI Inflation Calculator. Available: http://www.bls.gov/data/inflation_calculator.htm)

Regional Emergency Storage and Conveyance System Intertie Optimization

Table 3-85: Physical Benefit G-Reduce Water Costs to Customers, Including DACs

Project Phase	Date Benefits Begin to Accrue***	% Annual Benefit Realized in 2017†	% Annual Benefit Realized in 2018†	% Annual Benefit Realized in Year 2019 - 2036†
Short Term	August 2017	100%	0%	0%
Long Term	January 2018	0%	100%	100%

Operations and Management (O&M) Costs	
Speece Cone Facility O&M* ($/year)	$277,000
Energy Cost** (2008$/kWyr)	$72
Energy Cost (2008$/MWh) [kWhyr ÷ 365 days/yr ÷ 24 hr/day]	$8.22
CPI Conversion Factor from 2008 $ to 2014 $***	1.1
Energy Cost (2014$/MWh)	$9.04

Annualized Costs per Phase		
	Short Term	Long Term
Annualized Pumping Energy Use [Refer to Calculations for Benefit D] (MWh/year)	4,957	6,854
Annualized Pumping Energy Costs [Pumping Energy Use x Energy Costs]	$44,818	$61,967
Pumping Costs Contingency	10%	10%
Total Annualized Pumping Costs† [Annualized Energy Costs + 10% of Annualized Energy Costs]	$49,300	$68,163
Total Annualized Costs [System Pumping Costs + Speece O&M Costs]	$326,300	$345,163

Year	Improted Water Offset by Short Term [Short Term Component of Benefit A] (AFY)	Improted Water Offset by Long Term [Long Term Component of Benefit A] (AFY)	Imported Water Costs in 2012 $ (2012 $/AF)	2012 Imported Water Cost Converted to 2014 Dollars†† [2012 $ x 1.04 Conversion Factor] ($ per AF)	Total Imported Water Costs [(Short Term + Long Term) x Imported Water Cost/AF]	Total Short Term Costs [Short Term Phasing x Short Term Annualized Costs]	Total Long Term Costs [Long Term Phasing x Long Term Annualized Costs]	Physical Benefit G Total [Total Imported Costs - (Short Term Costs + Long Term Costs)]
2017	3,889	0	$1,445	$1,503	$5,844,389	$326,300	$0	$5,518,089
2018	0	5,377	$1,495	$1,555	$8,360,160	$0	$345,163	$8,014,996
2019	0	5,377	$1,548	$1,610	$8,656,540	$0	$345,163	$8,311,376
2020	0	5,377	$1,602	$1,666	$8,958,512	$0	$345,163	$8,613,349
2021	0	5,377	$1,626	$1,691	$9,092,722	$0	$345,163	$8,747,559
2022	0	5,377	$1,650	$1,716	$9,226,932	$0	$345,163	$8,881,769
2023	0	5,377	$1,675	$1,742	$9,366,734	$0	$345,163	$9,021,571
2024	0	5,377	$1,700	$1,768	$9,506,536	$0	$345,163	$9,161,373
2025	0	5,377	$1,726	$1,795	$9,651,930	$0	$345,163	$9,306,767
2026	0	5,377	$1,751	$1,821	$9,791,732	$0	$345,163	$9,446,569
2027	0	5,377	$1,778	$1,849	$9,942,718	$0	$345,163	$9,597,555
2028	0	5,377	$1,804	$1,876	$10,088,112	$0	$345,163	$9,742,949
2029	0	5,377	$1,831	$1,904	$10,239,098	$0	$345,163	$9,893,935
2030	0	5,377	$1,859	$1,933	$10,395,677	$0	$345,163	$10,050,513
2031	0	5,377	$1,887	$1,962	$10,552,255	$0	$345,163	$10,207,092
2032	0	5,377	$1,915	$1,992	$10,708,833	$0	$345,163	$10,363,670
2033	0	5,377	$1,944	$2,022	$10,871,004	$0	$345,163	$10,525,840
2034	0	5,377	$1,973	$2,052	$11,033,174	$0	$345,163	$10,688,010
2035	0	5,377	$2,003	$2,083	$11,200,936	$0	$345,163	$10,855,773
2036	0	5,377	$2,033	$2,114	$11,368,699	$0	$345,163	$11,023,535
Total (2015 through 2036)	**3,889 AF**	**102,163 AF**	**$35,245**	**$36,655**	**$194,856,693**	**$326,300**	**$6,558,105**	**$187,972,288**

Comments: *City of San Diego. 2-14. Lake Hodges Reservoir Water Quality Assessment Study Conceptual Planning Report. Pg. 6-2.
**SDCWA. 2008. Lake Hodges Project Reservoir Regulation Manual. April. Pg. D-8.
***Converted by multiplying by CPI Cost index of 1.1 to convert from 2008 to 2014 dollars.
†A 10% contingency is added to the energy pumping costs to account for other O&M needs of the pumps.
††Sweetwater Authority. 2014. WaterSMART: Title XVI Water Reclamation and Reuse Program Technical Proposal. January. Table 3-18 (pg. 44). Converted by multiplying by CPI Cost index of 1.04 to convert from 2012 to 2014 dollars.

Appendix 3-2: Reynolds Facility Design Drawing

This appendix includes the cover, design notes, and treatment schematics from the 90% design drawings for the Reynolds Facility Expansion that will occur as part of the *Reynolds Groundwater Desalination Facility Expansion* project to be implemented by Sweetwater Authority in partnership with the City of San Diego. A full copy of the 90% design drawings and associated design specifications is included in the attached CD of supporting documents under this project.

CONTRACT DOCUMENTS

For the construction of the

RICHARD A. REYNOLDS DESALINATION FACILITY PHASE II EXPANSION

SWA Project No. B.P. 20084022

Prepared for

SWEETWATER AUTHORITY
Chula Vista, California

Volume 3 of 3
Drawings

For information regarding
this project, contact:

Paul Johnson, P.E.
402 W. Broadway Ste. 1450
San Diego, CA 92101
(619) 687-0120

CH2MHILL

90% SUBMITTAL

CH2M HILL Project No. 488009

JULY 2014

INDEX OF DRAWINGS

GENERAL

CIVIL

PROCESS MECHANICAL

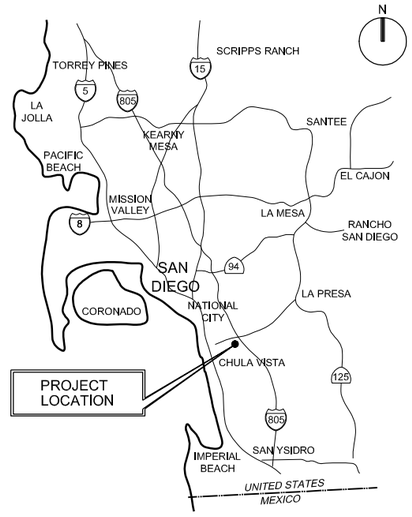
HVAC

STRUCTURAL

ELECTRICAL

INSTRUMENTATION AND CONTROL

IMAGE COPYRIGHT BY GOOGLE - 2014. SOURCE: CHULA VISTA. PHOTO DATE: 11-13-13. ANNOTATION BY CH2M HILL, 2014



LOCATION MAP
NO SCALE

VICINITY MAP
NO SCALE

SCREENED DRAWINGS ARE NOT INCLUDED IN THIS 90% SUBMITTAL

REGISTERED PROFESSIONAL ENGINEER DENNIS M. SMITH No. 25053 EXP. 12-31-15 CIVIL STATE OF CALIFORNIA

PRELIMINARY

SWEETWATER AUTHORITY

PLANS FOR THE INSTALLATION OF:

REYNOLDS DESALINATION FACILITY PHASE II EXPANSION INDEX OF DRAWINGS AND LOCATION MAP

REV.	DATE	DESCRIPTION	BY	APPVD.
A				
B				
C				

DESIGN BY: D. SMITH | SCALE: NO SCALE
DRAWN BY: A. GORDEN | DATE:
CHECKED BY: XXX | DESIGN#
AS CONSTRUCTED: | PAVEMENT#

1/4 SECTION | WO#
WO#
ENGINEER PE XXXXX | DATE | SHEET XX OF XX
APPROVED | DATE | G-1

PW: \\DEN\488009 – RICHARD A REYNOLDS DESAL FACILITY\$FILENAME

$PLOTDATE

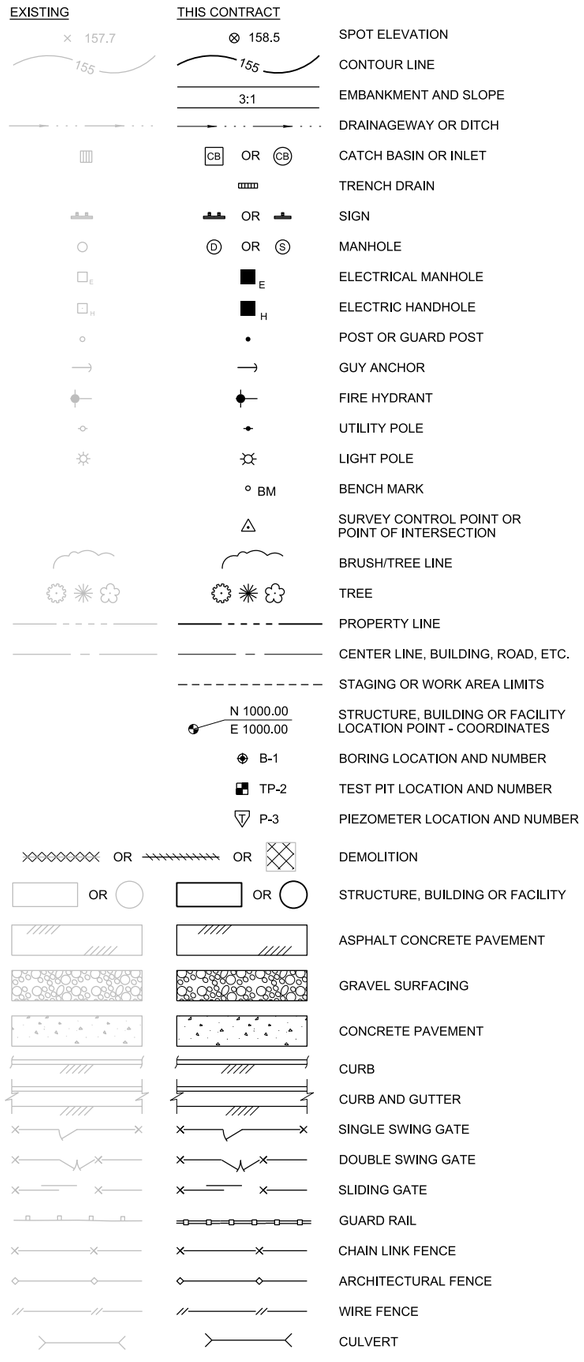
GENERAL SITE NOTES:

1. SOURCE OF TOPOGRAPHY SHOWN ON THE CIVIL PLANS IS BASED UPON TOPOGRAPHIC SURVEY CONDUCTED IN 2014 BY BERGGREN LAND SURVEYING AND MAPPING, INC. ADDITIONAL MAPPING MAY HAVE BEEN ADDED FROM AS-BUILT DATA TAKEN FROM ORIGINAL SITE DESIGN TOPOGRAPHIC SURVEY PROVIDED BY OWNER. EXISTING CONDITIONS MAY VARY FROM THOSE SHOWN ON THESE PLANS. THE CONTRACTOR SHALL VERIFY EXISTING CONDITIONS AND ADJUST WORK PLAN ACCORDINGLY PRIOR TO BEGINNING CONSTRUCTION.
2. EXISTING TOPOGRAPHY, STRUCTURES, AND SITE FEATURES ARE SHOWN SCREENED AND/OR LIGHT-LINED. NEW FINISH GRADE, STRUCTURES, AND SITE FEATURES ARE SHOWN HEAVY-LINED.
3. HORIZONTAL DATUM: CALIFORNIA STATE PLANE COORDINATE SYSTEM, ZONE 6, NAD 83 (1991.35 EPOCH).
4. VERTICAL DATUM: NGVD 29.
5. MAINTAIN, RELOCATE, OR REPLACE EXISTING SURVEY MONUMENTS, CONTROL POINTS, AND STAKES WHICH ARE DISTURBED OR DESTROYED. PERFORM THE WORK TO PRODUCE THE SAME LEVEL OF ACCURACY AS THE ORIGINAL MONUMENT(S) IN A TIMELY MANNER, AND AT THE CONTRACTOR'S EXPENSE.
6. FOR LOCATION OF CONTROL POINT ON STRUCTURES, SEE STRUCTURAL DRAWINGS.
7. COORDINATES AND DIMENSIONS SHOWN FOR ROADWAY IMPROVEMENTS ARE TO FACE OF CURB OR EDGE OF PAVEMENT.
8. STAGING AREA SHALL BE FOR CONTRACTOR'S EMPLOYEE PARKING, CONTRACTOR'S TRAILERS AND ON-SITE STORAGE OF MATERIALS. SEE DRAWING C-1 FOR LOCATION AND LIMITS.
9. PROVIDE TEMPORARY FENCING FOR STAGING AREA AS NECESSARY TO MAINTAIN SECURITY AT ALL TIMES.
10. ELEVATIONS GIVEN ARE TO FINISH GRADE UNLESS OTHERWISE SHOWN.
11. SLOPE UNIFORMLY BETWEEN CONTOURS AND SPOT ELEVATIONS SHOWN.
12. CONTRACTOR SHALL BE RESPONSIBLE FOR IMPLEMENTING AND MAINTAINING EROSION CONTROL DEVICES DURING CONSTRUCTION. SEE SPECIFICATIONS FOR REQUIREMENTS.
13. CONTRACTOR SHALL TAKE ALL OTHER MEASURES TO POSITIVELY PRECLUDE EROSION MATERIALS FROM LEAVING THE SITE. CONTRACTOR TO SUBMIT EROSION CONTROL PLAN.

GENERAL YARD PIPING AND UTILITIES NOTES:

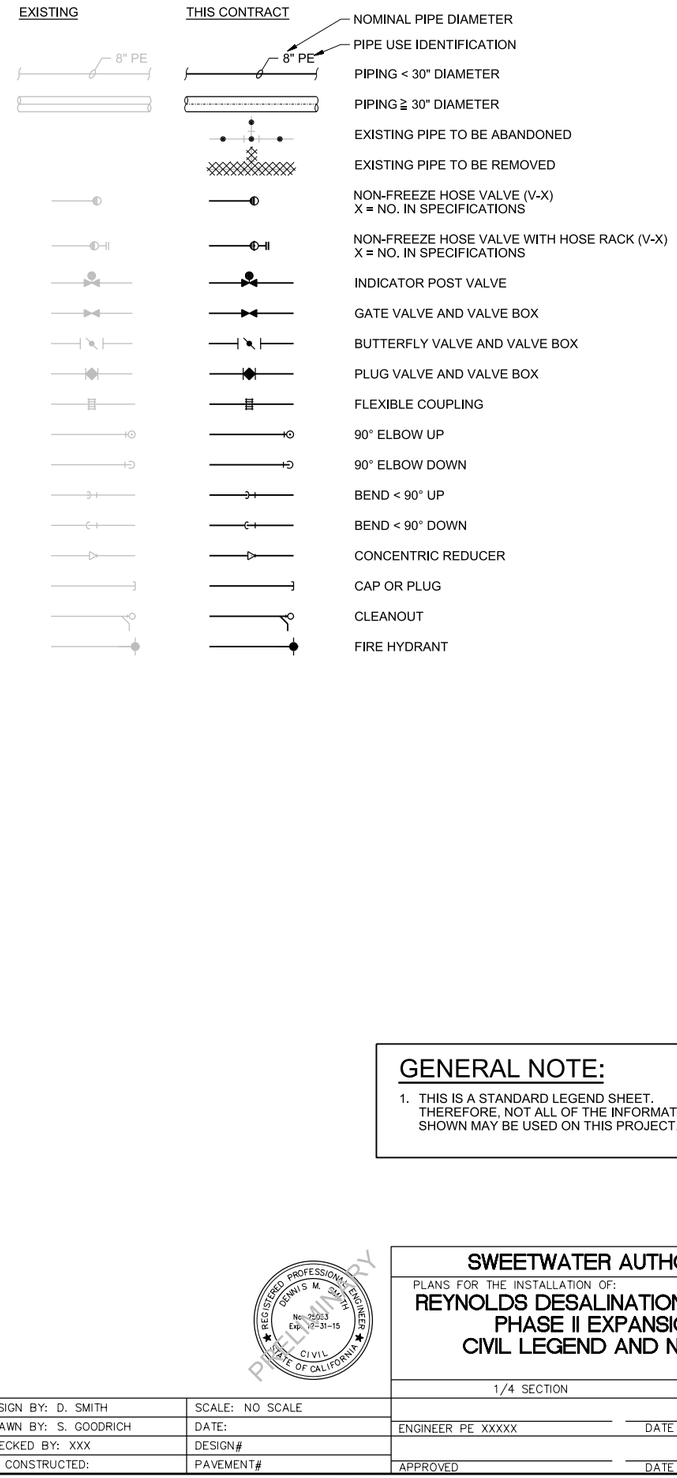
1. EXISTING UNDERGROUND UTILITIES OBTAINED FROM AS-BUILTS AND FROM FIELD SURVEY. CONTRACTOR SHALL FIELD VERIFY DEPTH AND LOCATION PRIOR TO EXCAVATION. PROTECT ALL EXISTING UTILITIES DURING CONSTRUCTION.
2. FOR PIPING FLOW STREAM IDENTIFICATION, SEE DRAWING G-11.
3. EXISTING PIPING AND EQUIPMENT ARE SHOWN SCREENED AND/OR LIGHT-LINED. NEW PIPING AND EQUIPMENT ARE SHOWN HEAVY-LINED.
4. UNLESS OTHERWISE SHOWN ALL PIPING SHALL HAVE A MINIMUM COVER OF 3 FEET.
5. ALL PIPES SHALL HAVE A CONSTANT SLOPE BETWEEN INVERT ELEVATIONS UNLESS A FITTING IS SHOWN.
6. ALL NEW WATER PIPES MUST BE PROPERLY FLUSHED, PRESSURE TESTED, CHLORINATED AND BACTERIOLOGICALLY TESTED, AS SPECIFIED.
7. FOR TRENCHING AND BACKFILL, SEE DRAWING _____.
8. FOR PIPELINE CONCRETE THRUST BLOCK REQUIREMENTS, SEE DRAWING G-6.
9. MINIMUM ALLOWABLE CLEARANCE BETWEEN PIPES AT CROSSINGS SHALL BE 3". CONTROLLED DENSITY FILL SUPPORT IS REQUIRED AS SHOWN.

CIVIL LEGEND



SPOT ELEVATION
CONTOUR LINE
EMBANKMENT AND SLOPE
DRAINAGEWAY OR DITCH
CATCH BASIN OR INLET
TRENCH DRAIN
SIGN
MANHOLE
ELECTRICAL MANHOLE
ELECTRIC HANDHOLE
POST OR GUARD POST
GUY ANCHOR
FIRE HYDRANT
UTILITY POLE
LIGHT POLE
BENCH MARK
SURVEY CONTROL POINT OR POINT OF INTERSECTION
BRUSH/TREE LINE
TREE
PROPERTY LINE
CENTER LINE, BUILDING, ROAD, ETC.
STAGING OR WORK AREA LIMITS
STRUCTURE, BUILDING OR FACILITY LOCATION POINT - COORDINATES
BORING LOCATION AND NUMBER
TEST PIT LOCATION AND NUMBER
PIEZOMETER LOCATION AND NUMBER
DEMOLITION
STRUCTURE, BUILDING OR FACILITY
ASPHALT CONCRETE PAVEMENT
GRAVEL SURFACING
CONCRETE PAVEMENT
CURB
CURB AND GUTTER
SINGLE SWING GATE
DOUBLE SWING GATE
SLIDING GATE
GUARD RAIL
CHAIN LINK FENCE
ARCHITECTURAL FENCE
WIRE FENCE
CULVERT

YARD PIPING LEGEND



PIPING < 30" DIAMETER
PIPING ≧ 30" DIAMETER
EXISTING PIPE TO BE ABANDONED
EXISTING PIPE TO BE REMOVED
NON-FREEZE HOSE VALVE (V-X)
X = NO. IN SPECIFICATIONS
NON-FREEZE HOSE VALVE WITH HOSE RACK (V-X)
X = NO. IN SPECIFICATIONS
INDICATOR POST VALVE
GATE VALVE AND VALVE BOX
BUTTERFLY VALVE AND VALVE BOX
PLUG VALVE AND VALVE BOX
FLEXIBLE COUPLING
90° ELBOW UP
90° ELBOW DOWN
BEND < 90° UP
BEND < 90° DOWN
CONCENTRIC REDUCER
CAP OR PLUG
CLEANOUT
FIRE HYDRANT

GENERAL NOTE:

1. THIS IS A STANDARD LEGEND SHEET. THEREFORE, NOT ALL OF THE INFORMATION SHOWN MAY BE USED ON THIS PROJECT.

REGISTERED PROFESSIONAL ENGINEER DENNIS M. SMITH No. 24053 Exp. 12-31-15 CIVIL STATE OF CALIFORNIA
PRELIMINARY

SWEETWATER AUTHORITY

PLANS FOR THE INSTALLATION OF:

REYNOLDS DESALINATION FACILITY PHASE II EXPANSION
CIVIL LEGEND AND NOTES

REV.	DATE	DESCRIPTION	BY	APPVD.
A				
B				
C				

DESIGN BY: D. SMITH | SCALE: NO SCALE
DRAWN BY: S. GOODRICH | DATE:
CHECKED BY: XXX | DESIGN#
AS CONSTRUCTED: | PAVEMENT#

1/4 SECTION | WO#
WO#
ENGINEER PE XXXXX | DATE | SHEET XX OF XX
APPROVED | DATE | G-2

PW: \\DEN\488009 – RICHARD A REYNOLDS DESAL FACILITY\ $FILENAME
11–JUL–2014

DESIGN CRITERIA:

1. DESIGN CODE: 2013 CALIFORNIA BUILDING CODE (CBC), AS AMENDED BY LOCAL AGENCIES.
2. ROOF LIVE LOAD: 20 PSF
3. ROOF DEAD LOADS:

ASPHALT SHINGLES	5 PSF
PLYWOOD SHEATHING	3 PSF
TRUSSES	5 PSF
CEILING INSULATION	3 PSF
MECHANICAL	4 PSF
MISC	2 PSF
COLLATERAL	3 PFS
TOTAL	25 PSF

4. WIND LOAD:
   WIND SPEED 115 MPH, 3 SEC GUST
   EXPOSURE C
   WIND IMPORTANCE FACTOR = 1.00
   RISK CATEGORY = III
5. SEISMIC LOAD:
   RISK CATEGORY III (TABLE 1604.5)
   IMPORTANCE FACTOR = 1.25
   SOIL SITE CLASS D
   (USGS HAZARD MAPS)
   MAPPED SPECTRAL RESPONSE ACCELERATIONS
   Ss = 0.874g
   S1 = 0.335g
   DESIGN SPECTRAL RESPONSE ACCELERATIONS
   Sds = 0.670g
   SD1 = 0.386g
   SEISMIC DESIGN CATEGORY D (TABLE 1613.5)
6. GEOTECHNICAL:
   A. ALLOWABLE BEARING PRESSURE: 2500 PSF
   ALLOWABLE BEARING PRESSURE CAN BE INCREASED BY ONE-THIRD FOR WIND OR SEISMIC LOADS.

GENERAL:

1. FOR ABBREVIATIONS NOT LISTED, SEE "ABBREVIATIONS FOR USE ON DRAWINGS AND TEXT", PUBLISHED BY THE AMERICAN NATIONAL STANDARDS INSTITUTE INC. (ANSI).
2. DESIGN DETAILS AS SHOWN ON THE DRAWINGS ARE INTENDED TO BE TYPICAL AND SHALL APPLY TO ALL SIMILAR SITUATIONS OCCURRING ON THE PROJECT, WHETHER OR NOT THEY ARE KEYED IN EACH LOCATION. CONSULT THE ENGINEER FOR REVIEW PRIOR TO CONSTRUCTION.
3. VERIFY ALL OPENING DIMENSIONS IN WALLS, SLABS, AND ROOF WITH THE MECHANICAL AND ELECTRICAL DRAWINGS.
4. NO STRUCTURAL MEMBERS SHALL BE CUT FOR PIPES, DUCTS, ETC, UNLESS SPECIFICALLY DETAILED OR APPROVED IN WRITING BY THE ENGINEER.
5. VISITS TO THE JOB SITE BY THE ENGINEER TO OBSERVE THE CONSTRUCTION DO NOT IN ANY WAY MEAN THAT THEY ARE GUARANTORS OF THE CONSTRUCTOR'S WORK, NOR RESPONSIBLE FOR COMPREHENSIVE OR SPECIAL INSPECTIONS, COORDINATION, SUPERVISION, NOR SAFETY AT THE JOB SITE.
6. SPECIAL INSPECTION (OWNER FURNISHED) IS REQUIRED IN ACCORDANCE WITH 2013 CBC SECTIONS 109 AND 1704 ON THE FOLLOWING PORTIONS OF THE WORK:
   CONCRETE PLACEMENT
   REINFORCING STEEL PLACEMENT
   STRUCTURAL WELDING IF REQUIRED
   ANCHORS, EMBEDS AND BOLTS INSTALLED IN CONCRETE
   CONCRETE ANCHORS
   GRADING, EXCAVATION, AND FILLING
   MASONRY CONSTRUCTION AS INDICATED. SEE MASONRY NOTE 8.

   ALL SPECIFIED CONCRETE, GROUT, AND MASONRY TESTING DURING CONSTRUCTION WILL BE FURNISHED BY CONTRACTOR. ALL SPECIFIED LABORATORY TEST MIXES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

FOUNDATIONS:

1. PROVIDE AND INSTALL COMPACTED GRANULAR FILL AS SPECIFIED UNDER ALL SLABS AND FOOTINGS TO UNDISTURBED EARTH.
2. EXCAVATIONS SHALL BE SHORED AS REQUIRED TO PREVENT SUBSIDENCE OR DAMAGE TO ADJACENT EXISTING STRUCTURES, STREETS, UTILITIES, ETC.
3. BACKFILL UNIFORMLY EACH SIDE OF FOUNDATION WALLS.

FORMWORK, SHORING AND BRACING:

1. CONSTRUCTION SHORING AND BRACING OF FORMWORK SHALL BE IN ACCORDANCE WITH CHAPTER 4 OF ACI 301 "SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS" AND ACI 347 "RECOMMENDED PRACTICE FOR CONCRETE FORMWORK".
2. THE STRUCTURES SHOWN ON THE DRAWINGS HAVE BEEN DESIGNED FOR STABILITY UNDER FINAL CONDITIONS ONLY. THESE PLANS DO NOT INCLUDE THE NECESSARY COMPONENTS OR EQUIPMENT FOR THE STRUCTURES DURING CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR ALL WORK RELATING TO CONSTRUCTION ERECTION METHODS, BRACING, SHORING, RIGGING, GUYS, SCAFFOLDING, FORMWORK, AND OTHER WORK AIDS REQUIRED TO SAFELY PERFORM THE WORK SHOWN.

CONCRETE:

1. ALL CAST-IN-PLACE CONCRETE SHALL HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 4000 PSI, EXCEPT 3000 PSI FOR SECONDARY CONCRETE ELEMENTS SUCH AS CURBS, SIDEWALKS, AND PIPE/CONDUIT ENCASEMENTS.
2. CONSTRUCTION JOINTS INDICATED ARE SUGGESTED LOCATIONS. CONTRACTOR MAY REVISE LOCATION OF JOINTS, SUBJECT TO SPECIFIED REQUIREMENTS, AND SHALL SUBMIT ALL JOINT LOCATIONS FOR REVIEW BY THE ENGINEER. ADDITIONAL CONSTRUCTION JOINT LOCATIONS, AS REQUIRED FOR CONSTRUCTION, SHALL BE SUBMITTED FOR REVIEW.
3. ROUGHEN AND CLEAN ALL CONSTRUCTION JOINTS IN WALLS AND SLABS AS SPECIFIED PRIOR TO PLACING ADJACENT CONCRETE. SANDBLASTING OR OTHER PREPARATION OF HORIZONTAL AND VERTICAL JOINTS IS REQUIRED.
4. THE CONTRACTOR SHALL COORDINATE PLACEMENT OF ALL OPENINGS, CURBS, DOWELS, SLEEVES, CONDUITS, BOLTS AND INSERTS PRIOR TO PLACEMENT OF CONCRETE.
5. NO ALUMINUM CONDUIT OR PRODUCTS CONTAINING ALUMINUM OR ANY OTHER MATERIAL INJURIOUS TO THE CONCRETE SHALL BE EMBEDDED IN THE CONCRETE.

CONCRETE REINFORCING

1. REINFORCING STEEL SHALL CONFORM TO ASTM A615, GRADE 60. FABRICATION AND PLACEMENT OF REINFORCING STEEL SHALL BE IN ACCORDANCE WITH CRSI MSP-1 "MANUAL OF STANDARD PRACTICE" AND ACI 301 "SPECIFICATIONS FOR STRUCTURAL, CONCRETE FOR BUILDING".
2. CLEARANCE FOR REINFORCEMENT BARS, UNLESS SHOWN OTHERWISE, SHALL BE:
   WHEN PLACED ON GROUND: ——— 3"
   ALL OTHER CONCRETE SURFACES:
   #5 BAR OR SMALLER ——— 1 1/2"
   #6 BAR OR LARGER ——— 2"
3. ALL WALL CORNER AND WALL INTERSECTION REINFORCEMENT BARS SHALL BE CONTINUOUS AROUND CORNERS AND THROUGH COLUMNS OR PILASTERS REINFORCEMENT SHALL BE EXTENDED INTO CONNECTION WALLS AND LAPPED ON THE OPPOSITE FACE OF THE CONNECTING WALLS, PER PLAN DETAILS.
4. ALL BENDS, UNLESS OTHERWISE SHOWN, SHALL BE A 90 DEGREE STANDARD HOOK AS DEFINED IN LATEST EDITION OF ACI 318.
5. UNLESS INDICATED OTHERWISE, CONTRACTOR MAY SPLICE CONTINUOUS SLAB OR LONGITUDINAL BEAM BARS AT LOCATIONS OF HIS CHOOSING, EXCEPT THAT TOP BAR SPLICES SHALL BE LOCATED AT MIDSPAN AND BOTTOM BAR SPLICES SHALL BE LOCATED AT SUPPORTS. ALL REINFORCEMENT BENDS AND LAPS, UNLESS OTHERWISE NOTED, SHALL SATISFY THE FOLLOWING MINIMUM REQUIREMENTS:

CONCRETE DESIGN STRENGTH = 4,000 PSI — GRADE 60 REINFORCING STEEL

BAR SIZE		#3	#4	#5	#6	#7	#8	#9	#10	#11
LAP SPLICE LENGTH										
SPACING<6"	TOP BAR ✶	1'-4"	2'-0"	3'-0"	4'-0"	5'-10"	6'-8"	7'-6"	8'-4"	9'-2"
	OTHER BAR	1'-4"	1'-7"	2'-3"	3'-1"	4'-6"	5'-2"	5'-10"	6'-5"	7'-1"
SPACING>6"	TOP BAR ✶	1'-4"	1'-7"	2'-0"	2'-5"	3'-6"	4'-0"	5'-0"	6'-0"	7'-1"
	OTHER BAR	1'-4"	1'-4"	1'-7"	1'-10"	2'-9"	3'-1"	3'-10"	4'-7"	5'-5"
EMBEDMENT LENGTH										
SPACING<6"	TOP BAR ✶	1'-0"	1'-7"	2'-3"	3'-1"	4'-6"	5'-2"	5'-10"	6'-5"	7'-1"
	OTHER BAR	1'-0"	1'-2"	1'-9"	2'-5"	3'-6"	4'-0"	4'-6"	5'-0"	5'-5"
SPACING>6"	TOP BAR ✶	1'-0"	1'-3"	1'-7"	1'-10"	2'-9"	3'-1"	3'-10"	4'-7"	5'-5"
	OTHER BAR	1'-0"	1'-0"	1'-2"	1'-5"	2'-1"	2'-5"	2'-11"	3'-7"	4'-2"

✶ TOP BARS SHALL BE DEFINED AS ANY HORIZONTAL BARS PLACED SUCH THAT MORE THAN 12" OF FRESH CONCRETE IS CAST IN THE MEMBER BELOW THE BAR, IN ANY SINGLE POUR. HORIZONTAL WALL BARS ARE CONSIDERED TOP BARS.

✶✶ WHERE 3000 PSI CONCRETE IS USED, INCREASE ABOVE LENGTHS BY 16%

MASONRY:

1. MORTAR SHALL CONFORM TO ASTM C270, TYPE S, HYDRATED. MASONRY CEMENT SHALL NOT BE USED.
2. GROUT SHALL CONFORM TO ASTM C476 COURSE GROUT AND SHALL HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 2000 PSI.
3. ALL CONCRETE MASONRY UNITS SHALL BE GRADE N, TYPE I, MEDIUM WEIGHT, AND HAVE A UNIT COMPRESSIVE MASONRY STRESS OF 1900 PSI. CONFORM TO ASTM C90.
4. THE DESIGN f'm OF THE FINISHED ASSEMBLY SHALL BE 1500 PSI.
5. PLACE COURSES IN RUNNING BOND PATTERN, UNLESS SPECIFICALLY INDICATED OTHERWISE.
6. AT BUILDING WALLS, LAP VERTICAL REINFORCING 48 BAR DIAMETER WITH DOWELS BUT ALL OTHER VERTICAL BAR LAPS SHALL BE 72 BAR DIAMETERS. ALL LAPS IN CANTILEVER CONSTRUCTION SHALL BE 72 BAR DIAMETERS. STAGGER ALL ADJACENT LAP SPLICES, SEPARATED BY 3 INCHES OR LESS, BY 24 INCHES.
7. PROVIDE TWO FULL HEIGHT TYPICAL VERTICAL BARS AT EDGES OF ALL OPENINGS AND FULL HEIGHT TYPICAL VERTICAL BARS IN 3 CELLS AT ALL CORNERS. PROVIDE MATCHING DOWELS FOR ALL VERTICAL BARS. PROVIDE REINFORCED LINTELS ABOVE AND REINFORCED BOND BEAMS BELOW ALL OPENINGS. PROVIDE HORIZONTAL CORNER BARS WITH MINIMUM 2'-0" LEGS AT ALL CORNERS.
8. PROVIDE SPECIAL INSPECTION FOR MASONRY CONSTRUCTION FOR ALL MASONRY AT STEEL BEAM SEAT AREAS, EMBED AREAS, ROOF LEVEL BOND BEAMS, PIERS, COLUMNS AND PILASTERS, AND UNIQUE DETAIL AREAS.
9. MASONRY UNIT AND GROUT TESTING SHALL BE IN CONFORMANCE WITH 2013 CBC 2105.2.2.1, "UNIT STRENGTH METHOD". TESTING WILL BE OWNER FURNISHED. OTHER CBC SECTION 2105 TEST METHODS MAY BE SUBMITTED AS AN ALTERNATIVE.

METAL FABRICATIONS:

1. W- SHAPES SHALL BE ASTM A992. MISCELLANEOUS SHAPES INCLUDING ANGLES, CHANNELS, PLATES, ETC. SHALL BE ASTM A- 36. SQUARE OR RECTANGULAR STEEL TUBING SHALL ONFORM TO ASTM A-500, GRADE B. STEEL PIPE SHALL BE A501 OR ASTM A53, GRADE B.
2. ALL STRUCTURAL STEEL SHALL BE FABRICATED AND ERECTED IN CONFORMANCE WITH THE AISC MANUAL OF STEEL CONSTRUCTION, CURRENT EDITION.
3. BOLTS INDICATED AS MACHINE BOLTS (MB) OR ANCHOR BOLTS (AB) SHALL CONFORM TO ASTM A307 FOR CARBON STEEL, A193 FOR STAINLESS STEEL, AND A153 FOR GALVANIZED STEEL EXCEPT WHERE SPECIFICALLY INDICATED OTHERWISE. ALL JOINT CONTACT SURFACES SHALL BE CLEAN AND FREE FROM OIL, DIRT AND PAINT.
4. ALL WELDS SHALL BE DONE BY AWS CERTIFIED WELDERS AND SHALL CONFORM TO AWS D 1.1. LATEST EDITION. ALL BUTT WELDS ARE FULL PENETRATION UNLESS INDICATED OTHERWISE. WELD FILLER METAL SHALL BE AWS A5.1 OR A5.5 E70XX ELECTRODES.
5. ALL WELDS FOUND DEFECTIVE SHALL BE REPAIRED AND/OR REPLACED AND RETESTED FOR ADEQUACY AT THE CONTRACTOR'S EXPENSE.
6. AT ALL FIELD WELDS, AT EMBED PLATES, AND ANGLES, LOW HEAT AND INTERMITTENT WELDS SHALL BE UTILIZED TO AVOID SPALLING OR CRACKING THE EXISTING CONCRETE.
7. ALL STRUCTURAL STEEL TO BE EMBEDDED IN CONCRETE SHALL BE CLEAN AND FREE OF PAINT, OIL OR DIRT.
8. NO HOLES OTHER THAN THOSE SPECIFICALLY DETAILED SHALL BE ALLOWED THROUGH STRUCTURAL STEEL MEMBERS. NO CUTTING OR BURNING OF STRUCTURAL STEEL WILL BE PERMITTED WITHOUT THE APPROVAL OF THE ENGINEER.

ROUGH CARPENTRY:

1. ALL FRAMING LUMBER SHALL BE DOUGLAS FIR-LARCH, NO. 1 OR BETTER TYPICAL UNLESS INDICATED OTHERWISE, EXCEPT PLATES, SILLS, AND BLOCKING MAY BE NO. 2 OR BETTER.
2. ALL ROOF SHEATHING SHALL BE 32/16, MINIMUM 5/8 INCH THICK, EXTERIOR, GRADED PER PS-1. NAILS SHALL BE GALVANIZED, COMMON. DO NOT USE BOX NAILS UNLESS A NAIL SPACING REDUCTION IS APPROVED.
3. FRAMING CONNECTORS SHALL BE ICC-ES APPROVED. ALL FRAMING CONNECTORS AND PARTS SHALL BE GALVANIZED.
4. PROVIDE GALVANIZED WASHERS AT ALL BOLT HEADS OR NUTS BEARING ON WOOD.
5. PRESSURE TREAT ALL WOOD IN CONTACT WITH CONCRETE OR MASONRY.

PREFABRICATED WOOD TRUSSES:

1. PROVIDE CALCULATIONS, PRODUCT DATA, LUMBER GRADES, CONNECTIONS, ETC. FOR ALL TYPES OF TRUSSES. THE CALCULATIONS MUST BE STAMPED AND SIGNED BY A REGISTERED CIVIL OR STRUCTURAL ENGINEER IN THE STATE OF NEW CALIFORNIA.
2. THE ABOVE SUPERIMPOSED DEAD LOADS SHALL NOT BE CONSTRUED TO BE ALL THE DEAD LOADS THAT COULD BE INCLUDED IN THE DESIGN OF THE PREFABRICATED WOOD TRUSSES.THE PLANS SHALL BE REVIEWED FOR ANY ADDITIONAL DEAD LOAD WHICH WOULD NORMALLY BE INCLUDED IN COMMON PRACTICE.
3. MECHANICAL/ELECTRICAL, CEILINGS, AND MISCELLANEOUS LOADING SHALL NOT BE INCLUDED IN THE DEAD LOAD USED TO RESIST UPLIFT.
4. WIND ANALYSIS FOR THE PREFABRICATED WOOD TRUSSES SHALL USE THE PROVISIONS IN THE 2013 CALIFORNIA BUILDING CODE FOR ELEMENTS, COMPONENTS OF STRUCTURES, AND EXTENT OF DISCONTINUITIES.
5. SNOW LOADS SHALL BE APPLIED TO THE PREFABRICATED WOOD ROOF TRUSSES PER THE REQUIREMENTS OF THE 2013 CALIFORNIA BUILDING CODE.
6. DESIGN THE TRUSSES FOR ANY ADDITIONAL LOADS INDICATED ON THE CONTRACT DRAWINGS. LOADS SHOWN ON DRAWINGS SHALL BE IN ADDITION TO ALL STANDARD LOADS. CONTRACTOR SHALL VERIFY AND COORDINATE EQUIPMENT WEIGHTS, LOCATIONS AND ATTACHMENT REQUIREMENTS PRIOR TO FABRICATION. EQUIPMENT SUPPLIER SHALL BE RESPONSIBLE FOR THE DESIGN OF THE VERTICAL AND LATERAL SUPPORT OF THEIR EQUIPMENT TO THE STRUCTURE.
7. TRUSSES SHALL BE DESIGNED FOR A TOTAL LOAD MAXIMUM DEFLECTION OF L/240 WHERE L IS THE TRUSS SPAN LENGTH.
8. TOP CHORDS SHALL BE A 2x6 MINIMUM.
9. TRUSS BRIDGING, BOTTOM CHORD BRACING, AND OTHER ACCESSORIES SHALL BE PER THE MANUFACTURER'S STANDARDS. PERMANENTLY BRACE BOTTOM CHORDS AT 6'-0" ON CENTER MAXIMUM SPACING. BRACING SHALL EXTEND TO WALLS.
10. SOLID BLOCK ALL TRUSS ENDS.

STRUCTURAL OBSERVATION

1. ALL STRUCTURAL OBSERVATION SHALL BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 1704.5 OF THE 2013 CALIFORNIA BUILDING CODE.
2. OBSERVATION INDICATED SHALL BE CONDUCTED BY THE STRUCTURAL OBSERVER (ENGINEER OF RECORD OR HIS DESIGNATED REPRESENTATIVE). PROVIDE MINIMUM 2 WORKING DAYS NOTICE TO THE STRUCTURAL OBSERVER PRIOR TO THE DATE OF THE REQUIRED OBSERVATION. AS A MINIMUM, THE STRUCTURAL OBSERVER SHALL VISIT THE SITE DURING INITIAL MASONRY CONSTRUCTION AND BEFORE TOP OF WALL CONNECTIONS ARE CONCEALED.
3. THE STRUCTURAL OBSERVER SHALL SUBMIT TO THE BUILDING DEPARTMENT A WRITTEN REPORT DETAILING ALL PORTIONS OF WORK OBSERVED AND SHALL IDENTIFY ANY DEFICIENT PORTIONS OF WORK, THAT TO THE BEST OF THE STRUCTURAL OBSERVER'S KNOWLEDGE, HAVE NOT BEEN RESOLVED. THE REPORT REQUIRED TO DOCUMENT STRUCTURAL OBSERVATION SHALL REFERENCE ALL PERTINENT DRAWING NUMBERS, BUILDING GRIDS, DETAIL NUMBERS, SPECIFICATIONS SECTIONS.

REGISTERED PROFESSIONAL ENGINEER — THOMAS E. PAIGE — No. C65724 — Exp. 03-30-15 — CIVIL — STATE OF CALIFORNIA

PRELIMINARY

REV.	DATE	DESCRIPTION	BY	APPVD.
A				
B				
C				

DESIGN BY: S. DUPUIS — SCALE: NO SCALE
DRAWN BY: S. GOODRICH — DATE:
CHECKED BY: T. PAIGE — DESIGN#
AS CONSTRUCTED: — PAVEMENT#

SWEETWATER AUTHORITY

PLANS FOR THE INSTALLATION OF:

REYNOLDS DESALINATION FACILITY PHASE II EXPANSION STRUCTURAL NOTES - 1

1/4 SECTION — WO#

WO#

ENGINEER PE XXXXX — DATE

APPROVED — DATE

SHEET XX OF XX

G-3

GENERAL ARCHITECTURAL NOTES

1. UNLESS OTHERWISE INDICATED, PLAN DIMENSIONS ARE TO COLUMN GRID ON CENTERLINES, NOMINAL SURFACE OF MASONRY, FACE OF STUDS AND FACE OF CONCRETE WALLS.
2. "FLOOR LINE" REFERS TO TOP ON CONCRETE SLABS. FINISH FLOORING IS INSTALLED ABOVE THE FLOOR LINE. FOR DEPRESSED FLOORS AND CURBS, SEE STRUCTURAL DRAWINGS.
3. REPETITIVE FEATURES ARE NOT DRAWN IN THEIR ENTIRETY AND SHALL BE COMPLETELY PROVIDED AS IF DRAWN IN FULL.
4. WHERE DOOR IS LOCATED NEAR CORNER OF ROOM AND IS NOT LOCATED BY DIMENSION ON PLAN OR DETAILS, DIMENSION SHALL BE 3-INCHES FROM FACE OF STUD (WALL) TO FACE OF ROUGH OPENING. DIMENSION SHALL BE 6" FROM FACE OF WALL TO EDGE OF ROUGH OPENING AT CONCRETE WALLS, 8" AT CMU WALLS.
5. AT SOUND INSULATED WALLS, FULL HEIGHT PARTITIONS SHALL BE SEALED BOTH SIDES WITH ACOUSTIC SEALANT; TOP, BOTTOM, INTERSECTION, DOOR FRAMES, GLAZED OPENING FRAMES, AND OTHER PENETRATIONS.
6. LINE OF EXISTING GRADES, AS SHOWN ON THE BUILDING ELEVATIONS AND SECTIONS ARE APPROXIMATE. THEY ARE AT THE BUILDING FACE, OR ON THE SECTION END EXCEPT AS NOTED.
7. VERIFY ALL ROUGH-IN DIMENSIONS FOR EQUIPMENT PROVIDED IN THIS CONTRACT, OR BY OTHERS.
8. REFER TO ARCHITECTURAL, STRUCTURAL, MECHANICAL, ELECTRICAL AND OTHER CATEGORIES OR DRAWINGS FOR ADDITIONAL NOTES.
9. VERIFY SIZE AND LOCATION OF, AND PROVIDE: REQUIRED OPENINGS THROUGH FLOORS AND WALLS, ACCESS DOORS, FURRING, CURBS, ANCHORS AND INSERTS. PROVIDE ALL BASES AND BLOCKING REQUIRED FOR ACCESSORIES, MECHANICAL, ELECTRICAL AND OTHER EQUIPMENT.

ARCH/STRUCT MATERIAL SYMBOLS

SYMBOL	LEGEND
	EARTH OR FINISH GRADE
	CONCRETE
	CMU WALL (PLAN)
	CMU WALL (SECTION)
	WOOD STUD WALL (PLAN)
	RIGID INSULATION
	BATT INSULATION
	STEEL
	PLYWOOD
	GYPSUM WALLBOARD
	ACOUSTICAL TILE
	WOOD, ROUGH CONTINUOUS
	WOOD, ROUGH NON-CONTINUOUS
	WOOD, FINISHED

ARCHITECTURAL/STRUCTURAL LEGEND

ROOM NAME 101	ROOM NUMBER
D-301A	DOOR NUMBER
W-1	WINDOW NUMBER
R-1	RELIGHT NUMBER
L-1	LOUVER NUMBER
	DIRECTION OF SLOPE DOWN
1 / XX-AS-401 — LINE INDICATES DIRECTION AND EXTENT OF DETAIL CUT	DETAIL REFERENCE
HINGE SIDE	DOOR/HATCH SWING
ACTIVE / INACTIVE	INDICATES PAIR OF DOORS
F.EXT-X	FIRE EXTINGUISHER "X" = NUMBER IN SPECIFICATIONS

CODE DATA :

OCCUPANCY CLASSIFICATION :	FACTORY GROUP F-1 (SECTION 306)
CONSTRUCTION TYPE :	TYPE IIB UNPROTECTED (TABLE 601)
ALLOWABLE FLOOR AREA :	15,500 SF PER FLOOR (TABLE 503)
ACTUAL FLOOR AREA :	470 GSF
ALLOWABLE HEIGHT :	55 FEET (TABLE 503)
ACTUAL HEIGHT :	12 FEET
ALLOWABLE NUMBER OF STORIES :	2 (TABLE 503)
ACTUAL NUMBER OF STORIES	1

REGISTERED PROFESSIONAL ENGINEER THOMAS E. PAYNE No. C65724 Exp. 03-30-15 CIVIL STATE OF CALIFORNIA

PRELIMINARY

REV.	DATE	DESCRIPTION	BY	APPVD.
A				
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DESIGN BY: S. DUPUIS | SCALE: NO SCALE
DRAWN BY: S. GOODRICH | DATE:
CHECKED BY: XXX | DESIGN#
AS CONSTRUCTED: | PAVEMENT#

SWEETWATER AUTHORITY

PLANS FOR THE INSTALLATION OF:

REYNOLDS DESALINATION FACILITY PHASE II EXPANSION STRUCTURAL NOTES - 2

1/4 SECTION | WO#

WO#

ENGINEER PE XXXXX | DATE

APPROVED | DATE

SHEET XX OF XX

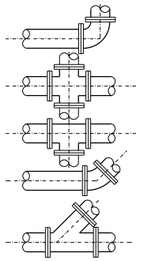
G-4

PIPE AND FITTING SYMBOLS

DOUBLE LINE

SINGLE LINE

- EXISTING PIPE
- NEW PIPE
- EXISTING PIPE TO BE ABANDONED
- EXISTING PIPE ABANDONDED IN PLACE AS REQUIRED TO PERFORM NEW WORK
- EXISTING PIPE TO BE REMOVED
- WELDED JOINT
- GROOVED END JOINT
- FLANGED JOINT
- MECHANICAL JOINT
- BELL & SPIGOT JOINT (;EADED)
- HUB & SPIGOT JOINT (RUBBER GASKET)
- BALL JOINT
- ADAPTER SIDE GROOVED END ADAPTER FLANGE
- FLANGED COUPLING ADAPTER
- FLANGED COUPLING ADAPTER WITH THRUST TIES
- FLEXIBLE COUPLING
- FLEXIBLE COUPLING WITH THRUST TIES
- METAL BELLOWS EXP JOINT
- ELASTOMER BELLOWS EXP JOINT
- ELBOW UP
- ELBOW DOWN
- TEE UP
- TEE DOWN
- LATERAL UP
- LATERAL DOWN
- CONCENTRIC REDUCER
- ECCENTRIC REDUCER
- REDUCING BUSHING
- UNION
- CAP
- ANCHOR



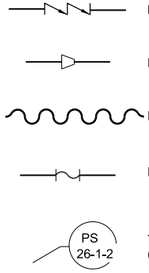
- ELBOW, 90 DEGREE
- CROSS
- TEE
- ELBOW, 45 DEGREE
- LATERAL

NOTES:

1. ONLY FLANGED END CONNECTIONS ARE SHOWN HERE FOR DOUBLE LINE FITTINGS. FITTINGS WITH OTHER END PATTERNS ARE SHOWN SIMILARLY ON THE CONSTRUCTION DRAWINGS. ALSO SEE PIPING SPECIFICATIONS.
2. SYMBOLS SHOWN HERE FOR SINGLE LINE FITTINGS ARE GENERIC ONLY. REFER TO PIPING SPECIFICATIONS FOR SPECIFIC END CONNECTIONS FOR SINGLE LINE PIPE AND FITTINGS.
3. EXISTING PIPE AND EQUIPMENT IS SHOWN LIGHT-LINED OR SCREENED OR NOTED AS EXISTING. NEW PIPING AND EQUIPMENT IS SHOWN HEAVY-LINED.

MISCELLANEOUS PIPING SYMBOLS

- STRAINER
- SIGHT GLASS
- FLEXIBLE (ELASTOMER) PIPE CONNECTION
- GAUGE WITH COCK
- THERMOMETER
- ROTAMETER
- PIG LAUNCHER
- PIG CATCHER
- BACKFLOW PREVENTER
- REDUCER
- FLEXIBLE HOSE
- FLEXIBLE CONNECTOR
- TYPICAL INSTRUMENT SYMBOL (SEE I&C LEGEND)



VALVE SYMBOLS

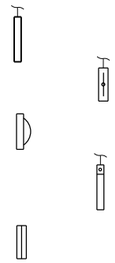
- GATE
- KNIFE GATE
- BUTTERFLY
- GLOBE
- BALL
- SEATING PORT
- ECCENTRIC PLUG
- PLUG OR COCK
- NEEDLE
- DIAPHRAGM
- PINCH
- SWING CHECK
- BALL CHECK
- HOSE VALVE (HV- X) OR (V-X) X = NO. IN SPECS
- SAMPLE
- MUD
- PRESSURE RELIEF
- AIR AND/OR VACUUM RELEASE
- REGULATED SIDE
- PRESSURE CONTROL
- REGULATED SIDE
- PRESSURE REGULATOR
- MULTI-PORT VALVE, ARROWS INDICATE FLOW PATTERN. SEATING PORTS ARE IMPLIED BY INDICATED FLOW PATTERN.
- TELESCOPING
- ROTARY
- ANGLE GATE

VALVE SYMBOLS

- PNEUMATIC DIAPHRAGM SPRING-OPPOSED, SINGLE OR DOUBLE ACTING
- PNEUMATIC CYLINDER SINGLE OR DOUBLE ACTING ACTUATED BY ON INPUT
- ELECTRIC MOTOR OPERATED
- HYDRAULIC
- MANUAL
- SOLENOID
- ELECTRO HYDRAULIC

GATE SYMBOLS

ELEVATION VIEW

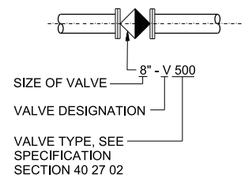


PLAN VIEW

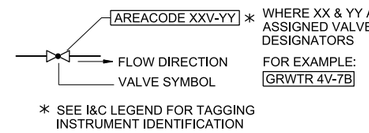
- SLUICE
- BUTTERFLY
- FLAP
- SHEAR
- FABRICATED SLIDE
- STOP LOG

VALVE DESIGNATIONS

MANUAL VALVES AND CHECK VALVES



CONTROL VALVES

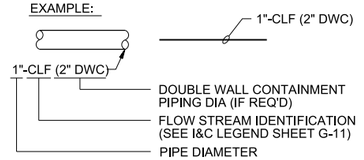


* WHERE XX & YY ARE ASSIGNED VALVE DESIGNATORS
FOR EXAMPLE: GRWTR 4V-7B

* SEE I&C LEGEND FOR TAGGING INSTRUMENT IDENTIFICATION

PIPING DESIGNATION

EXAMPLE:



PIPE AND FITTING END PATTERNS

B	BELL	PE	PLAIN END
S	SPIGOT	GE	GROOVED END
F	FLANGE	MJ	MECHANICAL JOINT

EXAMPLE:

REGISTERED PROFESSIONAL ENGINEER
DINGSHAN WANG
No. M052378
Exp. 06-30-15
MECHANICAL
STATE OF CALIFORNIA

SWEETWATER AUTHORITY

PLANS FOR THE INSTALLATION OF:

REYNOLDS DESALINATION FACILITY PHASE II EXPANSION MECHANICAL LEGEND 1

REV.	DATE	DESCRIPTION	BY	APPVD.
A				
B				
C				

DESIGN BY: Q. WANG	SCALE: NO SCALE
DRAWN BY: S. GOODRICH	DATE:
CHECKED BY: XXX	DESIGN#
AS CONSTRUCTED:	PAVEMENT#

1/4 SECTION — WO#

WO#

ENGINEER PE XXXXX — DATE

APPROVED — DATE

SHEET XX OF XX

G-5

PW: \\DEN\488009 – RICHARD A REYNOLDS DESAL FACILITY\$FILENAME

11-JUL-2014

THRUST BLOCK NOTES AND DETAILS

THRUST BLOCK NOTES

1. KEEP CONCRETE CLEAR OF JOINT AND JOINT ACCESSORIES.
2. CONCRETE THRUST BLOCKING SHALL BE POURED AGAINST UNDISTURBED EARTH.
3. REQUIRED VOLUMES OR BEARING AREAS AT FITTINGS SHALL BE AS INDICATED BELOW, ADJUSTED, IF NECESSARY, TO CONFORM TO THE TEST PRESSURE(S) AND ALLOWABLE SOIL BEARING STRESS(ES) STATED IN THE SPECIFICATIONS.
4. THRUST BLOCK VOLUMES FOR VERTICAL BENDS HAVING UPWARD RESULTANT THRUSTS ARE BASED ON TEST PRESSURE OF 150 PSIG AND THE WEIGHT OF CONCRETE = 4050 LBS/CU YD. TO COMPUTE VOLUMES FOR DIFFERENT TEST PRESSURES, USE THE FOLLOWING EQUATION: VOLUME = (TEST PRESS./150) x (TABLE VALUE).
5. BEARING AREAS FOR HORIZONTAL BEND THRUST BLOCKS ARE BASED ON TEST PRESSURE OF 150 PSIG AND AN ALLOWABLE SOIL BEARING STRESS OF 2000 LBS/SQ FT. TO COMPUTE BEARING AREAS FOR DIFFERENT TEST PRESSURES AND SOIL BEARING STRESSES, MULTIPLY TABLE VALUES BY THE FACTOR (13.33)(P'/S'_b), WHERE: P' = ACTUAL TEST PRESSURE, PSIG; S'_b = ACTUAL SOIL BEARING PRESSURE, PSF.
6. THRUST BLOCKS FOR VERTICAL BENDS HAVING DOWNWARD RESULTANT THRUSTS SHALL BE THE SAME AS FOR HORIZONTAL BENDS.
7. BEARING AREAS, VOLUMES, AND SPECIAL BLOCKING DETAILS SHOWN ON PLANS TAKE PRECEDENCE OVER THIS STANDARD
8. BEARING AREA OF THRUST BLOCK SHALL NOT BE LESS THAN 1.0 SQ FT.
9. VERTICAL BENDS THAT REQUIRE A THRUST BLOCK VOLUME EXCEEDING 5 CUBIC YARDS REQUIRE SPECIAL BLOCKING DETAILS. SEE PLANS FOR VOLUMES SHOWN TO LEFT OF SOLID LINE IN TABLE.
10. ALLOWABLE SOIL BEARING STRESS IS 2000 LBS/SQ FT. [TO BE VERIFIED]

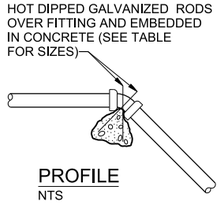
BEARING AREA OF THRUST BLOCKS IN SQ. FT. (HORIZONTAL BENDS)

FITTING SIZE	TEE, WYE, TERMINAL PLUG, OR CAP	90° BEND OR PLUGGED CROSS	TEE PLUGGED RUN		BEND ANGLE		
			A_1	A_2	45°	22 1/2°	11 1/4°
≤ 4	1.0	1.4	1.9	1.4	1.0	-	-
6	2.1	3.0	4.3	3.0	1.6	1.0	-
8	3.8	5.3	7.6	5.4	2.9	1.5	1.0
10	5.9	8.4	11.8	8.4	4.6	2.4	1.2
12	8.5	12.0	17.0	12.0	6.6	3.4	1.7
14	11.5	16.3	23.0	16.3	8.9	4.6	2.3
16	15.0	21.3	30.0	21.3	11.6	6.0	3.0
18	19.0	27.0	38.0	27.0	14.6	7.6	3.8
20	23.5	33.3	47.0	33.3	18.1	9.4	4.7
24	34.0	48.0	68.0	48.0	26.2	13.6	6.8

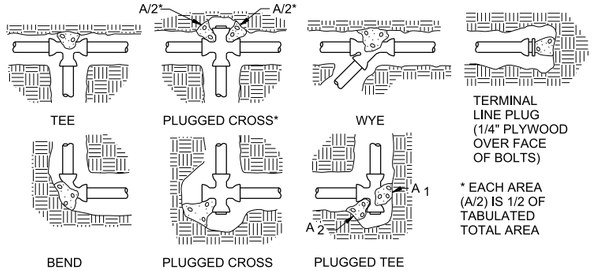
VOLUME OF THRUST BLOCK IN CUBIC YARDS (VERTICAL BENDS)

FITTING SIZE	BEND ANGLE		
	45°	22 1/2°	11 1/4°
4	1.1	0.4	0.2
6	2.7	1.0	0.4
8	4.0	1.5	0.6
10	6.0	2.3	0.9
12	8.5	3.2	1.3
14	11.5	4.3	1.8
16	14.8	5.6	2.3

FITTING SIZE	ROD SIZE	EMBEDMENT
12" AND LESS	#6	30"
14"-16"	#8	36"



PROFILE
NTS



PLAN
NTS

MECHANICAL LEGEND AND NOTES

GENERAL PIPING NOTES

1. UNDERGROUND UTILITIES SHOWN ARE TAKEN FROM EXISTING RECORDS AND ARE SHOWN FOR THE CONVENIENCE OF THE CONTRACTOR ONLY. THE CONTRACTOR SHALL CONTACT ALL UTILITY OWNERS AND CONFIRM LOCATIONS OF EXISTING UTILITIES AT LEAST 48 HOURS BEFORE BEGINNING CONSTRUCTION. THE CONTRACTOR SHALL ACCURATELY LOCATE AND UNCOVER ALL EXISTING UTILITIES BEFORE BEGINNING CONSTRUCTION. ANY DAMAGE RESULTING FROM THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE. WHERE CROSSING OF EXISTING UTILITIES OCCUR, PROVIDE 12" MINIMUM CLEARANCE.
2. UNLESS OTHERWISE NOTED, LAY PIPE TO UNIFORM GRADE BETWEEN INDICATED ELEVATION POINTS.
3. SIZE OF FITTINGS SHOWN ON PLANS SHALL CORRESPOND TO ADJACENT STRAIGHT RUN OF PIPE, UNLESS OTHERWISE INDICATED. TYPE OF JOINT AND FITTING MATERIAL SHALL BE THE SAME AS SHOWN FOR ADJACENT STRAIGHT RUN OF PIPE.
4. LOCATION AND NUMBER OF PIPE HANGERS AND PIPE SUPPORTS SHOWN IS ONLY APPROXIMATE. CONTRACTOR SHALL DESIGN SUPPORTS AS SPECIFIED IN SPECIFICATION SECTION 40 05 15.
5. ALL JOINTS SHALL BE WATERTIGHT. WALL PIPES SHALL BE USED WHEREVER PIPING PASSES FROM A STRUCTURE TO BACKFILL.
6. ALL FLEXIBLE CONNECTORS AND FLANGED COUPLING ADAPTERS SHALL BE PROVIDED WITH THRUST TIES, BLOCKS, AND ANCHORS, UNLESS OTHERWISE NOTED. THRUST PROTECTION SHALL BE ADEQUATE FOR TEST PRESSURES SPECIFIED IN SPECIFICATION SECTION 40 27 00.
7. SYMBOLS, LEGENDS, AND PIPE USE IDENTIFICATIONS SHOWN SHALL BE FOLLOWED THROUGHOUT THE PLANS, WHEREVER APPLICABLE. NOT ALL OF THE VARIOUS PIPING COMPONENTS ARE NECESSARILY USED IN THE PROJECT.
8. ALL BURIED PIPING SPECIFIED TO BE PRESSURE TESTED, EXCEPT FLANGED, WELDED, OR SCREWED PIPING, SHALL BE PROVIDED WITH CONCRETE THRUST BLOCKS AT ALL DIRECTION CHANGES, UNLESS OTHERWISE NOTED. SEE THRUST DETAILS AND NOTES ON THIS SHEET AND SPECIFICATION SECTION 40 27 00.
9. NUMBER AND LOCATION OF UNIONS SHOWN ON PLANS IS ONLY APPROXIMATE. PROVIDE ALL UNIONS NECESSARY TO FACILITATE CONVENIENT REMOVAL OF VALVES AND MECHANICAL EQUIPMENT.
10. WHERE A GROOVED END COUPLING IS SHOWN, IT SHALL BE THE RIGID JOINT TYPE, UNLESS OTHERWISE SPECIFIED. WHERE A FLANGED COUPLING ADAPTER IS SHOWN, A STANDARD FLANGE SHALL BE JOINED TO THE COUPLING ADAPTER.

REGISTERED PROFESSIONAL ENGINEER QINGSHAN WANG No. M052378 Exp. 06-30-15 MECHANICAL STATE OF CALIFORNIA

PRELIMINARY

SWEETWATER AUTHORITY

PLANS FOR THE INSTALLATION OF:

REYNOLDS DESALINATION FACILITY PHASE II EXPANSION MECHANICAL LEGEND 2

REV.	DATE	DESCRIPTION	BY	APPVD.
A				
B				
C				

DESIGN BY: Q. WANG | SCALE: NO SCALE
DRAWN BY: S. GOODRICH | DATE:
CHECKED BY: XXX | DESIGN#
AS CONSTRUCTED: | PAVEMENT#

1/4 SECTION | WO#
ENGINEER PE XXXXX | DATE | WO#
APPROVED | DATE | SHEET XX OF XX
G-6

PW: \\DEN\488009 – RICHARD A REYNOLDS DESAL FACILITY\$FILENAME

11–JUL–2014

HEATING, VENTILATING, AND AIR CONDITIONING SYMBOLS

SUPPLY GRILLE OR REGISTER (SG, SR)

EXHAUST, RETURN, OR TRANSFER GRILLE OR REGISTER (EG, ER, RG, RR, TG, TR)

4-WAY THROW | 3-WAY THROW | 2-WAY THROW | 1-WAY THROW
CEILING DIFFUSERS (CD)

CEILING EXHAUST, RETURN AND TRANSFER GRILLES AND REGISTERS (EG, ER, RG, RR, TG, TR)

MITERED ELBOW WITH TURNING VANES

RADIUS ELBOW

F — FIRE DAMPER

FS — FIRE/SMOKE DAMPER

S — SMOKE DAMPER

BALANCING DAMPER

M1 — MOTORIZED DAMPER

BDD — BACKDRAFT DAMPER

ID — DUCT INSPECTION DOOR (HORIZONTAL OR VERTICAL)

R — INCLINED RISE (R) OR DROP (D) ARROW IN DIRECTION OF FLOW

45 DEG BRANCH CONNECTION WITH BALANCING DAMPER

12x10 | 8x8 — ECCENTRIC TRANSITION

6x6 / 12x10 — CONCENTRIC TRANSITION

FOT — TRANSITION, FOT = FLAT ON TOP FOB = FLAT ON BOTTOM

FLEX DUCT AND SPIN-IN CONNECTION WITH INTEGRAL BALANCING DAMPER

AIR OUT OF OPENING

AIR INTO OPENING

COMBINATION DISCONNECT AND MOTOR STARTER

WP — WEATHER PROOF COMBINATION DISCONNECT AND MOTOR STARTER

VIBRATION ISOLATOR

(200) — AIR FLOW QUANTITY: 200 SCFM

PRESSURE AND TEMPERATURE TEST PLUG

POINT OF CONNECTION, RENOVATION

POINT OF REMOVAL, DEMOLITION

AD — CEILING ACCESS DOOR

UC — PROVIDE DOOR UNDERCUT

DOOR GRILLE

N — PHOTO NUMBER AND DIRECTION IDENTIFIER

FLEXIBLE CONNECTION (FC)

FLEXIBLE DUCTWORK (SINGLE LINE)

FLEXIBLE DUCTWORK (DOUBLE LINE)

24x16
1. RECTANGULAR DUCT
2. DIMENSIONS IN INCHES
3. FIRST DIMENSION VISIBLE SIDE

24/16
1. FLAT-OVAL DUCT
2. DIMENSIONS IN INCHES
3. FIRST DIMENSION VISIBLE SIDE

24Ø
1. ROUND DUCT
2. DIMENSIONS IN INCHES

24x16
1. INTERNAL INSULATION/SOUND ATTENUATION
2. AS SPECIFIED. DUCT DIMENSIONS SHOWN ARE NET INSIDE, TO INSIDE FACE OF LINER.
3. PROVIDE LINING WHERE SHOWN OR NOTED ON DWGS, AND AS DESCRIBED IN SPECIFICATIONS.

24x16
1. EXISTING DUCT/EQUIPMENT TO REMAIN

1. DEMOLITION - EXISTING DUCT/EQUIPMENT TO BE REMOVED

R — EXISTING EQUIPMENT, RELOCATED

X — INDICATES DUCT MOUNTED CONTROL DEVICE "X" SEE HVAC CONTROL SYMBOLS

SUPPLY OR INTAKE DUCT UP

SUPPLY OR INTAKE DUCT DOWN

RETURN OR EXHAUST DUCT UP

RETURN OR EXHAUST DUCT DOWN

EQUIPMENT NOMENCLATURE

MANUAL VALVES AND CHECK VALVES IDENTIFICATION

75 - V 400
- VALVE TYPE, SEE SPECIFICATIONS
- VALVE DESIGNATION
- SIZE OF VALVE

CONTROL VALVES IDENTIFICATION

M
- ACTUATOR SYMBOL
- FLOW DIRECTION
- VALVE SYMBOL
- FLOW DIRECTION

AIR OUTLET AND INLET IDENTIFICATION

8x8 / EG1 / (250)
- DIMENSIONS IN INCHES
- SPECIFICATION DESCRIPTION
- AIRFLOW IN CFM

HVAC EQUIPMENT TAG

85-UH-1
- SEQUENTIAL UNIT NUMBER
- HVAC EQUIPMENT IDENTIFICATION
- BUILDING IDENTIFICATION NUMBER

VALVE SYMBOLS

- GATE
- BUTTERFLY
- GLOBE
- BALL
- SEATING PORT / ECCENTRIC PLUG
- PLUG OR COCK
- NEEDLE
- SWING CHECK
- BALL CHECK
- B — BALANCING FITTING
- F / B — COMBINATION FLOWMETER AND BALANCING FITTING
- F / B / S.O. — COMBINATION FLOWMETER, BALANCING FITTING AND SHUT-OFF VALVE
- PRESSURE RELIEF
- AIR VENT (AUTO)
- AIR VENT (MANUAL)
- REGULATED SIDE PRESSURE CONTROL

HVAC PIPING SYMBOLS

DOUBLE LINE	SINGLE LINE	
		EXISTING PIPE (SCREENED)
		NEW PIPE
		EXISTING PIPE TO BE ABANDONED
		EXISTING PIPE TO BE REMOVED
		WELDED JOINT
		GROOVED END JOINT
		FLANGED JOINT
		FLEXIBLE COUPLING
		GROOVED END ADAPTER FLANGE
		STEEL BELLOWS EXPANSION JOINT
		ELBOW UP
		ELBOW DOWN
		TEE UP
		TEE DOWN
		LATERAL UP
		CONCENTRIC REDUCER
		ECCENTRIC REDUCER
		UNION
		ANCHOR
		PIPE ALIGNMENT GUIDE
		FLEXIBLE (ELASTOMER) PIPE CONNECTION

PIPING FLOW STREAM IDENTIFICATION

LPS	STEAM, LOW PRESSURE
HPS	STEAM, HIGH PRESSURE
SC	STEAM, CONDENSATE
CHS	CHILLED WATER, SUPPLY
CHR	CHILLED WATER, RETURN
HHS	HEATING HOT WATER, SUPPLY
HHR	HEATING HOT WATER, RETURN
CD	HVAC CONDENSATE DRAIN
CWS	CONDENSER WATER, SUPPLY
CWR	CONDENSER WATER, RETURN

HVAC CONTROLS SYMBOLS

- MCC — DIVISION 16 MOTOR CONTROL CENTER
- MS — MOTOR STARTER
- M — ELECTRIC MOTOR
- FZ — LOW-LIMIT FREEZE THERMOSTAT
- VFD / AFD — VARIABLE/ADJUSTABLE FREQUENCY DRIVE
- HVAC CONTROL PANEL (HCP)
- S — SWITCH
- OS — OCCUPANCY SENSOR
- M / M — MOTOR CONTROL VALVE (2-WAY), (3-WAY)
- T / T — TEMPERATURE SENSOR OR THERMOSTAT
- H / H — HUMIDITY SENSOR OR HUMIDISTAT
- h — ENTHALPY SENSOR
- FS — LIQUID FLOW SWITCH
- F — DUCT MOUNTED AIRFLOW MONITORING STATION
- ANALOG OUTPUT, INPUT: DATA POINT TO DDC
- DIGITAL OUTPUT, INPUT: DATA POINT TO DDC
- CS — CURRENT SENSOR
- DP — DIFFERENTIAL PRESSURE SENSOR OR SWITCH
- SP — STATIC PRESSURE SENSOR
- I — DUCT SMOKE DETECTOR
- FI — AREA SMOKE DETECTOR
- M — MOTORIZED DAMPER
- R — RELAY
- S — SOLENOID VALVE
- FACP — DIVISION 16 FIRE ALARM CONTROL PANEL
- PT — LIQUID LINE PRESSURE SENSOR AND SIGNAL TRANSMITTER
- FIT — LIQUID FLOW INDICATING TRANSMITTER
- FCV — FLOW CONTROL VALVE
- TURBINE LIQUID FLOW METER
- VENTURI FLOW METER
- POSITIVE, NEGATIVE, NEUTRAL ROOM PRESSURIZATION
- FSC — FAN SPEED CONTROLLER
- ALARM LIGHT AND HORN STATION

NOTE:

SEE INSTRUMENTATION LEGEND FOR ADDITIONAL CONTROL SYSTEM SYMBOLS, ABBREVIATIONS AND LEGEND.

HVAC GENERAL NOTES

1. THIS IS A STANDARD LEGEND SHEET. SOME SYMBOLS OR ABBREVIATIONS ON THIS SHEET MAY NOT APPEAR ON THE PLANS.
2. FOR ADDITIONAL ABBREVIATIONS OF OTHER DIVISIONS, SEE OTHER LEGENDS FOR PLUMBING, MECHANICAL, AND STRUCTURAL/ARCHITECTURAL.

ABBREVIATIONS AND EQUIPMENT ID

ACCU	AIR COOLED CONDENSING UNIT
ACU	AIR CONDITIONING UNIT
AHU	AIR HANDLING UNIT
AS	CENTRIFUGAL AIR SEPARATOR
BD	BALANCING DAMPER
BDD	BACKDRAFT DAMPER (GRAVITY)
BO	BOILER
CC	COOLING COIL
CCU	CABINET CONVECTOR UNIT
CD	CEILING DIFFUSER
CF	CEILING FAN
CMF	CHEMICAL FEEDER
CRU	CONDENSATE RETURN UNIT
CSU	CEILING-MOUNTED AIR SUPPLY UNIT
CU	CONDENSING UNIT
DL	DRUM LOUVER DIFFUSER
EA	EXHAUST AIR
EDH	ELECTRIC DUCT HEATER
EF	EXHAUST FAN
EG	EXHAUST GRILLE
ER	EXHAUST REGISTER
ET	DIAPHRAGM EXPANSION TANK
EUH	ELECTRIC UNIT HEATER
FC	FLEXIBLE CONNECTION, FAIL CLOSE
FCU	FAN-COIL UNIT
FD	FIRE DAMPER
FO	FAIL OPEN
FF	FINAL FILTER
FRP	FIBERGLASS REINFORCED PLASTIC
FSD	FIRE SMOKE DAMPER
FT	FINNED-TUBE BASEBOARD HEATER
FZ	FREEZE STAT
HC	HEATING COIL
HCP	HVAC CONTROL PANEL
HD	HOOD, EXHAUST
HGR	HOT GLYCOL RETURN
HGS	HOT GLYCOL SUPPLY
HTP	HEAT TRANSFER PACKAGE
HVU	HEATING AND VENTILATING UNIT
HWP	HEATING WATER PUMP
HX	HEAT EXCHANGER
IRH	INFRARED HEATERS
JD	JET DIFFUSER
MAU	MAKEUP AIR UNIT
MB	MIXING BOX
MD	MOTORIZED DAMPER
ML	MOTORIZED LOUVER
OA	ODOROUS AIR
OAI	OUTSIDE AIR INTAKE
OBD	OPPOSED-BLADE DAMPER (MANUAL)
OIT	OPERATOR INTERFACE TERMINAL
OS	OCCUPANCY SENSOR
OSA	OUTSIDE AIR
PA	PRESSURIZATION AIR
PCV	PRESSURE-CONTROL VALVE
PF	PREFILTER
PHC	PREHEAT COIL
PTAC	PACKAGED TERMINAL AIR CONDITIONING UNIT
PTS	PITOT-TUBE TESTING STATION
RA	RETURN AIR
RF	RETURN FAN
RG	RETURN GRILLE
RGH	RADIANT GAS-FIRED HEATING SYSTEM
RL	REFRIGERANT LIQUID PIPE
RR	RETURN REGISTER
RS	REFRIGERANT SUCTION PIPE
SA	SOUND ATTENUATOR OR SUPPLY AIR
SF	SUPPLY FAN

REGISTERED PROFESSIONAL ENGINEER — PATRICK R. RAUSCH — No. 24000 Exp. 12-31-15 — MECHANICAL — STATE OF CALIFORNIA

PRELIMINARY

SWEETWATER AUTHORITY

PLANS FOR THE INSTALLATION OF:

REYNOLDS DESALINATION FACILITY PHASE II EXPANSION HVAC LEGEND

REV.	DATE	DESCRIPTION	BY	APPVD.
A				
B				
C				

DESIGN BY: P. RAUSCH | SCALE: NO SCALE
DRAWN BY: S. GOODRICH | DATE:
CHECKED BY: XXX | DESIGN#
AS CONSTRUCTED: | PAVEMENT#

1/4 SECTION | WO#
WO#
ENGINEER PE XXXXX | DATE | SHEET XX OF XX
APPROVED | DATE | G-7

PW: \\DEN\488009 – RICHARD A REYNOLDS DESAL FACILITY\ $FILENAME

11–JUL–2014

ONE LINE DIAGRAMS-1

SYMBOL	DESCRIPTION
	DRAWOUT AIR CIRCUIT BREAKER, LOW VOLTAGE
400	CIRCUIT BREAKER, THERMAL MAGNETIC TRIP SHOWN, 3 POLE, UNO
AS/AF or AT/AF	CIRCUIT BREAKER, STATIC TRIP UNIT, SENSOR AMP TRIP AND FRAME RATINGS SHOWN, 3 POLE, UNO
100/M	CIRCUIT BREAKER, MAGNETIC TRIP ONLY, TRIP RATING SHOWN, 3 POLE, UNO
400 400	CIRCUIT BREAKER WITH CURRENT LIMITING FUSES, TRIP AND FUSE RATING INDICATED, 3 POLE, UNO
400 225	FUSED SWITCH, SWITCH AND FUSE CURRENT RATING INDICATED, 3 POLE, UNO
100	SWITCH, CURRENT RATING INDICATED, 3 POLE, UNO
60 (3)	FUSE, CURRENT RATING AND QUANTITY INDICATED
1	MAGNETIC STARTER WITH OVERLOAD, NEMA SIZE INDICATED, FVNR UNO
AFD	ELECTRONIC STARTER/SPEED CONTROL RVSS = REDUCED VOLTAGE SOFT STARTER AFD = AC ADJUSTABLE FREQUENCY DRIVE DC = DC ADJUSTABLE SPEED DRIVE RVAT = REDUCED VOLTAGE AUTO TRANSFORMER TYPE RVRT = REDUCED VOLTAGE REACTOR TYPE
	CABLE OR BUS CONNECTION POINT
K	KEY INTERLOCK
	SURGE ARRESTER (GAP TYPE)
10	CAPACITOR - KVAR INDICATED, 3 PHASE
3	MOTOR, SQUIRREL CAGE INDUCTION - HORSEPOWER INDICATED
500/625	GENERATOR, KW/KVA RATING SHOWN
VS V 0-600V	ANALOG METER WITH SWITCH - SCALE RANGE SHOWN V = VOLTAGE KW = KILOWATTS A = AMPERAGE KVAR = KILOVARS PF = POWER FACTOR
DPM	DIGITAL POWER METER (MULTIFUNCTION)
UM	UTILITY REVENUE METER
	GROUND
15 KVA 480-120/240V 1 PH	TRANSFORMER, SIZE, VOLTAGE RATINGS, AND PHASE INDICATED
	SHIELDED ISOLATION TRANSFORMER
480-120V (3)	POTENTIAL TRANSFORMER, VOLTAGE RATING AND QUANTITY INDICATED
100:5 (3)	CURRENT TRANSFORMER, RATIO(100:5) AND QUANTITY INDICATED (3)
	CONNECTION POINT TO EQUIPMENT SPECIFIED IN OTHER DIVISIONS. RACEWAY, CONDUCTOR AND CONNECTION IN THIS DIVISION
TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSOR

ONE LINE DIAGRAMS-2

SYMBOL	DESCRIPTION
	DRAWOUT POWER CIRCUIT BREAKER, MEDIUM VOLTAGE
	NON DRAWOUT FUSED SWITCH, MEDIUM VOLTAGE
	DRAWOUT FUSED SWITCH AND CONTACTOR, MEDIUM VOLTAGE
	DRAWOUT FUSED SWITCH AND VACUUM CONTACTOR, MEDIUM VOLTAGE
	DRAWOUT VACUUM CONTACTOR, MEDIUM VOLTAGE
	MEDIUM VOLTAGE CABLE STRESS CONE TYPE TERMINATION, OPEN TERMINATOR OR ELBOW
	SWITCH - LOAD BREAK, GROUP OPERATED, MEDIUM VOLTAGE
	SWITCH W/ARCING HORNS, MEDIUM VOLTAGE
	DISCONNECTING FUSE - SOLID MATERIAL, MEDIUM VOLTAGE
	SWITCH - HOOK STICK OPERATED, SINGLE POLE, MEDIUM VOLTAGE
	FUSE - EXPULSION, HOOK STICK OPERATED, SINGLE POLE, MEDIUM VOLTAGE
	GROUND SWITCH, GANG OPERATED
	TERMINAL BLOCK LUG
	DELTA CONNECTION
	WYE GROUNDED CONNECTION, SOLID GROUND
R or Z	WYE NEUTRAL GROUND RESISTOR OR IMPEDANCE CONNECTION
86	RELAY OR DEVICE, FUNCTION NUMBER AS INDICATED
50:5 (1)	CURRENT TRANSFORMER, ZERO SEQUENCE, RATIO AND QUANTITY INDICATED
800/1200:5 (3)	BUSHING CURRENT TRANSFORMER, MULTI-RATIO AND QUANTITY INDICATED
MO	MOTOR OPERATOR, BREAKER OR SWITCH
EMU	ENERGY MONITORING UNIT
MPR	MOTOR PROTECTION RELAY

NOTES:

1. THESE ARE STANDARD LEGEND SHEETS. SOME SYMBOLS AND ABBREVIATIONS MAY APPEAR ON THE LEGEND AND NOT ON THE DRAWINGS.
2. FOR ADDITIONAL ABBREVIATIONS OF OTHER DIVISIONS (HVAC, MECHANICAL, AND STRUCTURAL/ARCHITECTURAL) SEE OTHER LEGENDS.

CONTROL DIAGRAMS-1

SYMBOL	DESCRIPTION
	PUSH-BUTTON SWITCH, MOMENTARY CONTACT, NORMALLY OPEN
	PUSH-BUTTON SWITCH, MOMENTARY CONTACT, NORMALLY CLOSED
	PUSH BUTTON SWITCH, MAINTAINED CONTACTS WITH MECHANICAL INTERLOCK
	3 POSITION SELECTOR SWITCH MAINTAINED CONTACT
HAND OFF AUTO XOO OOX	SELECTOR SWITCH - MAINTAINED CONTACT - CHART IDENTIFIES OPERATION WHEN NEEDED FOR CLARITY:

	POSITION		
CKT	HAND	OFF	AUTO
1	X	O	O
2	O	O	X

X - CLOSED CONTACT
O - OPEN CONTACT

SYMBOL	DESCRIPTION
	TOGGLE SWITCH, ON-OFF TYPE
ON OFF	SELECTOR SWITCH, ON-OFF TYPE
	MUSHROOM HEAD SWITCH
A	INDICATING LIGHT, PUSH-TO-TEST, LETTER INDICATES COLOR
G	INDICATING LIGHT - LETTER INDICATES COLOR A - AMBER G - GREEN S - STROBE B - BLUE R - RED C - CLEAR W - WHITE
ETM	ELAPSED TIME METER
M	MOTOR STARTER CONTACTOR COIL
CRX	CONTROL RELAY, X INDICATES NUMERICAL ORDER IN CIRCUIT
TDR X	TIME DELAY RELAY, X INDICATES NUMERICAL ORDER IN CIRCUIT
SV X	SOLENOID VALVE, X INDICATES NUMERICAL ORDER IN CIRCUIT
	CONTACT - NORMALLY OPEN
	CONTACT - NORMALLY CLOSED
	REMOTE DEVICE
	TIME DELAY RELAY CONTACT, NORMALLY OPEN, CLOSES WHEN ENERGIZED AND TIMED OUT
	TIME DELAY RELAY CONTACT, NORMALLY CLOSED, OPENS WHEN ENERGIZED AND TIMED OUT
	TIME DELAY RELAY CONTACT, CLOSES WHEN ENERGIZED, OPENS WHEN DE-ENERGIZED AND TIMED OUT
	TIME DELAY RELAY CONTACT, OPENS WHEN ENERGIZED, CLOSES WHEN DE-ENERGIZED AND TIMED OUT
	MOTOR SPACE HEATER
	TERMINAL BLOCK, REMOTE
	TERMINAL BLOCK, INTERNAL
	FUSED TERMINAL BLOCK
	FUSE, RATING INDICATED
CPT 120V	TRANSFORMER, CONTROL POWER
	THERMOCOUPLE

CONTROL DIAGRAMS-2

SYMBOL	DESCRIPTION
	CAPACITOR
+ −	BATTERY
	LIMIT SWITCH, NORMALLY OPEN, CLOSES AT END OF TRAVEL
	LIMIT SWITCH, NORMALLY CLOSED, OPENS AT END OF TRAVEL
	TEMPERATURE SWITCH, OPENS ON TEMPERATURE RISE
	TEMPERATURE SWITCH, CLOSES ON TEMPERATURE RISE
	FLOAT SWITCH, NORMALLY OPEN, CLOSES ON DESCENDING LEVEL
	FLOAT SWITCH, NORMALLY OPEN, CLOSES ON RISING LEVEL
	PRESSURE SWITCH, NORMALLY CLOSED, OPENS ON RISING PRESSURE
	PRESSURE SWITCH, NORMALLY OPEN, CLOSES ON RISING PRESSURE
	FLOW SWITCH, CLOSES ON INCREASED FLOW
	FLOW SWITCH, OPENS ON INCREASED FLOW
NGR	NEUTRAL GROUND CURRENT LIMITING RESISTOR
RES	CALIBRATING RESISTOR
T GEN	TACHOMETER GENERATOR
GFS	GROUND FAULT SENSOR
	FLASHER
	SEALED CONTACT
	BUZZER
	POTENTIOMETER
	RESISTOR
	BLOWN FUSE INDICATOR
	COAXIAL CABLE
	MULTICONDUCTOR SHIELDED CABLE
	DUPLEX RECEPTACLE
L U	RELAY, WITH MECHANICAL LATCH
	FULLWAVE DIODE BRIDGE (AC TO DC)

REGISTERED PROFESSIONAL ENGINEER LAN NHU LAI No. E17730 Exp. 06-30-14 ELECTRICAL STATE OF CALIFORNIA

PRELIMINARY

SWEETWATER AUTHORITY

PLANS FOR THE INSTALLATION OF:

REYNOLDS DESALINATION FACILITY PHASE II EXPANSION ELECTRICAL LEGEND 1

REV.	DATE	DESCRIPTION	BY	APPVD.
A				
B				
C				

DESIGN BY: L. LAI
DRAWN BY: S. GOODRICH
CHECKED BY: XXX
AS CONSTRUCTED:

SCALE: NO SCALE
DATE:
DESIGN#
PAVEMENT#

1/4 SECTION — WO#
WO#
ENGINEER PE XXXXX — DATE
APPROVED — DATE

SHEET XX OF XX
G-8

PW: \\DEN\488009 – RICHARD A REYNOLDS DESAL FACILITY\$FILENAME

11–JUL–2014

SYMBOL	DESCRIPTION

POWER SYSTEM PLAN-1

	CONNECTION POINT TO EQUIPMENT SPECIFIED. RACEWAY, CONDUCTOR,TERMINATION AND CONNECTION IN THIS DIVISION.
MCC-A	MAJOR ELECTRICAL COMPONENT OR DEVICE - NAME OR IDENTIFYING SYMBOL AS SHOWN.
LPXXA	PANELBOARD - SURFACE MOUNTED PANELBOARD LETTER OR NUMBER FACILITY NUMBER LP - LOW VOLTAGE PANEL DP - DISTRIBUTION PANEL
	PANELBOARD - FLUSH MOUNTED
	TERMINAL JUNCTION BOX
M	MOTOR, SQUIRREL CAGE INDUCTION
G	GENERATOR, VOLTAGE AND SIZE AS INDICATED.
LPXXA	HOME RUN - DESTINATION SHOWN
or G	EXPOSED CONDUIT AND CONDUCTORS*
or G	CONCEALED CONDUIT AND CONDUCTORS*

NOTE:
ALL UNMARKED CONDUIT RUNS CONSIST OF TWO NO. 12, ONE NO. 12 GROUND CONDUCTORS IN 3/4" CONDUIT. RUNS MARKED WITH CROSSHATCHES INDICATE NUMBER OF NO. 12 CONDUCTORS. CROSSHATCH WITH SUBSCRIPT "G" INDICATES GREEN GROUND WIRE.

G	CROSSHATCHES WITH BAR INDICATE NO.10 CONDUCTOR. SIZE CONDUIT ACCORDING TO SPECIFICATIONS AND APPLICABLE CODE.
[A1]	CONDUIT AND CONDUCTOR CALLOUT, SEE LEGEND.
	CONDUIT DOWN
	CONDUIT UP
	CONDUIT, STUBBED AND CAPPED
	CONDUIT TERMINATION AT CABLE TRAY
EX	EXISTING CONDUIT/ DUCT BANK
BD	BUS DUCT - SEE SPECIFICATIONS
CE	CONCRETE ENCASED CONDUIT
DB	DIRECT BURIED CONDUIT
FO	FIBER OPTIC CONDUIT
XXXX	CONCRETE ENCASED DUCT BANK WHERE XXXX IS THE DUCT BANK NAME. SEE CIRCUIT AND RACEWAY CODING DEFINITION
	CONCEALED CONDUIT ROUTING AREA
	CONDUIT ROUTING AREA
	CABLE TRAY
T	TRANSFORMER
J or CS	GENERAL CONTROL OR WIRING DEVICE. LETTER SYMBOLS OR ABBREVIATIONS INDICATE TYPE OF DEVICE
CS	CONTROL STATION, SEE CONTROL DIAGRAMS FOR CONTROL DEVICE(S) REQUIRED.
30 F	NONFUSED DISCONNECT SWITCH, CURRENT RATING INDICATED, 3 POLE
60/40 F	FUSED DISCONNECT SWITCH, CURRENT RATING INDICATED (60/40, 60=SWITCH RATING / 40=FUSE RATING) 3 POLE
2	COMBINATION CIRCUIT BREAKER AND MAGNETIC STARTER, NEMA SIZE INDICATED

SYMBOL	DESCRIPTION

POWER SYSTEM PLAN-2

100/40 B	BREAKER, SEPARATELY MOUNTED, CURRENT RATING INDICATED (100/40, 100 = FRAME SIZE; 40 = TRIP RATING) 3 POLE
2	CONTACTOR, MAGNETIC, NEMA SIZE INDICATED
L 30	LIGHTING CONTACTOR, CURRENT RATING INDICATED
2	STARTER, MAGNETIC NEMA SIZE INDICATED
XX 2	CONVENIENCE RECEPTACLE - DUPLEX UNLESS NOTED OTHERWISE WP - WEATHERPROOF C - CLOCK HANGER TL - TWIST LOCK CRE - CORROSION RESISTANT GFCI - GROUND FAULT CIRCUIT INTERRUPTER SUBSCRIPT NUMBER AT RECEPTACLE INDICATES CIRCUIT
	240V RECEPTACLE
	CONVENIENCE RECEPTACLE - QUADRUPLEX
	MULTI OUTLET ASSEMBLY
	DUPLEX CONVENIENCE RECEPTACLE - FLUSH IN FLOOR
	CONVENIENCE RECEPTACLE, PEDESTAL, DUPLEX SINGLE FACE UNLESS INDICATED OTHERWISE
L20R 20	RECEPTACLE, SPECIAL PURPOSE-NEMA CONFIGURATION AND AMPERAGE INDICATED
T	THERMOSTAT
	UTILITY REVENUE METERING FACILITY
EUH	ELECTRIC UNIT HEATER
AC	ELECTRIC AIR CONDITIONER (SELF CONTAINED UNIT)
	UTILITY POLE

LIGHTING SYSTEM PLAN

1 or 1	LUMINAIRE, SEE SCHEDULE
(1)	LUMINAIRE, SEE SCHEDULE
(1)•	LUMINAIRE WITH INTERNAL BATTERY BACKUP, SEE SCHEDULE
4 or 4	LUMINAIRE AND POLE, SEE SCHEDULE
5 or 5	WALL MOUNTED LUMINAIRE, SEE SCHEDULE
1	FLOOD LIGHTS - AIM IN THE DIRECTION SHOWN
	STANDBY LIGHTING UNIT, FLUSH MOUNTED, SEE SCHEDULE
	STANDBY LIGHTING UNIT, SURFACE MOUNTED, SEE SCHEDULE
XX or	EXIT LIGHTS - FILLED SECTION INDICATES LIGHTED FACE, ARROW INDICATES EGRESS DIRECTIONAL INDICATORS, XX = FIXTURE NUMBER, SEE SCHEDULE
Sa or 2a	SMALL LETTER SUBSCRIPT AT SWITCH AND LUMINAIRE INDICATES SWITCHING, SUBSCRIPT NUMBER AT LUMINAIRE INDICATES CIRCUIT
S	WALL SWITCH: 2- DOUBLE POLE P- PILOT LIGHT 3- THREE WAY K- KEY OPERATED 4- FOUR WAY D- DIMMER WP- WEATHERPROOF CRE- CORROSION RESISTANT EX- EXPLOSIONPROOF L- MOMENTARY 3-WAY M- MOTOR RATED MS- MANUAL STARTER WITH OVERLOADS
OS	OCCUPANCY SENSOR
CS	LIGHTING CONTACTOR
CS	MOTION DETECTOR
CS	PHOTOCELL

SYMBOL	DESCRIPTION

GROUND SYSTEM PLAN

	GROUND ROD
	GROUND ROD IN TEST WELL
G	GROUNDING CONDUCTOR, SIZE AS INDICATED
TA	CABLE TO CABLE TEE
XA	CABLE TO CABLE CROSS
	PLATE ADAPTER
XJ	CABLE TO REINFORCING STEEL
GT	GROUND ROD TO CABLE
	FLEXIBLE GROUND STRAP
GP	CABLE TO PIPE (BOLTED CONNECTION)
GF	CABLE TO FLAT
WA	CABLE TO STEEL SURFACE
GR	CABLE TO TOP OF GROUND ROD
SS	PARALLEL SPLICE
	PIGTAIL FOR CONNECTION TO EQUIPMENT CABINET OR FRAME
G	EQUIPMENT GROUND BUS
N	EQUIPMENT NEUTRAL BUS
LA	CABLE TO LUG

ABBREVIATION	DESCRIPTION

ABBREVIATIONS-2

A	AMPERE, AUTOMATIC
AC	ALTERNATING CURRENT
AFF	ABOVE FINISHED FLOOR
ATS	AUTOMATIC TRANSFER SWITCH
BKR	BREAKER
C	CONDUIT, CONTACTOR, CONDUCTOR, CLOSE
CLF	CURRENT LIMITING FUSE
CPT	CONTROL POWER TRANSFORMER
CR	CONTROL RELAY
CT	CURRENT TRANSFORMER, CABLE TRAY
DC	DIRECT CURRENT
DP	DISTRIBUTION PANEL
E	EMPTY
EOL	ELECTRONIC OVERLOAD
EXST	EXISTING
F, FU	FUSE
FREQ	FREQUENCY
G	GROUND
GEN	GENERATOR
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GND	GROUND
HH	HANDHOLE
HOA	HAND-OFF-AUTO
HP	HORSEPOWER
HS	HAND SWITCH
HZ	HERTZ
IC	INTERRUPTING CAPACITY
J, JB	JUNCTION BOX
KA	KILOAMPERES
KV	KILOVOLT
KVA	KILOVOLT AMPERES
KW	KILOWATTS
M	MAGNETIC CONTACTOR COIL, MOTOR, MANUAL
MCC	MOTOR CONTROL CENTER
MH	MANHOLE, METAL HALIDE, MOUNTING HEIGHT
NC	NORMALLY CLOSED
N.O.	NORMALLY OPEN
NTS	NOT TO SCALE
OL	OVERLOAD RELAY
PB	PULL BOX
PNL	PANEL
RGS	RIGID GALVANIZED STEEL CONDUIT
SDG&E	SAN DIEGO GAS AND ELECTRIC
SS	START STOP
SST	STAINLESS STEEL
SV	SOLENOID VALVE
SWBD	SWITCHBOARD
TYP	TYPICAL
V	VOLTAGE, VOLTS
VFD	VARIABLE FREQUENCY DRIVE
W	WATTS
WP	WEATHERPROOF
XFMR	TRANSFORMER

REGISTERED PROFESSIONAL ENGINEER — LAN NHU LAI — No. E17730 — Exp. 12-30-14 — ELECTRICAL — STATE OF CALIFORNIA

PRELIMINARY

SWEETWATER AUTHORITY

PLANS FOR THE INSTALLATION OF:

REYNOLDS DESALINATION FACILITY PHASE II EXPANSION

ELECTRICAL LEGEND 2

REV.	DATE	DESCRIPTION	BY	APPVD.
A				
B				
C				

DESIGN BY: L. LAI — SCALE: NO SCALE
DRAWN BY: S. GOODRICH — DATE:
CHECKED BY: XXX — DESIGN#
AS CONSTRUCTED: — PAVEMENT#

1/4 SECTION — WO#

WO#

ENGINEER PE XXXXX — DATE

APPROVED — DATE

SHEET XX OF XX

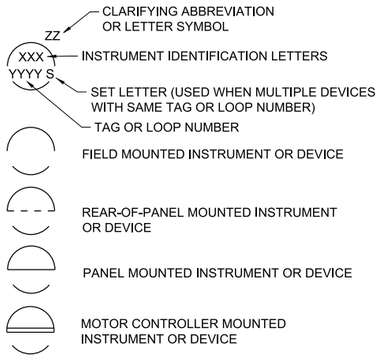
G-9

PW: \\DEN\488009 – RICHARD A REYNOLDS DESAL FACILITY\$FILENAME

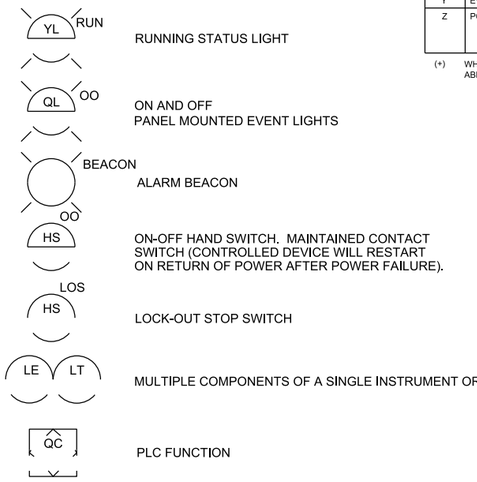
11–JUL–2014

INSTRUMENT AND DEVICE IDENTIFICATION

EXAMPLE SYMBOLS



SPECIAL CASES



PLC SYMBOL DEFINITIONS

- ▲ ANALOG INPUT
- ▼ ANALOG OUTPUT
- $\triangle_X$ DISCRETE INPUT
- ∇_X DISCRETE OUTPUT

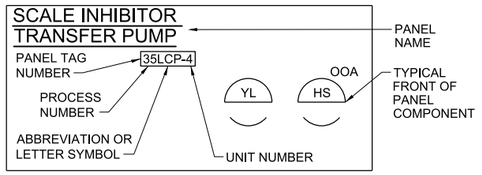
X = BLANK - MAINTAINED CONTACT
= M - MOMENTARY CONTACT
= P - PULSED CONTACT

INSTRUMENT IDENTIFICATION LETTERS TABLE

LETTER	FIRST LETTER (S)		SUCCEEDING LETTERS		
	PROCESS OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS (+)		ALARM		
B	BURNER				
C	CONDUCTIVITY (ELEC)			CONTROL	CLOSE OR CLOSED
D	DENSITY OR SP. GR.	DIFFERENTIAL			
E	VOLTAGE (EMF)		PRIMARY ELEMENT, OR SENSOR		
F	FLOW RATE	RATIO			FAIL
G	GATE		GLASS, GAUGE, OR VIEWING DEVICE		
H	HAND (MANUAL)				HIGH
I	CURRENT (ELEC)		INDICATE		
J	POWER	SCAN			
K	TIME OR TIME SCHEDULE	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT (PILOT)		LOW
M	MOTION				MIDDLE OR INTERMEDIATE
N	TORQUE		USERS CHOICE	USERS CHOICE	ON OR OPERATE
O			ORIFICE (RESTRICTION)		OPEN OR OPENED
P	PRESSURE OR VACUUM		POINT (TEST CONNECTION)		
Q	QUANTITY	INTEGRATE, TOTALIZE			
R	RADIATION		RECORD OR PRINT		
S	SPEED OR FREQUENCY	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE (+)		MULTIFUNCTION (+)	MULTIFUNCTION (+)	MULTIFUNCTION (+)
V	VIBRATION			VALVE, DAMPER OR LOUVER	
W	WEIGHT OR FORCE		WELL		
X	UNCLASSIFIED (+)	X AXIS	UNCLASSIFIED (+)	UNCLASSIFIED (+)	UNCLASSIFIED (+)
Y	EVENT, STATE, OR PRESENCE	Y AXIS		RELAY OR COMPUTE	
Z	POSITION	Z AXIS		DRIVE, ACTUATE OR UNCLASSIFIED FINAL CONTROL ELEMENT	

(+) WHEN USED, EXPLANATION IS SHOWN ADJACENT TO INSTRUMENT SYMBOL. SEE ABBREVIATIONS AND LETTER SYMBOLS.

PANEL EXAMPLE



TRANSDUCERS

A	= ANALOG	I	= CURRENT
D	= DIGITAL	P	= PNEUMATIC
E	= VOLTAGE	PF	= PULSE FREQUENCY
F	= FREQUENCY	PD	= PULSE DURATION
H	= HYDRAULIC	R	= RESISTANCE

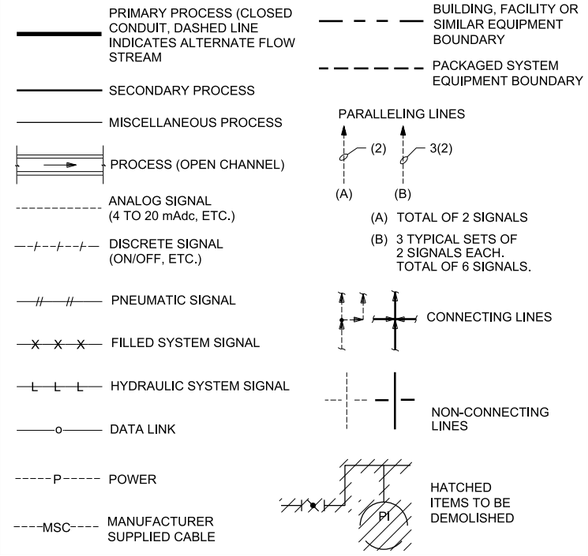
EXAMPLE:

CURRENT TO PNEUMATIC TRANSDUCER (BACK OF PANEL, IN A FLOW LOOP), UNIT PROCESS NUMBER 18, LOOP NUMBER 21

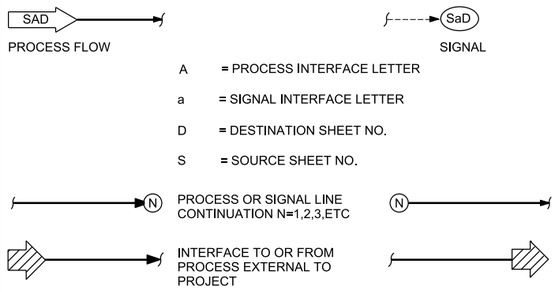
GENERAL NOTES

1. COMPONENTS AND PANELS SHOWN WITH A ASTERISK (∗) ARE PART OF A PACKAGE SYSTEM; SEE EQUIPMENT SPECIFICATIONS. FOR MULTIPLE PACKAGES ON SAME DRAWING, USE ∗, ∗ 2, ∗ 3, ETC.
2. COMPONENTS AND PANELS SHOWN WITH A DOUBLE ASTERISK (∗∗) ARE SPECIFIED DIVISION 26, ELECTRICAL.
3. COMPONENTS SHOWN WITH A DIAMOND (◆) ARE PART OF SECTION 40 90 00, INSTRUMENTATION AND, CONTROLS FOR PROCESS SYSTEMS.
4. THIS IS A STANDARD LEGEND. THEREFORE, NOT ALL OF THIS INFORMATION MAY BE USED ON THIS PROJECT.
5. EXISTING OR FUTURE ITEMS ARE REPRESENTED WITH A GRAY OR LIGHT LINE WORK. BLACK OR DARK LINE WORK REPRESENTS NEW ITEMS.

LINE LEGEND



INTERFACE SYMBOLS



SELF CONTAINED VALVE & EQUIPMENT TAG NUMBERS

W XD-Y

X: PROCESS NUMBER — SEE LIST- THIS SHEET
D: EQUIPMENT TYPE — SEE BELOW
Y: UNIT NUMBER

D:

AB	= AIR BLOWER	PCV	= PRESSURE CONTROL VALVE
ARV	= AIR RELEASE VALVE	P	= PUMP
ARVR	= AIR AND VACUUM RELEASE VALVE	PRV	= PRESSURE REGULATING VALVE
		PSE	= RUPTURE DISK
CF	= CARTRIDGE FILTER	PSV	= PRESSURE RELIEF VALVE
DG	= DEGASIFIER	SOV	= SOLENOID OPERATED VALVE
EDC	= EDUCTOR	T	= TANK
FAN	= FAN	TC	= TURBOCHARGER
FCV	= FLOW CONTROL VALVE	TCV	= TEMPERATURE CONTROL VALVE
FP	= FEED PUMP	TP	= TRANSFER PUMP
G	= GATE	V	= VALVE
HT	= HEATER		
HSP	= HIGH SERVICE PUMP		
M	= MECHANICAL EQUIPMENT		
MTR	= METER		
MX	= MIXER		

ABBREVIATIONS & LETTER SYMBOLS

ACK	ACKNOWLEDGE
ACP	AREA CONTROL PANEL
AFF	ABOVE FINISHED FLOOR
AFD	ADJUSTABLE FREQUENCY DRIVE
ALT	ALTERNATE
AM	AMMONIA
BW	BACKWASH
CCP	CENTRAL CONTROL PANEL
CK	CLOSE COMMAND
CL_2	CHLORINE (TYPICAL: USE STANDARD CHEMICAL ELEMENT ABBREVIATION)
CNTL	CONTROL
CP-X	CONTROL PANEL NO. X
DC	DIRECT CURRENT
DCM	DISTRIBUTED CNTRL MODULE ENCLOSURE (OR MULTIPLEXER)
DCS	DISTRIBUTED CONTROL SYSTEM
DF	DEGREES FAHRENHEIT
DO	DISSOLVED OXYGEN
DP	DRIVE PANEL
DUR	DURATION
DWC	DUAL WALL CONTAINMENT
ECP	ENVIRONMENT CONTROL PANEL
ES	EMERGENCY STOP
ETM	ELAPSED TIME METER
F	FALLING/USED WITH SETPOINT ON DWGS
FA	FAIL ALARM
FCL_2	FREE CHLORINE RESIDUAL
FL	FLUORIDE
FLR	FLOW RANGE
FOA	FORWARD/OFF/AUTO
FOR	FORWARD/OFF/REVERSE
FP-W-X	FIELD PANEL NO. W-X (W = UNIT PROCESS NUMBER X = PANEL NUMBER)
FREQ	FREQUENCY
FR	FORWARD-REVERSE
FWP	FEED WATER PANEL
GR	GAUGE RANGE
HOA	HAND-OFF-AUTO
HOR	HAND-OFF-REMOTE
HPP	HIGH PRESSURE PUMP
HSW	HAND SWITCH
ICP	INSTRUMENTATION CONTROL PANEL
INT	INTRUSION
I/O	INPUT/OUTPUT
IOC	INPUT - OUTPUT CABNET
IR	IN REMOTE
LCP	LOCAL CONTROL PANEL
LOS	LOCKOUT STOP
LR	LOCAL-REMOTE
LS	LINE SIZE
MA	MANUAL-AUTO
MC	MODULATE-CLOSED
MCC	MOTOR CONTROL CENTER
MFR	MANUFACTURER
MH	MOTOR HEATER
MOL	MOTOR OVERLOAD
MTS	MANUAL TRANSFER SWITCH
NOM	NOMINAL
NIC	NOT IN CONTRACT
OA	OFF-AUTO
OCR	OPEN-CLOSE-REMOTE
OCA	OPEN-CLOSE-AUTO
OIT	OPERATOR INTERFACE TERMINAL
OK	OPEN COMMAND
OL	OVERLOAD
OO	ON-OFF
OOA	ON-OFF-AUTO
OOR	ON-OFF-REMOTE
ORP	OXIDATION-REDUCTION POTENTIAL
OSC	OPEN-STOP-CLOSE
P	POWER
PA/S/PB	PORT A/STOP/PORT B
PDAMF	PRESSURE DIFFERENTIAL AT MAX FLOW
PDC	POWER DISTRIBUTION CENTER
pH	HYDROGEN ION CONCENTRATION
PR	PROCESS RANGE
PWP	PRODUCT WATER PANEL
PWR	POWER
R	RISING/USED WITH SETPOINTS ON DWGS
REM	REMOTE
RK	RUN COMMAND
RO	REVERSE OSMOSIS
RST	RESET
RTU-X	REMOTE TELEMETRY UNIT NO. X
RUN	RUNNING
SED	SEDIMENTATION
SEQ	SEQUENCE
SF	SLOWER-FASTER
SP	SET POINT
SR	SCALE RANGE
SS	START-STOP
TCL_2	TOTAL CHLORINE RESIDUAL
TRANS	TRANSMITTANCE
TURB	TURBIDITY
TYP	TYPICAL
UC	UNDER COMPUTER CONTROL
UPS	UNINTERRUPTIBLE POWER SUPPLY
VIB	VIBRATION
YS	ON STATUS
ZK	POSITION ADJUST
ZR	ZERO REFERENCE

PROCESS NUMBERS

4	RAW WATER
5	PRETREATMENT
10, 11, 12, 13, 14, 15	RO TRAINS
20	POST TREATMENT
23	IRON/MANGANESE BYPASS TREATMENT NO. 1
24	IRON/MANGANESE BYPASS TREATMENT NO. 2
25	MEMBRANE CLEANING SYSTEM
30	SULFURIC ACID FEED SYSTEM
35	SCALE INHIBITOR FEED SYSTEM
40	ALUMINUM SULFATE FEED SYSTEM
45	SODIUM HYPOCHLORITE FEED SYSTEM
50	CAUSTIC FEED SYSTEM
55	AMMONIA FEED SYSTEM
60	FLUORIDE FEED SYSTEM

REV.	DATE	DESCRIPTION	BY	APPVD.
A				
B				
C				

DESIGN BY: K. LYMAN — SCALE: NO SCALE
DRAWN BY: S. GOODRICH — DATE:
CHECKED BY: XXX — DESIGN#
AS CONSTRUCTED: — PAVEMENT#

SWEETWATER AUTHORITY

PLANS FOR THE INSTALLATION OF:
REYNOLDS DESALINATION FACILITY
PHASE II EXPANSION
INSTRUMENTATION AND CONTROL
LEGEND 1

1/4 SECTION — WO#
WO#
ENGINEER PE XXXXX — DATE
APPROVED — DATE
SHEET XX OF XX
G-10

PW: \\DEN\488009 – RICHARD A REYNOLDS DESAL FACILITY\ $FILENAME
11–JUL–2014

VALVE SYMBOLS

- GATE
- KNIFE GATE
- BUTTERFLY
- GLOBE
- BALL
- VEE- BALL
- PLUG
- SEAT PORT ECCENTRIC PLUG
- DIAPHRAGM
- PINCH
- NEEDLE
- SWING CHECK
- BALL CHECK
- PRESSURE RELIEF
- AIR AND/OR VACUUM RELEASE
- REGULATED SIDE PRESSURE CONTROL
- MULTI-PORT VALVES (BALL VALVE SHOWN. FOR OTHER VALVE TYPES, APPROPRIATE VALVE SYMBOL SHOWN.) ARROWS INDICATE FLOW PATTERN. SEAT PORTS ARE IMPLIED BY INDICATED FLOW PATTERN.
- TELESCOPE
- SAMPLE
- MUD

GATE SYMBOLS

- SLUICE
- BUTTERFLY
- FLAP
- FABRICATED SLIDE
- SHEAR

ACTUATOR SYMBOLS

- XX PNEUMATIC DIAPHRAM SPRING-OPPOSED, SINGLE OR DOUBLE ACTING
- XX PNEUMATIC CYLINDER SINGLE OR DOUBLE ACTING ACTUATED BY ONE INPUT
- M XX ELECTRIC MOTOR
- S XX SOLENOID
- H XX HYDRAULIC
- VALVE POSITIONER
- MANUAL
- E/H XX ELECTROHYDRAULIC
- DIAPHRAGM, DIFFERENTIAL PRESSURE

NOTE:
ON LOSS OF PRIMARY POWER (PNEUMATIC, ELECTRICAL OR HYDRAULIC)
XX: FO =FAIL OPEN
FC =FAIL CLOSED
FLP=FAIL TO LAST POSITION

PRIMARY ELEMENT SYMBOLS

- PARSHALL FLUME
- WEIR
- ORFICE PLATE
- FLOW TUBE
- PITOT-STATIC
- VORTEX METER
- FI ROTAMETER
- ULTRASONIC FLOWMETER
- TE TEMPERATURE WITH THERMOWELL
- M ELECTROMAGNETIC FLOWMETER
- PROPELLER OR TURBINE METER
- DE DENSITY METER
- XX GENERIC
- LE LEVEL (ULTRASONIC)
- LEVEL (BUBBLER TUBE)
- LS LEVEL SWITCH (FLOAT)
- LE LEVEL (RADAR)

MISCELLANEOUS SYMBOLS

- LE SIGHT GLASS
- DIAPHRAGM SEAL
- BLIND FLANGE
- AIR GAP
- D DRAIN
- AERATOR
- PLUG
- RECEPTACLE
- A SELF CONTAINED AIR SUPPLY
- SD D COMPOSITE SAMPLER (DIPPER TYPE)
- SS COMPOSITE SAMPLER (SUCTION TYPE)
- TV TV CAMERA
- RADIO ANTENNA
- I OR I INTERLOCK. SEE CONTROL DIAGRAMS
- A B S R C MEMORY ELEMENT S= SET , R= RESET
- X PURGE SET X: W = WATER A = AIR
- XX AIR SET XX= SUPPLY PRESSURE IN PSIG.
- FILTER/ REGULATOR/ GAUGE SET
- FLEXIBLE CONNECTOR
- PULSATION DAMPENER
- FILTER
- V OR V VENT
- 120V 120 VOLT, 60 HZ POWER
- 480V 480 VOLT, 60 HZ POWER
- ANNULAR DIAPHRAGM SEAL
- RUPTURE DISK (PRESSURE)
- RUPTURE DISK (VACUUM)
- PIG INSERT POINT
- OR PIG CATCH POINT
- PROPELLER TYPE MIXER
- M ELECTRIC MOTOR
- RS REMOVABLE SPOOL
- X TONE TRANSMITTER NO. X
- X TONE RECEIVER NO. X
- ALARM HORN / SPEAKER
- TV TV MONITOR
- HEATING ELEMENT
- S R ON/OFF RELAY. INPUT IS CONNECTED TO OUTPUT WHEN SWITCHING SIGNAL IS PRESENT.
- S R SWITCHING SIGNAL SWITCHING RELAY. INPUT WITH DOT IS CONNECTED TO OUTPUT WHEN SWITCHING SIGNAL IS PRESENT
- OTHER INPUT IS CONNECTED TO OUTPUT WHEN SWITCHING SIGNAL IS NOT PRESENT.
- F FLUSHING CONNECTION
- HOSE ADAPTOR
- S SEAL WATER SET
- WELD CAP
- CONCENTRIC REDUCER
- ECCENTRIC REDUCER
- INLINE MIXER
- STRAINER
- PIPE CAP OR PLUG
- MECHANICAL JOINT

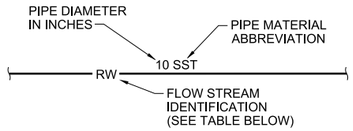
PUMP AND COMPRESSOR SYMBOLS

NOTE: XX: AS ADJUSTABLE SPEED
CS-1 CONSTANT SPEED (SINGLE SPEED)
CS-2 CONSTANT SPEED (TWO SPEED)

- CENTRIFUGAL PUMP (DRY PIT) XX
- CENTRIFUGAL WET PIT PUMP OR TURBINE PUMP XX
- CHEMICAL FEED PUMP XX
- DIAPHRAGM PUMP XX
- GEAR PUMP OR BLOWER (POSITIVE DISPLACEMENT) XX
- PISTON PUMP XX
- SUBMERSIBLE PUMP XX
- PROGRESSIVE CAVITY PUMP XX
- COMPRESSOR (CENTRIFUGAL) XX
- COMPRESSOR (PISTON) XX
- BLOWER OR FAN (CENTRIFUGAL) XX
- EJECTOR

LINE SIZE AND MATERIAL IDENTIFICATION

(FOR REFERENCE ONLY. SEE SITE AND MECHANICAL DRAWINGS)



CISP	CAST IRON SOIL PIPE
CLDI	CEMENT LINED DUCTILE IRON
CLSTL	CEMENT LINED STEEL
CU	COPPER
C900	C900 PVC
C905	C905 PVC
CPVC	SCH 80 CHLORINATED POLYVINYL CHLORIDE
FRP	FIBERGLASS REINFORCED PLASTIC
PVC	SCH 80 POLYVINYL CHLORIDE
SST	STAINLESS STEEL
STL	STEEL

FLOW STREAM IDENTIFICATION

AHP	AIR HIGH PRESSURE
ALP	AIR LOW PRESSURE
ALS	ALLUVIAL FORMATION SYPPLY
AMF	AQUA AMMONIA FEED
AS	ACID SOLUTION
ASF	ALUMINUM SULFATE FEED
BDR	BACKWASH DECANT RETURN
BS	BASE SOLUTION
BTS	BYPASS TO WASTE
BWW	BACKWASH TO WASTE
BYP	BYPASS
CAS	SODIUM HYDROXIDE SUPPLY
CF	CAUSTIC FEED
CFF	CARTRIDGE FILTER FEED
CFR	CLEANING SOLUTION FEED RECYCLE
CSW	CLEANING SOLUTION WASTE
CIS	CORROSION INHIBITOR SUPPLY
CLF	SODIUM HYPOCHLORITE FEED
CLS	CHLORINE SOLUTION SUPPLY
CM	CLEANING MAKEUP WATER
CP	COMBINED PERMEATE
CSR	CLEANING SOLUTION RETURN
CSS	CLEANING SOLUTION SUPPLY
D	DRAIN
DR	DRAIN, PROCESS
FD	FEED DUMP
FLF	FLUORIDE FEED
FTW	FEED TO WASTE
FW	FINISHED WATER
ISD	INTERSTAGE DISCHARGE
ISS	INTERSTAGE SUPPLY
MF	MEMBRANE FEED
OG	OFFGAS
OF	OVERFLOW
PC	PLANT CONCENTRATE
PCR	PERMEATE CLEANING RETURN
PFF	PRESSURE FILTER FEED
PLW	PRESSURIZED LUBE WATER
PTW	PERMEATE TO WASTE
RBP	BYPASS (PRESSURE RELIEF)
ROC	RO PROCESS CONCENTRATE
ROF	RO PROCESS FEED
RW	RAW WATER
SAF	SULFURIC ACID FEED
SAM	SAMPLE
SD	STORM DRAINAGE
SDF	SAN DIEGO FORMATION
SDS	SAN DIEGO FORMATION SUPPLY
SIF	SCALE INHIBITOR FEED
SPD	SUMP PUMP DISCHARGE
SS	SANITARY SEWER
TBY	TREATED BYPASS
TC	TRAIN CONCENTRATE
TP	TRAIN PERMEATE
TPB	TREATMENT PROCESS BYPASS
VAR	VENT, AIR RELEASE
PW	POTABLE WATER
W1	POTABLE WATER
W2	BACKFLOW PREVENTED POTABLE WATER

REGISTERED PROFESSIONAL ENGINEER KYLE L. LYMAN No. E 15763 Exp. 09-30-14 ELECTRICAL STATE OF CALIFORNIA

PRELIMINARY

REV.	DATE	DESCRIPTION	BY	APPVD.
A				
B				
C				

DESIGN BY: K. LYMAN | SCALE: NO SCALE
DRAWN BY: S. GOODRICH | DATE:
CHECKED BY: XXX | DESIGN#
AS CONSTRUCTED: | PAVEMENT#

SWEETWATER AUTHORITY

PLANS FOR THE INSTALLATION OF:

REYNOLDS DESALINATION FACILITY PHASE II EXPANSION INSTRUMENTATION AND CONTROL LEGEND 2

1/4 SECTION | WO#

WO#

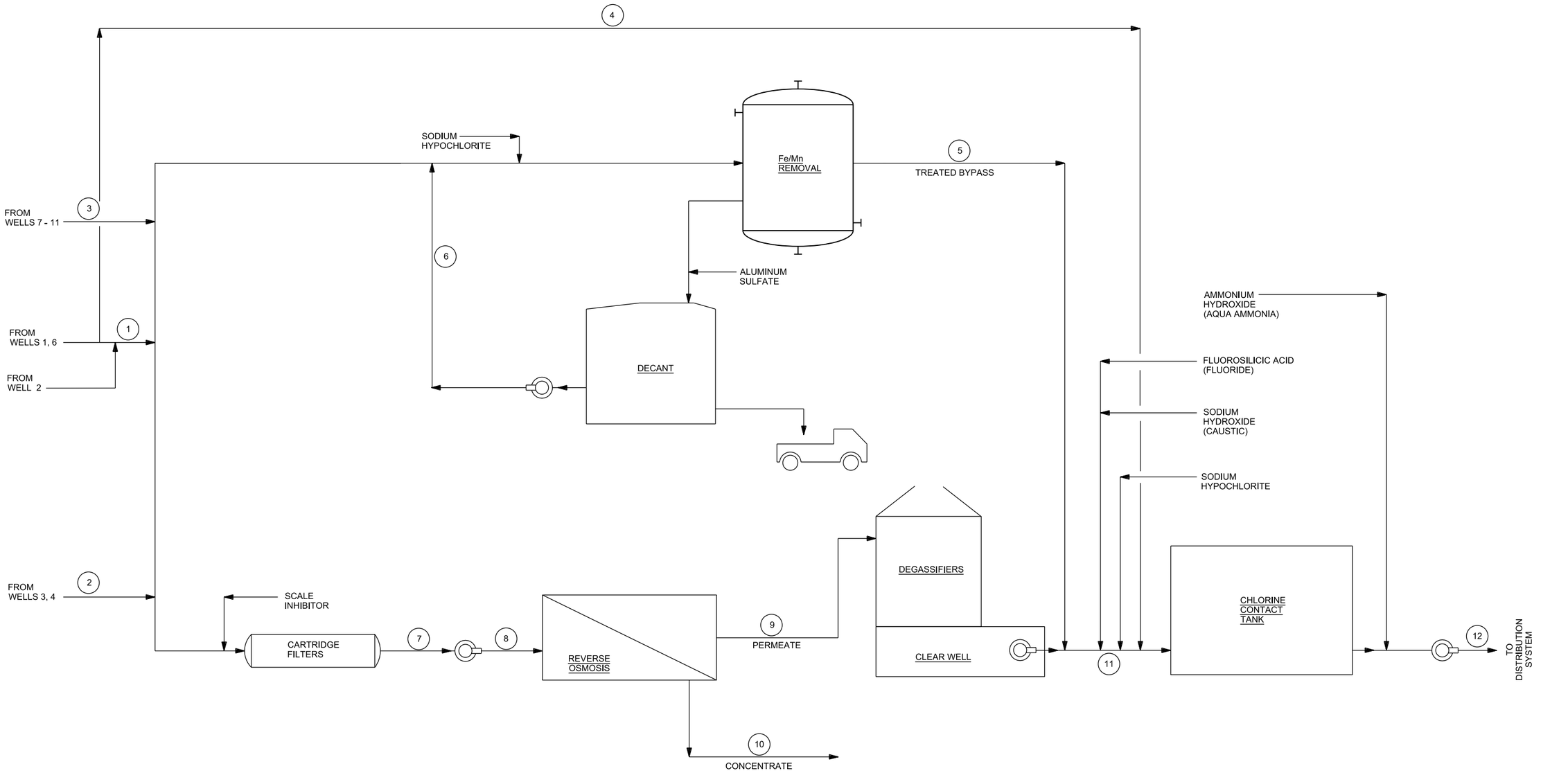
ENGINEER PE XXXXX | DATE | SHEET XX OF XX

APPROVED | DATE

G-11

PW: \\DEN\488009 – RICHARD A REYNOLDS DESAL FACILITY\ $FILENAME

11–JUL–2014



	1	2	3	4	5	6	7	8	9	10	11	12
EXISTING FLOW, MGD	0-4	0-2.1	N/A	0	0.9	0.05	4.9	4.9	4.0	0.9	4.9	4.9
NEW AVERAGE FLOW, MGD	0-4	0-2.1	?	0	1.4	0.08	7.9	7.9	6.4	1.5	7.9	7.9
NEW MAXIMUM FLOW, MGD	0-4	0-2.1	?	0	2.0	0.1	11.1	11.1	9.0	2.1	10	10
PRESSURE, PSIG	40-50	40-50	40-50	15	15	50	40	100-200	10	10	15	95

◇1

NOTE ◇1 EITHER RO PERMEATE (STREAM 9) OR TREATED BYPASS (STREAM 5) WITH BE SCALED BACK AT MAXIMUM FLOW SUCH THAT PLANT PRODUCTION WILL NOT EXCEED 10 MGD.

REGISTERED PROFESSIONAL ENGINEER
STEVE R. ALT
No. 60023
Exp. 06-30-15
CHEMICAL
STATE OF CALIFORNIA

PRELIMINARY

SWEETWATER AUTHORITY

PLANS FOR THE INSTALLATION OF:

REYNOLDS DESALINATION FACILITY PHASE II EXPANSION PROCESS FLOW DIAGRAM

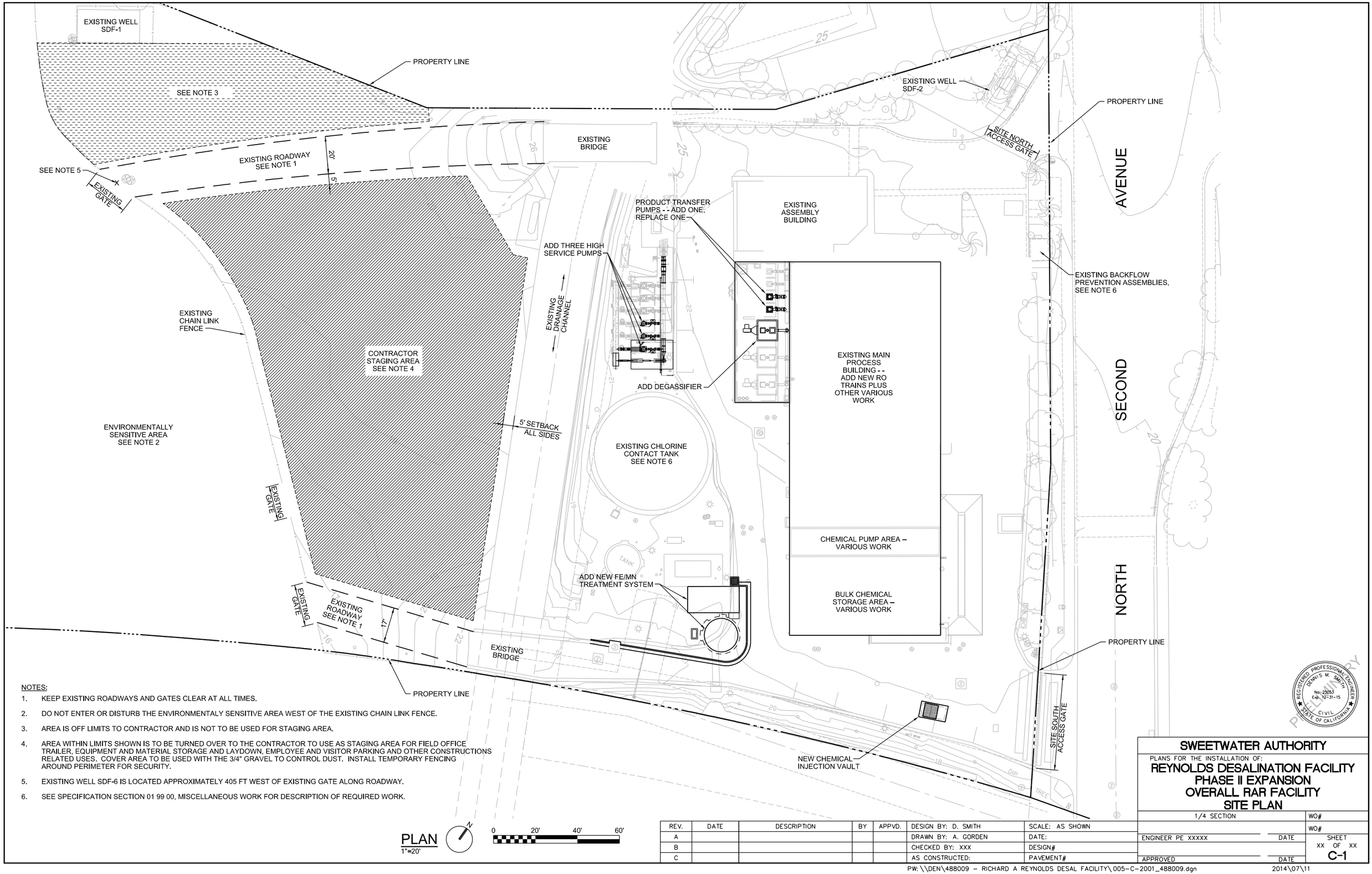
REV.	DATE	DESCRIPTION	BY	APPVD.
A				
B				
C				

DESIGN BY: S. ALT | SCALE: NO SCALE
DRAWN BY: S. GOODRICH | DATE:
CHECKED BY: XXX | DESIGN#
AS CONSTRUCTED: | PAVEMENT#

1/4 SECTION | WO#
WO#
ENGINEER PE XXXXX | DATE | SHEET XX OF XX
APPROVED | DATE | G-12

PW: \\DEN\488009 – RICHARD A REYNOLDS DESAL FACILITY\ $FILENAME

11-JUL-2014



NOTES:

1. KEEP EXISTING ROADWAYS AND GATES CLEAR AT ALL TIMES.
2. DO NOT ENTER OR DISTURB THE ENVIRONMENTALY SENSITIVE AREA WEST OF THE EXISTING CHAIN LINK FENCE.
3. AREA IS OFF LIMITS TO CONTRACTOR AND IS NOT TO BE USED FOR STAGING AREA.
4. AREA WITHIN LIMITS SHOWN IS TO BE TURNED OVER TO THE CONTRACTOR TO USE AS STAGING AREA FOR FIELD OFFICE TRAILER, EQUIPMENT AND MATERIAL STORAGE AND LAYDOWN, EMPLOYEE AND VISITOR PARKING AND OTHER CONSTRUCTIONS RELATED USES. COVER AREA TO BE USED WITH THE 3/4" GRAVEL TO CONTROL DUST. INSTALL TEMPORARY FENCING AROUND PERIMETER FOR SECURITY.
5. EXISTING WELL SDF-6 IS LOCATED APPROXIMATELY 405 FT WEST OF EXISTING GATE ALONG ROADWAY.
6. SEE SPECIFICATION SECTION 01 99 00, MISCELLANEOUS WORK FOR DESCRIPTION OF REQUIRED WORK.

PLAN
1"=20'

0 20' 40' 60'

REV.	DATE	DESCRIPTION	BY	APPVD.
A				
B				
C				

DESIGN BY: D. SMITH | SCALE: AS SHOWN
DRAWN BY: A. GORDEN | DATE:
CHECKED BY: XXX | DESIGN#
AS CONSTRUCTED: | PAVEMENT#

SWEETWATER AUTHORITY

PLANS FOR THE INSTALLATION OF:

REYNOLDS DESALINATION FACILITY PHASE II EXPANSION OVERALL RAR FACILITY SITE PLAN

1/4 SECTION | WO#

WO#

ENGINEER PE XXXXX | DATE

APPROVED | DATE

SHEET XX OF XX

C-1

PW: \\DEN\488009 – RICHARD A REYNOLDS DESAL FACILITY\005-C-2001_488009.dgn 2014\07\11