CHOLLA POWER PLANT
SEDIMENTATION BASIN
INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN
CH_Inflowflood_004_20161017

This *Inflow Design Flood Control System Plan* (Plan) document has been prepared specifically for the Sedimentation Basin at the Cholla Power Plant. This Plan has been prepared in accordance with our understanding of the requirements prescribed in §257.82 of the Federal Register, Volume 80, Number 74, dated April 17, 2015 (U. S. Government, 2015) for hydrologic and hydraulic capacity requirements for CCR surface impoundments associated with existing Coal Combustion Residual (CCR) surface impoundments. Section §257.82 is reproduced below for reference purposes. This document serves as the *initial plan* described in §257.82.

The Sedimentation Basin is an existing CCR surface impoundment facility. Calculations have been prepared in support of the facility operation and have been included herein to address the requirements listed.

§257.82 Hydrologic and Hydraulic capacity requirements for CCR surface impoundments

(a) The owner or operator of an existing or new CCR surface impoundment or any lateral expansion of a CCR surface impoundment must design, construct, operate, and maintain an inflow design flood control system as specified in paragraphs (a)(1) and (2) of this section.

(1) The inflow design flood control system must adequately manage flow into the CCR unit during and following the peak discharge of the inflow design flood specified in paragraph (a)(3) of this section.

(2) The inflow design flood control system must adequately manage flow from the CCR unit to collect and control the peak discharge resulting from the inflow design flood specified in paragraph (a)(3) of this section.

(3) The inflow design flood is:

(i) For a high hazard potential CCR surface impoundment, as determined under §257.73(a)(2) or §257.74(a)(2), the probable maximum flood;

(ii) For a significant hazard potential CCR surface impoundment, as determined under §257.73(a)(2) or §257.74(a)(2), the 1,000-year flood;

(iii) For a low hazard potential CCR surface impoundment, as determined under §257.73(a)(2) or §257.74(a)(2), the 100-year flood; or

(iv) For an incised CCR surface impoundment, the 25-year flood.

(b) Discharge from the CCR unit must be handled in accordance with the surface water requirements under §257.3-3.

(c) *Inflow design flood control system plan* –

(1) *Content of the Plan*. The owner or operator must prepare initial and periodic inflow design flood control system plans for the CCR unit according to the timeframes specified in paragraphs (c)(3) and (4) of this section. These plans must document how the inflow design flood control system has been

designed and constructed to meet the requirements of this section. Each plan must be supported by appropriate engineering calculations. The owner or operator of the CCR unit has completed the inflow design flood control system plan when the plan has been placed in the facility's operating record as required by §257.105(g)(4).

(2) *Amendment of the Plan*. The owner or operator of the CCR unit may amend the written inflow design flood control system plan at any time provided the revised plan is placed in the facility's operating record as required by §257.105(g)(4). The owner or operator must amend the written inflow design flood control system plan whenever there is a change in conditions that would substantially affect the written plan in effect.

(3) *Timeframes for preparing the initial plan* -

(i) *Existing CCR surface impoundments*. The owner or operator must prepare the initial inflow design flood control system plan no later than October 17, 2016.

(ii) New CCR surface impoundments and any lateral expansion of a CCR surface impoundment. The owner of operator must prepare the initial inflow design flood control system plan no later than the date of initial receipt of CCR in the CCR unit.

(4) *Frequency for revising the plan*. The owner or operator must prepare periodic inflow design flood control system plans required by paragraph (c)(1) of this section every five years. The date of completing the initial plan is the basis for establishing the deadline to complete the first periodic plan. The owner or operator may complete any required plan prior to the required deadline provided the owner or operator places the completed plan into the facility's operating record within a reasonable amount of time. In all cases, the deadline for completing a subsequent plan is based on the date of completing the previous plan. For purposes of this paragraph (c)(4), the owner or operator has completed an inflow design flood control system plan when the plan has been placed in the facility's operating record as required by §257.105(g)(4).

(5) The owner or operator must obtain a certification from a qualified engineer stating that the initial and periodic inflow design flood control system plans meet the requirements of this section.

(d) The owner or operator of the CCR unit must comply with the record keeping requirements specified in §257.105(g), the notification requirements specified in §257.106(g), and the internet requirements specified in §257.107(g).

SITE INFORMATION	
Site Name / Address	Cholla Power Plant / 4801 Frontage Road, Joseph City, AZ 86032
Owner Name / Address	Arizona Public Service / 400 North 5th Street, Phoenix, AZ 85004
CCR Unit	Sedimentation Basin

OVERVIEW

The Sedimentation Basin is an existing impoundment that encompasses approximately 1.69 acres and is located adjacent to the Unit 4 Cooling Towers at the Cholla Power Plant Facility. The area surrounding the Sedimentation Basin is graded to drain away from the impoundment. The Sedimentation Basin does not receive runoff from upstream tributary basins. This inflow / flood control plan describes the contributing runoff volumes and storage capacities estimated based on the design of the impoundment.

HAZARD CLASSIFICATION

Methodology

Per 40 CFR § 257.73, the hazard potential classification provides an indication of the possible adverse incremental consequences that result from the release of water or stored contents due to failure or mis-operation of the CCR surface impoundment. The classification is based solely on the consequences of failure. As such, it is not dependent of the condition of the embankment or the likelihood of failure. Classifications per the Rule are separate from relevant and/or applicable federal, state or local dam safety regulatory standards, which may also include hazard classification definitions, and are not intended to substitute for other regulatory hazard potential classifications.

Rule 40 CFR § 257.53 defines three hazard potential classifications as follows:

1. *High hazard potential CCR surface impoundment* – A diked surface impoundment where failure or mis-operation will probably cause loss of human life.
2. *Significant hazard potential CCR surface impoundment* – A diked surface impoundment where failure or mis-operation results in no probable loss of human life, but can cause economic loss, environmental damage, disruption of lifeline facilities, or impact other concerns.
3. *Low hazard potential CCR surface impoundment* – A diked surface impoundment where failure or mis-operation results in no probable loss of life and low economic and/or environmental losses. Losses are principally limited to the surface impoundment owner's property.

The hazard potential of the Sedimentation Basin was assessed qualitatively, per the above definitions. The qualitative assessment process is generally performed in a step-wise manner by first determining whether the pond could be classified as low hazard potential, based on immediately obvious factors such as proximity to property lines and/or surface water bodies. After determining that a structure does not meet the criteria for a Low Hazard Potential classification, the structure is assessed to determine whether it meets the criteria for High Hazard Potential. The potential for loss of life differentiates between high and significant hazard potential in the Final CCR Rule; therefore, if the Dam does not meet the criteria for high hazard potential, it would be classified as a Significant Hazard Potential structure.

The potential for downstream loss of life was assessed by reviewing land use in areas downstream (to

the south and west) of the Sedimentation Basin, where inundation is likely in the event of a release. No quantitative dam break or inundation studies were performed. The United States Geological Survey (USGS) 7.5-Minute Quadrangle topographic map of Joseph City, Arizona and associated digital orthoimage data (USGS, 2013) were used in conjunction with site topographic mapping (2-ft contour) to review downstream areas for existing permanent and temporary land use. Permanent land uses include permanently inhabited dwellings and worksite areas that would likely contain workers on a daily basis (public utilities, power plants, water and sewage treatment plants, private industrial plants, sand and gravel plants, farm operations, fish hatcheries). Temporary land uses include primary roads, established campgrounds, or other recreational areas.

Hazard Potential Classification Results

Inspection of site topographic mapping of the Sedimentation Basin and its immediate surrounding indicates that a catastrophic failure would result in discharge of water from the Sedimentation Basin to an adjacent drainage ditch to the south. The Sedimentation Basin is divided by a concrete wall that would limit the discharge from a failure to one half of the total volume of the basin. Discharged water would flow in the ditch from the Sedimentation Basin to the West Area Retention Pond (WARP). By inspection, the drainage ditch and the WARP will have capacity to route and store discharge from a failure of one half of the Sedimentation Basin. Any discharge from the WARP would flow south toward an onsite equipment storage area, switchyard, and parallel rail road spurs.

Any physical losses associated with failure of the Sedimentation Basin embankment would be to the embankment itself and, at worst case, in some manner, to the drainage ditch and/or the WARP, both of which are on APS property. The impact to the equipment storage area south of the WARP would be limited by the small amount of any discharge. Based on review of the USGS 7.5-Minute Quadrangle topographic map and aerial imagery of Joseph City, Arizona (USGS, 2013), the possible area of impact from a release does not contain any areas of permanent or temporary land use as defined by the Rule. Therefore, since failure or mis-operation of the Sedimentation Basin results in no probable loss of life and low economic and/or environmental losses, and the losses are principally limited to the APS property, the Sedimentation Basin satisfies the criteria for Low Hazard Potential classification.

Exhibit 1 – Sedimentation Basin at Cholla Power Plant Facility

§257.82 (a)(1)(2)(3) Hydrologic and Hydraulic capacity requirements for CCR surface impoundments	
(a) The owner or operator of an existing or new CCR surface impoundment or any lateral expansion of a CCR surface impoundment must design, construct, operate, and maintain an inflow design flood control system as specified in paragraphs (a)(1) and (2) of this section. (1) The inflow design flood control system must adequately manage flow into the CCR unit during and following the peak discharge of the inflow design flood specified in paragraph (a)(3) of this section.	Sedimentation Pond Plan & Details (APS 1975) indicate that the Sedimentation Basin is designed and operated with an approximate bottom elevation of 5007 feet, top elevation of 5019 feet, and operating water surface elevation of 5017 feet. The storage volume above the operating water surface elevation and below the existing spillway crest elevation of 5018.21 feet is estimated to be 1.74 acre-feet based on stage storage calculations included in Appendix 1. A 100-year inflow design flood volume, based on a low hazard potential classification, is estimated to yield a volume of 0.38 acre-feet. The Sedimentation Basin accommodates this 0.38 acre-feet runoff volume in the impoundment above the operating water surface elevation of 5017 feet and below the spillway crest elevation of 5218.21 feet. The 100-year runoff volume calculations are also included in Appendix 1.
(a) The owner or operator of an existing or new CCR surface impoundment or any lateral expansion of a CCR surface impoundment must design, construct, operate, and maintain an inflow design flood control system as specified in paragraphs (a)(1) and (2) of this section. (2) The inflow design flood control system must adequately manage flow from the CCR unit to collect and control the peak discharge resulting from the inflow design flood specified in paragraph (a)(3) of this section.	The Sedimentation Basin is designed and operated with an approximate bottom elevation of 5007 feet, top elevation of 5019 feet, and operating water surface elevation of 5017 feet. The 100-year runoff volume of 0.38 acre-feet is accommodated above the operating water surface elevation of 5017 and below the existing spillway flow line elevation of 5018.21 feet. No portion of a 100-year flow is expected to leave the Sedimentation Basin.

(a)(3) The inflow design flood is: (i) For a high hazard potential CCR surface impoundment, as determined under §257.73(a)(2) or §257.74(a)(2), the probable maximum flood; (ii) For a significant hazard potential CCR surface impoundment, as determined under §257.73(a)(2) or §257.74(a)(2) , the 1,000-year flood; (iii) For a low hazard potential CCR surface impoundment, as determined under §257.73(a)(2) or §257.74(a)(2), the 100-year flood; or (iv) For an incised CCR surface impoundment, the 25-year flood.	The hazard classification for the Sedimentation Basin is low hazard potential based on the assessment presented in the Hazard Classification section within this document.
§257.82 (b) Hydrologic and Hydraulic capacity requirements for CCR surface impoundments	
(b) Discharge from the CCR unit must be handled in accordance with the surface water requirements under §257.3-3.	The Sedimentation Basin is designed and operated with a bottom elevation of 5007 feet, top elevation of 5019 feet, and operating water surface elevation of 5017 feet. The 100-year runoff volume of 0.38 acre-feet is accommodated above the operating water surface elevation of 5017 feet and below the existing spillway flow line elevation of 5018.21 feet. No portion of a 100-year flow is expected to leave the Sedimentation Basin.

§257.82 (c)(1)(2)(3)(4)(5) Hydrologic and Hydraulic capacity requirements for CCR surface impoundments	
(c)(1) *Content of the plan.* The owner or operator must prepare initial and periodic inflow design flood control system plans for the CCR unit according to the timeframes specified in paragraphs (c)(3) and (4) of this section. These plans must document how the inflow design flood control system has been designed and constructed to meet the requirements of this section. Each plan must be supported by appropriate engineering calculations. The owner or operator of the CCR unit has completed the inflow design flood control system plan when the plan has been placed in the facility's operating record as required by §257.105(g)(4).	This *Inflow Design Flood Control Plan* serves as the initial plan prescribed herein.
(c)(2) *Amendment of the Plan*. The owner or operator of the CCR unit may amend the written inflow design flood control system plan at any time provided the revised plan is placed in the facility's operating record as required by §257.105(g)(4). The owner or operator must amend the written inflow design flood control system plan whenever there is a change in conditions that would substantially affect the written plan in effect.	The owner or operator acknowledges and will comply with this requirement.
(c)(3*) Timeframes for preparing the initial plan* – (i) Existing CCR impoundments. The owner or operator must prepare the initial inflow design flood control system plan no later than October 17, 2016. (ii) New CCR surface impoundments and any lateral expansion of a CCR surface impoundment. The owner or operator must prepare the initial inflow design flood control system plan no later than the date of initial receipt of CCR in the CCR Unit	The Sedimentation Basin is an existing CCR impoundment at Cholla Power Plant. The inflow design flood control system plan is included herein. The owner or operator acknowledges and will comply with this requirement.

(c)(4) *Frequency for revising the plan*. The owner or operator must prepare periodic inflow design flood control system plans required by paragraph (c)(1) of this section every five years. The date of completing the initial plan is the basis for establishing the deadline to complete the first periodic plan. The owner or operator may complete any required plan prior to the required deadline provided the owner or operator places the completed plan into the facility's operating record within a reasonable amount of time. In all cases, the deadline for completing a subsequent plan is based on the date of completing the previous plan. For purposes of this paragraph (c)(4), the owner or operator has completed an inflow design flood control system plan when the plan has been placed in the facility's operating record as required by §257.105(g)(4).	The owner or operator acknowledges and will comply with this requirement.
(c)(5) The owner or operator must obtain a certification from a qualified professional engineer stating that the initial and periodic inflow design flood control system plans meet the requirements of this section.	Certification by a professional engineer is included as an attachment to this document.
§257.82 (d) Hydrologic and Hydraulic capacity requirements for CCR surface impoundments	
(d) The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in §257.105(g), the notification requirements specified in §257.106(g), and the internet requirements specified in §257.107(g).	The owner or operator acknowledges and will comply with this requirement.

References

U.S. Government, April 2015, *Federal Register, Volume 80, Number 74, Rules and Regulations*.

Arizona Public Service, September 1975, *Sedimentation Pond Plan & Details*.

National Oceanic and Atmospheric Administration, June 2016, *Point Precipitation Frequency Estimates*.

Bureau of Reclamation, 1981, *Freeboard Criteria and Guidelines for Computing Freeboard Allowances for Storage Dams*.

Certification Statement for:

- 40 CFR § 257.73(a)(2)(ii) – Initial Hazard Potential Classification for an Existing CCR Surface Impoundment
- 40 CFR § 257.82(c)(5) – Initial Inflow Design Flood Control System Plan for an Existing CCR Surface Impoundment

CCR Unit: Arizona Public Service; Cholla Power Plant; Sedimentation Basin

I, Alexander W. Gourlay, being a Registered Professional Engineer in good standing in the State of Arizona, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the information contained in the initial inflow design flood control system plan dated September, 13, 2016 meets the requirements of 40 CFR § 257.73(a)(2)(ii) and 40 CFR § 257.82.

Alexander W. Gourlay, P.E.

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Printed Name

September 13, 2016

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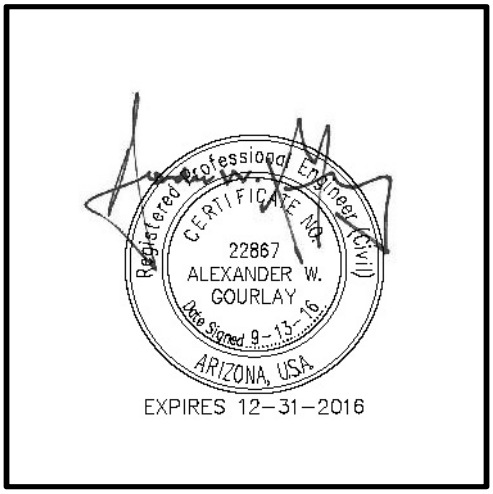
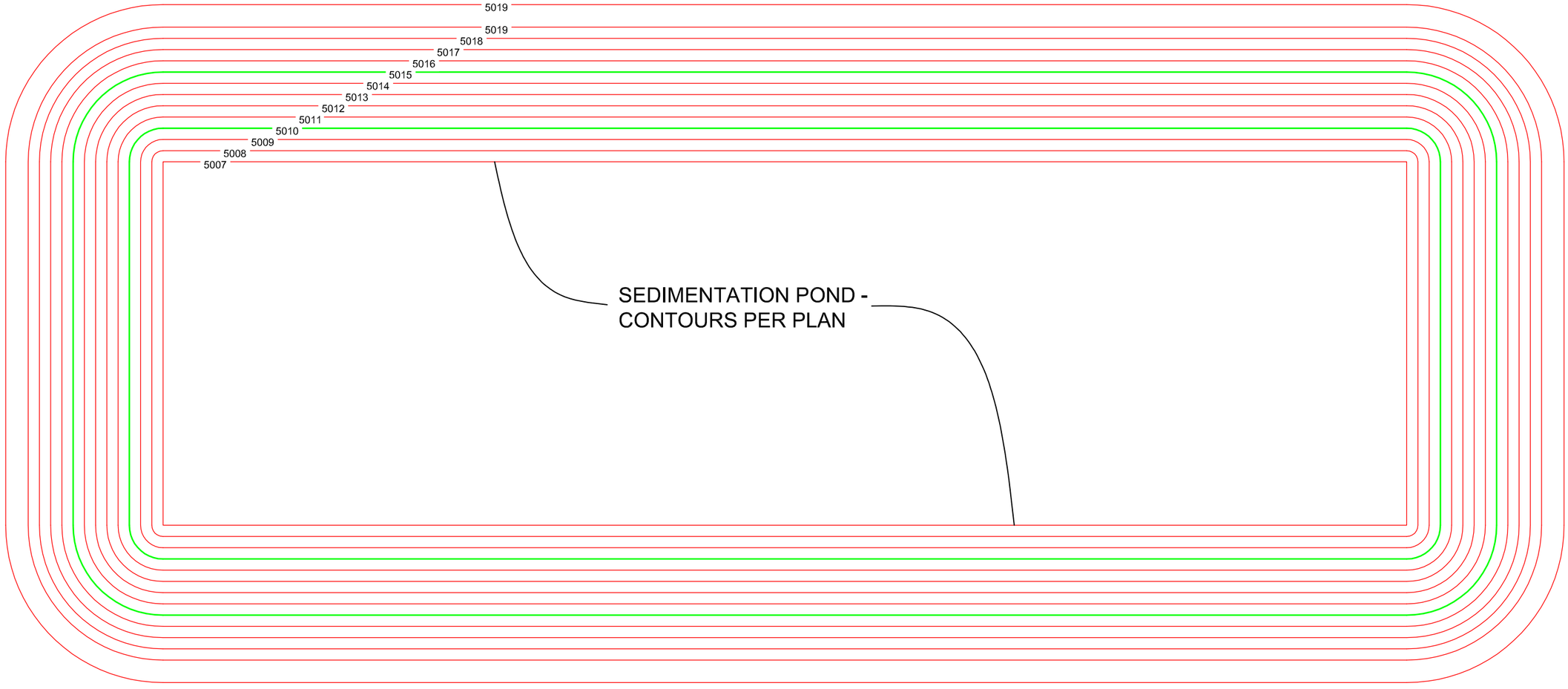
Date



APPENDIX 1 – SEDIMENTATION BASIN STAGE STORAGE CALCULATIONS


5019
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SEDIMENTATION POND -
CONTOURS PER PLAN

SEDI BASIN STORAGE VOLUME CALCULATIONS
7/13/2016

STAGE	DEPTH	AREA		VOL_{INC}	VOL_{CUM}	
		ft^2	acres	acre-feet	acre-feet	
5007	0	32204	0.739302	0.00	0.00	
5008	1	34806.27	0.799042	0.77	0.77	
5009	2	37465.1	0.86008	0.83	1.60	
5010	3	40180.47	0.922417	0.89	2.49	
5011	4	42952.39	0.986051	0.95	3.44	
5012	5	45780.86	1.050984	1.02	4.46	
5013	6	48665.88	1.117215	1.08	5.55	
5014	7	51607.44	1.184744	1.15	6.70	
5015	8	54605.56	1.253571	1.22	7.92	
5016	9	57660.22	1.323697	1.29	9.21	
5017	10	60771.43	1.39512	1.36	10.57	
5018	11	63939.19	1.467842	1.43	12.00	
5018.21	***11.21***	***64616.3***	***1.483386***	***0.31***	***12.31***	<----SPILLWAY ELEVATION
5019	12	67163.5	1.541862	1.50	13.50	

Notes:

1. Area is based on APS Drawing # G-44573, *Sedimentation Pond Plan & Details*, dated Sept 19, 1975.
2. Bottom of pond at EL5007 / Top of pond at EL5019 (WS at EL5017) per plan.
3. Volume provided with top 2-feet of freeboard (EL5019-EL5017) is 2.93 acre-feet.
4. Existing spillway with flow line at elevation 5018.21 is located in northeast corner.

Volume provided at EL5018.21 and above EL5017 is approximately 1.74 acre-feet.

5. Surface area of Sedi Basin estimated to be 73782 square feet (1.69 acres) per plan.
6. Inflow volume based on 100-year flood event ($P_{100\text{-}YR,24\text{-}HR}$=2.73 inches, C=1, A=1.69 acres):

P/12*A*C=[(2.73/12)*(1.69)*(1)]=0.38 acre-feet

NOAA Atlas 14, Volume 1, Version 5
Location name: Joseph City, Arizona, US*
Latitude: 34.9416°, Longitude: -110.3041°
Elevation: 5018 ft*
* source: Google Maps

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.176 (0.153–0.202)	0.227 (0.198–0.261)	0.307 (0.267–0.352)	0.371 (0.322–0.427)	0.466 (0.399–0.536)	0.544 (0.460–0.624)	0.631 (0.526–0.725)	0.723 (0.593–0.833)	0.854 (0.685–0.991)	0.961 (0.757–1.12)
10-min	0.267 (0.233–0.308)	0.345 (0.301–0.397)	0.467 (0.407–0.536)	0.565 (0.490–0.650)	0.710 (0.607–0.815)	0.829 (0.700–0.950)	0.960 (0.800–1.10)	1.10 (0.903–1.27)	1.30 (1.04–1.51)	1.46 (1.15–1.71)
15-min	0.331 (0.289–0.382)	0.428 (0.373–0.492)	0.578 (0.504–0.665)	0.701 (0.607–0.806)	0.880 (0.752–1.01)	1.03 (0.868–1.18)	1.19 (0.992–1.37)	1.36 (1.12–1.57)	1.61 (1.29–1.87)	1.81 (1.43–2.11)
30-min	0.446 (0.389–0.514)	0.576 (0.502–0.663)	0.779 (0.679–0.895)	0.944 (0.818–1.09)	1.19 (1.01–1.36)	1.38 (1.17–1.59)	1.60 (1.34–1.84)	1.84 (1.51–2.12)	2.17 (1.74–2.52)	2.44 (1.92–2.85)
60-min	0.552 (0.481–0.636)	0.713 (0.621–0.820)	0.964 (0.840–1.11)	1.17 (1.01–1.34)	1.47 (1.25–1.68)	1.71 (1.45–1.96)	1.98 (1.65–2.28)	2.27 (1.87–2.62)	2.69 (2.15–3.12)	3.02 (2.38–3.52)
2-hr	0.632 (0.556–0.725)	0.806 (0.708–0.926)	1.07 (0.939–1.23)	1.29 (1.12–1.47)	1.61 (1.39–1.84)	1.88 (1.60–2.15)	2.18 (1.83–2.49)	2.50 (2.06–2.86)	2.96 (2.38–3.41)	3.35 (2.63–3.87)
3-hr	0.675 (0.596–0.769)	0.857 (0.758–0.981)	1.11 (0.980–1.27)	1.33 (1.16–1.51)	1.65 (1.43–1.87)	1.91 (1.63–2.16)	2.20 (1.86–2.50)	2.52 (2.09–2.87)	2.99 (2.42–3.43)	3.38 (2.68–3.90)
6-hr	0.762 (0.685–0.853)	0.955 (0.859–1.07)	1.21 (1.08–1.36)	1.42 (1.27–1.59)	1.74 (1.53–1.94)	1.99 (1.74–2.22)	2.27 (1.96–2.54)	2.58 (2.18–2.90)	3.04 (2.51–3.43)	3.42 (2.77–3.90)
12-hr	0.877 (0.794–0.973)	1.09 (0.989–1.21)	1.35 (1.22–1.50)	1.57 (1.41–1.74)	1.86 (1.67–2.06)	2.09 (1.86–2.32)	2.33 (2.05–2.59)	2.60 (2.25–2.90)	3.07 (2.55–3.47)	3.46 (2.80–3.94)
24-hr	0.996 (0.920–1.08)	1.24 (1.15–1.35)	1.56 (1.44–1.69)	1.81 (1.67–1.96)	2.16 (1.99–2.34)	2.44 (2.24–2.64)	2.73 (2.49–2.95)	3.03 (2.74–3.28)	3.44 (3.08–3.73)	3.76 (3.34–4.09)
2-day	1.11 (1.03–1.21)	1.39 (1.29–1.51)	1.72 (1.60–1.87)	1.99 (1.84–2.16)	2.36 (2.17–2.55)	2.65 (2.43–2.86)	2.94 (2.69–3.18)	3.24 (2.94–3.51)	3.64 (3.28–3.96)	3.96 (3.54–4.31)
3-day	1.17 (1.09–1.27)	1.46 (1.36–1.58)	1.81 (1.68–1.95)	2.09 (1.94–2.25)	2.47 (2.29–2.66)	2.77 (2.55–2.98)	3.08 (2.82–3.32)	3.39 (3.09–3.66)	3.82 (3.45–4.13)	4.14 (3.72–4.50)
4-day	1.23 (1.15–1.33)	1.53 (1.43–1.65)	1.89 (1.77–2.04)	2.19 (2.04–2.35)	2.59 (2.40–2.77)	2.90 (2.68–3.10)	3.22 (2.96–3.45)	3.55 (3.24–3.81)	3.99 (3.61–4.30)	4.33 (3.89–4.69)
7-day	1.41 (1.31–1.52)	1.75 (1.63–1.89)	2.15 (2.00–2.31)	2.47 (2.30–2.65)	2.90 (2.69–3.11)	3.23 (2.99–3.46)	3.56 (3.29–3.82)	3.89 (3.58–4.18)	4.34 (3.96–4.68)	4.67 (4.24–5.05)
10-day	1.56 (1.45–1.68)	1.93 (1.80–2.08)	2.37 (2.21–2.54)	2.70 (2.52–2.89)	3.14 (2.92–3.36)	3.47 (3.22–3.71)	3.80 (3.51–4.06)	4.12 (3.80–4.41)	4.54 (4.17–4.87)	4.85 (4.43–5.23)
20-day	2.02 (1.89–2.17)	2.51 (2.34–2.69)	3.05 (2.85–3.27)	3.47 (3.24–3.71)	4.01 (3.73–4.28)	4.40 (4.09–4.70)	4.79 (4.43–5.11)	5.15 (4.77–5.51)	5.62 (5.17–6.03)	5.96 (5.45–6.40)
30-day	2.37 (2.22–2.54)	2.94 (2.75–3.15)	3.56 (3.34–3.80)	4.02 (3.77–4.29)	4.61 (4.32–4.91)	5.03 (4.70–5.36)	5.43 (5.07–5.79)	5.81 (5.41–6.20)	6.28 (5.82–6.71)	6.60 (6.11–7.07)
45-day	2.85 (2.67–3.04)	3.53 (3.31–3.78)	4.27 (4.01–4.56)	4.82 (4.53–5.13)	5.51 (5.17–5.85)	6.00 (5.62–6.36)	6.46 (6.05–6.85)	6.88 (6.44–7.29)	7.37 (6.90–7.83)	7.69 (7.20–8.18)
60-day	3.27 (3.07–3.49)	4.05 (3.80–4.32)	4.86 (4.57–5.17)	5.46 (5.13–5.80)	6.21 (5.82–6.58)	6.73 (6.31–7.13)	7.21 (6.76–7.64)	7.65 (7.16–8.11)	8.16 (7.62–8.66)	8.48 (7.92–9.01)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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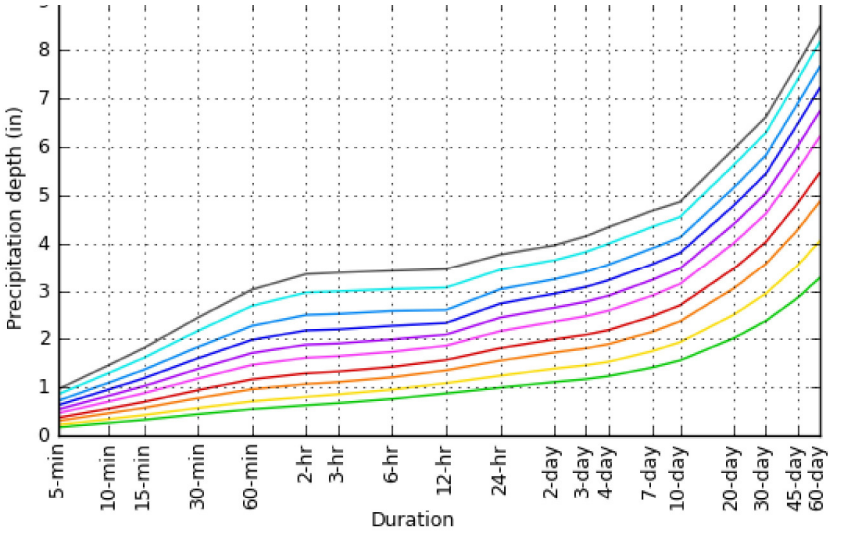
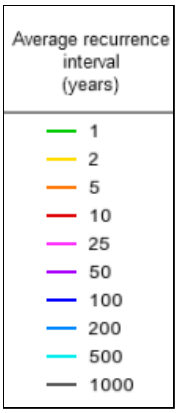
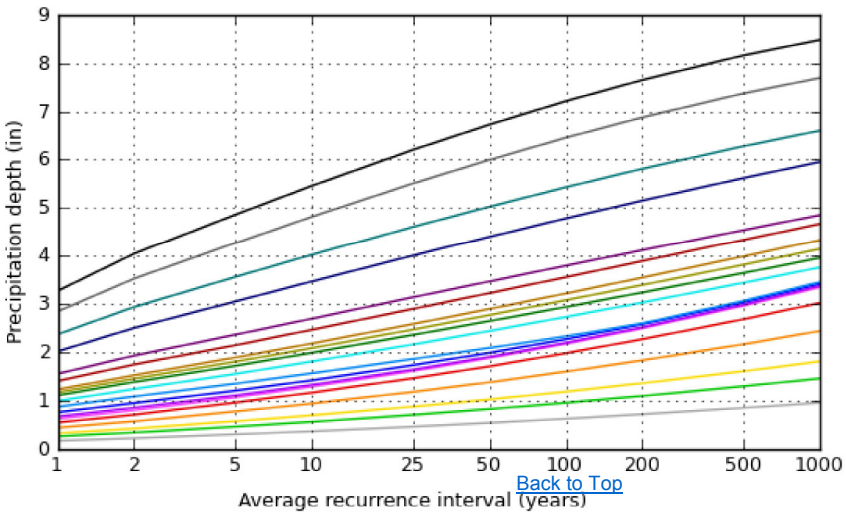
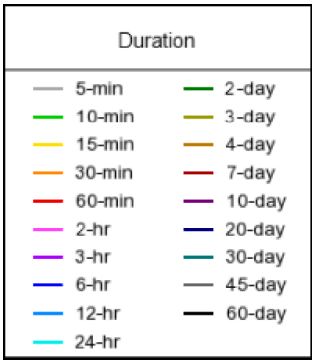
PF graphical









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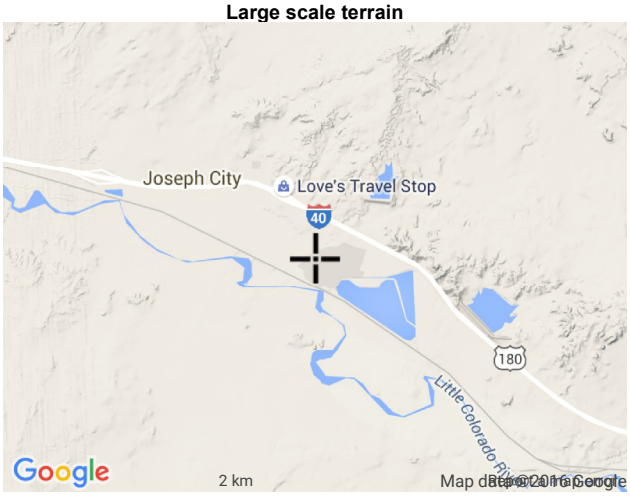
Maps & aerials

NOAA Atlas 14, Volume 1, Version 5

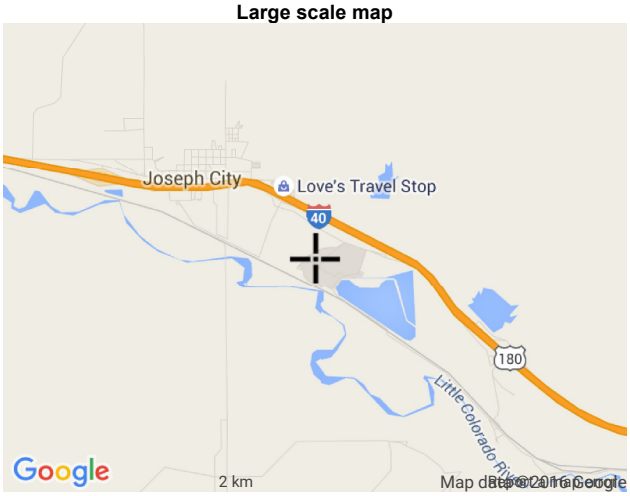
Created (GMT): Mon Jun 6 23:25:46 2016

Small scale terrain

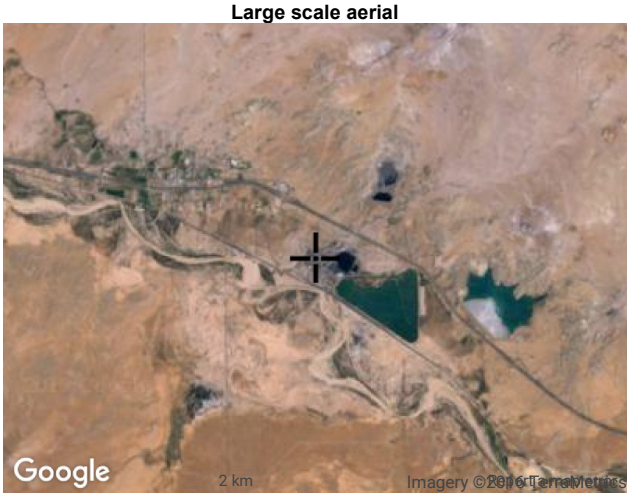
Large scale terrain



Large scale map



Large scale aerial



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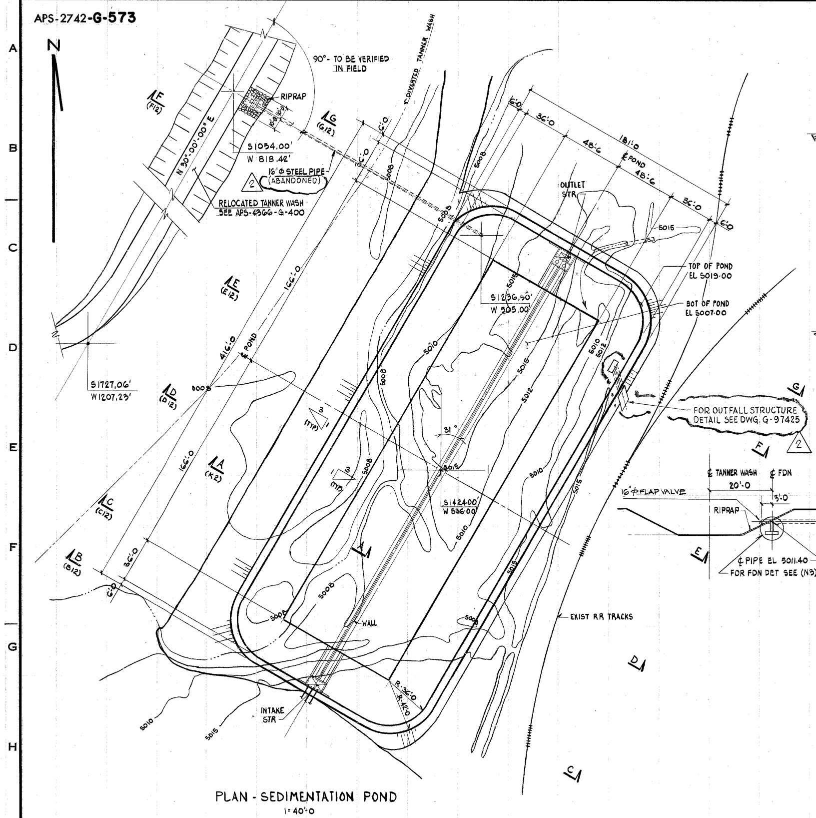
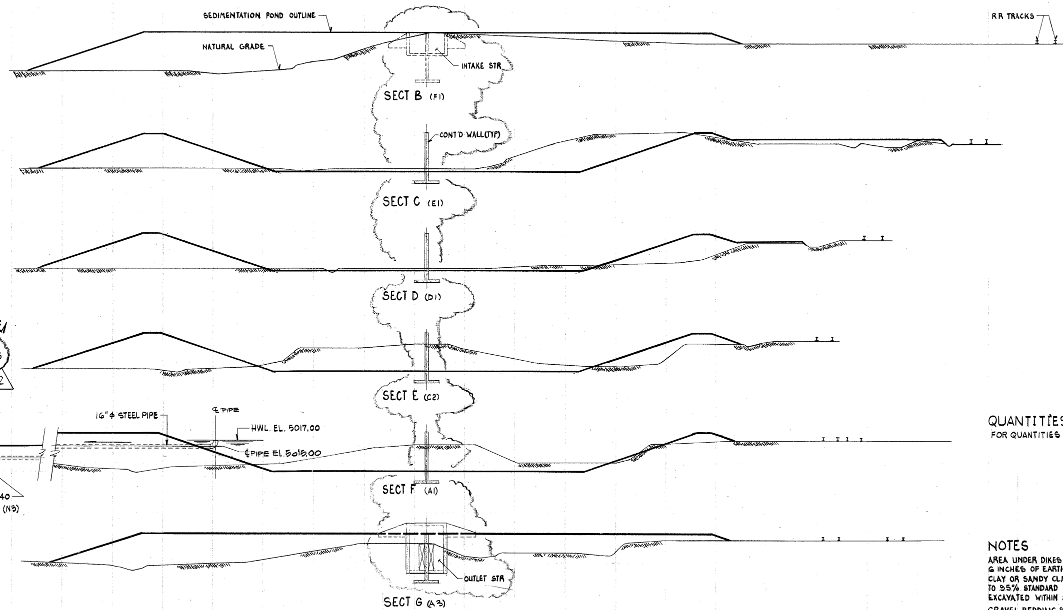
US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910

APPENDIX 2 – SEDIMENTATION BASIN PLAN & DETAILS

APS-2742-G-573



PLAN - SEDIMENTATION POND
1"= 40'-0



QUANTITIES
FOR QUANTITIES SEE G-574

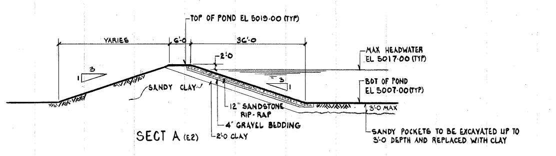
NOTES

AREA UNDER DIKES TO BE CLEARED AND A MINIMUM OF 6 INCHES OF EARTH STRIPPED. DIKE FILL SHALL CONSIST OF CLAY OR SANDY CLAY PLACED IN 8 INCH LAYERS AND COMPACTED TO 95% STANDARD PROCTOR. NO BORROW AREA SHALL BE EXCAVATED WITHIN 200 FEET OF TOE OF EXTERNAL DIKES.

GRAVEL BEDDING SHALL CONSIST OF SAND & GRAVEL HAVING LESS THAN 10% PASSING Nº 200 SIEVE AND HAVING 50% -¼ INCH OR LARGER.

RIP-RAP SHALL BE COCONINO SANDSTONE WITH 12 INCH MAXIMUM SIZE AND 50% OF STONES 6 INCHES OR LARGER.

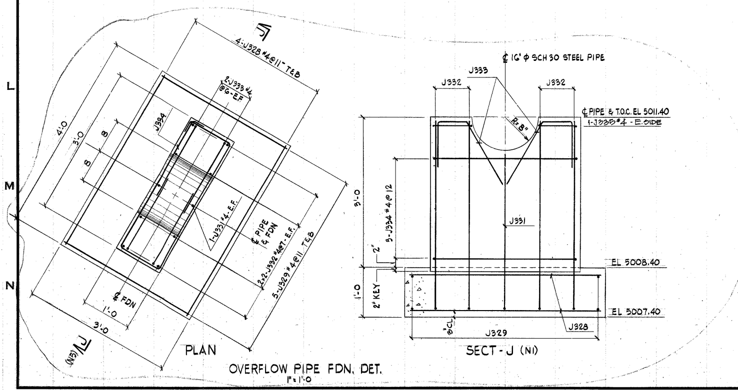
FOR OTHER INFORMATION SEE SPECIFICATION APS 2742-54-02



SECT A (E2)

REFERENCE DRAWINGS

LIST OF DRAWINGS	A-293
TANNER WASH RELOCATION	G-576
SEDIMENTATION POND STRUCTURES	G-574
TANNER WASH (KENNEY AERIAL MAPPING INC) SH1 & SH2	G-44247
TANNER WASH RELOCATION	APS-4366-G-400



PLAN
SECT-J (N1)
OVERFLOW PIPE FDN. DET.
1"=1'-0

Registered Professional Engineer (Civil) Certificate No. 9161 STEPHEN J. CSIBOR Date signed 9-19-75 Arizona U.S.A.

NO.	DATE	REVISION	BY	CH.	APPROVED
2	10-23-92	AS BUILT REVISION	VIC	TRH	
1	7-22-77	ADD: (N-N5) FDN, (J18) REF RELEASE: (H2; B5) PLAN, (A12; G12) SECT, (C4) OVERFLOW PIPE REVISED: (F6; F9) SECT.	H.B	JN.6	

ARIZONA PUBLIC SERVICE COMPANY
CHOLLA S.E. STATION
1977 - 250 MW INSTALLATION - UNIT No. 2
1978 - 250 MW EXTENSION - UNIT No. 3

SEDIMENTATION POND PLAN & DETAILS

EBASCO SERVICES INCORPORATED

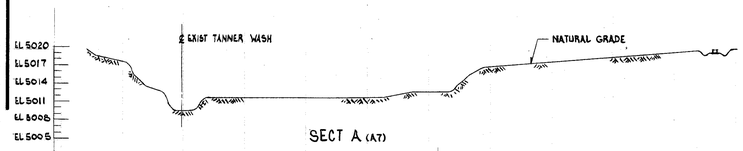
SCALE 1/16"=1'-0 UNLESS NOTED
DIV. C-H
DR. J IAFRATE
CH. R JONES
APPROVED
DATE SEP. 19, 75
APS-2742 G-573
APS DWG. #G-44573

"INDEX"

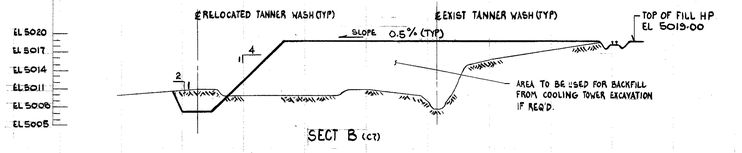
APS-2742-**G-576**

N

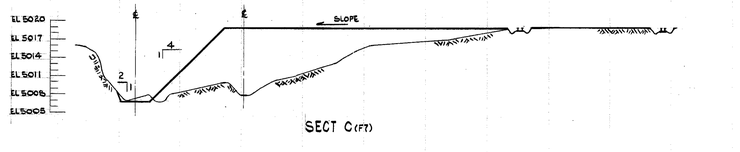
SECT A (A7)



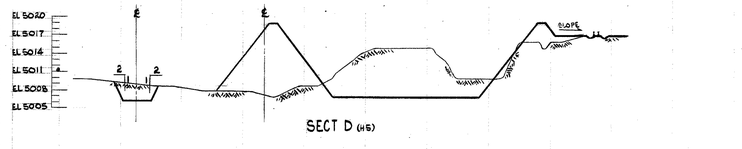
SECT B (C7)



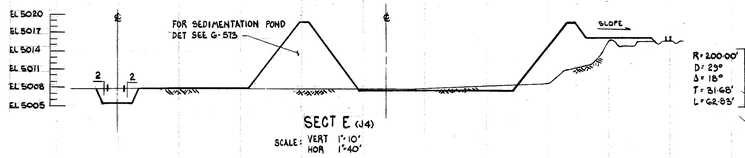
SECT C (F7)



SECT D (H5)



SECT E (J4)



SCALE: VERT 1"=10'
HOR 1"=40'

NOTES

FOR EXCAVATION AND BACKFILL SEE SPECIFICATION APS 2742-54-02

REFERENCE DRAWINGS

LIST OF DRAWINGS	
TANNER WASH (KENNEY AERIAL MAPPING INC) SH 1 FSH 2	A-100
SEDIMENTATION POND PLAN & DETAILS	G-44247
GRADING & DRAINAGE PLAN	G-515
TANNER WASH RELOCATION	G-487
	G-400

FOR FURTHER MODIFICATION TO TANNER WASH SEE DWG. APS 4366 G.400

NO.	DATE	REVISION	BY	CH.	APPROVED
1	10-15-76	ADDED: (K16) NOTE, (C18) REF.	GK	JP	

ARIZONA PUBLIC SERVICE COMPANY
CHOLLA S.E. STATION
1977 - 250 MW INSTALLATION - UNIT No. 2
1978 - 250 MW EXTENSION - UNIT No. 3

TANNER WASH RELOCATION

EBASCO SERVICES INCORPORATED

SCALE 1"=40'	APPROVED	DATE SEP. 4, 75
DIV. C-H		APS-2742
DR. J. IAFRATE		G-576
CH. E. JONES		

APS DWG. #G-44576

"INDEX"

APS-4366-G-400

QUANTITIES

ALL EXCAVATION & BACKFILL QUANTITIES BY FIELD

NOTES

FOR EXCAVATION & BACKFILL SEE EBASCO SPECIFICATION APS-4366-362-04

CONTOURS ON THIS DWG. ARE BASED ON AERIAL MAPPING CO. INC DWGS #76037 & #76110

REFFRENCE

LIST OF DRAWINGS		A 100
AERIAL MAPPING CO INC	JOB NO	76037
AERIAL MAPPING CO. INC.	JOB NO	76110
OPERATING AREA PLAN	SH-2	G-309
COOLING TOWER BASIN		G-361
TANNER WASH RELOCATION		2742-G-576

NO.	DATE	REVISION	BY	CH.	APPROVED

ARIZONA PUBLIC SERVICE COMPANY
CHOLLA S.E. STATION
1980-350 MW EXTENSION - UNIT NO. 4

TANNER WASH RELOCATION

EBASCO SERVICES INCORPORATED

SCALE 1"=40' | APPROVED E. Radin | DATE 10-15-76
DIV. C-H | APS 4366
DR. D-THAKER
CH. J. I. Patel | G-400

APS DWG. #G-51400

15"ϕ CMP x 70'-0" W/ END SECTIONS
W. END INV EL 5019.8
E. END INV EL 5020.0

WP E. BERM
W 47.28
S 97.72

JOSEPH CITY IRRIGATION CANAL (ABANDONED)

24' GATE

TANNER WASH

REMOVE CONCRETE RIPRAP FROM EXST CROSSING - LEAVE CULVERTS IN PLACE

EXST TANNER WASH WP
W 320.00
S 349.00

WP E. BERM
W 73.16
S 194.31

REVISE SECURITY FENCE TO FIT BERM CONTOURS THIS AREA

12'-0" (TYP)

30" CMP 95' LONG

℄ DITCH

FOR CONT. SEE S0013

INV EL 5016.4

INV EL 5016.2

CL E. BERM

E. BERM WP
W 455.00
S 576.15

EXST TANNER WASH WP
W 534.55
S 561.67

CL TANNER WASH

76'-0" (TYP)

TRANSITION BERM WIDTH THIS AREA

E. BERM WP
W 757.44
S 1100.00

RELOCATE EXISTING SECURITY FENCE AS SHOWN

INV EL 5014.0

30" ϕ CMP 150' LONG

14'-0" (TYP)

INV EL 5013.0

CL EAST BERM

REMOVE CONCRETE RIPRAP FROM EXST CROSSING - CLEAN & LEAVE CULVERTS IN PLACE

EXST TANNER WASH & EXST CONST CROSSING
WP W 1135.00
S 1601.95

PT FLOOD CONTROL BERM CURVE 1
W 1021.04
S 1556.59

PI FLOOD CONTROL BERM CURVE 1
W 1063.47
S 1630.08

INV EL 5011.00
30" ϕ CMP x 65'-0" LONG W/ END SECTIONS

CL ROAD S1670.00

INV EL 5010.50

PI SOUTH CONST ROAD CURVE 1
W 1066.88
S 1670.00

PC FLOOD CONTROL BERM CURVE 1
W 1084.00
S 1712.42

REVISE SECURITY FENCE TO FIT BERM CONTOURS THIS AREA

DITCH DRAINS SOUTH

TANNER WASH WP
W 1302.00
S 1891.20

FLOOD CONTROL BERM CURVE 1
R = 603.80'
Δ = 16°
D = 9°-30'
T = 84.86'
L = 168.42'

SOUTH CONST ROAD CURVE 1
R = 100'
Δ = 47°
D = 57°-17'-45"
T = 43.48'
L = 82.03'

PT FLOOD CONTROL BERM CURVE 2
W 1219.27
S 2254.65

PI FLOOD CONTROL BERM CURVE 2
W 1253.48
S 2391.87

PC FLOOD CONTROL BERM CURVE 2
W 1223.20
S 2530.00

FLOOD CONTROL BERM CURVE 2
R = 603.8
Δ = 26°-21'-47"
D = 9°-30'
T = 141.42
L = 277.51

GENERAL NOTES

1. FOR GENERAL NOTES AND LEGEND APPLICABLE TO PAVING & DRAINAGE PHASE II WORK, CONTRACT 8271.71.0030, SEE SH S0011.
2. ALL WORK INDICATED ON THIS DRAWING SHALL BE PROVIDED UNDER THE PAVING & DRAINAGE PHASE II CONTRACT 8271.71.0030.

NO	DATE	REVISIONS	DWN	CK	ACC	APP
3	7-2-82	CONFORMED TO CONSTRUCTION RECORDS	FJG			
2	6-9-81	GENERAL REVISIONS	WR			
1	4-1-81	ISSUED FOR CONSTRUCTION, SPEC. 8271.71.0030	BRS			
0	1-7-81	ISSUED FOR BID, SPEC. 8271.71.0030	BRS			

SCALE: 1" = 50'

I HEREBY CERTIFY THAT THIS DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF ARIZONA
SIGNED
DATE 1/15/80 REG. NO. 11430

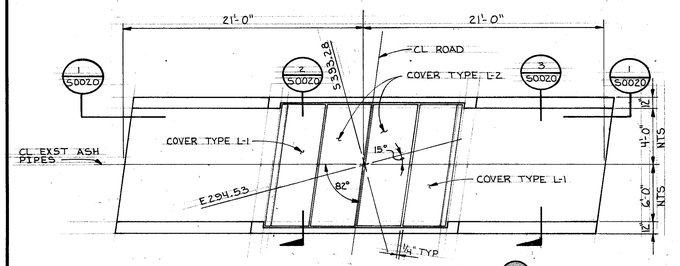
BLACK & VEATCH CONSULTING ENGINEERS
PROJECT 8271

ARIZONA PUBLIC SERVICE COMPANY
CHOLLA STEAM ELECTRIC STATION

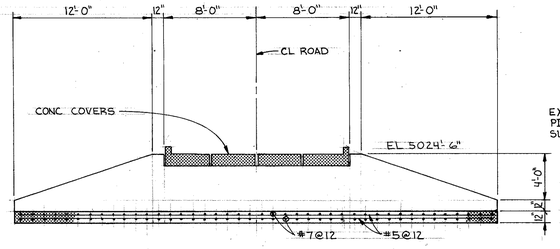
SITE
PAVING AND DRAINAGE
TANNER WASH FLOOD CONTROL BERM

B&V DWG NO. S0008 REV. 3
APS DWG NO. G-64108
SHEET 1 OF 1

INDEX



ASH PIPE TRUCK CROSSING
SCALE: 3/16" = 1'-0"
SEE SH S0009



SECTION 1
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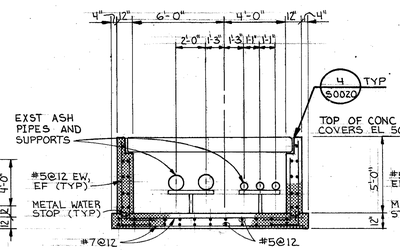
SEE THIS SH



SECTION 2
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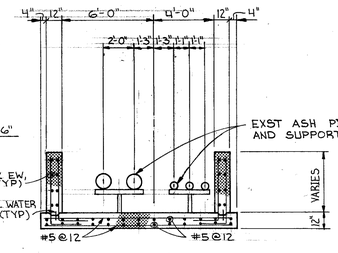
SEE THIS SH



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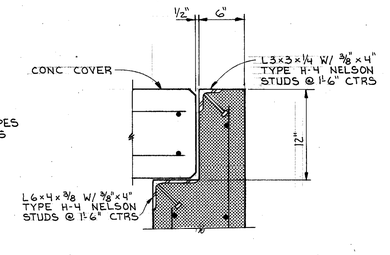
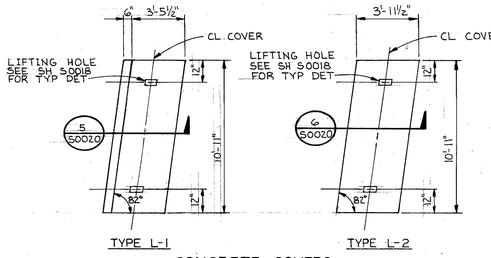
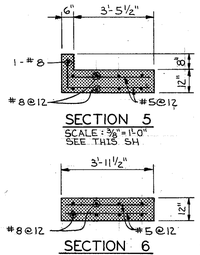
SCALE: 1/4" = 1'-0"
SEE THIS SH



DETAIL 4
SCALE: 1½" = 1'-0"
SEE THIS SH

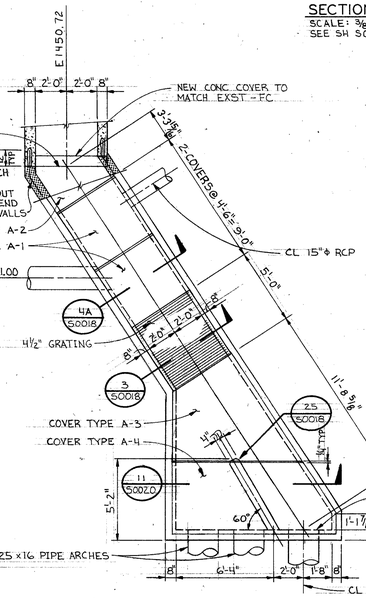


CONCRETE COVERS
SCALE: 1/4" = 1'-0"
SEE THIS SH

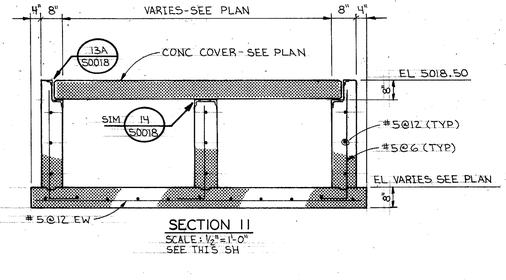


SECTION 5
SCALE: 3/8" = 1'-0"
SEE THIS SH

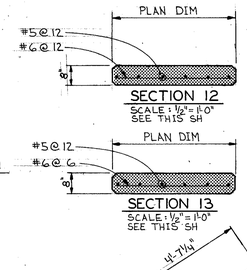
SECTION 6
SCALE: 3/8" = 1'-0"
SEE THIS SH



DETAIL 10
SCALE: 1½" = 1'-0"
SEE SH S0011

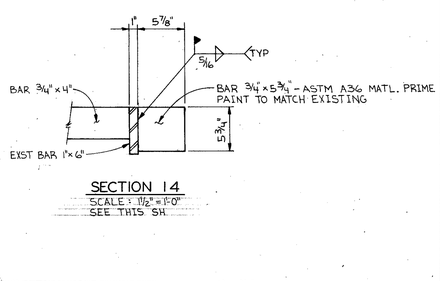


SECTION 11
SCALE: 1½" = 1'-0"
SEE THIS SH

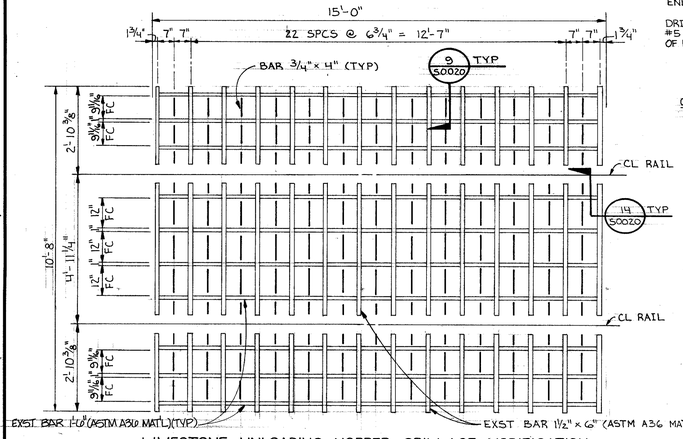


SECTION 12
SCALE: 1½" = 1'-0"
SEE THIS SH

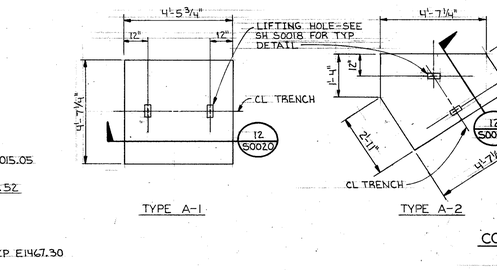
SECTION 13
SCALE: 1½" = 1'-0"
SEE THIS SH



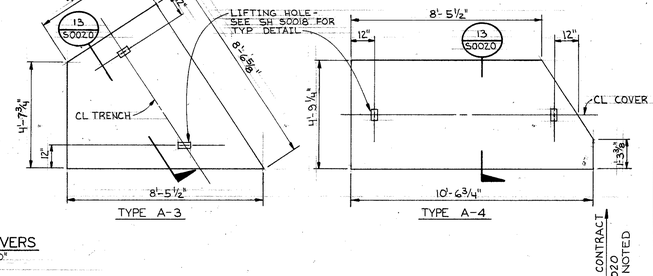
SECTION 14
SCALE: 1½" = 1'-0"
SEE THIS SH



LIMESTONE UNLOADING HOPPER GRILLAGE MODIFICATION
GRILLAGE ARRANGEMENT TYPICAL 4 PLACES
TOTAL REQUIRED ¾"x4" BARS - 324
TOTAL REQUIRED ¾"x5¾" BARS - 208
SCALE: ½" = 1'-0"
SEE SH S0009



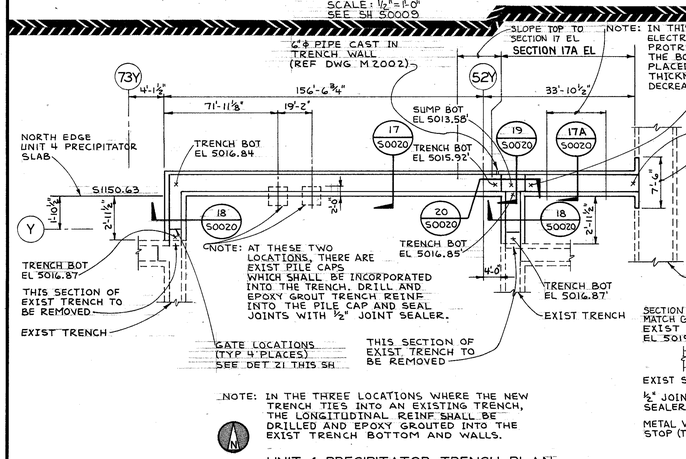
TYPE A-1 TYPE A-2



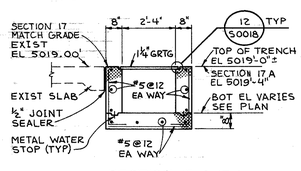
TYPE A-3 TYPE A-4

CONCRETE COVERS
SCALE: 3/8" = 1'-0"
SEE THIS SH

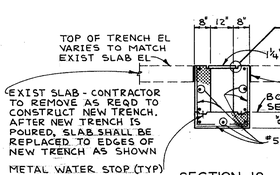
PHASE I CONTRACT
8271.71.0020
UNLESS NOTED



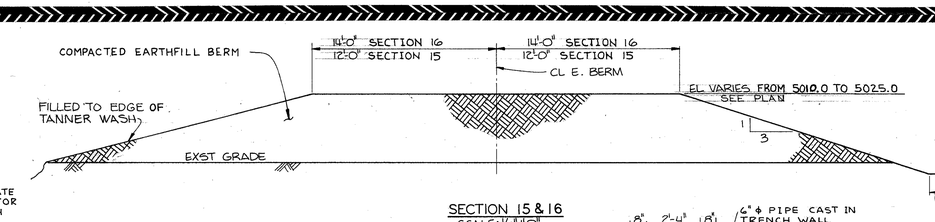
UNIT 4 PRECIPITATOR TRENCH PLAN
NO SCALE
SEE SH S0012



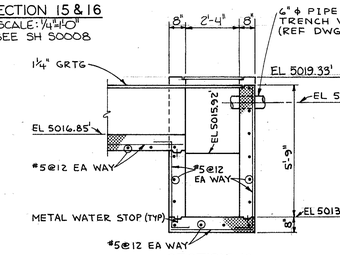
SECTION 17 & 17A
SCALE: 3/4" = 1'-0"
SEE SH S0020



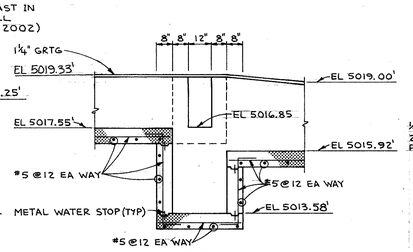
SECTION 18
SCALE: 3/4" = 1'-0"
SEE SH S0020



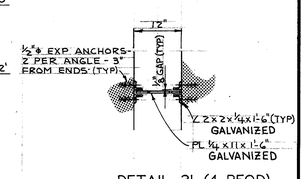
SECTION 15 & 16
SCALE: 1/4" = 1'-0"
SEE SH S0008



SECTION 19
SCALE: 3/4" = 1'-0"
SEE SH S0020



SECTION 20
NO SCALE
SEE SH S0020



DETAIL 21 (4 REQD)
SCALE: 3/4" = 1'-0"
SEE SH S0020

PHASE II CONTRACT
8271.71.0030

NO	DATE	REVISIONS	DWN	CK	ACC	APP
3*	7-2-82	CONFORMED TO CONSTRUCTION RECORDS	FJG			
2	4-1-81	ISSUED FOR CONSTRUCTION, SPEC. 8271.71.0030				
1	1-7-81	ISSUED FOR BID, SPEC. 8271.71.0030	BRS			
0	8/15/79	ISSUED FOR CONSTRUCTION, SPEC 8271.71.0020	TM	SEH		

SCALE: AS NOTED

I HEREBY CERTIFY THAT THIS DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF ARIZONA
SIGNED
DATE 8/14/79 REG. NO. 11430

BLACK & VEATCH
CONSULTING ENGINEERS
PROJECT
8271

ARIZONA PUBLIC SERVICE COMPANY
CHOLLA STEAM ELECTRIC STATION

SITE
PAVING AND DRAINAGE
SECTIONS AND DETAILS

B&V DWG NO. S0020 REV. 3
APS DWG NO. G-64120
SHEET 1 OF 1