S A W P A
SANTA ANA WATERSHED PROJECT AUTHORITY
11615 Sterling Avenue, Riverside, California 92503 • (951) 354-4220

REGULAR COMMISSION MEETING
TUESDAY, OCTOBER 16, 2018 – 9:30 A.M.

AGENDA
[Amended]

1. **CALL TO ORDER/PLEDGE OF ALLEGIANCE (Mark Bulot, Chair)**

2. **ROLL CALL**

3. **PUBLIC COMMENTS**

Members of the public may address the Commission on items within the jurisdiction of the Commission; however, no action may be taken on an item not appearing on the agenda unless the action is otherwise authorized by Government Code §54954.2(b).

4. **CONSENT CALENDAR**

All matters listed on the Consent Calendar are considered routine and non-controversial and will be acted upon by the Commission by one motion as listed below.

Recommendation: Approve as posted.

Recommendation: Approve as posted.

5. **NEW BUSINESS**

Presenter: David Ruhl
Recommendation: Receive and file.

Presenter: Rich Haller
Recommendation: Direct staff to adjust the medical insurance cap from $1,700.90 to $1,745.45, which reflects the ACWA/JPIA 2018 Kaiser Family Plan rate.

Presenter: Mark Norton
Recommendation: Receive and file.

Presenter: Mike Antos
Recommendation: (1) Authorize the General Manager to execute a Memorandum of Understanding (MOU) between SAWPA, the City of Riverside and the County of Riverside in support of the City application for a Transformative Climate Communities grant which, if awarded, would fund expansion of the Water-Energy Community Action Network (WECAN) Program; and, (2) If the WECAN Program is expanded, assign oversight of the program to Project Agreement (PA) 22 Committee.

6. INFORMATIONAL REPORTS

Recommendation: Receive for information.

Presenter: Karen Williams

Presenter: Karen Williams

Presenter: Karen Williams

- October 9, 2018

Presenter: Rich Haller

G. CHAIR'S COMMENTS/REPORT

H. COMMISSIONERS' COMMENTS

I. COMMISSIONERS' REQUEST FOR FUTURE AGENDA ITEMS

7. CLOSED SESSION

A. CONFERENCE WITH LEGAL COUNSEL – EXISTING LITIGATION PURSUANT TO GOVERNMENT CODE SECTION 54956.9(d)(1)
Name of Case: Spiniello Companies v. Charles King Company, Inc., Santa Ana Watershed Project Authority, The Ohio Casualty Insurance Company (Superior Court of Los Angeles BC616589)

B. CONFERENCE WITH LEGAL COUNSEL – EXISTING LITIGATION PURSUANT TO GOVERNMENT CODE SECTION 54956.9(d)(1)
Name of Case: County of Riverside v. MGP X Vernola, LLC, et al (Superior Court of Riverside RIC 1801451)
Name of Case: County of Riverside v. Anthony P. Vernola, et al (Superior Court of Riverside RIC 1801464)
Name of Case: County of Riverside v. Lowes HIW, Inc., et al (Superior Court of Riverside RIC 1801454)

C. PUBLIC EMPLOYEE ANNUAL PERFORMANCE EVALUATION – PURSUANT TO GOVERNMENT CODE SECTION 54957

Title: General Manager

8. ADJOURNMENT

Americans with Disabilities Act: If you require any special disability related accommodations to participate in this meeting, call (951) 354-4230 or email kberry@sawpa.org. 48-hour notification prior to the meeting will enable staff to make reasonable arrangements to ensure accessibility for this meeting. Requests should specify the nature of the disability and the type of accommodation requested.

Materials related to an item on this agenda submitted to the Commission after distribution of the agenda packet are available for public inspection during normal business hours at the SAWPA office, 11615 Sterling Avenue, Riverside, and available at www.sawpa.org, subject to staff's ability to post documents prior to the meeting.

Declaration of Posting

I, Kelly Berry, Clerk of the Board of the Santa Ana Watershed Project Authority declare that on Thursday, October 11, 2018, a copy of this ***amended*** agenda has been uploaded to the SAWPA website at www.sawpa.org and posted at the SAWPA office, 11615 Sterling Avenue, Riverside, California.

/s/

Kelly Berry, CMC

2018 SAWPA Commission Meetings/Events

First and Third Tuesday of the Month

(NOTE: Unless otherwise noticed, all Commission Workshops/Meetings begin at **9:30 a.m.**, and are held at SAWPA.)

January 1/2/18 ~~Commission Workshop~~ [cancelled] 1/16/18 Regular Commission Meeting	**February** 2/6/18 Commission Workshop 2/20/18 Regular Commission Meeting
March 3/6/18 Commission Workshop 3/20/18 Regular Commission Meeting	**April** 4/3/18 Commission Workshop 4/17/18 Regular Commission Meeting
May 5/1/18 Commission Workshop 5/8 – 5/11/18 ACWA Spring Conference, Sacramento 5/15/18 Regular Commission Meeting	**June** 6/5/18 Commission Workshop 6/19/18 Regular Commission Meeting
July 7/3/18 ~~Commission Workshop~~ [cancelled] 7/17/18 Regular Commission Meeting	**August** 8/7/18 Commission Workshop 8/21/18 Regular Commission Meeting
September 9/4/18 Commission Workshop 9/18/18 Regular Commission Meeting	**October** 10/2/18 Commission Workshop 10/16/18 Regular Commission Meeting
November 11/6/18 Commission Workshop 11/20/18 Regular Commission Meeting 11/27 – 11/30/18 ACWA Fall Conference, San Diego	**December** 12/4/18 Commission Workshop 12/18/18 Regular Commission Meeting

2019 SAWPA Commission Meetings|Events|Important Dates

First and Third Tuesday of the Month

(NOTE: Unless otherwise noticed, all Commission Workshops/Meetings begin at **9:30 a.m.**, and are held at SAWPA.)

January 1/8/19 Commission Workshop 1/22/19 Regular Commission Meeting	**February** 2/5/19 Commission Workshop 2/19/19 Regular Commission Meeting
March 3/5/19 Commission Workshop 3/19/19 Regular Commission Meeting 3/29/19 OWOW Conference 2019, Cal State Fullerton	**April** 4/2/19 Commission Workshop 4/16/19 Regular Commission Meeting
May 5/7/19 Commission Workshop 5/7 – 5/10/19 ACWA Spring Conference, Monterey 5/21/19 Regular Commission Meeting	**June** 6/4/19 Commission Workshop 6/18/19 Regular Commission Meeting
July 7/2/19 Commission Workshop 7/16/19 Regular Commission Meeting	**August** 8/6/19 Commission Workshop 8/20/19 Regular Commission Meeting
September 9/3/19 Commission Workshop 9/17/19 Regular Commission Meeting	**October** 10/1/19 Commission Workshop 10/15/19 Regular Commission Meeting
November 11/5/19 Commission Workshop 11/19/19 Regular Commission Meeting	**December** 12/3/19 Commission Workshop 12/17/19 Regular Commission Meeting 12/3 – 12/6/19 ACWA Fall Conference, San Diego

SAWPA COMPENSABLE MEETINGS

Commissioners and Alternate Commissioners will receive compensation for attending the meetings listed below, pursuant to the Commission Compensation, Expense Reimbursement, and Ethics Training Policy.

IMPORTANT NOTE: These meetings are subject to change. Prior to attending any meetings listed below, please confirm meeting details by viewing the website calendar using the following link:

http://www.sawpa.org/sawpa-events/

MONTH OF: OCTOBER

DATE	TIME	MEETING DESCRIPTION	LOCATION
10/2/18	8:30 AM	PA 23 Committee Mtg	CANCELLED
10/10/18	10:00 AM	Climate Risk/Response Pillar Mtg	CANCELLED
10/18/18	4:00 PM	LESJWA Board of Directors Mtg	Elsinore Valley MWD 31315 Chaney Street Lake Elsinore, CA
10/22/18	2:00 PM	OWOW Disadvantaged & Tribal Communities Pillar Mtg	CANCELLED
10/25/18	8:00 AM	PA 22 Committee Mtg	SAWPA
10/25/18	9:30 AM	OWOW Pillar Integration Mtg	SAWPA
10/30/18	9:00 AM	Basin Monitoring Program Task Force Mtg	SAWPA
10/30/18	1:00 PM	Lake Elsinore/Canyon Lake TMDL Task Force Mtg	SAWPA
10/31/18	1:00 PM	MSAR TMDL Task Force Mtg	SAWPA

MONTH OF: NOVEMBER

DATE	TIME	MEETING DESCRIPTION	LOCATION
11/14/18	1:00 PM	Basin Monitoring Program Task Force Mtg	SAWPA
11/15/18	11:00 AM	OWOW Steering Committee Mtg	SAWPA
11/22/18	8:00 AM	PA 22 Committee Mtg	SAWPA

Please Note: We strive to ensure the list of Compensable Meetings set forth above is accurate and up-to-date; the list is compiled based on input from SAWPA staff and Department Managers regarding meeting purpose and content.

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SAWPA COMMISSION
REGULAR MEETING MINUTES
OCTOBER 2, 2018

COMMISSIONERS PRESENT	Mark Bulot, Chair, San Bernardino Valley Municipal Water District Jasmin A. Hall, Secretary-Treasurer, Inland Empire Utilities Agency David J. Slawson, Alternate, Eastern Municipal Water District Bruce Whitaker, Orange County Water District Thomas P. Evans, Western Municipal Water District
COMMISSIONERS ABSENT	Ronald W. Sullivan, Vice Chair, Eastern Municipal Water District
ALTERNATE COMMISSIONERS PRESENT; NON-VOTING	Kati Parker, Alternate, Inland Empire Utilities Agency Brenda Dennstedt, Alternate, Western Municipal Water District (9:46 a.m.)
STAFF PRESENT	Rich Haller, Larry McKenney, Karen Williams, Mark Norton, Pete Vitt, David Ruhl, Carlos Quintero, Mark Antos, Kelly Berry

The Regular Commission Meeting of the Santa Ana Watershed Project Authority was called to order at 9:30 a.m. by Chair Bulot at the Santa Ana Watershed Project Authority, 11615 Sterling Avenue, Riverside, California.

1. CALL TO ORDER/PLEDGE OF ALLEGIANCE

2. ROLL CALL

Roll call was duly noted and recorded by the Clerk of the Board.

3. PUBLIC COMMENTS

There were no public comments.

4. SAN DIEGO ASSOCIATION OF ENVIRONMENTAL PROFESSIONALS – AWARD

The SAWPA Outreach Brochures prepared by Woodard & Curran and SAWPA were recently acknowledged by the San Diego Association of Environmental Professionals with its award for Outstanding Public Involvement. Woodard & Curran's Senior Project Manager Rosalyn Prickett and Water Resources Planner Nicole Poletto were in attendance and commended for their work on the brochures.

5. CONSENT CALENDAR

A. APPROVAL OF MEETING MINUTES: SEPTEMBER 18, 2018
Recommendation: Approve as posted.

B. DISPOSAL OF SAWPA SURPLUS PROPERTY (CM#2018.99)
Recommendation: Receive and file.

MOVED, approve the Consent Calendar.

Result:	**Adopted (Unanimously)**
Motion/Second:	Evans/Whitaker
Ayes:	Bulot, Evans, Hall, Slawson, Whitaker
Nays:	None
Abstentions:	None
Absent:	None

6. NEW BUSINESS

A. INJURY AND ILLNESS PREVENTION PLAN (IIPP) (CM#2018.100)

Carlos Quintero provided a PowerPoint presentation, a copy of which was provided to the Commission, staff and the public, regarding SAWPA's Injury and Illness Prevention Plan (IIPP). SAWPA currently provides ongoing training covering 24 specific programs. A safety committee meets regularly, along with biweekly safety tailgate meetings.

This item was for informational and discussion purposes; no action was taken on Agenda Item No. 6.A.

B. WECAN EXPANSION IN THE CITY OF RIVERSIDE (CM#2018.101)

Mike Antos provided an oral report about the WECAN program background, expansion and funding utilization. The City of Riverside would like to partner with SAWPA for further expansion of the existing program via a grant they will file with the Strategic Growth Council for a transformative climate communities grant opportunity. The Strategic Growth Council requires a Memorandum of Understanding (MOU) which will be brought to the Commission for consideration at the October 16, 2018 meeting.

This item was for informational and discussion purposes; no action was taken on Agenda Item No. 6.B.

C. PROPOSED JPA AMENDMENTS AND NEW PROJECT AGREEMENT 24 (CM#2018.102)

Rich Haller provided the PowerPoint contained in the agenda packet (pages 21-30); the Commission had provided direction to staff during the September 18 regular meeting to continue discussions with Member Agency General Managers seeking additional input regarding PA 24 Committee appointed members, definition of operating decisions and procedures, and unanimous approval of budget overruns and adjustments. Agenda packet materials contained two proposed draft Project Agreement 24 documents – one which proposed amendments to the SAWPA Joint Powers Authority Agreement (JPAA), which was provided to the Commission at the September 18 meeting, and one which does not propose amendments to the JPAA and does allow Member Agency GMs to be appointed to the committee. Haller referenced revised flowcharts originally contained in the agenda packet (pages 57-60), which were provided to the Commission, staff and the public.

Commissioner Evans noted he had raised earlier the issue of a trouble-making provision and the need to clearly define the term operating decision; he noted the SAWPA General Manager makes operating decisions within his authority and anything beyond that would come before the Commission. Rich Haller noted that operating decisions which have come to the Commission may not have been highlighted as such and, as an example, would have been in the form of a contract, such as the Reach V rehabilitation bypass pipeline. Haller referenced pages 41-49 of the agenda packet containing a table listing Commission actions regarding the Brine Line from January 2015 through May 2018. The intent of the draft PA 24 is to define operating decisions as higher level and not day-to-day decisions; however, Haller supported inclusion of clearly worded language delineating what would be taken to the PA 24 Committee as an operating decision vs. what the SAWPA General Manager would make as a day-to-day operating decision.

Larry McKenney noted the JPAA currently states that budget and operating decisions go to the Member Agencies. It is proposed in this JPAA amendment to change that language from being a decision of all the Member Agencies to being a unanimous decision of the PA 24 Committee or the Commission; the question of defining an operating decision remains. In the draft PA 24 there is an effort to define that for Brine Line purposes. Commissioner Evans stated this is a potential problem and suggested its removal.

Commissioner Evans noted his position that the PA 24 Committee should be comprised only of Commissioners and Alternates, and he continues to be opposed to appointment of the General Managers to the committee. Currently there is a meeting of the General Managers which is not public. If those same General Managers are appointed to the PA 24 Committee, they will be meeting in private, collectively coming to a decision about matters that the General Managers will then present back to themselves as members of the PA 24 Committee, which is a fundamental violation of the Brown Act. A violation, perceived or otherwise, should not be built into this process.

Chair Bulot noted it is the desire of some Commissioners to have the advice of their General Managers available during those meetings. The presence of the General Manages at the committee meetings, not necessarily as a PA 24 Committee member, would certainly fulfill that need and keep Commissioner Evans's concern out of the equation. Commissioner Evans agreed on the importance of technical input from General Managers, but he did not support them meeting collectively as PA 24 Committee members then re-approving something discussed among them previously.

Alternate Commissioner Slawson did not support precluding any Member Agency from making this decision, since the JPAA is currently supportive of appointing General Managers, and he did not see the Brown Act violation; perhaps the wiser decision would be to hold the General Manager meetings in accordance with the Brown Act. General Manager Miller and General Manager Markus voiced their desire that the meetings continue as non-Brown Act. Certainly, an option could be a split membership on the PA 24 Committee like the PA 23 Committee which is two General Managers and three Commissioners. Deputy General Manager Nick Kanetis suggested matters going before the PA 24 Committee would not be discussed at the General Manager meetings which would preclude any perceived or actual violation. General Manager Miller voiced concern this would further limit the matters that could be discussed collectively by the General Managers – matters which are core functions of SAWPA.

Chair Bulot noted the way to structurally accommodate a free exchange of ideas with the General Managers and accomplish the challenge of having operational decisions being made by non-Commissioners is that those Commissioners on the PA 24 Committee have their General Manager or engineer in attendance and available to provide technical expertise. Commissioner Hall voiced her support, noting that is how IEUA operates. Commissioner Whitaker supported a streamlined process and achieving separation of technical staff and electeds.

Chair Bulot stated it did not appear the Commission was ready to make a decision at this point. Haller noted the one version of the PA 24 not presented was one that limits membership to Commissioners and Alternate Commissioners, which could be prepared with this scenario included – then the Commission would have all available options before it for consideration.

Chair Bulot added that consideration of defining operational decisions remains outstanding – does the Commission desire to require unanimity on operational decisions the same as with budget decisions and would this include day-to-day operational decisions, high-level operational decisions, or both? In the past, decisions which have created difficulty were those regarding matters beyond the budget. Rich

Haller noted that the day-to-day reference document utilized by staff is the Sewer System Management Plan (SSMP), which was approved by the Commission and provides the general guidance used to operate and maintain the Brine Line. The SSMP could be the upper level policy decision, which was already made by the Commission that the PA 24 Committee could adopt which would give staff the guidance in operating and maintaining the Brine Line. Commissioner Evans noted actions and operations under the SSMP could be delegated, and those that are not would come back to the Commission; but a delegation authority should be considered stating what the SAWPA General Manager can do to keep the Brine Line operational. Chair Bulot suggested that each Commissioner re-visit the SSMP that would be incorporated by reference in the PA 24 language, so the Commission understands what a committee-level operational decision would be rather than something that could be delegated. A reference to the SSMP would make the PA 24 language more definitive in terms of what is operational. Haller noted the SSMP would be provided to Commissioners and Alternates, and that the matter would be brought before the Commission for further consideration at the October 16 regular meeting. Commissioner Whitaker encouraged achieving consensus to the extent possible and its importance moving forward.

No action was taken on Agenda Item No. 6.C.

7. INFORMATIONAL REPORTS

The following oral/written reports/updates were received and filed.

A. CHAIR'S COMMENTS/REPORT

There were no further Chair comments or reports.

B. COMMISSIONERS' COMMENTS

There were no further Commissioners' comments.

C. COMMISSIONERS' REQUEST FOR FUTURE AGENDA ITEMS

There were no further requests for future agenda items.

8. SAWPA COMMISSION MEETING SCHEDULE – NOVEMBER 2018

It was determined that a quorum will be present for the November 20, 2018 Commission meeting; by consensus of the Commission that the meeting will be held as scheduled.

9. CLOSED SESSION

Chair Bulot recessed the meeting to Closed Session at 10:34 a.m. During Closed Session, designated personnel essential to the discussion of Agenda Item No. 9.A. were present; only Rich Haller was present during portions of the discussion of Agenda Item No. 9.B.

A. CONFERENCE WITH LEGAL COUNSEL – EXISTING LITIGATION PURSUANT TO GOVERNMENT CODE SECTION 54956.9(d)(1)

Name of Case: Spiniello Companies v. Charles King Company, Inc., Santa Ana Watershed Project Authority, The Ohio Casualty Insurance Company (Superior Court of Los Angeles BC616589)

B. PUBLIC EMPLOYEE ANNUAL PERFORMANCE EVALUATION – PURSUANT TO GOVERNMENT CODE SECTION 54957

Title: General Manager

Chair Bulot resumed Open Session at 11:21 a.m. There was no reportable action.

10. ADJOURNMENT

There being no further business for review, Chair Bulot adjourned the meeting at 11:21 a.m.

Approved at a Regular Meeting of the Santa Ana Watershed Project Authority Commission on Tuesday, October 16, 2018.

____
Mark Bulot, Chair

Attest:

____
Kelly Berry, CMC
Clerk of the Board

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Santa Ana Watershed Project Authority

SAWPA

Finance Department

Santa Ana Watershed Project Authority

TREASURER'S REPORT

September 2018

During the month of September 2018, the Agency's actively managed temporary idle cash earned a return of 1.702%, representing interest earnings of $18,434. Additionally, the Agency's position in overnight funds L.A.I.F. generated $63,671 in interest, resulting in $82,105 of interest income from all sources. Please note that this data represents monthly earnings only, and does not indicate actual interest received. There were zero (0) investment positions purchased, zero (0) positions sold, zero (0) positions matured, and zero (0) positions were called.

This Treasurer's Report is in compliance with SAWPA's Statement of Investment Policy. Based upon the liquidity of the Agency's investments, this report demonstrates the ability to meet customary expenditures during the next six months.

October 9, 2018

Prepared and Submitted by: Karen L. Williams

Karen L. Williams, Chief Financial Officer

Santa Ana Watershed Project Authority

INVESTMENT PORTFOLIO - MARKED TO MARKET - UNREALIZED GAINS & LOSSES

September 30, 2018

SAWPA primarily maintains a "Buy and Hold" investment philosophy, with all investments held by the Citizens Business Bank via a third-party safekeeping contract.

Investment Type	Security Type	CUSIP	Dealer	Purchase Date	Maturity Date	Call Date (if appl)	Par Value	Yield To Maturity	Investment Cost	Market Value Current Month	Unrealized Gain / (Loss)	Coupon Rate	Interest Earned
Agency	FHLMC	3137EACA5	WMS	03-27-14	03-27-19	No Call	$ 500,000.00	1.790%	$ 546,650.00	$ 503,217.00	$ (43,433)	3.750%	$ 735.62
Agency	FHLMC	3137EAEC9	WMS	09-16-16	08-12-21	No Call	$ 1,000,000.00	1.335%	$ 990,060.00	$ 950,964.00	$ (39,096)	1.125%	$ 1,097.22
Agency	FHLMC	3137EADB2	WMS	04-17-17	01-13-22	No Call	$ 500,000.00	2.375%	$ 512,767.00	$ 491,058.00	$ (21,709)	2.375%	$ 976.03
Agency	FHLB	313379EE5	WMS	05-26-15	06-14-19	No Call	$ 500,000.00	1.420%	$ 504,015.00	$ 496,882.50	$ (7,133)	1.625%	$ 583.65
Agency	FHLB	313383HU8	WMS	06-16-16	06-12-20	No Call	$ 1,000,000.00	1.080%	$ 1,026,088.00	$ 981,562.00	$ (44,526)	1.750%	$ 887.69
Agency	FHLB	313379Q69	WMS	12-14-17	06-10-22	No Call	$ 1,000,000.00	2.150%	$ 998,930.00	$ 970,040.00	$ (28,890)	2.125%	$ 1,767.21
Agency	FNMA	3135GOZA4	WMS	03-27-14	02-19-19	No Call	$ 500,000.00	1.800%	$ 501,975.00	$ 499,070.50	$ (2,905)	1.875%	$ 739.73
Agency	FNMA	3135G0H55	WMS	12-28-15	12-28-20	No Call	$ 1,000,000.00	1.830%	$ 1,002,140.00	$ 978,162.00	$ (23,978)	1.875%	$ 1,504.12
Agency	FNMA	3135G0F73	WMS	06-16-16	11-30-20	No Call	$ 1,000,000.00	1.150%	$ 1,015,157.00	$ 971,419.00	$ (43,738)	1.500%	$ 945.21
Agency	USTN	912828A34	WMS	11-17-15	11-30-18	No Call	$ 1,000,000.00	1.166%	$ 1,002,500.00	$ 998,424.00	$ (4,076)	1.250%	$ 958.27
Agency	USTN	912828WC	WMS	11-17-15	10-31-20	No Call	$ 1,000,000.00	1.638%	$ 1,005,312.50	$ 977,812.00	$ (27,501)	1.750%	$ 1,346.17
Agency	USTN	912828G61	WMS	11-17-15	11-30-19	No Call	$ 1,000,000.00	1.469%	$ 1,001,210.94	$ 986,211.00	$ (15,000)	1.500%	$ 1,207.35
Agency	USTN	912828L32	WMS	06-17-16	08-31-20	No Call	$ 500,000.00	1.030%	$ 507,070.31	$ 486,406.00	$ (20,664)	1.375%	$ 423.42
Agency	USTN	912828L65	WMS	06-16-16	09-30-20	No Call	$ 500,000.00	1.041%	$ 506,992.19	$ 485,781.00	$ (21,211)	1.375%	$ 427.69
Agency	USTN	912828L99	WMS	06-16-16	10-31-20	No Call	$ 500,000.00	1.051%	$ 506,914.06	$ 485,097.50	$ (21,817)	1.375%	$ 431.71
Agency	USTN	912828S76	WMS	12-14-17	07-31-21	No Call	$ 1,000,000.00	2.013%	$ 969,062.50	$ 951,953.00	$ (17,110)	1.125%	$ 1,654.36
CD	Ally Bank	02006L2F9	WMS	01-13-15	04-20-20	No Call	$ 248,000.00	1.800%	$ 248,000.00	$ 248,000.00	$ -	1.800%	$ 366.90
CD	American Express	02587DP85	WMS	04-19-17	04-19-21	No Call	$ 248,000.00	2.250%	$ 248,000.00	$ 248,000.00	$ -	2.250%	$ 458.63
CD	American Express BK FSB	AN4199708	WMS	05-10-17	05-10-21	No Call	$ 248,000.00	2.200%	$ 248,000.00	$ 248,000.00	$ -	2.200%	$ 448.44
CD	Capital One NA	14042RAG6	WMS	09-30-15	10-01-18	No Call	$ 248,000.00	1.650%	$ 248,000.00	$ 248,000.00	$ -	1.650%	$ 336.33
CD	Capital One Bank USA NA	140420VZ0	WMS	09-30-15	10-01-18	No Call	$ 248,000.00	1.650%	$ 248,000.00	$ 248,000.00	$ -	1.650%	$ 336.33
CD	Wells Fargo Bank NA	9497482W6	WMS	12-02-15	12-03-18	No Call	$ 245,000.00	1.450%	$ 245,000.00	$ 244,745.52	$ (254)	1.450%	$ 291.99
CD	Goldman Sachs Bank USA	38148PUV7	WMS	12-20-17	12-20-22	No Call	$ 248,000.00	2.500%	$ 248,000.00	$ 248,000.00	$ -	2.500%	$ 509.59
Total Actively Invested Funds							**$ 14,233,000.00**		**$ 14,329,844.50**	**$ 13,946,805.02**	**$ (383,039)**	**1.702%**	**$ 18,433.64**
Total Local Agency Investment Fund									$ 37,532,231.03			2.064%	$ 63,671.12
Total Invested Cash							**$ 14,233,000.00**		**$ 51,862,075.53**			**1.964%**	**$ 82,104.76**

Key to Security Type:

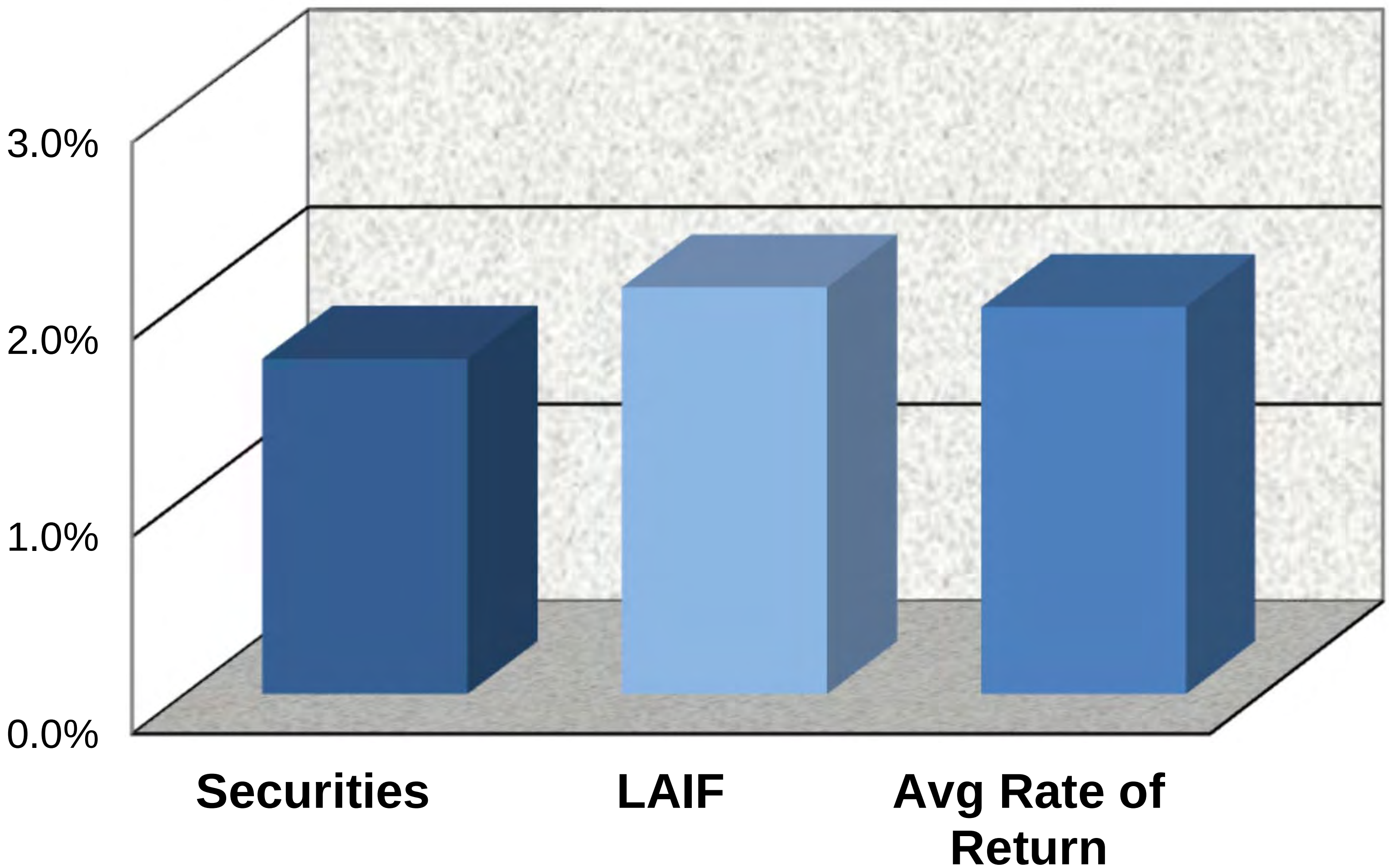
FHLB	=	Federal Home Loan Bank
FHLMC	=	Federal Home Loan Mortgage Corporation
FNMA	=	Federal National Mortgage Association
USTN	=	US Treasury Note
CORP	=	Corporate Note
CD	=	Certificate of Deposit
GDB	=	Goldman Sachs Bank
AEC	=	American Express Centurion

Key to Dealers:

FCS	=	FinaCorp Securities
MBS	=	Multi-Bank Securities
MS	=	Mutual Securities
RCB	=	RBC Dain Rauscher
SA	=	Securities America
TVI	=	Time Value Investments
WMS	=	Wedbush Morgan Securities

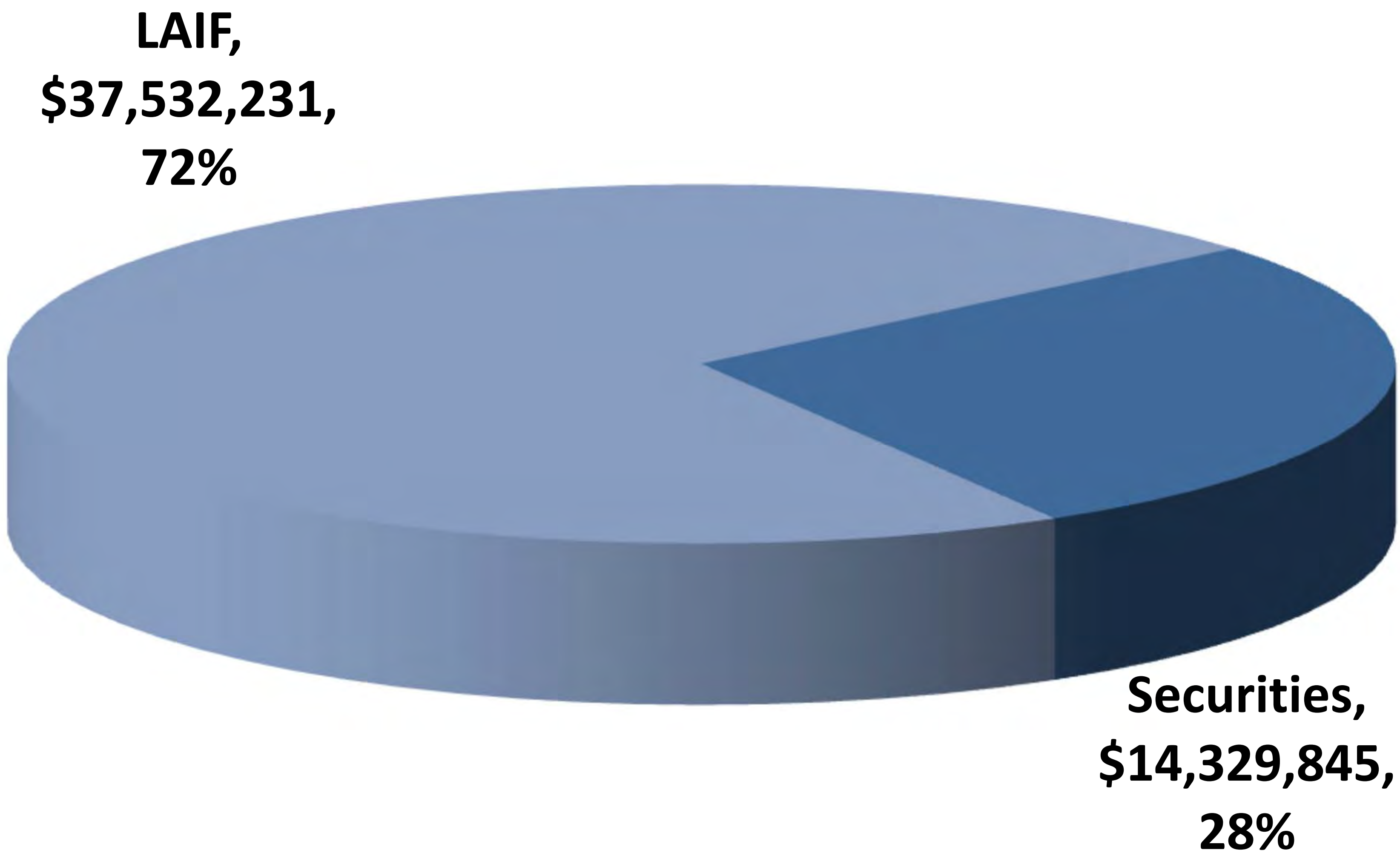
Sep-2018

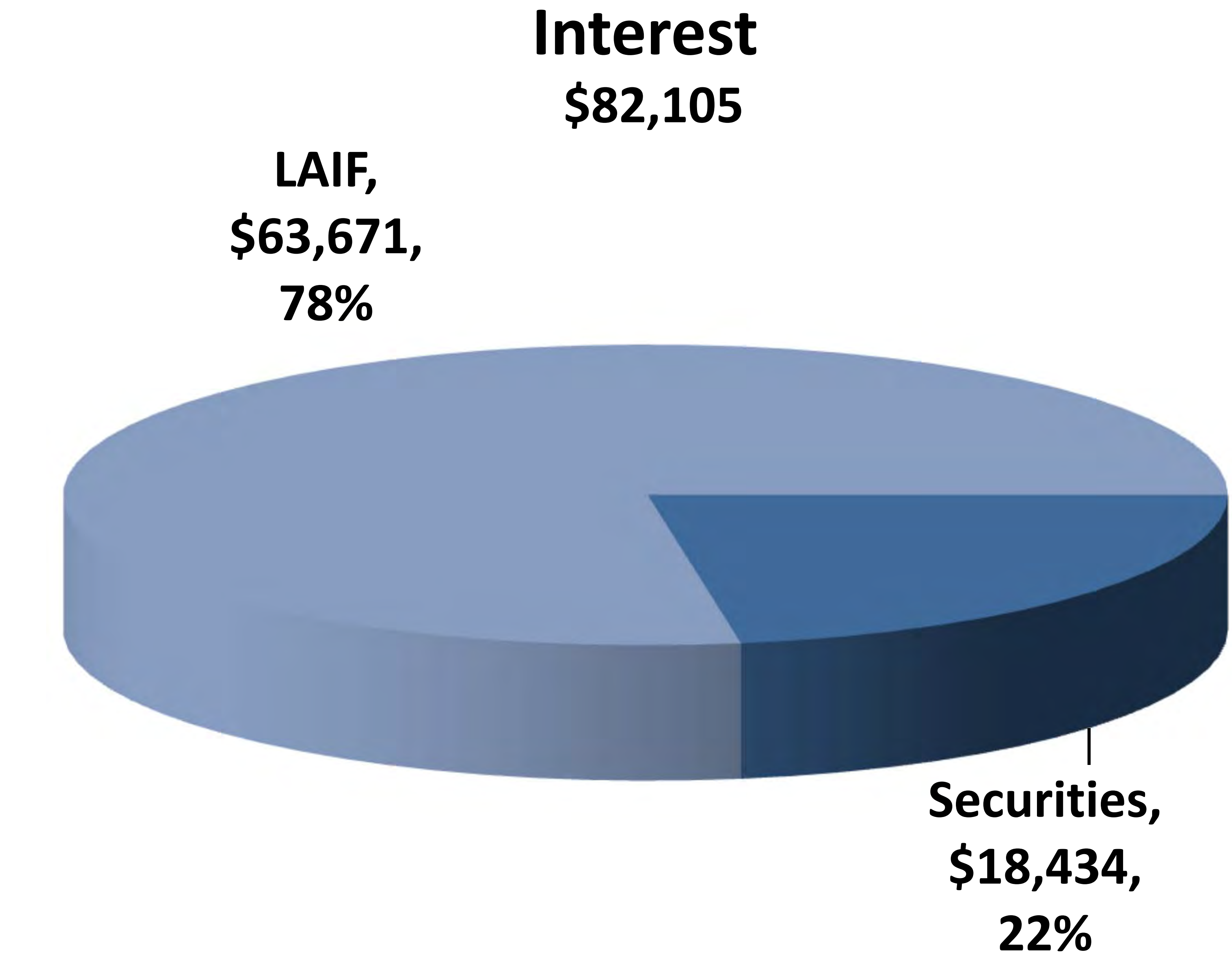
Interest Rate Analysis



Sep-2018

Investments
$51,862,076




Interest
$82,105
LAIF,
$63,671,
78%
Securities,
$18,434,
22%

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COMMISSION MEMORANDUM NO. 2018.106

DATE: October 16, 2018

TO: SAWPA Commission

SUBJECT: Inland Empire Brine Line Reach 4D Rehabilitation Work Plan

PREPARED BY: David Ruhl, Engineering Manager

RECOMMENDATION

It is recommended that the Commission receive and file a summary of the Reach 4D Work Plan prepared by Woodard & Curran.

DISCUSSION

The Brine Line Reach 4D, was constructed in the early 1990's and runs from the intersection with Reach 4A in the City of Chino approximately 21 miles East, to the intersection with Reach 4E in the City of Rialto, see Figure 1. About seven (7) miles of the Brine Line Reach 4D consists of T-Lock Lined 42-inch reinforced concrete pipe (RCP). The T-lock lining is a polyvinyl chloride (PVC) lining on the interior circumference of the pipe that provides a protective corrosion barrier between the flow and concrete pipe. The T-lock lining on this portion of the brine line was installed on the upper 270 degrees of the pipeline leaving the invert or bottom 90 degrees of the pipe unlined. Low flows during the initial years of operation placed the flow line below the termination of the T-lock liner and exposed the concrete to corrosion and uplifting of the T-Lock liner.

Work to be performed

In March 2018, the Commission authorized Woodard & Curran to prepare the Reach 4D Work Plan. The work included a pipeline condition assessment to evaluate the condition and the remaining useful life of this portion of the Reach 4D pipeline. The Work Plan includes an evaluation of potential repair methods, preferred repair method, recommended actions to monitor the condition of the Brine Line and provide repairs as necessary in the future and a schedule and cost estimate for the near-term, mid-term and long-term recommendations.

Condition Assessment

A condition assessment of the Reach 4D pipeline was conducted through visual assessment (manned entry and CCTV inspection), physical tests of the unlined concrete surface and estimating the depth of concrete cover over the steel reinforcement in the concrete pipe. Based on this assessment the consultant estimated the predicted remaining useful life of 10 to 20 years. The variability of 10 years in the estimated useful life is due to the lack of historical information on the rate of deterioration of the unlined concrete.

Based on the uniformity of the observed concrete deterioration that has occurred at the interface of the concrete and T-lock liner along the pipeline, it is likely that the entire seven (7) miles will require structural rehabilitation in approximately 10 to 20 years.

Rehabilitation Alternatives
Several rehabilitation alternatives were considered including segmental sliplining, continuous sliplining, cured-in-place pipe (CIPP) lining, spiral wound pipe lining and man-entry repairs. Total estimated cost of repair for the entire seven (7) mile portion of Reach 4D ranged from $34.2 Million to $64.2 Million. Rehabilitation alternatives were evaluated using the following criteria; Constructability/Work Area Requirements, Impacts to Hydraulic Capacity, Traffic/Public Disruption, Regulatory/Permitting, Cost, Risk of SSO, Solution Longevity. For the purposes of developing an order of magnitude cost estimate, based on the weighted rankings CIPP is the recommended alternative with Spiral wound pipe a close second. A description of the rehabilitation methods and the evaluation criteria is included in the attached draft Reach 4D Work Plan. The following table shows a summary of the rehabilitation alternatives, ranking and estimated cost. A re-evaluation of alternatives should be conducted prior to implementation of a repair in 10 to 20 years.

Summary or Rehabilitation Alternatives

Rehabilitation Alternative	Ranking	Planning Level Estimated Cost of Construction
Cured-in-place Pipe	1	$42,100,000
Spiral Wound Pipe	2	$36,300,000
Man-Entry Repair	3	$64,200,000
Segmental Sliplining	4	$34,200,000
Continuous Sliplining	5	$39,900,000

Implementation Schedule and Recommendations
Due to the lack of historical information on the rate of deterioration of the unlined concrete, the consultant recommends additional field investigation in five (5) years to characterize the rate of deterioration and further refine the remaining useful life of the pipe (mid-term recommendation). In order to obtain a complete baseline with which to compare future inspection results the consultant recommends completing two additional manned entry inspections at two key locations along with the cleaning and CCTV of one (1) one thousand foot segment (near-term recommendation). Lastly, based on the predicted remaining useful life of 10 – 20 years, the consultant recommends implementing the recommended rehabilitation method prior to the predicted remaining useful life. The predicted remaining useful life is recommended to be updated upon completion of the mid-term field investigations. A summary of the Work Plan recommendations in provided in the following table.

Summary of Work Plan Recommendations

Project	Anticipated Schedule	Project Recommendation	Estimated Cost
Near-Term	Within One Year	Man-entry inspections at two key locations, Clean and CCTV 1 pipe segment	$49,000
Mid-Term	5 years	Clean and CCTV entire 7 miles of pipeline. Man-entry inspection at seven locations. Refine useful life estimate.	$468,000
Long-Term	10 – 20 years	Implement recommended rehabilitation method for 7 miles of pipeline (CIPP)	$42,000,000

In July 2018, a workshop was held with the Member Agencies to review the findings of the field investigation, alternative rehabilitation methods, preferred rehabilitation method and the estimated project cost and schedule. Comments provided in the workshop are included in the Draft Work Plan submitted by the Consultant in September 2018. The draft Work Plan was distributed to the Member Agencies for comment in early October 2018. A copy of the Work Plan is provided for your review and comment. Upon incorporation of comments from the Member Agencies and SAWPA staff a final Reach 4D Work Plan will be completed in November 2018. Based on the recommendations presented in the draft Work Plan, it is anticipated a recommendation to accept the Work Plan and implement the near-term recommendations will be presented to the Commission in Early 2019.

CRITICAL SUCCESS FACTORS

1. Minimize disruptions to customers.
2. Ensure that Brine Line value and benefits are known to economic development agencies and others.
5. Protect and preserve the useful life of Brine Line assets through strategic maintenance, repair, and capital improvements.
8. Operate the Brine Line to: (1) protect the OCSD treatment plant and the environment from non-compliant dischargers, and (2) eliminate any uncontrolled pipeline releases.

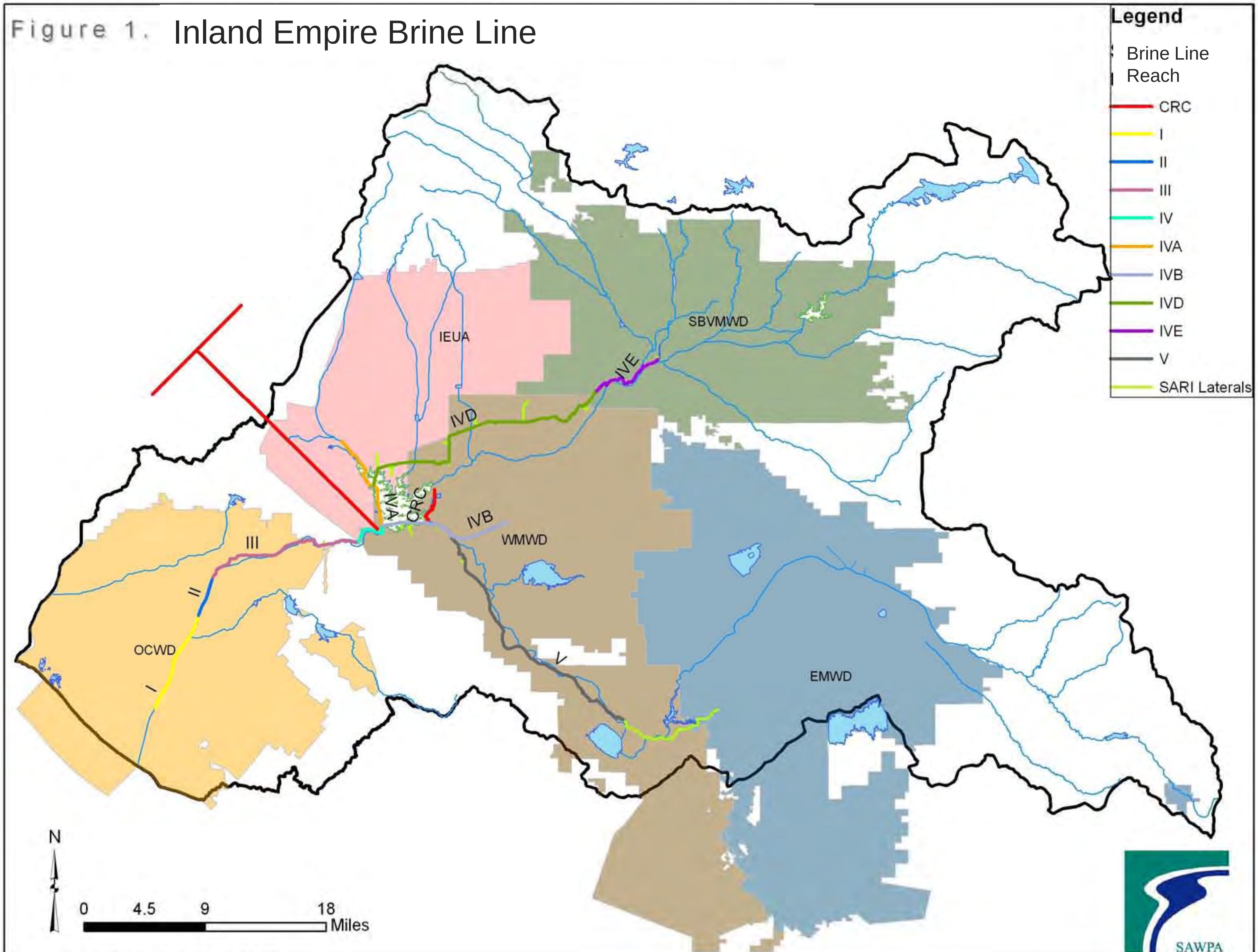
RESOURCE IMPACTS

Funds to cover the Work Plan are budgeted under the FY 2018 and FY 2019 Budget Fund No. 327.

Attachments:

1. Figure 1
2. Draft Work Plan
3. PowerPoint Presentation

Figure 1. Inland Empire Brine Line



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DRAFT Reach 4D Rehabilitation Work Plan

Prepared by:
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W&C Project No.
0011098.00

September 12, 2018

NOTE: The page numbering in this document will skip over certain page numbers; these pages were removed from the document because they were blank and it was not necessary for them to remain.

1. PURPOSE AND TABLE OF CONTENTS

The purpose of this Work Plan is to provide the Santa Ana Watershed Project Authority (SAWPA) with a summary of condition assessment findings and estimated remaining useful life for the Brine Line Reach 4D, Contract 1 and 2 alignment, as well as the recommended actions for near-term, mid-term and long-term to monitor the condition of the brine line and provide repairs as necessary in the future. This Work Plan also includes an analysis of rehabilitation alternatives for the entire seven-mile Reach 4D alignment that may serve as a reference for SAWPA's capital improvement project planning associated with long-term recommendations. This Work Plan reflects data that was available as of August 2018.

This Work Plan is organized as follows:

2. PROJECT BACKGROUND

SAWPA was formed in 1972 as a Joint Powers Authority comprised of five member agencies: Eastern Municipal Water District (EMWD), Inland Empire Utilities Agency (IEUA), Orange County Water District (OCWD), San Bernardino Valley Municipal Water District (SBVMWD), and Western Municipal Water District (WMWD). SAWPA owns and operates the 93-mile long Inland Empire Brine Line (Brine Line) which serves as critical infrastructure for protecting the inland water quality in the Santa Ana River Watershed. The Brine Line was constructed to receive high salinity discharges from customers within the Santa Ana River Watershed that are not permitted to discharge waste to their local sanitary sewer system. The Brine Line transports this high salinity wastewater to a treatment plant operated by the Orange County Sanitation District.

The Brine Line Reach 4D was constructed between 1990 and 1995 and runs approximately 21 miles from its connection in the City of Chino easterly to the City of Rialto, where it connects to Reach 4E. It primarily collects high salinity discharges from customers within the City of Chino and City of Jurupa Valley. The design and construction of Reach 4D was split up into six separate contracts. This TM addresses the condition of Contract 1 and 2 alignment only.

The Brine Line Reach 4D, Contract 1 and 2 alignment is approximately seven miles long and extends from Pomona Rincon Road in the City of Chino to the West and ends at the intersection of Hamner Avenue and Riverboat Drive within the City of Eastvale to the East (Figure 1). The seven mile alignment consists entirely of 42-inch reinforced concrete pipe (RCP) with T-Lock lining for 270 degrees around the inside diameter of the pipe, leaving the lower 90-degrees unlined. Table 1 includes a summary of the pipe segments, identified by upstream and downstream maintenance access structures (MAS).

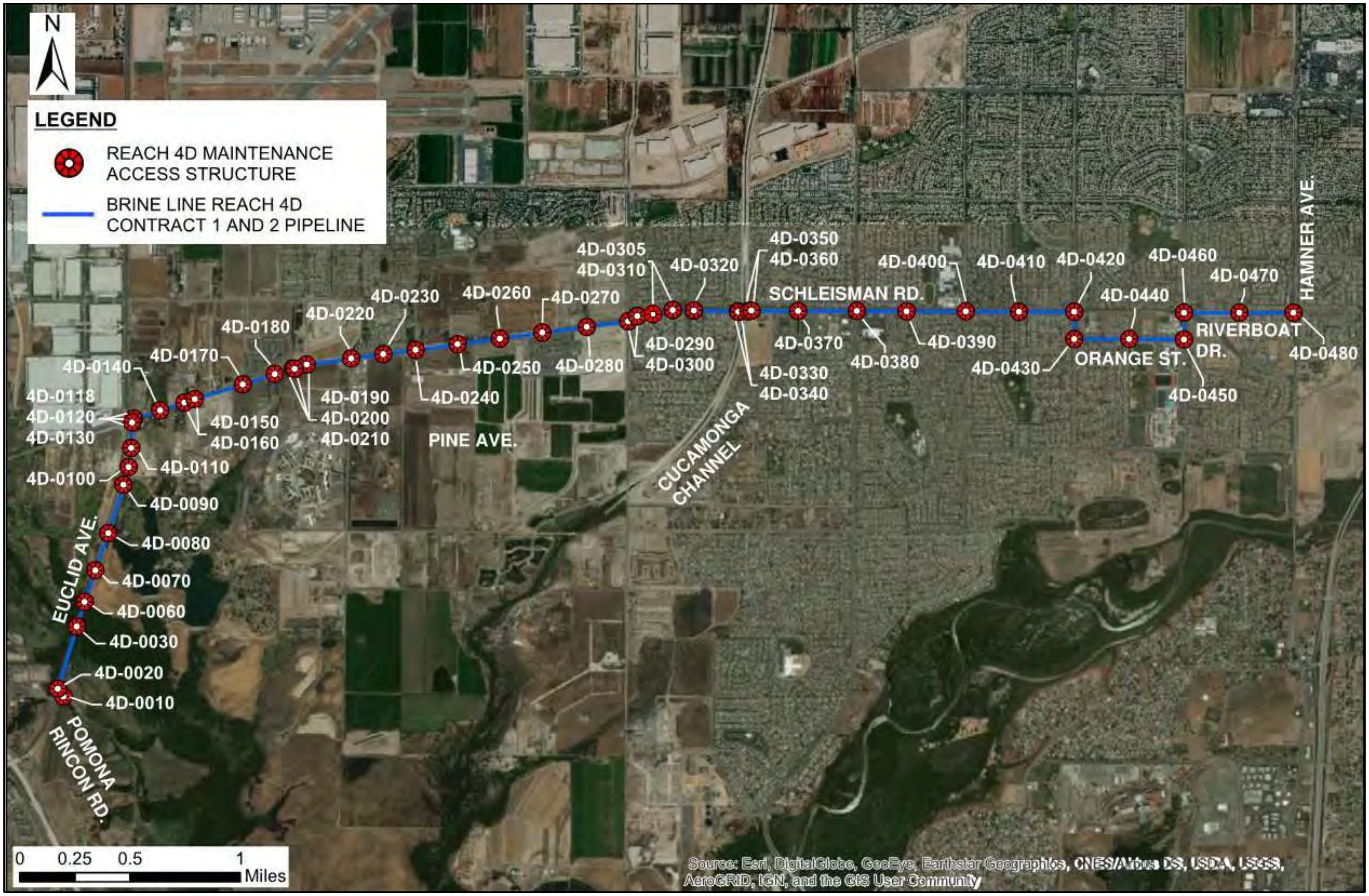


Figure 1: Aerial Map of Reach 4D Contract 1 and 2 Alignment

Table 1: Summary of Pipe Segments and MAS in Reach 4D Contract 1 and 2 Alignment

Upstream MAS	Downstream MAS	Approximate Length (ft)(1)	Approximate Slope (ft/ft) (1)
4D-0020	4D-0010	239	0.0010
4D-0030	4D-0020	1,564	0.0010
4D-0060	4D-0030	621	N/A – Sewer Siphon
4D-0070	4D-0060	797	0.0056
4D-0080	4D-0070	943	0.0068
4D-0090	4D-0080	1,214	0.0076
4D-0100	4D-0090	450	0.0076
4D-0110	4D-0100	455	0.0010
4D-0118	4D-0110	570	0.0010
4D-0120	4D-0118	43	0.0010
4D-0130	4D-0120	99	0.0024
4D-0140	4D-0130	670	0.0010
4D-0150	4D-0140	609	0.0010
4D-0160	4D-0150	253	0.0600
4D-0170	4D-0160	1,200	0.0024
4D-0180	4D-0170	813	0.0024
4D-0190	4D-0180	451	0.0024
4D-0200	4D-0190	43	N/A – Sewer Siphon
4D-0210	4D-0200	303	0.0010
4D-0220	4D-0210	1,080	0.0064
4D-0230	4D-0220	776	0.0068
4D-0240	4D-0230	781	0.0068
4D-0250	4D-0240	1,021	0.0068
4D-0260	4D-0250	1,020	0.0010
4D-0270	4D-0260	1,020	0.0010
4D-0280	4D-0270	1,074	0.0010
4D-0290	4D-0280	1,001	0.0010
4D-0300	4D-0290	205	0.0010
4D-0305(2)	4D-0300(2)	379	0.0008
4D-0310(2)	4D-0305(2)	517	0.0011
4D-0320	4D-0310	499	0.0010
4D-0330	4D-0320	1,001	0.0010
4D-0340	4D-0330	75	N/A – Sewer Siphon
4D-0350	4D-0340	244	N/A – Sewer Siphon
4D-0360	4D-0350	82	N/A – Sewer Siphon
4D-0370	4D-0360	1,110	0.0010
4D-0380	4D-0370	1,401	0.0010
4D-0390	4D-0380	1,189	0.0010
4D-0400	4D-0390	1,429	0.0010
4D-0410	4D-0400	1,272	0.0010
4D-0420	4D-0410	1,329	0.0010
4D-0430	4D-0420	648	0.0010
4D-0440	4D-0430	1,314	0.0010
4D-0450	4D-0440	1,317	0.0010
4D-0460	4D-0450	648	0.0043

Upstream MAS	Downstream MAS	Approximate Length (ft)(1)	Approximate Slope (ft/ft) (1)
4D-0470	4D-0460	1,322	0.0036
4D-0480	4D-0470	1,283	0.0036

(1) From Santa Ana Regional Interceptor Reach IV-D Contract No. 1 Record Drawings (Willdan Associates, February 1990), Santa Ana Regional Interceptor Reach IV-D Contract No. 2 Record Drawings (Willdan Associates, (July 1990), and Relocation of Existing SAWPA Santa Ana Regional Interceptor (SARI) Reach IV-D / Schleisman Road & Hellman Avenue Record Drawings (TMAD, Taylor, & Gaines, September 2011).

(2) Replacement segments installed in 2011 with 360-degree PVC lined RCP, per Relocation of Existing SAWPA Santa Ana Regional Interceptor (SARI) Reach IV-D / Schleisman Road & Hellman Avenue Record Drawings (TMAD, Taylor, & Gaines, September 2011).

In 2011, approximately 1,054 feet of RCP was abandoned or removed and replaced with 895 feet of 360-degree PVC lined RCP. The unlined portion of the removed pipeline exhibited concrete deterioration and uplifting of the T-Lock lining at the liner termination interface (Figure 2). It is thought that low flows during initial years of operation likely exposed the liner/concrete termination point allowing H_2S corrosion of the unlined concrete and uplifting of the T-Lock Liner. However, this theory has not been proven.

Figure 2: Concrete deterioration and uplifting of T-Lock liner in section of RCP removed in 2011. Photo Courtesy of SAWPA.

2.1 Flow Conditions

The T-Lock Liner terminates approximately 6.1 inches above the pipe invert on non-rotated pipe segments (see Section 5.1 for discussion of rotated pipe segments). A flow rate of approximately one million gallons per day (MGD) corresponds to an approximate water depth of 6.1 inches for the segments of 42-inch brine line with a slope of 0.0010, which is the lowest slope in the original Contract 1 and 2 alignment installed from 1990 to 1995. Approximately 59-percent of the alignment was installed at a 0.0010 slope, including the 1,054 feet of RCP removed and replaced in

2011. Therefore, the pipeline would have had to experience flows less than 1.0 MGD to expose the liner/concrete interface. The flow rate in the brine line varies throughout the day. If the daily low flow drops below 1.0 MGD, then the unlined concrete would be exposed. During times of exposure, it is possible that the sulfuric acid that is created as part of the biogenic corrosion process and present in small liquid droplets on the surface of the T-lock liner will flow along the surface of the T-lock liner onto the exposed concrete. If the exposure duration is very short, then the damage is minimal since the sulfuric acid is neutralized as the water surface rises. If the exposure is many hours long, the sulfuric acid will build and react with the exposed concrete before the water surface rises. At this time, it is not possible to determine the duration the concrete is exposed during the year.

The current average and peak dry weather flow in the Reach 4D Contract 1 and 2 alignment is approximately 5.50 MGD and 6.08 MGD respectively. The hydraulic conditions of the pipeline at the current average and peak dry weather flow are summarized in Table 2 and Table 3, respectively.

Table 2: Summary of Conditions at Current Average Dry Weather Flow of 5.50 MGD

	Slope = 0.0010	0.0020 < Slope < 0.0040	0.0040 < Slope < 0.0060	0.0060 < Slope < 0.0080	Slope = 0.0600
Water Depth (inches)	14.2	10.2 – 11.3	9.15 – 9.77	8.48 – 8.85	5.13
Percent Full (%)	33.8	24.3 – 27.0	21.8 – 23.3	20.2 – 21.1	12.2
Velocity (ft/s)	2.97	4.07 – 4.70	5.01 – 5.50	5.76 – 6.13	12.7
Percent of Entire Alignment(1)(2) (%)	58.5	14.2	3.97	17.2	0.7

(1) Entire Reach 4D Contract 1 and 2 alignment.
(2) The sewer siphons and new pipe segments installed in 2011 with 360-degree PVC T-Lock lined RCP were not included in any of the slope categories. These segments account for approximately 5.4-percent of the entire alignment.

Table 3: Summary of Conditions at Current Peak Dry Weather Flow of 6.08 MGD

	Slope = 0.0010	0.0020 < Slope < 0.0040	0.0040 < Slope < 0.0060	0.0060 < Slope < 0.0080	Slope = 0.0600
Water Depth (inches)	15.0	10.8 – 11.9	9.62 – 10.3	8.91 – 9.30	5.39
Percent Full (%)	35.6	25.6 – 28.4	22.9 – 24.5	21.2 – 22.1	12.8
Velocity (ft/s)	3.06	4.19 – 4.84	5.16 – 5.66	5.94 – 6.31	13.1
Percent of Entire Alignment(1)(2) (%)	58.5	14.2	3.97	17.2	0.7

(1) Entire Reach 4D Contract 1 and 2 alignment.
(2) The sewer siphons and new pipe segments installed in 2011 with 360-degree PVC T-Lock lined RCP were not included in any of the slope categories. These segments account for approximately 5.4-percent of the entire alignment.

During current average and peak dry weather flows, the water depth in the pipe segment installed at a slope of 0.0600 remains below 6.1 inches above the pipe invert, the approximate height of the concrete/T-Lock Liner interface. Therefore, corrosion of the unlined concrete and at the concrete/liner interface is likely. Per Table 1, this segment is located between MAS 4D-0150 and 4D-0160 and is approximately 252 feet in length. The water depth in the remainder of the Reach 4D Contract 1 and 2 alignment remains above the concrete/liner interface during average and peak dry weather flows (excluding the sewer siphons).

3. PROJECT OBJECTIVES AND BENEFITS

The main objective of the Reach 4D Rehabilitation Work Plan Project is to evaluate the structural integrity of the Brine Line Reach 4D Contract 1 and 2 alignment, estimate the remaining useful life of the pipeline, and recommend both near-term and long-term assessment and rehabilitation as necessary. Appropriate rehabilitation methods will aim to restore the structurally integrity of the pipeline. To accomplish this objective, a complete assessment of the pipeline must be performed. Conducting field inspections of the Brine Line is the first step of this process.

4. FIELD INVESTIGATION SUMMARY

Field investigation work was executed over a single 24-hour shutdown period that was coordinated by SAWPA and performed by SAWPA and its member agencies. The shutdown period began on Saturday, May 5th, 2018 and ended on Sunday, May 6th, 2018. The field investigation work discussed in this Section include:

1. Man-entry physical inspections at five MAS
2. Closed-circuit television (CCTV) inspections

4.1 Man-Entry Inspections

Woodard & Curran's subconsultant, V&A Consulting Engineers (V&A), conducted confined space manned entry physical inspections of the pipeline from the following five MAS: 4D-0020, 4D-0118, 4D-0150, 4D-0470, and 4D-0480. The pipeline was accessed within five feet from these five MAS for inspections and condition assessment testing of both the concrete/liner interface and the concrete behind the T-Lock Liner near the crown of the pipe and below the spring line of the pipe. Inspections were also conducted on the MAS concrete itself. A summary of the condition assessment tests performed on the MAS and pipeline is provided in Table 4.

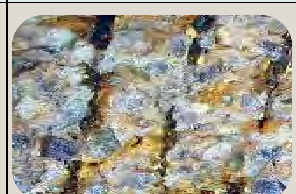
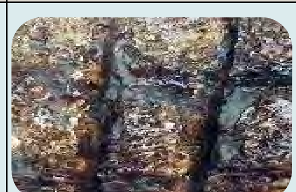
Table 4: Summary of Man-Entry Physical Inspection Tests

Man-Entry Tests	Location(s) Performed in Pipe	Location(s) Performed in MAS
Tactile Testing	At the concrete/liner interface.	None
Visual Assessment	• At the concrete/liner interface. • Behind the liner near the crown and below the spring line.	• Rim • Cone • Walls • Bench • Main pipe connection • Lateral penetrations • Channel
Concrete Sounding	• At the concrete/liner interface, if above water level. • Behind the liner near the crown and below the spring line.	Unlined concrete channel, if above water level.
Concrete Penetration Testing	• At the concrete/liner interface, if above water level. • Behind the liner near the crown and below the spring line.	This test was not performed inside the maintenance access structures.

Concrete Surface pH Testing	Behind the liner near the crown and below the spring line.	This test was not performed inside the maintenance access structures.
Surface Penetrating Radar	Behind the liner near the crown and below the spring line.	Walls

The condition of the concrete was rated according to the VANDA Concrete Condition Index (Table 5). Condition of corrosion can vary from Level 1 (best) to Level 4 (worst) based upon visual observations and field measurements from the man-entry physical inspections and testing.

Table 5: Summary of VANDA Concrete Condition Index Rating System. Courtesy of V&A.

Condition Rating	Description	Representative Photograph
Level 1	None/Minimal Damage to Concrete ▪ Hardness: No Loss ▪ Surface Profile: No Loss ▪ Cracking: Shrinkage Cracks ▪ Spalling: None ▪ Reinforcing Steel (Rebar): Not Exposed or Damaged	
Level 2	Damage to Concrete Mortar ▪ Hardness: Damage to Concrete Mortar ▪ Surface Profile: Some Loss ▪ Cracking: Thumbnail Sized Cracks of Minimal Frequency ▪ Spalling: Shallow Spalling of Minimal Frequency, Related Rebar Damage ▪ Reinforcing Steel (Rebar): May Be Exposed but Not Damaged	
Level 3	Loss of Concrete Mortar/Damage to Rebar ▪ Hardness: Complete Loss ▪ Surface Profile: Large Diameter Exposed Aggregate ▪ Cracking: ¼-inch to ½-inch Cracks, Moderate Frequency ▪ Spalling: Deep Spalling of Moderate Frequency, Related Rebar Damage ▪ Reinforcing Steel (Rebar): Exposed and Damaged, Can Be Rehabilitated	
Level 4	Rebar Severely Corroded/Significant Damage to Structure ▪ Hardness: Complete Loss ▪ Surface Profile: Large Diameter Exposed Aggregate ▪ Cracking: ½-inch Cracks or Greater, High Frequency ▪ Spalling: Deep Spalling at High Frequency, Related Rebar Damage ▪ Reinforcing Steel (Rebar): Damaged or Consumed, Loss of Structural Integrity	

See Appendix A for further information on the man-entry inspections, VANDA rating system, and individualized results of the condition assessment tests.

4.2 CCTV Inspections

CCTV inspections were performed to visually examine the interior pipe surfaces for defect identification, particularly along the concrete/liner interface. Inspections from MAS 4D-0010 to 4D-0220 were performed by V&A's subconsultant, Pro-Pipe. Inspections from MAS 4D-0220 to 4D-0480 were performed by SAWPA's CCTV Contractor, Houston & Harris. CCTV was excluded from the sewer siphons listed in Table 1, the grit trap located approximately 180 feet upstream of MAS 4D-0060 on Euclid Avenue, and the grit trap located approximately 850 feet upstream of MAS 4D-0370 on Schleisman Road.

Approximately 26,500 feet of the alignment was inspected with CCTV out of a total possible length of approximately 35,203 feet (75%). However, the interface of the concrete and T-Lock Liner was visible in only approximately 6,700 feet of pipe (19%), primarily due to a heavy slime layer covering the walls up to the 4 o'clock and 8 o'clock positions of the pipe. Cleaning was not able to be performed on a majority of the alignment prior to CCTV due to time constraints. High water levels were encountered in several segments that also prohibited inspection of the T-Lock Liner termination.

See Appendix B for a detailed summary of CCTV inspections, organized by upstream and downstream MAS.

4.3 Lessons Learned

The following is a brief discussion of lessons learned during the initial CCTV and man-entry inspection of Reach 4D of the Brine Line:

A. Weekend work is subject to a higher prevailing wage and can elevate the cost of inspections. It would be more cost effective if the inspections were conducted on a weekday/evening. This may not be possible because of City Encroachment Permit restrictions but should at least be investigated further before scheduling.

B. Cleaning the pipeline prior to inspections is crucial for capturing useful data. Cleaning could be conducted during short shut-down over a long period of time before the next inspection is scheduled. This would prevent issues with the necessity for a series of long shut-downs to accomplish cleaning and inspections all at once.

C. It would be favorable to complete inspections in the pipeline downstream of MAS 4D-150 after 10 p.m. so as to avoid large sanitary sewer flows associated with the prison located upstream of that location. Because of issues with scheduling two CCTV contractors and physical inspections, this could not be accomplished during initial inspections and there were issues with high water in the downstream-most segments of pipe. Perhaps physical inspections could be scheduled for a different day/time as the CCTV inspections to prevent time constraints associated with scheduling three different inspection contractors simultaneously. This, however, would add to traffic control and coordination costs.

5. CONDITION ASSESSMENT SUMMARY

This Section includes a summary of the condition of the brine line based on the results of the man-entry inspections and CCTV inspections. Refer to Appendix A for the man-entry condition assessment report. Refer to Appendix B for a detailed summary of CCTV inspections.

5.1 Pipelines

5.1.1 Visual Assessment

Visual assessment of the pipeline from the five manned entry inspections indicated the most common defects in the pipe segments include liner blisters and undermined liner terminations. Blisters in T-Lock liners commonly occur over time and do not compromise the service life of the RCP if the blisters are not ripped open, which would expose the concrete surface behind the liner to corrosive constituents. None of the observed blisters in the manned entry inspections or CCTV inspections were ruptured. The liner termination was deemed to be undermined if the concrete below the liner termination had eroded, but the lowermost PVC tee along the liner termination point was still embedded in the concrete. Unembedded liner terminations were observed at MAS 4D-0150 and 4D-0470, which refers to a condition when the lowermost PVC tee has become unembedded, resulting in uplifting of the liner termination point. This condition increases the chance of corrosive gases reacting with the concrete behind liner when the water surface is below the interface of the concrete and liner. A summary of the visual assessment from the five man-entry inspections is provided in Table 6. Refer to Appendix A for additional information and pictures from the visual assessment completed as part of the manned entry inspections.

Table 6: Visual Assessment Summary of Pipe Segments from Man-Entry Inspections. Courtesy of V&A.

MAS	Liner				Concrete		General	
	Blisters / Bulges	Failed Weld Strips	Termination Undermined	Termination Unembedded	Exposed Aggregate	Exposed Rebar	Slime Layer	Debris
4D-0020	X	X	X				X	
4D-0118	X	X	X		X		X	X
4D-0150	X		X	X	X		X	X
4D-0470	X		X	X	X	X(1)	X	
4D-0480							X	

(1) Table taken directly from 2018 V&A Condition Assessment Report. After further scrutiny, Woodard and Curran does not believe that exposed rebar is present at this location.

More uniformity in the conditions of the pipeline was observed in the CCTV inspection data compared to the manned entry inspection results. Throughout much of the pipe where the interface between the concrete and liner was visible, the unlined concrete below the liner termination was uniformly degraded with a groove indicating minor concrete loss and visible aggregate. The liner termination has become unembedded at points throughout the observed grooves. Additionally, the T-Lock liner appeared to be rotated between individual pipe segments throughout approximately seven pipe segments. The rotation varies from approximately one-inch to six-inches, measured from the liner termination at the pipe joints along each side of the pipe (Figure 3). The primary issue of these rotated segments is it increases the liner termination height above the pipe invert on one side of the pipe, thereby increasing the likelihood of the water surface dropping below the liner. As a result, the observed concrete corrosion below the liner was not consistent on both sides of the pipe along the segments with rotated segments. Figure 3 through Figure 6 are snapshots of the CCTV inspection footage showing defects in the pipeline. Refer to Appendix B for the detailed summary of CCTV inspections, organized by upstream and downstream MAS.

Figure 3: Rotated T-Lock Liner at Pipe Joint Between MAS 4D-0410 and 4D-0420

Figure 4: Minor Concrete Loss and Visible Aggregate Below Liner Termination and Rotated T-Lock Liner at Pipe Joint Between MAS 4D-0410 and 4D-0420

Figure 5: Minor Concrete Loss and Visible Aggregate Below Liner Termination and Rotated T-Lock Liner at Pipe Joint Between MAS 4D-0380 and 4D-0390

Figure 6: Liner Termination Uplift Along Pipe Segment Between MAS 4D-0240 and 4D-0250

5.1.2 Physical Testing

As discussed in Section 4.1 and Appendix A, V&A performed condition assessment tests on the concrete surfaces behind the liner using sounding to investigate for shallow subsurface discontinuities, pH measurements to evaluate environmental corrosivity, and penetration depth measurements to evaluate surface hardness. The results of these in-situ tests are summarized in Table 7.

Table 7: Summary of In-Situ Pipeline Condition Assessment Tests Performed on Concrete Behind the T-Lock Liner. Courtesy of V&A.

MAS	Pipe	Surface Condition	Sounding	Surface pH	Penetration Depth (in.)	VANDA Rating
4D-0020	Influent	Hard	Solid	12	1/16	1
4D-0118	Influent	Hard	Solid	12	< 1/16	1
4D-0150	Influent	Hard	Solid	12	< 1/16	1
4D-0470	Influent	Hard	Solid	11 – 12	1/16 – 1/8	2
4D-0480	Effluent	Hard	Solid	12	< 1/16	1

The test results displayed in Table 7 indicate that the concrete behind the T-Lock liner is in good condition and well protected from the corrosive environment. Therefore, the concrete surfaces received VANDA ratings ranging from 1 to 2. Refer to Appendix A for further information on the manned entry condition assessment tests performed at the five access MAS.

5.1.3 Concrete Cover

As part of the manned entry inspections, the depth of concrete cover over the steel reinforcement was estimated by performing surface penetrating radar (SPR) scans for the concrete behind the T-Lock liner and by measuring the depth of concrete deterioration below the liner termination. SPR scans also provide a measurement of the pipe wall thickness and spacing of steel reinforcement. Therefore, it is helpful to compare this data against the design criteria for the installed RCP. The design criteria for the installed RCP was not provided, so industry standard values were used. See Table 8 for a summary of the assumed RCP design criteria.

Table 8: Assumed Design Criteria for 42-inch RCP. Courtesy of V&A.

MAS	D-Load Design Req. (psi)(1)	Assumed Pipe Class(2)	Assumed Wall Thickness (in.)(2)	Assumed Min. Concrete Cover (in.)(2)	Assumed Min. Circumferential Rebar Spacing (in.)(2)
4D-0020	3,500	V	5.25	1.00	3.94
4D-0118	2,250	IV			
4D-0150	2,800	IV			
4D-0470	1,700	III			
4D-0480	1,700	III			

(1) Per Willdan Associates, Santa Ana Regional Interceptor Reach IV-D, Contract No. 1 – 3, 1990 Record Drawings.
(2) Per ASTM C76, AASHTO M170, and AWWA C302.

The SPR scan results for the five pipe segments are summarized in Table 9. Based on the results, the depth of concrete cover over the steel reinforcement appears to be greater than the minimum 1-inch requirement provided in Table 8 and the RCP walls are estimated to be approximately 6-inches thick.

Table 9: Summary of Pipeline SPR Results Performed on Concrete Behind T-Lock Liner. Courtesy of V&A.

MAS	Location	Bar Dir.(1)	Rebar Depth Max. (in.)	Rebar Depth Avg. (in.)	Rebar Depth Min. (in.)	Rebar Space Max. (in.)	Rebar Space Avg. (in.)	Rebar Space Min. (in.)
4D-0020	Influent Pipe 8:00 - 12:00	C	2.31	1.81	1.46	3.10	2.71	2.40
4D-0020	Influent Pipe 8:00 - 12:00	L	2.31	1.82	1.31	11.85	4.09	1.95
4D-0118	Influent Pipe 9:00 - 12:00	C	3.26	2.40	1.76	12.90	2.63	1.80
4D-0118	Influent Pipe 9:00 - 12:00	L	3.26	2.32	1.60	6.30	5.39	4.55
4D-0150	Influent Pipe 8:00 - 12:00	C	4.58	3.09	1.69	3.85	2.30	1.50
4D-0150	Influent Pipe 8:00 - 12:00	L	3.60	2.46	1.62	21.90	8.17	3.85
4D-0470	Influent Pipe 9:00 - 12:00	C	4.19	2.95	1.60	3.30	2.40	1.10
4D-0470	Influent Pipe 9:00 - 12:00	L	4.43	2.97	1.76	13.30	8.03	4.10
4D-0480	Effluent Pipe 8:00 – 12:00	C	3.75	2.60	1.08	3.45	2.44	1.20
4D-480	Effluent Pipe 8:00 – 12:00	L	3.07	2.28	1.54	23.05	14.88	10.15

(1) C = Circumferential, L = Longitudinal.

The depth of concrete deterioration below the liner termination was measured in the pipe segments at the five access MAS. These measurements are provided in Table 10, along with a summary of the liner termination condition and the corresponding VANDA rating for the five pipe segments. A range between one half to 1-inch of concrete deterioration was measured below the liner termination in the influent pipes of MAS 4D-0150 and 4D-0470, which corresponded with the highest liner uplift measurements and VANDA ratings. Comparing the measured deterioration depths in Table 10 to the estimated concrete cover in Table 9, it is likely that at least one-inch of concrete cover remains along the liner termination.

Table 10: Condition Assessment Summary for Interface of Concrete and T-Lock Liner. Courtesy of V&A.

MAS	Liner		Concrete	
	Termination Condition	Uplifted Liner Length (in.)(1)	Deterioration Depth (in.)	VANDA Rating
4D-0020	Embedded, yet undermined.	n/a	½	2
4D-0118	Embedded, yet undermined.	n/a	3/8	2
4D-0150	Uplifted and undermined.	1	½ – 1	3
4D-0470	Uplifted and undermined.	2	½ – 1	3
4D-0480	Embedded, yet undermined.	n/a	0	1

(1) Uplifted liner length measured from lower termination of 270-degree pipe liner towards 3:00 or 9:00 position.

Refer to Appendix A for additional results of the SPR scans and concrete deterioration measurements completed as part of the manned entry physical inspections.

5.1.4 Hydraulics

The condition assessment included an evaluation of hydraulic conditions in the pipeline to investigate if this was a potential cause of deterioration. The evaluation was based on available record drawings and field observations of hydraulic conditions during the 24-hour shutdown. The slime layer that was observed in a majority of the pipe segments indicated a typical water level in the pipeline that is above the liner termination, excluding the pipe segment between MAS 4D-0150 and 4D-0160 due to its steep slope of 0.0600 (Figure 7).

Figure 7: Typical Water Level (dashed red line) Indicated by Slime Layer (Left). Typical Water Level (dashed red line) in Steep Slope Between MAS 4D-0160 and 4D-0150 (Right).

These water level observations confirm the estimated water levels during the current average and peak dry weather flows listed in Table 2 and Table 3, respectively. With a slope of 0.0600, the water level during current average and peak dry weather flows is 5.13-inches and 5.39-inches, respectively. With the liner termination approximately 6.1-inches above the pipe invert, the water level is typically 0.7 to 1-inch below the liner in this segment. The manned entry condition assessment tests indicate the steep influent pipe at MAS 4D-0150 is in a worse condition than the evaluated pipelines at 4D-0020, 4D-0118, and 4D-0480, albeit still in fair condition. This location should be noted in future inspections. See Section 7.

See Appendix A for additional information on the hydraulic conditions at the five MAS evaluated in the manned entry physical inspections.

5.2 Maintenance Access Structures

5.2.1 Visual Assessment

Visual assessment from of the MAS from the five manned entry inspections and CCTV inspections indicated the structures are in good condition. The most common defects include unembedded liner at the bench and liner blisters. In several cases, the unlined concrete in the channels were in the poorest condition within the structures, with observed visible aggregate and aggregate loss near the interface of the T-Lock liner and concrete. The visual assessment findings from the five manned entry inspections are summarized in Table 11.

Table 11: Visual Assessment Summary for MAS. Courtesy of V&A.

MAS	Rim	Cone	Walls	Bench	Main Pipe Connection	Lateral Penetrations	Channel
4D-0020	Moderate corrosion	Liner in good condition	Liner in good condition	Liner unembedded, yet covering concrete	Good condition	Good condition	Slime layer. Exposed concrete aggregate.
4D-0118	Liner termination loose	Failed liner weld strips	Liner in good condition	Liner unembedded, yet covering concrete	Good condition	Encrustation	Slime layer. Exposed concrete aggregate.
4D-0150	Good condition	Liner in good condition	Minor liner blisters	Liner unembedded, yet covering concrete	Good condition	Good condition	Slime layer. Exposed concrete aggregate.
4D-0470	Good condition	Minor hole in liner	Liner blisters and bulges	Liner unembedded, yet covering concrete	Good condition	Cuts in liner due to CCTV crawler camera cable	Slime layer. Exposed rebar.
4D-0480	Good condition	Liner in good condition	Liner in good condition	Liner in good condition	Good condition	Good condition	Channel lined and in good condition

Refer to Appendix A for the full condition assessment of the five MAS completed as part of the manned entry inspections. Refer to Appendix B for the CCTV inspections of the MAS.

6. REMAINING USEFUL LIFE

Based on the condition of the concrete and T-Lock liner from the manned entry and CCTV inspection results, the Reach 4D Contract 1 and 2 brine line has an estimated predicated remaining useful life of 10 to 20 years. However, due to the lack of historical condition assessment data, the rate of deterioration is unknown. Data collected from this project should be compared to data from a future inspection in five years to characterize the rate of deterioration and further refine the remaining useful life. See Section 7 for preliminary future inspection recommendations.

7. RECOMMENDATIONS

This Section includes a description of recommendations for completion in the near-term (within one year of Work Plan), mid-term (within five years of Work Plan), and long-term (within 10 to 20 years of Work Plan) to increase the lifespan of the Reach 4D Contract 1 and 2 brine line. Refer to Section 10 for the planning level cost estimates associated with these recommendations. See Section 11 for an implementation schedule for each of these recommendations.

7.1 Near-Term

Woodard & Curran recommends completing the following inspection work within one year of this Work Plan (by September 2019):

1. Man-entry inspections at MAS 4D-0060 and 4D-0360
2. Clean and CCTV segment of pipe between MAS 4D-0240 and 4D-0250

7.1.1 Man-Entry Inspections at MAS 4D-0060 and 4D-0360

MAS 4D-0060 and 4D-0360 are located immediately upstream of siphons and are likely to experience high levels of corrosive gases. MAS 4D-0060 is upstream of the sewer siphon crossing Chino Creek on Euclid Avenue and is approximately 600 feet long. MAS 4D-0360 is upstream of the sewer siphon crossing Cucamonga Channel on Schleisman Road and is approximately 400 feet long. Inspections should include the same type of tests as were competed via man-entry inspection in May of 2018 as well as visual inspection and photographic documentation of the condition of air jumpers if present in the system. Therefore, it is recommended that V&A perform the man-entry inspections to ensure continuity. Woodard & Curran would perform an analysis of the data collected by V&A. By completing inspections of the pipeline at these manholes in the near-term, SAWPA is giving themselves a baseline with which to compare future inspection results as recommended in the Mid-Term described in Section 7.2.

Based on the field inspections completed in May of 2018, each man-entry inspection is assumed to take up to 4 hours to complete the condition assessment tests on the pipe segment and MAS. Traffic control will be required at both MAS. MAS 4D-0060 is located out of the street with easy access, so traffic control requirements will be minimal. MAS 4D-0360 is located in the southern-most eastbound lane on Schleisman Road, so moderate traffic control measures will be required with at least one lane closed.

It is assumed that SAWPA would provide the traffic control plans, encroachment permits from Caltrans, City of Chino, and City of Eastvale, and coordinate a minimum 8-hour shutdown with the major dischargers.

7.1.2 Clean and CCTV Pipe Segment Between MAS 4D-0240 and 4D-0250

Woodard & Curran recommends cleaning one pipe segment with hydro-jetting to remove the existing slime layer and inspecting with CCTV. The approximately 1,020-foot-long segment of pipe between MAS 4D-0240 and MAS 4D-0250 is recommended because the most liner uplift was observed in the length that could be seen in the CCTV footage gathered in May of 2018. In the CCTV inspection tape from the May 2018 field inspections, it was difficult to see the condition of the pipeline at the interface because it was obscured by slime. In addition, only approximately 65% of the line was inspected via CCTV because of time constraints associated with the field work. By cleaning and re-televising this segment, SAWPA will have a more definitive snapshot that can serve as a baseline of the existing condition of the brine line to compare with future CCTV inspection results as recommended in the Mid-Term described below. Inspection of the pipe segment could be in conjunction with the man-entry inspections or done separately.

Based on the CCTV inspections completed in May of 2018 and experience with similarly sized pipelines, it is assumed that hydro-jetting and CCTV will take up to 9 hours and 4 hours to complete, respectively. Traffic control will be required at the access MAS, which would likely be 4D-0250 because it is preferable to inspect in the downstream direction and 4D-0240 would require more traffic control because it is located near the center of the Pine Avenue and West Preserve Loop intersection. MAS 4D-0250 is located in the southern-most westbound lane on Pine Avenue, so moderate traffic control measures will be required with at least one lane closed.

7.2 Mid-Term

Woodard & Curran recommends that SAWPA reinspect the entirety of the Reach 4D Contract 1 and 2 alignment in five years. Re-inspection should include the following:

- Cleaning of the entire seven miles of pipe between MAS 4D-0010 and 4D-0480 to remove the existing slime layer prior to inspection. This will likely be done with hydro-jetting. If done properly, this method of cleaning is unlikely to damage the existing pipe.
- System shut-down similar to the shut-down completed for the May 2018 inspection to lower water levels in the pipeline as much as possible.
- CCTV of the entire seven miles of RCP between MAS 4D-0010 and 4D-0480 with the exception of the grit trap segments, the siphons, and the segments already T-lock lined for 360 degrees.
- Man-entry physical testing at the same five locations as completed in May 2018 as well as the two siphon inlet structures inspected as part of the Near-Term work. The seven locations include: MAS 4D-0020, 4D-0060 (siphon inlet), 4D-0118, 4D-0150, 4D-0360 (siphon inlet), 4D-0470, and 4D-0480.

Re-inspection of the entire alignment in five years is recommended because it would allow SAWPA to characterize the rate of deterioration by comparing the new data with the existing data collected in May 2018. The original estimated predicated remaining useful life of 10 to 20 years could then be further refined based on the data comparison. Additionally, CCTV inspection of the entire alignment would help assess areas of potential concern that cannot inspected via man-entry, such as the pipe segments with rotated T-Lock lining described in Section 5.1.1. It will also be useful to inspect the portions of the pipeline that were obscured with the slime layer during the May 2018 inspection.

It is assumed that SAWPA would provide the traffic control plans, encroachment permits from Caltrans, City of Chino, and City of Eastvale, and coordinate a minimum 24 hour shut-down with the dischargers similar to the shut-down completed for the May 2018 inspections.

7.3 Long-Term

Based on the uniformity of the observed concrete deterioration that has occurred at the interface of the concrete and T-Lock liner along the pipeline, it is likely that the entire seven mile Reach 4D Contract 1 and 2 alignment will require structural rehabilitation in approximately 10 to 20 years. As a conservative approach to long-term capital budgeting, it is assumed that the entire seven-mile alignment, minus the 360-degree PVC lined RCP installed in 2011 as well as the two siphons, will require structural rehabilitation in 10 years and that SAWPA should budget accordingly. However, this recommendation should be further refined after the Mid-Term inspection results have been evaluated in five years.

An analysis of long-term structural rehabilitation alternatives is required to determine the most cost-effective option that adequately increases the lifespan of the RCP and minimizes impacts to its existing hydraulic capacity. See Section 8.

8. LONG-TERM REHABILITATION ALTERNATIVES

8.1 Rehabilitation Alternatives Considered

This section includes descriptions of the structural rehabilitation options considered for the 42-inch diameter RCP brine line. The alternatives discussed in detail below include:

1. Segmental Sliplining

2. Continuous Sliplining
3. Cured-in-Place Pipe (CIPP) Lining
4. Spiral Wound Pipe Lining
5. Man-Entry Repairs

Alternatives 1 to 4 involve the installation of structural liners that are designed with a 50-year useful life. These liners essentially act as a new pipe within the existing pipe, and can be designed to have sufficient structural capacity to handle the specified external live and dead loads, independent of the condition of the existing pipe. The man-entry repairs alternative involves repairs to the unlined concrete along the pipe invert up to the T-Lock liner termination point. Therefore, the useful life of the concrete behind the existing T-Lock Liner would not be extended.

8.1.1 Segmental Sliplining

Segmental sliplining is accomplished by excavating down to the existing brine line and removing a short section (approximately 25 feet) of the top of the existing pipe and pushing approximately 20-foot segments of the liner pipe into the existing pipe to create a continuous liner. The process requires the excavation and construction of insertion shafts at each bend in the existing pipeline because segmental slip liners cannot maneuver through bends greater than two degrees. If no bends are present, insertion shafts can be spaced up to approximately 2,000 feet apart. 1,000 feet of sliplining can be extended in each direction from each insertion shaft. Insertion shaft dimensions for a 42-inch host pipe would be upwards of 30 feet long by 10 feet wide and require shoring due to the pipe depths. Construction access will require a working area of approximately 3,500 square feet to allow for equipment layout and work area around each insertion shaft, thereby requiring multiple lane closures and extensive traffic control due to the location of the brine line in the street right-of-way.

Segmental sliplining requires adequate clearance between the outside of the liner pipe and the inside wall of the existing pipe to reduce the sliding friction generated during installation. A 36-inch diameter sliplining pipe is the largest commercially available size that could be inserted into the 42-inch diameter brine line. This would result in a 27% loss in cross-sectional area causing a large reduction in hydraulic capacity. After the liner is inserted, the annular space between the liner and the existing pipe is filled with grout. Grouting operations would take place at both ends and at intermediate injection points.

Segmental sliplining can be accomplished during live flows, as long as the brine line remains below 30% capacity. In 10 years when the pipe is expected to be flowing half full during projected peak dry weather flows (11 MGD), partial bypass or discharger shutdowns will be required to install the slip liner and annular space grout.

Segmental sliplining pipe comes in a variety of materials including profile wall PVC, high-density polyethylene (HDPE), centrifugally cast fiberglass reinforced polymer mortar, ductile iron, and steel. Ductile iron and steel are not practical for use in a gravity sewer environment. All of the viable structural segmental sliplining products available are designed with a 50-year useful life. For the purposes of this analysis, the segmental sliplining pipe was assumed to be either profile wall PVC or HDPE.

The planning level construction capital cost for segmental sliplining with 36-inch HDPE is $34,187,000 (2018 dollars). It has the lowest capital cost of all of the rehabilitation alternatives. Refer to Appendix C for the detailed cost estimate.

8.1.2 Continuous Sliplining

Continuous sliplining is accomplished in a similar manner as segmental sliplining. The primary difference between the two alternatives is the method of joining pipe segments. Continuous sliplining involves the insertion of one long string of fused HDPE or PVC pipe through an existing pipe at each access shaft. This method requires a significant layout length behind the insertion shafts to string the pipe and fuse/test the joints prior to installation. Layout lengths of up to 1,000 feet may be required. Fuse time for each joint prior to installation is also time consuming and can take as much as 45 minutes per joint. As a result, continuous sliplining requires more traffic control and has a longer installation time compared to segmental sliplining. Insertion shaft dimensions for this project would be upwards of 60 feet long by 8 feet wide and require shoring due to the pipe depths. Construction access will require a working area of at least 4,500 square feet to allow for equipment layout and work area around each insertion shaft.

As with the segmental method, a 36-inch diameter pipe is the largest commercially available size that could be inserted into the 42-inch diameter brine line to provide adequate clearance between the outside of the liner pipe and the inside wall of the existing pipe. This would result in a 27% loss in cross-sectional area causing a large reduction in hydraulic capacity. After the liner is inserted, the annular space between the liner and the existing pipe is filled with grout. Grouting operations would take place at both ends and at intermediate injection points.

Unlike segmental sliplining, continuous sliplining does require full bypass or discharger shutdowns to install the liner and to annular space grout.

HDPE and PVC are the two pipe material options for continuous sliplining. For the purposes of this analysis and to provide a more direct comparison to segmental, a HDPE pipe was assumed. The planning level construction capital cost for continuous sliplining with 36-inch HDPE is $39,848,000. Refer to Appendix C for the detailed cost estimate.

8.1.3 Cured-in-Place Pipe Lining

CIPP is a structural rehabilitation solution that involves the insertion of a flexible, resin-impregnated synthetic fabric liner into the existing pipe. The three types of resins for sewer pipe rehabilitation are polyester, vinyl ester, and epoxy. The physical properties, chemical composition, and cost vary between the three. For this project, polyester resin would likely be used.

Depending on the size of the existing pipe, the liner is either installed through an existing manhole or through an access pit and is then positioned in the deteriorated pipe. For the 42-inch diameter brine line, the Contractor would install through the existing manholes, but would have to remove the frame, throat, and cone sections of the manholes to prevent damaging the liner material. The two common liner insertion methods are: (1) pressure inversion; or (2) pulled through. Pressure inversion uses hydrostatic pressure or air pressure to invert the liner into the pipe, turning it inside out as it travels down the pipe. The pulling method typical involves connecting the liner to a winch that is located at the downstream receiving manhole and position the liner in the pipe before filling with water. The water or air pressure inside the liner presses it against the pipe wall, eliminating annular space. After the liner is in position and secured at both ends, it is cured with hot water, steam, or high-intensity UV light. Unlike sliplining, the flexible CIPP liner easily conforms to curves and variations of the roundness of the brine line due to existing T-lock liner and aggregate grooves. Cure times vary depending on type of resin, liner thickness, and curing method (hot water, steam, or UV). Hot water and steam cures typically take at least 8 hours of continuous cure time while UV cure can take significantly less time. The finished product is a continuous, tight-fitting, pipe-within-a-pipe.

With the CIPP liner process, properly preparing the existing pipe is key to successful large diameter pipe rehabilitation. If not properly designed or installed, the liner can fail. In general, there are four causes for CIPP liner failures. Each failure mode has a strategy to eliminate this risk as shown in Table 12 below.

Table 12: CIPP Failure Modes and Strategies to Reduce Risk

Failure Mode	Strategy to Reduce Risk
The liner is not designed for "full groundwater" hydrostatic pressure and collapses when a higher pressure is applied.	The liner should be designed to withstand the highest possible groundwater level. Typically, a conservative groundwater design level is to assume the groundwater is at the ground surface elevation.
During the curing stage, the hydrostatic pressure inside the liner is less than the pressure outside the liner. The greater pressure on the outside collapses the liner and it is cured in this collapsed configuration.	1. Infiltration sources, such as leaks at pipe joints, should be grouted before the liner is installed. 2. The liner should be filled with water or steam and the pressure inside the liner should be at a higher pressure than the potential pressure outside the liner. This is accomplished by keeping the hydrostatic head or steam pressure inside the liner higher than the groundwater head. Liners cured with air are more likely to fail in this manner since air pressure is harder to maintain at a constant pressure than water pressure. 3. If it is not possible to keep the hydrostatic head or air pressure inside the liner higher than the groundwater head, additional infiltration sources should be located and repaired prior to attempting lining again.
Part of the liner does not reach the proper cure temperature due to a "cold sink" such as cold ground water running along the outside of the liner (but inside the host pipe). This uncured portion of the liner then collapses when ground water pressure is applied to the outside of the liner (or the liner eventually collapses under its own weight).	1. Infiltration sources, such as leaks at pipe joints, should be grouted before the liner is installed. 2. Thermocouples should be placed at the ends of the liner and at intermediate points (depending on length of the liner). Installing thermocouples at intermediate points along the pipe can be accomplished using a ribbon temperature gauge. The thermocouples will measure the temperature of the liner at regular intervals so that the contractor can determine when the proper temperature has been reached. 3. Areas with uncured liner should be located during post-installation inspection and flagged for repair. A pre-liner used prior to lining can also help with this issue.
Resin is washed out of part of the liner due to groundwater running along the outside liner (but inside the host pipe). Since the resin provides the strength of the liner, this weak section collapses when groundwater pressure is applied to the outside of the liner (or the liner collapses under its own weight).	1. Infiltration sources, such as leaks at pipe joints, should be grouted before the liner is installed. 2. Sections of liner without resin should be located during post-installation inspection and flagged for repair. A pre-liner used prior to lining can also help with this issue.

The liner profile is relatively thin compared to sliplining and similar to the tight fit spiral wound liner. It is estimated that an approximate 0.74-inch thick liner will be needed for structural rehabilitation of the 42-inch diameter brine line. This would result in a 7% loss in cross-sectional area with a total resultant inside diameter of 40.5 inches. Liner thickness is dependent on external live and dead loads and condition of the host pipe, which will be re-evaluated in 10 years. Nonetheless, it is expected to have the smallest reduction in hydraulic capacity out of the alternatives considered.

CIPP liners of this size can be applied through runs of up to 1,000 feet and through bends up to 45 degrees. Access points for liner insertions are spaced accordingly. For a project of this scale, a work area of approximately 75 ft x 20 ft (1,500 sf) per insertion location is anticipated to allow for the lining equipment and lining insertion process. The work area required is significantly less than sliplining and relatively equal to spiral wound lining. However, CIPP does require bypassing 100% of the flow during the entire installation process.

Long installations may require that the liner be delivered to the site without resin and "wet-out" (impregnated with resin) on-site. On-site wet-out is typically performed in a tent adjacent to the insertion manhole where resin is injected into the dry liner before installation. On-site wet-out is sometimes necessary because a long, large diameter liner containing resin would be too heavy to transport on streets and highways. Whether or not the liner is wet-out in the factory and shipped to the site or wet-out on-site is dependent upon the Contractor.

The planning level construction capital cost for CIPP lining is $42,127,000 (2018 dollars). Refer to Appendix C for the detailed cost estimate.

8.1.4 Spiral Wound Pipe Lining

Spiral wound lining is the installation of a continuous strip of PVC or HDPE that is interlocked with the use of specialized winding machines into a circular shape within the existing pipe. Historically, the spiral wound liner products installed as structural rehabilitation solutions produce an annular space between the liner and existing pipe. The annular space is typically 2 to 3-inches and must be grouted to key the liner into the pipe surface. The primary disadvantage of this in relation to the Reach 4D brine line is the reduction of hydraulic capacity in the rehabilitated pipe. Sekisui SPR Americas has a new tight fit spiral wound product on the market (SPR™ TF) that is a structural lining solution that forms a tight fit on the host pipe and does not require annular space grouting. This is the spiral wound lining product evaluated in this Work Plan.

The SPR™ TF spiral wound process consists of a specialized winding machine that rotates and traverses inside the existing pipe lining the walls with a continuous strip of PVC profile. The PVC profile strip includes male and female locking edges that are treated with an adhesive (Figure 8). As the winding machine travels the pipeline, the locking edges are snapped together, locking the liner in place to form a circular shape that matches the profile of the existing pipeline. The PVC profile is fed through existing manholes using an above ground spool. It can be installed through runs of approximately 1,000 feet and through bends up to 45 degrees. The maximum distance between existing MAS along the Reach 4D alignment to be rehabilitated is approximately 1,560 feet. Therefore, additional temporary access shafts would be required for installation of spiral wound pipe lining along limited segments of the brine line. Spiral wound pipe has a smaller installation footprint than CIPP at the existing MAS and it does not require modifications to the structures for liner installation. It does have a slower installation rate than CIPP, with typical rates for pipelines of this size ranging between 250 to 500 feet per day. A single, continuous run likely will not and does not have to be completed in a single day.

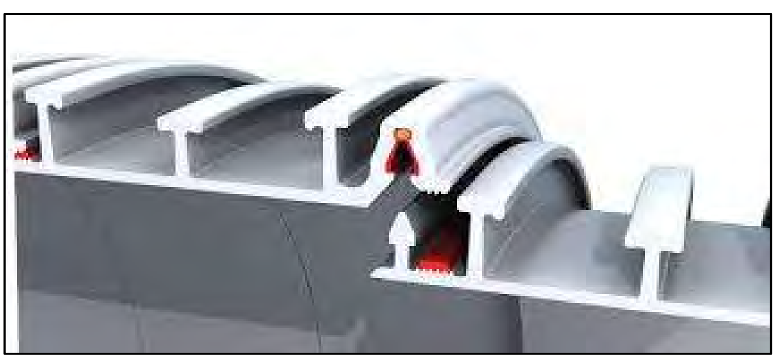


Figure 8: Interlocking Edges of PVC Profile Strip for SPR™ TF Spiral Wound Liner

The PVC profile strip includes outer ribs that support the liner in place and press against the existing pipe wall. If steel ribs are used instead of PVC, it reduces the total thickness of the liner. While not quite as thin as the CIPP solution, the steel reinforced tight fit spiral wound liner would be approximately 0.87-inches thick. That is would result in an 8% loss in cross sectional area with a total resultant inside diameter of 40.26 inches. Based on the criticality of maintaining the capacity of the existing brine line, this alternative will only consider the steel rib option. Refer to Appendix D for design calculations of the steel-reinforced option (profile type 91-22ROS-DEV) and standard PVC option (profile type 91-37RO), provided by the manufacturer.

The SPR™ TF spiral wound liner can be installed during live flows, as long as the brine line remains below 30% capacity. At a projected 11 MGD peak dry weather flow in 10 years and assuming the flow velocity is 4 feet per second, the 42-inch pipeline would be flowing approximately 50% full. Therefore, it is likely that partial bypass pumping would be required. The planning level cost estimate for installation of a spiral wound liner as provided as part of this analysis includes bypass with a 25% discount for reduced flow. Night flows should be carefully monitored to determine if flows are consistently low enough for an extended period of time to install the liner without bypass.

The planning level construction capital cost for the tight-fit SPR™ TM spiral wound lining is $36,282,000 (2018 dollars). Refer to Appendix C for the detailed cost estimate.

8.1.5 Man-Entry Repairs

Man-entry repairs involves concrete spot repair work with epoxy to fill voids and repair sections that have experienced significant deterioration. Additionally, a polyurethane coating would be applied to the unlined portion of the pipe up to the existing T-Lock Liner termination edge. This coating would provide corrosion protection to the unlined portion of the pipe, extending the useful life of the applied surface area. It is assumed the existing pipe surfaces behind the T-Lock Liner would not be touched as part of this alternative, unless a hole in the liner was identified during repairs. This alternative would only be in consideration if the concrete behind the liner was found to be in good condition during the condition assessment completed five years prior (see Section 6.2 for mid-term recommendation).

The primary advantage of man-entry repairs would be the minimal hydraulic capacity impacts on the pipeline because the existing pipe would be repaired, and a new coating would be installed to the unlined concrete. The cross-sectional area would not be reduced. Also, since the MAS would be used to access the pipe, no excavations would be required and the contractor staging area would be significantly less than the lining alternatives because there is no heavy equipment involved.

The primary disadvantage to this option is the lack of any additional structural integrity provided to the pipeline. The rehabilitation liners discussed above are designed with a 50-year useful life, but this alternative would not extend the life of the concrete behind the existing T-Lock liner and would only repair the unlined concrete to its original condition. Scour, flow velocity, and presence of corrosive gases would all impact the useful life of this repair. Other disadvantages include a slow installation rate due to the manual work requirement, and the need for a full bypass system. The planning level construction capital cost for man-entry repairs is $64,185,000 (2018 dollars). It is the most-expensive alternative. Refer to Appendix C for the detailed cost estimate.

8.1.6 Summary

A summary of the rehabilitation alternatives, organized by the evaluation criteria introduced in Section 7, is shown in Table 13.

Table 13: Summary of Long-Term Rehabilitation Alternatives

Rehab Alternative	Constructability / Work Area Requirements	Hydraulic Impacts	Bypass Needs	Traffic / Public Disruption	Regulatory / Permitting	Planning Level Cost ($Million)
Segmental Sliplining	• ~10 foot x 30 foot access pit required every approximately 2,000 feet or closer depending on pipe geometry. • Cannot negotiate through bends greater than 2 degrees.	• High. • Thick pipe section. • Annular space grouting required.	• Partial shut-down or bypass necessary. • Target: pipe 20-30% full during liner installation.	• High. • Large insertion pit excavations. • High number of insertion pits.	• Encroachment permits from City of Chino and Eastvale. • Encroachment permit from Caltrans.	$34.2
Continuous Sliplining	• ~8 foot x 60 foot access pit required every approximately 2,000 feet or closer depending on pipe geometry. • Cannot negotiate through a single bend greater than 30 degrees and less if compound bends encountered	• High. • Thick pipe section. • Annular space grouting required.	• Full bypass necessary. •	• High. • Large work area requirements. Pipe string layout required. • Construction productivity slow due to time associated with joint butt fusion.	• Encroachment permits from City of Chino and Eastvale. • Encroachment permit from Caltrans.	$39.8
CIPP	• Small excavation needed to remove cone of the existing manholes used for liner insertion. • Can negotiate bends up to 45 degrees unless compound bends encountered.	• Low. • Tight fit liner with no annular space.	• Full bypass necessary.	• Moderate. • Small insertion excavation. • Relatively quick insertion. • Long cure time once liner is inserted.	• Encroachment permits from City of Chino and Eastvale. • Encroachment permit from Caltrans.	$42.1
Spiral Wound Pipe	• No excavation required for insertion of liner. • Can negotiate planned bends up to 45 degrees.	• Low to Moderate. • Tight fit liner with no annular space but with a thicker wall than CIPP.	• Partial shut-down or bypass necessary. • Target: pipe 20-30% full during liner installation.	• Moderate. • No insertion excavations. • Contractor staging for equipment/liner installation at insertion manholes.	• Encroachment permits from City of Chino and Eastvale. • Encroachment permit from Caltrans.	$36.3
Man-Entry Repair	• No excavation required. • No limits on bends. • Confined space set-ups at every manhole.	• Minimal. • Repair of existing pipe with addition of some new liner at liner/pipe interface.	• Full bypass necessary.	• Low. • Traffic control associated with man-entry. • Limited contractor staging.	• Encroachment permits from City of Chino and Eastvale. • Encroachment permit from Caltrans.	$64.2

9. LONG-TERM REHABILITATION ALTERNATIVES ASSESSMENT CRITERIA

9.1 Criteria Description

This section describes the rehabilitation alternative assessment criteria that were used to develop our Long-Term recommendations for rehabilitation of the brine line. Assessment criteria were vetted by the Agency at the Rehabilitation Alternatives Analysis Review Meeting on July 18, 2018.

Constructability/Work Area Requirements

As described in Section 8, each rehabilitation alternative requires access to the existing pipe and has certain work area requirements to accommodate equipment necessary for liner installation. Both of the sliplining alternatives require large access shaft excavations and work area requirements. So, they were ranked the lowest. Both CIPP and spiral wound pipe have relatively small work area requirements that are quite similar to one another in size and required frequency. So, they were ranked equally and much higher than the sliplining alternatives. Man-entry repairs have virtually no work area requirements. So, they were ranked the highest.

Impacts to Hydraulic Capacity

Impacts to hydraulic capacity are directly related to the reduction of cross-sectional area for each of the rehabilitation alternatives. Both of the sliplining alternatives have the biggest reduction in cross-sectional area of the host pipe. Therefore, they have earned the lowest scores. Spiral wound pipe has a moderate impact and has been scored accordingly. CIPP has a slightly thinner cross section than spiral wound pipe. So, it scores better than the spiral wound pipe alternative. Man-entry repairs has the least impact to host pipe cross-sectional area and earns the highest score.

Traffic/Public Disruption

Traffic control and temporary construction impacts to commute routes were considered for each of the alternatives. The amount of disruption was quantified based on a combination of work area requirements and anticipated duration of construction for each of the alternatives. Because continuous sliplining requires a large layout area behind the insertion shaft for fused pipe prior to being pulled into place and because fusion duration will likely be lengthy, this option is likely to cause the highest amount of traffic disruption among the alternatives. Segmental sliplining's large access shafts which will require some time to excavate and shore earn it the second highest level of disruption. CIPP does require some excavation, but the excavation is shallow and minimal. In addition, the installation process is relatively quick. So, its disruption is considered moderate. Both spiral wound pipe and man-entry repairs can be done from existing manholes. So, traffic control requirements for these alternatives will be minimal. As a result, they were ranked the highest in this category.

Regulatory/Permitting

Environmental and other regulatory permitting requirements can impact project schedule and cost. As such, the assessment included analysis of how the alternative's design, schedule and cost may be affected by environmental and permitting requirements. All of the alternatives require construction within the travelled right-of-way. Therefore, it is anticipated that each of the alternatives will only require encroachment permits from Caltrans as well as the Cities of Chino and Eastvale. Both of the sliplining alternatives require considerable more layout and excavation than the other alternatives evaluated. Therefore, they were given a lower ranking as there will likely be more City and Caltrans encroachment permits restriction associated with these alternatives during construction.

Planning Level Cost

A planning level cost was developed for each of the long-term rehabilitation alternatives as presented in this TM. See Appendix C. Scoring for this criterion was directly correlated with these costs and is reflected in the table below. Man-entry repairs were by far the most expensive and received the lowest score. CIPP and continuous sliplining were both moderately high priced when compared with the other alternatives and were scored the same. Spiral wound pipe was lower priced than CIPP and continuous sliplining and was scored accordingly. Segmental sliplining was the least expensive and scored the highest.

Risk of SSO

The risk of an SSO is elevated when the hydraulic capacity of a pipeline is reduced while the volume of flow continues to increase over time. Therefore, those alternatives that have the least impact on hydraulic capacity were also considered to have the smallest risk of sanitary sewer overflows. Man-entry repairs was the highest scoring. This was followed by CIPP, spiral wound pipe, and the two sliplining alternatives.

Solution Longevity

All of the alternatives except for man-entry repairs are calling for the installation of a structural liner in the host pipe. As such, each of these alternatives offers a 50-year rehabilitation solution and are each ranked equally high in the table. Man-entry repair is only a temporary repair to the existing pipe to restore the existing concrete at the exposed locations. Eventually, the concrete will wear away again over time. So, this solution is likely only a 20-year solution. As such, it was ranked much lower in the table.

9.2 Criteria Weighting

Criteria for alternative selection were developed and submitted to SAWPA for review and input. SAWPA then provided the weighting associated with each of the criteria. As can be seen in Section 9.3 below, impacts to hydraulic capacity and planning level cost were deemed the most important to the agency and were weighted more heavily than the other selection criteria. Because of project future flows in the pipeline from current and future customers, impacts of the rehabilitation alternative on hydraulic capacity was deemed the most important of the selection criteria and was given the highest weighting in the matrix.

9.3 Criteria Table

Table 14 shows a weighted comparison of alternatives 1 through 5 based on the criterion as described above.

Table 14: Weighted Criteria Table with Final Alternative Ranking

	Weight	Alt 1: Segmental Sliplining	Weighted Score	Alt 2: Continuous Sliplining	Weighted Score	Alt 3: Cured-in-Place Pipe	Weighted Score	Alt 4: Spiral Wound Pipe	Weighted Score	Alt 5: Man-Entry Repair	Weighted Score
Criterion		**Score**		**Score**		**Score**				**Score**	
Constructability/Work Area Requirements	1	1	1	1	1	4	4	4	4	5	5
Impacts to Hydraulic Capacity	2	1	2	1	2	4	8	3	6	5	10
Traffic/Public Disruption	1	2	2	1	1	3	3	4	4	4	4
Regulatory/Permitting	1	3	3	3	3	5	5	5	5	5	5
Planning Level Cost	1.5	5	7.5	3	6	3	4.5	4	6	1	1.5
Risk of SSO	1	2	2	2	2	4	4	3	3	5	5
Solution Longevity	1	5	5	5	5	5	5	5	5	2	2
TOTAL			**22.5**		**18.5**		**33.5**		**33**		**32.5**

(1) A higher score for each criteria is better.
(2) A higher weight number indicates a higher impact to evaluation of the alternatives.
(3) A higher weighted score indicates a higher ranked alternative.
(4) Does not include rehabilitation of siphons.

9.4 Recommended Long-Term Rehabilitation Alternative

As previously described, assessment criteria were assigned a weight and each alignment was assigned a ranking. Since there were five alternatives being compared in the matrix, alternatives were ranked from 1 to 5, with 5 being the most preferred option. The score was multiplied by the weight and the resulting numbers were summed up for a final ranking score. The higher the score, the more favorable the option. The following is a summary of the resulting scoring:

Alternative:	Ranking:
Alternative 3: Cured-in-Place Pipe	1
Alternative 4: Spiral Wound Pipe	2
Alternative 5: Man-Entry Repair	3
Alternative 1: Segmental Sliplining	4
Alternative 2: Continuous Sliplining	5

Based on the weighted rankings in the assessment matrix, Alternative 3: Cured-in-Place Pipe is the recommended alternative for future Long-Term design and construction. However, Alternative 4: Spiral Wound Pipe came in a very close second. So, it is recommended that when it comes time for a rehabilitation method to be chosen for design that SAWPA evaluates Spiral Wound pipe rehabilitation as a viable alternative. For the purposes of this Work Plan, a cost estimate and construction schedule for Alternative 3: Cured-in-Place Pipe is being provided.

10. COST ESTIMATES

10.1 Components and Assumptions

Development of the planning level cost estimates for the near-term, mid-term, and long-term recommendations was based on several sources of information. These included the costs to perform the May 2018 field inspections, engineering fees associates with the current Reach 4D Rehabilitation Work Plan Project, review of bids for rehabilitation of similar sized piping systems in Northern California, standard estimating guides, discussions with rehabilitation technology suppliers, and the knowledge of some of the potential construction constraints related to the Reach 4D Contract 1 and 2 alignment. Descriptions of the components and assumptions specific to the near, mid, and long-term projects are provided in the following sections.

10.2 Near-Term

The cost estimate to complete the recommended near-term project includes the labor and engineering associated with cleaning and CCTV of approximately 1,020 feet of pipe between MAS 4D-0240 and 4D-0250, man-entry physical inspections and testing at MAS 4D-0060 and 4D-0360, and the development of a report summarizing the collected data. The following notes and assumptions were used in calculating the quantities and unit costs:

- SAWPA will provide the traffic control plans, encroachment permits from Caltrans, City of Chino, and City of Eastvale, and will coordinate the minimum 8 hour shut-down with the dischargers. SAWPA project management and other costs associated with coordination and permit acquisition not provided as part of this estimate.
- The unit cost for pipe cleaning with hydro-jetting was based on the hourly rates from SAWPA's contract with their current service provider:
  - Cleaning jetter: $223 per hour
  - Water truck: $110 per hour

- The cleaning duration was assumed to be 8 hours per 1,000 feet of sewer.
- The CCTV inspection unit cost was based on SAWPA's current CCTV Contractor ($0.835 per foot), rounded up to $1 per foot.
- Traffic control will be required during the cleaning, CCTV, and man-entry inspections. The unit cost was based on an aggregate of the total cost from the May 2018 field inspections ($11,250) and the traffic control cost per SAWPA's contract with their current pipeline cleaning service provider ($475 per 8 hours).
- V&A will perform the man-entry inspections at MAS 4D-0060 and 4D-0360. The unit cost for inspections reflects the field work labor at an assumed duration of 4 hours per entry, preparation of a health and safety plan, preparation of data for analysis by Woodard & Curran, and subcontracting the lining repair and confined space entry work.
- Woodard & Curran will supervise the CCTV and man-entry field work for up to 8 hours, analyze the CCTV and man-entry inspection data, and develop a summary report. The hourly labor rates match those from the current Reach 4D Rehabilitation Work Plan Project (Task Order No. W&C327-01).
- Field work will be performed over a single night and occur during the work week to avoid prevailing wage requirements.
- Task 5 costs include Woodard and Curran project management fees.
- Estimate is provided in August 2018 dollars.

The cost estimate for the recommended near-term work is displayed in Table 15.

Table 15: Cost Estimate for Recommended Near-Term Inspection Work

Item No.	Estimated Qty	Unit	Item Description	Unit Cost	Total Cost
1	1	Lump Sum	Traffic Control	$1,500	$1,500
2	8	Hour	Cleaning (Hydro-Jetting)	$333	$2,700
3	1,020	Linear Foot	CCTV Inspection (MAS 4D-0250 TO 4D-0240)	$1	$1,020
4	2	Each	Man-Entry Inspection (MAS 4D-0060 & 4D-0360)	$10,100	$20,200
5	1	Lump Sum	CCTV & Man-Entry Inspection Data Analysis and Report Preparation	$23,400	$23,400
				TOTAL	**$49,000**

10.3 Mid-Term

The cost estimate to complete the recommended mid-term project includes the planning and execution of re-inspecting the entire seven-mile Reach 4D Contract 1 and 2 alignment, as described in Section 7.2. This recommended project is similar to the current Reach 4D Rehabilitation Work Plan Project, but adds cleaning (hydro-jetting) of the entire alignment prior to inspections and two more man-entry inspections located at MAS 4D-0060 and 4D-0360.

The following notes and assumptions were used in calculating the quantities and unit costs:

- SAWPA will provide the traffic control plans, encroachment permits from Caltrans, City of Chino, and City of Eastvale, and will coordinate the 24-hour shut-down with the dischargers. SAWPA project management and other costs associated with coordination and permit acquisition not provided as part of this estimate.
- The unit cost for pipe cleaning with hydro-jetting was based on the hourly rates from SAWPA's contract with their current service provider:
    - Cleaning jetter: $223 per hour, Water truck: $110 per hour
- The cleaning duration was assumed to be 8 hours per 1,000 feet of sewer.
- The CCTV inspection unit cost was based on Pro-Pipe's fee estimate to CCTV up to 11,750 feet in May 2018 ($27,456) which comes out to approximately $2.34/foot.
- Cleaning and CCTV of the sewer siphons will be excluded.
- Traffic control will be required during the cleaning, CCTV, and man-entry inspections. The unit cost was based on an escalation of the total cost from the May 2018 field inspections ($11,250), which represented approximately 67-percent of the total alignment, minus the sewer siphons.
- V&A will perform the seven man-entry inspections and develop a condition assessment report matching the level of detail from the Reach 4D Manned Entry Condition Assessment Report, dated July 2018. The unit cost was based on V&A's fee for the current Reach 4D Rehabilitation Work Plan Project, escalated to account for two additional inspections. Traffic control and CCTV were excluded from the unit cost.
- Woodard & Curran's scope of work, project team, and hourly rates match those from the current Reach 4D Rehabilitation Work Plan Project (Task Order No. W&C327-01). The level of effort was increased to account for additional data analysis from the two additional man-entry inspections, to compare the new data with the data from the May 2018 field inspections, and escalation.
- Field work will be performed over a single 24-hour shut-down period.
- Task 5 costs include Consultant estimated project management fees.
- Estimate is provided in August 2018 dollars.

The cost estimate for the recommended mid-term work is displayed in Table 16.

Table 16: Cost Estimate for Recommended Mid-Term Inspection Work

Item No.	Estimated Qty	Unit	Item Description	Unit Cost	Total Cost
1	1	Lump Sum	Traffic Control	$16,900	$16,900
2	282	Hour	Cleaning (Hydro-Jetting)	$333	$94,023
3	35,294	Linear Foot	CCTV Inspection of Entire 7-Mile Alignment (MAS 4D-0010 TO 4D-0480)	$2.34	$82,471
4	1	Lump Sum	Man-Entry Inspections and Condition Assessment at 7 MAS Locations	$128,445	$128,445
5	1	Lump Sum	Consultant Fee to Provide Engineering Services Matching Task Order No. W&C327-01	$145,305	$145,305
				TOTAL	**$468,000**

10.4 Long-Term

The planning level construction cost estimate for the recommended long-term rehabilitation project includes the installation of CIPP lining along the entire Reach 4D Contract 1 and 2 alignment, excluding the 360-degree PVC lined RCP segments installed in 2011 between MAS 4D-0300 and 4D-0310. The following notes and assumptions were used in calculating the total construction cost:

- A 30-percent planning level contingency was added to the construction cost subtotal.
- Because estimate is provided in 2018 dollars, each rehabilitation alternative unit cost was increased by 20 percent to account for current inflated bid climate.
- A lump sum cost for mobilization and demobilization was assumed to be equal to five-percent of the summation of all other bid items except traffic control.
- The traffic control lump sum cost was assumed to be equal to 10-percent of the summation of all other bid items except mobilization and demobilization, based on the City of Chino's and City of Eastvale's traffic control requirements from the field work performed in May 2018. Additionally, it was assumed that night work will be required for curing of the CIPP liners. CIPP has the highest traffic control costs of all the long-term rehabilitation liners because it was assumed to be the only alternative that will require night work.
    - Traffic control for the other long-term rehabilitation liner alternatives assumed seven-percent of the summation of all other bid items except mobilization and demobilization, based on the City of Chino's and City of Eastvale's traffic control requirements from the field work performed in May 2018.
- The permitting allowance of $10,000 and water pollution control work lump sum cost of $10,000 were based on past rehabilitation projects for similar sized piping systems located in primarily in street rights-of-way.
- The potholing lump sum unit cost of $40,500 was based on an assumed quantity of 27 potholes at $1,500 each.
- The sanitary sewer bypass unit cost of $5,803,000 was based on the following:
    - Assumed to be sized for an 11.0 MGD capacity
    - Equipment/material rental costs and labor costs were based on quotations received from Rain for Rent in February 2018 for a 20.3 MGD bypass system and 5.5 MGD bypass system.
    - The maximum length for each bypass system was assumed to be approximately one mile, as requested by SAWPA. A total of eight 11 MGD, one-mile bypass setups will be assembled, operated, and dissembled in order to rehabilitate the entire pipeline alignment. See the construction schedule in Section 11.2 for further information.
    - A 24/7 pump watch crew will be required for while the bypass system is in operation. The crew will not be required during assembly and disassembly of each one-mile bypass system setup.
    - The total duration of bypass operations is approximately 18 months. See the construction schedule in Section 11.2 for further information.
- The CIPP lining unit cost of $480 per foot was based on a review of recent project bids for CIPP installation in a similar sized trunk sewer. It includes cleaning, pre-CIPP CCTV inspection, existing pipe surface preparation, CIPP liner installation, and post-CIPP CCTV inspection.
- Estimate is provided in August 2018 dollars.

The cost estimate for the recommended mid-term work is displayed in Table 17.

Table 17: Planning Level Construction Cost Estimate for Recommended Long-Term Rehabilitation Work with CIPP Lining

Bid Item No.	Estimated Qty	Unit	Bid Item Description	Unit Cost	Adjusted Unit Cost	Total Cost
1	1	Lump Sum	Mobilization / Demobilization (5%)	$1,373,087	$1,647,704	$1,647,704
2	1	Lump Sum	Traffic Control	$2,746,174	$3,295,408	$3,295,408
3	1	Allowance	Permitting	$10,000	$12,000	$12,000
4	1	Lump Sum	Water Pollution Control Work (Including SWPPP)	$10,000	$12,000	$12,000
5	1	Lump Sum	Potholing	$40,500	$48,600	$48,600
6	1	Lump Sum	Sanitary Sewer Bypass	$5,803,000	$6,963,600	$6,963,600
7	35,461	Linear Foot	CIPP Lining of Existing 42-inch Pipe	$480	$576	$20,425,536
				SUBTOTAL		**$32,405,000**
			Planning Level Contingency (30% of Bid Items)	30%		$9,721,500
				TOTAL		**$42,126,500**

11. SCHEDULE

11.1 Implementation Schedule for Near-Term, Mid-Term, and Long-Term Recommendations

The implementation schedules for the recommended near-term, mid-term, and long-term projects are provided in **Error! Reference source not found.**, Figure 10, and Figure 11, respectively. The near-term and mid-term project implementation schedules are organized by “planning & preparation” and “execution”. The long-term project schedule is organized by “planning”, “design”, and “construction”. Descriptions of each are provided below.

- Planning & Preparation – for near-term and mid-term schedules
    - The planning and preparation task includes the kickoff meeting between SAWPA and Engineering Consultant, data collection and review, development of a field investigation plan and schedule, permit acquisition, and cleaning of the brine line.
    - The acquisition of encroachment permits from Caltrans, City of Chino, and City of Eastvale is on the critical path. This task was assumed to take 45 days to complete, based on the current Reach 4D Rehabilitation Work Plan Project. Cleaning of the brine line may begin after all three permits are in hand.
- Execution – for near-term and mid-term schedules
    - The execution task includes the field work inspections, preparation of the collected CCTV and man-entry condition assessment data, and data analysis. For the near-term project, it is assumed that a

brief memo summarizing the condition assessment results is sufficient. For the mid-term project, it is assumed the same deliverables as the current Reach 4D Rehabilitation Work Plan Project would be required.

- Planning, Design, and Construction – for long-term schedule
    - The planning phase includes the development of a Preliminary Design Report, which would involve an analysis of structural rehabilitation liners available on the market at that time period.
    - The design phase includes the development of final design plans and specifications that will be delivered in three packages (60%, 90%, and 100%) and the bid phase.
    - The construction phase begins at Contractor notice-to-proceed and ends at the completion of final site cleanup/restoration activities.
    - See Section 11.2 for a detailed project schedule.

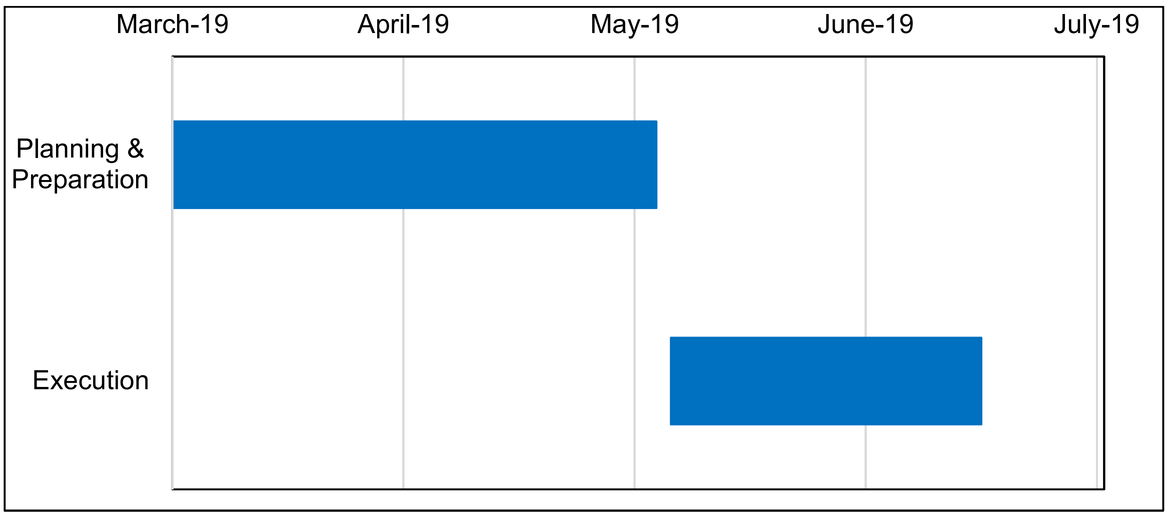


Figure 9: Implementation Schedule for Recommended Near-Term Project

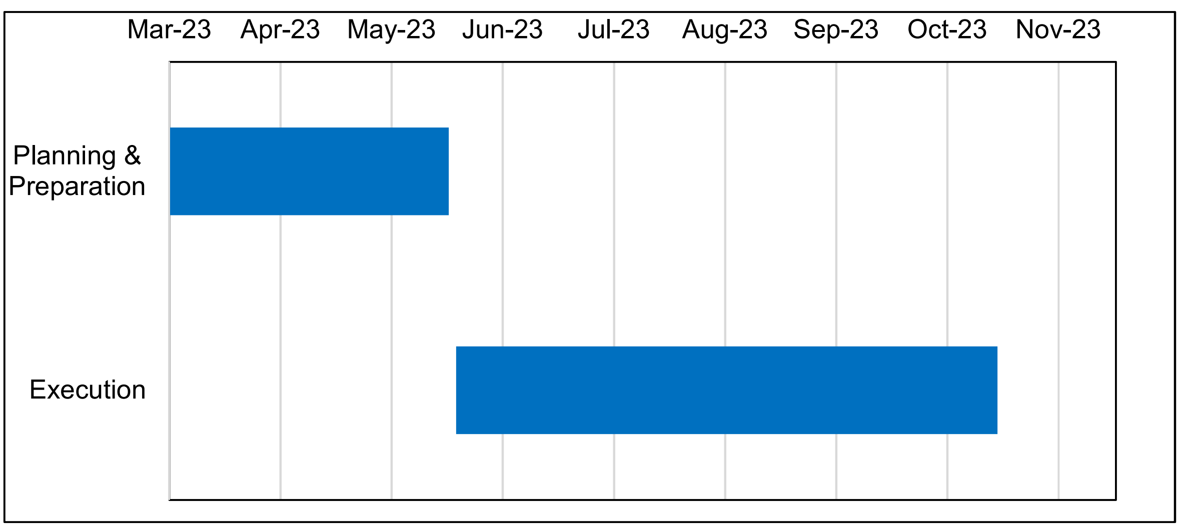


Figure 10: Implementation Schedule for Recommended Mid-Term Project

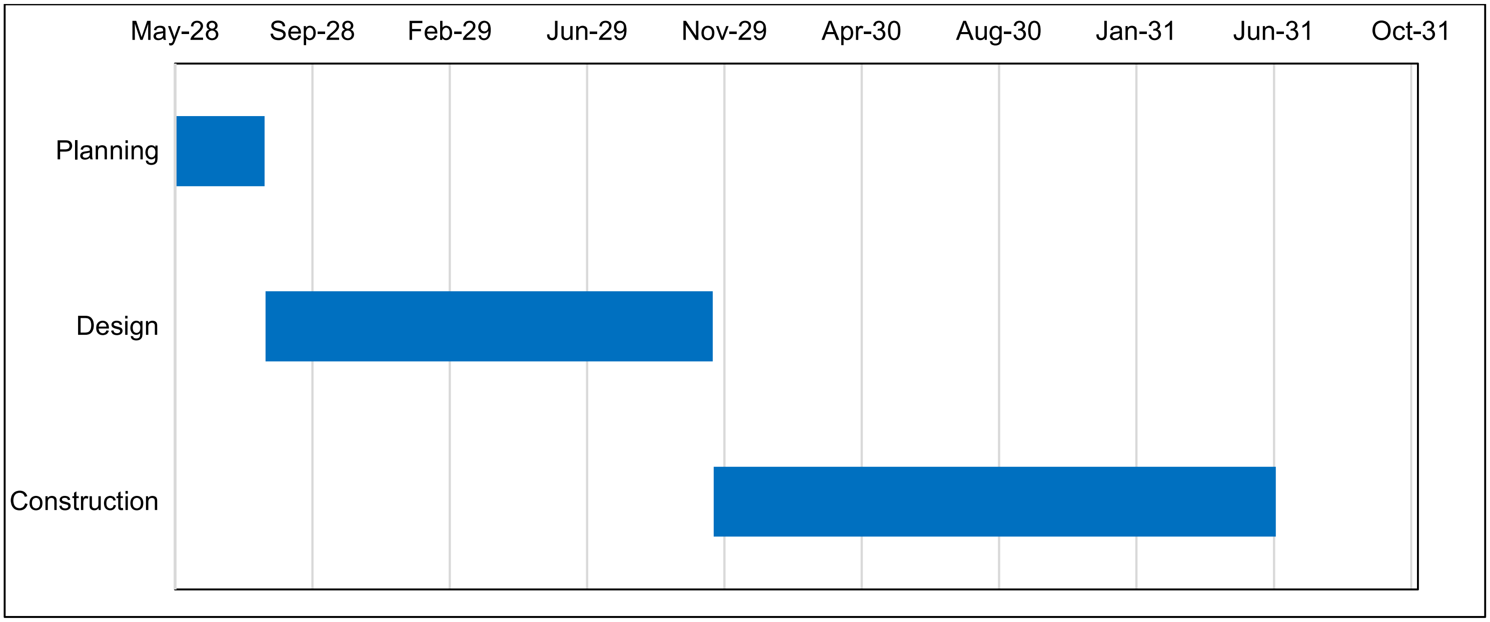


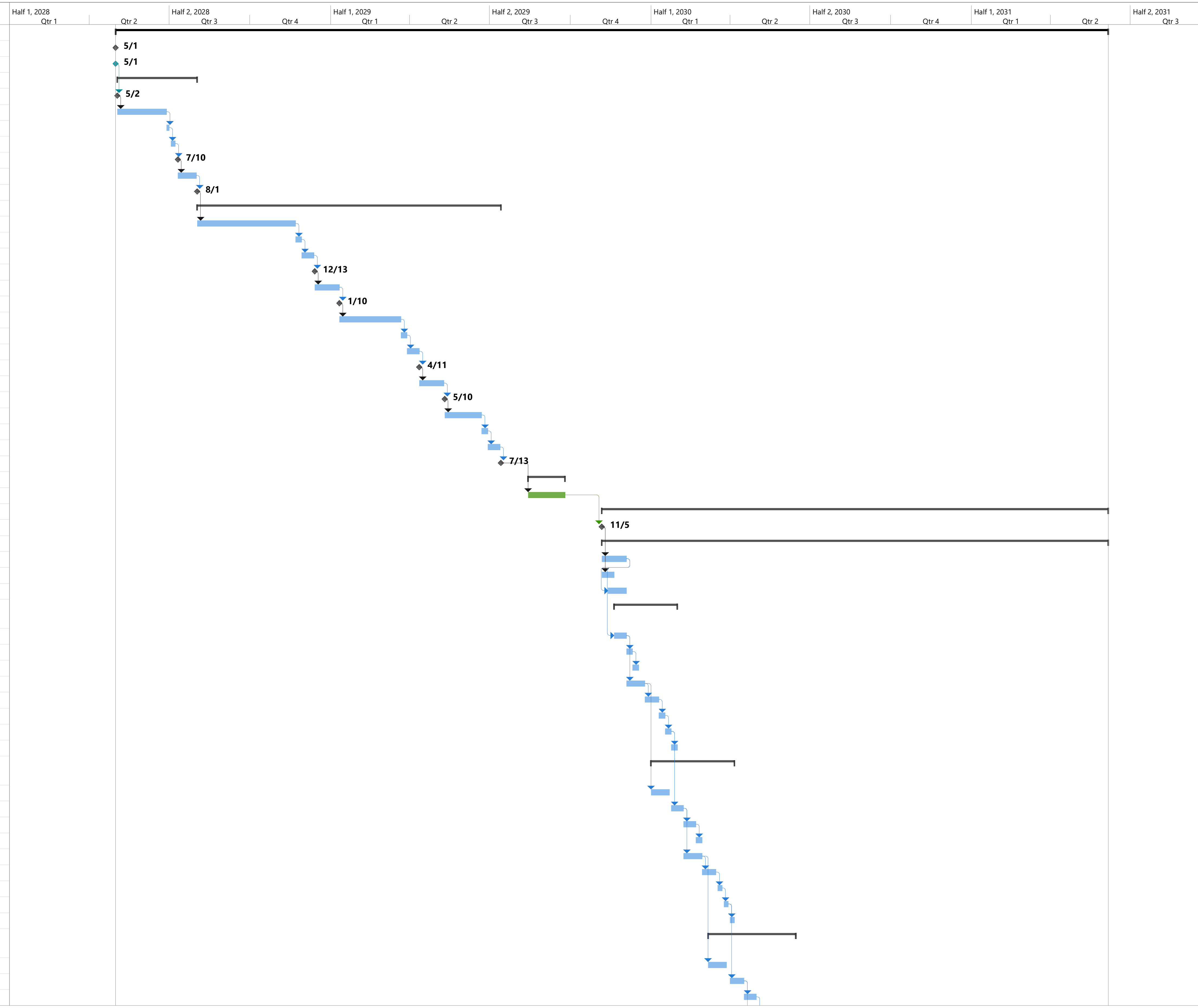
Figure 11: Implementation Schedule for Recommended Long-Term Rehabilitation Project with CIPP Lining

11.2 Project Schedule for Long-Term Rehabilitation Project

An example project schedule for the recommended long-term rehabilitation project involving CIPP lining of the entire Reach 4D Contract 1 and 2 alignment is shown in Figure 12. The schedule is comprised of four main components – Preliminary Design Phase, Design Phase, Bid Phase, and Construction Phase. Each of the schedule components was based on previous project experience with CIPP lining of similar sized piping systems. Based on the assumed durations of each task, the project is expected to take approximately 809 working days, or 3.1 years.

Figure 12. Reach 4D Rehabilitation Work Plan Long-Term Rehabilitation Project Schedule
2018-09-12

ID	Task Name	Duration	Start	Finish
0	**Reach 4D Rehabilitation**	**809 days**	**Mon 5/1/28**	**Thu 6/5/31**
1	**Task 1 - Project Management**	**0 days**	**Mon 5/1/28**	**Mon 5/1/28**
2	Notice to Proceed	0 days	Mon 5/1/28	Mon 5/1/28
3	**Task 2 - Preliminary Design**	**65 days**	**Tue 5/2/28**	**Tue 8/1/28**
4	Kick off meeting & Site Visit	0 days	Tue 5/2/28	Tue 5/2/28
5	Develop Design Memo	40 days	Wed 5/3/28	Tue 6/27/28
6	W&C QA/QC Review	3 days	Wed 6/28/28	Fri 6/30/28
7	Update Memo	5 days	Mon 7/3/28	Fri 7/7/28
8	Deliver Design Memo	0 days	Mon 7/10/28	Mon 7/10/28
9	SAWPA review	15 days	Tue 7/11/28	Mon 7/31/28
10	Design Memo review meeting	0 days	Tue 8/1/28	Tue 8/1/28
11	**Task 3 - Design Plans and Specifications**	**248 days**	**Wed 8/2/28**	**Fri 7/13/29**
12	Develop 60% Design Package	80 days	Wed 8/2/28	Tue 11/21/28
13	W&C QA/QC Review	5 days	Wed 11/22/28	Tue 11/28/28
14	Update 60% Design Package	10 days	Wed 11/29/28	Tue 12/12/28
15	Deliver 60% Design Package to SAWPA	0 days	Wed 12/13/28	Wed 12/13/28
16	SAWPA review	20 days	Thu 12/14/28	Wed 1/10/29
17	60% Design review meeting	0 days	Wed 1/10/29	Wed 1/10/29
18	Develop 90% Design Package	50 days	Thu 1/11/29	Wed 3/21/29
19	W&C QA/QC Review	5 days	Thu 3/22/29	Wed 3/28/29
20	Update 90% Design Package	10 days	Thu 3/29/29	Wed 4/11/29
21	Deliver 90% Design Package to SAWPA	0 days	Wed 4/11/29	Wed 4/11/29
22	SAWPA review	20 days	Thu 4/12/29	Wed 5/9/29
23	90% Design review meeting	0 days	Thu 5/10/29	Thu 5/10/29
24	Develop 100% Design Package	30 days	Fri 5/11/29	Thu 6/21/29
25	W&C QA/QC Review	5 days	Fri 6/22/29	Thu 6/28/29
26	Update 100% Design Package	10 days	Fri 6/29/29	Thu 7/12/29
27	Deliver 100% Design Package	0 days	Fri 7/13/29	Fri 7/13/29
28	**Task 4 -Bid and Construction Assistance**	**30 days**	**Tue 8/14/29**	**Mon 9/24/29**
29	Assist SAWPA during bidding	30 days	Tue 8/14/29	Mon 9/24/29
30	**Task 5 - Engineering Services During Construction**	**413 days**	**Mon 11/5/29**	**Thu 6/5/31**
31	Construction NTP	0 days	Mon 11/5/29	Mon 11/5/29
32	**Construction**	**413 days**	**Tue 11/6/29**	**Thu 6/5/31**
33	Submittals review	20 days	Tue 11/6/29	Mon 12/3/29
34	Measure Internal Diameter of segments (all segments)	10 days	Tue 11/6/29	Mon 11/19/29
35	Order/Delivery of Lining (for first bypass setup)	15 days	Tue 11/13/29	Mon 12/3/29
36	**Inspection and Lining MAS 4D-0480 to 4D-0440 - 4,570 ft (1st Bypass Setup)**	**52 days**	**Tue 11/20/29**	**Wed 1/30/30**
37	Setup bypass	10 days	Tue 11/20/29	Mon 12/3/29
38	Clean 4 Pipe Segments	5 days	Tue 12/4/29	Mon 12/10/29
39	CCTV 4 Pipe Segments	5 days	Tue 12/11/29	Mon 12/17/29
40	Excavate 3 temporary access pits	15 days	Tue 12/4/29	Mon 12/24/29
41	Line 4 Pipe Segments	12 days	Tue 12/25/29	Wed 1/9/30
42	Post Lining CCTV and inspection	5 days	Thu 1/10/30	Wed 1/16/30
43	Dismantle bypass	5 days	Thu 1/17/30	Wed 1/23/30
44	Site Cleanup/Restoration	5 days	Thu 1/24/30	Wed 1/30/30
45	**Inspection and Lining MAS 4D-0400 to 4D-0440 - 4,560 ft (2nd Bypass Setup)**	**69 days**	**Tue 1/1/30**	**Fri 4/5/30**
46	Order/Delivery of Lining (for 2nd bypass setup)	15 days	Tue 1/1/30	Mon 1/21/30
47	Setup bypass	10 days	Thu 1/24/30	Wed 2/6/30
48	Clean 4 Pipe Segments	10 days	Thu 2/7/30	Wed 2/20/30
49	CCTV 4 Pipe Segments	5 days	Thu 2/21/30	Wed 2/27/30
50	Excavate 3 temporary access pits	15 days	Thu 2/7/30	Wed 2/27/30
51	Line 4 Pipe Segments	12 days	Thu 2/28/30	Fri 3/15/30
52	Post Lining CCTV and inspection	5 days	Mon 3/18/30	Fri 3/22/30
53	Dismantle bypass	5 days	Mon 3/25/30	Fri 3/29/30
54	Site Cleanup/Restoration	5 days	Mon 4/1/30	Fri 4/5/30
55	**Inspection and Lining MAS 4D-0360 to 4D-0400 - 5,130 ft (3rd Bypass Setup)**	**72 days**	**Thu 3/7/30**	**Fri 6/14/30**
56	Order/Delivery of Lining (for 3rd bypass setup)	15 days	Thu 3/7/30	Wed 3/27/30
57	Setup bypass	12 days	Mon 4/1/30	Tue 4/16/30
58	Clean 4 Pipe Segments	10 days	Wed 4/17/30	Tue 4/30/30



Project: Reach 4D Rehabilitation
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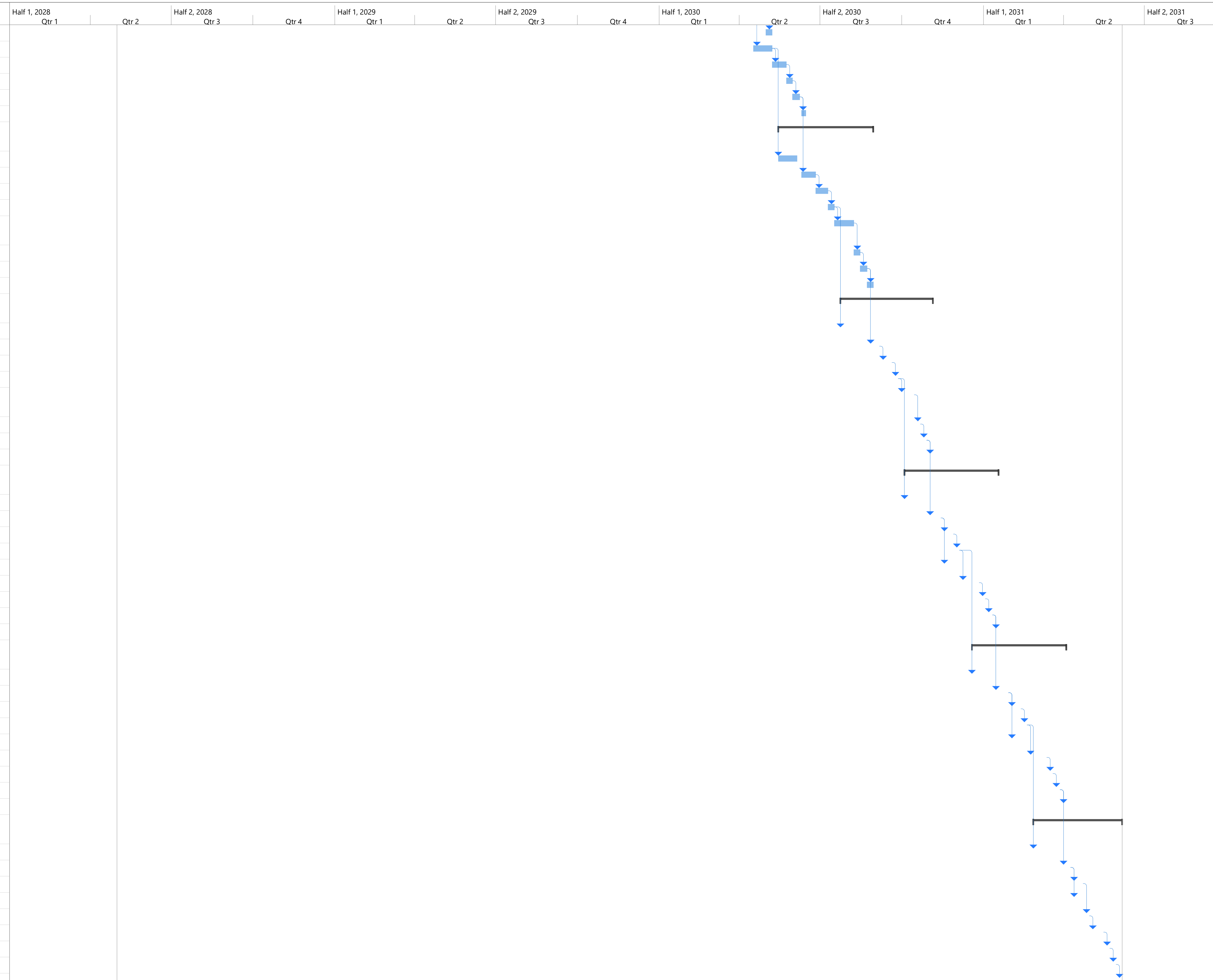
Task	Milestone	Project Summary	Inactive Milestone	Manual Task	Manual Summary Rollup	Start-only	External Tasks	Deadline	Manual Progress
Split	Summary	Inactive Task	Inactive Summary	Duration-only	Manual Summary	Finish-only	External Milestone	Progress	

Figure 12. Reach 4D Rehabilitation Work Plan Long-Term Rehabilitation Project Schedule
2018-09-12

ID	Task Name	Duration	Start	Finish
59	CCTV 4 Pipe Segments	5 days	Wed 5/1/30	Tue 5/7/30
60	Excavate 3 temporary access pits	15 days	Wed 4/17/30	Tue 5/7/30
61	Line 4 Pipe Segments	12 days	Wed 5/8/30	Thu 5/23/30
62	Post Lining CCTV and inspection	5 days	Fri 5/24/30	Thu 5/30/30
63	Dismantle bypass	6 days	Fri 5/31/30	Fri 6/7/30
64	Site Cleanup/Restoration	5 days	Mon 6/10/30	Fri 6/14/30
65	**Inspection and Lining MAS 4D-0270 to 4D-0360 - 5,080 ft (4th Bypass Setup) (4D-0300 to 4D-0310 won't be lined)**	**77 days**	**Wed 5/15/30**	**Thu 8/29/30**
66	Order/Delivery of Lining (for 4th bypass setup)	15 days	Wed 5/15/30	Tue 6/4/30
67	Setup bypass	12 days	Mon 6/10/30	Tue 6/25/30
68	Clean 8 Pipe Segments	10 days	Wed 6/26/30	Tue 7/9/30
69	CCTV 8 Pipe Segments	5 days	Wed 7/10/30	Tue 7/16/30
70	Line 8 Pipe Segments (no temporary access pits needed)	16 days	Wed 7/17/30	Wed 8/7/30
71	Post Lining CCTV and inspection	5 days	Thu 8/8/30	Wed 8/14/30
72	Dismantle bypass	6 days	Thu 8/15/30	Thu 8/22/30
73	Site Cleanup/Restoration	5 days	Fri 8/23/30	Thu 8/29/30
74	**Inspection and Lining MAS 4D-0220 to 4D-0270 - 4,620 ft (5th Bypass Setup)**	**74 days**	**Wed 7/24/30**	**Mon 11/4/30**
75	Order/Delivery of Lining (for 5th bypass setup)	15 days	Wed 7/24/30	Tue 8/13/30
76	Setup bypass	10 days	Fri 8/23/30	Thu 9/5/30
77	Clean 5 Pipe Segments	10 days	Fri 9/6/30	Thu 9/19/30
78	CCTV 5 Pipe Segments	5 days	Fri 9/20/30	Thu 9/26/30
79	Line 5 Pipe Segments (no temporary access pits needed)	12 days	Fri 9/27/30	Mon 10/14/30
80	Post Lining CCTV and inspection	5 days	Tue 10/15/30	Mon 10/21/30
81	Dismantle bypass	5 days	Tue 10/22/30	Mon 10/28/30
82	Site Cleanup/Restoration	5 days	Tue 10/29/30	Mon 11/4/30
83	**Inspection and Lining MAS 4D-0140 to 4D-0220 - 4,750 ft (6th Bypass Setup)**	**76 days**	**Fri 10/4/30**	**Fri 1/17/31**
84	Order/Delivery of Lining (for 6th bypass setup)	15 days	Fri 10/4/30	Thu 10/24/30
85	Setup bypass	12 days	Tue 10/29/30	Wed 11/13/30
86	Clean 8 Pipe Segments	10 days	Thu 11/14/30	Wed 11/27/30
87	CCTV 8 Pipe Segments	5 days	Thu 11/28/30	Wed 12/4/30
88	Excavate 1 temporary access pit	5 days	Thu 11/14/30	Wed 11/20/30
89	Line 8 Pipe Segments	16 days	Thu 12/5/30	Thu 12/26/30
90	Post Lining CCTV and inspection	5 days	Fri 12/27/30	Thu 1/2/31
91	Dismantle bypass	6 days	Fri 1/3/31	Fri 1/10/31
92	Site Cleanup/Restoration	5 days	Mon 1/13/31	Fri 1/17/31
93	**Inspection and Lining MAS 4D-0070 to 4D-0140 - 4,440 ft (7th Bypass Setup)**	**76 days**	**Thu 12/19/30**	**Thu 4/3/31**
94	Order/Delivery of Lining (for 7th bypass setup)	15 days	Thu 12/19/30	Wed 1/8/31
95	Setup bypass	12 days	Mon 1/13/31	Tue 1/28/31
96	Clean 8 Pipe Segments	10 days	Wed 1/29/31	Tue 2/11/31
97	CCTV 8 Pipe Segments	5 days	Wed 2/12/31	Tue 2/18/31
98	Excavate 1 temporary access pit	5 days	Wed 1/29/31	Tue 2/4/31
99	Line 8 Pipe Segments	16 days	Wed 2/19/31	Wed 3/12/31
100	Post Lining CCTV and inspection	5 days	Thu 3/13/31	Wed 3/19/31
101	Dismantle bypass	6 days	Thu 3/20/31	Thu 3/27/31
102	Site Cleanup/Restoration	5 days	Fri 3/28/31	Thu 4/3/31
103	**Inspection and Lining MAS 4D-0010 to 4D-0070 - 3,220 ft (8th Bypass Setup)**	**72 days**	**Wed 2/26/31**	**Thu 6/5/31**
104	Order/Delivery of Lining (for 8th bypass setup)	15 days	Wed 2/26/31	Tue 3/18/31
105	Setup bypass	8 days	Fri 3/28/31	Tue 4/8/31
106	Clean 4 Pipe Segments	10 days	Wed 4/9/31	Tue 4/22/31
107	Excavate 1 temporary access pit	5 days	Wed 4/9/31	Tue 4/15/31
108	CCTV 4 Pipe Segments	5 days	Wed 4/23/31	Tue 4/29/31
109	Line 4 Pipe Segments (up to 1 temporary access pit)	12 days	Wed 4/30/31	Thu 5/15/31
110	Post Lining CCTV and inspection	5 days	Fri 5/16/31	Thu 5/22/31
111	Dismantle bypass	5 days	Fri 5/23/31	Thu 5/29/31
112	Site Cleanup/Restoration	5 days	Fri 5/30/31	Thu 6/5/31



Project: Reach 4D Rehabilitation
Date: 2018-09-12

Task, Split, Milestone, Summary, Project Summary, Inactive Task, Inactive Milestone, Inactive Summary, Manual Task, Duration-only, Manual Summary Rollup, Manual Summary, Start-only, Finish-only, External Tasks, External Milestone, Deadline, Progress, Manual Progress

APPENDIX A:

SAWPA Inland Empire Brine Line Reach 4D Rehabilitation – Reach 4D Manned Entry Condition Assessment Report

Santa Ana Watershed Project Authority

Inland Empire Brine Line Reach 4D Rehabilitation

Reach 4D Manned Entry Condition Assessment

Prepared for: Jennifer Glynn, P.E.
Senior Project Manager
Woodard & Curran
2175 North California Blvd., Suite 315
Walnut Creek, CA 94596

Date: Draft: June 2018
Final: July 2018

Prepared by: V&A consulting engineers

V&A Project No. 18-0016

Executive Summary

V&A Consulting Engineers, Inc. (V&A) was retained by Woodard & Curran to perform closed-circuit television (CCTV) data collection and manned entry condition assessments of the Inland Empire Brine Line Reach 4D to support the Santa Ana Watershed Project Authority (SAWPA). CCTV reports were provided by V&A's CCTV contractor to Woodard & Curran and CCTV findings are not discussed by V&A in this report.

The intent of the condition assessment was to evaluate the 270-degree T-Lock pipe and the access manholes. V&A performed confined space manned entry condition assessment at five manholes during a 24-hour shutdown on May 6 and 7, 2018. The locations of the five manholes were selected by Woodard & Curran and SAWPA. During confined space manned entry, V&A assessed the T-Lock liner termination point within the pipe and the concrete behind the T-Lock liner near the crown of the pipe and below the spring line. V&A also performed feel tests at the 270-degree liner lower termination for the pipe segments. V&A performed a visual assessment of the access manholes.

The condition assessment indicated that the 270-degree liner termination is undermined and unembedded for Reach 4D. The concrete surfaces currently lined were in good condition and rehabilitating the exposed concrete invert may extend the useful life of the pipeline.

The condition assessment indicated the Reach 4D manholes were in good condition. V&A recommends minor spot repairs to seal holes and repair weld strips.

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Abbreviations and Acronyms

Abbreviations/Acronyms	Definition
AASHTO	American Association of State Highway and Transportation Officials
AIC	American Concrete Institute
ASTM	American Society for Testing and Materials
avg.	Average
AWWA	American Water Works Association
CCTV	Closed-circuit television
CO	Carbon monoxide
CO_2	Carbon dioxide
dia.	Diameter
dir.	Direction
ft.	Feet
H_2S	Hydrogen Sulfide
ICRI	International Concrete Repair Institute
in.	Inch
JEC	Jamison Engineering Contractors
LEL	Lower Explosive Limit
max.	Maximum
MH	Manhole
min.	Minimum
N/A	Not Applicable
OSHA	Occupation Safety and Health Administration
PPE	Personal Protective Equipment
psi	Pounds per Square Inch
RCP	Reinforced Concrete Pipe
SAWPA	Santa Ana Watershed Project Authority
SPR	Surface Penetrating Radar
SSPC	Steel Structures Painting Council
STA	Station
V&A	V&A Consulting Engineers, Inc.
VANDA®	V&A Condition Index
VCP	Vitrified Clay Pipe

1 Introduction

V&A Consulting Engineers, Inc. (V&A) was retained by Woodard & Curran to perform closed-circuit television (CCTV) data collection and manned entry condition assessments of the Inland Empire Brine Line Reach 4D to support the Santa Ana Watershed Project Authority (SAWPA). The Brine Line is a 42-inch reinforced concrete pipe (RCP) with a T-Lock lining at the upper 270 degrees of the pipe. The lower 90 degrees is unlined. The field work was performed during a 24-hour shutdown, coordinated by SAWPA and performed by SAWPA and its member agencies.

The purpose of the CCTV data collection and manned entry condition assessments was to:

1. Provide video documentation of the Brine Line focusing on the transition between the T-Lock liner and unlined pipe
2. Assess the concrete behind the T-Lock liner
3. Identify uplifting of the T-Lock liner and assess the concrete at the transition between the T-Lock liner and unlined pipe.

V&A retained Pro-Pipe to perform CCTV inspections. Locations of the CCTV work were determined by Woodard & Curran and SAWPA. No CCTV was performed at siphons. CCTV reports were provided by Pro-Pipe to Woodard & Curran and CCTV findings are not discussed by V&A in this report.

V&A performed a confined space manned entry condition assessment of the pipe at five manholes. The locations of the five manholes were selected by Woodard & Curran and SAWPA. During confined space manned entry of the five access manholes, V&A assessed the concrete behind the T-Lock liner at two locations on the pipe: one near the crown of the pipe and one below the spring line of the pipe. The concrete was exposed by cutting four sides of a rectangle and removing the T-Lock liner. The T-Lock liner was repaired by placing a new PVC sheet over the exposed concrete with adhesive, and then sealing the cut edges using PVC weld strips and a hot air welding gun. V&A also performed feel tests at the termination point between the pipe liner and the concrete surface. V&A felt to determine if the T-Lock liner edge was still embedded. Feel tests were required at most of the locations because the liner – concrete surface interface was located below the typical flow line in the pipe. If the liner termination was unembedded, V&A measured the length of liner that was curling from the termination point towards the pipe crown. V&A also measured the depth of concrete deterioration at the interface with the T-Lock liner. V&A also performed a visual assessment and concrete testing at each access manhole. However, if a liner was present in the manhole, concrete testing was not performed.

The field work performed by V&A occurred on Sunday, May 6, beginning at 3:00 p.m. through Monday, May 7, ending by 6:00 a.m. Figure 1-1 is a map showing the Brine Line alignment and manhole locations.

Figure 1-1. Inland Empire Brine Line Reach 4D Alignment and Manhole Locations[a]

(a) While onsite, SAWPA directed V&A to enter Manhole 4D-0118 and not Manhole 4D-0120 as planned.

2 Approach

V&A used both qualitative and quantitative means to evaluate the condition of pipe segments and access manholes. Approach to pipeline access as well as condition assessment methods and techniques used are described in this section.

2.1 Traffic Control

Permits and traffic control plans were prepared and obtained by SAWPA. Encroachment permits were obtained from Caltrans, City of Chino, and City of Eastvale. V&A retained Roadway Construction Services to provide traffic control at the access manholes.

2.2 Confined Space Entry

A confined space (Photo 2-1) is defined as any space that is large enough and so configured that a person can bodily enter and perform assigned work, has limited or restricted means for entry or exit, and is not designed for continuous employee occupancy. The atmosphere must be continuously monitored for sufficient concentrations of oxygen (19.5% to 23.5%), and the presence of hydrogen sulfide (H_2S) gas, carbon monoxide (CO) gas, and lower explosive limit (LEL) levels. A typical confined space entry crew has members with Occupational Safety and Health Administration (OSHA)-defined responsibilities of Entrant, Attendant, and Supervisor. The Entrant is the individual performing the work. He or she is equipped with the necessary personal protective equipment (PPE) needed to perform the job safely, including a personal four-gas monitor (Photo 2-2). The Attendant is responsible for maintaining contact with the Entrant, monitoring the atmosphere using another four-gas monitor, and maintaining entry records. The Supervisor is responsible for developing the safe work plan for the job at hand prior to entry and overseeing the confined space entry. V&A retained Jamison Engineering Contractors (JEC) for confined space entry support.

Photo 2-1. Example confined space entry setup

Photo 2-2. Typical personal four-gas monitor

2.3 Visual Assessment

Qualitative evaluations of pipe segments and access manholes were conducted from inside the manholes, focusing on the condition of exposed concrete surfaces. Cracks, delamination, corrosion, and other defects referenced in American Concrete Institute (ACI) 201.1R-92, "Guide for Making a Condition Survey of Concrete in Service" were documented with digital, still photographs. Clock positions noted in this report are facing in the downstream direction.

2.4 Pipe Lining Assessment

The pipe segments were constructed with a PVC lining system over the upper 270 degrees of the pipe (Figure 2-1). The PVC lining is embedded in the concrete pipe using T-shaped ribs. This type of system is commonly referred to as T-Lock. V&A determined if the lowermost PVC tee (the liner termination point) was still embedded in the concrete and if the concrete surrounding the tee had eroded, undermining the liner. The depth of concrete deterioration was measured at the liner termination point to evaluate the severity of liner undermining.

V&A also assessed the concrete surface behind the T-Lock liner at two locations for each of the five evaluated pipe segments: one location near the pipe crown and one location below the pipe spring line. The concrete was exposed by cutting out a rectangle, removing the liner, assessing the concrete, and then repairing the liner. Condition assessment of the concrete included visual assessment, sounding, penetration testing, surface pH testing, and surface penetrating radar. V&A retained JEC for T-Lock liner cutting and repair.

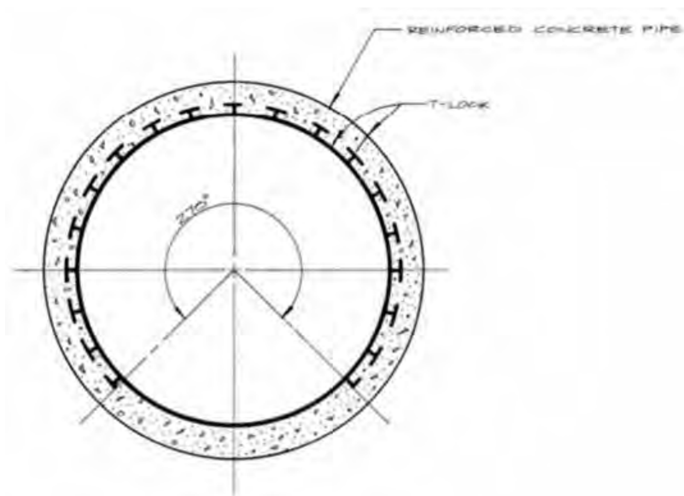


Figure 2-1. Reinforced Concrete Pipe with PVC (T-Lock) Liner
(Willdan Associates, Santa Ana Regional Interceptor Reach IV-D, Contract No. 1 – 3, 1990 Record Drawings)

2.5 Concrete Sounding

Sounding was performed within each evaluated pipe segment (both exposed concrete and behind the lining) to investigate for shallow, subsurface discontinuities. Using a hammer to strike the concrete surfaces, the sound can indicate if defects such as voids, delamination, or honeycombing are present. The sound returned from solid concrete without subsurface discontinuities is a sharp “ping” noise. A “hollow” sound generally means that a discontinuity exists beneath the sounding location. A soft “thud” typically results from deteriorated concrete.

2.6 Concrete Penetration Testing

Concrete surface degradation, if allowed to progress, can lead to deterioration of the concrete reinforcement. Penetration testing was performed on the exposed concrete surfaces and concrete exposed behind the pipe liner within each evaluated pipe segment to measure the depth of concrete degradation. A consistent level of force was applied from a chipping hammer to remove loose material from the concrete surface, until solid, hard material was reached, and then the depth of the resulting cavity was measured. Typically, as concrete deteriorates the cement paste begins to lose integrity and becomes soft when exposed to a corrosive atmosphere. The correlation between penetration measurements and concrete surface hardness is presented in Table 2-1.

Table 2-1 Concrete Surface Hardness Index

Penetration Depth (in.)	Hardness Loss
> 1/4	Significant
1/8 – 1/4	Moderate
1/16 – 1/8	Minor
< 1/16	Negligible

2.7 Concrete Surface pH Testing

Concrete pH is lowered over time by the reaction with particulates in the atmosphere, such as carbon dioxide (CO_2) and hydrogen sulfide (H_2S), with cement hydrates in the concrete. Knowing the surface pH of the concrete can indicate the rate of concrete deterioration due to environment exposure. pH measurements below 7 can indicate aggressive concrete attack. V&A performed in-situ pH measurements on exposed concrete surfaces behind the liner within each evaluated pipe segment.

2.8 Surface Penetrating Radar

Concrete cover depth is important to mitigate corrosion of embedded reinforcing steel. The greater the thickness of concrete cover, the less likely that corrosive constituents have reached the embedded steel. Surface Penetrating Radar (SPR) was used to identify the thickness of concrete cover over reinforcing steel for the interior surfaces of the pipe. Scans also provided information on the type of pipe used for construction based on measured wall thickness and reinforcement placement. Scanning is typically performed over a 3-foot by 3-foot area, and a radar beam scans up to 16 inches into the concrete. The unit generates a 2-dimensional image of the underlying concrete member based on the measured radar reflections. Figure 2-2 shows a sample 2-dimensional image of the SPR scan with distance scanned plotted on the x-axis and the depth scanned plotted on the y-axis.

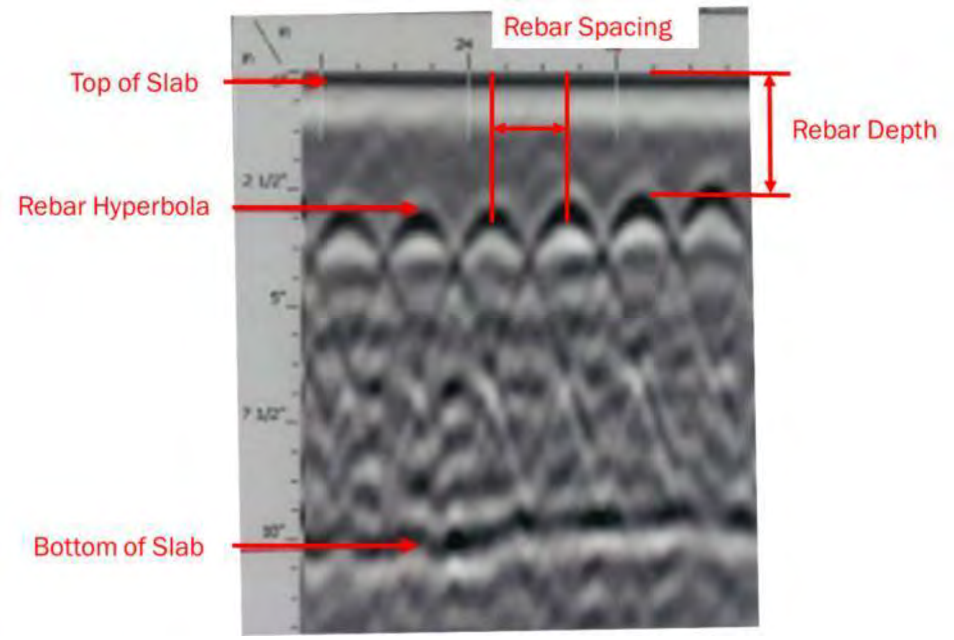


Figure 2-2 Sample Surface Penetrating Radar Scan

Per ASTM C76, "Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe," the minimum wall thickness of 42-inch internal diameter pipe varies between 3.50 and 5.25 inches depending on the pipe class. AWWA C302, "Reinforced Concrete Pressure Pipe, Noncylinder Type" and ASTM C76 recommend a minimum distance between the circumferential reinforcement and the interior surface of the pipe of 1 inch when the wall thickness exceeds 2.5 and 3 inches, respectively. Per AWWA C302, for pipe with a wall thickness of 3 inches or more, the maximum center-to-center spacing for circumferential reinforcement is three fourths of the wall thickness or 4 inches, whichever is smaller. Assumed pipe segment design information used for condition assessment analysis is presented in Table 2-2**Error! Reference source not found.**.

Table 2-2. Assumed 42-inch Reinforced Concrete Pipe Design Information

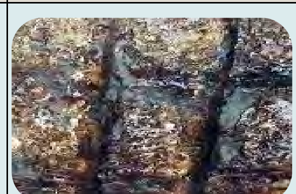
MH	D-Load Design Req. (psi)[a]	Assumed Pipe Class[b]	Assumed Wall Thickness (in.)[b]	Assumed Min. Concrete Cover (in.)[b]	Assumed Min. Circumferential Rebar Spacing (in.)[b]
4D-0020	3,500	V	5.25	1.00	3.94
4D-0118	2,250	IV			
4D-0150	2,800	IV			
4D-0470	1,700	III			
4D-0480	1,700	III			

(a) Per Willdan Associates, Santa Ana Regional Interceptor Reach IV-D, Contract No. 1 – 3, 1990 Record Drawings.
(b) Per ASTM C76, AASHTO M170, and AWWA C302.

2.9 VANDA® Concrete Condition Index

The VANDA Concrete Condition Index was created by V&A to provide consistent reporting of corrosion damage based on qualitative, objective criteria. Condition of corrosion can vary from Level 1 to Level 4 based upon visual observations and field measurements, with Level 1 indicating the best case and Level 4 indicating severe damage. VANDA ratings were applied to evaluated concrete surfaces based on collected field data.

Table 2-3. VANDA Concrete Condition Index

Condition Rating	Description	Representative Photograph
Level 1	None/Minimal Damage to Concrete ▪ Hardness: No Loss ▪ Surface Profile: No Loss ▪ Cracking: Shrinkage Cracks ▪ Spalling: None ▪ Reinforcing Steel (Rebar): Not Exposed or Damaged	
Level 2	Damage to Concrete Mortar ▪ Hardness: Damage to Concrete Mortar ▪ Surface Profile: Some Loss ▪ Cracking: Thumbnail Sized Cracks of Minimal Frequency ▪ Spalling: Shallow Spalling of Minimal Frequency, Related Rebar Damage ▪ Reinforcing Steel (Rebar): May Be Exposed but Not Damaged	
Level 3	Loss of Concrete Mortar/Damage to Rebar ▪ Hardness: Complete Loss ▪ Surface Profile: Large Diameter Exposed Aggregate ▪ Cracking: ¼-inch to ½-inch Cracks, Moderate Frequency ▪ Spalling: Deep Spalling of Moderate Frequency, Related Rebar Damage ▪ Reinforcing Steel (Rebar): Exposed and Damaged, Can Be Rehabilitated	
Level 4	Rebar Severely Corroded/Significant Damage to Structure ▪ Hardness: Complete Loss ▪ Surface Profile: Large Diameter Exposed Aggregate ▪ Cracking: ½-inch Cracks or Greater, High Frequency ▪ Spalling: Deep Spalling at High Frequency, Related Rebar Damage ▪ Reinforcing Steel (Rebar): Damaged or Consumed, Loss of Structural Integrity	

3 Findings: Pipe Segments

The field observations and testing results for the evaluated pipe segments were reviewed for correlations with respect to separation distance, geometry, and hydraulic conditions. There are various factors that were considered to investigate the root cause and patterns of deterioration for the evaluated pipe segments, which are discussed in this section.

3.1 Visual Assessment

Visual assessment findings are summarized in Table 3-1. Representative photos of observation types are shown in Photo 3-1 through Photo 3-4. Complete observations and field data for each evaluated pipe segment and manhole are presented in Appendix A.

The evaluated worst-case condition of the pipeline was at Manholes 4D-0150 and 4D-0470. Except within Manhole 4D-0480, the evaluated pipe segments had liner blisters and undermined liner terminations. Based on V&A's and T-Lock liner manufacturer experience, liner blisters are a typical age-based feature that do not compromise the liner or pipe segment service life if the blisters are not ripped open, exposing concrete surfaces to corrosion constituents, and if the liner tees are still embedded. The uplifted liner termination may lead to further concrete deterioration. The assessed portions of the pipeline are located far away from each other (some accessed manholes are miles apart), yet similar defects and extent of deterioration were documented indicating the unevaluated pipe segments of Reach 4D may be in a similar condition.

Large rocks and debris were accumulated at Manhole 4D-0118 and 4D-0150 which may be caused by a low spot in the pipe or local hydraulic conditions. This is discussed further in Section 3.2.

A slime layer was observed at all accessed manholes, yet the cause of the slime layer was unknown. V&A collected and delivered slime samples to SAWPA for testing. Sample testing results for the slime layer are not discussed in this report.

Table 3-1. Visual Assessment Summary – Pipe Segments

	Liner				Concrete		General	
MH[(a)]	Blisters / Bulges	Failed Weld Strips	Termination Undermined	Termination Unembedded	Exposed Aggregate	Exposed Rebar	Slime Layer	Debris
4D-0020	X	X	X				X	
4D-0118	X	X	X		X		X	X
4D-0150	X		X	X	X		X	X
4D-0470	X		X	X	X	X	X	
4D-0480							X	

(a) While onsite, SAWPA directed V&A to enter Manhole 4D-0118 and not Manhole 4D-0120 as planned.

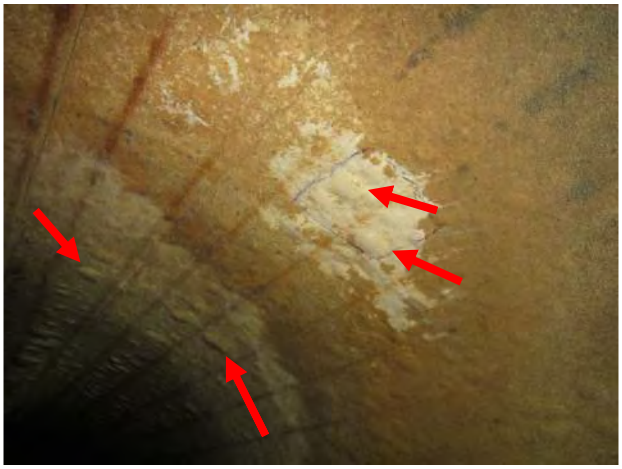


Photo 3-1. Typical lining blisters (indicated by red arrows).

Photo 3-2. Typical slime layer.

Photo 3-3. Typical undermined and unembedded liner termination. Typical exposed concrete aggregate.

Photo 3-4. Exposed reinforcing steel only seen at Manhole 4D-0470 (circled in red).

3.2 Hydraulic Conditions

The hydraulic conditions in the pipeline were evaluated by reviewing available record drawings and field observations to investigate if this was a potential cause of deterioration. This evaluation was performed to solely assess the physical condition of the pipe, not capacity or other hydraulic aspects. Hydraulic observations at the accessed manholes during the shutdown may differ from typical conditions. A summary is presented in Table 3-2.

There was a slime layer within the evaluated pipe segments that indicated the typical water level. The water level appeared to be typically above the liner termination for the evaluated pipe segments. The exception was the influent pipe segment at Manhole 4D-0150 due to the steep slope. There was no slime layer present, so it was unknown if the flow level is typically below the liner termination. There was significant scouring within this pipe segment, so further investigation may be warranted.

As mentioned in Section 3.1, there was debris in the channel at Manhole 4D-0118 and 4D-0150. Both manholes had a change in slope between the influent and effluent pipes, while the other three manholes had a constant slope for the influent and effluent pipes. The difference in slope may be the cause of the debris accumulation.

It was unknown if lateral flow is significantly affecting pipe hydraulics and condition.

Table 3-2. Condition Summary – Pipe Segment Hydraulics

MH	Main Pipe Configuration[a,b]	Effluent Slope[b]	Influent Slope[b]	Debris©	Typ. Water Level©	No. of Laterals©
4D-0020	45° bend	0.0010	0.0010	None	Above liner termination for both main pipes.	1 – unknown if in use
4D-0118	Straight through	0.0010	0.0024	Large rocks / debris	Above liner termination for both main pipes.	1 – outside drop; unknown if in use
4D-0150	Straight through	0.0010	0.0600[d]	Large rocks / debris	Above liner termination for effluent pipe. Unknown for influent pipe.	2 – one capped and one active during assessment
4D-0470	Straight through	0.0036	0.0036	None	Above liner termination for both main pipes.	1 – capped
4D-0480	45° bend	0.0036	0.0036	None	Above liner termination for both main pipes.	2 – not capped, yet unknown if in use

(a) Plan view notes. No significant vertical drops or bends at manholes.
(b) Per Willdan Associates, Santa Ana Regional Interceptor Reach IV-D, Contract No. 1 – 3, 1990 Record Drawings.
(c) Per field observations.
(d) Pipe segment with steep slope connects to manhole pipe segment (location of change in slope) is approximately 10 feet from manhole.

Photo 3-5. Typical water level indicated by slime layer (red dashed line).

Photo 3-6. Steep slope for Manhole 4D-0150 influent pipe. Apparent typical water level indicated by red

dashed line.

3.3 Lining Assessment and Concrete Testing

Per methods discussed in Section 2.4, V&A evaluated the liner termination point for the T-Lock liner within the pipe segments connected to each accessed manhole. Assessment results are summarized in Table 3-3 and are presented in Appendix A for each pipe at each accessed manhole. Except for Manhole 4D-0480, results indicated the concrete surface has moderately deteriorated at the liner termination. Moderate deterioration means the concrete had exposed aggregate, limited or no cover over reinforcement, and that the last tee of the PVC liner may be almost or is already loose. Based on visual observations and performed testing, the worst-case condition of the concrete reinforcement appeared to be only minor damage. Condition assessment results indicated the liner termination may be almost or is already unembedded for the remainder of the Reach 4D pipeline.

Table 3-3. Condition Summary – Pipe Liner Termination Point

MH	Liner		Concrete	
	Termination Condition	Uplifted Liner Length (in.)[(a)]	Deterioration Depth (in.)	VANDA Rating
4D-0020	Embedded, yet undermined.	n/a	½	2
4D-0118	Embedded, yet undermined.	n/a	3/8	2
4D-0150	Uplifted and undermined.	1	½ – 1	3
4D-0470	Uplifted and undermined.	2	½ – 1	3
4D-0480	Embedded, yet undermined.	n/a	0	1

(a) Uplifted liner length measured from lower termination of 270-degree pipe liner towards 3:00 or 9:00 position.

V&A evaluated the concrete surfaces beneath the cut liner using visual assessment, sounding to investigate for shallow subsurface discontinuities, pH measurements to evaluate environment corrosivity, and penetration depth measurements to evaluate surface hardness. In-situ concrete surface testing results are summarized in Table 3-4 and are presented in Appendix A for each accessed manhole. Based on the surface evaluation results, the concrete surfaces are rated VANDA 1 to 2. Results indicated the currently lined concrete appeared to be well protected from the corrosive environment and in good condition for the Reach 4D.

Table 3-4. Condition Summary – Concrete Behind Pipe Liner

MH	Pipe	Surface Condition	Sounding	Surface pH	Penetration Depth (in.)	VANDA Rating
4D-0020	Influent	Hard	Solid	12	1/16	1
4D-0118	Influent	Hard	Solid	12	< 1/16	1
4D-0150	Influent	Hard	Solid	12	< 1/16	1
4D-0470	Influent	Hard	Solid	11 – 12	1/16 – 1/8	2
4D-0480	Effluent	Hard	Solid	12	< 1/16	1

V&A performed SPR scans on the pipe segments chosen to cut the liner and perform in-situ concrete testing. The SPR results for the pipe segments are summarized in Table 3-5. The following four items were indicated by the scans:

1. Concrete cover appeared to be thicker than the minimum 1-inch requirement discussed in Section 2.8.

2. Center-to-center spacing for the circumferential reinforcement appeared to be less than the maximum requirement discussed in Section 2.8.

3. The pipe appeared to be manufactured with one mat of circumferential (C) and longitudinal (L) reinforcing bars.

4. The concrete walls appeared to be approximately 6-inches thick.

Table 3-5. Surface Penetrating Radar Summary – Pipe Segments

MH	Location	Bar Dir.(a)	Rebar Depth Max. (in.)	Rebar Depth Avg. (in.)	Rebar Depth Min. (in.)	Rebar Space Max. (in.)	Rebar Space Avg. (in.)	Rebar Space Min. (in.)
4D-0020	Influent Pipe 8:00 - 12:00	C	2.31	1.81	1.46	3.10	2.71	2.40
4D-0020	Influent Pipe 8:00 - 12:00	L	2.31	1.82	1.31	11.85	4.09	1.95
4D-0118	Influent Pipe 9:00 - 12:00	C	3.26	2.40	1.76	12.90	2.63	1.80
4D-0118	Influent Pipe 9:00 - 12:00	L	3.26	2.32	1.60	6.30	5.39	4.55
4D-0150	Influent Pipe 8:00 - 12:00	C	4.58	3.09	1.69	3.85	2.30	1.50
4D-0150	Influent Pipe 8:00 - 12:00	L	3.60	2.46	1.62	21.90	8.17	3.85
4D-0470	Influent Pipe 9:00 - 12:00	C	4.19	2.95	1.60	3.30	2.40	1.10
4D-0470	Influent Pipe 9:00 - 12:00	L	4.43	2.97	1.76	13.30	8.03	4.10
4D-0480	Effluent Pipe 8:00 – 12:00	C	3.75	2.60	1.08	3.45	2.44	1.20
4D-480	Effluent Pipe 8:00 – 12:00	L	3.07	2.28	1.54	23.05	14.88	10.15

(a) C = Circumferential, L = Longitudinal

4 Findings: Manholes

The field observations and testing results for the evaluated manholes were reviewed for correlations with respect to separation distance, geometry, and hydraulic conditions. There are various factors that were considered to investigate the root cause and patterns of deterioration for the evaluated manholes, which are discussed in this section.

4.1 Visual Assessment

Visual assessment findings are summarized in Table 4-1. Representative observations are shown in Photo 4-1 through Photo 4-4. Complete observations are presented in Appendix A.

The evaluated worst-case condition of the access manholes was at Manholes 4D-0118 and 4D-0470, which was minor damage. Visual assessment results indicated the lined manhole surfaces for Reach 4D were in good condition. The unlined channel for the accessed manholes were in poor condition, which indicated unevaluated manholes for Reach 4D may be in a similar condition.

Table 4-1. Visual Assessment Summary - Manholes

MH[a]	Rim	Cone	Walls	Bench	Main Pipe Connection	Lateral Penetrations	Channel
4D-0020	Moderate corrosion	Liner in good condition	Liner in good condition	Liner unembedded, yet covering concrete	Good condition	Good condition	Slime layer. Exposed concrete aggregate.
4D-0118	Liner termination loose	Failed liner weld strips	Liner in good condition	Liner unembedded, yet covering concrete	Good condition	Encrustation	Slime layer. Exposed concrete aggregate.
4D-0150	Good condition	Liner in good condition	Minor liner blisters	Liner unembedded, yet covering concrete	Good condition	Good condition	Slime layer. Exposed concrete aggregate.
4D-0470	Good condition	Minor hole in liner	Liner blisters and bulges	Liner unembedded, yet covering concrete	Good condition	Cuts in liner due to CCTV crawler camera cable	Slime layer. Exposed rebar.
4D-0480	Good condition	Liner in good condition	Liner in good condition	Liner in good condition	Good condition	Good condition	Channel lined and in good condition

(a) While onsite, SAWPA directed V&A to enter Manhole 4D-0118 and not Manhole 4D-0120 as planned.

Photo 4-1. Typical failed liner weld strip.

Photo 4-2. Typical slime layer and encrustation.

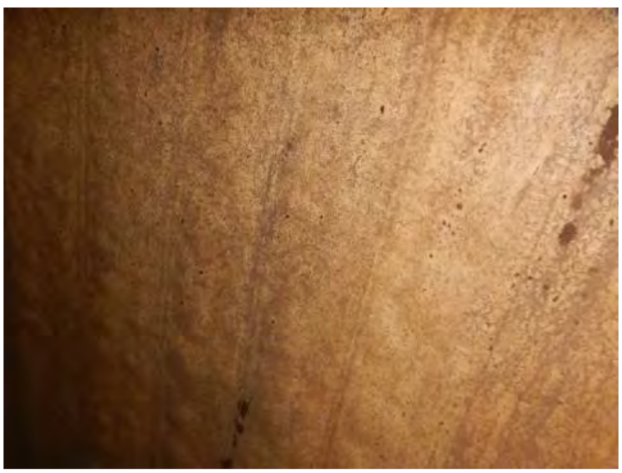


Photo 4-3. Typical liner blisters.

Photo 4-4. Typical loose liner termination.

The manhole channels appeared to have been constructed as indicated in the available record drawings. A pipe segment was cut and tied into the manhole structure, and the concrete surfaces were lined with a PVC lining system (Figure 4-1). The liner terminations at installed laterals and at the opening of the cut RCP were in good condition at the assessed manholes (Photo 4-5 and Photo 4-6). However, for the majority of the assessed manholes the liner termination within the channel has failed or is undermined (Photo 4-7 and Photo 4-8).

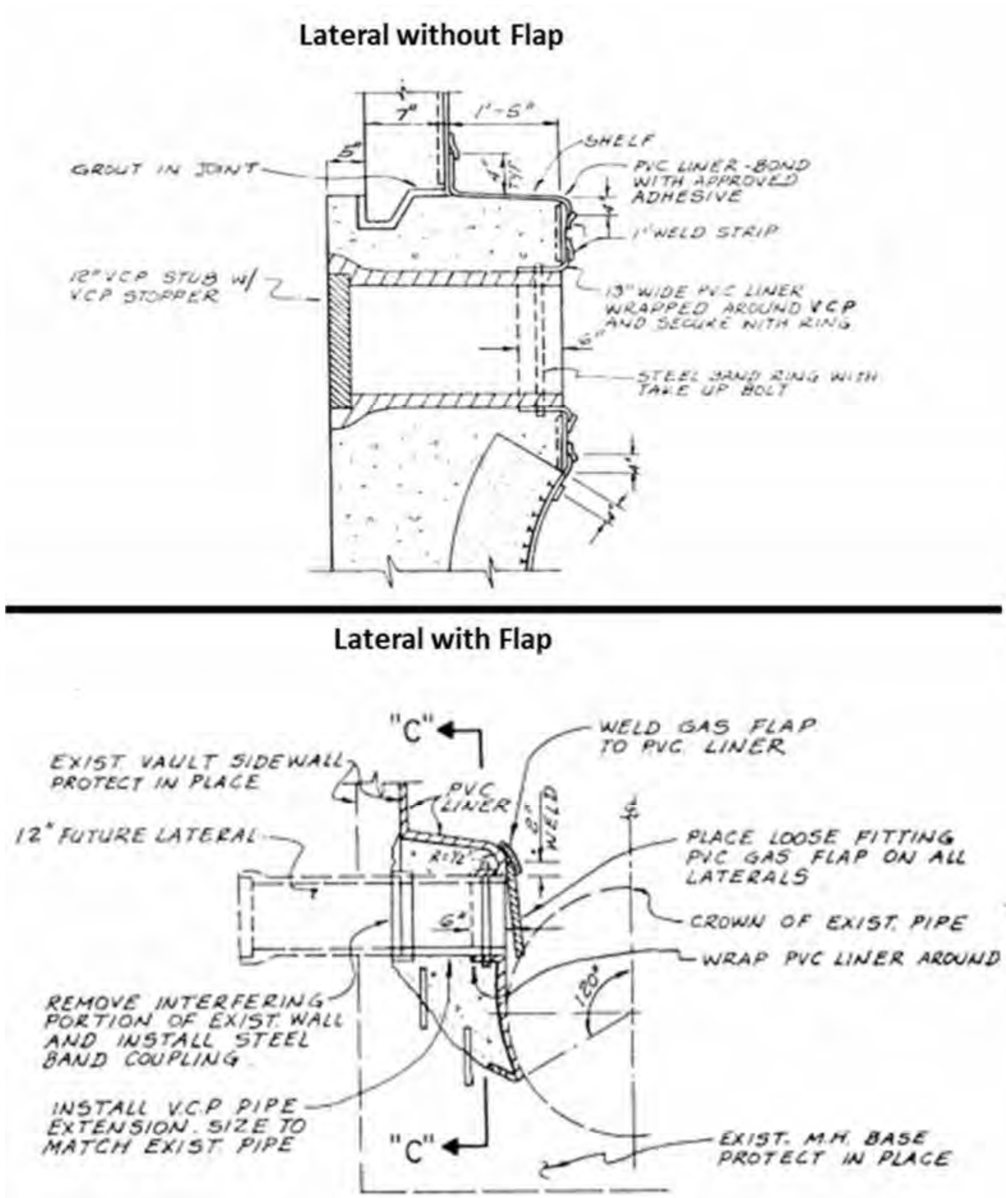


Figure 4-1. PVC Liner Termination Design for Lateral Penetrations
(Willdan Associates, Santa Ana Regional Interceptor Reach IV-D, Contract No. 1 – 3, 1990 Record Drawings)

Photo 4-5. Typical main pipe connection in good condition.

Photo 4-6. Typical lateral penetration in good condition.

Photo 4-7. Typical undermined liner termination and exposed aggregate.

Photo 4-8. Exposed reinforcing steel only seen at MH 4D-0470.

4.2 Concrete Testing

The accessed manholes were T-Lock lined and the liner was in good condition, therefore penetration and pH testing could not be performed. Sounding within the manholes did not indicate shallow, subsurface discontinuities.

V&A performed SPR scans within the accessed manholes with results summarized in Table 4-2. Scan results indicated concrete reinforcement has sufficient cover for protection from the corrosive brine line environment. Scans indicated one mat of longitudinal (L) and circumferential (C) reinforcing bars were embedded in the concrete. Scans indicated concrete walls were approximately 8-inches thick.

Scans indicated an anomaly at Manhole 4D-0150 for the south wall above the bench (Figure 4-2). Record drawings indicated there are other utility lines nearby this manhole, yet based on the depth of the scan location (approximately 20 feet below grade) this seemed unlikely to be a pipeline. Actual conditions are unknown. The anomaly appeared to be outside of the manhole wall, and the manhole wall appeared to be uncompromised, therefore, the anomaly does not appear to be a current concern.

Table 4-2. Surface Penetrating Radar Summary – Manholes

MH	Location	Bar Dir.[a]	Rebar Depth Max. (in.)	Rebar Depth Avg. (in.)	Rebar Depth Min. (in.)	Rebar Space Max. (in.)	Rebar Space Avg. (in.)	Rebar Space Min. (in.)
4D-0020	East Wall Above Bench	L	6.00	5.59	5.10	39.90	39.35	38.80
4D-0020	East Wall Above Bench	C	4.95	4.37	3.75	9.10	5.02	3.30
4D-0150	South Wall Above Bench	L	6.59	5.85	4.13	36.90	36.88	36.85
4D-0150	South Wall Above Bench	C	6.81	5.42	2.62	9.75	5.46	2.70
4D-0480	North Wall Above Bench	L	6.22	4.09	2.84	7.30	6.23	3.85
4D-0480	North Wall Above Bench	C	6.44	4.04	3.22	37.20	27.93	0.00

(a) C = Circumferential, L = Longitudinal

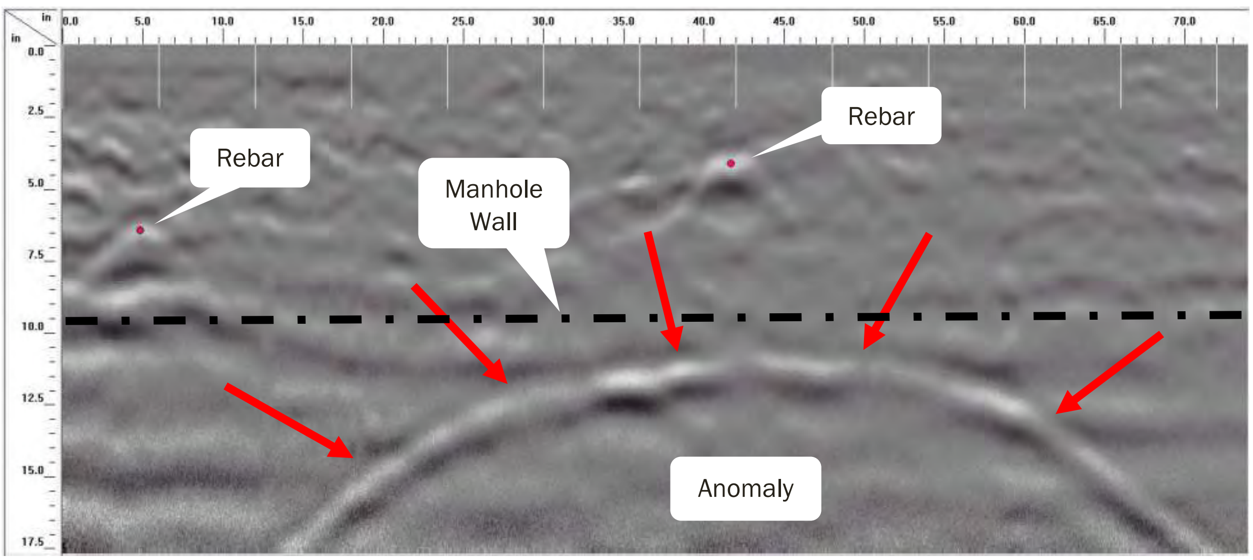


Figure 4-2 Surface Penetrating Radar Scan – Anomaly at Manhole 4D-0150 (indicated with red arrows)[a]

(a) Note that units are presented in the figure for reference and do not represent precise depths or distances.

5 Conclusions and Recommendations

Based on the condition assessment results, V&A presents the following conclusions and recommendations for the pipeline and manholes. Recommendations are only intended for the evaluated manholes and pipe segments. V&A assumed condition ratings and recommendations provided in this report would be used by others in conjunction with the CCTV video to extrapolate condition ratings to other portions of the pipeline and develop overall recommendations.

5.1 Remaining Service Life Estimates

V&A presents remaining service life estimates in Table 5-1 for the manholes and pipe segments that V&A entered and evaluated. The manhole is considered the portion of the structure above the tied in pipe segment, as shown in Figure 5-1. Service life is defined as the expected length of time an asset is projected to last based on current conditions with the assumption that conditions will stay the same over time. If repairs or rehabilitation are implemented, this can extend the useful life, or the expected length of time an asset is projected to last based on current conditions with management to control known conditions to prolong the service life. Service life considered the factors noted in the table: lining condition, concrete condition (both lined and unlined), and hydraulic (water level) condition.

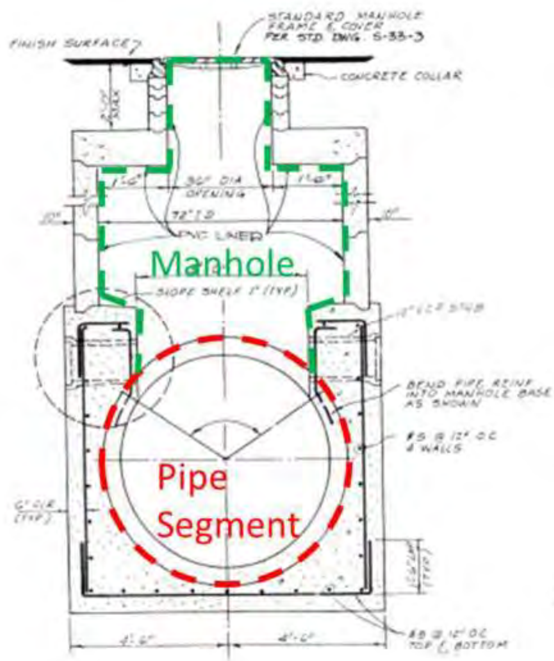


Figure 5-1. Standard Manhole Detail – Section View
(Willdan Associates, Santa Ana Regional Interceptor Reach IV-D, Contract No. 1 – 3, 1990 Record Drawings)

Table 5-1. Remaining Service Life Estimates for V&A Evaluated Structures

	Manhole Structure	Influent Pipe	Effluent Pipe
Manhole 4D-0020			
Lining Condition[(a)]	Good condition	Termination point undermined	Termination point undermined
Concrete Condition[(b)]	Lined (VANDA 1)	Lined (VANDA 1) Channel (VANDA 2)	Lined (VANDA 1) Channel (VANDA 2)
Typical Water Level[(c)]	Above liner termination	Above liner termination	Above liner termination
Remaining Service Life Estimate[(d)]	30+	15 – 20	15 – 20
Manhole 4D-0118			
Lining Condition[(a)]	Good condition	Termination point undermined	Termination point undermined
Concrete Condition[(b)]	Lined (VANDA 1)	Lined (VANDA 1) Channel (VANDA 2)	Lined (VANDA 1) Channel (VANDA 2)
Typical Water Level[(c)]	Above liner termination	Above liner termination	Above liner termination
Remaining Service Life Estimate[(d)]	20 – 30	15 – 20	15 – 20
Manhole 4D-0150			
Lining Condition[(a)]	Good condition	Termination point uplifting	Termination point uplifting
Concrete Condition[(b)]	Lined (VANDA 1)	Lined (VANDA 1) Channel (VANDA 3)	Lined (VANDA 1) Channel (VANDA 3)
Typical Water Level[(c)]	Above liner termination	Below liner termination	Above liner termination
Remaining Service Life Estimate[(d)]	30+	5 – 10	15 – 20
Manhole 4D-0470			
Lining Condition[(a)]	Minor damage	Termination point uplifting	Termination point uplifting
Concrete Condition[(b)]	Lined (VANDA 1)	Lined (VANDA 1) Channel (VANDA 3)	Lined (VANDA 2) Channel (VANDA 3)
Typical Water Level[(c)]	Above liner termination	Above liner termination	Above liner termination
Remaining Service Life Estimate[(d)]	20 – 30	5 – 10	5 – 10
Manhole 4D-0480			
Lining Condition[(a)]	Good condition	Good condition	Good condition
Concrete Condition[(b)]	Lined (VANDA 1)	Lined (VANDA 1) Channel (VANDA 1)	Lined (VANDA 1) Channel (VANDA 1)
Typical Water Level[(c)]	Above liner termination	Above liner termination	Above liner termination
Remaining Service Life Estimate[(d)]	30+	30+	30+

(a) Only significant defects that would compromise liner function noted.
(b) Condition noted for lined and unlined concrete surfaces.
(c) Only used to evaluate physical condition, not hydraulic condition.
(d) Based on physical condition. Operation, level of service, and economic failure modes may affect results.

5.2 Reach 4D Pipe Segments

The condition assessment indicated the 270-degree liner termination was undermined and unembedded, and the unlined concrete invert was moderately deteriorated. The concrete surfaces still lined, however, were in good condition, despite minor unopened blisters. It is recommended that close attention is paid to CCTV footage for similar observations in the unentered pipe segments. V&A recommends performing the following two actions:

a. Maintaining the flow inside the pipe so that the lower termination edge is continuously immersed and not exposed to the headspace in the pipe.

b. Repair and line the exposed concrete invert to extend the useful life of the pipeline. Lining considerations are discussed in Section 5.4.

5.3 Reach 4D Manholes

The condition assessment indicated the manholes were still lined and in good condition. It is recommended that close attention is paid to CCTV footage for similar observations in the unentered manholes. V&A recommends minor liner spot repairs to seal holes and repair weld strips. Lining considerations are discussed in Section 5.4.

5.4 Lining Considerations

A successful lining project depends on selecting products that fit the field conditions. A few options for rehabilitating the Reach 4D pipe segments and manholes are presented in this section.

5.4.1 Flow Bypass

The candidate concrete lining systems will require the pipeline to be isolated and dewatered to allow surfaces to be prepared and coated in a dry environment. Flow will need to be diverted out of the pipeline using bypass pumps and piping. Flow bypass will not be needed for minor spot repairs in the manholes.

5.4.2 Cured-in-Place Pipe

Cured-in-place pipe (CIPP) is a common trenchless pipeline renewal method. The CIPP method involves a liquid thermostat resin-saturated material that is inserted into the host pipeline and then inflated. Several advantages and limitations of CIPP are listed below. Typically, CIPP design is intended to extend useful life by 50 years.

Advantages

- Jointless system creating a smooth interior surface, which may improve flow capacity of the host pipe.
- Only slight decrease in internal diameter.

Limitations

- Laterals would have to be restored after host pipe is restored.
- Maximum pipe bend able to be accommodated is 45 degrees.
- Excavation may be required for host pipe access.
- Defects in the host pipe may cause defects in the CIPP, such as obstructions and protrusions.

5.4.3 Slip Lining (HDPE or Fusible PVC)

Slip lining is one of the earliest forms of trenchless pipe renewal. The slip lining method involves accessing the pipeline at strategic locations within the system and inserting fused HDPE or PVC pipe sections joined into a continuous pipe. Several advantages and limitations of slip lining are listed below. The slip line design life depends on the pipe material used. Typically, PVC or HDPE pipe have a design life of 50 years.

Advantages

- Long, maintenance-free service life.
- Pipe material is rugged and durable.
- Hydraulic conditions remain virtually unchanged with time.
- Compared to open trench construction, excavation is limited to sending/receiving pits and making connections to appurtenances.
- Bottle-tight joints result in reduced risk of infiltration and exfiltration.
- Smooth constant outside diameter results in lower forces required to insert pipe into deteriorated pipelines.
- Minimum confined space entries will be required.

Limitations

- Laterals would have to be restored after host pipe is restored.
- Sending and receiving pits will be long and deep due to the pipe diameter.
- Construction staging and laydown areas will be required to accommodate storage of the pipe prior to inserting into the host pipe.
- Potential reduction in the flow capacity of the host pipe.

5.4.4 Spray-Applied Polyurethane Coating

Another option to rehabilitate the unlined channel is to clean and resurface the substrate and then install a spray-applied polyurethane coating. Depending on the length of pipe to rehabilitate, this approach may be very expensive and time consuming to implement. Typically, spray-applied polyurethane coating systems have a design life of 25 years.

The coating application would include:

- Establish how much of the T-Lock within the pipe needs to be removed.
- Resurface the concrete with a repair mortar, such as Tnemec MortarCrete Series 217 or approved equal, to cover any exposed aggregate or exposed reinforcing steel. The existing concrete should be prepared per Society of Protective Coatings (SSPC) WJ-4 high pressure water jetting at 5,000 psi to remove loose debris, followed by SSPC SP13 abrasive blasting to remove contaminated concrete and provide concrete surfaces with a surface profile of CSP 5 per International Concrete Repair Institute (ICRI) 310.2. Depending on reinforcing steel bar cross-sectional loss, the steel bar may need to be replaced or coated with a corrosion inhibitor.
- Recoat the repaired areas with a 6-inch overlap over the sound T-Lock with 125 mils of Warren Environmental Polyurethane or approved equal.

5.4.5 Arrow-Lock PVC Lining

Arrow-Lock may be used for manhole spot repairs. Using Arrow-Lock to repair the 270-degree pipe liner termination point may be very expensive and time consuming to implement depending on the length of pipe to rehabilitate. Arrow-Lock has a design life of 50 years.

Arrow-Lock PVC liners function the same way as T-Lock; however, Arrow-Lock is primarily used as a rehabilitation product and not for new construction. Unlike T-Lock, Arrow-Lock can be applied on vertical or horizontal concrete surfaces that have already been cured. The installation requires a six-step process:

1. Remove damaged T-Lock.
2. Clean and abrade concrete surface.
3. Spray application of a waterborne epoxy primer.
4. Trowel application of an epoxy mastic.
5. Embedment of the Arrow-Lock sheet into the epoxy mastic before it is cured.
6. Weld joint strips over seams.

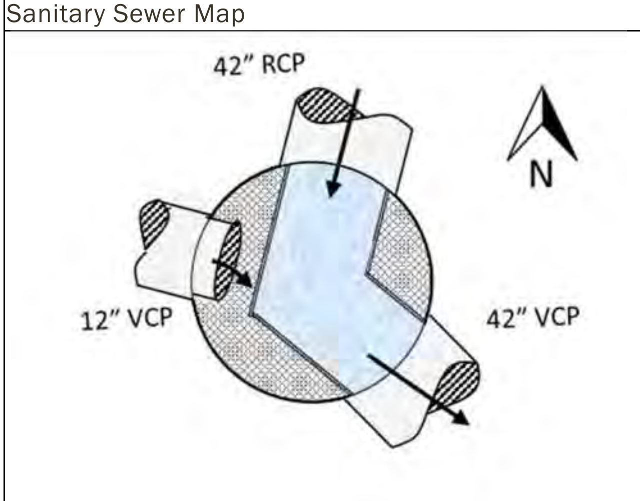
Appendix A: Field Reports

MH 4D-0020

Manhole:	4D-0020	**Overall Condition:**
Location:	Pomona Rincon Road and Euclid Avenue	**Manhole:** T-Lock liner in good condition. Liner terminations at pipe connections, pipe penetrations, and at the manhole rim were in good condition. Moderate surface corrosion on manhole rim. **Pipe Segments**: 270-degree T-Lock liner had minor blisters. Liner termination was embedded, yet undermined. Concrete exposed for testing was in good condition.
Date:	5/6/2018	
Time:	3:30 p.m. – 7:30 p.m.	
Engineers:	Clinton McAdams, Mike Sherman	
Flow Level:	12 inches	

Sanitary Sewer Map

Topside View



Flow Diagram (Not to Scale)

Plan View

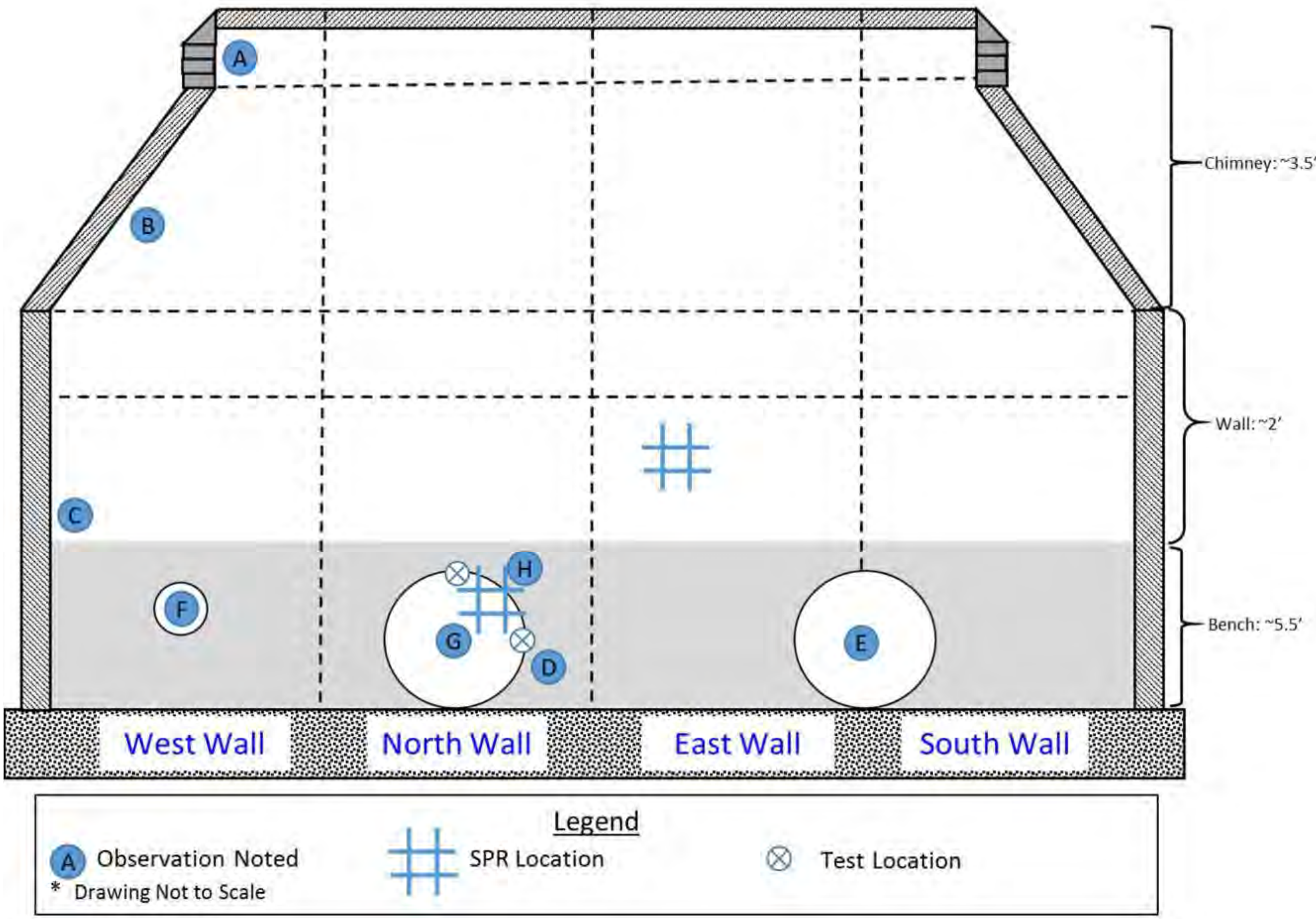
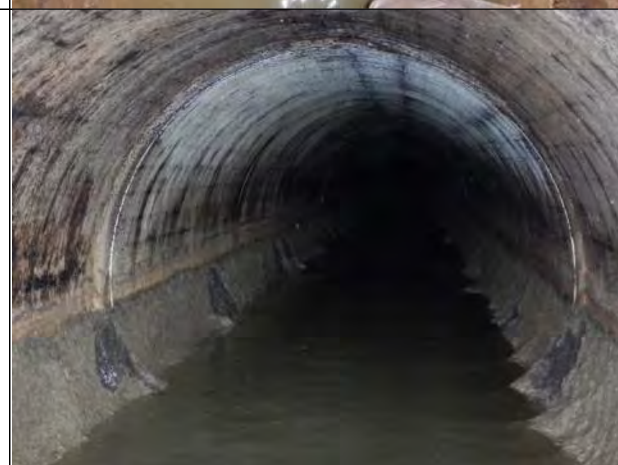
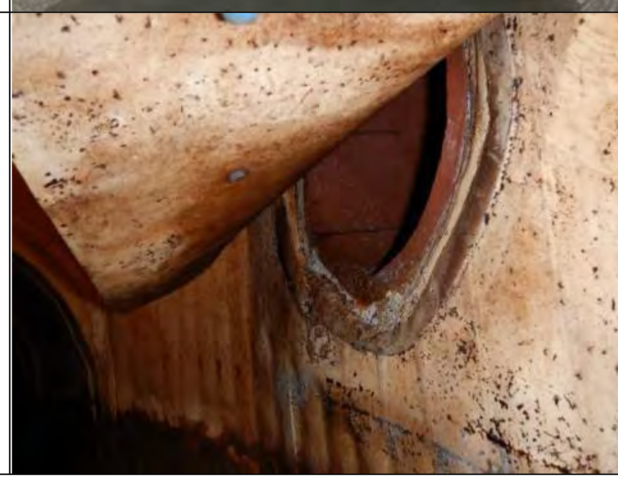


Figure A-2. Observations Diagram – Manhole 4D-0020

	Observations:	
A	Rim had moderate corrosion (exfoliation). Liner termination was in good condition.	
B	Chimney liner was in good condition.	
C	Liner was not embedded in bench, yet still covered concrete surface.	

D	Slime layer appeared to be up to the typical waterline.	
E	Effluent pipe liner had minor blisters.	
F	Lateral with gas flap. Liner termination at pipe penetration was in good condition, yet had minor encrustation. Flap appeared to be attached and operable.	

G	Influent pipe liner had minor blisters.	
H	Liner at pipe connections in good condition.	

Table A-2. Pipe Liner Termination Testing Results – Manhole 4D-0020

Location	Liner Condition	Concrete Deterioration Depth (in.)	VANDA Concrete Rating
Influent Pipe	Embedded, yet undermined.	1/2	2
Effluent Pipe	Embedded, yet undermined.	1/2	2

No Photo Available (underwater)	No Photo Available (underwater)
Influent pipe liner termination	Effluent pipe liner termination

Table A-3. Exposed Concrete Testing Results – Manhole 4D-0020 Influent Pipe Liner Cut

Location	Surface Condition	Sounding	Surface pH	Penetration Depth (in.)	VANDA Rating
Crown (12:00)	Hard	Solid	12	1/16	1
Spring line (3:00)	Hard	Solid	12	1/16	1

Influent pipe liner cut at crown (12:00)

Influent pipe liner cut at spring line (9:00)

Liner repair at crown (12:00)

Liner repair at spring line (9:00)

Table A-4. Surface Penetrating Radar Scan Results – Manhole 4D-0020

Location	File ID	Bar Dir.	Rebar Depth Max. (in.)	Rebar Depth Avg. (in.)	Rebar Depth Min. (in.)	Rebar Space Max. (in.)	Rebar Space Avg. (in.)	Rebar Space Min. (in.)
Influent Pipe 8:00 - 12:00	002	C	1.85	1.68	1.46	3.10	2.70	2.40
Influent Pipe 8:00 - 12:00	003	C	2.31	1.94	1.62	2.90	2.73	2.45
Influent Pipe 8:00 - 12:00	004	L	2.08	1.89	1.77	11.85	4.70	1.95
Influent Pipe 8:00 - 12:00	005	L	2.31	1.74	1.31	10.50	3.47	2.05
East Wall Above Bench	006	V	5.85	5.63	5.40	39.90	39.90	39.90
East Wall Above Bench	007	V	6.00	5.55	5.10	38.80	38.80	38.80
East Wall Above Bench	008	C	4.73	4.15	3.75	9.10	6.07	3.40
East Wall Above Bench	009	C	4.95	4.59	4.13	4.90	3.98	3.30

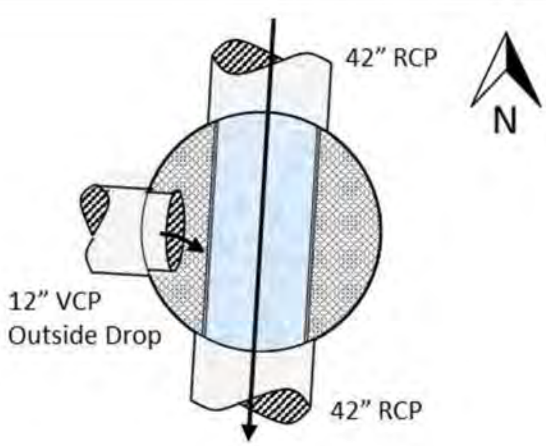
(a) C = Circumferential, L = Longitudinal

MH 4D-0118

Manhole:	4D-0118	**Overall Condition:**
Location:	Euclid Avenue and Pine Street	**While onsite, SAWPA directed to enter Manhole 4D-0118 and not Manhole 4D-0120.** **Manhole:** Loose weld strips at cone and effluent pipe connection. Liner termination loose at the manhole rim. Encrustation within outside drop lateral and on liner. **Pipe Segments:** 270-degree T-Lock liner had minor blisters. Liner termination was embedded, yet undermined. Concrete exposed for testing was in good condition.
Date:	5/6/2018	
Time:	4:30 pm – 8:30 pm	
Engineers:	Michael Johannessen, Jenna Mariano	
Flow Level:	12 inches	

Sanitary Sewer Map

Topside View



Flow Diagram (Not to Scale)

Plan View

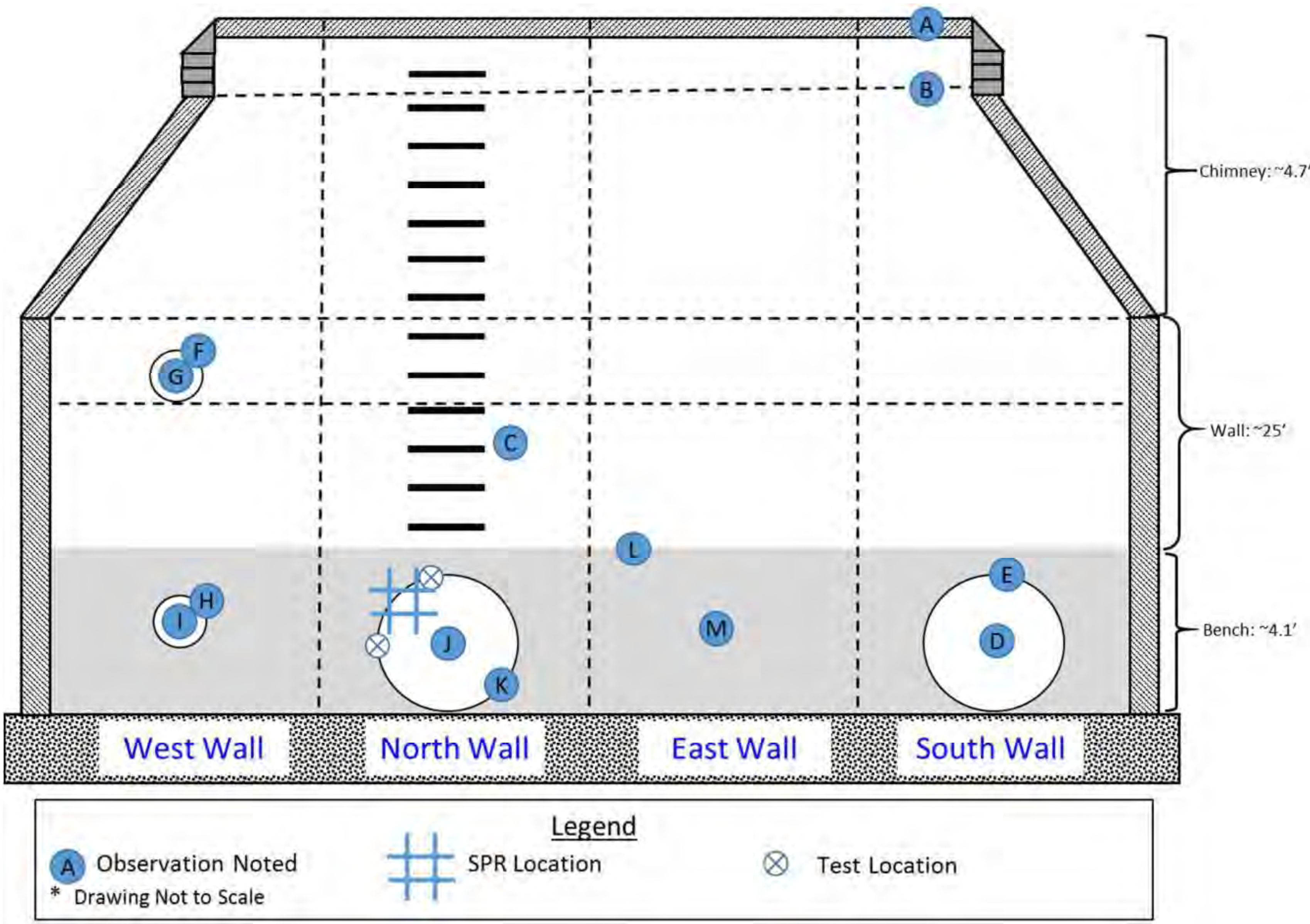
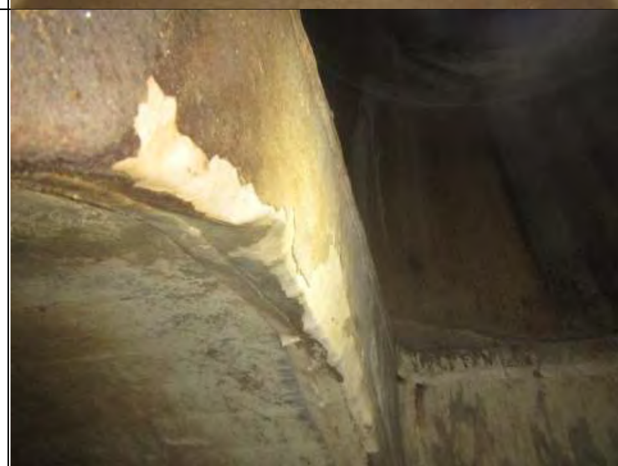
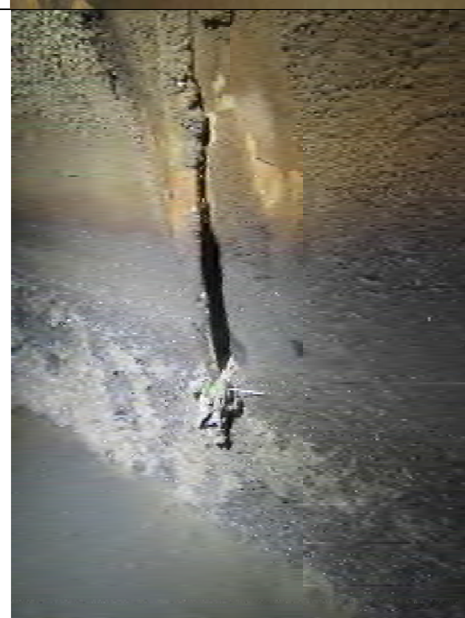
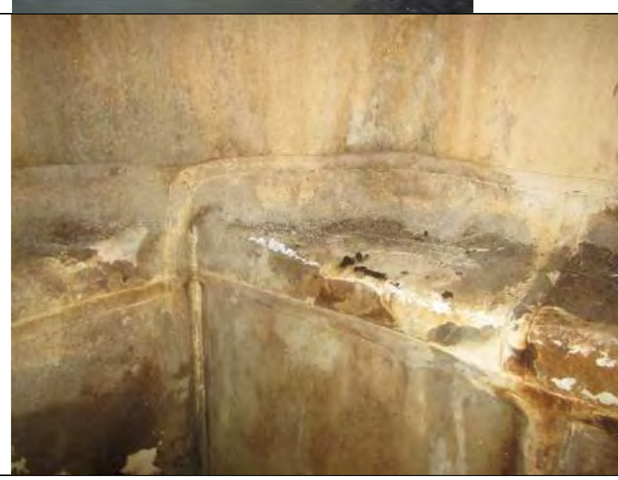


Figure A-3. Observations Diagram – Manhole 4D-0118

	Observations:	
A	Liner termination loose at rim. Minor surface corrosion on rim.	
B	Liner weld strips loose at cone.	
C	Rung penetrations in good condition.	

D	Minor liner blisters on effluent pipe. Slime layer appeared to be up to the typical waterline.	
E	Loose weld strips at effluent pipe connection.	
F	Top opening for outside drop inlet. Liner termination in good condition.	

G	Inside top opening of outside drop inlet. Mineral encrustation inside vitrified clay pipe.	
H	Mineral encrustation at bottom opening of outside drop inlet. Liner termination appeared to be in good condition.	
I	Mineral encrustation inside bottom opening of outside drop inlet.	

J	Influent pipe had minor liner blisters. Slime layer appeared to be up to the typical waterline.	
K	Liner weld strip loose near influent pipe connection.	
L	Liner was not embedded in bench, yet still covered concrete surface. Unknown if a PVC sheet was originally installed with embedded tees or only with an adhesive.	

M	Encrustation on liner surface.	

Table A-5. Pipe Liner Termination Testing Results – Manhole 4D-0118

Location	Liner Condition	Concrete Deterioration Depth (in.)	VANDA Concrete Rating
Influent Pipe	Embedded, yet undermined.	3/8	2
Effluent Pipe	Embedded, yet undermined.	3/8	2

No Photo Available (underwater)	No Photo Available (underwater)
Influent pipe liner termination underwater	Effluent pipe liner termination underwater

Table A-6. Exposed Concrete Testing Results – Manhole 4D-0118 Influent Pipe Liner Cut

Location	Surface Condition	Sounding	Surface pH	Penetration Depth (in.)	VANDA Rating
Crown (11:00)	Hard	Solid	12	<1/16	1
Spring line (3:00)	Hard	Solid	12	<1/16	1

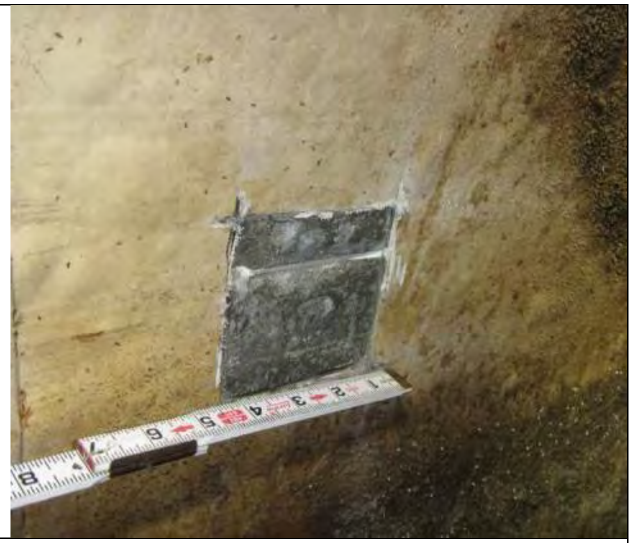
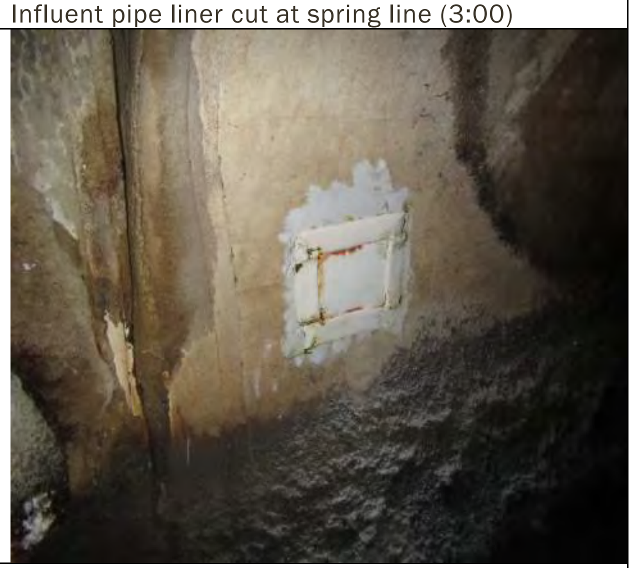
	
Influent pipe liner cut at crown (11:00)	Influent pipe liner cut at spring line (3:00)
	
Liner repair at crown (11:00)	Liner repair at spring line (3:00)

Table A-7. Surface Penetrating Radar Scan Results – Manhole 4D-0118

Location	File ID	Bar Dir.[a]	Rebar Depth Max. (in.)	Rebar Depth Avg. (in.)	Rebar Depth Min. (in.)	Rebar Space Max. (in.)	Rebar Space Avg. (in.)	Rebar Space Min. (in.)
Influent Pipe 9:00 - 12:00	002	C	3.26	3.04	2.94	3.40	2.29	1.80
Influent Pipe 9:00 - 12:00	003	C	2.47	2.31	2.15	2.55	2.18	1.85
Influent Pipe 9:00 - 12:00	004	C	2.00	1.86	1.76	12.90	3.41	1.90
Influent Pipe 9:00 - 12:00	005	L	2.63	2.20	1.60	5.55	5.25	4.80
Influent Pipe 9:00 - 12:00	006	L	2.63	2.27	2.00	5.70	5.50	5.30
Influent Pipe 9:00 - 12:00	007	L	3.26	2.50	1.92	6.30	5.43	4.55

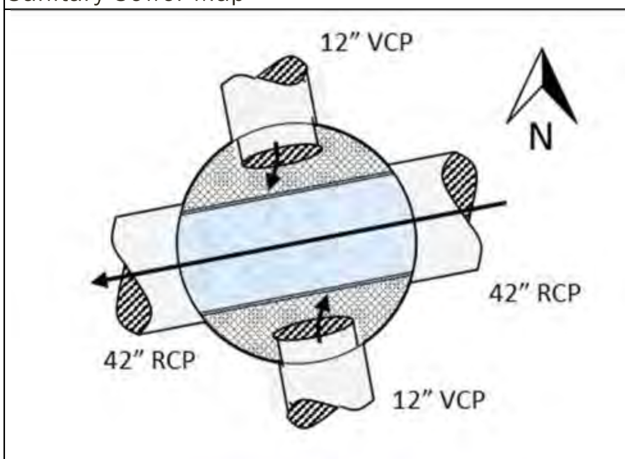
(a) C = Circumferential, L = Longitudinal

MH 4D-0150

Manhole:	4D-0150	**Overall Condition:**
Location:	Pine Avenue and Johnson Avenue	**Manhole:** T-Lock liner in good condition. Liner terminations at pipe connections, pipe penetrations, and at the manhole rim were in good condition. **Pipe Segments**: 270-degree T-Lock liner had minor blisters. Liner termination was unattached and undermined. Concrete exposed for testing was in good condition.
Date:	5/6/2018	
Time:	7:30 p.m. – 11:00 p.m.	
Engineers:	Clinton McAdams, Mike Sherman	
Flow Level:	12 inches	

Sanitary Sewer Map

Topside View



Flow Diagram (Not to Scale)

Plan View

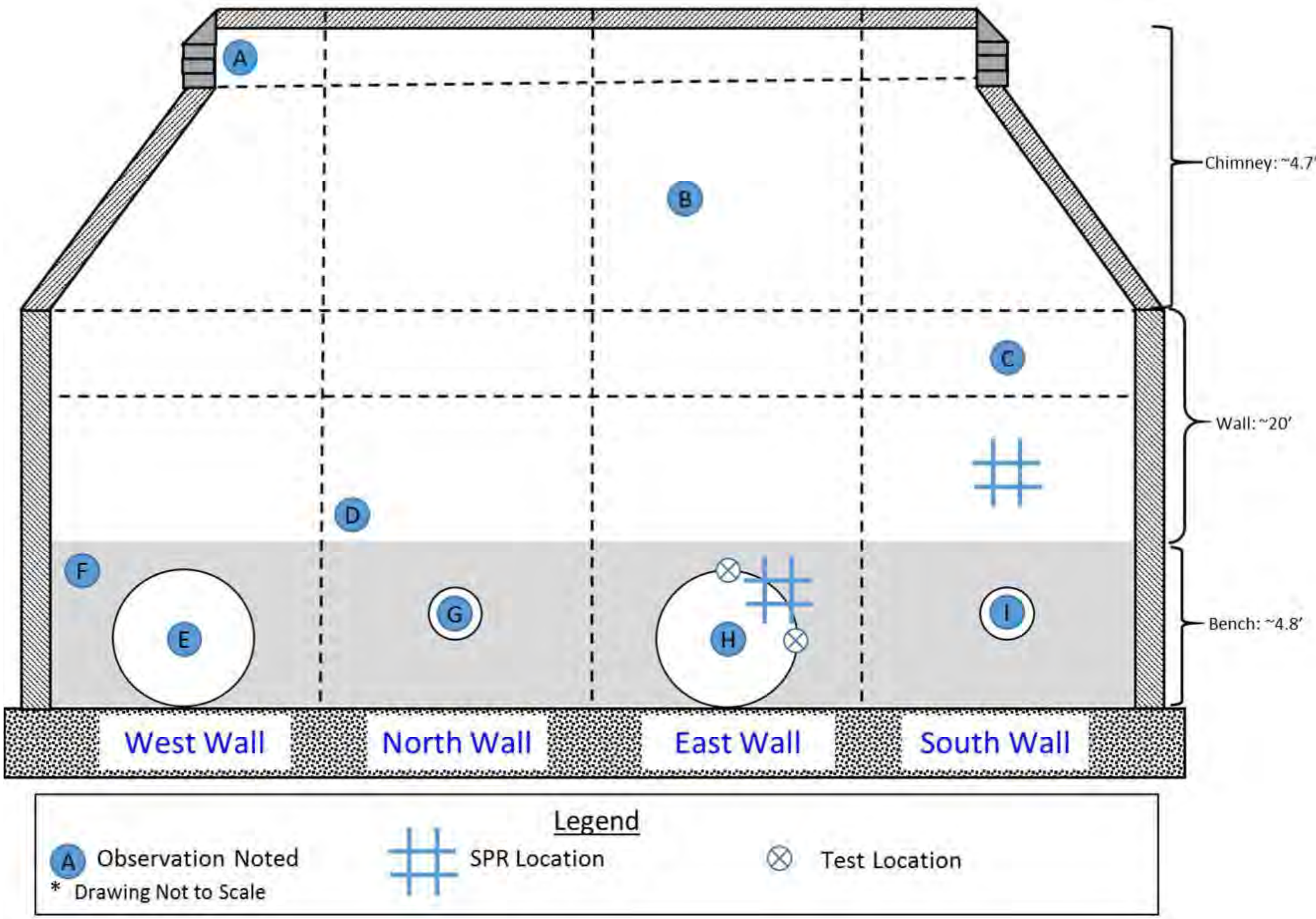
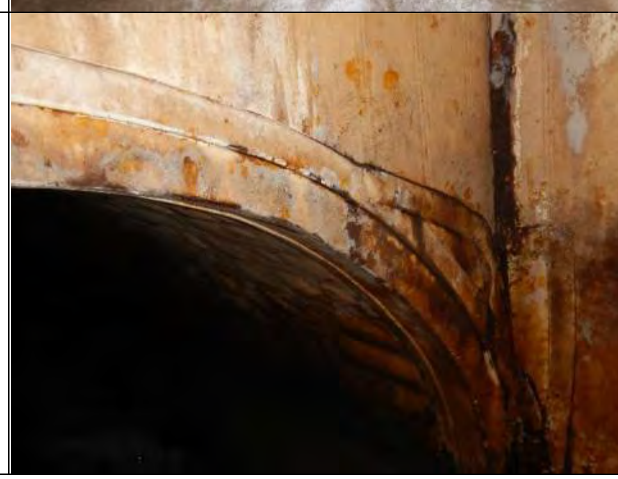


Figure A-4. Observations Diagram – Manhole 4D-0150

	Observations:	
A	Rim and liner termination was in good condition.	
B	Chimney liner was in good condition.	
C	Wall liner had minor blisters. Weld strips were in good condition.	

D	Liner was not embedded in bench, yet still covered concrete surface.	
E	Miner liner blisters on effluent pipe. The liner termination was undermined and unattached. Slime layer appeared to be up to the typical waterline.	
F	Liner at pipe connections was in good condition.	

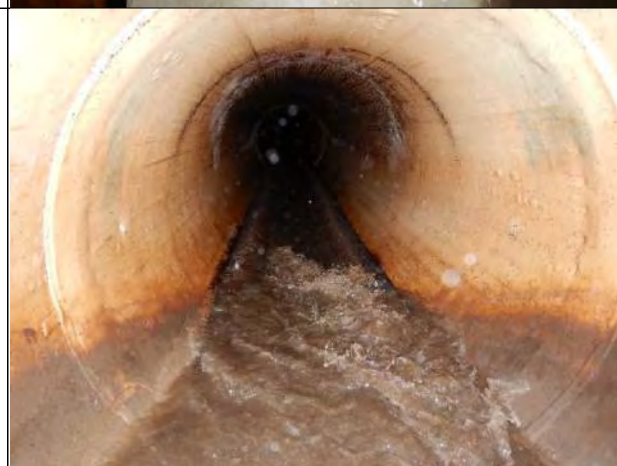
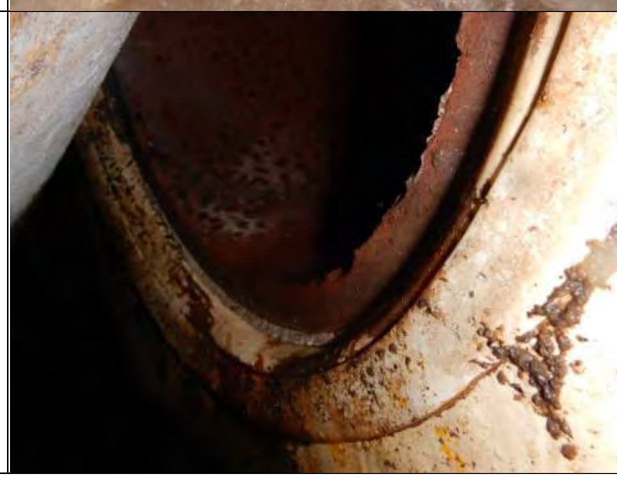
G	Lateral without gas flap. Liner termination at pipe connection was in good condition.	
H	Influent pipe liner had minor blisters. Weld strips were in good condition. The liner termination was undermined and unattached. Significant slope noticed in upstream pipe segments.	
I	Lateral with gas flap. Liner termination at pipe connection was in good condition. Flap appeared to be attached and operable.	

Table A-8. Pipe Liner Termination Testing Results – Manhole 4D-0150

Location	Liner Condition	Concrete Deterioration Depth (in.)	VANDA Concrete Rating
Influent Pipe	Unembedded and undermined.	3/4	3
Effluent Pipe	Unembedded and undermined.	1/2	3


Influent pipe liner termination (undermined)


Effluent pipe liner termination (cut and loose liner indicated with red arrows)

Table A-9. Exposed Concrete Testing Results – Manhole 4D-0150 Influent Pipe Liner Cut

Location	Surface Condition	Sounding	Surface pH	Penetration Depth (in.)	VANDA Rating
Crown (12:00)	Hard	Solid	12	<1/16	1
Spring line (3:00)	Hard	Solid	12	<1/16	1


Influent pipe liner cut at crown (12:00)


Influent pipe liner cut at spring line (9:00)

	
Liner repair at crown (12:00)	Liner repair at spring line (9:00)

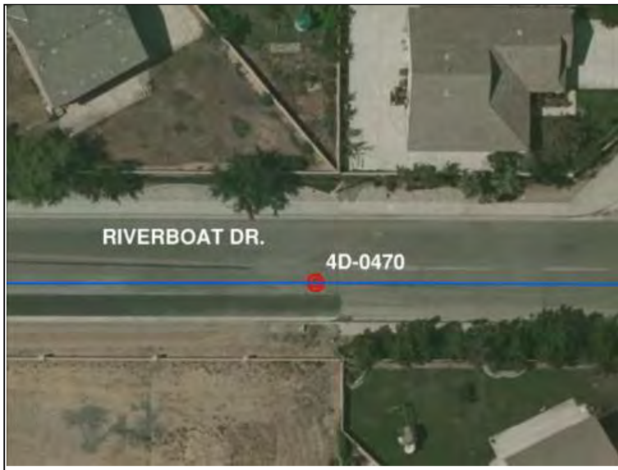
Table A-10. Surface Penetrating Radar Scan Results – Manhole 4D-0150

Location	File ID	Bar Dir.[a]	Rebar Depth Max. (in.)	Rebar Depth Avg. (in.)	Rebar Depth Min. (in.)	Rebar Space Max. (in.)	Rebar Space Avg. (in.)	Rebar Space Min. (in.)
South Wall Above Bench	010	V	5.85	5.85	5.85	N/A[b]	N/A[b]	N/A[b]
South Wall Above Bench	011	V	6.59	6.41	6.22	36.90	36.90	36.90
South Wall Above Bench	012	V	6.44	5.29	4.13	36.85	36.85	36.85
South Wall Above Bench	013	C	6.81	6.02	5.03	9.75	6.74	5.50
South Wall Above Bench	014	C	6.00	5.41	4.28	6.20	4.75	2.70
South Wall Above Bench	015	C	6.07	4.83	2.62	6.45	4.88	2.80
Influent Pipe Above Flow	017	C	4.58	4.03	3.53	2.35	2.08	1.50
Influent Pipe Above Flow	018	C	3.90	3.16	2.84	3.85	2.47	1.80
Influent Pipe Above Flow	019	C	2.46	2.07	1.69	2.85	2.36	2.05
Influent Pipe Above Flow	020	L	3.60	2.46	1.62	21.90	8.24	4.35
Influent Pipe Above Flow	021	L	3.15	2.46	1.93	21.00	8.09	3.85

(b) C = Circumferential, L = Longitudinal
(c) N/A indicates only one bar identified within scan range.

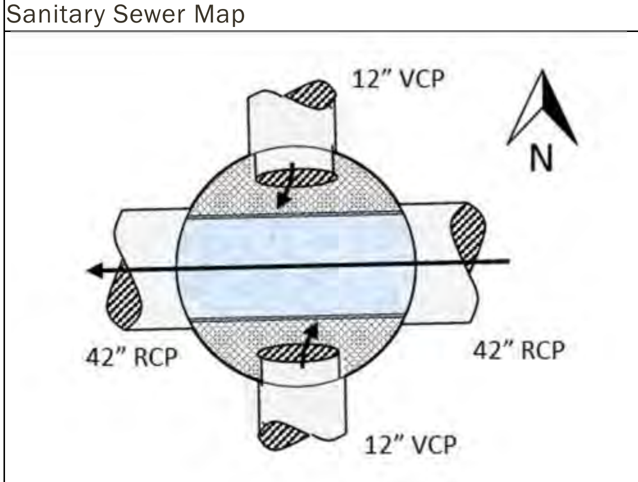
MH 4D-0470

Manhole:	4D-0470	**Overall Condition:**
Location:	Riverboat Drive	**Manhole:** Holes in T-Lock liner at cone and effluent pipe connection. Some holes appeared to be from a CCTV crawler camera. Bulges in liner between ribs. **Pipe Segments**: 270-degree T-Lock liner had minor blisters. Liner termination was unattached and undermined. Exposed aggregate and reinforcement corrosion staining at unlined concrete channel. Concrete exposed for testing was in good condition.
Date:	5/6/2018	
Time:	8:30pm – 12:30am	
Engineers:	Michael Johannessen, Jenna Mariano	
Flow Level:	2 inches	



Sanitary Sewer Map

Topside View



Flow Diagram (Not to Scale)

Plan View

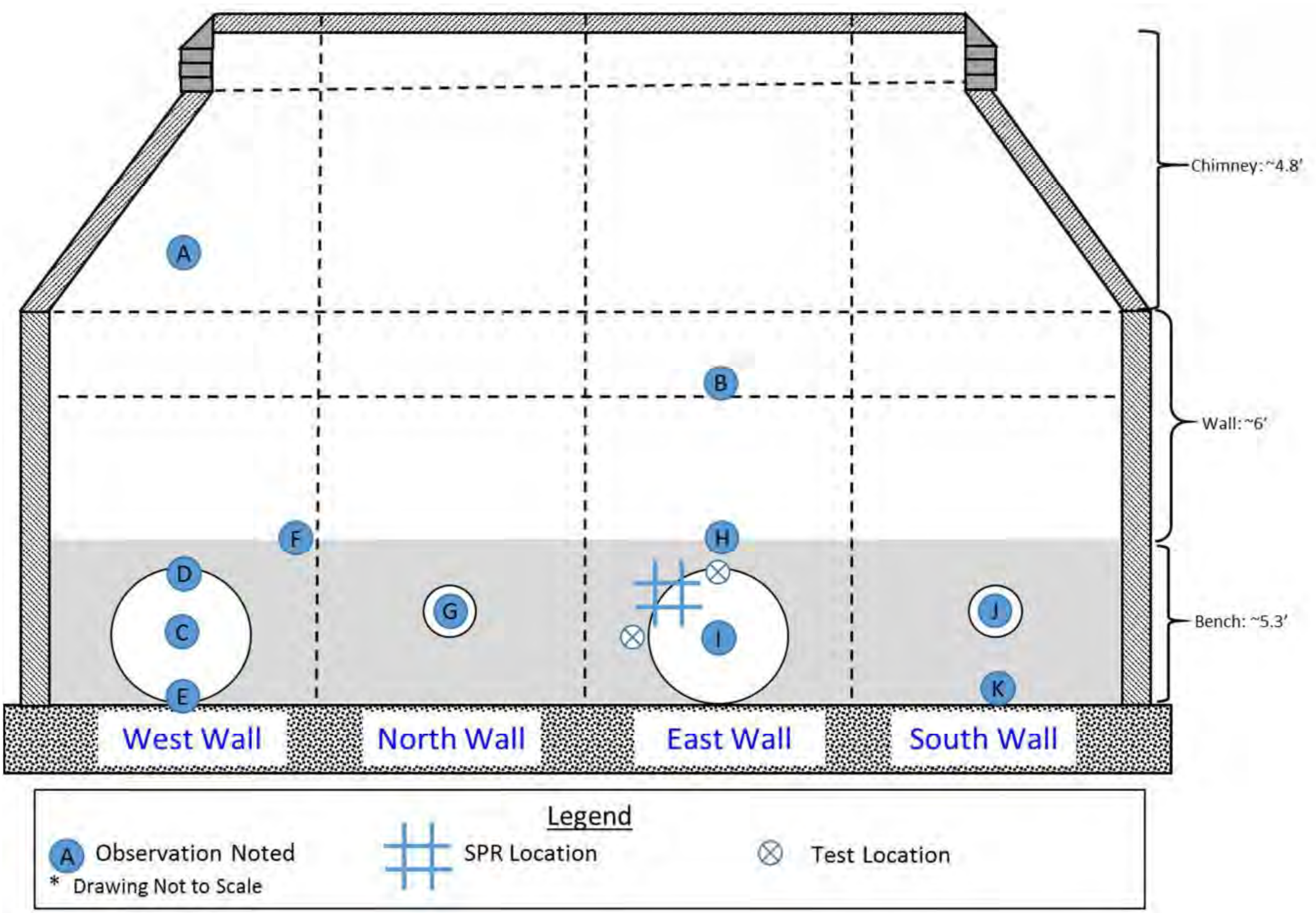
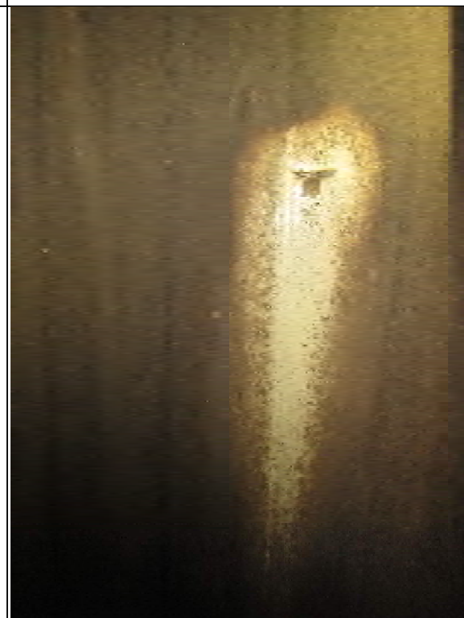
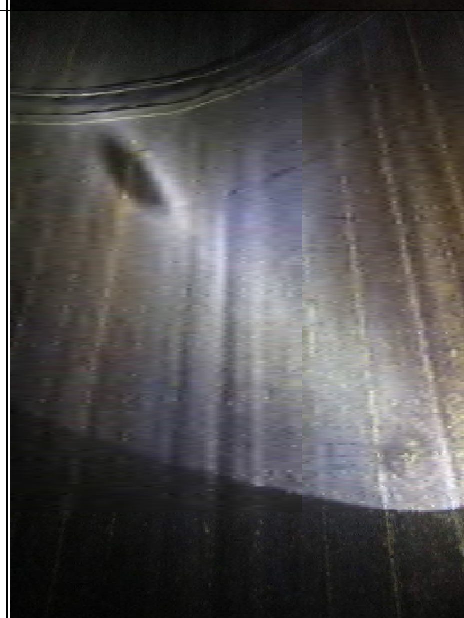
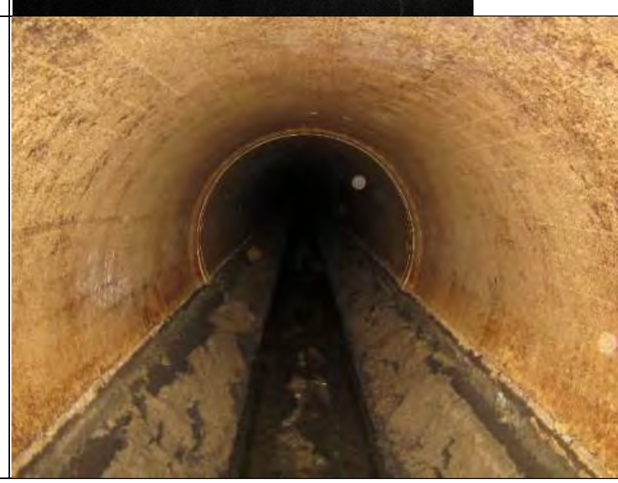
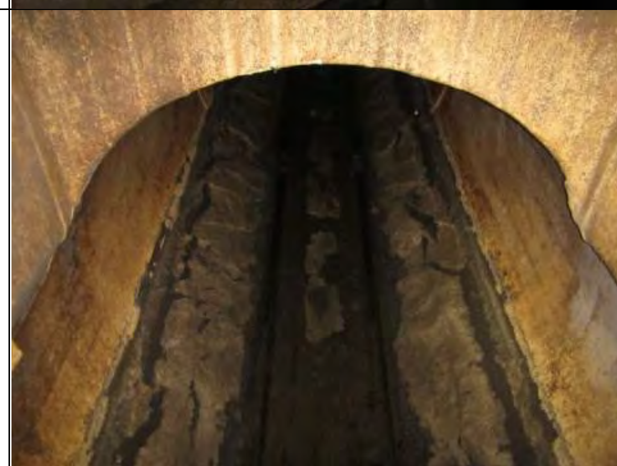
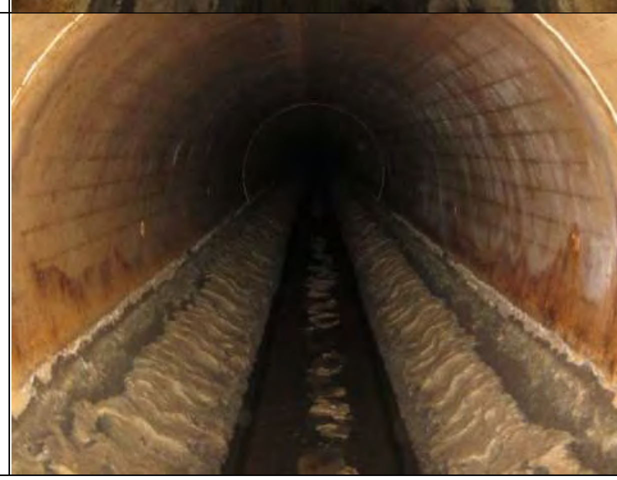


Figure A-5. Observations Diagram – Manhole 4D-0470

	Observations:	
A	Approximate 3-inch wide hole in T-Lock liner at cone.	
B	Bulges between T-Lock ribs for manhole wall. Liner ribs appeared to be still attached.	
C	Effluent pipe liner had minor blisters. Slime layer appeared to be up to typical waterline.	

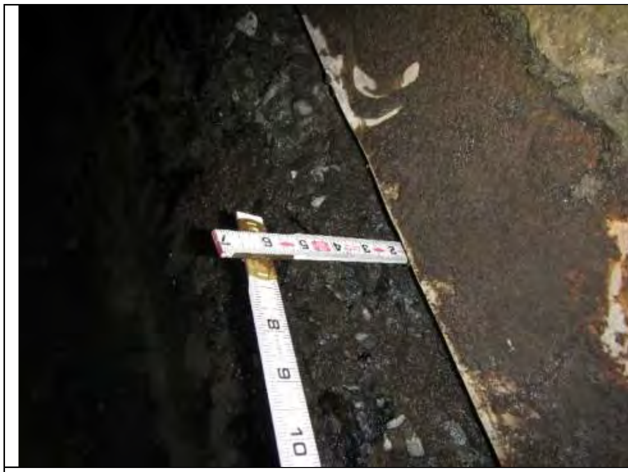
D	Cut in liner at effluent pipe crown. Cuts appeared to be from a CCTV camera cable.	
E	CCTV crawler camera tracks observed in slime.	
F	Liner was not embedded in bench, yet still covered concrete surface.	

G	Lateral with gas flap. Liner termination at pipe penetration was in good condition. Flap appeared to be attached and operable.	
H	Overview of manhole channel construction. Appeared to be constructed per design drawings; reinforced concrete pipe segment cut and tied into manhole structure.	
I	Influent pipe had minor liner blisters.	

J	Lateral with gas flap. Liner termination at pipe penetration was in good condition. Flap appeared to be attached and operable.	
K	Corrosion staining evidence of embedded reinforcement corrosion. Exposed aggregate at unlined concrete channel.	

Table A-11. Pipe Liner Termination Testing Results – Manhole 4D-0470

Location	Liner Condition	Concrete Deterioration Depth (in.)	VANDA Concrete Rating
Influent Pipe	Unembedded and undermined.	1/4 - 1/2	3
Effluent Pipe	Unembedded and undermined.	1/4 - 1/2	3


Influent pipe liner termination undermined


Effluent pipe liner termination undermined

Table A-12. Exposed Concrete Testing Results – Manhole 4D-0470 Influent Pipe Liner Cut

Location	Surface Condition	Sounding	Surface pH	Penetration Depth (in.)	VANDA Rating
Crown (12:00)	Hard	Solid	12	1/16	1
Spring line (3:00)	Hard	Solid	11 – 12	1/8	2


Influent pipe liner cut at crown (12:00)


Manhole channel liner cut at spring line (3:00)

	
Liner repair at crown (12:00)	Liner repair at spring line (3:00)

Table A-13. Surface Penetrating Radar Scan Results – Manhole 4D-0470

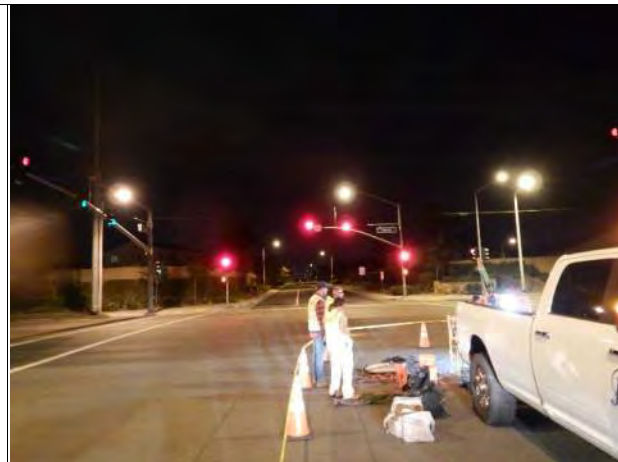
Location	File ID	Bar Dir.[a]	Rebar Depth Max. (in.)	Rebar Depth Avg. (in.)	Rebar Depth Min. (in.)	Rebar Space Max. (in.)	Rebar Space Avg. (in.)	Rebar Space Min. (in.)
Influent Pipe 9:00 - 12:00	009	L	4.35	3.12	1.92	12.85	7.51	4.10
Influent Pipe 9:00 - 12:00	010	L	4.43	2.93	1.84	12.80	8.30	4.35
Influent Pipe 9:00 - 12:00	012	L	4.04	2.85	1.76	13.30	8.29	5.05
Influent Pipe 9:00 - 12:00	014	C	4.04	3.58	3.18	3.30	2.63	2.20
Influent Pipe 9:00 - 12:00	015	C	4.19	3.55	2.94	2.90	2.04	1.10
Influent Pipe 9:00 - 12:00	017	C	2.00	1.74	1.60	3.05	2.54	2.15

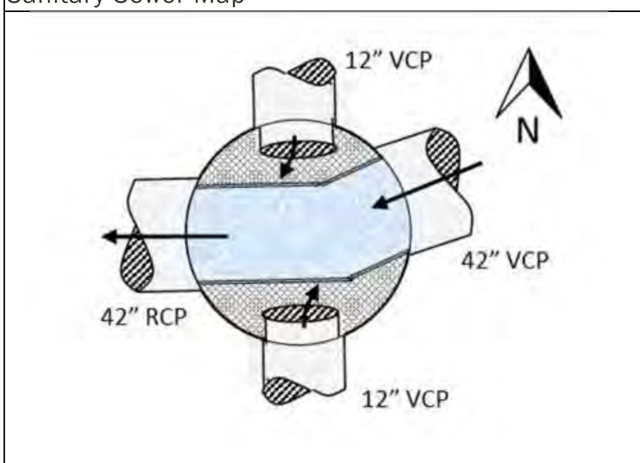
(a) C = Circumferential, L = Longitudinal

MH 4D-0480

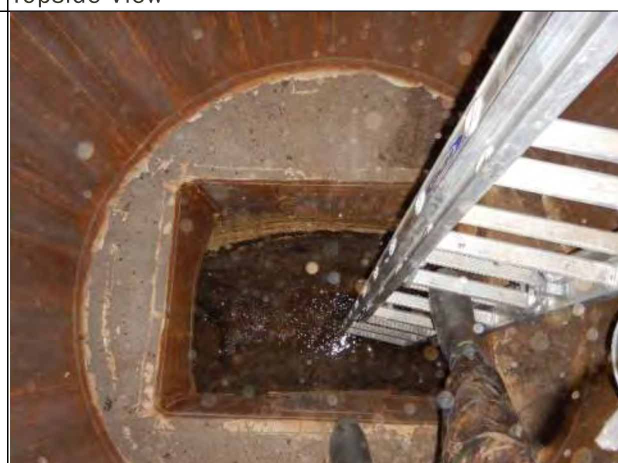
Manhole:	4D-0480	**Overall Condition:**
Location:		**Manhole:** T-Lock liner was in good condition. Liner terminations at pipe connections, pipe penetrations, and at the manhole rim were in good condition. Channel was lined and in good condition. **Pipe Segments**: 270-degree T-Lock liner was in good condition. Liner termination was attached and in good condition. Concrete exposed for testing was in good condition.
Date:	5/7/2018	
Time:	11:00 p.m. - 3:00 a.m.	
Engineers:	Clinton McAdams, Mike Sherman	
Flow Level:	2 inches	

Sanitary Sewer Map


Topside View



Flow Diagram (Not to Scale)


Plan View

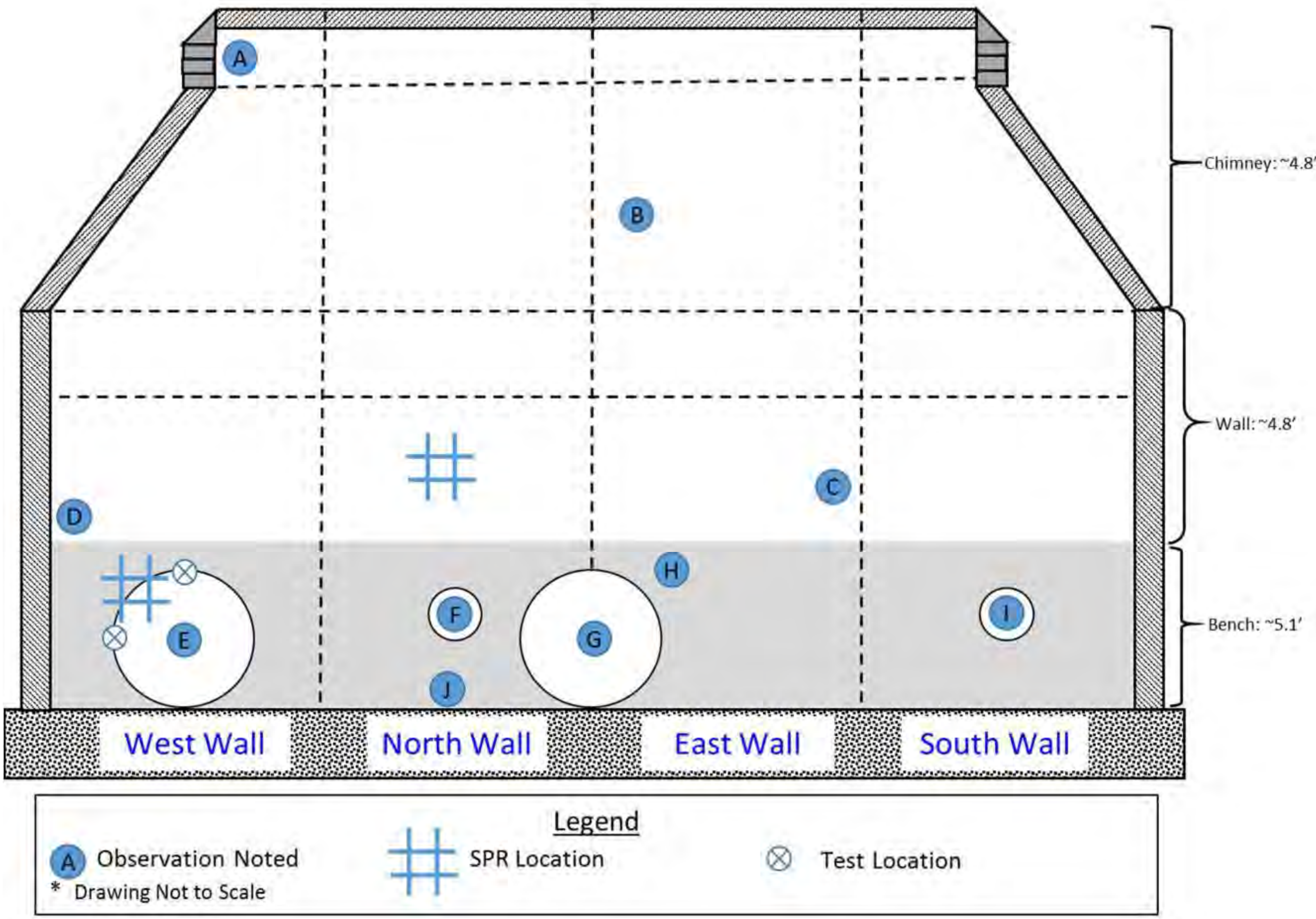
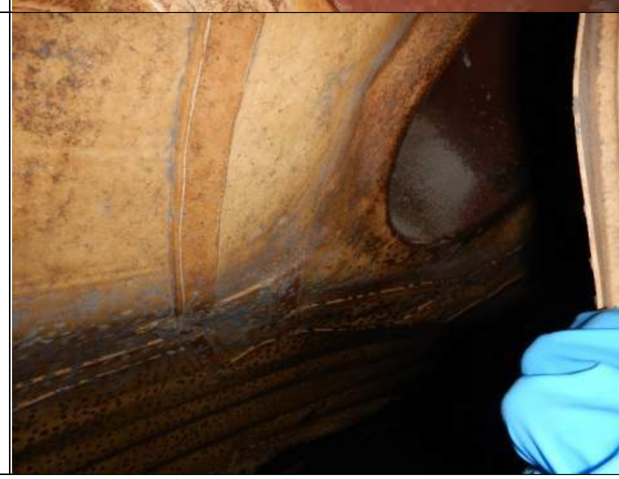


Figure A-6. Observations Diagram – Manhole 4D-0480

	Observations:	
A	Rim was in good condition.	
B	Liner at chimney was in good condition.	
C	Liner at bench was in good condition.	

D	Liner at pipe penetration was in good condition.	
E	Effluent pipe liner was in good condition (no blisters). Liner termination was attached and not undermined. Slime layer appeared to be up to the typical waterline.	
F	Lateral with gas flap. Liner termination at pipe connection was in good condition. Flap appeared to be attached and operable.	

G	Influent pipe was constructed of vitrified clay. Liner at pipe connection was in good condition. Slime layer appeared to be up to the typical waterline.	
H	Liner termination at vitrified clay pipe connection was in good condition.	
I	Lateral with gas flap. Liner termination at pipe connection was in good condition.	

J	Channel liner was in good condition.	

Table A-14. Pipe Liner Termination Testing Results – Manhole 4D-0480

Location	Liner Condition	Concrete Deterioration Depth (in.)	VANDA Concrete Rating
Influent Pipe	N/A (Vitrified Clay Pipe)	N/A	N/A
Effluent Pipe	Attached and not undermined.	Negligible	1

	
Influent pipe liner termination in good condition	Effluent pipe liner termination in good condition

Table A-15. Exposed Concrete Testing Results – Manhole 4D-0480 Effluent Pipe Liner Cut

Location	Surface Condition	Sounding	Surface pH	Penetration Depth (in.)	VANDA Rating
Crown (12:00)	Hard	Solid	12	1/16	1
Spring line (3:00)	Hard	Solid	12	1/16	1

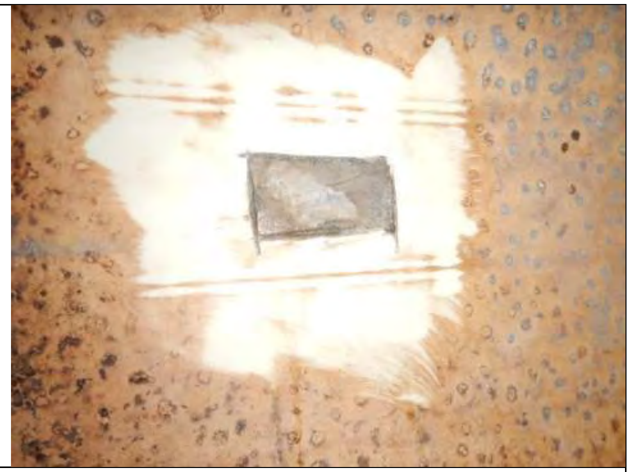
	
Effluent pipe liner cut at crown (12:00)	Effluent pipe liner cut at spring line (9:00)
	
Liner repair at crown (12:00)	Liner repair at spring line (9:00)

Table A-16. Surface Penetrating Radar Scan Results – Manhole 4D-0480

Location	File ID	Bar Dir.[(a)]	Rebar Depth Max. (in.)	Rebar Depth Avg. (in.)	Rebar Depth Min. (in.)	Rebar Space Max. (in.)	Rebar Space Avg. (in.)	Rebar Space Min. (in.)
North Wall Above Bench	022	C	6.44	4.62	3.22	23.85	18.65	13.45
North Wall Above Bench	023	C	3.37	3.37	3.37	N/A*	N/A*	N/A*
North Wall Above Bench	024	C	4.65	4.13	3.60	37.20	37.20	37.20
North Wall Above Bench	025	V	6.22	5.22	3.98	6.85	6.42	5.90
North Wall Above Bench	026	V	4.50	3.88	2.84	7.30	6.05	3.85
North Wall Above Bench	027	V	3.53	3.17	2.84	7.00	6.23	4.95
Effluent Pipe 8:00 - 12:00	028	C	3.37	3.07	2.62	3.45	2.58	1.20
Effluent Pipe 8:00 - 12:00	029	C	3.75	3.32	2.92	2.65	2.37	1.45
Effluent Pipe 8:00 - 12:00	030	C	1.69	1.41	1.08	2.80	2.37	1.35
Effluent Pipe 8:00 - 12:00	031	L	3.00	2.27	1.54	22.50	15.05	10.70
Effluent Pipe 8:00 - 12:00	032	L	3.07	2.29	1.54	23.05	14.70	10.15

(a) C = Circumferential, L = Longitudinal
(b) N/A indicates only one bar identified within scan range.

V&A Project No. 18-0016

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San Diego, CA 92127
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APPENDIX B:

Brine Line Reach 4D CCTV Inspection Summary of Condition by Reach

Appendix A: Summary of Condition Assessment by Reach from CCTV Inspections

U/S Manhole	D/S Manhole	Inspection Information	CCTV General Comments	Condition Summary
4D-0480	4D-0470	• Length surveyed: 715 ft • Pipe length: 1,282 ft • Direction of survey: U/S (4D-0470 to 4D-0480)	• Water level ~10% (water level below liner termination) • Liner termination not visible for entire reach due to slime layer/scaling on pipe walls. • Poor video quality. Liner condition above water surface is unclear. • Inspection abandoned at 715 ft. Unable to pull camera further upstream due to heavy deposits. • Condition of inside of 4D-0480 and 4D-0470 were not recorded.	• Unable to see liner termination or unlined concrete due to slime layer/scaling. Condition of pipe unknown based on CCTV inspection. Refer to condition assessment results from man-entry inspections of 4D-0480 and 4D-0470.
4D-0470	4D-0460	• Length surveyed: 646 ft • Pipe length: 1,321 ft • Direction of survey: D/S (4D-0470 to 4D-0460)	• Water level ~10% (water level below liner termination) • Liner termination not visible for entire reach due to slime layer/scaling on pipe walls. • Aggregate visible at 98 ft where small gap in slime layer/scaling is shown at 5 o'clock. • Turbulent flow in pipe at 615 ft. Possible debris restricting flow area. • Inspection abandoned at 646 ft. Camera blocked due to heavy deposits. • Condition of inside of 4D-0460 and 4D-0470 were not recorded.	• Unable to see liner termination or unlined concrete due to slime layer/scaling except at one location (98 ft) where aggregate was visible at 5 o'clock due to gap in slime layer. Condition of pipe unknown based on CCTV inspection. Refer to condition assessment results from man-entry inspection of 4D-0470. • Wrinkle in pipe liner near joint at 471 ft (8 o'clock to 9 o'clock), approximately 3 to 6 inches wide. • Wrinkle in pipe liner near joint at 491 ft (8 o'clock to 9 o'clock), approximately 1 to 3 inches wide. • Liner blistering at 472 and 530 ft.
4D-0460	4D-0450	• Length surveyed: 356 ft • Pipe length: 648 ft • Direction of survey: U/S (4D-0450 to 4D-0460)	• Water level ~10% (water level below liner termination) • Poor video clarity. Camera is jerky and does not focus well. Camera does not stop to capture potentially exposed concrete or liner termination where slime layer/scaling is light and sporadic. • Light slime layer/scaling on pipe walls from 0 ft to 60 ft. • Liner termination not visible after 60 ft. due to slime layer/scaling on pipe walls. • Turbulent flow in pipe at 101 ft. Possible debris restricting flow area. • Inspection abandoned at 356 ft for unspecified reason. • Condition of inside of 4D-0450 and 4D-0460 were not recorded.	• Unable to see liner termination or unlined concrete due to either poor video quality or slime layer/scaling. Condition of unlined portion of pipe unknown based on CCTV inspection. • Liner blistering at 159 ft.
4D-0450	4D-0440	• Length surveyed: 1,317 ft • Pipe length: 1,317 ft • Direction of survey: D/S (4D-0450 to 4D-0440)	• Water level ~10% (water level below liner termination) • Poor video clarity. Camera is jerky and does not focus well. Operator indicated camera is struggling due to resistance. • Debris underneath flow line identified at 34 ft. • Liner termination not visible for approximately 30% of the segment due to slime layer/scaling on pipe walls. • Turbulent flow in pipe at 279 ft, 570 ft, 690 ft. Possible debris restricting flow area. • Condition of inside of 4D-0450 was not recorded.	• Liner termination appears to be visible starting at 289 ft, but camera does not stop to focus on it. • Potentially visible aggregate below liner termination on both sides of pipe for majority of segment after 289 ft, but camera does not stop to focus on pipe walls, so it is difficult to verify. • Pipe sticks are rotated and liner termination does not align at pipe joints in several locations. Misalignment ranges from approximately 1 to 6 inches due improper installation of the pipe and occurs at the following locations: 365 ft, 405 ft, 585 ft, 605 ft, 625 ft, 645 ft, 705 ft, 725 ft, 787 ft, 827 ft, 908 ft, 1,008 ft, 1,108 ft, 1,128 ft, and 1,188 ft. Corrosion at these locations is not consistent at the 3 O'clock and 9 O'clock positions as is true for the properly installed pipe. • Potential longitudinal groove in pipe with exposed aggregate at liner termination on right-side from 365 ft to 385 ft, 520 ft to 545 ft, 675 ft to 740 ft, 890 ft to 908 ft, 928 ft to 948 ft, 1,010 ft to 1,070 ft, 1,090 ft to 1,108 ft, and from 1,130 ft to 1,149 ft. No visible rebar. Camera does not stop to focus on it, so it is difficult to determine condition. • Potential longitudinal groove in pipe with exposed aggregate at liner termination on left-side from 500 ft to 565 ft, 585 ft to 640 ft, 675 ft to 705 ft, 750 ft to 800 ft, 825 ft to 850 ft, and from 1,188 ft to 1,208 ft. Camera does not stop to focus on it, so it is difficult to determine condition. No visible rebar. • Liner termination detached at pipe joint (2 to 4-inch long) at 927 ft. • Continuous liner blistering from 309 ft to 327 ft, and from 507 ft to 545 ft. • Liner blistering at 407 ft. • Manhole 4D-0440 appears to be in good condition.
4D-0440	4D-0430	• Length surveyed: 1,150 ft • Pipe length: 1,313 ft • Direction of survey: U/S (4D-0430 to 4D-0440)	• Water level ~10% (water level below liner termination) • Minimal slime layer/scaling on pipe walls from beginning of survey to 1,030 ft. Liner termination not visible after 1,030 ft. due to slime layer/scaling on pipe walls • Turbulent flow in pipe at 1,089 ft. • Inspection abandoned at 1,150 ft. Camera blocked due to heavy deposits. • Condition of inside of 4D-0430 and 4D-0440 were not recorded.	• Visible aggregate on left and right sides of pipe at the liner termination for majority of segment. No visible rebar. • Pipe sticks are rotated and liner termination does not align at pipe joints in several locations. Misalignment ranges from approximately 1 to 6 inches due improper installation of the pipe and occurs at the following locations: 35 ft, 95 ft, 116 ft, 237 ft, 317 ft, 519 ft, 579 ft, 801 ft, 860 ft, 920 ft, 940 ft, and 960 ft. • Corrosion staining indicating the presence of ferrous metal at 461 ft. No rebar seen. Cause of staining unknown. • Liner termination detached at pipe joint (~4 inches long) at 843 ft. • Liner blistering at 949 ft.
4D-0430	4D-0420	• Length surveyed: 650 ft • Pipe length: 650 ft • Direction of survey: D/S	• Water level ~10% (water level below liner termination) • Poor video quality. • Minimal slime layer/scaling on pipe walls.	• Visible aggregate at liner termination along both sides of the pipe throughout the pipe segment. It is difficult to identify liner detachment due to video quality. No visible rebar.

U/S Manhole	D/S Manhole	Inspection Information	CCTV General Comments	Condition Summary
		(4D-0430 to 4D-0420)	• Debris at pipe connection into 4D-0420 causing flow turbulence. • Minimal footage of manhole 4D-0420. • Condition of inside of 4D-0430 was not recorded.	• Pipe sticks are rotated and liner termination does not align at pipe joints in several locations. Misalignment ranges from approximately 1 to 6 inches due improper installation of the pipe and occurs at the following locations: 26 ft, 66 ft, 86 ft, 106 ft, 285 ft, 428 ft, 447 ft, 467 ft, 506 ft, 527 ft, and 567 ft. • Potential liner detachment of up to 1 inch long on left-side at 480 ft. Poor video quality makes it difficult to verify. • Exposed aggregate and aggregate loss below liner termination in 4D-0420 manhole channel along 90° bend. Liner termination also detached (1 to 2 inches long) at that location. No visible rebar.
4D-0420	4D-0410	• Length surveyed: 1,320 ft • Pipe length: 1,320 ft • Direction of survey: U/S (4D-0410 to 4D-0420)	• Water level ~10% (water level below liner termination) • Minimal slime layer/scaling on pipe walls from beginning of survey to 1,020 ft. Liner termination covered by slime layer/scaling after 1,020 ft. • Condition of inside of 4D-0410 was not recorded.	• Pipe sticks are rotated and liner termination does not align at pipe joints in several locations. Misalignment ranges from approximately 1 to 6 inches due improper installation of the pipe and occurs for over ~ 95% of the segment from start of inspection to approximately 1,020 ft. Liner termination is covered by slime layer/scaling after 1,020 ft. • Visible aggregate below liner termination on both sides of pipe for over ~ 95% of segment from start of inspection to approximately 1,020 ft. No visible rebar. • Apparent aggregate loss point defects shown throughout segment. Difficult to verify due to video quality and speed at which camera moves through pipe. No visible rebar. • Longitudinal groove with exposed aggregate on right-side of pipe below liner termination from 465 ft to 485 ft, 515 ft to 580 ft, 608 ft to 640 ft, and from 820 ft to 860 ft. Liner termination detached by up to 1 inch along these distances. No visible rebar. • Longitudinal groove with exposed aggregate on left-side of pipe below liner termination from 227 ft to 264 ft, 404 ft to 463 ft, 485 ft to 505 ft, 900 ft to 920 ft, and from 960 ft to 980 ft. Liner termination detached by up to 1-inch along these distances. No visible rebar • Aggregate loss in 90° bend of manhole channel at 4D-0420. No visible rebar. • Liner blistering around pipe joints along majority of pipe.
4D-0410	4D-0400	• Length surveyed: 1,050 ft • Pipe length: 1,271 ft • Direction of survey: D/S (4D-0410 to 4D-0400)	• Water level ~20% (water level below liner termination) • Liner termination not visible for entire reach due to slime layer/scaling on pipe walls • Inspection abandoned at 1,050 ft. Camera blocked due to heavy debris. • Condition of inside of 4D-0410 and 4D-0400 were not recorded.	• Liner blistering around 250 ft, 450 ft, 613 ft, 855 ft. • Unable to see liner termination or unlined concrete due to slime layer/scaling on pipe walls. Condition of pipe unknown based on CCTV inspection.
4D-0400	4D-0390	• Length surveyed: 1,132 ft • Pipe length: 1,428 ft • Direction of survey: U/S (4D-0390 to 4D-0400)	• Water level ~15% (water level below liner termination) • Water marks on pipe show flow line typically 50% full. • Poor video quality makes it difficult to identify point defects. • Liner termination covered by slime layer/scaling after 1,015 ft. • Inspection abandoned at 1,132 ft due to heavy debris blocking camera. • Condition of inside of 4D-0390 and 4D-0400 were not recorded.	• Pipe sticks are rotated and liner termination does not align at pipe joints in several locations. Misalignment ranges from approximately 1 to 6 inches due improper installation of the pipe and occurs at the following locations: 45 ft., 65 ft., 85 ft., 105 ft, 125 ft, 225 ft., 245 ft., 305 ft., 320 ft., 340 ft., 360 ft., 380 ft., 420 ft., 460 ft., 540 ft., 615 ft., 638 ft., 658 ft., 735 ft., 755, 775 ft., 815 ft., 935 ft., 953 ft. • Visible aggregate below liner termination on both sides of pipe for majority of segment up to 1,015 ft. No visible rebar. • Longitudinal groove with exposed aggregate below liner termination on right side of pipe from 15 ft to 40 ft, 65 ft to 85 ft, 225 ft to 240 ft, 320 ft to 380 ft, 550 ft to 590 ft, 698 ft to 710 ft, 775 ft to 791 ft, and from 970 ft to 1,005 ft. Liner termination detached by up to 1-inch along these distances. No visible rebar • Longitudinal groove with exposed aggregate below liner termination on left side of pipe from 88 ft to 106 ft, 108 ft to 125 ft, 302 ft to 320 ft, 330 ft to 350 ft, 698 to 710 ft, and from 875 ft to 953 ft. Liner termination detached by up to 1-inch along these distances. No visible rebar
4D-0390	4D-0380	• Length surveyed: 130 ft • Pipe length: 1,188 ft • Direction of survey: D/S (4D-0390 to 4D-0380)	• Water level ~20% (water level below liner termination) • Water marks on pipe show flow line typically 50% full. • Minimal slime layer/scaling. Pipe appears to have been cleaned. • Heavy floating deposits/debris after 70 ft. • Liner termination covered by heavy debris and higher water depth after 90 ft. • Survey abandoned due to heavy floating debris at 130 ft. • Condition of inside of 4D-0380 and 4D-0390 were not recorded.	• Pipe sticks are rotated and liner termination does not align at pipe joints in several locations. Misalignment ranges from approximately 1 to 6 inches due improper installation of the pipe and occurs at the following locations: 35 ft., 55 ft., and 75 ft. • Aggregate visible along entire observed segment where liner termination is above water level and/or not covered by slime layer/scaling. No visible rebar. • Longitudinal groove with exposed aggregate below liner termination on right side of pipe from 34 ft to 52 ft. No visible rebar. • Continuous liner detachment of up to 1-inch on right side of pipe from 34 ft to 70 ft. • Continuous liner detachment of up to 1-inch on left side of pipe from 50 ft – 63 ft. • Liner termination detached up to 1-inch on left side at 87 ft. Approximately 1-foot long.
4D-0380	4D-0370	• Length surveyed: 440 ft • Pipe length: 1,400 ft • Direction of survey: U/S (4D-0370 to 4D-0380)	• Water level ~10% (water level below liner termination) • Poor video clarity. Camera is shaky and does not focus well. • Liner termination not visible for entire reach due to slime layer/scaling on pipe walls • Inspection abandoned at 440 ft per the Contractor's direction.	• Unable to see liner termination or unlined concrete due to slime layer/scaling on pipe walls. Condition of pipe unknown based on CCTV inspection. • Liner blistering around pipe joints for majority of segment.

U/S Manhole	D/S Manhole	Inspection Information	CCTV General Comments	Condition Summary
			• Condition of inside of 4D-0370 and 4D-0380 were not recorded.	
4D-0370	4D-0360	• Length surveyed: 892 ft • Pipe length: 1,109 ft • Direction of survey: D/S (4D-0370 to 4D-0360)	• Water level ~20% (water level below liner termination) • Poor video clarity. Camera is shaky and does not focus well for a majority of the inspection. • Liner termination not visible for entire reach due to slime layer/scaling on pipe walls • Inspection abandoned at 892 ft. per the Contractor's direction. • Condition of inside of 4D-0360 and 4D-0370 were not recorded.	• Unable to see liner termination or unlined concrete due to slime layer/scaling on pipe walls. Condition of pipe unknown based on CCTV inspection.
4D-0330	4D-0320	• Length surveyed: 912 ft • Pipe length: 1,000 ft • Direction of survey: U/S (4D-0320 to 4D-0330)	• Water level ~20% (water level below liner termination) • Liner termination not visible for entire reach due to slime layer/scaling on pipe walls. • Survey abandoned due to settled debris blocking camera. • Condition of inside of 4D-0320 and 4D-0330 were not recorded.	• Unable to see liner termination or unlined concrete due to slime layer/scaling on pipe walls. Condition of pipe unknown based on CCTV inspection. • Liner blistering throughout majority of pipe segment.
4D-0320	4D-0310	• Length surveyed: 498 ft • Pipe length: 498 ft • Direction of survey: D/S (4D-0320 to 4D-0310)	• Water level ~20% (water level below liner termination) • Liner termination not visible for entire reach due to slime layer/scaling on pipe walls. • Condition of inside of 4D-0320 was not recorded.	• Unable to see liner termination or unlined concrete due to slime layer/scaling on pipe walls. Condition of pipe unknown based on CCTV inspection. • Manhole 4D-0310 appeared to be in good condition.
4D-0310	4D-0300	• Length surveyed: 10 ft • Pipe length: 425 ft • Direction of survey: D/S (4D-0310 to 4D-0300)	• Water level ~20% (water level below liner termination) • Liner termination not visible for entire reach due to slime layer/scaling on pipe walls. • Survey abandoned due to settled debris blocking camera at 10 ft. • Condition of inside of 4D-0300 and 4D-0310 were not recorded.	• Unable to see liner termination or unlined concrete due to slime layer/scaling on pipe walls. Condition of pipe unknown based on CCTV inspection.
Unmarked*	4D-0300	• Length surveyed: 130 ft • Pipe length: 377 ft • Direction of survey: U/S (Unmarked* to 4D-0300)	• CCTV operator stated the access manhole was not labeled in the field, and thus was referred to as "SAWPA" in the CCTV video. Unmarked manhole was installed during the 2011 Relocation of Existing SAWPA Santa Ana Regional Interceptor (SARI) Reach IV-D / Schleisman Road & Hellman Ave., but was not shown in the traffic control plans. • Water level ~20% (water level below liner termination). • Liner termination not visible for majority of reach due to slime layer/scaling on pipe walls. • Observation abandoned at 130 ft. due to heavy debris blocking camera. • Condition of inside of 4D-0300 and unmarked manhole were not recorded	• Unable to see liner termination or unlined concrete for majority of reach due to slime layer/scaling on pipe walls. • Where exposed, pipe is in good condition along liner transition.
Unmarked*	4D-0290	• Length surveyed: 207 ft • Pipe length: 207 ft • Direction of survey: D/S (Unmarked* to 4D-0290)	*See comment above regarding "unmarked" manhole. • Water level ~20% (water level below liner termination) • Liner termination not visible for entire reach due to slime layer/scaling on pipe walls. • Heavy debris restricted flow and raised water level to approximately 40% starting at 110 ft. • Condition of inside of unmarked manhole was not recorded.	• Unable to see liner termination or unlined concrete due to slime layer/scaling on pipe walls. Condition of pipe unknown based on CCTV inspection. • Manhole 4D-0290 appeared to be in good condition. • Liner blistering throughout majority of pipe.
4D-0290	4D-0280	CCTV split into two runs: Run 1: • Length surveyed: 506 ft • Direction of survey: U/S (4D-0280 to 4D-0290) Run 2: • Length surveyed: 347 ft • Direction of survey: D/S (4D-0290 to 4D-0280) • Total length surveyed: 853 ft • Total pipe length: 1,000 ft	• Liner termination not visible for entire reach due to slime layer/scaling on pipe walls and high water level. • Water level started at ~25% in the U/S run and rose to ~40% by 505 ft., accompanied by heavy debris flow. Water level above liner termination. • U/S observation abandoned at 506 ft due to heavy debris blocking camera. • D/S observation abandoned at 347 ft. due to loss of traction and heavy debris. • Condition of inside of 4D-0280 and 4D-0290 were not recorded.	• Unable to see liner termination or unlined concrete due to slime layer/scaling on pipe walls and high water level. Condition of pipe unknown based on CCTV inspection. • Liner blistering at pipe joints for majority of segment.
4D-0280	4D-0270	• Length surveyed: 566 ft • Pipe length: 1,074 ft • Direction of survey: D/S (4D-0280 to 4D-0270)	• Water level ~30% (water level above liner termination) • Liner termination not visible for entire reach due to slime layer/scaling and high water level. • Observation abandoned due to heavy debris in flow path blocking camera. • Condition of inside of 4D-0270 and 4D-0280 were not recorded.	• Unable to see liner termination or unlined concrete due to slime layer/scaling on pipe walls and high water level. Condition of pipe unknown based on CCTV inspection.
4D-0270	4D-0260	• Length surveyed: 334 ft • Pipe length: 1,020 ft • Direction of survey: U/S (4D-0260 to 4D-0270)	• Water level ~20% (water level below liner termination) • Poor lighting and footage is blurry, making it difficult to see condition of liner. • Liner termination not visible for entire reach due to slime layer/scaling on pipe walls. • Survey abandoned due to settled debris blocking camera. • Condition of inside of 4D-0260 and 4D-0270 were not recorded.	• Unable to see liner termination or unlined concrete due to slime layer/scaling on pipe walls. Condition of pipe unknown based on CCTV inspection.

U/S Manhole	D/S Manhole	Inspection Information	CCTV General Comments	Condition Summary
4D-0260	4D-0250	• Length surveyed: 257 ft • Pipe length: 1,020 ft • Direction of survey: D/S (4D-0260 to 4D-0250)	• Water level ~20% (water level below liner termination) • Liner termination not visible for entire reach due to slime layer/scaling on pipe walls. • Survey abandoned due to settled debris blocking camera. • Condition of inside of 4D-0250 and 4D-0260 were not recorded.	• Unable to see liner termination or unlined concrete due to slime layer/scaling on pipe walls. Condition of pipe unknown based on CCTV inspection. • Liner blistering around pipe joints for majority of segment.
4D-0250	4D-0240	• Length surveyed: 656 ft • Pipe length: 1,020 ft • Direction of survey: U/S (4D-0240 to 4D-0250)	• Water level ~15% (water level below liner termination) • Liner termination not visible for approximately 30% of segment due to slime layer/scaling on pipe walls. • Inspection abandoned at 656 ft per the Contractor's direction. • Condition of inside of 4D-0240 and 4D-0250 were not recorded.	• Continuous liner detachment of 1 to 3 inches and apparent longitudinal groove with exposed aggregate on right-side throughout entire inspection (656 ft). Aggregate below liner consistently covered by slime layer, but aggregate loss appears likely. Liner termination periodically covered by slime layer, but consistently appears detached when exposed. • Continuous liner detachment of 1 to 3 inches and apparent longitudinal groove with exposed aggregate on left-side of pipe from 90 ft to end of inspection (656 ft). Aggregate below liner consistently covered by slime layer, but aggregate loss is likely. Liner termination periodically covered by slime layer, but consistently appears detached when exposed. • Pipe sticks are rotated and liner termination does not align at pipe joints in several locations. Misalignment ranges from approximately 2 to 6 inches due improper installation of the pipe and occurs from 500 ft to 570 ft.
4D-0240	4D-0230	• Length surveyed: 778 ft • Pipe length: 778 ft • Direction of survey: D/S (4D-0240 to 4D-0230)	• Water level ~15% (water level below liner termination) • Turbulent flow for majority of pipeline, particularly at the pipe joints. Large deposits near bottom of pipe appear to restrict flow area. • Liner termination not visible for approximately 40% of segment due to slime layer/scaling on pipe walls. • 4D-0230 manhole channel appears to be in good condition. Other manhole components were not recorded. • Condition of inside of 4D-0240 was not recorded.	• Continuous liner detachment of 1 to 3 inches and longitudinal groove with exposed aggregate below liner termination on both sides of pipe throughout entire segment. Aggregate below liner consistently covered by slime layer, but aggregate loss is likely. Liner termination periodically covered by slime layer, but consistently appears detached when exposed. No visible rebar.
4D-0230	4D-0220	• Length surveyed: 124 ft • Pipe length: 776 ft • Direction of survey: D/S (4D-0230 to 4D-0220)	• Water level ~20% (water level below liner termination) • Liner termination not visible for 60% of reach due to slime layer/scaling on pipe walls. • Inspection abandoned at 133 ft. for an unspecified reason. • Condition of inside of 4D-0220 and 4D-0230 were not recorded.	• Continuous liner detachment of 1 to 3 inches and longitudinal groove with exposed aggregate on left-side of pipe from 42 ft to 65 ft and from 87 ft to 102 ft. Aggregate below liner consistently covered by slime layer, but aggregate loss is likely. Liner termination periodically covered by slime layer, but consistently appears detached when exposed.
4D-0220	4D-0210	• Length surveyed: 1,082 ft • Pipe length: 1,082 ft • Direction of survey: D/S (4D-0220 to 4D-0210)	• Water level ~10% (water level below liner termination) • Liner termination not visible for entire reach due to slime layer/scaling on pipe walls.	• Unable to see liner termination or unlined concrete due to slime layer/scaling on pipe walls. Condition of pipe unknown based on CCTV inspection. • Manholes 4D-0220 and 4D-0210 are lined and appear to be in good condition.
4D-0210	4D-0200	• Length surveyed: 305 ft • Pipe length: 305 ft • Direction of survey: D/S (4D-0210 to 4D-0200)	• Water level ~10% (water level below liner termination) • Fogging/misting of the camera during the first 50 ft reduces clarity • Liner termination not visible for entire reach due to slime layer/scaling on pipe walls.	• Unable to see liner termination or unlined concrete due to slime layer/scaling on pipe walls. Condition of pipe unknown based on CCTV inspection. • Liner blistering at 115 ft and 304 ft. • Manholes 4D-0210 and 4D-0200 are lined and appear to be in good condition.
4D-0190	4D-0180	• Length surveyed: 452 ft • Pipe length: 452 ft • Direction of survey: D/S (4D-0190 to 4D-0180)	• Water level ~15% (water level below liner termination) • Liner termination not visible for entire reach due to slime layer/scaling on pipe walls.	• Unable to see liner termination or unlined concrete due to slime layer/scaling on pipe walls. Condition of pipe unknown based on CCTV inspection. • Manholes 4D-0190 and 4D-0180 are lined and appear to be in good condition.
4D-0180	4D-0170	• Length surveyed: 744 ft • Pipe length: 812 ft • Direction of survey: D/S (4D-0180 to 4D-0170)	• Water level ~10% (water level below liner termination) • Water marks on pipe show flow line typically 40% full. • Liner termination not visible for entire reach due to slime layer/scaling on pipe walls. • Inspection abandoned at 744 ft. Camera blocked due to heavy debris. • Condition of inside of 4D-0170 was not recorded.	• Unable to see liner termination or unlined concrete due to slime layer/scaling on pipe walls. Condition of pipe unknown based on CCTV inspection.
4D-0170	4D-0160	• Length surveyed: 1,206 ft • Pipe length: 1,206 ft • Direction of survey: U/S (4D-0160 to 4D-0170)	• Water level ~10%. (water level below liner termination) • Water marks on pipe show flow line typically 40% full. • Settled debris at 3 ft causing flow turbulence. • Poor video quality due to fogging/misting from 100 ft to 740 ft. • Liner termination not visible for entire reach due to slime layer/scaling on pipe walls.	• Unable to see liner termination or unlined concrete due to slime layer/scaling on pipe walls. Condition of pipe unknown based on CCTV inspection. • Liner blistering at 368 ft, 390 ft, 529 ft, 555 ft, 582 ft, 680 ft, 933 ft, 1,106 ft, and 1,200 ft. • Liner termination at top of 4D-0170 manhole cone detached by up to 1 inch. Approximately 3 inches in length.
4D-0160	4D-0150	• Length surveyed: 252 ft • Pipe length: 252 ft • Direction of survey: U/S	• Water level ~5%. (water level below liner termination) • Water marks on pipe show flow line typically below the liner termination; approximately 20% full.	• Continuous visible aggregate at liner termination on both sides of pipe for majority of pipe segment. • Visible aggregate with minor aggregate loss below liner termination on left-side of pipe from 10 ft to 80 ft, 215 ft to 240 ft, and 252 ft.

U/S Manhole	D/S Manhole	Inspection Information	CCTV General Comments	Condition Summary
		(4D-0150 to 4D-0160)	• Minimal slime layer/scaling on pipe walls. • Turbulent flow near pipe joint at 240 ft, approximately 10 feet upstream of manhole 4D-0150. Pipe slope appears to decrease at this location.	• Visible aggregate with minor aggregate loss below liner termination on right-side of pipe from 207 ft to 250 ft. • Liner blistering at 205 and 252 ft. • Liner termination detached on right-side of pipe at connection to manhole 4D-0150. Liner detached by approximately 3 inches. • No visible rebar at any point along segment. • Visible aggregate below liner termination in 4D-0160 manhole channel. • Refer to condition assessment results from man-entry inspections of 4D-0150.
4D-0150	4D-0140	• Length surveyed: 607 ft • Pipe length: 607 ft • Direction of survey: D/S (4D-0150 to 4D-0140)	• Water level ~30%. (water level below liner termination) • Water marks on pipe show flow line typically 40-50% full. • Liner termination not visible for entire reach due to slime layer/scaling on pipe walls.	• Unable to see liner termination or unlined concrete due to slime layer/scaling on pipe walls. Condition of pipe unknown based on CCTV inspection. • Liner blistering throughout majority of pipe segment. • Manhole 4D-0150 and 4D-0140 appear to be in good condition. See observations for reach 4D-0140 to 4D-0130 for infiltration runner in 4D-0140.
4D-0140	4D-0130	CCTV split into two runs to cover this reach: Run 1: • Length surveyed: 136 ft • Direction of survey: U/S (4D-0130 to 4D-0140) Run 2: • Length surveyed: 492 ft • Direction of survey: D/S (4D-0140 to 4D-0130) • Total length surveyed: 628 ft • Total pipe length: 669 ft	• Water level ~25%. (water level below liner termination) • Water marks on pipe show flow line typically 40% full. • Liner termination not visible for entire reach due to slime layer/scaling on pipe walls and high water level.	• Unable to see liner termination or unlined concrete due to slime layer/scaling on pipe walls. Condition of pipe unknown based on CCTV inspection. • Liner blistering throughout majority of pipe segment. • Infiltration runner at corner of 4D-0140 manhole bench around 3 o'clock, facing the outlet pipe. Otherwise, manhole appears to be in good condition.
4D-0130	4D-0120	• Length surveyed: 98 ft • Pipe length: 98 ft • Direction of survey: U/S (4D-0120 to 4D-0130)	• Water level ~30%. (water level above liner termination) • Water marks on pipe show flow line typically 40% full. • Liner termination not visible for entire reach due to slime layer/scaling on pipe walls and high water level.	• Unable to see liner termination or unlined concrete due to slime layer/scaling on pipe walls and high water level. Condition of pipe unknown. • Liner blistering throughout majority of pipe segment. • Manholes 4D-0130 and 4D-0120 appear to be in good condition.
4D-0120	4D-0118	• Length surveyed: 43 ft • Pipe length: 43 ft • Direction of survey: U/S (4D-0118 to 4D-0120)	• Water level ~30%. (water level above liner termination) • Water marks on pipe show flow line typically 50% full. • Liner termination not visible for entire reach due to slime layer/scaling on pipe walls and high water level.	• Unable to see liner termination or unlined concrete due to slime layer/scaling on pipe walls and high water level. Condition of pipe unknown based on CCTV inspection. Refer to condition assessment results from man-entry inspections of 4D-0180. • Liner blistering throughout majority of pipe segment. • Manholes 4D-0120 and 4D-0118 appear to be in good condition
4D-0118	4D-0110	• Length surveyed: 569 ft • Pipe length: 569 ft • Direction of survey: D/S (4D-0118 to 4D-0110)	• Water level ~25%. (water level below liner termination) • Water marks on pipe show flow line typically 50% full. • Liner termination not visible for entire reach due to slime layer/scaling on pipe walls and high water level. • Fogging/misting reduces video clarity for majority of segment.	• Unable to see liner termination or unlined concrete due to slime layer/scaling on pipe walls. Condition of pipe unknown based on CCTV inspection. Refer to condition assessment results from man-entry inspections of 4D-0180. • Liner blistering throughout majority of pipe segment. • Manholes 4D-0118 and 4D-0110 appear to be in good condition.
4D-0110	4D-0100	• Length surveyed: 462 ft • Pipe length: 462 ft • Direction of survey: D/S (4D-0110 to 4D-0100)	• Water level ~25%. (water level below liner termination) • Water marks on pipe show flow line typically 40% full. • Fogging/misting reduces video clarity after 80 ft • Liner termination not visible for entire reach due to slime layer/scaling on pipe walls.	• Unable to see liner termination or unlined concrete due to slime layer/scaling on pipe walls. Condition of pipe unknown based on CCTV inspection. • Liner blistering throughout majority of pipe segment. • Liner blistering in manhole cone and barrel in 4D-0110. • Manholes 4D-0110 and 4D-0100 appear to be in good condition.
4D-0100	4D-0090	• Length surveyed: 445 ft • Pipe length: 445 ft • Direction of survey: U/S (4D-0090 to 4D-0100)	• Water level ~10%. (water level below liner termination) • Water marks on pipe show flow line typically 40% full. • Liner termination not visible for a majority of reach due to slime layer/scaling on pipe walls.	• Continuous visible aggregate at liner termination on right side at 23 ft – 25 ft. No visible rebar. • Visible aggregate point defect at liner termination on right-side at 74 ft. No visible rebar • Visible aggregate point defect at liner termination on left-side at 174 ft. No visible rebar. • Unable to see liner termination or unlined concrete for a majority of segment due to slime layer/scaling on pipe walls. • Liner blistering throughout majority of pipe segment. • Manholes 4D-0100 and 4D-0090 appear to be in good condition.
4D-0090	4D-0080	• Length surveyed: 1,213 ft	• Water level ~10%. (water level below liner termination)	• Liner detached and folded over at 4 o'clock on pipe joint at 264 ft. Approximately 4 to 6-inches long.

U/S Manhole	D/S Manhole	Inspection Information	CCTV General Comments	Condition Summary
		• Pipe length: 1,213 ft • Direction of survey: D/S (4D-0090 to 4D-0080)	• Water marks on pipe show flow line typically 25% full • Liner termination not visible for approximately 50% of reach due to slime layer/scaling on pipe walls.	• Visible aggregate point defect at liner termination on right side at 415 ft and 638 ft. No visible rebar. • Aggregate loss point defect at liner termination on right side at 604 ft. No visible rebar. • Continuous visible aggregate at liner termination on right side at 580 ft – 587 ft, 600 ft – 610 ft, 820 – 835 ft, 896 ft – 902 ft, 1165 ft – 1199 ft. No visible rebar. • Continuous visible aggregate at liner termination on left side at 850 ft – 868 ft, 1170 ft – 1200 ft. No visible rebar. • Appears to be a roughly 1-inch wide hole approximately 1-inches to 2-inches deep at liner termination on left side at 864 ft. No visible rebar. • Liner blistering throughout majority of pipe segment. • Liner blistering in manhole cone and barrel in 4D-0090 and 4D-0080. • Manholes 4D-0080 and 4D-0090 appear to be in good condition.
4D-0080	4D-0070	• Length surveyed: 951 ft • Pipe length: 951 ft • Direction of survey: D/S (4D-0080 to 4D-0070)	• Water level ~10%. (water level below liner termination) • Water marks on pipe show flow line typically 30% full. • Liner termination not visible for entire reach due to slime layer/scaling on pipe walls.	• Unable to see liner termination or unlined concrete due to slime layer/scaling on pipe walls. Condition of pipe unknown Condition of pipe unknown based on CCTV inspection. • Manholes 4D-0080 and 4D-0070 appear to be in good condition.
4D-0070	4D-0060	• Length surveyed: 567 ft • Pipe length: 796 ft • Direction of survey: D/S (4D-0070 to 4D-0060)	• Water level ~15%. (water level below liner termination) • Water marks on pipe show flow line typically 30% full. • Survey abandoned at Euclid grit trap (567 ft). No footage of manhole 4D-0060.	• Potential longitudinal groove with exposed aggregate at liner termination on left side from 0 ft – 370 ft, and 400 ft – 560 ft. Slime layer prohibits clear view of aggregate for verification. • Potential longitudinal groove with exposed aggregate at liner termination on right side for majority of segment. Slime layer prohibits clear view of aggregate for verification. • Liner blistering around pipe joints for majority of segment.
4D-0030	4D-0020	• Length surveyed: 1,579 ft • Pipe length: 1,579 ft • Direction of survey: D/S (4D-0030 to 4D-0020)	• Water level ~15%. (water level below liner termination) • Water marks on pipe show flow line typically 30% full. • Liner termination not visible for a majority of reach due to slime layer/scaling on pipe walls.	• Unable to see liner termination or unlined concrete due to slime layer/scaling on pipe walls. Condition of pipe unknown based on CCTV inspection. Refer to condition assessment results from man-entry inspections of 4D-0020. • Liner blistering around pipe joints for majority of segment. • Manholes 4D-0030 and 4D-0020 appear to be in good condition.
4D-0020	4D-0010	• Length surveyed: 233 ft • Pipe length: 233 ft • Direction of survey: D/S (4D-0020 to 4D-0010)	• Water level ~15%. (water level below liner termination) • Water marks on pipe show flow line typically 30% full. • Liner termination not visible for a majority of reach due to slime layer/scaling on pipe walls.	• Unable to see liner termination or unlined concrete due to slime layer/scaling on pipe walls. Condition of pipe unknown based on CCTV inspection. Refer to condition assessment results from man-entry inspections of 4D-0020. • Infiltration stain from 1 o'clock to 4 o'clock at 116 ft. • Liner blistering around pipe joints for majority of segment. • Manholes 4D-0020 and 4D-0010 appear to be in good condition.

APPENDIX C:

Rehabilitation Alternatives
Planning Level Cost Estimates

Santa Ana Watershed Project Authority
Brine Line Reach 4D
10-Year Rehabilitation Planning
Planning Level Construction Cost Estimate
Segmental Sliplining Alternative

1.20 Bidding Climate Factor

Bid Item No.	Estimated Qty	Unit	Bid Item Description	Unit Cost	Adjusted Unit Cost	Total Cost
1	1	LUMP SUM	MOBILIZATION / DEMOBILIZATION (5%)	$ 1,149,363	$ 1,379,236	$ 1,379,236
2	1	LUMP SUM	TRAFFIC CONTROL	$ 1,609,108	$ 1,930,930	$ 1,930,930
3	1	ALLOWANCE	PERMITTING	$ 10,000	$ 12,000	$ 12,000
4	1	LUMP SUM	WATER POLLUTION CONTROL WORK (INCLUDING SWPPP)	$ 10,000	$ 12,000	$ 12,000
5	1	LUMP SUM	POTHOLING	$ 81,000	$ 97,200	$ 97,200
6	1	LUMP SUM	SANITARY SEWER BYPASS	$ 4,352,250	$ 5,222,700	$ 5,222,700
7	27	EACH	ACCESS PITS FOR SLIPLINING	$ 19,200	$ 23,040	$ 622,080
8	35,461	LINEAR FOOT	SLIPLINING INSTALLATION OF 36-INCH HDPE	$ 400	$ 480	$ 17,021,280
				SUBTOTAL		**$ 26,298,000**
			PLANNING LEVEL CONTINGENCY (30% OF BID ITEMS)	30%		$ 7,889,400
				TOTAL		**$ 34,187,400**

Santa Ana Watershed Project Authority
Brine Line Reach 4D
10-Year Rehabilitation Planning
Planning Level Construction Cost Estimate
Continuous Slip Lining Alternative

1.20 Bidding Climate Factor

Bid Item No.	Estimated Qty	Unit	Bid Item Description	Unit Cost	Adjusted Unit Cost	Total Cost
1	1	LUMP SUM	MOBILIZATION / DEMOBILIZATION (5%)	$ 1,339,681	$ 1,607,617	$ 1,607,617
2	1	LUMP SUM	TRAFFIC CONTROL	$ 1,875,553	$ 2,250,663	$ 2,250,663
3	1	ALLOWANCE	PERMITTING	$ 10,000	$ 12,000	$ 12,000
4	1	LUMP SUM	WATER POLLUTION CONTROL WORK (INCLUDING SWPPP)	$ 10,000	$ 12,000	$ 12,000
5	1	LUMP SUM	POTHOLING	$ 81,000	$ 97,200	$ 97,200
6	1	LUMP SUM	SANITARY SEWER BYPASS	$ 5,803,000	$ 6,963,600	$ 6,963,600
7	27	EACH	ACCESS PITS FOR SLIPLINING	$ 17,280	$ 20,736	$ 559,872
8	35,461	LINEAR FOOT	SLIPLINING INSTALLATION OF 36-INCH VCP or HDPE	$ 450	$ 540	$ 19,148,940
				SUBTOTAL		**$ 30,652,000**
			PLANNING LEVEL CONTINGENCY (30% OF BID ITEMS)	30%		$ 9,195,600
				TOTAL		**$ 39,847,600**

Santa Ana Watershed Project Authority
Brine Line Reach 4D
10-Year Rehabilitation Planning
Planning Level Construction Cost Estimate
CIPP Alternative

1.20 Bidding Climate Factor

Bid Item No.	Estimated Qty	Unit	Bid Item Description	Unit Cost	Adjusted Unit Cost	Total Cost
1	1	LUMP SUM	MOBILIZATION / DEMOBILIZATION (5%)	$ 1,373,087	$ 1,647,704	$ 1,647,704
2	1	LUMP SUM	TRAFFIC CONTROL	$ 2,746,174	$ 3,295,408	$ 3,295,408
3	1	ALLOWANCE	PERMITTING	$ 10,000	$ 12,000	$ 12,000
4	1	LUMP SUM	WATER POLLUTION CONTROL WORK (INCLUDING SWPPP)	$ 10,000	$ 12,000	$ 12,000
5	1	LUMP SUM	POTHOLING	$ 40,500	$ 48,600	$ 48,600
6	1	LUMP SUM	SANITARY SEWER BYPASS	$ 5,803,000	$ 6,963,600	$ 6,963,600
7	35,461	LINEAR FOOT	CIPP LINING OF EXISTING 42-INCH PIPE	$ 480	$ 576	$ 20,425,536
				SUBTOTAL		**$ 32,405,000**
			PLANNING LEVEL CONTINGENCY (30% OF BID ITEMS)	30%		$ 9,721,500
				TOTAL		**$ 42,126,500**

Santa Ana Watershed Project Authority
Brine Line Reach 4D
10-Year Rehabilitation Planning
Planning Level Construction Cost Estimate
Segmental Sliplining Alternative

1.20 Bidding Climate Factor

Bid Item No.	Estimated Qty	Unit	Bid Item Description	Unit Cost	Adjusted Unit Cost	Total Cost
1	1	LUMP SUM	MOBILIZATION / DEMOBILIZATION (5%)	$ 1,149,363	$ 1,379,236	$ 1,379,236
2	1	LUMP SUM	TRAFFIC CONTROL	$ 1,609,108	$ 1,930,930	$ 1,930,930
3	1	ALLOWANCE	PERMITTING	$ 10,000	$ 12,000	$ 12,000
4	1	LUMP SUM	WATER POLLUTION CONTROL WORK (INCLUDING SWPPP)	$ 10,000	$ 12,000	$ 12,000
5	1	LUMP SUM	POTHOLING	$ 81,000	$ 97,200	$ 97,200
6	1	LUMP SUM	SANITARY SEWER BYPASS	$ 4,352,250	$ 5,222,700	$ 5,222,700
7	27	EACH	ACCESS PITS FOR SLIPLINING	$ 19,200	$ 23,040	$ 622,080
8	35,461	LINEAR FOOT	SLIPLINING INSTALLATION OF 36-INCH HDPE	$ 400	$ 480	$ 17,021,280
				SUBTOTAL		**$ 26,298,000**
			PLANNING LEVEL CONTINGENCY (30% OF BID ITEMS)	30%		$ 7,889,400
				TOTAL		**$ 34,187,400**

Santa Ana Watershed Project Authority
Brine Line Reach 4D
10-Year Rehabilitation Planning
Planning Level Construction Cost Estimate
Man-Entry Rehab Alternative

1.20 Bidding Climate Factor

Bid Item No.	Estimated Qty	Unit	Bid Item Description	Unit Cost	Adjusted Unit Cost	Total Cost
1	1	LUMP SUM	MOBILIZATION / DEMOBILIZATION (5%)	$ 2,157,891	$ 2,589,469	$ 2,589,469
2	1	LUMP SUM	TRAFFIC CONTROL	$ 3,021,047	$ 3,625,257	$ 3,625,257
3	1	ALLOWANCE	PERMITTING	$ 10,000	$ 12,000	$ 12,000
4	1	LUMP SUM	WATER POLLUTION CONTROL WORK (INCLUDING SWPPP)	$ 10,000	$ 12,000	$ 12,000
5	1	LUMP SUM	SANITARY SEWER BYPASS	$ 5,803,000	$ 6,963,600	$ 6,963,600
6	35,461	Linear Foot	MAN-ENTRY CONCRETE REPAIRS AND EPOXY/POLYURETHANE COATING	$ 850	$ 1,020	$ 36,170,220
				SUBTOTAL		**$ 49,373,000**
			PLANNING LEVEL CONTINGENCY (30% OF BID ITEMS)	30%		$ 14,811,900
				TOTAL		**$ 64,184,900**

APPENDIX D:

Spiral Wound ASTM F1741 Design Calculations

Fully Deteriorated Design

	Run No.	1	2	3	4	5
	Manhole No.	A to B	A to B	A to B	A to B	A to B
Design Information	Existing Pipe Diameter (in.)	42	42	42	42	42
	Annular Gap (in.)	-	-	-	-	-
	Liner External Diameter (in.)	42	42	42	42	42
	Liner Internal Diameter (in.)	40.3	40.3	39.0	39.0	39.0
	Depth to Invert of Existing (ft.)	25.0	20.0	16.7	10.0	6.0
	Cover Height above Crown of Existing (ft.)	21.5	16.5	13.2	6.5	2.5
	Cover Height above Crown of Liner (ft.)	21.5	16.5	13.2	6.5	2.5
	Water Table above Crown of Existing (ft.)	21.5	16.5	13.2	6.5	2.5
	Water Table above Crown of Liner (ft.)	21.5	16.5	13.2	6.5	2.5
	Soil Density (lb/ft^3)	120	120	120	120	120
	%Ovality	2	2	2	2	2
	Factor of Safety	2	2	2	2	2
	Modulus of Soil Reaction (psi)	1,000	1,000	1,000	1,000	1,000
Profile Details	Profile Type	91-22ROS-DEV	91-22ROS-DEV	91-37RO	91-37RO	91-37RO
	Steel Reinforcement	1.6 x 17.0	1.6 x 17.0	-	-	-
	Profile Height (in)	0.866	0.866	1.496	1.496	1.496
	Depth to Neutral Axis (in)	0.437	0.437	0.506	0.506	0.506
	Moment of Inertia (in^4/in)	N/A	N/A	0.07235	0.07235	0.07235
	Long Term Ring Bending Modulus (psi)	N/A	N/A	116,000	116,000	116,000
	Long Term Ring Stiffness (psi)	0.39	0.39	0.13	0.13	0.13
	Long Term Pipe Stiffness (psi)	20.95	20.95	7.03	7.03	7.03
Calculated Information	Water Buoyancy Factor	0.67	0.67	0.67	0.67	0.67
	Coefficient of Elastic Support	0.50	0.42	0.37	0.28	0.23
	Ovality Reduction Factor	0.84	0.84	0.84	0.84	0.84
	Impact Factor	1.10	1.10	1.10	1.10	1.29
Loading	Soil Pressure (psi)	12.00	9.21	7.37	3.63	1.40
	Hydrostatic Pressure (psi)	9.31	7.14	5.72	2.81	1.08
	Live Load on Pipe (psi) [using selected load case]	0.19	0.27	0.36	1.18	4.67
	Total External Pressure on Pipe (psi)	21.51	16.63	13.44	7.63	7.15
Design	Pipe External Pressure Capacity (psi)	27.10	24.83	13.48	11.63	10.56
	Design Check	OK	OK	OK	OK	OK
	Actual Factor of Safety	2.52	2.99	2.01	3.05	2.95

Hydraulic Information	Host Pipe Manning's Coefficient	0.012	0.012	0.012	0.012	0.012
	Liner Manning's Coefficient	0.009	0.009	0.009	0.009	0.009
	Slope of Line	0.0100	0.0100	0.0100	0.0100	0.0100
	Percentage Reduction in Area	8.08%	8.08%	13.74%	13.74%	13.74%
	Percentage Reduction in Diameter	4.12%	4.12%	7.12%	7.12%	7.12%
	Original Flow Capacity (ft3/s)	109	109	109	109	109
	Liner Flow Capacity (ft3/s)	130	130	119	119	119
	Percentage Change in Flow	19.17%	19.17%	9.48%	9.48%	9.48%

Cooper E80 Rail Load	Axle Load (lb)	80,000	80,000	80,000	80,000	80,000
	Length of Tie (ft)	8.5	8.5	8.5	8.5	8.5
	Tie Spacing (ft)	5.0	5.0	5.0	5.0	5.0
	Impact Factor	1.5	1.5	1.5	1.5	1.5
	Alpha	0.39	0.50	0.62	1.16	2.08
	Beta	(0.20)	(0.25)	(0.31)	(0.58)	(1.04)
	Applied Load (psi)	5	6	8	13	18

HS20 Wheel Load	Surface Dimension 1 (ft)	52	44	38	12	5
	Surface Dimension 2 (ft)	55	47	41	23	10
	Applied Load (lb)	80,000	80,000	80,000	48,000	32,000
	Impact Factor	1.00	1.00	1.00	1.00	1.10
	Adjusted Load (psi)	0.19	0.27	0.36	1.18	4.67

Boeing 747 Load	Surface Dimension 1 (ft)	72.9	42.2	37.4	27.7	9.3
	Surface Dimension 2 (ft)	47.7	40.5	25.6	15.9	10.1
	Applied Load (lb)	927,144	695,358	463,572	463,572	231,786
	Impact Factor	1.10	1.10	1.10	1.10	1.10
	Adjusted Load (psi)	2.04	3.11	3.70	8.05	18.90

Boeing 777 Load	Surface Dimension 1 (ft)	79.8	30.3	25.5	15.8	10.0
	Surface Dimension 2 (ft)	42.5	35.3	30.5	20.8	15.0
	Applied Load (lb)	718,725	359,363	359,363	359,363	359,363
	Impact Factor	1.10	1.10	1.10	1.10	1.10
	Adjusted Load (psi)	1.62	2.57	3.53	8.37	18.37

HS25 Wheel Load	Surface Dimension 1 (ft)	52	44	38	12	5
	Surface Dimension 2 (ft)	55	47	41	23	10
	Applied Load (lb)	100,000	100,000	100,000	60,000	40,000
	Impact Factor	1.00	1.00	1.00	1.00	1.10
	Adjusted Load (psi)	0.24	0.34	0.45	1.48	5.84

HS10 Wheel Load	Surface Dimension 1 (ft)	52	44	38	12	5
	Surface Dimension 2 (ft)	55	47	41	23	10
	Applied Load (lb)	40,000	40,000	40,000	24,000	16,000
	Impact Factor	1.00	1.00	1.00	1.00	1.10
	Adjusted Load (psi)	0.10	0.14	0.18	0.59	2.34

Wheel Load Summary (psi)	N/A	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	HS10	*0.10*	*0.14*	*0.18*	*0.59*	*2.34*
	HS20	*0.19*	*0.27*	*0.36*	*1.18*	*4.67*
	HS25	*0.24*	*0.34*	*0.45*	*1.48*	*5.84*
	Cooper E80	*4.81*	*6.16*	*7.53*	*12.95*	*18.43*
	B747	*2.04*	*3.11*	*3.70*	*8.05*	*18.90*
	B777	*1.62*	*2.57*	*3.53*	*8.37*	*18.37*
	Custom	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*

Detailed Calcs FD (US)

Run Number	1

Fully Deteriorated Design Condition (ASTM F1741 Appendix X1.2.2)

1. Design Information

Existing Pipe Internal Diameter, D_e =	42.00	in
Depth to Invert of Existing Pipe, H_i =	25.00	ft
Cover Height above Crown of Existing Pipe, H_e =	21.50	ft
Water Table above Crown of Existing Pipe, H_{we} =	21.50	ft
Soil Density, w =	120.00	pcf
Ovality of Existing Pipe, q =	2.00	%
Minimum Factor of Safety, N =	2.00	
Modulus of Soil Reaction, E'_s =	1000.00	psi

2. Profile Details

Profile Type =	91-22ROS-DEV	
Steel Reinforcement thickness, or option =	1.6 x 17.0	mm
Profile Height, t =	0.87	in
Depth to Neutral Axis, t_{NA} =	0.44	in
Moment of Inertia, I =	N/A	in^4/in
Long term modulus of Elasticity of Plastic Profile, E_L	N/A	psi
Long Term Ring Stiffness of Pipe, RS_L =	0.39	psi

3. Calculated Information

Water Buoyancy Factor

$$R_w = 1 - 0.33\left(\frac{H_{we}}{H_e}\right); (0.67 \min)$$

Where:
Hwe = 21.50 ft
He = 22 ft

R_w = 0.67

Coefficient of Elastic Support

$$B' = \frac{1}{1 + 4e^{-0.065 H_e}}$$

Where:
He = 22 ft

B' = 0.50

Detailed Calcs FD (US)

Ovality Reduction Factor

$$C = \left[\frac{1 - q/100}{\left(1 + q/100\right)^2} \right]^3$$

Where:
q = 2 %

C = 0.84

Impact Factor

$$\alpha = 1.4 - 0.15\left(H_e \times 0.3048\right); \left(1.1 \min\right)$$

Where:
H_e = 22 ft

$\alpha =$ 1.10

4. Loading

Soil Pressure

$$q_s = wH_e R_w / 144$$

Where:
H_e = 22 ft
R_w = 0.67

q_s = 12.00 psi

Hydrostatic Pressure

$$q_w = 0.433\, H_{we}$$

Where:
H_{we} = 22 ft

q_{we} = 9.31 psi

Vehicular Loading (see HS20 Loading for this line)

HS20 Loading

$$w_q = \frac{\Sigma P \alpha}{L_1 \times L_2 \times 144}$$

Where:
$\Sigma P =$ 80000.00 lbs
L_1 = 52.46 ft
L_2 = 55.29 ft
$\alpha =$ 1.00

w_q = 0.19 psi

Detailed Calcs FD (US)

Cooper E80 Rail Load (not applicable for this line)
(Model as strip load using Boussinesq distribution Table C-1 COE EM 1110)

$w_q = \sigma_P /144 = (q*I_f/\pi)*(\alpha+\sin(\alpha)*\cos(\alpha+2*\beta)/144$

Where:

$q =$	80000.00	psf	
$I_f =$	1.50		Mandated as per AREMA
$\alpha =$	0.39		$\alpha = \mathrm{ATan}((x+L_T/2)/H_{SC}) - \beta$
$\beta =$	-0.20		$\beta = \mathrm{ATan}((x-L_T/2)/H_{SC})$

$w_q =$ 4.81 psi

Total External Pressure on Pipe

$$q'_t = q_s + q_w + w_L$$

$q'_t =$ 21.51 psi

5. Design

Pipe External Pressure Capacity

$$q_t = \frac{C}{N}\sqrt{\left[32 \times R_w \times B' \times E'_s \times \left(\frac{E_L I}{D^3}\right)\right]}$$

Where:

C =	0.84	
N =	2	
Rw =	0.67	
B' =	0.50	
E's =	1,000	psi

$\frac{E_L I}{D^3} =$ Long Term Ring Stiffness, RSL

$=$ 0.390 psi

$q_t =$ 27.10 psi

Design Check

$q_t > q'_t$ = OK

ie. 27.10 >21.51 = OK

Actual Factor of Safety

$N_{actual} =$ (qt x N) / q't

$N_{actual} =$ 2.5

Detailed Calcs FD (US)

Run Number 2

Fully Deteriorated Design Condition (ASTM F1741 Appendix X1.2.2)

1. Design Information

Existing Pipe Internal Diameter, D_e =	42.00	in
Depth to Invert of Existing Pipe, H_i =	20.00	ft
Cover Height above Crown of Existing Pipe, H_e =	16.50	ft
Water Table above Crown of Existing Pipe, H_{we} =	16.50	ft
Soil Density, w =	120.00	pcf
Ovality of Existing Pipe, q =	2.00	%
Minimum Factor of Safety, N =	2.00	
Modulus of Soil Reaction, E'_s =	1000.00	psi

2. Profile Details

Profile Type =	91-22ROS-DEV	
Steel Reinforcement thickness, or option =	1.6 x 17.0	mm
Profile Height, t =	0.87	in
Depth to Neutral Axis, t_{NA} =	0.44	in
Moment of Inertia, I =	N/A	in^4/in
Long term modulus of Elasticity of Plastic Profile, E_L	N/A	psi
Long Term Ring Stiffness of Pipe, RS_L =	0.39	psi

3. Calculated Information

Water Buoyancy Factor

$$R_w = 1 - 0.33\left(\frac{H_{we}}{H_e}\right); (0.67\,\mathrm{min})$$

Where:
Hwe = 16.50 ft
He = 17 ft

R_W = 0.67

Coefficient of Elastic Support

$$B' = \frac{1}{1 + 4e^{-0.065\,H_e}}$$

Where:
He = 17 ft

B' = 0.42

Detailed Calcs FD (US)

Ovality Reduction Factor

$$C = \left[\frac{1 - q/100}{\left(1 + q/100\right)^2} \right]^3$$

Where:
q = 2 %

C = 0.84

Impact Factor

$$\alpha = 1.4 - 0.15\left(H_e \times 0.3048\right); \left(1.1 \min\right)$$

Where:
H_e = 17 ft

$\alpha =$ 1.10

4. Loading

Soil Pressure

$$q_s = wH_e R_w / 144$$

Where:
H_e = 17 ft
R_w = 0.67

q_s = 9.21 psi

Hydrostatic Pressure

$$q_w = 0.433\, H_{we}$$

Where:
H_{we} = 17 ft

q_{we} = 7.14 psi

Vehicular Loading (see HS20 Loading for this line)

HS20 Loading

$$w_q = \frac{\Sigma P \alpha}{L_1 \times L_2 \times 144}$$

Where:
$\Sigma P =$ 80000.00 lbs
$L_1 =$ 43.71 ft
$L_2 =$ 46.54 ft
$\alpha =$ 1.00

$w_q =$ 0.27 psi

Detailed Calcs FD (US)

Cooper E80 Rail Load (not applicable for this line)
(Model as strip load using Boussinesq distribution Table C-1 COE EM 1110)

$w_q = \sigma_P /144 = (q*I_f/\pi)*(\alpha+\sin(\alpha)*\cos(\alpha+2*\beta)/144$

Where:

$q =$	80000.00	psf	
$I_f =$	1.50		Mandated as per AREMA
$\alpha =$	0.50		$\alpha = \text{ATan}((x+L_T/2)/H_{SC}) - \beta$
$\beta =$	-0.25		$\beta = \text{ATan}((x-L_T/2)/H_{SC})$

$w_q =$ 6.16 psi

Total External Pressure on Pipe

$$q'_t = q_s + q_w + w_L$$

$q'_t =$ 16.63 psi

5. Design

Pipe External Pressure Capacity

$$q_t = \frac{C}{N}\sqrt{\left[32 \times R_w \times B' \times E'_s \times \left(\frac{E_L I}{D^3}\right)\right]}$$

Where:

C =	0.84	
N =	2	
Rw =	0.67	
B' =	0.42	
E's =	1,000	psi
$\frac{E_L I}{D^3} =$	Long Term Ring Stiffness, RSL	
=	0.390	psi

$q_t =$ 24.83 psi

Design Check

$q_t > q'_t$ = OK

ie. 24.83 >16.63 = OK

Actual Factor of Safety

$N_{actual} =$ (qt x N) / q't

$N_{actual} =$ 3.0

Detailed Calcs FD (US)

Run Number	3

Fully Deteriorated Design Condition (ASTM F1741 Appendix X1.2.2)

1. Design Information

Existing Pipe Internal Diameter, D_e =	42.00	in
Depth to Invert of Existing Pipe, H_i =	16.70	ft
Cover Height above Crown of Existing Pipe, H_e =	13.20	ft
Water Table above Crown of Existing Pipe, H_{we} =	13.20	ft
Soil Density, w =	120.00	pcf
Ovality of Existing Pipe, q =	2.00	%
Minimum Factor of Safety, N =	2.00	
Modulus of Soil Reaction, E'_s =	1000.00	psi

2. Profile Details

Profile Type =	91-37RO	
Steel Reinforcement thickness, or option =	-	mm
Profile Height, t =	1.50	in
Depth to Neutral Axis, t_{NA} =	0.51	in
Moment of Inertia, I =	0.07	in^4/in
Long term modulus of Elasticity of Plastic Profile, E_L	116000.00	psi
Long Term Ring Stiffness of Pipe, RS_L =	0.13	psi

3. Calculated Information

Water Buoyancy Factor

$$R_w = 1 - 0.33\left(\frac{H_{we}}{H_e}\right); (0.67\,\text{min})$$

Where:
Hwe = 13.20 ft
He = 13 ft

R_W = 0.67

Coefficient of Elastic Support

$$B' = \frac{1}{1 + 4e^{-0.065\,H_e}}$$

Where:
He = 13 ft

B' = 0.37

Project Owner: SAWPA Brine Line Reach 4D
Project Location: Southern California
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Detailed Calcs FD (US)

Ovality Reduction Factor

$$C = \left[\frac{1 - q/100}{\left(1 + q/100\right)^2} \right]^3$$

Where:
q = 2 %

C = 0.84

Impact Factor

$$\alpha = 1.4 - 0.15\left(H_e \times 0.3048\right); \left(1.1 \min\right)$$

Where:
H_e = 13 ft

$\alpha =$ 1.10

4. Loading

Soil Pressure

$$q_s = wH_e R_w / 144$$

Where:
H_e = 13 ft
R_w = 0.67

q_s = 7.37 psi

Hydrostatic Pressure

$$q_w = 0.433\, H_{we}$$

Where:
H_{we} = 13 ft

q_{we} = 5.72 psi

Vehicular Loading (see HS20 Loading for this line)

HS20 Loading

$$w_q = \frac{\Sigma P \alpha}{L_1 \times L_2 \times 144}$$

Where:
$\Sigma P =$ 80000.00 lbs
L_1 = 37.93 ft
L_2 = 40.77 ft
$\alpha =$ 1.00

w_q = 0.36 psi

Detailed Calcs FD (US)

Cooper E80 Rail Load (not applicable for this line)
(Model as strip load using Boussinesq distribution Table C-1 COE EM 1110)

$w_q = \sigma_P /144 = (q*I_f/\pi)*(\alpha+\sin(\alpha)*\cos(\alpha+2*\beta)/144$

Where:

q =	80000.00	psf	
I_f =	1.50		Mandated as per AREMA
α =	0.62		$\alpha = ATan((x+L_T/2)/H_{SC}) - \beta$
β =	-0.31		$\beta = ATan((x-L_T/2)/H_{SC})$

w_q = 7.53 psi

Total External Pressure on Pipe

$$q'_t = q_s + q_w + w_L$$

q'_t = 13.44 psi

5. Design

Pipe External Pressure Capacity

$$q_t = \frac{C}{N}\sqrt{\left[32 \times R_w \times B' \times E'_s \times \left(\frac{E_L I}{D^3}\right)\right]}$$

Where:

C =	0.84	
N =	2	
Rw =	0.67	
B' =	0.37	
E's =	1,000	psi
$\frac{E_L I}{D^3}$ =	Long Term Ring Stiffness, RSL	
=	0.131	psi

q_t = 13.48 psi

Design Check

$q_t > q'_t$ = OK

ie. 13.48 >13.44 = OK

Actual Factor of Safety

N_{actual} = (qt x N) / q't

N_{actual} = 2.0

Detailed Calcs FD (US)

Run Number 4

Fully Deteriorated Design Condition (ASTM F1741 Appendix X1.2.2)

1. Design Information

Existing Pipe Internal Diameter, D_e =	42.00	in
Depth to Invert of Existing Pipe, H_i =	10.00	ft
Cover Height above Crown of Existing Pipe, H_e =	6.50	ft
Water Table above Crown of Existing Pipe, H_{we} =	6.50	ft
Soil Density, w =	120.00	pcf
Ovality of Existing Pipe, q =	2.00	%
Minimum Factor of Safety, N =	2.00	
Modulus of Soil Reaction, E'_s =	1000.00	psi

2. Profile Details

Profile Type =	91-37RO	
Steel Reinforcement thickness, or option =	-	mm
Profile Height, t =	1.50	in
Depth to Neutral Axis, t_{NA} =	0.51	in
Moment of Inertia, I =	0.07	in^4/in
Long term modulus of Elasticity of Plastic Profile, E_L	116000.00	psi
Long Term Ring Stiffness of Pipe, RS_L =	0.13	psi

3. Calculated Information

Water Buoyancy Factor

$$R_w = 1 - 0.33\left(\frac{H_{we}}{H_e}\right); (0.67\,\mathrm{min})$$

Where:
Hwe = 6.50 ft
He = 7 ft

R_W = 0.67

Coefficient of Elastic Support

$$B' = \frac{1}{1 + 4e^{-0.065\,H_e}}$$

Where:
He = 7 ft

B' = 0.28

Detailed Calcs FD (US)

Ovality Reduction Factor

$$C = \left[\frac{1 - q/100}{\left(1 + q/100\right)^2} \right]^3$$

Where:
q = 2 %

C = 0.84

Impact Factor

$$\alpha = 1.4 - 0.15\left(H_e \times 0.3048\right); \left(1.1 \min\right)$$

Where:
H_e = 7 ft

$\alpha =$ 1.10

4. Loading

Soil Pressure

$$q_s = wH_e R_w / 144$$

Where:
H_e = 7 ft
R_w = 0.67

q_s = 3.63 psi

Hydrostatic Pressure

$$q_w = 0.433\,H_{we}$$

Where:
H_{we} = 7 ft

q_{we} = 2.81 psi

Vehicular Loading (see HS20 Loading for this line)

HS20 Loading

$$w_q = \frac{\Sigma P \alpha}{L_1 \times L_2 \times 144}$$

Where:
$\Sigma P =$ 48000.00 lbs
$L_1 =$ 12.21 ft
$L_2 =$ 23.04 ft
$\alpha =$ 1.00

$w_q =$ 1.18 psi

Detailed Calcs FD (US)

Cooper E80 Rail Load (not applicable for this line)
(Model as strip load using Boussinesq distribution Table C-1 COE EM 1110)

$w_q = \sigma_P/144 = (q*I_f/\pi)*(\alpha+\sin(\alpha)*\cos(\alpha+2*\beta)/144$

Where:

q =	80000.00	psf	
I_f =	1.50		Mandated as per AREMA
α =	1.16		$\alpha = \mathrm{ATan}((x+L_T/2)/H_{SC}) - \beta$
β =	-0.58		$\beta = \mathrm{ATan}((x-L_T/2)/H_{SC})$

w_q = 12.95 psi

Total External Pressure on Pipe

$$q'_t = q_s + q_w + w_L$$

q'_t = 7.63 psi

5. Design

Pipe External Pressure Capacity

$$q_t = \frac{C}{N}\sqrt{\left[32 \times R_w \times B' \times E'_s \times \left(\frac{E_L I}{D^3}\right)\right]}$$

Where:

C =	0.84	
N =	2	
Rw =	0.67	
B' =	0.28	
E's =	1,000	psi
$\frac{E_L I}{D^3}$ =	Long Term Ring Stiffness, RSL	
=	0.131	psi

q_t = 11.63 psi

Design Check

$q_t > q'_t$ = OK

ie. 11.63 >7.63 = OK

Actual Factor of Safety

N_{actual} = (qt x N) / q't

N_{actual} = 3.1

Detailed Calcs FD (US)

Run Number	5

Fully Deteriorated Design Condition (ASTM F1741 Appendix X1.2.2)

1. Design Information

Existing Pipe Internal Diameter, D_e =	42.00	in
Depth to Invert of Existing Pipe, H_i =	6.00	ft
Cover Height above Crown of Existing Pipe, H_e =	2.50	ft
Water Table above Crown of Existing Pipe, H_{we} =	2.50	ft
Soil Density, w =	120.00	pcf
Ovality of Existing Pipe, q =	2.00	%
Minimum Factor of Safety, N =	2.00	
Modulus of Soil Reaction, E'_s =	1000.00	psi

2. Profile Details

Profile Type =	91-37RO	
Steel Reinforcement thickness, or option =	-	mm
Profile Height, t =	1.50	in
Depth to Neutral Axis, t_{NA} =	0.51	in
Moment of Inertia, I =	0.07	in^4/in
Long term modulus of Elasticity of Plastic Profile, E_L	116000.00	psi
Long Term Ring Stiffness of Pipe, RS_L =	0.13	psi

3. Calculated Information

Water Buoyancy Factor

$$R_w = 1 - 0.33\left(\frac{H_{we}}{H_e}\right); (0.67\,\mathrm{min})$$

Where:

Hwe =	2.50	ft
He =	3	ft

R_W = 0.67

Coefficient of Elastic Support

$$B' = \frac{1}{1 + 4e^{-0.065\,H_e}}$$

Where:

He = 3 ft

B' = 0.23

Project Owner: SAWPA Brine Line Reach 4D
Project Location: Southern California
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Detailed Calcs FD (US)

Ovality Reduction Factor

$$C = \left[\frac{1 - q/100}{\left(1 + q/100\right)^2} \right]^3$$

Where:
q = 2 %

C = 0.84

Impact Factor

$$\alpha = 1.4 - 0.15(H_e \times 0.3048); (1.1 \min)$$

Where:
H_e = 3 ft

$\alpha =$ 1.29

4. Loading

Soil Pressure

$$q_s = wH_e R_w / 144$$

Where:
H_e = 3 ft
R_w = 0.67

q_s = 1.40 psi

Hydrostatic Pressure

$$q_w = 0.433 H_{we}$$

Where:
H_{we} = 3 ft

q_{we} = 1.08 psi

Vehicular Loading (see HS20 Loading for this line)

HS20 Loading

$$w_q = \frac{\Sigma P \alpha}{L_1 \times L_2 \times 144}$$

Where:
$\Sigma P =$ 32000.00 lbs
$L_1 =$ 5.21 ft
$L_2 =$ 10.04 ft
$\alpha =$ 1.10

$w_q =$ 4.67 psi

Detailed Calcs FD (US)

Cooper E80 Rail Load (not applicable for this line)
(Model as strip load using Boussinesq distribution Table C-1 COE EM 1110)

$w_q = \sigma_P / 144 = (q*I_f/\pi)*(\alpha+\sin(\alpha)*\cos(\alpha+2*\beta)/144$

Where:

$q =$	80000.00	psf	
$I_f =$	1.50		Mandated as per AREMA
$\alpha =$	2.08		$\alpha = \text{ATan}((x+L_T/2)/H_{SC}) - \beta$
$\beta =$	-1.04		$\beta = \text{ATan}((x-L_T/2)/H_{SC})$

$w_q =$ 18.43 psi

Total External Pressure on Pipe

$$q'_t = q_s + q_w + w_L$$

$q'_t =$ 7.15 psi

5. Design

Pipe External Pressure Capacity

$$q_t = \frac{C}{N}\sqrt{\left[32 \times R_w \times B' \times E'_s \times \left(\frac{E_L I}{D^3}\right)\right]}$$

Where:

C =	0.84	
N =	2	
Rw =	0.67	
B' =	0.23	
E's =	1,000	psi

$\frac{E_L I}{D^3} =$ Long Term Ring Stiffness, RSL

$=$ 0.131 psi

$q_t =$ 10.56 psi

Design Check

$q_t > q'_t$ = OK

ie. 10.56 >7.15 = OK

Actual Factor of Safety

$N_{actual} =$ (qt x N) / q't

$N_{actual} =$ 3.0

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SAWPA Brine Line Reach 4D Work Plan

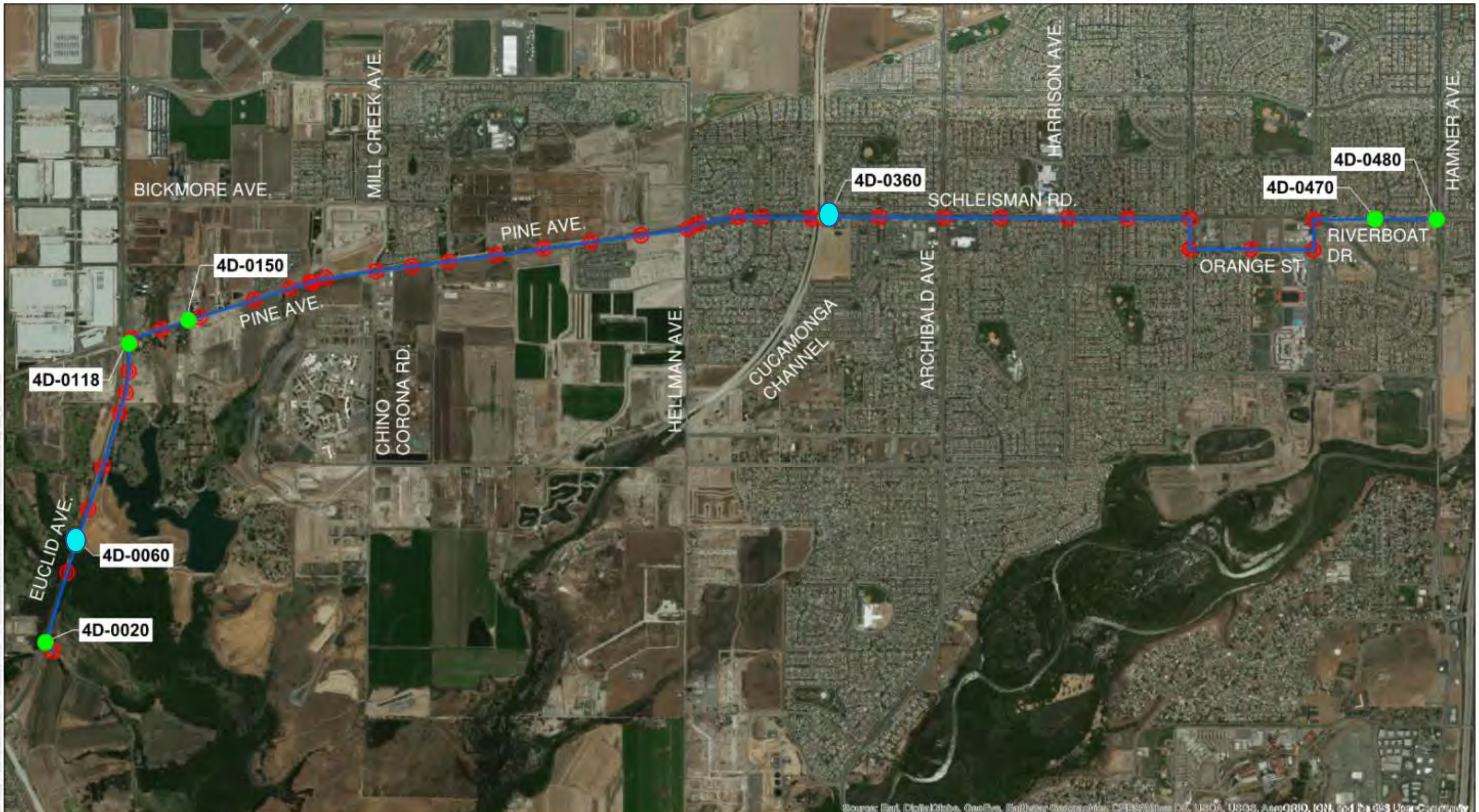
Commission Meeting

October 16, 2018

WOODARD & CURRAN

Reach 4D Contracts 1 and 2 System Overview

- 7 Miles long
- Within cities of Chino and Eastvale.
- 42” RCP with 270 degree T-Lock
- Built in 1990



LEGEND

- MANHOLE
- MANHOLE RECOMMENDED FOR TESTING IN FIVE YEARS
- BRINE LINE REACH 4D PIPELINE
- INSPECTION MANHOLE/RECOMMENDED FOR TESTING IN FIVE YEARS

SAWPA BRINELINE REACH 4D

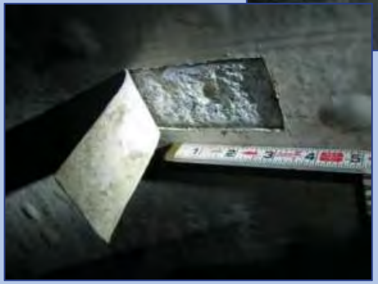
INSPECTION MANHOLES/MANHOLES RECOMMENDED FOR MAN-ENTRY PHYSICAL TESTING IN FIVE YEARS

N

WOODARD &CURRAN

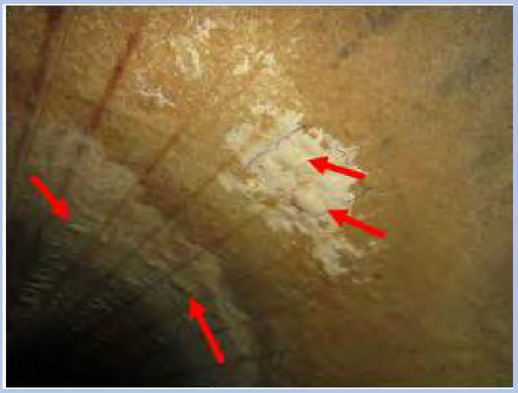
Summary of Man-Entry Physical Inspection Tests

Man-Entry Tests	Location(s) Performed in Pipe	Location(s) Performed in MAS
Tactile Testing	At the concrete/liner interface.	None
Visual Assessment	• At the concrete/liner interface. • Behind the liner near the crown and below the spring line.	• Rim • Cone • Walls • Bench • Main pipe connection • Lateral penetrations • Channel
Concrete Sounding	• At the concrete/liner interface, if above water level. • Behind the liner near the crown and below the spring line.	Unlined concrete channel, if above water level.
Concrete Penetration Testing	• At the concrete/liner interface, if above water level. • Behind the liner near the crown and below the spring line.	This test was not performed inside the maintenance access structures.
Concrete Surface pH Testing	Behind the liner near the crown and below the spring line.	This test was not performed inside the maintenance access structures.
Surface Penetrating Radar	Behind the liner near the crown and below the spring line.	Walls



Summary of Man-Entry Investigation Results

MH[a]	Liner				Concrete		General	
	Blisters / Bulges	Failed Weld Strips	Termination Undermined	Termination Unembedded	Exposed Aggregate	Exposed Rebar	Slime Layer	Debris
4D-0020	X	X	X				X	
4D-0118	X	X	X		X		X	X
4D-0150	X		X	X	X		X	X
4D-0470	X		X	X	X	X	X	
4D-0480							X	



Man-Entry Investigation Results – Concrete Deterioration

MH	D-Load Design Req. (psi)[a]	Assumed Pipe Class[b]	Assumed Wall Thickness (in.)[b]	Assumed Min. Concrete Cover (in.)[b]	Assumed Min. Circumferential Rebar Spacing (in.)[b]
4D-0020	3,500	V			
4D-0118	2,250	IV			
4D-0150	2,800	IV	5.25	1.00	3.94
4D-0470	1,700	III			
4D-0480	1,700	III			

MH	Liner		Concrete	
	Termination Condition	Uplifted Liner Length (in.)[a]	Deterioration Depth (in.)	VANDA Rating
4D-0020	Embedded, yet undermined.	n/a	½	2
4D-0118	Embedded, yet undermined.	n/a	3/8	2
4D-0150	Uplifted and undermined.	1	½ – 1	3
4D-0470	Uplifted and undermined.	2	½ – 1	3
4D-0480	Embedded, yet undermined.	n/a	0	1

Summary of CCTV Field Investigation Extents

- ~26,500 feet of 42-inch brine line inspected out of ~35,200 feet of total brine line in Reach 4D. (75%)
- Liner/pipe interface visible in ~6,500 feet of pipe.
- 19% of the total length of Reach 4D was visible during CCTV inspections.
- Reason?:
  - Major reason: Slime layer
  - Minor reason: High flows
- Detailed summary available.

Summary of CCTV Investigation Results

- More uniformity in conditions than man-entry inspections.
- Rotated liner present in 7 reaches. Rotation varies from 1-6 inches. Corrosion not consistent at 3 O'clock and 9 O'clock positions.
- Minor concrete loss with visible aggregate (groove) along much of liner/concrete interface where visible.

Remaining Useful Life

Based on a combination of man-entry and CCTV inspection results, the 42-inch pipe has an estimated predicated remaining useful life of 10-20 years.

<u>However:</u>

- Rate of deterioration is unknown.
- Available data is from one point in time.
- Useful to compare existing data with data from a future inspection to characterize rate of deterioration and further refine remaining useful life at the five-year mark.

Flow conditions were different in 1990

- When first installed, low flow level exposed unlined concrete to sulfuric acid causing corrosion at the interface of lined and unlined concrete.

Preliminary Suggested Recommendations

<u>Near-Term:</u>

- Man-entry inspections at MAS 4D-0060 and 4D-0360
  - MAS 4D-0060 is immediately upstream of 600 foot-long sewer siphon crossing Chino Creek on Euclid Avenue.
  - MAS 4D-0360 is immediately upstream of 400 foot-long sewer siphon crossing Cucamonga Channel on Schleisman Road.
  - Same tests as completed for recent man-entry inspections plus visual inspection of air jumpers.
  - Provides a baseline for future inspections.
- Clean and CCTV segment of pipe between MAS 4D-0240 and 4D-0250
  - Most liner uplift observed (65% of 1,020 foot segment televised)
  - Remove slime layer
  - Provides a baseline for future inspections.

Time Frame = Within 1 Year of Work Plan

Estimated Cost = $49,000

Preliminary Suggested Recommendations

Mid-Term:

- Clean entire 7 miles of pipe to remove the existing slime layer prior to inspection.
- System shut-down similar to the shut-down completed for the initial inspection (June 2018) to lower water levels in the pipeline as much as possible.
- Man-entry physical testing at the same five locations as completed in June 2018 as well as two additional locations at siphon inlet structures located at MH 4D-0060 an MH 4D-0360.
- CCTV inspection of 7 miles of pipe.
- Re-assess remaining useful life
- Define rehabilitation project boundaries (as necessary)
- Project prioritization

Time Frame = In 5 Years

Estimated Cost = $468,000

Preliminary Suggested Recommendations

<u>Long-Term:</u>

- Rehabilitate pipeline within boundaries as identified with Mid-Term inspections using CIPP liner.
- Assumed full 7 miles for purposes of worst case scenario budgeting.
  - Not including 360-degree PVC lined RCP installed in 2011
  - Not including the two siphons

Time Frame = 10 to 20 years (depending on results of Mid-Term Inspections)

Estimated Cost: $42.1 Million

Rehabilitation Alternatives Evaluated and Criteria Used for Evaluation

<u>Rehabilitation Alternatives:</u>

- Segmental Sliplining
- Continuous Sliplining
- Cured-In-Place Pipe Lining
- Spiral Wound Pipe
- Man-Entry Repairs

<u>Evaluation Criteria:</u>

- Constructability/Work Area Requirements
- Impacts to Hydraulic Capacity
- Traffic Impacts/Public Disruption
- Regulatory/Permitting
- Planning Level Cost
- Risk of SSO
- Solution Longevity

QUESTIONS?

Man-Entry Investigation Results – Manholes

MH[a]	Rim	Cone	Walls	Bench	Main Pipe Connection	Lateral Penetrations	Channel
4D-0020	Moderate corrosion	Liner in good condition	Liner in good condition	Liner unembedded, yet covering concrete	Good condition	Good condition	Slime layer. Exposed concrete aggregate.
4D-0118	Liner termination loose	Failed liner weld strips	Liner in good condition	Liner unembedded, yet covering concrete	Good condition	Encrustation	Slime layer. Exposed concrete aggregate.
4D-0150	Good condition	Liner in good condition	Minor liner blisters	Liner unembedded, yet covering concrete	Good condition	Good condition	Slime layer. Exposed concrete aggregate.
4D-0470	Good condition	Minor hole in liner	Liner blisters and bulges	Liner unembedded, yet covering concrete	Good condition	Cuts in liner due to CCTV crawler camera cable	Slime layer. Exposed rebar.
4D-0480	Good condition	Liner in good condition	Liner in good condition	Liner in good condition	Good condition	Good condition	Channel lined and in good condition

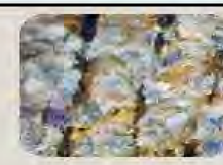
Deterioration Rating System Used in Analysis

Practical rating:

- Established and proven VANDA rating system

Professional judgement based on:

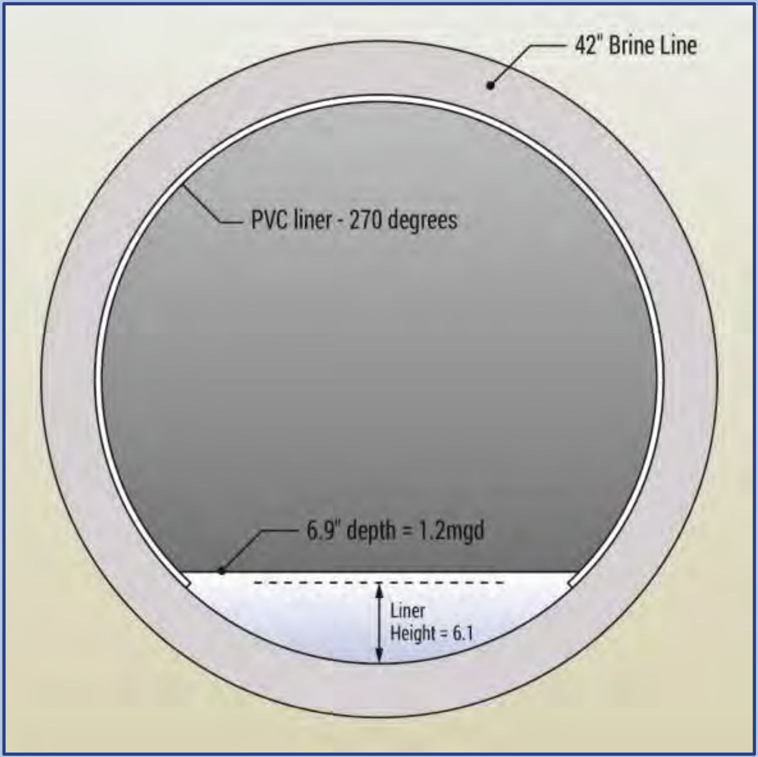
- Current and future system operation
- Extent of observed damage
- Damage location

Condition Rating	Description	Representative Photograph
Level 1	**None/Minimal Damage to Concrete** • Hardness: No Loss • Surface Profile: No Loss • Cracking: Shrinkage Cracks • Spalling: None • Reinforcing Steel (Rebar): Not Exposed or Damaged	
Level 2	**Damage to Concrete Mortar** • Hardness: Damage to Concrete Mortar • Surface Profile: Some Loss • Cracking: Thumbnail Sized Cracks of Minimal Frequency • Spalling: Shallow Spalling of Minimal Frequency, Related Rebar Damage • Reinforcing Steel (Rebar): May Be Exposed but Not Damaged	
Level 3	**Loss of Concrete Mortar/Damage to Rebar** • Hardness: Complete Loss • Surface Profile: Large Diameter Exposed Aggregate • Cracking: ¼-inch to ½-inch Cracks, Moderate Frequency • Spalling: Deep Spalling of Moderate Frequency, Related Rebar Damage • Reinforcing Steel (Rebar): Exposed and Damaged, Can Be Rehabilitated	
Level 4	**Rebar Severely Corroded/Significant Damage to Structure** • Hardness: Complete Loss • Surface Profile: Large Diameter Exposed Aggregate • Cracking: ½-inch Cracks or Greater, High Frequency • Spalling: Deep Spalling at High Frequency, Related Rebar Damage • Reinforcing Steel (Rebar): Damaged or Consumed, Loss of Structural Integrity	

Hydraulics – Conditions of Current Average Dry Weather Flow of 5.5 MGD

	Slope = 0.0010	0.0020 < Slope < 0.0040	0.0040 < Slope < 0.0060	0.0060 < Slope < 0.0080	Slope = 0.0600
Water Depth (inches)	14.2	10.2 – 11.3	9.15 – 9.77	8.48 – 8.85	5.13
Percent Full (%)	33.8	24.3 – 27.0	21.8 – 23.3	20.2 – 21.1	12.2
Velocity (ft/s)	2.97	4.07 – 4.70	5.01 – 5.50	5.76 – 6.13	12.7
Percent of Entire Alignment(1)(2) (%)	58.5	14.2	3.97	17.2	0.7

(1) Entire Reach 4D Contract 1 and 2 alignment.
(2)The sewer siphons and new pipe segments installed in 2011 with 360-degree PVC T-Lock lined RCP were not included in any of the slope categories. These segments account for approximately 5.4-percent of the entire alignment.



Man-Entry Investigation Results – Hydraulics

MH	Main Pipe Configuration[a,b]	Effluent Slope[b]	Influent Slope[b]	Effluent – Avg. Velocity (ft/s) [e]	Influent – Avg. Velocity (ft/s) [e]	Debris[c]	Typ. Water Level[c]	No. of Laterals[c]
4D-0020	45° bend	0.0010	0.0010	1.82	1.82	None	Above liner termination for both main pipes.	1 – unknown if in use
4D-0118	Straight through	0.0010	0.0024	1.82	2.83	Large rocks / debris	Above liner termination for both main pipes.	1 – outside drop; unknown if in use
4D-0150	Straight through	0.0010	0.0600[d]	1.82	5.51	Large rocks / debris	Above liner termination for effluent pipe. Unknown for influent pipe.	2 – one capped and one active during assessment
4D-0470	Straight through	0.0036	0.0036	3.46	3.46	None	Above liner termination for both main pipes.	1 – capped
4D-0480	45° bend	0.0036	0.0036	3.46	3.46	None	Above liner termination for both main pipes.	2 – not capped, yet unknown if in use

(a) Plan view notes. No significant vertical drops or bends at manholes.
(b) Per Willdan Associates, Santa Ana Regional Interceptor Reach IV-D, Contract No. 1 – 3, 1990 Record Drawings.
(c) Per field observations.
(d) Pipe segment with steep slope connects to manhole pipe segment (location of change in slope) is approximately 10 feet from manhole.
(e) Based on an average daily dry weather flow of 5.5 MGD, Manning's roughness coefficient of 0.012, average water depth of 12.6 inches for pipe slopes between 0.001 – 0.0036 ft/ft, and an average water depth of 6.1 inches for a pipe slope of 0.06 ft/ft.

Photo 3-5. Typical water level indicated by slime layer (red dashed line).

Photo 3-6. Steep slope for Manhole 4D-0150 influent pipe. Apparent typical water level indicated by red

Future Rehabilitation Alternatives

Rehab Alternative	Constructability / Work Area Requirements	Hydraulic Impacts	Bypass Needs	Traffic / Public Disruption	Regulatory / Permitting	Planning Level Cost ($Million)
Segmental Sliplining	• ~10 foot x 30 foot access pit required every approximately 2,000 feet or closer depending on pipe geometry. • Cannot negotiate through bends greater than 2 degrees.	• High. • Thick pipe section. • Annular space grouting required.	• Partial shut-down or bypass necessary. • Target: pipe 20-30% full during liner installation.	• High. • Large insertion pit excavations. • High number of insertion pits.	• Encroachment permits from City of Chino and Eastvale. • Encroachment permit from Caltrans.	$34.2
Continuous Sliplining	• ~8 foot x 60 foot access pit required every approximately 2,000 feet or closer depending on pipe geometry. • Cannot negotiate through a single bend greater than 30 degrees and less if compound bends encountered	• High. • Thick pipe section. • Annular space grouting required.	• Full bypass necessary.	• High. • Large work area requirements. Pipe string layout required. • Construction productivity slow due to time associated with joint butt fusion.	• Encroachment permits from City of Chino and Eastvale. • Encroachment permit from Caltrans.	$39.8
CIPP	• Small excavation needed to remove cone of the existing manholes used for liner insertion. • Can negotiate bends up to 45 degrees unless compound bends encountered.	• Low. • Tight fit liner with no annular space.	• Full bypass necessary.	• Moderate. • Small insertion excavation. • Relatively quick insertion. • Long cure time once liner is inserted.	• Encroachment permits from City of Chino and Eastvale. • Encroachment permit from Caltrans.	$42.1
Spiral Wound Pipe	• No excavation required for insertion of liner. • Can negotiate planned bends up to 45 degrees.	• Low to Moderate. • Tight fit liner with no annular space but with a thicker wall than CIPP.	• Partial shut-down or bypass necessary. • Target: pipe 20-30% full during liner installation.	• Moderate. • No insertion excavations. • Contractor staging for equipment/liner installation at insertion manholes.	• Encroachment permits from City of Chino and Eastvale. • Encroachment permit from Caltrans.	$36.3
Man-Entry Repair	• No excavation required. • No limits on bends. • Confined space set-ups at every manhole.	• Minimal. • Repair of existing pipe with addition of some new liner at liner/pipe interface.	• Full bypass necessary.	• Low. • Traffic control associated with man-entry. • Limited contractor staging.	• Encroachment permits from City of Chino and Eastvale. • Encroachment permit from Caltrans.	$64.2

Rehabilitation Alternatives Weighted Criteria Ranking

	Weight	Alt 1: Segmental Sliplining	Weighted Score	Alt 2: Continuous Sliplining	Weighted Score	Alt 3: Cured-in-Place Pipe	Weighted Score	Alt 4: Spiral Wound Pipe	Weighted Score	Alt 5: Man-Entry Repair	Weighted Score
Criterion		Score		Score		Score		Score		Score	
Constructability/Work Area Requirements	1	1	1	1	1	4	4	4	4	5	5
Impacts to Hydraulic Capacity	2	1	2	1	2	4	8	3	6	5	10
Traffic/Public Disruption	1	2	2	1	1	3	3	4	4	4	4
Regulatory/Permitting	1	3	3	3	3	5	5	5	5	5	5
Planning Level Cost	1.5	5	7.5	3	6	3	4.5	4	6	1	1.5
Risk of SSO	1	2	2	2	2	4	4	3	3	5	5
Solution Longevity	1	5	5	5	5	5	5	5	5	2	2
TOTAL			22.5		18.5		33.5		33		32.5

(1) A higher score for each criteria is better.
(2) A higher weight number indicates a higher impact to evaluation of the alternatives.
(3) A higher weighted score indicates a higher ranked alternative.
(4) Does not include rehabilitation of siphons.

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COMMISSION MEMORANDUM NO. 2017.103

DATE: October 16, 2018

TO: SAWPA Commission

SUBJECT: 2019 Medical Insurance Cap

PREPARED BY: Richard E. Haller, Interim General Manager

RECOMMENDATION

It is recommended that the Commission direct staff to adjust the medical insurance cap from $1,700.90 to $1,745.45, which reflects the ACWA/JPIA 2019 Kaiser Family Plan rate.

DISCUSSION

Historically, SAWPA has set the medical insurance cap to the lower of the Kaiser or Blue Cross family rate. The current medical insurance cap is $1,700.90. Below is a table outlining recent adjustments to the medical insurance cap.

Coverage Period	Percentage Increase	Increase Amount	Cap Amount
Jan – Dec 2013	1.2%	$ 15.00	$ 1,245.00
Jan – Dec 2014	17.75%	221.00	$ 1,466.00
Jan – Dec 2015	0.00	0.00	$ 1,466.00
Jan – Dec 2016	0.3%	4.64	$ 1,470.64
Jan – Dec 2017	2.4%	35.01	$ 1,505.65
Jan – Dec 2018	12.97%	195.25	$ 1,700.90
Jan – Dec 2019	***2.6%***	***$ 44.55***	***$ 1,745.45***

Applicable ACWA/JPIA 2019 Medical Plan Rates in the Southern California region are as follows:

Anthem Blue Cross [Classic PPO] Family Rate:	$2,262.51
Anthem Blue Cross [CalCare HMO] Family Rate:	$2,021.80
Kaiser [HMO with Chiro]:	$1,745.45

CRITICAL SUCCESS FACTORS

- By providing competitive employee benefits, SAWPA can continue to maintain a strong reputation as a watershed-wide, knowledgeable, neutral and trusted facilitator, leader, and administrator of contracted activities.
- Adequate professional staff and resources to effectively provide facilitation, management, administrative and technical support to collaborative work efforts.

RESOURCE IMPACTS

There are sufficient funds in the FY 2018-19 Budget to cover the increase from the current medical insurance cap of $1,700.90 to the proposed medical insurance cap of $1,745.45.

Attachment:

1. ACWA JPIA 2019 Medical Plan Monthly Rates

ACWA JPIA 2019 Medical Plan Monthly Rates

OTHER SOUTHERN CALIFORNIA

Fresno, Imperial, Inyo, Kern, Kings, Madera, Orange, Riverside, San Diego, San Luis Obispo, Santa Barbara & Tulare Counties

	Standard Rates			Incentive Rates (-4%)			Change
Anthem Blue Cross	Single	Two-Party	Family	Single	Two-Party	Family	(EE/Fam)
Classic PPO	895.35	1,825.09	2,356.37	859.93	1,752.48	2,262.51	0.9%/-3.1%
Classic PPO, Retired w/Medicare	570.67	1,159.50	1,495.97	548.24	1,113.51	1,436.52	0.9%/-5.8%
Advantage PPO	753.67	1,534.66	1,980.93	723.92	1,473.67	1,902.09	0.9%/-3.1%
Advantage PPO, Retired w/Medicare	480.94	975.56	1,258.19	462.10	936.93	1,208.26	0.9%/-5.8%
CalCare HMO	789.88	1,569.85	2,105.63	758.68	1,507.46	2,021.80	0%
CalCare HMO, Retired w/Medicare	554.58	1,099.32	1,563.04	532.79	1,055.75	1,500.92	0%
Value HMO	727.48	1,445.06	1,937.97	698.78	1,387.65	1,860.85	0%
Value HMO, Retired w/Medicare	511.00	1,012.17	1,438.79	490.96	972.08	1,381.64	0%
Consumer Driven Health Plan (CDHP)	718.26	1,462.05	1,887.07	689.92	1,403.96	1,811.99	0.9%/-3.1%
CDHP, Retired w/Medicare	458.51	929.57	1,198.75	440.57	892.78	1,151.20	0.9%/-5.8%

Kaiser	Kaiser South			Kaiser North (Fresno area, zip based)			South	North
HMO with Chiro	623.16	1,236.43	1,745.45	742.72	1,475.56	2,083.81	2.6%	2.6%
HMO with Chiro & Optical	634.74	1,259.60	1,778.23	755.95	1,502.01	2,121.23	2.6%	2.6%
Senior Advantage with Chiro	195.05	380.21	889.23	316.15	622.42	1,230.67	2.5%	2.5%
Value HMO with Chiro	569.07	1,128.25	1,592.37	686.14	1,362.39	1,923.69	2.6%	2.6%
Consumer Driven Health Plan	444.83	879.78	1,240.79	561.62	1,113.36	1,571.31	2.6%	2.6%

COMMISSION MEMORANDUM NO. 2018.107

DATE:	October 16, 2018
TO:	SAWPA Commission
SUBJECT:	OWOW Steering Committee Response to OC Stakeholders Letter and OWOW Program Status Report
PREPARED BY:	Mark Norton, Water Resources & Planning Manager

RECOMMENDATION

It is recommended that the Commission receive and file the informational report on the status of the response by the OWOW Steering Committee to the OC agencies letter regarding the Prop 1 funding allocation, and inclusion of OC projects and OC Plan in OWOW; a status report about the OWOW Program will also be provided.

DESCRIPTION

At the OWOW Steering Committee meeting on September 27, 2018, discussion centered on a July 13, 2018 letter sent to the OWOW Steering Committee from OCWD, OC Public Works and OCSD (copy attached) to request the following items:

- 38% of the total available future grant funds be allocated to priority projects identified in the OC Plan;
- The OC Plan be incorporated as a separate chapter within the OC Plan;
- Projects within the North and Central Orange County Watershed Management Areas (WMA) be ranked and prioritzed for Proposition 1 IRWM funding through the process developed in The OC Plan.

The OWOW Steering Committee heard presentations about the request from Amanda Carr, Deputy Director, OC Public Works, OC Environmental Resources Dept. along with input by Michael Markus, General Manager, OCWD. SAWPA staff provided background information about IRWMs and the Prop 1 IRWM Implementation grant funding and shared feedback to the letter by the OWOW stakeholders held on Aug. 23rd and the OWOW Pillar Chair held on Sept. 4th. The OWOW Steering Committee comments recognized the intent that IRWM funding is to encourage partnership and working together across the watershed. The committee indicated interest in better understanding the weighting allocation that OC reps used to generate their 38% allocation and requested additional information of staff on how this formula would change for Years 2020, 2030 and 2040 along with the corresponding weighting allocations with the other two counties, Riverside and San Bernardino, that lie within the Santa Ana River Watershed. OC concerns focused on the disconnect of OC subwatersheds from the upper Santa Ana River Watershed and with the current OWOW Prop 1 IRWM Project Rating, Ranking and benefit weighting which they believe would reduce competitiveness of most of the OC IRWM plan projects. The OWOW Steering Committee decided to defer action in responding to the letter at this time. To help address the OC concerns and promote further dialog, SAWPA has scheduled a meeting of the OWOW Pillar Chairs and interested watershed stakeholders at OC Public Works office in the City of Orange on Thursday, Oct. 18th from 1 pm – 3 pm.

OWOW Program Status
The OWOW Program contains three separate ongoing efforts, the Proposition 1 IRWM Implementation Grants, the OWOW Plan Update 2018 and the Disadvantaged Communities Involvement Program. Below is a brief update of these three activities.

<u>Proposition 1 IRWM Implementation Grant Funding</u>

The Proposition 1 IRWM implementation grants has been announced by Department of Water Resources with a release of the draft Project Solicitation Package (PSP) on October 5, 2018. The draft PSP will be reviewed and will help SAWPA staff further refine the "Call for Projects Seeking Grants" online tool, as well as the details of OWOW Steering Committee approved eligibility criteria (specifically the context surrounding the DWR-proposed CEQA eligibility requirements.)

The timeline shared by DWR has been updated and now reflects the release of the Draft PSP and a 45-day public comment period with public meetings from Oct. 5 – Nov. 20th, with the Final PSP expected in "late 2018", followed by our application due to DWR "anticipated" in April 2019.

With the release of a Proposition 1 IRWM Project Solicitation Package from DWR, SAWPA will release a new Call for Projects for Prop 1 grant funding which links to an online project information system developed by SAWPA. Thereafter the projects will be reviewed for entry errors and all projects along with project information will be released to the public for review. A workshop called "Let's Connect through OWOW" will be held to consider whether any project proponents would be interested in merging their projects with others to improve competitiveness, multi-benefit and multi-jurisdictional partnerships allowing for revisions to their projects. Thereafter the list of projects will be rated and ranking based on the Prop 1 and OWOW eligibility criteria and the weighting of priorities as agreed upon by the OWOW Steering Committee. Thereafter additional workshops will be held among stakeholders to refine the list of priority projects based on stakeholder input. This feedback will enable a recommended portfolio of projects to be brought to the OWOW Steering Committee for their review and possible recommendation of support to the SAWPA Commission and DWR. The OWOW Governance will ensure that the portfolio of projects that are eligible for the funding opportunity, are suitably ready to proceed, have sufficient local match funding identified, and provide benefits to the watershed in line with the goals of the OWOW Plan Update 2018.

Though the eligibility criteria and the rating & ranking system was adopted by the OWOW Steering Committee at their July 26 meeting, this rating and ranking system may be revised and updated again before project prioritization subject to further discussion with OC stakeholders and the OWOW Steering Committee. The final rating and ranking system and extensive review process that will occur after prioritization reflects a concerted effort for improved stakeholder involvement and transparency. Key features derived from the stakeholder process includes a new way to ensure there is grant support for large-budget projects but also for smaller budget projects pursuing innovative new ideas or small-scale demonstrations.

OWOW Plan Update 2018

The OWOW Plan Update 2018 is behind the schedule set earlier in the effort. An internal draft report has been prepared but additional work is needed to ensure that the plan is fully complete, edited, formatted and reflects all the requirements of the 2016 DWR IRWM Plan Standards. The public review draft is now anticipated to be brought to the OWOW Steering Committee in November, with public notices and review periods thereafter, with final adoption in February 2019 by the SAWPA Commission. SAWPA staff is working with a consultant, Dudek, to help support staff in reviewing the Pillar chapters and all other chapters for completeness.

Disadvantaged Communities Involvement Program

The Disadvantaged Communities Involvement Program is continuing with about one third of the scheduled tasks being complete. Multiple threaded and linked activities are being pursued by members of the program team. The Strengths & Needs Assessment report is being assembled by the California State University team with contributions from all partners, with a shareable report expected before the end of the year. Additional community engagement is planned throughout the coming year, both in “listening” and “teaching” modes, to share what was learned during the first year and receive feedback from participants. Our third pair of CivicSpark Water Fellows came on-board in September, and the Community Water Intern program continues to receive applications from agencies and non-profits seeking interns, and from students interested in completing those projects. A “Trust the Tap” media and outreach campaign is being developed in Spanish, Vietnamese and English by a consultant to SAWPA, which will be freely distributed to interested water agencies who wish to include the information in their existing community engagements.

In the coming months SAWPA will retain one or several on-call consultants with translation skills, for both documents and live public meetings. This consultant will be available via application to any watershed agency or organization that has a community engagement about water that would benefit from translation.

The DCI Program technical advisory committee is meeting monthly to develop a decision-making process of how to allocate technical assistance to communities. There is a draft list of projects and programs that would bring benefits to members of disadvantaged and underrepresented communities, as well as economically distressed areas. This list, which continues to evolve, is drawn from the engagement efforts completed within the DCI Program, and from projects submitted to the OWOW Plan Update 2018 process. The TAC is committed to having a decision-making process established and early-action TA project recommendations for the OWOW Steering Committee to consider early in 2019.

CRITICAL SUCCESS FACTORS (OWOW)

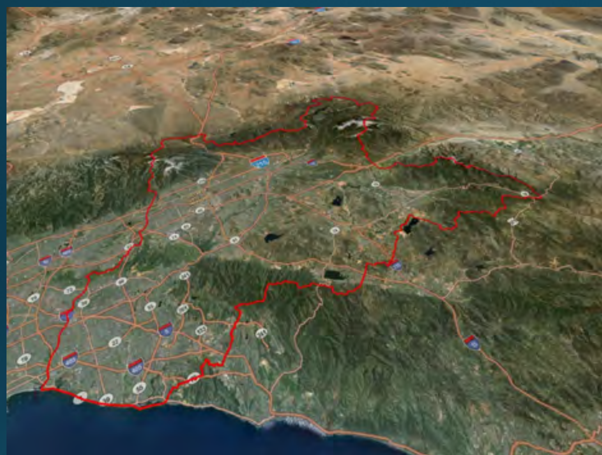
CSF 1. Continued support from SAWPA Commission of OWOW Steering Committee’s decision-making authority as a means of ensuring trust, transparency, and external communications.

CSF 3. Distribution of benefits from the implementation of all integrated water resources management activities across the watershed in a fair and equitable fashion. Recognition that upstream conditions affect downstream water quality and quantity.

CSF 4. OWOW criteria and values are transparent to watershed-wide stakeholders.

RESOURCE IMPACTS
Staff time associated with the OWOW Program Proposition 1 IRWM Grants is within Fund 373.

Attachments:
1. PowerPoint Presentation
2. July 13, 2018 correspondence (OC Stakeholders)



OWOW Program Status Report & OWOW Steering Committee Response to OC Letter

One Water, One Watershed

OWOW Program Status

1. OWOW Plan Update 2018
2. Disadvantaged Communities Involvement Program
3. Proposition 1 IRWM Implementation Grants

OWOW Plan Update 2018

Public Review Draft Release Nov. 1, 2018

→

OWOW Steering Committee – Draft Report and Comments

Nov. 15, 2018

→

OWOW Steering Committee Recommendation to Adopt – January 17, 2019

SAWPA Commission Adoption – February 2019

- Assembled document with formatting complete
- Final edits underway at SAWPA

OWOW Plan Update 2018

- Chapter 1: Overview, History
- Chapter 2: How the Plan Gets Made
- Chapter 3: Watershed Setting
- Chapter 4: Vision, Goals, Objectives
- Chapter 5: Recommended Strategies
- Chapter 6: Program Review, Evaluation, Prioritization
- Chapter 7: Impacts and Benefits of Sustainable Integrated Solutions
- Chapter 8: Finance and Funding
- Chapter 9: Data Management & Plan Performance Monitoring

OWOW Plan Update 2018

Draft / Alphabetical

- 5.1 Climate Risk and Response
- 5.2 Data Management and Monitoring
- 5.3 Disadvantaged Communities
- 5.4 Integrated Stormwater Management
- 5.5 Land Use and Water Planning
- 5.6 Natural Resources Stewardship
- 5.7 Tribal Communities
- 5.8 Water Quality
- 5.9 Water Resources Optimization
- 5.10 Water Use Efficiency

- Chapter 1: Overview, History
- Chapter 2: How the Plan Gets Made
- Chapter 3: Watershed Setting
- Chapter 4: Vision, Goals, Objectives
- Chapter 5: Recommended Strategies
- Chapter 6: Program Review, Evaluation, Prioritization
- Chapter 7: Impacts and Benefits of Sustainable Integrated Solutions
- Chapter 8: Finance and Funding
- Chapter 9: Data Management & Plan Performance Monitoring

A legacy of movement

- OWOW Plan (2008): Moving towards Sustainability
- OWOW 2.0 Plan (2014): Moving into Implementation
- OWOW Plan Update 2018:
  - Moving Forward Together

ONE WATER ONE WATERSHED

Program Element 1	Program Element 2	Program Element 3
Strengths & Needs Assessment • Nearing completion, report due in the late fall • Added listening sessions now being planned for the coming months	Education / Engagement • Many items underway (internships, Trust the Tap) • Share results with elected leaders starting in the Spring • On-call translation services expected soon.	Project Development • Technical Assistance to Communities • TAC fully engaged, developing a system for selecting and prioritizing projects for Technical Assistance

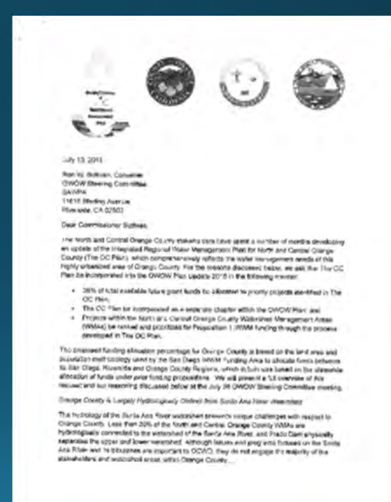
Disadvantaged Communities Involvement Program

Prop 1 IRWM Implementation Grants - Latest from DWR

Activity	Timeline
DWR Conversations with IRWM Regions	May 2017 – August 2018
Release draft Project Solicitation Package (PSP) for 45-day public comment period	October 5, 2018
Three public comment meetings (north, central, south)	October 5 – Nov. 20, 2018
Draft PSP comment period closes	Nov. 20, 2018
Final PSP released	Fall 2018
DWR Funding Area Workshops	Winter 2018/2019
Round 1 Grants Applications due to DWR	Starting April 2019
Round 1 awards	Late 2019
Round 2 solicitation	Early 2020

The July 13, 2018 letter

- County of Orange, Orange County Water District, and Orange County Sanitation District
  - Together as the North/Central OC Watershed Management Area



Shared terms:

- Integrated Regional Water Management Program
  - Funding Areas
  - Regional Water Management Groups
  - IRWM Plans
- OWOW Program
  - Subregional plans
  - One Water
  - One Watershed

IRWM elsewhere in CA

- Twelve Funding Areas
  - Designated by the Legislature
- Forty-Nine RWMG
- Three models for IRWM grant seeking:
  - Funding Areas with only one RWMG
    - Santa Ana and North Coast
  - Funding Areas with sharing agreements
    - e.g. San Diego
  - Funding areas with competitive grant proposals to DWR (this is most common)

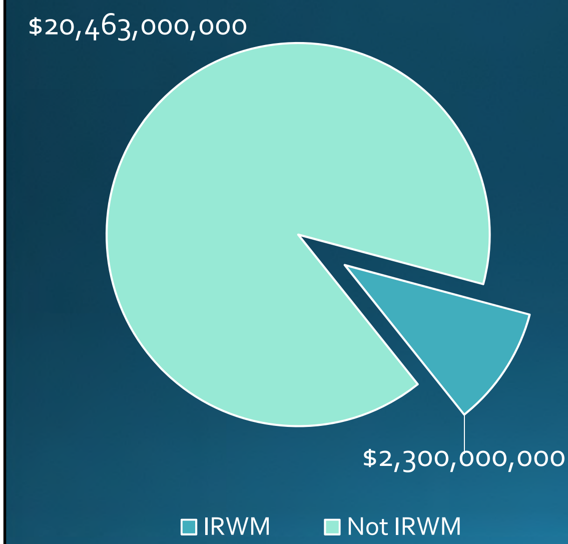
Orange County Stakeholders

- Have been strongly engaged and influential in OWOW Program
- Active participation in Pillar Workgroups, and therefore the OWOW Plans
- Worked with SAWPA staff to effectively import all North and Central IRWM projects into OWOW Plan for planning purposes

OWOW Program adjusts:

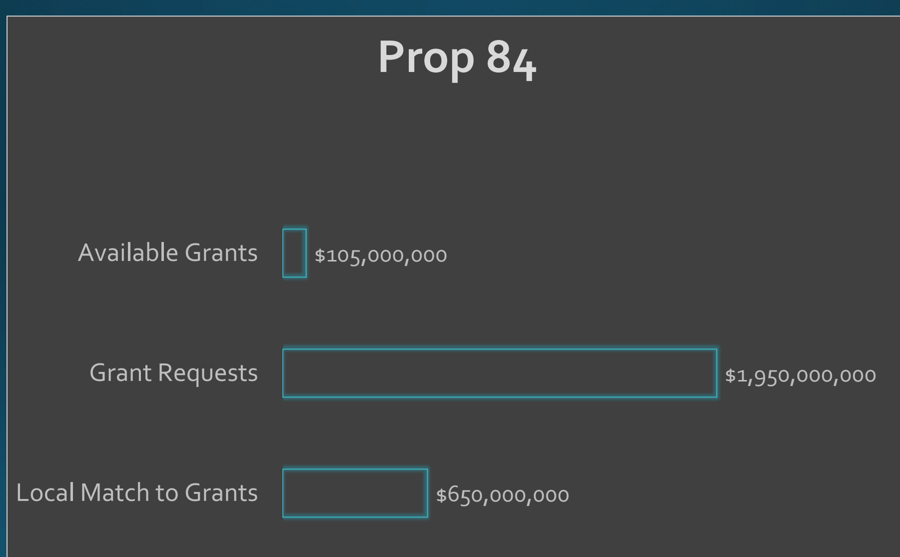
- Adopted process improvements:
  - Assertion that IRWM funded-projects cause no undue harm to others
  - Direct import of project lists from other plans
  - Quantified rating & ranking system developed with stakeholder input
- About 25% of implementation grants have been awarded to OC agencies and non-profits

Statewide Water Bond Allocation for IRWM



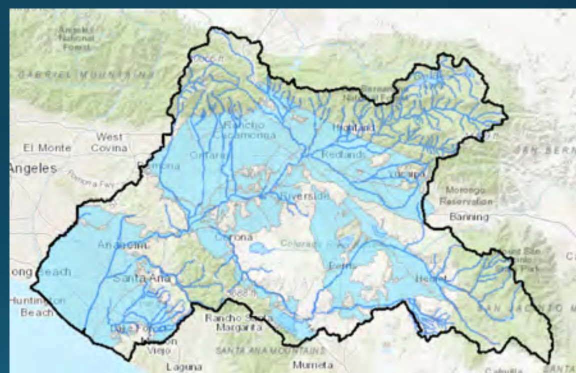
- Props 50, 84, 1E, 1
  - About 10% for IRWM
- Prop 68 (Jun '18 passed)
  - ZERO for IRWM
- Prop 3 (Nov '18 ballot)
  - Essentially ZERO for IRWM

OWOW Program IRWM Grants



SAWPA & Santa Ana Funding Area

- Boundaries
  - Five-member agencies
  - Santa Ana Regional Board jurisdiction
  - Watershed
    - Administrative
    - Physical
    - Social
    - Historic
  - IRWM Program



Groundwater Management Zones, Streams & Water Bodies

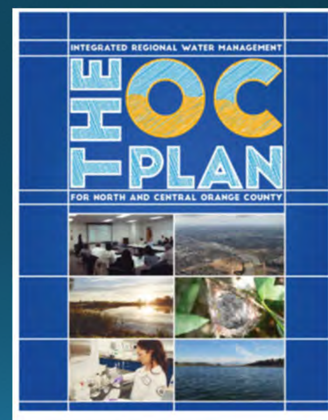
OWOW Steering Committee

Orange County Supervisor	Riverside County Supervisor
San Bernardino County Supervisor	Orange County City elected
Riverside County City elected	San Bernardino County City elected
2 SAWPA Commissioners	Environmental Advocacy Representative
Appointed member of Santa Ana Regional Water Quality Control Board	Business Community Representative

- SAWPA Commission = RWMG
  - Accepted through Regional Acceptance Process with DWR
- OWOW SC holds delegated advisory authority to:
  - Manage the updating of the IRWM Plan (OWOW Plans)
  - Develop a suite of projects when needed for IRWM Program grants

New OC requested changes to OWOW Program

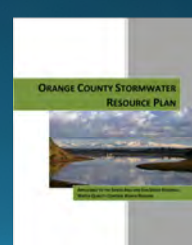
- To the OWOW Plan Update 2018:
  1. Subregional plan as a chapter of the OWOW Plan.
     - The OC Plan – 273 pages
     - OWOW Plan Update 2018 (current draft) - ~350 pages



Inclusion of subregional plans

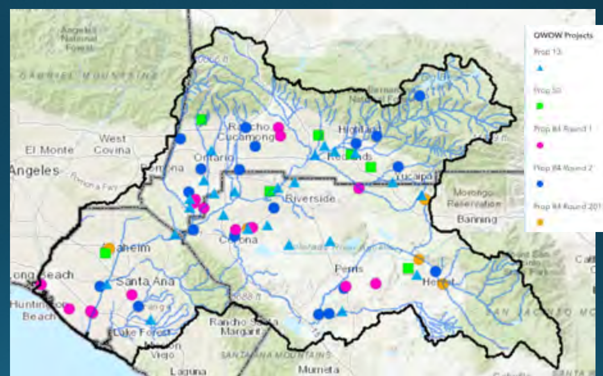
- Only required for Stormwater Resources Management Plans, two have been included:
  - Chino Basin Stormwater Resources Management Plan
  - North/Central OC Stormwater Resources Management Plan

- In a collaborative mode, invitations sent to:
  - Friends of Harbors, Beaches and Parks
    - The Newport Bay Idea Book (2015)
  - OC Public Works
    - The OC Plan (2018)
  - California Coastal Conservancy
    - Santa Ana River Parkway and Open Space Plan (2018)



Inclusion of subregional plans

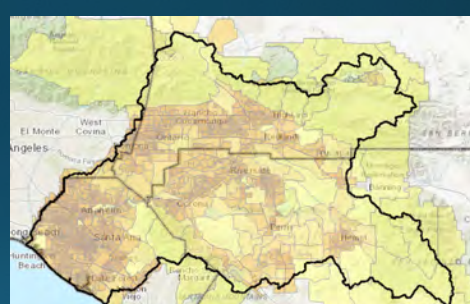
- Including other plans as chapters dis-integrates the OWOW Program.
- Management Scales
  - Geography
  - Topic



OWOW Funded Projects

New OC requested changes to OWOW Program

- To the OWOW Program policy for responding to grant opportunities:
  2. Designate 38% of available funding for projects in / by Orange County agencies
  3. Let The OC Plan *rating & ranking* and *eligibility criteria* be used to distribute those grant dollars.



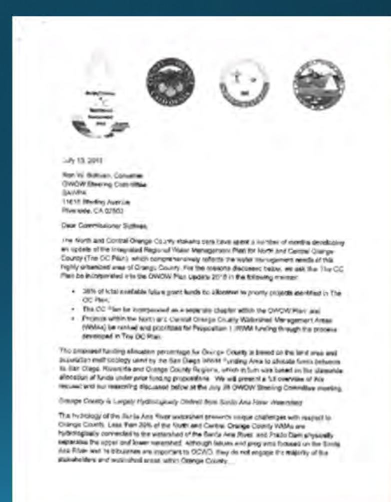
Population Density Map w/ County Boundaries

"Competitive"

- General Obligation Bond grants must be distributed competitively.
- DWR takes this responsibility seriously.
  - Funding Areas with multiple RWMG "compete" for the funding
  - In the past, our proposals have been "scored" in a competition with proposals *in other Funding Areas*.
- The watershed has made sustained effort to encourage DWR to consider our internal competition sufficient to this Legislative mandate.

Stakeholder discussion and response

- Stakeholder Integration Meeting
- OWOW Pillar Chairs Meeting
  - Both meetings focused quickly on underlying issues.



OWOW Stakeholder Feedback about letter

- Voices shared (paraphrased):
  - OWOW encourages collaboration, upstream and downstream, and this proposal is the opposite of that.
  - Ensuring funding supports the projects most needed, and the people who judge what is most needed should be local.
  - In the past, the ranking system was a problem, because the stakeholders were not part of the discussion, it was outside experts.
  - An option, if the differences cannot be resolved, will be to request becoming a region.
  - A good point that lower watershed or area not connected to the Santa Ana River have a hard time describing their watershed benefit.
  - Ensuring local control of "competitiveness" is important, not "roll the dice" at DWR.
  - Wouldn't good OC projects be competitive in the whole watershed?

OWOW Pillar Chair Meeting

- Focus of discussion:
  - Changing from a watershed benefit understood as flowing with water to a watershed benefit described with resilience.
  - A compromise system for ensuring geographic distribution of available grant dollars.
- This led to a proposed change to the Eligibility Policy:
  - Because we are interdependent, resilience anywhere is resilience everywhere.
  - "Strive to ensure" each of the three county areas receive no less than 25% of the available grant dollars in each opportunity
- This suggested change was not accepted by OC Letter parties prior to OWOW Steering Committee meeting

OWOW Program, today

- Recognized in CA as leader in regional integrated water management.
- An adaptive management effort, learning, and constantly evolving to the regional needs.
- All stakeholders have been significant to its development and refinement, but many important features came from dedicated and invested OC stakeholders.
- Maintaining the planning and management partnerships across the watershed is important to stakeholders.
- IRWM Implementation grants are a small specialized source of funding intended to be used in specialized ways.

OWOW Steering Committee Actions – Sept. 27, 2018

1. Hold off on responding to OC letter at this time
2. Gather more info about how OC 38% funding allocation request was derived and determine how funding allocation among Counties changes using future population projections.
3. Support future negotiations among OC Letter parties and OWOW Pillar Chairs and OWOW Stakeholders about Prop 1 IRWM Implementation Grant Project Eligibility, rating and ranking and weighting of benefits.

OWOW Pillar Chair Meeting

- Meeting is scheduled for October 18th 1 pm – 3 pm at OC Public Works
- Meeting will be among OC Letter reps, OC stakeholders, OWOW Pillar Chairs, OWOW interested stakeholders, SAWPA staff
  - Focus of meeting to ensure OC stakeholders input is received and accounted for in OWOW Prop 1 IRWM Implementation Grant program, rating and ranking process and weighting of benefits
  - Impacts of new DWR Prop 1 IRWM Implementation Proposal Solicitation Package will be shared and discussed

North/Central OC Watershed Management Area

July 13, 2018

Ron W. Sullivan, Convener
OWOW Steering Committee
SAWPA
11615 Sterling Avenue
Riverside, CA 02503

Dear Commissioner Sullivan,

The North and Central Orange County stakeholders have spent a number of months developing an update of the Integrated Regional Water Management Plan for North and Central Orange County (The OC Plan), which comprehensively reflects the water management needs of this highly urbanized area of Orange County. For the reasons discussed below, we ask that The OC Plan be incorporated into the OWOW Plan Update 2018 in the following manner:

- 38% of total available future grant funds be allocated to priority projects identified in The OC Plan;
- The OC Plan be incorporated as a separate chapter within the OWOW Plan; and
- Projects within the North and Central Orange County Watershed Management Areas (WMAs) be ranked and prioritized for Proposition 1 IRWM funding through the process developed in The OC Plan.

The proposed funding allocation percentage for Orange County is based on the land area and population methodology used by the San Diego IRWM Funding Area to allocate funds between its San Diego, Riverside and Orange County Regions, which in turn was based on the statewide allocation of funds under prior funding propositions. We will present a full overview of this request and our reasoning discussed below at the July 26 OWOW Steering Committee meeting.

Orange County is Largely Hydrologically Distinct from Santa Ana River Watershed

The hydrology of the Santa Ana River watershed presents unique challenges with respect to Orange County. Less than 20% of the North and Central Orange County WMAs are hydrologically connected to the watershed of the Santa Ana River, and Prado Dam physically separates the upper and lower watershed. Although issues and programs focused on the Santa Ana River and its tributaries are important to OCWD, they do not engage the majority of the stakeholders and watershed areas within Orange County.

Water Resource Priorities and Needs in Orange County are Unique Within the Funding Area

Issues, projects and programs focused on Orange County sub-watersheds are difficult to link to Santa Ana River-related benefits and concerns. Water resource priorities, such as beach water quality, seawater intrusion control, marine protected areas, and ecological health of Upper Newport Bay, are unique to this area and have little in common with the rest of the Santa Ana River watershed.

Since 2005 Orange County has maintained IRWM plans for its North, Central and South watershed management areas. Responding to requests from Orange County stakeholders, OC Environmental Resources began in early 2017 to update the existing North and Central Orange County IRWM plans. The intention of this effort was to:

- provide a forum to engage local stakeholders in the IRWM process,
- strengthen collaborative project efforts in the North and Central watershed management areas,
- identify and focus on the unique water resource issues within Orange County,
- develop a project portfolio that addresses the identified issues, and
- continue to maintain the option to become a region within the Santa Ana Funding Area.

The combined and updated plan was completed in March 2018, was adopted by the Orange County Water District and Orange County Sanitation District, and is undergoing final approval by the County of Orange.

Orange County Stakeholders Set Goals and Objectives that Diverge from those in the OWOW Plan Goals

Water resource management priorities, challenges and issues within Orange County are highly integrated, reflective of the long-standing collaboration that predates the state's IRWM program. Water supply, water quality, flood risk, drought preparedness, wastewater treatment, recycled water, stormwater, and groundwater are cooperatively managed regionally within Orange County, and have been for decades. For example, the Orange County Flood Control District and the Orange County Water District began joint operations to manage flood risk while increasing groundwater recharge in the 1930s and Newport Bay stakeholders, with support from the County of Orange, have been working together to manage water quality impairments since the 1970s. We believe that these natural and long-standing integrated, regional water management efforts would be served best with grant funding decisions for Orange County projects determined through a local process.

With the changes requested above, we believe the OWOW process will be strengthened through increased local stakeholder participation and be more reflective of the needs identified by Orange County stakeholders. We hope that through our joint efforts we will improve the management of water resources in the Santa Ana Funding Area and foster collaboration and innovation in solving complex challenges in the watershed. We ask that a response to these requests be provided by August 27 as we have scheduled a meeting of the Regional Water Management Group on August 29 to review your response.

Sincerely,

Amanda Carr
Deputy Director, OC Environmental Resources
OC Public Works

Michael R. Markus, P.E.
General Manager
Orange County Water District

Jim Herberg, P.E.
General Manager
Orange County Sanitation District

cc: OWOW Steering Committee members
SAWPA Commissioners
SAWPA General Managers
OCWD Board of Directors
OCSD Board of Directors

COMMISSION MEMORANDUM NO. 2018.108

DATE: October 16, 2018

TO: SAWPA Commission

SUBJECT: Memorandum of Understanding (MOU) for WECAN Expansion in the City of Riverside

PREPARED BY: Mike Antos, Senior Watershed Manager

RECOMMENDATION

That the Commission consider the following actions:

1. Authorize the General Manager to execute a Memorandum of Understanding (MOU) between SAWPA, the City of Riverside and the County of Riverside in support of the City application for a Transformative Climate Communities grant which, if awarded, would fund expansion of the Water-Energy Community Action Network (WECAN) Program; and,
2. If the WECAN Program is expanded, assign oversight of the program to Project Agreement (PA) 22 Committee.

DISCUSSION

The City of Riverside, in partnership with the County of Riverside, is developing a proposal for the California Strategic Growth Council (SGC) grant program, "Transformative Climate Communities" (TCC.) The SGC is a cabinet level committee created by SB732 in 2008 to coordinate the activities of State agencies regarding growth and sustainability, including assisting local entities in planning sustainable communities. This grant program supports efforts to diminish green house gas emissions while fostering public health and environmental benefits as well as catalyzing economic opportunities and shared prosperity in regions of the state which are designated as overburdened by the California EPA tool, CalEnviroScreen.

The City approached SAWPA about the existing Water-Energy Community Action Network Program (WECAN) being conducted by SAWPA. This program, funded by a 2014 Water-Energy Nexus grant from the Department of Water Resources and local funding partners, supports the retrofit of indoor plumbing fixtures and front yard landscapes at homes of low-income community members in the watershed. WECAN has expanded once before, when West Valley Water District received a Federal grant which supported additional landscape transformations in its service area. The implementation work using the current funding for WECAN will be complete by the end of October 2018. Administrative work to wrap up the State (awarded to SAWPA) and Federal (awarded to WVWD) grants will be finished by the end of January 2019.

The MOU under consideration today needs to be executed prior to the grant proposal being submitted by the City of Riverside at the end of October. The MOU describes the partnership in broad terms in service of the grant application. The activity it describes and the expansion of WECAN will be contingent on the grant being successfully awarded to Riverside. If awarded, the grant will require a subgrantee agreement between the City and SAWPA that will describe the scope of work for SAWPA. This agreement will be developed and brought to the SAWPA Commission for action if a grant is awarded.

The work by SAWPA and our existing WECAN contractors and partners would be entirely funded by the grant. The entire grant scope of work is still under development and depending on discussions in the final weeks of proposal development, and on the amount awarded by SGC, the SAWPA scope of work and grant award may change. Currently, the work proposed includes 60,000 square feet of front yard transformation, about 68 homes All work will be within the TCC program boundary, which is interior to but not completely covering the City of Riverside.

The total value of this proposed work, if awarded, will be approximately $500,000.

CRITICAL SUCCESS FACTORS

Roundtable CSF 1.	SAWPA has a strong reputation as a watershed-wide, knowledgeable, neutral and trusted facilitator, leader, and administrator of contracted activities.
Roundtable CSF 2.	Goals, scope, costs, resources, timelines, and the contract term are approved by the Commission before executing an agreement to participate in a roundtable group.

RESOURCE IMPACTS

Work to develop and submit SAWPA's portion of the grant application is funded by 370-01, General Basin Planning. The work of the expanded WECAN Program will be entirely funded by the TCC grant, if awarded.

Attachments:

1. Memorandum of Understanding (MOU) For the Transformative Climate Communities Collaborative Stakeholder Structure
2. Project Area Map

MEMORANDUM OF UNDERSTANDING
FOR THE TRANSFORMATIVE CLIMATE COMMUNITIES
COLLABORATIVE STAKEHOLDER STRUCTURE

This Memorandum of Understanding ("MOU") is made and entered into this ____ day of ______________, 2018 by and between the COUNTY OF RIVERSIDE, a political subdivision of the State of California ("County"), the CITY OF RIVERSIDE, a California charter city and municipal corporation ("City"), THE SANTA ANA WATERSHED PROJECT AUTHORITY, a California joint powers authority ("SAWPA"), WAKELAND HOUSING AND DEVELOPMENT CORPORATION, a California nonprofit corporation ("Wakeland"), the REGENTS OF THE UNIVERSITY OF CALIFORNIA, a California nonprofit corporation formed under Article IX of the California Constitution, as represented by the University of California Riverside School of Medicine and the University of California Riverside School of Agriculture ("School of Medicine" and "School of Agriculture"), the RIVERSIDE UNIFIED SCHOOL DISTRICT, a California public school district ("District"), GRID ALTERNATIVES, a California nonprofit corporation ("Grid"), and the RIVERSIDE COMMUNITY HEALTH FOUNDATION, a California non-profit corporation ("Foundation"). City, SAWPA, Wakeland, School of Medicine, School of Agriculture, District, Grid, and Foundation will hereafter collectively be referred to as "Partners." County and Partners will hereafter collectively be referred to as "Parties."

RECITALS

A. The California Strategic Growth Council (SGC) awards grants for the development and implementation of neighborhood-level climate sustainability plans as part of the Transformative Climate Communities (TCC) program.

B. The County is the Lead Applicant and is applying to SGC for a grant to fund a range of projects that have climate, public health, and pollution reduction benefits. The proposed program will hereafter be referred to as "Pathways to Health."

C. The Partners are organizations or public entities authorized to lead community-based projects that have demonstrated the organizational capacity to support the County in the implementation of Pathways to Health.

D. The Parties have determined that there exists a need to reduce greenhouse gas emissions, foster public health and environmental benefits, and catalyze economic opportunity and shared prosperity within the greater Riverside area, as depicted in Exhibit "A" attached hereto and incorporated herein by this reference ("Project Area").

E. The Partners fully support the objectives, goals, strategies and projects identified under the TCC grant application that was proposed by the County for approval by the Strategic Growth Council ("TCC Grant"), and the Partners agree to be Co-Applicants for the TCC Grant.

F. The Parties desire to enter into an MOU as hereinafter set forth in order to establish a collaborative stakeholder structure for matters pertaining to the TCC Grant and the use of the TCC funding ("Grant Funding") in the Project Area.

G. The Parties acknowledge and agree that other Partners may be added to this MOU from time to time.

NOW THEREFORE, in consideration of the mutual covenants, conditions and advantages herein stated, the Parties hereto agree as follows:

1. PURPOSE AND GOALS

a. The Parties agree to conduct the TCC Grant activities set forth in this MOU, jointly, under the project name "Pathways to Health."

b. The goals of Pathways to Health were developed by the Parties and are outlined and specified in the Agreement for use of Grant Funds under the Transformative Climate Communities Program by and between the Strategic Growth Council and the County of Riverside in the amount of thirty five million dollars ($35,000,000), dated ______________________________, with a three year term ("Agreement for Use of TCC Grant Funds").

c. The purpose of this MOU is to formalize the partnership and understanding between the Parties and set forth the terms by which the Parties will manage, coordinate and administer TCC Grant-related activities within the boundaries of the Project Area. The Parties agree that the purpose for conducting the activities as a coordinated group shall include the following:

(1) Implementing activities, programs, strategies, and projects as set forth in the Agreement for Use of TCC Funds;

(2) Promoting the execution of objectives and goals set forth in the Agreement for Use of TCC Funds;

(3) Providing a platform for community engagement and input into implementation of activities related to the TCC Grant; and

(4) Performing such other functions as may be deemed necessary and appropriate to meet the objectives of this MOU.

2. GOVERNANCE

a. General. Parties shall actively promote community engagement and shall work in conjunction with an advisory community-based group, called the Advisory Committee. The Advisory Committee shall have the organization and powers specified below.

b. Membership. Parties shall each designate one individual to represent that Party on the Advisory Committee, with the City representative serving as the Advisory Committee chair. These designations may be done at a staff-level and shall not be determined by the legislative body of any Party. In addition, the City shall appoint one representative from each of the following community stakeholder groups ("Stakeholders"):

(1) Residents of the Chicago-Linden affordable housing project;

(2) Residents of the Mission Heritage affordable housing project;

(3) Members of the Eastside Forum;

(4) Participants in or graduates of the Resident Leadership Academy; and

(5) Members of the Eastside HealZone.

c. Additional Stakeholders. Individuals and organizations desiring to become Stakeholder members of the Advisory Committee shall submit a written request to the County. The Parties may add these additional stakeholders to the Advisory Committee by amending this MOU, in writing, with the consent of all Parties, as to this section 2, Governance. Stakeholders shall not be Parties to this MOU.

d. Advisory. Advisory Committee members shall be entitled to make recommendations about, provide input into, and assist the Parties in the implementation of activities under the TCC Grant, but they do not have any final decision making abilities.

e. Not a Brown Act Body. The Advisory Committee is not subject to the Ralph M. Brown Act. The Advisory Committee is created by execution of this MOU and not by virtue of any legislative action taken by the governing body of any Party. As set forth in subsection 2(b), no legislative body for any Party shall appoint any member to the Advisory Committee.

f. Meetings. The Advisory Committee shall conduct meetings at least on a quarterly-basis, as follows:

(1) Meetings shall be held within the City of Riverside, at a time and location previously determined by the Parties.

(2) Meetings shall be open to the public.

(3) Meetings shall be facilitated in a manner that promotes equity, respect, and resident empowerment.

g. Decision Making.

(1) A simple majority of all members of the Advisory Committee shall constitute a quorum for the transaction of business at any meeting of the Advisory Committee.

(2) Any decision of the Advisory Committee shall be carried upon the affirmative vote of the majority of members present at the meeting. Notwithstanding the presence of a quorum, decisions regarding TCC Grant related activities must include input from the Party designated as responsible for such activity as set forth in Section 3 below.

3. ROLES, RESPONSIBILITIES, AND RELATIONSHIPS

a. General. This MOU sets forth the roles and responsibilities for the County and all Partners in the Pathways to Health program. If at any time, the Parties wish to add additional Partners to Pathways to Health, the Parties may do so by amending this MOU as to parties and attaching and incorporating the duly executed signature of the new partner to this MOU. In conducting the TCC Grant activities set forth in this MOU, the Parties individually agree to perform the following tasks or undertaking:

b. The City shall:

(1) Serve as fiscal agent for Pathways to Health, producing financial reports and statements;

(2) Provide a lead staff member to coordinate all activities of Pathways to Health;

(3) Provide financial support as determined in Section 6 below;

(4) Meet monthly with the County to discuss policy momentum, program/project deliverables, financial components, and other such issues regarding the use of the TCC Grant funds;

(5) Provide leverage in the form of matching funds or in kind goods or services pursuant to the Agreement for Use of TCC Grant Funds;

(6) Assist in the implementation of activities related to the TCC Grant;

(7) Develop and maintain a webpage devoted to the Pathways to Health; and

(8) Assume the lead role in implementing activities related to the TCC Grant.

c. The County shall:

(1) Through its Assistant County Executive Officer/EDA, or their designee, administer the terms and conditions of this MOU for Partners;

(2) Provide a staff member to assist the City in coordinating activities of Pathways to Health;

(3) Meet monthly with the City to discuss policy momentum, program/project deliverables, financial components, and other such issues regarding the use of the TCC Grant funds;

(4) Provide leverage in the form of matching funds or in kind goods or services pursuant to the Agreement for Use of TCC Grant Funds;

(5) Assist in the implementation of activities related to the TCC Grant;

d. The Partners other than City shall:

(1) As a subrecipient of TCC Grant funds, manage their approved projects in the Project Area;

(2) Provide leverage in the form of matching funds or in kind goods or services pursuant to the Agreement for Use of TCC Grant Funds;

(3) Assist in the implementation of activities related to the TCC Grant;

(4) Provide a staff member to assist the City in coordinating activities of Pathways to Health; and

(5) Provide all required reporting to the City on use of TCC Grant funds and performance measures for their projects; and

4. EFFECTIVE DATE AND TERM

a. This MOU shall become effective as of the date on which the last Party executes this MOU ("Effective Date").

b. The Term of the MOU will commence on the Effective Date and continue for five (5) years, unless terminated earlier by the Parties as provided in Section 8(d) below, and will automatically terminate unless otherwise extended by a written amendment to this MOU executed by all of the Parties.

5. FINANCING AND BUDGETING

a. It is the intent and understanding of the Parties to this MOU that the activities conducted pursuant to this MOU will be financed by TCC Grant funds and matching funds pursuant to an Agreement for use of TCC Grant funds.

b. The general administrative budget shall be promulgated by the budget incorporated in the Agreement for use of TCC Grant funds.

6. ACCOUNTING

a. The City is designated as the fiscal agent. The City shall account separately for all funds collected or disbursed pursuant to this MOU. The City shall maintain and keep records of all expenditures and obligations incurred pursuant to this MOU and the Agreement for use of TCC Grant funds, and all income and fees received thereby according to generally recognized accounting principles. Such records shall be maintained by the City for a minimum of seven (7) years following the termination of the Agreement for use of TCC Grant funds. The records relating to this MOU shall be open to inspection and audit by the Parties or its authorized representative on an annual basis or as is deemed necessary by the Parties upon reasonable notice to the City.

b. The City shall provide the Parties monthly expenditure reports by the last day of the following month, as well as a copy of a full annual financial statement for the partnership activities immediately upon completion thereof, but in no case later than six (6) months following the end of the fiscal year. The monthly expenditure reports and annual financial statements shall contain a status report of all appropriations and expenditures by line item, any emergency expenditure, appropriation changes (increases or decreases or new/supplemental appropriations after original budget was approved) and remaining unspent balances including encumbered amounts by purpose.

7. ACCOUNTABILITY PLAN

a. Within ninety (90) calendar days from the date of award of the TCC Grant, the Parties shall adopt an Accountability Plan consisting of the following:

(1) Performance expectations for each Party;

(2) Regular and timely tracking and communicating of results of TCC Grant activities;

(3) Regular and timely comparison of results with expectations; and

(4) Establishment of definitive steps to correct any identified discrepancies between expectations and results.

8. GENERAL PROVISIONS

a. Indemnification. Each of the Parties agree to defend, indemnify and hold harmless each and every other Party and its officers, officials, board of supervisors, city council, board of directors, employees or agents from and against any damages including, but not limited to, attorneys' fees, expert and consultant fees, and other costs and fees of litigation, arising out of the alleged gross negligence, intentional or willful misconduct of the Party, its agents, officers, officials, board of supervisors, city council, board of directors, employees or representatives in the performance of this MOU.

b. Notices. Any notices, bills, invoices, or reports relating to this MOU, and any request, demand, statement or other communication required or permitted hereunder shall be in writing to the addresses set forth on the signature pages , and shall be deemed to have been received on (a) the day of delivery, if delivered by hand during regular business hours or by confirmed facsimile during regular business hours; or (b) on the third business day following deposit in the United States mail, postage prepaid.

c. Dispute. The Parties agree that before any Party commences any legal or equitable action, action for declaratory relief, suit, proceeding, or arbitration regarding the TCC Grant that the Parties shall first submit the dispute to mediation through a mutually acceptable professional mediator in Riverside County. Each Party shall bear its own expenses and costs associated with the mediation. The Parties shall share the cost of mediator equally.

d. Termination.

(1) Any Party may terminate its participation in this MOU for any reason by giving thirty (30) days advance written notice to the designated representatives of the other Parties. This right to terminate ends once a sub-recipient agreement is entered into. At that time, the termination terms of the sub-recipient agreement shall govern. The Parties shall have the right to terminate this MOU upon a majority vote.

(2) Except as otherwise provided herein, upon termination of this MOU, or an individual Party's termination of participation in this MOU, that Party shall not have any obligation to the other Parties.

e. Conflict of Interest. No member, official or employee of the Parties shall have any personal interest, direct or indirect, in this MOU nor shall any such member, official or employee participate in any decision relating to this MOU which affects his or her personal interest or the interests of any corporation, partnership or association in which he or she is directly or indirectly interested.

f. Governing Law. This MOU and any dispute arising hereunder shall be governed and interpreted in accordance with the laws of the State of California.

g. Venue. Any legal action related to the performance or interpretation of this MOU shall be filed only in the superior court in Riverside County, California, and the Parties waive any provision of law providing for a change of venue to another location.

h. No Third-Party Beneficiaries. This MOU is made and entered into for the sole protection and benefit of the Parties hereto and shall not create any rights in any third Parties. No other person or entity shall have any right of action based upon the provisions of this MOU.

i. Compliance with Laws and Regulations. By executing this MOU, the Parties agree to comply with all applicable federal, state and local laws, regulations and ordinances.

j. Authority. The persons executing this MOU or exhibits attached hereto on behalf of the Parties to this MOU hereby warrant and represent that they have the authority to execute this MOU and warrant and represent that they have the authority to bind the respective Parties to this MOU to the performance of its obligations hereunder.

k. Amendments. This MOU may be amended, in writing, from time-to-time by the Parties acting through their governing bodies, or designees.

l. Cooperation/Further Act. The Parties shall cooperate fully with one another, and shall take any additional acts or sign any additional documents as may be necessary, appropriate or convenient to attain the purposes of this MOU.

m. Entire Agreement. This MOU, including all exhibits and attachments hereto, is intended by the Parties hereto as a final expression of their understanding with respect to the subject matter hereof and as a complete and exclusive statement of the terms and conditions thereof and supersedes any and all prior and contemporaneous agreements and understandings, oral or written, in connection therewith. Any amendments to or clarification of this MOU shall be in writing and acknowledged by all Parties to this MOU.

n. Nondiscrimination. Parties shall not discriminate on the grounds of race, religious creed, color, national origin, ancestry, physical disability, mental disability, medical condition, including the medical condition of Acquired Immune Deficiency Syndrome (AIDS) or any condition related thereto, genetic information, marital status, sex, gender, gender identity, gender expression, age, sexual orientation, or military or veteran status in the selection and retention of employees and subcontractors and the procurement of materials and equipment, except as provided in Section 12940 of the California Government Code. Further, Parties agree to conform to the requirements of the Americans with Disabilities Act in the performance of this MOU.

(Signatures on Following Pages)

IN WITNESS WHEREOF, the PARTIES hereto have caused this MOU to be executed by their duly authorized representatives on the dates set forth below.

COUNTY OF RIVERSIDE,
a political subdivision of the State of California

By:______________________________

Dated:____________

ATTESTED TO:

By:_____________________________

APPROVED AS TO FORM:

By: ___________________________

Address:

County of Riverside
Attention: Rob Field
3403 10th Street
Riverside, CA 92501

CITY OF RIVERSIDE,
a California charter city and municipal corporation

By:______________________________

Dated:____________

ATTESTED TO:

By:______________________________

APPROVED AS TO FORM:

By: ___________________________

Address:

City of Riverside
Attention: Emilio Ramirez
3900 Main Street
Riverside, CA 92522

SANTA ANA WATERSHED PROJECT AUTHORITY, a California joint powers authority

By: ___________________________

Title: __________________________

Dated:_____________

Address:

SAWPA
Attention: Mike Antos
Address
Address

REGENTS OF THE UNIVERSITY OF CALIFORNIA, a California nonprofit corporation formed under Article IX of the California Constitution, as represented by the University of California Riverside School of Medicine

By: ________________________

Title: _______________________

Dated:____________

Address:

UCR School of Medicine
Attention:
Address
Address

REGENTS OF THE UNIVERSITY OF CALIFORNIA, a California nonprofit corporation formed under Article IX of the California Constitution, as represented by the University of California Riverside School of Agriculture

By: ___________________________

Title: __________________________

Dated:_____________

Address:

UCR School of Agriculture
Attention:
Address
Address

RIVERSIDE UNIFIED SCHOOL DISTRICT, a California public school district

____

By: __________________________

Title: _________________________

Dated:____________

Address:

RUSD
Attention:
Address
Address

GRID ALTERNATIVES, a California
nonprofit corporation

By: ___________________________

Title: __________________________

Dated:_____________

Address:

Grid Alternatives
Attention:
Address
Address

RIVERSIDE COMMUNITY HEALTH FOUNDATION, a California non-profit corporation

By: _________________________

Title: ________________________

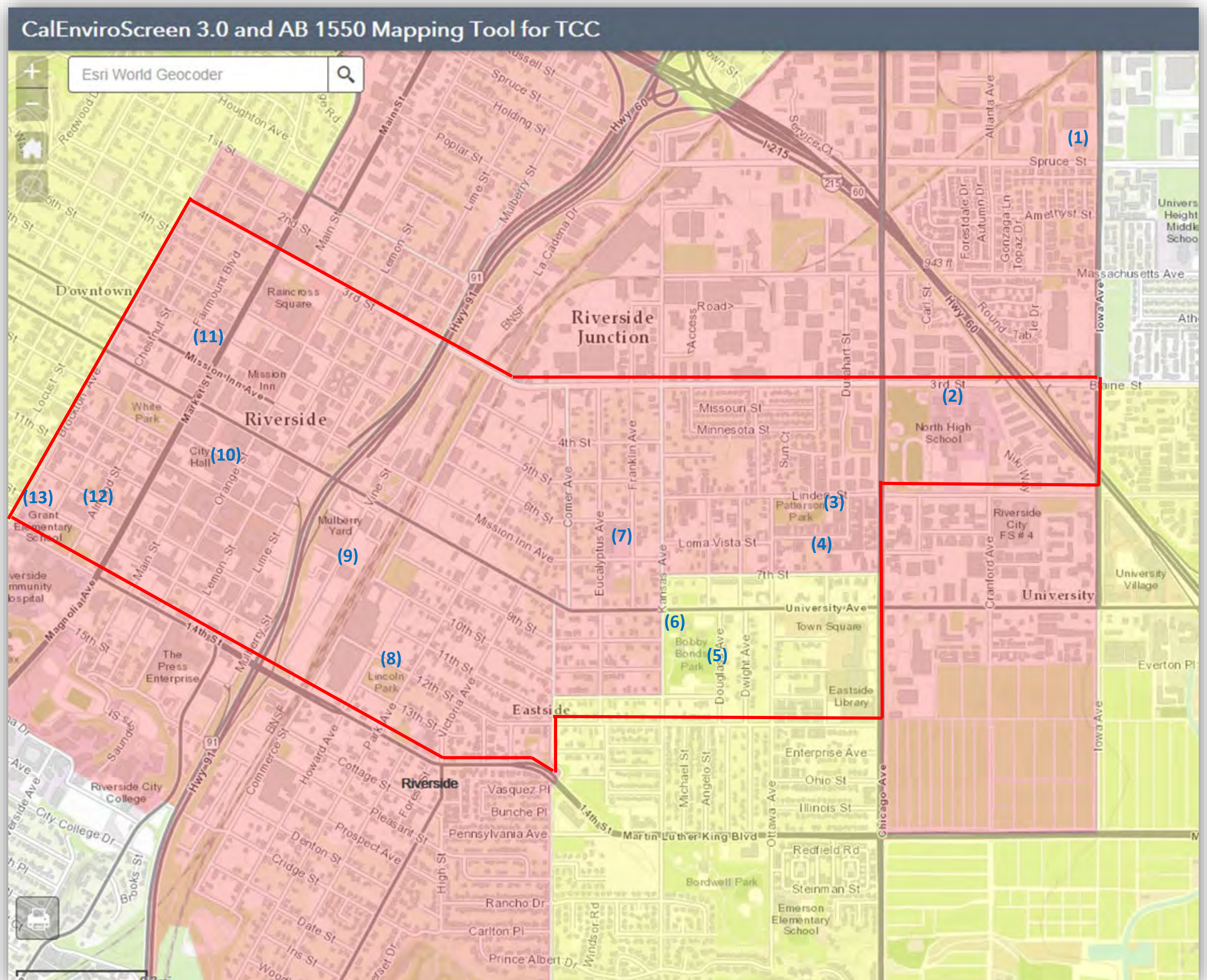
Dated:____________

Address:

Riverside Community Health Foundation
Attention:
Address
Address

EXHIBIT A
Project Area Map

Attachment A
Proposed Project Area Map



Key

Project area boundary

(1) Workforce Development Center
(2) North High School
(3) Patterson Park
(4) Chicago-Linden Housing Project
(5) Bobby Bonds Park
(6) Cesar Chavez Community Center
(7) Longfellow Elementary School
(8) Lincoln Park
(9) Metrolink Station and RTA Transit Hub
(10) Riverside City Hall
(11) Mission Heritage Housing Project
(12) Riverside County Office of Education
(13) Grant Elementary School

Santa Ana Watershed Project Authority
Cash Transaction Report
Month of August 2018

Below is a summary of cash transactions completed during the month in the Authority's checking account with US Bank. Attached are summaries by major revenue and expense classifications.

Cash Receipts and Deposits to Account	$	3,417,291.36
Net Investment Transfers		(1,801,322.34)
Cash Disbursements		(2,975,083.90)
Net Change for Month	$	(1,359,114.88)
Balance at Beginning of Month		2,350,568.09
Balance at End of Month per General Ledger	$	991,453.21
Collected Balance per Bank Statement	$	1,762,269.57

ACCOUNTS PAYABLE RECONCILIATION

Accounts Payable Balance @ 07/31/18	$	3,501,047.15
Invoices Received for August 2018		2,716,390.29
Invoices Paid by check/wire during August 2018 (see attached register)		(2,597,151.87)
Accounts Payable Balance @ 08/31/18	$	3,620,285.57

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CASH RECEIPTS

Brine Line Operating Revenues	$	990,968.20
OCFCD Loan Payment - Interest		58,671.07
Member Agency Contributions		588,678.00
Participant Fees		171,435.00
Grant Proceeds - Prop 84		49,812.45
Grant Proceeds - Prop 84 Pass-throughs		1,557,384.33
Other		342.31
Total Receipts and Deposits	$	3,417,291.36

INVESTMENT TRANSFERS

Transfer of Funds:		
From (to) LAIF	$	(4,000,000.00)
From (to) Grant Retention (USB)		-
From (to) CalTRUST (USB)		2,184,625.94
From (to) Legal Defense Fund		-
From (to) Investments		14,051.72
Total Investment Transfers	$	(1,801,322.34)

CASH DISBURSEMENTS

By Check:		
Payroll	$	-
Operations		2,597,151.87
Total Checks Drawn	$	2,597,151.87
By Cash Transfer:		
Payroll	$	256,776.70
Payroll Taxes		115,543.03
Take Care (AFLAC)		5,612.30
Total Cash Transfers	$	377,932.03
Total Cash Disbursements	$	2,975,083.90

Santa Ana Watershed Project Authority
Check Detail
Aug-18

Category	Check #	Check Date	Type	Vendor	Check Amount
Asset Clearing	3280	8/17/2018	CHK	Sonsray Machinery LLC	$ 54,191.69
Asset Clearing Total					**$ 54,191.69**
Benefits	3246	8/3/2018	CHK	Cal PERS Long Term Care Program	$ 102.04
Benefits	3248	8/3/2018	CHK	State Compensation Ins Fund	$ 4,953.75
Benefits	3259	8/9/2018	CHK	ACWA/JPIA	$ 49,386.73
Benefits	3274	8/17/2018	CHK	AFLAC	$ 560.55
Benefits	3276	8/17/2018	CHK	Cal PERS Long Term Care Program	$ 102.04
Benefits	3286	8/23/2018	CHK	WageWorks	$ 140.00
Benefits	3295	8/31/2018	CHK	Cal PERS Long Term Care Program	$ 102.04
Benefits	3299	8/31/2018	CHK	Mutual Of Omaha	$ 3,214.24
Benefits	EFT02125	8/3/2018	CHK	Vantagepoint Transfer Agents	$ 4,438.58
Benefits	EFT02129	8/3/2018	CHK	Vantagepoint Transfer Agents	$ 338.46
Benefits	EFT02144	8/17/2018	CHK	Vantagepoint Transfer Agents	$ 4,388.58
Benefits	EFT02148	8/17/2018	CHK	Vantagepoint Transfer Agents	$ 360.54
Benefits	EFT02170	8/31/2018	CHK	Vantagepoint Transfer Agents	$ 4,463.58
Benefits	EFT02173	8/31/2018	CHK	Vantagepoint Transfer Agents	$ 360.50
Benefits	P034091	8/1/2018	WDL	Public Employees' Retirement	$ 20,195.75
Benefits	P034092	8/1/2018	WDL	CalPERS Supplemental Income	$ 3,532.50
Benefits	P034212	8/17/2018	WDL	Public Employees' Retirement	$ 19,747.65
Benefits	P034213	8/17/2018	WDL	CalPERS Supplemental Income	$ 3,873.50
Benefits	P034319	8/31/2018	WDL	Public Employees' Retirement	$ 19,747.65
Benefits	P034320	8/31/2018	WDL	CalPERS Supplemental Income	$ 3,873.50
Benefits	WDL000004540	8/1/2018	WDL	Takecare	$ 370.36
Benefits	WDL000004541	8/2/2018	WDL	Takecare	$ 507.35
Benefits	WDL000004545	8/7/2018	WDL	Takecare	$ 370.36
Benefits	WDL000004548	8/10/2018	WDL	Takecare	$ 350.00
Benefits	WDL000004556	8/21/2018	WDL	Takecare	$ 370.36
Benefits	WDL000004560	8/22/2018	WDL	Takecare	$ 1,788.48
Benefits	WDL000004563	8/27/2018	WDL	Takecare	$ 369.03
Benefits	WDL000004566	8/31/2018	WDL	Takecare	$ 1,486.36
Benefits Total					**$ 149,494.48**
Building Lease	3292	8/23/2018	CHK	Wilson Property Services, Inc	$ 1,458.00
Building Lease Total					**$ 1,458.00**
Consulting	3298	8/31/2018	CHK	Teaman, Ramirez & Smith, Inc	$ 7,500.00
Consulting	EFT02128	8/3/2018	CHK	CDM Smith, Inc.	$ 26,208.11
Consulting	EFT02132	8/3/2018	CHK	GeoScience Support Services	$ 1,732.50
Consulting	EFT02139	8/9/2018	CHK	CDM Smith, Inc.	$ 15,308.15
Consulting	EFT02142	8/9/2018	CHK	Woodard & Curran Inc.	$ 48,565.29
Consulting	EFT02150	8/17/2018	CHK	Trussell Technologies, Inc.	$ 20,916.11
Consulting	EFT02151	8/17/2018	CHK	Dudek	$ 9,962.50
Consulting	EFT02152	8/17/2018	CHK	Woodard & Curran Inc.	$ 11,354.66
Consulting	EFT02158	8/23/2018	CHK	West Coast Advisors	$ 11,500.00
Consulting	EFT02162	8/23/2018	CHK	Accent Computer Solutions Inc	$ 4,228.94
Consulting	EFT02163	8/23/2018	CHK	Woodard & Curran Inc.	$ 26,444.95
Consulting	EFT02174	8/31/2018	CHK	DeGrave Communications	$ 1,283.22
Consulting Total					**$ 185,004.43**
Contributions	3278	8/17/2018	CHK	Public Policy Institute of California	$ 10,000.00
Contributions Total					**$ 10,000.00**
Credit Cards	P034214	8/9/2018	WDL	US Bank	$ 7,444.94
Credit Cards Total					**$ 7,444.94**
Debt Services	3297	8/31/2018	CHK	State Water Resources Control Board	$ 227,182.02
Debt Services Total					**$ 227,182.02**
Director Costs	EFT02155	8/23/2018	CHK	Eastern Municipal Water District	$ 240.33
Director Costs	EFT02164	8/23/2018	CHK	Jasmin Hall	$ 56.68
Director Costs	EFT02167	8/23/2018	CHK	Susan Longville	$ 65.40
Director Costs	EFT02168	8/23/2018	CHK	Bruce Whitaker	$ 65.40
Director Costs	EFT02171	8/31/2018	CHK	Western Municipal Water District	$ 203.82
Director Costs Total					**$ 631.63**
Dues	3281	8/17/2018	CHK	Corona Chamber of Commerce	$ 660.00
Dues Total					**$ 660.00**
Employee Reimbursement	EFT02130	8/3/2018	CHK	Ian Achimore	$ 20.71
Employee Reimbursement	EFT02134	8/9/2018	CHK	Regina Patterson	$ 134.38

Santa Ana Watershed Project Authority
Check Detail
Aug-18

Category	Check #	Check Date	Type	Vendor	Check Amount
Employee Reimbursement	EFT02149	8/17/2018	CHK	Karen Williams	$ 160.94
Employee Reimbursement	EFT02159	8/23/2018	CHK	Marie Jauregui	$ 55.00
Employee Reimbursement	EFT02161	8/23/2018	CHK	David Ruhl	$ 7.05
Employee Reimbursement	EFT02165	8/23/2018	CHK	Kelly Berry	$ 31.97
Employee Reimbursement	EFT02169	8/31/2018	CHK	Richard Whetsel	$ 252.60
Employee Reimbursement	EFT02176	8/31/2018	CHK	Mike Antos	$ 36.45
Employee Reimbursement Total					**$ 699.10**
Engineering	3251	8/3/2018	CHK	Stantec	$ 2,303.57
Engineering	EFT02141	8/9/2018	CHK	Dudek	$ 2,775.00
Engineering Total					**$ 5,078.57**
Equipment Expensed	3290	8/23/2018	CHK	The Technology Depot	$ 216.89
Equipment Expensed Total					**$ 216.89**
Equipment Rented	3263	8/9/2018	CHK	Konica Minolta Business Solutions	$ 764.77
Equipment Rented	3288	8/23/2018	CHK	GreatAmerica Financial Services	$ 1,452.56
Equipment Rented Total					**$ 2,217.33**
Facility Repair & Maintenance	3253	8/3/2018	CHK	TNT Elevator Inc	$ 240.00
Facility Repair & Maintenance	3256	8/3/2018	CHK	Western Water Works Supply Co	$ 5,077.54
Facility Repair & Maintenance	3266	8/9/2018	CHK	Tripac Marketing Inc.	$ 329.46
Facility Repair & Maintenance	3269	8/9/2018	CHK	Industrial Fire Protection	$ 353.88
Facility Repair & Maintenance	3289	8/23/2018	CHK	K&H Metals and Supplies	$ 90.76
Facility Repair & Maintenance	EFT02126	8/3/2018	CHK	Yeier Janitorial	$ 1,370.00
Facility Repair & Maintenance	EFT02137	8/9/2018	CHK	Green Meadows Landscape	$ 625.00
Facility Repair & Maintenance	EFT02145	8/17/2018	CHK	Western Exterminator Co.	$ 116.50
Facility Repair & Maintenance Total					**$ 8,203.14**
Lab Costs	EFT02127	8/3/2018	CHK	E. S. Babcock & Sons, Inc.	$ 1,251.00
Lab Costs	EFT02136	8/9/2018	CHK	E. S. Babcock & Sons, Inc.	$ 1,188.00
Lab Costs	EFT02146	8/17/2018	CHK	E. S. Babcock & Sons, Inc.	$ 1,426.00
Lab Costs	EFT02160	8/23/2018	CHK	E. S. Babcock & Sons, Inc.	$ 905.00
Lab Costs	EFT02172	8/31/2018	CHK	E. S. Babcock & Sons, Inc.	$ 341.00
Lab Costs Total					**$ 5,111.00**
Legal Costs	EFT02143	8/9/2018	CHK	Hunt Ortmann Palffy Nieves Dahl	$ 62,470.57
Legal Costs	EFT02177	8/31/2018	CHK	Hunt Ortmann Palffy Nieves Dahl	$ 94,440.47
Legal Costs Total					**$ 156,911.04**
Materials & Supplies	EFT02140	8/9/2018	CHK	A Cone Zone Inc	$ 1,918.64
Materials & Supplies Total					**$ 1,918.64**
Office Expense	3252	8/3/2018	CHK	Printing Connection, Inc.	$ 304.50
Office Expense	3260	8/9/2018	CHK	Aramark Corporation Refreshments	$ 212.12
Office Expense	3265	8/9/2018	CHK	Staples Business Advantage	$ 1,890.80
Office Expense	3275	8/17/2018	CHK	Konica Minolta Business Solutions	$ 651.84
Office Expense	3277	8/17/2018	CHK	Printing Connection, Inc.	$ 2,957.73
Office Expense Total					**$ 6,016.99**
Offiste Storage	EFT02147	8/17/2018	CHK	Iron Mountain	$ 121.66
Offiste Storage Total					**$ 121.66**
Other Contract Services	EFT02131	8/3/2018	CHK	EcoTech Services Inc	$ 71,929.80
Other Contract Services	EFT02154	8/23/2018	CHK	Orange County Sanitation District	$ 2,670.68
Other Contract Services	EFT02157	8/23/2018	CHK	Western Municipal Water District	$ 13,213.54
Other Contract Services	EFT02166	8/23/2018	CHK	DeGrave Communications	$ 955.00
Other Contract Services	EFT02175	8/31/2018	CHK	EcoTech Services Inc	$ 90,257.70
Other Contract Services Total					**$ 179,026.72**
Payroll	WDL000004534	8/3/2018	WDL	Direct Deposit 8/3/2018	$ 84,635.02
Payroll	WDL000004535	8/3/2018	WDL	PR Tax - Federal	$ 31,949.07
Payroll	WDL000004536	8/3/2018	WDL	PR Tax - State	$ 6,949.28
Payroll	WDL000004550	8/17/2018	WDL	Direct Deposit 8/17/2018	$ 89,352.52
Payroll	WDL000004552	8/17/2018	WDL	PR Tax - Federal	$ 32,077.25
Payroll	WDL000004553	8/17/2018	WDL	PR Tax - State	$ 7,899.06
Payroll	WDL000004562	8/31/2018	WDL	Direct Deposit 8/31/2018	$ 82,789.16
Payroll	WDL000004564	8/31/2018	WDL	PR Tax - Federal	$ 29,580.39
Payroll	WDL000004565	8/31/2018	WDL	PR Tax - State	$ 7,087.98
Payroll Total					**$ 372,319.73**
Prop84	3268	8/9/2018	CHK	City of Irvine	$ 67,014.28

Santa Ana Watershed Project Authority
Check Detail
Aug-18

Category	Check #	Check Date	Type	Vendor	Check Amount
Prop84	3270	8/9/2018	CHK	Soboba Band of Luiseno Indians	$ 14,790.55
Prop84	3283	8/23/2018	CHK	San Bernardino Valley Municipal Water	$ 629,875.36
Prop84	3284	8/23/2018	CHK	City of Corona	$ 311,490.39
Prop84	3287	8/23/2018	CHK	City of Riverside	$ 184,787.40
Prop84	3291	8/23/2018	CHK	US Forest Service	$ 7,834.52
Prop84	EFT02138	8/9/2018	CHK	Lake Elsinore & San Jacinto	$ 44,588.31
Prop84	EFT02153	8/23/2018	CHK	Inland Empire Utilities Agency	$ 301,159.26
Prop84	EFT02156	8/23/2018	CHK	ESRI Inc.	$ 4,441.66
Prop84 Total					**$ 1,565,981.73**
Safety	3285	8/23/2018	CHK	SafeT	$ 793.95
Safety	EFT02135	8/9/2018	CHK	Underground Service Alert	$ 191.50
Safety Total					**$ 985.45**
Software	3250	8/3/2018	CHK	Aatrix Software, Inc.	$ 399.95
Software	EFT02133	8/9/2018	CHK	ESRI Inc.	$ 13,000.00
Software Total					**$ 13,399.95**
Temporary Services	3244	8/3/2018	CHK	AppleOne Employment Services	$ 1,523.40
Temporary Services	3261	8/9/2018	CHK	AppleOne Employment Services	$ 930.68
Temporary Services	3273	8/17/2018	CHK	AppleOne Employment Services	$ 1,562.84
Temporary Services	3282	8/23/2018	CHK	AppleOne Employment Services	$ 1,246.76
Temporary Services	3293	8/31/2018	CHK	AppleOne Employment Services	$ 1,562.84
Temporary Services Total					**$ 6,826.52**
Utilities	3245	8/3/2018	CHK	AT&T	$ 766.35
Utilities	3247	8/3/2018	CHK	Southern California Edison	$ 30.23
Utilities	3249	8/3/2018	CHK	Burrtec Waste Industries Inc	$ 77.00
Utilities	3255	8/3/2018	CHK	Verizon Wireless	$ 1,808.32
Utilities	3257	8/3/2018	CHK	AT&T	$ 1,020.82
Utilities	3258	8/3/2018	CHK	Verizon Wireless	$ 313.46
Utilities	3262	8/9/2018	CHK	Riverside, City of	$ 2,692.85
Utilities	3264	8/9/2018	CHK	Southern California Edison	$ 246.42
Utilities	3272	8/9/2018	CHK	Riverside, City of	$ 144.33
Utilities	3279	8/17/2018	CHK	Verizon Wireless	$ 14.16
Utilities	3294	8/31/2018	CHK	AT&T	$ 643.83
Utilities	3296	8/31/2018	CHK	Southern California Edison	$ 29.29
Utilities	3300	8/31/2018	CHK	Verizon Wireless	$ 2,038.94
Utilities	3301	8/31/2018	CHK	AT&T	$ 771.46
Utilities	3302	8/31/2018	CHK	AT&T	$ 1,020.82
Utilities Total					**$ 11,618.28**
Vehicle Expenses	3254	8/3/2018	CHK	Riverside Transmission Center	$ 758.47
Vehicle Expenses	3267	8/9/2018	CHK	County of Riverside/Transportation	$ 563.60
Vehicle Expenses	3271	8/9/2018	CHK	Morgan Company	$ 1,041.90
Vehicle Expenses Total					**$ 2,363.97**
Grand Total					**$ 2,975,083.90**

		Accounts Payable
	Checks	$ 2,518,736.38
	Wire Transfers	$ 78,415.49
		$ 2,597,151.87
	Bank Fees	
	Take Care	$ 5,612.30
	Other	
	Payroll	$ 372,319.73
Total Disbursements for August 2018		**$ 2,975,083.90**

Santa Ana Watershed Project Authority

Consulting

August 2018

Check #	Check Date	Task #	*Task Description*	Vendor Name	Total Contract	Check Amount	Remaining Contract Amount	Notes/Comments
EFT02162	8/23/2018	ACS100-09	*IT Support*	Accent Computer Solutions	$ 186,800.00	$ 4,228.94	$ 182,571.06	
EFT02128	8/3/2018	CDM386-12	*SAR Bacteria Monitoring Program*	CDM Smith, Inc.	$ 330,671.00	$ 26,208.11	$ 48,845.46	
EFT02139	8/9/2018	CDM3847-17	*Audit Support of CBRP*	CDM Smith, Inc.	$ 44,870.00	$ 670.00	$ 22.61	
EFT02139	8/9/2018	CDM386-12	*SAR Bacteria Monitoring Program*	CDM Smith, Inc.	$ 330,671.00	$ 14,638.15	$ 34,207.31	
EFT02174	8/31/2018	DEGR392-03	*Social Media Suport - EC TF*	DeGrave Communications	$ 30,000.00	$ 1,283.22	$ 28,716.78	
EFT02151	8/17/2018	DUDK373-04	*OWOW Plan Update 2018*	Dudek	$ 38,740.00	$ 9,962.50	$ 28,777.50	
EFT02132	8/3/2018	GEOS374-01	*SAR WLA Model Update*	GeoScience Support Services	$ 273,766.00	$ 1,732.50	$ 697.25	
3298	8/31/2018	TEAM100-07	*SAWPA Audting Services*	Teaman, Ramirez, & Smith	$ 79,500.00	$ 7,500.00	$ 72,000.00	
EFT02150	8/17/2018	TRU240-20	*BL Water Quality Monitoring Analysis & Billing*	Trussell Technologies, Inc.	$ 49,885.00	$ 13,440.11	$ 19,504.49	
EFT02150	8/17/2018	TRU240-21	*BL Water Quality Monitoring Assessment*	Trussell Technologies, Inc.	$ 41,590.00	$ 7,476.00	$ 31,608.00	
EFT02158	8/23/2018	WCA100-03-02	*State Legislative Consulting Services*	West Coast Advisors	$ 345,000.00	$ 11,500.00	$ 31,500.00	
EFT02142	8/9/2018	W&C327-01	*4D Rehabilitation - Engineering Services*	Woodard & Curran Inc. (RMC)	$ 226,649.00	$ 29,904.70	$ 86,240.22	
EFT02142	8/9/2018	RMC504-401-03	*Proposed Technical Writing*	Woodard & Curran Inc. (RMC)	$ 34,992.00	$ 18,660.59	$ -	
EFT02152	8/17/2018	RMC504-401-02	*SARCCUP Program Mgmt Services*	Woodard & Curran Inc. (RMC)	$ 260,515.00	$ 11,354.66	$ 119,630.39	
EFT02163	8/23/2018	W&C327-01	*4D Rehabilitation - Engineering Services*	Woodard & Curran Inc. (RMC)	$ 226,649.00	$ 26,444.95	$ 59,795.27	
						$ 185,004.43		

COMMISSION MEMORANDUM NO. 2018.104

DATE: October 16, 2018

TO: SAWPA Commission

SUBJECT: Inter-Fund Borrowing – August 2018

PREPARED BY: Karen Williams, Chief Financial Officer

RECOMMENDATION
It is recommended that the Commission receive and file the informational report on short-term, cash-flow inter-fund borrowing.

DISCUSSION
On December 13, 2005, the Commission approved Resolution No. 452, Inter-Fund and Inter-Project Loan Policy. Staff was directed to bring back an accounting of the loans each month for review when the total exceeded $250,000 in aggregate.

The following projects, with negative cash flow, are listed below with the amounts borrowed from SAWPA General Fund Reserves in August 2018. The total amount borrowed is over the aggregate $250,000 amount recommended in Resolution No. 452, Inter-Fund and Inter-Project Loan Policy. The Commission has requested that this item be brought back each month as an informational item when the loan amount is over the $250,000 aggregate amount.

Fund	Fund Name	07/31/18 Balance	Loan Receipts	New Charges	08/31/18 Balance
130	Proposition 84 Admin	$59,951.51	($0.00)	$13,676.91	$73,628.42
135	Proposition 84 Admin R2	69,968.03	(22,016.85)	23,170.94	71,122.12
140	Proposition 84 Admin R3	48,407.77	(8,035.73)	16,637.88	57,009.92
145	Proposition 84 Admin R4	107,755.57	(0.00)	15,869.30	123,624.87
398	Proposition 1 – DACI Grant	79,793.65	(0.00)	12,527.72	92,321.37
477	LESJWA Administration	3,550.39	(0.00)	21,083.61	24,634.00
504	Prop 84 - Drought Projects	154,534.48	(19,759.87)	31,306.08	166,080.69
	Total Funds Borrowed	$523,961.40	($49,812.45)	$134,272.44	$608,421.39

General Fund Reserves Balance	$3,233,552.64
Less Amount Borrowed	608,421.39
Balance of General Fund Reserves	$2,625,131.25

The following table lists each fund that has a negative cash flow, the source of funding for the fund, how often the fund is billed, and the projected rate of payment for the fund.

NEGATIVE CASH-FLOW FUNDS

Fund No.	Source of Funding	Billing Frequency	Projected Payment Time
130,135,140, 145 – Proposition 84 Admin	DWR – Prop 84 Grant	Monthly/Quarterly	Up to 4 months
398 – Proposition 1 – DACI Grant	DWR – Prop 1 Grant	Monthly	Up to 4 months
477 – LESJWA Admin	Reimbursement from LESJWA	Monthly	2 to 4 weeks
504 - Proposition 84 Drought Projects	DWR – Prop 84 Grant	Monthly	Up to 4 months
504 – Proposition 84 SARCCUP Projects	DWR – Prop 84 Grant	Monthly/Quarterly	Up to 4 month

Fund 130
The outstanding balance of the funds due from DWR is the mandatory 10% retention from each invoice billed. Retention funds will not be released until the Proposition 84 Round I contract is completed in 2018.

Fund 135
This fund is for the administration of Proposition 84 Round II grant funds. These funds will be billed quarterly and 10% will be withheld for retention.

Fund 140
This fund is for the administration of Proposition 84 Drought Round grant funds. These funds will be billed monthly and 10% will be withheld for retention.

Fund 145
This fund is for the administration of Proposition 84 Round 2015 grant funds. These funds will be billed quarterly and 10% will be withheld for retention.

Fund 398
This fund is for the Proposition 1 DACI grant project. These funds will be billed monthly once the contracts with DWR have been signed.

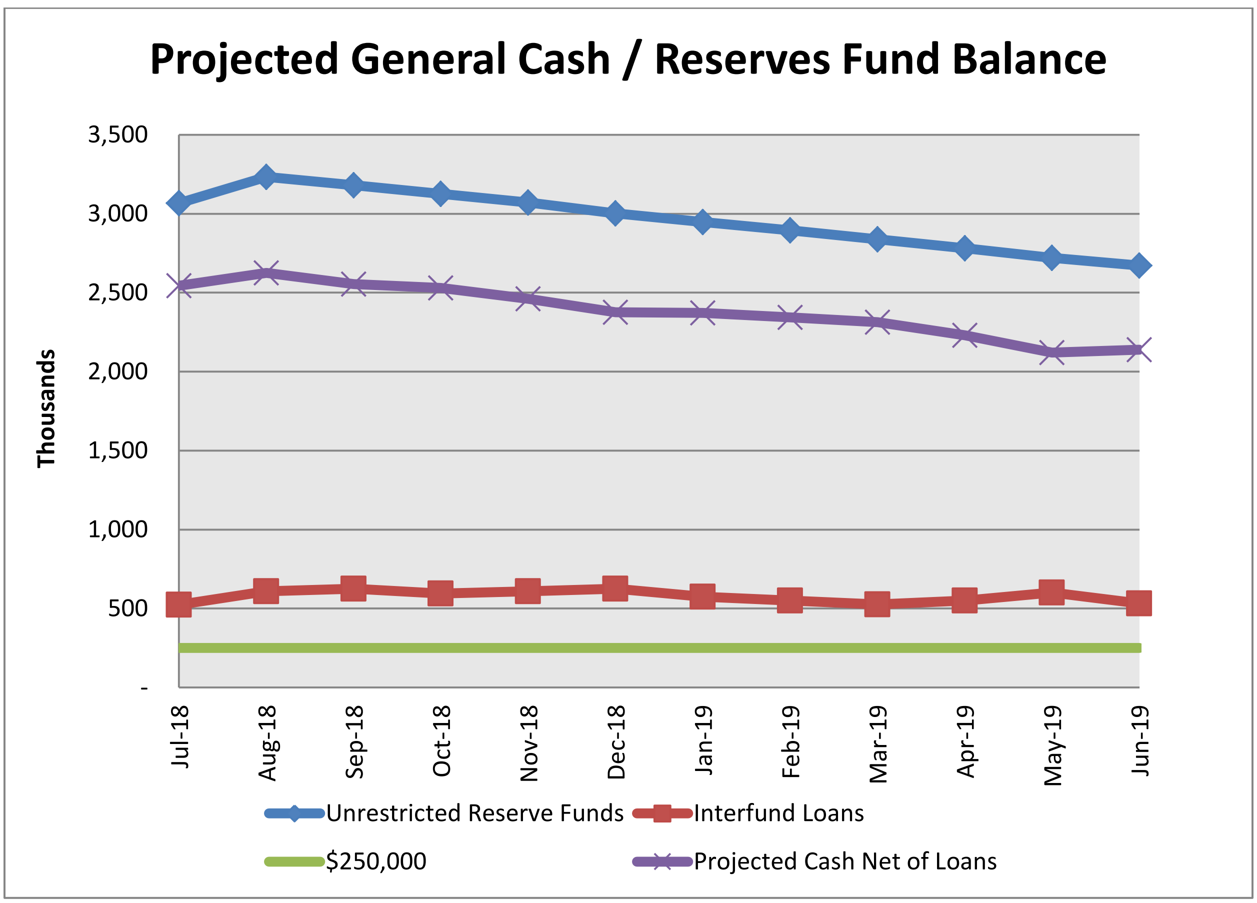
Fund 477
Each month LESJWA is billed the cost for administering the JPA. Once the bill is received, LESJWA submits payment within two weeks.

Fund 504
This fund is for the implementation of drought related projects and SARCCUP projects which are administered through PA-22 and PA23.

The following graph shows the total budget, total project costs to date, and the amount remaining on each grant.

Fund	Fund Name	Total Budget	Project Costs Through 08/31/18	Remaining Grant Budget
130	Proposition 84 Admin R1	$660,004	($490,729)	$169,275
135	Proposition 84 Admin R2	627,405	(409,727)	217,678
140	Proposition 84 Admin R3	625,000	(561,420)	63,580
145	Proposition 84 Admin R4	3,213,384	(514,047)	2,699,337
373	OWOW Planning Grant	250,000	(121,726)	128,274
397	Energy Water DAC Grant (WECAN)	2,164,816	(1,817,737)	347,079
398	Proposition 1 – DACI Grant	1,362,741	(712,552)	650,189
504	Prop 84 - Drought Projects	6,962,610	(2,647,770)	4,314,840
504	Prop 84 – 2015 Round (SARCCUP)	1,000,000	(448,732)	551,268
	Totals	$16,865,960	($7,724,440)	$9,141,520

The following graph shows projected inter-fund loan balances, total unrestricted General Fund Reserves available for loans, and projected cash net of loans through June 2019. The projected loan balance is expected to remain over the $250,000 aggregate limit through June 2019 because of Proposition 1 and 84 grants, but can be covered by General Fund Reserves without a major impact on cash flow.



RESOURCE IMPACTS

The funds borrowed from the General Fund Reserves will be paid back with interest when the funding is received. Interfund loans for grants are not charged interest unless the grant contracts specifically states interest is eligible for reimbursement. There is sufficient cash available to cover proposed borrowings and to pay budgeted expenditures for the General Fund.

COMMISSION MEMORANDUM NO. 2018.105

DATE: October 16, 2018

TO: SAWPA Commission

SUBJECT: Performance Indicators and Financial Reporting – August 2018

PREPARED BY: Karen Williams, Chief Financial Officer

RECOMMENDATION
It is recommended that the Commission receive and file staff's report.

DISCUSSION
The attached reports have been developed to keep the Commission informed as to SAWPA's business and budget performance. These reports are categorized into the following groups: financial reporting, cash and investments, and performance indicators. They are explained in detail below. As new reports are developed, they will be added for the Commission's review.

Financial Reporting

Balance Sheet by Fund Type	Lists total assets, liabilities, and equity by fund type for a given period.
Revenue & Expense by Fund Type	Lists total revenue and expenses by fund type for a given period.
Receivables Management	Shows total outstanding accounts receivable by age.
Open Task Order Schedule	Shows SAWPA's total outstanding obligation for open task orders.
List of SAWPA Funds	Shows each SAWPA Fund with the fund description and fund group.
Debt Service Funding Analysis	Shows total annual income by source used to make debt service payments through debt maturity at FYE 2048.
Debt Service Payment Schedule	Shows total debt service interest and principal payments through debt maturity at FYE 2048.

Cash and Investments

Total Cash and Investments (chart)	Shows the changes in cash and investments balance for the last twelve months.
Cash Balance & Source of Funds	Shows total cash and investments for all SAWPA funds and the types of investments held for each fund.
Cash & Investments (pie chart)	Shows total cash and investments for all SAWPA funds and the percentage of each investment type.
Reserve Account Analysis	Shows changes to each reserve account for the year and projected ending balance for each.
Twelve Month Security Schedule (chart)	Shows the maturity dates for securities held and percentage of securities in each category.

Treasurer's Report	Shows book and market value for both Treasury strips and securities held by the Agency.

Performance Indicators

Average Daily Flow by Month	Shows total flow in the Brine Line System by month compared to total treatment capacity owned. This is an indicator of the available capacity in the line. As we add yearly flows, it will show trends in flow throughout the year.
Summary of Labor Multipliers	Summarizes the information generated from the following two reports and compares the actual benefit and Indirect Cost Allocation rates to the total budgeted rates.
General Fund Costs	Lists total Fund No. 100 costs to date and the amount of those costs recovered through the Indirect Cost Allocation and member contributions.
Benefit Summary	Lists total employee benefit costs actual to budget and projects them through the end of the year. This report compares how the actual benefit rate compares to the budgeted rate.
Labor Hours Budget vs. Actual	Shows total budgeted hours for each project and compares them to the actual hours charged to each.

RESOURCE IMPACTS

Staff expects minimal impacts to SAWPA or its member agencies related to this effort.

Attachments:

1. Balance Sheet by Fund Type
2. Revenue & Expense by Fund Type
3. Accounts Receivable Aging Report
4. Open Task Order Schedule
5. List of SAWPA Funds
6. Debt Service Funding Analysis
7. Debt Service Payment Schedule
8. Total Cash and Investments (chart)
9. Cash Balance & Source of Funds
10. Reserve Account Analysis
11. Twelve-Month Maturity Schedule - Securities
12. Treasurer's Report
13. Average Daily Flow by Month
14. Summary of Labor Multipliers
15. General Fund Costs
16. Benefits
17. Labor Hours Budgeted vs. Actual

Santa Ana Watershed Project Authority
Balance Sheet by Fund Type
For the One Month Ending Tuesday, July 31, 2018

	General Fund	Brine Line Enterprise	Capital Projects	OWOW Projects	Roundtable Projects	Fund Totals
Assets						
Current Assets						
Cash and Investments	$4,081,582.03	$41,187,197.78	$4,837,074.67	$719,646.25	$2,338,021.51	$53,163,522.24
Accounts Receivable	306,668.56	1,911,843.15	0.00	5,417,505.89	179,295.33	7,815,312.93
Installment Notes Receivable	0.00	(1.00)	0.00	0.00	0.00	(1.00)
Interest Receivable	0.00	63,713.07	0.00	0.00	0.00	63,713.07
Prepaids and Deposits	31,141.46	103,227.39	0.00	0.00	0.00	134,368.85
Total Current Assets	4,419,392.05	43,265,980.39	4,837,074.67	6,137,152.14	2,517,316.84	61,176,916.09
Fixed Assets						
Property, Plant & Equipment less accum depreciation	1,176,084.14	60,195,310.58	0.00	0.00	0.00	61,371,394.72
Work In Process	0.00	0.00	28,119,698.48	0.00	0.00	28,119,698.48
Total fixed assets	1,176,084.14	60,195,310.58	28,119,698.48	0.00	0.00	89,491,093.20
Other Assets						
Wastewater treatment/disposal rights, net of amortization	0.00	27,539,151.70	0.00	0.00	0.00	27,539,151.70
Inventory - Mitigation Credits	0.00	0.00	0.00	0.00	1,910,560.00	1,910,560.00
Total Other Assets	0.00	27,539,151.70	0.00	0.00	1,910,560.00	29,449,711.70
Total Assets	$5,595,476.19	$131,000,442.67	$32,956,773.15	$6,137,152.14	$4,427,876.84	$180,117,720.99
Liabilities and Fund Equity						
Current Liabilities						
Accounts Payable/Accrued Expenses	$725,319.02	$1,073,396.43	$267,966.86	$4,533,195.31	$58,928.98	$6,658,806.60
Accrued Interest Payable	0.00	247,533.06	194,805.78	0.00	0.00	442,338.84
Customer Deposits	10,000.00	0.00	0.00	0.00	451,275.71	461,275.71
Noncurrent Liabilities						
Long-term Debt	4,327,604.00	16,641,350.69	12,374,940.00	0.00	0.00	33,343,894.69
Deferred Revenue	0.00	70,209,133.50	0.00	0.00	0.00	70,209,133.50
Total Liabilities	5,062,923.02	88,171,413.68	12,837,712.64	4,533,195.31	510,204.69	111,115,449.34
Fund Equity						
Contributed Capital	0.00	20,920,507.03	0.00	0.00	0.00	20,920,507.03
Retained Earnings	1,330,766.05	21,458,911.90	20,231,802.56	985,966.44	3,576,972.00	47,584,418.95
Revenue Over/Under Expenditures	(798,212.88)	449,610.06	(112,742.05)	617,990.39	340,700.15	497,345.67
Total Fund Equity	532,553.17	42,829,028.99	20,119,060.51	1,603,956.83	3,917,672.15	69,002,271.65
Total Liabilities & Fund Equity	$5,595,476.19	$131,000,442.67	$32,956,773.15	$6,137,152.14	$4,427,876.84	$180,117,720.99

Santa Ana Watershed Project Authority
Revenue & Expenses by Fund Type
For the One Month Ending Tuesday, July 31, 2018

	General Fund	Brine Line Enterprise	Capital Projects	OWOW Projects	Roundtable Projects	Fund Totals
Operating Revenue						
Discharge Fees	$0.00	$928,204.66	$0.00	$0.00	$0.00	$928,204.66
Grant Proceeds	0.00	0.00	0.00	71,347.39	0.00	71,347.39
Financing Proceeds	0.00	0.00	0.00	0.00	10,851.45	10,851.45
Total Operating Revenue	0.00	928,204.66	0.00	71,347.39	10,851.45	1,010,403.50
Operating Expenses						
Labor	169,793.49	72,416.11	6,059.39	37,680.09	9,372.57	295,321.65
Benefits	60,824.09	31,645.85	2,647.95	16,466.21	4,095.81	115,679.91
Indirect Costs	0.00	102,179.12	8,549.79	53,166.59	13,224.70	177,120.20
Education & Training	979.47	0.00	0.00	0.00	0.00	979.47
Consulting & Professional Services	30,077.18	0.00	95,482.47	107,724.30	1,283.22	234,567.17
Operating Costs	353.88	224,130.09	0.00	0.00	0.00	224,483.97
Repair & Maintenance	3,615.50	970.63	0.00	0.00	0.00	4,586.13
Phone & Utilities	5,219.65	759.79	0.00	0.00	0.00	5,979.44
Equipment & Computers	40,219.84	29,338.27	0.00	0.00	0.00	69,558.11
Meeting & Travel	1,340.42	63.56	2.45	1,692.29	0.00	3,098.72
Other Administrative Costs	6,073.26	11,657.50	0.00	65.00	10,000.00	27,795.76
Benefits Applied	150,894.83	0.00	0.00	0.00	0.00	150,894.83
Indirect Costs Applied	(180,103.31)	0.00	0.00	0.00	0.00	(180,103.31)
Other Expenses	19,194.56	9,318.03	0.00	0.00	0.00	28,512.59
Construction	0.00	0.00	0.00	37,562.52	0.00	37,562.52
Total Operating Expenses	308,482.86	482,478.95	112,742.05	254,357.00	37,976.30	1,196,037.16
Operating Income (Loss)	(308,482.86)	445,725.71	(112,742.05)	(183,009.61)	(27,124.85)	(185,633.66)
Nonoperating Income (Expense)						
Member Contributions	650,695.00	0.00	0.00	801,000.00	20,000.00	1,471,695.00
Other Agency Contributions	0.00	0.00	0.00	0.00	347,825.00	347,825.00
Interest Income	0.00	17,481.54	0.00	0.00	0.00	17,481.54
Interest Expense - Debt Service	0.00	(13,630.57)	0.00	0.00	0.00	(13,630.57)
Other Income	0.00	33.38	0.00	0.00	0.00	33.38
Use of Reserves	(8,920.02)	0.00	0.00	0.00	0.00	(8,920.02)
Total Nonoperating Income (Expense)	641,774.98	3,884.35	0.00	801,000.00	367,825.00	1,814,484.33
Excess Rev over (under) Exp	$333,292.12	$449,610.06	($112,742.05)	$617,990.39	$340,700.15	$1,628,850.67

Aging Report
Santa Ana Watershed Project Authority
Receivables as of August 31, 2018

Customer Name	Project	Total	Current	0-30 Days	31-60 Days	61 and Over
Beaumont Cherry Valley Water District	Basin Monitoring TF	13,712.00				13,712.00
Chino Basin Desalter Authority	Brine Line	317,673.76		151,409.86	166,263.90	
Department of Water Resources	Prop 84, WECAN	3,352,657.75			114,680.40	3,237,977.35
Eastern Municipal Water District	Brine Line, SARCCUP Cost Share	440,828.52		265,840.54	174,987.98	
Inland Empire Utilities Agency	Brine Line, Emerging Constituents, SARCCUP	350,442.96		218,367.50	132,075.46	
City of Jurupa Valley	MSAR TMDL	14,018.00				14,018.00
Lake Elsinore & San Jacinto Watersheds Authority	LESJWA Administration	15,083.61			15,083.61	
Orange County Water District	Member Agency Contributions, SA Sucker, SARCCUP	148,544.00			87,544.00	61,000.00
Orange County	MSAR TMDL	40,159.00				40,159.00
Riverside, City of	SA Sucker	4,000.00				4,000.00
Riverside County	MSAR TMDL	14,018.00				14,018.00
San Bernardino County	RWQ Monitoring TF, MSAR TMDL	227,051.00				227,051.00
San Bernardino Valley Municipal Water District	Brine Line, SARCCUP Cost Share	286,077.21		100,296.87	185,780.34	
Western Municipal Water District	Brine Line, SARCCUP Cost Share	879,419.33		349,065.06	439,632.27	90,722.00
Total Accounts Receivable		6,103,685.14	-	1,084,979.83	1,316,047.96	3,702,657.35

Santa Ana Watershed Project Authority
Open Task Orders Schedule
Aug-18
(Reflects Invoices Received as of 09/13/18)

Task Order No. Project Contracts	Fund No.	Vendor Name	Task Description	Begin Date	End Date	Original Contract	Change Orders	Total Contract	Billed To Date	Contract Balance	SAWPA Manager	Comments
ACS100-11	100-00	Accent Computer Solutions	IT Support	08/08/2018	06/30/2020	$ 186,800.00	$ -	$ 186,800.00	$ 9,237.13	$ 177,562.87	Dean Unger	
BART100-03	100-00	Bartel & Associates	GASB 68 Actuarial Information	04/24/2018	12/31/2018	$ 1,200.00	$ -	$ 1,200.00	$ 1,200.00	$ -	Karen Williams	
HAMM100-240-01	100/240	Hammons Strategies	Technicial Writing - SAWPA/BL	07/01/2018	06/30/2019	$ 10,000.00	$ -	$ 10,000.00	$ 1,815.00	$ 8,185.00	Rich Haller	
INSOL100-11	100-00	Integrated Systems Solutions	Management of Info Systems & Technology	08/01/2018	06/30/2019	$ 3,000.00	$ -	$ 3,000.00		$ 3,000.00	Dean Unger	
NICO100-05	100-00	Nicolay Consulting Group	GASB 45/75 Transisiton Plan	08/22/2017	06/30/2019	$ 7,200.00	$ 900.00	$ 8,100.00	$ 5,700.00	$ 2,400.00	Karen Williams	
TEAM100-07	100-00	Teaman, Ramirez, & Smith	Auditing Services	06/05/2018	06/30/2021	$ 79,500.00	$ -	$ 79,500.00	$ 7,500.00	$ 72,000.00	Karen Williams	
TTD100-04	100-00	The Technology Depot	Phone Support	08/17/2018	06/30/2019	$ 5,000.00	$ -	$ 5,000.00	$ -	$ 5,000.00	Dean Unger	
WCA100-03-02	100-03	West Coast Advisors	State Legislative Consulting FY16-18	11/24/2015	12/31/2018	$ 345,000.00	$ -	$ 345,000.00	$ 325,000.00	$ 20,000.00	Rich Haller	
DOUG240-03	240	Douglas Environmental	Brine Line Meter Calibration	07/01/2018	06/30/2020	$ 25,620.00		$ 25,620.00		$ 25,620.00	Carlos Quintero	On Call
WO2019-04	240	E S Babcock	Brine Line Sample Collection & Analysis	07/01/2018	06/30/2019	$ 86,454.00	$ -	$ 86,454.00	$ 8,588.00	$ 77,866.00	Carols Quintero	
HAZ240-09	240	Haz Mat Trans Inc	On Call Draining & Emergency Clean Up	07/01/2018	06/30/2020	$ 96,665.00	$ -	$ 96,665.00		$ 96,665.00	Carlos Quintero	On Call
HAZ240-10	240	Haz Mat Trans Inc	BL Debris Hauling & Disposal services	07/01/2018	06/30/2020	$ 34,800.00		$ 34,800.00		$ 34,800.00	Carlos Quintero	On Call
HOU240-04	240	Houston Harris PCS Inc	Brine Line On Call Inspection Services	07/01/2018	06/30/2020	$ 96,448.00	$ -	$ 96,448.00		$ 96,448.00	Carlos Quintero	On Call
WO2018-10	240	IEUA	Reach IV-A Upper Support	07/01/2017	06/30/2018	$ 10,000.00	$ -	$ 10,000.00	$ 5,633.09	$ 4,366.91	Carlos Quintero	
INN240-03	240	Innerline Engineering Inc	Brine Line On-Call Line Cleaning	07/01/2018	06/30/2020	$ 151,020.00		$ 151,020.00	$ 2,164.50	$ 148,855.50	Carlos Quintero	On Call
TRU240-20	240	Trussell Technologies	BL Water Quality Analysis	09/07/2017	10/31/2018	$ 49,885.00	$ -	$ 49,885.00	$ 47,618.87	$ 2,266.13	Carlos Quintero	
TRU240-21	240	Trussel Technologies	BL Monitoring Assesment	01/04/2018	09/30/2018	$ 41,590.00	$ -	$ 41,590.00	$ 17,476.00	$ 24,114.00	Carlos Quintero	
WO2019-01	240	WMWD	Sample Collection & Analysis	07/01/2018	06/30/2019	$ 80,000.00	$ -	$ 80,000.00	7,112.71	$ 72,887.29	David Ruhl	
WO2019-02	240	WMWD	Brine Line Operations & Maintenance	07/01/2018	06/30/2019	$ 25,000.00	$ -	$ 25,000.00	763.16	$ 24,236.84	Carlos Quintero	
STAN320-01	320	Stantec	Alcoa Dike - BL Protection	05/30/2018	12/31/2018	$ 13,584.00	$ -	$ 13,584.00	3,345.57	$ 10,238.43	David Ruhl	
DUDK326-06	326	Dudek	Reach V Rehabilitation - Ph I, Tasks 3-4	03/03/2017	06/30/2019	$ 134,900.00	$ -	$ 134,900.00	$ 93,430.63	$ 41,469.37	David Ruhl	
VALI326-04	326	Vali Cooper & Associates Inc	IEBL Reach V Rehabilitation	03/15/2017	06/30/2019	$ 1,252,400.00	$ -	$ 1,252,400.00	$ 816,066.53	$ 436,333.47	David Ruhl	
W&C327-01	327	Woodard & Curran	4D Rehabilitation - Engineering Services	04/11/2018	12/31/2018	$ 226,649.00	$ -	$ 226,649.00	$ 166,853.73	$ 59,795.27	David Ruhl	
DUDK373-01	373	Dudek	Technical Writing - OWOW Plan Update 2018	12/19/2017	12/31/2018	$ 25,600.00	$ 8,725.00	$ 34,325.00	$ 28,535.51	$ 5,789.49	Mark Norton	

Santa Ana Watershed Project Authority
Open Task Orders Schedule
Aug-18
(Reflects Invoices Received as of 09/13/18)

Task Order No. Project Contracts	Fund No.	Vendor Name	Task Description	Begin Date	End Date	Original Contract	Change Orders	Total Contract	Billed To Date	Contract Balance	SAWPA Manager	Comments
			(phase 1)									
DUDK373-04	373	Dudek	Technical Writing - OWOW Plan Update 2018	07/30/2018	12/31/2018	$ 38,740.00	$ -	$ 38,740.00	$ 16,183.75	$ 22,556.25	Mike Antos	
			(phase 2)									
GEOS374-01	374	GeoScience Support Service	SAR WLA Model Update	02/01/2017	12/31/2018	$ 249,800.00	$ 35,446.00	$ 285,246.00	$ 273,068.75	$ 12,177.25	Mark Norton	
RISK374-07	374	Risk Sciences	Basin Monitoring TF	11/06/2017	12/31/2018	$ 73,150.00	$ -	$ 73,150.00	$ 42,229.68	$ 30,920.32	Mark Norton	
SCH381-01	381	Scheevel Engineering	S.A. Sucker - Beneficial Use Project	04/18/2017	12/31/2018	$ 96,725.00	$ -	$ 96,725.00	$ 80,266.50	$ 16,458.50	Ian Achimore	
CDM384-15	384-01	CDM Smith	CBRP Implementation Support (Cucamonga)	02/08/2017	12/31/2018	$ 12,135.00	$ -	$ 12,135.00	$ 5,399.64	$ 6,735.36	Mark Norton	
RISK384-09	384-01	Risk Sciences	MSAR TMDL Task Force	07/01/2018	06/30/2019	$ 49,340.00	$ -	$ 49,340.00	$ 3,835.78	$ 45,504.22	Rick Whetsel	
CDM386-13	386	CDM Smith	Regional Bacteria Monitoring Program	07/01/2018	06/30/2019	$ 324,914.00		$ 324,914.00		$ 324,914.00	Rick Whetsel	
RISK386-10	386	Risk Sciences	Compliance Expert - RWQM TF	07/01/2018	06/30/2019	$ 46,820.00	$ -	$ 46,820.00	$ 3,520.78	$ 43,299.22	Rick Whetsel	
SAWA387-06	387	Santa Ana Watershed Association	Arundo Surveying	07/17/2018	08/31/2019	$ 23,000.00	$ -	$ 23,000.00	$ -	$ 23,000.00	Ian Achimore	
DEGR392-04	392	DeGrave Communications	Social Media Support - EC TF	07/01/2018	06/30/2019	$ 30,000.00	$ -	$ 30,000.00	$ 2,726.87	$ 27,273.13	Mark Norton	
PO3289	397	CAPOC	Green House Gas Contract - WECAN	06/27/2016	10/31/2018	$ 16,628.00	$ -	$ 16,628.00	$ 4,592.60	$ 12,035.40	Mike Antos	
PO3377	397	CAPR	Green House Gas Contract - WECAN	10/31/2016	10/31/2018	$ 85,000.00	$ -	$ 85,000.00	$ 85,850.00	$ (850.00)	Mike Antos	
PO3285	397	CAPSB	Green House Gas Contract - WECAN	06/20/2016	10/31/2018	$ 868,153.00	$ -	$ 868,153.00	$ 537,497.13	$ 330,655.87	Mike Antos	
ECOT397-01	397	Ecotech	WECAN Landscaping Project	05/26/2016	10/31/2018	$ 1,300,000.00	$ 82,000.00	$ 1,382,000.00	$ 1,263,461.50	$ 118,538.50	Mike Antos	
ECOT397-02	397	Ecotech	WECAN Landscaping Project	04/04/2017	10/30/2018	$ 612,000.00	$ -	$ 612,000.00	$ 551,012.00	$ 60,988.00	Mike Antos	
ECOT397-03	397	Ecotech	WECAN Landscaping Project	03/13/2018	09/30/2018	$ 27,600.00	$ -	$ 27,600.00	$ 5,900.00	$ 21,700.00	Mike Antos	
GMC397-01	397	Green Media Creations	WECAN Outreach and Management	05/26/2016	10/31/2018	$ 170,000.00	$ 20,000.00	$ 190,000.00	$ 174,844.05	$ 15,155.95	Mike Antos	
GMC397-02	397	Green Media Creations	WVWD Turf Removal	04/11/2017	10/30/2018	$ 80,000.00		$ 80,000.00	$ 79,744.32	$ 255.68	Mike Antos	
PO3466	398	California Rural Water Association	Disadvantaged Communities Grant	07/19/2017	04/30/2020	$ 240,000.00	$ -	$ 240,000.00	$ 90,517.07	$ 149,482.93	Mike Antos	
DEGR398-01	398	Degrave Communications	Social Meida Support	03/20/2018	06/30/2019	$ 78,434.00	$ -	$ 78,434.00	$ 5,885.48	$ 72,548.52	Mike Antos	
PO3463	398	Local Government Commission	Disadvantaged Communities Grant	07/19/2017	04/30/2020	$ 442,000.00	$ -	$ 442,000.00	$ 184,085.22	$ 257,914.78	Mike Antos	
PO3551	398	UC Irvine	Disadvantaged Communities Grant	11/06/2017	04/30/2020	$ 105,000.00	$ 22,000.00	$ 127,000.00	$ 80,151.95	$ 46,848.05	Mike Antos	
PO3465	398	University Enterprises Corporation	Disadvantaged Communities Grant	07/19/2017	04/30/2020	$ 1,290,500.00	$ -	$ 1,290,500.00	$ 117,650.45	$ 1,172,849.55	Mike Antos	

Santa Ana Watershed Project Authority
Open Task Orders Schedule
Aug-18
(Reflects Invoices Received as of 09/13/18)

Task Order No. Project Contracts	Fund No.	Vendor Name	Task Description	Begin Date	End Date	Original Contract	Change Orders	Total Contract	Billed To Date	Contract Balance	SAWPA Manager	Comments
PO3464	398	Water Education Foundation	Disadvantaged Communities Grant	07/19/2017	04/30/2020	$ 150,000.00	$ -	$ 150,000.00	$ 8,484.69	$ 141,515.31	Mike Antos	
CVS504-301-01	504-00	CV Strategies	FAQ on Conservation Based Rates	11/29/2016	03/31/2019	$ 25,000.00	$ 15,750.00	$ 40,750.00	$ 18,488.75	$ 22,261.25	Ian Achimore	
MSS504-301-01	504-00	Miller Spatial Services	Geocoding & Business Type Classification	08/24/2017	12/31/2018	$ 300,000.00	$ -	$ 300,000.00	$ 136,955.55	$ 163,044.45	Rick Whetsel	
OMNI504-301-01	504-00	OmniEarth Inc	Web Based Water Consumption Reporting	09/21/2015	12/31/2018	$ 1,500,000.00	$ -	$ 1,500,000.00	$ 858,679.20	$ 641,320.80	Mark Norton	
RMC504-401-04	504-04	Woodard & Curran	SARCCUP Program Mgmt Services	07/01/2018	06/30/2019	$ 224,485.00	$ -	$ 224,485.00	$ 13,571.19	$ 210,913.81	Ian Achimore	
										$ 5,439,916.67		

LIST OF SAWPA FUNDS

Fund No.	Fund Description	Fund Group
100-00	General Fund	General
100-03	State Lobbying	General
100-04	Federal Lobbying	General
100-05	Grant Applications	General
130	Proposition 84 – Program Management - Round 1	OWOW
135	Proposition 84 – Program Management – Round 2	OWOW
140	Proposition 84 – Program Management – Drought Round	OWOW
145	Proposition 84 – Program Management – 2015 Round	OWOW
240	Brine Line Enterprise	Brine Line
320-01	Brine Line Protection – Downstream Prado	Capital Projects
320-03	Brine Line Protection Above Prado	Capital Projects
320-04	Brine Line Protection D/S Prado in Riverside County	Capital Projects
326	Reach V Capital Repairs	Capital Projects
327	Reach IV-D Corrosion Repair	Capital Projects
370-01	Basin Planning General	OWOW
370-02	USBR Partnership Studies	OWOW
372	Imported Water Recharge Work Group	Roundtable
373	Watershed Management (OWOW)	OWOW
374	Basin Monitoring Program Task Force	Roundtable
381	Santa Ana River Fish Conservation	Roundtable
384-01	MSAR TMDL Task Force	Roundtable
386	Regional Water Quality Monitoring Task Force	Roundtable
387	Arundo Management & Habitat Restoration	Roundtable
392	Emerging Constituents Task Force	Roundtable
396	Forest First	Roundtable
397	Energy – Water DAC Grant Project	OWOW
398	Proposition 1 - DACI	OWOW
477	LESJWA Administration	Roundtable
504-01	Proposition 84 – Capital Projects Round 1 & 2	OWOW
504-00	Proposition 84 – Drought Capital Projects	OWOW
504-04	Proposition 84 – Final Round SARCCUP	OWOW

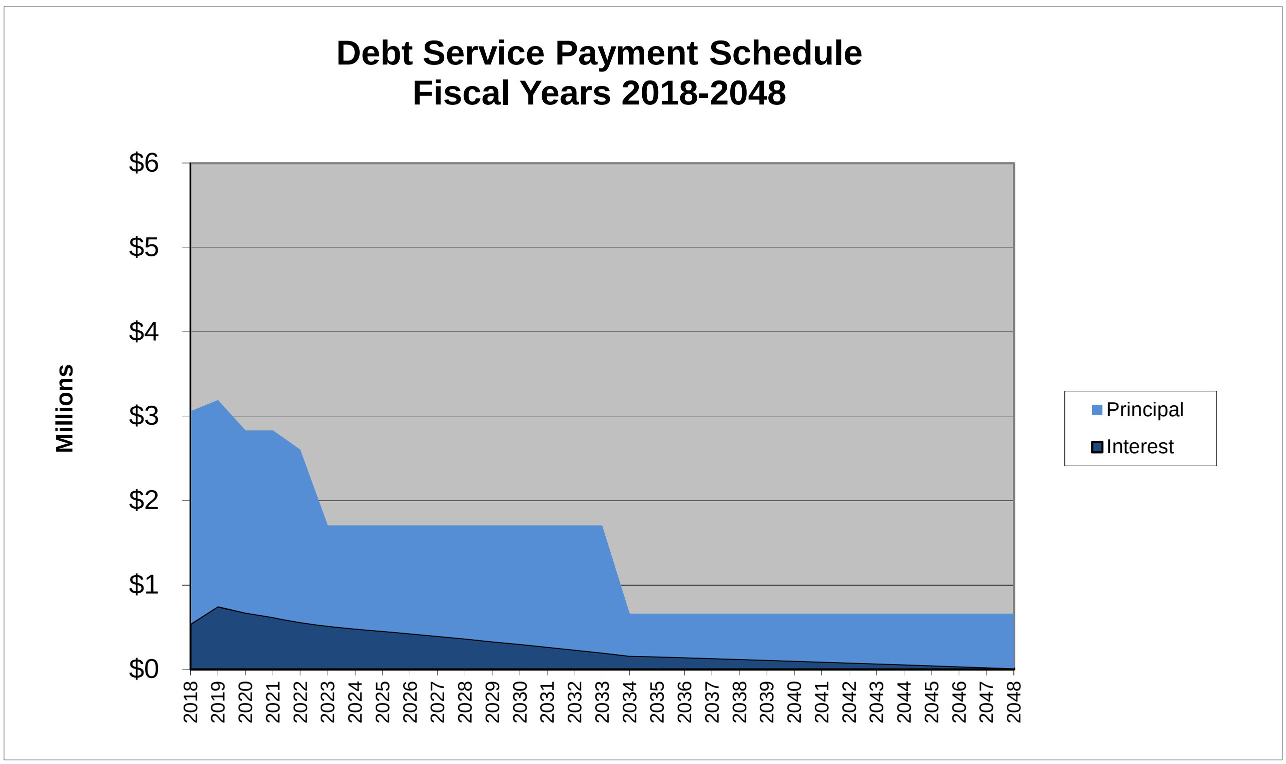
Santa Ana Watershed Project Authority
Brine Line Debt Service Funding Analysis
August 31, 2018

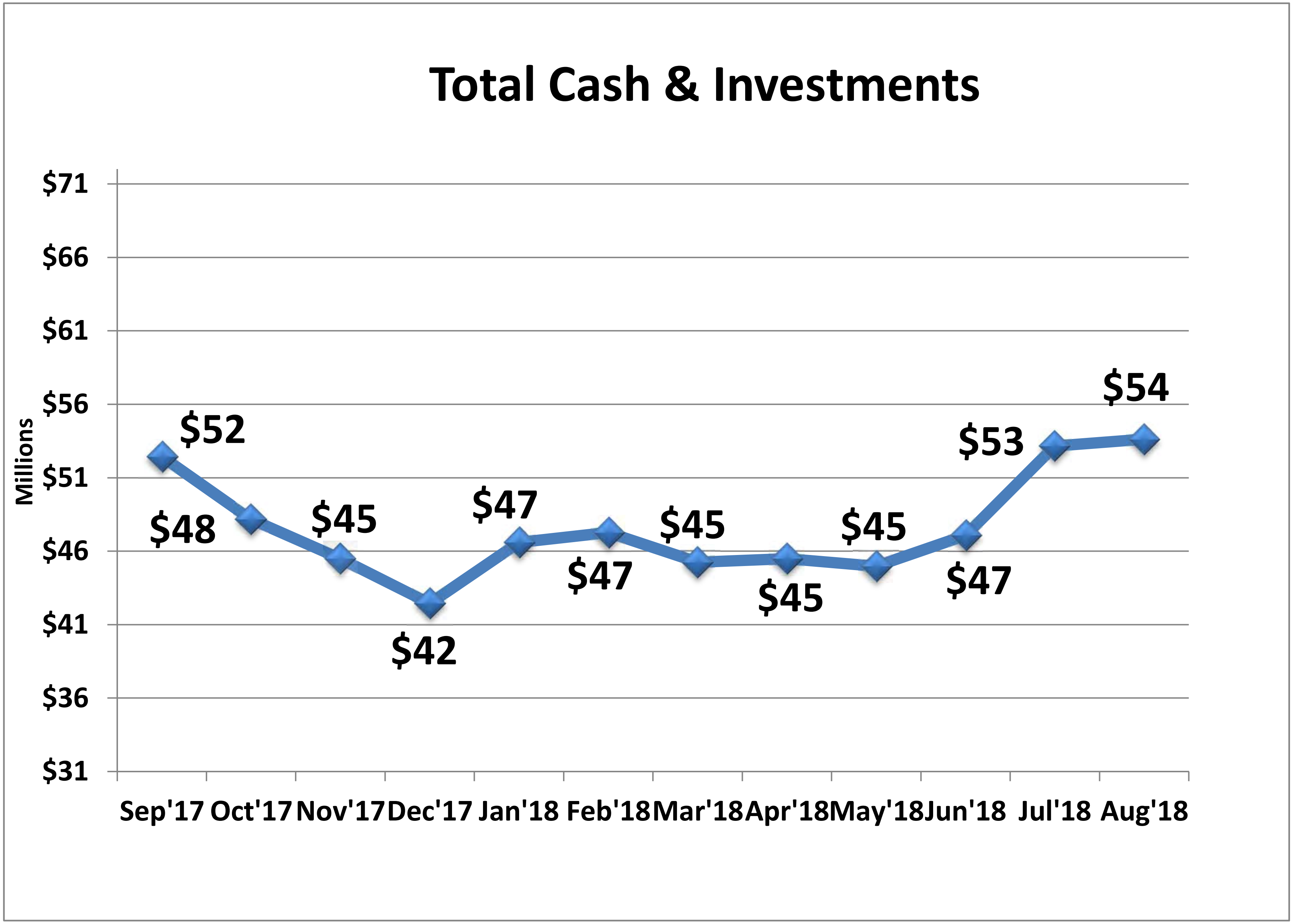
FYE	T-Strip Maturity	Capacity Loan Receipts	Rates	Loan Pymts	Interest Earned *	Excess Cash	Ending Cash Balance
	Beginning Balance						5,335,350
2019	395,000	89,053	1,708,750	(3,191,277)	26,392	(972,082)	4,363,268
2020	395,000	-	1,708,750	(2,835,027)	56,175	(675,102)	3,688,166
2021	-	-	1,708,750	(2,835,027)	42,673	(1,083,604)	2,604,562
2022	-	-	1,708,750	(2,607,713)	21,001	(877,961)	1,726,601
2023	-	-	1,708,750	(1,708,750)	3,442	3,442	1,730,043
2024	-	-	1,708,750	(1,708,750)	3,511	3,511	1,733,554
2025	-	-	1,708,750	(1,708,750)	3,581	3,581	1,737,135
2026	-	-	1,708,750	(1,708,750)	3,653	3,653	1,740,787
2027	-	-	1,708,750	(1,708,750)	3,726	3,726	1,744,513
2028	-	-	1,708,750	(1,708,750)	3,800	3,800	1,748,313
2029	-	-	1,708,750	(1,708,750)	3,876	3,876	1,752,189
2030	-	-	1,708,750	(1,708,750)	3,954	3,954	1,756,143
2031	-	-	1,708,750	(1,708,750)	4,033	4,033	1,760,175
2032	-	-	1,708,750	(1,708,750)	4,113	4,113	1,764,289
2033	-	-	1,708,749	(1,708,749)	4,196	4,196	1,768,484
2034	-	-	664,476	(664,476)	4,280	4,280	1,772,764
2035	-	-	664,476	(664,476)	4,365	4,365	1,777,130
2036	-	-	664,476	(664,476)	4,452	4,452	1,781,581
2037	-	-	664,476	(664,476)	4,541	4,541	1,786,124
2038	-	-	664,476	(664,476)	4,632	4,632	1,790,755
2039	-	-	664,476	(664,476)	4,725	4,725	1,795,480
2040	-	-	664,476	(664,476)	4,819	4,819	1,800,299
2041	-	-	664,476	(664,476)	4,916	4,916	1,805,215
2042	-	-	664,476	(664,476)	5,014	5,014	1,810,229
2043	-	-	664,476	(664,476)	5,114	5,114	1,815,344
2044	-	-	664,476	(664,476)	5,217	5,217	1,820,560
2045	-	-	664,476	(664,476)	5,321	5,321	1,825,881
2046	-	-	664,476	(664,476)	5,427	5,427	1,831,309
2047	-	-	664,476	(664,476)	5,536	5,536	1,836,844
2048	-	-	664,476	(664,476)	5,647	5,647	1,842,492
	790,000	89,053	35,598,389	(40,232,434)	262,132	(3,492,859)	-

*Interest earned is based on a conservative 2.00% average return over the period

Santa Ana Watershed Project Authority
Brine Line Debt Service Payment Schedule
August 31, 2018

FYE	Interest	Principal	Total Payment	New SRF Loan	Remaining Principal
2018	539,727	2,520,997	3,060,725	15,088,592	32,274,537
2019	748,142	2,443,135	3,191,277	-	29,831,402
2020	674,909	2,160,119	2,835,027	-	27,671,283
2021	620,485	2,214,543	2,835,027	-	25,456,740
2022	564,670	2,043,043	2,607,713	-	23,413,697
2023	514,020	1,194,730	1,708,750	-	22,218,967
2024	485,808	1,222,942	1,708,750	-	20,996,026
2025	456,917	1,251,833	1,708,750	-	19,744,193
2026	427,330	1,281,420	1,708,750	-	18,462,774
2027	397,030	1,311,719	1,708,750	-	17,151,054
2028	366,000	1,342,750	1,708,750	-	15,808,304
2029	334,221	1,374,529	1,708,750	-	14,433,776
2030	301,675	1,407,074	1,708,750	-	13,026,701
2031	268,344	1,440,405	1,708,750	-	11,586,296
2032	234,208	1,474,541	1,708,750	-	10,111,755
2033	199,248	1,509,501	1,708,749	-	8,602,254
2034	163,443	501,033	664,476	-	8,101,220
2035	153,923	510,553	664,476	-	7,590,667
2036	144,223	520,254	664,476	-	7,070,413
2037	134,338	530,138	664,476	-	6,540,275
2038	124,265	540,211	664,476	-	6,000,064
2039	114,001	550,475	664,476	-	5,449,589
2040	103,542	560,934	664,476	-	4,888,655
2041	92,884	571,592	664,476	-	4,317,063
2042	82,024	582,452	664,476	-	3,734,611
2043	70,958	593,519	664,476	-	3,141,092
2044	59,681	604,796	664,476	-	2,536,297
2045	48,190	616,287	664,476	-	1,920,010
2046	36,480	627,996	664,476	-	1,292,014
2047	24,548	639,928	664,476	-	652,087
2048	12,390	652,087	664,477	-	(0)

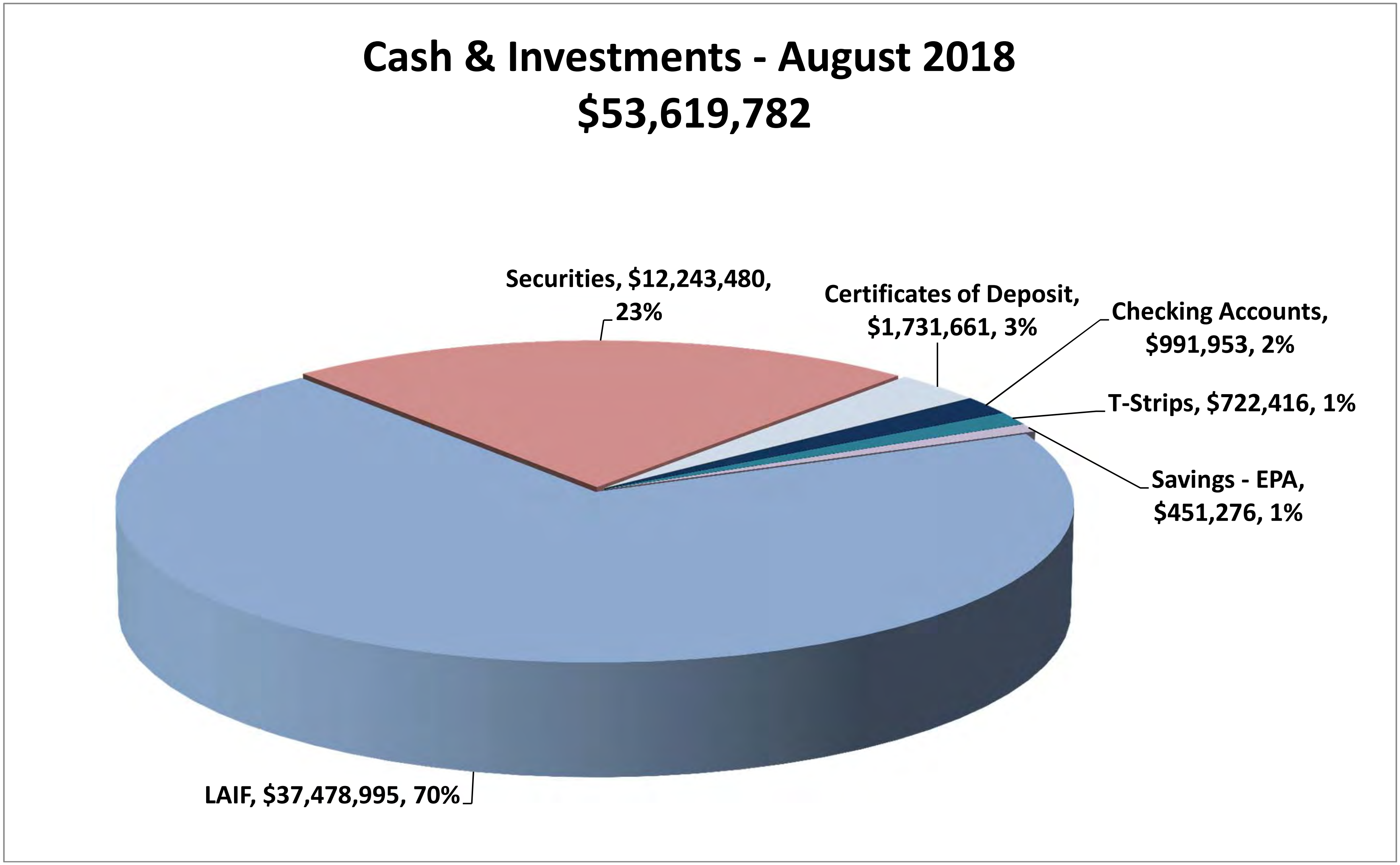



Total Cash & Investments
Millions
$71
$66
$61
$56
$51
$46
$41
$36
$31
$52
$48
$45
$42
$47
$47
$45
$45
$45
$47
$53
$54
Sep'17
Oct'17
Nov'17
Dec'17
Jan'18
Feb'18
Mar'18
Apr'18
May'18
Jun'18
Jul'18
Aug'18

CASH BALANCE & SOURCE OF FUNDS

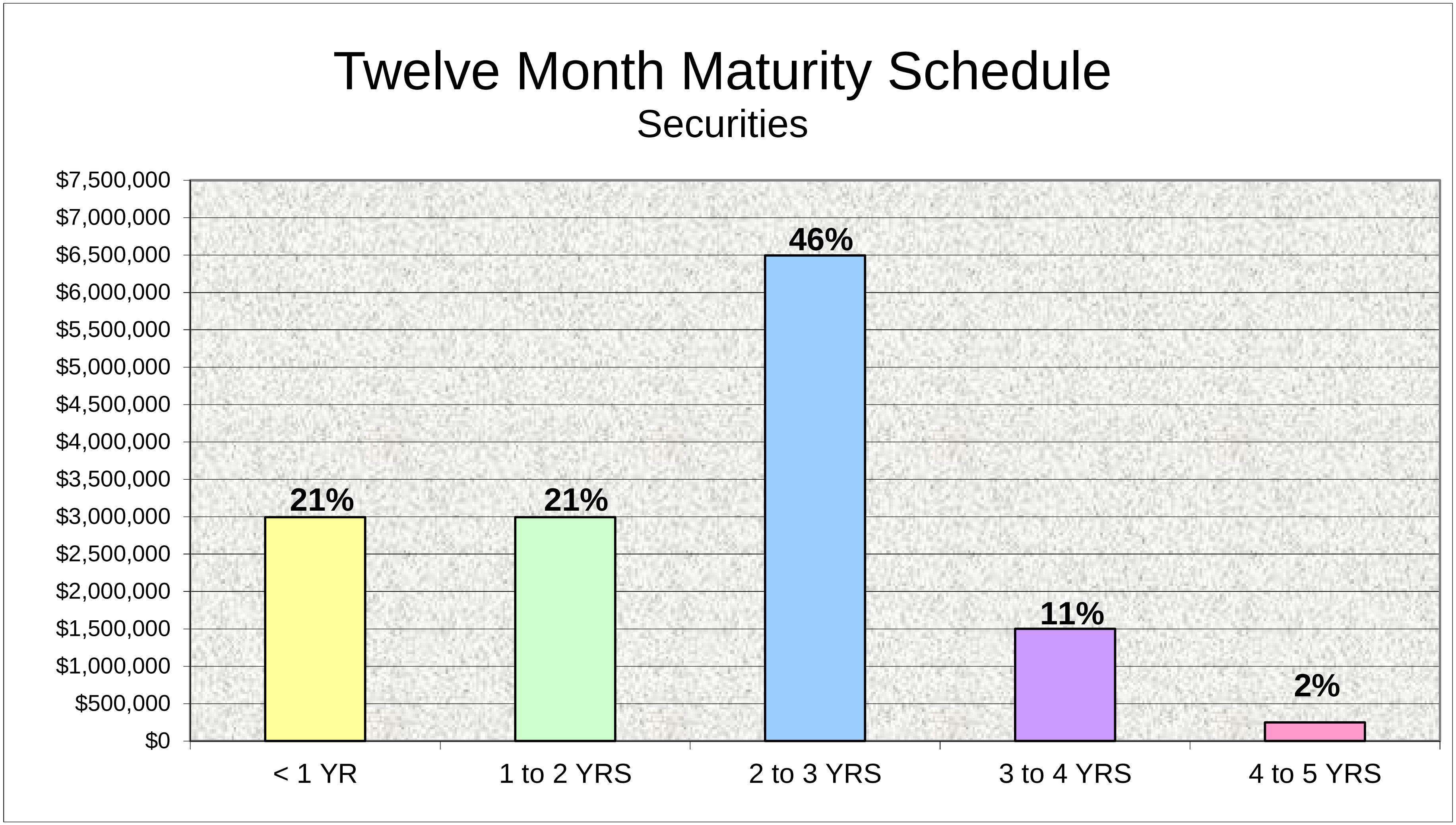
August 31, 2018

Reserve Accounts			Cash and Investments						
		Total	Checking (Cash)	LAIF Account	Savings EPA	Investment Securities	Certificates of Deposit	Treasury Strips	Total
100	General Fund	$ 2,625,131	991,953	1,633,178	-	-	-	-	$ 2,625,131
100	Building Reserve	$ 1,014,730	-	1,014,730	-	-	-	-	$ 1,014,730
370	Basin Planning General	$ 420,377	-	420,377	-	-	-	-	$ 420,377
370	USBR Partnership Studies	$ 53,492	-	53,492	-	-	-	-	$ 53,492
373	Watershed Management Plan	$ 358,307	-	358,307	-	-	-	-	$ 358,307
240	Self Insurance Reserve	$ 4,023,058	-	4,023,058	-	-	-	-	$ 4,023,058
240	Brine Line Debt Retirement	$ 5,630,930	-	4,908,514	-	-	-	722,416	$ 5,630,930
240	Brine Line - Pipeline Replacement	$ 16,220,801	-	2,245,660	-	12,243,480	1,731,661	-	$ 16,220,801
240	Brine Line - OCSD Rehabilitation	$ 3,575,919	-	3,575,919	-	-	-	-	$ 3,575,919
240	Brine Line - Capacity Management	$ 11,392,906	-	11,392,906	-	-	-	-	$ 11,392,906
240	Brine Line - OCSD Future Capacity	$ 1,753,246	-	1,753,246	-	-	-	-	$ 1,753,246
240	Brine Line - Flow Imbalance Reserve	$ 94,097	-	94,097	-	-	-	-	$ 94,097
240	Brine Line - Operating Reserve	$ 3,533,243	-	3,533,243	-	-	-	-	$ 3,533,243
401	Legal Defense Fund	$ 451,276	-	-	451,276	-	-	-	$ 451,276
372	Imported Water Recharge	$ (792)	-	(792)	-	-		-	$ (792)
374	Basin Monitoring Program TF	$ 496,408	-	496,408	-	-	-	-	$ 496,408
381	SAR Fish Conservation	$ 167,064	-	167,064	-	-	-	-	$ 167,064
384	Middle SAR TMDL TF	$ 138,967	-	138,967	-	-	-	-	$ 138,967
386	RWQ Monitoring TF	$ 137,978	-	137,978	-	-	-	-	$ 137,978
387	Mitigation Bank Credits	$ 946,631	-	946,631	-	-	-	-	$ 946,631
392	Emerging Constituents TF	$ 110,601	-	110,601	-	-	-	-	$ 110,601
397	Energy - Water DAC Grant	$ 174,013	-	174,013	-	-	-	-	$ 174,013
504	Prop 84 - SARCCUP Projects	$ 301,399	-	301,399	-	-		-	$ 301,399
		$ 53,619,782	$ 991,953	$ 37,478,995	$ 451,276	$ 12,243,480	$ 1,731,661	$ 722,416	$ 53,619,784


Cash & Investments - August 2018
$53,619,782
Securities, $12,243,480, 23%
Certificates of Deposit, $1,731,661, 3%
Checking Accounts, $991,953, 2%
T-Strips, $722,416, 1%
Savings - EPA, $451,276, 1%
LAIF, $37,478,995, 70%

Santa Ana Watershed Project Authority
Reserve Account Analysis
August 31, 2018

Reserve Account	Balance @ 6/30/2018	Interest Earned	Fund Contributions	Loan/T-Strip Receipts	Debt Service Payments	Inter-Fund Loans	Fund Expenses	Balance @ 8/31/2018	Estimated Fund Changes	Balance @ 6/30/2019
Brine Line Operating Reserve	2,585,699	14,527	1,593,532				(660,515)	3,533,243	-	3,533,243
Flow Imbalance Reserve	93,670	427						94,097	-	94,097
OCSD Future Capacity	1,745,247	7,999						1,753,246	-	1,753,246
Capacity Management	11,352,490	40,416	-					11,392,906	-	11,392,906
Pipeline Replacement	11,309,285	52,435	250,000			4,609,081		16,220,801	(749,121)	15,471,680
OCSD Rehabilitation	3,559,605	16,315						3,575,919	-	3,575,919
Debt Retirement	5,157,252	21,503	313,191		(583,432)			4,908,514	1,472,653	6,381,167
Self Insurance	3,988,170	18,222	16,667					4,023,058	83,333	4,106,392
General Fund	2,636,095	14,063	652,310			(608,421)	(68,916)	2,625,131	-	2,625,131
Building Reserve	910,526	4,204	100,000					1,014,730	-	1,014,730
	43,338,039	190,109	2,925,699	-	(583,432)	4,000,660	(729,431)	49,141,645	806,865	49,948,510


Twelve Month Maturity Schedule
Securities
$7,500,000
$7,000,000
$6,500,000
$6,000,000
$5,500,000
$5,000,000
$4,500,000
$4,000,000
$3,500,000
$3,000,000
$2,500,000
$2,000,000
$1,500,000
$1,000,000
$500,000
$0
21%
21%
46%
11%
2%
< 1 YR
1 to 2 YRS
2 to 3 YRS
3 to 4 YRS
4 to 5 YRS

SAWPA

TREASURER'S REPORT

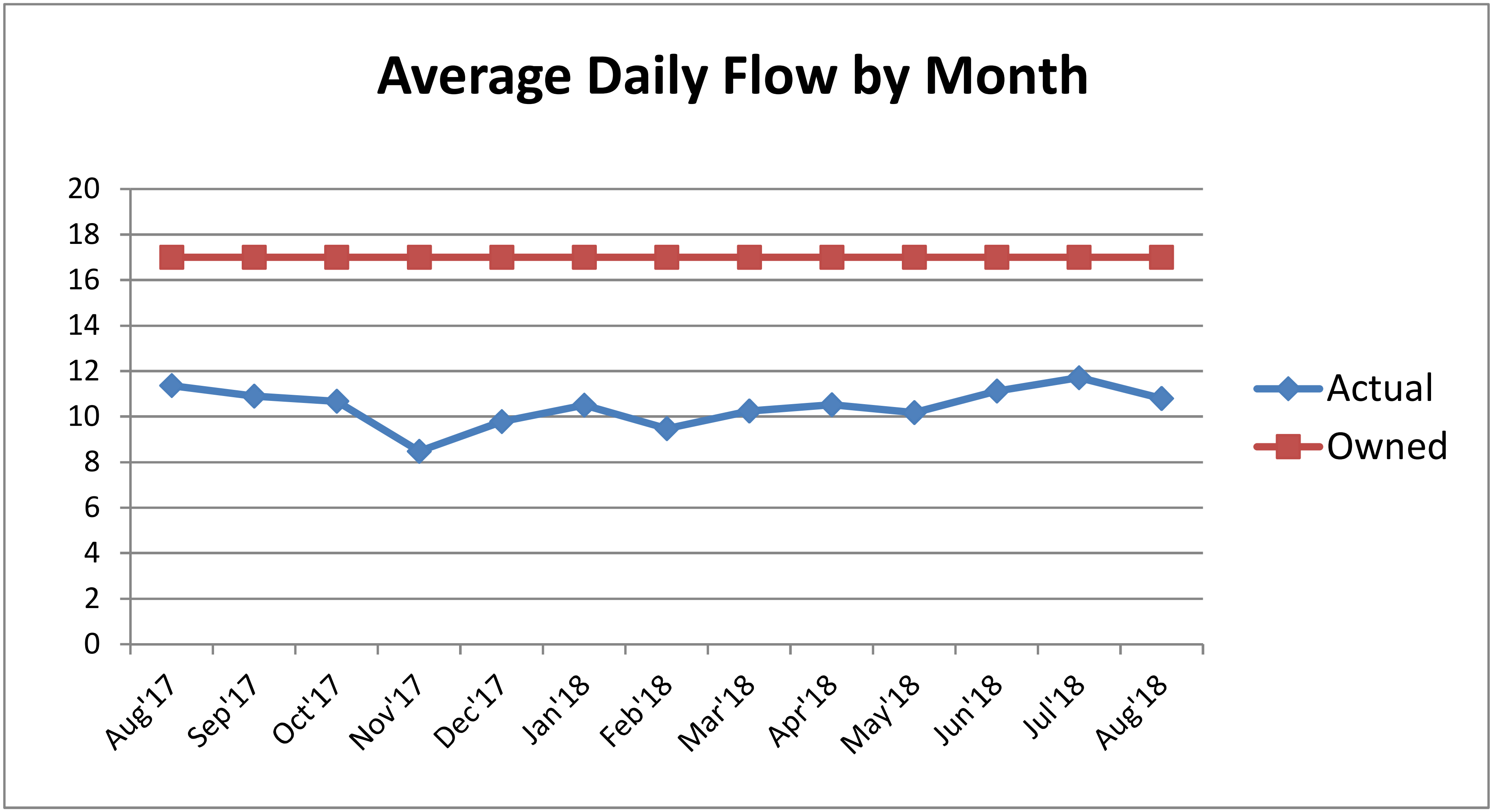
As of August 31, 2018

Investment T-Strips
Safekeeping US Bank

T-STRIPS	Debt	Purchase Date	Maturity Date	PAR	Cost	Initial Discount	Current Discount	Book Value	Market Value	Interest Rate
USB	TVRI	02/11/2000	05/15/2020	790,000.00	228,677.35	561,322.65	67,583.86	722,416.14	764,109.34	6.38%
				$ 790,000.00	$ 228,677.35	$ 561,322.65	$ 67,583.86	722,416.14	$ 764,109.34	6.38%

Investment Commercial
Safekeeping US Bank

Type	Security	Purchase Date	Maturity Date	Unit Cost	Cost	Principal	Current Value	Market Value	Interest Rate
Agency	FHLMC	3/27/2014	3/27/2019	109.33	$ 546,650.00	$ 500,000.00	$ 500,000.00	504,068.50	3.75%
Agency	FHLMC	9/16/2016	8/12/2021	100.00	$ 990,060.00	$ 1,000,000.00	$ 1,000,000.00	954,409.00	1.125%
Agency	FHLMC	4/17/2017	1/13/2022	102.55	$ 512,767.00	$ 500,000.00	$ 500,000.00	493,308.50	2.375%
Agency	FHLB	5/26/2015	6/14/2019	100.80	$ 504,015.00	$ 500,000.00	$ 500,000.00	496,920.00	1.63%
Agency	FHLB	6/16/2016	6/12/2020	102.61	$ 1,026,088.00	$ 1,000,000.00	$ 1,000,000.00	983,485.00	1.75%
gency	FHLB	12/14/2017	6/10/2022	99.89	$ 998,930.00	$ 1,000,000.00	$ 1,000,000.00	975,184.00	2.125%
Agency	FNMA	3/27/2014	2/19/2019	100.40	$ 501,975.00	$ 500,000.00	$ 500,000.00	499,139.00	1.88%
Agency	FNMA	12/28/2015	12/28/2020	100.21	$ 1,002,140.00	$ 1,000,000.00	$ 1,000,000.00	981,270.00	1.88%
Agency	FNMA	6/16/2016	11/30/2020	101.52	$ 1,015,157.00	$ 1,000,000.00	$ 1,000,000.00	973,871.00	1.50%
Agengy	USTN	11/17/2015	11/30/2018	100.00	$ 1,002,500.00	$ 1,000,000.00	$ 1,000,000.00	997,832.00	1.25%
Agengy	USTN	11/17/2015	10/31/2020	100.00	$ 1,005,312.50	$ 1,000,000.00	$ 1,000,000.00	980,547.00	1.75%
Agengy	USTN	11/17/2015	11/30/2019	100.00	$ 1,001,210.94	$ 1,000,000.00	$ 1,000,000.00	987,266.00	1.50%
Agengy	USTN	6/17/2016	8/31/2020	101.13	$ 507,070.31	$ 500,000.00	$ 500,000.00	487,519.50	1.38%
Agengy	USTN	6/16/2016	9/30/2020	101.12	$ 506,992.19	$ 500,000.00	$ 500,000.00	486,992.00	1.38%
Agengy	USTN	6/16/2016	10/31/2020	101.12	$ 506,914.06	$ 500,000.00	$ 500,000.00	486,386.50	1.38%
Agency	USTN	12/14/2017	7/31/2021	96.91	$ 969,062.50	$ 1,000,000.00	$ 1,000,000.00	955,469.00	1.125%
CD	Ally Bank	4/20/2017	4/20/2020	100.00	$ 248,000.00	$ 248,000.00	$ 248,000.00	248,000.00	1.80%
CD	American Exp Centurion	4/19/2017	4/19/2021	100.00	$ 248,000.00	$ 248,000.00	$ 248,000.00	248,000.00	2.25%
CD	American Express BK FSB	5/10/2017	5/10/2021	100.00	$ 248,000.00	$ 248,000.00	$ 248,000.00	248,000.00	2.20%
CD	Capital One Bank USA NA	9/30/2015	10/1/2018	100.00	$ 248,000.00	$ 248,000.00	$ 248,000.00	247,956.93	1.65%
CD	Capital One NA	9/30/2015	10/1/2018	100.00	$ 248,000.00	$ 248,000.00	$ 248,000.00	247,956.93	1.65%
CD	Wells Fargo Bank NA	12/2/2015	12/3/2018	100.00	$ 245,000.00	$ 245,000.00	$ 245,000.00	244,602.64	1.45%
CD	Goldman Sachs Bank USA	12/20/2017	12/20/2022	100.00	$ 248,000.00	$ 248,000.00	$ 248,000.00	248,000.00	2.50%
					$ 14,329,844.50	$ 14,233,000.00	$ 14,233,000.00	13,976,183.50	1.79%



Average Daily Flow by Month
20
18
16
14
12
10
8
6
4
2
0
Aug'17
Sep'17
Oct'17
Nov'17
Dec'17
Jan'18
Feb'18
Mar'18
Apr'18
May'18
Jun'18
Jul'18
Aug'18
Actual
Owned

SUMMARY OF LABOR MULTIPLIERS

		Benefit Rate
Total Employee Benefits	238,311	0.345
Total Payroll	690,409	
Gross Indirect Costs	601,554	
Less: Member Contributions & Other Revenue	(75,000)	
Indirect Costs for Distribution	526,554	
		Indirect Rate
Direct Labor	389,727	1.351
Indirect Costs	526,554	

FY 2017-18 Labor multiplier - thru 08/31/18	**1.696**
FY 2017-18 Labor multiplier	1.990
FY 2016-17 Labor multiplier	1.901
FY 2015-16 Labor multiplier	2.073
FY 2014-15 Labor multiplier	1.850
FY 2013-14 Labor multiplier	2.105

INDIRECT COSTS

(to be Distributed)

G/L Acct.	Description		Actual thru 8/31/18
51000	Salaries - Regular	$	300,682
52000	Benefits	$	104,237
60111	Tuition Reimbursement	$	-
60112	Training	$	-
60113	Education	$	-
60114	Other Training & Education	$	979
60120	Audit Fees	$	7,500
60121	Consulting	$	31,094
60126	Temporary Services	$	10,630
60128	Other Professional Services	$	-
60129	Other Contract Services	$	-
60130	Legal Fees	$	-
60133	Employment Recruitment	$	-
60153	Materials & Supplies	$	-
60154	Safety	$	354
60155	Security	$	572
60156	Custodial Contract Services	$	2,157
60157	Landscaping Maintenance	$	1,250
60158	HVAC	$	-
60159	Facility Repair & Maintenance	$	1,577
60160	Telephone	$	2,821
60161	Cellular / Paging Services	$	2,015
60163	Electricity	$	4,384
60164	Water Services	$	1,136
60170	Equipment Expensed	$	1,299

(Continued - next column)

G/L Acct.	Description		Actual thru 8/31/18
60171	Equipment Rented	$	6,352
60172	Equipment Repair / Maintenance	$	443
60180	Computer Hardware	$	444
60181	Software / Updates / Licensing	$	35,451
60182	Internet Services	$	2,067
60183	Computer Supplies	$	1,263
60184	Computer Repair / Maintenance	$	-
60190	Offsite Meeting / Travel Expense	$	12
60191	In House Meetings	$	65
60192	Conference Expense	$	1,269
60193	Car, Repair, Maint	$	-
60200	Dues	$	215
60202	Subscriptions	$	-
60203	Contributions	$	10,000
60210	Bank Charges	$	-
60211	Shipping / Postage	$	-
60212	Office Supplies	$	3,326
60213	Offsite Storage	$	837
60220	Commission Fees	$	1,200
60221	Commission Mileage Reimb.	$	155
60222	Other Commission Expense	$	78
60230	Other Expense	$	49
80000	Retiree Medical Expense	$	18,833
80001	Insurance Expense	$	21,240
80000	Building Repair/Replacement Reserve	$	16,667
13005	Fixed Assets	$	8,900
	Total Costs	$	601,554

Direct Costs Paid by Projects	$	180,103
Member Contribution Offset	$	75,000
	$	255,103
Over allocation %		-65.8%
Over (Under) Allocation of General Fund Costs	$	(346,451)

BENEFITS SUMMARY

(Distributed based on Actual Labor)

G/L Acct	Description	Budget		Actual @ 8/31/18		Projected FYE 2019
70101	FICA Expense	191,217	$	30,330	$	181,980
70102	Medicare Expense	56,479	$	8,172	$	49,032
70103	State Unemployment Insurance	5,824	$	-	$	6,300
70104	Worker's Compensation Insurance	102,821	$	13,838	$	68,288
70105	State Disability Insurance	25,551	$	4,300	$	25,800
70106	PERS Pension Plan	730,279	$	86,961	$	521,768
70111	Medical Expense	459,036	$	75,213	$	451,278
70112	Dental Expense	32,630	$	4,593	$	27,558
70113	Vision Insurance	8,255	$	1,230	$	7,380
70114	Life Insurance Expense	16,014	$	2,490	$	14,940
70115	Long Term Disability	18,657	$	2,781	$	16,686
70116	Wellness Program Expense	3,500	$	403	$	2,418
70117	401a Profit Sharing - Employers Contribution	-	$	-	$	-
70120	Car Allowance	36,000	$	8,000	$	48,000
	Total Benefits	1,686,263		238,311		1,421,428
	Total Payroll	3,859,112	$	690,409	$	4,142,456
	Benefits Rate	43.7%		34.5%		34.3%

Santa Ana Watershed Project Authority
Labor Hours Budget vs Actual
Month Ending August 31, 2018

	Fund	Budget	Actual	%
100	General & Administrative	24,625	5,003	20.32%
130	Prop 84 Round 1 Administration	815	94	11.50%
135	Prop 84 Round 2 Administration	830	125	15.00%
140	Prop 84 2014 Drought Administration	600	194	32.25%
145	Prop 84 Final Round Administration	1,735	107	6.14%
240	Brine Line Enterprise	18,250	3,213	17.61%
320	Brine Line Protection	245	31	12.65%
326	Reach V Capital Repairs	795	66	8.33%
327	Reach IV-D Corrosion Repairs	1,475	34	2.32%
370-01	General Basin Planning	2,365	283	11.98%
370-02	USBR Partnership Studies	110	3	2.73%
372	Imported Water Recharge	60	0	0.42%
373	Watershed Management Plan	2,775	266	9.58%
374	Basin Monitoring Program	419	68	16.17%
381	SAR Fish Conservation	190	32	16.84%
384-01	Chino TMDL Facilitation	165	39	23.79%
386MONIT	Storm Water Quality Standards TF	130	14	10.58%
387	Arundo Removal & Habitat Restoration	173	25	14.60%
392	Emerging Constituents	54	13	24.07%
396	Forest First	20	-	0.00%
397	Water-Energy Grant Administration	464	53	11.31%
397EXPAN	Water-Energy WVWD Administration	-	31	100.00%
398ADMIN	DACI Grant	2,435	111	4.56%
477-02	LESJWA - Administration	330	37	11.14%
477TMDL	LESJWA - TMDL Task Force	720	99	13.72%
504-301A	Prop 84 2014 Drought Implementation	765	30	3.86%
504-301C	Prop 84 2014 Drought Implementation	485	197	40.52%
504-401I	Prop 84 Final Round Implementation	90	20	21.67%
504-401PA23	Prop 84 Final Round Implementation	475	14	2.95%
504-401WUEAMDIN	Prop 84 Final Round Implementation	195		0.00%
504-402SMART	Prop 84 Final Round Implementation	290	22	7.41%
		62,080	10,221	16.46%

Note: Should be at 16.67% of budget for 2 months

General Manager's Report

October 2018

Santa Ana Watershed Project Authority | 11615 Sterling Avenue, Riverside, CA 92503 | www.sawpa.org

INSIDE THE OCTOBER REPORT

Brine Line Updates — Prado Basin

Reach 4B Lower Access Road – Before clearing

During the month of September 2018, the Operations Department re-established the access road on Reach 4B Lower within the Prado Basin and cleared vegetation around each one of the maintenance access structures on Reaches 4A Lower and 4B Lower. A total of three (3) bridges were installed using I -beams and steel plates to allow access for clearing equipment and maintenance vehicles. The purpose of re-establishing the road is to make sure the Brine Line structures and road are not lost to overgrown vegetation and can be accessed in case of emergencies. Additionally, all sealed structures are inspected to make sure they are water tight and prevent any water kept behind Prado Dam from entering the Brine Line.

Reach 4B Lower Access Road – After clearing

Brine Line Maintenance Access Structure

Rock Removal Project

On September 26th, the OCSD Board awarded a contract to Griffith Company in the amount of $2.8 Million for the Santa Ana River Interceptor Rock Removal Project. Work is anticipated to begin in November 2018. SAWPA staff will continue to represent SAWPA's interests during the implementation of the Rock Removal Project, which will continue through December 2019.

Annual Santa Ana Riverwalk Provides 12 Years of Habitat Data

On October 18th, SAWPA with support from Orange County Water District is hosting one of the longest running Southern California annual habitat assessments, the Santa Ana Riverwalk. Started in 2006, the primary purpose of the Riverwalk is to assess habitat beneficial to an endemic aquatic species, the Santa Ana sucker. Data collected each year is available in the Riverwalk Atlas report. Last year was a particularly important year to collect data along the River because it occurred after what many perceived as the end of the 2011 to 2016 drought.

Pretreatment Program — Annual Report

SAWPA staff in cooperation with Member and Contract Agency staff completed the Inland Empire Brine Line Pretreatment Program Annual Report. The Annual Report, covering the period of July 1, 2017 through June 30, 2018, was submitted to Orange County Sanitation District (OCSD) as part of SAWPA's reporting requirements outlined in the 1991 MOU with OCSD. The nearly 700 page document includes a summary of the status of Industrial User compliance over the reporting period, summary of compliance and enforcement activities conducted by SAWPA during the reporting period, and other relevant information requested by OCSD.

Santa Ana Watershed Project Authority
Executive Financial Information Report
July 2018

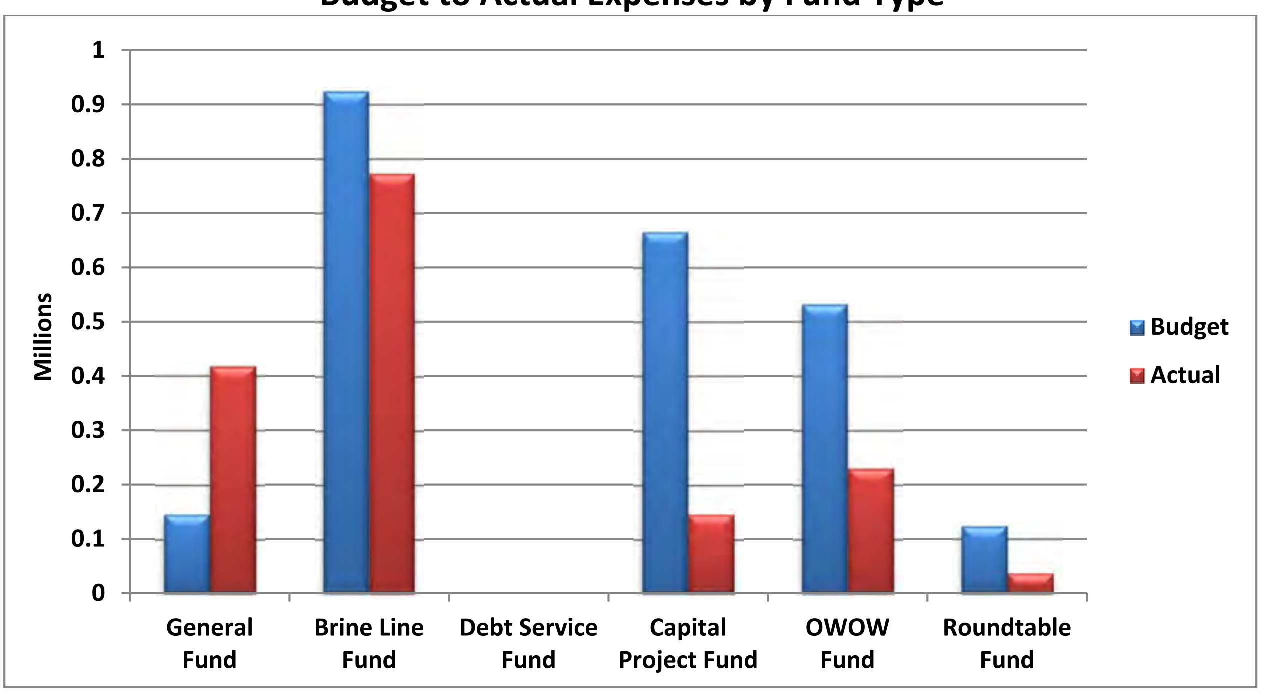
Staff comments provided on the last page are an integral part of this report.

Overview	This report highlights the agency's key financial indicators for the Fiscal Year-to-Date (FYTD) through July 2018 unless otherwise noted.

Budget to Actual Expenses by Fund Type — Favorable

	Annual Budget	FYTD Budget	FYTD Actual	Favorable (Unfavorable) Variance
General Fund	$650,695	$145,891	$417,403	($271,512)
Brine Line Enterprise	11,090,586	924,216	772,408	151,808
Debt Service Fund	3,183,451	-	-	-
Capital Project Fund	7,986,032	665,503	146,099	519,404
OWOW Fund	6,380,106	531,676	230,366	301,310
Roundtable Fund	1,475,981	122,998	37,976	85,022
Total	**$30,766,852**	**$2,390,284**	**$1,604,251**	**$786,032**

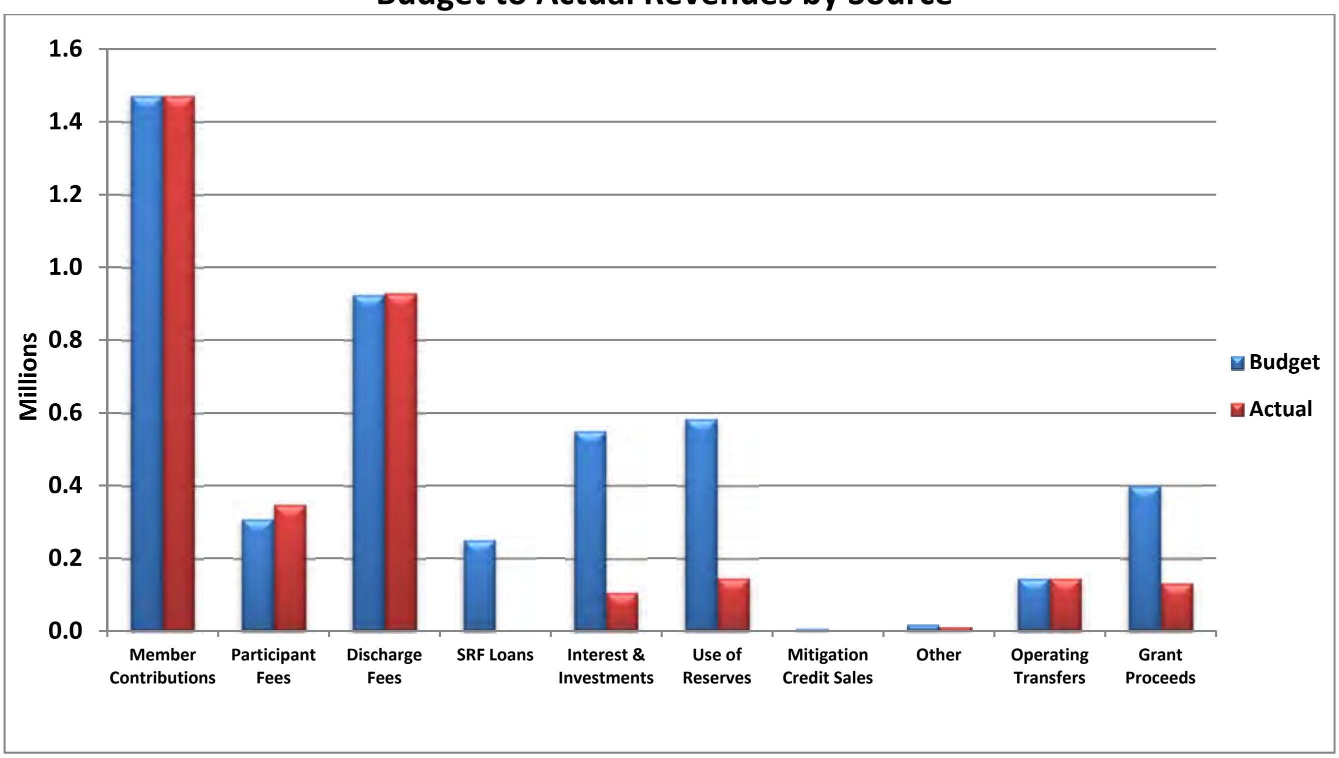
Budget to Actual Expenses by Fund Type



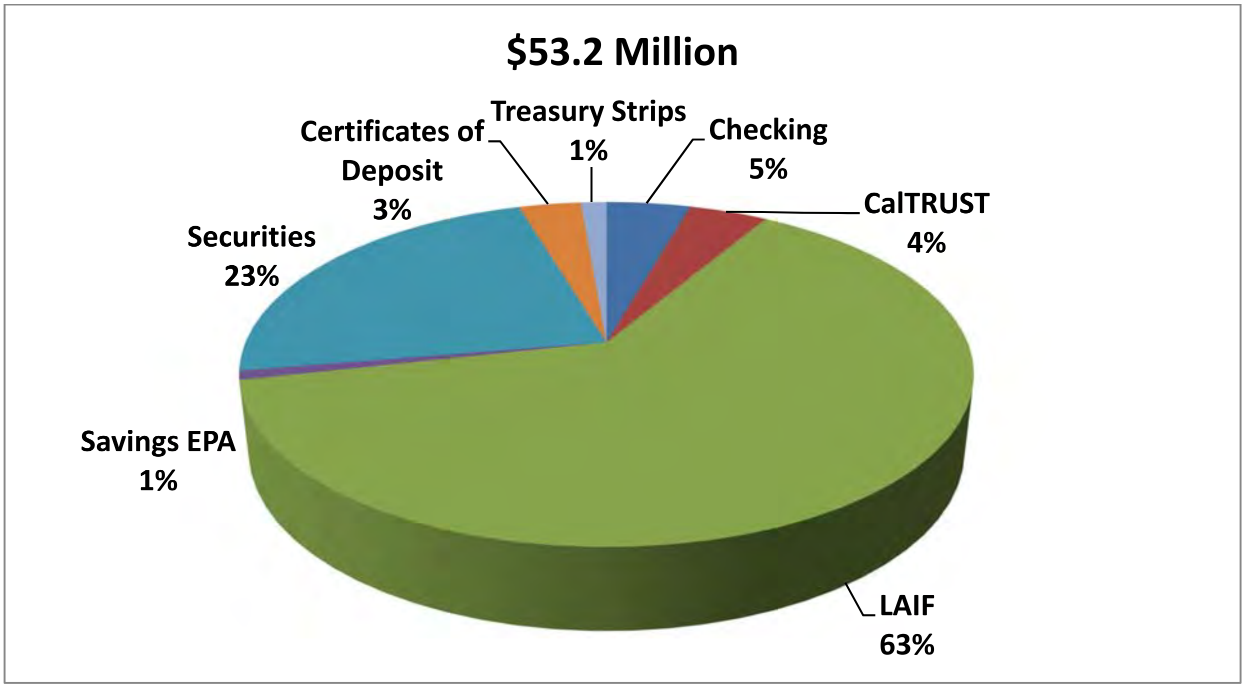
Budget to Actual Revenues by Source — Concern

	Annual Budget	FYTD Budget	FYTD Actual	Favorable (Unfavorable) Variance
Member Contributions	$1,471,695	$1,471,695	$1,471,695	$-
Participant Fees	1,309,273	308,139	347,825	39,686
Discharge Fees	11,090,587	924,216	928,205	3,989
SRF Loans	3,000,000	250,000	-	(250,000)
Interest & Investments	1,173,582	549,415	106,535	(442,881)
Use of Reserves	6,995,901	582,992	146,099	(436,893)
Mitigation Credit Sales	88,980	7,415	-	(7,415)
Other	206,674	17,223	10,885	(6,338)
Operating Transfers	144,252	144,252	144,252	-
Grant Proceeds	4,777,256	398,105	132,510	(265,594)
Total	**$30,258,200**	**$4,653,450**	**$3,288,005**	**($1,365,446)**

Budget to Actual Revenues by Source



Total Cash & Investments - July



Reserve Fund Balance - July

	Amount
General Fund	$2,543,122
Building Fund	1,014,730
Legal Defense Fund	451,276
OWOW Fund	1,240,057
Roundtable Fund	1,890,296
Self Insurance	4,014,725
Debt Retirement	6,057,766
Pipeline Replacement	16,323,794
OCSD Rehabilitation	3,575,919
Capacity Management	11,392,906
Future Capacity	1,753,246
Flow Imbalance	94,097
Brine Line Operating	2,811,587
Total Reserves	**$53,163,523**

Legend

		Compared to Budget
	Ahead or Favorable	Above +5% Favorable Revenue or Expense Variance
	On Track	+5% to -2% Variance
	Behind	-3% to -5% Variance
	Concern	Below -5% Variance

Staff Comments

For this month's report, the item(s) explained below are either "behind", a "concern", or have changed significantly from the prior month.

1) Total revenues are 29% below budget. Since this is the first month of the FYE 2019 Budget, projects tend to start out slowly. It is anticipated that all projects will be on track with the budget at the end of the fiscal year.

2)

GENERAL MANAGERS MEETING NOTES

TUESDAY, OCTOBER 9, 2018

PARTICIPANTS PRESENT	REPRESENTING
Paul Jones	Eastern Municipal Water District
Halla Razak	Inland Empire Utilities Agency
Michael Markus	Orange County Water District
Doug Headrick	San Bernardino Valley Municipal Water District
Craig Miller	Western Municipal Water District
Rich Haller	Santa Ana Watershed Project Authority
Karen Williams	Santa Ana Watershed Project Authority
Larry McKenney (Via-Conference Call)	Santa Ana Watershed Project Authority
David Ruhl	Santa Ana Watershed Project Authority
Carlos Quintero	Santa Ana Watershed Project Authority
Ian Achimore	Santa Ana Watershed Project Authority
Sara Villa	Santa Ana Watershed Project Authority

CALL TO ORDER

The meeting was called to order at 7:30 a.m. at SAWPA, 11615 Sterling Avenue, Riverside, California.

FUTURE SAWPA COMMISSION AGENDA ITEMS

Rich Haller reviewed the handout provided of the Agenda Planning Matrix (SAWPA Commission, OWOW Steering Committee, PA22, PA23, and Outside Meetings).

ROUNDTABLES UPDATE

Ian Achimore informed the General Managers that SAWPA is working with Geoscience on the Wasteload Allocation Model Update for the Santa Ana River, and it is anticipated to be finalized and submitted to the Regional Board at the end of the year.

OWOW UPDATE

Rich Haller and Ian Achimore provided updates on the following:

- OC Letter Response – Rich Haller informed the General Managers that the Steering Committee requested additional information regarding population data (current population and projected up to 2022). The Steering Committee also requested clarification on how SAWPA included water quality in the rating and ranking system. There is a meeting scheduled with the pillars and all stakeholders including Orange County stakeholders on October 18 to further discuss Orange County concerns. The information will be presented to the OWOW Steering Committee in November.

  Ian Achimore noted that DWR released the Draft Project Solicitation Package (PSP) guidelines for the Proposition 1 Implementation Grants, and comments are due in November. DWR has three (3) major changes since the release of Proposition 84 funds: 1) all projects must be CEQA ready/completed six (6) months after the grant award, 2) the regional groups can provide input on how much funding is allocated to each round, 3) DWR is requiring a pre-application workshop where they will be briefed on the proposed projects in an interview type setting.

- Draft Water Quality Impact Study from Homeless Encampments RFP – Ian Achimore referenced the handout that was provided of the Draft Water Quality Impact Study from Homeless Encampments RFP. He noted that comments have been received and incorporated; it is anticipated to bring it forward for Commission approval November 20th. It was questioned where most of the red-line comments come from and Ian Achimore noted Greg Woodside and Paul Jones. It was questioned if the Riverside Housing Authority provided comments? Ian Achimore noted he will follow-up with Mike Antos. Halla Razak requested that once the water quality results are available that they be distributed to the General Managers.

PA24, PA25, PA26

Rich Haller informed the General Managers that the Commission requested additional information pertaining to PA24. A Sewer System Management Plan (SSMP) will be brought forward to the Commission due to it relating to the day-to-day operating decisions language within the Project Agreement 24 (PA24). There will be three versions of PA24; 1) PA24 with the JPA Amendments, 2) PA24 without the JPA Amendments (both version 1 and 2 will have membership comprised of commissioners, alternate commissioners, and agency general managers), and 3) PA24 with no JPA Amendments and membership comprised of commissioners, alternate commissioners, and no agency general managers.

Rich Haller referenced the handout that was provided of the SSMP Executive Summary and Table of Contents. He noted that the SSMP has a lot of guidance on how to operate the brine line on a day-to-day basis and it is currently in use. Paul Jones suggested that in version A in the PA24 where there is language on the operating decisions to have it modified and have it reference the SSMP. Craig Miller noted that Director Evans is suggesting that there be a clause that has a delegation of authority to the SAWPA General Manager on day-to-day operating decisions as a separate stand-alone document to the PA24. Paul Jones suggested that WMWD draft the language of what is being suggested and Craig Miller concurred. It was questioned why PA24 is going back to the SAWPA Commission on October 16? Doug Headrick noted Mark Bulot wants it done and to move on. Paul Jones noted he could work with Craig Miller in developing a document. Doug Headrick noted he will talk to Mark Bulot regarding deferring the agenda item.

OWOW CONFERENCE 2019

Rich Haller referenced the handout that was provided of the Agenda for the OWOW Conference and informed the General Managers that the conference is scheduled for March 29, 2019 at Cal State Fullerton.

BRINE LINE UPDATE

David Ruhl provided updates on the following:

a. Pretreatment Program Update – SAWPA staff worked with the member agencies on the submittal of the Annual Report. He thanked the agencies for their assistance.

b. OCSD Rock Removal – OCSD Board awarded the Rock Removal Contract to Griffith Company for $2.8 M, and the work should start in November time-frame.

c. Reach 4D Corrosion Study – A handout that was provided to the General Managers was referenced regarding the summary of the workplan recommendations by Woodard and Curran for the seven (7) mile Reach 4D corrosion study. David Ruhl noted that it will be brought forward to the SAWPA Commission on October 16 and Woodard and Curran will be providing a PowerPoint presentation.

d. Beaumont Request to Discharge to Brine Line – A meeting took place with OCSD, SAWPA, and City of Beaumont staff in September. The City of Beaumont provided a PowerPoint presentation of their treatment plant upgrade and pretreatment program and answered OCSD's questions. OCSD stated they will follow-up with a written approval soon. A draft Agreement between Valley, SAWPA and the City of Beaumont is anticipated to go out to the agencies for comment this week.

e. Lease Capacity Pool – All comments have been received and are being incorporated, it is anticipated to have the Lease Capacity Pool Agreement go to SAWPA Commission for approval in November.

OPERATIONS UPDATE

Carlos Quintero provided updates on the following:

a. Access Road Reach IV-A, IV-B – SAWPA staff completed clearing out the vegetation on the access roads in Reaches IV-A and IV-B. The work took about six (6) days with a mulcher grinder.

b. SA Sucker Habitat – One bid was received for the Santa Ana Sucker Habitat Restoration and it came in 78% over the engineers estimate. SAWPA Commission approved to do the work in-house and renting the equipment (loader, excavator, and mulcher grinder). The project will take about two (2) weeks to complete, the rock is being delivered and there is a biologist on site.

c. Reach IV-B Upper Relocation – The SAWPA Commission approved an Agreement with the Riverside County Transportation Commission to reimburse SAWPA up to $68,400 for the relocation of 150 feet of the Brine Line on Reach IV-B Upper to move away from Southern CA Edison conduit.

d. SAWPA Building Parking Lot – SAWPA staff is working with WMWD in developing a plan on repaving SAWPA's building parking lot. Additional changes are being made to make sure our parking lot is in ADA compliance by adding a path from the charging stations to the building entrance.

SCHEDULING – NEXT GM MEETING

The next General Managers meeting is scheduled for November 13, 2018, at 7:30 a.m. at SAWPA.
The meeting adjourned at 8:48 a.m.

COMMISSION REVIEW: October 16, 2018

2018-10-9 GM Mtg Notes

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Legislative Status Report for SAWPA
10/8/2018

AB 2050 (**Caballero** D) **Small System Water Authority Act of 2018.**
Current Text: Vetoed: 9/28/2018 html pdf
Introduced: 2/6/2018
Last Amend: 8/6/2018
Status: 9/28/2018-Vetoed by Governor.
Location: 9/28/2018-A. VETOED
Summary: Would create the Small System Water Authority Act of 2018 and state legislative findings and declarations relating to authorizing the creation of small system water authorities that will have powers to absorb, improve, and competently operate noncompliant public water systems. The bill, no later than March 1, 2019, would require the state board to provide written notice to cure to all public agencies, private water companies, or mutual water companies that operate a public water system that has either less than 3,000 service connections or that serves less than 10,000 people, and are not in compliance, for 4 consecutive quarters, with one or more state or federal primary drinking water standard maximum contaminant levels as of December 31, 2018, as specified.

AB 2060 (**Garcia, Eduardo** D) **Water: grants: advanced payments.**
Current Text: Vetoed: 9/28/2018 html pdf
Introduced: 2/6/2018
Last Amend: 8/21/2018
Status: 9/28/2018-Vetoed by Governor.
Location: 9/28/2018-A. VETOED
Summary: Would require the State Water Resources Control Board, within 60 days of awarding a grant from the grant fund, to provide a project proponent that requests an advanced payment and satisfies certain criteria with the requested advanced payment, up to a maximum of $500,000 or 50% of the grant award, whichever is less, for projects in which the project proponent is a nonprofit organization or a disadvantaged community, or the project benefits a disadvantaged community. The bill would require the advanced funds to be handled as prescribed.

AB 2064 (**Gloria** D) **Integrated regional water management plans: grants: advanced payment.**
Current Text: Vetoed: 9/28/2018 html pdf
Introduced: 2/7/2018
Last Amend: 6/27/2018
Status: 9/28/2018-Vetoed by Governor.
Location: 9/28/2018-A. VETOED
Summary: Current law, until January 1, 2025, requires a regional water management group, within 90 days of notice that a grant has been awarded, to provide the Department of Water Resources with a list of projects to be funded by the grant funds if the project proponent is a nonprofit organization or a disadvantaged community or the project benefits a disadvantaged community. Current law requires the department, within 60 days of receiving this project information, to provide advanced payment of 50% of the grant award for those projects that satisfy specified criteria. The bill, until January 1, 2025, would require the department to provide a project proponent that requests advanced payment and satisfies certain criteria with advanced payment for those projects of $500,000 or 50% of the grant award, whichever is less.

AB 2249 (**Cooley** D) **Public contracts: local agencies: alternative procedure.**
Current Text: Chaptered: 8/20/2018 html pdf
Introduced: 2/13/2018
Last Amend: 6/4/2018
Status: 8/20/2018-Approved by the Governor. Chaptered by Secretary of State - Chapter 169, Statutes of 2018.
Location: 8/20/2018-A. CHAPTERED
Summary: The Uniform Public Construction Cost Accounting Act permits the governing body of a public agency, in the event all bids received for the performance of that public project are in excess of $175,000, to award the contract at $187,500 or less to the lowest responsible bidder if it determines the cost estimate of the public agency was reasonable. This bill would instead authorize public projects of $60,000 or less to be performed by the employees of a public agency, authorize public projects of $200,000 or less to be let to contract by informal procedures, and require public projects of more than $200,000 to be let to contract by formal bidding procedures.

AB 2252 (**Limón** D) **State grants: state grant administrator.**
Current Text: Chaptered: 9/10/2018 html pdf
Introduced: 2/13/2018
Last Amend: 8/17/2018

Status: 9/10/2018-Approved by the Governor. Chaptered by Secretary of State - Chapter 318, Statutes of 2018.

Location: 9/10/2018-A. CHAPTERED

Summary: Would enact the Grant Information Act of 2018. The bill would require the California State Library, on or before July 1, 2020, to create a funding opportunities Internet Web portal that provides a centralized location for grant seekers to find state grant opportunities. The bill would additionally require each state agency, on or before July 1, 2020, to register every grant the state agency administers with the California State Library prior to commencing a solicitation or award process for distribution of the grant, as specified. The bill would require each state agency, on or before July 1, 2020, to provide for the acceptance of electronic applications for any grant administered by the state agency, as appropriate.

AB 2339 **(Gipson D) Water utility service: sale of water utility property by a city.**

Current Text: Chaptered: 9/28/2018 html pdf

Introduced: 2/13/2018

Last Amend: 8/15/2018

Status: 9/28/2018-Approved by the Governor. Chaptered by Secretary of State - Chapter 866, Statutes of 2018.

Location: 9/28/2018-A. CHAPTERED

Summary: Would authorize the City of El Monte, the City of Montebello, and the City of Willows, until January 1, 2022, to sell its public utility for furnishing water service for the purpose of consolidating its public water system with another public water system pursuant to the specified procedures, only if the potentially subsumed water system is wholly within the boundaries of the city, if the city determines that it is uneconomical and not in the public interest to own and operate the public utility, and if certain requirements are met. The bill would prohibit the city from selling the public utility for one year if 50% of interested persons, as defined, protest the sale.

AB 2371 **(Carrillo D) Water use efficiency: landscape irrigation.**

Current Text: Chaptered: 9/28/2018 html pdf

Introduced: 2/14/2018

Last Amend: 8/17/2018

Status: 9/28/2018-Approved by the Governor. Chaptered by Secretary of State - Chapter 867, Statutes of 2018.

Location: 9/28/2018-A. CHAPTERED

Summary: The Contractors' State License Law provides for the licensing by written examination and regulation of contractors by the Contractors' State License Board in the Department of Consumer Affairs. Current law requires the Contractors' State License Board to periodically review and, if needed, revise the contents of qualifying examinations to ensure that the examination questions are timely and relevant to the business of contracting. This bill, before revision of the landscaping contractor examination, would require the Contractors' State License Board to confer with specified entities to determine whether any updates or revisions to the examination are needed to reflect new and emerging landscape irrigation efficiency practices, as specified.

AB 2447 **(Reyes D) California Environmental Quality Act: land use: environmental justice.**

Current Text: Vetoed: 10/1/2018 html pdf

Introduced: 2/14/2018

Last Amend: 8/24/2018

Status: 9/30/2018-Vetoed by Governor.

Location: 9/30/2018-A. VETOED

Summary: Would, except as provided, require a lead agency that is preparing an EIR or a negative declaration to provide certain notices required by CEQA to owners and occupants of property located within1/2 mile of any parcel or parcels, and to any schools located within one mile of any parcel or parcels, on which is located a project involving an industrial or equivalent land use, as defined, within a disadvantaged community or within 1/2 mile of a disadvantaged community.

AB 2501 **(Chu D) Drinking water: state administrators: consolidation and extension of service.**

Current Text: Chaptered: 9/28/2018 html pdf

Introduced: 2/14/2018

Last Amend: 8/24/2018

Status: 9/28/2018-Approved by the Governor. Chaptered by Secretary of State - Chapter 871, Statutes of 2018.

Location: 9/28/2018-A. CHAPTERED

Summary: The California Safe Drinking Water Act requires the State Water Resources Control Board, before ordering consolidation or extension of service, to fulfill certain requirements, including, among other things, to hold a public meeting, and to establish a reasonable deadline, as prescribed, for a potentially receiving water system and a potentially subsumed water system to negotiate consolidation or another means of providing an adequate supply of affordable, safe drinking water. The act requires the state board to conduct a public hearing at the expiration of the reasonable deadline, as specified. This bill would revise and recast these provisions.

AB 2538 **(Rubio D) Municipal separate storm sewer systems: financial capability analysis.**
Current Text: Vetoed: 9/28/2018 html pdf
Introduced: 2/14/2018
Last Amend: 8/24/2018
Status: 9/28/2018-Vetoed by Governor.
Location: 9/28/2018-A. VETOED
Summary: Would require the State Water Resources Control Board, by July 1, 2019, to establish financial capability assessment guidelines for municipal separate storm sewer system permittees that are adequate and consistent when considering the costs to local jurisdictions.

AB 2541 **(Salas D) Safe Drinking Water State Revolving Fund: project financing: severely disadvantaged communities.**
Current Text: Chaptered: 8/28/2018 html pdf
Introduced: 2/14/2018
Last Amend: 3/15/2018
Status: 8/27/2018-Approved by the Governor. Chaptered by Secretary of State - Chapter 217, Statutes of 2018.
Location: 8/28/2018-A. CHAPTERED
Summary: Current law authorizes the State Water Resources Control Board, to the extent permitted by federal law, to provide grant funding, and principal forgiveness and 0% financing on loans, from the Safe Drinking Water State Revolving Fund to a project for a water system with a service area that qualifies as a severely disadvantaged community if the water system demonstrates that repaying a Safe Drinking Water State Revolving Fund loan with interest would result in unaffordable water rates, as defined. This bill would instead authorize the board, to the extent permitted by federal law, to provide up to 100% grant funding, and principal forgiveness and 0% financing on loans, from the Safe Drinking Water State Revolving Fund to a project for a water system that serves a severely disadvantaged community.

AB 2543 **(Eggman D) State agencies: infrastructure project budget and schedule: Internet Web site information.**
Current Text: Chaptered: 9/30/2018 html pdf
Introduced: 2/15/2018
Last Amend: 3/13/2018
Status: 9/29/2018-Approved by the Governor. Chaptered by Secretary of State - Chapter 918, Statutes of 2018.
Location: 9/30/2018-A. CHAPTERED
Summary: Would require each state agency or department authorized to undertake any infrastructure project costing $100,000,000 or more to publicly post on its Internet Web site any change in the cost or schedule of the project that would result in the project exceeding its established budget by 10 percent or more or being delayed by 12 months or longer. The bill would require that the posted information describe how much the project is expected to exceed its established budget or delay its construction schedule.

AB 2654 **(Quirk-Silva D) Design-build: Orange County.**
Current Text: Chaptered: 8/28/2018 html pdf
Introduced: 2/15/2018
Last Amend: 6/14/2018
Status: 8/28/2018-Approved by the Governor. Chaptered by Secretary of State - Chapter 239, Statutes of 2018.
Location: 8/28/2018-A. CHAPTERED
Summary: Would authorize the County of Orange to use the design-build process for specified types of public works infrastructure projects, limited to no more than one project per year in excess of $5,000,000. The bill would also authorize the Orange County Flood Control District to use the design-build process for flood protection improvements and would limit those to no more than 12 projects in excess of $5,000,000 prior to January 1, 2025.

AB 2975 **(Friedman D) Wild and scenic rivers.**
Current Text: Chaptered: 8/28/2018 html pdf
Introduced: 2/16/2018
Last Amend: 5/29/2018
Status: 8/27/2018-Approved by the Governor. Chaptered by Secretary of State - Chapter 221, Statutes of 2018.
Location: 8/28/2018-A. CHAPTERED

Summary: Would, if (1) the federal government takes action to enact a statute that, upon enactment, would require the removal or delisting of any river or segment of a river in California that is included in the national wild and scenic rivers system and not in the state wild and scenic rivers system; or (2) the secretary determines that the federal government by enactment of a statute or by executive order has exempted a river or segment of a river in California that is not in the state wild and scenic river system from the protection of certain federal provisions governing restrictions on water resources projects, require the secretary, after holding a public hearing on the issue, based on the information obtained through the public hearing, to determine whether the provision of state protection for the river or segment of the river that has been removed, delisted, or exempted from the federal wild and scenic rivers system is in the best interest of the state and, if so, to take specified actions, until December 31, 2025, to add the river or segment of a river to the state wild and scenic rivers system and to classify that river or segment of a river, as prescribed.

SB 998 (**Dodd** D) **Discontinuation of residential water service: urban and community water systems.**

Current Text: Chaptered: 9/28/2018 html pdf

Introduced: 2/5/2018

Last Amend: 8/6/2018

Status: 9/28/2018-Approved by the Governor. Chaptered by Secretary of State. Chapter 891, Statutes of 2018.

Location: 9/28/2018-S. CHAPTERED

Summary: Would require an urban and community water system, defined as a public water system that supplies water to more than 200 service connections, to have a written policy on discontinuation of water service to certain types of residences for nonpayment available in prescribed languages. The bill would require the policy to include certain components, be available on the system's Internet Web site, and be provided to customers in writing, upon request.

SB 1215 (**Hertzberg** D) **Provision of sewer service: disadvantaged communities.**

Current Text: Chaptered: 10/1/2018 html pdf

Introduced: 2/15/2018

Last Amend: 8/24/2018

Status: 9/30/2018-Approved by the Governor. Chaptered by Secretary of State. Chapter 982, Statutes of 2018.

Location: 9/30/2018-S. CHAPTERED

Summary: The Porter-Cologne Water Quality Control Act requires each California regional water quality control board to adopt water quality control plans and to establish water quality objectives in those plans, considering certain factors, to ensure the reasonable protection of beneficial uses and the prevention of nuisance. This bill would, except as provided, authorize the regional board to order the provision of sewer service by a special district, city, or county to a disadvantaged community, as defined, under specified circumstances. By authorizing the regional board to require a special district, city, or county to provide sewer service, this bill would impose a state-mandated local program.

SB 1422 (**Portantino** D) **California Safe Drinking Water Act: microplastics.**

Current Text: Chaptered: 9/28/2018 html pdf

Introduced: 2/16/2018

Last Amend: 8/23/2018

Status: 9/28/2018-Approved by the Governor. Chaptered by Secretary of State. Chapter 902, Statutes of 2018.

Location: 9/28/2018-S. CHAPTERED

Summary: Would require the State Water Resources Control Board, on or before July 1, 2020, to adopt a definition of microplastics in drinking water, and on or before July 1, 2021, to adopt a standard methodology to be used in the testing of drinking water for microplastics and requirements for 4 years of testing and reporting of microplastics in drinking water, including public disclosure of those results.

Total Measures: 17
Total Tracking Forms: 17