APPENDICES

WESTCAPS Strategic Plan Refinement of West Maricopa Combine Pipeline Study

WESTCAPS
our west valley water coalition

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

AUGUST 2002

Introduction

The appendix report includes the back-up information processed during the selection and layout of the preferred alignment for the refinement of the strategic plan (refinement report). Selected tables and graphs of the alternatives are used in the refinement report from the appendices. Although the entire scope of the information was not provided in the refinement report, the information provided in this report was used to make decisions about the selection of the preferred alignment. The report itself does not provide text as to how the information was used. However, the goal was to provide the data in an organized fashion so that if information is sought during the screening of the refinement report, that the information is readily findable in this report. The terms forward flow and reverse flow are used. Forward flow denotes the delivery of water from the well field at the far west side of the system and pumped eastward toward Miller and Tuthill roads, Cotton Lane, and Sarival road. Reverse flow allows the water to flow in the opposite direction, from the Sarival road trunkline into the various developed areas along Miller and Tuthill roads, and Cotton Lane.

This report is provided as various appendix reports, appendices A through D. Each appendix is labeled in order to easily find the back-up data.

Appendix A includes the data for forward flow delivery along the five possible alignments. For each alignment a schematic model of the hydraulic results is provided; ground profiles, modeled pipe sizes, and pressure distributions are shown; and ground profiles, hydraulic features, and hydraulic grade lines are provided for each potential alignment. At the end of Appendix A, a summary of the equipment needed and costs for each alignment is provided.

Appendix B provides the same information as was provided for Appendix A, except for each of the reverse flow scenarios.

Appendix C provides the data as it relates to the preferred alignment, Alignment 3, in forward flow mode. The appendix is broken down into a schematic layout and hydraulic results; ground profiles, pipe sizes, and pressure distributions; and ground profiles hydraulic features and hydraulic grade lines for each five-year increment beginning with year 2005 and ending with year 2025. At the end of Appendix C, a summary of the equipment needed and costs for each alignment is provided.

Appendix D provides the data as it relates to the preferred alignment, Alignment 3, in reverse flow mode. The same type of information provided in Appendix C is provided in Appendix D. At the end of Appendix D, a summary of the equipment needed and costs for each alignment is provided.

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APPENDIX C

Transient Years' (2005, 2015, 2025) Water Delivery along Preferred Alignment 3 (Flood Control Dike and Yuma Road, Forward Flow), with three laterals

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APPENDIX C

Transient Years' (2005, 2015, 2025) Water Delivery along Preferred Alignment 3 (Flood Control Dike and Yuma Road, Forward Flow), with three laterals

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For Year 2005, Alignments 3 (Flood Control Dike and Yuma Road) with 3 laterals

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APPENDIX D

Reverse Flow, Transient Years' (2005, 2015, 2025) Water Delivery along Preferred Alignment 3 (Flood Control Dike and Yuma Road, Forward Flow), with three laterals

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Appendix A

Forward Flow Water Delivery
Along
Alignments 1, 2, 3, 4 and 5

Appendix A-1

Alignment 1 with 3 Laterals (Forward Flow)

1. Schematic Model Layout and Hydraulic Results

2. Tables
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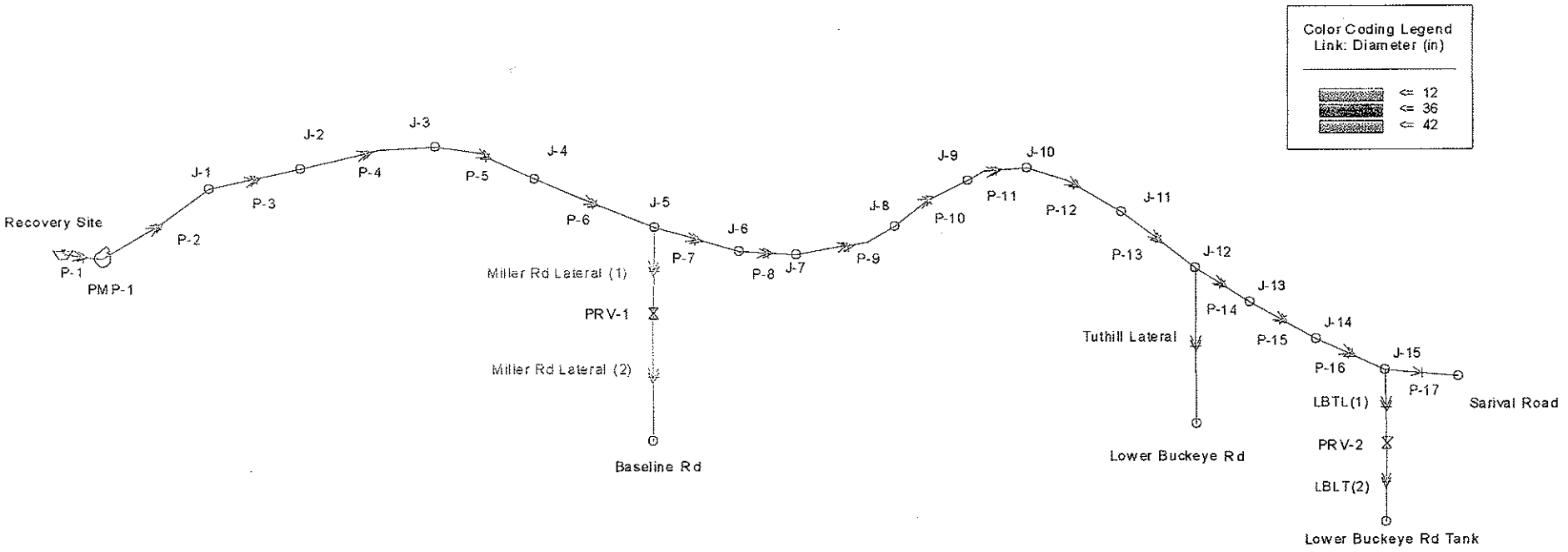
Scenario: Year 2025 Peak Demand

Alignment 1

Recovery Storage Site to Sarival Road along Tonopah-Salome Highway and McDowell Road

West Maricopa Combine Pipeline to the Future (PTTF)

(Forward Flow)



Title: WMC T/S HWY - McDowell Alignment 1 (Forward Flow)
f:\...\wmc t-s hwy mcdowell pipe, alt 1.wcd
02/19/02 09:43:08 AM

Bureau of Reclamation

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Project Engineer: Michael Lee
Cybernet v3.1 [071]

Analysis Results
Scenario

Title: WMC T-S HWY McDowell Alignment, Alernative 1
Project Engineer: Michael Lee
Project Date: 11/29/01
Comments:

Scenario Summary	
Label	Year 2025 Peak Demand
Demand Alternative	Year 2025 Peak Demand
Physical Alternative	Year 2025 Peak Demand
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow

Liquid Characteristics			
Liquid	Water at 20C(68F)	Specific Gravity	1.00
Kinematic Viscosity	0.108e-4 ft²/s		

Network Inventory			
Number of Pipes	22	Number of Tanks	0
Number of Reservoirs	1	- Constant Area:	0
Number of Junctions	19	- Variable Area:	0
Number of Pumps	1	Number of Valves	2
- Constant Power:	0	- FCV's:	0
- One Point (Design Point):	1	- PBV's:	0
- Standard (3 Point):	0	- PRV's:	2
- Standard Extended:	0	- PSV's:	0
- Custom Extended:	0	- TCV's:	0
- Multiple Point:	0	Number of Spot Elevations	0

Pipe Inventory			
Total Length	147,648.00 ft		
12 in	15,787.00 ft	42 in	110,055.00 ft
36 in	21,806.00 ft		

Analysis Results
Scenario: Year 2025 Peak Demand
Steady State Analysis

Junctions @ 0.00 hr

Label	Constituent (mg/l)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Demand (Calculated) (cfs)	Pressure Head (ft)
Baseline Rd	N/A	1,140.8	111.06	35.01	256.8
J-1	N/A	1,344.6	89.77	0.00	207.6
J-2	N/A	1,320.5	76.77	0.00	177.5
J-3	N/A	1,308.3	69.75	0.00	161.3
J-4	N/A	1,299.4	90.99	0.00	210.4
J-5	N/A	1,289.7	83.31	0.00	192.7
J-6	N/A	1,289.5	83.24	0.00	192.5
J-7	N/A	1,287.8	82.09	0.00	189.8
J-8	N/A	1,286.9	65.27	0.00	150.9
J-9	N/A	1,285.3	55.92	0.00	129.3
J-10	N/A	1,284.2	56.76	0.00	131.2
J-11	N/A	1,283.3	72.80	0.00	168.3
J-12	N/A	1,282.2	82.67	0.00	191.2
J-13	N/A	1,281.7	86.78	0.00	200.7
J-14	N/A	1,280.2	110.77	0.00	256.2
J-15	N/A	1,279.6	115.70	0.00	267.6
Lower Buckeye Rd	N/A	1,128.1	105.57	4.77	244.1
Lower Buckeye Rd Tai	N/A	1,120.7	83.75	12.02	193.7
Sarival Road	N/A	1,279.6	118.73	0.00	274.6

Reservoirs @ 0.00 hr

Label	Constituent (mg/l)	Calculated Hydraulic Grade (ft)	Reservoir Inflow (cfs)	Reservoir Outflow (cfs)
Recovery Site	N/A	1,110.0	N/A	51.80

Pipes @ 0.00 hr

Label	Status	Constituent (mg/l)	Flow (cfs)	Velocity (ft/s)	From Grade (ft)	To Grade (ft)	Friction Loss (ft)	Minor Loss (ft)	Total Headloss (ft)	Headloss Gradient (ft/1000ft)
LBLT(2)	Open	N/A	12.02	1.25	1,122.6	1,120.7	1.9	0.2e-1	2.0	0.12
LBTL(1)	Open	N/A	12.02	1.25	1,279.6	1,279.4	0.1	0.2e-1	0.1	0.14
Miller Rd Lateral (1)	Open	N/A	35.01	4.95	1,289.7	1,287.5	1.8	0.3	2.1	2.14
Miller Rd Lateral (2)	Open	N/A	35.01	4.95	1,179.5	1,140.8	38.4	0.3	38.7	1.86
P-1	Open	N/A	51.80	5.38	1,110.0	1,108.9	0.4e-1	1.0	1.1	53.11
P-2	Open	N/A	51.80	5.38	1,352.8	1,344.6	7.9	0.4	8.2	1.88
P-3	Open	N/A	51.80	5.38	1,344.6	1,320.5	23.7	0.4	24.1	1.82
P-4	Open	N/A	51.80	5.38	1,320.5	1,308.3	11.9	0.4	12.2	1.85
P-5	Open	N/A	51.80	5.38	1,308.3	1,299.4	8.5	0.4	8.9	1.87
P-6	Open	N/A	51.80	5.38	1,299.4	1,289.7	9.4	0.4	9.7	1.86
P-7	Open	N/A	16.79	1.75	1,289.7	1,289.5	0.1	0.4e-1	0.2	0.29
P-8	Open	N/A	16.79	1.75	1,289.5	1,287.8	1.6	0.4e-1	1.7	0.23
P-9	Open	N/A	16.79	1.75	1,287.8	1,286.9	0.9	0.4e-1	0.9	0.23
P-10	Open	N/A	16.79	1.75	1,286.9	1,285.3	1.6	0.4e-1	1.6	0.23
P-11	Open	N/A	16.79	1.75	1,285.3	1,284.2	1.0	0.4e-1	1.1	0.23
P-12	Open	N/A	16.79	1.75	1,284.2	1,283.3	0.9	0.4e-1	0.9	0.23

Analysis Results
Scenario: Year 2025 Peak Demand
Steady State Analysis

Pipes @ 0.00 hr

Label	Status	Constituent (mg/l)	Flow (cfs)	Velocity (ft/s)	From Grade (ft)	To Grade (ft)	Friction Loss (ft)	Minor Loss (ft)	Total Headloss (ft)	Headloss Gradient (ft/1000ft)
P-13	Open	N/A	16.79	1.75	1,283.3	1,282.2	1.1	0.4e-1	1.2	0.23
P-14	Open	N/A	12.02	1.25	1,282.2	1,281.7	0.5	0.2e-1	0.5	0.13
P-15	Open	N/A	12.02	1.25	1,281.7	1,280.2	1.5	0.2e-1	1.5	0.12
P-16	Open	N/A	12.02	1.25	1,280.2	1,279.6	0.6	0.2e-1	0.6	0.12
P-17	Open	N/A	0.00	0.00	1,279.6	1,279.6	0.0	0.0	0.0	0.00
Tuthill Lateral	Open	N/A	4.77	6.07	1,282.2	1,128.1	153.6	0.4	154.0	9.76

Pumps @ 0.00 hr

Label	Status	Constituent (mg/l)	From Grade (ft)	To Grade (ft)	Flow (cfs)	Head (ft)	Relative Speed	Useful Power (Hp)
PMP-1	On	N/A	1,108.9	1,352.8	51.80	243.9	1.00	1,431.60

PRVs @ 0.00 hr

Label	Status	Constituent (mg/l)	From Grade (ft)	To Grade (ft)	Flow (cfs)	Headloss (ft)	Setting (psi)
PRV-1	Throttling	N/A	1,287.5	1,179.5	35.01	108.0	40.00
PRV-2	Throttling	N/A	1,279.4	1,122.6	12.02	156.8	50.00

Table AP A-1

West Maricopa Combine, WESTCAPS
Potential Pipeline to The Future (PTTF), Alignment 1

A. Alignment 1: From the Recovery Storage Site along Tonopah-Salome HWY and McDowell Road to Sarival Road

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Recovery Site Storage	0.00	0	0	1,099	0	42	51.80	37,500	7	1,109
P	Pump Station & Air Chamber	0.0038	20	20	1,099	0	42	51.80	37,500	112	1,352
1	Air Valve	0.83	4,382	4,402	1,142	43	42	51.80	37,500	90	1,344
2		2.50	13,200	17,602	1,148	6	42	51.80	37,500	77	1,320
3	Air & Vacuum Valve	1.25	6,600	24,202	1,152	4	42	51.80	37,500	70	1,308
4	Blow-off Valve	0.90	4,752	28,954	1,094	-58	42	51.80	37,500	91	1,299
5	Tie to Miller Road Lateral	0.99	5,227	34,182	1,102	8	42	16.79	12,157	83	1,289
6		0.11	581	34,762	1,102	0	42	16.79	12,157	83	1,289
7		1.37	7,234	41,996	1,103	1	42	16.79	12,157	82	1,287
8	Air Valve	0.73	3,854	45,850	1,141	38	42	16.79	12,157	65	1,286
9		1.35	7,128	52,978	1,161	20	42	16.79	12,157	56	1,285
10	Air & Vacuum Valve	0.87	4,594	57,572	1,158	-3	42	16.79	12,157	57	1,284
11		0.73	3,854	61,426	1,120	-38	42	16.79	12,157	73	1,283
12	Tie to Tuthill Road Lateral	0.97	5,122	66,548	1,096	-24	42	16.79	12,157	83	1,282
13		0.75	3,960	70,508	1,086	-10	42	12.02	8,702	87	1,281
14		2.35	12,408	82,916	1,029	-57	42	12.02	8,702	111	1,279
15	Tie to Cotton Lane Lateral	0.90	4,752	87,668	1,017	-12	42	12.02	8,702	116	1,279
16	Sarival Road	1.00	5,280	92,948	1,010	-7	42			53	1,127
Total		17.60	92,948			-89					

Table AP A-1

West Maricopa Combine, WESTCAPS
Potential Pipeline to The Future (PTTF), Alignment 1

B — **Miller Road Lateral: From Trunk Alignment 1 to Baseline Road**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	McDowell Road	0	0	0	1,102	0	36	35.01	25,344	83	1,289
PRV(U)	PRV Upstream Side	0.1894	1,000	1,000	1,092	-10	36	35.01	25,344	87	1,287
PRV(D)	PRV Downstream Side	0.0009	5	1,005	1,092	0	36	35.01	25,344	40	1,179
1	Baseline Road	3.94	20,803	21,808	889	-203	36	35.01	25,344	111	1,141
Total		4.13	21,808			-213					

C — **Tuthill Road Lateral: From Trunk Alignment 1 to Lower Buckeye Road**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	McDowell Road	0	0	0	1,096	0	12	4.77	3,455	83	1,282
1	Lower Buckeye Rd	2.99	15,787	15,787	889	-207	12	4.77	3,455	105	1,127
Total		2.99	15,787			-207					

D — **Cotton Lane Lateral: From Trunk Alignment 1 to Lower Buckeye Road Storage Tank**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	McDowell Road	0	0	0	1,017	0	42	12.02	8,702	116	1,279
PRV(U)	PRV Upstream Side	0.1894	1,000	1,000	1,012	-5	42	12.02	8,702	118	1,279
PRV(D)	PRV Downstream Side	0.0009	5	1,005	1,012	0	42	12.02	8,702	50	1,122
1	Lower Buckeye Rd Storage Tank	3.05	16,104	17,109	932	-80	42	12.02	8,702	84	1,120
Total		3.24	17,109			-85					

Figure AP A-1A

Alignment 1
From Recovery Storage Site along Tonopah-Salome HWY and McDowell Road to Sarival Road
West Maricopa Combine, WESTCAPS

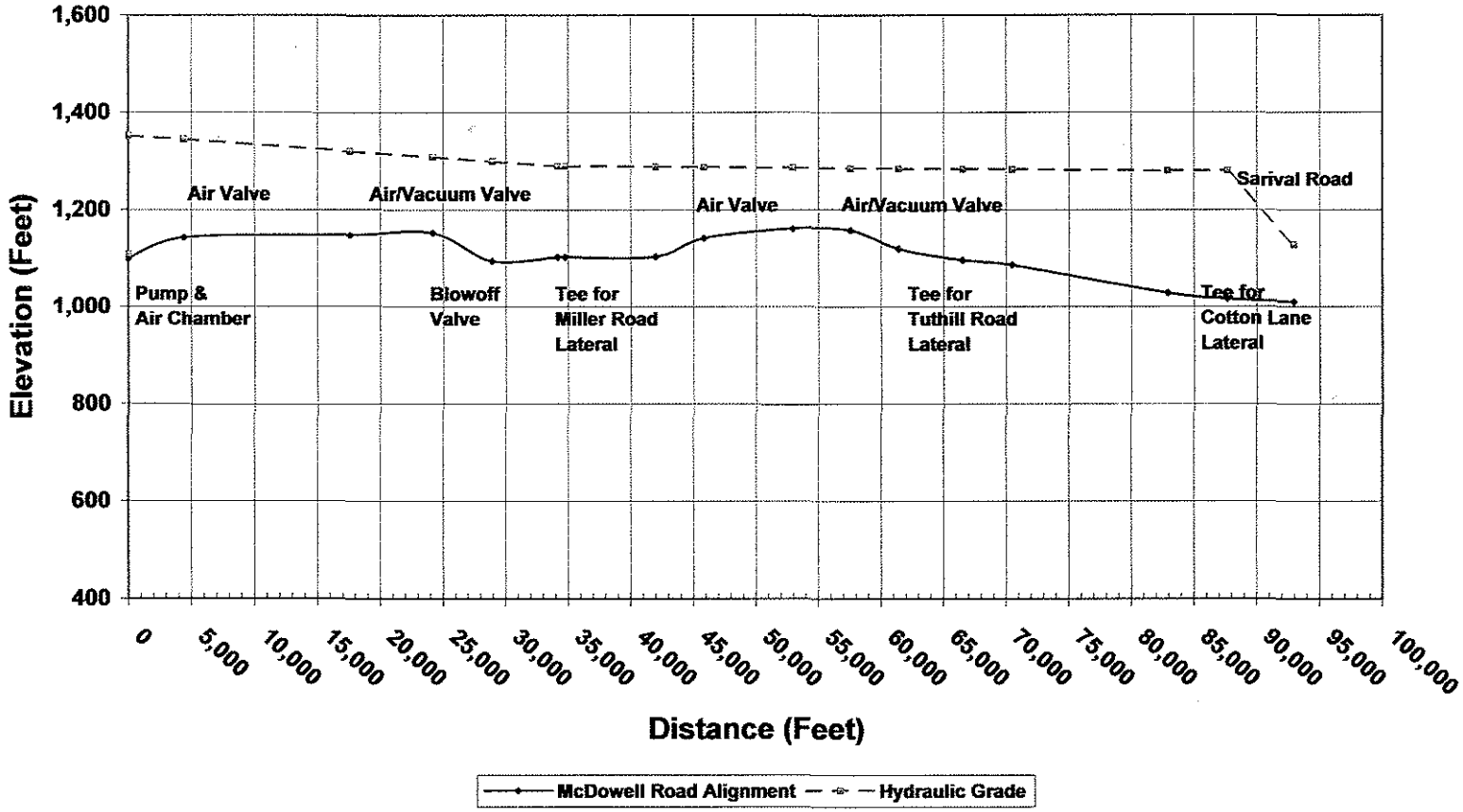


Figure AP A-1B

Miller Road Lateral
From Alignment 1 along Miller Road to Baseline Road
West Maricopa Combine, WESTCAPS

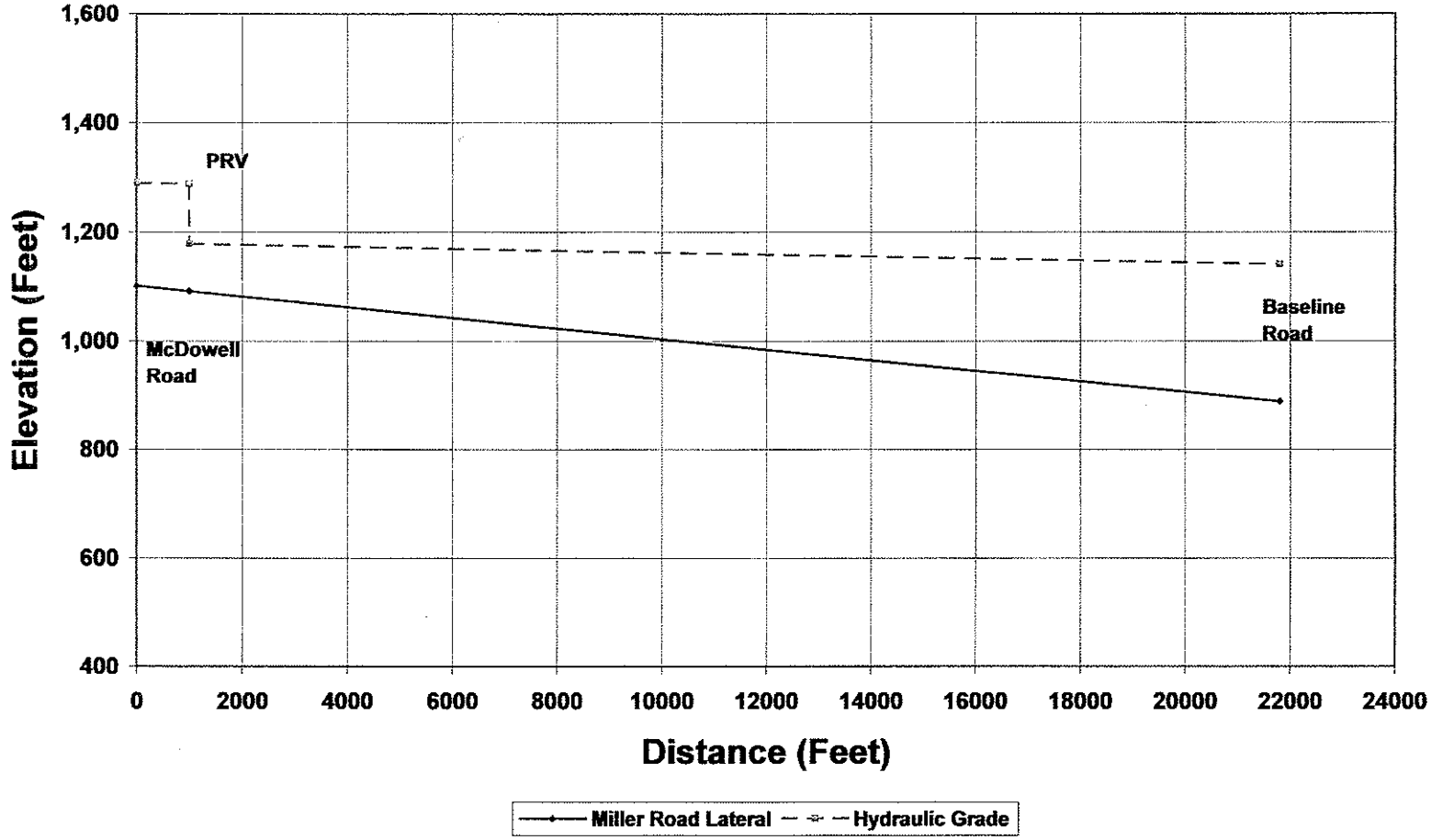


Figure AP A-1C

Tuthill Road Lateral
From Alignment 1 along Tuthill Road to Lower Buckeye Road
West Maricopa Combine, WESTCAPS

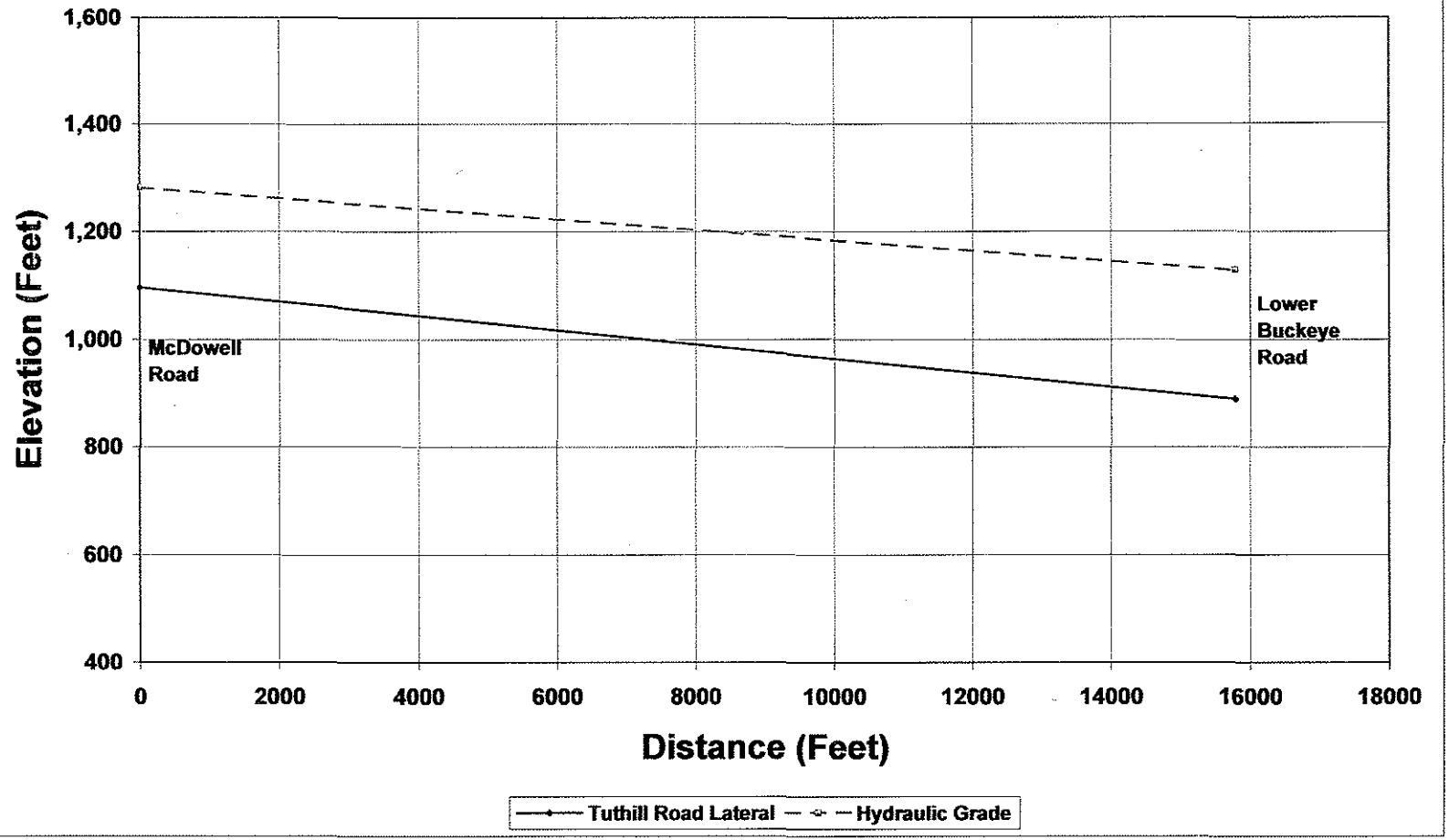
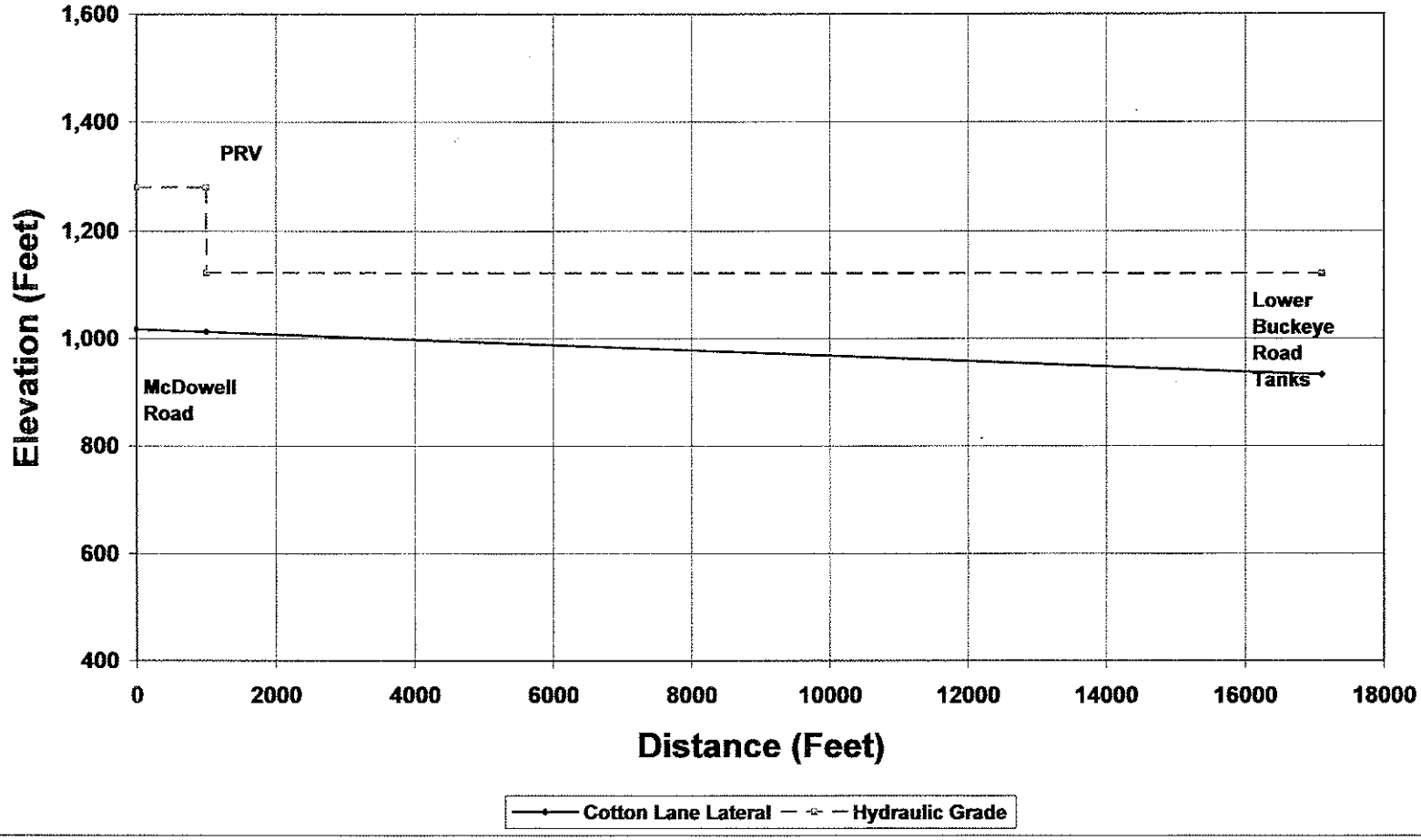


Figure AP A-1D

Cotton Lane Lateral
From Alignment 1 along Cotton Lane to Lower Buckeye Road Tanks
West Maricopa Combine, WESTCAPS



Appendix A-2

Alignment 2 with 3 Laterals (Forward Flow)

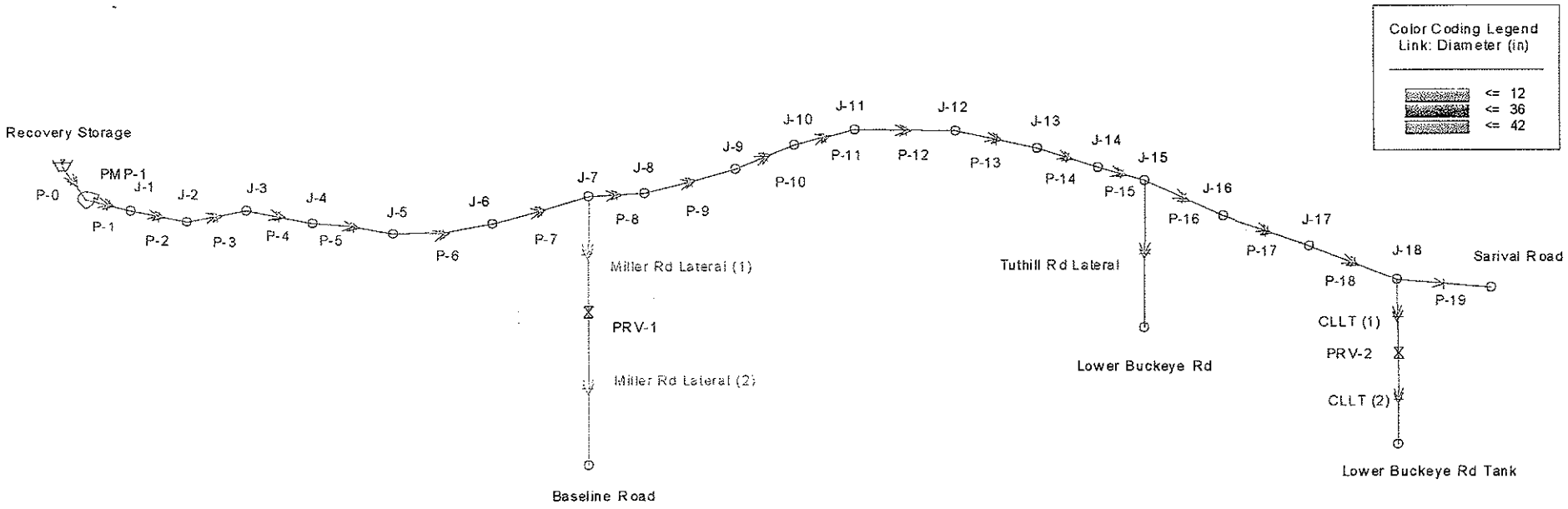
1. **Schematic Model Layout and Hydraulic Results**

2. **Tables**
   Ground Profiles, Pipe Sizes, and Pressure Distributions

3. **Figure**
   Ground Profiles, Hydraulic Features, and Hydraulic Grade Lines

Scenario: Year 2025 Peak Demand

Alignment 2
Recovery Storage Site to Sarival Road along I-10 Freeway
West Maricopa Combine Pipeline to The Future (PTTF)
(Forward Flow)



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Analysis Results
Scenario

Title: WMC I-10 Alignment, Alternative 2
Project Engineer: Michael Lee
Project Date: 01/10/02
Comments:

Scenario Summary	
Label	Year 2025 Peak Demand
Demand Alternative	Year 2025 Peak Demand
Physical Alternative	Year 2025 Peak Demand
Initial Settings Alternative	Year 2025 Peak Demand
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow

Liquid Characteristics			
Liquid	Water at 20C(68F)	Specific Gravity	1.00
Kinematic Viscosity	0.108e-4 ft²/s		

Network Inventory			
Number of Pipes	25	Number of Tanks	0
Number of Reservoirs	1	- Constant Area:	0
Number of Junctions	22	- Variable Area:	0
Number of Pumps	1	Number of Valves	2
- Constant Power:	0	- FCV's:	0
- One Point (Design Point):	1	- PBV's:	0
- Standard (3 Point):	0	- PRV's:	2
- Standard Extended:	0	- PSV's:	0
- Custom Extended:	0	- TCV's:	0
- Multiple Point:	0	Number of Spot Elevations	0

Pipe Inventory			
Total Length	139,750.00 ft		
12 in	14,995.00 ft	42 in	104,585.00 ft
36 in	20,170.00 ft		

Analysis Results
Scenario: Year 2025 Peak Demand
Steady State Analysis

Junctions @ 0.00 hr

Label	Constituent (mg/l)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Demand (Calculated) (cfs)	Pressure Head (ft)
Baseline Road	N/A	1,122.83	103.28	35.01	238.83
J-1	N/A	1,296.30	103.48	0.00	239.30
J-2	N/A	1,281.04	94.72	0.00	219.04
J-3	N/A	1,278.32	84.03	0.00	194.32
J-4	N/A	1,270.37	88.81	0.00	205.37
J-5	N/A	1,261.48	99.24	0.00	229.48
J-6	N/A	1,252.78	85.53	0.00	197.78
J-7	N/A	1,245.12	73.56	0.00	170.12
J-8	N/A	1,244.84	70.85	0.00	163.84
J-9	N/A	1,243.41	67.21	0.00	155.41
J-10	N/A	1,242.85	62.20	0.00	143.85
J-11	N/A	1,242.11	49.78	0.00	115.11
J-12	N/A	1,240.54	46.07	0.00	106.54
J-13	N/A	1,239.18	64.08	0.00	148.18
J-14	N/A	1,238.02	67.90	0.00	157.02
J-15	N/A	1,237.92	67.86	0.00	156.92
J-16	N/A	1,237.30	74.07	0.00	171.30
J-17	N/A	1,236.20	91.33	0.00	211.20
J-18	N/A	1,235.32	97.87	0.00	226.32
Lower Buckeye Rd	N/A	1,091.58	89.77	4.77	207.58
Lower Buckeye Rd Tai	N/A	1,117.82	82.52	12.02	190.82
Sarival Road	N/A	1,235.32	103.49	0.00	239.32

Reservoirs @ 0.00 hr

Label	Constituent (mg/l)	Calculated Hydraulic Grade (ft)	Reservoir Inflow (cfs)	Reservoir Outflow (cfs)
Recovery Wells	N/A	1,110.00	N/A	51.80

Pipes @ 0.00 hr

Label	Status	Constituent (mg/l)	Flow (cfs)	Velocity (ft/s)	From Grade (ft)	To Grade (ft)	Friction Loss (ft)	Minor Loss (ft)	Total Headloss (ft)	Headloss Gradient (ft/1000ft)
LBLT(1)	Open	N/A	12.02	1.25	1,235.32	1,235.18	0.12	0.02	0.14	0.14
Miller Rd Lateral (1)	Open	N/A	35.01	4.95	1,245.12	1,242.97	1.84	0.30	2.14	2.14
Miller Rd Lateral (2)	Open	N/A	35.01	4.95	1,158.50	1,122.83	35.37	0.30	35.67	1.86
P-0	Open	N/A	51.80	5.38	1,110.00	1,108.94	0.04	1.03	1.06	53.11
P-1	Open	N/A	51.80	5.38	1,304.05	1,296.30	7.40	0.35	7.75	1.88
P-2	Open	N/A	51.80	5.38	1,296.30	1,281.04	14.90	0.35	15.25	1.84
P-3	Open	N/A	51.80	5.38	1,281.04	1,278.32	2.37	0.35	2.72	2.06
P-4	Open	N/A	51.80	5.38	1,278.32	1,270.37	7.59	0.35	7.94	1.88
P-5	Open	N/A	51.80	5.38	1,270.37	1,261.48	8.54	0.35	8.89	1.87
P-6	Open	N/A	51.80	5.38	1,261.48	1,252.78	8.35	0.35	8.70	1.87
P-7	Open	N/A	51.80	5.38	1,252.78	1,245.12	7.31	0.35	7.66	1.88
P-8	Open	N/A	16.79	1.75	1,245.12	1,244.84	0.24	0.04	0.27	0.26
P-9	Open	N/A	16.79	1.75	1,244.84	1,243.41	1.39	0.04	1.43	0.23

Analysis Results
Scenario: Year 2025 Peak Demand
Steady State Analysis

Pipes @ 0.00 hr

Label	Status	Constituent (mg/l)	Flow (cfs)	Velocity (ft/s)	From Grade (ft)	To Grade (ft)	Friction Loss (ft)	Minor Loss (ft)	Total Headloss (ft)	Headloss Gradient (ft/1000ft)
P-10	Open	N/A	16.79	1.75	1,243.41	1,242.85	0.53	0.04	0.57	0.24
P-11	Open	N/A	16.79	1.75	1,242.85	1,242.11	0.70	0.04	0.74	0.24
P-12	Open	N/A	16.79	1.75	1,242.11	1,240.54	1.54	0.04	1.57	0.23
P-13	Open	N/A	16.79	1.75	1,240.54	1,239.18	1.32	0.04	1.36	0.23
P-14	Open	N/A	16.79	1.75	1,239.18	1,238.02	1.12	0.04	1.16	0.23
P-15	Open	N/A	16.79	1.75	1,238.02	1,237.92	0.06	0.04	0.10	0.36
P-16	Open	N/A	12.02	1.25	1,237.92	1,237.30	0.60	0.02	0.62	0.12
P-17	Open	N/A	12.02	1.25	1,237.30	1,236.20	1.08	0.02	1.10	0.12
P-18	Open	N/A	12.02	1.25	1,236.20	1,235.32	0.86	0.02	0.88	0.12
P-19	Open	N/A	0.00	0.00	1,235.32	1,235.32	0.00	0.00	0.00	0.00
P-25	Open	N/A	12.02	1.25	1,119.62	1,117.82	1.79	0.02	1.81	0.12
Tuthill Rd Lateral	Open	N/A	4.77	6.07	1,237.92	1,091.58	145.89	0.45	146.34	9.76

Pumps @ 0.00 hr

Label	Status	Constituent (mg/l)	From Grade (ft)	To Grade (ft)	Flow (cfs)	Head (ft)	Relative Speed	Useful Power (Hp)
PMP-1	On	N/A	1,108.94	1,304.05	51.80	195.11	1.00	1,145.28

PRVs @ 0.00 hr

Label	Status	Constituent (mg/l)	From Grade (ft)	To Grade (ft)	Flow (cfs)	Headloss (ft)	Setting (psi)
PRV-1	Throttling	N/A	1,242.97	1,158.50	35.01	84.47	40.00
PRV-2	Throttling	N/A	1,235.18	1,119.62	12.02	115.55	50.00

Table AP A-2

West Maricopa Combine, WESTCAPS
Potential Pipeline to The Future (PTTF), Alignment 2

A **Alignment 2: From the Recovery Storage Site along I - 10 to Sarival Road**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Recovery Site Storage	0	0	0	1,099	0	42	51.80	37,500	7	1,109
P	Pump Station & Air Chamber	0.0038	20	20	1,099	0	42	51.80	37,500	91	1,304
1	Blow-off Valve	0.78	4,118	4,138	1,062	-37	42	51.80	37,500	104	1,296
2		1.57	8,290	12,428	1,067	5	42	51.80	37,500	95	1,281
3	Air & Vacuum Valve	0.25	1,320	13,748	1,089	22	42	51.80	37,500	84	1,278
4		0.8	4,224	17,972	1,070	-19	42	51.80	37,500	89	1,270
5	Blow-off Valve	0.9	4,752	22,724	1,037	-33	42	51.80	37,500	99	1,261
6		0.88	4,646	27,370	1,060	23	42	51.80	37,500	85	1,252
7	Tie to Miller Road Lateral	0.77	4,066	31,436	1,080	20	42	51.80	37,500	74	1,245
8		0.2	1,056	32,492	1,086	6	42	16.79	12,157	71	1,244
9		1.18	6,230	38,722	1,093	7	42	16.79	12,157	67	1,243
10		0.45	2,376	41,098	1,104	11	42	16.79	12,157	62	1,242
11		0.6	3,168	44,266	1,132	28	42	16.79	12,157	50	1,242
12	Air & Vacuum Valve	1.3	6,864	51,130	1,139	7	42	16.79	12,157	46	1,240
13		1.12	5,914	57,044	1,096	-43	42	16.79	12,157	64	1,239
14		0.95	5,016	62,060	1,086	-10	42	16.79	12,157	68	1,237
15	Tie to Tuthill Road Lateral	0.05	264	62,324	1,086	0	42	16.79	12,157	68	1,237
16		0.95	5,016	67,340	1,071	-15	42	12.02	8,702	74	1,237
17		1.7	8,976	76,316	1,030	-41	42	12.02	8,702	91	1,235
18	Tie to Cotton Lane Lateral	1.35	7,128	83,444	1,014	-16	42	12.02	8,702	98	1,235
19	Sarival Road	1.01	5,333	88,777	1,001	-13	42			104	1,235
Total		16.8138	88,777			-98					

Table AP A-2

West Maricopa Combine, WESTCAPS
Potential Pipeline to The Future (PTTF), Alignment 2

B — **Miller Road Lateral: From Trunk Alignment 2 to Baseline Road**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	From I - 10 Freeway	0	0	0	1,080	0	36	35.01	25,344	74	1,245
PRV(U)	PRV Upstream Side	0.1894	1,000	1,000	1,071	-9	36	35.01	25,344	77	1,243
PRV(D)	PRV Downstream Side	0.0009	5	1,005	1,071	0	36	35.01	25,344	40	1,158
1	Baseline Road	3.63	19,166	20,171	889	-182	36	35.01	25,344	104	1,123
Total		3.82	20,171			-191					

C — **Tuthill Road Lateral: From Trunk Alignment 2 to Lower Buckeye Road**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	From I - 10 Freeway	0	0	0	1,086	0	12	4.77	3,455	68	1,237
1	Lower Buckeye Rd	2.84	14,995	14,995	889	-197	12	4.77	3,455	90	1,091
Total		2.84	14,995			-197					

D — **Cotton Lane Lateral: From Trunk Alignment 2 to Lower Buckeye Road Storage Tank**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	I - 10 Freeway	0	0	0	1,014	0	42	12.02	8,702	98	1,235
PRV(U)	PRV Upstream Side	0.1894	1,000	1,000	1,008	-6	42	12.02	8,702	100	1,234
PRV(D)	PRV Downstream Side	0.0009	5	1,005	1,008	0	42	12.02	8,702	50	1,119
1	Lower Buckeye Rd Storage Tank	2.81	14,837	15,842	932	-76	42	12.02	8,702	82	1,117
Total		3.00	15,842			-82					

Figure AP A-2A

Alignment 2
From Recovery Storage Site along I - 10 to Sarival Road
West Maricopa Combine, WESTCAPS

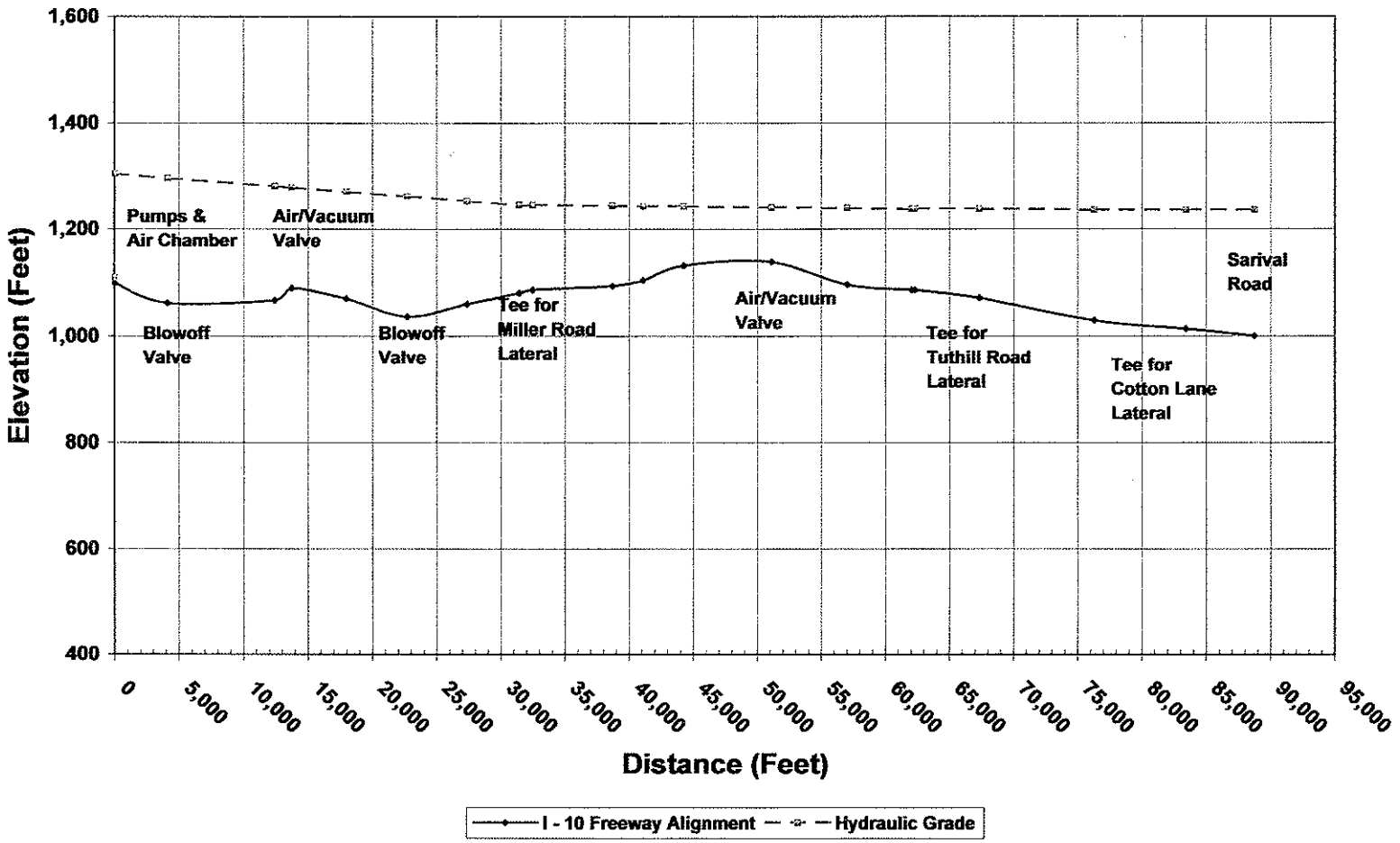


Figure AP A-2B

Miller Road Lateral
From Alignment 2 along Miller Road to Baseline
West Maricopa Combine, WESTCAPS

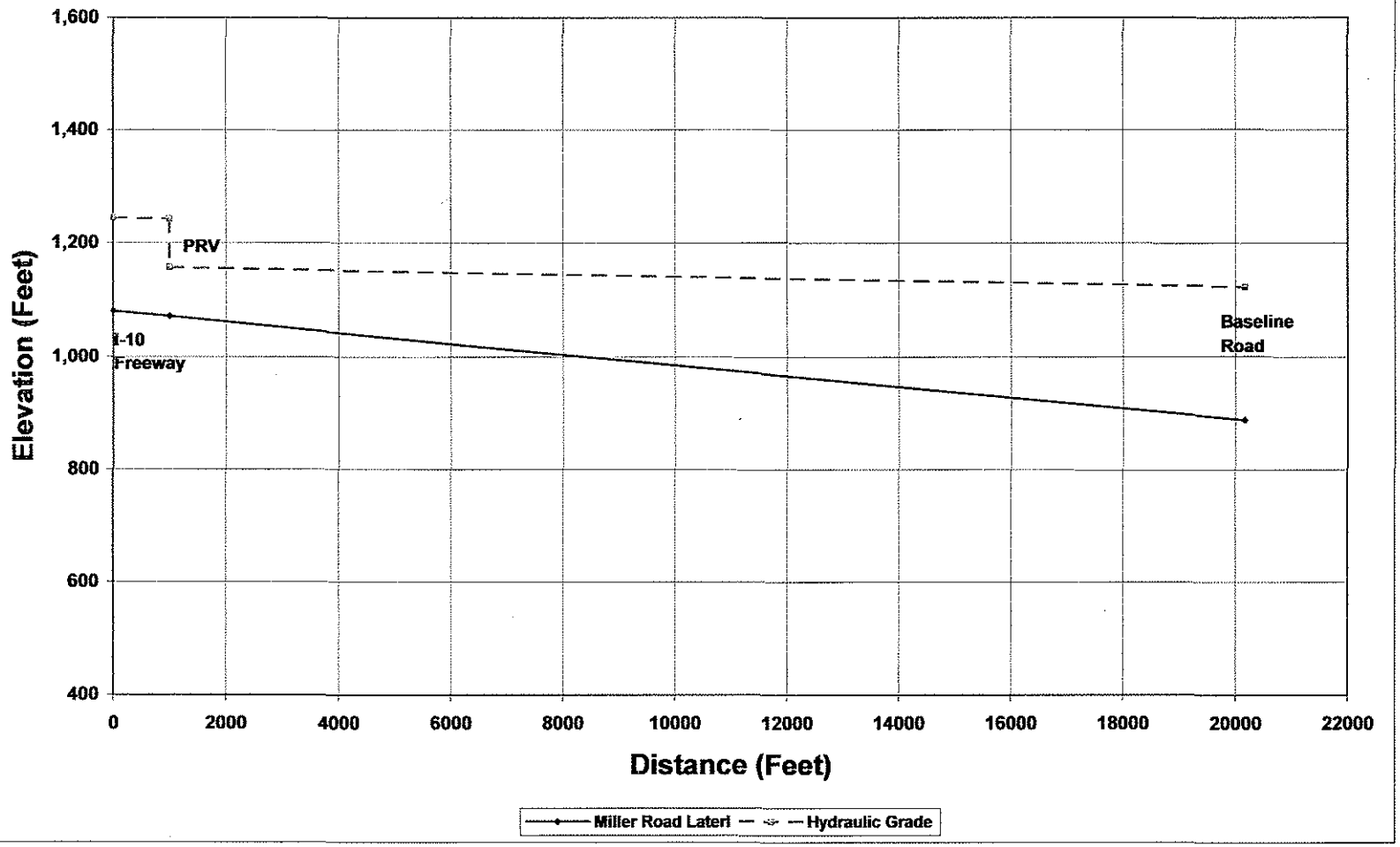


Figure AP A-2C

Tuthill Road Lateral
From Alignment 2 along Tuthill Road to Lower Buckeye Road
West Maricopa Combine, WESTCAPS

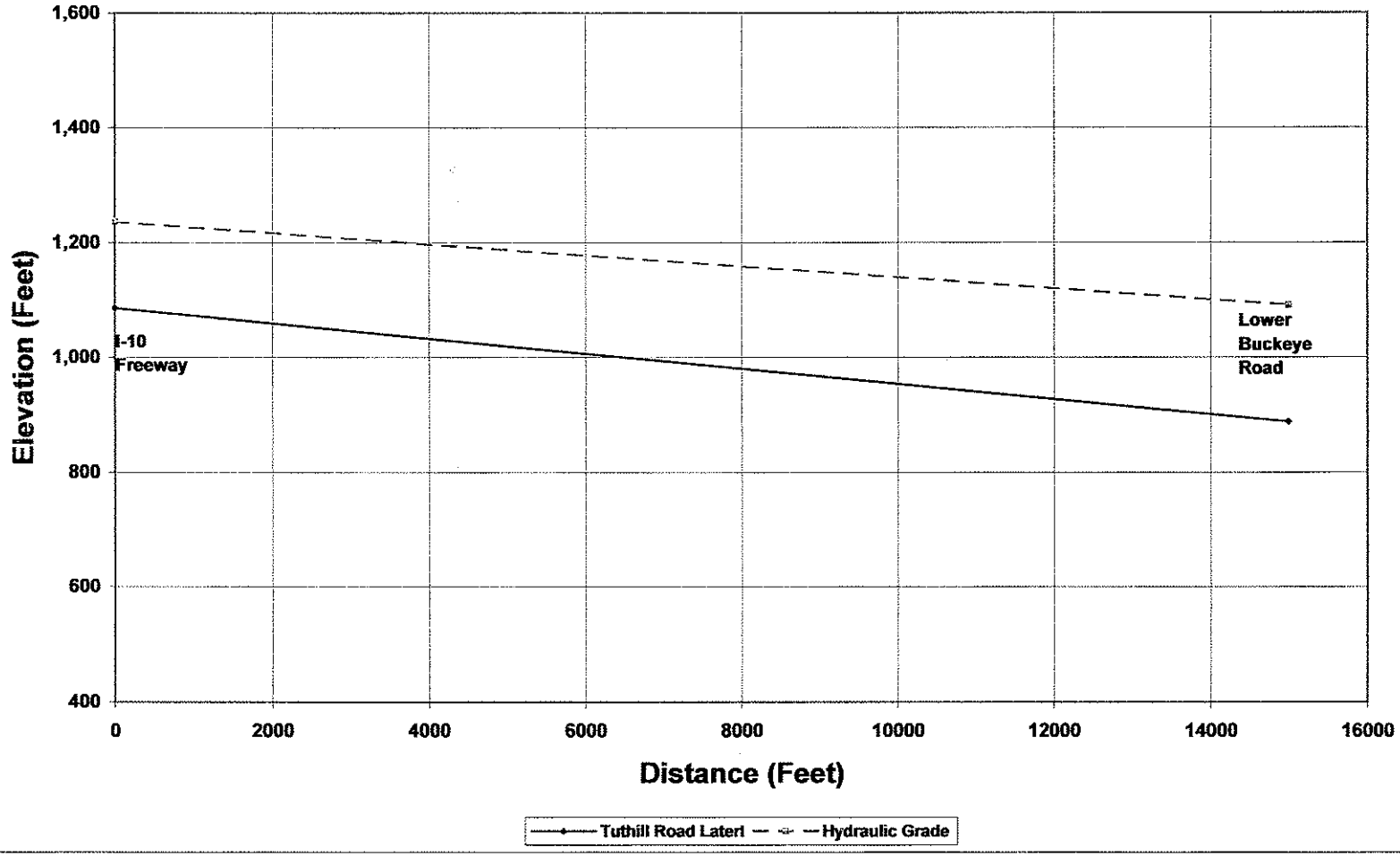
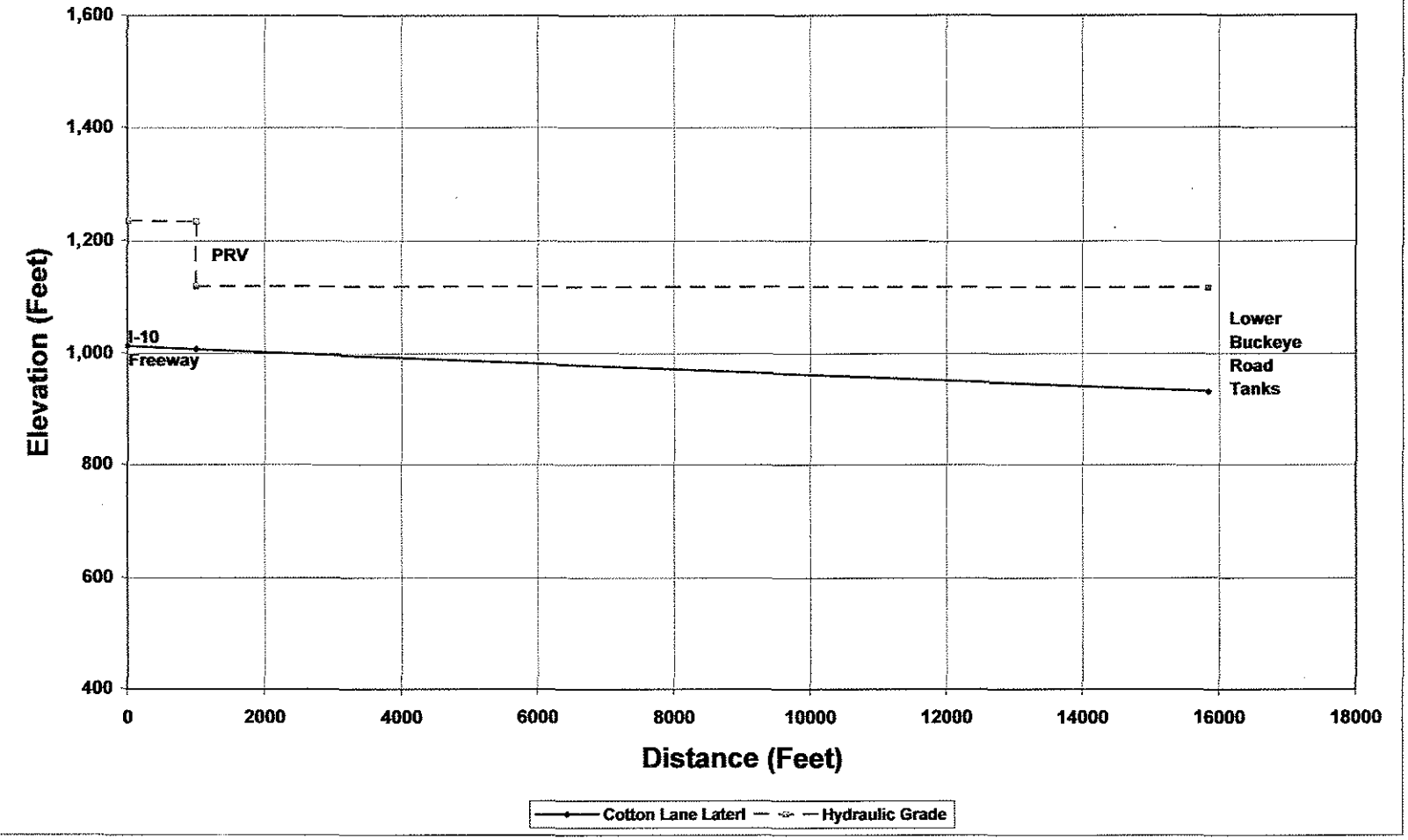


Figure AP A-2D

Cotton Lane Lateral
From Alignment 2 along Cotton Lane to Lower Buckeye Road Tanks
West Maricopa Combine, WESTCAPS



Appendix A-3

Alignment 3 with 3 Laterals (Forward Flow)

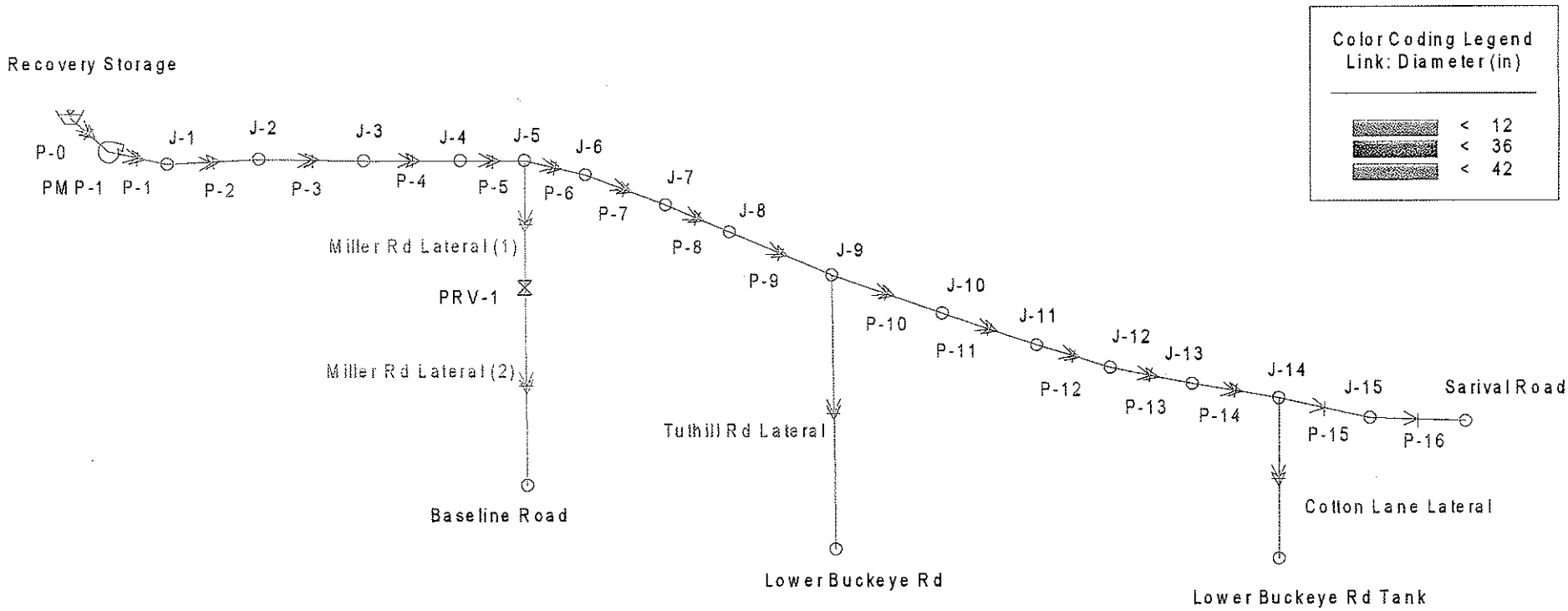
1. **Schematic Model Layout and Hydraulic Results**

2. **Tables**
   Ground Profiles, Pipe Sizes, and Pressure Distributions

3. **Figure**
   Ground Profiles, Hydraulic Features, and Hydraulic Grade Lines

Scenario: Year 2025 Peak Demand

Alignment 3
Recovery Storage Site to Sarival Road along Dike and Yuma Road
West Maricopa Combine Pipeline to The Future (PTTF)
(Forward Flow)



Title: WMC Dike-Yuma Alignment 3 (Forward Flow)
f:\mlee\westcaps\wmc dike-yuma pipe, alt 3.wcd
02/19/02 09:44:46 AM

Bureau of Reclamation

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Project Engineer: Michael Lee
Cybernet v3.1.[071]

Analysis Results
Scenario

Title: WMC Dike-Yuma Alignment, Alternative 3
Project Engineer: Michael Lee
Project Date: 11/21/01
Comments:

Scenario Summary	
Label	Year 2025 Peak Demand
Demand Alternative	Year 2025 Peak Demand
Physical Alternative	Year 2025 Peak Demand
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow

Liquid Characteristics			
Liquid	Water at 20C(68F)	Specific Gravity	1.00
Kinematic Viscosity	0.108e-4 ft²/s		

Network Inventory			
Number of Pipes	21	Number of Tanks	0
Number of Reservoirs	1	- Constant Area:	0
Number of Junctions	19	- Variable Area:	0
Number of Pumps	1	Number of Valves	1
- Constant Power:	0	- FCV's:	0
- One Point (Design Point):	1	- PBV's:	0
- Standard (3 Point):	0	- PRV's:	1
- Standard Extended:	0	- PSV's:	0
- Custom Extended:	0	- TCV's:	0
- Multiple Point:	0	Number of Spot Elevations	0

Pipe Inventory			
Total Length	118,292.00 ft		
12 in	5,280.00 ft	42 in	92,842.00 ft
36 in	20,170.00 ft		

Analysis Results
Scenario: Year 2025 Peak Demand
Steady State Analysis

Junctions @ 0.00 hr

Label	Constituent (mg/l)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Demand (Calculated) (cfs)	Pressure Head (ft)
Baseline Road	N/A	1,155.96	117.60	35.01	271.96
J-1	N/A	1,248.47	81.07	0.00	187.47
J-2	N/A	1,226.57	61.65	0.00	142.57
J-3	N/A	1,206.00	56.22	0.00	130.00
J-4	N/A	1,203.09	51.50	0.00	119.09
J-5	N/A	1,197.99	48.86	0.00	112.99
J-6	N/A	1,197.01	51.46	0.00	119.01
J-7	N/A	1,195.11	57.99	0.00	134.11
J-8	N/A	1,193.92	60.08	0.00	138.92
J-9	N/A	1,191.35	81.88	0.00	189.35
J-10	N/A	1,190.47	90.15	0.00	208.47
J-11	N/A	1,189.69	96.73	0.00	223.69
J-12	N/A	1,189.48	94.04	0.00	217.48
J-13	N/A	1,188.94	96.41	0.00	222.94
J-14	N/A	1,188.75	98.92	0.00	228.75
J-15	N/A	1,188.75	98.92	0.00	228.75
Lower Buckeye Rd	N/A	1,139.53	110.50	4.77	255.53
Lower Buckeye Rd Tai	N/A	1,187.93	112.84	12.02	260.93
Sarival Road	N/A	1,188.75	96.32	0.00	222.75

Reservoirs @ 0.00 hr

Label	Constituent (mg/l)	Calculated Hydraulic Grade (ft)	Reservoir Inflow (cfs)	Reservoir Outflow (cfs)
Recovery Storage	N/A	1,110.00	N/A	51.80

Pipes @ 0.00 hr

Label	Status	Constituent (mg/l)	Flow (cfs)	Velocity (ft/s)	From Grade (ft)	To Grade (ft)	Friction Loss (ft)	Minor Loss (ft)	Total Headloss (ft)	Headloss Gradient (ft/1000ft)
Cotton Lane Lateral	Open	N/A	12.02	1.25	1,188.75	1,187.93	0.80	0.02	0.81	0.12
Miller Rd Lateral (1)	Open	N/A	35.01	4.95	1,197.99	1,195.85	1.84	0.30	2.14	2.14
Miller Rd Lateral (2)	Open	N/A	35.01	4.95	1,191.62	1,155.96	35.37	0.30	35.67	1.86
P-0	Open	N/A	51.80	5.38	1,110.00	1,108.94	0.04	1.03	1.06	53.11
P-1	Open	N/A	51.80	5.38	1,255.27	1,248.47	6.45	0.35	6.80	1.90
P-2	Open	N/A	51.80	5.38	1,248.47	1,226.57	21.55	0.35	21.90	1.83
P-3	Open	N/A	51.80	5.38	1,226.57	1,206.00	20.22	0.35	20.57	1.83
P-4	Open	N/A	51.80	5.38	1,206.00	1,203.09	2.56	0.35	2.91	2.04
P-5	Open	N/A	51.80	5.38	1,203.09	1,197.99	4.75	0.35	5.10	1.93
P-6	Open	N/A	16.79	1.75	1,197.99	1,197.01	0.94	0.04	0.98	0.23
P-7	Open	N/A	16.79	1.75	1,197.01	1,195.11	1.87	0.04	1.90	0.23
P-8	Open	N/A	16.79	1.75	1,195.11	1,193.92	1.15	0.04	1.18	0.23
P-9	Open	N/A	16.79	1.75	1,193.92	1,191.35	2.54	0.04	2.58	0.23
P-10	Open	N/A	12.02	1.25	1,191.35	1,190.47	0.86	0.02	0.88	0.12
P-11	Open	N/A	12.02	1.25	1,190.47	1,189.69	0.78	0.00	0.78	0.12
P-12	Open	N/A	12.02	1.25	1,189.69	1,189.48	0.19	0.02	0.21	0.13

Analysis Results
Scenario: Year 2025 Peak Demand
Steady State Analysis

Pipes @ 0.00 hr

Label	Status	Constituent (mg/l)	Flow (cfs)	Velocity (ft/s)	From Grade (ft)	To Grade (ft)	Friction Loss (ft)	Minor Loss (ft)	Total Headloss (ft)	Headloss Gradient (ft/1000ft)
P-13	Open	N/A	12.02	1.25	1,189.48	1,188.94	0.54	0.00	0.54	0.12
P-14	Open	N/A	12.02	1.25	1,188.94	1,188.75	0.17	0.02	0.19	0.13
P-15	Open	N/A	0.00	0.00	1,188.75	1,188.75	0.00	0.00	0.00	0.00
P-16	Open	N/A	0.00	0.00	1,188.75	1,188.75	0.00	0.00	0.00	0.00
Tuthill Rd Lateral	Open	N/A	4.77	6.07	1,191.35	1,139.53	51.37	0.45	51.82	9.81

Pumps @ 0.00 hr

Label	Status	Constituent (mg/l)	From Grade (ft)	To Grade (ft)	Flow (cfs)	Head (ft)	Relative Speed	Useful Power (Hp)
PMP-1	On	N/A	1,108.94	1,255.27	51.80	146.34	1.00	858.96

PRVs @ 0.00 hr

Label	Status	Constituent (mg/l)	From Grade (ft)	To Grade (ft)	Flow (cfs)	Headloss (ft)	Setting (psi)
PRV-1	Throttling	N/A	1,195.85	1,191.62	35.01	4.22	50.00

Table AP A-3

West Maricopa Combine, WESTCAPS
Potential Pipeline to The Future (PTTF), Alignment 3

A **Alignment 3: From the Recovery Storage Site along Dike and Yuma Road to Sarival Road**

Profile Point	Comment	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Recovery Site Storage	0	0	0	1,099	0	42	51.80	37,500	7	1,109
P	Pump Station & Air Chamber	0.0038	20	20	1,099	0	42	51.80	37,500	70	1,255
1	Blow-off Valve	0.68	3,590	3,610	1,066	-33	42	51.80	37,500	81	1,248
2	Air & Vacuum Valve	2.27	11,986	15,596	1,089	23	42	51.80	37,500	62	1,226
3		2.13	11,246	26,842	1,081	-8	42	51.80	37,500	56	1,206
4		0.27	1,426	28,268	1,089	8	42	51.80	37,500	52	1,203
5	Tie to Miller Road Lateral & Air & Vacuum Valve	0.5	2,640	30,908	1,090	1	42	51.80	37,500	49	1,197
6		0.8	4,224	35,132	1,083	-7	42	16.79	12,157	51	1,196
7		1.58	8,342	43,474	1,066	-17	42	16.79	12,157	58	1,195
8		0.97	5,122	48,596	1,060	-6	42	16.79	12,157	60	1,193
9	Tie to Tuthill Road Lateral	2.15	11,352	59,948	1,007	-53	42	16.79	12,157	82	1,191
10		1.35	7,128	67,076	987	-20	42	12.02	8,702	90	1,190
11		1.23	6,494	73,570	971	-16	42	12.02	8,702	97	1,189
12		0.3	1,584	75,154	977	6	42	12.02	8,702	94	1,189
13		0.85	4,488	79,642	971	-6	42	12.02	8,702	96	1,188
14	Tie to Cotton Lane Lateral	0.27	1,426	81,068	965	-6	42	12.02	8,702	99	1,188
15		0.55	2,904	83,972	965	0	42	0.00	0	99	1,188
16	Sarival Road	0.43	2,270	86,242	971	6	42	0.00	0	96	1,188
Total		16.3338	86,242			-128					

Table AP A-3

West Maricopa Combine, WESTCAPS
Potential Pipeline to The Future (PTTF), Alignment 3

B — **Miller Road Lateral: From Trunk Alignment 3 to Baseline Road**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Yuma Road	0	0	0	1,091	0	36	35.01	25,344	48	1,197
PRV(U)	PRV Upstream Side	0.1894	1,000	1,000	1,081	-10	36	35.01	25,344	52	1,195
PRV(D)	PRV Downstream Side	0.0009	5	1,005	1,081	0	36	35.01	25,344	50	1,191
1	Baseline Road	3.79	20,011	21,016	889	-192	36	35.01	25,344	118	1,156
Total		3.9803	21,016			-202					

C — **Tuthill Road Lateral: From Trunk Alignment 3 to Lower Buckeye Road**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Yuma Road	0	0	0	1,007	0	12	4.77	3,453	79	1,184
1	Lower Buckeye Rd	1	5,280	5,280	889	-118	12	4.77	3,453	107	1,132
Total		1	5,280			-118					

D — **Cotton Lane Lateral: From Trunk Alignment 3 to Lower Buckeye Road Storage Tank**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Yuma Road	0	0	0	965	0	42	12.02	8,702	99	1,188
1	Lower Buckeye Rd Storage Tanks	1.25	6,600	6,600	932	-33	42	12.02	8,702	113	1,187
Total		1.25	6,600			-33					

Figure AP A-3A

Alignment 3
From Recovery Site along Dike and Yuma Road to Sarival Road
West Maricopa Combine, WESTCAPS

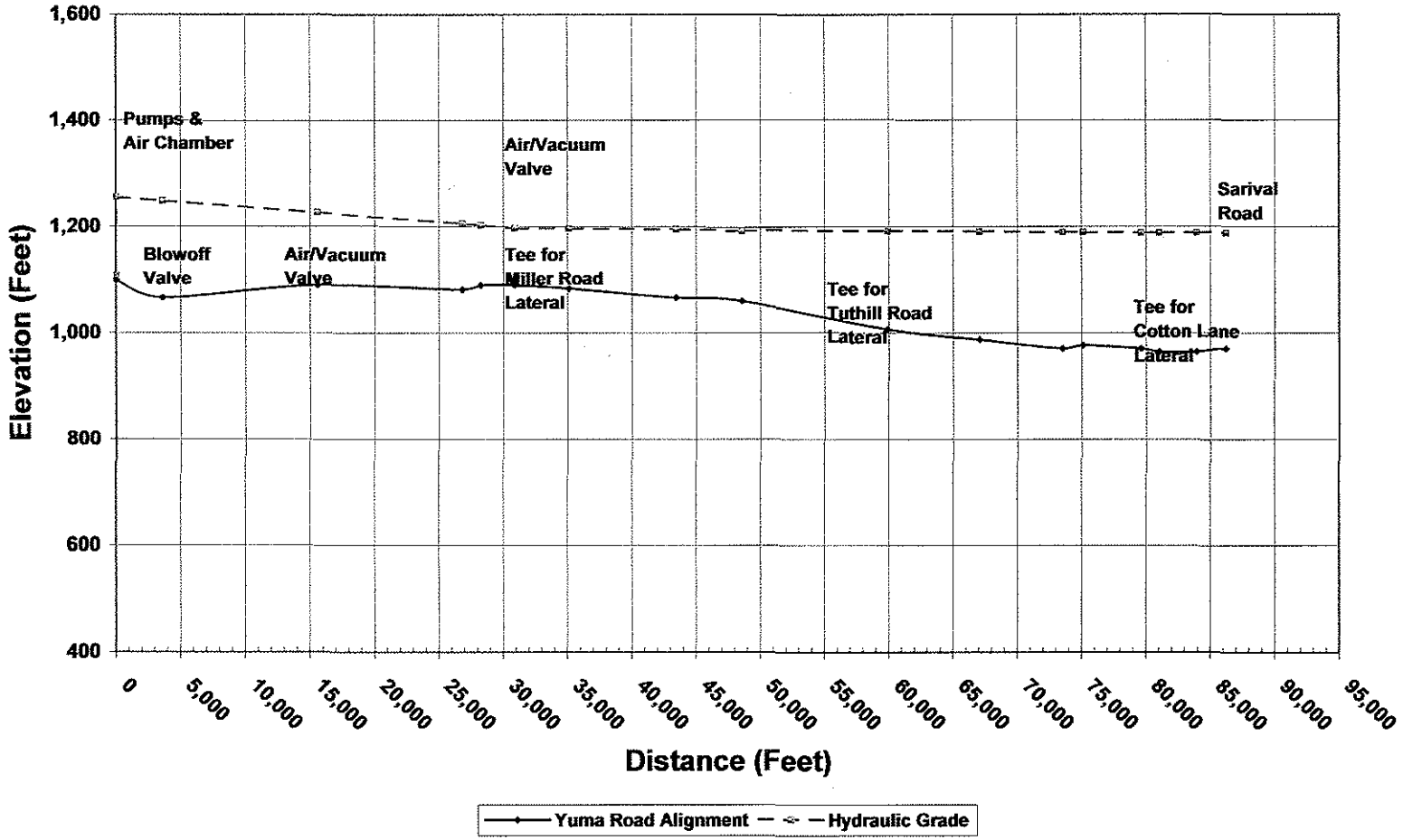


Figure AP A-3B

Miller Road Lateral
From Alignment 3 along Miller Road to Baseline Road
West Maricopa Combine, WESTCAPS

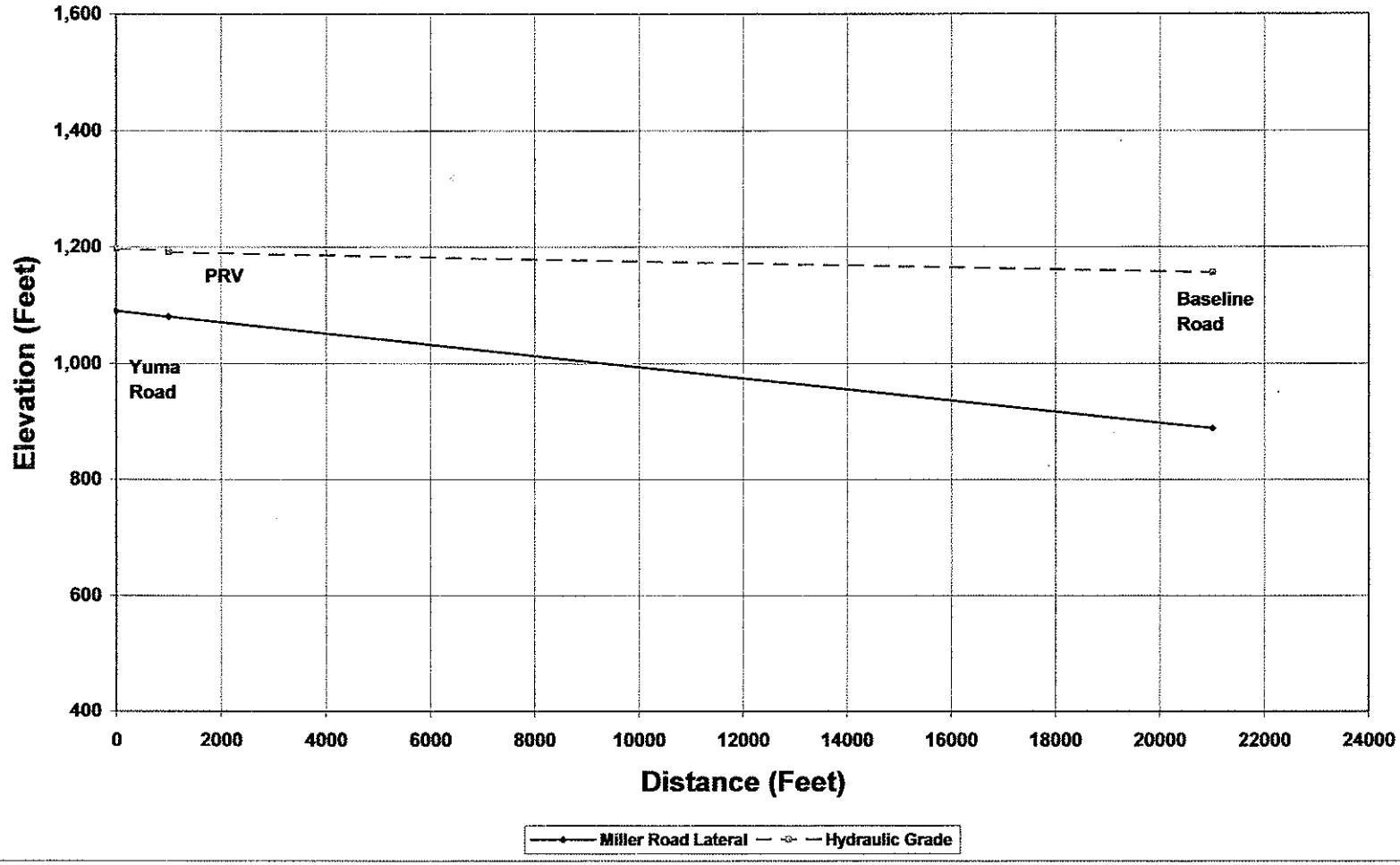


Figure AP A-3C

Tuthill Road Lateral
From Alignment 3 along Tuthill Road to Lower Buckeye Road
West Maricopa Combine, WESTCAPS

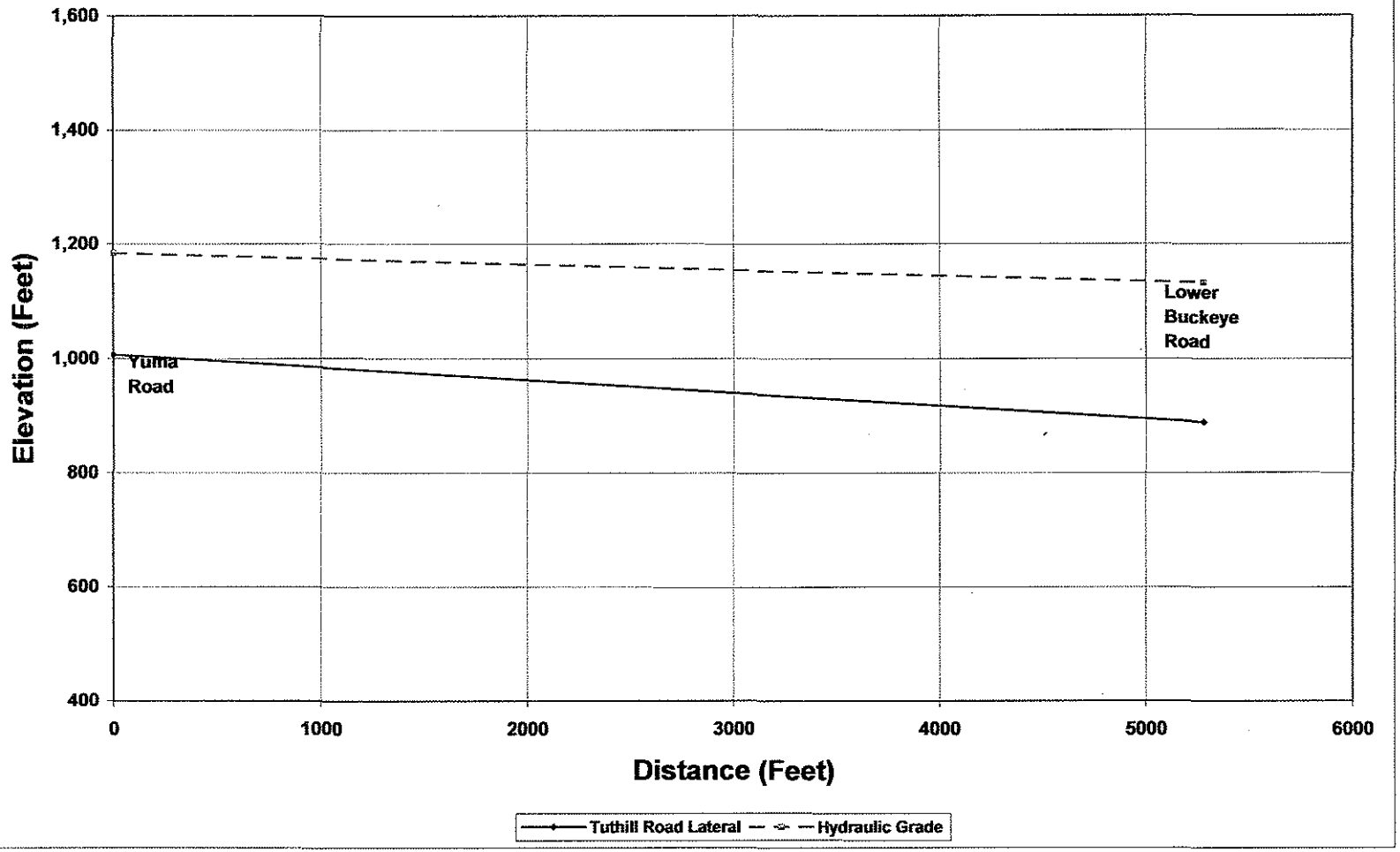
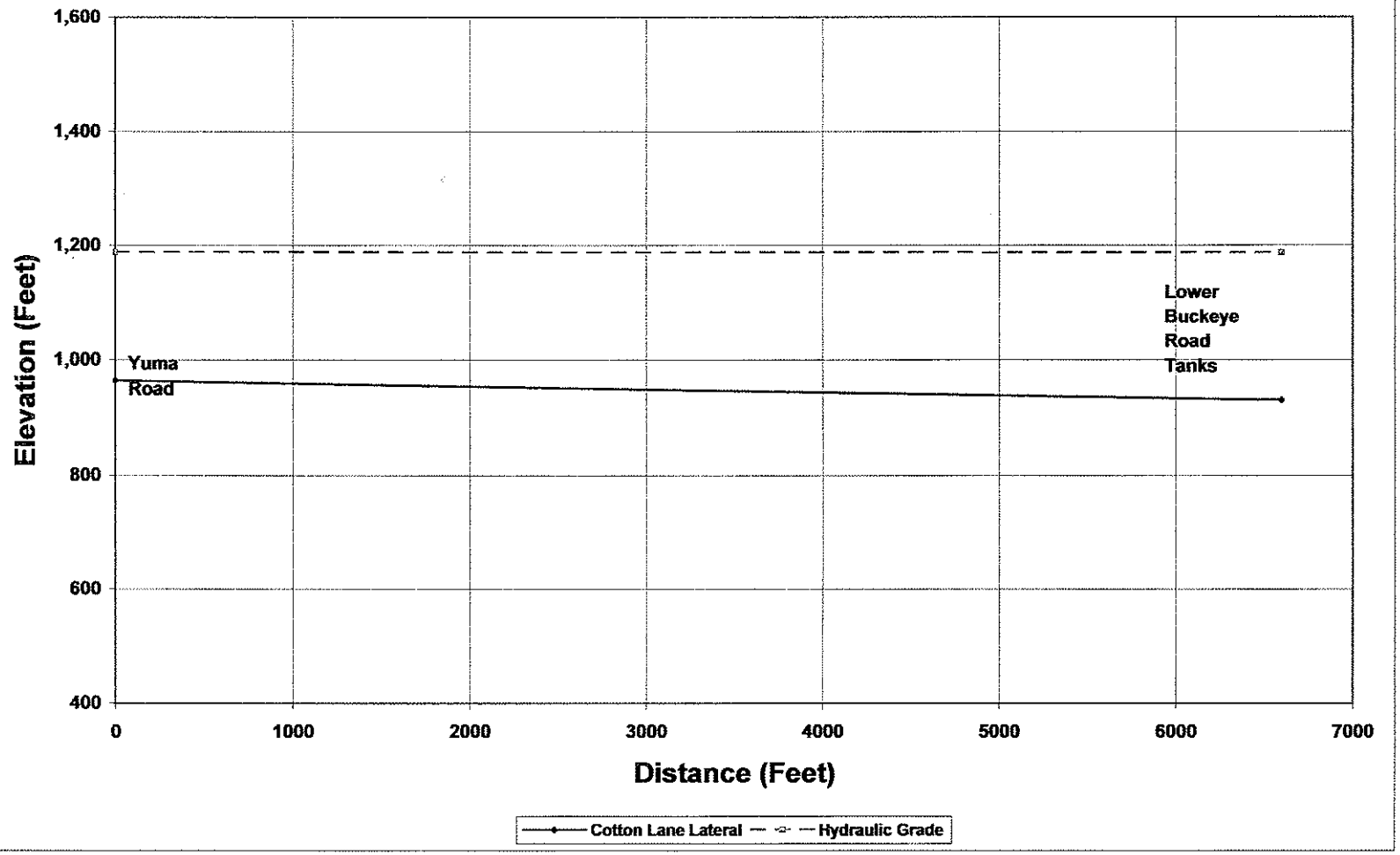


Figure AP A-3D

Cotton Lane Lateral
From Alignment 3 along Cotton Lane to Lower Buckeye Road Tanks
West Maricopa Combine, WESTCAPS



Appendix A-4

Alignment 4 with 3 Laterals (Forward Flow)

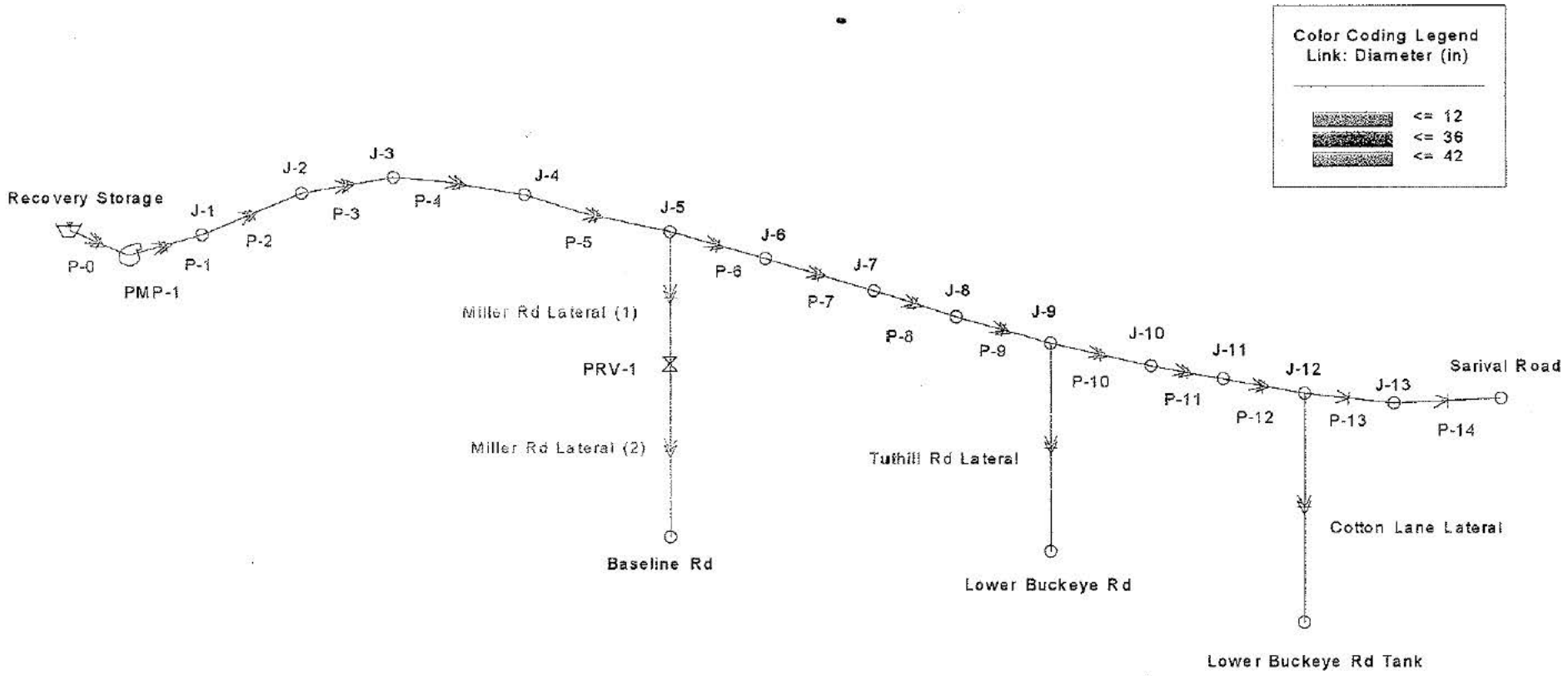
1. **Schematic Model Layout and Hydraulic Results**

2. **Tables**
   Ground Profiles, Pipe Sizes, and Pressure Distributions

3. **Figure**
   Ground Profiles, Hydraulic Features, and Hydraulic Grade Lines

Scenario:Year 2025 Peak Demand

Alignment 4
Recovery Storage to Sarival Road along T/S HWY and Yuma Road
West Maricopa Comibine Pipeline to The Future (PTTF)
(Forward Flow)



Analysis Results
Scenario

Title: WMC T-S HWY Yuma Alignment, Alternative 4
Project Engineer: Michael Lee
Project Date: 11/29/01
Comments:

Scenario Summary	
Label	Year 2025 Peak Demand
Demand Alternative	Year 2025 Peak Demand
Physical Alternative	Year 2025 Peak Demand
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow

Liquid Characteristics			
Liquid	Water at 20C(68F)	Specific Gravity	1.00
Kinematic Viscosity	0.108e-4 ft²/s		

Network Inventory			
Number of Pipes	19	Number of Tanks	0
Number of Reservoirs	1	- Constant Area:	0
Number of Junctions	17	- Variable Area:	0
Number of Pumps	1	Number of Valves	1
- Constant Power:	0	- FCV's:	0
- One Point (Design Point):	1	- PBV's:	0
- Standard (3 Point):	0	- PRV's:	1
- Standard Extended:	0	- PSV's:	0
- Custom Extended:	0	- TCV's:	0
- Multiple Point:	0	Number of Spot Elevations	0

Pipe Inventory			
Total Length	122,250.00 ft		
12 in	5,280.00 ft	42 in	95,956.00 ft
36 in	21,014.00 ft		

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Analysis Results
Scenario: Year 2025 Peak Demand
Steady State Analysis

Junctions @ 0.00 hr

Label	Constituent (mg/l)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Demand (Calculated) (cfs)	Pressure Head (ft)
Baseline Rd	N/A	1,131.3	106.93	35.01	247.3
J-1	N/A	1,296.3	69.32	0.00	160.3
J-2	N/A	1,271.3	54.17	0.00	125.3
J-3	N/A	1,263.8	47.91	0.00	110.8
J-4	N/A	1,250.4	70.25	0.00	162.4
J-5	N/A	1,241.3	67.14	0.00	155.3
J-6	N/A	1,241.0	67.01	0.00	155.0
J-7	N/A	1,239.4	75.85	0.00	175.4
J-8	N/A	1,237.3	78.41	0.00	181.3
J-9	N/A	1,234.6	101.03	0.00	233.6
J-10	N/A	1,233.0	115.47	0.00	267.0
J-11	N/A	1,232.6	113.55	0.00	262.6
J-12	N/A	1,232.1	117.66	0.00	272.1
J-13	N/A	1,232.1	117.66	0.00	272.1
Lower Buckeye Rd	N/A	1,182.8	129.22	4.77	298.8
Lower Buckeye Rd Tai	N/A	1,231.3	131.58	12.02	304.3
Sarival Road	N/A	1,232.1	115.06	0.00	266.1

Reservoirs @ 0.00 hr

Label	Constituent (mg/l)	Calculated Hydraulic Grade (ft)	Reservoir Inflow (cfs)	Reservoir Outflow (cfs)
Recovery Site	N/A	1,110.0	N/A	51.80

Pipes @ 0.00 hr

Label	Status	Constituent (mg/l)	Flow (cfs)	Velocity (ft/s)	From Grade (ft)	To Grade (ft)	Friction Loss (ft)	Minor Loss (ft)	Total Headloss (ft)	Headloss Gradient (ft/1000ft)
Cotton Lane Lateral	Open	N/A	12.02	1.25	1,232.1	1,231.3	0.8	0.2e-1	0.8	0.12
Miller Rd Lateral (1)	Open	N/A	35.01	4.95	1,241.3	1,239.1	1.8	0.3	2.1	2.14
Miller Rd Lateral (2)	Open	N/A	35.01	4.95	1,168.5	1,131.3	36.9	0.3	37.2	1.86
P-0	Open	N/A	51.80	5.38	1,110.0	1,108.9	0.4e-1	1.0	1.1	53.11
P-1	Open	N/A	51.80	5.38	1,304.1	1,296.3	7.4	0.4	7.8	1.88
P-2	Open	N/A	51.80	5.38	1,296.3	1,271.3	24.7	0.4	25.0	1.82
P-3	Open	N/A	51.80	5.38	1,271.3	1,263.8	7.1	0.4	7.5	1.89
P-4	Open	N/A	51.80	5.38	1,263.8	1,250.4	13.0	0.4	13.4	1.85
P-5	Open	N/A	51.80	5.38	1,250.4	1,241.3	8.8	0.4	9.2	1.87
P-6	Open	N/A	16.79	1.75	1,241.3	1,241.0	0.3	0.4e-1	0.3	0.26
P-7	Open	N/A	16.79	1.75	1,241.0	1,239.4	1.5	0.4e-1	1.6	0.23
P-8	Open	N/A	16.79	1.75	1,239.4	1,237.3	2.0	0.4e-1	2.1	0.23
P-9	Open	N/A	16.79	1.75	1,237.3	1,234.6	2.6	0.4e-1	2.7	0.23
P-10	Open	N/A	12.02	1.25	1,234.6	1,233.0	1.6	0.0	1.6	0.12
P-11	Open	N/A	12.02	1.25	1,233.0	1,232.6	0.4	0.0	0.4	0.12
P-12	Open	N/A	12.02	1.25	1,232.6	1,232.1	0.5	0.2e-1	0.5	0.13
P-13	Open	N/A	0.00	0.00	1,232.1	1,232.1	0.0	0.0	0.0	0.00
P-14	Open	N/A	0.00	0.00	1,232.1	1,232.1	0.0	0.0	0.0	0.00

Analysis Results
Scenario: Year 2025 Peak Demand
Steady State Analysis

Pipes @ 0.00 hr

Label	Status	Constituent (mg/l)	Flow (cfs)	Velocity (ft/s)	From Grade (ft)	To Grade (ft)	Friction Loss (ft)	Minor Loss (ft)	Total Headloss (ft)	Headloss Gradient (ft/1000ft)
Tuthill Rd Lateral	Open	N/A	4.77	6.07	1,234.6	1,182.8	51.4	0.4	51.8	9.81

Pumps @ 0.00 hr

Label	Status	Constituent (mg/l)	From Grade (ft)	To Grade (ft)	Flow (cfs)	Head (ft)	Relative Speed	Useful Power (Hp)
PMP-1	On	N/A	1,108.9	1,304.1	51.80	195.1	1.00	1,145.28

PRVs @ 0.00 hr

Label	Status	Constituent (mg/l)	From Grade (ft)	To Grade (ft)	Flow (cfs)	Headloss (ft)	Setting (psi)
PRV-1	Throttling	N/A	1,239.1	1,168.5	35.01	70.6	40.00

Table AP A-4

West Maricopa Combine, WESTCAPS
Potential Pipeline to The Future (PTTF), Alignment 4

A	Alignment 4: From the Recovery Storage Site along Tonopah-Salome HWY and Yuma Road to Sarival Road											
		Distance			Elevation		Pipe	Year 2025		Anticipated	
Profile		Between		Cumulative	Spot	Between	Diameter	Design Peak Flow		Pressure	Hyd.Grade
Point	Description	(Mile)	(Feet)	(Feet)	(Feet)	(Feet)	(Inches)	(cfs)	(AF/Yr)	(psi)	(Feet)
0	Recovery Site Storage	0	0	0	1,099	0	42	51.80	37,500	7	1,109
P	Pump Station & Air Chamber	0.0038	20	20	1,099	0	42	51.80	37,500	91	1,304
1		0.78	4,118	4,138	1,141	42	42	51.80	37,500	69	1,296
2		2.6	13,728	17,866	1,151	10	42	51.80	37,500	54	1,271
3	Air & Vacuum Valve	0.75	3,960	21,826	1,158	7	42	51.80	37,500	48	1,263
4		1.37	7,234	29,060	1,093	-65	42	51.80	37,500	70	1,250
5	Tie to Miller Road Lateral	0.93	4,910	33,970	1,091	-2	42	51.80	37,500	67	1,241
6		0.22	1,162	35,132	1,091	0	42	16.79	12,157	67	1,241
7		1.3	6,864	41,996	1,069	-22	42	16.79	12,157	76	1,239
8		1.73	9,134	51,130	1,061	-8	42	16.79	12,157	78	1,237
9	Tie to Tuthill Road Lateral	2.24	11,827	62,958	1,006	-55	42	16.79	12,157	101	1,234
10		2.53	13,358	76,316	971	-35	42	12.02	8,702	115	1,232
11		0.7	3,696	80,012	975	4	42	12.02	8,702	114	1,232
12	Tie to Cotton Lane Lateral	0.75	3,960	83,972	965	-10	42	12.02	8,702	117	1,231
13		0.18	950	84,922	965	0	42	0.00	0	117	1,231
14	Sarival Road	0.84	4,435	89,358	971	6	42	0.00	0	115	1,231
Total		16.9238	89,358			-128					

Table AP A-4

West Maricopa Combine, WESTCAPS
Potential Pipeline to The Future (PTTF), Alignment 4

B — **Miller Road Lateral: From Trunk Alignment 4 to Baseline Road**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Yuma Road	0	0	0	1,091	0	36	35.01	25,344	67	1,241
PRV(U)	PRV Upstream Side	0.1894	1,000	1,000	1,081	-10	36	35.01	25,344	71	1,239
PRV(D)	PRV Downstream Side	0.0009	5	1,005	1,081	0	36	35.01	25,344	40	1,168
1	Baseline Road	3.79	20,011	21,016	889	-192	36	35.01	25,344	107	1,131
Total		3.98	21,016			-202					

C — **Tuthill Road Lateral: From Trunk Alignment 4 to Lower Buckeye Road**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Yuma Road	0	0	0	1,007	0	12	4.77	3,453	101	1,234
1	Lower Buckeye Rd	1	5,280	5,280	889	-118	12	4.77	3,453	129	1,182
Total		1	5,280			-118					

D — **Cotton Lane Lateral: From Trunk Alignment 4 to Lower Buckeye Road Storage Tank**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Yuma Road	0	0	0	965	0	42	12.02	8,702	117	1,231
1	Lower Buckeye Rd Storage Tanks	1.25	6,600	6,600	932	-33	42	12.02	8,702	132	1,231
Total		1.25	6,600			-33					

Figure AP A-4A

Alignment 4
From Recovery Storage Site along Tonopah-Salome HWY and Yuma Road to Sarival Road
West Maricopa Combine, WESTCAPS

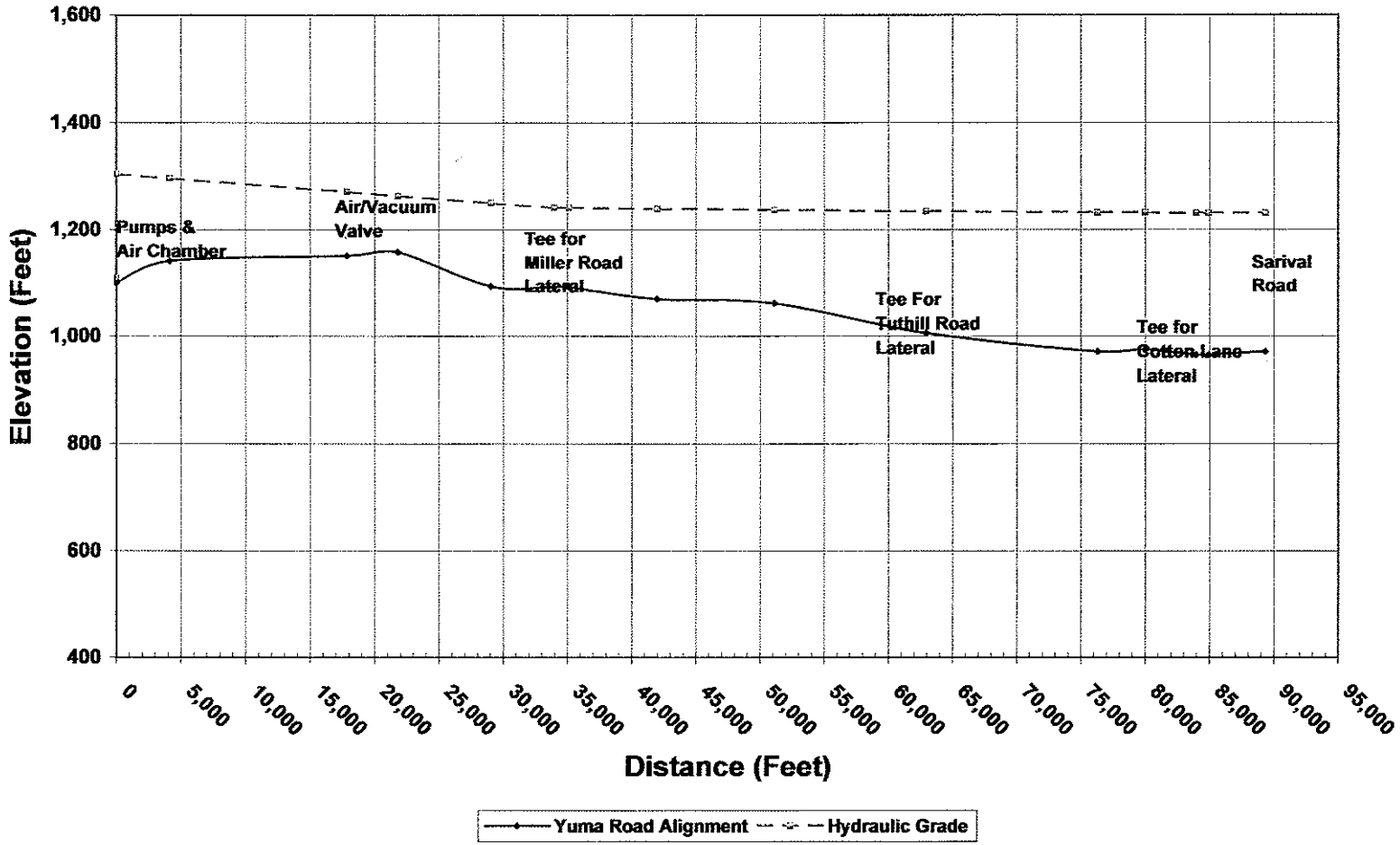


Figure AP A-4B

Miller Road Lateral
From Alignment 4 along Miller Road to Baseline Road
West Maricopa Combine, WESTCAPS

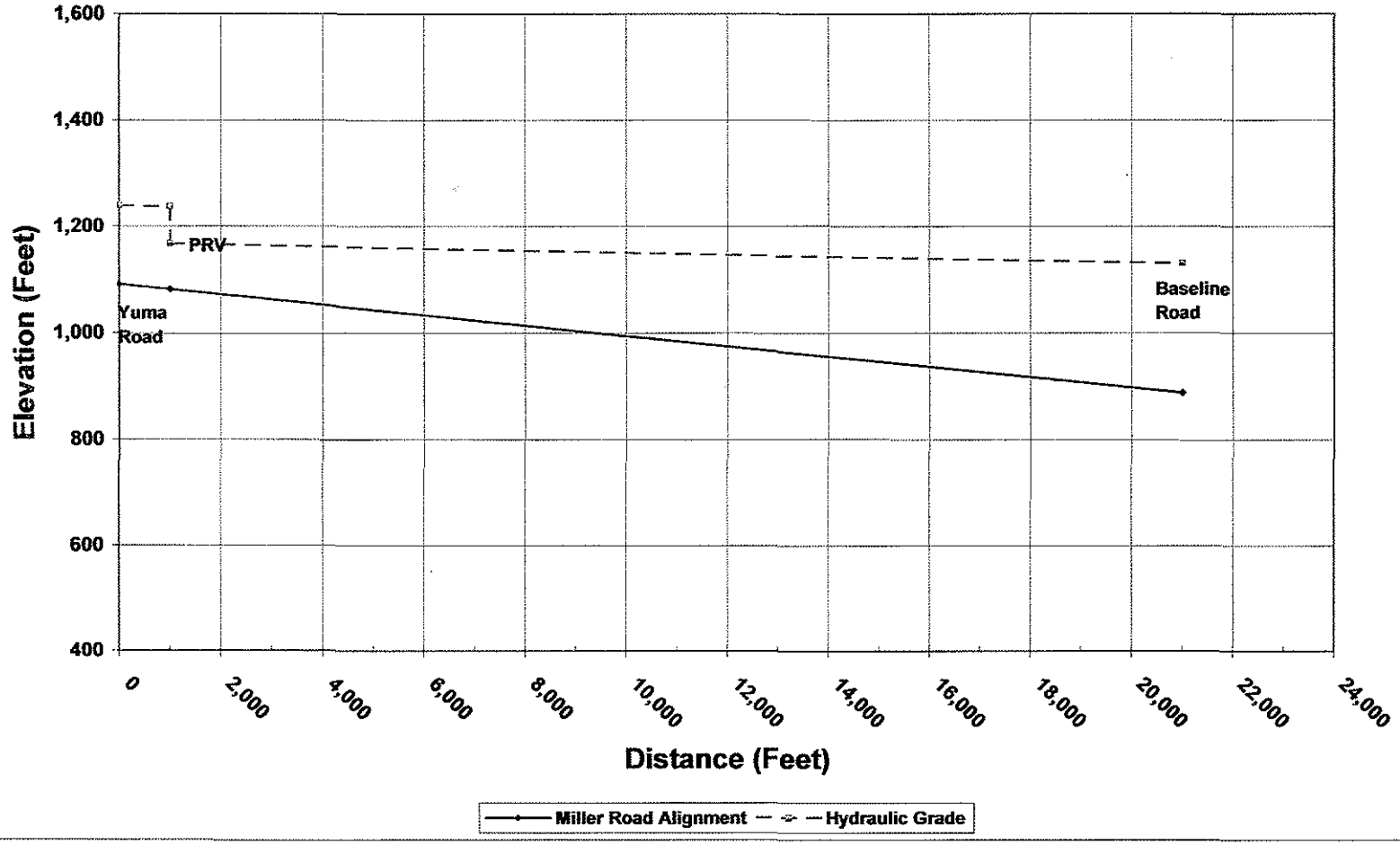


Figure AP A-4C

Tuthill Road Lateral
From Alignment 4 along Tuthill Road to Lower Buckeye Road
West Maricopa Combine, WESTCAPS

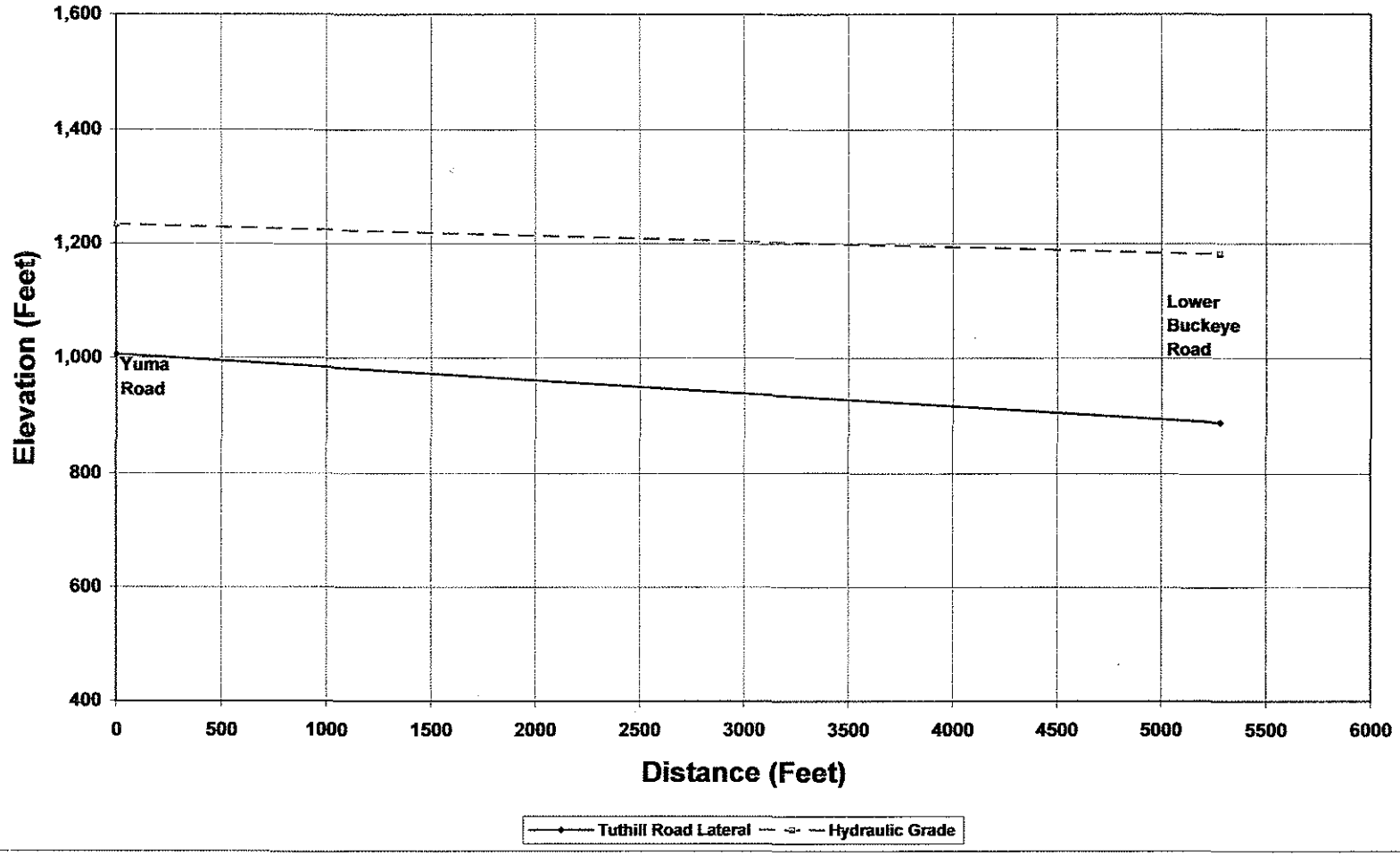
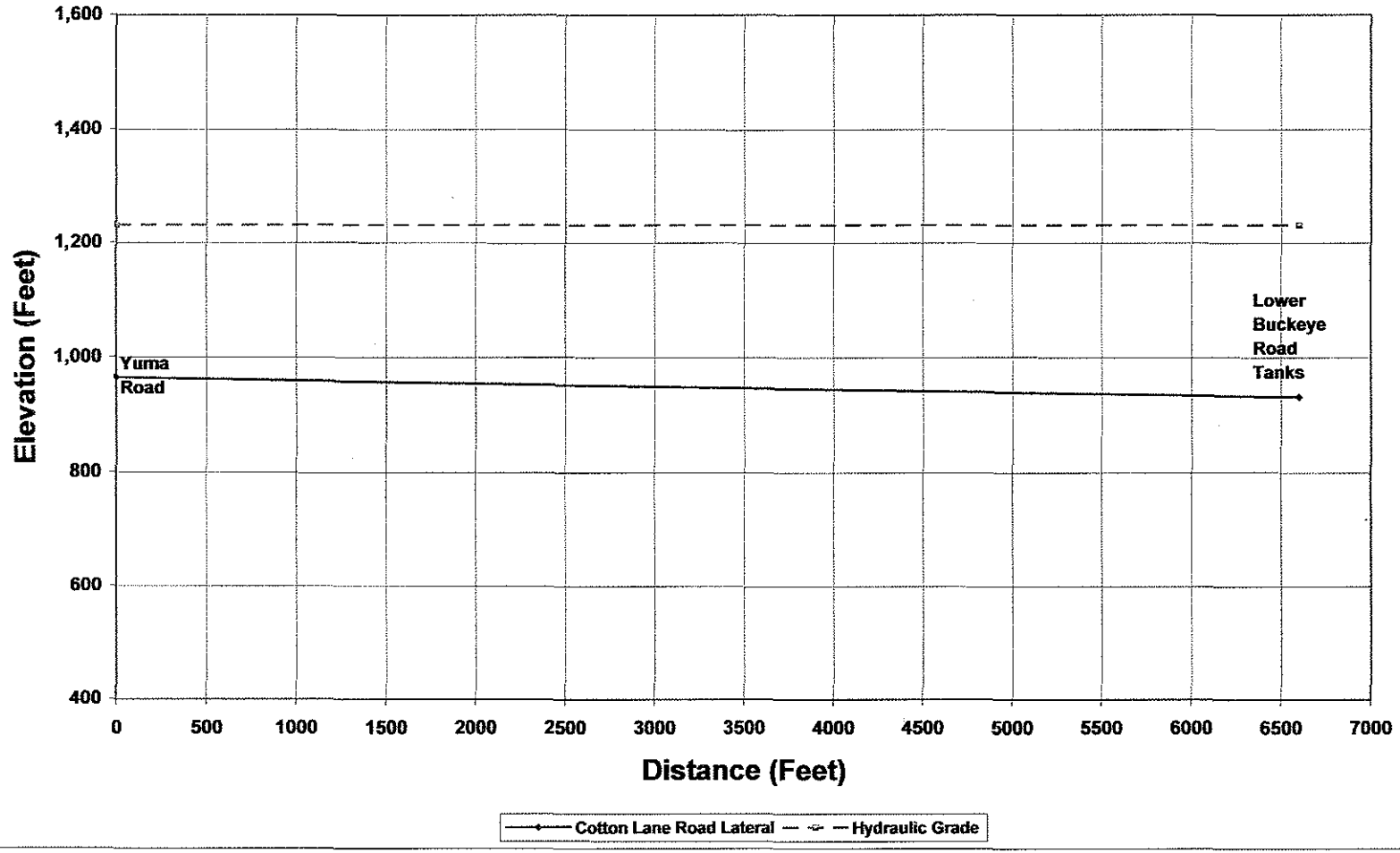


Figure AP A-4D

Cotton Lane Lateral
From Alignment 4 along Cotton Lane to Lower Buckeye Road Tanks
West Maricopa Combine, WESTCAPS



Appendix A-5

Alignment 5 with 3 Laterals (Forward Flow)

1. **Schematic Model Layout and Hydraulic Results**

2. **Tables**
   Ground Profiles, Pipe Sizes, and Pressure Distributions

3. **Figures**
   Ground Profiles, Hydraulic Features, and Hydraulic Grade Lines

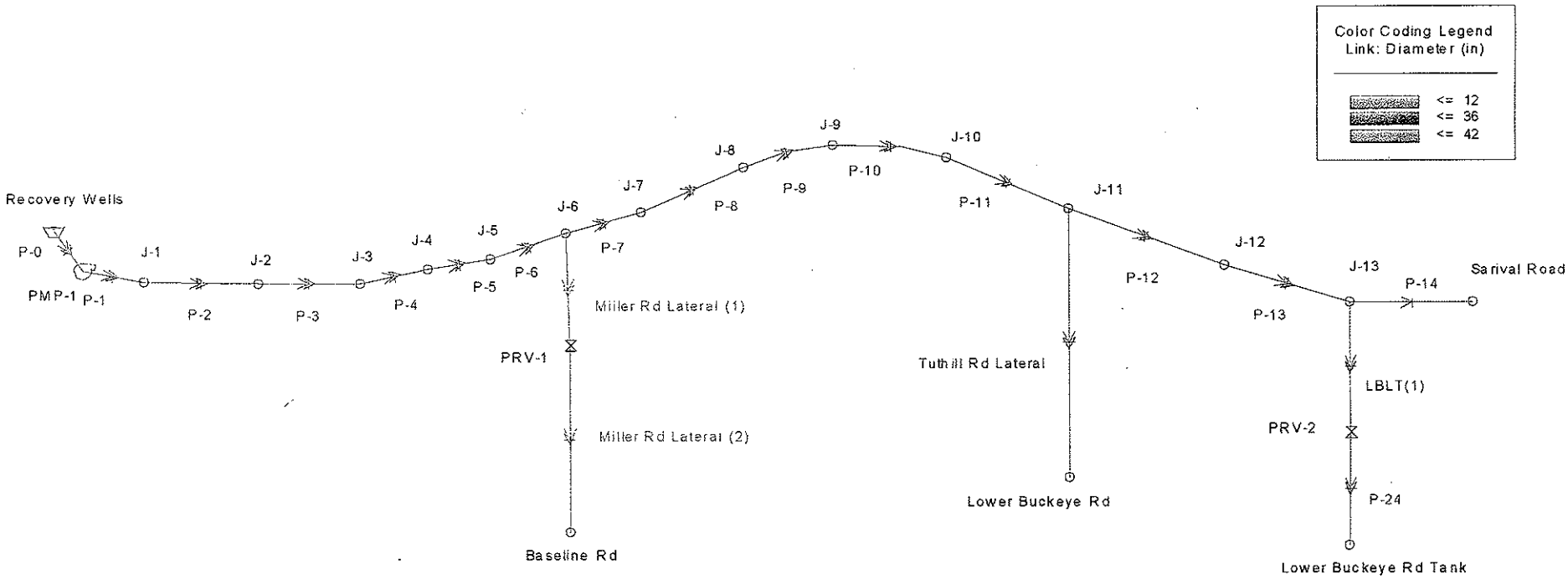
Scenario: Year 2025 Peak Demand

Alignment 5

Recovery Storage to Sarival Road along Dike and McDowell Road

West Maricopa Combine Pipeline to The Future (PTTF)

(Forward Flow)



Title: WMC Dike-McDowell Alignment 5 (Forward Flow)
f:\mlee\westcaps\wmc dike-mcdowell pipe, alt 5.wcd
02/19/02 09:45:46 AM

Bureau of Reclamation

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Project Engineer: Michael Lee
Cybernet v3.1 [071]

Analysis Results
Scenario

Title: WMC Dike-McDowell Alignment, Alternative 5
Project Engineer: Michael Lee
Project Date: 11/21/01
Comments:

Scenario Summary	
Label	Year 2025 Peak Demand
Demand Alternative	Year 2025 Peak Demand
Physical Alternative	Year 2025 Peak Demand
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow

Liquid Characteristics			
Liquid	Water at 20C(68F)	Specific Gravity	1.00
Kinematic Viscosity	0.108e-4 ft²/s		

Network Inventory			
Number of Pipes	20	Number of Tanks	0
Number of Reservoirs	1	- Constant Area:	0
Number of Junctions	17	- Variable Area:	0
Number of Pumps	1	Number of Valves	2
- Constant Power:	0	- FCV's:	0
- One Point (Design Point):	1	- PBV's:	0
- Standard (3 Point):	0	- PRV's:	2
- Standard Extended:	0	- PSV's:	0
- Custom Extended:	0	- TCV's:	0
- Multiple Point:	0	Number of Spot Elevations	0

Pipe Inventory			
Total Length	144,744.00 ft		
12 in	15,787.00 ft	42 in	107,151.00 ft
36 in	21,806.00 ft		

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Analysis Results
Scenario: Year 2025 Peak Demand
Steady State Analysis

Junctions @ 0.00 hr

Label	Constituent (mg/l)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Demand (Calculated) (cfs)	Pressure Head (ft)
Baseline Rd	N/A	1,117.69	101.06	35.01	233.69
J-1	N/A	1,316.76	110.60	0.00	255.76
J-2	N/A	1,294.86	91.18	0.00	210.86
J-3	N/A	1,274.29	85.75	0.00	198.29
J-4	N/A	1,271.38	81.03	0.00	187.38
J-5	N/A	1,266.28	73.20	0.00	169.28
J-6	N/A	1,265.45	72.85	0.00	168.45
J-7	N/A	1,263.65	71.63	0.00	165.65
J-8	N/A	1,262.72	54.37	0.00	125.72
J-9	N/A	1,260.11	46.32	0.00	107.11
J-10	N/A	1,259.28	62.83	0.00	145.28
J-11	N/A	1,258.07	72.25	0.00	167.07
J-12	N/A	1,256.10	99.93	0.00	231.10
J-13	N/A	1,255.48	105.29	0.00	243.48
Lower Buckeye Rd	N/A	1,104.02	95.15	4.77	220.02
Lower Buckeye Rd Tai	N/A	1,120.66	83.75	12.02	193.66
Sarival Road	N/A	1,255.48	108.32	0.00	250.48

Reservoirs @ 0.00 hr

Label	Constituent (mg/l)	Calculated Hydraulic Grade (ft)	Reservoir Inflow (cfs)	Reservoir Outflow (cfs)
Recovery Wells	N/A	1,110.00	N/A	51.80

Pipes @ 0.00 hr

Label	Status	Constituent (mg/l)	Flow (cfs)	Velocity (ft/s)	From Grade (ft)	To Grade (ft)	Friction Loss (ft)	Minor Loss (ft)	Total Headloss (ft)	Headloss Gradient (ft/1000ft)
LBLT(1)	Open	N/A	12.02	1.25	1,255.48	1,255.35	0.12	0.02	0.14	0.14
Miller Rd Lateral (1)	Open	N/A	35.01	4.95	1,265.45	1,263.31	1.84	0.30	2.14	2.14
Miller Rd Lateral (2)	Open	N/A	35.01	4.95	1,156.37	1,117.69	38.39	0.30	38.68	1.86
P-0	Open	N/A	51.80	5.38	1,110.00	1,108.94	0.04	1.03	1.06	53.11
P-1	Open	N/A	51.80	5.38	1,323.56	1,316.76	6.45	0.35	6.80	1.90
P-2	Open	N/A	51.80	5.38	1,316.76	1,294.86	21.55	0.35	21.90	1.83
P-3	Open	N/A	51.80	5.38	1,294.86	1,274.29	20.22	0.35	20.57	1.83
P-4	Open	N/A	51.80	5.38	1,274.29	1,271.38	2.56	0.35	2.91	2.04
P-5	Open	N/A	51.80	5.38	1,271.38	1,266.28	4.75	0.35	5.10	1.93
P-6	Open	N/A	51.80	5.38	1,266.28	1,265.45	0.47	0.35	0.83	3.13
P-7	Open	N/A	16.79	1.75	1,265.45	1,263.65	1.77	0.04	1.81	0.23
P-8	Open	N/A	16.79	1.75	1,263.65	1,262.72	0.89	0.04	0.92	0.23
P-9	Open	N/A	16.79	1.75	1,262.72	1,260.11	2.57	0.04	2.61	0.23
P-10	Open	N/A	16.79	1.75	1,260.11	1,259.28	0.79	0.04	0.83	0.23
P-11	Open	N/A	16.79	1.75	1,259.28	1,258.07	1.22	0.00	1.22	0.22
P-12	Open	N/A	12.02	1.25	1,258.07	1,256.10	1.95	0.02	1.97	0.12
P-13	Open	N/A	12.02	1.25	1,256.10	1,255.48	0.59	0.02	0.61	0.12
P-14	Open	N/A	0.00	0.00	1,255.48	1,255.48	0.00	0.00	0.00	0.00

Analysis Results
Scenario: Year 2025 Peak Demand
Steady State Analysis

Pipes @ 0.00 hr

Label	Status	Constituent (mg/l)	Flow (cfs)	Velocity (ft/s)	From Grade (ft)	To Grade (ft)	Friction Loss (ft)	Minor Loss (ft)	Total Headloss (ft)	Headloss Gradient (ft/1000ft)
P-24	Open	N/A	12.02	1.25	1,122.62	1,120.66	1.94	0.02	1.96	0.12
Tuthill Rd Lateral	Open	N/A	4.77	6.07	1,258.07	1,104.02	153.60	0.45	154.04	9.76

Pumps @ 0.00 hr

Label	Status	Constituent (mg/l)	From Grade (ft)	To Grade (ft)	Flow (cfs)	Head (ft)	Relative Speed	Useful Power (Hp)
PMP-1	On	N/A	1,108.94	1,323.56	51.80	214.63	1.00	1,259.81

PRVs @ 0.00 hr

Label	Status	Constituent (mg/l)	From Grade (ft)	To Grade (ft)	Flow (cfs)	Headloss (ft)	Setting (psi)
PRV-1	Throttling	N/A	1,263.31	1,156.37	35.01	106.94	30.00
PRV-2	Throttling	N/A	1,255.35	1,122.62	12.02	132.72	50.00

Table AP A-5

West Maricopa Combine, WESTCAPS
Potential Pipeline to The Future (PTTF), Alignment 5

A **Alignment 5: From the Recovery Storage Site along Dike and McDowell Road to Sarival Road**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Recovery Site Storage	0	0	0	1,099	0	42	51.80	37,500	7	1,109
P	Pump Station & Air Chamber	0.0038	20	20	1,099	0	42	51.80	37,500	99	1,323
1	Blow-off Valve	0.68	3,590	3,610	1,066	-33	42	51.80	37,500	111	1,316
2	Air Valve	2.27	11,986	15,596	1,089	23	42	51.80	37,500	91	1,294
3		2.13	11,246	26,842	1,081	-8	42	51.80	37,500	86	1,274
4	Common Pt	0.27	1,426	28,268	1,089	8	42	51.80	37,500	81	1,271
5		0.5	2,640	30,908	1,102	13	42	51.80	37,500	73	1,266
6	Tie to Miller Road Lateral	0.05	264	31,172	1,102	0	42	51.80	37,500	73	1,265
7		1.5	7,920	39,092	1,103	1	42	16.79	12,157	72	1,263
8		0.75	3,960	43,052	1,142	39	42	16.79	12,157	54	1,262
9	Air & Vacuum Valve	2.18	11,510	54,562	1,158	16	42	16.79	12,157	46	1,259
10		0.67	3,538	58,100	1,119	-39	42	16.79	12,157	63	1,259
11	Tie to Tuthill Road Lateral	1.03	5,438	63,538	1,096	-23	42	16.79	12,157	72	1,257
12		3.07	16,210	79,748	1,030	-66	42	12.02	8,702	100	1,255
13	Tie to Cotton Lane Lateral	0.93	4,910	84,658	1,017	-13	42	12.02	8,702	105	1,255
14	Sarival Road	1.02	5,386	90,044	1,010	-7	42	0.00	0	108	1,255
Total		17.0538	90,044			-89					

Table AP A-5

West Maricopa Combine, WESTCAPS
Potential Pipeline to The Future (PTTF), Alignment 5

B — **Miller Road Lateral: From Trunk Alignment 5 to Baseline Road**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	McDowell Road	0	0	0	1,102	0	36	35.01	25,344	73	1,265
PRV(U)	PRV Upstream Side	0.1894	1,000	1,000	1,092	-10	36	35.01	25,344	76	1,263
PRV(D)	PRV Downstream Side	0.0009	5	1,005	1,092	0	36	35.01	25,344	30	1,156
1	Baseline Road	3.94	20,803	21,808	889	-203	36	35.01	25,344	101	1,118
Total		4.1303	21,808			-213					

C — **Tuthill Road Lateral: From Trunk Alignment 5 to Lower Buckeye Road**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	McDowell Road	0	0	0	1,096	0	12	4.77	3,453	29	1,157
1	Lower Buckeye Rd	2.99	15,787	15,787	889	-207	12	4.77	3,453	95	1,103
Total		2.99	15,787			-207					

D — **Cotton Lane Lateral: From Trunk Alignment 5 to Lower Buckeye Road Storage Tank**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	McDowell Road	0	0	0	1,017	0	42	12.02	8,702	105	1,255
PRV(U)	PRV Upstream Side	0.1894	1,000	1,000	1,012	-5	42	12.02	8,702	107	1,255
PRV(D)	PRV Downstream Side	0.0009	5	1,005	1,012	0	42	12.02	8,702	50	1,122
1	Lower Buckeye Rd Storage Tank	3.05	16,104	17,109	932	-80	42	12.02	8,702	84	1,120
Total		3.24	17,109			-85					

Figure AP A-5A

Alignment 5

From Recovery Site along Dike and McDowell Road to Sarival Road

West Maricopa Combine, WESTCAPS

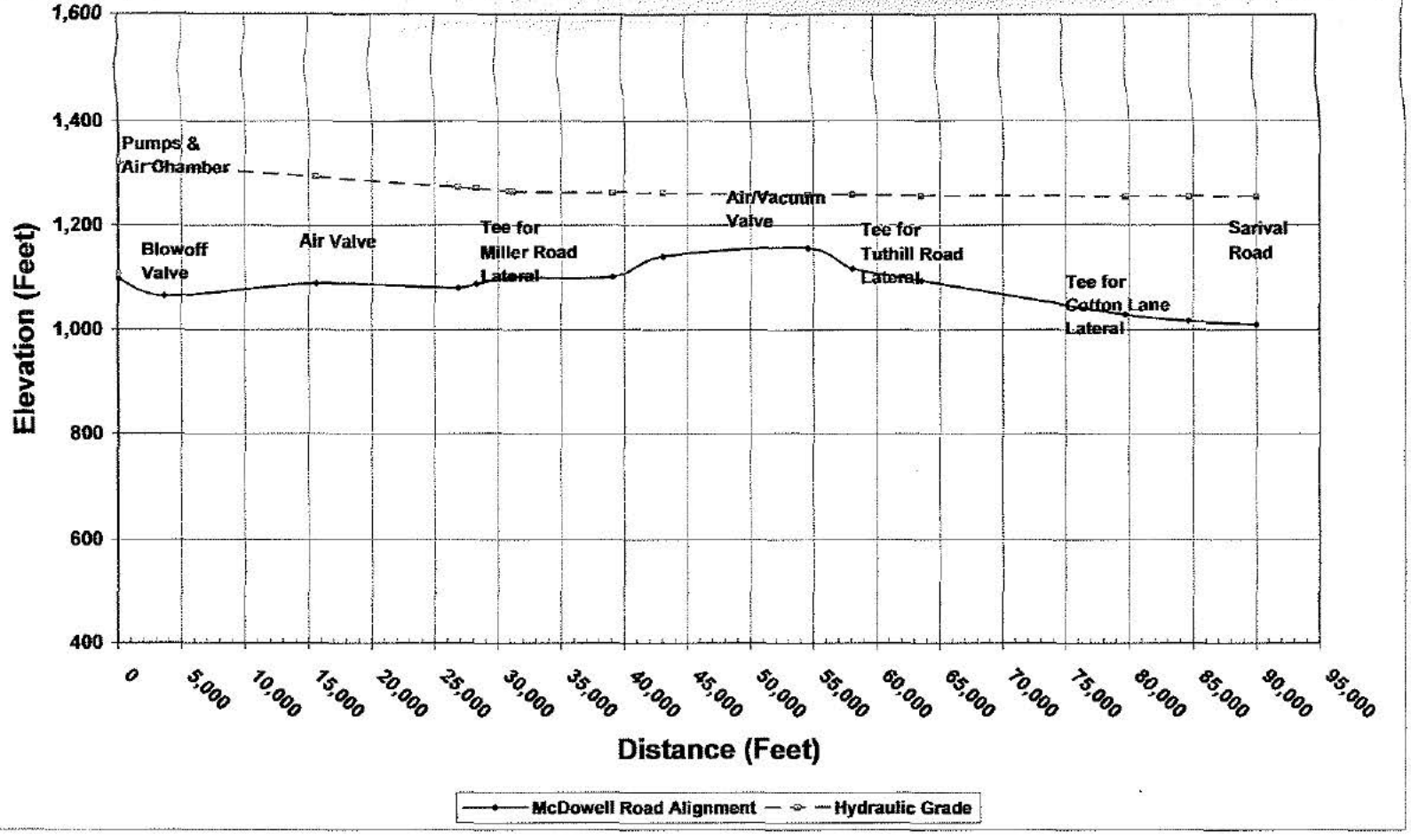


Figure AP A-5B

Miller Road Lateral
From Alignment 5 along Miller Road to Baseline Road
West Maricopa Combine, WESTCAPS

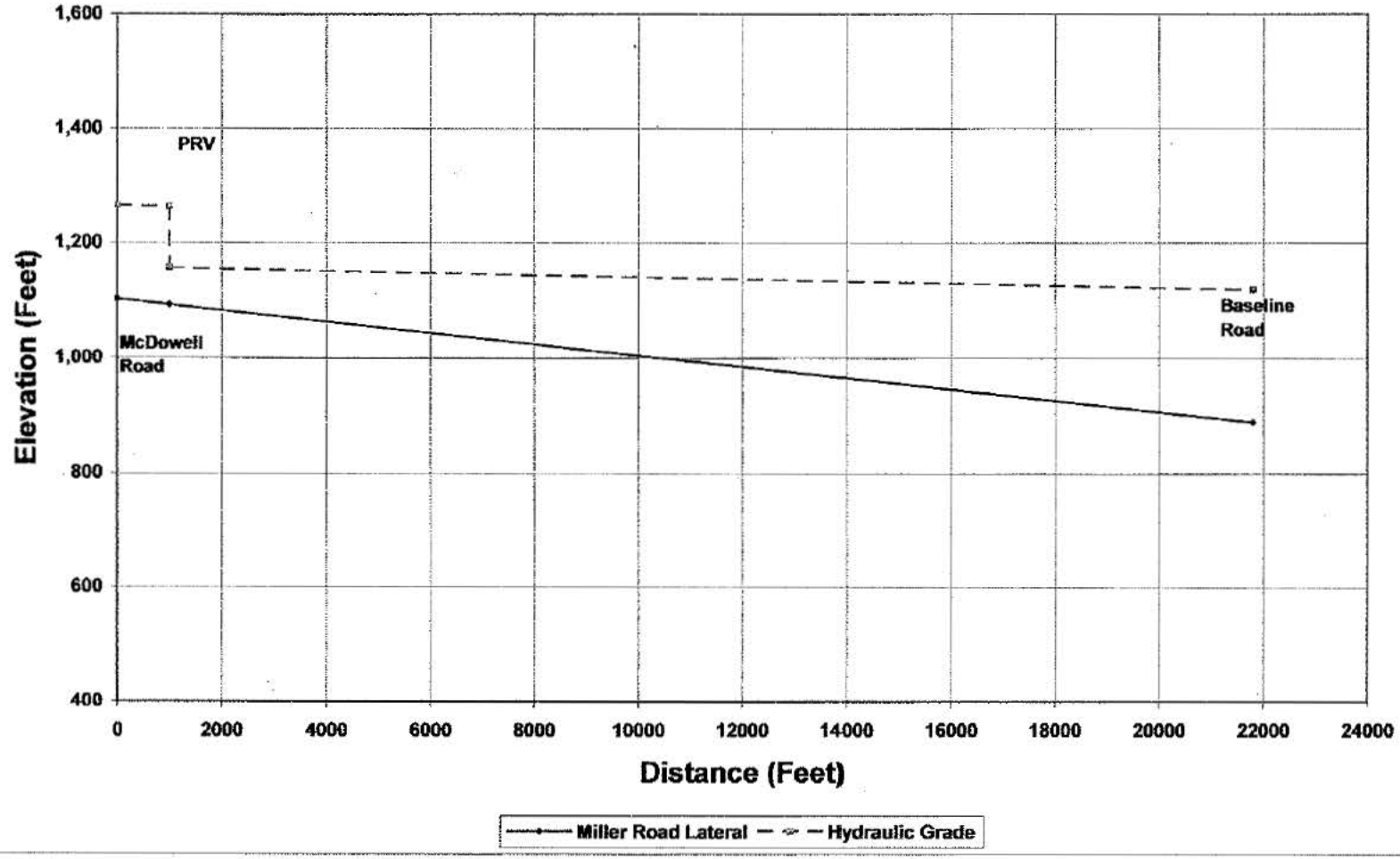


Figure AP A-5C

Tuthill Road Lateral
From Alignment 5 along Tuthill Road to Lower Buckeye Road
West Maricopa Combine, WESTCAPS

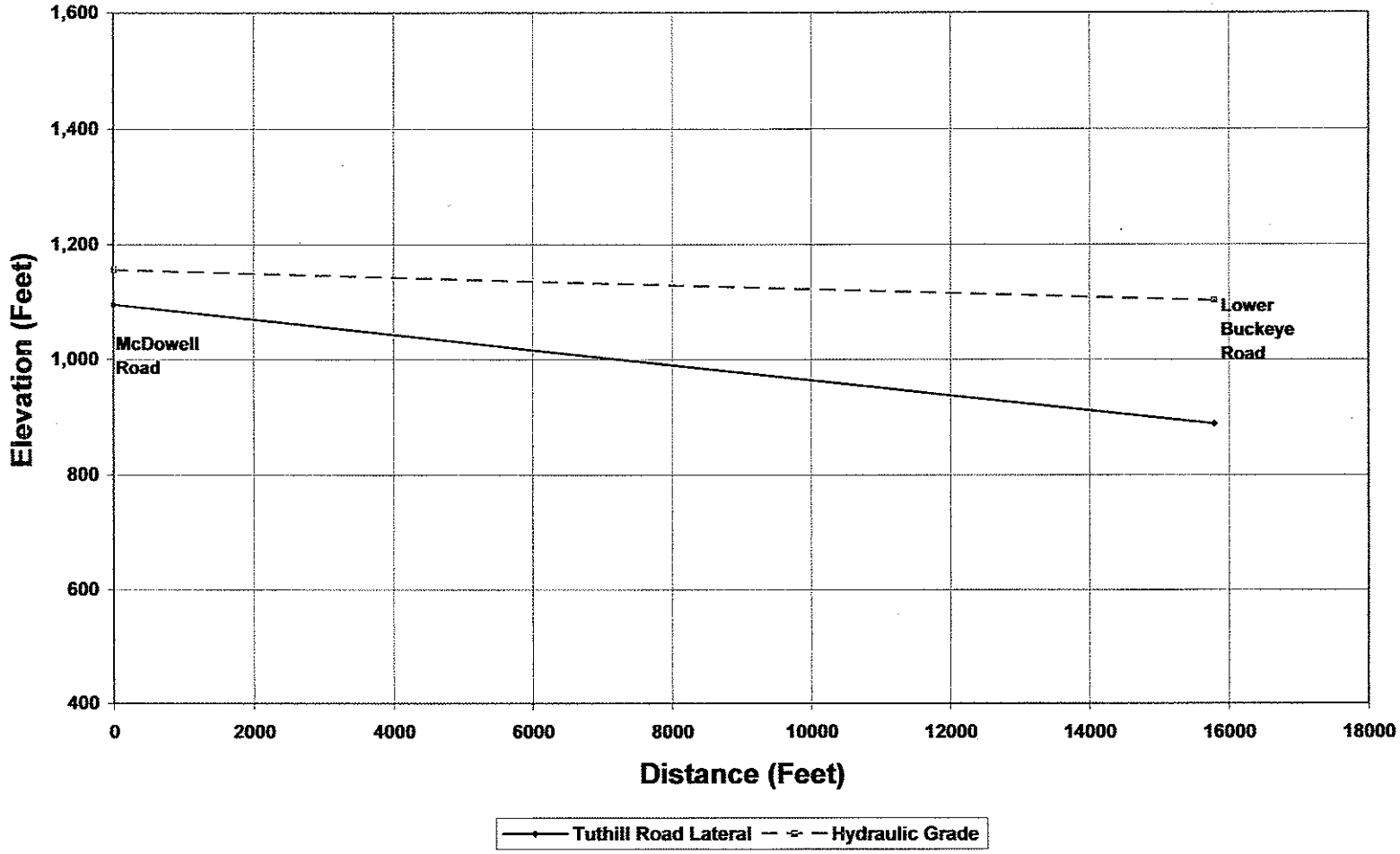
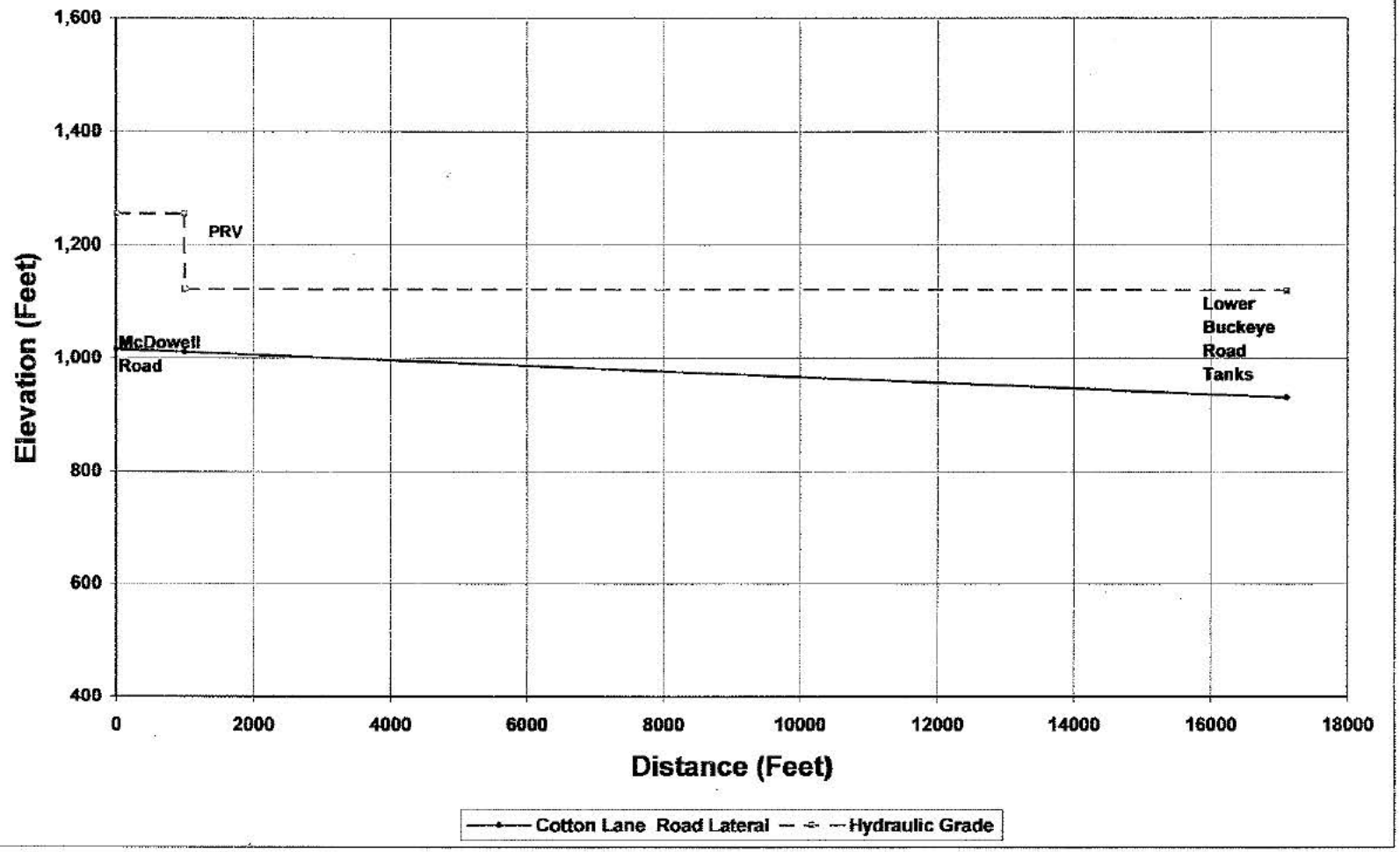


Figure AP A-5D

Cotton Lane Lateral
From Alignment 5 along Cotton Lane to Lower Buckeye Road Tanks
West Maricopa Combine, WESTCAPS



Appendix A-S

Summary for All Alignments (Forward Flow)

Tables

1. Overall Quantity, and Pumps Summary
2. Construction Unit Costs, Operating Costs, and Amortization Data
3. Construction and Capital Cost Estimation
4. Annual Operating Costs
5. Total Annual Costs, and Costs per 1,000 Gallons of Water Delivered

Table AP A-S1

Quantity Estimation
Water Delivery from the Recovery Site storage (Forward)
West Maricopa Combine Pipeline to the Future (PTTF)

I. Overall Quantity Summary

Item	Description	Unit	Size	Quantity				
				Alignment (see Note)				
				1	2	3	4	5
Reinforced Concrete Pipe in Feet	Trunk line	Inches	42	92,948	88,777	86,242	89,353	90,044
Sizes are for Inside Diameter	Cotton Lane Lateral	Inches	42	17,109	15,842	6,600	6,600	17,109
	Miller Road Lateral	Inches	36	21,808	20,171	21,016	21,016	21,808
	Tuthill Road Lateral	Inches	12	15,787	14,995	5,280	5,280	15,787
Pumps (80 % Efficiency)	near Recharge site storage	H.P.	1,075	NA	NA	1	NA	NA
including housing structures	near Recharge site storage	H.P.	1,435	NA	1	NA	1	
	near Recharge site storage	H.P.	1,575	NA	NA	NA	NA	1
	near Recharge site storage	H.P.	1,790	1	NA	NA	NA	NA
Air Chamber	on pumps' discharge line	$Feet^3$	2,500	1	1	1	1	1
Air Valve	Trunk line	Inches	42	2	NA	NA	NA	1
Air / Vacuum Valve	Trunk line	Inches	42	2	2	2	1	1
Blow-off Valve	Trunk line	Inches	42	1	2	1	NA	1
Gate Valves (see Note 6)	Trunk line	Inches	42	18	17	16	17	17
	Cotton Lane Lateral	Inches	42	3	3	2	2	3
	Miller Road Lateral	Inches	36	4	4	4	4	4
	Tuthill Road Lateral	Inches	12	3	3	2	2	3
Pressure Reducing Valve	on Cotton Lane Road Lateral	Inches	42	1	1	1	1	1
	on Miller Road Lateral	Inches	36	1	1	NA	NA	1
S.C.A.D.A.		Lump sum	each	1	1	1	1	1
Right-of Way Acquisition								
a. Public land (Federal and State)	Trunk line and Laterals	acre	NA	13.5	8.4	1.8	5.6	9.2
b. Private land	Trunk line and Laterals	acre	NA	54.4	56.4	53.4	50.7	57.4

Note: Public lands are State and Burea of Land Management (BLM) lands.

II. Pumps' Summary

Item	Description	Unit		Alignment (see Note)				
				1	2	3	4	5
Pumpage	Maximum in cfs	cfs		51.80	51.80	51.80	51.80	51.80
	Maximum in acre-feet a year	AF/Yr		37,500	37,500	37,500	37,500	37,500
Total Dynamic Head	Energy head required	Feet		244	195	146	195	215
Power	Horse power	H.P.		1,790	1,435	1,075	1,435	1,575

Note
Alignment 1: From Recovery Storage Site to Sarival Road along Tonopah-Salome Highway and McDowell Road
Alignment 2: From Recovery Storage Site to Sarival Road along I - 10 Freeway
Alignment 3: From Recovery Storage Site to Sarival Road along Dike and Yuma Road
Alignment 4: From Recovery Storage Site to Sarival Road along Tonopah-Salome Highway and Yuma road
Alignment 5: From Recovery Storage Site to Sarival Road along Dike and McDowell Road
6 Gate valves are assumed to be located at about every one mile interval.

Table AP A-S2

Unit Cost Data
Water Delivery from Recovery Site Storage (Forward)
West Maricopa Combine Pipeline to the Future (PTTF)

I. Unit Cost for Construction

Item	Unit	Size	Unit Cost ($)
Reinforced concrete pipe (I.D.)	Inches	42	$193
	Inches	36	$174
	Inches	12	$68
Pumps (80 % Efficiency)	H.P.	1,075	$602,200
including housing structures	H.P.	1,435	$602,200
	H.P.	1,575	$602,200
	H.P.	1,790	$602,200
Air Chamber structure and compressor	$Feet^3$	2,500	$90,000
Air Valve (Inches)	Inches	all sizes	$5,000
Air/Vacuum Valve w/ Structure	Inches	all sizes	$5,000
Blow-off Valve	Inches	all sizes	$6,000
Gate and Check Valves	Inches	all sizes	$20,000
Pressure Reducing Valve	Inches	36	$7,200
	Inches	42	$7,200
S.C.A.D.A	Lump sum	NA	$100,000
Right-of Way Acquisition			
a. Public land (Federal and State)	Acre	NA	$10,000
b. Private land	Acre	NA	$30,000

Note
1. Pump unit cost ($) = $100,000 + $15,000 per MGD * MGD's

II. Cost Data for Operating and Maintenance

Item	Unit	Size
Pipe O.& M., Percent of Construction Cost	%	0.5
Pump O.& M.	$/AF/Foot	0.13
Energy cost (pumping)	$/kwh	0.06

III. Amortization Data

Item	Unit	Size
Annual Interest Rate	%	5.5
Duration	Year	20
Amortizing factor	NA	0.08368

Table AP A-S3

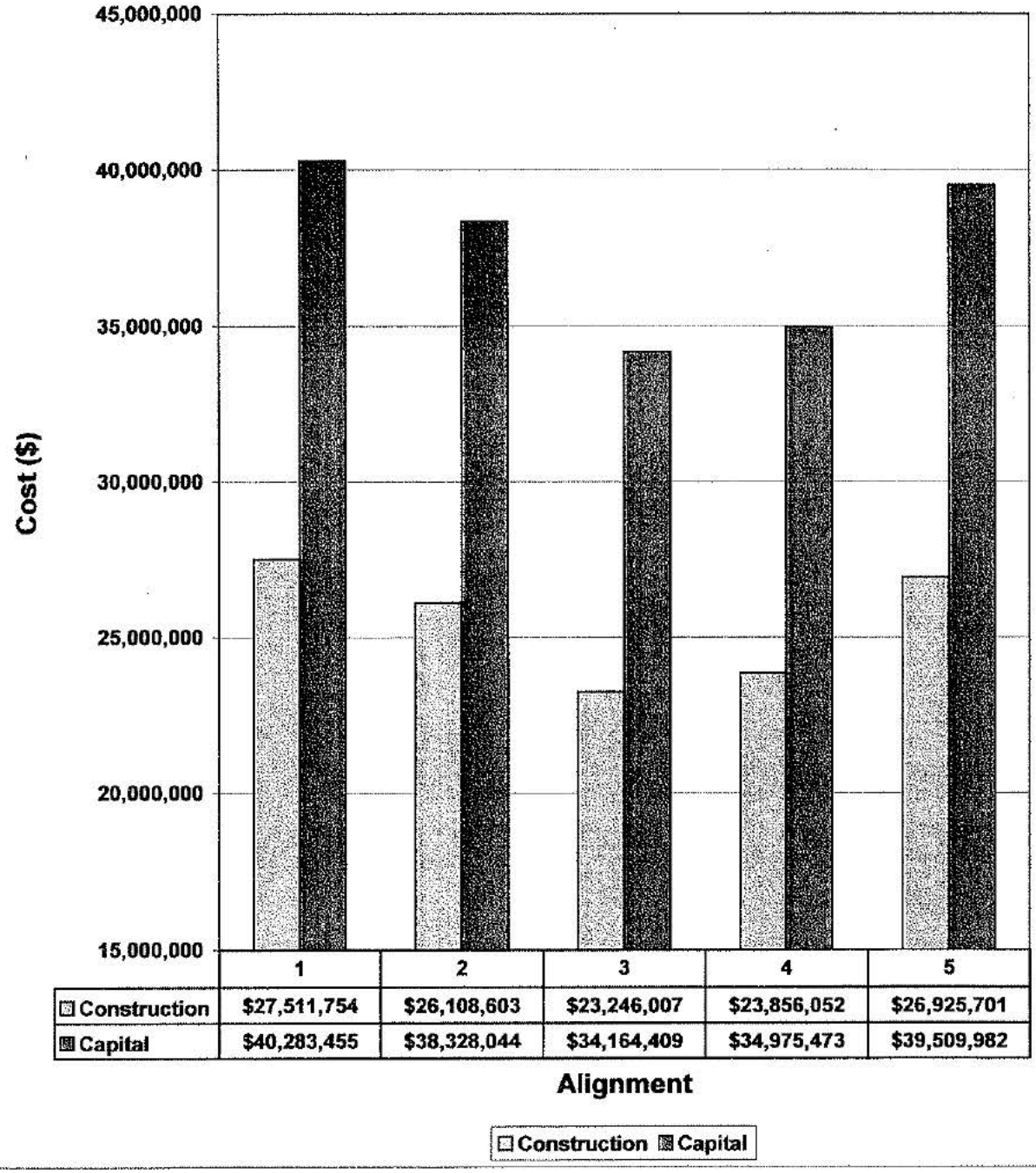
Construction & Capital Cost Estimation
Water Delivery from the Recovery Site Storage (Forward)
West Maricopa Combine Pipeline to the Future (PTTF)

Item	Description	Unit	Size	Construction Cost ($) Alignment (see Note) 1	2	3	4	5
Reinforced Concrete Pipe in Feet	Trunk line	(Inches)	42	$17,957,554	$17,151,716	$16,661,954	$17,263,000	$17,396,501
Sizes are for inside diameter	Cotton Lane Lateral	(Inches)	42	$3,305,459	$3,060,674	$1,275,120	$1,275,120	$3,305,459
	Miller Road Lateral	(Inches)	36	$3,791,975	$3,507,333	$3,654,262	$3,654,262	$3,791,975
	Tuthill Road Lateral	(Inches)	12	$1,074,147	$1,020,260	$359,251	$359,251	$1,074,147
Subtotal				$26,129,135	$24,739,984	$21,950,588	$22,551,633	$25,568,082
Pumps (80 % Efficiency)	near Recharge site storage	(H.P.)	1,075	NA	NA	$602,200	NA	NA
including housing structures	near Recharge site storage	(H.P.)	1,435	NA	$602,200	NA	$602,200	NA
		(H.P.)	1,575	NA	NA	NA	NA	$602,200
	near Recharge site storage	(H.P.)	1,790	$602,200	NA	NA	NA	NA
Subtotal				$602,200	$602,200	$602,200	$602,200	$602,200
Air Chamber	on pumps' discharge line	$Feet^3$	2,500	$90,000	$90,000	$90,000	$90,000	$90,000
Air Valve	Trunk line	(Inches)	42	$10,000	NA	NA	NA	$5,000
Air / Vacuum Valve	Trunk line	(Inches)	42	$10,000	$10,000	$10,000	$5,000	$5,000
Blow-off Valve	Trunk line	(Inches)	42	$6,000	$12,000	$6,000	$0	$6,000
Gate Valves (see Note 6)	Trunk line	(Inches)	42	$360,000	$340,000	$320,000	$340,000	$340,000
	Cotton Lane Lateral	(Inches)	42	$60,000	$60,000	$40,000	$40,000	$60,000
	Miller Road Lateral	(Inches)	36	$80,000	$80,000	$80,000	$80,000	$80,000
	Tuthill Road Lateral	(Inches)	12	$60,000	$60,000	$40,000	$40,000	$60,000
Subtotal				$560,000	$540,000	$480,000	$500,000	$540,000
Pressure Reducing Valve	on Cotton Lane Lateral	(Inches)	42	$7,200	$7,200	$7,200	$7,200	$7,200
	on Miller Road Lateral	(Inches)	36	$7,200	$7,200	NA	NA	$7,200
Subtotal				$14,400	$14,400	$7,200	$7,200	$14,400
S.C.A.D.A.		Lump sum	NA	$100,000	$100,000	$100,000	$100,000	$100,000
Total Construction Cost				$27,511,754	$26,108,603	$23,246,007	$23,856,052	$26,925,701
Contingency: %	Percent of Total Construction Cost	%	20	$5,502,351	$5,221,721	$4,649,201	$4,771,210	$5,385,140
Engineering & Administration, %	Percent of Total Construction Cost	%	20	$5,502,351	$5,221,721	$4,649,201	$4,771,210	$5,385,140
Right-of-Way Acquisition								
a. Public land (Federal and State)	Trunk line and Laterals	acres		$135,000	$84,000	$18,000	$56,000	$92,000
b. Private land	Trunk line and Laterals	acres		$1,632,000	$1,692,000	$1,602,000	$1,521,000	$1,722,000
Subtotal				$1,767,000	$1,776,000	$1,620,000	$1,577,000	$1,814,000
Total Capital Cost				$40,283,455	$38,328,044	$34,164,409	$34,975,473	$39,509,982

Note
Alignment 1: From Recovery Storage Site to Sarival Road along Tonopah-Salome Highway and McDowell Road
Alignment 2: From Recovery Storage Site to Sarival Road along I - 10 Freeway
Alignment 3: From Recovery Storage Site to Sarival Road along Dike and Yuma Road
Alignment 4: From Recovery Storage Site to Sarival Road along Tonopah-Salome Highway and Yuma road
Alignment 5: From Recovery Storage Site to Sarival Road along Dike and McDowell Road
6 Gate valves are assumed to be located at about every one mile interval.

Figure AP A-S1

Construction & Capital Costs (Forward Flow)



	1	2	3	4	5
Construction	$27,511,754	$26,108,603	$23,246,007	$23,856,052	$26,925,701
Capital	$40,283,455	$38,328,044	$34,164,409	$34,975,473	$39,509,982

Table AP A-S4

Annual Operating and Maintenance Cost
Water Delivery from the Recovery Storage Site (Forward)
West Maricopa Combine Pipeline to the Future (PTTF)

Item	Alignment				
	1	2	3	4	5
Pipe O.& M. Cost	$137,559	$130,543	$116,230	$119,280	$134,629
Pump O.& M. Cost	$793,000	$633,750	$474,500	$633,750	$698,750
Pumping Energy Cost	$467,903	$375,107	$281,003	$375,107	$411,702
Total O.& M. Cost	$1,398,462	$1,139,400	$871,733	$1,128,137	$1,245,081

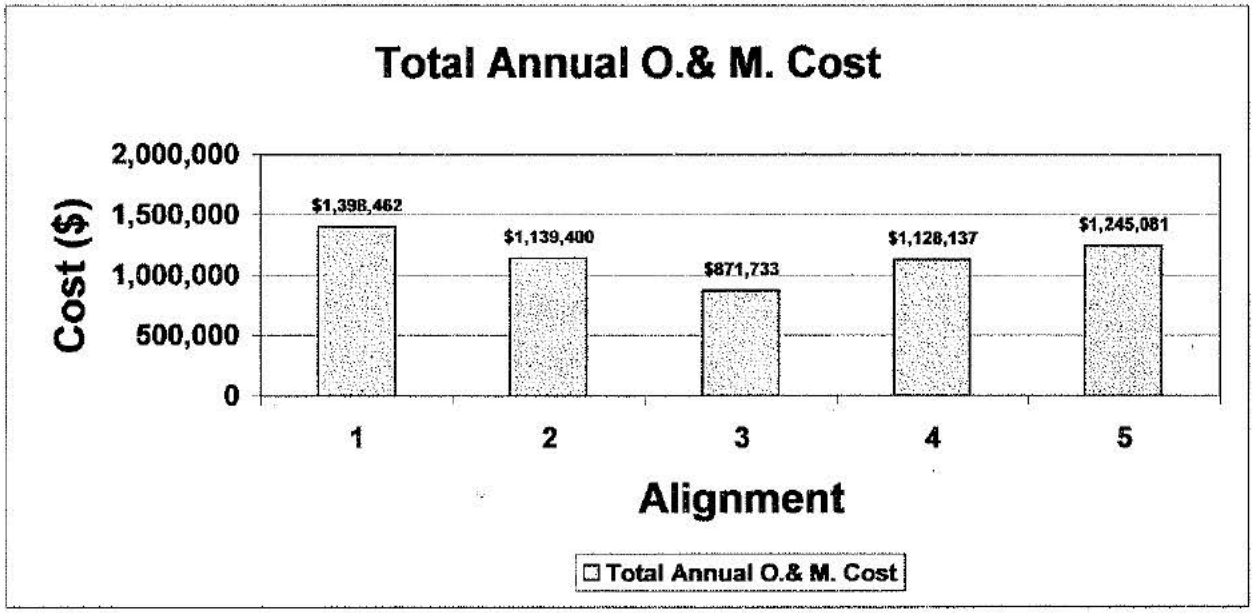
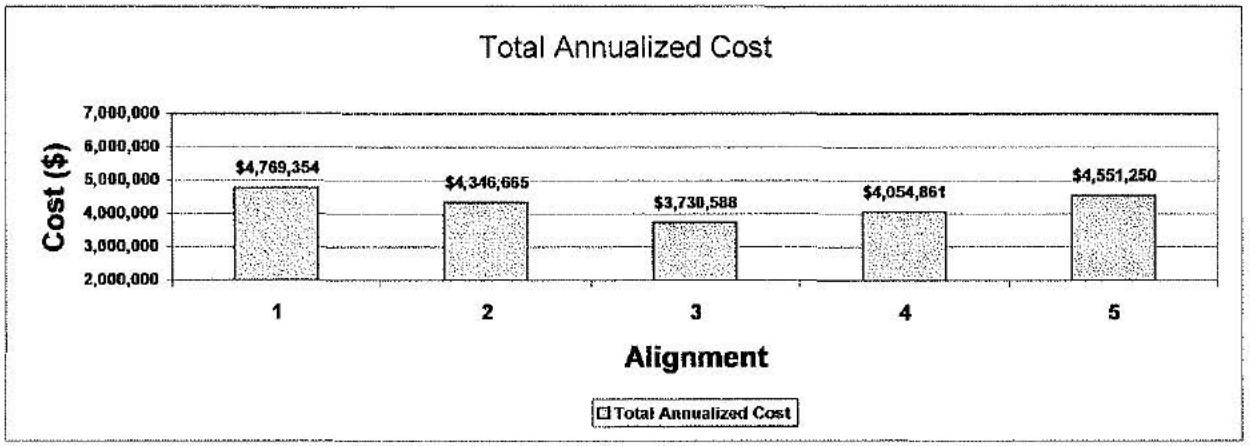
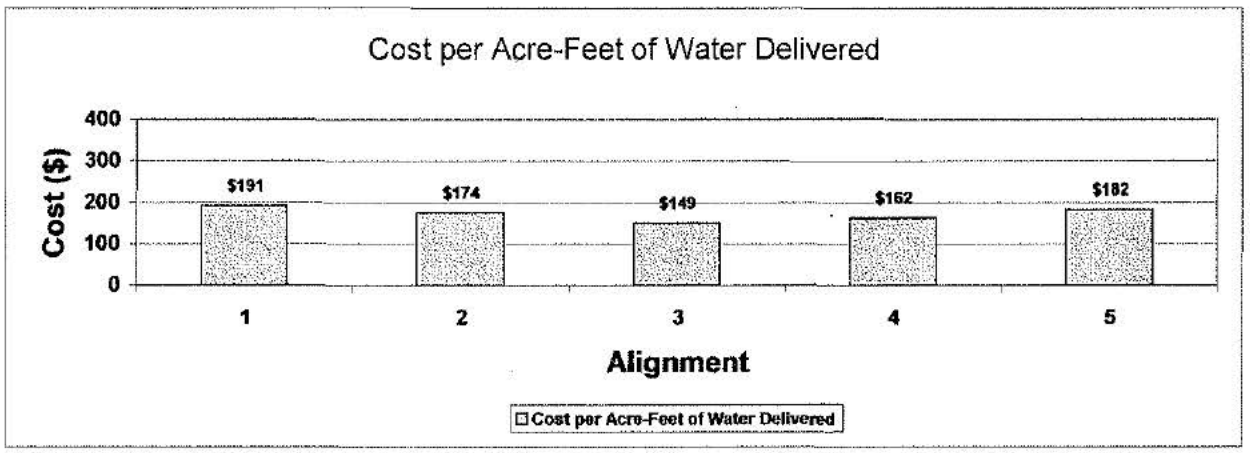


Table AP A-S5

Annualized Capital, and O.& M. Costs
Water Delivery from the Recovery Storage Site (Forward)
West Maricopa Combine Pipeline to the Future (PTTF)

Item	Alignment				
	1	2	3	4	5
Annual Water Delivered (Acre-Feet)	25,000	25,000	25,000	25,000	25,000
20 Years' Amortized Capital Cost	$3,370,893	$3,207,265	$2,858,855	$2,926,724	$3,306,169
Annual O.& M. Cost	$1,398,462	$1,139,400	$871,733	$1,128,137	$1,245,081
Total Annualized Cost	$4,769,354	$4,346,665	$3,730,588	$4,054,861	$4,551,250
Cost per Acre-Foot	$191	$174	$149	$162	$182
Cost per 1,000 Gallons	$0.59	$0.53	$0.46	$0.50	$0.56





Appendix B

Reversal Flow Water Delivery Along Alignments 1, 2 and 3

Appendix B-1

Alignment 1 with 3 Laterals (Reversal Flow)

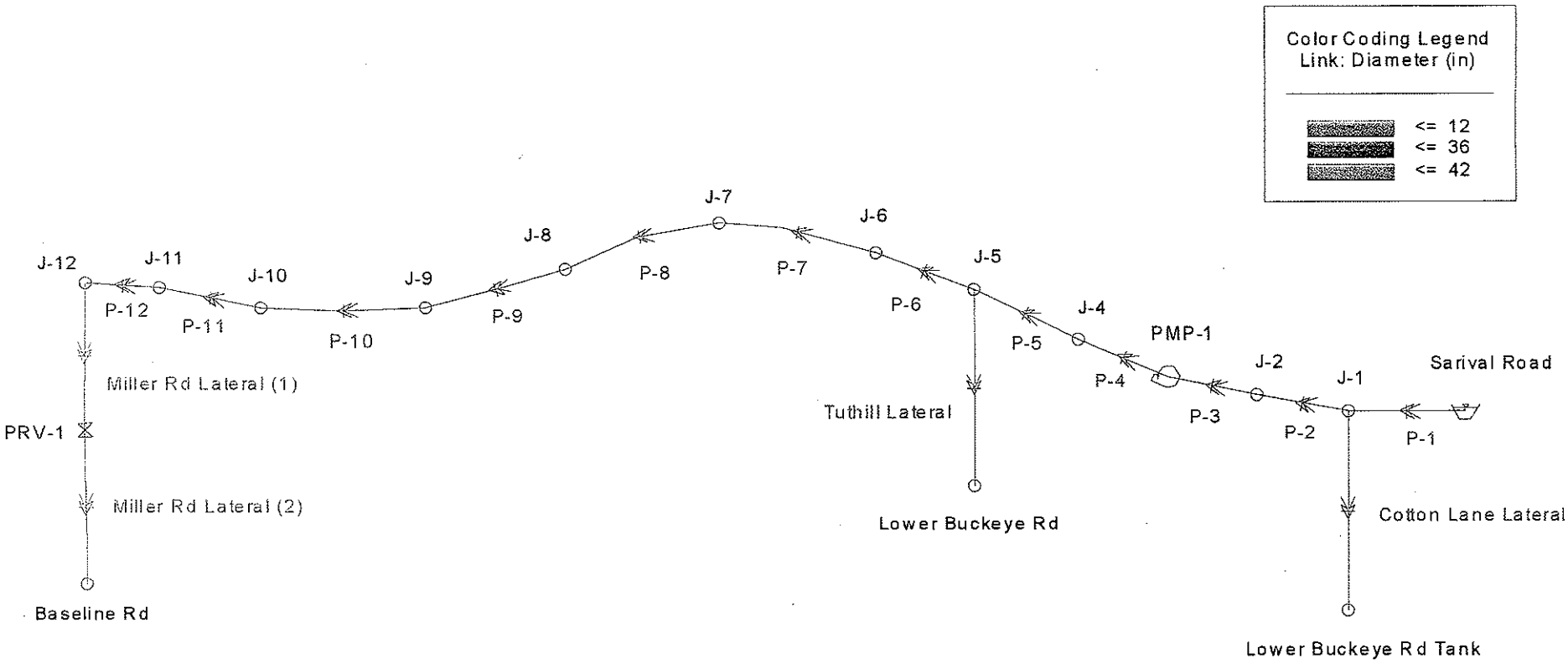
1. **Schematic Model Layout and Hydraulic Results**

2. **Tables**
   Ground Profiles, Pipe Sizes, and Pressure Distributions

3. **Figure**
   Ground Profiles, Hydraulic Features, and Hydraulic Grade Lines

Scenario: Year 2025 Peak Demand

Alignment 1
Sarival Road to Buckeye Area along McDowell Road
West Maricopa Combine Pipeline to The Future (PTTF)
(Reversal Flow)



Analysis Results
Scenario

Title: WMC Sarival Road - McDowell Road Alignment (Rev), Alignment 1
Project Engineer: Michael Lee
Project Date: 11/29/01
Comments:

Scenario Summary	
Label	Year 2025 Peak Demand
Demand Alternative	Year 2025 Peak Demand
Physical Alternative	Year 2025 Peak Demand
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow

Liquid Characteristics			
Liquid	Water at 20C(68F)	Specific Gravity	1.00
Kinematic Viscosity	0.108e-4 ft²/s		

Network Inventory			
Number of Pipes	16	Number of Tanks	0
Number of Reservoirs	1	- Constant Area:	0
Number of Junctions	14	- Variable Area:	0
Number of Pumps	1	Number of Valves	1
- Constant Power:	0	- FCV's:	0
- One Point (Design Point):	1	- PBV's:	0
- Standard (3 Point):	0	- PRV's:	1
- Standard Extended:	0	- PSV's:	0
- Custom Extended:	0	- TCV's:	0
- Multiple Point:	0	Number of Spot Elevations	0

Pipe Inventory			
Total Length	113,477.00 ft		
12 in	15,787.00 ft	42 in	75,884.00 ft
36 in	21,806.00 ft		

Analysis Results
Scenario: Year 2025 Peak Demand
Steady State Analysis

Junctions @ 0.00 hr

Label	Constituent (mg/l)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Demand (Calculated) (cfs)	Pressure Head (ft)
Baseline Rd	N/A	1,140.8	111.06	35.01	256.8
J-1	N/A	1,196.5	79.77	0.00	184.5
J-2	N/A	1,191.0	72.23	0.00	167.0
J-4	N/A	1,325.3	105.66	0.00	244.3
J-5	N/A	1,320.8	99.36	0.00	229.8
J-6	N/A	1,316.1	86.98	0.00	201.1
J-7	N/A	1,312.6	69.03	0.00	159.6
J-8	N/A	1,308.5	65.93	0.00	152.5
J-9	N/A	1,302.1	71.82	0.00	166.1
J-10	N/A	1,298.6	86.74	0.00	200.6
J-11	N/A	1,292.1	84.37	0.00	195.1
J-12	N/A	1,291.4	84.09	0.00	194.4
Lower Buckeye Rd	N/A	1,166.7	122.26	4.77	282.7
Lower Buckeye Rd Tai	N/A	1,194.4	115.63	12.02	267.4

Reservoirs @ 0.00 hr

Label	Constituent (mg/l)	Calculated Hydraulic Grade (ft)	Reservoir Inflow (cfs)	Reservoir Outflow (cfs)
Sarival Road	N/A	1,208.7	N/A	51.80

Pipes @ 0.00 hr

Label	Status	Constituent (mg/l)	Flow (cfs)	Velocity (ft/s)	From Grade (ft)	To Grade (ft)	Friction Loss (ft)	Minor Loss (ft)	Total Headloss (ft)	Headloss Gradient (ft/1000ft)
Cotton Lane Lateral	Open	N/A	12.02	1.25	1,196.5	1,194.4	2.1	0.2e-1	2.1	0.12
Miller Rd Lateral (1)	Open	N/A	35.01	4.95	1,291.4	1,289.3	1.8	0.3	2.1	2.14
Miller Rd Lateral (2)	Open	N/A	35.01	4.95	1,179.5	1,140.8	38.4	0.3	38.7	1.86
P-1	Open	N/A	51.80	5.38	1,208.7	1,196.5	9.5	2.7	12.2	2.31
P-2	Open	N/A	39.78	4.13	1,196.5	1,191.0	5.2	0.2	5.4	1.15
P-3	Open	N/A	39.78	4.13	1,191.0	1,188.7	0.9e-2	2.3	2.3	234.14
P-4	Open	N/A	39.78	4.13	1,339.2	1,325.3	13.7	0.2	13.9	1.12
P-5	Open	N/A	39.78	4.13	1,325.3	1,320.8	4.4	0.2	4.6	1.16
P-6	Open	N/A	35.01	3.64	1,320.8	1,316.1	4.5	0.2	4.6	0.90
P-7	Open	N/A	35.01	3.64	1,316.1	1,312.6	3.4	0.2	3.5	0.91
P-8	Open	N/A	35.01	3.64	1,312.6	1,308.5	4.0	0.2	4.2	0.91
P-9	Open	N/A	35.01	3.64	1,308.5	1,302.1	6.2	0.2	6.4	0.89
P-10	Open	N/A	35.01	3.64	1,302.1	1,298.6	3.4	0.2	3.5	0.91
P-11	Open	N/A	35.01	3.64	1,298.6	1,292.1	6.3	0.2	6.5	0.89
P-12	Open	N/A	35.01	3.64	1,292.1	1,291.4	0.5	0.2	0.7	1.15
Tuthill Lateral	Open	N/A	4.77	6.07	1,320.8	1,166.7	153.6	0.4	154.0	9.76

Analysis Results
Scenario: Year 2025 Peak Demand
Steady State Analysis

Pumps @ 0.00 hr

Label	Status	Constituent (mg/l)	From Grade (ft)	To Grade (ft)	Flow (cfs)	Head (ft)	Relative Speed	Useful Power (Hp)
PMP-1	On	N/A	1,188.7	1,339.2	39.78	150.5	1.00	678.64

PRVs @ 0.00 hr

Label	Status	Constituent (mg/l)	From Grade (ft)	To Grade (ft)	Flow (cfs)	Headloss (ft)	Setting (psi)
PRV-1	Throttling	N/A	1,289.3	1,179.5	35.01	109.8	40.00

Table AP B-1

West Maricopa Combine, WESTCAPS
Potential Pipeline to The Future (PTTF), Alignment 1 (Reversal)

A. **Alignment 1 (Reversal): From Sarival Road along McDowell Road to Buckeye Area**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Sarival Road	0.00	0	0	1,010	0	42	51.80	37,500	88	1,209
1	Tie to Cotton Lane Lateral	1.00	5,280	5,280	1,017	7	42	51.80	37,500	80	1,196
2		0.90	4,752	10,032	1,029	12	42	39.78	28,799	72	1,191
P	Pumps & Air Chamber	0.0038	20	10,052	1,029	0	42	39.78	28,799	137	1,339
4		2.35	12,408	22,460	1,086	57	42	39.78	28,799	106	1,326
5	Tie to Tuthill Road Lateral	0.75	3,960	26,420	1,096	10	42	39.78	28,799	100	1,321
6		0.97	5,122	31,542	1,120	24	42	35.01	25,344	88	1,317
7		0.73	3,854	35,396	1,158	38	42	35.01	25,344	69	1,313
8	Air & Vacuum Valve	0.87	4,594	39,990	1,161	3	42	35.01	25,344	66	1,309
9		1.35	7,128	47,118	1,141	-20	42	35.01	25,344	72	1,303
10		0.73	3,854	50,972	1,103	-38	42	35.01	25,344	87	1,299
11		1.37	7,234	58,206	1,102	-1	42	35.01	25,344	85	1,293
12	Tie to Miller Road Lateral	0.11	581	58,786	1,102	0	42	35.01	25,344	85	1,292
Total		11.13	58,786			92					

Table AP B-1

West Maricopa Combine, WESTCAPS
Potential Pipeline to The Future (PTTF), Alignment 1 (Reversal)

B — **Miller Road Lateral : From Trunk Alignment 1 (Reversal) to Baseline Road**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	McDowell Road	0	0	0	1,102	0	36	35.01	25,344	85	1,292
PRV (U)	PRV Upstream Side	0.1894	1,000	1,000	1,092	-10	36	35.01	25,344	88	1,290
PRV (D)	PRV Downstream Side	0.00095	5	1,005	1,092	0	36	35.01	25,344	40	1,179
1	Baseline Road	3.94	20,803	20,803	889	-203	36	35.01	25,344	111	1,141
Total		4.13035	21,808			-213					

C — **Tuthill Road Lateral: From Trunk Alignment 1 (Reversal) to Lower Buckeye Road**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	McDowell Road	0	0	0	1,096	0	12	4.77	3,453	100	1,321
1	Lower Buckeye Rd	2.99	15,787	15,787	889	-207	12	4.77	3,453	123	1,167
Total		2.99	15,787			-207					

D — **Cotton Lane Lateral: From Trunk Alignment 1 (Reversal) to Lower Buckeye Road Storage Tank**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	McDowell Road	0	0	0	1,017	0	42	12.02	8,702	80	1,196
1	Lower Buckeye Rd Storage Tanks	3.24	17,107	17,107	932	-85	42	12.02	8,702	116	1,194
Total		3.24	17,107			-85					

Figure AP B-1A

Alignment 1 (Reversal)
From Sarival Road along McDowell Road to Buckeye Area
West Maricopa Combine, WESTCAPS

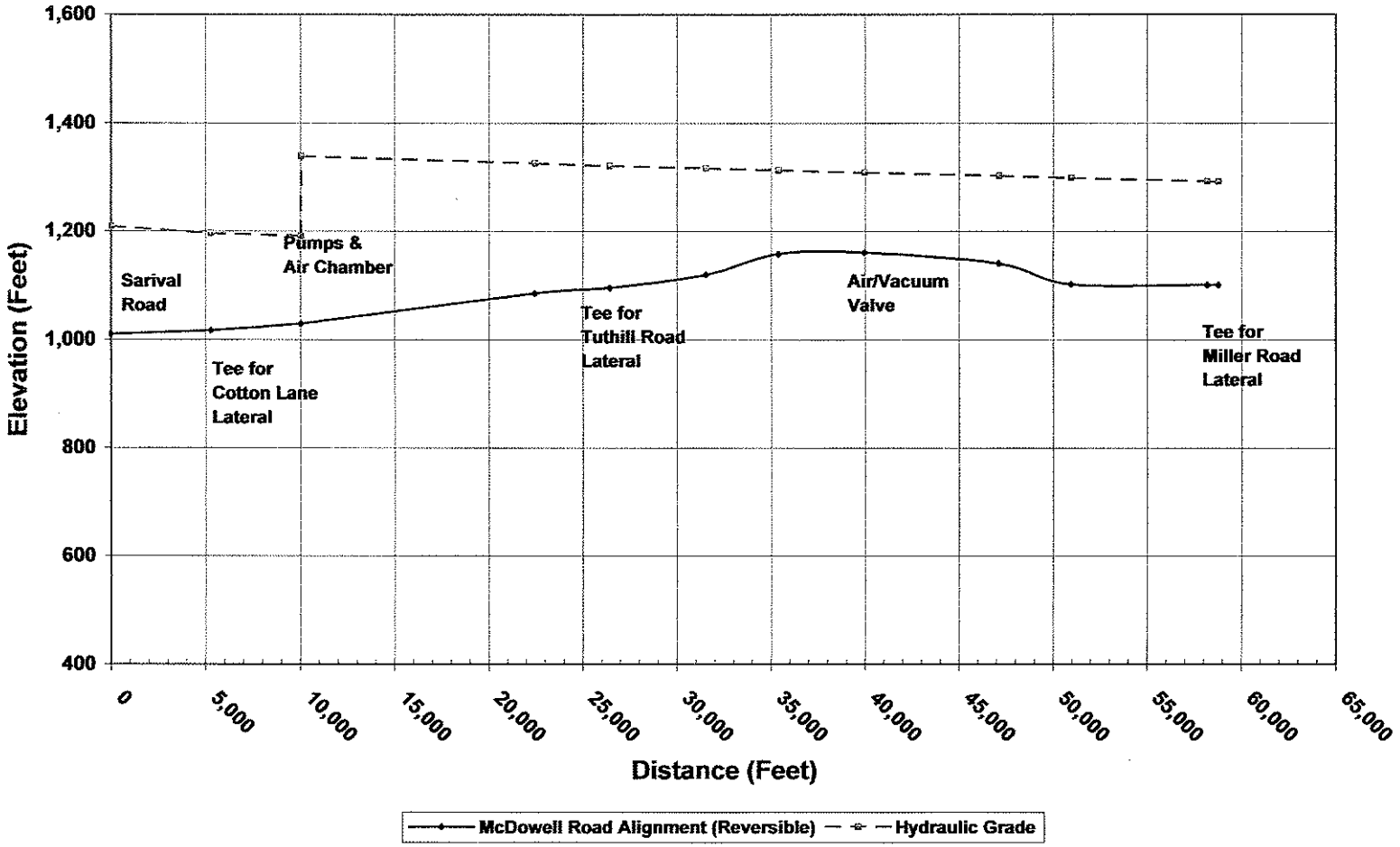


Figure AP B-1B

Miller Road Lateral
From Alignment 1 (Reversal) along Miller Road to Baseline Road
West Maricopa Combine, WESTCAPS

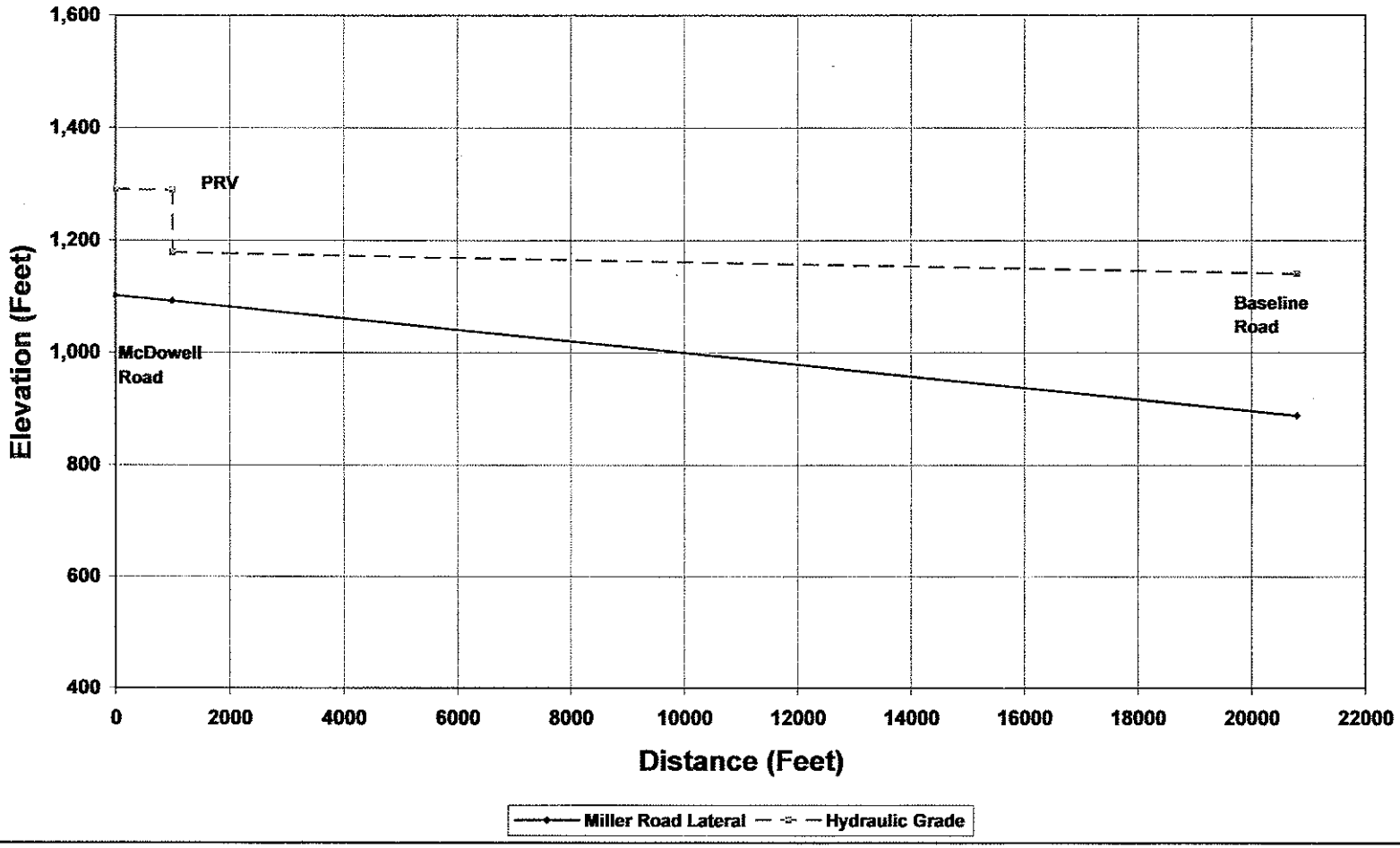


Figure AP B-1C

Tuthill Road Lateral
From Alignment 1 (Reversal) along Tuthill Road to Lower Buckeye Road
West Maricopa Combine, WESTCAPS

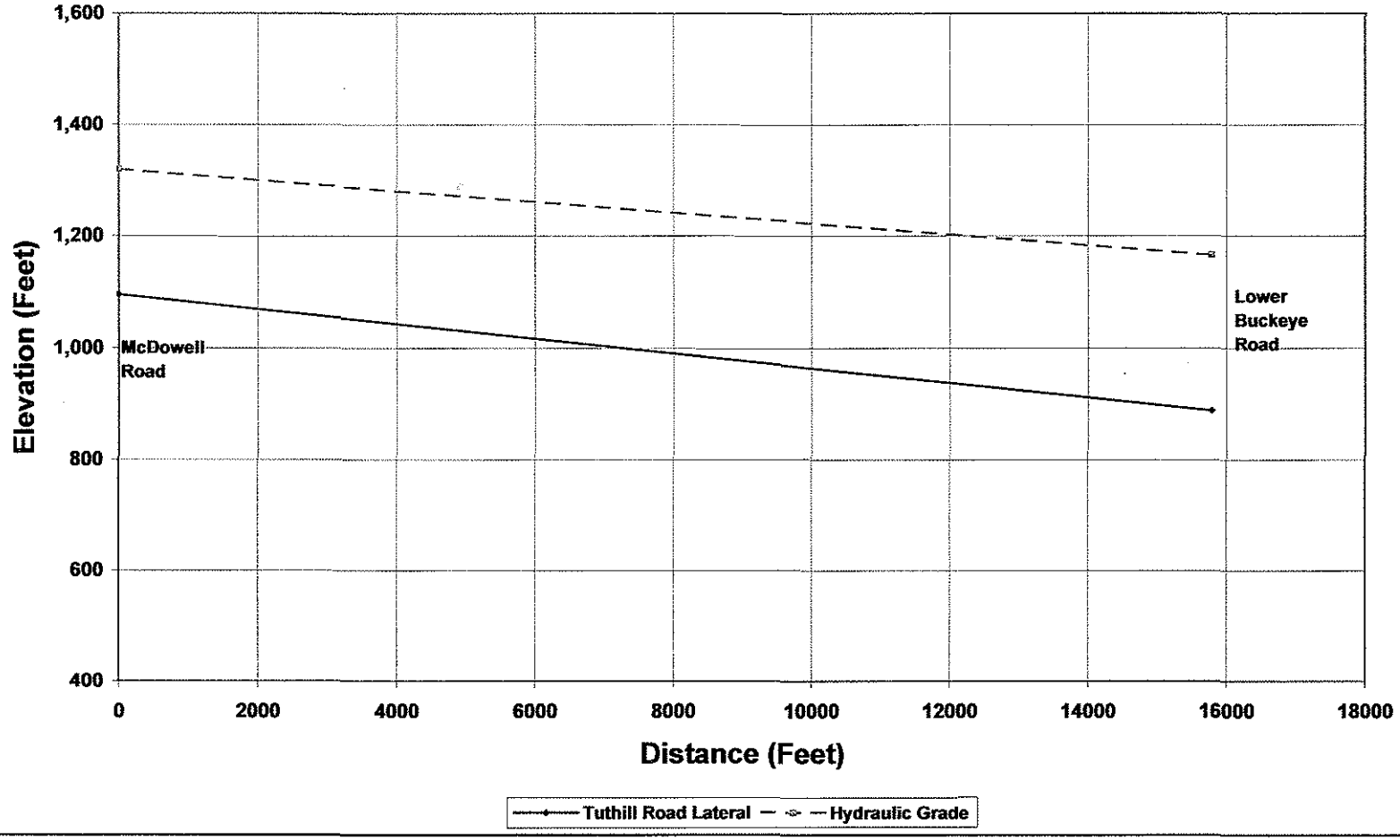
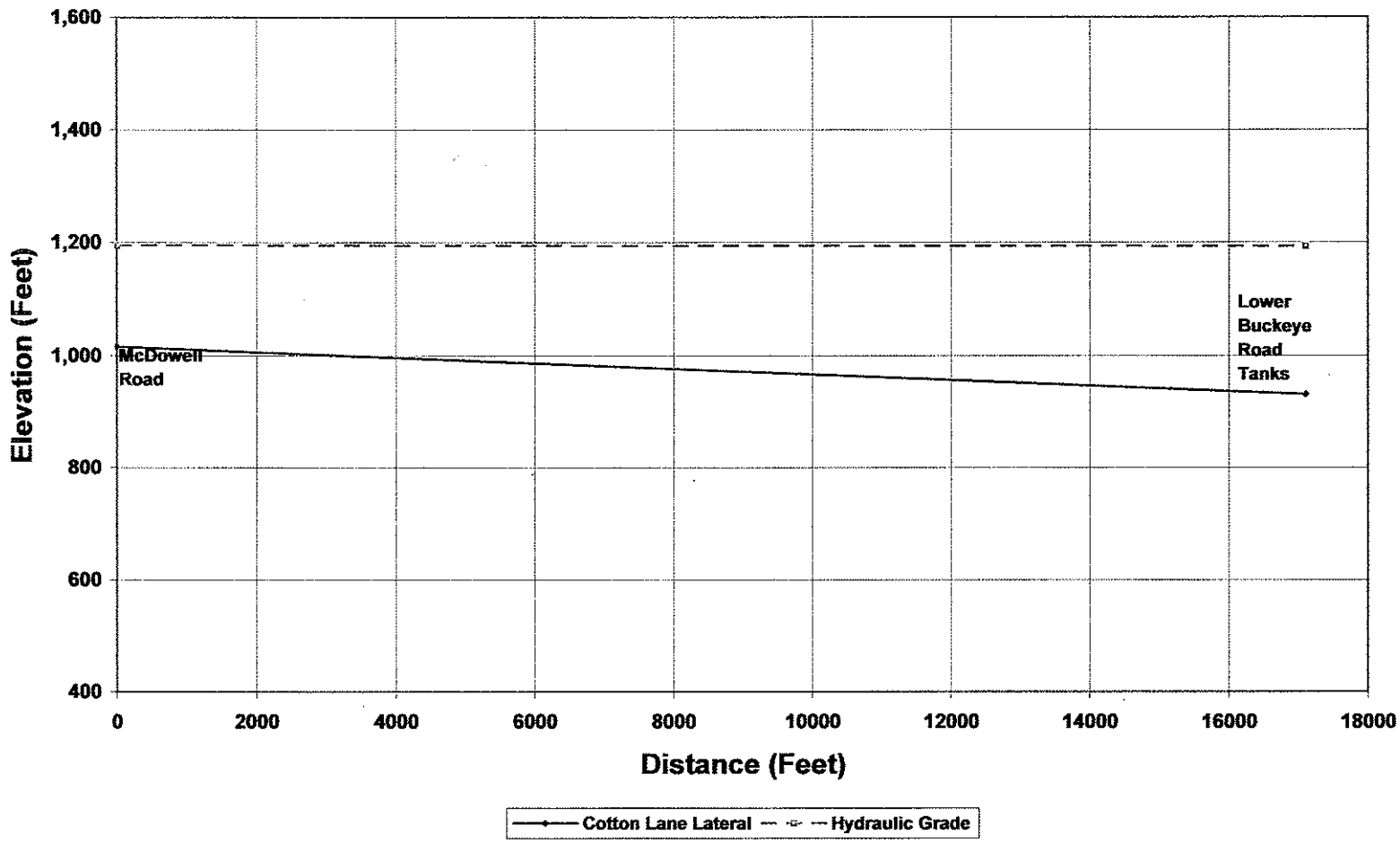


Figure AP B-1D

Cotton Lane Lateral
From Alignment 1 (Reversal) along Cotton Lane to Lower Buckeye Road Tanks
West Maricopa Combine, WESTCAPS



Appendix B-2

Alignment 2 with 3 Laterals (Reversal Flow)

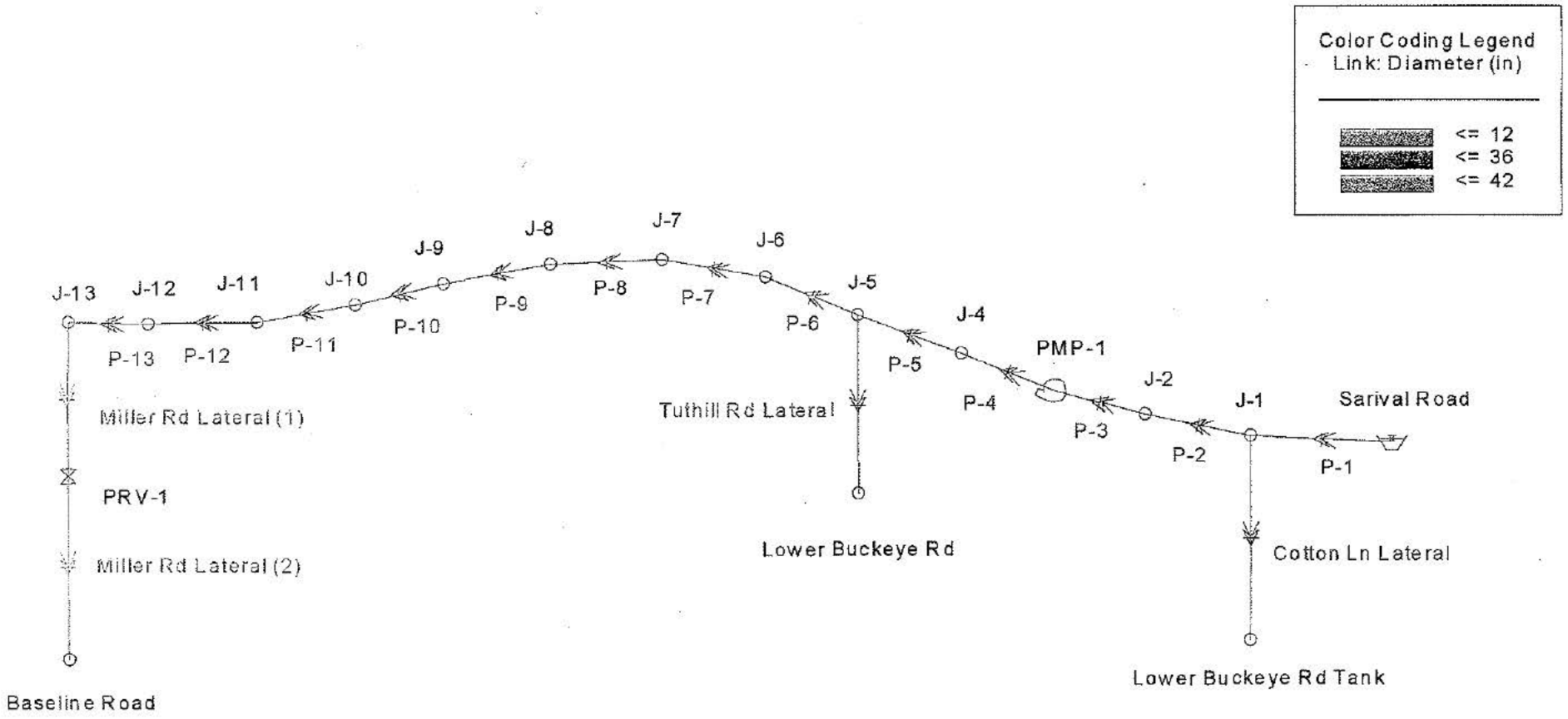
1. **Schematic Model Layout and Hydraulic Results**

2. **Tables**
   Ground Profiles, Pipe Sizes, and Pressure Distributions

3. **Figure**
   Ground Profiles, Hydraulic Features, and Hydraulic Grade Lines

Scenario: Year 2025 Peak Demand

Alignment 2
Sarival Road to Buckeye Area along I-10 Freeway
West Maricopa Combine Pipeline to The Future (PTTF)
(Reversal Flow)



Analysis Results
Scenario

Title: WMC Sarival Road I-10 Alignment (Rev), Alignment 2
Project Engineer: Michael Lee
Project Date: 01/10/02
Comments:

Scenario Summary	
Label	Year 2025 Peak Demand
Demand Alternative	Year 2025 Peak Demand
Physical Alternative	Year 2025 Peak Demand
Initial Settings Alternative	Year 2025 Peak Demand
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow

Liquid Characteristics			
Liquid	Water at 20C(68F)	Specific Gravity	1.00
Kinematic Viscosity	0.108e-4 ft²/s		

Network Inventory			
Number of Pipes	17	Number of Tanks	0
Number of Reservoirs	1	- Constant Area:	0
Number of Junctions	15	- Variable Area:	0
Number of Pumps	1	Number of Valves	1
- Constant Power:	0	- FCV's:	0
- One Point (Design Point):	1	- PBV's:	0
- Standard (3 Point):	0	- PRV's:	1
- Standard Extended:	0	- PSV's:	0
- Custom Extended:	0	- TCV's:	0
- Multiple Point:	0	Number of Spot Elevations	0

Pipe Inventory			
Total Length	108,324.00 ft		
12 in	14,995.00 ft	42 in	73,159.00 ft
36 in	20,170.00 ft		

Analysis Results
Scenario: Year 2025 Peak Demand
Steady State Analysis

Junctions @ 0.00 hr

Label	Constituent (mg/l)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Demand (Calculated) (cfs)	Pressure Head (ft)
Baseline Road	N/A	1,122.83	103.28	35.01	238.83
J-1	N/A	1,206.88	85.57	0.00	197.88
J-2	N/A	1,198.81	75.16	0.00	173.81
J-4	N/A	1,339.03	118.07	0.00	273.03
J-5	N/A	1,333.29	109.10	0.00	252.29
J-6	N/A	1,332.90	108.93	0.00	251.90
J-7	N/A	1,328.37	102.65	0.00	237.37
J-8	N/A	1,323.06	81.76	0.00	189.06
J-9	N/A	1,316.92	82.13	0.00	189.92
J-10	N/A	1,314.03	92.99	0.00	215.03
J-11	N/A	1,311.80	96.78	0.00	223.80
J-12	N/A	1,306.21	97.39	0.00	225.21
J-13	N/A	1,305.13	99.52	0.00	230.13
Lower Buckeye Rd	N/A	1,186.95	131.01	4.77	302.95
Lower Buckeye Rd Tai	N/A	1,204.95	120.19	12.02	277.95

Reservoirs @ 0.00 hr

Label	Constituent (mg/l)	Calculated Hydraulic Grade (ft)	Reservoir Inflow (cfs)	Reservoir Outflow (cfs)
Sarival Road	N/A	1,219.19	N/A	51.80

Pipes @ 0.00 hr

Label	Status	Constituent (mg/l)	Flow (cfs)	Velocity (ft/s)	From Grade (ft)	To Grade (ft)	Friction Loss (ft)	Minor Loss (ft)	Total Headloss (ft)	Headloss Gradient (ft/1000ft)
Cotton Ln Lateral	Open	N/A	12.02	1.25	1,206.88	1,204.95	1.91	0.02	1.93	0.12
Miller Rd Lateral (1)	Open	N/A	35.01	4.95	1,305.13	1,302.99	1.84	0.30	2.14	2.14
Miller Rd Lateral (2)	Open	N/A	35.01	4.95	1,158.50	1,122.83	35.37	0.30	35.67	1.86
P-1	Open	N/A	51.80	5.38	1,219.19	1,206.88	9.58	2.73	12.31	2.31
P-2	Open	N/A	39.78	4.13	1,206.88	1,198.81	7.86	0.21	8.07	1.13
P-3	Open	N/A	39.78	4.13	1,198.81	1,198.59	0.01	0.21	0.22	21.81
P-4	Open	N/A	39.78	4.13	1,349.14	1,339.03	9.90	0.21	10.11	1.13
P-5	Open	N/A	39.78	4.13	1,339.03	1,333.29	5.53	0.21	5.74	1.14
P-6	Open	N/A	35.01	3.64	1,333.29	1,332.90	0.23	0.16	0.39	1.48
P-7	Open	N/A	35.01	3.64	1,332.90	1,328.37	4.37	0.16	4.53	0.90
P-8	Open	N/A	35.01	3.64	1,328.37	1,323.06	5.15	0.16	5.31	0.90
P-9	Open	N/A	35.01	3.64	1,323.06	1,316.92	5.98	0.16	6.14	0.89
P-10	Open	N/A	35.01	3.64	1,316.92	1,314.03	2.73	0.16	2.89	0.92
P-11	Open	N/A	35.01	3.64	1,314.03	1,311.80	2.07	0.16	2.23	0.94
P-12	Open	N/A	35.01	3.64	1,311.80	1,306.21	5.43	0.16	5.59	0.90
P-13	Open	N/A	35.01	3.64	1,306.21	1,305.13	0.92	0.16	1.08	1.02
Tuthill Rd Lateral	Open	N/A	4.77	6.07	1,333.29	1,186.95	145.89	0.45	146.34	9.76

Analysis Results
Scenario: Year 2025 Peak Demand
Steady State Analysis

Pumps @ 0.00 hr

Label	Status	Constituent (mg/l)	From Grade (ft)	To Grade (ft)	Flow (cfs)	Head (ft)	Relative Speed	Useful Power (Hp)
PMP-1	On	N/A	1,198.59	1,349.14	39.78	150.55	1.00	678.64

PRVs @ 0.00 hr

Label	Status	Constituent (mg/l)	From Grade (ft)	To Grade (ft)	Flow (cfs)	Headloss (ft)	Setting (psi)
PRV-1	Throttling	N/A	1,302.99	1,158.50	35.01	144.49	40.00

Table AP B-2

West Maricopa Combine, WESTCAPS
Potential Pipeline to The Future (PTTF), Alignment 2 (Reversal)

A — **Alignment 2 (Reversal): From Sarival Road along I - 10 to Buckeye Area**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Sarival Road	0	0	0	1,001	0	42	51.80	37,500	97	1,219
1	Tie to Cotton Lane Lateral	1.01	5,333	5,333	1,014	13	42	51.80	37,500	85	1,206
2		1.35	7,128	12,461	1,030	16	42	39.78	28,799	75	1,198
P	Pumps & Air Chamber	0.0038	20	12,481	1,030	0	42	39.78	28,799	140	1,349
4		1.7	8,976	21,457	1,071	41	42	39.78	28,799	118	1,339
5		0.95	5,016	26,473	1,086	15	42	39.78	28,799	110	1,334
6	Tie to Tuthill Road lateral	0.05	264	26,737	1,086	0	42	39.78	28,799	109	1,333
7		0.95	5,016	31,753	1,096	10	42	35.01	25,344	103	1,329
8		1.12	5,914	37,666	1,139	43	42	35.01	25,344	82	1,323
9	Air & Vacuum Valve	1.3	6,864	44,530	1,132	-7	42	35.01	25,344	82	1,317
1		0.6	3,168	47,698	1,104	-28	42	35.01	25,344	94	1,315
11		0.45	2,376	50,074	1,093	-11	42	35.01	25,344	97	1,312
12		1.18	6,230	56,305	1,086	-7	42	35.01	25,344	98	1,307
13	Tie to Miller Road Lateral	0.2	1,056	57,361	1,080	-6	42	35.01	25,344	100	1,306
Total		10.86	57,361			79					

Table AP B-2

West Maricopa Combine, WESTCAPS
Potential Pipeline to The Future (PTTF), Alignment 2 (Reversal)

B — **Miller Road Lateral: From Trunk Alignment 2 to Baseline Road**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	I - 10 Freeway	0	0	0	1,080	0	36	35.01	25,344	100	1,306
PRV(U)	PRV Upstream Side	0.1894	1,000	1,000	1,070	-10	36	35.01	25,344	104	1,304
PRV(D)	PRV Downstream Side	0.0009	5	1,005	1,070	0	36	35.01	25,344	40	1,158
1	Baseline Road	3.63	19,166	20,171	889	-181	36	35.01	25,344	104	1,123
Total		3.8203	20,171			-191					

C — **Tuthill Road Lateral: From Trunk Alignment 2 to Lower Buckeye Road**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	I - 10 Freeway	0	0	0	1,086	0	12	4.77	3,453	110	1,334
1	Lower Buckeye Rd	2.84	14,995	14,995	889	-197	12	4.77	3,453	131	1,187
Total		2.84	14,995			-197					

D — **Cotton Lane Lateral: From Trunk Alignment 2 to Lower Buckeye Road Storage Tank**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	I - 10 Freeway	0	0	0	1,014	0	42	12.02	8,702	85	1,206
1	Lower Buckeye Rd Storage Tanks	3.00	15,840	15,840	932	-82	42	12.02	8,702	120	1,204
Total		3.00	15,840			-82					

Figure AP B-2A

Alignment 2 (Reversal)
From Sarival Road along I - 10 to Buckeye Area
West Maricopa Combine, WESTCAPS

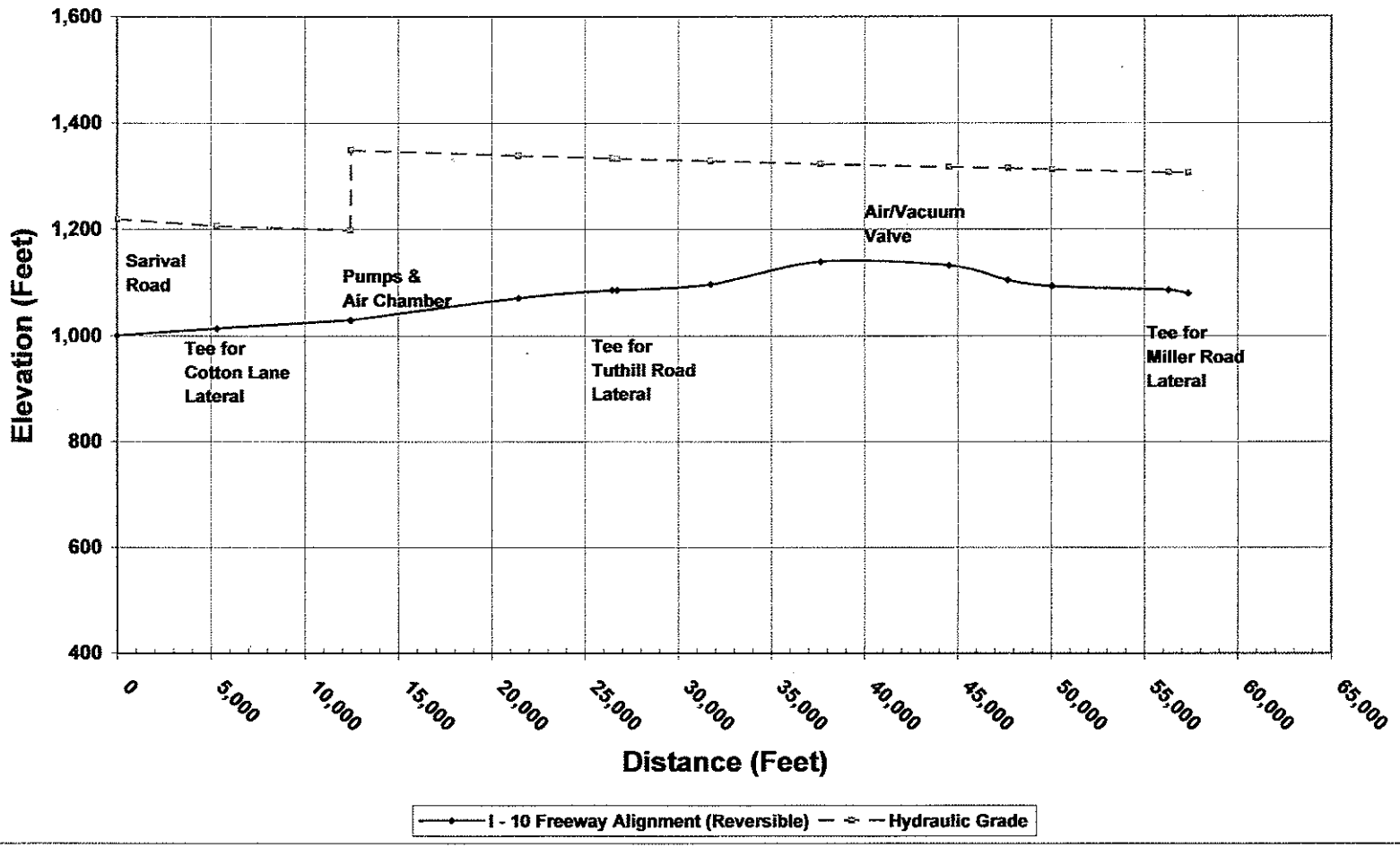


Figure AP B-2B

Miller Road Lateral
From Alignment 2 (Reversal) along Miller Road to Baseline Road
West Maricopa Combine, WESTCAPS

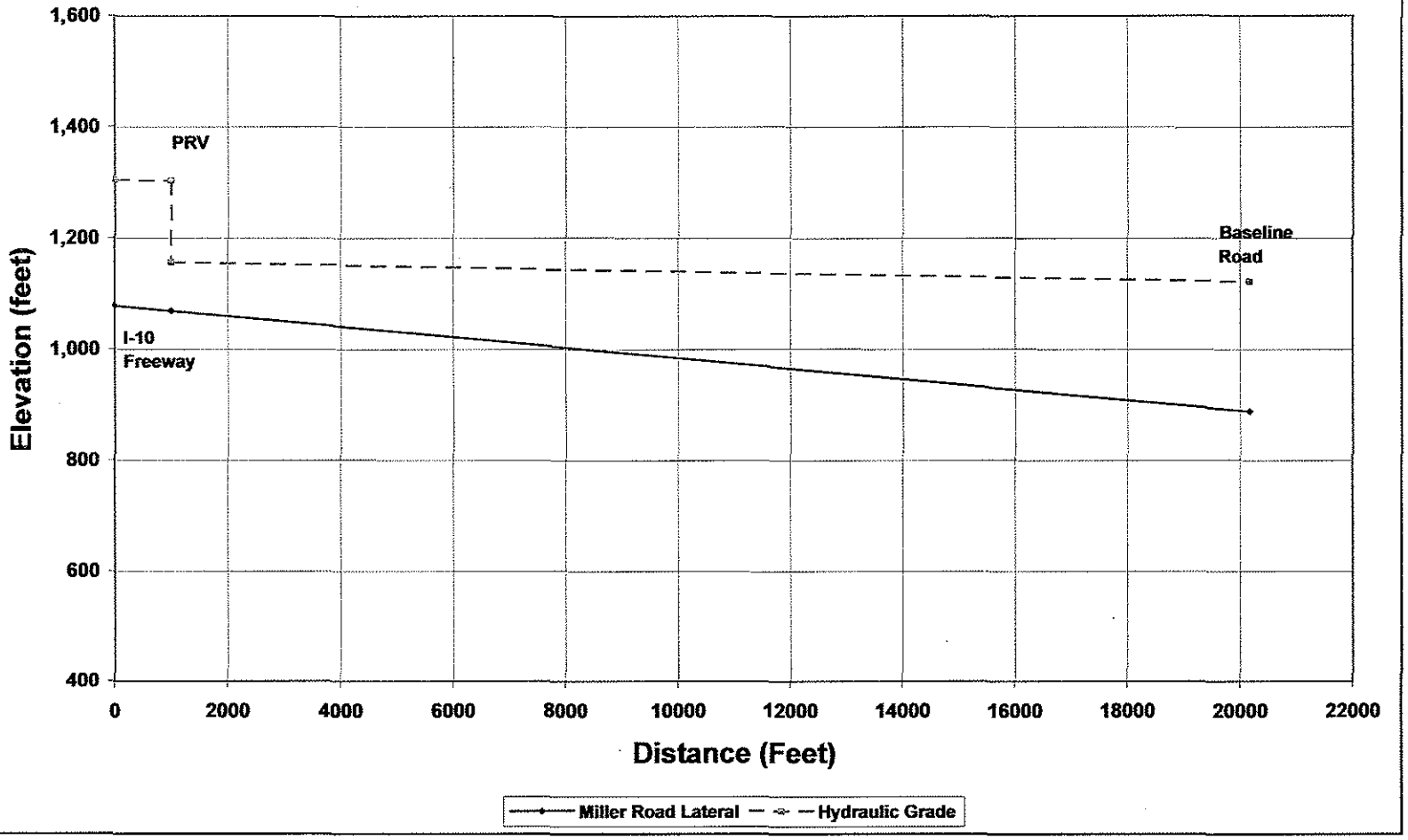


Figure AP B-2C

Tuthill Road Lateral
From Alignment 2 (Reversal) along Tuthill Road to Lower Buckeye Road
West Maricopa Combine, WESTCAPS

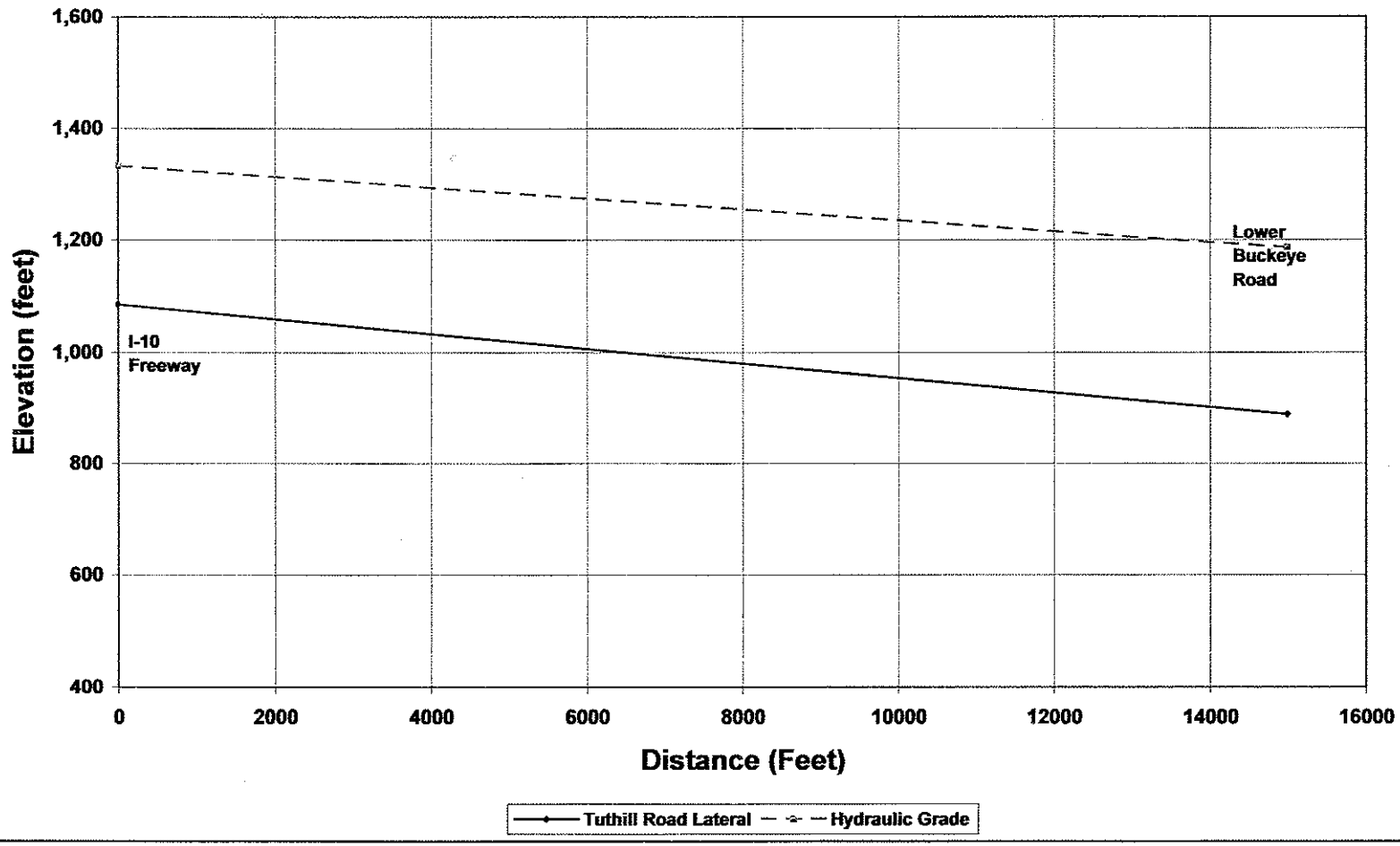
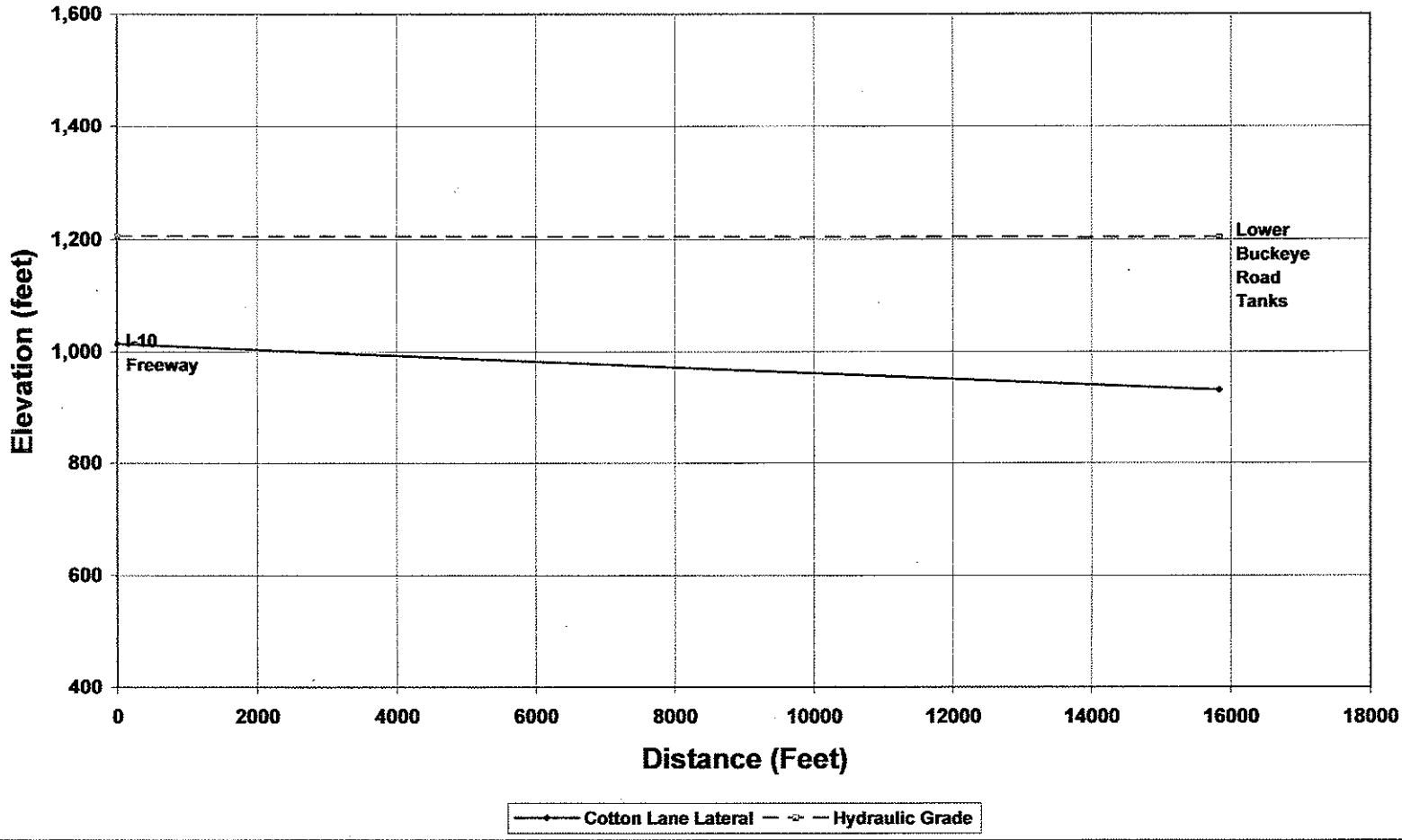


Figure AP B-2D

Cotton Lane Lateral
From Alignment 2 (Reversal) along Cotton Lane to Lower Buckeye Road Tanks
West Maricopa Combine, WESTCAPS



Appendix B-3

Alignment 3 with 3 Laterals (Reversal Flow)

1. **Schematic Model Layout and Hydraulic Results**

2. **Tables**
   Ground Profiles, Pipe Sizes, and Pressure Distributions

3. **Figure**
   Ground Profiles, Hydraulic Features, and Hydraulic Grade Lines

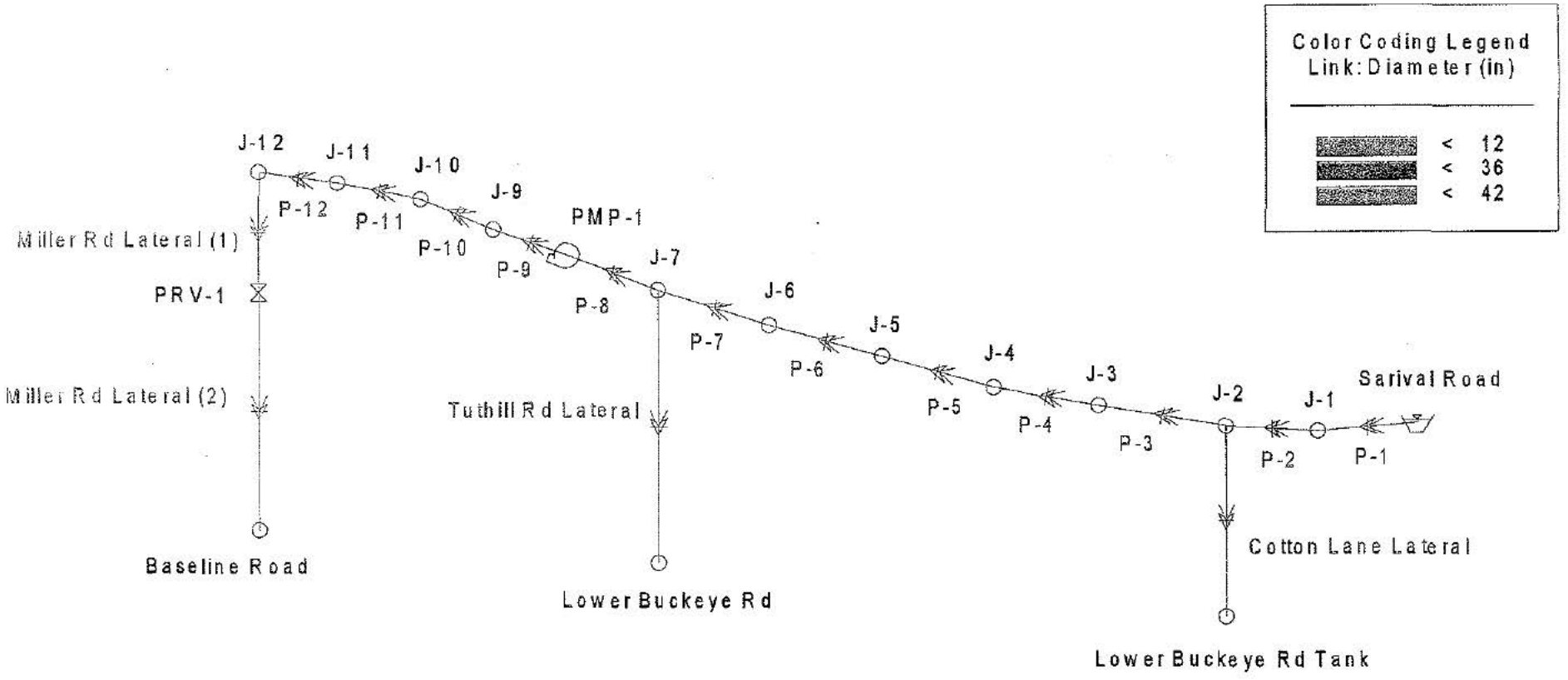
Scenario: Year 2025 Peak Demand

Alignment 3

Sarival Road to Buckeye Area along Yuma Road

West Maricopa Combine Pipeline to The Future (PTTF)

(Reversal Flow)



Title: WMC Sarival Road - Yuma Alignment 3 (Reversal Flow)
wmc sarival road - yuma pipe (rev), alt 3.wcd
02/19/02 09:47:26 AM

Bureau of Reclamation

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Project Engineer: Michael Lee
Cybernet v3.1 [071]

Analysis Results
Scenario

Title: WMC Sarival Road - Yuma Alignment (Rev), Alignment 3
Project Engineer: Michael Lee
Project Date: 11/21/01
Comments:

Scenario Summary	
Label	Year 2025 Peak Demand
Demand Alternative	Year 2025 Peak Demand
Physical Alternative	Year 2025 Peak Demand
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow

Liquid Characteristics			
Liquid	Water at 20C(68F)	Specific Gravity	1.00
Kinematic Viscosity	0.108e-4 ft²/s		

Network Inventory			
Number of Pipes	16	Number of Tanks	0
Number of Reservoirs	1	- Constant Area:	0
Number of Junctions	14	- Variable Area:	0
Number of Pumps	1	Number of Valves	1
- Constant Power:	0	- FCV's:	0
- One Point (Design Point):	1	- PBV's:	0
- Standard (3 Point):	0	- PRV's:	1
- Standard Extended:	0	- PSV's:	0
- Custom Extended:	0	- TCV's:	0
- Multiple Point:	0	Number of Spot Elevations	0

Pipe Inventory			
Total Length	87,394.00 ft		
12 in	5,280.00 ft	42 in	61,944.00 ft
36 in	20,170.00 ft		

Analysis Results
Scenario: Year 2025 Peak Demand
Steady State Analysis

Junctions @ 0.00 hr

Label	Constituent (mg/l)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Demand (Calculated) (cfs)	Pressure Head (ft)
Baseline Road	N/A	1,155.96	117.60	35.01	271.96
J-1	N/A	1,222.88	113.68	0.00	262.88
J-2	N/A	1,217.31	111.27	0.00	257.31
J-3	N/A	1,215.53	107.91	0.00	249.53
J-4	N/A	1,210.37	103.08	0.00	238.37
J-5	N/A	1,208.42	104.83	0.00	242.42
J-6	N/A	1,201.26	94.81	0.00	219.26
J-7	N/A	1,193.19	82.68	0.00	191.19
J-9	N/A	1,282.95	98.57	0.00	227.95
J-10	N/A	1,278.33	93.98	0.00	217.33
J-11	N/A	1,270.90	83.42	0.00	192.90
J-12	N/A	1,267.07	78.73	0.00	182.07
Lower Buckeye Rd	N/A	1,141.37	111.29	4.77	257.37
Lower Buckeye Rd Tai	N/A	1,216.50	125.19	12.02	289.50

Reservoirs @ 0.00 hr

Label	Constituent (mg/l)	Calculated Hydraulic Grade (ft)	Reservoir Inflow (cfs)	Reservoir Outflow (cfs)
Sarival Road	N/A	1,229.69	N/A	51.80

Pipes @ 0.00 hr

Label	Status	Constituent (mg/l)	Flow (cfs)	Velocity (ft/s)	From Grade (ft)	To Grade (ft)	Friction Loss (ft)	Minor Loss (ft)	Total Headloss (ft)	Headloss Gradient (ft/1000ft)
Cotton Lane Lateral	Open	N/A	12.02	1.25	1,217.31	1,216.50	0.80	0.02	0.81	0.12
Miller Rd Lateral (1)	Open	N/A	35.01	4.95	1,267.07	1,264.92	1.84	0.30	2.14	2.14
Miller Rd Lateral (2)	Open	N/A	35.01	4.95	1,191.62	1,155.96	35.37	0.30	35.67	1.86
P-1	Open	N/A	51.80	5.38	1,229.69	1,222.88	4.08	2.73	6.81	3.00
P-2	Open	N/A	51.80	5.38	1,222.88	1,217.31	5.22	0.35	5.57	1.92
P-3	Open	N/A	39.78	4.13	1,217.31	1,215.53	1.57	0.21	1.78	1.25
P-4	Open	N/A	39.78	4.13	1,215.53	1,210.37	4.95	0.21	5.16	1.15
P-5	Open	N/A	39.78	4.13	1,210.37	1,208.42	1.75	0.21	1.95	1.23
P-6	Open	N/A	39.78	4.13	1,208.42	1,201.26	7.16	0.00	7.16	1.10
P-7	Open	N/A	39.78	4.13	1,201.26	1,193.19	7.86	0.21	8.07	1.13
P-8	Open	N/A	35.01	3.64	1,193.19	1,193.02	0.01	0.16	0.17	16.91
P-9	Open	N/A	35.01	3.64	1,293.00	1,282.95	9.89	0.16	10.05	0.89
P-10	Open	N/A	35.01	3.64	1,282.95	1,278.33	4.46	0.16	4.62	0.90
P-11	Open	N/A	35.01	3.64	1,278.33	1,270.90	7.26	0.16	7.43	0.89
P-12	Open	N/A	35.01	3.64	1,270.90	1,267.07	3.68	0.16	3.84	0.91
Tuthill Rd Lateral	Open	N/A	4.77	6.07	1,193.19	1,141.37	51.37	0.45	51.82	9.81

Analysis Results
Scenario: Year 2025 Peak Demand
Steady State Analysis

Pumps @ 0.00 hr

Label	Status	Constituent (mg/l)	From Grade (ft)	To Grade (ft)	Flow (cfs)	Head (ft)	Relative Speed	Useful Power (Hp)
PMP-1	On	N/A	1,193.02	1,293.00	35.01	99.98	1.00	396.65

PRVs @ 0.00 hr

Label	Status	Constituent (mg/l)	From Grade (ft)	To Grade (ft)	Flow (cfs)	Headloss (ft)	Setting (psi)
PRV-1	Throttling	N/A	1,264.92	1,191.62	35.01	73.30	50.00

Table AP B-3

West Maricopa Combine, WESTCAPS
Potential Pipeline to The Future (PTTF), Alignment 3 (Reversal)

A **Alignment 3 (Reversal): From Sarival Road along Yuma Road to Buckeye Area**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Sarival Road	0	0	0	971	0	42	51.80	37,500	114	1,229
1		0.43	2,270	2,270	965	-6	42	51.80	37,500	114	1,222
2	Tie to Cotton Lane Lateral	0.55	2,904	5,174	965	0	42	39.78	28,799	111	1,217
3		0.27	1,426	6,600	971	6	42	39.78	28,799	108	1,215
4		0.85	4,488	11,088	977	6	42	39.78	28,799	103	1,210
5		0.3	1,584	12,672	971	-6	42	39.78	28,799	105	1,208
6		1.23	6,494	19,166	987	16	42	39.78	28,799	95	1,201
7	Tie to Tuthill Road Lateral	1.35	7,128	26,294	1,007	20	42	39.78	28,799	83	1,193
P	Pumps & Air Chamber	0.0038	20	26,314	1,007	0	42	35.01	25,344	126	1,293
9		2.15	11,352	37,666	1,060	53	42	35.01	25,344	99	1,283
10		0.97	5,122	42,788	1,066	6	42	35.01	25,344	94	1,279
11		1.58	8,342	51,130	1,083	17	42	35.01	25,344	84	1,271
12	Tie to Miller Road Lateral	0.8	4,224	55,354	1,090	7	42	35.01	25,344	79	1,267
Total		10.48	55,354			119					

Table AP B-3

West Maricopa Combine, WESTCAPS
Potential Pipeline to The Future (PTTF), Alignment 3 (Reversal)

B — **Miller Road Lateral: From Trunk Alignment 3 (Reversal) to Baseline Road**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Yuma Road	0	0	0	1,091	0	36	35.01	25,344	78	1,267
PRV(U)	PRV Upstream Side	0.1894	1,000	1,000	1,081	-10	36	35.01	25,344	82	1,265
PRV(D)	PRV Downstream Side	0.0009	5	1,005	1,081	0	36	35.01	25,344	50	1,191
1	Baseline Road	3.79	20,011	21,016	889	-192	36	35.01	25,344	118	1,156
Total		3.98	21,016			-202					

C — **Tuthill Road Lateral: From Trunk Alignment 3 (Reversal) to Lower Buckeye Road**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Yuma Road	0	0	0	1,007	0	12	4.77	3,453	83	1,193
1	Lower Buckeye Rd	1.00	5,280	5,280	889	-118	12	4.77	3,453	111	1,141
Total		1.00	5,280			-118					

D — **Cotton Lane Lateral: From Trunk Alignment 3 (Reversal) to Lower Buckeye Road Storage Tank**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Yuma Road	0	0	0	1,007	0	42	12.02	8,702	93	1,217
1	Lower Buckeye Rd Storage Tanks	1.25	6,600	6,600	932	-75	42	12.02	8,702	125	1,216
Total		1.25	6,600			-75					

Figure AP B-3A

Alignment 3 (Reversal)
From Sarival Road along Yuma Road to Buckeye Area
West Maricopa Combine, WESTCAPS

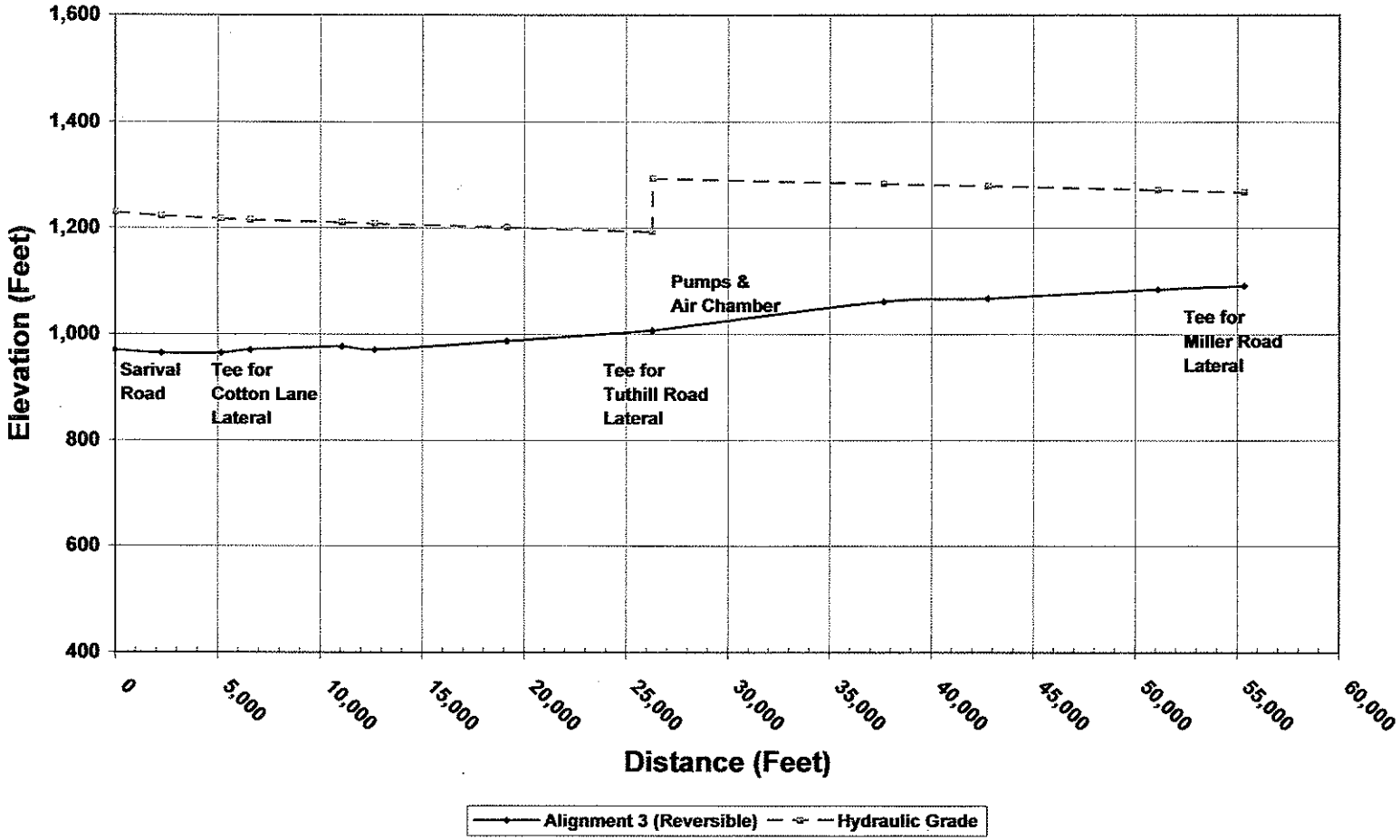


Figure AP B-3B

Miller Road Lateral
From Alignment 3 (Reversal) along Miller Road to Baseline Road
West Maricopa Combine, WESTCAPS

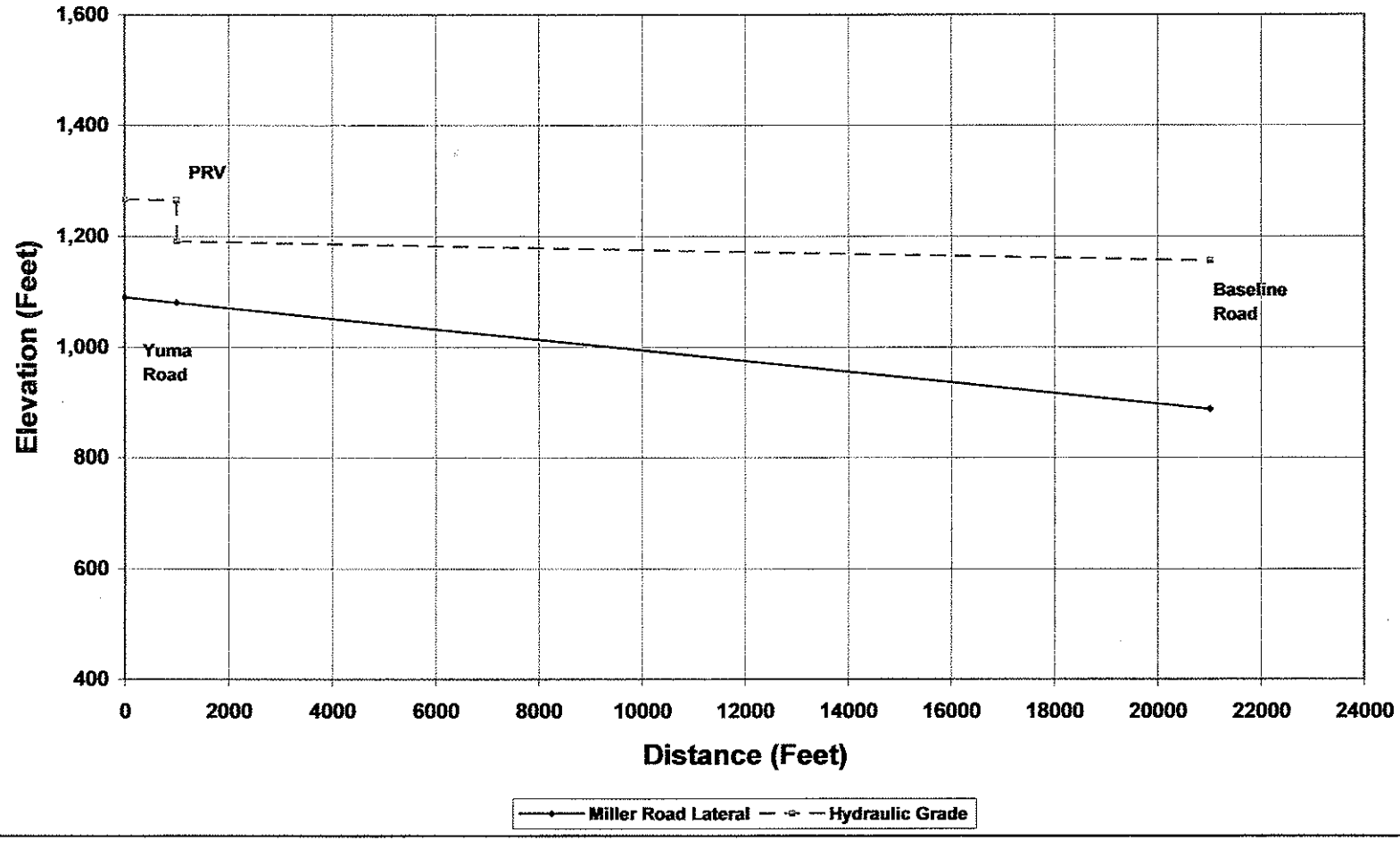


Figure AP B-3C

Tuthill Road Lateral
From Alignment 3 (Reversal) along Tuthill Road to Lower Buckeye Road
West Maricopa Combine, WESTCAPS

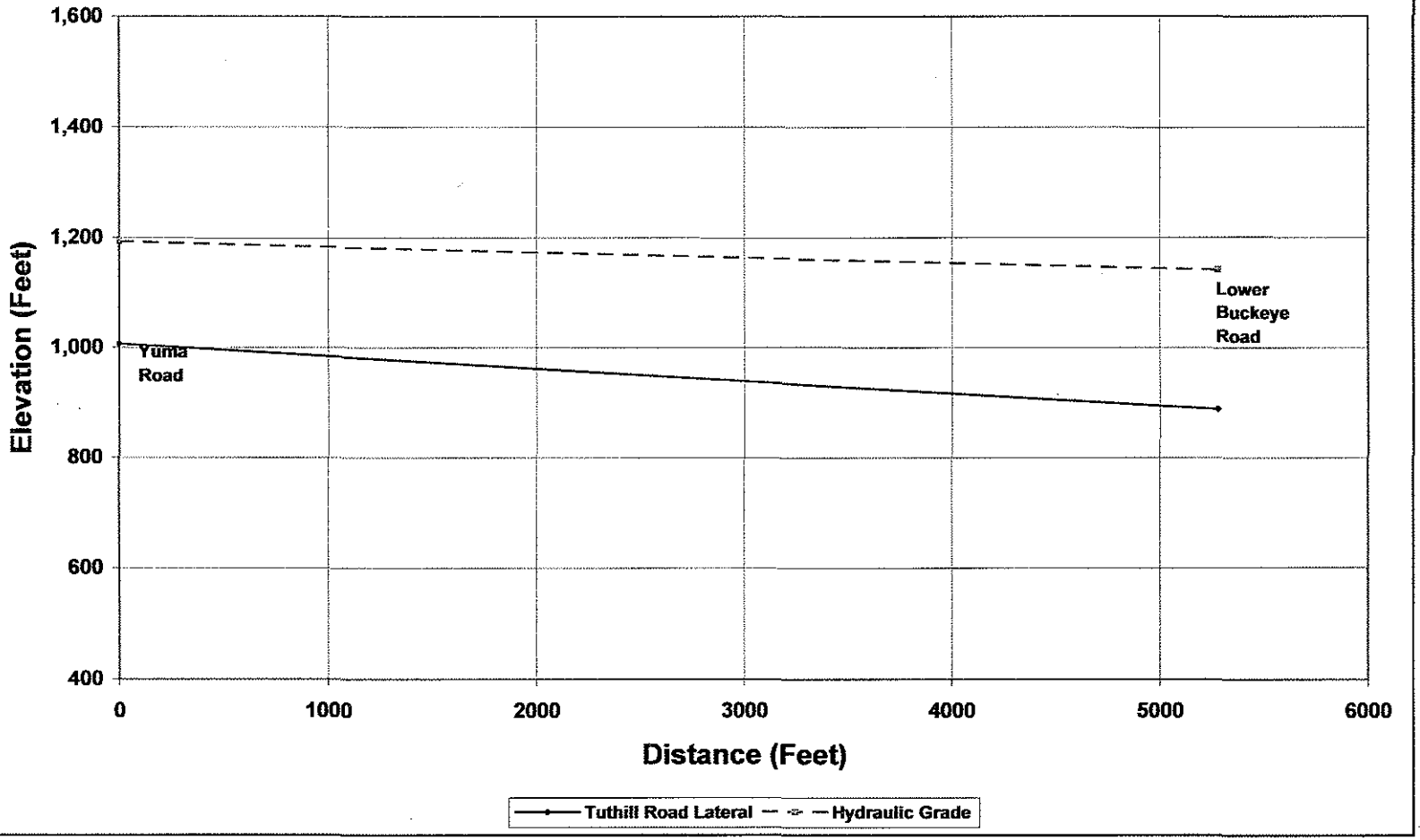
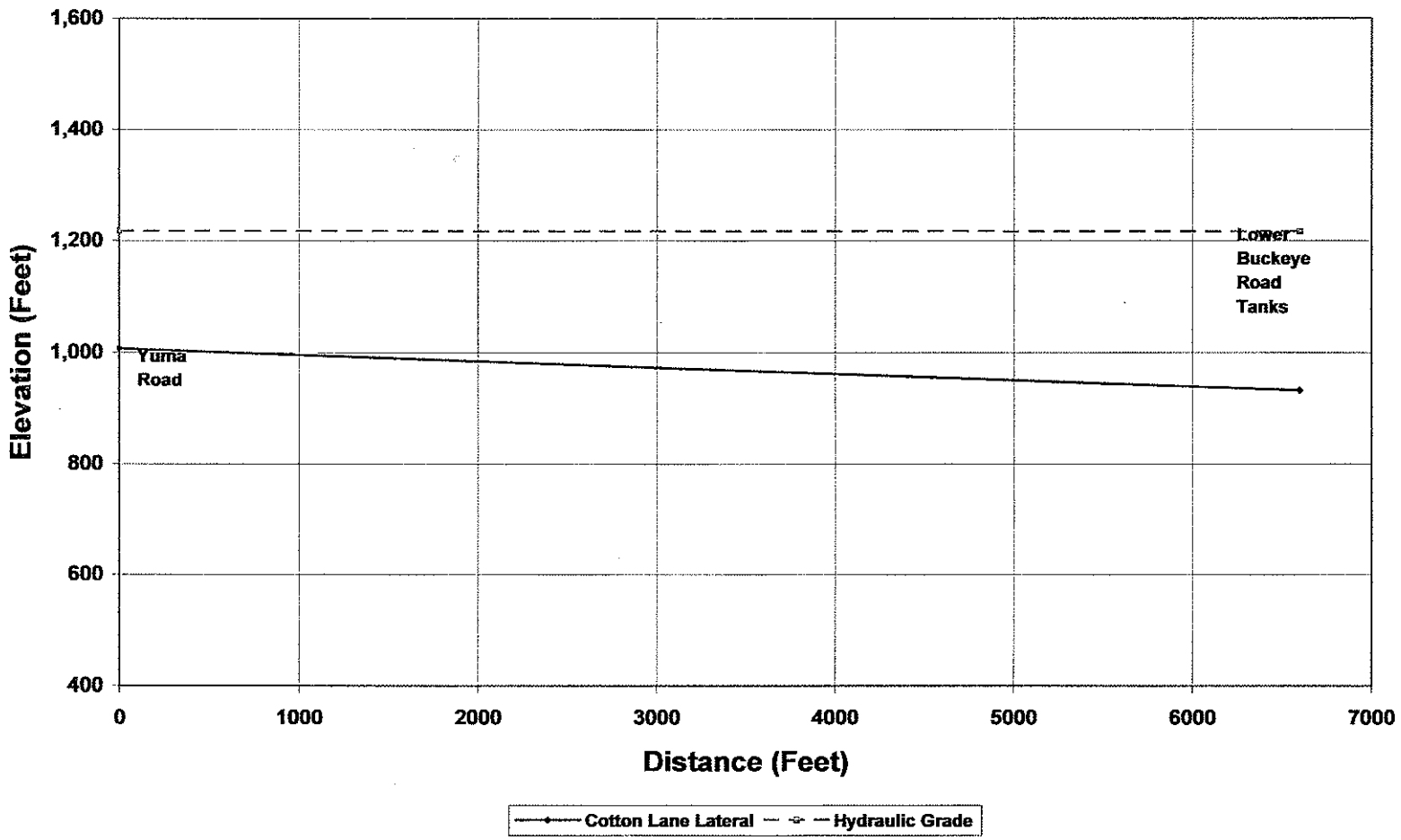


Figure AP B-3D

Cotton Lane Lateral
From Alignment 3 (Reversal) along Cotton Lane to Lower Buckeye Road Tanks
West Maricopa Combine, WESTCAPS



Appendix B-S

Summary
For
All Alignments
(Reversal Flow)

Tables

1. **Overall Quantity, and Pumps Summary**
2. **Construction and Capital Cost Estimation**
3. **Annual Operating Costs**
4. **Total Annual Costs, and Costs per 1,000 Gallons of Water Delivered**

Table AP B-S1

Quantity Estimation
Water Delivery (Year 2025 Adjusted Demand) from Sarival Road (Reversible)
West Maricopa Combine Pipeline to the Future (PTTF)

I. Pumps' Summary

Item	Description	Unit	Size	Alignment		
				1	2	3
Number of Pump		each		1	1	1
Pumpage	Maximum in cfs	cfs		39.78	39.78	35.01
	Maximum in acre-feet a year	AF/Yr		28,799	28,799	25,344
Total Dynamic Head	Energy head required	Feet		151	151	100
Power	Horse power	H.P.		850	850	500

Table AP B-S2

Pumps Construction & Capital Costs Estimation
Water Delivery from Sarival Road (Reversible)
West Maricopa Combine Pipeline to the Future (PTTF)

Item	Description	Unit	Size	Construction & Caoital Costs ($) Alignment 1	2	3
Pumps (80 % Efficiency)	near Recharge site storage	(H.P.)	500			$439,400
including housing structures	near Recharge site storage	(H.P.)	850	$485,650	$485,650	
Subtotal				$485,650	$485,650	$439,400
Contingency: %	Percent of Total Construction Cost	%	20	$97,130	$97,130	$87,880
Engineering & Administration, %	Percent of Total Construction Cost	%	20	$97,130	$97,130	$87,880
Total Capital Cost				$679,910	$679,910	$615,160

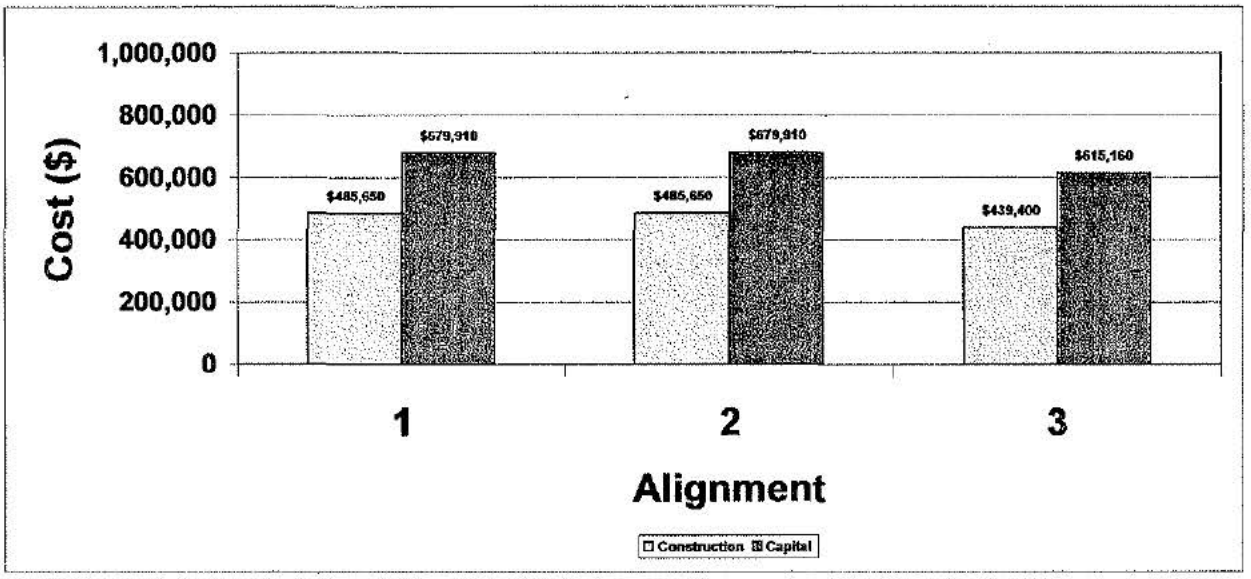


Table AP B-S3

Annual Pumps Operating and Maintenance Cost
Water Delivery from Sarival Road (Reversible)
West Maricopa Combine Pipeline to the Future (PTTF)

Item	Alignment		
	1	2	3
Pump O.& M. Cost	$376,883	$376,883	$219,648
Pumping Energy Cost	$222,189	$222,189	$130,699
Total PumpsO.& M. Cost	$599,072	$599,072	$350,347

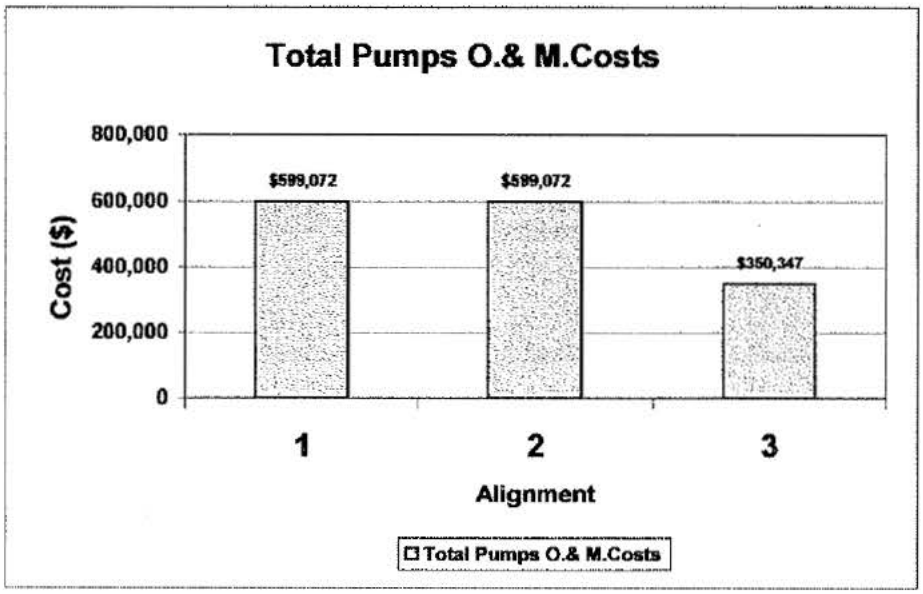
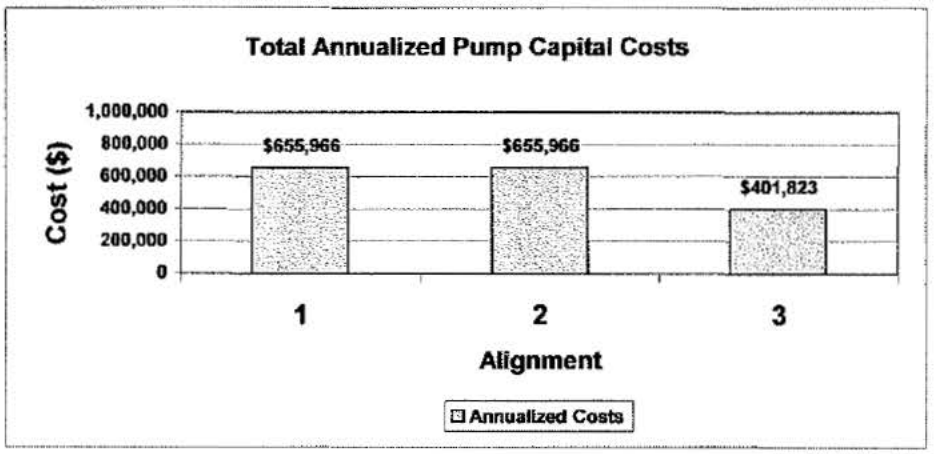
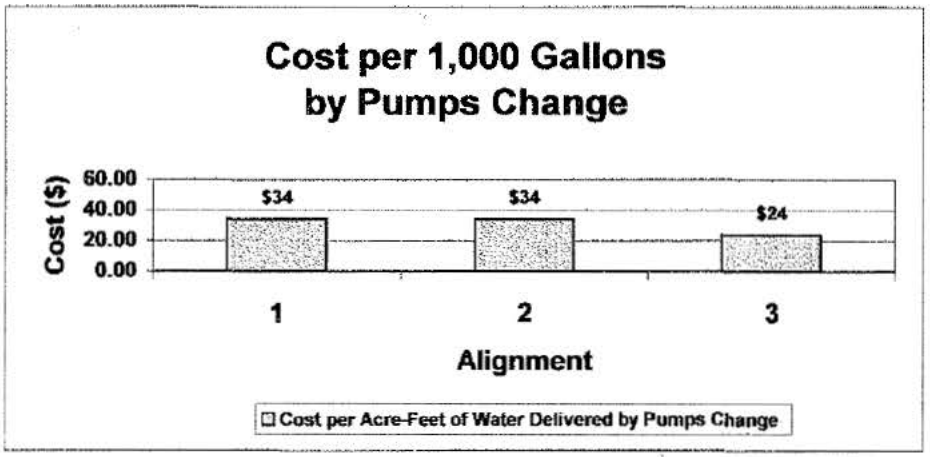


Table AP B-S4

Annualized Pump Capital, and O.& M. Costs
Water Delivery from Sarival Road (Reversible)
West Maricopa Combine Pipeline to the Future (PTTF)

Item	Alignment		
	1	2	3
Annual Water Delivered	19,199	19,199	16,896
20 Years' Amortized Capital Cost	$56,894	$56,894	$51,476
Annual Pump O.& M. Cost	$599,072	$599,072	$350,347
Total Annualized Cost	$655,966	$655,966	$401,823
Cost per Acre-Foot	$34	$34	$24
Cost per 1,000 Gallons	$0.10	$0.10	$0.07





Appendix C

Transient Years' Water Delivery Along Preferred Alignment 3 (Forward Flow)

Appendix C-1

Year 2005
(Forward Flow)

1. **Schematic Model Layout and Hydraulic Results**

2. **Tables**
   Ground Profiles, Pipe Sizes, and Pressure Distributions

3. **Figure**
   Ground Profiles, Hydraulic Features, and Hydraulic Grade Lines

Scenario: Year 2005 Peak Demand

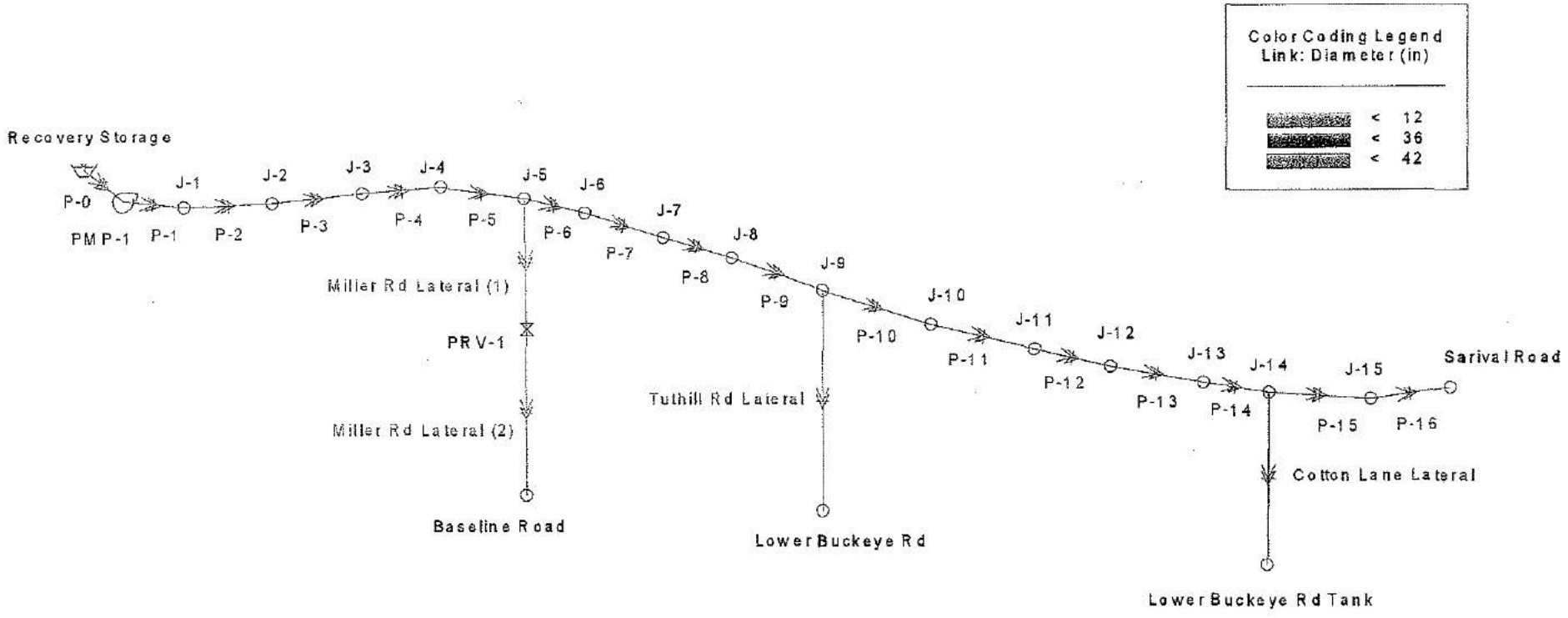
Alignment 3

Recovery Storage to Sarival Road along Dike and Yuma Road

West Maricopa Combine Pipeline to The Future (PTTF)

(Forward Flow)

Year 2005 Water Delivery



Title: WMC Dike-Yuma Alignment 3 (Forward Flow) - 2005
I:\...\westcaps\wmc dike-yuma pipe-2005, alt 3.wcd
02/19/02 09:47:55 AM

Bureau of Reclamation

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Project Engineer: Michael Lee
Cybernet v3.1 [071]

Analysis Results
Scenario

Title: WMC Dike-Yuma Alignment 3 - 2005
Project Engineer: Michael Lee
Project Date: 11/21/01
Comments:

Scenario Summary	
Label	Year 2005 Peak Demand
Demand Alternative	Year 2005 Peak Demand
Physical Alternative	Year 2005 Peak Demand
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow

Liquid Characteristics			
Liquid	Water at 20C(68F)	Specific Gravity	1.00
Kinematic Viscosity	0.108e-4 ft²/s		

Network Inventory			
Number of Pipes	21	Number of Tanks	0
Number of Reservoirs	1	- Constant Area:	0
Number of Junctions	19	- Variable Area:	0
Number of Pumps	1	Number of Valves	1
- Constant Power:	0	- FCV's:	0
- One Point (Design Point):	1	- PBV's:	0
- Standard (3 Point):	0	- PRV's:	1
- Standard Extended:	0	- PSV's:	0
- Custom Extended:	0	- TCV's:	0
- Multiple Point:	0	Number of Spot Elevations	0

Pipe Inventory			
Total Length	118,292.00 ft		
12 in	5,280.00 ft	42 in	92,842.00 ft
36 in	20,170.00 ft		

Analysis Results
Scenario: Year 2005 Peak Demand
Steady State Analysis

Junctions @ 0.00 hr

Label	Constituent (mg/l)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Demand (Calculated) (cfs)	Pressure Head (ft)
Baseline Road	N/A	1,190.42	132.51	5.62	306.42
J-1	N/A	1,297.25	102.16	0.00	236.25
J-2	N/A	1,275.35	82.75	0.00	191.35
J-3	N/A	1,254.78	77.31	0.00	178.78
J-4	N/A	1,251.87	72.59	0.00	167.87
J-5	N/A	1,246.77	69.95	0.00	161.77
J-6	N/A	1,240.35	70.21	0.00	162.35
J-7	N/A	1,227.94	72.19	0.00	166.94
J-8	N/A	1,220.22	71.45	0.00	165.22
J-9	N/A	1,203.44	87.11	0.00	201.44
J-10	N/A	1,193.39	91.41	0.00	211.39
J-11	N/A	1,184.48	94.48	0.00	218.48
J-12	N/A	1,182.04	90.83	0.00	210.04
J-13	N/A	1,175.88	90.76	0.00	209.88
J-14	N/A	1,173.66	92.40	0.00	213.66
J-15	N/A	1,173.49	92.32	0.00	213.49
Lower Buckeye Rd	N/A	1,198.01	135.79	1.41	314.01
Lower Buckeye Rd Tai	N/A	1,167.15	103.85	36.89	240.15
Sarival Road	N/A	1,173.36	89.67	7.88	207.36

Reservoirs @ 0.00 hr

Label	Constituent (mg/l)	Calculated Hydraulic Grade (ft)	Reservoir Inflow (cfs)	Reservoir Outflow (cfs)
Recovery Storage	N/A	1,110.00	N/A	51.80

Pipes @ 0.00 hr

Label	Status	Constituent (mg/l)	Flow (cfs)	Velocity (ft/s)	From Grade (ft)	To Grade (ft)	Friction Loss (ft)	Minor Loss (ft)	Total Headloss (ft)	Headloss Gradient (ft/1000ft)
Cotton Lane Lateral	Open	N/A	36.89	3.83	1,173.66	1,167.15	6.33	0.18	6.51	0.99
Miller Rd Lateral (1)	Open	N/A	5.62	0.80	1,246.77	1,246.70	0.06	0.01	0.07	0.07
Miller Rd Lateral (2)	Open	N/A	5.62	0.80	1,191.62	1,190.42	1.20	0.01	1.21	0.06
P-0	Open	N/A	51.80	5.38	1,110.00	1,108.94	0.04	1.03	1.06	53.11
P-1	Open	N/A	51.80	5.38	1,304.05	1,297.25	6.45	0.35	6.80	1.90
P-2	Open	N/A	51.80	5.38	1,297.25	1,275.35	21.55	0.35	21.90	1.83
P-3	Open	N/A	51.80	5.38	1,275.35	1,254.78	20.22	0.35	20.57	1.83
P-4	Open	N/A	51.80	5.38	1,254.78	1,251.87	2.56	0.35	2.91	2.04
P-5	Open	N/A	51.80	5.38	1,251.87	1,246.77	4.75	0.35	5.10	1.93
P-6	Open	N/A	46.18	4.80	1,246.77	1,240.35	6.14	0.28	6.42	1.52
P-7	Open	N/A	46.18	4.80	1,240.35	1,227.94	12.13	0.28	12.41	1.49
P-8	Open	N/A	46.18	4.80	1,227.94	1,220.22	7.45	0.28	7.72	1.51
P-9	Open	N/A	46.18	4.80	1,220.22	1,203.44	16.50	0.28	16.78	1.48
P-10	Open	N/A	44.77	4.65	1,203.44	1,193.39	9.78	0.26	10.05	1.41
P-11	Open	N/A	44.77	4.65	1,193.39	1,184.48	8.91	0.00	8.91	1.37
P-12	Open	N/A	44.77	4.65	1,184.48	1,182.04	2.17	0.26	2.44	1.54

Analysis Results
Scenario: Year 2005 Peak Demand
Steady State Analysis

Pipes @ 0.00 hr

Label	Status	Constituent (mg/l)	Flow (cfs)	Velocity (ft/s)	From Grade (ft)	To Grade (ft)	Friction Loss (ft)	Minor Loss (ft)	Total Headloss (ft)	Headloss Gradient (ft/1000ft)
P-13	Open	N/A	44.77	4.65	1,182.04	1,175.88	6.16	0.00	6.16	1.37
P-14	Open	N/A	44.77	4.65	1,175.88	1,173.66	1.96	0.26	2.22	1.56
P-15	Open	N/A	7.88	0.82	1,173.66	1,173.49	0.16	0.01	0.17	0.06
P-16	Open	N/A	7.88	0.82	1,173.49	1,173.36	0.13	0.01	0.13	0.06
Tuthill Rd Lateral	Open	N/A	1.41	1.80	1,203.44	1,198.01	5.39	0.04	5.43	1.03

Pumps @ 0.00 hr

Label	Status	Constituent (mg/l)	From Grade (ft)	To Grade (ft)	Flow (cfs)	Head (ft)	Relative Speed	Useful Power (Hp)
PMP-1	On	N/A	1,108.94	1,304.05	51.80	195.11	1.00	1,145.28

PRVs @ 0.00 hr

Label	Status	Constituent (mg/l)	From Grade (ft)	To Grade (ft)	Flow (cfs)	Headloss (ft)	Setting (psi)
PRV-1	Throttling	N/A	1,246.70	1,191.62	5.62	55.07	50.00

Table AP C-1

West Maricopa Combine, WESTCAPS
Potential Pipeline to The Future (PTTF) Alignment 3 - Forward Flow - 2005

A **Alignment 3: From the Recovery Storage Site along Dike and Yuma Road to Sarival Road**

Profile Point	Comment	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2005 Design Peak Flow (cfs)	Year 2005 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Recovery Site Storage	0	0	0	1,099	0	42	51.80	37,500	7	1,109
P	Pump Station & Air Chamber	0.0038	20	20	1,099	0	42	51.80	37,500	91	1,304
1	Blow-off Valve	0.68	3,590	3,610	1,066	-33	42	51.80	37,500	102	1,297
2	Air & Vacuum Valve	2.27	11,986	15,596	1,089	23	42	51.80	37,500	83	1,275
3		2.13	11,246	26,842	1,081	-8	42	51.80	37,500	77	1,254
4		0.27	1,426	28,268	1,089	8	42	51.80	37,500	72	1,251
5	Tie to Miller Road Lateral & Air & Vacuum Valve	0.5	2,640	30,908	1,090	1	42	51.80	37,500	70	1,246
6		0.8	4,224	35,132	1,083	-7	42	46.18	27,729	70	1,240
7		1.58	8,342	43,474	1,066	-17	42	46.18	27,729	72	1,227
8		0.97	5,122	48,596	1,060	-6	42	46.18	27,729	72	1,220
9	Tie to Tuthill Road Lateral	2.15	11,352	59,948	1,007	-53	42	46.18	27,729	87	1,203
10		1.35	7,128	67,076	987	-20	42	44.77	26,710	91	1,193
11		1.23	6,494	73,570	971	-16	42	44.77	26,710	94	1,184
12		0.3	1,584	75,154	977	6	42	44.77	26,710	91	1,182
13		0.85	4,488	79,642	971	-6	42	44.77	26,710	91	1,175
14	Tie to Cotton Lane Lateral	0.27	1,426	81,068	965	-6	42	44.77	26,710	92	1,173
15		0.55	2,904	83,972	965	0	42	7.88	5,700	92	1,173
16	Sarival Road	0.43	2,270	86,242	971	6	42	7.88	5,700	90	1,173
Total		16.3338	86,242			-128					

Table AP C-1

West Maricopa Combine, WESTCAPS
Potential Pipeline to The Future (PTTF) Alignment 3 - Forward Flow - 2005

B — **Miller Road Lateral: From Trunk Alignment 3 to Baseline Road**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2005 Design Peak Flow (cfs)	Year 2005 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Yuma Road	0	0	0	1,091	0	36	5.62	4,071	69	1,246
PRV(U)	PRV Upstream Side	0.1894	1,000	1,000	1,081	-10	36	5.62	4,071	74	1,246
PRV(D)	PRV Downstream Side	0.0009	5	1,005	1,081	0	36	5.62	4,071	50	1,191
1	Baseline Road	3.79	20,011	21,016	889	-192	36	5.62	4,071	133	1,190
Total		3.9803	21,016			-202					

C — **Tuthill Road Lateral: From Trunk Alignment 3 to Lower Buckeye Road**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2005 Design Peak Flow (cfs)	Year 2005 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Yuma Road	0	0	0	1,007	0	12	1.41	1,019	87	1,203
1	Lower Buckeye Rd	1	5,280	5,280	889	-118	12	1.41	1,019	136	1,198
Total		1	5,280			-118					

D — **Cotton Lane Lateral: From Trunk Alignment 3 to Lower Buckeye Road Storage Tank**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2005 Design Peak Flow (cfs)	Year 2005 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Yuma Road	0	0	0	965	0	42	36.89	26,710	92	1,173
1	Lower Buckeye Rd Storage Tanks	1.25	6,600	6,600	932	-33	42	36.89	26,710	104	1,167
Total		1.25	6,600			-33					

Figure AP C-1A

Alignment 3
From Recovery Site along Dike and Yuma Road to Sarival Road
West Maricopa Combine, WESTCAPS
Year 2005 Water Delivery Scenario

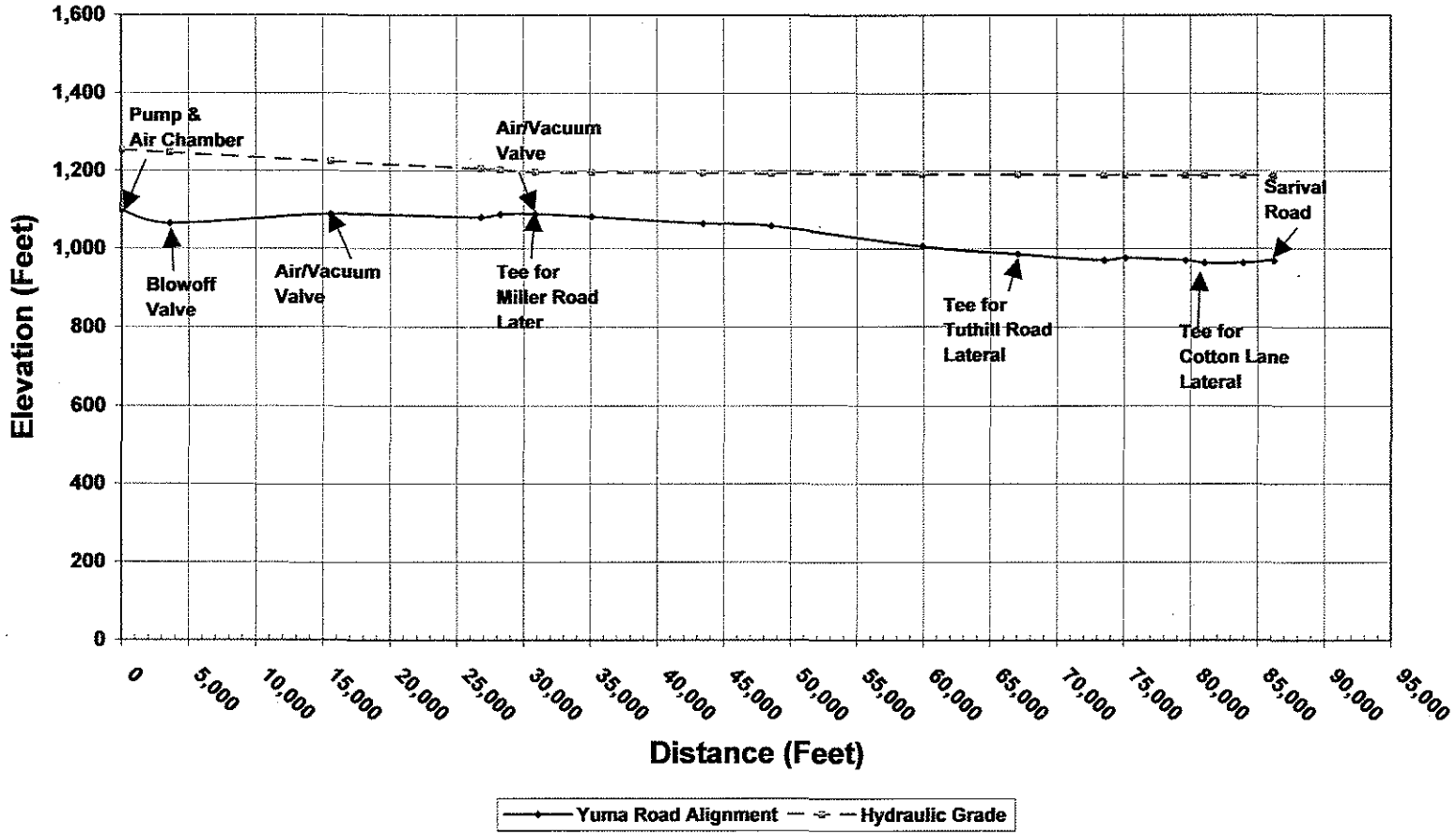


Figure AP C-1B

Miller Road Lateral
From Alignment 3 along Miller Road to Baseline Road
West Maricopa Combine, WESTCAPS
Year 2005 Water Water Delivery Scenario

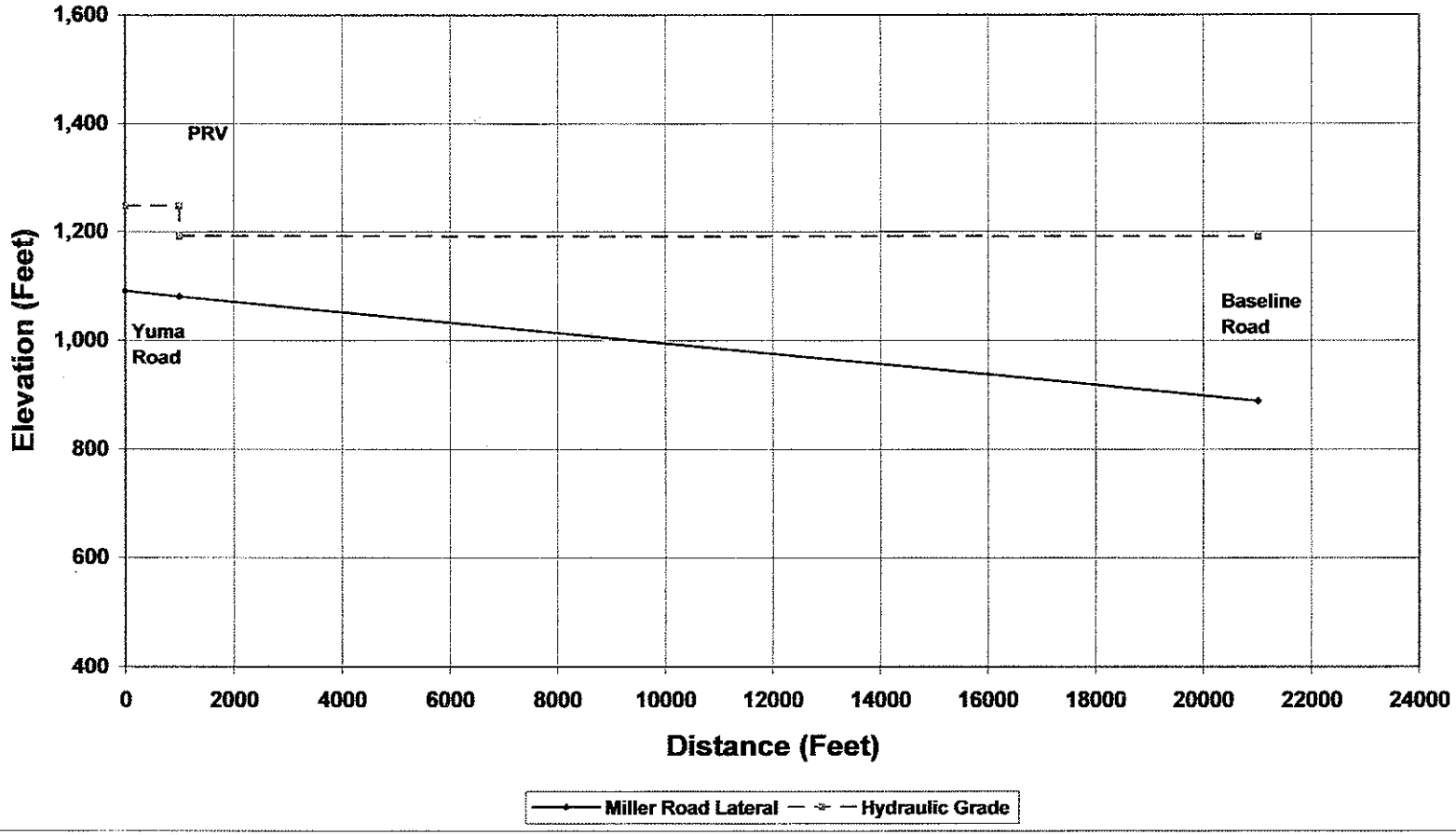


Figure AP C-1C

Tuthill Road Lateral
From Alignment 3 along Tuthill Road to Lower Buckeye Road
West Maricopa Combine, WESTCAPS
Year 2005 Water Water Delivery Scenario

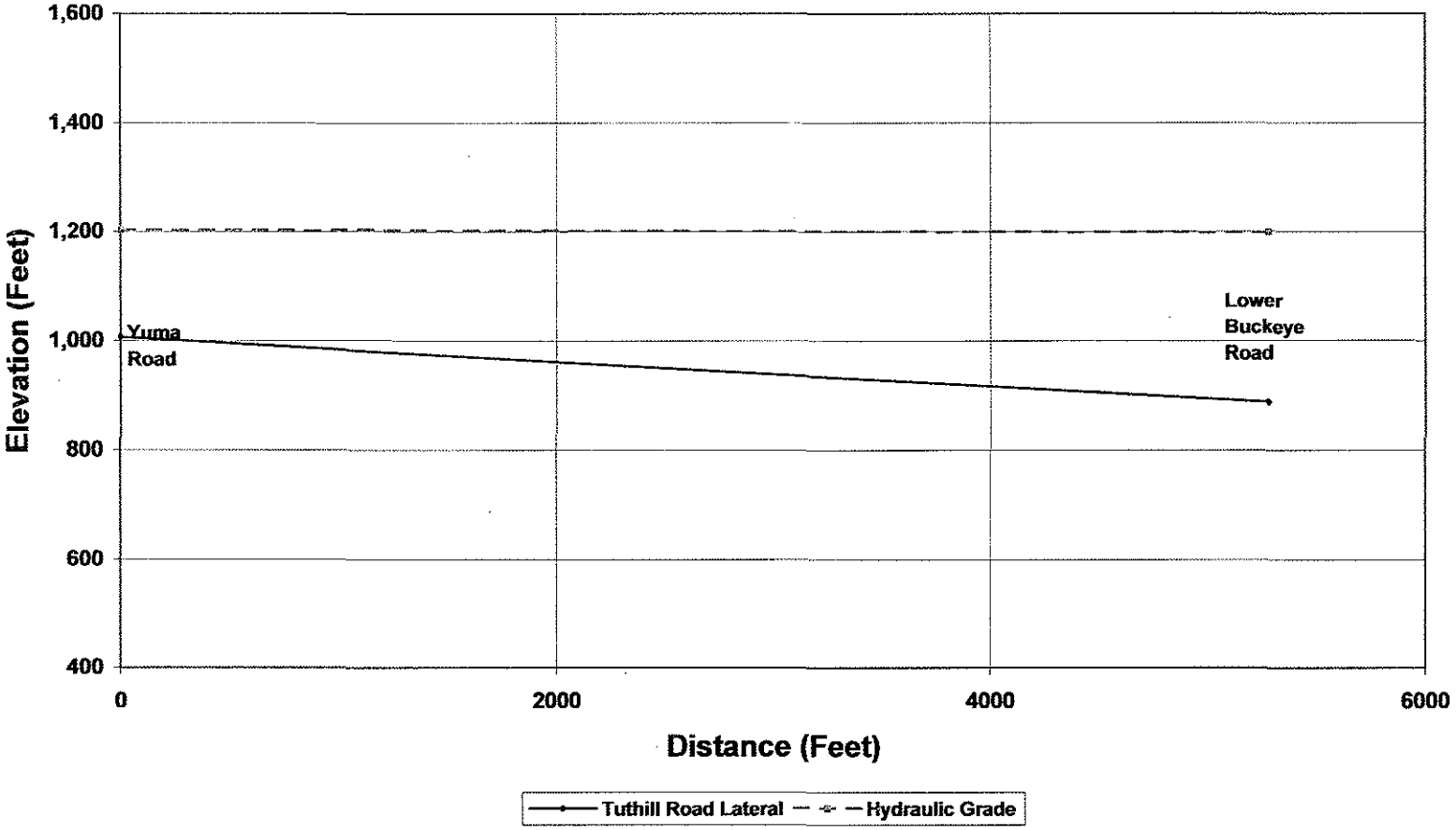
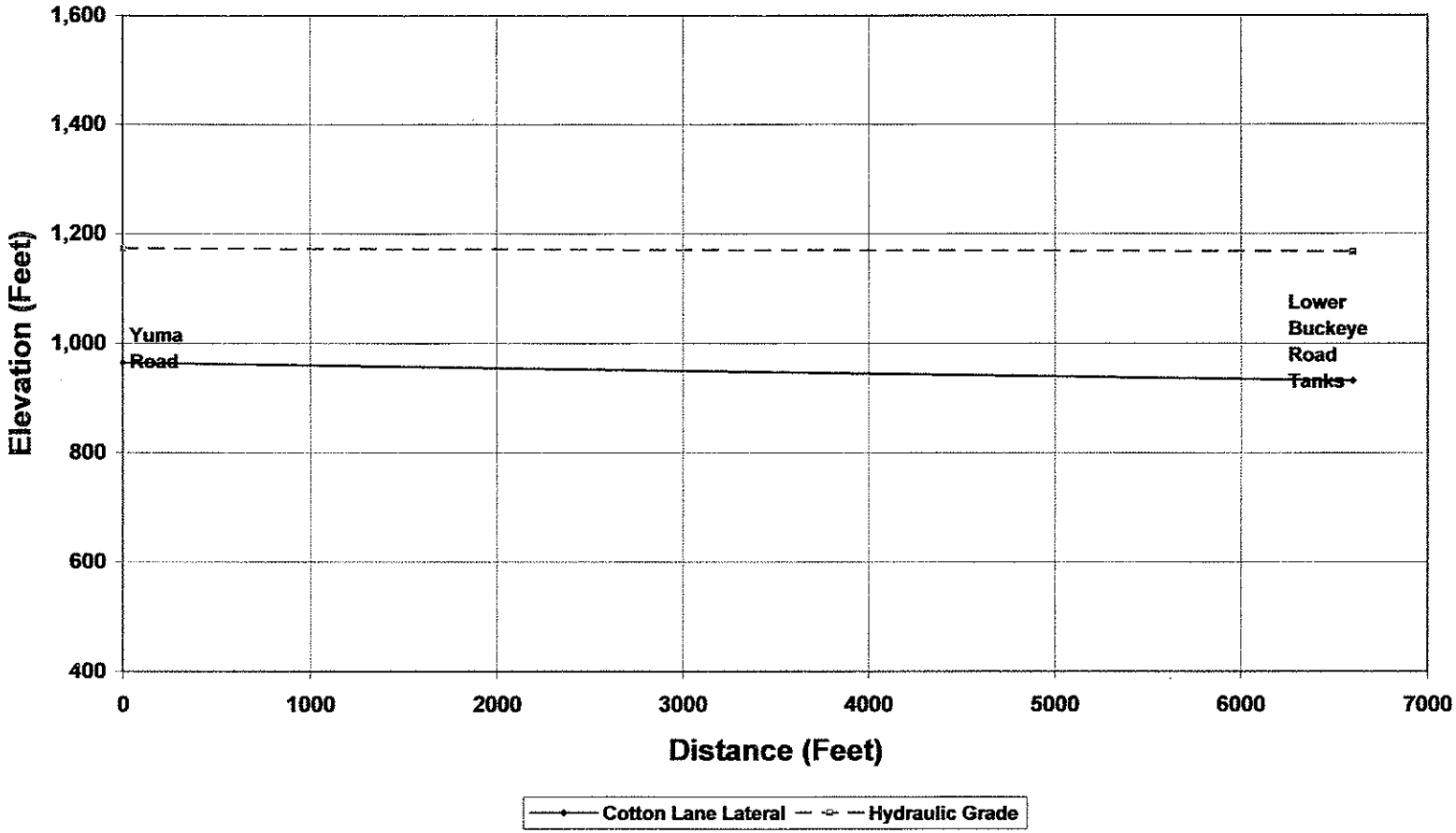


Figure AP C-1D

Cotton Lane Lateral
From Alignment 3 along Cotton Lane to Lower Buckeye Road Tanks
West Maricopa Combine, WESTCAPS
Year 2005 Water Water Delivery Scenario



Appendix C-2

Year 2015
(Forward Flow)

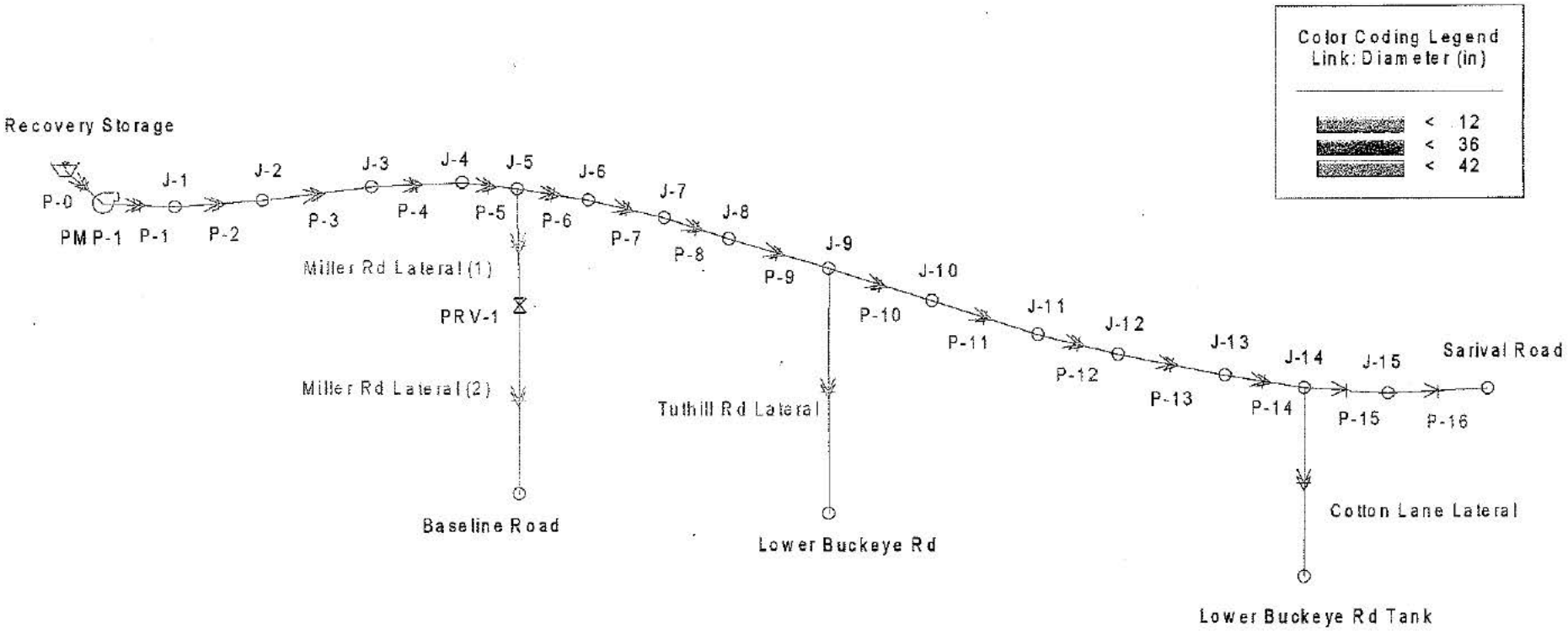
1. **Schematic Model Layout and Hydraulic Results**

2. **Tables**
   Ground Profiles, Pipe Sizes, and Pressure Distributions

3. **Figure**
   Ground Profiles, Hydraulic Features, and Hydraulic Grade Lines

Scenario: Year 2015 Peak Demand

Alignment 3
Recovery Storage to Sarival Road along Dike and Yuma Road
West Maricopa Combine Pipeline to The Future (PTTF)
(Forward Flow)
Year 2015 Water Delivery



Analysis Results
Scenario

Title: WMC Dike-Yuma Alignment 3 - 2015
Project Engineer: Michael Lee
Project Date: 11/21/01
Comments:

Scenario Summary	
Label	Year 2015 Peak Demand
Demand Alternative	Year 2015 Peak Demand
Physical Alternative	Year 2015 Peak Demand
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow

Liquid Characteristics			
Liquid	Water at 20C(68F)	Specific Gravity	1.00
Kinematic Viscosity	0.108e-4 ft²/s		

Network Inventory			
Number of Pipes	21	Number of Tanks	0
Number of Reservoirs	1	- Constant Area:	0
Number of Junctions	19	- Variable Area:	0
Number of Pumps	1	Number of Valves	1
- Constant Power:	0	- FCV's:	0
- One Point (Design Point):	1	- PBV's:	0
- Standard (3 Point):	0	- PRV's:	1
- Standard Extended:	0	- PSV's:	0
- Custom Extended:	0	- TCV's:	0
- Multiple Point:	0	Number of Spot Elevations	0

Pipe Inventory			
Total Length	118,292.00 ft		
12 in	5,280.00 ft	42 in	92,842.00 ft
36 in	20,170.00 ft		

Analysis Results
Scenario: Year 2015 Peak Demand
Steady State Analysis

Junctions @ 0.00 hr

Label	Constituent (mg/l)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Demand (Calculated) (cfs)	Pressure Head (ft)
Baseline Road	N/A	1,185.97	130.58	12.95	301.97
J-1	N/A	1,302.64	104.50	0.00	241.64
J-2	N/A	1,280.75	85.08	0.00	196.75
J-3	N/A	1,260.18	79.64	0.00	184.18
J-4	N/A	1,257.26	74.92	0.00	173.26
J-5	N/A	1,252.17	72.29	0.00	167.17
J-6	N/A	1,247.51	73.30	0.00	169.51
J-7	N/A	1,238.50	76.76	0.00	177.50
J-8	N/A	1,232.90	76.93	0.00	177.90
J-9	N/A	1,220.72	94.58	0.00	218.72
J-10	N/A	1,213.91	100.29	0.00	231.91
J-11	N/A	1,207.87	104.59	0.00	241.87
J-12	N/A	1,206.22	101.28	0.00	234.22
J-13	N/A	1,202.04	102.07	0.00	236.04
J-14	N/A	1,200.54	104.02	0.00	240.54
J-15	N/A	1,200.54	104.02	0.00	240.54
Lower Buckeye Rd	N/A	1,204.34	138.53	2.56	320.34
Lower Buckeye Rd Tai	N/A	1,194.23	115.56	36.29	267.23
Sarival Road	N/A	1,200.54	101.42	0.00	234.54

Reservoirs @ 0.00 hr

Label	Constituent (mg/l)	Calculated Hydraulic Grade (ft)	Reservoir Inflow (cfs)	Reservoir Outflow (cfs)
Recovery Storage	N/A	1,110.00	N/A	51.80

Pipes @ 0.00 hr

Label	Status	Constituent (mg/l)	Flow (cfs)	Velocity (ft/s)	From Grade (ft)	To Grade (ft)	Friction Loss (ft)	Minor Loss (ft)	Total Headloss (ft)	Headloss Gradient (ft/1000ft)
Cotton Lane Lateral	Open	N/A	36.29	3.77	1,200.54	1,194.23	6.14	0.17	6.32	0.96
Miller Rd Lateral (1)	Open	N/A	12.95	1.83	1,252.17	1,251.83	0.29	0.04	0.33	0.33
Miller Rd Lateral (2)	Open	N/A	12.95	1.83	1,191.62	1,185.97	5.62	0.04	5.66	0.30
P-0	Open	N/A	51.80	5.38	1,110.00	1,108.94	0.04	1.03	1.06	53.11
P-1	Open	N/A	51.80	5.38	1,309.45	1,302.64	6.45	0.35	6.80	1.90
P-2	Open	N/A	51.80	5.38	1,302.64	1,280.75	21.55	0.35	21.90	1.83
P-3	Open	N/A	51.80	5.38	1,280.75	1,260.18	20.22	0.35	20.57	1.83
P-4	Open	N/A	51.80	5.38	1,260.18	1,257.26	2.56	0.35	2.91	2.04
P-5	Open	N/A	51.80	5.38	1,257.26	1,252.17	4.75	0.35	5.10	1.93
P-6	Open	N/A	38.85	4.04	1,252.17	1,247.51	4.46	0.20	4.66	1.10
P-7	Open	N/A	38.85	4.04	1,247.51	1,238.50	8.81	0.20	9.01	1.08
P-8	Open	N/A	38.85	4.04	1,238.50	1,232.90	5.41	0.20	5.61	1.09
P-9	Open	N/A	38.85	4.04	1,232.90	1,220.72	11.99	0.20	12.18	1.07
P-10	Open	N/A	36.29	3.77	1,220.72	1,213.91	6.63	0.17	6.81	0.95
P-11	Open	N/A	36.29	3.77	1,213.91	1,207.87	6.04	0.00	6.04	0.93
P-12	Open	N/A	36.29	3.77	1,207.87	1,206.22	1.47	0.17	1.65	1.04

Analysis Results
Scenario: Year 2015 Peak Demand
Steady State Analysis

Pipes @ 0.00 hr

Label	Status	Constituent (mg/l)	Flow (cfs)	Velocity (ft/s)	From Grade (ft)	To Grade (ft)	Friction Loss (ft)	Minor Loss (ft)	Total Headloss (ft)	Headloss Gradient (ft/1000ft)
P-13	Open	N/A	36.29	3.77	1,206.22	1,202.04	4.18	0.00	4.18	0.93
P-14	Open	N/A	36.29	3.77	1,202.04	1,200.54	1.33	0.17	1.50	1.05
P-15	Open	N/A	0.00	0.00	1,200.54	1,200.54	0.00	0.00	0.00	0.00
P-16	Open	N/A	0.00	0.00	1,200.54	1,200.54	0.00	0.00	0.00	0.00
Tuthill Rd Lateral	Open	N/A	2.56	3.26	1,220.72	1,204.34	16.24	0.13	16.37	3.10

Pumps @ 0.00 hr

Label	Status	Constituent (mg/l)	From Grade (ft)	To Grade (ft)	Flow (cfs)	Head (ft)	Relative Speed	Useful Power (Hp)
PMP-1	On	N/A	1,108.94	1,309.45	51.80	200.51	1.00	1,176.97

PRVs @ 0.00 hr

Label	Status	Constituent (mg/l)	From Grade (ft)	To Grade (ft)	Flow (cfs)	Headloss (ft)	Setting (psi)
PRV-1	Throttling	N/A	1,251.83	1,191.62	12.95	60.21	50.00

Table AP C-2

West Maricopa Combine, WESTCAPS
Potential Pipeline to The Future (PTTF) Alignment 3 - Forward Flow - 2015

A	Alignment 3: From the Recovery Storage Site along Dike and Yuma Road to Sarival Road										
		Distance			Elevation		Pipe	Year 2015		Anticipated	
Profile		Between		Cumulative	Spot	Between	Diameter	Design Peak Flow		Pressure	Hyd.Grade
Point	Comment	(Mile)	(Feet)	(Feet)	(Feet)	(Feet)	(Inches)	(cfs)	(AF/Yr)	(psi)	(Feet)
0	Recovery Site Storage	0	0	0	1,099	0	42	51.80	37,500	7	1,109
P	Pump Station & Air Chamber	0.0038	20	20	1,099	0	42	51.80	37,500	93	1,309
1	Blow-off Valve	0.68	3,590	3,610	1,066	-33	42	51.80	37,500	104	1,302
2	Air & Vacuum Valve	2.27	11,986	15,596	1,089	23	42	51.80	37,500	85	1,280
3		2.13	11,246	26,842	1,081	-8	42	51.80	37,500	80	1,260
4		0.27	1,426	28,268	1,089	8	42	51.80	37,500	75	1,257
5	Tie to Miller Road Lateral & Air & Vacuum Valve	0.5	2,640	30,908	1,090	1	42	51.80	37,500	72	1,252
6		0.8	4,224	35,132	1,083	-7	42	38.86	28,129	73	1,247
7		1.58	8,342	43,474	1,066	-17	42	38.86	28,129	77	1,238
8		0.97	5,122	48,596	1,060	-6	42	38.86	28,129	77	1,232
9	Tie to Tuthill Road Lateral	2.15	11,352	59,948	1,007	-53	42	38.86	28,129	94	1,220
10		1.35	7,128	67,076	987	-20	42	36.30	26,275	100	1,213
11		1.23	6,494	73,570	971	-16	42	36.30	26,275	104	1,207
12		0.3	1,584	75,154	977	6	42	36.30	26,275	101	1,206
13		0.85	4,488	79,642	971	-6	42	36.30	26,275	102	1,202
14	Tie to Cotton Lane Lateral	0.27	1,426	81,068	965	-6	42	36.30	26,275	104	1,200
15		0.55	2,904	83,972	965	0	42	0.00	0	104	1,200
16	Sarival Road	0.43	2,270	86,242	971	6	42	0.00	0	101	1,200
Total		16.3338	86,242			-128					

Table AP C-2

West Maricopa Combine, WESTCAPS
Potential Pipeline to The Future (PTTF) Alignment 3 - Forward Flow - 2015

B — **Miller Road Lateral: From Trunk Alignment 3 to Baseline Road**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2015 Design Peak Flow (cfs)	Year 2015 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Yuma Road	0	0	0	1,091	0	36	12.94	9,371	72	1,252
PRV(U)	PRV Upstream Side	0.1894	1,000	1,000	1,081	-10	36	12.94	9,371	76	1,251
PRV(D)	PRV Downstream Side	0.0009	5	1,005	1,081	0	36	12.94	9,371	50	1,191
1	Baseline Road	3.79	20,011	21,016	889	-192	36	12.94	9,371	130	1,185
Total		3.9803	21,016			-202					

C — **Tuthill Road Lateral: From Trunk Alignment 3 to Lower Buckeye Road**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2015 Design Peak Flow (cfs)	Year 2015 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Yuma Road	0	0	0	1,007	0	12	2.56	1,854	94	1,220
1	Lower Buckeye Rd	1	5,280	5,280	889	-118	12	2.56	1,854	139	1,204
Total		1	5,280			-118					

D — **Cotton Lane Lateral: From Trunk Alignment 3 to Lower Buckeye Road Storage Tank**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2015 Design Peak Flow (cfs)	Year 2015 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Yuma Road	0	0	0	965	0	42	36.30	26,275	104	1,200
1	Lower Buckeye Rd Storage Tanks	1.25	6,600	6,600	932	-33	42	36.30	26,275	116	1,194
Total		1.25	6,600			-33					

Figure AP C-2A

Alignment 3
From Recovery Site along Dike and Yuma Road to Sarival Road
West Maricopa Combine, WESTCAPS
Year 2015 Water Delivery Scenario

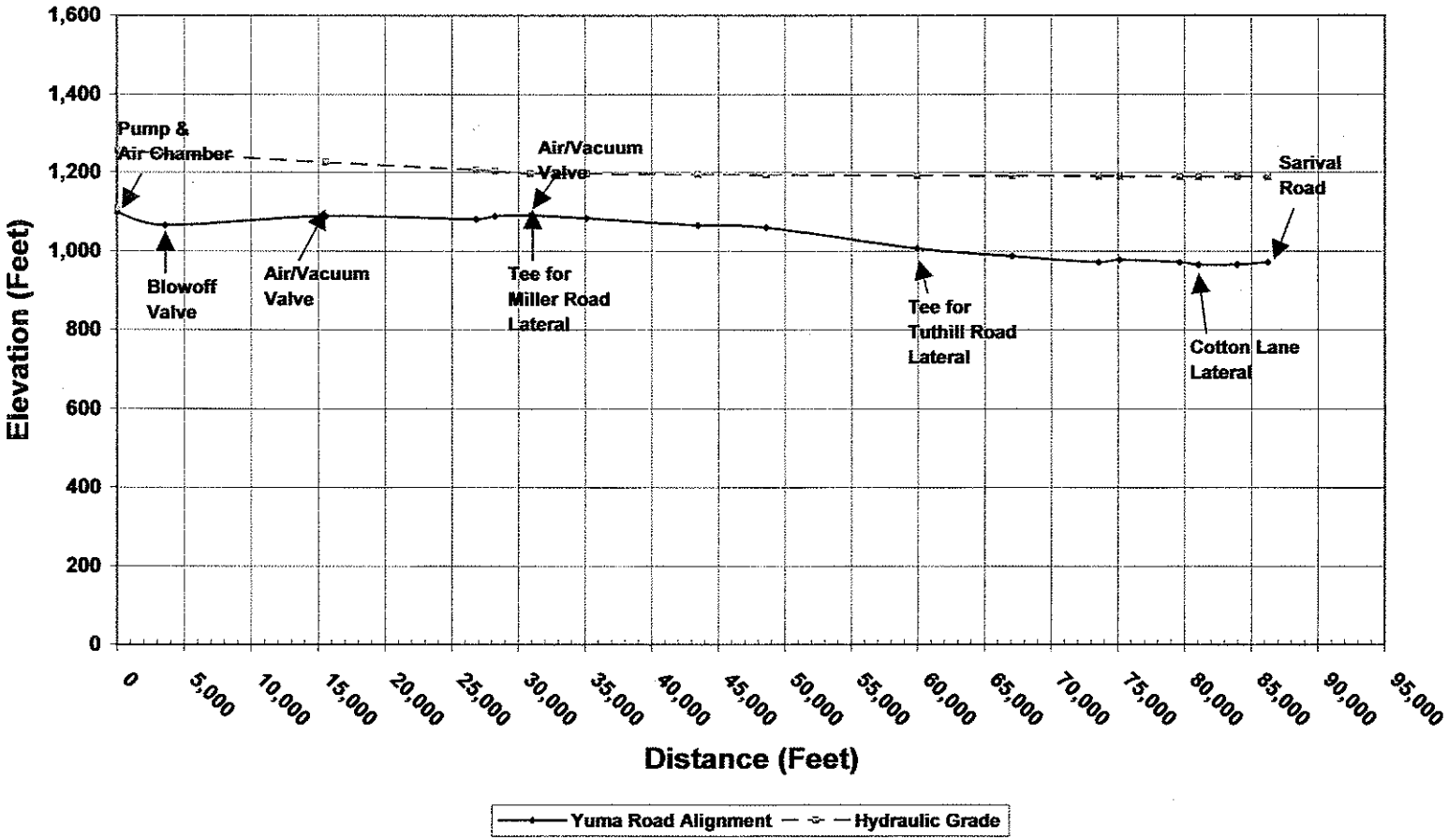


Figure AP C-2B

Miller Road Lateral
From Alignment 3 along Miller Road to Baseline Road
West Maricopa Combine, WESTCAPS
Year 2015 Water Delivery Scenario

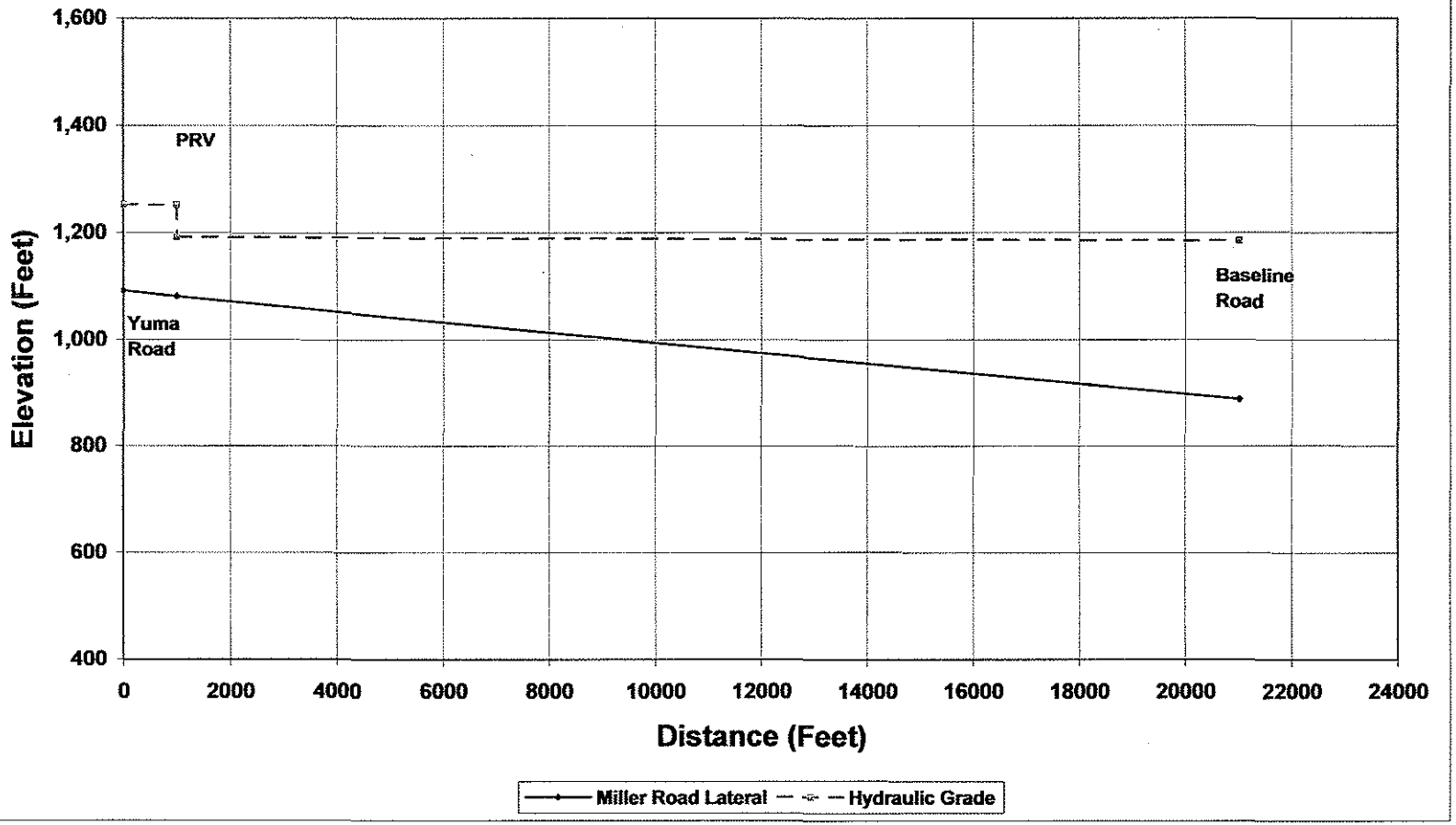


Figure AP C-2C

Tuthill Road Lateral
From Alignment 3 along Tuthill Road to Lower Buckeye Road
West Maricopa Combine, WESTCAPS
Year 2015 Water Delivery Scenario

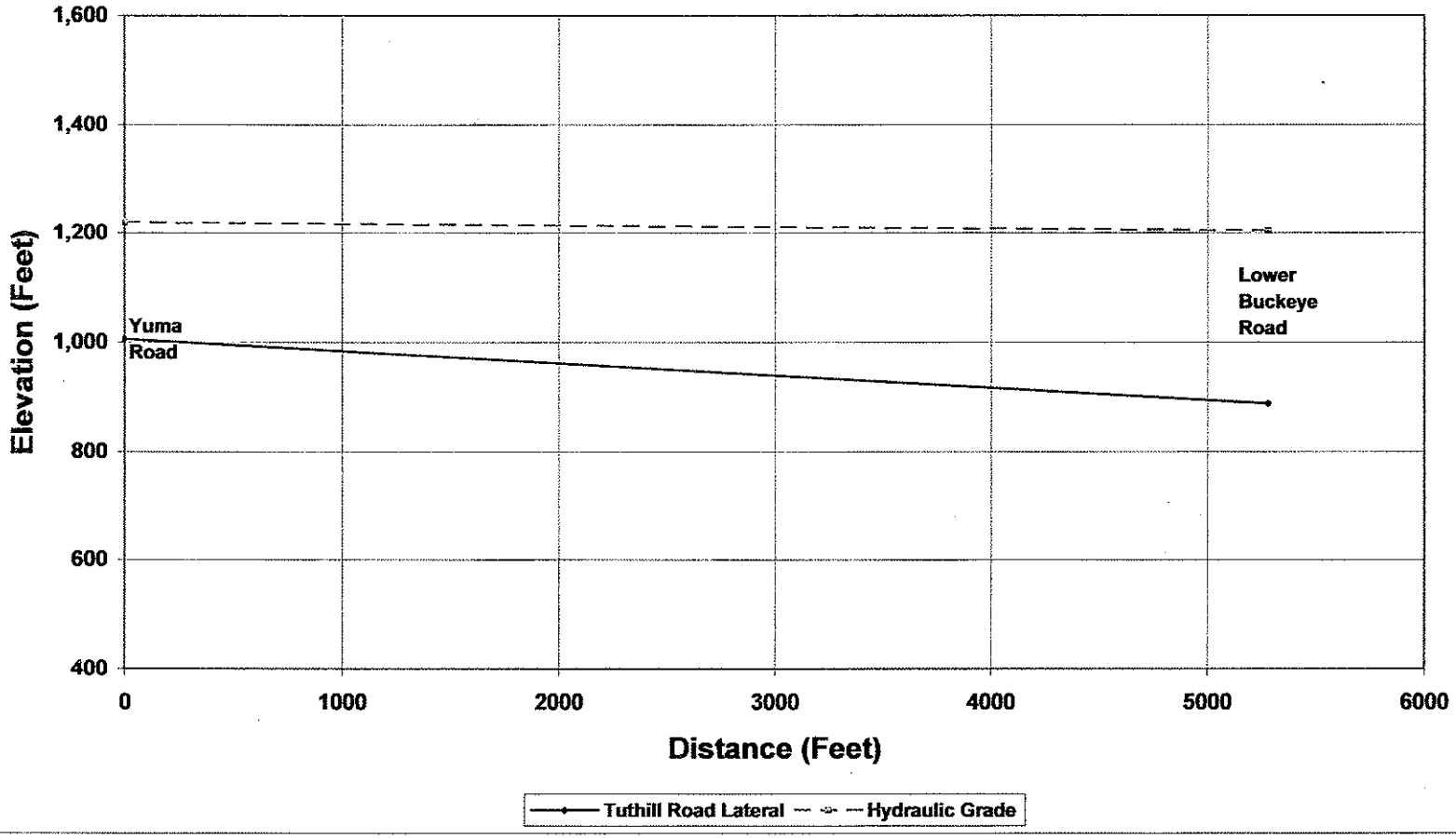
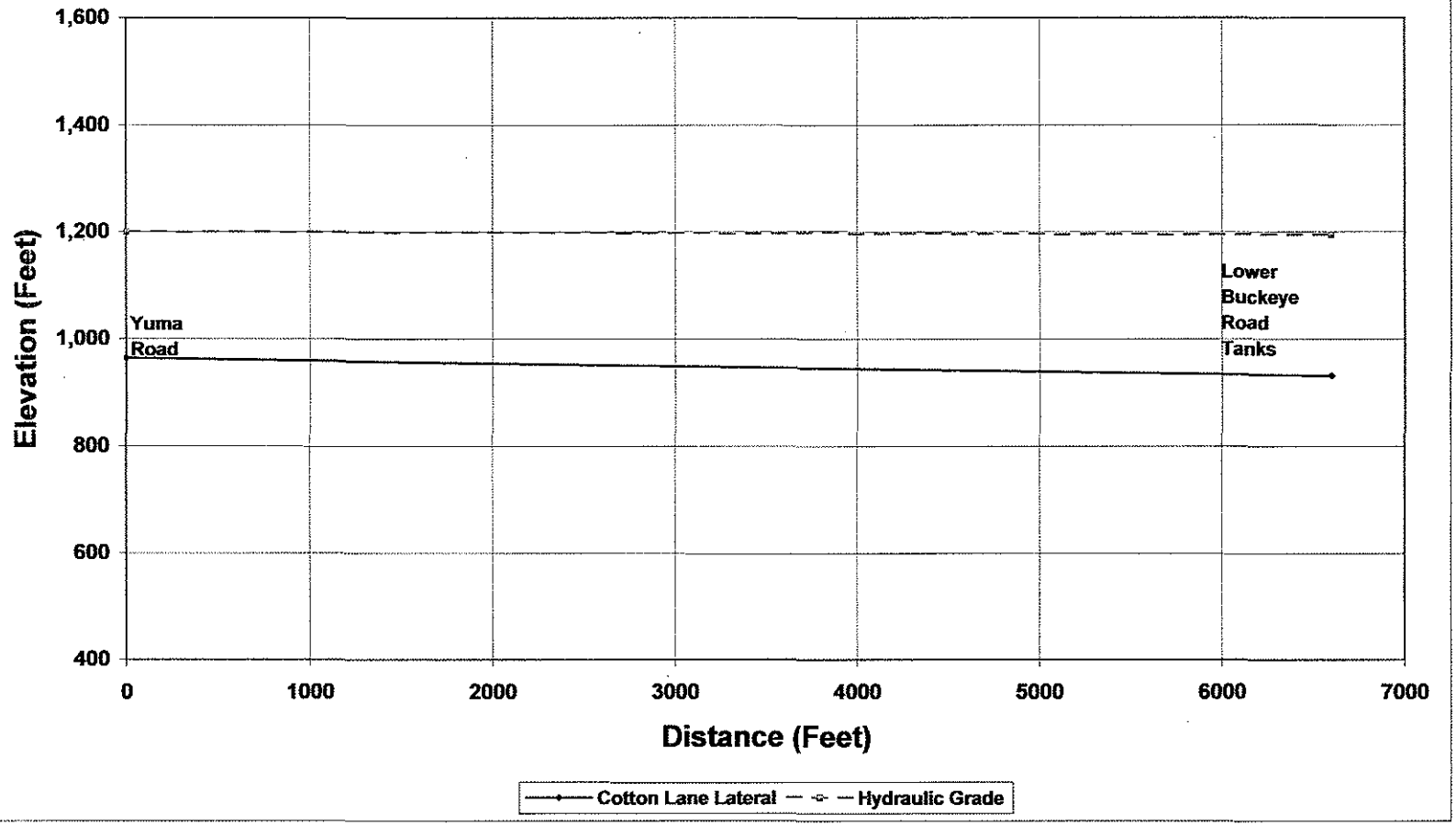


Figure AP C-2D

Cotton lane Lateral
From Alignment 3 along Cotton Lane to Lower Buckeye Road Tanks
West Maricopa Combine, WESTCAPS
Year 2015 Water Delivery Scenario



Appendix C-3

Year 2025
(Forward Flow)

1. **Schematic Model Layout and Hydraulic Results**

2. **Tables**
   Ground Profiles, Pipe Sizes, and Pressure Distributions

3. **Figure**
   Ground Profiles, Hydraulic Features, and Hydraulic Grade Lines

Scenario: Year 2025 Peak Demand

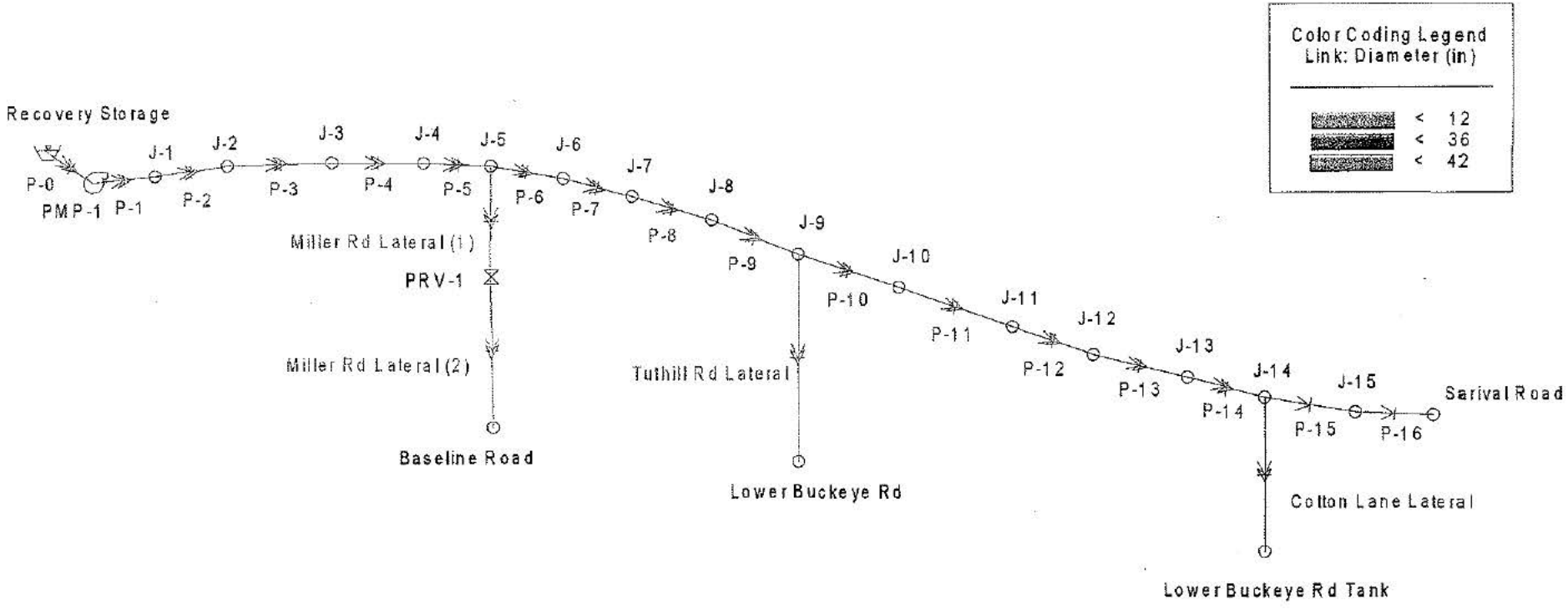
Alignment 3

Recovery Storage to Sarival Road along Dike and Yuma Road

West Maricopa Combine Pipeline to The Future (PTTF)

(Forward Flow)

Year 2025 Water Delivery



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Analysis Results
Scenario: Year 2025 Peak Demand
Steady State Analysis

Junctions @ 0.00 hr

Label	Constituent (mg/l)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Demand (Calculated) (cfs)	Pressure Head (ft)
Baseline Road	N/A	1,155.96	117.60	35.01	271.96
J-1	N/A	1,248.47	81.07	0.00	187.47
J-2	N/A	1,226.57	61.65	0.00	142.57
J-3	N/A	1,206.00	56.22	0.00	130.00
J-4	N/A	1,203.09	51.50	0.00	119.09
J-5	N/A	1,197.99	48.86	0.00	112.99
J-6	N/A	1,197.01	51.46	0.00	119.01
J-7	N/A	1,195.11	57.99	0.00	134.11
J-8	N/A	1,193.92	60.08	0.00	138.92
J-9	N/A	1,191.35	81.88	0.00	189.35
J-10	N/A	1,190.47	90.15	0.00	208.47
J-11	N/A	1,189.69	96.73	0.00	223.69
J-12	N/A	1,189.48	94.04	0.00	217.48
J-13	N/A	1,188.94	96.41	0.00	222.94
J-14	N/A	1,188.75	98.92	0.00	228.75
J-15	N/A	1,188.75	98.92	0.00	228.75
Lower Buckeye Rd	N/A	1,139.53	110.50	4.77	255.53
Lower Buckeye Rd Tai	N/A	1,187.93	112.84	12.02	260.93
Sarival Road	N/A	1,188.75	96.32	0.00	222.75

Reservoirs @ 0.00 hr

Label	Constituent (mg/l)	Calculated Hydraulic Grade (ft)	Reservoir Inflow (cfs)	Reservoir Outflow (cfs)
Recovery Storage	N/A	1,110.00	N/A	51.80

Pipes @ 0.00 hr

Label	Status	Constituent (mg/l)	Flow (cfs)	Velocity (ft/s)	From Grade (ft)	To Grade (ft)	Friction Loss (ft)	Minor Loss (ft)	Total Headloss (ft)	Headloss Gradient (ft/1000ft)
Cotton Lane Lateral	Open	N/A	12.02	1.25	1,188.75	1,187.93	0.80	0.02	0.81	0.12
Miller Rd Lateral (1)	Open	N/A	35.01	4.95	1,197.99	1,195.85	1.84	0.30	2.14	2.14
Miller Rd Lateral (2)	Open	N/A	35.01	4.95	1,191.62	1,155.96	35.37	0.30	35.67	1.86
P-0	Open	N/A	51.80	5.38	1,110.00	1,108.94	0.04	1.03	1.06	53.11
P-1	Open	N/A	51.80	5.38	1,255.27	1,248.47	6.45	0.35	6.80	1.90
P-2	Open	N/A	51.80	5.38	1,248.47	1,226.57	21.55	0.35	21.90	1.83
P-3	Open	N/A	51.80	5.38	1,226.57	1,206.00	20.22	0.35	20.57	1.83
P-4	Open	N/A	51.80	5.38	1,206.00	1,203.09	2.56	0.35	2.91	2.04
P-5	Open	N/A	51.80	5.38	1,203.09	1,197.99	4.75	0.35	5.10	1.93
P-6	Open	N/A	16.79	1.75	1,197.99	1,197.01	0.94	0.04	0.98	0.23
P-7	Open	N/A	16.79	1.75	1,197.01	1,195.11	1.87	0.04	1.90	0.23
P-8	Open	N/A	16.79	1.75	1,195.11	1,193.92	1.15	0.04	1.18	0.23
P-9	Open	N/A	16.79	1.75	1,193.92	1,191.35	2.54	0.04	2.58	0.23
P-10	Open	N/A	12.02	1.25	1,191.35	1,190.47	0.86	0.02	0.88	0.12
P-11	Open	N/A	12.02	1.25	1,190.47	1,189.69	0.78	0.00	0.78	0.12
P-12	Open	N/A	12.02	1.25	1,189.69	1,189.48	0.19	0.02	0.21	0.13

Analysis Results
Scenario: Year 2025 Peak Demand
Steady State Analysis

Pipes @ 0.00 hr

Label	Status	Constituent (mg/l)	Flow (cfs)	Velocity (ft/s)	From Grade (ft)	To Grade (ft)	Friction Loss (ft)	Minor Loss (ft)	Total Headloss (ft)	Headloss Gradient (ft/1000ft)
P-13	Open	N/A	12.02	1.25	1,189.48	1,188.94	0.54	0.00	0.54	0.12
P-14	Open	N/A	12.02	1.25	1,188.94	1,188.75	0.17	0.02	0.19	0.13
P-15	Open	N/A	0.00	0.00	1,188.75	1,188.75	0.00	0.00	0.00	0.00
P-16	Open	N/A	0.00	0.00	1,188.75	1,188.75	0.00	0.00	0.00	0.00
Tuthill Rd Lateral	Open	N/A	4.77	6.07	1,191.35	1,139.53	51.37	0.45	51.82	9.81

Pumps @ 0.00 hr

Label	Status	Constituent (mg/l)	From Grade (ft)	To Grade (ft)	Flow (cfs)	Head (ft)	Relative Speed	Useful Power (Hp)
PMP-1	On	N/A	1,108.94	1,255.27	51.80	146.34	1.00	858.96

PRVs @ 0.00 hr

Label	Status	Constituent (mg/l)	From Grade (ft)	To Grade (ft)	Flow (cfs)	Headloss (ft)	Setting (psi)
PRV-1	Throttling	N/A	1,195.85	1,191.62	35.01	4.22	50.00

Table AP C-3

West Maricopa Combine, WESTCAPS
Potential Pipeline to The Future (PTTF) Alignment 3 - Forward Flow - 2025

A **Alignment 3: From the Recovery Storage Site along Dike and Yuma Road to Sarival Road**

Profile Point	Comment	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Recovery Site Storage	0	0	0	1,099	0	42	51.80	37,500	7	1,109
P	Pump Station & Air Chamber	0.0038	20	20	1,099	0	42	51.80	37,500	70	1,255
1	Blow-off Valve	0.68	3,590	3,610	1,066	-33	42	51.80	37,500	81	1,248
2	Air & Vacuum Valve	2.27	11,986	15,596	1,089	23	42	51.80	37,500	62	1,226
3		2.13	11,246	26,842	1,081	-8	42	51.80	37,500	56	1,206
4		0.27	1,426	28,268	1,089	8	42	51.80	37,500	52	1,203
5	Tie to Miller Road Lateral & Air & Vacuum Valve	0.5	2,640	30,908	1,090	1	42	51.80	37,500	49	1,197
6		0.8	4,224	35,132	1,083	-7	42	16.79	12,157	51	1,196
7		1.58	8,342	43,474	1,066	-17	42	16.79	12,157	58	1,195
8		0.97	5,122	48,596	1,060	-6	42	16.79	12,157	60	1,193
9	Tie to Tuthill Road Lateral	2.15	11,352	59,948	1,007	-53	42	16.79	12,157	82	1,191
10		1.35	7,128	67,076	987	-20	42	12.02	8,702	90	1,190
11		1.23	6,494	73,570	971	-16	42	12.02	8,702	97	1,189
12		0.3	1,584	75,154	977	6	42	12.02	8,702	94	1,189
13		0.85	4,488	79,642	971	-6	42	12.02	8,702	96	1,188
14	Tie to Cotton Lane Lateral	0.27	1,426	81,068	965	-6	42	12.02	8,702	99	1,188
15		0.55	2,904	83,972	965	0	42	0.00	0	99	1,188
16	Sarival Road	0.43	2,270	86,242	971	6	42	0.00	0	96	1,188
Total		16.3338	86,242			-128					

Table AP C-3

West Maricopa Combine, WESTCAPS
Potential Pipeline to The Future (PTTF) Alignment 3 - Forward Flow - 2025

B — **Miller Road Lateral: From Trunk Alignment 3 to Baseline Road**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Yuma Road	0	0	0	1,091	0	36	35.01	25,344	48	1,197
PRV(U)	PRV Upstream Side	0.1894	1,000	1,000	1,081	-10	36	35.01	25,344	52	1,195
PRV(D)	PRV Downstream Side	0.0009	5	1,005	1,081	0	36	35.01	25,344	50	1,191
1	Baseline Road	3.79	20,011	21,016	889	-192	36	35.01	25,344	118	1,156
Total		3.9803	21,016			-202					

C — **Tuthill Road Lateral: From Trunk Alignment 3 to Lower Buckeye Road**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Yuma Road	0	0	0	1,007	0	12	4.77	3,453	79	1,184
1	Lower Buckeye Rd	1	5,280	5,280	889	-118	12	4.77	3,453	107	1,132
Total		1	5,280			-118					

D — **Cotton Lane Lateral: From Trunk Alignment 3 to Lower Buckeye Road Storage Tank**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Yuma Road	0	0	0	965	0	42	12.02	8,702	99	1,188
1	Lower Buckeye Rd Storage Tanks	1.25	6,600	6,600	932	-33	42	12.02	8,702	113	1,187
Total		1.25	6,600			-33					

Figure AP C-3A

Alignment 3
From Recovery Site along Dike and Yuma Road to Sarival Road
West Maricopa Combine, WESTCAPS
Year 2025 Water Delivery Scenario

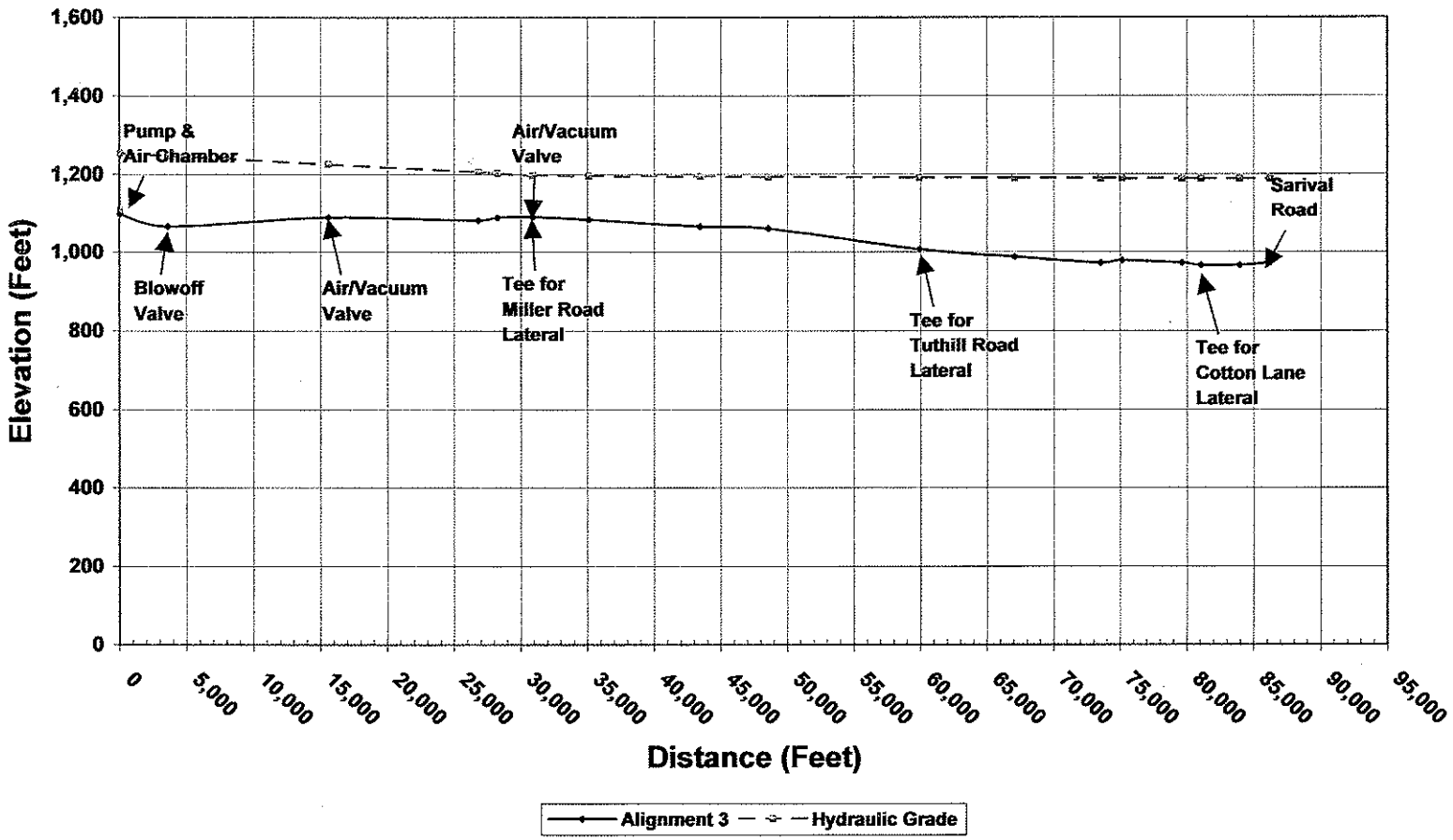


Figure AP C-3B

Miller Road Lateral
From Alignment 3 along Miller Road to Baseline Road
West Maricopa Combine, WESTCAPS
Year 2025 Water Delivery Scenario

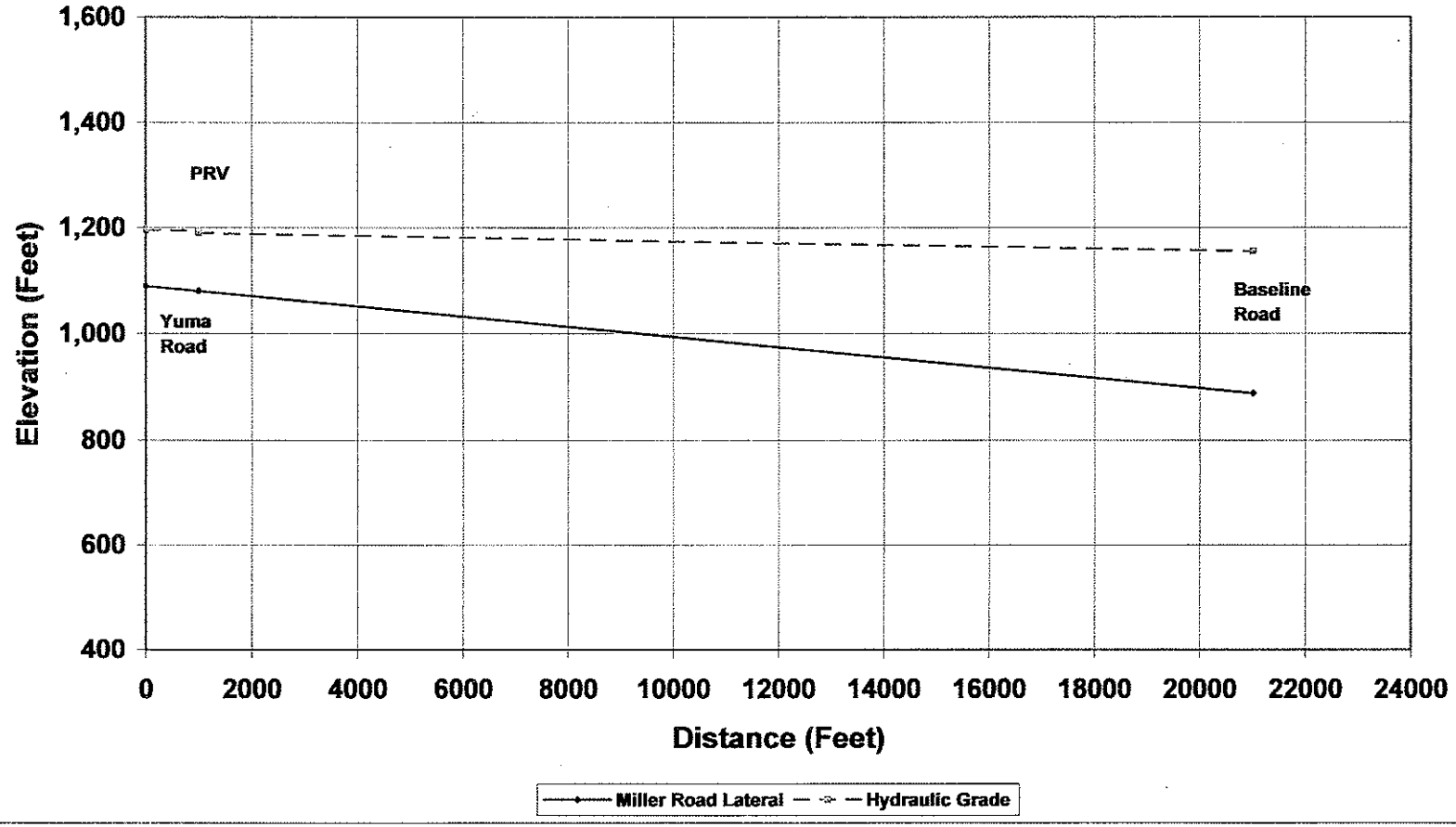


Figure AP C-3C

Tuthill Road Lateral
From Alignment 3 along Tuthill Road to Lower Buckeye Road
West Maricopa Combine, WESTCAPS
Year 2025 Water Delivery Scenario

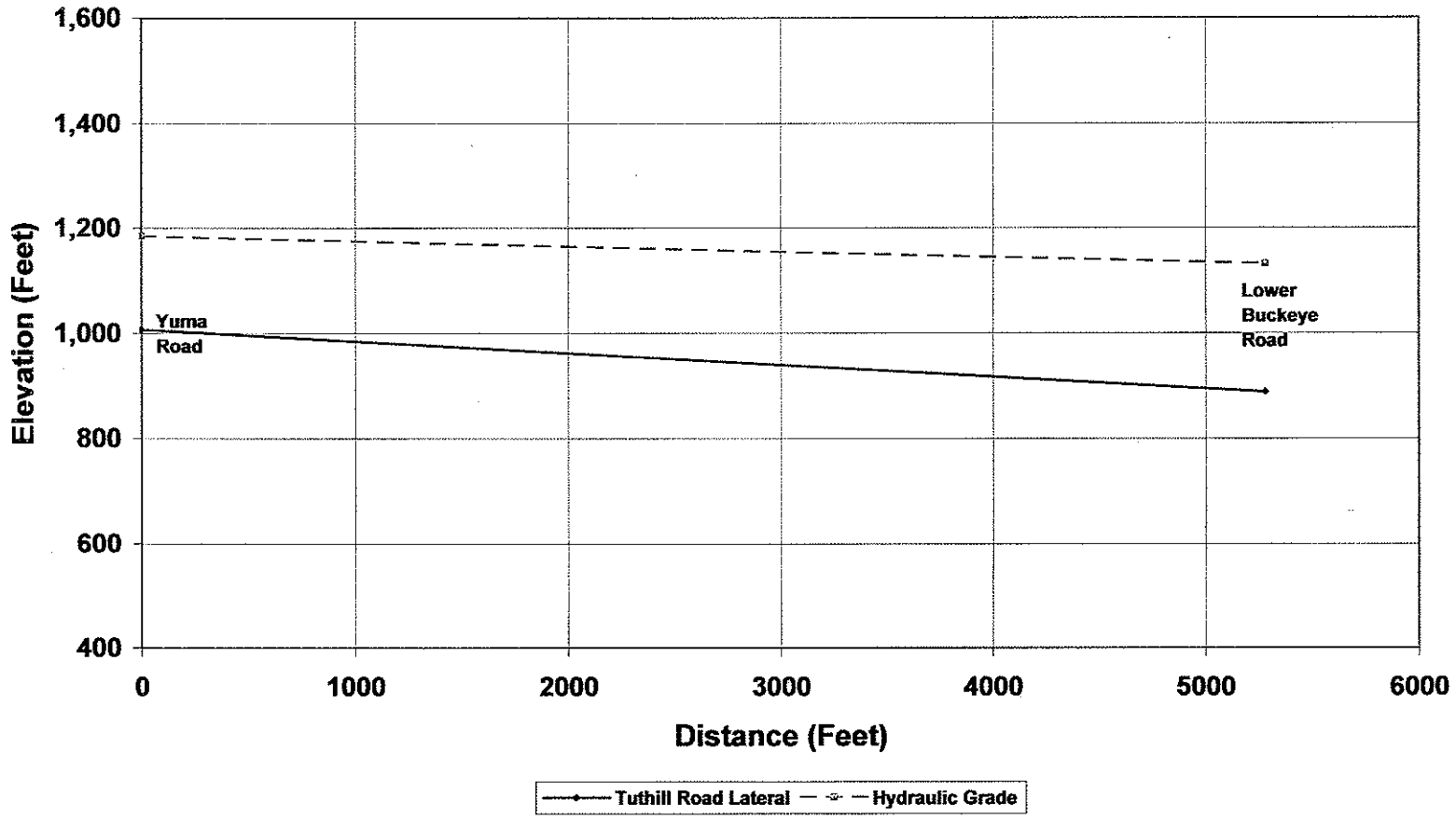
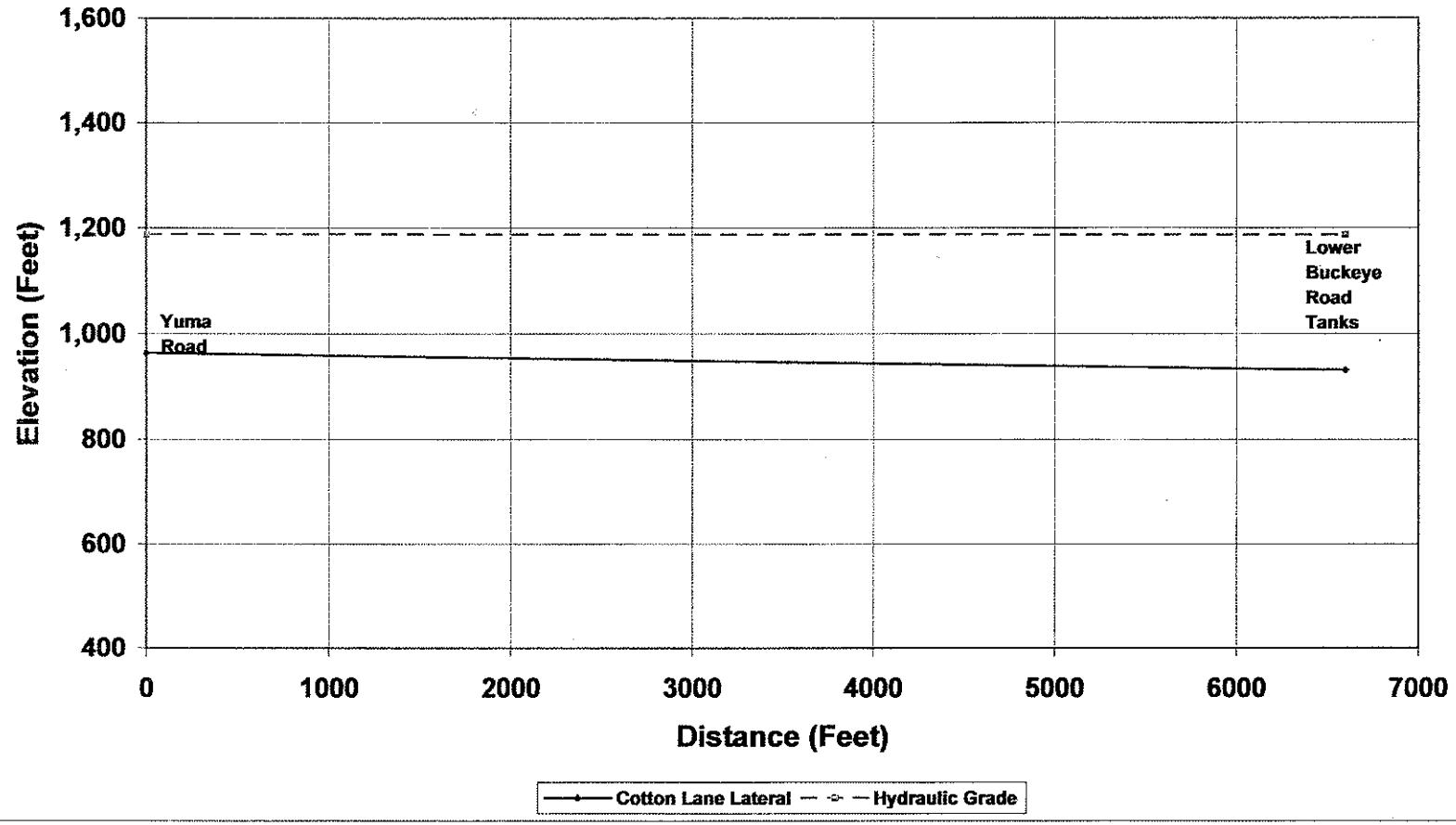


Figure AP C-3D

Cotton Lane Lateral
From Alignment 3 along Cotton Lane to Lower Buckeye Road Storage Tanks
West Maricopa Combine, WESTCAPS
Year 2025 Water Delivery Scenario



Appendix C-S

Summary
For
Transient Years' Water Delivery
(Forward Flow)

Tables

1. **Overall Quantity, and Pumps Summary**
2. **Construction and Capital Cost Estimation**
3. **Annual Operating Costs**
4. **Total Annual Costs, and Costs per 1,000 Gallons of Water Delivered**

Table AP C-S1

Quantity Estimation

Transient Water Delivery from the Recovery Site Storage along Dike and Yuma Road (Forward)

West Maricopa Combine Pipeline to the Future (PTTF)

I. Pumps' Summary

Item	Description	Unit		Year		
				2005	2015	2025
Number of Pumps		each		1	1	1
Pumpage	Maximum in cfs	cfs		51.80	51.80	51.80
	Maximum in acre-feet a year	AF/Yr		37,500	37,500	37,500
Total Dynamic Head	Energy head required	Feet		195	200	146
Power	Horse power	H.P.		1,435	1,470	1,075

Table AP C-S2

Pumps Construction & Capital Cost Estimation
Transient Year Water Delivery from the Recovery Site Storage along Dike and Yuma Road (Forward)
West Maricopa Combine Pipeline to the Future (PTTF)

Item	Description	Unit	Size	Construction & Capital Costs ($) Year 2005	2015	2025
Pumps (80 % Efficiency)	near Recharge site storage	(H.P.)	1,075	NA	NA	$602,200
Including housing structures	near Recharge site storage	(H.P.)	1,435	$602,200	NA	NA
		(H.P.)	1,470	NA	$602,200	NA
Subtotal				$602,200	$602,200	$602,200
Total Construction Cost				$602,200	$602,200	$602,200
Contingency: %	Percent of Total Construction Cost	%	20	$120,440	$120,440	$120,440
Engineering & Administration, %	Percent of Total Construction Cost	%	20	$120,440	$120,440	$120,440
Total Capital Cost				$843,080	$843,080	$843,080

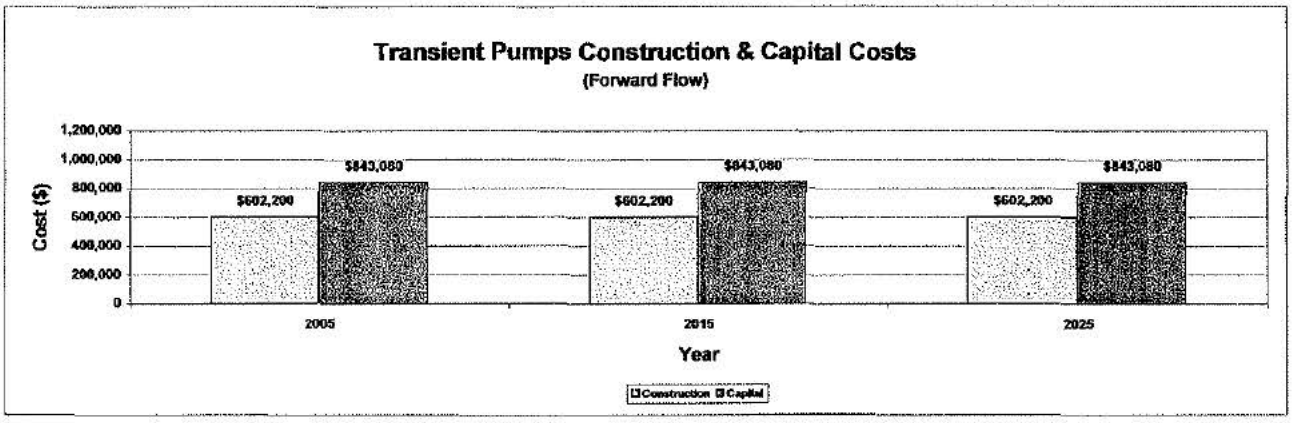


Table AP C-S3

Annual Pumps Operating and Maintenance Cost

Transient Year Water Delivery from the Recovery Storage Site along Dike and Yuma Road (Alignment 3) (Forward Flow) West Maricopa Combine Pipeline to the Future (PTTF)

Item	Year		
	2005	2015	2025
Pump O.& M. Cost	$633,750	$650,000	$474,500
Pumping Energy Cost	$375,107	$384,256	$281,003
Total O.& M. Cost	$1,008,857	$1,034,256	$755,503

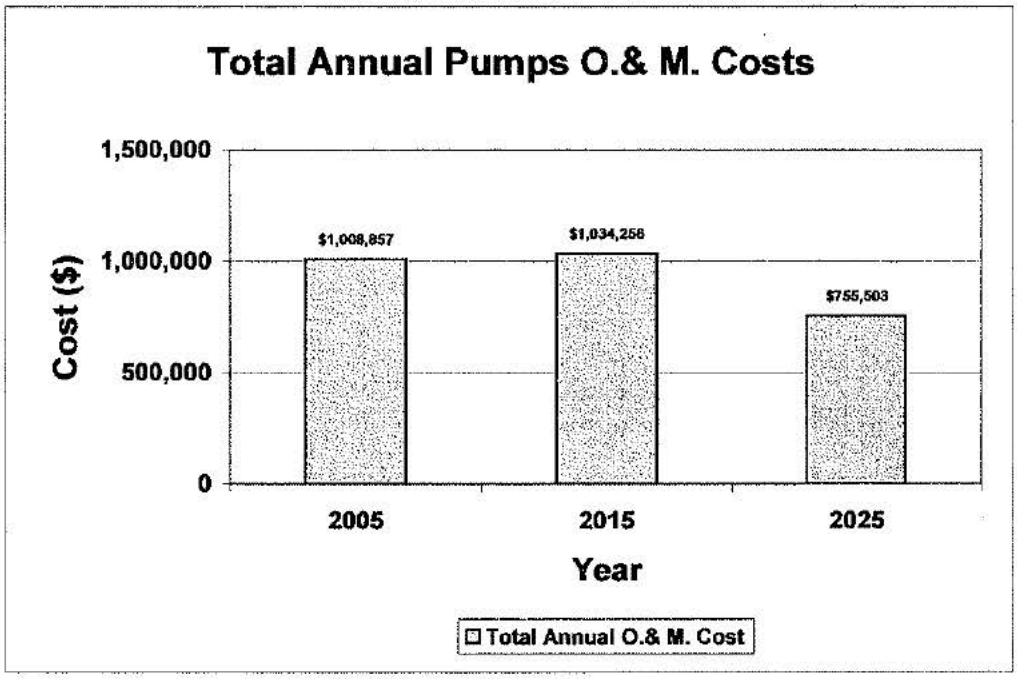
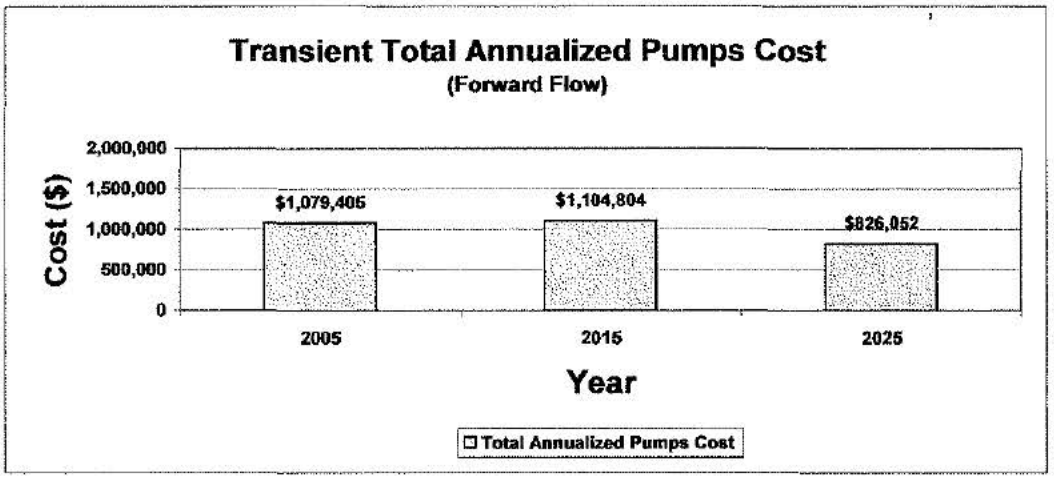
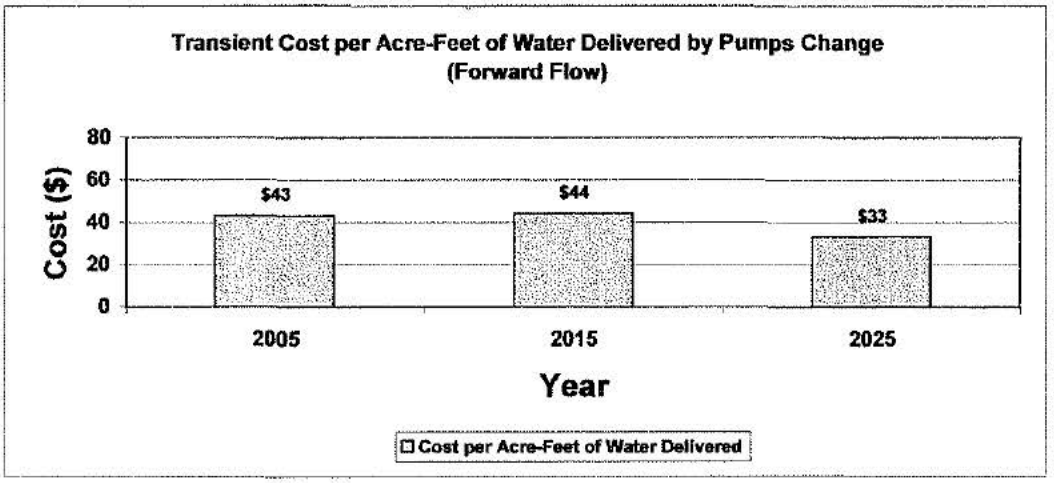


Table AP C-S4

Annualized Pumps Capital, and O.& M. Costs
Transient Year Water Delivery from the Recovery Storage Site along Dike and Yuma Road (Alignment 3) (Forward Flow)
West Maricopa Combine Pipeline to the Future (PTTF)

Item	Year		
	2005	2015	2025
Annual Water Delivered (Acre-Feet)	25,000	25,000	25,000
20 Years' Amortized Capital Cost	$70,548	$70,548	$70,548
Annual Pumps O.& M. Cost	$1,008,857	$1,034,256	$755,503
Total Annualized Pumps Cost	$1,079,405	$1,104,804	$826,052
Cost per Acre-Foot	$43	$44	$33
Cost per 1,000 Gallons	$0.13	$0.14	$0.10





Appendix D

Transient Years' Water Delivery Along Preferred Alignment 3 (Reversal Flow)

Appendix D-1

Year 2005
(Reversal Flow)

1. **Schematic Model Layout and Hydraulic Results**

2. **Tables**
   Ground Profiles, Pipe Sizes, and Pressure Distributions

3. **Figure**
   Ground Profiles, Hydraulic Features, and Hydraulic Grade Lines

Scenario: Year 2005 Peak Demand

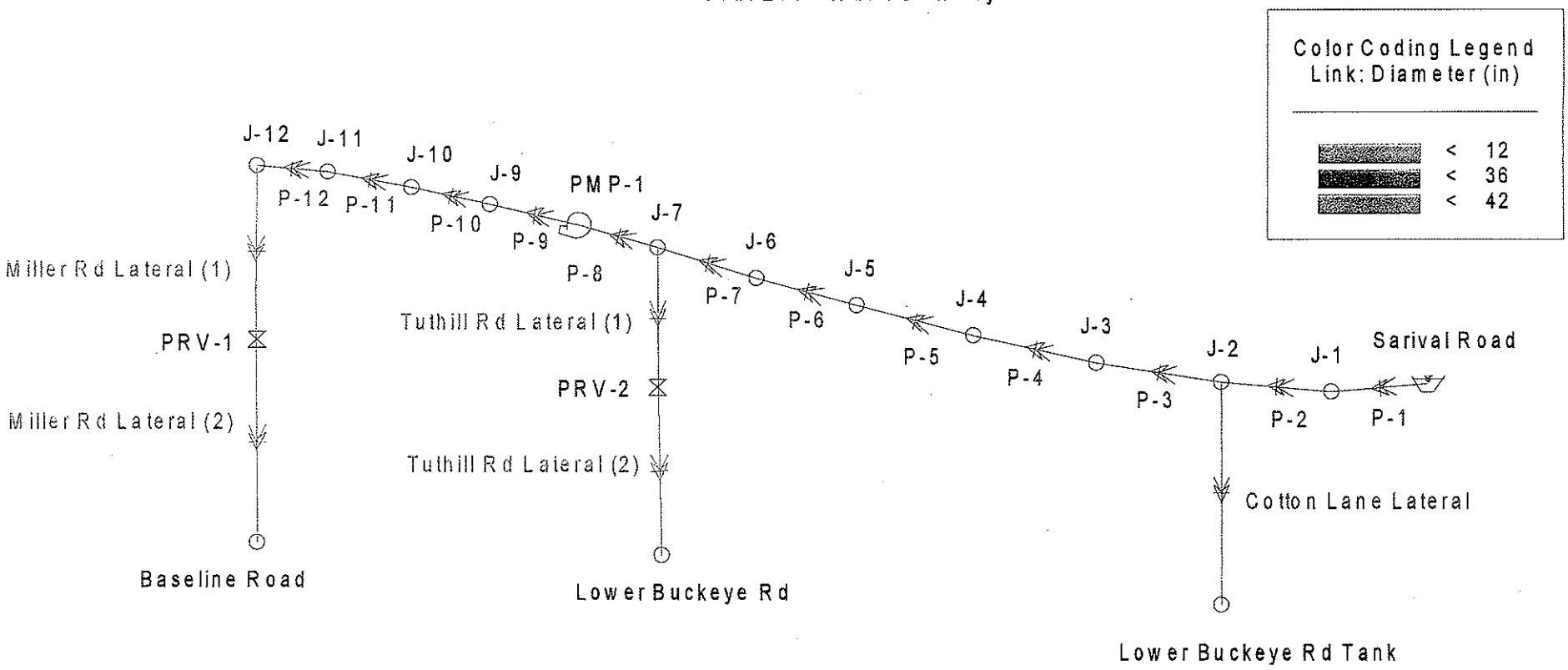
Alignment 3

Sarival Road to Buckeye Area along Yuma Road

West Maricopa Combine Pipeline to The Future (PTTF)

(Reversal Flow)

Year 2005 Water Delivery



Title: WMC Sarival Road - Yuma Alignment 3 (Reversal Flow) - 2005
wmc sarival road - yuma pipe (rev)-2005, alt 3.wcd
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Bureau of Reclamation

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Project Engineer: Michael Lee
Cybernet v3.1 [071]

Analysis Results
Scenario

Title: WMC Sarival Road - Yuma Alignment 3 (Rev) - 2005
Project Engineer: Michael Lee
Project Date: 11/21/01
Comments:

Scenario Summary	
Label	Year 2005 Peak Demand
Demand Alternative	Year 2005 Peak Demand
Physical Alternative	Year 2005 Peak Demand
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow

Liquid Characteristics			
Liquid	Water at 20C(68F)	Specific Gravity	1.00
Kinematic Viscosity	0.108e-4 ft²/s		

Network Inventory			
Number of Pipes	17	Number of Tanks	0
Number of Reservoirs	1	- Constant Area:	0
Number of Junctions	14	- Variable Area:	0
Number of Pumps	1	Number of Valves	2
- Constant Power:	0	- FCV's:	0
- One Point (Design Point):	1	- PBV's:	0
- Standard (3 Point):	0	- PRV's:	2
- Standard Extended:	0	- PSV's:	0
- Custom Extended:	0	- TCV's:	0
- Multiple Point:	0	Number of Spot Elevations	0

Pipe Inventory			
Total Length	87,394.00 ft		
12 in	5,280.00 ft	42 in	61,944.00 ft
36 in	20,170.00 ft		

Analysis Results
Scenario: Year 2005 Peak Demand
Steady State Analysis

Junctions @ 0.00 hr

Label	Constituent (mg/l)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Demand (Calculated) (cfs)	Pressure Head (ft)
Baseline Road	N/A	1,179.48	127.78	5.62	295.48
J-1	N/A	1,224.72	114.47	0.00	264.72
J-2	N/A	1,220.62	112.70	0.00	260.62
J-3	N/A	1,220.55	110.08	0.00	254.55
J-4	N/A	1,220.35	107.39	0.00	248.35
J-5	N/A	1,220.27	109.95	0.00	254.27
J-6	N/A	1,219.98	102.91	0.00	237.98
J-7	N/A	1,219.65	94.12	0.00	217.65
J-9	N/A	1,344.22	125.07	0.00	289.22
J-10	N/A	1,344.06	122.40	0.00	283.06
J-11	N/A	1,343.81	114.95	0.00	265.81
J-12	N/A	1,343.68	111.86	0.00	258.68
Lower Buckeye Rd	N/A	1,090.22	89.18	1.41	206.22
Lower Buckeye Rd Tai	N/A	1,214.11	124.16	36.89	287.11

Reservoirs @ 0.00 hr

Label	Constituent (mg/l)	Calculated Hydraulic Grade (ft)	Reservoir Inflow (cfs)	Reservoir Outflow (cfs)
Sarival Road	N/A	1,229.69	N/A	43.92

Pipes @ 0.00 hr

Label	Status	Constituent (mg/l)	Flow (cfs)	Velocity (ft/s)	From Grade (ft)	To Grade (ft)	Friction Loss (ft)	Minor Loss (ft)	Total Headloss (ft)	Headloss Gradient (ft/1000ft)
Cotton Lane Lateral	Open	N/A	36.89	3.83	1,220.62	1,214.11	6.33	0.18	6.51	0.99
P-1	Open	N/A	43.92	4.56	1,229.69	1,224.72	3.01	1.96	4.97	2.19
P-2	Open	N/A	43.92	4.56	1,224.72	1,220.62	3.85	0.25	4.10	1.41
P-3	Open	N/A	7.03	0.73	1,220.62	1,220.55	0.06	0.01	0.07	0.05
P-4	Open	N/A	7.03	0.73	1,220.55	1,220.35	0.20	0.01	0.21	0.05
P-5	Open	N/A	7.03	0.73	1,220.35	1,220.27	0.07	0.01	0.08	0.05
P-6	Open	N/A	7.03	0.73	1,220.27	1,219.98	0.29	0.00	0.29	0.04
P-7	Open	N/A	7.03	0.73	1,219.98	1,219.65	0.32	0.01	0.32	0.05
P-8	Open	N/A	5.62	0.58	1,219.65	1,219.65	0.26e-3	0.41e-2	0.44e-2	0.44
P-9	Open	N/A	5.62	0.58	1,344.55	1,344.22	0.34	0.41e-2	0.34	0.03
P-10	Open	N/A	5.62	0.58	1,344.22	1,344.06	0.15	0.41e-2	0.16	0.03
P-11	Open	N/A	5.62	0.58	1,344.06	1,343.81	0.25	0.41e-2	0.25	0.03
P-12	Open	N/A	5.62	0.58	1,343.81	1,343.68	0.12	0.41e-2	0.13	0.03
P-16	Open	N/A	5.62	0.80	1,343.68	1,343.55	0.13	0.01	0.13	0.07
P-17	Open	N/A	5.62	0.80	1,180.62	1,179.48	1.14	0.01	1.14	0.06
P-18	Open	N/A	1.41	1.80	1,219.65	1,218.59	1.02	0.04	1.06	1.06
P-19	Open	N/A	1.41	1.80	1,094.62	1,090.22	4.37	0.04	4.41	1.03

Analysis Results
Scenario: Year 2005 Peak Demand
Steady State Analysis

Pumps @ 0.00 hr

Label	Status	Constituent (mg/l)	From Grade (ft)	To Grade (ft)	Flow (cfs)	Head (ft)	Relative Speed	Useful Power (Hp)
PMP-1	On	N/A	1,219.65	1,344.55	5.62	124.91	1.00	79.55

PRVs @ 0.00 hr

Label	Status	Constituent (mg/l)	From Grade (ft)	To Grade (ft)	Flow (cfs)	Headloss (ft)	Setting (psi)
PRV-1	Throttling	N/A	1,343.55	1,180.62	5.62	162.92	50.00
PRV-2	Throttling	N/A	1,218.59	1,094.62	1.41	123.97	50.00

Table AP D-1

West Maricopa Combine, WESTCAPS
Potential Pipeline to The Future (PTTF) Alignment 3 (Reversal) - 2005

A **Alignment 3 (Reversible): From Sarival Road along Yuma Road to Buckeye Area**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2005 Design Peak Flow (cfs)	Year 2005 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Sarival Road	0	0	0	971	0	42	43.92	31,800	114	1,229
1		0.43	2,270	2,270	965	-6	42	43.92	31,800	114	1,224
2	Tie to Cotton Lane Lateral	0.55	2,904	5,174	965	0	42	43.92	31,800	113	1,220
3		0.27	1,426	6,600	971	6	42	7.03	5,090	110	1,220
4		0.85	4,488	11,088	977	6	42	7.03	5,090	107	1,220
5		0.3	1,584	12,672	971	-6	42	7.03	5,090	110	1,220
6		1.23	6,494	19,166	987	16	42	7.03	5,090	103	1,219
7	Tie to Tuthill Road Lateral	1.35	7,128	26,294	1,007	20	42	7.03	5,090	94	1,219
P	Pumps & Air Chamber	0.0038	20	26,314	1,007	0	42	5.62	4,071	148	1,344
9		2.15	11,352	37,666	1,060	53	42	5.62	4,071	125	1,344
10		0.97	5,122	42,788	1,066	6	42	5.62	4,071	123	1,344
11		1.58	8,342	51,130	1,083	17	42	5.62	4,071	115	1,343
12	Tie to Miller Road Lateral	0.8	4,224	55,354	1,090	7	42	5.62	4,071	112	1,343
Total		10.48	55,354			119					

Table AP D-1

West Maricopa Combine, WESTCAPS
Potential Pipeline to The Future (PTTF) Alignment 3 (Reversal) - 2005

B **Miller Road Lateral 1: From Trunk Alignment 3 (Reversal) along Miller Road to Baseline Road**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2005 Design Peak Flow (cfs)	Year 2005 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Yuma Road	0	0	0	1,091	0	36	5.62	4,071	111	1,343
PRV(U)	PRV Upstream Side	0.1894	1,000	1,000	1,081	-10	36	5.62	4,071	116	1,343
PRV(D)	PRV Downstream Side	0.0009	5	1,005	1,081	0	36	5.62	4,071	45	1,180
1	Baseline Road	3.79	20,011	21,016	889	-192	36	5.62	4,071	128	1,179
Total		3.98	21,016			-202					

C **Tuthill Road Lateral: From Trunk Alignment 3 (Reversal) along Tuthill Road to Lower Buckeye Road**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2005 Design Peak Flow (cfs)	Year 2005 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Yuma Road	0	0	0	1,007	0	12	1.41	1,019	94	1,219
PRV(U)	PRV Upstream Side	0.1894	1,000	1,000	984	-23	12	1.41	1,019	104	1,218
PRV(D)	PRV Downstream Side	0.0009	5	1,005	984	0	12	1.41	1,019	50	1,094
1	Lower Buckeye Rd	0.81	4,277	5,282	889	-95	12	1.41	1,019	89	1,090
Total		1.00	5,282			-118					

D **Cotton Lane Lateral: From Trunk Alignment 3 (Reversal) through Cotton Lane to Lower Buckeye Road Storage Tank**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2005 Design Peak Flow (cfs)	Year 2005 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Yuma Road	0	0	0	1,007	0	42	36.89	26,710	94	1,220
1	Lower Buckeye Rd Storage Tanks	1.25	6,600	6,600	932	-75	42	36.89	26,710	124	1,214
Total		1.25	6,600			-75					

Figure AP D-1A

Alignment 3 (Reversal)
From Sarival Road along Yuma Road to Buckeye Area
West Maricopa Combine, WESTCAPS
Year 2005 Water Delivery Scenario

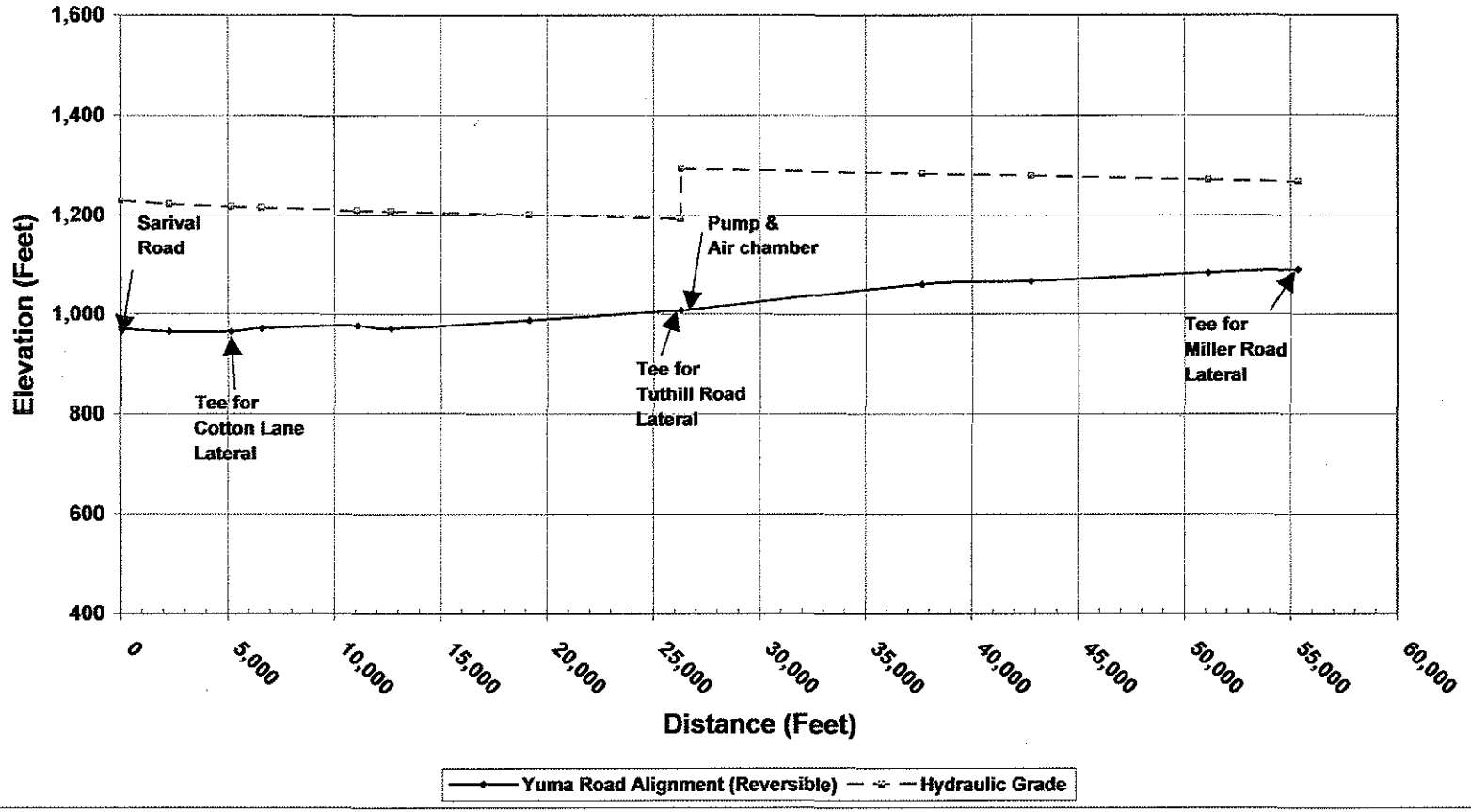


Figure AP D-1B

Miller Road Lateral
From Alignment 3 (Reversal) along Miller Road to Baseline Road
West Maricopa Combine, WESTCAPS
Year 2005 Water Delivery Scenario

Figure AP D-1C

Tuthill Road Lateral
From Alignment 3 (Reversal) along Tuthill Road to Lower Buckeye Road
West Maricopa Combine, WESTCAPS
Year 2005 Water Delivery Scenario

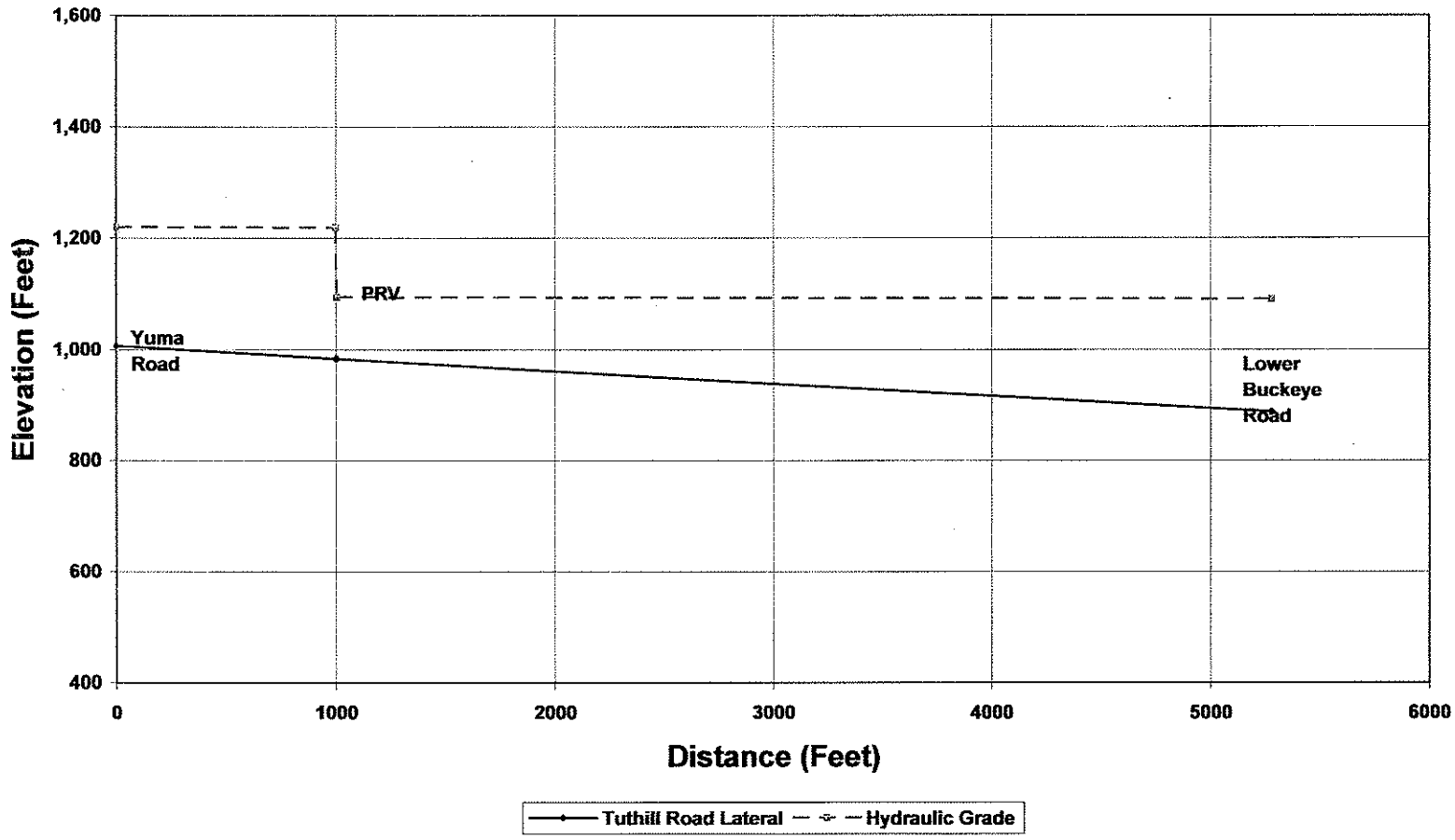
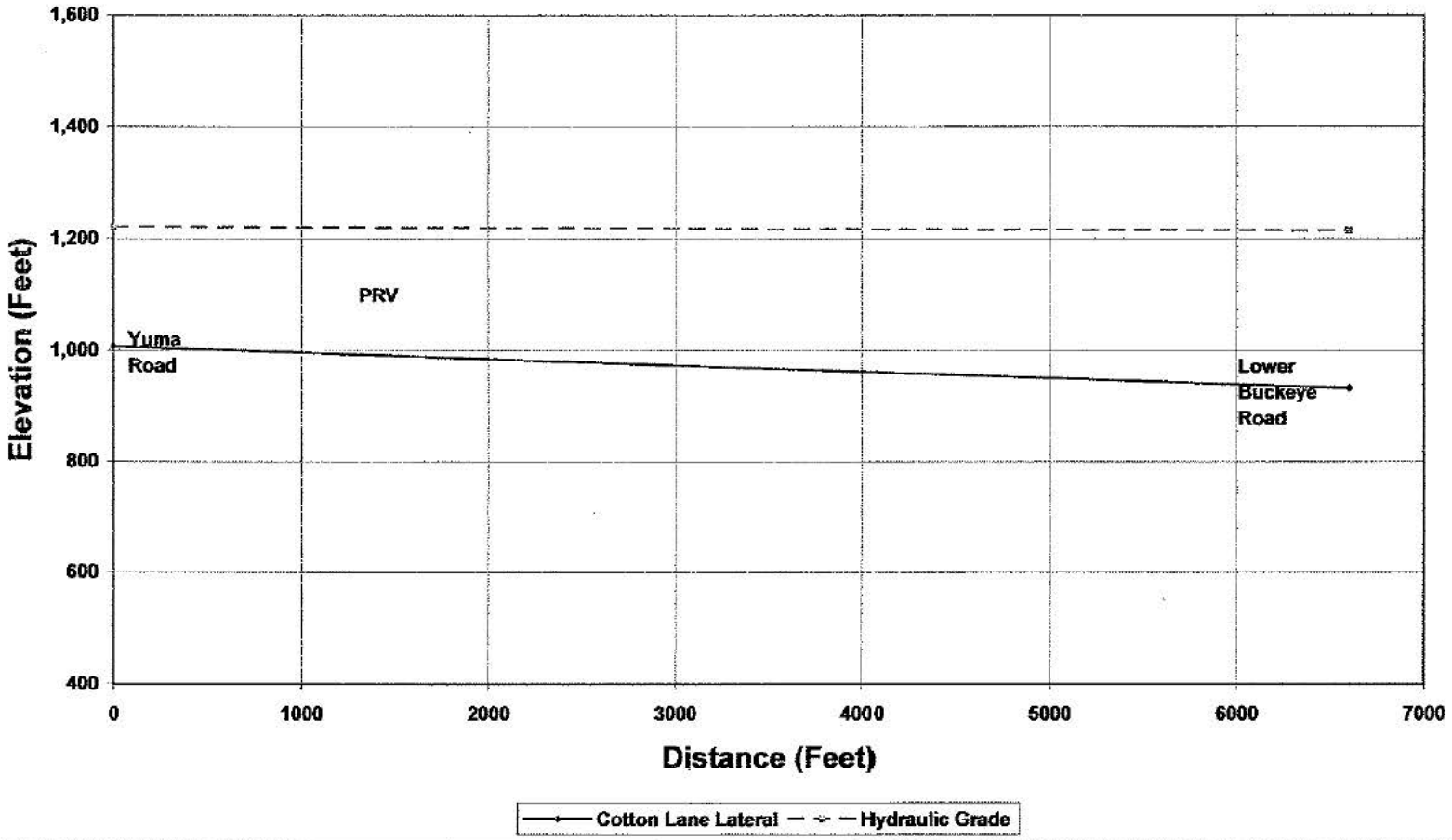


Figure AP D-1D

Cotton Lane Lateral
From Alignment 3 (Reversal) along Cotton Lane to Lower Buckeye Road Tanks
West Maricopa Combine, WESTCAPS
Year 2005 Water Delivery Scenario



Appendix D-2

Year 2015
(Reversal Flow)

1. **Schematic Model Layout and Hydraulic Results**

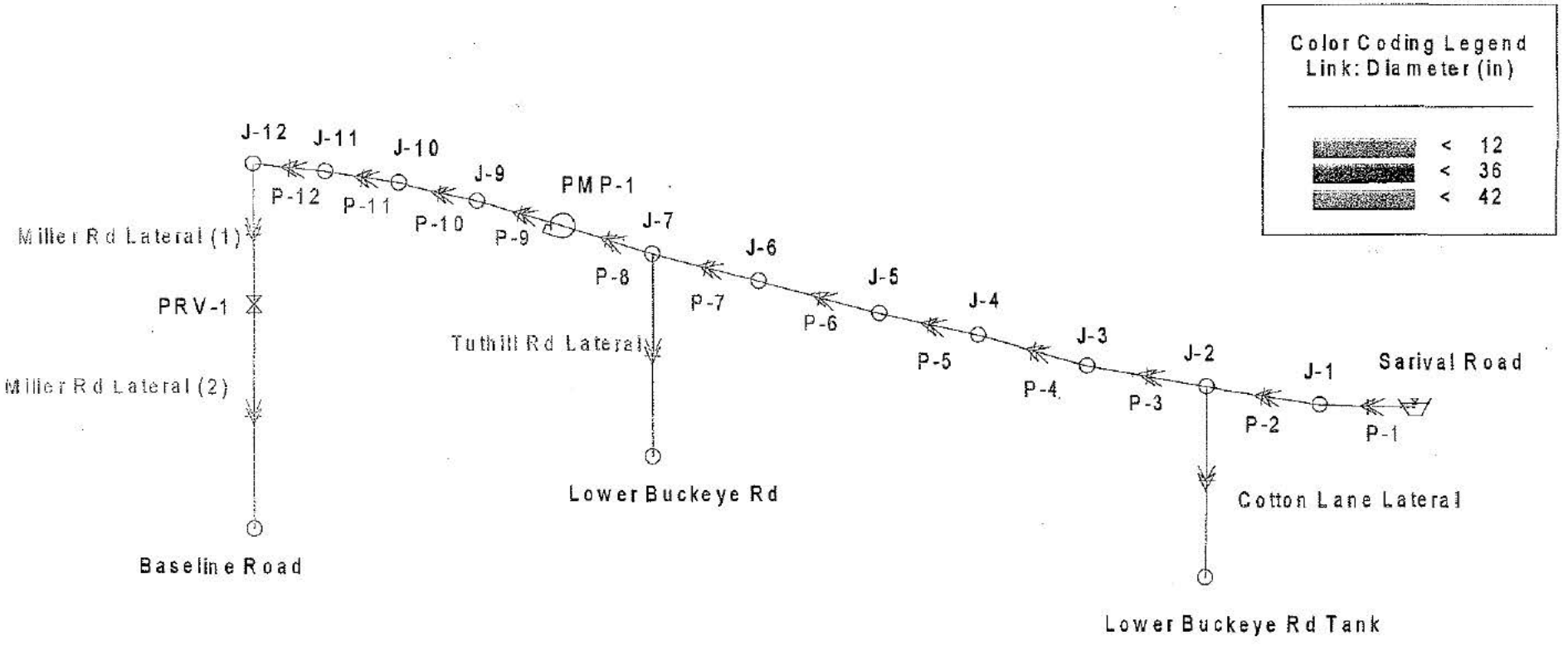
2. **Tables**
   Ground Profiles, Pipe Sizes, and Pressure Distributions

3. **Figure**
   Ground Profiles, Hydraulic Features, and Hydraulic Grade Lines

Scenario: Year 2015 Peak Demand

Alignment 3
Sarival Road to Buckeye Area along Yuma Road
West Maricopa Combine Pipeline to The Future (PTTF)
(Reversal Flow)

Year 2015 Water Delivery



Analysis Results
Scenario

Title: WMC Sarival Road - Yuma Alignment 3 (Rev) - 2015
Project Engineer: Michael Lee
Project Date: 11/21/01
Comments:

Scenario Summary	
Label	Year 2015 Peak Demand
Demand Alternative	Year 2015 Peak Demand
Physical Alternative	Year 2015 Peak Demand
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow

Liquid Characteristics			
Liquid	Water at 20C(68F)	Specific Gravity	1.00
Kinematic Viscosity	0.108e-4 ft²/s		

Network Inventory			
Number of Pipes	16	Number of Tanks	0
Number of Reservoirs	1	- Constant Area:	0
Number of Junctions	14	- Variable Area:	0
Number of Pumps	1	Number of Valves	1
- Constant Power:	0	- FCV's:	0
- One Point (Design Point):	1	- PBV's:	0
- Standard (3 Point):	0	- PRV's:	1
- Standard Extended:	0	- PSV's:	0
- Custom Extended:	0	- TCV's:	0
- Multiple Point:	0	Number of Spot Elevations	0

Pipe Inventory			
Total Length	87,394.00 ft		
12 in	5,280.00 ft	42 in	61,944.00 ft
36 in	20,170.00 ft		

Analysis Results
Scenario: Year 2015 Peak Demand
Steady State Analysis

Junctions @ 0.00 hr

Label	Constituent (mg/l)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Demand (Calculated) (cfs)	Pressure Head (ft)
Baseline Road	N/A	1,185.97	130.58	12.94	301.97
J-1	N/A	1,222.88	113.68	0.00	262.88
J-2	N/A	1,217.31	111.27	0.00	257.31
J-3	N/A	1,217.00	108.54	0.00	251.00
J-4	N/A	1,216.11	105.56	0.00	244.11
J-5	N/A	1,215.77	108.01	0.00	249.77
J-6	N/A	1,214.52	100.55	0.00	232.52
J-7	N/A	1,213.11	91.29	0.00	211.11
J-9	N/A	1,341.90	124.06	0.00	286.90
J-10	N/A	1,341.17	121.15	0.00	280.17
J-11	N/A	1,339.99	113.29	0.00	261.99
J-12	N/A	1,339.39	110.01	0.00	254.39
Lower Buckeye Rd	N/A	1,196.74	135.24	2.56	312.74
Lower Buckeye Rd Tai	N/A	1,210.99	122.81	36.30	283.99

Reservoirs @ 0.00 hr

Label	Constituent (mg/l)	Calculated Hydraulic Grade (ft)	Reservoir Inflow (cfs)	Reservoir Outflow (cfs)
Sarival Road	N/A	1,229.69	N/A	51.80

Pipes @ 0.00 hr

Label	Status	Constituent (mg/l)	Flow (cfs)	Velocity (ft/s)	From Grade (ft)	To Grade (ft)	Friction Loss (ft)	Minor Loss (ft)	Total Headloss (ft)	Headloss Gradient (ft/1000ft)
Cotton Lane Lateral	Open	N/A	36.30	3.77	1,217.31	1,210.99	6.15	0.17	6.32	0.96
Miller Rd Lateral (1)	Open	N/A	12.94	1.83	1,339.39	1,339.09	0.29	0.00	0.29	0.29
Miller Rd Lateral (2)	Open	N/A	12.94	1.83	1,191.62	1,185.97	5.61	0.04	5.65	0.29
P-1	Open	N/A	51.80	5.38	1,229.69	1,222.88	4.08	2.73	6.81	3.00
P-2	Open	N/A	51.80	5.38	1,222.88	1,217.31	5.22	0.35	5.57	1.92
P-3	Open	N/A	15.50	1.61	1,217.31	1,217.00	0.28	0.03	0.31	0.21
P-4	Open	N/A	15.50	1.61	1,217.00	1,216.11	0.87	0.03	0.90	0.20
P-5	Open	N/A	15.50	1.61	1,216.11	1,215.77	0.31	0.03	0.34	0.21
P-6	Open	N/A	15.50	1.61	1,215.77	1,214.52	1.25	0.00	1.25	0.19
P-7	Open	N/A	15.50	1.61	1,214.52	1,213.11	1.37	0.03	1.41	0.20
P-8	Open	N/A	12.94	1.34	1,213.11	1,213.09	0.14e-2	0.02	0.02	2.33
P-9	Open	N/A	12.94	1.34	1,343.49	1,341.90	1.57	0.02	1.59	0.14
P-10	Open	N/A	12.94	1.34	1,341.90	1,341.17	0.71	0.02	0.73	0.14
P-11	Open	N/A	12.94	1.34	1,341.17	1,339.99	1.15	0.02	1.17	0.14
P-12	Open	N/A	12.94	1.34	1,339.99	1,339.39	0.58	0.02	0.61	0.14
Tuthill Rd Lateral	Open	N/A	2.56	3.26	1,213.11	1,196.74	16.24	0.13	16.37	3.10

Analysis Results
Scenario: Year 2015 Peak Demand
Steady State Analysis

Pumps @ 0.00 hr

Label	Status	Constituent (mg/l)	From Grade (ft)	To Grade (ft)	Flow (cfs)	Head (ft)	Relative Speed	Useful Power (Hp)
PMP-1	On	N/A	1,213.09	1,343.49	12.94	130.40	1.00	191.21

PRVs @ 0.00 hr

Label	Status	Constituent (mg/l)	From Grade (ft)	To Grade (ft)	Flow (cfs)	Headloss (ft)	Setting (psi)
PRV-1	Throttling	N/A	1,339.09	1,191.62	12.94	147.47	50.00

Table AP D-2

West Maricopa Combine, WESTCAPS
Potential Pipeline to The Future (PTTF) Alignment 3 (Reversal) - 2015

A **Alignment 3 (Reversal): From Sarival Road along Yuma Road to Buckeye Area**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2015 Design Peak Flow (cfs)	Year 2015 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Sarival Road	0	0	0	971	0	42	51.80	37,500	114	1,229
1		0.43	2,270	2,270	965	-6	42	51.80	37,500	114	1,222
2	Tie to Cotton Lane Lateral	0.55	2,904	5,174	965	0	42	51.80	37,500	111	1,217
3		0.27	1,426	6,600	971	6	42	15.50	11,225	109	1,217
4		0.85	4,488	11,088	977	6	42	15.50	11,225	106	1,216
5		0.3	1,584	12,672	971	-6	42	15.50	11,225	108	1,215
6		1.23	6,494	19,166	987	16	42	15.50	11,225	101	1,214
7	Tie to Tuthill Road Lateral	1.35	7,128	26,294	1,007	20	42	15.50	11,225	91	1,213
P	Pumps & Air Chamber	0.0038	20	26,314	1,007	0	42	12.94	9,371	148	1,343
9		2.15	11,352	37,666	1,060	53	42	12.94	9,371	124	1,341
10		0.97	5,122	42,788	1,066	6	42	12.94	9,371	121	1,341
11		1.58	8,342	51,130	1,083	17	42	12.94	9,371	113	1,339
12	Tie to Miller Road Lateral	0.8	4,224	55,354	1,090	7	42	12.94	9,371	110	1,339
Total		10.48	55,354			119					

Table AP D-2

West Maricopa Combine, WESTCAPS
Potential Pipeline to The Future (PTTF) Alignment 3 (Reversal) - 2015

B **Miller Road Lateral 1: From Trunk Alignment 3 (Reversal) through Miller Road to Baseline Road**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2015 Design Peak Flow (cfs)	Year 2015 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Yuma Road	0	0	0	1,091	0	36	12.94	9,371	110	1,339
PRV(U)	PRV Upstream Side	0.1894	1,000	1,000	1,081	-10	36	12.94	9,371	114	1,339
PRV(D)	PRV Downstream Side	0.0009	5	1,005	1,081	0	36	12.94	9,371	50	1,191
1	Baseline Road	3.79	20,011	21,016	889	-192	36	12.94	9,371	130	1,185
Total		3.98	21,016			-202					

C **Tuthill Road Lateral: From Trunk Alignment 3 (Reversal) through Tuthill Road to Lower Buckeye Road**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2015 Design Peak Flow (cfs)	Year 2015 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Yuma Road	0	0	0	1,007	0	12	2.56	1,854	91	1,213
1	Lower Buckeye Rd	1.00	5,280	5,280	889	-118	12	2.56	1,854	135	1,196
Total		1.00	5,280			-118					

D **Cotton Lane Lateral: From Trunk Alignment 3 (Reversal) through Cotton Lane to Lower Buckeye Road Storage Tank**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2015 Design Peak Flow (cfs)	Year 2015 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Yuma Road	0	0	0	1,007	0	42	36.29	26,275	93	1,217
1	Lower Buckeye Rd Storage Tanks	1.25	6,600	6,600	932	-75	42	36.29	26,275	123	1,210
Total		1.25	6,600			-75					

Figure AP D-2A

Alignment 3 (Reversal)
From Sarival Road along Yuma Road to Buckeye Area
West Maricopa Combine, WESTCAPS
Year 2015 Water Delivery Scenario

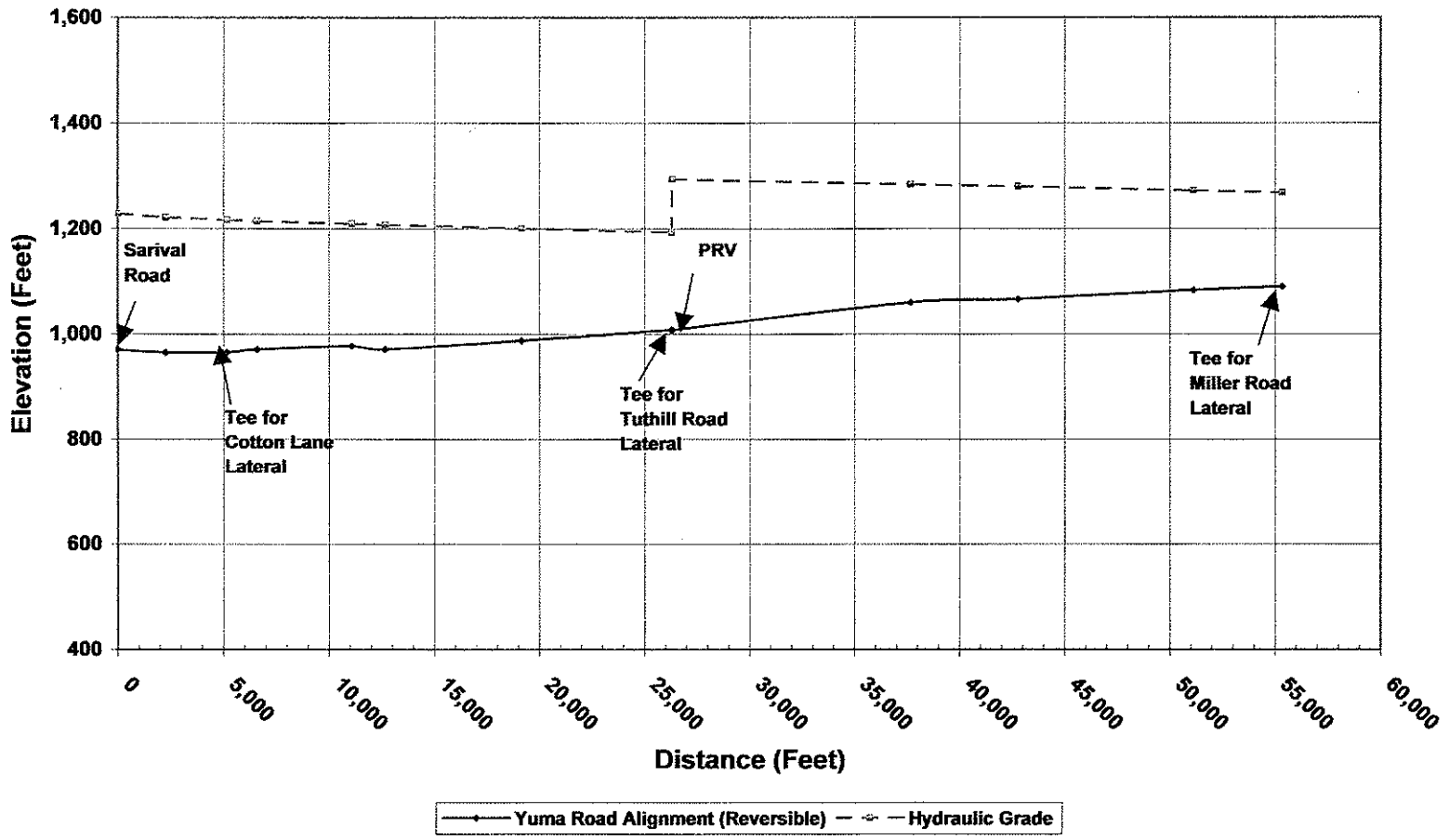


Figure AP D-2B

Miller Road Lateral
From Alignment 3 along Miller Road to Baseline Road
West Maricopa Combine, WESTCAPS
Year 2015 Water Delivery Scenario

Figure AP D-2C

Tuthill Road Lateral
From Alignment 3 along Tuthill Road to Lower Buckeye Road
West Maricopa Combine, WESTCAPS
Year 2015 Water Delivery Scenario

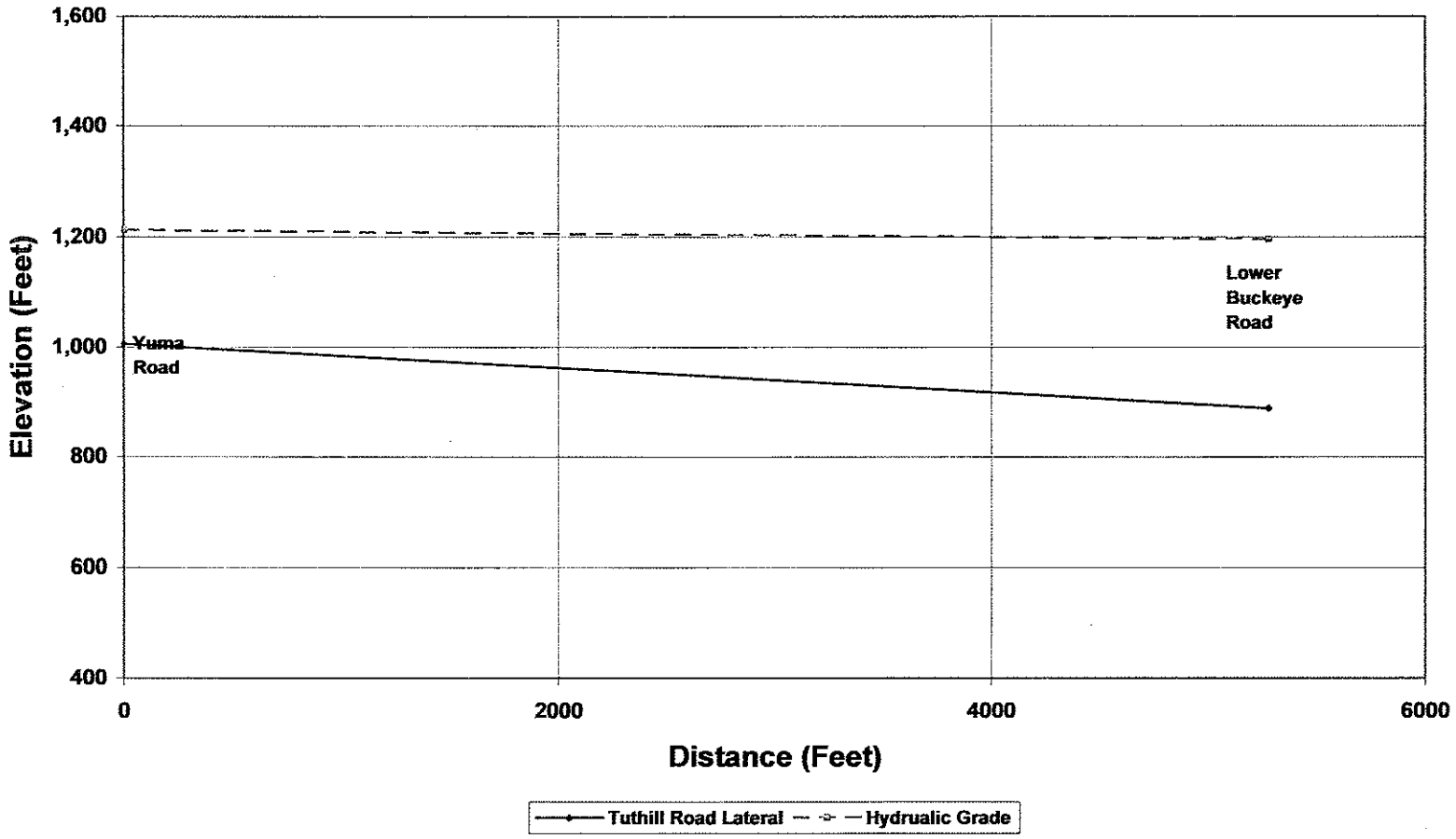
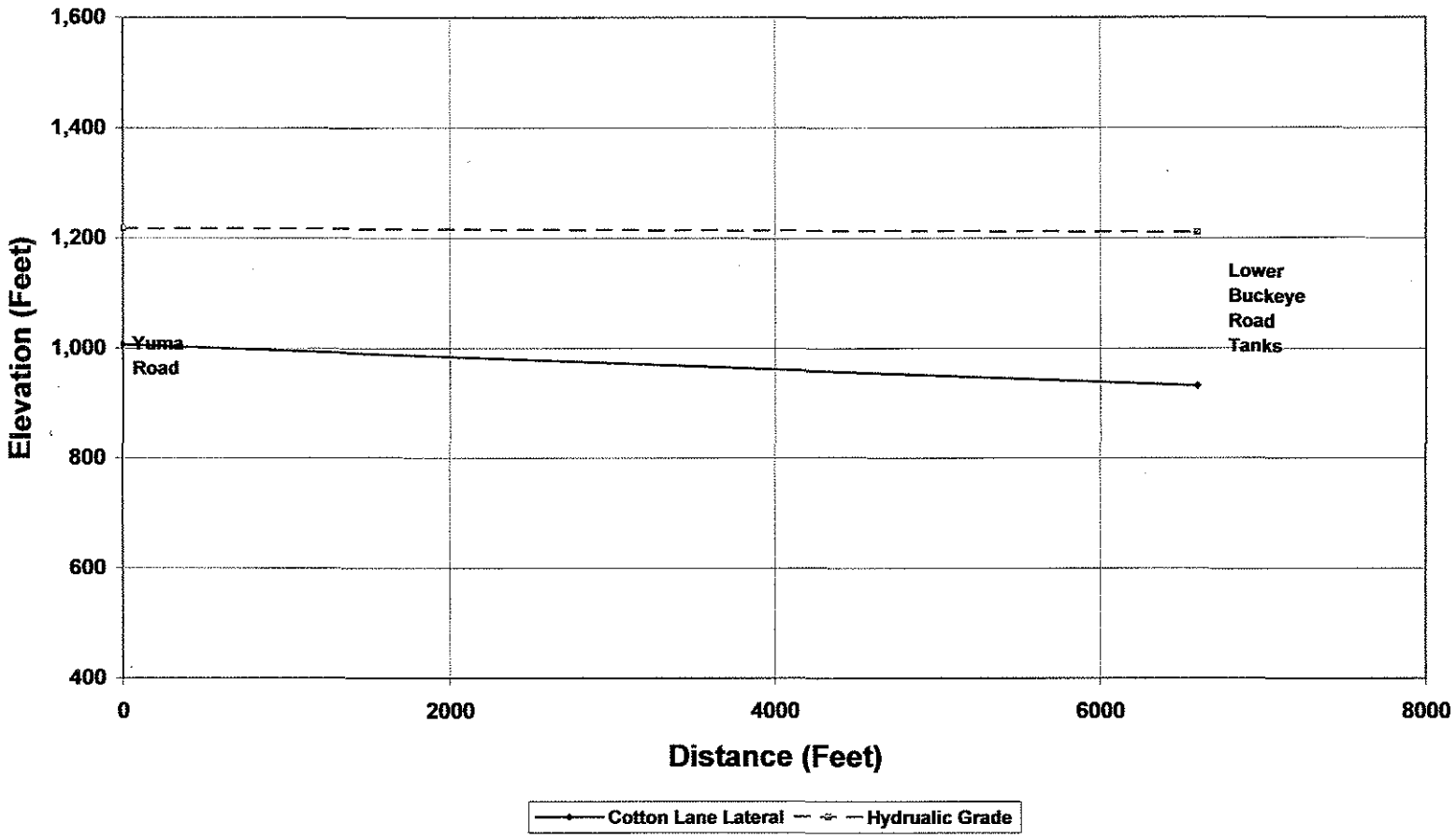


Figure AP D-2D

Cotton Lane Lateral
From Alignment 3 along Cotton Lane to Lower Buckeye Road Tanks
West Maricopa Combine, WESTCAPS
Year 2015 Water Delivery Scenario



Appendix D-3

Year 2025
(Reversal Flow)

1. **Schematic Model Layout and Hydraulic Results**

2. **Tables**
   Ground Profiles, Pipe Sizes, and Pressure Distributions

3. **Figure**
   Ground Profiles, Hydraulic Features, and Hydraulic Grade Lines

Scenario: Year 2025 Peak Demand

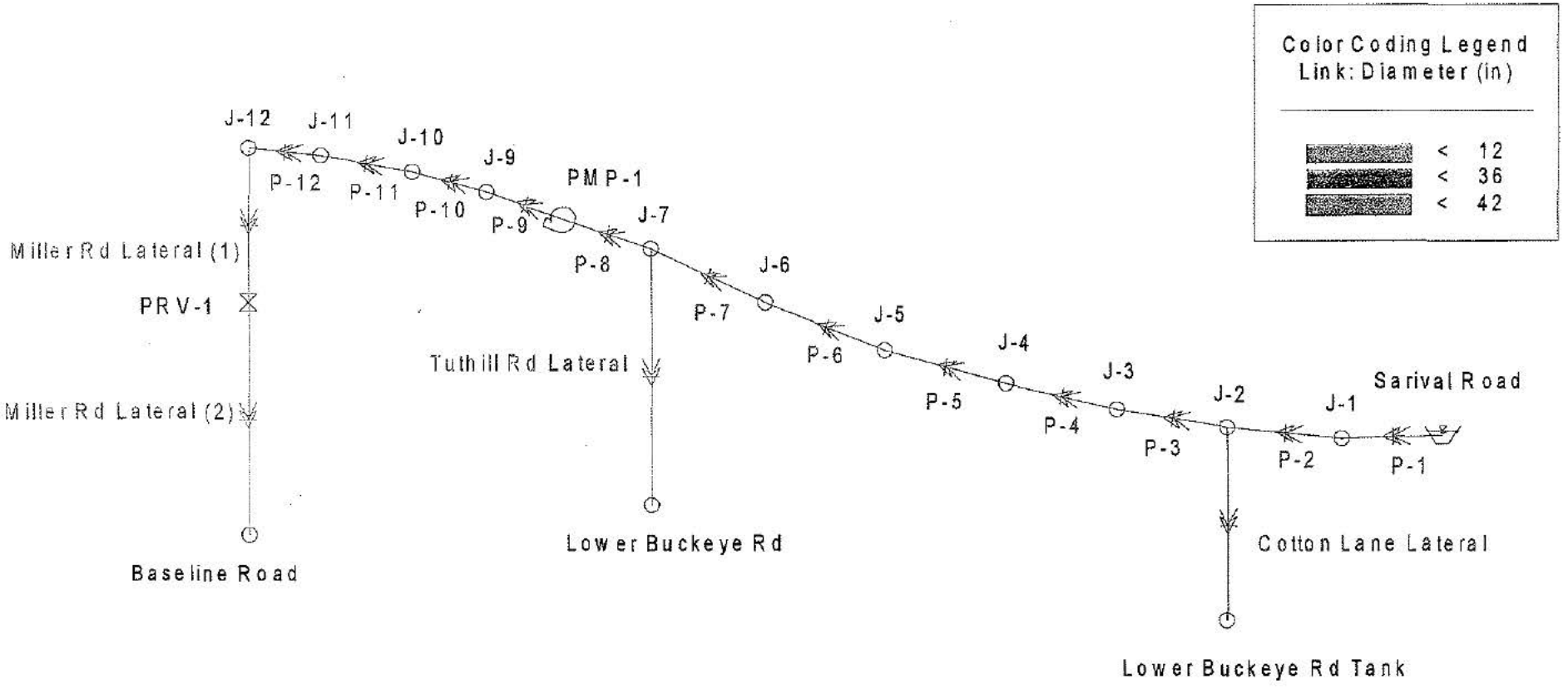
Alignment 3

Sarival Road to Buckeye Area along Yuma Road

West Maricopa Combine Pipeline to The Future (PTTF)

(Reversal Flow)

Year 2025 Water Delivery



Analysis Results
Scenario

Title: WMC Sarival Road - Yuma Alignment 3 (Rev)-2025
Project Engineer: Michael Lee
Project Date: 11/21/01
Comments:

Scenario Summary	
Label	Year 2025 Peak Demand
Demand Alternative	Year 2025 Peak Demand
Physical Alternative	Year 2025 Peak Demand
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow

Liquid Characteristics			
Liquid	Water at 20C(68F)	Specific Gravity	1.00
Kinematic Viscosity	0.108e-4 ft²/s		

Network Inventory			
Number of Pipes	16	Number of Tanks	0
Number of Reservoirs	1	- Constant Area:	0
Number of Junctions	14	- Variable Area:	0
Number of Pumps	1	Number of Valves	1
- Constant Power:	0	- FCV's:	0
- One Point (Design Point):	1	- PBV's:	0
- Standard (3 Point):	0	- PRV's:	1
- Standard Extended:	0	- PSV's:	0
- Custom Extended:	0	- TCV's:	0
- Multiple Point:	0	Number of Spot Elevations	0

Pipe Inventory			
Total Length	87,394.00 ft		
12 in	5,280.00 ft	42 in	61,944.00 ft
36 in	20,170.00 ft		

Analysis Results
Scenario: Year 2025 Peak Demand
Steady State Analysis

Junctions @ 0.00 hr

Label	Constituent (mg/l)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Demand (Calculated) (cfs)	Pressure Head (ft)
Baseline Road	N/A	1,155.96	117.60	35.01	271.96
J-1	N/A	1,222.88	113.68	0.00	262.88
J-2	N/A	1,217.31	111.27	0.00	257.31
J-3	N/A	1,215.53	107.91	0.00	249.53
J-4	N/A	1,210.37	103.08	0.00	238.37
J-5	N/A	1,208.42	104.83	0.00	242.42
J-6	N/A	1,201.26	94.81	0.00	219.26
J-7	N/A	1,193.19	82.68	0.00	191.19
J-9	N/A	1,282.95	98.57	0.00	227.95
J-10	N/A	1,278.33	93.98	0.00	217.33
J-11	N/A	1,270.90	83.42	0.00	192.90
J-12	N/A	1,267.07	78.73	0.00	182.07
Lower Buckeye Rd	N/A	1,141.37	111.29	4.77	257.37
Lower Buckeye Rd Tai	N/A	1,216.50	125.19	12.02	289.50

Reservoirs @ 0.00 hr

Label	Constituent (mg/l)	Calculated Hydraulic Grade (ft)	Reservoir Inflow (cfs)	Reservoir Outflow (cfs)
Sarival Road	N/A	1,229.69	N/A	51.80

Pipes @ 0.00 hr

Label	Status	Constituent (mg/l)	Flow (cfs)	Velocity (ft/s)	From Grade (ft)	To Grade (ft)	Friction Loss (ft)	Minor Loss (ft)	Total Headloss (ft)	Headloss Gradient (ft/1000ft)
Cotton Lane Lateral	Open	N/A	12.02	1.25	1,217.31	1,216.50	0.80	0.02	0.81	0.12
Miller Rd Lateral (1)	Open	N/A	35.01	4.95	1,267.07	1,264.92	1.84	0.30	2.14	2.14
Miller Rd Lateral (2)	Open	N/A	35.01	4.95	1,191.62	1,155.96	35.37	0.30	35.67	1.86
P-1	Open	N/A	51.80	5.38	1,229.69	1,222.88	4.08	2.73	6.81	3.00
P-2	Open	N/A	51.80	5.38	1,222.88	1,217.31	5.22	0.35	5.57	1.92
P-3	Open	N/A	39.78	4.13	1,217.31	1,215.53	1.57	0.21	1.78	1.25
P-4	Open	N/A	39.78	4.13	1,215.53	1,210.37	4.95	0.21	5.16	1.15
P-5	Open	N/A	39.78	4.13	1,210.37	1,208.42	1.75	0.21	1.95	1.23
P-6	Open	N/A	39.78	4.13	1,208.42	1,201.26	7.16	0.00	7.16	1.10
P-7	Open	N/A	39.78	4.13	1,201.26	1,193.19	7.86	0.21	8.07	1.13
P-8	Open	N/A	35.01	3.64	1,193.19	1,193.02	0.01	0.16	0.17	16.91
P-9	Open	N/A	35.01	3.64	1,293.00	1,282.95	9.89	0.16	10.05	0.89
P-10	Open	N/A	35.01	3.64	1,282.95	1,278.33	4.46	0.16	4.62	0.90
P-11	Open	N/A	35.01	3.64	1,278.33	1,270.90	7.26	0.16	7.43	0.89
P-12	Open	N/A	35.01	3.64	1,270.90	1,267.07	3.68	0.16	3.84	0.91
Tuthill Rd Lateral	Open	N/A	4.77	6.07	1,193.19	1,141.37	51.37	0.45	51.82	9.81

Analysis Results
Scenario: Year 2025 Peak Demand
Steady State Analysis

Pumps @ 0.00 hr

Label	Status	Constituent (mg/l)	From Grade (ft)	To Grade (ft)	Flow (cfs)	Head (ft)	Relative Speed	Useful Power (Hp)
PMP-1	On	N/A	1,193.02	1,293.00	35.01	99.98	1.00	396.65

PRVs @ 0.00 hr

Label	Status	Constituent (mg/l)	From Grade (ft)	To Grade (ft)	Flow (cfs)	Headloss (ft)	Setting (psi)
PRV-1	Throttling	N/A	1,264.92	1,191.62	35.01	73.30	50.00

Table AP D-3

West Maricopa Combine, WESTCAPS
Potential Pipeline to The Future (PTTF) Alignment 3 (Reversal) - 2025

A **Alignment 3 (Reversal): From Sarival Road along Yuma Road to Buckeye Area**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Sarival Road	0	0	0	971	0	42	51.80	37,500	114	1,229
1		0.43	2,270	2,270	965	-6	42	51.80	37,500	114	1,222
2	Tie to Cotton Lane Lateral	0.55	2,904	5,174	965	0	42	51.80	37,500	111	1,217
3		0.27	1,426	6,600	971	6	42	39.78	28,799	108	1,215
4		0.85	4,488	11,088	977	6	42	39.78	28,799	103	1,210
5		0.3	1,584	12,672	971	-6	42	39.78	28,799	105	1,208
6		1.23	6,494	19,166	987	16	42	39.78	28,799	95	1,201
7	Tie to Tuthill Road Lateral	1.35	7,128	26,294	1,007	20	42	39.78	28,799	83	1,193
P	Pumps & Air Chamber	0.0038	20	26,314	1,007	0	42	35.01	25,344	126	1,293
9		2.15	11,352	37,666	1,060	53	42	35.01	25,344	99	1,283
10		0.97	5,122	42,788	1,066	6	42	35.01	25,344	94	1,279
11		1.58	8,342	51,130	1,083	17	42	35.01	25,344	84	1,271
12	Tie to Miller Road Lateral	0.8	4,224	55,354	1,090	7	42	35.01	25,344	79	1,267
Total		10.48	55,354			119					

Table AP D-3

West Maricopa Combine, WESTCAPS
Potential Pipeline to The Future (PTTF) Alignment 3 (Reversal) - 2025

B **Miller Road Lateral 1: From Trunk Alignment 3 (Reversal) through Miller Road to Baseline Road**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Yuma Road	0	0	0	1,091	0	36	35.01	25,344	78	1,267
PRV(U)	PRV Upstream Side	0.1894	1,000	1,000	1,081	-10	36	35.01	25,344	82	1,265
PRV(D)	PRV Downstream Side	0.0009	5	1,005	1,081	0	36	35.01	25,344	50	1,191
1	Baseline Road	3.79	20,011	21,016	889	-192	36	35.01	25,344	118	1,156
Total		3.98	21,016			-202					

C **Tuthill Road Lateral: From Trunk Alignment 3 (Reversal) through Tuthill Road to Lower Buckeye Road**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Yuma Road	0	0	0	1,007	0	12	4.77	3,453	83	1,193
1	Lower Buckeye Rd	1.00	5,280	5,280	889	-118	12	4.77	3,453	111	1,141
Total		1.00	5,280			-118					

D **Cotton Lane Lateral: From Trunk Alignment 3 (Reversal) through Cotton Lane to Lower Buckeye Road Storage Tank**

Profile Point	Description	Distance Between (Mile)	Distance Between (Feet)	Distance Cumulative (Feet)	Elevation Spot (Feet)	Elevation Between (Feet)	Pipe Diameter (Inches)	Year 2025 Design Peak Flow (cfs)	Year 2025 Design Peak Flow (AF/Yr)	Anticipated Pressure (psi)	Anticipated Hyd.Grade (Feet)
0	Yuma Road	0	0	0	1,007	0	42	12.02	8,702	93	1,217
1	Lower Buckeye Rd Storage Tanks	1.25	6,600	6,600	932	-75	42	12.02	8,702	125	1,216
Total		1.25	6,600			-75					

Figure AP D-3A

Alignment 3 (Reversal)
From Sarival Road along Yuma Road to Buckeye Area
West Maricopa Combine, WESTCAPS
Year 2025 Water Delivery Scenario

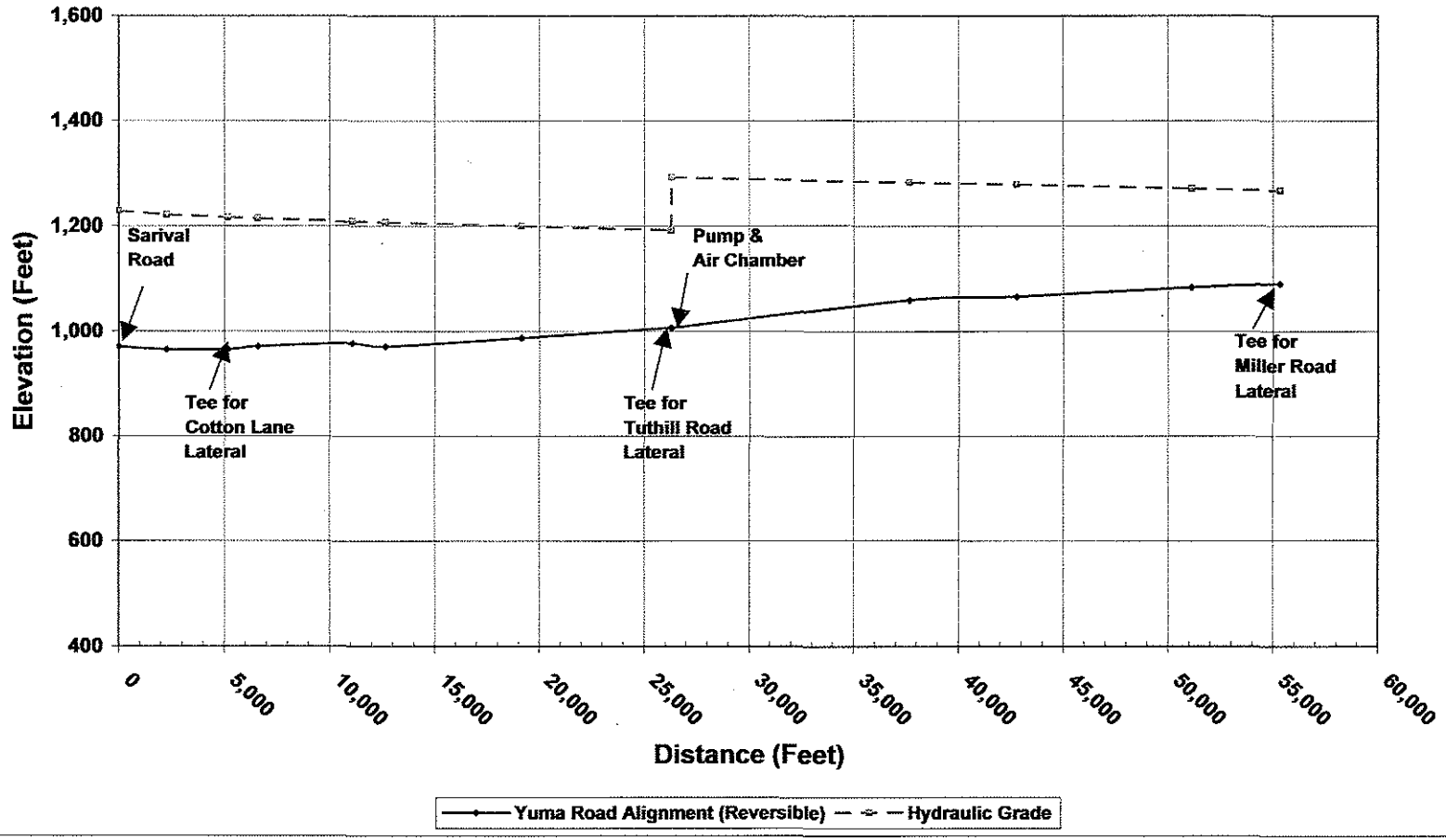


Figure AP D-3B

Miller Road Lateral
From Alignment 3 along Miller Road to Baseline Road
West Maricopa Combine, WESTCAPS
Year 2025 Water Delivery Scenario

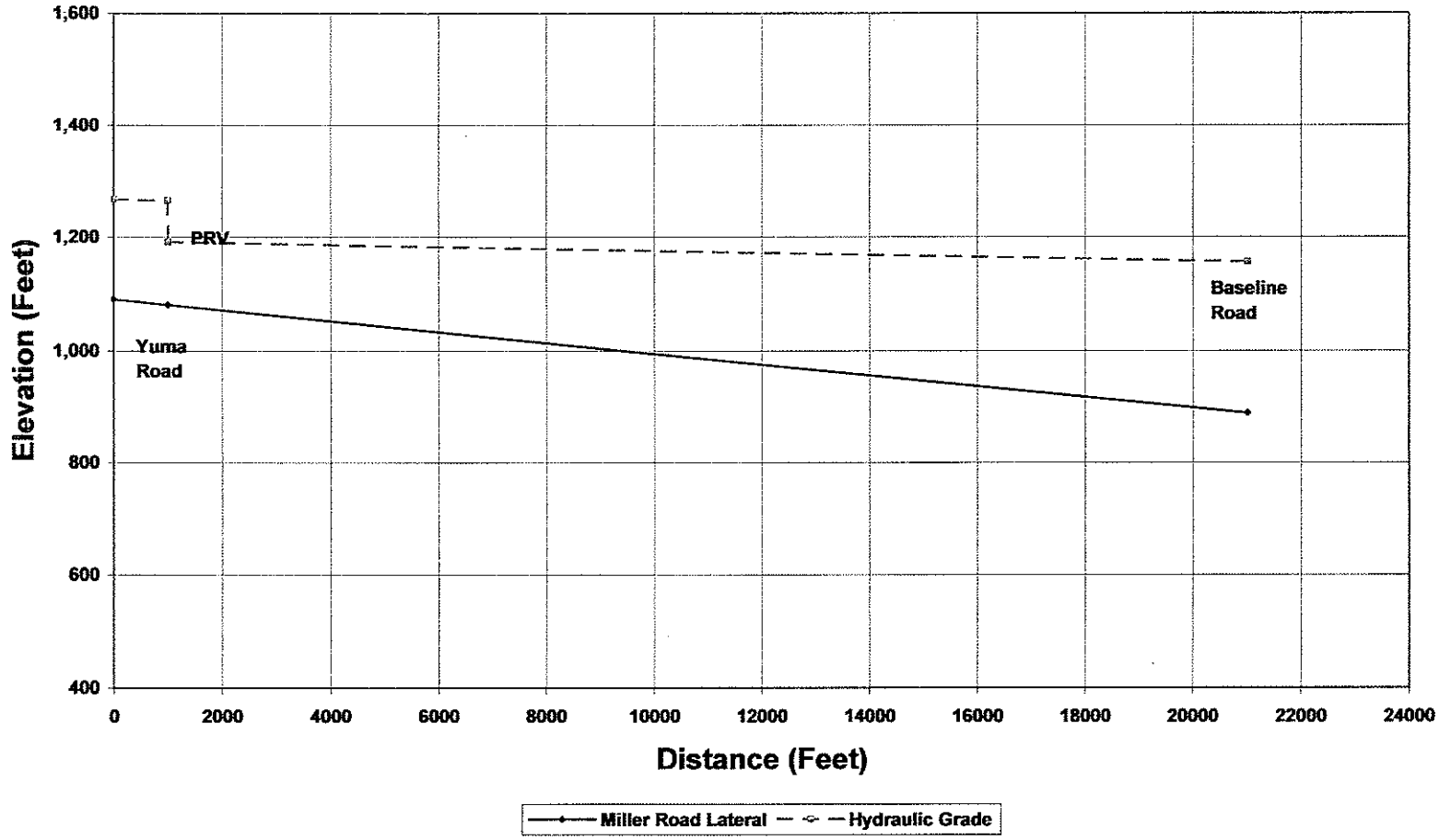


Figure AP D-3C

Tuthill Road Lateral
From Alignment 3 along Tuthill Road to Lower Buckeye Road
West Maricopa Combine, WESTCAPS
Year 2025 Water Delivery Scenario

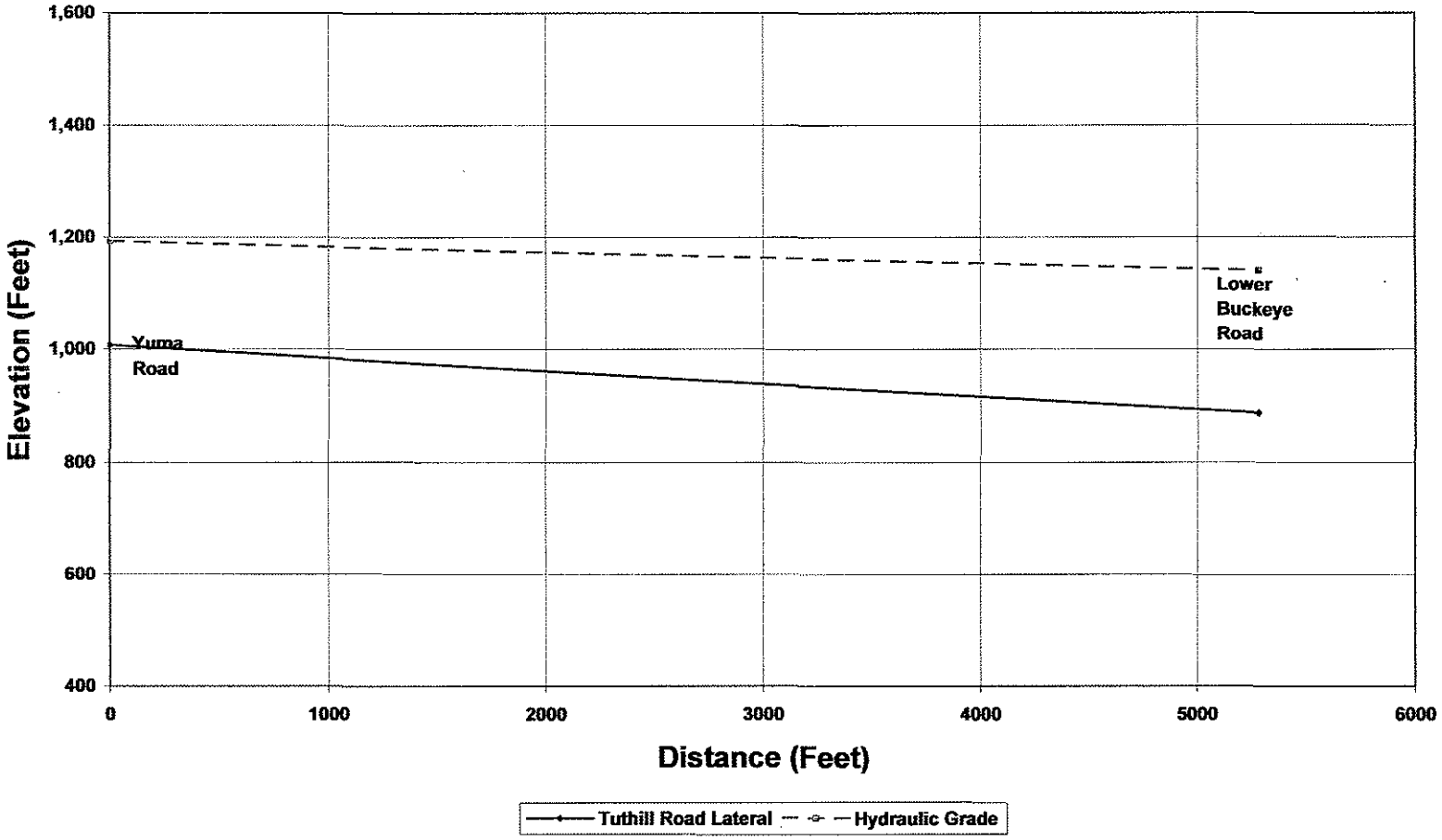
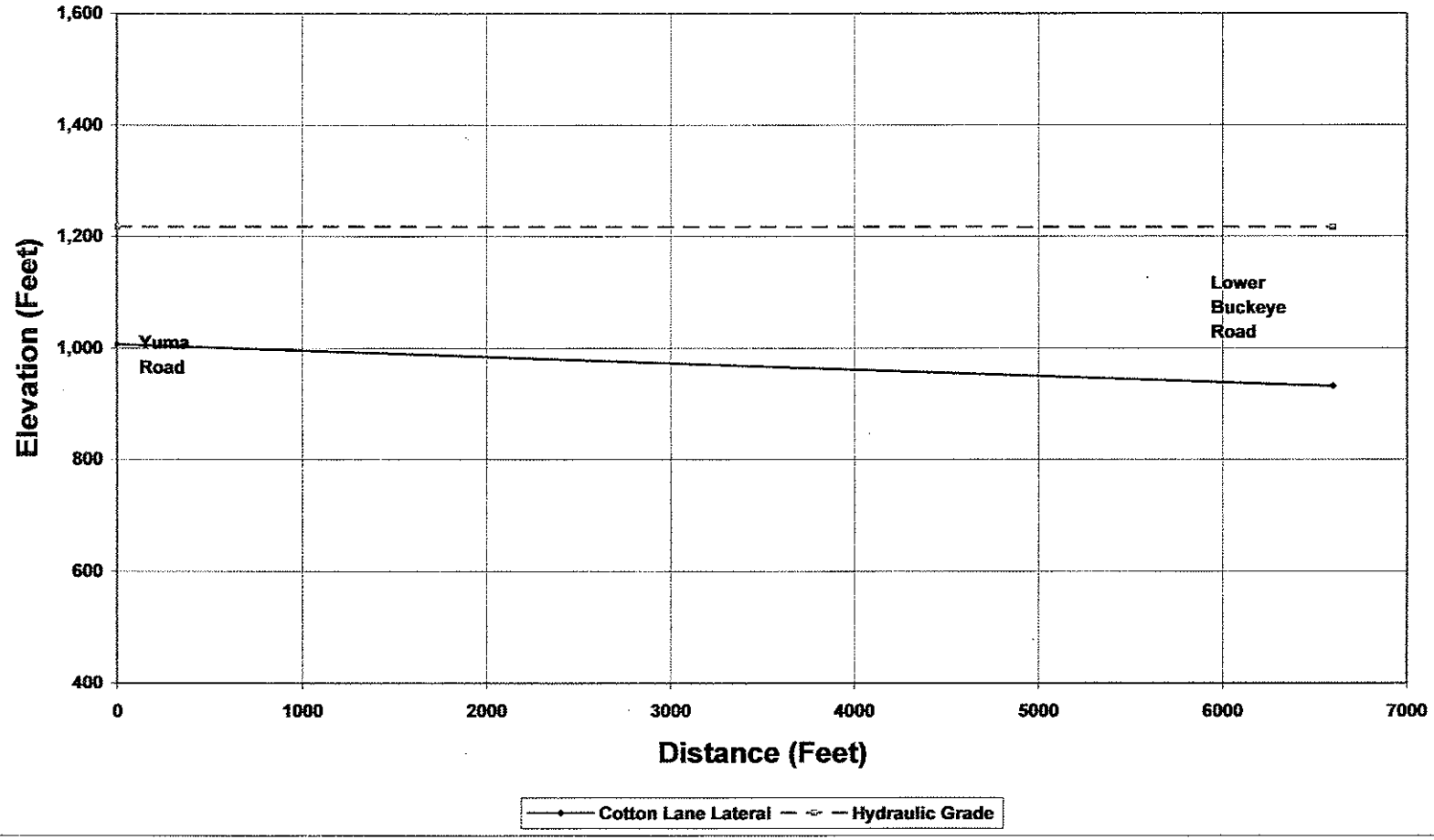


Figure AP D-3D

Cotton Lane Lateral
From Alignment 3 along Cotton Lane to Lower Buckeye Road Tanks
West Maricopa Combine, WESTCAPS
Year 2025 Water Delivery Scenario



Appendix D-S

Summary
For
Transient Years' Water Delivery
(Reversal Flow)

Tables

1. **Overall Quantity, and Pumps Summary**
2. **Construction and Capital Cost Estimation**
3. **Annual Operating Costs**
4. **Total Annual Costs, and Costs per 1,000 Gallons of Water Delivered**

Table AP D-S1

Quantity Estimation
Transient Water Delivery from Sarival Road through Alignment 3 (Reversal)
West Maricopa Combine Pipeline to the Future (PTTF)

I. Pumps' Summary

Item	Description	Unit	Size	Year		
				2005	2015	2025
Number of Pumps		each		1	1	1
Pumpage	Maximum in cfs	cfs		5.62	12.94	35.01
	Maximum in acre-feet a year	AF/Yr		4,071	9,371	25,344
Total Dynamic Head	Energy head required	Feet		125	130	100
Power	Horse power	H.P.		100	240	500

Table AP D-S2

Pumps Construction & Capital Cost Estimation
Transient Water Delivery from Sarival Road through Alignment 3 (Reversal
West Maricopa Combine Pipeline to the Future (PTTF)

Item	Description	Unit	Size	Construction and Capital Costs ($) Year 2005	2015	2025
Pumps (80 % Efficiency)	@ right after Tuthill Road Lateral Tee	(H.P.)	100	$15,480		
including housing structures	@ right after Tuthill Road Lateral Tee	(H.P.)	240		$225,445	
	@ right after Tuthill Road Lateral Tee	(H.P.)	500			$439,390
Subtotal				$15,480	$225,445	$439,390
Total Construction Cost				$15,480	$225,445	$439,390
Contingency: %	Percent of Total Construction Cost	%	20	$3,096	$45,089	$87,878
Engineering & Administration, %	Percent of Total Construction Cost	%	20	$3,096	$45,089	$87,878
Total Capital Cost				$21,672	$315,623	$615,146

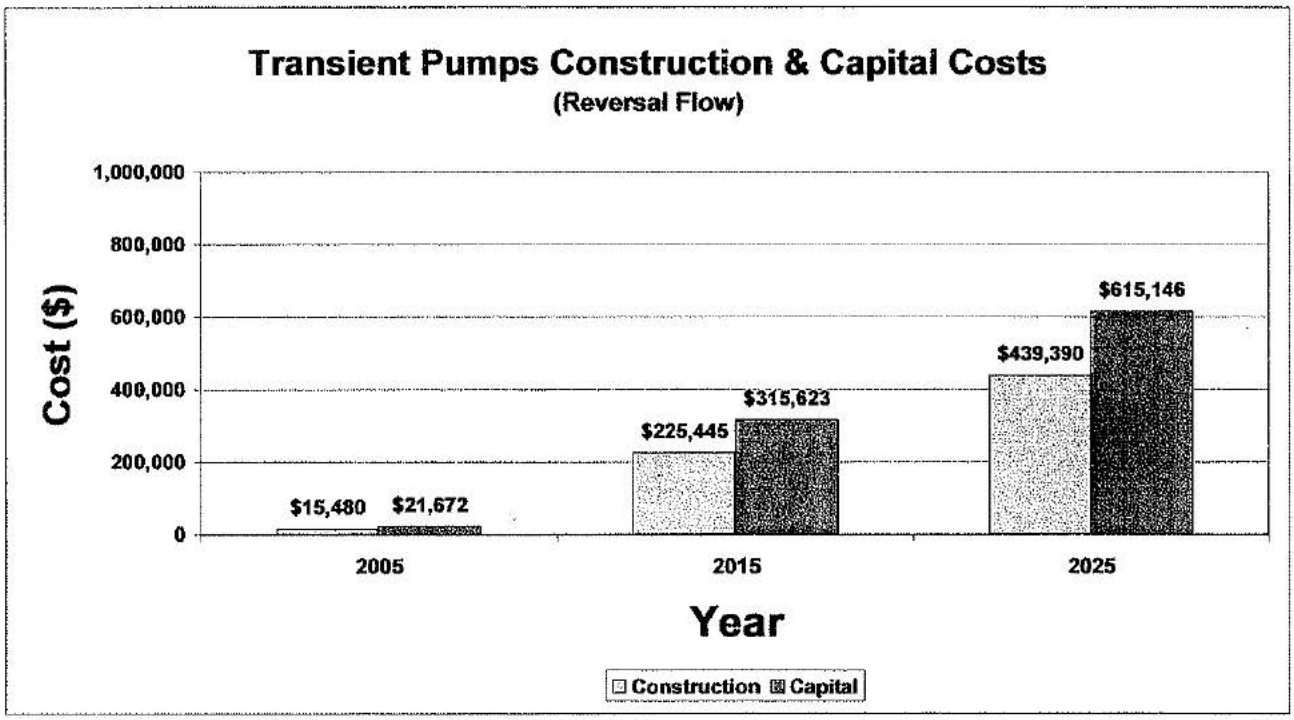


Table AP D-S3

Annual Pumps Operating and Maintenance Cost

Transient Water Delivery from Sarival Road through Alignment 3 (Reversal)

West Maricopa Combine Pipeline to the Future (PTTF)

Item	Year		
	2005	2015	2025
Pump O.& M. Cost	$44,103	$105,580	$219,648
Pumping Energy Cost	$26,140	$62,736	$130,699
Total O.& M. Cost	$70,242	$168,316	$350,347

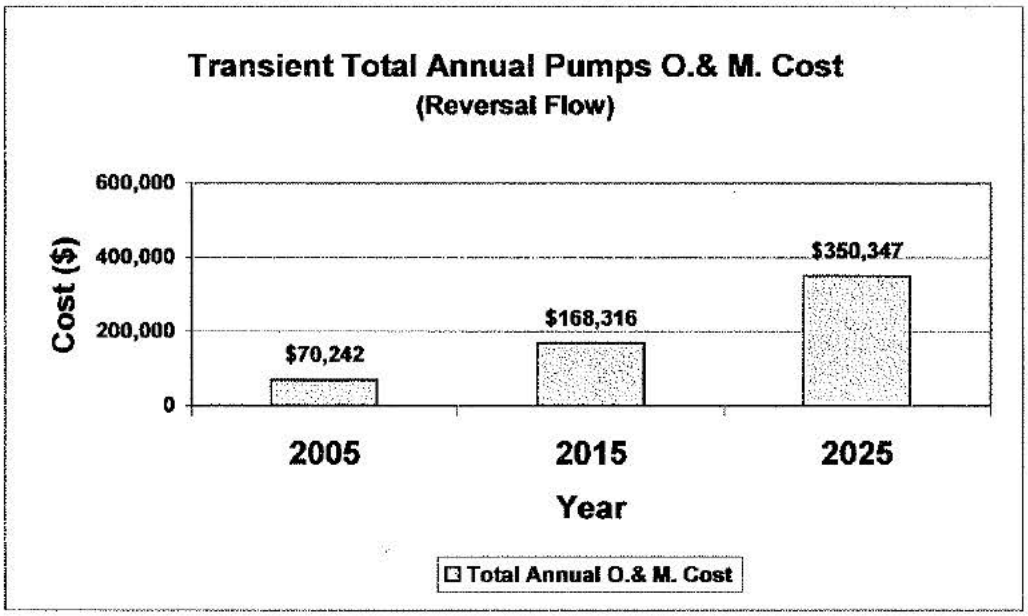


Table AP D-S4

Annualized Pumps Capital, and O.& M. Costs

Transient Water Delivery from Sarival Road through Alignment 3 (Reversible)

West Maricopa Combine Pipeline to the Future (PTTF)

Item	Year		
	2005	2015	2025
Annual Water Delivered	2,714	6,247	16,896
20 Years' Amortized Capital Cost	$1,813	$26,411	$51,475
Annual Pumps O.& M. Cost	$70,242	$168,316	$350,347
Total Annualized Pumps Cost	$72,056	$194,727	$401,822
Cost per Acre-Foot	$27	$31	$24
Cost per 1,000 Gallons	$0.08	$0.10	$0.07