Project Name: Sewer & Manhole Rehabilitation
Project No.: 212231
Amendment No: 2
Date:

This Amendment to that certain Standard Form Agreement dated June 11, 2024 by and between the City of Glendale and B & F Contracting, Inc. (CM@Risk) for services, deliverables and work related to Project No. 212231.1, Project Name: Sewer & Manhole Rehabilitation Phase VI, (the "Agreement") is made and entered into effective this _____ day of November, 2024.

1. This Amendment #2 establishes a Guaranteed Maximum Price ("GMP") and Construction Phase Fee for Construction Services and incorporates such terms into the Agreement, making the Agreement effective for Construction Phase Services:

   a. The total fee for Construction Phase Services, which is included in the Guaranteed Maximum Price (GMP) as defined under the Agreement, shall be fixed at One Hundred Fifty-Seven Thousand Nine Hundred Dollars and 95/100 Dollars ($157,938.95). [This amendment for GMP-002 is for Phase 6B and 6D only. Previous GMP-001 was for Phase 6C only.]

   b. The Guaranteed Maximum Price ("GMP") for Construction Services, as defined under the Agreement, shall be Three Million Fifty-Four Thousand Three Hundred Forty-Six Dollars and 13/100 Dollars ($3,054,346.13). [This amendment for GMP-002 is for Phase 6B and 6D only. Previous GMP-001 was for Phase 6C only.]

   c. The total compensation under the Agreement, as amended by this Amendment, shall be:

	Pre-Construction Phase	Construction Phase	Total
Original Agreement:	$153,532.00	$	$153,532.00
Previous Amendments:	$	$1,371,649.44	$1,371,649.44
This Amendment:	$	$3,054,346.13	$3,054.346.13
Total (including this Amendment):	$153,532.00	$4,425,995.57	$4,579,527.57

2. DELETE the blank template "Exhibit C – Cost of the Work – Schedule of Values" from the Agreement, and ADD "Exhibit C – B&F Contracting, Inc. Cost of the Work – Schedule of Values" dated October 28, 2024 (15 Pages), attached herein.

3. ADD "Exhibit E – Construction Documents necessary to define Scope of Work and deliverables for the Construction Phase Services, including plans, designs, drawings, specifications and other required Contract Documents" dated October 28, 2024 (190 Pages), attached herein.

4. ADD "Exhibit F - Statement of All Clarifications and Assumptions" dated October 28, 2024 (3 Pages), attached herein.

5. ADD "Exhibit G – Schedule of Major Milestones" dated October 28, 2024 (1 Pages), attached herein.

6. ADD 174 days for Article 5.3.1 Substantial Completion of the Work.

7. ADD 30 days from substantial completion for Article 5.4.1 Final Completion of the Work.

8. All other provisions, terms and conditions of the Agreement shall remain unchanged and in full effect.

(Signature on following page)

IN WITNESS WHEREOF, the Parties hereto have duly executed this Amendment, effective as of the date first written above.

OWNER
City of Glendale
5850 W. Glendale Avenue
Glendale, AZ 85301

By: Its Authorized Representative:

Signature

Kevin R. Phelps
Printed Name

Glendale City Manager
Title

Date

CM@RISK
B&F Contracting, Inc.
11011 N. 23rd Avenue
Phoenix, AZ 85029

By Its Authorized Representative:

Signature

Printed Name

Title

Date

ATTEST:

Julie K. Bower (SEAL)
City Clerk

APPROVED AS TO FORM:

Michael D. Bailey
City Attorney

DESIGN PROFESSIONAL
Consor North America, Inc.
2432 W. Peoria Avenue, Suite 1246
Phoenix, AZ 85029

By Its Authorized Representative:

Signature (Reviewed in accordance with the "Agreement Between Owner and Design Professional" Section 4.8.1.14 of Exhibit A "Scope of Services for the Design Professional")

Printed Name

Title

Date

EXHIBIT C
Cost of the Work

(One (1) page - template)
(15 pages - final document to be included with GMP Amendment)

EXHIBIT C: COST OF THE WORK

SEWER & MANHOLE REHABILITATION, PHASE 6C

GMP-002 REV-1

PROJECT NO. 212231

OCTOBER 28, 2024

SUBMITTED BY B&F CONTRACTING, INC.

B&F Contracting, Inc., serving as the Construction Manager at Risk, is providing GMP-002 for Sewer & Manhole Rehabilitation Phase 6B & 6D projects. The scope of work for GMP-002 is outlined in further detail in this Exhibit C and Exhibit E.

B&F Contracting, Inc.
CONSTRUCTION MANAGER AT RISK AGREEMENT - Exhibit C - Cost of the Work
GMP-002 Rev-1 SCHEDULE OF VALUES

DIRECT CONSTRUCTION COST					
Cost Code	**Item of Work**	**Quantity**	**Unit of Measure**	**Unit Cost**	**Total GMP**
General Items					
	Mobilization/Demobilization	1	LS	$51,766.68	$ 51,766.68
	General Conditions	5	MO	$53,048.79	$ 265,243.95
				General Items Subototal:	**$ 317,010.63**
Phase 6B					
	Cleaning & Pre-CCTV Existing 12" Sewer	2494	LF	$11.95	$ 29,803.30
	Install 12" CIPP Liner Per Spec No. 02767	2494	LF	$66.89	$ 166,823.66
	Post-CIPP Cleaning & CCTV Inspection (Pano)	2494	LF	$6.72	$ 16,759.68
	Remove & Replace Frame & Cover	1	EACH	$2,580.54	$ 2,580.54
	Adjust Frame & Cover To Grade	1	EACH	$1,630.53	$ 1,630.53
	Repair & Coat Chimney, Cone, & Wall	570	SF	$38.00	$ 21,675.20
	Repair & Coat Bench	5	EACH	$900.00	$ 4,500.00
	Repair/Reshape & Coat Channel	3	EACH	$400.00	$ 1,200.00
	Inspect & Assess Manhole	2	EACH	$400.00	$ 800.00
	CIPP Liner End Seal Or Line Through & Cut Out Access	11	EACH	$656.96	$ 7,226.56
	Cut & Remove CIPP Coupon To Reinstate Tap	1	EACH	$145.00	$ 145.00
	Remove Hanging Gasket	22	EACH	$677.20	$ 14,898.40
	Remove & Replace Existing 12" VCP Sewer	35	LF	$1,717.64	$ 60,117.44
	Remove & Replace Asphalt	81	SY	$102.38	$ 8,292.78
	Construct 5' Diameter Manhole	1	EACH	$24,617.64	$ 24,617.64
	Remove Existing Manhole	1	EACH	$30,669.48	$ 30,669.48
	Install New Concrete Junction Structure (Alt Design 96-inch Polymer Structure)	1	EACH	$200,655.49	$ 200,655.49
	39" Bypass System Setup & Teardown	1	LS	$340,670.46	$ 340,670.46
	39" Bypass Operation	32	DY	$7,791.65	$ 249,332.80
				Phase 6B Subototal:	**$ 1,182,398.96**
Phase 6D					
	Cleaning & Pre-CCTV Existing 8" Sewer	2466	LF	$9.49	$ 23,402.34
	Install 8" CIPP Liner	2466	LF	$55.18	$ 136,073.88
	Post-CIPP Cleaning & CCTV Inspection (Pano)	2466	LF	$6.08	$ 14,993.28
	Remove & Replace Frame & Cover	2	EACH	$2,455.54	$ 4,911.08
	Repair & Coat Chimney, Cone, & Wall	726	SF	$46.00	$ 33,396.00
	Repair & Coat Bench	9	EACH	$900.00	$ 8,100.00
	Repair/Reshape & Coat Channel	9	EACH	$400.00	$ 3,600.00
	Inspect & Assess Manhole	1	EACH	$400.00	$ 400.00
	CIPP Liner End Seal Or Line Through & Cut Out Access	19	EACH	$271.28	$ 5,154.32
	Cut & Remove CIPP Coupon To Reinstate Tap	52	EACH	$317.09	$ 16,488.68
	Install SLC Seal	3	EACH	$2,570.82	$ 7,712.46
	Cut Intruding Tap Prior To CIPP	14	EACH	$1,329.13	$ 18,607.82
	Remove & Replace Existing 8" VCP Sewer	60	LF	$1,062.56	$ 63,753.60
	Remove & Replace Asphalt	67	SY	$188.13	$ 12,604.71
	Remove Existing 45-Bends & Install 6' Diameter Manhole	1	EACH	$34,336.06	$ 34,336.06
	Remove Flushing Tank & Install 5' Diameter Manhole	3	EACH	$30,431.03	$ 91,293.09
				Phase 6D Subototal:	**$ 474,827.32**
SUBTOTAL DIRECT CONSTRUCTION COST (DCC)					**$ 1,974,236.91**
CONSTRUCTION PHASE FEE					
FEE	Fixed Fee, Equal to 8% of DCC	1	LS	$ 157,938.95	$ 157,938.95
SUBTOTAL CONSTRUCTION PHASE FEE					**$ 157,938.95**
INDIRECT CONSTRUCTION COSTS (ICC)					
BONDS	CMR Performance and Payment Bonds - Actual Cost, not-to-Exceed **1%** of DCC	1	LS	$ 21,321.76	$ 21,322.76
	CMR-managed Sub-Contractor Bond Program - Actual Cost not-to- exceed **0%** of DCC of covered Sub-Contractors (if applicable)				$ -
INSURANCE	CMR Insurances (Worker's Comp, General Liability, Auto Liability, Umbrella) - Actual Cost, not-to-exceed **1.1%** of DCC	1	LS	$ 23,688.48	$ 23,689.48
	Builder's Risk - Actual Cost not-to-exceed **0%** of DCC				$ -
	CMR-managed Sub-Contractor Inssurance Program - Actual Cost not-to-exceed **0%** of DCC of covered Sub-Contractors (if applicable)				$ -
TAXES	Actual Cost, Equal to **5.98%** of DCC + Fee + Bond + Insurance	1	LS	$ 130,195.85	$ 130,196.85
SUBTOTAL INDIRECT CONSTRUCTION COST (ICC)					**$ 175,209.09**
ALLOWANCES & CONTINGENCIES					
	Traffic Control	1	AL	$ 206,643.20	$ 206,643.20
	Off-Duty Officers	1	AL	$ 97,507.57	$ 97,507.57
	Survey/GIS	1	AL	$ 11,674.76	$ 11,674.76
	Quality Control Material Testing	1	AL	$ 14,009.71	$ 14,009.71
	Odor Control Allowance	1	AL	$ 17,512.14	$ 17,512.14
	Pavement Sealing & Striping Allowance	1	AL	$ 70,048.54	$ 70,048.54
	Paver & Hardscape Restoration Phase 6D Sht 5 Sta. 14+07	1	AL	$ 15,760.92	$ 15,760.92
	Owner's Contingency	1	CONT	$ 313,804.35	$ 313,804.35
TOTAL GMP = DCC + FEE + ICC					**$ 3,054,346.13**
ADDITIONAL GMP PROPOSAL REQUIREMENTS AND INFORMATION					
Attach to this Cost of the Work a detailed breakdown of the complete GMP, including General Conditions, using the CM@Risk's own format.					

Corporate: 11011 N. 23rd Ave. Phoenix, AZ 85029
Office: 623-582-1170|Fax: 623-582-3761
Tucson: 1904 W. Prince Rd. Tucson, AZ 85705
Office: 520-207-8228|Fax: 520-305-3323
AZ Licenses: ROC-089744 A General Contracting
ROC-111282 B-04 General Engineering

Proposal

Cost Detail with Manhours

Project Name:	Phase 6B & 6D Sewer & MH Rehab (Alt Junction Structure)	**Customer:**	City of Glendale
Job Number:	24-3001-PH B & D **Bid Number:** 212231	**Billing Address:**	5850 West Glendale Ave, Suite 315
Bid As:	Prime Contractor		Glendale, AZ 85301 USA
Estimator:	Travis Monk	**Phone:**	
Project Address:	67th Ave & Northern, Glendale, AZ	**Contact:**	Michael Johnson
Completion Date:	5/9/2025		

Pay Items

Description	Quantity	UM	Man Hours	Man Hours per Unit	Unit Direct Cost	Total Direct Cost
Phase: General Items						
1 - Mobilization/Demobilization	**1.00**	**LS**	**196.00**	**196.00**	**$51,766.53**	**$51,766.53**
Phase 6B CIPP Mobilization	1.00	EACH			$1,209.00	$1,209.00
Phase 6D CIPP Mobilization	1.00	EACH			$1,209.00	$1,209.00
Mobilization/Demobilization	16.00	TRIP	64.00	4.00	$648.48	$10,375.60
GC-Mobilization Crew (2.00 TRIP/DY, 8.00 DY)	16.00	TRIP	64.00	4.00	$551.60	$8,825.60
Pipe Material Buy	2.00	LS			$775.00	$1,550.00
Equipment Moves	3.00	TRIP	12.00	4.00	$551.60	$1,654.80
GC-Mobilization Crew (2.00 TRIP/DY, 1.50 DY)	3.00	TRIP	12.00	4.00	$551.60	$1,654.80
Shoring & Plates Delivery/Pickup	8.00	TRIP			$250.00	$2,000.00
Project Signs	2.00	EACH	0.00	0.00	$790.00	$1,580.00
Furnish Signs	3.00	EACH			$250.00	$750.00
Labor For Delivery & Initial Setting Of Sigsn	4.00	HR			$95.00	$380.00
Spring Stand Rental 3 Each X 30 Days	60.00	DY			$7.50	$450.00
Construction Water	1.00	LS			$4,750.00	$4,750.00
Water Meter	1.00	EACH			$1,500.00	$1,500.00
Street Sweeping	24.00	HR			$125.00	$3,000.00
Slide Rail Delivery/Pickup	1.00	LS			$6,500.00	$6,500.00
Dust Permit	1.00	EACH			$1,080.00	$1,080.00
Pothole	20.00	EACH	120.00	6.00	$845.41	$16,908.13
GC-Combo Hydro Truck Crew (3.00 EACH/DY, 6.67 DY)	20.00	EACH	120.00	6.00	$845.41	$16,908.13
2 - General Conditions	**5.00**	**MO**	**1,760.00**	**352.00**	**$53,048.64**	**$265,243.20**
Yard Rent	5.00	MO			$3,500.00	$17,500.00
Portable Toilets (Delivery, Rental, Servicing, & Pickup)	5.00	MO			$600.00	$3,000.00
Temporary Fence (Delivery, Rental, Pickup)	5.00	MO			$750.00	$3,750.00
Project Manager	55.00	DY	440.00	8.00	$1,032.64	$56,795.20
JI-Project Manager	440.00	HR	440.00	1.00	$129.08	$56,795.20

Description	Quantity	UM	Man Hours	Man Hours per Unit	Unit Direct Cost	Total Direct Cost
2 - General Conditions	**5.00**	**MO**	**1,760.00**	**352.00**	**$53,048.64**	**$265,243.20**
JI-Project Manager Crew (8.00 HR/DY, 55.00 DY)	440.00	HR	440.00	1.00	$129.08	$56,795.20
Project Superintendent	110.00	DY	880.00	8.00	$956.64	$105,230.40
JI-Project Superintendent	880.00	HR	880.00	1.00	$119.58	$105,230.40
JI-Project Superintendent Crew (8.00 HR/DY, 110.00 DY)	880.00	HR	880.00	1.00	$119.58	$105,230.40
Project Engineer	55.00	DY	440.00	8.00	$842.32	$46,327.60
JI-Project Engineer	440.00	HR	440.00	1.00	$105.29	$46,327.60
JI-Project Engineer Crew (8.00 HR/DY, 55.00 DY)	440.00	HR	440.00	1.00	$105.29	$46,327.60
Small Tools & Supplies	7,880.00	MH	0.00	0.00	$3.00	$23,640.00
Small Tools & Supplies	7,880.00	MH			$3.00	$23,640.00
Water & Ice	20.00	WK			$125.00	$2,500.00
Connex Box	5.00	MO			$550.00	$2,750.00
Dumpster Service	5.00	MO			$500.00	$2,500.00
Field Communication Devices	5.00	MO			$250.00	$1,250.00

Phase: Phase 6B

3 - Cleaning & Pre-CCTV Existing 12" Sewer	**2,494.00**	**LF**	**192.00**	**0.08**	**$11.95**	**$29,796.64**
Cleaning Support Crew	2,494.00	LF	96.00	0.04	$5.31	$13,243.04
Cleaning Support Crew (623.50 LF/DY, 4.00 DY)	2,494.00	LF	96.00	0.04	$5.31	$13,243.04
Sewer Cleaning & Pre-CCTV	2,494.00	LF	96.00	0.04	$6.64	$16,553.60
Vactor Cleaning & CCTV Crew (623.50 EACH/DY, 4.00 DY)	2,494.00	EACH	96.00	0.04	$6.64	$16,553.60
4 - Install 12" CIPP Liner Per Spec No. 02767	**2,494.00**	**LF**	**192.00**	**0.08**	**$66.89**	**$166,811.84**
CIPP Support Crew	2,494.00	LF	192.00	0.08	$10.89	$27,147.84
CIPP Support Crew (311.75 LF/DY, 8.00 DY)	2,494.00	LF	192.00	0.08	$10.89	$27,147.84
CIPP Lining Sub	2,494.00	EACH			$56.00	$139,664.00
5 - Post-CIPP Cleaning & CCTV Inspection (Pano)	**2,494.00**	**LF**	**48.00**	**0.02**	**$6.72**	**$16,762.96**
Subcontractor - Pano	2,494.00	LF			$4.00	$9,976.00
CCTV & Flow Management Support Crew	2,494.00	LF	48.00	0.02	$2.72	$6,786.96
CIPP Support Crew (1,247.00 LF/DY, 2.00 DY)	2,494.00	LF	48.00	0.02	$2.72	$6,786.96
6 - Remove & Replace Frame & Cover	**1.00**	**EACH**	**12.00**	**12.00**	**$2,580.53**	**$2,580.53**
RH-Manhole Adjust Crew (2.00 EACH/DY, 0.50 DY)	1.00	EACH	12.00	12.00	$1,207.28	$1,207.28
Ready Mix Concrete - MAG AA 4000	1.05	CY			$165.00	$173.25
Shortload	1.00	UNIT			$250.00	$250.00
Frame & Cover - Manhole Frame & Cover 30in	1.00	EACH			$950.00	$950.00
7 - Adjust Frame & Cover To Grade	**1.00**	**EACH**	**12.00**	**12.00**	**$1,630.53**	**$1,630.53**
RH-Manhole Adjust Crew (2.00 EACH/DY, 0.50 DY)	1.00	EACH	12.00	12.00	$1,207.28	$1,207.28
Ready Mix Concrete - MAG AA 4000	1.05	CY			$165.00	$173.25
Shortload	1.00	UNIT			$250.00	$250.00
8 - Repair & Coat Chimney, Cone, & Wall	**570.40**	**SF**	**0.00**	**0.00**	**$38.00**	**$21,675.20**
Manhole Sub - Repair & Coat Chimney, Cone, & Wall	570.40	SF			$38.00	$21,675.20
9 - Repair & Coat Bench	**5.00**	**EACH**	**0.00**	**0.00**	**$900.00**	**$4,500.00**
Manhole Sub - Repair & Coat Bench	5.00	EACH			$900.00	$4,500.00
10 - Repair/Reshape & Coat Channel	**3.00**	**EACH**	**0.00**	**0.00**	**$400.00**	**$1,200.00**

Description	Quantity	UM	Man Hours	Man Hours per Unit	Unit Direct Cost	Total Direct Cost
10 - Repair/Reshape & Coat Channel	**3.00**	**EACH**	**0.00**	**0.00**	**$400.00**	**$1,200.00**
Manhole Sub - Repair/Reshape & Coat Channel	3.00	EACH			$400.00	$1,200.00
11 - Inspect & Assess Manhole	**2.00**	**EACH**	**0.00**	**0.00**	**$400.00**	**$800.00**
Manhole Sub	2.00	EACH			$400.00	$800.00
12 - CIPP Liner End Seal Or Line Through & Cut Out Access	**11.00**	**EACH**	**48.00**	**4.36**	**$656.96**	**$7,226.52**
CIPP Support Crew	11.00	EACH	48.00	4.36	$601.96	$6,621.52
CIPP Support Crew (5.50 LF/DY, 2.00 DY)	11.00	LF	48.00	4.36	$601.96	$6,621.52
CIPP Lining Sub	11.00	EACH			$55.00	$605.00
13 - Cut & Remove CIPP Coupon To Reinstate Tap	**1.00**	**EACH**	**0.00**	**0.00**	**$145.00**	**$145.00**
CIPP Lining Sub	1.00	EACH			$145.00	$145.00
14 - Remove Hanging Gasket	**22.00**	**EACH**	**96.00**	**4.36**	**$677.20**	**$14,898.32**
Cleaning Support Crew	22.00	EACH	48.00	2.18	$300.98	$6,621.52
Cleaning Support Crew (11.00 LF/DY, 2.00 DY)	22.00	LF	48.00	2.18	$300.98	$6,621.52
Sewer Cleaning & Pre-CCTV	22.00	LF	48.00	2.18	$376.22	$8,276.80
Vactor Cleaning & CCTV Crew (11.00 EACH/DY, 2.00 DY)	22.00	EACH	48.00	2.18	$376.22	$8,276.80
15 - Remove & Replace Existing 12" VCP Sewer	**35.00**	**LF**	**312.00**	**8.91**	**$1,717.63**	**$60,117.22**
Dig & Remove Pipe	35.00	LF	288.00	8.23	$894.98	$31,324.16
SL-VCP 12in Diameter Crew (8.75 LF/DY, 4.00 DY)	35.00	LF	288.00	8.23	$894.98	$31,324.16
Dump Fees	8.00	EACH			$75.00	$600.00
Haul-Off Spoils	8.00	LOAD	24.00	3.00	$404.70	$3,237.60
Trucking/Haul-Off (5.33 LOAD/DY, 1.50 DY)	8.00	LOAD	24.00	3.00	$404.70	$3,237.60
Pipe Material Buy	1.00	LS			$3,707.00	$3,707.00
Ready Mix - Slurry ABC Slurry 1/2 Sack	176.40	CY			$117.65	$20,753.46
Aggregate - ABC MAG Spec	22.00	TON			$22.50	$495.00
16 - Remove & Replace Asphalt	**81.00**	**SY**	**17.00**	**0.21**	**$102.38**	**$8,292.77**
Sawcut & Remove Asphalt	81.00	SY	17.00	0.21	$22.38	$1,812.77
CP-Sawcutting Small Crew (162.00 SY/DY, 0.50 DY)	81.00	SY	12.00	0.15	$14.99	$1,214.48
Trucking/Haul-Off (162.00 SF/DY, 0.50 DY)	81.00	SF	5.00	0.06	$7.39	$598.29
Asphalt Replacement	81.00	SY			$80.00	$6,480.00
17 - Construct 5' Diameter Manhole	**1.00**	**EACH**	**84.00**	**84.00**	**$24,617.57**	**$24,617.57**
Excavate & Prep Manhole	1.00	EACH	72.00	72.00	$8,315.12	$8,315.12
SL-VCP 12in Diameter Crew (1.00 LF/DY, 1.00 DY)	1.00	LF	72.00	72.00	$8,315.12	$8,315.12
Dump Fees	2.00	EACH			$75.00	$150.00
Ready Mix - Slurry ABC Slurry 1/2 Sack	33.60	CY			$117.65	$3,953.04
Aggregate - ABC MAG Spec	8.80	TON			$22.50	$198.00
New Manhole Sub	1.00	EACH			$9,325.00	$9,325.00
Final Adjustment	1.00	EACH	12.00	12.00	$1,726.41	$1,726.41
RH-Manhole Adjust Crew (2.00 EACH/DY, 0.50 DY)	1.00	EACH	12.00	12.00	$1,303.16	$1,303.16
Ready Mix Concrete - MAG AA 4000	1.05	CY			$165.00	$173.25
Shortload	1.00	UNIT			$250.00	$250.00
Frame & Cover - Manhole Frame & Cover 30in	1.00	EACH			$950.00	$950.00

Description	Quantity	UM	Man Hours	Man Hours per Unit	Unit Direct Cost	Total Direct Cost
18 - Remove Existing Manhole	**1.00**	**EACH**	**248.00**	**248.00**	**$30,669.40**	**$30,669.40**
Excavate, Demo, And Remove Manhole	1.00	EACH	192.00	192.00	$21,546.60	$21,546.60
SL-VCP 12in Diameter Crew (0.33 LF/DY, 3.00 DY)	1.00	LF	192.00	192.00	$21,546.60	$21,546.60
Dump Fees	14.00	EACH			$75.00	$1,050.00
Haul-Off	14.00	LOAD	24.00	1.71	$231.26	$3,237.60
Trucking/Haul-Off (4.67 LOAD/DY, 3.00 DY)	14.00	LOAD	24.00	1.71	$231.26	$3,237.60
Hydro Excavation Crew	2.00	DY	32.00	16.00	$2,417.60	$4,835.20
Hydro Excavation Crew (1.00 EACH/DY, 2.00 DY)	2.00	EACH	32.00	16.00	$2,417.60	$4,835.20
19 - Install New Concrete Junction Structure (Alt Design 96-inch Polymer Structure)	**1.00**	**EACH**	**440.00**	**440.00**	**$200,654.93**	**$200,654.93**
Prep Excavation, Set Trench Protection, & Cut/Prep Existing Pipe	1.00	EACH	192.00	192.00	$19,622.40	$19,622.40
SL-VCP 12in Diameter Crew (0.33 LF/DY, 3.00 DY)	1.00	LF	192.00	192.00	$19,622.40	$19,622.40
Install Precast Structure & Backfill	1.00	EACH	168.00	168.00	$16,384.80	$16,384.80
SL-VCP 12in Diameter Crew (0.33 LF/DY, 3.00 DY)	1.00	LF	168.00	168.00	$16,384.80	$16,384.80
Armorock Polymer Precast 96-inch Manhole	1.00	EACH			$88,400.00	$88,400.00
Ready Mix - Slurry ABC Slurry 1/2 Sack	194.25	CY			$117.65	$22,853.51
Aggregate - ABC MAG Spec	27.50	TON			$22.50	$618.75
36" VCP & Coupling	7.00	LF			$700.00	$4,900.00
Stub-out & Pipe Collar On 39" Side	1.00	EACH	80.00	80.00	$32,365.47	$32,365.47
FRP Wrap	1.00	EACH			$20,000.00	$20,000.00
CP-Concrete Replace Crew (0.50 LF/DY, 2.00 DY)	1.00	LF	80.00	80.00	$4,989.28	$4,989.28
Pipe - PVC SDR 26 Pipe 36in	14.00	LF			$368.48	$5,158.69
Concrete Forms, Stakes, Rebar, Cure, Etc.	1.00	EACH			$485.00	$485.00
Ready Mix Concrete - MAG AA 4000	10.50	CY			$165.00	$1,732.50
20 - 39" Bypass System Setup & Teardown	**1.00**	**LS**	**2,692.19**	**2,692.19**	**$340,669.52**	**$340,669.52**
Mobilization / Demobilization	24.00	TRIP	96.00	4.00	$668.92	$16,054.08
GC-Mobilization Crew (2.00 TRIP/DY, 12.00 DY)	24.00	TRIP	96.00	4.00	$668.92	$16,054.08
Dig And Replace Suction / Discharge Pit	2.00	EACH	317.33	158.67	$21,112.35	$42,224.71
RH-Excavation & Backfill Suction Pit Crew (0.33 EACH/DY, 6.00 DY)	2.00	EACH	240.00	120.00	$12,861.60	$25,723.20
Ready Mix Concrete - MAG AA 4000	2.10	CY			$185.00	$388.50
Ready Mix - Slurry ABC Slurry 1/2 Sack	26.25	CY			$117.65	$3,088.31
Manhole Barrel Sections For Pits	2.00	EACH			$675.00	$1,350.00
Frame & Cover - Manhole Frame & Cover 30in	2.10	EACH			$950.00	$1,995.00
Concrete - Short Load Fee	1.00	EACH			$250.00	$250.00
RH-Manhole Adjust Crew (2.00 EACH/DY, 1.00 DY)	2.00	EACH	24.00	12.00	$1,234.92	$2,469.84
Coating Repair	2.00	EACH	53.33	26.67	$3,479.93	$6,959.85
Manhole Coating (0.75 EACH/DY, 2.67 DY)	2.00	EACH	53.33	26.67	$2,572.43	$5,144.85
Ready Mix Concrete - C-120	22.00	BAG			$20.50	$451.00
Sewer Shield Epoxy	8.80	EACH			$155.00	$1,364.00
Trenching And Removal & Backfill	510.00	LF	1,024.00	2.01	$267.90	$136,629.48
RH-Bypass Pipe Trench, Removal, & Backfill Crew (34.00 LF/DY, 15.00 DY)	510.00	LF	960.00	1.88	$203.42	$103,744.80
Ready Mix - Slurry ABC Slurry 1/2 Sack	163.80	CY			$117.65	$19,271.07

Description	Quantity	UM	Man Hours	Man Hours per Unit	Unit Direct Cost	Total Direct Cost
20 - 39" Bypass System Setup & Teardown	**1.00**	**LS**	**2,692.19**	**2,692.19**	**$340,669.52**	**$340,669.52**
Aggregate - ABC Non Spec	122.10	TON			$22.50	$2,747.25
Asphalt - Cold Mix	22.00	TON			$165.00	$3,630.00
CP-Sawcutting Large Crew (510.00 LF/DY, 2.00 DY)	1,020.00	LF	64.00	0.06	$5.50	$5,611.36
Dump Fee - Concrete	2.00	LOAD			$100.00	$200.00
Dump Fee - Asphlat	6.00	LOAD			$75.00	$450.00
Dump Fee - Dirt	13.00	LOAD			$75.00	$975.00
Bypass Installation	1.00	EACH	674.86	674.86	$61,527.38	$61,527.38
RH-Bypass Sewer Setup Crew (0.17 EACH/DY, 6.00 DY)	1.00	EACH	192.00	192.00	$22,055.04	$22,055.04
RH-Bypass Fusion 12-18in Crew (0.17 MO/DY, 6.00 DY)	1.00	MO	240.00	240.00	$19,628.16	$19,628.16
Set And Remove Plugs (0.50 EACH/DY, 2.00 DY)	1.00	EACH	48.00	48.00	$4,233.84	$4,233.84
Test Pipe	3,000.00	LF	94.86	0.03	$2.48	$7,431.94
Pressure Test Crew (1,012.00 LF/DY, 2.96 DY)	3,000.00	LF	94.86	0.03	$2.48	$7,431.94
Crossing Delays	5.00	EACH	100.00	20.00	$1,635.68	$8,178.40
RH-Bypass Fusion 12-18in Crew (2.00 EACH/DY, 2.50 DY)	5.00	EACH	100.00	20.00	$1,635.68	$8,178.40
Bypass Takedown	1.00	EACH	320.00	320.00	$33,576.48	$33,576.48
RH-Bypass Sewer Takedown Crew (0.13 EACH/DY, 8.00 DY)	1.00	EACH	256.00	256.00	$27,932.16	$27,932.16
RH-Pipe Pigging Crew (0.50 EACH/DY, 2.00 DY)	1.00	EACH	64.00	64.00	$5,644.32	$5,644.32
Bypass Superintendent	20.00	DY	160.00	8.00	$956.64	$19,132.80
JI-Project Superintendent	160.00	HR	160.00	1.00	$119.58	$19,132.80
JI-Project Superintendent Crew (8.00 HR/DY, 20.00 DY)	160.00	HR	160.00	1.00	$119.58	$19,132.80
Bypass Calcs	1.00	EACH			$1,500.00	$1,500.00
Hardscape Restoration	1.00	LS	100.00	100.00	$30,024.60	$30,024.60
Asphalt Restoration	284.00	SY			$80.00	$22,720.00
Concrete Restoration (C&G, Sidewalk)	3.00	LOC	100.00	33.33	$2,434.87	$7,304.60
CP-Concrete Replace Crew (1.20 LOC/DY, 2.50 DY)	3.00	LOC	100.00	33.33	$2,078.87	$6,236.60
Ready Mix Concrete - MAG AA 4000	4.20	CY			$165.00	$693.00
Shortload	1.00	UNIT			$250.00	$250.00
Concrete Forms, Stakes, Rebar, Cure, Etc.	1.00	EACH			$125.00	$125.00
21 - 39" Bypass Operation	**32.00**	**DY**	**1,536.00**	**48.00**	**$7,791.63**	**$249,332.00**
Sewer Bypass Equipment	32.00	DY	0.00	0.00	$3,102.43	$99,277.60
Sewer Bypass Equipment (1.00 DY/DY, 32.00 DY)	32.00	DY	0.00	0.00	$3,102.43	$99,277.60
Sewer Bypass Pump Watch	32.00	DY	1,536.00	48.00	$4,008.00	$128,256.00
RH-Bypass Sewer Pump Watch Crew (1.00 HR/DY, 32.00 DY)	32.00	HR	1,536.00	48.00	$4,008.00	$128,256.00
Support Equipment	32.00	DY	0.00	0.00	$681.20	$21,798.40
Phase: Phase 6D						
22 - Cleaning & Pre-CCTV Existing 8" Sewer	**2,466.00**	**LF**	**160.00**	**0.06**	**$9.49**	**$23,403.36**
Cleaning Support Crew	2,466.00	LF	64.00	0.03	$2.78	$6,849.76
Cleaning Support Crew (616.50 LF/DY, 4.00 DY)	2,466.00	LF	64.00	0.03	$2.78	$6,849.76
Sewer Cleaning & Pre-CCTV	2,466.00	LF	96.00	0.04	$6.71	$16,553.60
Vactor Cleaning & CCTV Crew (616.50 EACH/DY, 4.00 DY)	2,466.00	EACH	96.00	0.04	$6.71	$16,553.60

Description	Quantity	UM	Man Hours	Man Hours per Unit	Unit Direct Cost	Total Direct Cost
22 - Cleaning & Pre-CCTV Existing 8" Sewer	**2,466.00**	**LF**	**160.00**	**0.06**	**$9.49**	**$23,403.36**
24 - Post-CIPP Cleaning & CCTV Inspection (Pano)	**2,466.00**	**LF**	**48.00**	**0.02**	**$6.08**	**$15,001.32**
Subcontractor - Pano	2,466.00	LF			$4.00	$9,864.00
Cleaning Support Crew	2,466.00	LF	48.00	0.02	$2.08	$5,137.32
Cleaning Support Crew (822.00 LF/DY, 3.00 DY)	2,466.00	LF	48.00	0.02	$2.08	$5,137.32
25 - Remove & Replace Frame & Cover	**2.00**	**EACH**	**24.00**	**12.00**	**$2,455.53**	**$4,911.06**
RH-Manhole Adjust Crew (2.00 EACH/DY, 1.00 DY)	2.00	EACH	24.00	12.00	$1,207.28	$2,414.56
Ready Mix Concrete - MAG AA 4000	2.10	CY			$165.00	$346.50
Shortload	1.00	UNIT			$250.00	$250.00
Frame & Cover - Manhole Frame & Cover 36in	2.00	EACH			$950.00	$1,900.00
26 - Repair & Coat Chimney, Cone, & Wall	**726.00**	**SF**	**0.00**	**0.00**	**$46.00**	**$33,396.00**
Manhole Sub - Repair & Coat Chimney, Cone, & Wall	726.00	SF			$46.00	$33,396.00
27 - Repair & Coat Bench	**9.00**	**EACH**	**0.00**	**0.00**	**$900.00**	**$8,100.00**
Manhole Sub - Repair & Coat Bench	9.00	EACH			$900.00	$8,100.00
28 - Repair/Reshape & Coat Channel	**9.00**	**EACH**	**0.00**	**0.00**	**$400.00**	**$3,600.00**
Manhole Sub - Repair/Reshape & Coat Channel	9.00	EACH			$400.00	$3,600.00
29 - Inspect & Assess Manhole	**1.00**	**EACH**	**0.00**	**0.00**	**$400.00**	**$400.00**
Manhole Sub	1.00	EACH			$400.00	$400.00
30 - CIPP Liner End Seal Or Line Through & Cut Out Access	**19.00**	**EACH**	**40.00**	**2.11**	**$271.28**	**$5,154.38**
CIPP Support Crew	19.00	EACH	40.00	2.11	$217.28	$4,128.38
CIPP Lining Support Crew (9.50 LF/DY, 2.00 DY)	19.00	LF	40.00	2.11	$217.28	$4,128.38
CIPP Lining Sub	19.00	EACH			$54.00	$1,026.00
31 - Cut & Remove CIPP Coupon To Reinstate Tap	**52.00**	**EACH**	**60.00**	**1.15**	**$317.09**	**$16,488.57**
CIPP Support Crew	52.00	EACH	60.00	1.15	$119.09	$6,192.57
CIPP Lining Support Crew (17.33 LF/DY, 3.00 DY)	52.00	LF	60.00	1.15	$119.09	$6,192.57
CIPP Lining Sub	52.00	EACH			$198.00	$10,296.00
32 - Install SLC Seal	**3.00**	**EACH**	**16.00**	**5.33**	**$2,570.81**	**$7,712.44**
Flow Management Support Crew	3.00	LF	16.00	5.33	$570.81	$1,712.44
Support Crew (3.00 LF/DY, 1.00 DY)	3.00	LF	16.00	5.33	$570.81	$1,712.44
Subcontractor - Top Hat	3.00	EACH			$2,000.00	$6,000.00
33 - Cut Intruding Tap Prior To CIPP	**14.00**	**EACH**	**132.00**	**9.43**	**$1,329.13**	**$18,607.77**
Flow Management Support Crew	14.00	EACH	60.00	4.29	$442.33	$6,192.57
Flow Management Support Crew (4.67 EACH/DY, 3.00 DY)	14.00	EACH	60.00	4.29	$442.33	$6,192.57
Sewer Cleaning & Pre-CCTV	14.00	EACH	72.00	5.14	$886.80	$12,415.20
Vactor Cleaning & CCTV Crew (4.67 EACH/DY, 3.00 DY)	14.00	EACH	72.00	5.14	$886.80	$12,415.20
34 - Remove & Replace Existing 8" VCP Sewer	**60.00**	**LF**	**444.00**	**7.40**	**$1,062.55**	**$63,753.14**
Dig & Remove Pipe	60.00	LF	432.00	7.20	$849.97	$50,998.32
SL-VCP 8in Art Medium Diameter Crew (6.67 LF/DY, 9.00 DY)	60.00	LF	432.00	7.20	$849.97	$50,998.32
Sawcut & Remove Asphalt	60.00	SY	12.00	0.20	$20.24	$1,214.48

Description	Quantity	UM	Man Hours	Man Hours per Unit	Unit Direct Cost	Total Direct Cost
34 - Remove & Replace Existing 8" VCP Sewer	**60.00**	**LF**	**444.00**	**7.40**	**$1,062.55**	**$63,753.14**
CP-Sawcutting Small Crew (120.00 SY/DY, 0.50 DY)	60.00	SY	12.00	0.20	$20.24	$1,214.48
Dump Fees	8.00	EACH			$75.00	$600.00
Pipe Material Buy	1.00	LS			$1,525.60	$1,525.60
Ready Mix - Slurry ABC Slurry 1/2 Sack	72.45	CY			$117.65	$8,523.74
Aggregate - ABC MAG Spec	39.60	TON			$22.50	$891.00
35 - Remove & Replace Asphalt	**67.00**	**SY**	**12.00**	**0.18**	**$188.13**	**$12,604.48**
Sawcut & Remove Asphalt	67.00	SY	12.00	0.18	$18.13	$1,214.48
CP-Sawcutting Small Crew (134.00 SY/DY, 0.50 DY)	67.00	SY	12.00	0.18	$18.13	$1,214.48
Asphalt Replacement	67.00	SY			$170.00	$11,390.00
36 - Remove Existing 45-Bends & Install 6' Diameter Manhole	**1.00**	**EACH**	**156.00**	**156.00**	**$34,335.97**	**$34,335.97**
Excavate, Prep Manhole, & Backfill	1.00	EACH	144.00	144.00	$15,274.56	$15,274.56
SL-VCP 8in Art Medium Diameter Crew (0.33 LF/DY, 3.00 DY)	1.00	LF	144.00	144.00	$15,274.56	$15,274.56
Dump Fees	2.00	EACH			$75.00	$150.00
Ready Mix - Slurry ABC Slurry 1/2 Sack	45.15	CY			$117.65	$5,311.90
Aggregate - ABC MAG Spec	19.80	TON			$22.50	$445.50
New 6' Dia. Manhole Sub	1.00	EACH			$10,125.00	$10,125.00
Frame & Cover - Manhole Frame & Cover 30in	1.00	EACH			$950.00	$950.00
Final Adjustment	1.00	EACH	12.00	12.00	$1,726.41	$1,726.41
RH-Manhole Adjust Crew (2.00 EACH/DY, 0.50 DY)	1.00	EACH	12.00	12.00	$1,303.16	$1,303.16
Ready Mix Concrete - MAG AA 4000	1.05	CY			$165.00	$173.25
Shortload	1.00	UNIT			$250.00	$250.00
Pipe Material Buy	1.00	LS			$352.60	$352.60
37 - Remove Flushing Tank & Install 5' Diameter Manhole	**3.00**	**EACH**	**516.00**	**172.00**	**$30,430.94**	**$91,292.83**
Excavate & Prep Manhole	3.00	EACH	432.00	144.00	$15,857.36	$47,572.08
SL-VCP 8in Art Medium Diameter Crew (0.33 LF/DY, 9.00 DY)	3.00	LF	432.00	144.00	$15,857.36	$47,572.08
Hydro Excavation Crew	3.00	DY	48.00	16.00	$2,368.56	$7,105.68
Hydro Excavation Crew (1.00 EACH/DY, 3.00 DY)	3.00	EACH	48.00	16.00	$2,368.56	$7,105.68
Dump Fees	8.00	EACH			$75.00	$600.00
Ready Mix - Slurry ABC Slurry 1/2 Sack	75.60	CY			$117.65	$8,894.34
Aggregate - ABC MAG Spec	30.80	TON			$22.50	$693.00
New 5' Dia. Manhole Sub	3.00	EACH			$6,415.00	$19,245.00
Frame & Cover - Manhole Frame & Cover 30in	3.00	EACH			$950.00	$2,850.00
Final Adjustment	3.00	EACH	36.00	12.00	$1,444.24	$4,332.73
RH-Manhole Adjust Crew (2.00 EACH/DY, 1.50 DY)	3.00	EACH	36.00	12.00	$1,303.16	$3,909.48
Ready Mix Concrete - MAG AA 4000	1.05	CY			$165.00	$173.25
Shortload	1.00	UNIT			$250.00	$250.00
23 - Install 8" CIPP Liner	**2,466.00**	**LF**	**160.00**	**0.06**	**$55.17**	**$136,061.20**
CIPP Support Crew	2,466.00	LF	160.00	0.06	$7.17	$17,693.20
CIPP Lining Support Crew (246.60 LF/DY, 10.00 DY)	2,466.00	LF	160.00	0.06	$7.17	$17,693.20

Description	Quantity	UM	Man Hours	Man Hours per Unit	Unit Direct Cost	Total Direct Cost
23 - Install 8" CIPP Liner	**2,466.00**	**LF**	**160.00**	**0.06**	**$55.17**	**$136,061.20**
CIPP Lining Sub 8" CIPP	2,466.00	EACH			$48.00	$118,368.00

Direct Cost Totals

	Amount	Percent of Direct Cost
Labor:	$594,489.10	30.11%
Equipment Owned:	$535,182.28	27.11%
Equipment Rented:	$62,290.12	3.16%
Materials Owned:	$0.00	0.00%
Materials Purchased:	$250,998.52	12.71%
Subcontracted:	$529,628.20	26.83%
Trucking Owned:	$0.00	0.00%
Trucking Hired:	$0.00	0.00%
Miscellaneous:	$1,625.00	0.08%
Plug:	$0.00	0.00%
Direct Cost:	$1,974,213.21	

Pay Item Summary

	Amount	Percent of Bid Price
Total Direct Cost:	$1,974,213.21	100.00%
Total DC Adds/Cuts:	$0.00	0.00%
Total Indirect Cost:	$0.00	0.00%
Total Bond:	$0.00	0.00%
Total Overall Cost:	$1,974,213.21	100.00%
Total Overhead:	$0.00	0.00%
Total Profit:	$23.70	0.00%
Total Margin:	$23.70	0.00%
Total Bid Price:	$1,974,236.91	

Corporate: 11011 N. 23rd Ave. Phoenix, AZ 85029
Office: 623-582-1170|Fax: 623-582-3761
Tucson: 1904 W. Prince Rd. Tucson, AZ 85705
Office: 520-207-8228|Fax: 520-305-3323
AZ Licenses: ROC-089744 A General Contracting
ROC-111282 B-04 General Engineering

Proposal

Man Hours Report - Task

Project Name:	Phase 6B & 6D Sewer & MH Rehab (Alt Junction Structure)	**Customer:**	City of Glendale
Job Number:	24-3001-PH B & D **Bid Number:** 212231	**Billing Address:**	5850 West Glendale Ave, Suite 315
Bid As:	Prime Contractor		Glendale, AZ 85301 USA
Estimator:	Travis Monk	**Phone:**	
Project Address:	67th Ave & Northern, Glendale, AZ	**Contact:**	Michael Johnson
Completion Date:	5/9/2025		

Pay Items

Description	Cost Method	Bid Quantity	UM	Man Hours
1 - Mobilization/Demobilization	**Detail**	**1.00**	**LS**	**196.00**
Phase 6B CIPP Mobilization	Sub.	1.00	EACH	0.00
Phase 6D CIPP Mobilization	Sub.	1.00	EACH	0.00
Mobilization/Demobilization	Detail	16.00	TRIP	64.00
Equipment Moves	Detail	3.00	TRIP	12.00
Shoring & Plates Delivery/Pickup	Sub.	8.00	TRIP	0.00
Project Signs	Detail	2.00	EACH	0.00
Construction Water	Sub.	1.00	LS	0.00
Water Meter	Sub.	1.00	EACH	0.00
Street Sweeping	Sub.	24.00	HR	0.00
Slide Rail Delivery/Pickup	Sub.	1.00	LS	0.00
Dust Permit	Sub.	1.00	EACH	0.00
Pothole	Detail	20.00	EACH	120.00
Furnish Signs	Sub.	3.00	EACH	0.00
Labor For Delivery & Initial Setting Of Sigsn	Sub.	4.00	HR	0.00
Spring Stand Rental 3 Each X 30 Days	Sub.	60.00	DY	0.00
3 - Cleaning & Pre-CCTV Existing 12" Sewer	**Detail**	**2,494.00**	**LF**	**192.00**
Cleaning Support Crew	Detail	2,494.00	LF	96.00
Sewer Cleaning & Pre-CCTV	Detail	2,494.00	LF	96.00
4 - Install 12" CIPP Liner Per Spec No. 02767	**Detail**	**2,494.00**	**LF**	**192.00**
CIPP Support Crew	Detail	2,494.00	LF	192.00
CIPP Lining Sub	Sub.	2,494.00	EACH	0.00
5 - Post-CIPP Cleaning & CCTV Inspection (Pano)	**Detail**	**2,494.00**	**LF**	**48.00**
Subcontractor - Pano	Sub.	2,494.00	LF	0.00
CCTV & Flow Management Support Crew	Detail	2,494.00	LF	48.00
6 - Remove & Replace Frame & Cover	**Detail**	**1.00**	**EACH**	**12.00**
7 - Adjust Frame & Cover To Grade	**Detail**	**1.00**	**EACH**	**12.00**

Description	Cost Method	Bid Quantity	UM	Man Hours
(8 - Repair & Coat Chimney, Cone, & Wall continued)				
8 - Repair & Coat Chimney, Cone, & Wall	**Detail**	**570.40**	**SF**	**0.00**
Manhole Sub - Repair & Coat Chimney, Cone, & Wall	Sub.	570.40	SF	0.00
9 - Repair & Coat Bench	**Detail**	**5.00**	**EACH**	**0.00**
Manhole Sub - Repair & Coat Bench	Sub.	5.00	EACH	0.00
10 - Repair/Reshape & Coat Channel	**Detail**	**3.00**	**EACH**	**0.00**
Manhole Sub - Repair/Reshape & Coat Channel	Sub.	3.00	EACH	0.00
11 - Inspect & Assess Manhole	**Detail**	**2.00**	**EACH**	**0.00**
Manhole Sub	Sub.	2.00	EACH	0.00
12 - CIPP Liner End Seal Or Line Through & Cut Out Access	**Detail**	**11.00**	**EACH**	**48.00**
CIPP Support Crew	Detail	11.00	EACH	48.00
CIPP Lining Sub	Sub.	11.00	EACH	0.00
13 - Cut & Remove CIPP Coupon To Reinstate Tap	**Detail**	**1.00**	**EACH**	**0.00**
CIPP Lining Sub	Sub.	1.00	EACH	0.00
14 - Remove Hanging Gasket	**Detail**	**22.00**	**EACH**	**96.00**
Cleaning Support Crew	Detail	22.00	EACH	48.00
Sewer Cleaning & Pre-CCTV	Detail	22.00	LF	48.00
15 - Remove & Replace Existing 12" VCP Sewer	**Detail**	**35.00**	**LF**	**312.00**
Dig & Remove Pipe	Detail	35.00	LF	288.00
Dump Fees	Sub.	8.00	EACH	0.00
Haul-Off Spoils	Detail	8.00	LOAD	24.00
16 - Remove & Replace Asphalt	**Detail**	**81.00**	**SY**	**17.00**
Sawcut & Remove Asphalt	Detail	81.00	SY	17.00
Asphalt Replacement	Sub.	81.00	SY	0.00
17 - Construct 5' Diameter Manhole	**Detail**	**1.00**	**EACH**	**84.00**
Excavate & Prep Manhole	Detail	1.00	EACH	72.00
Dump Fees	Sub.	2.00	EACH	0.00
New Manhole Sub	Sub.	1.00	EACH	0.00
Final Adjustment	Detail	1.00	EACH	12.00
18 - Remove Existing Manhole	**Detail**	**1.00**	**EACH**	**248.00**
Excavate, Demo, And Remove Manhole	Detail	1.00	EACH	192.00
Dump Fees	Sub.	14.00	EACH	0.00
Haul-Off	Detail	14.00	LOAD	24.00
Hydro Excavation Crew	Detail	2.00	DY	32.00
19 - Install New Concrete Junction Structure (Alt Design 96-inch Polymer Structure)	**Detail**	**1.00**	**EACH**	**440.00**
Prep Excavation, Set Trench Protection, & Cut/Prep Existing Pipe	Detail	1.00	EACH	192.00
Install Precast Structure & Backfill	Detail	1.00	EACH	168.00
Stub-out & Pipe Collar On 39" Side	Detail	1.00	EACH	80.00
FRP Wrap	Sub.	1.00	EACH	0.00
2 - General Conditions	**Detail**	**5.00**	**MO**	**1,760.00**
Yard Rent	Sub.	5.00	MO	0.00
Portable Toilets (Delivery, Rental, Servicing, & Pickup)	Sub.	5.00	MO	0.00

Description	Cost Method	Bid Quantity	UM	Man Hours	Direct Cost/MH	Unit Direct Cost	Total Direct Cost
(2 - General Conditions continued)							
Temporary Fence (Delivery, Rental, Pickup)	Sub.	5.00	MO	0.00			
Project Manager	Detail	55.00	DY	440.00			
Project Superintendent	Detail	110.00	DY	880.00			
Project Engineer	Detail	55.00	DY	440.00			
Small Tools & Supplies	Detail	7,880.00	MH	0.00			
Water & Ice	Sub.	20.00	WK	0.00			
Connex Box	Sub.	5.00	MO	0.00			
Dumpster Service	Sub.	5.00	MO	0.00			
Field Communication Devices	Sub.	5.00	MO	0.00			
JI-Project Manager	Detail	440.00	HR	440.00			
JI-Project Superintendent	Detail	880.00	HR	880.00			
JI-Project Engineer	Detail	440.00	HR	440.00			
22 - Cleaning & Pre-CCTV Existing 8" Sewer	**Detail**	**2,466.00**	**LF**	**160.00**			
Cleaning Support Crew	Detail	2,466.00	LF	64.00			
Sewer Cleaning & Pre-CCTV	Detail	2,466.00	LF	96.00			
24 - Post-CIPP Cleaning & CCTV Inspection (Pano)	**Detail**	**2,466.00**	**LF**	**48.00**			
Subcontractor - Pano	Sub.	2,466.00	LF	0.00			
Cleaning Support Crew	Detail	2,466.00	LF	48.00			
25 - Remove & Replace Frame & Cover	**Detail**	**2.00**	**EACH**	**24.00**			
26 - Repair & Coat Chimney, Cone, & Wall	**Detail**	**726.00**	**SF**	**0.00**			
Manhole Sub - Repair & Coat Chimney, Cone, & Wall	Sub.	726.00	SF	0.00			
27 - Repair & Coat Bench	**Detail**	**9.00**	**EACH**	**0.00**			
Manhole Sub - Repair & Coat Bench	Sub.	9.00	EACH	0.00			
28 - Repair/Reshape & Coat Channel	**Detail**	**9.00**	**EACH**	**0.00**			
Manhole Sub - Repair/Reshape & Coat Channel	Sub.	9.00	EACH	0.00			
29 - Inspect & Assess Manhole	**Detail**	**1.00**	**EACH**	**0.00**			
Manhole Sub	Sub.	1.00	EACH	0.00			
30 - CIPP Liner End Seal Or Line Through & Cut Out Access	**Detail**	**19.00**	**EACH**	**40.00**			
CIPP Support Crew	Detail	19.00	EACH	40.00			
CIPP Lining Sub	Sub.	19.00	EACH	0.00			
31 - Cut & Remove CIPP Coupon To Reinstate Tap	**Detail**	**52.00**	**EACH**	**60.00**			
CIPP Support Crew	Detail	52.00	EACH	60.00			
CIPP Lining Sub	Sub.	52.00	EACH	0.00			
32 - Install SLC Seal	**Detail**	**3.00**	**EACH**	**16.00**			
Flow Management Support Crew	Detail	3.00	LF	16.00			
Subcontractor - Top Hat	Sub.	3.00	EACH	0.00			
33 - Cut Intruding Tap Prior To CIPP	**Detail**	**14.00**	**EACH**	**132.00**			
Flow Management Support Crew	Detail	14.00	EACH	60.00			
Sewer Cleaning & Pre-CCTV	Detail	14.00	EACH	72.00			
34 - Remove & Replace Existing 8" VCP Sewer	**Detail**	**60.00**	**LF**	**444.00**			
Dig & Remove Pipe	Detail	60.00	LF	432.00			

Description	Cost Method	Bid Quantity	UM	Man Hours
(34 - Remove & Replace Existing 8" VCP Sewer continued)				
Sawcut & Remove Asphalt	Detail	60.00	SY	12.00
Dump Fees	Sub.	8.00	EACH	0.00
35 - Remove & Replace Asphalt	**Detail**	**67.00**	**SY**	**12.00**
Sawcut & Remove Asphalt	Detail	67.00	SY	12.00
Asphalt Replacement	Sub.	67.00	SY	0.00
36 - Remove Existing 45-Bends & Install 6' Diameter Manhole	**Detail**	**1.00**	**EACH**	**156.00**
Excavate, Prep Manhole, & Backfill	Detail	1.00	EACH	144.00
Dump Fees	Sub.	2.00	EACH	0.00
New 6' Dia. Manhole Sub	Sub.	1.00	EACH	0.00
Final Adjustment	Detail	1.00	EACH	12.00
37 - Remove Flushing Tank & Install 5' Diameter Manhole	**Detail**	**3.00**	**EACH**	**516.00**
Excavate & Prep Manhole	Detail	3.00	EACH	432.00
Hydro Excavation Crew	Detail	3.00	DY	48.00
Dump Fees	Sub.	8.00	EACH	0.00
New 5' Dia. Manhole Sub	Sub.	3.00	EACH	0.00
Final Adjustment	Detail	3.00	EACH	36.00
23 - Install 8" CIPP Liner	**Detail**	**2,466.00**	**LF**	**160.00**
CIPP Support Crew	Detail	2,466.00	LF	160.00
CIPP Lining Sub 8" CIPP	Sub.	2,466.00	EACH	0.00
20 - 39" Bypass System Setup & Teardown	**Detail**	**1.00**	**LS**	**2,692.19**
Mobilization / Demobilization	Detail	24.00	TRIP	96.00
Dig And Replace Suction / Discharge Pit	Detail	2.00	EACH	317.33
Trenching And Removal & Backfill	Detail	510.00	LF	1,024.00
Bypass Installation	Detail	1.00	EACH	674.86
Bypass Takedown	Detail	1.00	EACH	320.00
Bypass Superintendent	Detail	20.00	DY	160.00
Bypass Calcs	Sub.	1.00	EACH	0.00
Hardscape Restoration	Detail	1.00	LS	100.00
Coating Repair	Detail	2.00	EACH	53.33
Test Pipe	Detail	3,000.00	LF	94.86
Crossing Delays	Detail	5.00	EACH	100.00
JI-Project Superintendent	Detail	160.00	HR	160.00
Asphalt Restoration	Sub.	284.00	SY	0.00
Concrete Restoration (C&G, Sidewalk)	Detail	3.00	LOC	100.00
21 - 39" Bypass Operation	**Detail**	**32.00**	**DY**	**1,536.00**
Sewer Bypass Equipment	Detail	32.00	DY	0.00
Sewer Bypass Pump Watch	Detail	32.00	DY	1,536.00
Support Equipment	Detail	32.00	DY	0.00
Pay Item Totals:				**9,653.19**
Summary Totals:				**9,653.19**

EXHIBIT E

Construction Documents necessary to define Scope of Work and Deliverables for the Construction Phase Services, including plans, designs, drawings, specifications and other required Contract Documents

(190 **pages - To be Incorporated by Amendment)**

EXHIBIT E: CONSTRUCTION DOCUMENTS

SEWER & MANHOLE REHABILITATION, PHASE 6B & 6D

COG PROJECT NUMBER: 212231

GMP-002 REV-1

DOCUMENTS:

- Sewer & Manhole Rehabilitation, Phase 6B
  - Drawings: City of Glendale, Glendale, Arizona – Project No. 212231 Sewer & Manhole Rehabilitation, Phase 6B Sealed 7-29-2024
  - Technical Specifications: City of Glendale, Water Services Department – Sewer & Manhole Rehabilitation Phase 6B (Area 7 & 9) Project No. 212231 Sealed 1-26-2024
- Sewer & Manhole Rehabilitation, Phase 6D
  - Drawings: City of Glendale, Glendale, Arizona – Project No. 212231 Sewer & Manhole Rehabilitation, Phase 6D Sealed 7-29-2024
  - Technical Specifications: City of Glendale, Water Services Department – Sewer & Manhole Rehabilitation Phase 6D (Area 1 & 3) Project No. 212231 Sealed 1-26-2024
- Sewer & Manhole Rehabilitation, Phase 6B & 6D Scope of Work Description
- Sewer & Manhole Rehabilitation, Phase 6B Supplemental Exhibits
  - Conceptual Bypass Drawing
  - Existing 39-inch Sewer Flow Data (Utilized for 67th Ave & Butler 39-inch Bypass)
  - Alternate Junction Structure Design (Armorock 72-inch Polymer Manhole)

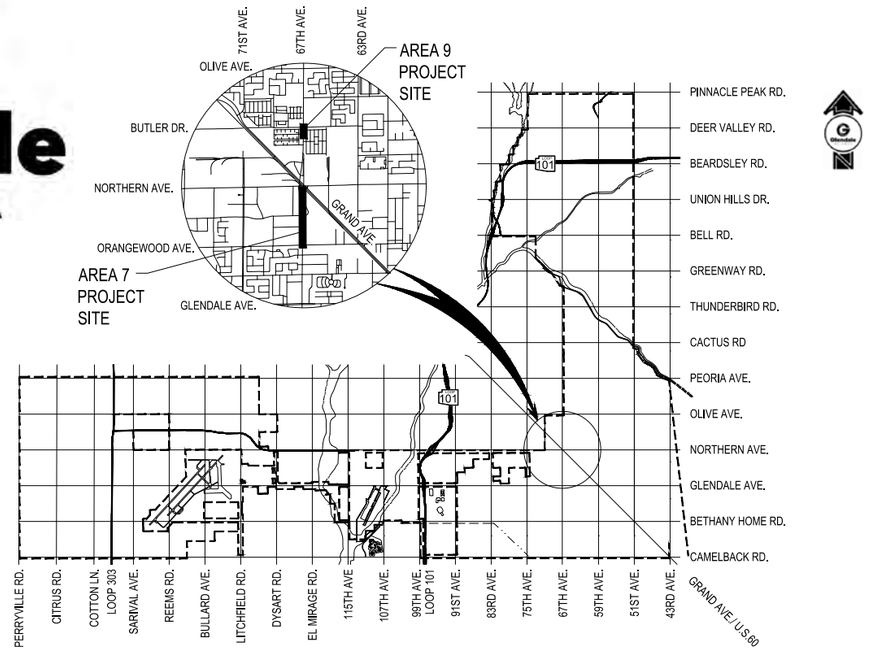
CITY OF GLENDALE

GLENDALE, ARIZONA

PROJECT # 212231

SEWER & MANHOLE REHABILITATION, PHASE 6B

Glendale
ARIZONA



VICINITY MAP

SHEET INDEX

SHT. #	
1	COVER SHEET
2	KEY MAP SHEET
3	CONTROL SHEET
4	GENERAL NOTES, LEGEND, & ABBREVIATIONS
5 - 7	AREA 7 - SEWER PLAN
8	AREA 9 - SEWER PLAN AND PROFILE SHEETS
9	MANHOLE REHABILITATION SCHEDULE & DETAILS
10 - 11	MANHOLE DETAILS
S-1 - S-7	MH0129450 RECONSTRUCTION SHEETS

MAYOR
JERRY P. WEIERS

CITY COUNCIL
LEANDRO BALDENEGRO
JOYCE V. CLARK
IAN HUGH
RAY MALNAR
LAUREN TOLMACHOFF
BART TURNER

CITY MANAGER
KEVIN R. PHELPS

CITY CLERK
JULIE K. BOWER

CITY ATTORNEY
MICHAEL D. BAILEY

consor 2432 W. PEORIA AVENUE, SUITE 1246 PHOENIX, AZ 85029 Phone: (602) 906-1901

PROJECT BENCHMARK:

BRASS CAP IN HANDHOLE
AT THE INTERSECTION OF 75TH AVENUE & MARYLAND AVENUE
ELEVATION = 1108.558' (NAVD88 DATUM)

APPROVED _____ DATE _____
MARICOPA COUNTY DEPARTMENT
OF ENVIRONMENTAL SERVICES
PERMIT NO.

RECORD DRAWING

I certify that the locations, elevations, depths and record drawing comments accurately reflect the existing field conditions and materials actually used during construction. This certification is based on periodic field observations and the contractors representations of the facilities as constructed.

NAME _____ DATE _____

REGISTRATION NO. _____ EXP. DATE _____

REVD. BY: _____
TECHNICAL REGISTRANT

PLANS ACCEPTANCE

The City of Glendale accepts these plans for construction, as being in general compliance with plan preparation requirements of the City. Responsibility for the completeness and accuracy of the plans and related design resides with the Licensed Design Professional and Firm of Record which shall meet State of Arizona Board of Technical Registration requirements.

_____ _____
CITY ENGINEER DATE

_____ _____
TRANSPORTATION DIRECTOR DATE

_____ _____
WATER SERVICES DIRECTOR DATE

CITY OF GLENDALE
ENGINEERING DEPARTMENT
5850 W. GLENDALE AVE.
GLENDALE, ARIZONA 85301 (623) 930-3630

Registered Professional Engineer (Civil) CERTIFICATE NO. 34588 MARK V. LEE Date Signed 7-29-2024

Designed TPB | Drawn HC | Checked MVL

No.	Date	Description
1		
2		
3		
4		

REVISIONS

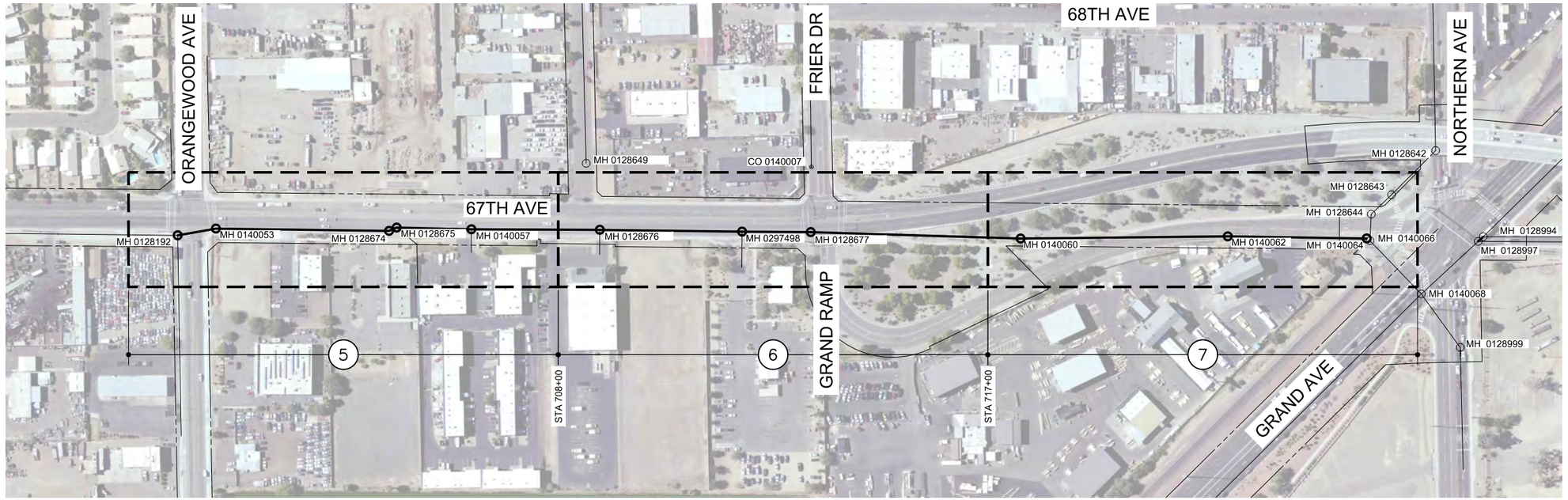
212231
SEWER & MANHOLE REHABILITATION, PHASE 6B
AREAS 7 & 9
COVER SHEET

No Scale

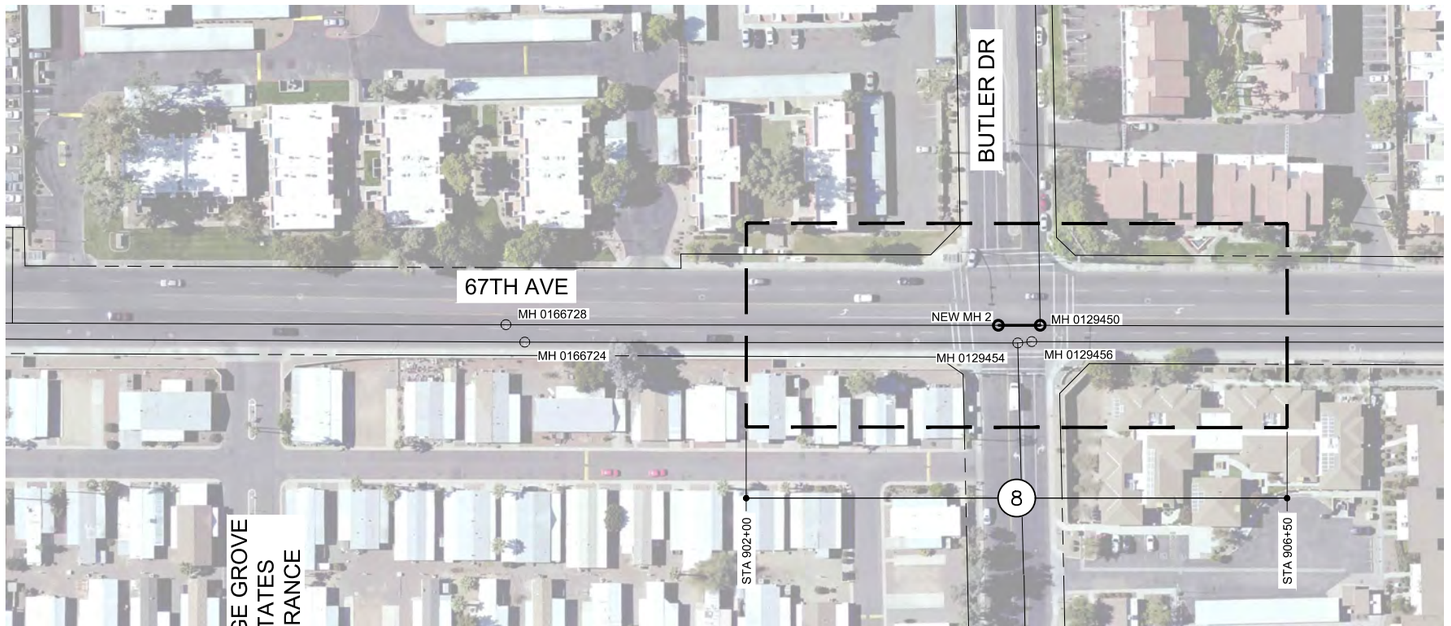
Contact Arizona 811 at least two full working days before you begin excavation
ARIZONA 811 Call 811 or click Arizona811.com

SHT. 1
OF 16

DSC #



KEY MAP AREA 7



KEY MAP AREA 9

LEGEND

(X) SEWER SHEET

consor
2432 W. PEORIA AVENUE, SUITE 1246
PHOENIX, AZ 85029
Phone: (602) 906-1901

CITY OF GLENDALE
ENGINEERING DEPARTMENT
5850 W. GLENDALE AVE.
GLENDALE, ARIZONA 85301 (623) 930-3630

Registered Professional Engineer (Civil)
14588
MARK V.
LEE
7-29-2024
Date Signed
Expires 6-30-2026

Designed	Drawn	Checked
TPB	HC	MVL

No.	Date	Description
		REVISIONS

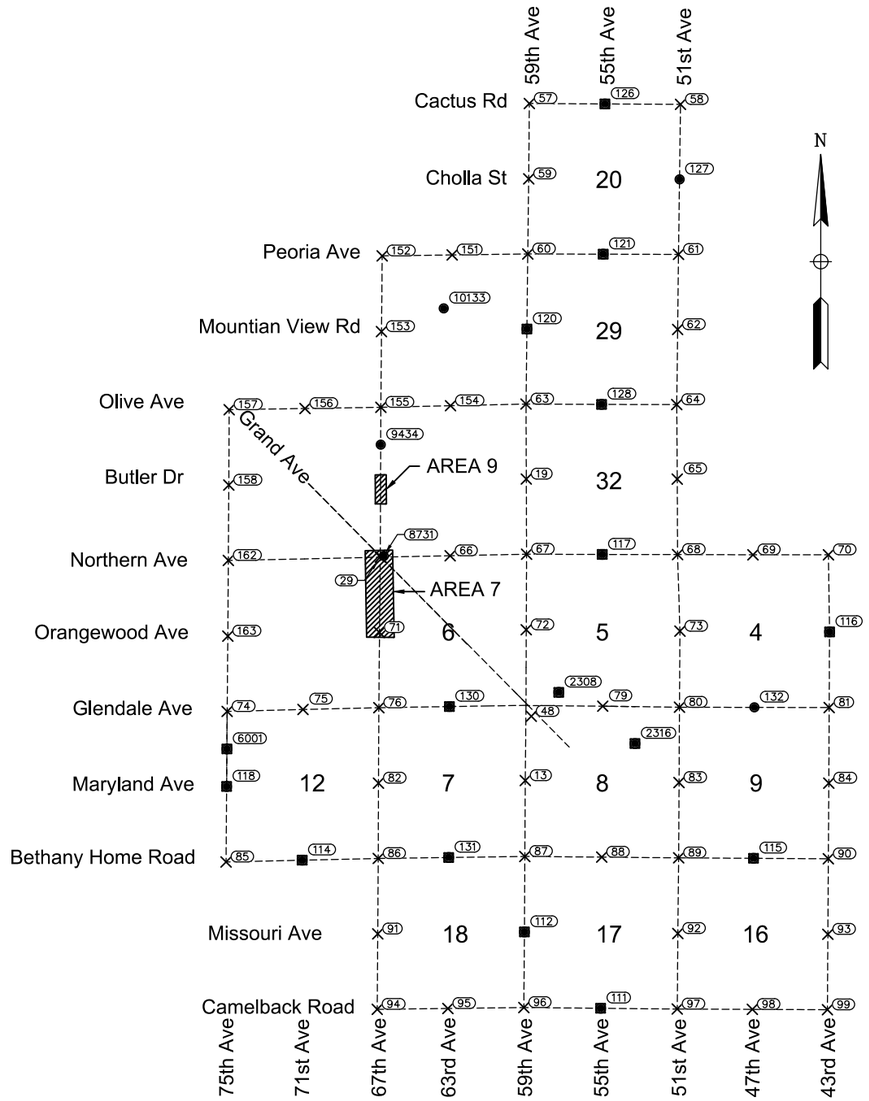
212231
SEWER & MANHOLE REHABILITATION, PHASE 6B
AREAS 7 & 9
KEY MAP

SCALE:
NONE

Contact Arizona 811 at least two full working days before you begin excavation
ARIZONA 811
Call 811 or click Arizona811.com

SHT. 2
OF 18

DSC #



CONTROL PLAN

LEGEND

- BRASS CAP IN HANDHOLE
- BRASS CAP FLUSH
- SECTION OR ¼ CORNER
- AREA OF SEWER & MANHOLE REHABILITATION

PROJECT BENCH MARKS

(118) BRASS CAP IN HANDHOLE
AT THE INTERSECTION OF 75TH AVENUE & MARYLAND AVENUE
ELEVATION = 1108.558' (NAVD88 DATUM)

(111) BRASS CAP IN HANDHOLE
AT THE INTERSECTION OF 55TH AVENUE & CAMEBACK ROAD
ELEVATION = 1127.998' (NAVD88 DATUM)

(127) BRASS CAP FLUSH
AT THE INTERSECTION OF 51ST AVENUE & CHOLLA STREET
ELEVATION = 1213.778' (NAVD88 DATUM)

CONTROL COORDINATE TABLE

NO	Northing	Easting	Elevation	Description
13	920966.35	617848.09		Section or 1/4 Corner
19	931502.71	617884.4		Section or 1/4 Corner
29	928773.71	612782.82		Section or 1/4 Corner
48	923212.31	618059.63		Section or 1/4 Corner
57	944625.75	617990		Section or 1/4 Corner
58	944594.98	623271.8		Section or 1/4 Corner
59	941992.33	617968.18		Section or 1/4 Corner
60	939367.3	617935.77		Section or 1/4 Corner
61	939352.25	623202.3		Section or 1/4 Corner
62	936728.34	623172.09		Section or 1/4 Corner
63	934123.4	617874.76		Section or 1/4 Corner
64	934104.36	623140.37		Section or 1/4 Corner
65	931500.33	623157.57	1185.88	Section or 1/4 Corner
66	928822.83	615224.79		Section or 1/4 Corner
67	928876.37	617893.93		Section or 1/4 Corner
68	928864.02	623169.43		Section or 1/4 Corner
69	928856.2	625802.57		Section or 1/4 Corner
70	928855.65	628440.05		Section or 1/4 Corner
71	926140.44	612755.71		Section or 1/4 Corner
72	926235.81	617882.91		Section or 1/4 Corner
73	926187.56	623251.7		Section or 1/4 Corner
74	923381.67	607433.35		Section or 1/4 Corner
75	923451.29	610083.96	1121.71	Section or 1/4 Corner
76	923512.44	612733.23		Section or 1/4 Corner
79	923565.32	620555.1	1159.96	Section or 1/4 Corner
80	923529.58	623235.42		Section or 1/4 Corner
81	923518.95	628465.46		Section or 1/4 Corner
82	920877.33	612719.19		Section or 1/4 Corner
83	920897.88	623221.39		Section or 1/4 Corner
84	920876.89	628454.34		Section or 1/4 Corner
85	918122.51	607395.31		Section or 1/4 Corner
86	918244.36	612711.33		Section or 1/4 Corner
87	918314.96	617833.44		Section or 1/4 Corner
88	918291.44	620521.13		Section or 1/4 Corner
89	918266.02	623207		Section or 1/4 Corner
90	918233.02	628436.73		Section or 1/4 Corner
91	915608.35	612693.89		Section or 1/4 Corner
92	915621.9	623179.42		Section or 1/4 Corner
93	915594.93	628420.58		Section or 1/4 Corner
94	912971.88	612676.28		Section or 1/4 Corner
95	913002.74	615146.49		Section or 1/4 Corner
96	913035.77	617798.17		Section or 1/4 Corner
97	912982.6	623158.98		Section or 1/4 Corner
98	912971.34	625781.63		Section or 1/4 Corner
99	912959.31	628404.86		Section or 1/4 Corner
111	913008.83	620478.6	1128	Fd BC/HH
112	915675.36	617818.77	1129.69	Fd BC/HH
114	918183.44	610053.12	1113.54	Fd BC/HH
115	918249.26	625822	1154.03	Fd BC/HH
116	926159.53	628477.84	1181.65	Fd BC/HH
117	928866.29	620535.7	1171.93	Fd BC/HH
118	920758.18	607414.6	1108.56	Fd BC/HH
120	936744.94	617904.71	1179.72	Fd BC/HH
121	939360.11	620569.11	1197.41	Fd BC/HH
126	944610.41	620630.56	1213.13	Fd BC/HH
127	941974.05	623236.57	1213.78	Fd BC flush
128	934110.45	620511.61	1182	Fd BC/HH
130	923552.16	615196.58	1141.68	Fd BC/HH
131	918278.04	615171.93	1130.9	Fd BC/HH
132	923523.25	625849.88	1169.58	Fd BC flush
151	939333.69	615296.42		Section or 1/4 Corner
152	939301.42	612849.23		Section or 1/4 Corner
153	936655.91	612825.74		Section or 1/4 Corner
154	934064.97	615237.46		Section or 1/4 Corner
155	934010.13	617807.27		Section or 1/4 Corner
156	933968.26	610157.65		Section or 1/4 Corner
157	933925.95	607503.99		Section or 1/4 Corner
158	931291.9	607490.56		Section or 1/4 Corner
162	928659.11	607473.77		Section or 1/4 Corner
163	926013.31	607456.95		Section or 1/4 Corner
2308	924048.27	619016.55	1153.35	Fd BCHH (Area 1)
2316	922258.43	621680.05	1158.06	Fd BCHH (Area 3)
6001	922069.97	607423.99	1111.51	Fd BCHH (Area 6)
8731	928810.52	612899.48	1144.93	Fd BCF AZHIGHWAY (Area 7 & 8)
9434	932701.49	612797.26	1151.49	Fd BCF (Area 9)
10133	937463.78	614997.46	1174.15	Fd BCF (Area 10)

consor 2432 W. PEORIA AVENUE, SUITE 1246
PHOENIX, AZ 85029
Phone: (602) 906-1901

CITY OF GLENDALE
ENGINEERING DEPARTMENT
5850 W. GLENDALE AVE.
GLENDALE, ARIZONA 85301 (623) 930-3630

Registered Professional Engineer (Civil) CERTIFICATE NO. 14488 MARK V. LEE 7-29-2024 Date Signed

Designed TPB | Drawn HC | Checked MVL

No.	Date	Description
		REVISIONS

212231
SEWER & MANHOLE REHABILITATION, PHASE 6B
AREAS 7 & 9
CONTROL SHEET

SCALE:
1"=2500' HORZ.

Contact Arizona 811 at least two full working days before you begin excavation
Call 811 or click Arizona811.com

SHT. 3
OF 18

DSC #

GENERAL NOTES FOR CONSTRUCTION

A. ALL CONSTRUCTION SHALL CONFORM TO THE LATEST MAG STANDARD DETAILS AND SPECIFICATIONS AND THE CITY'S CURRENT ENGINEERING DESIGN AND CONSTRUCTION STANDARDS.

B. THIS SET OF PLANS HAS BEEN REVIEWED FOR COMPLIANCE WITH CITY REQUIREMENTS PRIOR TO ISSUANCE OF CONSTRUCTION PERMITS. HOWEVER, SUCH REVIEW AND ACCEPTANCE SHALL NOT PREVENT THE CITY FROM REQUIRING CORRECTION OF ERRORS IN SAID PLANS AND/OR CONSTRUCTION WHEN IN VIOLATION OF ANY LAWS, ORDINANCES, CODES OR STANDARDS THAT ARE IN EFFECT. REVIEW AND ACCEPTANCE OF PLANS DOES NOT RELEASE A DEVELOPER OR ENGINEER FROM RESPONSIBILITY FOR ERRORS OR OMISSIONS ON SAID PLANS.

C. THE CITY DOES NOT WARRANT ANY QUANTITIES SHOWN ON THESE PLANS.

D. THE CITY PLANS ACCEPTANCE IS FOR GENERAL LAYOUT IN THE RIGHT-OF-WAY ONLY. THIS ACCEPTANCE IS VALID FOR A PERIOD OF SIX MONTHS. CONSTRUCTION PERMITS SHALL BE OBTAINED DURING THIS PERIOD OR THE PLANS SHALL BE RESUBMITTED FOR REVIEW.

E. A CITY ACCEPTED SET OF PLANS SHALL BE AVAILABLE ON THE JOB SITE AT ALL TIMES.

F. THE CITY SHALL BE NOTIFIED 48 HOURS PRIOR TO ANY CONSTRUCTION WORK. CONSTRUCTION WORK CONCEALED WITHOUT INSPECTION BY THE CITY SHALL BE SUBJECT TO EXPOSURE AT THE CONTRACTOR'S EXPENSE.

G. A RIGHT-OF-WAY CONSTRUCTION PERMIT IS REQUIRED FOR ALL WORK WITHIN THE PUBLIC RIGHT-OF-WAY OR WITHIN A CITY EASEMENT. A 100% PERFORMANCE BOND OR EQUIVALENT FORM OF FINANCIAL SURETY MAY BE REQUIRED FOR ALL WORK WITHIN THE RIGHT-OF-WAY PRIOR TO THE ISSUANCE OF ANY RIGHT-OF-WAY CONSTRUCTION PERMIT(S). ALL WORK WITHIN THE RIGHT-OF-WAY SHALL BE INSPECTED AND APPROVED BY THE CITY'S ENGINEERING DIVISION.

H. IMPROVEMENTS SHALL NOT BE ACCEPTED UNTIL "AS-BUILT" PLANS AND ELECTRONIC (AUTOCAD) FILES HAVE BEEN SUBMITTED AND APPROVED BY THE CITY.

I. THE DEVELOPER IS RESPONSIBLE FOR ALL COSTS AND WORK RELATED TO THE REMOVAL, RELOCATION OR ABANDONMENT OF ALL OBSTRUCTIONS AND/OR UTILITIES WITHIN THE RIGHT-OF-WAY THAT CONFLICT WITH THE NEW IMPROVEMENTS.

J. THE DEVELOPER IS RESPONSIBLE FOR OBTAINING OR DEDICATING ALL REQUIRED RIGHTS-OF-WAY AND EASEMENTS TO THE CITY PRIOR TO ISSUANCE OF THE BUILDING'S CERTIFICATE OF OCCUPANCY.

K. THE CONTRACTOR SHALL CONTACT BLUE STAKE (602-263-1100) 48 HOURS PRIOR TO CONSTRUCTION.

L. THE CONTRACTOR SHALL BARRICADE CONSTRUCTION SITES AT ALL TIMES PER THE CITY OF PHOENIX TRAFFIC BARRICADE MANUAL. WHEN REQUIRED BY THE CITY, A TRAFFIC CONTROL PLAN SHALL BE SUBMITTED FOR APPROVAL A MINIMUM OF 72 HOURS IN ADVANCE OF CONSTRUCTION.

M. THE CONTRACTOR MAY OBTAIN A FIRE HYDRANT METER FOR CONSTRUCTION WATER FROM THE CITY WATER SERVICES DEPARTMENT. THE UNLAWFUL REMOVAL OF WATER FROM A FIRE HYDRANT IS A VIOLATION OF THE MUNICIPAL CODE, PUNISHABLE BY FINE AND/OR IMPRISONMENT.

N. DAMAGE CAUSED BY THE DEVELOPER DURING CONSTRUCTION TO CITY INFRASTRUCTURE OR FACILITIES SHALL BE REPAIRED OR REPLACED BY THE DEVELOPER, AT HIS EXPENSE, IN A MANNER ACCEPTABLE TO THE CITY.

O. THERE SHALL BE NO DIRT RAMPS OVER SIDEWALKS DURING CONSTRUCTION.

P. AN AZPDES PERMIT IS REQUIRED FOR ALL CONSTRUCTION THAT DISTURBS LAND OVER ONE (1) ACRE IN SIZE. PRIOR TO START OF ANY CONSTRUCTION, THE CONTRACTOR SHALL SUBMIT A NOTICE OF INTENT (NOI) TO THE ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY (ADEQ) AND A COPY TO THE CITY OF GLENDALE AND HAVE A COPY OF THE SWPPP ON SITE AT ALL TIMES.

Q. PRIVATE ON-SITE WATER AND SEWER LINES SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE UNIFORM PLUMBING CODE AS ADOPTED BY THE CITY.

R. THE CONTRACTOR SHALL REPLACE ALL PAVEMENT MARKINGS DAMAGED DURING CONSTRUCTION, PER THE THERMOPLASTIC PAVEMENT MARKING SPECIFICATIONS INCLUDED WITH THIS PROJECT.

S. THE CONTRACTOR SHALL REPLACE ALL TRAFFIC SIGNAL LOOP DETECTORS DAMAGED DURING CONSTRUCTION PER THE CITY OF GLENDALE DETAILS TS-1, TS-2 AND TS-3. SUCH WORK IS A NON-PAY ITEM.

T. IN AREAS WHERE THERE IS ASPHALT BEING REPLACED, THE CONTRACTOR SHALL BE RESPONSIBLE TO RE-STRIPE ANY EXISTING STRIPING EFFECTED BY THE PROJECT WITH 90 MIL THERMOPLASTIC PAINT.

U. ANY SIGNING (SIGN, POST, BASE POST) DAMAGED BY THE CONTRACTOR DURING THE PROJECT ACTIVITIES ON THIS PROJECT SHALL BE REPLACED WITH NEW PARTS THAT ADHERE TO THE CITY'S SIGNING REQUIREMENTS.

V. CONTRACTOR TO LOCATE ALL UTILITIES POTENTIALLY IN CONFLICT PRIOR TO CONSTRUCTION AND SHALL NOT PROCEED WITH CONSTRUCTION WITHOUT WRITTEN APPROVAL OF ENGINEER.

COX COMMUNICATIONS NOTES

1. A MINIMUM OF 90 DAY ADVANCE NOTICE IS REQUIRED BY COX COMMUNICATIONS TO RELOCATE THEIR FACILITIES.
2. ALL COSTS TO RELOCATE SHALL BE AT THE EXPENSE OF THE DEVELOPER/CUSTOMER.
3. WHEN CROSSING COX COMMUNICATIONS FACILITIES THE CONTRACTOR SHALL POTHOLE TO DETERMINE DEPTH AND MAINTAIN A MINIMUM OF 12 INCHES OF VERTICAL AND HORIZONTAL SEPARATION FROM THE PROPOSED FACILITY. SUPPORT AND PROTECT ALL COX COMMUNICATIONS FACILITIES DURING CONSTRUCTION.
4. AVOID UNNECESSARY DAMAGES AND CALL 811 BEFORE DIGGING OR TRENCHING. CONTACTING 811 FOR LOCATION OF COX COMMUNICATIONS FACILITIES MUST BE COMPLETED PRIOR TO ANY CONSTRUCTION AND FAILURE TO DO SO MAY RESULT IN CITY, STATE, AND/OR FEDERAL VIOLATIONS.
5. PROTECT IN PLACE FACILITIES (VAULTS, HANDHOLE, MANHOLES, FIBER CABINET, POWER SUPPLY, SERVICE DROPS AND/OR SURFACE MOUNTS) WITHIN PROJECT VICINITY.

ABBREVIATIONS

ACBC	ASPHALT CEMENT BASE COURSE
ACP	ASPHALT CEMENT PAVING
ACSC	ASPHALT CEMENT SURFACE COURSE
ADOT	ARIZONA DEPARTMENT OF TRANSPORTATION
AZHWY	ARIZONA STATE HIGHWAY
BC	BRASS CAP
BCF	BRASS CAP FLUSH
BCHH	BRASS CAP IN HANDHOLE
C	CONCRETE
CCTV	CLOSED CIRCUIT TELEVISION
℄	CENTER LINE
COMM	COMMUNICATION
CLSM	CONTROLLED LOW STRENGTH MATERIAL
CIP	CAST IRON PIPE
CIPP	CURED IN PLACE PIPE
CO	CLEANOUT
CONC	CONCRETE
CONT	CONTINUOUS
DIP	DUCTILE IRON PIPE
DTL	DETAIL
D/W	DRIVEWAY
ELEC	ELECTRIC
ELEV	ELEVATION
EX	EXISTING
HORIZ	HORIZONTAL
HDD	HORIZONTAL DIRECTION DRILLING
HDPE	HIGH DENSITY POLYETHYLENE
ICV	IRRIGATION CONTROL VALVE
INV	INVERT
IP	IRON PIPE IN HANDHOLE
MH	MANHOLE
M	MONUMENT LINE
MSA	MISCELLANEOUS SURVEY ABANDONED
NPI	NON PAY ITEM
OHE	OVERHEAD ELECTRIC
P	PAVEMENT
P.I.P.	PROTECT IN PLACE
PVC	POLYVINYL CHLORIDE
R/W	RIGHT-OF-WAY
SLC	SERVICE LATERAL CONNECTION
STA	STATION
STD	STANDARD
SWR	SEWER
TBM	TEMPORARY BENCH MARK
TCE	TEMPORARY CONSTRUCTION EASEMENT
TEL	TELEPHONE
TYP	TYPICAL
UNK	UNKNOWN DIMENSION
UON	UNLESS OTHERWISE NOTED
VCP	VITRIFIED CLAY PIPE
VERT	VERTICAL
WTR	WATER

GENERAL NOTES FOR STREET CONSTRUCTION

A. THE DEVELOPER/CONTRACTOR IS RESPONSIBLE FOR PAYING PERMIT FEES PRIOR TO CONSTRUCTION OF ANY STREET IMPROVEMENTS.

B. THE PAVING CONTRACTOR IS RESPONSIBLE FOR OBTAINING WATER AND SEWER AS-BUILT PLANS BEFORE START OF CONSTRUCTION TO DETERMINE THE LOCATION OF ALL EXISTING UTILITY FRAMES AND COVERS THAT MUST BE ADJUSTED TO FINISH GRADE.

C. THE PAVING CONTRACTOR SHALL NOT START CONSTRUCTION UNTIL CONFLICTING UNDERGROUND UTILITY CONSTRUCTION IS COMPLETED AND SERVICE STUBS TO ALL LOTS HAVE BEEN ADEQUATELY EXTENDED TO THE RIGHT-OF-WAY OR EASEMENT LINE.

D. IF THE EXISTING PAVEMENT DOES NOT MEET CITY REQUIREMENTS, THE DEVELOPER WILL BE REQUIRED TO REMOVE AND REPLACE THE PAVEMENT TO STREET CENTERLINE. THE CITY SHALL DETERMINE THE EXACT LIMITS OF PAVEMENT TO BE REMOVED AND REPLACED.

E. ALL EXISTING STREET MONUMENTS MUST BE PRESERVED. PRIOR TO CONSTRUCTION, MONUMENTS WILL BE REFERENCED HORIZONTALLY AND VERTICALLY. AFTER CONSTRUCTION, MONUMENTS SHALL BE RESET AND ANY NEW INFORMATION SHALL BE REFLECTED ON THE AS-BUILT PLANS.

F. THE MAXIMUM STAKE INTERVAL FOR GRADES OF 0.2% OR LESS SHALL BE 25 FEET FOR CONCRETE WORK AND 50 FEET FOR ASPHALT ROADWAY SECTION, EXCEPT ON HORIZONTAL OR VERTICAL CURVES WHERE A MAXIMUM STAKE INTERVAL OF 20 FEET FOR CONCRETE WORK SHALL BE REQUIRED. ALL CURB RETURNS SHALL BE STAKED AT THE P.C. AND THE MIDPOINT OF THE RETURN. NO GRADE STAKE INTERVAL SHALL EXCEED 50 FEET.

G. THE DEVELOPER IS RESPONSIBLE FOR THE INSTALLATION OF ALL NEW PAVEMENT MARKINGS AND THE REMOVAL OF ALL EXISTING PAVEMENT MARKING THAT ARE IN CONFLICT WITH THE NEW PAVEMENT MARKINGS.

H. NO PERSON SHALL USE ANY MECHANICAL EQUIPMENT FOR CLEARING, GRUBBING, ROAD CONSTRUCTION, TRENCHING, EXCAVATING, DEMOLITION OR ENGAGE IN ANY EARTHMOVING ACTIVITY WITHOUT FIRST OBTAINING A DUST CONTROL PERMIT FROM AIR POLLUTION CONTROL, MARICOPA COUNTY DEPARTMENT OF ENVIRONMENTAL SERVICES.

I. CONTRACTOR IS RESPONSIBLE FOR PAVEMENT REPLACEMENT AND REQUIRED TREATMENT IN ACCORDANCE WITH THE MOST RECENT GLENDALE PAVEMENT ORDINANCE.

GENERAL NOTES FOR SEWER MAIN CONSTRUCTION

A. THE DEVELOPER/CONTRACTOR IS RESPONSIBLE FOR PAYING PERMIT FEES PRIOR TO CONSTRUCTION OF ANY SEWER LINES.

B. MAG STANDARD DETAIL 404 SHALL APPLY WHETHER SHOWN ON THE APPROVED PLANS OR NOT.

C. CONFLICTS WITH THE EXISTING UTILITIES DISCOVERED DURING CONSTRUCTION SHALL BE CALLED TO THE ATTENTION OF THE CITY AND RESOLVED PRIOR TO PROCEEDING.

D. LOCATION OF ALL MANHOLES AND CLEANOUTS MUST BE REFERENCED AT ALL TIMES DURING CONSTRUCTION AND MADE AVAILABLE TO THE CITY'S WATER SERVICES DEPARTMENT.

E. ALL NEW SEWER MAINS SHALL BE INSPECTED BY CLOSED CIRCUIT TELEVISION METHODS ACCEPTABLE TO THE CITY. ANY DEFECTS DISCOVERED DURING TELEVISED INSPECTION SHALL BE CORRECTED AND RE-TELEVISED AT NO COST TO THE CITY. VIDEOTAPES OR CDS OF ALL TELEVISED INSPECTIONS SHALL BE PROVIDED TO THE CITY PRIOR TO FINAL ACCEPTANCE OF THE SEWER MAIN. THE TELEVISED INSPECTION WILL BE AFTER THE INSTALLATION OF DRY UTILITIES AND PAVING.

F. BEDDING AND BACKFILL OF ALL SEWER MAINS AND SERVICES IN CITY RIGHTS-OF-WAY OR EASEMENTS SHALL FOLLOW CITY OF GLENDALE STANDARD DETAIL G-690.

G. NO PERSON SHALL USE ANY MECHANICAL EQUIPMENT FOR CLEARING, GRUBBING, ROAD CONSTRUCTION, TRENCHING, EXCAVATING, DEMOLITION OR ENGAGE IN ANY EARTHMOVING ACTIVITY WITHOUT FIRST OBTAINING A DUST CONTROL PERMIT FROM AIR POLLUTION CONTROL, MARICOPA COUNTY DEPARTMENT OF ENVIRONMENTAL SERVICES.

H. PERFORM A DEFLECTION TEST OF THE TOTAL LENGTH OF ALL SEWER LINES MADE OF FLEXIBLE MATERIALS TO ENSURE THAT THE INSTALLATION MEETS OR EXCEEDS THE MANUFACTURER'S RECOMMENDATIONS AND RECORD THE RESULTS. (R18-9-E301.D.2.i / MAG 615.11)

I. TEST EACH SEGMENT OF THE SEWER LINE FOR LEAKAGE USING THE APPROPRIATE ASTM TEST FOR THE PIPE MATERIAL. (R18-9-E301.D.2.j / MAG 615.11)

J. EACH MANHOLE WILL BE TESTED ACCORDING TO R18-9-E301.D.3.e AND f.

K. CONTRACTOR SHALL VERIFY LOCATION OF EXISTING SEWER SERVICE CONNECTIONS PRIOR TO CONSTRUCTION.

SOUTHWEST GAS NOTES

1. GAS PIPING COATING/WRAPPING MAY CONTAIN ASBESTOS. CONFLICTING PIPING MUST BE REMOVED BY ONE OF SOUTHWEST GAS CORPORATION'S NESHAP CERTIFIED CONTRACTORS. THE CERTIFIED CONTRACTORS WILL REMOVE THE PIPE DURING THE WORK HOURS OF 7:00 AM TO 3:30 PM, MONDAY THROUGH FRIDAY. THE COSTS OF THE CERTIFIED NESHAP CONTRACTORS, ABANDONMENT MATERIALS, STORAGE AND TRANSPORTATION SHALL BE AT THE COST OF THE CONTRACTOR. THE CONTRACTOR SHALL EXCAVATE TO WITHIN 1 FOOT OF THE EXISTING GAS PIPING TO BE REMOVED. THE CONTRACTOR SHALL PROVIDE SHORING, PLATING, TRAFFIC CONTROL AND COORDINATION AS REQUIRED FOR SOUTHWEST GAS CORPORATION TO REMOVE THE GAS PIPING. THE CONTRACTOR SHALL CONTACT SOUTHWEST GAS CORPORATION AT LEAST ONE WEEK PRIOR TO CONSTRUCTION AT 602-484-5256 TO COORDINATE THE REMOVAL OF THE ABANDONED PIPE. TO HAVE SMALL SECTIONS OF 10 FOOT OR LESS OF POTENTIALLY CONFLICTING GAS PIPING REMOVED THE CONTRACTOR SHALL CONTACT SOUTHWEST GAS CORPORATION AT 602-271-4277.
2. DURING PROJECT CONSTRUCTION ALL GAS PIPELINE VALVES, LINE LOCATING STATIONS, TEST POINTS, UNDERGROUND VAULTS SHALL BE KEPT ACCESSIBLE AT ALL TIMES.
3. CONTACT SOUTHWEST GAS FOR EMERGENCIES AT 1-800-528-4277.
4. ONCE MECHANICAL TRENCHING IS IN PROGRESS, DO NOT ATTEMPT TO TRENCH WITHIN TWO FEET OF A GAS PIPE. THE TRENCHING SHALL BE DONE BY HAND IN ORDER TO PREVENT ANY DAMAGE TO THE GAS PIPE. IN THE EVENT THE CONTRACTOR SHOULD "HOOK" OR OTHERWISE STRAIN A GAS PIPE WHILE EXCAVATING, A CALL SHOULD BE PLACED TO (602)271-GASS (4277).
5. WHEN EXCAVATIONS ARE COMPLETE, ALL EXPOSED GAS PIPES SHALL BE PROTECTED. IF LEFT UNATTENDED, THE EXPOSED PIPE SHALL BE SURROUNDED WITH AT LEAST 6 INCHES BELOW AND 6 INCHES ABOVE WITH PORTLAND CEMENT CONCRETE FINE AGGREGATE SAND. IF THE TRENCH IS MORE THAN 3 FEET WIDE, THE PIPE MUST BE SUPPORTED IN A MANNER WHERE THE SUPPORTING MATERIAL DOES NOT DAMAGE THE PIPE OR THE PROTECTIVE WRAPPING. CONTACT SOUTHWEST GAS ENGINEERING AT 480-730-3855 TO REVIEW AND APPROVE ALL PROPOSED PIPE SUPPORT DESIGNS.
6. WHEN BACKFILLING, SOUTHWEST GAS REQUIRES BOTH SIX INCHES OF BEDDING AND SIX INCHES OF SHADING WITH SAND OR MATERIAL FREE OF ROCKS AND ABLE TO PASS THROUGH A 3/8 INCH SCREEN. DO NOT DROP BACKFILL DIRECTLY OVER THE GAS PIPE. DURING THE COMPACTION PROCESS, USE EXTRA CARE WHEN DIRECTLY OVER THE GAS PIPE IN ORDER TO AVOID AND DAMAGE.

APS AND SRP NOTES:

1. THE CONTRACTOR SHALL PROTECT IN PLACE ALL EXISTING OVERHEAD AND UNDERGROUND FACILITIES NOT IMPACTED BY THE CONSTRUCTION OF THIS PROJECT.
2. ELECTRICAL FACILITIES THAT ARE NOT IN CONFLICT, BUT MAY REQUIRE ANY POLE BRACING, ADJUSTMENTS OF MANHOLES TO GRADE (REQUIRES PRESENCE OF ELECTRICAL INSPECTOR), TEMPORARY RELOCATIONS OF OVERHEAD AND REQUIRED OUTAGES (DUE TO CONSTRUCTION OF PROJECT) WILL BE AT THE COST OF THE CONTRACTOR.
3. IT IS THE CONTRACTORS RESPONSIBILITY TO MAINTAIN MINIMUM OSHA CLEARANCES FROM ELECTRICAL OVERHEAD AND UNDERGROUND FACILITIES. NO EQUIPMENT, SPOIL PILES ETC. SHALL BE PLACED BENEATH AND/OR OVER ELECTRICAL FACILITIES.
4. HAND DIG WITHIN 2 FEET OF ENERGIZED UNDERGROUND ELECTRICAL FACILITIES.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING SRP AND/OR APS BEFORE STARTING CONSTRUCTION.

ADOT NOTES:

1. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL PERMITS REQUIRED PRIOR TO CONSTRUCTION.
2. PERMITTEES ARE REQUESTED TO CONTACT THEIR LOCAL PERMIT OFFICE TO SET UP A PRE-APPLICATION MEETING TO DETERMINE ALL THE REQUIRED DOCUMENTATION AND REQUIREMENTS PRIOR TO SUBMISSION OF A PERMIT APPLICATION.
3. ANY WORK DONE WITHIN ADOT RIGHT-OF-WAY SHALL COMPLY WITH ADOT'S LATEST ENCROACHMENT PERMITS POLICIES GUIDELINES & PROCEDURES MANUAL.
4. PAVEMENT RESTORATION, BACKFILL, AND STRIPING WITHIN ADOT RIGHT-OF-WAY WILL COMPLY WITH ADOT'S LATEST STANDARD DETAILS AND SPECIFICATIONS FOR ADOT RIGHT-OF-WAY.

LEGEND

- EXISTING EDGE OF VEGETATION
- EXISTING TREE TO REMAIN
- EXISTING SAGUARO CACTUS
- EXISTING PALM TREE
- EXISTING STREET SIGN
- EXISTING TRAFFIC SIGN
- EXISTING UTILITY POLE
- EXISTING GAS METER
- EXISTING MAIL BOX
- EXISTING GUY ANCHOR
- EXISTING STREET LIGHT
- EXISTING MANHOLE
- EXISTING VALVE
- EXISTING FIRE HYDRANT
- EXISTING WATER METER
- EXISTING SEWER MANHOLE
- EXISTING TRAFFIC SIGNAL
- EXISTING TELEPHONE BOX
- EXISTING GAS METER (GM)
- EXISTING ELECTRIC BOX
- PAVEMENT REPLACEMENT TYPE AND SQ. YD. QUANTITY PER M.A.G. DETAIL 200 & COG STD DTL G-319, COP STD DTL P-1200, OR ADOT STD DTL C-07.06 PER AGENCY ROW (A / 24)
- BACKFILL TYPE – SEE CITY OF GLENDALE STD DTL G-690 FOR COG ROW, MAG SPECIFICATIONS FOR COP ROW OR ADOT SPECIFICATIONS FOR ADOT ROW (690)
- EXISTING CONCRETE SIDEWALK
- EXISTING DRIVEWAY
- EXISTING BRICK/PAVERS
- EXISTING RAILROAD
- EXISTING WIRE FENCE
- EXISTING MASONRY FENCE
- EXISTING CONCRETE CURB
- EXISTING EDGE OF PAVEMENT
- EXISTING CONTOUR LINE
- PROPERTY LINE
- RIGHT-OF-WAY LINE
- EASEMENT LINE
- CENTER LINE
- DISTRICT BOUNDARY OR CITY LIMITS
- E — EXISTING UNDERGROUND ELECTRICAL
- OH E — EXISTING OVERHEAD ELECTRICAL
- TEL CA — EXISTING TELEPHONE BURIED CABLE
- TV — EXISTING CABLE TV
- FO — EXISTING UNDERGROUND FIBER OPTIC
- 2"G — EXISTING GAS LINE & SIZE
- 12"Irr — EXISTING IRRIGATION LINE & SIZE (SMALLER THAN 18")
- 12"S — EXISTING SEWER LINE (SMALLER THAN 18")
- 12"SD — EXISTING STORM DRAIN LINE (SMALLER THAN 18")
- 12"W — EXISTING WATER LINE & SIZE (SMALLER THAN 18")
- 18"Irr — EXISTING IRRIGATION LINE & SIZE (18" OR LARGER)
- 18"S — EXISTING SEWER LINE & SIZE (18" OR LARGER)
- 18"SD — EXISTING STORM DRAIN LINE & SIZE (18" OR LARGER)
- 18"W — EXISTING WATER LINE & SIZE (18" OR LARGER)
- NEW SEWER LINE
- EXISTING SEWER LINE WITH CIPP LINING IN PROFILE VIEW
- EXISTING SEWER MANHOLE TO BE REHABILITATED
- STATION — CONSTRUCTION PLAN CALLOUT
- X — CONSTRUCTION KEY NOTE NUMBER
- 60 — US 60

consor
2432 W. PEORIA AVENUE, SUITE 1246
PHOENIX, AZ 85029
Phone: (602) 906-1901

Glendale ARIZONA

CITY OF GLENDALE
ENGINEERING DEPARTMENT
5850 W. GLENDALE AVE.
GLENDALE, ARIZONA 85301 (623) 930-3630

Registered Professional Engineer (Civil) — CERTIFICATE NO. 34988 — MARK V. LEE — Date Signed 7-29-2024 — One Sheet Only — Not Valid Without Original Signature

Designed	Drawn	Checked
TPB	HC	MVL

No.	Date	Description
		REVISIONS

212231
SEWER & MANHOLE REHABILITATION, PHASE 6B
GENERAL NOTES, LEGEND & ABBREVIATIONS

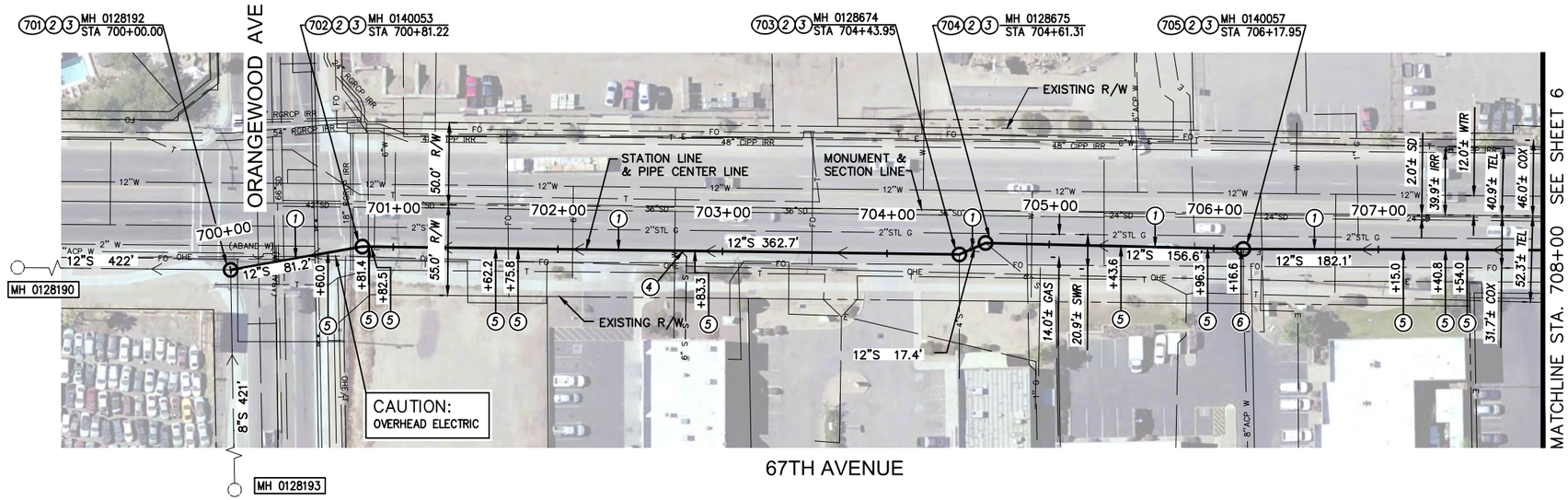
SCALE:
NO SCALE

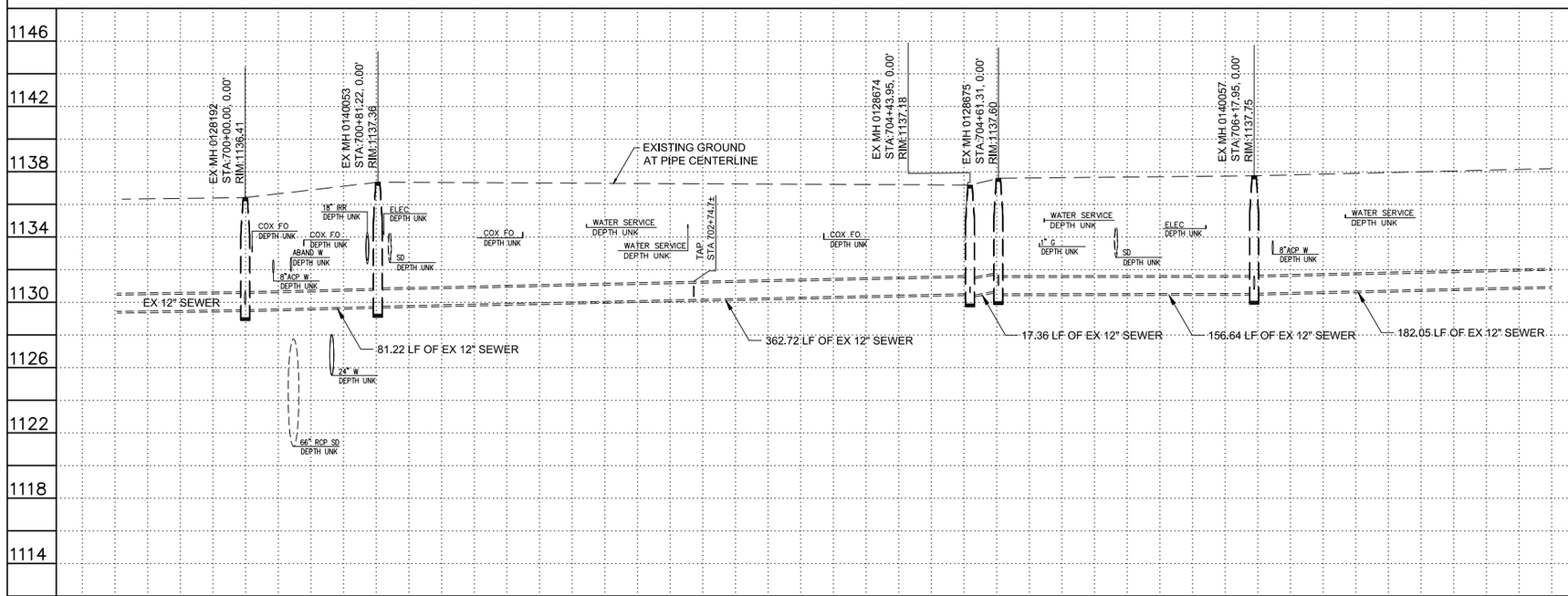
Contact Arizona 811 at least two full working days before you begin excavation
ARIZONA 811
Call 811 or click Arizona811.com

SHT. 4
OF 18

DSC #

PEC JOB NO.: W231441AZ FILE NAME: Base Bid 12C 161764-Notes 04.DWG PLOTTING DATE: REVISION DATE: - AUTOCAD VER.: 2019





CONSTRUCTION NOTES

(1)	CLEAN EXISTING 12" PIPE, INSTALL CIPP LINER PER SPECIFICATIONS NO. 02767	800 LF
(2)	REHABILITATE MANHOLE PER SCHEDULE DTL 1 ON SHT 9	5 EA
(3)	TERMINATE CIPP LINER AT MANHOLE WITH END SEAL & TAPER PER DTL 6 ON SHT 10 OR CIPP LINE THROUGH MANHOLE AND CUT OUT ACCESS HOLE AT BENCH AND SEAL EDGES PER DTL 7 ON SHT 10.	5 EA
(4)	CUT & REMOVE CIPP COUPON TO REINSTATE ALL TAPS STA 702+74.7	1 EA
(5)	REMOVE HANGING GASKET PRIOR TO INSTALLATION OF CIPP STA 700+60.0± STA 700+81.4± STA 700+82.5± STA 701+62.2± STA 701+75.8± STA 702+83.3± STA 705+43.6± STA 705+96.3± STA 707+15.0± STA 707+40.8± STA 707+54.0±	11 EA
(6)	REMOVE UNKNOWN OBSTRUCTION FROM PIPE PRIOR TO INSTALLATION OF CIPP STA 706+16.6±	1 EA

TEMPORARY BENCHMARK

AZHWY BRASS CAP FLUSH AT 34' NORTH OF NORTHERN AVE AND 116' EAST OF 67TH AVE
ELEVATION = 1144.93

COORDINATE TABLE

NO.	NORTHING	EASTING	DESCRIPTION
701	926111.95	612796.26	EX MH 0128192
702	926191.92	612782.08	EX MH 0140053
703	926554.61	612786.87	EX MH 0128674
704	926570.53	612779.92	EX MH 0128675
705	926727.12	612783.57	EX MH 0140057

NOTES:

1. *CONTRACTOR TO VERIFY LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.*
2. *CONTRACTOR SHALL RESTORE ALL PAVEMENT STRIPING AND MARKINGS REMOVED OR DAMAGED TO MATCH EXISTING STRIPING CONFIGURATION. CONTRACTOR IS RESPONSIBLE TO DOCUMENT AND MATCH EXISTING PAVEMENT STRIPING AND MARKINGS.*

consor
2432 W. PEORIA AVENUE, SUITE 1246
PHOENIX, AZ 85029
Phone: (602) 906-1901

Glendale ARIZONA

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ENGINEERING DEPARTMENT
5850 W. GLENDALE AVE.
GLENDALE, ARIZONA 85301 (623) 930-3630

Registered Professional Engineer (Civil) CERTIFICATE NO. 34588 MARK V. LEE 7-29-2024 Date Signed

Designed	Drawn	Checked
TPB	HC	MVL

No.	Date	Description
		REVISIONS

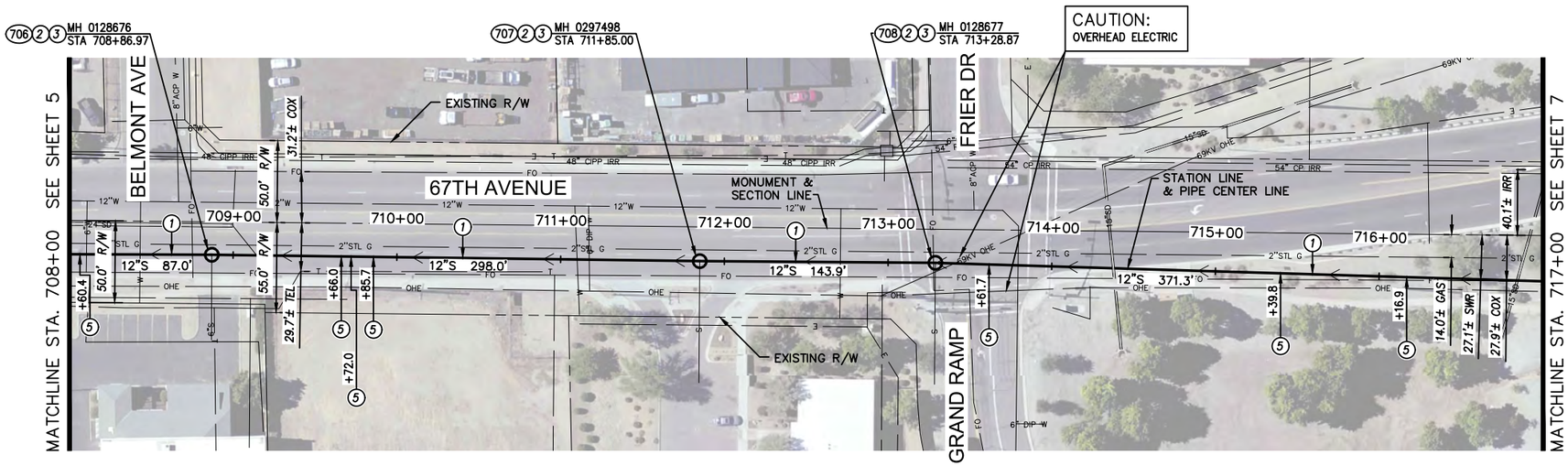
212231
SEWER & MANHOLE REHABILITATION, PHASE 6B
AREA 7
SEWER PLAN & PROFILE

SCALE:
1"=40' HORZ.
1"=4' VERT.

Contact Arizona 811 at least two full working days before you begin excavation
ARIZONA 811
Call 811 or click Arizona811.com

SHT. 5
OF 18

DSC #

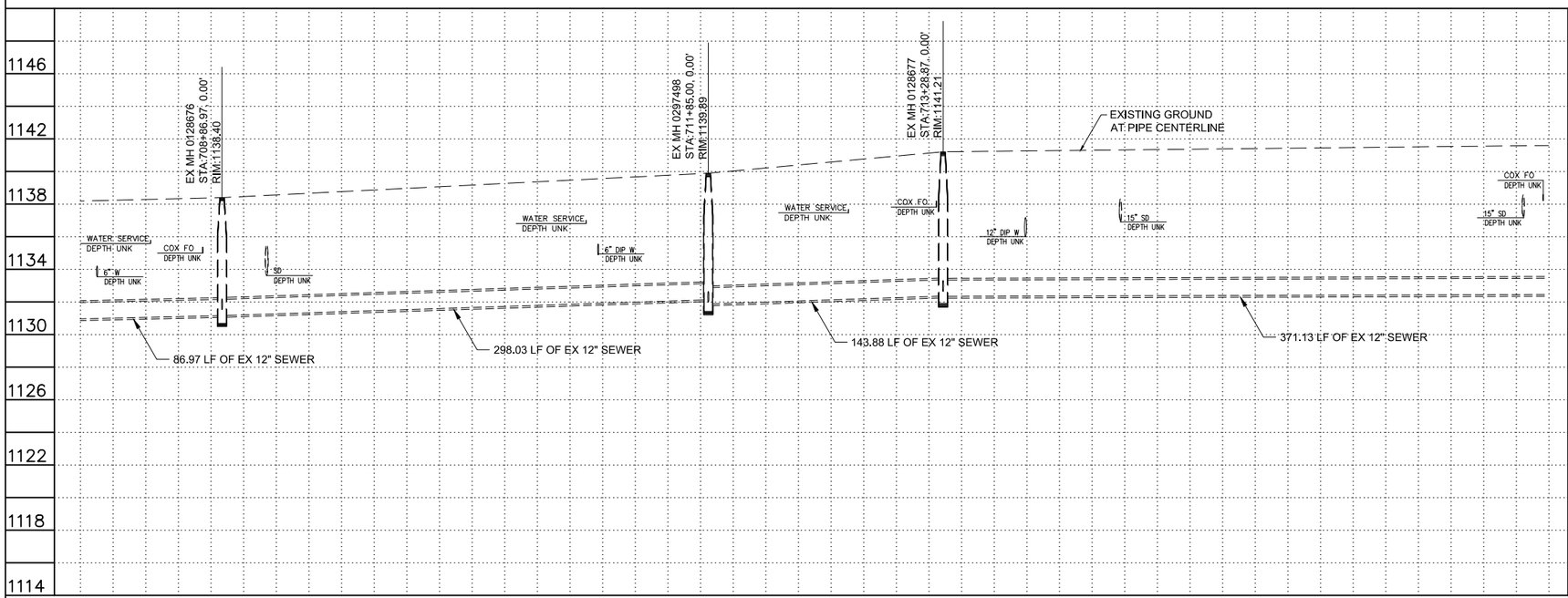


CONSTRUCTION NOTES

1. CLEAN EXISTING 12" PIPE, INSTALL CIPP LINER PER SPECIFICATIONS NO. 02767 — 900 LF
2. REHABILITATE MANHOLE PER SCHEDULE DTL 1 ON SHT 9 — 3 EA
3. TERMINATE CIPP LINER AT MANHOLE WITH END SEAL & TAPER PER DTL 6 ON SHT 10 OR CIPP LINE THROUGH MANHOLE AND CUT OUT ACCESS HOLE AT BENCH AND SEAL EDGES PER DTL 7 ON SHT 10. — 3 EA
5. REMOVE HANGING GASKET PRIOR TO INSTALLATION OF CIPP — 11 EA
   - STA 708+60.4±
   - STA 709+66.0±
   - STA 709+72.0±
   - STA 709+85.7±
   - STA 713+61.7±
   - STA 715+39.8±
   - STA 716+16.9±

TEMPORARY BENCHMARK

AZHWY BRASS CAP FLUSH AT 34' NORTH OF NORTHERN AVE AND 116' EAST OF 67TH AVE
ELEVATION = 1144.93



COORDINATE TABLE

NO.	NORTHING	EASTING	DESCRIPTION
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707	927294.14	612788.49	EX MH 0297498
708	927438.02	612789.51	EX MH 0128677

NOTES:

1. *CONTRACTOR TO VERIFY LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.*
2. *CONTRACTOR SHALL RESTORE ALL PAVEMENT STRIPING AND MARKINGS REMOVED OR DAMAGED TO MATCH EXISTING STRIPING CONFIGURATION. CONTRACTOR IS RESPONSIBLE TO DOCUMENT AND MATCH EXISTING PAVEMENT STRIPING AND MARKINGS.*

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Registered Professional Engineer (Civil) CERTIFICATE NO. 34588 MARK V. LEE 7-29-2024 Date Signed

Designed	Drawn	Checked
TPB	HC	MVL

No.	Date	Description
		REVISIONS

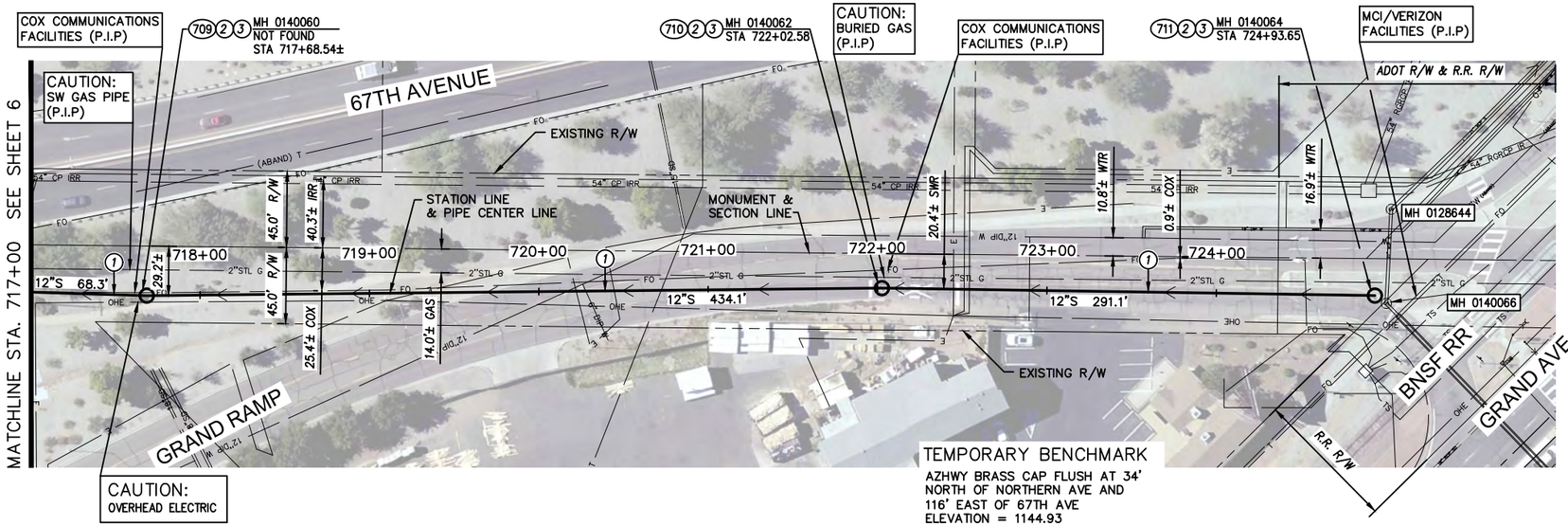
212231
SEWER & MANHOLE REHABILITATION, PHASE 6B
AREA 7
SEWER PLAN & PROFILE

SCALE:
1"=40' HORZ.
1"=4' VERT.

Contact Arizona 811 at least two full working days before you begin excavation
ARIZONA 811
Call 811 or click Arizona811.com

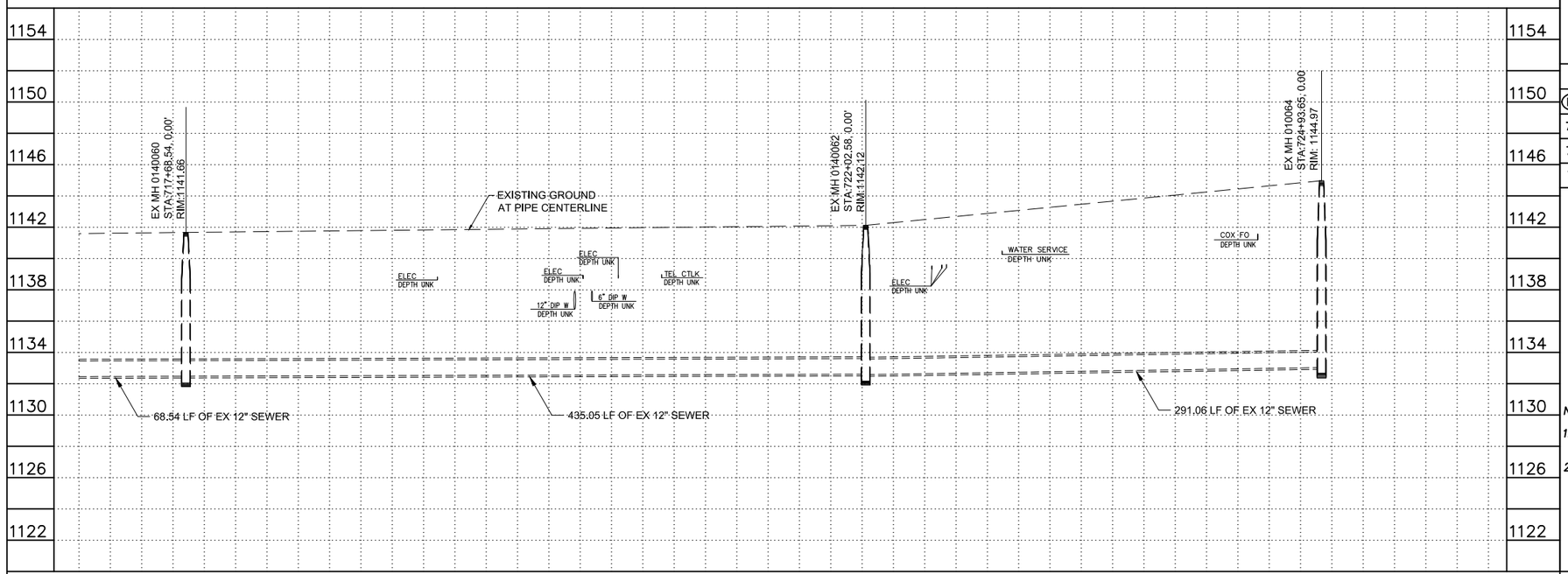
SHT. 6
OF 18

DSC #



TEMPORARY BENCHMARK

AZHWY BRASS CAP FLUSH AT 34' NORTH OF NORTHERN AVE AND 116' EAST OF 67TH AVE
ELEVATION = 1144.93



CONSTRUCTION NOTES

1. CLEAN EXISTING 12" PIPE, INSTALL CIPP LINER PER SPECIFICATIONS NO. 02767 — 794 LF
2. REHABILITATE MANHOLE PER SCHEDULE DTL 1 ON SHT 9 — 3 EA
3. TERMINATE CIPP LINER AT MANHOLE WITH END SEAL & TAPER PER DTL 6 ON SHT 10 OR CIPP LINE THROUGH MANHOLE AND CUT OUT ACCESS HOLE AT BENCH AND SEAL EDGES PER DTL 7 ON SHT 10. — 3 EA

COORDINATE TABLE

NO.	NORTHING	EASTING	DESCRIPTION
709	927877.48	612802.84	EX MH 0140060
710	928311.50	612798.42	EX MH 0140062
711	928602.53	612802.82	EX MH 0140064

NOTES:

1. *CONTRACTOR TO VERIFY LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.*
2. *CONTRACTOR SHALL RESTORE ALL PAVEMENT STRIPING AND MARKINGS REMOVED OR DAMAGED TO MATCH EXISTING STRIPING CONFIGURATION. CONTRACTOR IS RESPONSIBLE TO DOCUMENT AND MATCH EXISTING PAVEMENT STRIPING AND MARKINGS.*

consor
2432 W. PEORIA AVENUE, SUITE 1246
PHOENIX, AZ 85029
Phone: (602) 906-1901

Glendale ARIZONA

CITY OF GLENDALE
ENGINEERING DEPARTMENT
5850 W. GLENDALE AVE.
GLENDALE, ARIZONA 85301 (623) 930-3630

Registered Professional Engineer (Civil) CERTIFICATE NO. 34588 MARK V. LEE 7-29-2024 Date Signed

Designed	Drawn	Checked
TPB	HC	MVL

No.	Date	Description
		REVISIONS

212231
SEWER & MANHOLE REHABILITATION, PHASE 6B
AREA 7
SEWER PLAN & PROFILE

SCALE:
1"=40' HORZ.
1"=4' VERT.

Contact Arizona 811 at least two full working days before you begin excavation
ARIZONA 811
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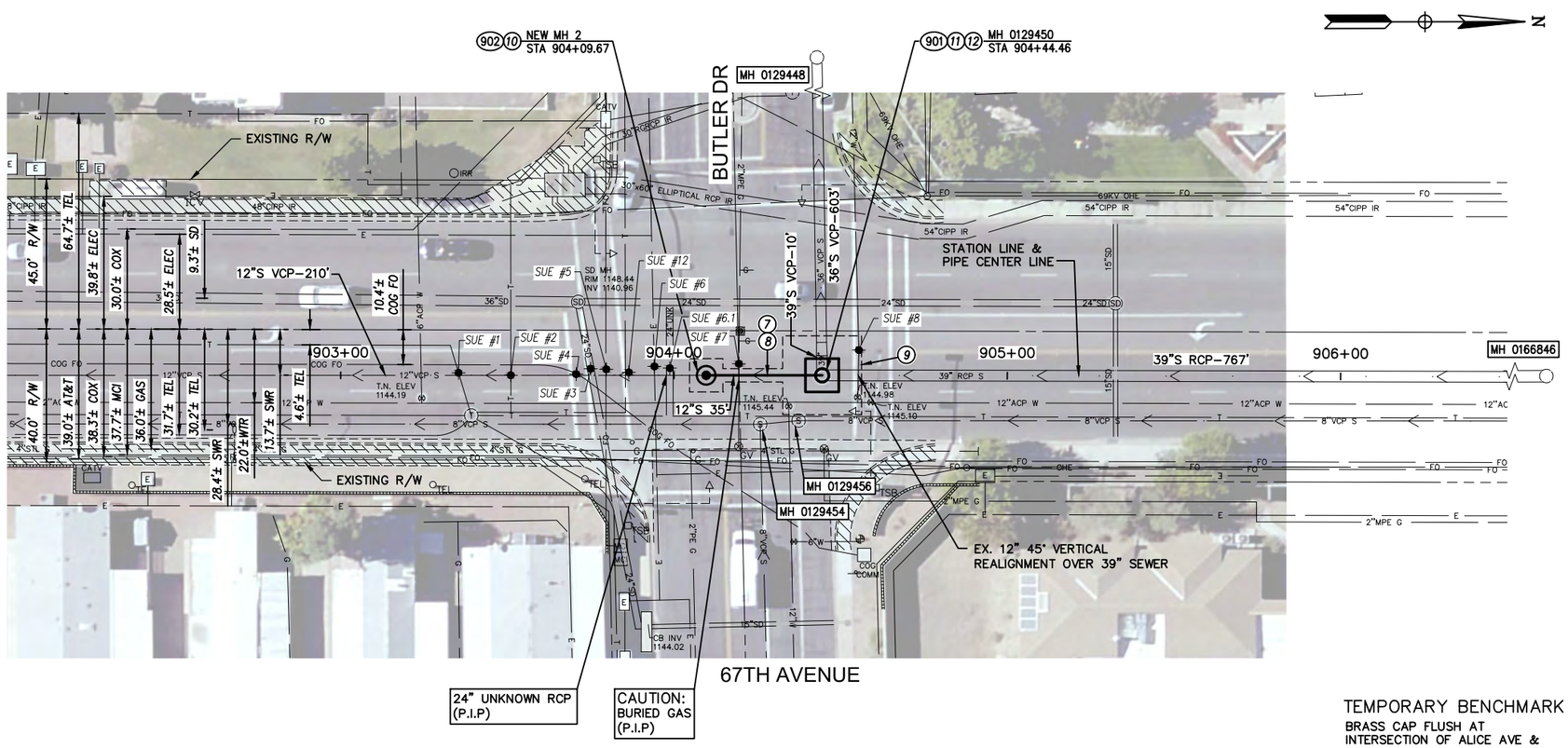
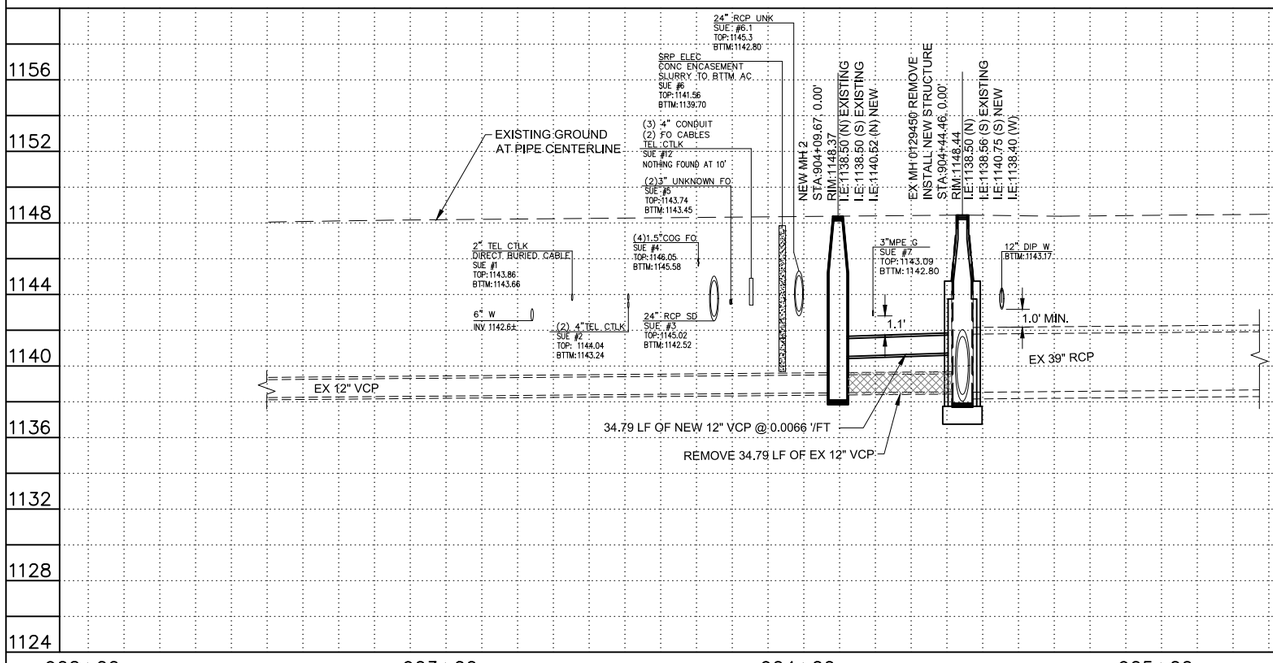
SHT. 7
OF 18

DSC #



TEMPORARY BENCHMARK

BRASS CAP FLUSH AT
INTERSECTION OF ALICE AVE &
67TH AVE
ELEVATION = 1151.49



SUBSURFACE UTILITY EXPLORATION (SUE) TABLE

#	STATION, OFFSET DESCRIPTION, MATERIAL	ELEVATION
1	903+35.4, 0.7'L 2" Centurylink Direct Buried Cable	T.O.U. 1143.86 B.O.U. 1143.66
2	903+51.1, 0.1'L (2) 4" PVC Centurylink	T.O.U. 1144.04 B.O.U. 1143.24
3	903+75.0, 2.0'L COG 24" RCP Storm Drain	T.O.U. 1145.02 B.O.U. 1142.52
4	903+70.7, 0.4'L (4) 1.5" PVC COG Fiber optic	T.O.U. 1146.05 B.O.U. 1145.58
5	903+79.7, 1.8'L (2) 3" Unknown Fiber optic	T.O.U. 1143.74 B.O.U. 1143.45
6	903+94.1, 2.7'L 22.3" Wide SRP Electric Conc Encasement – Slurry extends to bottom of Asphalt	T.O.U. 1141.56 B.O.U. 1139.70
6.1	903+98.7, 2.1'L 24" RCP Unknown Pipe that was not marked	T.O.U. 1145.30 B.O.U. 1142.80
7	904+19.5, 3.5'L 3" MPE SW Gas line	T.O.U. 1143.09 B.O.U. 1142.80
8	904+55.5, 7.6'L COG 12" DIP Water	T.O.U. 1143.44 B.O.U. 1142.34
12	903+86.5, 0.8'L Centurylink Duct Bank	No Bluestake marks. Not Found at 10' deep.

CONSTRUCTION NOTES

7. REMOVE EXISTING 12" VCP SEWER — 35 LF
8. INSTALL NEW 12" SEWER PIPE BACKFILL PER COG STD DTL G-690 — 35 LF
9. REMOVE & REPLACE ASPHALT PAVEMENT PER MAG STD DTL 200 & COG STD DTL G-319 — 81 SY
10. CONSTRUCT 5' DIA. MANHOLE PER MAG STD DTL 420-1, TYPE A; 30" FRAME AND COVER PER MAG STD DTL 423-2 AND COG STD DTL G-704 & COG 7.32; NO STEPS COAT INTERIOR OF MANHOLE WITH APPROVED CORROSION RESISTANT COATING PER SPECIFICATIONS; SEE DTL 10 ON SHEET 11. ALSO SEE GENERAL NOTES FOR SEWER MAIN CONSTRUCTION ON SHEET 4 FOR ADDITIONAL INFORMATION. (MH 2) STA 904+09.67 — 1 EA
11. REMOVE EXISTING MANHOLE — 1 EA
12. INSTALL NEW CONCRETE JUNCTION STRUCTURE PER SHEETS S-1 TO S-7 & COAT WITH APPROVED CORROSION PROTECTIVE COATING PER DETAILS AND SPECIFICATIONS (MH 0129450) STA 904+44.46 — 1 EA

COORDINATE TABLE

NO.	NORTHING	EASTING	DESCRIPTION
901	931417.71	612806.15	EX MH 0129450
902	931382.92	612806.11	NEW MH 2

NOTES:

1. CONTRACTOR TO VERIFY LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.
2. CONTRACTOR SHALL RESTORE ALL PAVEMENT STRIPING AND MARKINGS REMOVED OR DAMAGED TO MATCH EXISTING STRIPING CONFIGURATION. CONTRACTOR IS RESPONSIBLE TO DOCUMENT AND MATCH EXISTING PAVEMENT STRIPING AND MARKINGS.

CITY OF GLENDALE
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GLENDALE, ARIZONA 85301 (623) 930-3630

Registered Professional Engineer (Civil) — CERTIFICATE NO. 34588 — MARK V. LEE — 7-29-2024 — Date Signed — Not Valid Without Signature

Designed	Drawn	Checked
TPB	HC	MVL

No.	Date	Description
		REVISIONS

212231

SEWER & MANHOLE REHABILITATION, PHASE 6B
AREA 9
SEWER PLAN & PROFILE

SCALE:
1"=20' HORZ.
1"=4' VERT.

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PHOENIX, AZ 85029
Phone: (602) 906-1901

MANHOLE REHABILITATION SCHEDULE

MANHOLE DESCRIPTION & PROPERTIES												REHABILITATION CODE										
AREA	MANHOLE NUMBER	MANHOLE ID	JURISDICTION	COVER SIZE (IN)	BARREL DIAMETER (IN)	DEPTH (RIM TO INVERT) (FT)	MATERIAL	EXISTING CORROSION PROTECTION	PIPE CONNECTIONS (EA)	PIPE CONNECTIONS SIZE (CLOCK POSITION)	SURFACE MATERIAL AT MANHOLE	ASSESSMENT COMMENTS & DEFECT LOCATIONS	① REMOVE & REPLACE FRAME & COVER (EA)	② ADJUST FRAME & COVER TO GRADE (EA)	③ REPAIR & COAT CHIMNEY, CONE, & WALL ($F)	④ REPAIR & COAT BENCH (EA)	⑤ REPAIR/RESHAPE & COAT CHANNEL (EA)	⑥ NEW 60-INCH MANHOLE (EA)	⑦ NEW 72-INCH MANHOLE (EA)	⑧ REMOVE MANHOLE (EA)	⑨ INSPECT & ASSESS MANHOLE	- REMOVE STEPS (NPI)	⑩ INSTALL JUNCTION STRUCTURE (EA)
7	701	MH 0128192	COG ROW	24	48	6.9	Conc		3	12(6), 12(12), 8(3)	Asphalt/ Curb				86.6	1	1						
	702	MH 0140053	COG ROW	24	48	7.6	Conc		2	12(6), 12(12)	Conc												
	703	MH 0128674	COG ROW	24	48	6.8	Conc		3	12(6), 12(12), 4(3)	Asphalt				85.3	1	1						
	704	MH 0128675	COG ROW	24	48	7.1	Conc		3	12(6), 12(12), 6(2)	Asphalt												
	705	MH 0140057	COG ROW	24	48	7.2	Conc		3	12(6), 12(12), 8(3)	Asphalt												
	706	MH 0128676	COG ROW	24	48	7.2	Conc		3	12(6), 12(12), 6(3)	Asphalt				91.0		1						
	707	MH 0297498	COG ROW			8.0	Conc		3	12(6), 12(6), 8(3)	Asphalt	Need to inspect									1		
	708	MH 0128677	COG ROW	24	48	8.9	Conc		3	12(6), 12(12), 8(3)	Asphalt					1							
	709	MH 0140060	COG ROW			0.0					Gravel	Buried - Locate & need to inspect		1							1		
	710	MH 0140062	COG ROW	24	48	9.5	Conc		2	12(6), 12(12)	Asphalt	Tight fitting lid	1		119.9	1							
	711	MH 0140064	ADOT ROW	30	60	11.9	Brick		1	12(6)	Asphalt/ Curb				187.6	1							
	901	MH 0129450	COG ROW			10.0			3	12(6), 39(9), 39(12)	Asphalt									1			1
												TOTAL	1	1	570.3	5	3	0	0	1	2	0	1

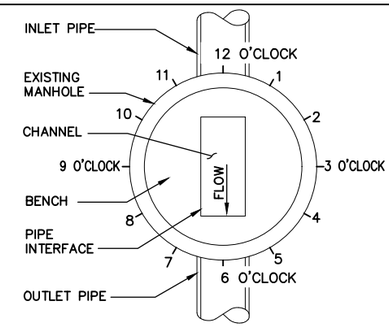
NOTES:

1. SEE DETAIL 2 FOR MANHOLE CLOCK POSITION REFERENCE.
2. SEE DETAIL 3 FOR MANHOLE REHABILITATION DIAGRAM & TERMINOLOGY.

DETAIL NO. 1

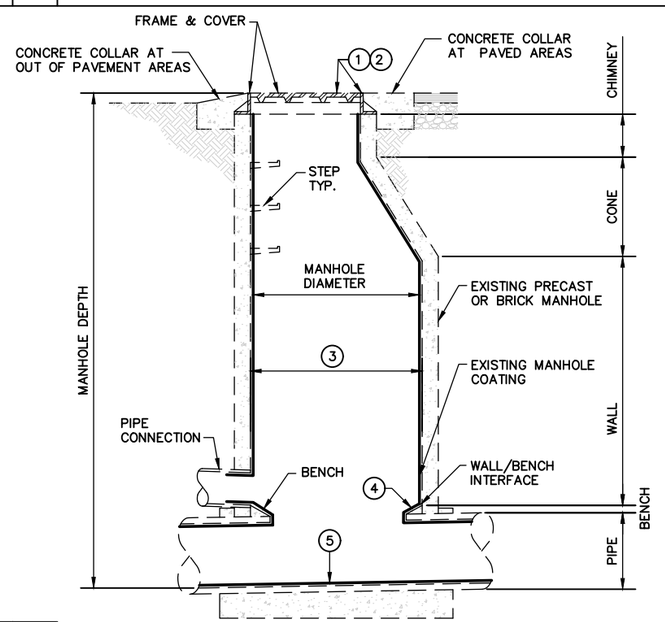
REHABILITATION CODES

1. REMOVE & REPLACE MANHOLE FRAME, COVER & COLLAR PER MAG STD DET 422, & 423. COVER PER COG STD DTL G-704 (SEE DETAIL 8 ON SHEET 10).
2. LOCATE & ADJUST MANHOLE FRAME & COVER TO GRADE PER MAG STD DET 422. COVER PER COG STD DTL G-704.
3. REPAIR & COAT INTERIOR SURFACE OF MANHOLE WITH APPROVED CORROSION PROTECTIVE COATING PER DETAILS 3 & 4 ON THIS SHEET & SPECIFICATIONS. SEE DETAIL 5 ON SHEET 10 FOR BRICK MANHOLE REPAIR & COATING.
4. REPAIR DEFECTIVE BENCH & COAT WITH APPROVED CORROSION PROTECTIVE COATING PER DETAILS & SPECIFICATIONS
5. REPAIR DEFECTIVE CHANNEL & COAT WITH APPROVED CORROSION PROTECTIVE COATING PER DETAILS & SPECIFICATIONS
6. NEW 60-INCH DIAMETER MANHOLE PER MAG STD DET 420, TYPE A; 30" FRAME & COVER PER MAG STD DTL 423-2, COVER PER COG STD DTL G-704. NO STEPS; COAT INTERIOR OF MANHOLE WITH APPROVED CORROSION PROTECTIVE COATING
7. NEW 72-INCH DIAMETER MANHOLE PER MAG STD DET 420, TYPE A; 30" FRAME & COVER PER MAG STD DTL 423-2, COVER PER COG STD DTL G-704. NO STEPS; COAT INTERIOR OF MANHOLE WITH APPROVED CORROSION PROTECTIVE COATING
8. REMOVE AND DISPOSE OF EXISTING MANHOLE
9. INSPECT AND ASSESS MANHOLE; EVALUATE REHAB WITH ENGINEER/OWNER
10. INSTALL JUNCTION STRUCTURE PER DETAILS ON SHEETS S-1 TO S-7



MANHOLE CLOCK POSITION REFERENCE
NOT TO SCALE

DETAIL NO. 2



MANHOLE REHABILITATION DIAGRAM & TERMINOLOGY
NOT TO SCALE

DETAIL NO. 3

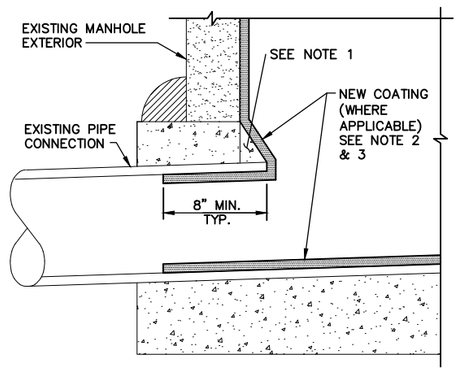
NOTES:

CIRCLED NUMBERS CORRESPOND TO REHABILITATION CODE LISTED IN SCHEDULE, SEE DETAIL 1 ON THIS SHEET. CONTRACTOR SHALL REFER TO PROJECT SPECIFICATIONS FOR DETAILED DESCRIPTION OF REHABILITATION WORK.

WHERE APPLICABLE, CONTRACTOR SHALL COAT ALL EXPOSED CONCRETE SURFACES AS SHOWN AND AS DESCRIBED IN THE SPECIFICATIONS. EXISTING CONCRETE SURFACE SHALL BE REPAIRED AND PREPPED PRIOR TO COATING APPLICATION IN ACCORDANCE WITH THE SPECIFICATIONS.

NEW COATING (WHERE APPLICABLE) SHALL OVERLAP INTO EXISTING PIPE A MINIMUM OF 8-INCHES AS SHOWN IN DETAIL 4 ON THIS SHEET. THE CONTRACTOR SHALL CREATE A WATER TIGHT SEAL AT THE MANHOLE TO PIPE INTERFACE. ROUGHEN PIPE SURFACE PRIOR TO COATING.

IF REQUIRED AND PRIOR TO COATING, THE CONTRACTOR SHALL TRIM INTRUDING PIPE CONNECTIONS ABOVE THE CHANNEL FLUSH WITH MANHOLE WALL.



NOTES:

1. IF REQUIRED AND IF LEDGE IS PRESENT ABOVE PIPE, THE CONTRACTOR SHALL GROUT UP TO 8" ABOVE PIPE PRIOR TO COATING. THEN COAT THE EXPOSED CONCRETE WITH COATING PER SPECIFICATIONS.
2. THE CONTRACTOR SHALL REHABILITATE ALL EXPOSED CONCRETE SURFACES OR EXISTING DEFECTIVE COATING SYSTEM. THE COATING SHALL BE 1/8" (OR 125 MILS) ON THE MANHOLE OR JUNCTION STRUCTURE. REFER TO THE MANHOLE REHABILITATION TABLE FOR APPROXIMATE COATING AREA AND TO THE SPECIFICATIONS FOR ADDITIONAL COATING REQUIREMENTS.
3. HOLIDAY TEST PER MAG SPECIFICATIONS 626.3.3

DETAIL NO. 4

TYPICAL COATING END TREATMENT
NOT TO SCALE

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ENGINEERING DEPARTMENT
5850 W. GLENDALE AVE.
GLENDALE, ARIZONA 85301 (623) 930-3630

Designed: TPB | Drawn: HC | Checked: MVL

No.	Date	Description
		REVISIONS

212231
SEWER & MANHOLE REHABILITATION, PHASE 6B

MANHOLE REHAB SCHEDULE & DETAILS

SCALE: NO SCALE

Contact Arizona 811 at least two full working days before you begin excavation. Call 811 or click Arizona811.com

SHT. 9 OF 18

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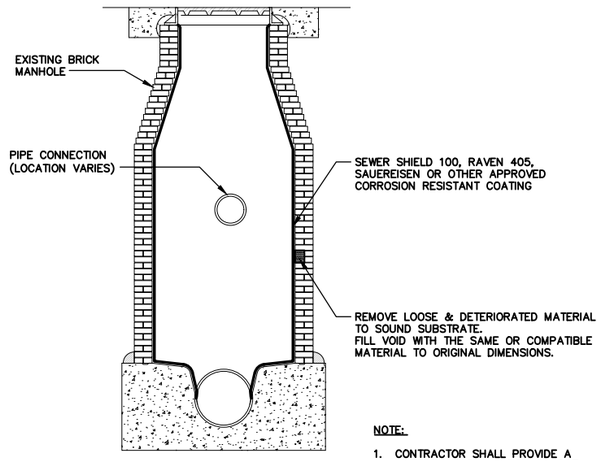
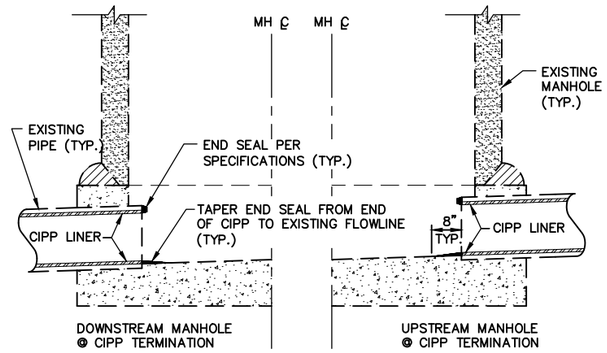


ELEVATION VIEW
NOT TO SCALE

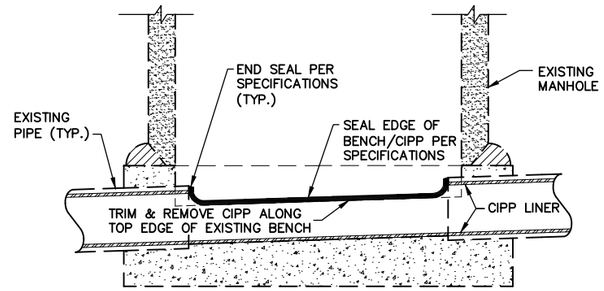
TYPICAL REPAIR & COATING ON BRICK MANHOLE
NOT TO SCALE

DETAIL NO. 5



CIPP TERMINATION AT MANHOLE DETAIL
NOT TO SCALE

DETAIL NO. 6

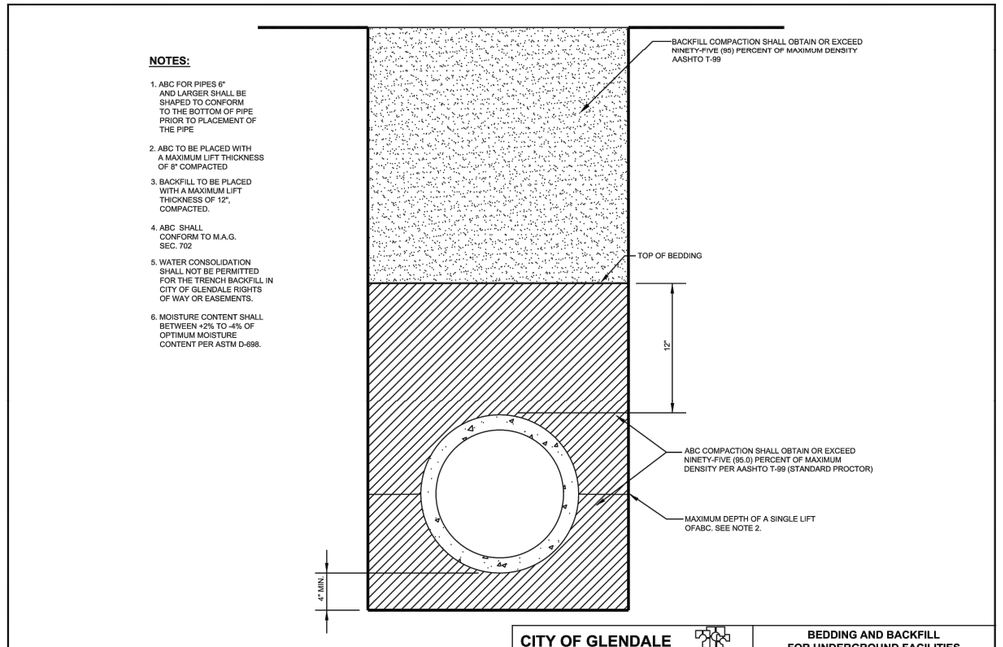


CIPP LINE THROUGH MANHOLE DETAIL
NOT TO SCALE

DETAIL NO. 7

CITY OF GLENDALE STANDARD DETAIL	MANHOLE COVER DETAIL	
APPROVED BY: CITY ENGINEER — David D. Bocard, P.E.	DATE: 10/20/2020 REVISED: OCT. 2020	DETAIL NO. G-704

DETAIL NO. 8



CITY OF GLENDALE STANDARD DETAIL	BEDDING AND BACKFILL FOR UNDERGROUND FACILITIES IN CITY RIGHT-OF-WAY AND EASEMENTS	
APPROVED BY: CITY ENGINEER — David D. Bocard, P.E.	DATE: 9/15/2014 REVISED: MARCH 2014	DETAIL NO. G-690

DETAIL NO. 9

consor
2432 W. PEORIA AVENUE, SUITE 1246
PHOENIX, AZ 85029
Phone: (602) 906-1901

CITY OF GLENDALE
ENGINEERING DEPARTMENT
5850 W. GLENDALE AVE.
GLENDALE, ARIZONA 85301 (623) 930-3630

Registered Professional Engineer (Civil) — CERTIFICATE NO. 34588 — MARK V. LEE — 7-29-2024 — Date Signed — ARIZONA U.S.A.

Designed TPB | Drawn HC | Checked MVL

No.	Date	Description
		REVISIONS

212231
SEWER & MANHOLE REHABILITATION, PHASE 6B

MANHOLE DETAILS

SCALE:
NO SCALE

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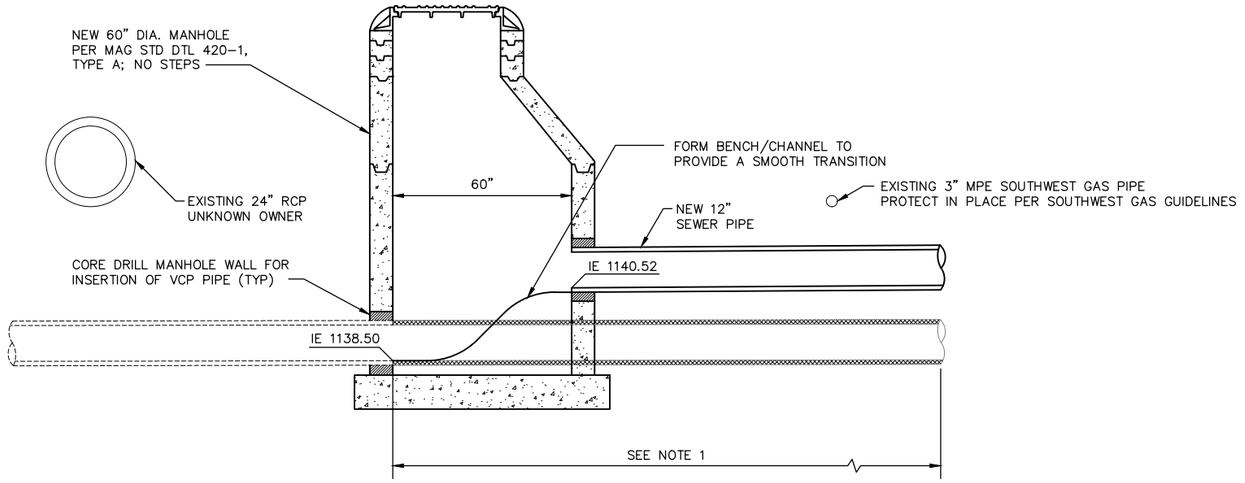
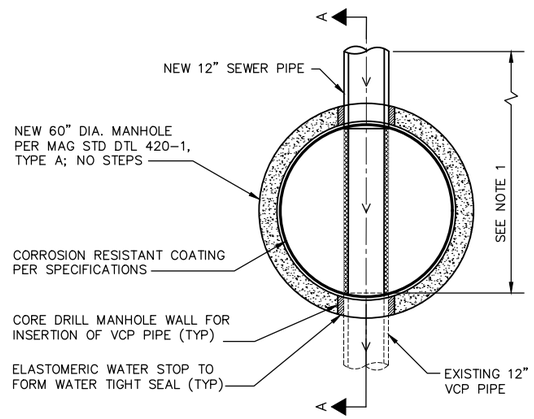


SECTION A-A



PLAN VIEW

NOTES:

1. REMOVE EXISTING 12" PIPE FROM MH 0129450 TO NEW MH 2 AND AS NECESSARY TO CONSTRUCT NEW MANHOLE. SEE SHEET 8.
2. CORE DRILL MANHOLE AND RECONNECT EXISTING PIPE TO THE SOUTH AND NEW PIPE TO THE NORTH.
3. CONTRACTOR TO PROVIDE BYPASS OF SEWAGE FLOWS TO FACILITATE CONSTRUCTION OF MANHOLE, AS NEEDED.
4. FIELD CLOSURE COUPLING, IF USED, TO BE FERNCO OR APPROVED EQUAL.

NORTH

67 AVE & BUTLER DR MANHOLE STA 904+09.67 (NEW MH 2)
(SEE SHEET 8)

SCALE: ½"=1'-0"

DETAIL NO. 10

consor 2432 W. PEORIA AVENUE, SUITE 1246
PHOENIX, AZ 85029
Phone: (602) 906-1901

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GLENDALE, ARIZONA 85301 (623) 930-3630

Registered Professional Engineer (Civil) MARK V. LEE 24488 Date Signed 7-29-2024 Arizona U.S.A.

Designed	Drawn	Checked
TPB	HC	MVL

No.	Date	Description
		REVISIONS

212231
SEWER & MANHOLE REHABILITATION, PHASE 6B

MANHOLE DETAILS

SCALE:
NO SCALE

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GENERAL STRUCTURAL NOTES

U.O.N. = UNLESS OTHERWISE NOTED G.S.N. = GENERAL STRUCTURAL NOTES

DIVISION 1: GENERAL REQUIREMENTS

ALL WORK SHALL COMPLY WITH THE MARICOPA ASSOCIATION OF GOVERNMENTS (MAG) UNIFORM STANDARD SPECIFICATIONS AND DETAILS FOR PUBLIC WORKS CONSTRUCTION.

NOTES TO CONTRACTOR

ANY CHANGES TO THE STRUCTURE OR THE DESIGN SHOWN ON THESE DRAWINGS SHALL BE SUBMITTED BY THE CONTRACTOR IN WRITING FOR CITY REVIEW AND APPROVAL A MINIMUM OF 7 DAYS PRIOR TO BEGINNING THE WORK.

THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS ON SITE AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES OR CONFLICTS BETWEEN THE CONSTRUCTION DRAWINGS AND GENERAL STRUCTURAL NOTES BEFORE PROCEEDING WITH THE WORK.

THE CONTRACTOR SHALL VERIFY ALL EXISTING UNDERGROUND SERVICES THAT INTERFERE WITH HIS WORK. EXISTING UNDERGROUND SERVICES SHALL NOT BE DISTURBED OR REMOVED WITHOUT THE APPROVAL OF THE OWNER OR ITS REPRESENTATIVE, UNLESS NOTED ON THE DRAWINGS.

THE CONTRACT STRUCTURAL DRAWINGS REPRESENT THE FINISHED STRUCTURE, BUT DO NOT INDICATE THE METHOD OF CONSTRUCTION. THE MEANS, METHODS AND TECHNIQUES OF CONSTRUCTION, AND THE ASSOCIATED SAFETY PRECAUTIONS, ARE THE RESPONSIBILITIES OF THE CONTRACTOR.

THE CONTRACTOR SHALL PROVIDE ALL MEASURES NECESSARY TO PROTECT EXISTING BUILDING ELEMENTS, UTILITIES, AND OTHER STRUCTURES DURING CONSTRUCTION. SUCH MEASURES SHALL INCLUDE, BUT NOT BE LIMITED TO, BRACING AND SHORING FOR LOADS IMPOSED DURING CONSTRUCTION, INCLUDING CONSTRUCTION EQUIPMENT.

NOTES AND DETAILS ON DRAWINGS SHALL TAKE PRECEDENCE OVER GENERAL STRUCTURAL NOTES AND TYPICAL DETAILS. WHERE NO DETAILS ARE SHOWN, CONSTRUCTION SHALL CONFORM TO SIMILAR WORK ON THE PROJECT.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE COST OF ADDITIONAL DESIGN OR REVIEW WORK BY THE ENGINEER DUE TO ERRORS OR OMISSIONS IN CONSTRUCTION BY THE CONTRACTOR.

SHORING REQUIREMENTS

THE CONTRACTOR SHALL PROVIDE ALL SHORING MEASURES NECESSARY TO CONSTRUCT THE PROJECT IN ACCORDANCE WITH OSHA REQUIREMENTS. SHORING SHALL BE DESIGNED FOR ALL EARTH LOADING AND ALL ANTICIPATED LOADS IMPOSED DURING CONSTRUCTION, INCLUDING CONSTRUCTION EQUIPMENT.

PRIOR TO BEGINNING THE WORK, THE CONTRACTOR SHALL PROVIDE CALCULATIONS OF SHORING SEALED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF ARIZONA.

SUBMITTALS

SHOP DRAWINGS:

1. CONCRETE REINFORCING STEEL
2. CONCRETE MIX DESIGN
3. GROUT
4. PIPE WATERSTOP
5. CORROSION RESISTANT INTERIOR COATING
6. EXTERIOR JOINT WRAP
7. WATERTIGHT JOINT SEALANT
8. CAST-IN-PLACE WATERSTOP
9. MANHOLE TOP SLAB (PRECAST ALTERNATIVE) REQUIREMENTS PER THIS SHEET

SHOP DRAWINGS SHALL BE SUBMITTED TO ENGINEER FOR REVIEW PRIOR TO COMPONENT FABRICATION. ALL SHOP DRAWINGS SHALL BE REVIEWED AND STAMPED BY THE GENERAL CONTRACTOR PRIOR TO SUBMISSION TO THE ENGINEER.

DIVISION 3: CONCRETE

CAST-IN-PLACE AND PRECAST CONCRETE
PORTLAND CEMENT CONCRETE SHALL CONFORM TO ALL REQUIREMENTS OF MAG SPECIFICATION SECTION 725, CLASS AA.

CONCRETE FINISHES
WALLS: UNFINISHED PLYWOOD FORM FACED
SLABS: MEDIUM BROOM

DEFORMED REINFORCING
BARS: NEW BILLET PER ASTM A615 (S1); GRADE 60
WIRE: PER ASTM A1064

WELDING: PER AWS D1.4. NO WELDING OR GAS CUTTING OF GRADE 60 BARS IS PERMITTED, EXCEPT WITH PRIOR APPROVAL FROM ENGINEER.

BAR LAP: 48 BAR DIAMETERS, U.O.N.

DETAILING: PER ACI 315 (PART B).
FABRICATION AND PLACING: PER CRSI STANDARDS.

CONCRETE PROTECTION FOR REINFORCING:
SHALL BE PER ACI 318-19 CHAPTER 20 U.O.N. ON THE PLANS.

REINFORCING IN CONCRETE PLACED AGAINST EARTH WITHOUT FORMS IS TO BE SUPPORTED BY CONCRETE BLOCK, APPROVED NON-METALLIC CHAIRS, OR ANOTHER METHOD APPROVED BY THE ENGINEER.

CONSTRUCTION JOINTS
CONSTRUCTION JOINTS FOR OTHER THAN SLABS-ON-GRADE SHALL BE ONLY AS INDICATED ON THE CONSTRUCTION DRAWINGS UNLESS OTHERWISE APPROVED IN WRITING BY ENGINEER OF RECORD.

MANHOLE TOP SLAB (PRECAST ALTERNATIVE)

THE CONTRACTOR HAS THE OPTION TO PRECAST THE MANHOLE TOP SLAB ADJACENT TO THE SITE CONFORMING TO THE DRAWINGS AND PER THE FOLLOWING REQUIREMENTS:

THE TOP SLAB SHALL BE CAST ON A RIGID SUBSTRATE TO PROVIDE A ACCEPTABLE WORK PLATFORM FOR REBAR CHAIRS.

THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING A STAGING AREA FOR THE CASTING OF THE TOP SLAB,

THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING LIFTING LUGS TYPE AND LOCATION, CRANE TYPE AND SIZE, ALLOWABLE SURFACE LOADING AND UTILITIES UNDER THE CRANE PADS, PICK LOCATION FOR THE CRANE, RIGGING, AND FIELD INVESTIGATION FOR OBSTRUCTIONS TO LIFT AND SWING.

THE CONTRACTOR SHALL PROVIDE A CRANE LIFT PLAN (INCLUDING NECESSARY CALCULATIONS) ADDRESSING THE ITEMS ABOVE.

THE TOP SLAB SHALL NOT BE LIFTED IN PLACE UNTIL IT REACHES FULL DESIGN STRENGTH.

DIVISION 31:EARTHWORK [PROJECT HAS NO SOILS REPORT]

STRUCTURAL EXCAVATION AND BACKFILL FOR THE MANHOLE STRUCTURE SHALL BE PER MAG SPECIFICATION SECTION 206. COMPACTED PER MAG SPECIFICATION SECTION 211.

SUBGRADE PREPARATION AND PLACEMENT OF AGGREGATE BASE COURSE UNDER THE BASE SLAB OF THE MANHOLE STRUCTURE AS SHOWN ON THE DRAWINGS SHALL BE PER MAG SPECIFICATIONS 301 AND 310.

ALL WORK SHALL BE REVIEWED BY A SOILS ENGINEER REGISTERED IN THE STATE OF ARIZONA.

DIVISION 46: WATER AND WASTEWATER EQUIPMENT

PIPE WATERSTOP
INSTALL 'LINK SEAL'®.MODULAR SEAL MODEL S-316 (LS-200) AROUND ALL PIPE PENETRATIONS TO PROVIDE SEAL AGAINST PENETRATING WATER. LINK-SEAL® MODULAR SEAL MANUFACTURED BY GARLOCK SEALING TECHNOLOGIES HOUSTON, TEXAS, U.S.A.- INSTALL PER THE MANUFACTURER'S RECOMMENDATIONS.

CORROSION RESISTANT INTERIOR COATING
COAT THE EXPOSED INTERIOR SURFACES OF THE CAST-IN-PLACE STRUCTURE AND THE PRECAST RISER CONE WITH AN APPROVED CORROSION PROTECTIVE COATING PER THE SPECIFICATIONS AND DETAILS IN THIS PLAN SET.

EXTERIOR JOINT WRAP
INSTALL 'CONSEAL'® CS-212, 0.065" X 8" WIDE (OR APPROVED EQUAL) POLYOLEFIN BACKED EXTERIOR JOINT WRAP WHERE INDICATED ON THE DRAWINGS - INSTALL PER THE MANUFACTURER'S RECOMMENDATIONS.

WATERTIGHT JOINT SEALANT
INSTALL PREMOLDED BUTYL RUBBER SEALANT 'CONSEAL'® CS-102 (OR APPROVED EQUAL) WHERE INDICATED ON THE DRAWINGS - INSTALL PER THE MANUFACTURER'S RECOMMENDATIONS.

CAST-IN-PLACE WATERSTOP
'GREENSTREAK'® 735 RIBBED PVC WATERSTOP WITH CENTERBULB (OR APPROVED EQUAL) WHERE INDICATED ON THE DRAWINGS - INSTALL PER THE MANUFACTURER'S RECOMMENDATIONS.

consor 2432 W. PEORIA AVENUE, SUITE 1246
PHOENIX, AZ 85029
Phone: (602) 906-1901

CITY OF GLENDALE
ENGINEERING DEPARTMENT
5850 W. GLENDALE AVE.
GLENDALE, ARIZONA 85301 (623) 930-3630

Registered Professional Engineer (Structural) CERTIFICATE NO. 20396 JOSEPH BERGMAN Date Signed 5-29-2024 Arizona, U.S.A.

Designed	JVB	Checked	MVL
Drawn	JVB		

No.	Date	Description
		REVISIONS

212231
SEWER & MANHOLE REHABILITATION, PHASE 6B
MH 0129450 RECONSTRUCTION
GENERAL STRUCTURAL NOTES (GSN)

SCALE:
NO SCALE

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ARIZONA811 Call 811 or click Arizona811.com

SHT. S-1
OF 18

DSC #

PEC JOB NO.: W231441AZ FILE NAME: PLOTTING DATE: - REVISION DATE: - AUTOCAD VER.: 2019

GENERAL NOTES

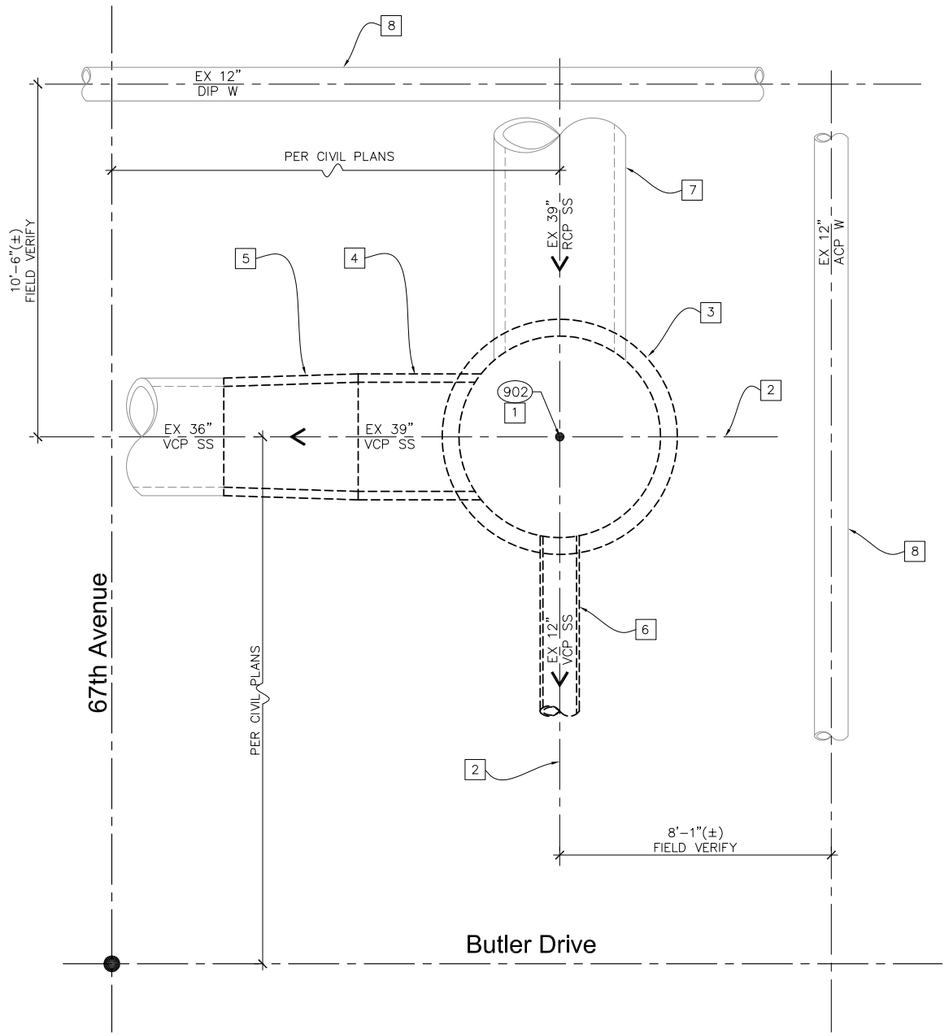
A. CONTRACTOR SHALL INDEPENDENTLY FIELD VERIFY EXISTING CONDITIONS AND PIPE INVERT ELEVATIONS PRIOR TO BEGINNING THE WORK AND NOTIFY ENGINEER OF ANY DISCREPANCIES.

B. WORK SHALL NOT COMMENCE UNTIL FLOW DIVERSION HAS BEEN COMPLETED.

C. SEE G.S.N. SHEET S-1 FOR STRUCTURAL REQUIREMENTS.

DEMOLITION NOTES

1. MANHOLE CENTER COORDINATE PER CIVIL DRAWINGS
2. CENTERLINE OF EXISTING MANHOLE
3. REMOVE EXISTING 72" DIA MANHOLE STRUCTURE IN ITS ENTIRETY
4. REMOVE EXISTING 39" PIPE SECTION
5. REMOVE EXISTING 39"X 36" PIPE TRANSITION SECTION
6. REMOVE EXISTING 12" VCP SS PIPE SEE CIVIL PLANS
7. CONTRACTOR OPTION TO REMOVE A PORTION OF EXISTING 39" PIPE BACK TO NEAREST JOINT OR TO LEAVE IN PLACE AND FORM NEW MANHOLE STRUCTURE AROUND PIPE.
8. PROTECT IN PLACE EXISTING 12" WATERLINE



DEMO PLAN

NORTH

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PHOENIX, AZ 85029
Phone: (602) 906-1901

PEC JOB NO.: W231441AZ FILE NAME: PLOTTING DATE: - REVISION DATE: - AUTOCAD VER.: 2019

CITY OF GLENDALE
ENGINEERING DEPARTMENT
5850 W. GLENDALE AVE.
GLENDALE, ARIZONA 85301 (623) 930-3630

Registered Professional Engineer (Structural)
CERTIFICATE NO. 20396
JOHN V. BERGMAN
Date Signed 7-29-2024
ARIZONA, U.S.A.

Designed	JVB	Drawn	JVB	Checked	MVL

No.	Date	Description
		REVISIONS

212231
SEWER & MANHOLE REHABILITATION, PHASE 6B
MH 0129450 RECONSTRUCTION
DEMOLITION PLAN

SCALE:
NO SCALE

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SHT. S-2
OF 18

DSC #

SEE PROPOSED 72-INCH POLYMER ARMOROCK MANHOLE IN LIEU OF CAST-IN-PLACE JUNCTION STRUCTURE.

GENERAL NOTES

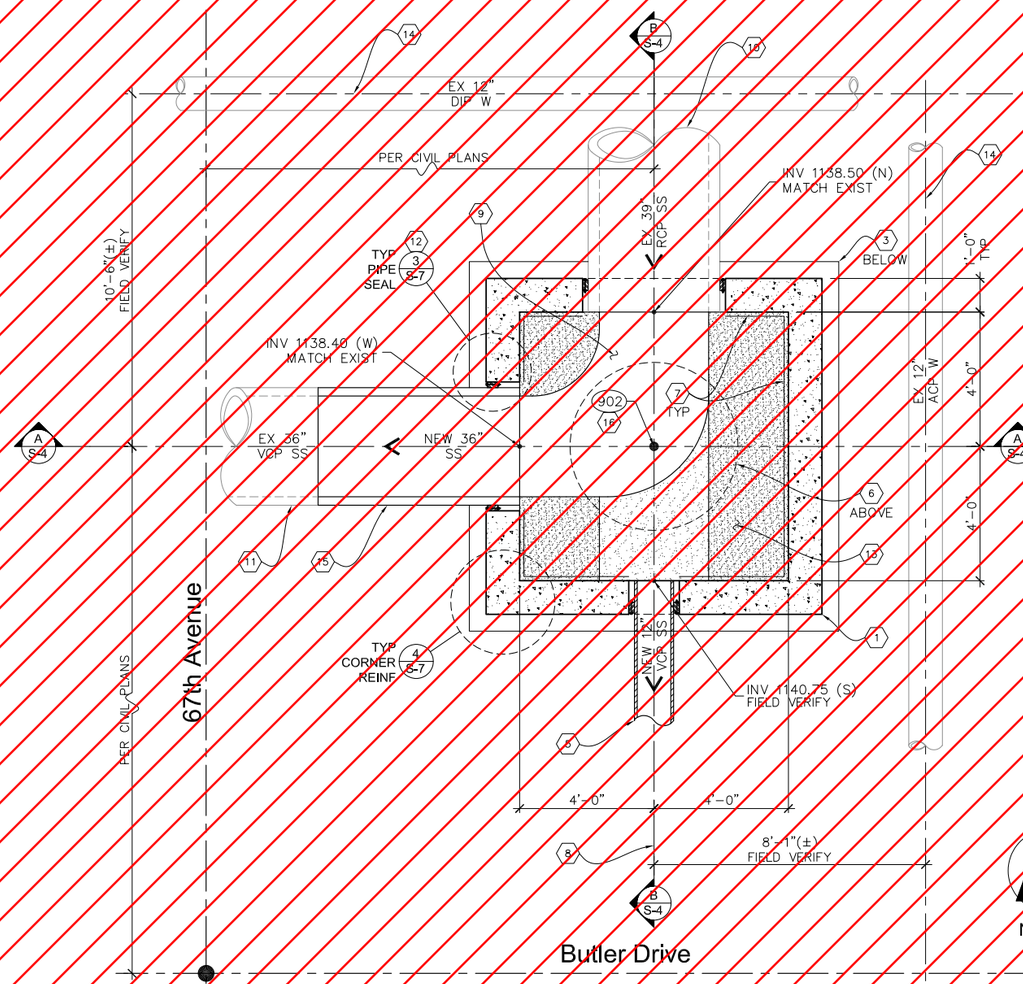
A. CONTRACTOR SHALL INDEPENDENTLY FIELD VERIFY EXISTING CONDITIONS AND PIPE INVERT ELEVATIONS PRIOR TO BEGINNING THE WORK AND NOTIFY ENGINEER OF ANY DISCREPANCIES.

B. WORK SHALL NOT COMMENCE UNTIL FLOW DIVERSION HAS BEEN COMPLETED.

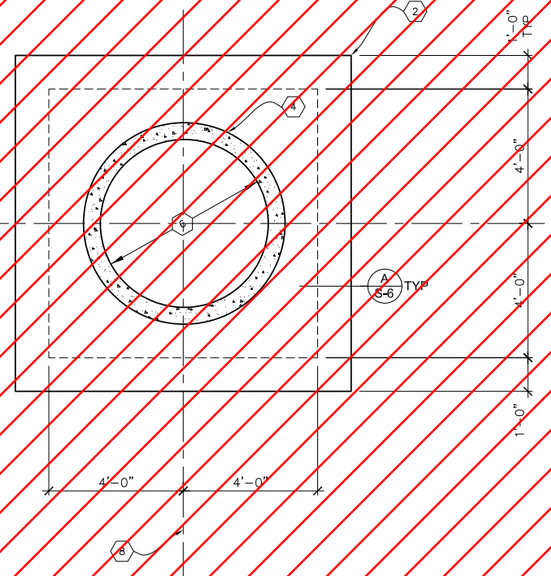
C. SEE G.S.N. SHEET S1 FOR STRUCTURAL REQUIREMENTS.

KEY NOTES

1. CAST-IN-PLACE CONCRETE MANHOLE STRUCTURE
2. CAST-IN-PLACE CONCRETE MANHOLE TOP SLAB SEE G.S.N. FOR PRE-CAST OPTION
3. CAST-IN-PLACE CONCRETE MANHOLE BASE SLAB
4. PRECAST REINFORCED CONCRETE CONCENTRIC RISER CONE - SEE SHEET S-4 FOR SECTION VIEW
5. NEW 12" VCP SEWER LINE - SEE CIVIL DRAWINGS
6. 60" DIAMETER OPENING IN MANHOLE TOP SLAB
7. INTERIOR COATING PER G.S.N.
8. CENTER OF MANHOLE STRUCTURE
9. SHAPE FLOW CHANNEL AS REQUIRED FOR SMOOTH TRANSITION
10. CONTRACTOR OPTION TO REMOVE A PORTION OF EXISTING 39" PIPE BACK TO NEAREST JOINT OR TO LEAVE IN PLACE AND FORM NEW MANHOLE STRUCTURE AROUND PIPE.
11. EXISTING 36" VCP SEWER LINE - CONNECT TO NEW SECTION OF 36" SEWER LINE
12. SEAL JOINT BETWEEN PIPE AND NEW MANHOLE WALL PER G.S.N.
13. CONCRETE BENCH
14. FIELD VERIFY LOCATION OF EXISTING 12" WATERLINE PRIOR TO EXCAVATION AND PROTECT IN PLACE
15. REPLACE EXISTING SEWER LINE TRANSITION WITH NEW SECTION OF 36" SEWER LINE
16. MANHOLE CENTER COORDINATE PER CIVIL DRAWINGS



PLAN VIEW (BELOW TOP SLAB)



PLAN VIEW OF TOP SLAB

consor
2432 W. PEORIA AVENUE, SUITE 1246
PHOENIX, AZ 85029
Phone: (602) 906-1901

CITY OF GLENDALE
ENGINEERING DEPARTMENT
5850 W. GLENDALE AVE.
GLENDALE, ARIZONA 85301 (623) 930-3630

Glendale

Registered Professional Engineer (Structural) — Matthew V. Lee — 20396 — Expires 6-30-2024 — Date Signed 4-29-2024

Designed	Drawn	Checked
JVB	JVB	MVL

No.	Date	Description

REVISIONS

212231

SEWER & MANHOLE REHABILITATION, PHASE 6B
MH 0129450 RECONSTRUCTION
PLAN VIEWS

SCALE:
NO SCALE

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SHT. S-3
OF 18

DSC # - - - - -

REF. JOB NO. W23441AZ FILE NAME: PLOTTING DATE: REVISION DATE: AUTOCAD VER. 2019

SEE PROPOSED 72-INCH POLYMER ARMOROCK MANHOLE IN LIEU OF CAST-IN-PLACE JUNCTION STRUCTURE.

GENERAL NOTES

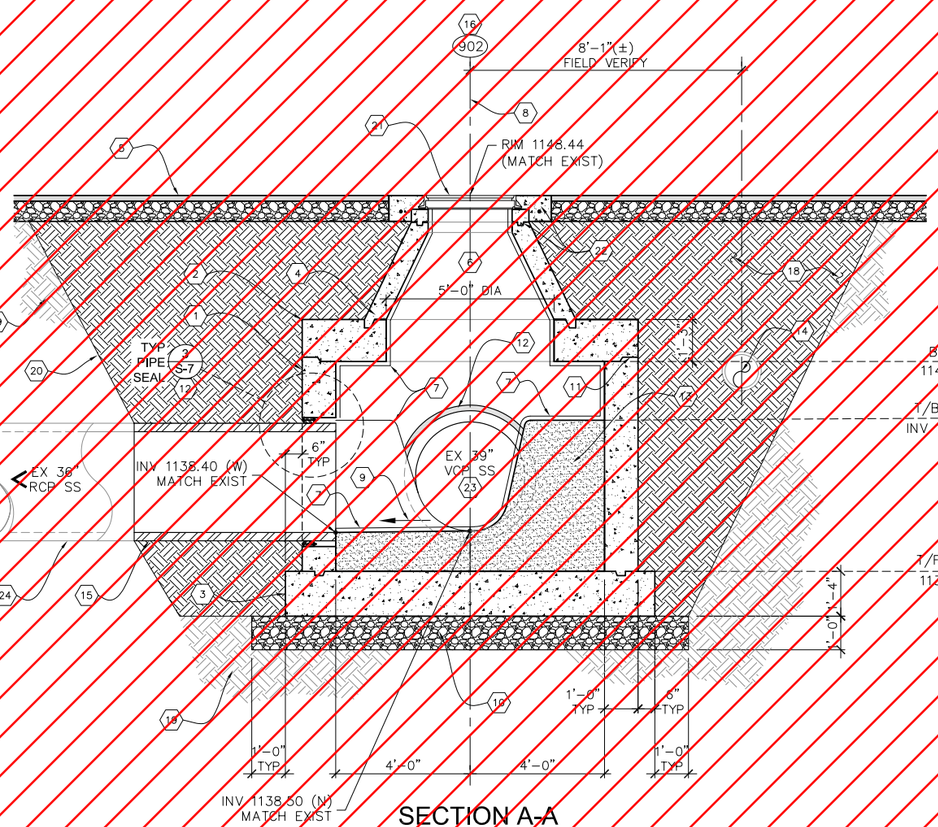
A. CONTRACTOR SHALL INDEPENDENTLY FIELD VERIFY EXISTING CONDITIONS AND PIPE INVERT ELEVATIONS PRIOR TO BEGINNING THE WORK AND NOTIFY ENGINEER OF ANY DISCREPANCIES.

B. WORK SHALL NOT COMMENCE UNTIL FLOW DIVERSION HAS BEEN COMPLETED.

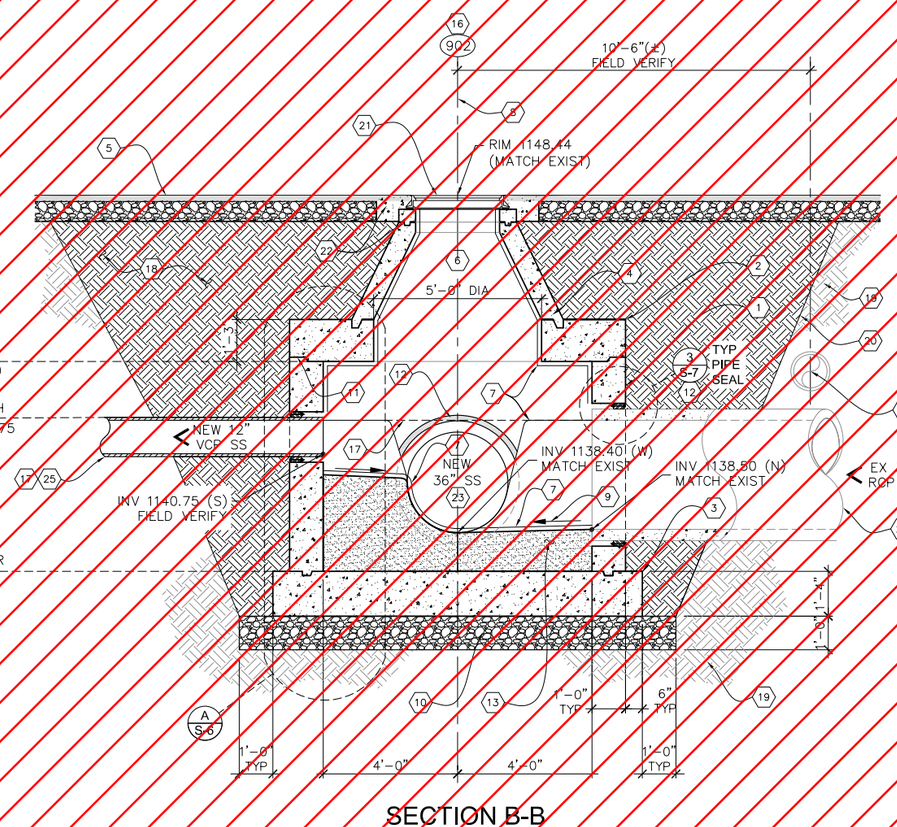
C. SEE G.S.N. SHEET S1 FOR STRUCTURAL REQUIREMENTS.

KEY NOTES

1. CAST-IN-PLACE CONCRETE MANHOLE STRUCTURE
2. CAST-IN-PLACE CONCRETE MANHOLE STRUCTURE TOP SLAB – SEE G.S.N. FOR PRE-CAST OPTION
3. CAST-IN-PLACE CONCRETE MANHOLE STRUCTURE BASE SLAB
4. 60-INCH PRECAST REINFORCED CONCRETE CONCENTRIC RISER CONE
5. FINISHED GRADE AND PAVEMENT STRUCTURAL SECTION PER CIVIL PLANS
6. 60" DIAMETER OPENING IN MANHOLE TOP SLAB
7. CORROSION RESISTANT INTERIOR COATING PER G.S.N.
8. CENTER OF MANHOLE STRUCTURE
9. SHAPE FLOW CHANNEL AS REQUIRED FOR SMOOTH TRANSITION
10. COMPACTED GRANULAR BACKFILL BORROW MATERIAL ON UNDISTURBED NATIVE SOIL OR COMPACTED FILL SUBGRADE PER G.S.N.
11. KEYED CONSTRUCTION JOINT WITH WATERTIGHT JOINT SEALANT PER G.S.N.
12. SEAL JOINT BETWEEN PIPE AND NEW MANHOLE WALL PER G.S.N.
13. CONCRETE BENCH
14. FIELD VERIFY LOCATION OF EXISTING 12" WATERLINE PRIOR TO EXCAVATION AND PROTECT IN PLACE
15. REPLACE EXISTING SEWER LINE TRANSITION WITH NEW SECTION OF 36" SEWER LINE
16. MANHOLE CENTER COORDINATE PER CIVIL DRAWINGS
17. MATCH CROWN OF EXISTING NORTH 39" RCP SANITARY SEWER
18. BACKFILL PER G.S.N.
19. EXISTING UNDISTURBED MATERIAL
20. APPROXIMATE LINE OF EXCAVATION
21. 30" DIA MANHOLE FRAME AND COVER PER MAG STD DETAIL 423-2 AND COG DETAIL G-704
22. MANHOLE ADJUSTMENT RINGS AND CONCRETE COLLAR PER MAG STD DETAIL 422-1, TYPE A
23. CONTRACTOR OPTION TO REMOVE A PORTION OF EXISTING 39" PIPE BACK TO NEAREST JOINT OR TO LEAVE IN PLACE AND FORM NEW MANHOLE STRUCTURE AROUND PIPE.
24. EXISTING 36" VCP SEWER LINE AND CONNECT TO NEW SECTION OF 36" SEWER LINE
25. NEW 12" VCP SEWER LINE – SEE CIVIL DRAWINGS



SECTION A-A



SECTION B-B

consor
2432 W. PEORIA AVENUE, SUITE 1248
PHOENIX, AZ 85029
Phone: (602) 996-1901

CITY OF GLENDALE
ENGINEERING DEPARTMENT
5850 W. GLENDALE AVE.
GLENDALE, ARIZONA 85301 (623) 930-3630

Glendale

Registered Professional Engineer (Structural)
JOHN V. BERGUN
20396
Date Signed 7-29-2024
Registered
Arizona U.S.A.

Designed	Drawn	Checked
JVB	JVB	MVB

No.	Date	Description
REVISIONS		

212231

SEWER & MANHOLE REHABILITATION, PHASE 6B
MH 0129450 RECONSTRUCTION
SECTION VIEWS

SCALE:
NO SCALE

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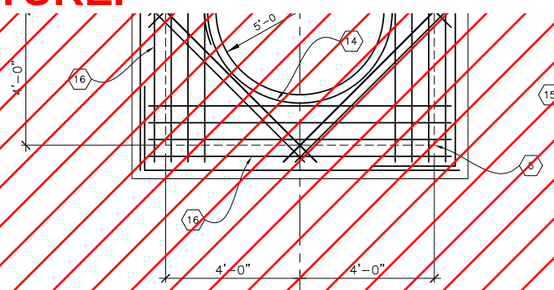
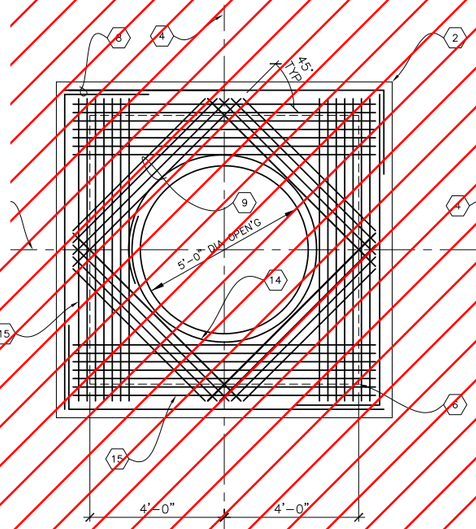
SHT. S-4
OF 18

PEC JOB NO.: W231441AZ FILE NAME: PLOTTING DATE: - REVISION DATE: AUTOCAD VER.: 2019

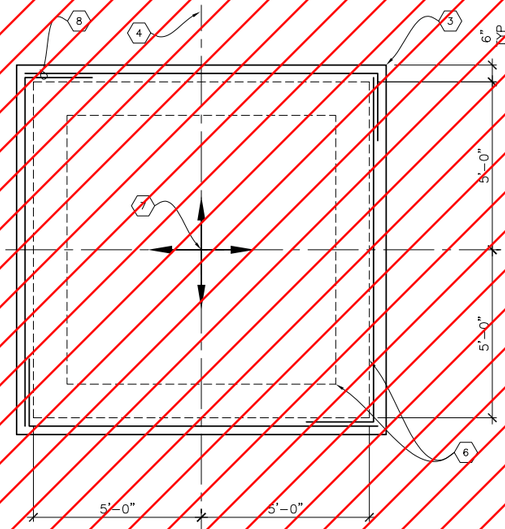
SEE PROPOSED 72-INCH POLYMER ARMOROCK MANHOLE IN LIEU OF CAST-IN-PLACE JUNCTION STRUCTURE.



PLAN VIEW OF TOP SLAB
TOP REINFORCING



PLAN VIEW OF TOP SLAB
BOTTOM REINFORCING



PLAN VIEW OF BASE SLAB
REINFORCING

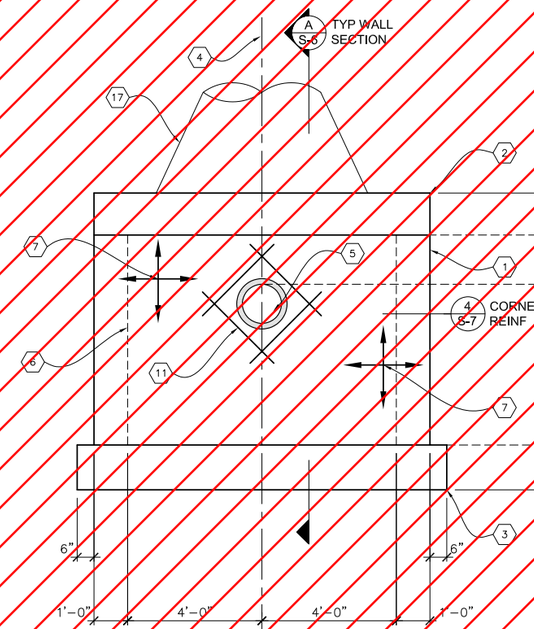
NORTH

KEY NOTES

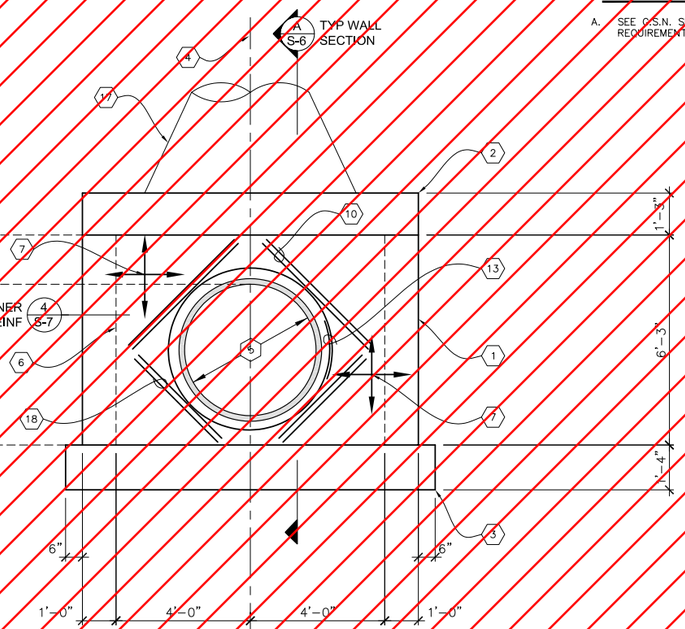
1. CAST-IN-PLACE CONCRETE MANHOLE STRUCTURE
2. CAST-IN-PLACE CONCRETE MANHOLE STRUCTURE TOP SLAB – SEE G.S.N. FOR PRE-CAST OPTION
3. CAST-IN-PLACE CONCRETE STRUCTURE MANHOLE BASE
4. CENTER OF MANHOLE STRUCTURE
5. PIPE OPENING IN WALL PER PLAN
6. MANHOLE STRUCTURE WALL BEYOND (SHOWN DASHED)
7. #5 @ 6" O.C. EACH WAY EACH FACE
8. #5 CONTINUOUS EDGE BARS TOP AND BOTTOM MIN 30" BAR LAP
9. 4-#6 45° DIAGONAL BARS @ 3" O.C. AS SHOWN
10. 2-#5 x 54" LONG 45° DIAGONAL BARS AT PIPE OPENING AS SHOWN EACH FACE – MAINTAIN 2" CLEAR FROM OPENING
11. 1-#5 x 36" LONG 45° DIAGONAL BARS AT PIPE OPENING AS SHOWN EACH FACE – MAINTAIN 2" CLEAR FROM OPENING
12. 2-#6 45° DIAGONAL BARS @ 3" O.C. AS SHOWN
13. #4 HOOP AROUND PIPE OPENING AS SHOWN EACH FACE – MAINTAIN 2" CLEAR FROM OPENING
14. #5 HOOP AROUND PIPE OPENING AS SHOWN TOP AND BOTTOM – MAINTAIN 2" CLEAR FROM OPENING
15. #6 REINFORCING @ 3" O.C. AS SHOWN
16. #5 REINFORCING @ 6" O.C. AS SHOWN
17. 30-INCH PRECAST REINFORCED CONCRETE CONCENTRIC RISER CONE
18. 2-#5 x 42" LONG 45° DIAGONAL BARS AT PIPE OPENING AS SHOWN EACH FACE – MAINTAIN 2" CLEAR FROM OPENING
19. MATCH CROWN OF EXISTING NORTH 39" RCP SANITARY SEWER

GENERAL NOTES

A. SEE G.S.N. SHEET S-1 FOR STRUCTURAL REQUIREMENTS.



ELEVATION LOOKING NORTH
(LOOKING WEST SIMILAR)



ELEVATION LOOKING SOUTH
(LOOKING EAST SIMILAR)

consor
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Phone: (602) 906-1901

CITY OF GLENDALE
ENGINEERING DEPARTMENT
5850 W. GLENDALE AVE.
GLENDALE, ARIZONA 85301 (623) 930-3630

Registered Professional Engineer (Structural)
JOSEPH V. BERGMAN
20396
Date Signed 4-29-2024
Registered Professional Engineer

Designed	Drawn	Checked
JVB	JVB	MVD

No.	Date	Description
REVISIONS		

212231

SEWER & MANHOLE REHABILITATION, PHASE 6B
MH 012945 RECONSTRUCTION
REINFORCING PLANS

SCALE:
NO SCALE

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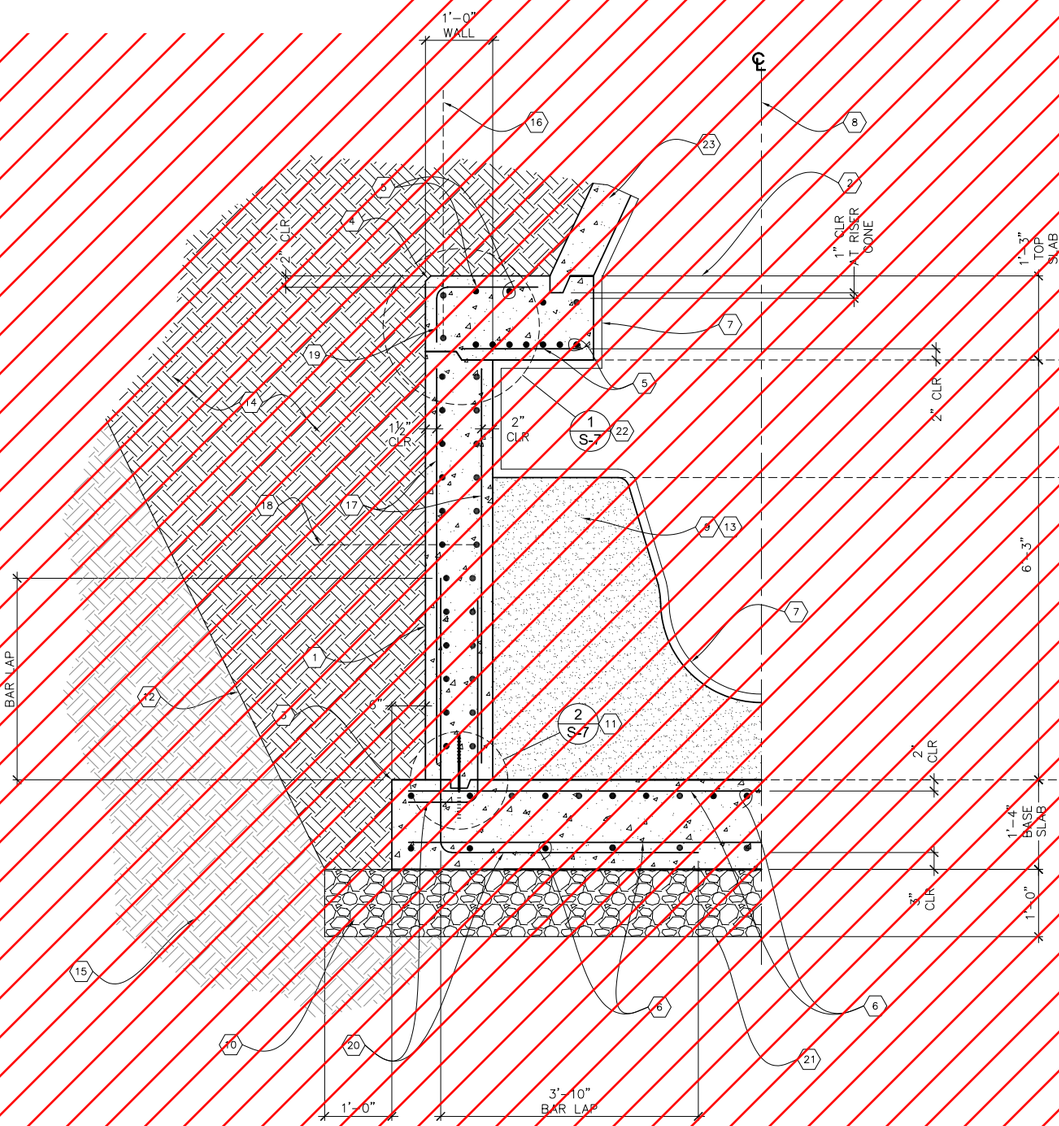
SHT. S-5
OF 18

PEC JOB NO.: W23441AZ FILE NAME: PLOTTING DATE: - REVISION DATE: AUTOCAD VER.: 2019

SEE PROPOSED 72-INCH POLYMER ARMOROCK MANHOLE IN LIEU OF CAST-IN-PLACE JUNCTION STRUCTURE.



TYPICAL WALL SECTION A

KEY NOTES

1. CAST-IN-PLACE CONCRETE MANHOLE WALL
2. CAST-IN-PLACE CONCRETE MANHOLE TOP SLAB SEE G.S.N. FOR PRE-CAST OPTION
3. CAST-IN-PLACE CONCRETE MANHOLE BASE SLAB
4. ¾" X ¾" X 45° CHAMFER
5. TOP SLAB REINFORCING PER SHEET S-5
6. BASE SLAB REINFORCING PER SHEET S-5
7. CORROSION RESISTANT INTERIOR COATING PER G.S.N.
8. CENTER OF MANHOLE STRUCTURE
9. SHAPE FLOW CHANNEL AS REQUIRED FOR SMOOTH TRANSITION
10. COMPACTED GRANULAR BACKFILL BORROW MATERIAL ON UNDISTURBED NATIVE SOIL OR COMPACTED FILL SUBGRADE PER G.S.N.
11. SHEAR KEY WITH CAST-IN-PLACE WATERSTOP PER G.S.N.
12. APPROXIMATE LINE OF EXCAVATION
13. CONCRETE BENCH
14. BACKFILL PER G.S.N.
15. EXISTING UNDISTURBED MATERIAL
16. #5 CONTINUOUS EDGE BARS TOP AND BOTTOM MIN 30" BAR LAP
17. VERTICAL WALL REINFORCING #5 @ 6" O.C. EACH FACE
18. HORIZONTAL WALL REINFORCING #5 @ 6" O.C. EACH FACE
19. BEND DOWN TOP BAR REINFORCING AS SHOWN
20. BENT DOWELS – MATCH VERTICAL WALL REINFORCING SIZE AND SPACING
21. SUBGRADE PREPARATION PER G.S.N.
22. TOP SLAB / WALL JOINT WITH WATERTIGHT JOINT SEALANT AND EXTERIOR JOINT WRAP PER G.S.N.
23. 60-INCH PRECAST REINFORCED CONCRETE CONCENTRIC RISER CONE

CITY OF GLENDALE
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5850 W. GLENDALE AVE.
GLENDALE, ARIZONA 85301 (623) 930-3630

Designed JVB | Drawn JVB | Checked MVB

No.	Date	Description
1		
2		
3		
4		

212231

SEWER & MANHOLE REHABILITATION, PHASE 6B
MH 0129450 RECONSTRUCTION
WALL SECTION

SCALE: NO SCALE

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SHT. S-6
OF 18

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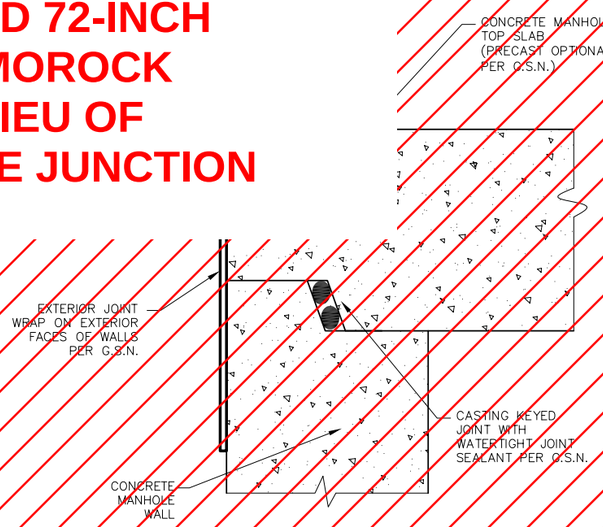
PHOENIX, AZ 85029
Phone: (602) 906-1901

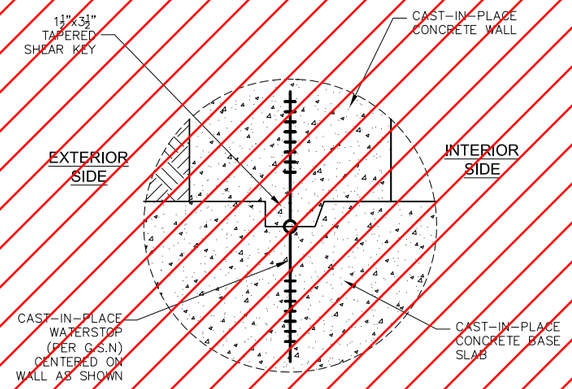
PEC JOB NO.: W23144TAZ FILE NAME: PLOTTING DATE: - REVISION DATE: - AUTOCAD VER.: 2019

DSC #

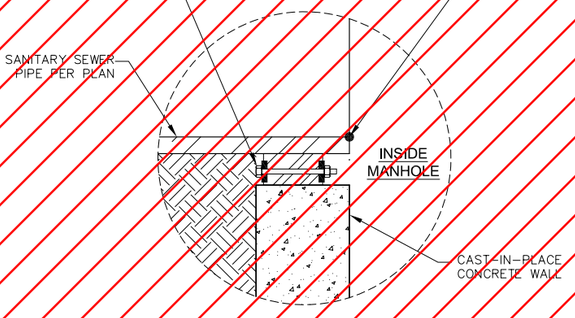
SEE PROPOSED 72-INCH POLYMER ARMOROCK MANHOLE IN LIEU OF CAST-IN-PLACE JUNCTION STRUCTURE.



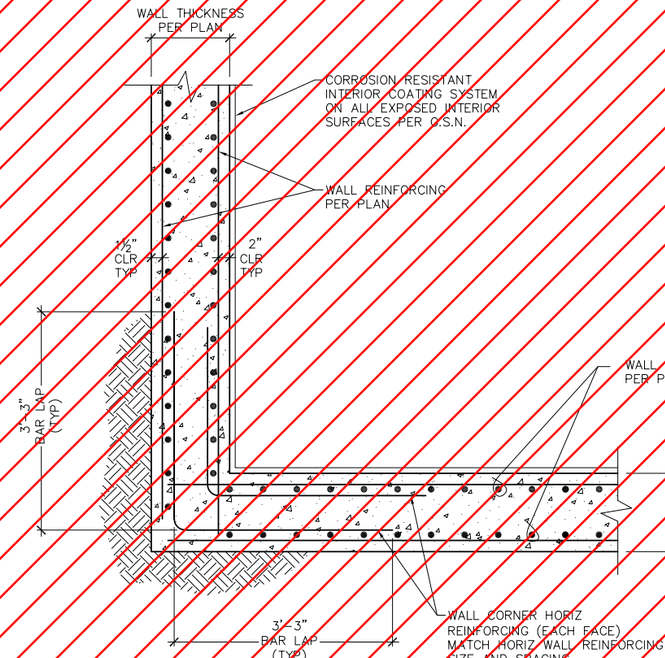
DETAIL 1
TOP SLAB / WALL JOINT



DETAIL 2
TYPICAL SHEAR KEY



DETAIL 3
TYPICAL PIPE SEAL



DETAIL 4
TYPICAL WALL CORNER
HORIZ REINFORCING DETAIL

consor 2432 W. PEORIA AVENUE, SUITE 1246
PHOENIX, AZ 85029
Phone: (602) 906-1901

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CITY OF GLENDALE
ENGINEERING DEPARTMENT
5850 W. GLENDALE AVE.
GLENDALE, ARIZONA 85301 (623) 930-3630

Registered Professional Engineer (Structural) Jason V. Boehm 20396 BOEHM Date Signed 1-29-2024 Arizona

Designed	Drawn	Checked
JVB	JVB	MVB

No.	Date	Description
		REVISIONS

212231

SEWER & MANHOLE REHABILITATION, PHASE 6B
MH 012945O RECONSTRUCTION
DETAILS

SCALE:
NO SCALE

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SHT. S-7
OF 18

DSC # - - - - -

CITY OF GLENDALE

WATER SERVICES DEPARTMENT

SEWER AND MANHOLE REHABILITATION
PHASE 6B (AREA 7 & 9)
PROJECT NO. 212231

TECHNICAL SPECIFICATIONS

July 2024

Prepared by:

consor

2432 W. Peoria Avenue, Suite 1246
Phoenix, Arizona 85029
602-906-1901

CITY OF GLENDALE
WATER SERVICES DEPARTMENT

SEWER AND MANHOLE REHABILITATION
PHASE 6B (AREA 7 & 9)
PROJECT NO. 212231

TECHNICAL SPECIFICATIONS

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SECTION 02603	CORROSION PROTECTIVE COATING SYSTEM
SECTION 02661	DIVERSION OF SEWAGE FLOW AND DEWATERING
SECTION 02760	SEWER AND STRUCTURE CLEANING
SECTION 02761	CCTV INSPECTION OF SANITARY SEWERS
SECTION 02767	CIPP LINING OF EXISTING SANITARY SEWERS
SECTION 03600	GROUT

SECTION 02100

MANHOLE REHABILITATION

PART 1 - GENERAL

1.1 - DESCRIPTION

1.1.1. - Scope

This section specifies rehabilitation of existing sanitary sewer manholes due to deterioration, corrosion, damage, etc., and manholes not specifically scheduled for rehabilitation that may be altered with this project for other purposes such as bypass pumping suction/discharge pits. Rehabilitation will restore the manholes and provide protection against infiltration and corrosion to the manhole interior. Corrosion protection of existing manholes in the sewer project consists of the installment of an approved protective coating or replacement of the manhole.

Manholes shall be rehabilitated according to the Contract Documents.

1.1.2. - Requirements

A. CONTRACTOR shall furnish all labor, materials, and equipment required to clean, modify, and apply specified rehabilitation system to the structures indicated on the Contract Documents or to remove and/or remove and replace with manholes. CONTRACTOR shall comply with the local authority and all Occupational Safety and Health Administration (OSHA) requirements for confined space entry.

B. CONTRACTOR shall field verify all manhole dimensions prior to the purchase of materials to be used for the rehabilitation of manholes.

C. All materials specified by name brand or manufacturer shall be delivered unopened to the job in original containers. All safety precautions recommended by the manufacturer in printed instructions or special bulletins shall be obtained and followed.

D. Application of the specified rehabilitation system shall be performed by a contractor certified and trained by the manufacturer.

E. In this specification, unless otherwise specifically noted, the word “manhole” shall mean “sewer structure” and shall encompass sewer manholes, sewage lift station wet wells, sewer diversion structures, sewer junction structures, and other sewer structures. It also encompasses sewer pipes (or portions thereof) that are located within the sewer structure but does not include sewer pipes (or portions thereof) that are located outside of the limits of the structure.

F. In this specification, “existing manholes” shall mean those manholes that are (or were) not constructed as part of this project work.

G. Where required by the Contract Documents; existing manholes shall be rehabilitated and an approved corrosion protective coating applied to their interior surfaces or a structural insert installed, as specified herein.

H. The approved coating system (as specified herein) shall be applied to all exposed brick, concrete, grout, mortar, and cementitious surfaces within the manhole, including unlined concrete pipes within the manhole, bench-to-pipe transitions, bench, risers, cones, adjusting rings, etc. Coating of the metallic manhole frame and cover is not required**.**

1.1.3. - References

Comply with the applicable provisions and recommendations of the following, unless otherwise shown or specified.

Reference	Title
ASTM C478	Standard Specification for Precast Concrete Manhole Sections
ASTM D16	Standard Terminology for Paint, Coatings, Materials, etc.
ASTM D412	Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubber and Thermoplastic Elastomers-Tension
ASTM D638	Standard Test Method for Tensile Properties of Plastics
ASTM D790	Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
ASTM D3359	Standard Test Methods for Measuring Adhesion by Tape Test
ASTM D3960	Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings
MAG 601	Trench Excavation, Backfilling and Compaction
MAG 625	Manhole Construction and Drop Sewer Connections
MAG 725	Portland Cement Concrete
MAG 741	Lining for Reinforced Concrete Sanitary Sewer Pipe
NASSCO MACP	National Association of Sewer Service Companies, Manhole Assessment and Certification Program

1.2 - QUALITY ASSURANCE

Rehabilitated or restored manholes shall be inspected by the ENGINEER prior to coating and documented with photographs per PART 3 – POST-EXECUTION, literal D of this section.

1.3 - GUARANTEE

All structural rehabilitation work performed by the CONTRACTOR shall be guaranteed against faulty workmanship and/or materials for a period of one (1) year after final acceptance of work.

PART 2 - EXECUTION

2.1 - SEQUENCE OF REHABILITATION

If the manhole, bench, or channel are coded to be rehabilitated, then cleaning, coating, structural insert, and testing activities shall be done simultaneously.

The following numerals of sequence of rehabilitation include all the tasks that need to be performed to rehabilitate a manhole.

Refer to the Contract Documents to identify all manholes included for rehabilitation and which rehabilitation tasks are included for each manhole.

2.1.1. - Remove and Replace Manhole Collar, Frame and Cover

A. Removal of the existing defective collar, frame and cover is included in this item of work and shall be completed and disposed of by the CONTRACTOR at a suitable location for disposal.

B. Replacement and installation of the collar, frame and cover shall be per MAG Standard Details 422 and 423. Cast iron frames and covers shall be Class 35 with weights and dimensions in conformance with MAG Standard Detail 423.

C. Cleaning or coating of the adjustment rings shall be included in the replacement of the frame and cover. Cleaning and coating of the adjustment rings shall be per Cleaning and Preparation Activities of SECTION 02603.

2.1.2. - Adjust Frame and Cover to Grade

A. Adjust frame and cover to grade includes locating buried or otherwise not visible frame and cover, excavating buried frame and cover, and raising to grade in accordance with MAG Standard Detail 422.

B. Adjusting rings used to raise the frame and cover to grade shall be coated with an approved protective coating in accordance with SECTION 2603.

2.1.3. - Repair and Coat Chimney, Cone and Wall

Repair and Coat Chimney, Cone and Wall of existing manholes shall include the following activities:

A. Cleaning the manhole, removing corroded/deteriorated materials from the manhole, and otherwise preparing the manhole for one of the approved coating systems per SECTION 02603.

B. Applying one of the approved coatings as specified herein SECTION 02603.

C. Testing the finished surface, as required herein SECTION 02603.

D. Repairs to the interior of the manhole do not include the bench or channel. Repairs to the bench and channel are included as separate rehabilitation tasks.

E. For manholes coded for rehabilitation with an approved coating system, the entire manhole interior shall be coated including the adjustment rings, cone, riser section, bench, and channel. For manholes coded for rehabilitation with an approved structural insert system, any of the manhole components not protected by the structural insert shall be coated.

F. The coating system shall also extend to the water line of the manhole unless the channel consists of a corrosion resistant pipe material or has been lined through with cured-in-place pipe (CIPP). Coating edges shall be terminated at or below the water line by keying into the concrete with a minimum ¼-inch wide x ¼-inch deep saw cut. Prior to coating application, the saw cut shall be dried and vacuumed to remove all dust and residue. During coating application, a liberal amount of material shall be applied to the saw-cut area and smoothed level. At no time shall the existing reinforcement be cut or damaged during installation of the keyways.

G. Coating and structural insert shall include sealing between the adjustment rings and frame.

H. Replacement of adjustment rings is included in this item of work.

I. The outside of grading rings shall be neatly plastered with 1/2-inch of cement mortar as the Work progresses.

J. Grading rings shall be used for all manholes, where required. Grade rings shall be a maximum of 12-inches in height, constructed on the roof slab or cone section on which the manhole frame and cover shall be placed. The height of the grade rings shall be such as is necessary to bring the manhole frame to the proper grade.

K. Each grading ring shall be laid in a full bed of mortar and shall be thoroughly bonded.

L. Cleaning of the adjustment rings prior to the job shall be per SECTION 02603.

M. Coating of the existing adjustment rings shall be the same procedures as given for the entire manhole interior surfaces in SECTION 02603.

N. Removal of all existing manhole steps is included in this item of work. Unless otherwise noted, for existing manholes that have existing manhole steps installed in them, the CONTRACTOR shall remove said steps from the manhole. If the manhole steps are "strongly embedded" in the concrete (for manhole steps, this is defined as a pulling force of 100 pounds per step being insufficient to dislodge them from the concrete), the CONTRACTOR may cut them off flush with the surface of the surrounding manhole and leave the embedded portion in place in the concrete. When the manhole is fully prepared and ready for the coating system, any portion of the steps that remain embedded in the concrete shall not protrude above the surface of the concrete. and includes removal of existing steps by cutting the protruding parts as close as possible to the manhole surface.

O. The remaining nub shall be ground down and grouted over to form a smooth surface.

2.1.4. - Repair and Coat Bench

A. Cleaning of the manhole bench prior to the job shall be Cleaning and Preparation Activities of SECTION 02603.

B. Rebuilding of the bench shall include grouting in accordance with SECTION 03600, GROUT, as necessary to restore the bench to the original or better grade.

C. Benches shall be built up and given a uniform wood float finish. Care shall be taken to slope all benches for proper drainage to the invert. ALL manhole bench reconstruction work shall be done in accordance with MAG Standard Detail 420.

D. Rebuilt Benches shall be coated in accordance with the procedures as given for the entire manhole interior surfaces in SECTION 02603.

E. In order to reconstruct the benches, the CONTRACTOR will be required to provide dry working conditions in all manhole benches and invert areas to allow the concrete and other materials to set properly.

2.1.5. - Repair/Reshape and Coat Channel

A. Cleaning of the manhole channel prior to the job shall be per Cleaning and Preparation Activities of SECTION 02603.

B. Rebuilding and reshaping of the channels through manholes shall be constructed of Class “A” concrete per MAG Section 725; Portland Cement Concrete. Channels shall be properly formed to the sizes, cross sections, grades and shapes as per MAG Standard Detail 420-3 and as shown in the project plans.

C. Reshaped channel shall be coated in accordance with the procedures as given for the entire manhole interior surfaces in SECTION 02603.

D. In order to reconstruct the channels, the CONTRACTOR will be required to provide dry working conditions in all manhole channel areas to allow the concrete and other materials to set properly.

2.1.6. - New 60-inch Diameter Sanitary Sewer Manhole per MAG 420 & 423

A. At the locations shown on the plans the CONTRACTOR shall provide a new 60-inch diameter manhole. All work shall be in accordance with MAG Detail 420, Type A with a 30-inch frame and cover per MAG Detail 424-2.

B. No steps are to be installed in the new manhole.

C. New manholes shall be coated with an approved corrosion protective coating in accordance with SECTION 02603.

2.1.7. - Install New Cast-in-Place Concrete Junction Structure

A. At the location shown on the plans the CONTRACTOR shall install a new cast-in-place concrete junction structure. This work includes all excavation and backfill as required for installation of the structure in accordance with the plans as well as all forming, placement of reinforcement, protective coatings, access manhole, etc., for the structure to be complete in place.

B. The interior surface of the new structure shall be coated with an approved corrosion protective coating in accordance with SECTION 02603.

C. This work shall also include removal of existing 39-inch pipe as needed to construct the junction structure.

2.1.8. - Inspect and Assess Manhole

A. Inspect and assess manhole includes inspection of manhole using either remotely controlled camera or scanner or man-entry into the manhole. Inspection shall be conducted using non-destructive techniques that will provide a clear view of the interior conditions in the manhole.

B. Assessment of the manhole condition and evaluation of rehabilitation if needed shall be coordinated by CONTRACTOR with the ENGINEER and OWNER. Any recommended rehabilitation shall be completed in accordance with defined items of work included in this section.

2.1.9. - Remove and Dispose of Existing Manhole

A. At the location shown on the plans the CONTRACTOR shall remove and dispose of existing manhole. Work includes excavation of material sufficient to remove the existing structure in preparation for construction of a new manhole or new pipe installation.

B. The removed structure shall be disposed of by CONTRACTOR in a location approved for disposal of sanitary sewer structure.

2.1.10. - Usage of Temporary Flow-Through Plugs

A. Where determined necessary, the CONTRACTOR may install temporary flow-through plugs so that repair materials are installed over a dry substrate and are allowed to cure in accordance with manufacturer recommendations before coming in contact with sewage.

B. The CONTRACTOR shall insure that flow-through plugs are of adequate capacity and size to maintain flow throughout the rehabilitation process without sewer backup.

C. If sewage backup occurs, the CONTRACTOR shall be solely responsible for any cleanup, repair, property damage costs and claims, or resultant regulatory agency fines.

PART 3 - POST-EXECUTION

Upon completion of this rehabilitation project, the CONTRACTOR shall provide to the City with the Project Record Documents, which will include but not be limited to:

A. Exhibits and/or As-Builts drawing reflecting all changes made in the specifications and working drawings during the construction process, and show the exact dimensions, geometry, and location of all elements of the work completed for every manhole under the contract.

B. Change orders approved during the construction process and other modifications to the contract should be reflected on the final Exhibits and As-Builts.

C. Product data and specifications.

D. Photographic record of all the work performed and every manhole showing the pre-execution and the post-execution condition. Frame and cover, and adjustment ring replacements should also be documented.

E. Field test records.

PART 4 - MEASUREMENT AND PAYMENT

A. DEFINITION: Full compensation for all labor, materials and equipment required to clean manholes, prepare surface of manholes, remove manholes, construct new manholes, excavation, saw cutting, removal and replacement of surrounding finish grade materials, remove and replace frame and cover, adjusting rings, cone, shaft, bench, channel, etc., repair manhole walls, grouting, furnish and install coating and insert liner in accordance with manufacturer’s recommendations and these technical specifications, all safety and support systems required to complete the work as described in these special provisions, restoration of adjacent site, and including any incidental items necessary to complete the work.

B. MEASUREMENT AND PAYMENT: Measurement and Payment of Manhole Rehabilitation shall be on a unit price for each item of work described as follows:

1. Remove and Replace Manhole Collar, Frame and Cover: measurement and payment shall be on a unit price bid per each for the work complete in place.
2. Adjust Frame and Cover to Grade: measurement and payment shall be on a unit price bid per each for the work complete in place.
3. Repair and Coat Chimney, Cone and Wall: measurement and payment shall be on a unit price bid per square foot of manhole completely coated as described herein.
4. Repair and Coat Bench: measurement and payment shall be on a unit price bid per each for the work, complete in place.
5. Repair and Coat Channel: measurement and payment shall be on a unit price bid per each for the work, complete in place.
6. New 60-inch Diameter Sanitary Sewer Manhole per MAG 420 & 423: measurement and payment shall be on a unit price bid per each for the work complete in place.
7. Install New Junction Structure: measurement and payment shall be on a unit price bid per each for the work complete in place.
8. Inspect and Assess Manhole: measurement and payment shall be on a unit price bid per each for the work complete in place including inspection, assessment and rehabilitation.
9. Remove and Dispose of Existing Manhole: measurement and payment for removal and disposal of existing manhole shall be on a unit price bid per each for the work complete in place. + + END OF SECTION + +

SECTION 02603

CORROSION PROTECTIVE COATING SYSTEM

PART 1 - GENERAL

1.1 - DESCRIPTION

1.1.1. - Scope

This section specifies the coating system used for the coating of the manholes as indicated in the Contract Documents.

The coating shall yield a hard, durable chemical resistant coating and shall be specifically designed to be applied on a dry surface. The finished coating shall provide a watertight seal and shall adhere to all components of the manhole and adjoining pipeline and any pipeline liner systems if present.

1.1.2. - Definitions

Specific coating terminology used in this section is in accordance with definitions contained in ASTM D16, ASTM D3960, and the following definitions:

Replacement of the adjustment rings shall include the following:

A. Dry Film Thickness (DFT): The thickness of one fully cured continuous application of coating.

B. Field Coat: The application or the completion of application of the coating system after installation of the surface at the site of the work.

C. Shop Coat: One or more coats applied in a shop or plant prior to shipment to the site of erection or fabrication, where the field or finishing coat is applied.

D. Tie Coat: An intermediate coat used to bond different types of paint coats. Coatings are used to improve the adhesion of a succeeding coat.

E. Volatile Organic Compound (VOC) Content: The portion of the coating that is a compound of carbon, is photochemically reactive, and evaporates during drying or curing, expressed in grams per liter or pounds per gallon.

F. Touch-Up Painting: The application of paint on areas of painted surfaces to repair marks, scratches, and areas where the coating has deteriorated to restore the coating film to an unbroken condition.

1.1.3. - References

This section contains references to the following documents. They are a part of this section as specified and modified. In case of conflict between the requirements

of this section and those of the listed documents, the requirements of this section shall prevail.

Reference	Title
ASTM D16	Standard Terminology Relating for Paint, Related Coatings, Material, and Applications
ASTM D256	Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics
ASTM D638	Standard Test Method For Tensile Properties Of Plastics
ASTM D695	Standard Test Method for Compressive Properties of Rigid Plastics
ASTM D790	Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics
ASTM D3359	Standard Test Methods for Measuring Adhesion by Tape Test
ASTM D1653	Standard Test Methods for Water Vapor Transmission of Organic Coating Films
ASTM D3960	Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings
ASTM D4060	Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser
ASTM D4258	Standard Practice for Surface Cleaning Concrete for Coating
ASTM D4262	Standard Test Method for pH of Chemically Cleaned or Etched Concrete Surfaces
ASTM D4541	Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
NACE RP0274	High-Voltage Electrical Inspection of Pipeline Coatings
SSPC-SP13	Surface Preparation of Concrete

1.1.4. - Quality Assurance

A. STANARDIZATION: Materials and supplies provided shall be the standard products of manufacturers. Materials in each coating system shall be the products of a single manufacturer.

B. SPARK TESTING: Spark testing shall be used on all manholes that are coated to detect cracks and thin spots in the coating system. A 1/8-inch hole shall be drilled through the coating as a control for the holiday detector. A stainless-steel concrete anchoring bolt shall be installed in the manhole interior for grounding during spark testing. The entire interior surface of the manhole shall

be spark tested per NACE RP0274 standard in the presence of the ENGINEER. Areas that fail the spark test as well as the 1/8-inch control hole shall be promptly repaired and retested. Subsequent inspections and repair work shall be at the expense of the CONTRACTOR. The spark testing will be performed by the CONTRACTOR and witnessed by the ENGINEER and shall be completed and any repairs made prior to the final acceptance inspection. Spark test results shall be provided in writing by the CONTRACTOR to the CITY.

C. PHYSICAL TESTING: Results of the following tests, performed on cured and coated concrete specimens, shall be provided.
   1. Compressive Strength – ASTM D695
   2. Water Vapor Transmission – ASTM D1653
   3. Impact Resistance – ASTM D256
   4. Abrasion Resistance – ASTM D4060
   5. Flexural Strength and Modulus of Elasticity – ASTM D790
   6. Tensile Strength – ASTM D638

D. ADHESION TESTING: At a minimum one in four of the manholes coated, the CONTRACTOR shall perform an adhesion test after proper cure in accordance with ASTM D4541 to demonstrate that the specified field coatings adhere to the substrate. Manholes to be tested will be chosen by the ENGINEER and the adhesion test shall be witnessed by the ENGINEER. Test results showing an adhesion rating of that specified by the manufacturer or better for all surfaces shall be considered acceptable provided the test results in failure at or within the substrate. If the test dolly should pull off with failure in the epoxy or coating additional testing will be required. Where unacceptable test results are obtained, the CONTRACTOR shall be responsible for removing and reapplying the specified coatings at no cost to the CITY. A failed test shall require testing two additional manholes at no additional cost to the CITY.

1.1.5. - Delivery and Storage

Materials shall be delivered to the job site in their original, unopened containers. Each container shall bear the manufacturer’s name, coating type, batch number, date of manufacture, storage life, and special directions.

Materials shall be stored in enclosed structures and shall be protected from weather an excessive heat or cold. Flammable materials shall be stored in accordance with state and local codes. Materials exceeding storage life recommended by the manufacturer shall be removed from the site.

PART 2 - PRODUCTS

The coating system shall be a trowel-able 100% solids epoxy monolithic surfacing system for use in coating new or existing manholes, wet wells, lift stations, treatment plants and other structures.

2.1 - MATERIALS

A. COATING: All pre-approved corrosion protective coating systems for application to existing manholes for the City of Glendale sewer rehabilitation projects are listed in the CITY's Design Standards.

B. PRIMER: Primer shall be as recommended by the manufacturer for each application.

C. UNDERLAYMENT: Underlayment applied prior to coating shall be as recommended by the manufacturer for each application.

D. INFILTRATION CONTROL: Manhole infiltration control material shall be as recommended by the manufacturer. Surface preparation and application shall be as recommended by the manufacturer.

2.2 - COATING SYSTEM APPLICATION PLAN

Coating System Application Plan shall be prepared that includes a description of the following:

A. Quality Assurance Procedures:

1. Training program to qualify personal in the correct storage and handling of coating materials, and the necessary safety requirements.
2. List of application and testing equipment to be used, including inspections confirming satisfactory conditions of equipment.
3. Detailed procedures and methods for surface preparation including repair and reprofiling as required, application of primer and final coating and testing.

B. Criteria for acceptance of the preparation of concrete and other manhole surfaces.

C. Plan for sewage diversion or the use of flow-through plugs, if required.

D. Method and material for sealing active leaks.

E. Detailed plan of surface preparation, including repair and reprofiling.

F. Details of application primer and finish coats, including required curing times.

G. Detailed environmental provisions such as shading from the sun.

H. Procedures for adhesion testing.

I. Dry film thickness testing.

2.3 - PRODUCT DATA

Before materials are delivered to the job site, the CONTRACTOR shall provide the following information:

A. For the underlayment filler, primer, and finish coating, the CONTRACTOR shall furnish a Material Safety Data Sheet (MSDS).

B. For the underlayment filler and finish coating, the CONTRACTOR shall provide the manufacturer's application instructions, which shall include the following:

1. Surface preparation recommendations.
2. Primer type, where required.
3. Maximum dry and wet mil thickness per coat.
4. Minimum and maximum curing time between coats, including atmospheric conditions for each.
5. Curing time before submergence in liquid.
6. Thinner to be used with coating material.
7. Ventilation requirements.
8. Minimum atmospheric conditions during which the coating shall be applied.
9. Allowable application methods.
10. Maximum allowable moisture content.
11. Maximum storage life.

C. List of materials proposed to be used under this section and manufacturer's data for each material including test data referenced in part 1.1.4 C. of this section.

PART 3 - EXECUTION

3.1 - COATING APPLICATOR QUALIFICATIONS

A. The CONTRACTOR or SUBCONTRACTOR performing the work covered by this specification (also referred to herein as "the coating applicator") shall be an approved applicator of the manufacturer. It shall be the CONTRACTOR's responsibility to ensure that any SUBCONTRACTOR used for such work is an approved applicator.

3.2 - COATING SYSTEM APPLICATION

3.2.1. - Cleaning and Preparation of Surfaces to be Coated

A. The CONTRACTOR shall clean manholes to be rehabilitated per SSPC-SP13. Before application of the coating system, the surface must be clean and free of all contaminants including oil, grease, incompatible existing coatings, waxes,

form release, curing compounds, efflorescence, sealers, salts, dust, and chemical contaminants. Suitable heaters shall be used as needed to produce a surface-dry condition. The surface will be vacuumed to make sure that loose particles are not present. The entire manhole interior including frame, walls and bench shall be cleaned using either abrasive blasting and/or high-pressure water blast as recommended by the coating and/or repair product manufacturer and approved by the ENGINEER. All concrete, brick or mortar that is not sound or has been damaged by chemical exposure shall be removed to a sound, neutralized surface. Manholes designated for spot repair or bench coating only shall be cleaned in their entirety as previously described.

Other manhole cleaning methods may be used in addition to abrasive blasting or water blasting, as necessary to properly clean and prepare the manhole, but shall not be used as a substitute for abrasive blasting or water blasting. Subject to CITY approval, other methods that may be used in addition to abrasive blasting or water blasting (but not as a substitute for them) are high pressure shotblasting, grinding, mechanical removal methods, chemical cleaning, detergent cleaning, hot water blasting and acid etching. If chemical cleaning or acid etching are used, the substrate shall be neutralized and washed of residue. The CONTRACTOR shall use whatever methods are required to properly clean and prepare the manhole for the coating system.

Unless otherwise noted, for existing manholes lined or coated with a previously applied corrosion protective coating, the CONTRACTOR shall entirely remove the existing liner/coating (including any underlayment layers) prior to performing other cleaning activities.

The CONTRACTOR shall also remove all dirt, rocks, rust, spalled masonry including mortar, concrete and brick, roots, sludge, grit and other deleterious materials and debris from the interior manhole. The finished interior surface shall consist of sound concrete or brick with adequate profile and porosity to provide a strong bond between the necessary repair materials and/or coating and the substrate.

During cleaning and preparation, methods shall be taken to prevent any debris from entering the downstream sewer mains.

B. CONTRACTOR shall also be responsible for any additional surface preparation beyond water blasting as required by the coating system manufacturer. Where additional preparation is required, the CONTRACTOR shall provide all labor, materials, and equipment as necessary, and at no additional cost to the CITY.

C. Visual Appearance of the Manhole – The prepared substrate shall have the appearance of sound concrete (or brick and/or mortar), free from discolored, white, chalky, and cracked areas.

D. Aural Observations – When struck with a metal hammer or tool, the prepared substrate shall exhibit the characteristic sound of solid, competent concrete (or brick).

E. CONTRACTOR shall test prepared surfaces after cleaning but prior to application of the coating system to determine the pH and moisture content of the concrete, as required according to manufacturer's recommendations. Testing may include pH and Phenolphthalein as described below:

   pH testing – The ENGINEER shall use wetted litmus paper applied to the surface of the substrate to ensure that the pH of the substrate is 7 or higher. This test will be considered obligatory.

   Phenolphthalein testing – The ENGINEER shall apply a few drops of phenolphthalein to the surface of the concrete, which if the concrete is competent should yield a purple color.

   The ENGINEER is not obligated to use all of the above tests but may do so at CITY's sole discretion. Often visual, mechanical and/or aural observations and tests alone will be adequate, but the pH and/or phenolphthalein tests may be used if there is still some uncertainty.

F. The area between the manhole and the manhole ring and any other area that might exhibit movement or cracking due to expansion and contraction shall be grouted with a watertight, expansive grout, approved for use by the manufacturer's representative and the ENGINEER.

G. The CONTRACTOR shall apply an approved underlayment to the interior of all manholes on this project to reshape and re-profile portions of the interior surface of the manholes. Prior to any surface coating work in existing manholes, the CONTRACTOR shall fill all voids, including any left by the removal of manhole steps; removal of loose and spalled concrete material in accordance with cleaning and preparation recommendations; and removal of concrete where evidence of exposed reinforcement is visible in the interior of the manhole. These areas will require buildup and re-profiling of the manhole wall as needed such that the manhole and bench surface is restored to an even and uniform surface profile using one of the underlayment materials approved and recommended by the selected coating material manufacturers.

   The underlayment shall be installed over a clean surface prepared in accordance with the requirements of this specification. The CONTRACTOR shall employ whatever means necessary (e.g., humidity control, temperature control, additional blasting, mechanical surface preparation, etc.) to ensure proper curing of the underlayment layer, strong adherence of the underlayment layer to the prepared manhole surface, and strong adherence to any layer installed over the underlayment layer.

   The underlayment shall be applied throughout the entire manhole at a minimum ½-inch total cured thickness. Underlayment shall be hand troweled and in accordance with the manufacturer's recommendations. After installation, the underlayment shall be free of trowel marks and irregularities. Notwithstanding the thickness requirement, an additional underlayment thickness requirement may be required by the ENGINEER for existing manholes that exhibit extreme deterioration.

3.2.2. - Coating Application Preparation

A. CONTRACTOR shall protect the newly lined sewer from debris, overspray, or any detrimental activity due to restoration of the manholes.

B. Manholes to be coated shall be cleaned in their entirety in accordance with the requirements of subsection 3.2.1 of this specification. The CONTRACTOR shall employ whatever means necessary (e.g., humidity control, temperature control, additional blasting, mechanical surface preparation, etc.) to ensure strong adherence of the surface coating layer(s) to any underlying and overlying layers and proper curing of the surface coating layer(s). If the surface coating is applied in two or more layers, the time between applications of the various layers shall be controlled to ensure proper bond between layers. Loose and protruding concrete shall be removed. Missing brick and mortar shall be filled using a grout as recommended by the coating manufacturer and approved by the ENGINEER. The grout filler shall be used to bring all areas of holes and pitting up to the nominal surface of the manhole so that there is an even interior surface in the manhole without waves, pits, or holes. Any exposed rebar shall be cleaned, and all areas of corrosion removed prior to application of the grout as recommended by the coating manufacturer and approved by the ENGINEER.

C. After surface preparation is complete, all materials dislodged during cleaning shall be removed from the work area. The CONTRACTOR shall be responsible for transporting and disposing, including all disposal fees, of any sediments and material removed from the sewer structures. All sediment and debris removed from the sewer structures shall be disposed off-site in a lawful manner. Hauling containers shall be watertight. On-site stockpiling of removed material will not be permitted.

   The CONTRACTOR is responsible for obtaining all necessary permits, fees, and approval from all regulatory agencies required to perform the work, including transport of sediments. Off-site disposal of all material removed from the sewer shall be the CONTRACTOR’s responsibility.

   A letter identifying the methods the CONTRACTOR plans to employ to remove sediment, debris, grease, scale, encrustations, and roots in the sewer structures to be repaired or coated shall be submitted to ENGINEER. The letter shall include a detailed explanation of the cleaning process and a schedule of activities and a list of the actions he plans to take to mitigate impact to the public during the cleaning operation.

   Any sediment or debris from cleaning operations larger than U.S. #8 sieve shall not be deposited downstream in the sewer main. Sedimentation deposited downstream, as determined by the ENGINEER, shall be removed at no cost to the CITY. The CONTRACTOR shall be thoroughly familiar with all phases of sewer structure cleaning to ensure the completion of this Contract without causing a health hazard or damage to the sewage system, public and private properties.

3.2.3. - Coating System Installation

A. The CONTRACTOR shall install the coating system in the manholes after all removals, replacements, rebuilding, re-shaping, re-profiling, and adjustment activities are completed. Quantities of materials may vary significantly based on interior surface and conditions.

B. COATING TERMINATION: The CONTRACTOR shall submit shop drawings for approval detailing coating termination work.

C. ATMOSPHERIC CONDITIONS: Maintain sufficient forced air supply to provide and maintain a temperature of 50 to 90 degrees F and a circulating airflow inside the structures during the coating process or per manufacturer's recommendations.

D. REPAIR OF DEFECTS: CONTRACTOR shall repair all defects in the coating system where directed by the ENGINEER.

E. SPOT REPAIR AND BENCH COATING: The CONTRACTOR shall follow the coating manufacturer recommendations in regard to the distance the coating should be extended beyond the damaged area. If there is no recommendation from the coating manufacturer, the CITY shall provide direction to the CONTRACTOR.

3.2.4. - Coatings

A. GENERAL: Coating products shall not be used until the ENGINEER has inspected the materials and the coating manufacturer's technical representative has instructed the CONTRACTOR and ENGINEER in the surface preparation, mixing, and application of the coating. The coating manufacturer's technical representative must be a factory representative, not a local representative or an affiliate of the CONTRACTOR.

B. COATING SYSTEMS: Field coats shall consist of one or more finish coats to build up the coating to the specified dry film thickness. Unless otherwise specified, finish coats shall not be applied until other work in the area is complete and until all previous coats have been inspected.

C. COATING REQUIREMENTS: All items of equipment, or parts and surfaces of equipment, which are immersed when in service, with the exception of pumps and valves, shall have all surface preparation and coating work performed in the field.

3.2.5. - Application

A. WORKMANSHIP: Coated surfaces shall be free from runs, drops, ridges, waves, laps, and brush marks. Coats shall be applied so as to produce an even film of uniform thickness completely coating corners and crevices. Painting shall be done in accordance with the requirements of SSPC Paint Application Specification No. 1.

The CONTRACTOR's equipment shall be designed for application of the materials specified. The coating shall be applied using a trowel or spray equipment to the proper thickness and surface characteristics as recommended by the coating manufacturer.

When possible, the application of the coating to the required minimum thickness shall be applied in a single coat sharply cut to line. Care shall be exercised to avoid over-coating or spattering on surfaces not to be coated.

B. ATMOSPHERIC CONDITIONS: Coatings shall be applied only to surfaces that are dry, and only under conditions of evaporation rather than condensation. Coatings shall not be applied during rainy, misty weather, or to surfaces upon which there is frost or moisture condensation. During damp weather, when the temperature of the surface to be coated is within 10 degrees F of the dew point, the surfaces shall be heated to prevent moisture condensation thereon. During coating, and for a period of at least 8 hours after the coating has been applied, the temperature of the surfaces to be coated, the coated surfaces, and the atmosphere in contact shall be maintained at or above 40 degrees F and 10 degrees F above the dew point. Paint, when applied, shall be approximately the same temperature as that of the surface on which it is applied. Fans or heaters shall be used inside enclosed areas where conditions causing condensation are severe.

C. PROTECTION OF COATED SURFACES: Items which have been coated shall not be handled, worked on, or otherwise disturbed, until the coating is completely dry and hard.

D. FILM THICKNESS AND CONTINUITY: Coating system thickness is the total thickness of finish coats. The coating system shall have a minimum wet film thickness of 125 mils applied in a single application where possible or as specified by the manufacturer.

The surface area covered for various types of surfaces shall not exceed those recommended by the manufacturer. Coatings shall be applied to the thickness specified, and in accordance with these special provisions.

In testing for continuity of coating about welds, projections (such as bolts and nuts), and crevices, the ENGINEER will determine the minimum conductivity for smooth areas of like coating where the dry mil thickness has been accepted. This conductivity shall then be taken as the minimum required for these rough or irregular areas. Pinholes and holidays shall be repainted to the required coverage.

E. SAFETY AND VENTILATION REQUIRMENTS: Requirements for safety and ventilation shall be in accordance with the Society for Protective Coatings (SSPC) Paint Application Guide No. 3.

3.2.6. - Cleanup

Upon completion of coating, the CONTRACTOR shall remove surplus materials, protective coverings, and accumulated rubbish, and thoroughly clean all surfaces and repair any overspray or other paint-related damage.

PART 4 - MEASUREMENT AND PAYMENT

The application of corrosion protective coating system is part of the Manhole Rehabilitation described on SECTION 02100 and it is subjected to the scenario of manhole rehabilitation, which could be to fully coat a manhole or to partially coat a manhole as required for spot repairs.

Measurement and payment of Corrosion Protective Lining System is as described on PART 4 - MEASUREMENT AND PAYMENT, SECTION 02100.

+ + END OF SECTION + +

SECTION 02661

DIVERSION OF SEWAGE FLOW AND DEWATERING

PART 1 - GENERAL

1.1 - DESCRIPTION

A. SCOPE

This section describes the requirements for temporary bypassing and dewatering of sewer pipes and structures during rehabilitation and installation. Temporary diversion of sewage flows is a key aspect of this project and includes the maintenance of service to the customer connections and/or making alternative arrangements for customers.

The CONTRACTOR is made aware that sewer pipe and structure rehabilitation may occur during the monsoon months with severe thunderstorms and possible flash flooding events. Adverse weather conditions may impact the capacity of the bypassing system. The CONTRACTOR shall be prepared for these weather conditions and alter procedures accordingly.

B. EXPERIENCE

CONTRACTOR shall utilize staff and/or a subcontractor that has been directly responsible for completion of a pipe rehabilitation project that required the bypass pumping of sewage flows.

1.2 - QUALITY ASSURANCE

The CONTRACTOR is solely responsible for maintaining the quality assurance of his work during the length of the project. The contractor is responsible for any costs associated with corrective measures required to replace or repair items not meeting the quality standards specified by the CITY.

A. BYPASS DESIGN: The actual design of the bypass arrangement shall be prepared by the CONTRACTOR and shall be submitted to the ENGINEER to determine conformance to project objectives. Means and methods of accomplishing the bypassing shall be the responsibility of the CONTRACTOR.

B. TESTING: The CONTRACTOR shall have the entire bypassing system in place and successfully pressure tested at 1.5 times the maximum operating pressure of the system before bypassing any sewage.

1.3 - SUBMITTALS

At the Preconstruction Conference, the CONTRACTOR shall submit drawings and complete design data showing methods and equipment he proposes to utilize in sewer bypassing for approval by the ENGINEER. The submittal shall include the following information.

1. Drawings indicating the scheme and location of temporary sewer plugs and bypass discharge lines. The drawings shall also show the method and location for discharging the bypass lines as well as routing of bypass piping including placement in roadway or landscape area behind sidewalk, locations where bypass piping is to be recessed into the pavement, road closures, closure of pedestrian facilities, etc.

2. Capacities of pumps, prime movers, and standby equipment.

3. Design calculations proving adequacy of the system and selected equipment.

4. Standby power source.

5. Staffing plan.

6. Show suction and discharge points with elevations and stationing on the design plans.

7. Proposed noise control and exhaust control plans for pumping equipment.

8. Proposed plan for disruption of sewer service laterals.

9. Bypass piping inspection plan.

10. Odor control plan.

11. SSO response plan.

12. Emergency contacts, including names, job titles, email addresses, and 24-hour phone numbers.

1.4 - JOB CONDITIONS

A. AVAILABLE FLOW DATA

The CITY may be able to divert some of the sewer flows upstream of the project work sites, however, this is not guaranteed and shall be coordinated between the CITY, ENGINEER, and CONTRACTOR prior to the diversion design. The CITY Water Services Department may be able to provide available flow data however, this is not guaranteed. CONTRACTOR is responsible for obtaining current flow

condition information at the time of construction. Any additional monitoring or gathering of flow data to properly size the bypass system is the responsibility of the CONTRACTOR. The CONTRACTOR shall include considerations for increased flows due to rainfall events, fluctuations of peak flows due to holidays, civic events, etc., equipment failure risks, etc., and provide adequate reserve capacity and redundancy to maintain sewer flows within the sewer pipe upstream and downstream of the bypass. The CITY is not responsible for any deviations in quantity of sewage flow at any time during the construction period. If necessary, the CONTRACTOR shall provide additional means of flow diversion at no additional cost to the CITY to handle deviations in quantity of sewage flow at any time during the construction period.

B. SERVICE OR COLLECTOR LINES

The CONTRACTOR shall determine the location of service lines connected to adjacent users or collector pipes at manholes of sanitary sewers to be bypassed.

1.5 - MEASUREMENT AND PAYMENT

A. DEFINITION: Full compensation for all labor, material, equipment, and monitoring required to temporarily bypass wastewater flows around the rehabilitation and/or replacement work and/or dewater pipelines in preparation for cleaning and rehabilitation or replacement. Bypass shall include standby pumps and piping. Also includes installation, maintenance and removal of bypass pumps and bypass pipes, noise suppression, odor control, plugging of sewers, vactoring, excavation and backfill of any required trenches, steel plating, sawcut, removal and repair or replacement of asphalt and concrete pavement, removal and repair or replacement of concrete curb, gutter and sidewalk, construction of suction and discharge structures to facilitate bypass pumping, landscape restoration, and all other incidentals necessary to complete the work in conformance with Plans and Specifications.

B. MEASUREMENT: Measurement of Diversion of Sewage Flow and Dewatering shall be on a lump sum basis. Intermediate measurements for payment shall be made by the ENGINEER on a percentage of project completed basis. The CONTRACTOR shall be responsible for additional costs associated with an underestimate of the means required to divert sewage flows during the construction period.

C. PAYMENT: Payment for Diversion of Sewage Flow and Dewatering shall be per the price bid on a lump sum basis. Intermediate payments for this work shall be made on a percentage of work completed basis.

PART 2 - PRODUCTS

2.1 - MATERIALS

A. CONTRACTOR shall provide temporary pumps, conduits, and other equipment to bypass sewer flow around the CONTRACTOR's work area as required. CONTRACTOR shall furnish all necessary labor and supervision to set up and operate the pumping and bypass system. Critical grade sound attenuated pumps shall be provided for the bypass pumping as required unless otherwise approved – see Section 3.6 Noise Control. Sound measurements shall be made in accordance with American National Standard S.13-1971. Pumps and bypass lines shall be of adequate capacity and size to handle the required capacity. The bypass system shall be designed to normally maintain the wastewater flow below the top of the pipe without surcharging.

B. The CONTRACTOR shall maintain on site sufficient equipment and materials to ensure continuous and successful operation of the bypass and dewatering systems. The standby pumps shall be installed and fully operational at all times including all pumps, equipment and piping being in-place. Standby pumps shall be fueled and operational at all times. The CONTRACTOR shall maintain on site a sufficient number of valves, tees, elbows, connections, tools, sewer plugs, piping, and other parts of system hardware to ensure immediate repair or modification of any part of the system as necessary. Piping shall be leak free.

C. For bypassing systems with a required capacity equal to or less than 2 MGD and piping lengths greater than 1,000 feet, and for systems with required capacity greater than 2 MGD, the CONTRACTOR shall provide multiple bypass lines to convey 150% of the maximum anticipated flow (as determined by the CONTRACTOR). Redundant lines should be fully connected in the bypass system to allow the system to be switched over quickly in the event of a leak. In all cases, redundant standby pump(s) shall be on site and operational at all times in case of primary pump failure.

D. All pumps, generators, and other equipment shall be placed in spill containment impound or on a new plastic tarp to provide containment and protect against sewage spills, or the spill of gasoline, oil, and hydraulic fluid spills.

PART 3 - EXECUTION

The CONTRACTOR shall notify the ENGINEER a minimum of 48 hours prior to shutting down of a pipeline and start of bypassing.

3.1 - SERVICE LINES

Every effort shall be made by the CONTRACTOR to ensure that sewer service to customers is maintained during the course of the work. When disruptions are

necessary, service to laterals shall be disrupted for a period of no more than eight hours. Laterals within residential areas shall only be disrupted during the period of 8:00 a.m. to 5:00 p.m. Monday through Friday. Laterals within business areas shall be addressed on a case-by-case basis. The CONTRACTOR shall provide a public information representative when he visits customers to discuss bypass pumping of services or making alternative arrangements with the customer for service outages. No matter what arrangement is made, the CONTRACTOR must cooperate with the ENGINEER to provide CITY documentation that all affected users have been contacted and arrangements made for disruption or alternate accommodations. This documentation must be submitted prior to the start of work on the section of sewer line affected.

3.2 - PUBLIC NOTIFICATIONS

The CONTRACTOR shall notify the ENGINEER and the CITY of any planned service interruptions at least two weeks prior to the event. The CONTRACTOR shall retain the services of a local Public Involvement firm to perform notification of the work to the public. At a minimum, the first notification shall be 5 days before the interruption of service. Much greater advance notice may be required if an alternate to pumping the customer's service is proposed by the CONTRACTOR. The second notification shall be 24 hours prior to the interruption of service. Notification shall be made door to door with printed handouts or door hangers. The information provided shall include, at a minimum, the reason for the interruption, the time period of the interruption, and a local 24-hour telephone hotline number for project information. ALL INFORMATION ON THE PRINTED HANDOUTS AND/OR DOOR HANGERS SHALL BE APPROVED BY THE CITY PRIOR TO DISTRIBUTION.

3.3 - MONITORING

The bypassing system shall not be shut down between shifts, on holidays or weekends, or during work stoppages without written permission from the ENGINEER. The bypass system will have an attendant around the clock whose only duty is to maintain the bypass pumping system until the bypassing of that specific pipeline is no longer required.

The CONTRACTOR shall inspect the entire bypass pumping system for leaks or spills on an hourly basis. The CONTRACTOR shall also create an inspection log and shall enter the time of inspection and the condition of the piping and the name of the inspector into the log for review by the ENGINEER.

3.4 - PUBLIC AND PRIVATE ACCESS

The CONTRACTOR shall maintain public and private access along project routes. Bypass lines shall be protected from damage due to traffic and shall not impede pedestrian or vehicular traffic routes unless otherwise allowed by approved traffic control plans. Bypass lines shall be buried at street crossings and business entrances unless otherwise approved by the ENGINEER. Temporary steel plating

with milled edges may be used with approval for buried lines. Ramps protecting bypass lines shall be a minimum level of protection at accesses to private residences unless otherwise approved by the ENGINEER.

CONTRACTOR shall maintain pedestrian traffic and comply with ADA regulations for access to all residential and commercial property unless written approval is otherwise obtained from the property owner allowing for reduced access.

3.5 - DISCHARGE

In areas where flows are bypassed, all bypass flows shall be discharged as approved by the ENGINEER. Bypass discharge velocities shall not exceed 10 feet per second. The CONTRACTOR shall employ mitigation measures to protect the discharge structure from potential damage caused by discharge flows. Mitigation measures may include extending discharge piping deeper into the discharge structure or configuring the discharge piping to direct flows into the downstream pipe.

No bypassing to the ground surface, receiving waters, storm drains, or bypassing which results in soil or groundwater contamination or any potential health hazards shall be permitted. In addition, no backups and overflows onto private property shall be permitted.

3.6 - NOISE CONTROL

The CONTRACTOR shall perform all work in compliance with OSHA standards and in no case will noise levels be permitted which would interfere with the work of the CITY or others. Noise levels shall be in accordance with the City of Glendale noise ordinance.

The CONTRACTOR shall utilize sound attenuated bypass pumps with a maximum decibel rating of 70 decibels at 50 feet. Each internal combustion engine, used for any purpose on the job or related to the job, shall be equipped with a muffler of a type recommended by the manufacturer. No internal combustion engine shall be operated on the project without previously mentioned muffler.

Noisy portable equipment, such as generators or compressors, shall be located as far away from sensitive noise receptor areas as practicable. (Sensitive noise receptors are defined as occupied buildings with windows or doors facing the site). Noise barriers shall be constructed around noisy stationary construction equipment such as compressors or generators that have to be utilized at locations near (within 100 feet of) sensitive noise receptors as defined above. Idling equipment not actively utilized for extended periods of time shall be shutoff.

3.7 - DAMAGES

The CONTRACTOR shall repair, without cost to the CITY, any damage that may result from his negligence, inadequate or improper installation, maintenance, and operation of bypassing system, including mechanical or electrical failures.

3.8 - ODOR CONTROL

The CONTRACTOR shall employ methods and procedures that mitigate the generation and discharge of objectionable odors to the surface environment at all times.

If odor complaints arise, the CONTRACTOR shall add ferric chloride to the wastewater flow upstream of bypass pumping operations to reduce odor. The CONTRACTOR shall make his own determination of flow characteristic for required dosing.

The CONTRACTOR shall add the ferric chloride from a location upstream that will allow 10 to 15 minutes reaction time before the flow enters the work area. The chemical dosing shall reduce odors generated from the wastewater stream to a level acceptable to the CITY. If this is not accomplished by adding the ferric chloride only, an additional control may be required. If odors are still unacceptable after addition of ferric chloride, the CONTRACTOR may also add hydrogen peroxide. The CONTRACTOR shall add hydrogen peroxide downstream to the flow that has been dosed with ferric chloride. The Hydrogen peroxide shall be added to allow a 5-minute reaction time before flow enters the work area. Any dosage combination of the two chemicals may be used to ensure continuous control of odors acceptable to the CITY.

3.9 - SANITARY SEWER OVERFLOWS

The CONTRACTOR shall take any and all precautions necessary to prevent backups and overflows on private property from blocked laterals during all sewer rehabilitation work. Special arrangements or supplemental bypasses may be required for some property owners.

CONTRACTOR is responsible for immediate and proper cleanup should any spill occur, regardless of amount.

3.10 - TERMINATION OF BYPASS

Bypass operations shall not be terminated until approvals are obtained from the ENGINEER for:

1. Pipe Rehabilitation

2. Manhole and/or Structure Rehabilitation

+ + END OF SECTION + +

SECTION 02760

SEWER AND STRUCTURE CLEANING

PART 1 – GENERAL

1.1 DESCRIPTION

A. SCOPE:

This section specifies the requirements for cleaning and/or heavy cleaning the sewers and sewer structures prior to CCTV inspection, ENGINEER's inspection, and pipe or structure rehabilitation.

B. REQUIREMENTS:

The work to be done under this Contract consists of furnishing all labor and equipment to remove the accumulated corrosion, tuberculation, sediments and debris, down to sound, solid structural material of the sanitary sewer pipes and sewer manhole and structures.

The CONTRACTOR shall remove existing corrosion, tuberculation, sediment, debris, pipe supports, roots, scale, encrustations, and grease accumulations from the sanitary sewer pipes and structures to be inspected and/or rehabilitated and adequately prepare the surfaces for installation of CIPP liner, coating system and/or repair grout. All materials dislodged during cleaning shall be removed from the work area and carried to an approved disposal site.

Cleaning of the sewer is required prior to CCTV inspection of the sewer to view current line conditions.

1.2 SUBMITTALS

The following submittal shall be provided.

1. A letter identifying the methods the CONTRACTOR plans to employ to remove corrosion, tuberculation, sediment, debris, grease, scale, encrustations, and roots throughout the sewer pipe to be rehabilitated and in the sewer structures to be repaired or coated. The letter shall include a detailed explanation of the cleaning process and a schedule of activities, references where the CONTRACTOR

has used the identified cleaning method successfully in the past and a list of the actions he plans to take to mitigate impact to the public during the cleaning operation.

1.3 MEASUREMENT AND PAYMENT

Heavy Cleaning of Existing Pipe (Allowance) where required to clean existing ductile iron pipe (DIP) due to excessive buildup of corrosion and tuberculation inside the pipe will be measured and paid for per hour of heavy cleaning that is completed. All tools, materials, personnel, and equipment required for removal of excessive tuberculation, corrosion, sediment, and other materials are included in this item of work.

No separate measurement or payment will be made for standard Sewer and Structure Cleaning of vitrified clay pipe (VCP), concrete, or polyvinyl chloride (PVC) pipe, the cost considered as included in CIPP lining of existing pipes or manhole rehabilitation depending on which work the cleaning is associated with.

PART 2 – MATERIALS

2.1 CHEMICAL ADDITIVES

No chemicals shall be used without written approval of the OWNER. In no case shall any chemical additive be used which might be considered hazardous or might be considered detrimental to organisms or equipment of a wastewater treatment plant, or detrimental to old or new pipe materials.

2.2 PRODUCT DATA

Copies of all disposal receipts shall be provided.

PART 3 – EXECUTION

3.1 GENERAL

The CONTRACTOR shall, at all times, conduct its work so as to prevent any blockage and minimize surcharging in the sewer manholes and connecting sewer pipelines. Damage to existing facilities as a result of the CONTRACTOR’s work shall be promptly repaired in kind at the CONTRACTOR’s expense.

3.2 SEWER BYPASSING AND DEWATERING

If required, the sewer flow shall be bypassed during the cleaning of the sewers as specified in Section 02661.

3.3 CLEANING

The CONTRACTOR shall grit blast or hydro blast with a minimum 3,000 PSI water pressure for duration sufficient to clean to coating or lining manufacturer's recommendations the pipe or structure surface receiving a protective coating or lining.

A. Manholes and Pipes: Cleaning shall remove all loose coatings previously applied, sediment, rocks, debris, roots, grease accumulations and obstructions from the sewer to be rehabilitated and from the structures to be coated (if applicable). Cleaning of the sewer and structure interior surfaces shall remove all grease, scale, encrustation, and any other material from the surface that may impede application or performance of applied coatings. Multiple passes with cleaning equipment may be required at no additional cost to the OWNER.

   Sediment, material or debris from cleaning operations larger than U.S. #8 sieve shall not be deposited downstream in the sewer main. Sedimentation deposited downstream shall be removed at no cost to the OWNER.

   The CONTRACTOR shall be thoroughly familiar with all phases of sewer pipe and structure cleaning to ensure that surface preparation is adequate for coating or pipe rehabilitation to be installed without causing a health hazard or damage to the sanitary sewage system, public and private properties.

   The CONTRACTOR shall clean the sanitary sewer pipe and structures so that there is no visible residue, rocks, debris, roots, grease accumulation and/or obstructions. The CONTRACTOR shall clean the pipe and/or manhole structure adequately to ensure proper installation of the rehabilitation method proposed. CONTRACTOR shall clean all exposed rebar to remove areas of corrosion down to solid steel.

   Unless otherwise noted, for existing manholes or portions of the manhole lined or coated with a previously applied cured-in-place epoxy corrosion protective coating, the CONTRACTOR shall entirely remove the existing liner/coating (including any underlayment layers) prior to performing other cleaning activities.

Pipe or manhole structures discovered by the CONTRACTOR or his Subcontractor to be physically deteriorated to the extent where cleaning may detrimentally impact the structural integrity of the existing pipe or manhole structure shall be brought to the attention of the OWNER prior to conducting cleaning operations. Once cleaning operations commence, the CONTRACTOR accepts all liability and responsibility for damage to existing pipes and structures.

It shall be the responsibility of the CONTRACTOR to repeat the cleaning process if root re-growth or other detrimental obstructions or residue becomes present at no additional cost to the OWNER.

B. Heavy Cleaning: Heavy cleaning shall be used for cleaning of existing ductile iron pipe (DIP) with excessive buildup of corrosion and tuberculation inside the pipe. Heavy cleaning includes additional cleaning of DIP using specialized mechanical equipment specific to the removal of interior coating and accumulation of corrosion and tuberculation within the pipe. Specialized equipment shall be chain flail or rotating sawblade. In each case, the CONTRACTOR shall use extreme caution when heavy cleaning so as not to damage the pipe.

Heavy cleaning shall remove all accumulation of corrosion and tuberculation from within the DIP such that the existing pipe diameter is restored in preparation for installation of cured-in-place pipe (CIPP) lining. All sediment, material, or debris from heavy cleaning operations larger than U.S. #8 sieve shall not be deposited downstream in the sewer main. Sedimentation deposited downstream shall be removed at no cost to the OWNER.

The CONTRACTOR shall be thoroughly familiar and experienced with heavy cleaning techniques and equipment to ensure that the existing pipe is not damaged, and the surface preparation is adequate for CIPP installation without causing a health hazard or damage to the sanitary sewage system, public and private properties.

3.4 DISPOSAL OF SEDIMENTS

The CONTRACTOR shall be responsible for transporting and disposing, including all disposal fees, of any sediments and material removed from the sewer or structures.

All sediment and debris removed from the sewer shall be disposed off-site in a lawful manner. Hauling containers shall be watertight. On-site stockpiling of removed material will not be permitted.

The CONTRACTOR is responsible for obtaining all necessary permits, fees, and approval from all regulatory agencies required to perform the work, including transport of sediments. Off-site disposal of all material removed from the sewer shall be the CONTRACTOR's responsibility.

+ + END OF SECTION + +

SECTION 02761

CCTV INSPECTION OF SANITARY SEWERS

PART 1 – GENERAL

1.1 DESCRIPTION

This specification defines the requirements for internal television inspection of existing sewer pipe before and after rehabilitation.

The CONTRACTOR shall inspect the sewer pipe interior using a color closed circuit television (CCTV) camera and document the inspection on video with audio location and date information, video title information, and hard copy inspection logs. A television inspection shall be performed after cleaning of the sewer as specified in Section 02760, Sewer and Structure Cleaning. The rehabilitated sewer will be CCTV inspected again in the same direction as the previous inspection after the lining of the sewer has been completed to ensure proper installation. The CONTRACTOR shall be responsible for properly inspecting the pipe.

1.2 QUALITY ASSURANCE

CONTRACTOR'S Qualifications: The CONTRACTOR shall have a minimum of three (3) years of experience in such work necessary to successfully meet this specification and provide references for five (5) sewer inspection projects involving remote CCTV pan and tilt inspection.

The CONTRACTOR shall have all operators who are successfully trained and certified through the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment and Certification Program (PACP). The CONTRACTOR shall provide copies of the PACP certification and project references for the operator.

A. PRE-REHABILITATION

The CONTRACTOR shall complete CCTV inspection of the interior of each pipe segment scheduled for rehabilitation prior to commencement of rehabilitation activities. The CCTV footage shall be reviewed by the ENGINEER for any obstructions or defects that would prohibit proper installation of the liner or repair sleeve.

The pre-rehabilitation CCTV inspection shall be approved by the ENGINEER prior to installation of the CIPP liner or repair sleeve. If the

sewer line is determined not to be adequately cleaned, it shall be re-cleaned, and CCTV inspected by the CONTRACTOR at no additional cost to the OWNER. If the inspection is not completed such that all of the interior surface of the pipe is able to be viewed, the pipe shall be re-inspected at no additional cost to the OWNER.

B. POST – REHABILITATION

After rehabilitation of the pipe has been completed, the CONTRACTOR shall again complete CCTV inspection of the interior of each pipe that was rehabilitated. Inspection shall be sufficient to clearly see all the interior of the pipe and the newly installed CIPP liner or point repair sleeve. Any errors or required corrections for the rehabilitation method should be addressed by the Contractor.

The ENGINEER will review video recordings and logs to ensure compliance with the requirements listed in this specification and contract documents. If any portion of the liner/pipe is determined not acceptable, the liner/pipe shall be repaired or replaced, whichever the ENGINEER deems appropriate, and re-inspected by CCTV, at no additional cost to the OWNER.

1.3 SUBMITTALS

A. The following submittals shall be provided by the CONTRACTOR for review.
   1. CONTRACTOR reference projects per 02761-1.2.
   2. Operator PACP certificate and reference projects per 02761-1.2.
   3. Manufacturer's product literature for video equipment to be used.
   4. One copy each, of the finished video recordings/photographs and USB external hard drive, showing the existing sewer pipelines after cleaning and the sewer pipelines after liner installation, shall be submitted to the ENGINEER. The ENGINEER will review the recordings, not for accuracy of content, but to make sure that the required information is provided, and the recording is of acceptable quality. If the ENGINEER determines that the video recording is defective or not of adequate quality, the CONTRACTOR shall CCTV inspect again at the CONTRACTOR's expense.

1.4 MEASUREMENT AND PAYMENT

CCTV shall be incidental to the Work. Additional CCTV inspections required after the initial inspection, due to the failure of the initial inspection, shall be paid for by the CONTRACTOR.

Part 2 – PRODUCTS

2.1 MATERIALS

A. TELEVISION INSPECTION CAMERA(S)

Camera(s) shall be intrinsically safe and shall be operative in 100 percent humidity conditions. Lighting intensity shall be remote controlled and shall be adjusted to minimize reflective glare. Lighting and camera quality shall provide a clear, in-focus picture of the entire inside periphery of the sewer.

B. VIDEO RECORDINGS

Video recordings of all sewer line inspections shall be made on high-quality color USB external hard drive. The audio portion of the composite videotape shall be sufficiently free from electrical interference and background noise to provide complete intelligibility of the oral report.

C. FOOTAGE COUNTER

A footage counter device, which measures the distance traveled by the camera in the sewer, shall be accurate to plus or minus 2 feet in 1,000 feet.

D. VIDEO TITLING

Video equipment shall include genlocking capabilities to the extent that computer generated data (i.e., footage, date, size, address and location, etc.) as determined by CITY can be overlaid onto video, and both indicated on the television monitor and permanently recorded on the inspection video.

E. FLOW IN SEWERS

During CCTV inspections, and continuously until completion of liner installation and inspection, the CONTRACTOR shall provide temporary dry conditions in the sewer pipelines. The bypassing requirements are provided in Section 02661, Diversion of Sewage Flow and Dewatering.

Part 3 – EXECUTION

3.1 INSPECTION METHODS

A. VERBAL COMMENTARY

The CONTRACTOR shall record on the audio track of the video inspection recording narrative of the location, upstream and downstream control points, date, and time of the inspection.

B. ACCESS

The ENGINEER shall have access to observe the monitor and all other operations at all times. The system of cabling employed to transport the camera and transmit its signal shall not obstruct the camera's view.

C. INSPECTION RATE

The camera shall be pulled through the sewer in either direction, but all inspections at each location shall be in the same direction. Maximum rate of travel shall be 30 feet per minute when recording.

D. IMAGE PERSPECTIVE

The camera image shall be down the center axis of the pipe when the camera is in motion. The CONTRACTOR is required to provide a 360-degree view of the pipe interior. Points of interest shall also be video recorded and shall include, but not be limited to, defects, encrustations, mineral deposits, debris, sediment, any location determined not to be clean or part of a proper liner installation, or defects in the liner (including, but not limited to bumps, folds, tears, dimples, etc.).

E. SEWER IDENTIFICATION

All inspection documentation shall include the sewer location.

+ + END OF SECTION + +

SECTION 02767

CIPP LINING OF EXISTING SEWERS

PART 1 – GENERAL

1.1 DESCRIPTION

A. SCOPE

This section specifies a cured-in-place pipe (CIPP) liner for the rehabilitation of sanitary sewer pipe as indicated on the plans. The CIPP liner is a flexible tube composed of either fiberglass or felt. The tube is impregnated with a thermosetting or ultraviolet (UV) activated resin. The liner is placed inside a deteriorated sewer pipe by either inversion or insertion. The liner is then cured via exposure to hot water, steam, or UV light. The finished product is a continuous watertight liner from manhole to manhole, tight fitting to the host pipe, and smooth interior surface.

The CONTRACTOR is made aware that the lining of the sewers may occur during the summer months with temperatures exceeding 115 degrees F and severe thunderstorms. The CONTRACTOR shall be prepared for these weather conditions and alter installation procedures accordingly.

This section also specifies service lateral connection (SLC) seal also referred to as Top Hats™. The SLC seals the point of connection from a main pipeline to a connecting lateral pipeline and is installed without excavation using a resin-impregnated, flexible laminate installed into the existing service lateral, lapping over the main pipeline, sealing the connection.

Removal of intruding gasket is also included in this specification as part of the preparation work required prior to insertion of a CIPP liner. This work includes trimming and removing the gasket such that it is flush with the interior pipe wall.

1.2 QUALITY ASSURANCE

A. REFERENCES

This section contains references to the following documents. They are a part of this section as specified and modified. In case of conflict between the

requirements of this section and those of the listed documents, the requirements of this section shall prevail.

Reference	Title
ASTM D543	Test Method for Resistance of Plastics to Chemical Reagents
ASTM D638	Test Method for Tensile Properties of Plastics
ASTM D790	Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
ASTM D883	Definitions and Terms Relating to Plastics
ASTM D1600	Abbreviations, Acronyms, and Codes for Terms Relating to Plastics
ASTM D2990	Test Method for Tensile, Compressive and Flexural Creep and Creep-Rupture of Plastics
ASTM D3567	Standard Practice for Determining Dimensions of “Fiberglass” (Glass-Fiber-Reinforced Thermosetting Resin) Pipe and Fittings
ASTM D5813	Standard Specification for Cured-in-Place Thermosetting Resin Sewer Piping Systems
ASTM F216	Rehabilitation of Existing Pipelines and Conduits by Inversion and Curing of a Resin Impregnated Tube
ASTM F412	Definitions of Terms relating to Plastic Piping Systems
ASTM F1216	Standard Practice for Rehabilitation of Existing Pipelines and Conduits by Inversion and Curing of a Resin Impregnated Tube
ASTM F1743	Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of Cured-in-Place Thermosetting Resin Pipe (CIPP)
ASTM F2019	Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pulled in Place Installation of Glass Reinforced Plastic (GRP) Cured-in-Place Thermosetting Resin Pipe (CIPP)
DIN EN 761	Plastic piping systems – Glass-reinforced thermosetting plastics (GRP) pipes – Determination of the creep factor under dry conditions

B. CIPP LINER SAMPLES AND TESTING

1. SAMPLE PREPARATION: The CONTRACTOR shall prepare samples of the installed CIPP liner for subsequent testing of its physical properties. Samples shall be prepared and tested using the flat plate sampling method in accordance with the procedures in Section 8.1 of ASTM F1216 or ASTM F1743, or Section 7 of ASTM 2019, as is applicable. For fiberglass tube that is UV light cured, restrained samples shall be taken at the manholes. The sample will be constructed on the

same materials (tube and resin/catalyst) as is used for that given liner installation. The flat plate sample shall be large enough to provide five sample specimens for each Short Term Flexural (Bending) properties as per ASTM D790 and ASTM D638 respectively. The sample will be clamped in a mold and placed in the downtube during the curing period of the CIPP tube. The samples shall be removed after all the water is removed from the cured pipe tube.

2. SAMPLE LABELING: The CONTRACTOR shall individually label the samples with permanent ink with the following information:
    a. Date and time the sample was removed and bagged
    b. Sample location
    c. Liner length, diameter and thickness
    d. Resin
    e. Catalyst or hardener
    f. Installation method (inversion or pull-in)
    g. Curing process (hot water or steam

3. CHAIN OF CUSTODY: The CONTRACTOR shall prepare a chain of custody form for the CIPP samples and submit to the ENGINEER with the following documentation:
    a. Project name
    b. Project number
    c. Contractor name and person responsible for collecting samples
    d. Sample number (use manhole number or location where the sample was cured)
    e. Date and time the sample was removed and bagged
    f. Location of curing (downtube, silencer, outlet chamber, etc.)
    g. Type of restraint used

    The signed chain of custody form shall be presented to the ENGINEER, who will independently verify that the sample is the correct sample and has been properly bagged and labeled for shipment. The ENGINEER will sign the chain of custody form and sample so attesting. A copy of the delivery manifest and chain of custody form will be given to the ENGINEER after all signatures are affixed and the sample is ready for shipment.

4. SAMPLE TESTING. The cured sample shall be tested by an independent third-party testing laboratory, as recommended by the CIPP liner manufacturer and approved by the ENGINEER, for the following properties:
    a. The flexural (bending) properties of the cured resin shall have minimum initial test values as given in Table 1 of ASTM F1216, ASTM F1743, or ASTM F2019, whichever is applicable.

b. 50-year Flexural Creep Modulus in accordance with ASTM D2990 at 10,000 hours or equal test as approved by the ENGINEER. If approved 10,000 hour tests are not available, CONTRACTOR shall use a minimum 50% reduction (50% retention) of Flexural Modulus of Elasticity (per ASTM F1216, ASTM F1743, or ASTM F2019 whichever is applicable) for all formula calculations.
c. Long term properties in accordance with ASTM D2990.
d. The CONTRACTOR shall be responsible for all costs associated with the testing of the liner physical properties.

Final payment to CONTRACTOR will not be made until test results are received. The CONTRACTOR shall be responsible for any deviation from the specified physical properties and those evaluated through testing. Failure to meet the specified physical properties will result in the CIPP liner being considered defective work which will be handled in accordance with MAG Section 106.

5. SAMPLING FREQUENCY: The above-stated sampling shall be performed for each truckload of shipped CIPP. For example: one flat plate sample from each CIPP delivery.

6. WALL THICKNESS: The wall thickness of the felt tube shall be ordered to the next standard 1.5 mm incremental thickness above the minimum calculated design thickness. Unless otherwise specified to provide for excess resin migration, the gap thickness of the wetting-out equipment shall be sized to allow an excess of 5 to 10 percent resin to pass during impregnation. The minimum wall thickness shall be determined at a minimum of three locations on a cut section of the CIPP flat plate sample using a method of measurement accurate to the nearest 0.005 inch. Thickness measurements do not take into account the outer or inner foil layers. The minimum value shall meet the requirements of Section 02767.

C. INSPECTION:

The ENGINEER shall inspect the CIPP after installation, which shall include end seals, seals at manholes, service reconnections, and SLC seals. The inspection will be performed and recorded using CCTV equipment in accordance with Section 02761. If visible defects are observed in the CIPP liner, it will result in the CIPP liner being considered defective work which will be handled in accordance with MAG Section 106.

D. LAYER INSPECTION

The layers of the cured fiberglass CIPP sample shall be uniformly bonded. It shall not be possible to separate any two layers with a probe so that the layers separate cleanly. If separation of the layers occurs during inspection of the field samples, then new samples will be cut from the manhole and inspected. Any reoccurrence may cause rejection of the work.

E. CIPP LINER HANDLING:

The CONTRACTOR shall be responsible for the delivery, storage, handling, and installation of all materials for CIPP in accordance with the written manufacturer's requirements and recommendations.

CONTRACTOR shall exercise adequate care during transportation, handling, and installation to ensure the CIPP material is not torn, cut, exposed to direct sunlight, or otherwise damaged. If any part or parts of the CIPP materials becomes torn, cut, or otherwise damaged before or during insertion, it shall be repaired or replaced in accordance with the manufacturer's recommendations and approval by the ENGINEER before proceeding further, and at the CONTRACTOR'S expense.

E. WARRANTY:

The CONTRACTOR shall warrant the completed work against defects in workmanship and material for a period of one year from the date of final acceptance. The ENGINEER, while not acting as quality control agent for the CONTRACTOR, shall be allowed to view and document any portion of this contract, including but not limited to, verifying the type and quantities of resin used at any point during this work.

Testing for chemical resistance shall be performed on a previously prepared sample of the finished product, proposed for this project. A certified affidavit, signed by an officer of the company, shall be provided stating that the resin the tests apply to and the resin submitted for this project are the same.

Finished and cured CIPP liner properties specified in Part 2 shall be tested as specified. Previous test data will not be acceptable.

1.3 SUBMITTALS

The following submittals shall be provided:

A. Certification showing the CONTRACTOR is currently licensed by the appropriate licensor to perform CIPP installation and curing. Certification shall be given to the ENGINEER before any materials are delivered to the job site.

B. A certified affidavit, signed by an officer of the company, shall be provided stating that the CONTRACTOR'S on-site Field Superintendent has received proper training by the manufacturer for the steam and hot water CIPP liner installation methods and procedures, as applicable. Certification shall be given to the ENGINEER before any materials are delivered to the job site.

C. The type of tube material, resin and catalyst/hardener to be used. Certification stating CIPP tube has been manufactured in accordance with ASTM F1216, ASTM F1743, or ASTM F2019, as applicable, and resin is, suitable for its intended use.

D. Prior to insertion, the CONTRACTOR shall provide data on the maximum allowable stresses, maximum pulling force (if pull-in-place method is used), and maximum elongation of the tube.

E. Shop drawings which detail short- and long-term properties (providing all supporting test data) of all component materials and construction and recommendations for material storage and temperature control, CIPP liner handling, insertion, curing, trimming, and finishing.

F. Materials, methods, and equipment to be used for end seals at manholes and structures.

G. Structural design calculations for each CIPP liner segment (manhole to manhole) for fully deteriorated pipe condition to include size, the recommended thicknesses, field measurements, and assumptions used as the basis for calculations which demonstrate that the liner has been properly sized to avoid the creation of wrinkles or folds. All calculations shall be signed and sealed by a Registered Civil Engineer in the state of Arizona and submitted in duplicate to the ENGINEER at least 10 working days prior to the start of work.

H. Detailed method for addressing CIPP sampling requirements including location and size of each sample, method of removal, method of liner repair.

I. CCTV Inspection reports as specified in Section 02761.

J. The CONTRACTOR shall provide a delivery manifest for each liner with the following information:
    1. The inversion location where the liner will be installed.
    2. Provide the manhole numbers for each end of the inversion.

3. If the CONTRACTOR has assigned an inversion number provide that number as well.

K. Liner diameter, length, and thickness.

L. CIPP manufacturer's recommended installation procedures, including resin manufacturer's curing requirements.

M. Manhole connection details.

N. Third party laboratory test results of required testing.

O. Material safety data sheets for all hazardous chemicals used or expected to be on-site. At a minimum, sheets for the resin, catalyst, cleaners, and repair agents should be submitted.

P. Written warranties as required herein.

Q. Service Lateral Connection (SLC) Seal (Top Hat™):
1. Method, procedure, or information per the specifications to provide either an adhesive, water-tight seal to the host pipeline or a mechanical seal between the cured SLC and host pipeline connections.
2. Technical procedure or information regarding the control and mitigation of shrinkage and wrinkling during installation and cure.
3. Minimum of three (3) references from municipal or public wastewater service providers in which the system proposed was used in accordance with the specifications herein.
4. Wet-out procedures or information if wet-out at the manufacturing plant.
5. Physical properties test for the proposed technology in accordance with the specifications herein that meet the minimum requirements as identified herein.
6. Copy of the chemical resistance test for the proposed technology in accordance with the specifications herein that meets the minimum requirements herein.
7. MSDS Sheets.

R. Remove Intruding Gasket:
1. Method, procedure, and information per the specifications to cut and remove the hanging gasket that protrudes into the interior of the pipe. This work shall be completed prior to insertion of the CIPP liner.
2. Equipment that is used to trim and remove the hanging gasket.

1.4 CONTRACTOR QUALIFICATIONS

A. The licensed CONTRACTOR, or Subcontractor, shall have CIPP lining experience on sanitary sewers of similar size to this project and as defined herein. The CONTRACTOR shall submit the attached CONTRACTOR Qualification Form. The minimum qualifying CONTRACTOR experience for this project is 3 or more projects totaling a minimum of 20,000 feet of CIPP liner successfully installed in sewers within the past 5 years. This experience shall be for projects completed within the United States with the same CIPP liner and resin combination proposed for this project. CONTRACTOR shall provide project lengths, diameters, date of installation, owner name and telephone number, CIPP liner manufacturer and resin type on the Qualification Form. References may be checked.

B. The CONTRACTOR shall provide a full-time project Superintendent for the project. The Superintendent shall meet all the same qualifications called out above for the CONTRACTOR. The CONTRACTOR shall submit the attached Superintendent Qualification Form six (6) working days after bid opening. All requested information must be provided. References may be checked.

C. Service Lateral Connection (Top Hat™): Current certification by manufacturer to install the system proposed in accordance with the specifications herein. Certification shall indicate the Contractor has been licensed or certified by the manufacturer for a minimum of two (2) years.

1.5 MEASUREMENT AND PAYMENT

CURED IN PLACE PIPE (CIPP)

A. Definition: Full compensation for all work associated with preparation and installation of fully deteriorated cured-in-place pipe (CIPP) liner as indicated in the Design Drawings and as described in these Technical Specifications. Work includes field measurement of existing interior pipe diameter prior to ordering materials; preparation of existing sewer pipe including standard cleaning of pipe including removal of sediments, roots, grease, and other materials; heavy cleaning for removal of tuberculation from DIP will be measured and paid for separately under item Heavy Cleaning of Existing Pipe (Allowance); pre- and post-construction CCTV inspection; removal of any objects protruding into the pipe such as service taps, removal of any gaskets hanging in the pipe at the joints, repair of severely offset joints, and other items as required to ensure a smooth profile once the CIPP is installed; wetting out of CIPP bag; transportation of CIPP to project locations; on-site storage of CIPP as required to prevent curing of CIPP prior to insertion; insertion of CIPP bag into the pipe via inversion or pull-in

method; heated water or steam curing of the CIPP in accordance with the manufacturer's recommendations and the approved design; reopening of service taps; end seals; sampling, third-party testing; disposal of curing water; and all necessary safety and support systems required to perform the work.

B. Measurement: Measurement for CIPP lining of existing sewers shall be per linear foot along the longitudinal axis of the pipe and shall extend from center of upstream manhole to center of downstream manhole.

C. Payment: Payment for CIPP lining of existing sewers shall be per linear foot of CIPP installed at the appropriate diameter as called for on the plans including all work as described above.

SERVICE LATERAL CONNECTION (SLC) SEAL

A. Definition: Service lateral connection (SLC) seal (also known as Top Hat™) includes all materials, equipment, and labor necessary to install SLC seal at the locations shown on the plans with the intent of providing a seal at the existing sewer service connections where there may be a gap in the existing connection of the service lateral to the pipe.

B. Measurement: Measurement for SLC Seal (Top Hat™) shall be per each.

C. Payment: for SLC Seal (Top Hat™) will be made per the unit price bid per each for each unit installed at the locations shown in the plans.

REMOVE INTRUDING GASKET

A. Definition: Remove Intruding Gasket includes all materials, equipment, and labor necessary to remotely cut and remove hanging gasket from within the interior of the mainline sewer pipe. The hanging gasket shall be cut and removed sufficient so that it does not reflect through the new CIPP liner. Cutting of the hanging gasket shall be completed by equipment compatible with such work. All work shall be completed prior to installation of the CIPP liner into the mainline sewer pipe.

B. Measurement: Measurement for Remove Intruding Gasket shall be per each.

C. Payment: for Remove Intruding Gasket will be made per the unit price bid per each for each unit installed at the locations shown in the plans.

REMOVE OBSTRUCTION FROM PIPE

A. Definition: Remove Obstruction From Pipe includes all materials, equipment, and labor necessary to remotely locate and remove existing obstruction from within the interior of the pipe at the location shown on the plans. The obstruction shall be removed without damaging the pipe so as not to hinder rehabilitation of the pipe with a CIPP liner. The obstruction once removed shall be properly disposed of. All work shall be completed prior to installation of the CIPP liner into the mainline sewer pipe.

B. Measurement: Measurement for Remove Obstruction From Pipe shall be per each.

C. Payment: for Remove Obstruction From Pipe will be made per the unit price bid per each for each unit installed at the locations shown in the plans.

PART 2 – PRODUCTS

2.1 GENERAL

A. All materials and installation procedures provided by the CONTRACTOR for use in the CIPP installation process shall be equal to or exceed the requirements of Section 5 of ASTM F1216, Section 5 of ASTM F1743, or ASTM F2019, as is applicable.

B. CONTRACTOR shall be responsible for control of all material and process variables to provide a finished CIPP possessing the minimum properties specified in ASTM F1216, ASTM F1743, or ASTM F2019, as is applicable and supplemented herein.

C. The finished SLC seal product shall be fabricated from materials which when cured will be chemically resistant to withstand internal exposure to domestic sewage and shall meet the chemical resistance requirements of ASTM D-543. It shall also be compatible with the lining system materials utilized in the main sewer line.

2.2 CIPP TUBE

A. FABRIC TUBING:

FELT: The Felt tube shall consist of one or more layers of absorbent, flexible felt fabric. The layers may be woven or non-woven materials or combination thereof, capable of carrying resin, withstand installation pressures, sufficient strength to bridge missing pipe, and hold up under

curing temperatures. The seams of the tube must be leak free and stronger than the non-seamed felt.

GLASS REINFORCED PLASTIC (GRP): The GRP tube shall consist of a seamless, spirally would fiberglass that is flexible and has strain values (expandable) up to ten (10) percent. The tube will not have a longitudinal seam, including a stitched seam, stitch-free-weld or bond, or stitch-free overlap. The tube shall be constructed to withstand installation pressures and have sufficient strength to bridge missing pipe.

B. CHEMICAL RESISTANCE

The chemical resistance tests should be completed in accordance with Test Method D543. Exposure should be for a minimum of one month at 73.4 degrees F. During this period, the CIPP test specimens should lose no more than 20 percent of their initial flexural strength and flexural modulus when tested in accordance with Section 8 of ASTM F1216 or ASTM F1743, or Section 6 of ASTM F2019, whichever is applicable, when subjected to the following solutions:

Chemical Solution	**FELT TUBE Concentration [percent]**	**GRP TUBE Concentration [percent]**
Tap Water (pH 6-9)	100	n/a
Nitric Acid	5	1
Phosphoric Acid	10	n/a
Sulfuric Acid	10	5
Gasoline	100	100
Vegetable Oil	100	100
Detergent	0.1	0.1
Soap	0.1	0.1

The CONTRACTOR shall be responsible for all costs associated with the chemical resistance tests.

Proof of meeting these requirements shall be provided to the engineer for approval at least seven (7) days prior to commencement of work.

C. PHYSICAL APPEARANCE:

The tube shall be free from defects, such as tears, holes, cuts, foreign materials, blisters, cracks, and other surface defects. The tube shall be

homogenous across the entire wall thickness. No dry or unsaturated layers shall be evident.

2.3 RESINS

A. GENERAL

Resins shall be tinted for visibility and provide positive indication of adequate liner wet-out. Resins should be appropriate for conditions encountered in a sanitary sewer environment. Resins should withstand the corrosive effect of residential, commercial, and industrial effluents, liquids, and/or gases common to sewers. Resins should be resistant to abrasion caused by solids, grit, aggregate, and/or sand.

B. TYPES OF RESIN

INVERSION METHOD: a general purpose, unsaturated, styrene-based thermoset resin and catalyst system or an epoxy resin and hardener that is compatible with the inversion process,

PULL-IN-PLACE METHOD: an isophthalic based polyester, or vinyl ester thermoset resin and catalyst or an epoxy resin and hardener that is compatible with pull-in-place installation.

C. STRUCTURAL PROPERTIES

The structural properties of the cured resin shall have minimum initial test values as given in Table 1 of ASTM F1216, ASTM F1743, or ASTM F2019, whichever is applicable, (and supplemented below in the table below). Properties for these or any other enhanced resins shall be substantiated with test data.

Test Property	**Test Method**	**FELT TUBE Minimum Value [psi]**	**GRP TUBE Minimum Value [psi]**
Flexural strength	ASTM D790	4,500	6,500
Flexural modulus	ASTM D790	300,000	725,000
50-year flexural creep modulus	ASTM D2990	150,000	

2.4 DIMENSIONS

A. LENGTH: CONTRACTOR shall make allowances in determining the tube length for stretch during installation and shrinkage during curing. The minimum length shall be that which continuously spans the distance from the center of the inlet manhole to the center of the outlet manhole. The CONTRACTOR shall verify the lengths in the field before the tube is cut and impregnated. Individual installation runs may include one or more manhole-to-manhole sections as approved by the ENGINEER and will only be allowed when no more than 20 lateral services are interrupted at one time. Installation of the liner shall be through existing or new manholes. Excavation for liner insertion shall not be permitted except to replace the manhole cones, if necessary and/or required. The maximum inversion installation shall be 660 linear feet without prior approval from the ENGINEER.

B. DIAMETER: CONTRACTOR shall make allowances in determining the tube circumference for stretch during installation and shrinkage during curing. The tube shall be sized such that when installed it will tightly fit the internal circumference of the original pipe. The diameter of the existing pipes may be larger than the nominal inside diameter. It is the CONTRACTOR's responsibility to determine the required diameter of the liner prior to ordering materials.

C. THICKNESS: The nominal wall thickness shall be at least the calculated design thickness, or the minimum specified, and may be up to 15 percent greater except where felt layers overlap, in which case it may be in excess of this value. The wall thickness of the felt tube shall be ordered to the next standard 1.5 mm incremental thickness above the minimum calculated design thickness. Unless otherwise specified to provide for excess resin migration, the gap thickness of the wetting-out equipment shall be sized to allow an excess of 5 to 10 percent resin to pass during impregnation.

    1. Fiberglass: The impregnated tube shall have a thickness that when compressed at installation pressures and cured will meet or exceed the design thickness in accordance with ASTM F1216, Appendix XI. The minimum allowable wall thickness for fiberglass CIPP is 2.8mm.

2.5 MANUFACTURER

A. CIPP LINER COMPOSITION:

    1. FELT LINER: The felt tube shall have an inner film and outer film to prevent resin migration and contamination. The inner film and outer film must both be styrene gas barriers.

2. GRP LINER: The fiberglass tube shall be saturated with the appropriate resin using a resin bath to allow for the lowest possible amount of air entrapment. Vacuum-suction impregnation methods are not allowed due to the introduction of air using this method. The liner will then be formed into a spirally would shape for the purpose of being seamless in its cured state. An inner film and outer film material will be added that are both impervious to airborne styrene. The outer film will also have UV blocking characteristics. The inner membrane will be removed after the curing process is complete.

B. MANUFACTURERS:

All impregnation or “wet-out” of the tube must be done at an EPA-regulated, quality-controlled facility. Approved CIPP liner manufacturers are Insituform Technologies, Inliner Technologies, Spiniello Companies, Applied Felts, Inc., Reline America Inc., or equal.

2.6 DESIGN CRITERIA

A. The liner shall be designed for a “fully deteriorated” pipe condition in accordance with the procedures of ASTM F1216, Appendix XI and these special provisions. All material properties used in design calculations shall be long-term (time-corrected) values. The CONTRACTOR shall be familiar with the existing site conditions when preparing the liner design.

B. CONTRACTOR shall prepare design calculations for approval prior to performing the lining work. The submitted design calculations shall provide the following information as a minimum:

Project Number No. X through No. XX

Manhole to Manhole designation QS-XX-MHXX to QS-XX-MHXX

Pipe Nominal Diameter (inches)

Minimum Liner thickness (inches)

Proposed Liner Thickness (inches)

The CONTRACTOR shall note that the actual level of deterioration may vary within any given section of sewer.

C. The following parameters shall be assumed for the liner design:

1. Fully deteriorated host pipe

2. Safety factor of 2.0

3. Modulus of soil reaction, E'S = 1,500 psi (fully deteriorated)

4. Unit weight of soil = 140 pcf

5. The minimum ovality for straight runs shall be 5.0 percent

6. AASHTO H20 traffic loads

7. AREMA E-80 railroad loads

8. Head of groundwater of 5 feet above top of pipe

9. Minimum 50-year service life

D. External Buckling Design: Where the CIPP is designed as a stand-alone pipe in a fully deteriorated condition, acceptable third-party testing and verification of design analysis techniques (ASTM F 1216, Section XI.2.2) shall be submitted by each manufacturer and/or CIPP product. This testing requirement can be accomplished with soil box testing.

2.7 CIPP TERMINATION POINTS

A. The CONTRACTOR shall provide shop drawings for approval detailing the proposed CIPP liner terminations.

2.8 SERVICE LATERAL CONNECTION (SLC) SEAL (TOP HAT™)

A. The SLC shall form a “tee” section with a lap inside the main pipe and a tube which shall extend continuously from the sewer main into the lateral for a minimum of 12-inches. Configuration of laterals or other obstructions that prevent the full installation of the SLC must be approved by the ENGINEER or CITY. Excavation for SLC installation shall not be permitted. The SLC shall be capable of sealing a combination of “tees” or “wyes” of varying angle. The resin shall be cured to form the tube into a hard, impermeable pipe-within-a-pipe.

B. When cured, the SLC shall seal the connection of the lateral to the mainline in a continuous tight-fitting, watertight pipe-within-a-pipe to eliminate any visible leakage between the lateral and mainline and shall provide a leak-proof seal to prevent root intrusion, infiltration, and exfiltration between a liner and a host pipe.

C. Seals installed with resins that do not bond to host pipeline shall include either (A) an adhesive epoxy compound applied at the edges of the seal both inside the lateral and around the brim inside the main line, or (B) a mechanical seal inside the lateral.

D. After inspection and cleaning of the mainline pipe, the Contractor shall proceed with installing the SLC seal. Rehabilitated mains shall have previously reinstated active lateral connections to the full diameter of the lateral connection and include any finished brushing for a smooth cut.

E. The SLC material shall be fabricated from either a non-woven felt or fiberglass laminate or combination thereof. The SLC manufacturer shall supply either technical procedure or information to control or mitigate shrinkage and wrinkling during cure.

F. The SLC material shall be fabricated to neatly fit the internal circumference of the lateral pipeline, extends into the lateral pipeline a minimum of 12-inches, and laps over the main pipeline wall a minimum of 4-inches.

G. The SLC shall use a polyester resin, vinyl ester resin, or epoxy-resin. The watertight seal shall either be an adhesive epoxy compound or rubberized seal.

PART 3 – EXECUTION

3.1 PREPARATORY PROCEDURES

A. TRAFFIC CONTROL:

Traffic control devices and plans as approved by the CITY.

B. SEWER CLEANING:

Prior to CIPP tube installation, the CONTRACTOR shall clean or heavy clean the existing sewer in accordance with Section 02760. The CONTRACTOR shall clear the existing sewer of obstructions such as tuberculation, sediment or other solids or collapsed pipe that will prevent or hinder CIPP liner installation.

C. ODOR CONTROL

At the project site prior to bypassing sewage flow, the CONTRACTOR shall provide odor control measures, see Section 02661.

D. SEWER BYPASSING AND DEWATERING

The CONTRACTOR shall be responsible for bypassing flow around his work and dewatering of sewer lines in accordance with the requirements of Section 02661.

E. CCTV INSPECTION

Experienced personnel training in locating breaks, obstacles, and service connections by visual inspection shall perform inspection of the sewer main. The interior of the sewer shall be carefully inspected in accordance with Section 02761 to determine the location of conditions which may prevent proper installation of CIPP. CONTRACTOR shall furnish television inspection data to the ENGINEER.

F. MEASUREMENT

The existing sewer lines may be larger than their nominal size due to corrosion of the pipe. It is the CONTRACTOR's responsibility to measure the actual inside diameter at different locations of the sewer to determine the appropriate size of CIPP liner to use.

G. SERVICE LATERAL CONNECTION (SLC) SEAL (TOP HAT™)

1. It is required that the service lateral be inactive during the time of installation. This is normally accomplished by turning off the services or requesting that the businessowner/homeowner relinquish its services during the required period of installation.

2. Line Obstructions - It shall be the responsibility of the CONTRACTOR to clear the line of obstructions that will prevent the insertion of the SLC material. If inspection reveals an obstruction that cannot be removed by conventional sewer cleaning equipment, the CONTRACTOR shall make an external point repair excavation to uncover and remove the obstruction. The CONTRACTOR shall inform the ENGINEER prior to the commencement of the Work.

3. The mainline pipe opening shall be prepared to accept the SLC and the mainline rehabilitated pipe shall be maximized to obtain the best possible connection.

4. The transition from the mainline pipe to the service lateral shall be smooth and continuous to provide adequate support for the SLC during installation and cure.

H. REMOVE INTRUDING TAP

Prior to CIPP insertion into the mainline sewer pipe, any intruding service taps shall have the end of the pipe remotely trimmed using an appropriate tool compatible with such work. The end of the service tap shall be trimmed flush with the interior wall of the pipe such that it will not reflect through the cured CIPP once installed.

3.2 INSTALLATION PROCEDURES

A. GENERAL

All procedures performed by the CONTRACTOR in the CIPP installation shall be equal to or exceed the requirements of Section 7 of ASTM F1216, Section 7 in ASTM F1743, or Section 6 of ASTM F2019, as is applicable.

The CONTRACTOR shall designate the location where the CIPP felt tube would be impregnated with resin (“wet-out”). Locations shall be subject to approval by the ENGINEER and applicable local agencies. The CONTRACTOR shall allow the ENGINEER to inspect the materials and “wet-out” procedure.

If the “wet-out” location is not at the project site, the impregnated CIPP tube shall be transported to site under controlled environmental conditions. Transport vehicles shall include a tamper-resistant, sealed temperature-recording device which records the temperature of the liner at all times after leaving the wet-out site. The CONTRACTOR shall decide when to transport the impregnated CIPP tube to site and when to commence insertion with respect to weather conditions.

CONTRACTOR is responsible for obtaining construction/fire hydrant meters from the CITY and for paying all applicable deposit fees and water usage fees.

The CONTRACTOR shall ensure that the pressure inside of the CIPP tube exceeds the pressure exerted on the pipe by groundwater.

The exterior of the manufactured tube shall be marked along its length at regular intervals not to exceed five (5) feet. These marks shall be used as a gauge to measure elongation during insertion. Should the overall elongation of a reach exceed five percent (5%) of the overall length for fabric tube and two percent (2%) for GRP tube, the liner tube shall be rejected and replaced.

B. CIPP INSTALLATION PROCESS

CIPP installations will not be undertaken in weather conditions that could jeopardize the installation of the CIPP or be detrimental to the long-term performance of the CIPP. All equipment, labor, and materials required to complete the work must be ready on-site before installation begins. The felt CIPP liner will be installed by the inversion tube method or the pull/winch method. The fiberglass CIPP liner will be installed winching or pull-in-place method.

1. INVERSION METHOD: The tube shall be impregnated with a liquid thermosetting resin and lowered into the manhole through an inversion tube. The inversion tube will then be filled with water or air where the weight of the water or air pressure will push the tube through the damaged pipe inside out, while pressing the resin impregnated side firmly against the inside walls of the damaged pipe. The smooth coated side of the liner shall become the new interior surface of the pipe.

2. PULL/WINCHING METHOD: The bottom half of the sewer pipe throughout the section to be lined shall be covered with a polyethylene foil or other suitable material to facilitate threading of the liner and reduce the risk of damage to the liner material. The tube liner shall be formed with a polyurethane coating on its interior surface. Rollers shall be installed in the upstream and downstream manholes to guide the liner into and out of the host pipe and to guard against chafing of the crowns at the entry and exit from the winch cable. The resin impregnated tube liner shall be lowered into the manhole. The tube shall then be pulled into position within the existing pipe with the aid of a power winch that is equipped with a device to monitor the force and prevent excessive tension. Should the pulling force exceed the manufacturer’s recommendations, the tube shall be rejected and replaced. In addition, the tube liner shall use a sliding foil on the bottom one-third of the existing conduit during winching.

The CONTRACTOR shall cap each end of the liner and use liner restraints in the manholes. The CONTRACTOR shall introduce water or air into the liner to inflate the liner until it has a tight fit against the inner walls of the host pipe producing dimples at lateral and side connections and flared ends at manholes. All hoses/pipes used for introducing water or air shall be ramped during the installation and curing process to allow for the ease of vehicular and pedestrian traffic. All hoses/pipes shall be color-coded for identification to prevent the use of hoses/pipes used for water conveyance are not used for wastewater conveyance or vice versa.

C. SERVICE LATERAL CONNECTION (SLC) SEAL (TOP HAT™) INSTALLATION PROCESS

1. The resin impregnated tube shall be loaded inside a pressure apparatus. The pressure apparatus, attached to a robotic device, shall be positioned in the mainline pipe at the service connection. The robotic device, together with a television camera, shall be used to align the SLC repair with the service connection opening. Air pressure, supplied to the pressure apparatus through an air hose, shall be used to invert or expand the resin impregnated SLC into the lateral pipe. The pressure shall be adjusted to fully place the SLC into the lateral pipe and hold the tube tight to the pipe wall. Care shall be taken during the curing process not to over-stress the tube. The pressure apparatus shall include a bladder which shall inflate in the mainline pipe, effectively seating the SLC repair against the service connection.

2. After inversion or pull in is completed, recommended pressure is maintained on the impregnated tube for the duration of the curing process.

D. CIPP CURING

The curing process shall follow a step cure or similar approach recommended by the manufacturer and approved by the ENGINEER and shall be held at the top step for an adequate length of time as determined by the liner manufacturer to ensure that the design physical properties are attained.

1. HOT WATER CURING

a. CONTRACTOR shall use a flexible and impermeable calibration hose to inflate the tube. The calibration hose may or may not remain in the complete installation. Any dry tube or inflation hose material that enters the existing pipe that has not been previously vacuum impregnated with resin under controlled conditions cannot be included in the structural wall of the CIPP. The nominal thickness of this material shall be deducted from the field sample thickness measured in order to verify that the minimum specified wall thickness is achieved. Hose material remaining in the installation shall be compatible with the resin system used, shall bond permanently with the tube, and shall be translucent to facilitate post installation inspection. Hose materials which are to be removed after curing, shall be of non-bondable material. After the tube is inserted through the pipe section, the CONTRACTOR

shall heat the water by circulating it through a boiler, where the hot water will cause the resin to cure.

b. The CONTRACTOR shall monitor the temperature of the tube liner during curing by remote temperature sensors placed at the interface of the existing pipe and the CIPP. A minimum of two temperature sensors shall be installed, one at either end of the length being lined. The curing process shall not be terminated until the temperature sensor readings indicate that a satisfactory cure has been completed. Any extended cure times shall not adversely affect the properties of the CIPP lining material.
c. Circulation water shall cool down to at least 100 degrees F for 1 hour before releasing the hydrostatic head.
d. The rate of temperature rise and fall during heating and cooling shall not exceed 2 degrees F per minute.
e. The water shall be evacuated from the pipe at a controlled rate to prevent negative pressure in the pipe. The water shall not be released until the water is at an ambient air temperature.

2. STEAM CURING
   a. Steam source and air compressors are used to circulate the steam/air mixture through the pipe at a temperature recommended by the manufacturer causing the resin to harden.
   b. The CONTRACTOR shall monitor the temperature of the tube liner during curing by remote temperature sensors placed at the interface of the existing pipe and the CIPP. A minimum of two temperature sensors shall be installed, one at either end of the length being lined. The curing process shall not be terminated until the temperature sensor readings indicate that a satisfactory cure has been completed. Any extended cure times shall not adversely affect the properties of the CIPP lining material.
   c. The temperature of the air shall cool down to at least 140 degrees F for 1 hour before releasing air pressure.
   d. The outlet hose shall be equipped with a pressure regulating valve, temperature gauge, and pressures gauge.

3. ULTRAVIOLET CURING
   a. During the curing process, infrared sensors will record the curing parameters using a computer and database that are tamper proof. The curing parameters shall be controlled as determined by the manufacturers' quality protocol. The curing data shall consist of the following:
      1) Curing speed
      2) Light source working and wattage
      3) Inner air pressure
      4) Exothermic temperature
      5) Date and time

6) Length of liner

b. The ultraviolet curing apparatus shall operate between 200 to 400-nm ranges.

c. The ultraviolet curing apparatus shall be pulled through the liner at a speed recommended by the manufacturer while a constant air pressure maintains inflation and pressing of the liner material tightly against the inner walls of the host pipe.

E. SERVICE LATERAL CONNECTION (SLC) SEAL (TOP HAT™) CURING

1. Curing method shall be compatible with the resin selected. The initial cure shall be deemed to be completed when the SLC has been exposed to the UV light, heat source or held in place for the time period specified by the manufacturer.

2. The Contractor shall cool (if heat cured) the hardened SLC before relieving the pressure in the pressure apparatus. Cool-down may be accomplished by the introduction of cool air into the pressure apparatus. Care shall be taken to maintain proper pressure throughout the cure and cool-down period.

3. If cured by ambient-cure process, the Contractor shall maintain bladder pressure until SLC has completely cured per manufacturer's recommendations before relieving the pressure in the pressure apparatus.

4. SLC shall be cured in place by the manufacturer's suggested resin technology, using a polyester resin, vinyl ester resin, or epoxy-resin with a watertight seal which shall be comprised of either an adhesive epoxy compound or rubberized seal.

5. Material shall be impregnated with resin in a controlled environment and stored per manufacturer's recommendations for transport.

6. Method of cure shall be either heat-cure process, ultra-violet light exposure, or ambient-cure process and shall result in a cured in place seal per all specifications herein and meet the minimum physical properties represented herein.

7. Contractor shall maintain a visible, written log of all activities in accordance with manufacturer's recommendations and shall include time/location of wet out, time of insertion, time/location of lateral insertion, bladder pressure requirements, required cure time, actual cure time, and cool down duration.

3.3 FINISHED CIPP PRODUCT

A. FINISH:

The finished CIPP shall be continuous over the entire length of an installation run, manhole to manhole. The wall color of the interior CIPP surface after installation shall be a light reflective color so that a clear detailed examination with CCTV equipment may be made.

B. DEFECTS:

Any defects or non-conforming work as determined by the ENGINEER shall be corrected at the CONTRACTOR'S expense.

1. UNDER THICKNESS LINER:

A minimum wall thickness at any point shall not be less than 90% of the design thickness, or the product will be considered unacceptable. An under-thickness liner may be brought into compliance by either:

a. Removal and replacement of the undersized liner, or
b. Install a second liner with full wall thickness as stated on the liner design submittal after acceptable surface preparation of the undersized liner interior. This option will be considered by the CITY on a case-by-case basis. The CITY will consider the loss of flow capacity and this option may be refused for that reason. The addition of a thin liner that makes up the difference of the under sizing is not an acceptable remedy because the structural properties are not additive if they are not cured simultaneously.

2. FLEXURAL TESTING FAILURE:

In the event of a failure of the flexural strength, flexural modulus or flexural creep tests, another flat plate sample shall be tested. Should the second sample fail, the liner shall be brought to compliance by either:

a. Removal and replacement of the undersized liner, or
b. Install a second liner with full wall thickness as stated on the liner design submittal after acceptable surface preparation of the undersized liner interior. This option will be considered by the CITY on a case-by-case basis. The CITY will consider the loss of flow capacity and this option may be refused for that reason. The addition of a thin liner that makes up the difference of the under sizing is not an acceptable remedy because the structural properties are not additive if they are not cured simultaneously.

3. WRINKLES:

   a. Circumferential wrinkles in the bottom half of the finished liner pipe which exceed three (3) percent of the nominal diameter in height are unacceptable and shall be removed or repaired by the CONTRACTOR. Methods of repair shall be proposed by the CONTRACTOR and submitted to the ENGINEER for approval.
   b. Circumferential or longitudinal wrinkles in the finished liner pipe which reduce the hydraulic capacity of the pipe (wrinkles which exceed five (5) percent of the nominal pipe diameter) are unacceptable and shall be removed or repaired by the CONTRACTOR. Methods of repair shall be proposed by the CONTRACTOR and submitted to the ENGINEER for approval.
   c. Wrinkles in the finished liner pipe that reduce the structural stability of the pipe are unacceptable. If a void between the wrinkle and the pipe exists, the CONTRACTOR shall repair or replace that section of the pipe. Methods of repair shall be proposed by the CONTRACTOR and submitted to the ENGINEER for approval.
   d. Wrinkles in the finished CIPP that reduce the structural integrity of the CIPP are unacceptable. CONTRACTOR shall repair or replace that section of the pipe. Methods of repair shall be proposed by the CONTRACTOR and submitted to the ENGINEER for approval.

4. OTHER DEFECTS:

   Other defects such as foreign inclusions, dry spots, pinholes, delamination, or wrinkling beyond the specification allowances, determined by the ENGINEER as affecting the integrity or strength of the CIPP, or as adversely affecting the hydraulic capacity of the CIPP, shall be repaired or replaced at the CONTRACTORS' expense. Methods of repair shall be proposed by the CONTRACTOR and submitted to the ENGINEER for approval.

C. GRP CIPP LINER

1. INNERFILM: The inner film of the fiberglass CIPP liner should be removed and discarded to provide optimal quality of the final product.

2. FLUSHING: Flushing of the UV cured fiberglass liner (to reduce styrene residual) is not required provided third party testing results document styrene residual levels (without flushing) are within acceptable defined levels.

D. CIPP TERMINATION POINTS (END SEALS):

1. End seals shall be not be installed until the CIPP pipe has relaxed for a minimum period of 24 hours.

2. The CIPP shall make a tight seal at the manhole opening with no annular gaps. The liner shall be cut neat and trimmed.

3. The CONTRACTOR shall secure the connections between the CIPP and the connection liner end seals. The securing materials shall adequately bond with the host CIPP pipe per CIPP manufacturer's specifications and shall be significantly different in color from the liner.

4. The CONTRACTOR shall furnish and apply epoxy resin to CIPP liner end seal at all upstream and downstream ends of the CIPP liner to form a watertight seal.

E. SERVICE RECONNECTIONS:

1. After the curing is complete, existing lateral service connections shall be re-established. The cut liner shall have no jagged edges and shall be sanded smooth. The CONTRACTOR shall provide a seal, recommended by the lining manufacturer, at the service connection so that no leakage of fluids may infiltrate between the liner and the existing sewer surface. Seals must be submitted and approved prior to use.
2. Reinstate service laterals using only remote internal methods (prior to CIPP acceptance).
3. Where the CIPP liner does not create dimples at the service connections or in other ways indicate the locations, the exact location shall be determined from the internal inspection data. It shall be the CONTRACTOR's responsibility to accurately locate and reinstate all service connections after the CIPP installation and curing has been completed. All service connections shall be reinstated to a minimum of 95% of the original opening, centered on the lateral opening.
4. Any misplaced cuts made by the remote internal method while reinstating service laterals will be repaired using approved materials and a remote internal method at no additional cost to OWNER.

3.4 FINISHED SERVICE LATERAL CONNECTION (SLC) SEAL (TOP HAT™) PRODUCT

A. DEFECTS

1. The finished SLC shall be free of dry spots, lifts and de-lamination. The lateral SLC shall not inhibit the closed-circuit television post video

inspection of the mainline or service lateral pipes. Frayed ends of the SLC repair shall be removed prior to acceptance.

2. During the warranty period, any defects which will affect the integrity or strength of the SLC shall be repaired at the CONTRACTOR'S expense in a manner mutually agreed upon by the Manufacturer, CITY and the CONTRACTOR.

B. PROPERTIES

1. The structural performance of the finished pipe shall be adequate to accommodate all anticipated loads throughout its design life. No cured-in-place pipe rehabilitation technology will be allowed that requires bonding to the existing pipe for any part of its structural strength.

3.5 FINISHED LIQUID WASTE DISPOSAL

The CONTRACTOR shall obtain the ENGINEER'S written approval prior to the disposal of the water and/or condensate from the curing process into the sanitary sewage system.

3.6 CLEANUP

Following inspection, the CONTRACTOR shall clean up the entire project area. The CONTRACTOR shall dispose of all excess material and debris not incorporated into the permanent installation off-site.

+ + END OF SECTION + +

SECTION 03600

GROUT

PART 1 - GENERAL

1.1 - DESCRIPTION

This section specifies grout for uses other than masonry or annular space grouting.

1.1.1. - References

This section contains references to the following documents. They are a part of this section as specified and modified. In case of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

Reference	Title
ASTM C33	Concrete Aggregates
ASTM C40	Organic impurities in Fine Aggregates for Concrete
ASTM C88	Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C117	Material Finer than 75 um (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C136	Sieve Analysis of Fine and Coarse Aggregates
ASTM C150	Portland Cement
ASTM C289	Potential Reactivity of Aggregates (Chemical Method)
ASTM C494	Chemical Admixtures for Concrete
ASTM 3881	Epoxy-Resin-Base Bonding Systems for Concrete
ASTM D2419	Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate
ASTM E329	Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction
CRD-C621-91	Corps of Engineers Specification for Nonshrink Grout

1.1.2. - Quality Assurance

To demonstrate conformance with the specified requirements for grout, the CONTRACTOR shall provide the services of an independent testing laboratory that complies with the requirements of ASTM E329. The testing laboratory shall sample and test grout materials as required in this section. Costs of testing laboratory services shall be borne by the CONTRACTOR.

1.2 - MEASUREMENT AND PAYMENT

No separate measurement or payment for this item. Grouting shall be considered incidental to the Work for which grouting is necessary, such as, manhole installation and sewer connection to manholes.

PART 2 - PRODUCTS

2.1 - MATERIALS

2.1.1. - Cement

Portland cement shall be ASTM C150 Type II or Type V, low alkali, containing less than 0.60 percent alkalis.

2.1.2. - Aggregate

A. GENERAL: Aggregate shall be nonreactive and shall be washed before use. When sources of aggregate are changed, test reports shall be provided for the new material. The tests specified shall be performed prior to commencing grout work.

B. FINE AGGREGATE: Fine aggregate shall be hard, dense, durable particles of either sand or crushed stone regularly graded from coarse to fine and shall conform to ASTM C33 as modified herein. When tested in accordance with ASTM C136, gradation shall be such that 100 percent by weight will pass a standard No. 8 mesh sleeve and no less than 45 percent by weight will pass a standard No. 40 mesh sieve.

Variation from the specified gradations in individual tests will be acceptable if the average of three consecutive tests is within the specified limits and the variation is within the permissible variation listed below:

U.S. standard sieve size	Permissible variation in individual tests [percent]
30 or coarser	2
50 or finer	0.5

Other tests shall be in accordance with the following specifications:

Test	Test Method	Requirements
Organic Impurities	ASTM C40	Color lighter than Amount of Material Standard
Passing No. 200 Sieve	ASTM C117	3% maximum by weight
Soundness	ASTM C88	10% maximum loss with sodium sulfate
Reactivity	ASTM C289	Innocuous aggregate
Sand Equivalent	ASTM D2419	Minimum 80

2.1.3. - Admixtures

A. GENERAL: Admixtures shall be compatible with the grout. Calcium chloride or admixtures containing calcium chloride are not acceptable. Admixtures shall be used in accordance with the manufacturer's recommendations and shall be added separately to the grout mix.

B. WATER REDUCING RETARDER: Water reducing retarder shall be ASTM C494 Type D and shall be Master Builders Pozzolith 300-R, Sika Corporation Plastiment, or equal.

C. LUBRICANT FOR CEMENT PRESSURE GROUTING: Lubricant additive for cement pressure grouting shall be Intrusion Prepakt Intrusion Aid, Sika Intraplast N, or equal.

D. Water for washing aggregate, for mixing and for curing shall be free from oil and deleterious amounts of acids, alkalis, and organic materials; shall not contain more than 1000 mg/1 of chlorides as C1, nor more than 1300 mg/1 of sulfates as SO_4; and shall not contain an amount of impurities that may cause a change of more than 25 percent in the setting time of the cement nor a reduction of more than 5 percent in the compressive strength of the grout at 14 days when compared with the result obtained with distilled water. Additionally, water used for curing shall not contain an amount of impurities sufficient to discolor the grout.

2.1.4. - Bonding Compounds

Epoxy resin bonding compounds shall be used for wet areas and shall be Sika Chemical Corporation, Sikadur 32 Hi-Mod, 32 Hi-Mod LPL, or 35 Hi-Mod LV 350, 370, or 390m as applicable; or equal.

Non-epoxy bonding compounds shall be used for dry areas and shall be Burke Company, Acrylic Bondcrete; Imperial Chemical Industrial, Inc., Thoro System Products, Acryl 60; Thoro Bond; or equal.

A. CURING COMPOUND

Curing compound shall be Master Builders, MasterSeal; A.C. Horn Inc., Horn ClearSeal EM 180, Burke Company Spartan Cote WB Cure Seal Hardener; or

equal, conforming to ASTM C309. Curing compounds shall be clear and shall be applied in accordance with the manufacturer's instructions.

2.2 - GROUT

2.2.1. - Cement Grout

Cement grout shall be a mixture of one part cement, two parts sand, proportioned by volume, admixtures for pressure grouting, and sufficient water to form a workable mix.

2.2.2. - Non-shrink Grout

Non-shrink grout is available with both metallic and nonmetallic aggregate. Metallic aggregate grout shall be Master Builders Embeco 636, Burke Company Metallic Spec Grout, Sonneborn Ferroligh G Redimix, or equal. Nonmetallic aggregate grout shall be Five Star Products, Inc. Five Star Grout, Master Builders Masterflow 713, Burke Company Non-Ferrous, Non-Shrink Grout, or equal.

2.2.3. - Epoxy Grout for Crack Repair and Dowel Anchorage

Except as noted below, epoxy grout shall be a high modulus, two-component, moisture insensitive, 100 percent solids, thermosetting modified polyamide epoxy compound. The consistency shall be a paste form capable of not sagging in horizontal or overhead anchoring configurations. Material shall conform to ASTM C881 Type 1, Grade 3, such as Adhesive Ownering Concresive 1440 series, Sika Corporation Sikadur Hi-Mod Series, Adhesive Technology Corporation Solidbond 200 or equal, and shall have a heat deflection temperature in excess of 130 degrees F.

Epoxy for pressure grouting/crack injection shall be a two-component, moisture insensitive, high modulus, injection grade, 100 percent solids, blend of epoxy-resin compounds. The consistency shall be as required to achieve complete penetration in hairline cracks and larger. Material shall conform to ASTM C881 Type 1 Grade 1, such as Sika Corporation Sikadur 52, Adhesive Ownering Company SCB products, Adhesive Technology Corporation SLV 300 series, or equal.

2.2.4. - Polymer Concrete (for Resurfacing or Patching)

Polymer concrete (for resurfacing or patching) shall consist of a liquid binder and dry aggregate mixed together to make a mortar or grout of a consistency as required for the application. The liquid binder shall be a chemical and oil resistant, stress relieved, low modulus, moisture insensitive, two-component epoxy-resin compound. The consistency shall be similar to lightweight oil for proper mixing with aggregate. Material shall conform to ASTM C881 Type 3 Grade 1, such as Sika Corporation Sikadur Lo-Mod series, Adhesive Ownering Concresive 1470, Adhesive Technology Corporation 400 series, or equal.

The aggregate shall be oven dry in sealed packages until time of mixing, and shall be of size and consistency compatible with recommendations of manufacturer of liquid binder for intended application.

2.3 - PRODUCT DATA

2.3.1. - Manufacturer's Data

Manufacturer's data shall be provided for the following.

A. Bonding compounds

B. Nonshrink grout

C. Pressure grout

D. Retardants

E. Epoxy grout

F. Polymer concrete

2.3.2. - Laboratory Test Reports

Test reports on previously tested materials shall be accompanied by the manufacturer's statement that the previously tested material is the same type, quality, manufacture, and make as that proposed for use in this project. Test reports are required for the following:

A. Cement

B. Aggregates

C. Retardants

D. Bonding compounds

E. Epoxy resin

2.3.3. - Evidence of Testing Laboratory Competence

The CONTRACTOR shall require that the laboratory provide directly to CITY evidence of the most recent inspection of its facilities by the Cement and Concrete Reference Laboratory of the National Bureau of Standards. The evidences shall show that deficiencies mentioned in the report of that inspection have been corrected. The evidence of inspection shall be provided prior to delivery of materials to the job site.

PART 3 - EXECUTION

3.1 - GENERAL

Bonding compound for use with grout shall be recommended by grout manufacturer. Primer, if required for polymer concrete, shall be provided per manufacturer's recommendation.

3.2 - CEMENT GROUT

Cement grout shall be used for filling nonbearing portions of equipment pads and pressure grouting.

Except for the specialized equipment for pressure grouting, mixing and placing apparatus shall be similar to that normally used for cast-in-place concrete. Grout shall be mixed for a period of at least 1 minute. Diluted grout shall be agitated to keep ingredients mixed.

3.3 - NONSHRINK GROUT

Nonshrink, nonmetallic aggregate grout shall be used for the bearing surfaces of machinery and equipment bases, column base plates and bearing plates. Nonshrink metallic aggregate grout shall be used for setting anchor bolts and grouting reinforcing steel holes. Grout shall meet the requirements of CRD-C621 and shall be placed in accordance with manufacturer's instructions.

Holes required for grouting shall be blown clean with compressed air and left free of dust or standing water. Horizontal holes for grouting shall be drilled at a slight downward angle to facilitate holding the grout until setting is complete. Bolts or reinforcing steel installed in horizontal grout holes shall be centered in the drilled hole.

3.4 - EPOXY GROUT

A. Epoxy grout shall be used for repairing cracks, repairing structural concrete, and may be used for setting reinforcing dowels or anchor bolts into holes for grouting. Concrete shall be primed in accordance with the grout manufacturer's instructions.

B. Use of epoxy grout for anchorage of bolts or reinforcing dowels shall be subject to the following conditions:

   1. Use shall be limited to locations where exposure, on an intermittent or continuous basis, to acid concentrations higher than 10 percent, to chlorine gas, or to machine or diesel oils, is extremely unlikely.

   2. Use shall be limited to applications where exposure to fire or exposure to concrete or rod temperature above the product's heat deflection temperature or 120 degrees F (whichever is less) is extremely unlikely. Overhead applications (such as pipe supports) because of the above concerns shall be disallowed.

3. Approval from CITY for specific application and from supplier of equipment to be anchored is applicable.
4. Anchor diameter and grade of steel shall be per contract documents or per equipment supplier specifications. Anchor shall be threaded or deformed full length of embedment and shall be free or rust, scale, grease, and oils.
5. Embedment depth and hole diameter shall be as specified.
6. Holes shall have rough surfaces, such as can be achieved using a rotary percussion drill.
7. Holes shall be blown clean with compressed air and be free of dust or standing water prior to application of grout.
8. Anchor shall be left undisturbed and unloaded for full curing period.
9. Anchors shall not be placed on concrete below 25 degrees F.

+ + END OF SECTION + +

JOB SITE COPY
THESE PLANS SHALL BE KEPT AT THE JOBSITE AND BE AVAILABLE TO CITY OF GLENDALE INSPECTORS DURING WORKING HOURS. PLANS SHALL NOT BE ALTERED WITHOUT BUILDING OFFICIALS APPROVAL.

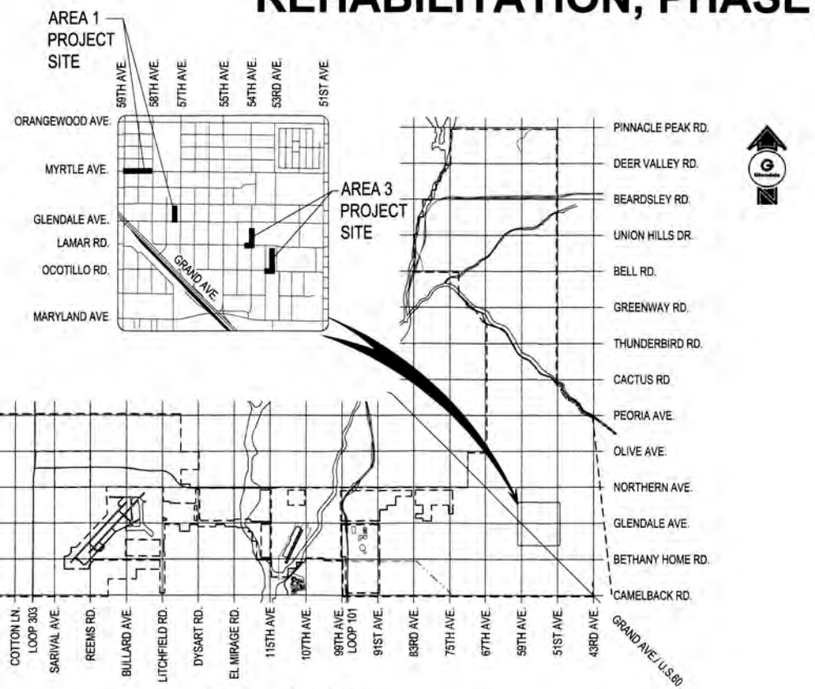
CITY OF GLENDALE

GLENDALE, ARIZONA

PROJECT # 212231

SEWER & MANHOLE REHABILITATION, PHASE 6D

Glendale
ARIZONA



VICINITY MAP

SHEET INDEX

SHT. #	
1	COVER SHEET
2	AREAS 1 & 3 KEY MAP SHEET
3	CONTROL SHEET
4	GENERAL NOTES, LEGEND, & ABBREVIATIONS
5 - 7	AREA 1 - SEWER PLAN AND PROFILE SHEET
8 - 12	AREA 3 - SEWER PLAN AND PROFILE SHEET
13	MANHOLE REHABILITATION SCHEDULE & DETAILS
14	MANHOLE DETAILS

MAYOR
JERRY P. WEIERS

CITY COUNCIL
LEANDRO BALDENEGRO
JOYCE V. CLARK
IAN HUGH
RAY MALNAR
LAUREN TOLMACHOFF
BART TURNER

CITY MANAGER
KEVIN R. PHELPS

CITY CLERK
JULIE K. BOWER

CITY ATTORNEY
MICHAEL D. BAILEY

consor 2432 W. PEORIA AVENUE, SUITE 1246 PHOENIX, AZ 85029 Phone: (602) 906-1901

PROJECT BENCHMARK:

BRASS CAP IN HANDHOLE
AT THE INTERSECTION OF 75TH AVENUE & MARYLAND AVENUE
ELEVATION = 1108.558' (NAVD88 DATUM)

APPROVED _____ DATE _____
MARICOPA COUNTY DEPARTMENT OF ENVIRONMENTAL SERVICES
PERMIT NO.

RECORD DRAWING

I certify that the locations, elevations, depths and record drawing comments accurately reflect the existing field conditions and materials actually used during construction. This certification is based on periodic field observations and the contractors representations of the facilities as constructed.

NAME _____ DATE _____

REGISTRATION NO. _____ EXP. DATE _____

REVD. BY: _____
TECHNICAL REGISTRANT

PLANS ACCEPTANCE

The City of Glendale accepts these plans for construction, as being in general compliance with plan preparation requirements of the City. Responsibility for the completeness and accuracy of the plans and related design resides with the Licensed Design Professional and Firm of Record which shall meet State of Arizona Board of Technical Registration requirements.

David D. Beard — Digitally signed by David D. Beard DN: C=US, E=dbeard@glendaleaz.com, O=City of Glendale, OU=Engineering Department, CN=David D. Beard Date: 2024.09.26 09:18:32-07'00'
CITY ENGINEER — DATE 9-26-2024

TRANSPORTATION DIRECTOR — DATE

Ron Savio
WATER SERVICES DIRECTOR — DATE 9-27-2024

Project Name
COG SEWER & MANHOLE REI

☐ APPROVED REVISIONS ☑ REVIEWED
☐ ZONING APPROVAL ONLY

BY JWALKER DATE 9/27/2024
DISCIPLINE
SUBMITTAL# 242181 SPEC

This review is only for general conformance of the project and general compliance. Corrections or comments made on these drawings during this review do not relieve Contractor/Subcontractor from compliance with the requirements of the plans and specifications. Contractor is responsible for all dimensions and fabrication to be confirmed and correlated at the job site

CITY OF GLENDALE
ENGINEERING DEPARTMENT
5850 W. GLENDALE AVE.
GLENDALE, ARIZONA 85301 (623) 930-3630

Registered Professional Engineer (Civil) 34588 MARK V. LEE 7-29-2024 Date Signed Arizona U.S.A.

Designed TPB | Drawn HC | Checked MVL

REVISIONS

No.	Date	Description

212231
SEWER & MANHOLE REHABILITATION, PHASE 6D
AREAS 1 & 3
COVER SHEET

No Scale

Contact Arizona 811 at least two full working days before you begin excavation. ARIZONA811 Call 811 or click Arizona811.com

SHT. 1 OF 14

DSC #

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THESE PLANS MUST BE KEPT AT THE CONSTRUCTION SITE AT ALL TIMES AND BE AVAILABLE TO CITY REPRESENTATIVES DURING WORKING HOURS. PLANS SHALL NOT BE ALTERED WITHOUT WRITTEN APPROVAL OF CITY OFFICIALS APPROVAL

consor
2432 W. PEORIA AVENUE, SUITE 1246
PHOENIX, AZ 85029
Phone: (602) 906-1901

KEY MAP AREA 1

KEY MAP AREA 3

LEGEND

(X) SEWER SHEET

212231

SEWER & MANHOLE REHABILITATION, PHASE 6D
AREAS 1 & 3
KEY MAP

SCALE: NONE

SHT. 2 OF 14

No.	Date	Description

REVISIONS

Designed: TPB
Drawn: HC
Checked: MVL

Registered Professional Engineer (Civil)
CERTIFICATE NO. 34588
MARK V. LEE
7-29-2024
Date Signed
ARIZONA, U.S.A.

CITY OF GLENDALE
ENGINEERING DEPARTMENT
5850 W. GLENDALE AVE.
GLENDALE, ARIZONA 85301 (623) 930-3630

Glendale

DSC # _ _ _ _ _ _

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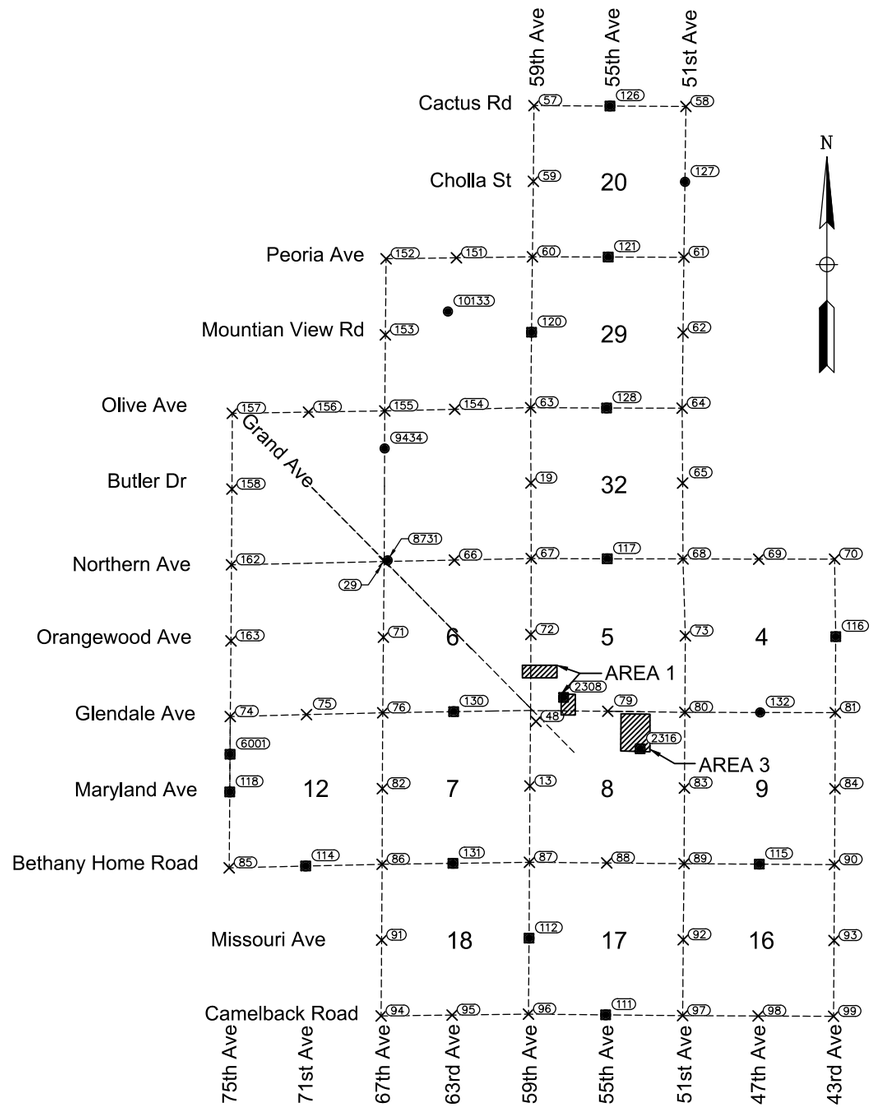
THESE PLANS SHALL BE KEPT AT THE JOBSITE AND BE AVAILABLE TO CITY OF GLENDALE INSPECTORS DURING WORKING HOURS. PLANS SHALL NOT BE ALTERED WITHOUT BUILDING OFFICIALS APPROVAL.



CONTROL PLAN

LEGEND

- BRASS CAP IN HANDHOLE
- BRASS CAP FLUSH
- SECTION OR ¼ CORNER
- AREA OF SEWER & MANHOLE REHABILITATION

PROJECT BENCH MARKS

(118) BRASS CAP IN HANDHOLE
AT THE INTERSECTION OF 75TH AVENUE & MARYLAND AVENUE
ELEVATION = 1108.558' (NAVD88 DATUM)

(111) BRASS CAP IN HANDHOLE
AT THE INTERSECTION OF 55TH AVENUE & CAMEBACK ROAD
ELEVATION = 1127.998' (NAVD88 DATUM)

(127) BRASS CAP FLUSH
AT THE INTERSECTION OF 51ST AVENUE & CHOLLA STREET
ELEVATION = 1213.778' (NAVD88 DATUM)

CONTROL COORDINATE TABLE

NO	Northing	Easting	Elevation	Description
13	920966.35	617848.09		Section or 1/4 Corner
19	931502.71	617884.4		Section or 1/4 Corner
29	928773.71	612782.82		Section or 1/4 Corner
48	923212.31	618059.63		Section or 1/4 Corner
57	944625.75	617990		Section or 1/4 Corner
58	944594.98	623271.8		Section or 1/4 Corner
59	941992.33	617968.28		Section or 1/4 Corner
60	939367.3	617935.77		Section or 1/4 Corner
61	939352.25	623202.3		Section or 1/4 Corner
62	936728.34	623172.09		Section or 1/4 Corner
63	934123.4	617874.76		Section or 1/4 Corner
64	934104.36	623140.37		Section or 1/4 Corner
65	931500.33	623157.57	1185.88	Section or 1/4 Corner
66	928822.83	615224.79		Section or 1/4 Corner
67	928876.37	617893.93		Section or 1/4 Corner
68	928864.02	623169.43		Section or 1/4 Corner
69	928856.2	625802.57		Section or 1/4 Corner
70	928855.65	628440.05		Section or 1/4 Corner
71	926140.44	612755.71		Section or 1/4 Corner
72	926235.81	617882.91		Section or 1/4 Corner
73	926187.56	623251.7		Section or 1/4 Corner
74	923381.67	607433.35		Section or 1/4 Corner
75	923451.29	610083.96	1221.71	Section or 1/4 Corner
76	923512.44	612733.23		Section or 1/4 Corner
79	923565.32	620555.1	1159.96	Section or 1/4 Corner
80	923529.58	623235.42		Section or 1/4 Corner
81	923518.95	628465.46		Section or 1/4 Corner
82	920877.33	612719.59		Section or 1/4 Corner
83	920897.88	623221.39		Section or 1/4 Corner
84	920876.89	628454.34		Section or 1/4 Corner
85	918122.51	607395.31		Section or 1/4 Corner
86	918244.36	612711.33		Section or 1/4 Corner
87	918314.96	617833.44		Section or 1/4 Corner
88	918291.44	620521.13		Section or 1/4 Corner
89	918266.02	623207		Section or 1/4 Corner
90	918233.02	628436.73		Section or 1/4 Corner
91	915608.35	612693.89		Section or 1/4 Corner
92	915621.9	623179.42		Section or 1/4 Corner
93	915594.93	628420.58		Section or 1/4 Corner
94	912971.88	612676.28		Section or 1/4 Corner
95	913002.74	615146.49		Section or 1/4 Corner
96	913035.77	617798.17		Section or 1/4 Corner
97	912982.6	623158.98		Section or 1/4 Corner
98	912971.34	625781.63		Section or 1/4 Corner
99	912959.31	628404.86		Section or 1/4 Corner
111	913008.83	620478.6	1128	Fd BC/HH
112	915675.36	617818.77	1129.69	Fd BC/HH
114	918183.44	610053.12	1113.54	Fd BC/HH
115	918249.26	625822	1154.03	Fd BC/HH
116	926159.53	628477.84	1181.65	Fd BC/HH
117	928866.29	620535.7	1171.93	Fd BC/HH
118	920758.18	607414.6	1108.56	Fd BC/HH
120	936744.94	617904.71	1179.72	Fd BC/HH
121	939360.11	620569.21	1197.41	Fd BC/HH
126	944610.41	620630.56	1213.13	Fd BC/HH
127	941974.05	623236.57	1213.78	Fd BC flush
128	934110.45	620511.61	1182	Fd BC/HH
130	923552.16	615196.58	1141.68	Fd BC/HH
131	918278.04	615171.93	1130.9	Fd BC/HH
132	923523.25	625849.88	1169.58	Fd BC flush
151	939333.69	615296.42		Section or 1/4 Corner
152	939301.42	612849.23		Section or 1/4 Corner
153	936655.91	612825.74		Section or 1/4 Corner
154	934064.97	615237.46		Section or 1/4 Corner
155	934010.13	617807.22		Section or 1/4 Corner
156	933968.26	610157.65		Section or 1/4 Corner
157	933925.95	607503.99		Section or 1/4 Corner
158	931291.9	607490.56		Section or 1/4 Corner
162	928659.11	607473.77		Section or 1/4 Corner
163	926013.31	607456.95		Section or 1/4 Corner
2308	924048.27	619016.55	1153.35	Fd BCHH (Area 1)
2316	922258.43	621680.05	1158.06	Fd BCHH (Area 3)
6001	922069.97	607423.99	1111.51	Fd BCHH (Area 6)
8731	928810.52	612899.48	1144.93	Fd BCF AZHIGHWAY (Area 7 & 8)
9434	932701.49	612797.26	1151.49	Fd BCF (Area 9)
10133	937463.78	614997.46	1174.15	Fd BCF (Area 10)

consor
2432 W. PEORIA AVENUE, SUITE 1246
PHOENIX, AZ 85029
Phone: (602) 906-1901

CITY OF GLENDALE
ENGINEERING DEPARTMENT
5850 W. GLENDALE AVE.
GLENDALE, ARIZONA 85301 (623) 930-3630

Designed TPB | Drawn HC | Checked MVL

No.	Date	Description
		REVISIONS

212231
SEWER & MANHOLE REHABILITATION, PHASE 6D
AREAS 1 & 3
CONTROL SHEET

SCALE:
1"=2500' HORZ.

Contact Arizona 811 at least two full working days before you begin excavation
Call 811 or click Arizona811.com

SHT. 3
OF 14

DSC #

JOB SITE COPY
THESE PLANS SHALL BE KEPT AT THE JOBSITE AND BE AVAILABLE TO CITY OF GLENDALE INSPECTORS DURING WORKING HOURS. PLANS SHALL NOT BE ALTERED WITHOUT BUILDING OFFICIALS APPROVAL.

GENERAL NOTES FOR CONSTRUCTION

A. ALL CONSTRUCTION SHALL CONFORM TO THE LATEST MAG STANDARD DETAILS AND SPECIFICATIONS AND THE CITY'S CURRENT ENGINEERING DESIGN AND CONSTRUCTION STANDARDS.

B. THIS SET OF PLANS HAS BEEN REVIEWED FOR COMPLIANCE WITH CITY REQUIREMENTS PRIOR TO ISSUANCE OF CONSTRUCTION PERMITS. HOWEVER, SUCH REVIEW AND ACCEPTANCE SHALL NOT PREVENT THE CITY FROM REQUIRING CORRECTION OF ERRORS IN SAID PLANS AND/OR CONSTRUCTION WHEN IN VIOLATION OF ANY LAWS, ORDINANCES, CODES OR STANDARDS THAT ARE IN EFFECT. REVIEW AND ACCEPTANCE OF PLANS DOES NOT RELEASE A DEVELOPER OR ENGINEER FROM RESPONSIBILITY FOR ERRORS OR OMISSIONS ON SAID PLANS.

C. THE CITY DOES NOT WARRANT ANY QUANTITIES SHOWN ON THESE PLANS.

D. THE CITY PLANS ACCEPTANCE IS FOR GENERAL LAYOUT IN THE RIGHT-OF-WAY ONLY. THIS ACCEPTANCE IS VALID FOR A PERIOD OF SIX MONTHS. CONSTRUCTION PERMITS SHALL BE OBTAINED DURING THIS PERIOD OR THE PLANS SHALL BE RESUBMITTED FOR REVIEW.

E. A CITY ACCEPTED SET OF PLANS SHALL BE AVAILABLE ON THE JOB SITE AT ALL TIMES.

F. THE CITY SHALL BE NOTIFIED 48 HOURS PRIOR TO ANY CONSTRUCTION WORK. CONSTRUCTION WORK CONCEALED WITHOUT INSPECTION BY THE CITY SHALL BE SUBJECT TO EXPOSURE AT THE CONTRACTOR'S EXPENSE.

G. A RIGHT-OF-WAY CONSTRUCTION PERMIT IS REQUIRED FOR ALL WORK WITHIN THE PUBLIC RIGHT-OF-WAY OR WITHIN A CITY EASEMENT. A 100% PERFORMANCE BOND OR EQUIVALENT FORM OF FINANCIAL SURETY MAY BE REQUIRED FOR ALL WORK WITHIN THE RIGHT-OF-WAY PRIOR TO THE ISSUANCE OF ANY RIGHT-OF-WAY CONSTRUCTION PERMIT(S). ALL WORK WITHIN THE RIGHT-OF-WAY SHALL BE INSPECTED AND APPROVED BY THE CITY'S ENGINEERING DIVISION.

H. IMPROVEMENTS SHALL NOT BE ACCEPTED UNTIL "AS-BUILT" PLANS AND ELECTRONIC (AUTOCAD) FILES HAVE BEEN SUBMITTED AND APPROVED BY THE CITY.

I. THE DEVELOPER IS RESPONSIBLE FOR ALL COSTS AND WORK RELATED TO THE REMOVAL, RELOCATION OR ABANDONMENT OF ALL OBSTRUCTIONS AND/OR UTILITIES WITHIN THE RIGHT-OF-WAY THAT CONFLICT WITH THE NEW IMPROVEMENTS.

J. THE DEVELOPER IS RESPONSIBLE FOR OBTAINING OR DEDICATING ALL REQUIRED RIGHTS-OF-WAY AND EASEMENTS TO THE CITY PRIOR TO ISSUANCE OF THE BUILDING'S CERTIFICATE OF OCCUPANCY.

K. THE CONTRACTOR SHALL CONTACT BLUE STAKE (602-263-1100) 48 HOURS PRIOR TO CONSTRUCTION.

L. THE CONTRACTOR SHALL BARRICADE CONSTRUCTION SITES AT ALL TIMES PER THE CITY OF PHOENIX TRAFFIC BARRICADE MANUAL. WHEN REQUIRED BY THE CITY, A TRAFFIC CONTROL PLAN SHALL BE SUBMITTED FOR APPROVAL A MINIMUM OF 72 HOURS IN ADVANCE OF CONSTRUCTION.

M. THE CONTRACTOR MAY OBTAIN A FIRE HYDRANT METER FOR CONSTRUCTION WATER FROM THE CITY WATER SERVICES DEPARTMENT. THE UNLAWFUL REMOVAL OF WATER FROM A FIRE HYDRANT IS A VIOLATION OF THE MUNICIPAL CODE, PUNISHABLE BY FINE AND/OR IMPRISONMENT.

N. DAMAGE CAUSED BY THE DEVELOPER DURING CONSTRUCTION TO CITY INFRASTRUCTURE OR FACILITIES SHALL BE REPAIRED OR REPLACED BY THE DEVELOPER, AT HIS EXPENSE, IN A MANNER ACCEPTABLE TO THE CITY.

O. THERE SHALL BE NO DIRT RAMPS OVER SIDEWALKS DURING CONSTRUCTION.

P. AN AZPDES PERMIT IS REQUIRED FOR ALL CONSTRUCTION THAT DISTURBS LAND OVER ONE (1) ACRE IN SIZE. PRIOR TO START OF ANY CONSTRUCTION, THE CONTRACTOR SHALL SUBMIT A NOTICE OF INTENT (NOI) TO THE ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY (ADEQ) AND A COPY TO THE CITY OF GLENDALE AND HAVE A COPY OF THE SWPPP ON SITE AT ALL TIMES.

Q. PRIVATE ON-SITE WATER AND SEWER LINES SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE UNIFORM PLUMBING CODE AS ADOPTED BY THE CITY.

R. THE CONTRACTOR SHALL REPLACE ALL PAVEMENT MARKINGS DAMAGED DURING CONSTRUCTION, PER THE THERMOPLASTIC PAVEMENT MARKING SPECIFICATIONS INCLUDED WITH THIS PROJECT.

S. THE CONTRACTOR SHALL REPLACE ALL TRAFFIC SIGNAL LOOP DETECTORS DAMAGED DURING CONSTRUCTION PER THE CITY OF GLENDALE DETAILS TS-1, TS-2 AND TS-3. SUCH WORK IS A NON-PAY ITEM.

T. IN AREAS WHERE THERE IS ASPHALT BEING REPLACED, THE CONTRACTOR SHALL BE RESPONSIBLE TO RE-STRIPE ANY EXISTING STRIPING EFFECTED BY THE PROJECT WITH 90 MIL THERMOPLASTIC PAINT.

U. ANY SIGNING (SIGN, POST, BASE POST) DAMAGED BY THE CONTRACTOR DURING THE PROJECT ACTIVITIES ON THIS PROJECT SHALL BE REPLACED WITH NEW PARTS THAT ADHERE TO THE CITY'S SIGNING REQUIREMENTS.

V. CONTRACTOR TO IDENTIFY LOCATION OF ALL UTILITIES POTENTIALLY IN CONFLICT PRIOR TO CONSTRUCTION, WITH A WRITTEN APPROVAL FROM THE ENGINEER OF RECORD BEFORE PROCEEDING.

COX COMMUNICATIONS NOTES

1. A MINIMUM OF 90 DAY ADVANCE NOTICE IS REQUIRED BY COX COMMUNICATIONS TO RELOCATE THEIR FACILITIES.
2. ALL COSTS TO RELOCATE SHALL BE AT THE EXPENSE OF THE DEVELOPER/CUSTOMER.
3. WHEN CROSSING COX COMMUNICATIONS FACILITIES THE CONTRACTOR SHALL POTHOLE TO DETERMINE DEPTH AND MAINTAIN A MINIMUM OF 12 INCHES OF VERTICAL AND HORIZONTAL SEPARATION FROM THE PROPOSED FACILITY. SUPPORT AND PROTECT ALL COX COMMUNICATIONS FACILITIES DURING CONSTRUCTION.
4. AVOID UNNECESSARY DAMAGES AND CALL 811 BEFORE DIGGING OR TRENCHING. CONTACTING 811 FOR LOCATION OF COX COMMUNICATIONS FACILITIES MUST BE COMPLETED PRIOR TO ANY CONSTRUCTION AND FAILURE TO DO SO MAY RESULT IN CITY, STATE, AND/OR FEDERAL VIOLATIONS.
5. PROTECT IN PLACE FACILITIES (VAULTS, HANDHOLE, MANHOLES, FIBER CABINET, POWER SUPPLY, SERVICE DROPS AND/OR SURFACE MOUNTS) WITHIN PROJECT VICINITY.

ABBREVIATIONS

ACBC	ASPHALT CEMENT BASE COURSE
ACP	ASPHALT CEMENT PAVING
ACSC	ASPHALT CEMENT SURFACE COURSE
ADOT	ARIZONA DEPARTMENT OF TRANSPORTATION
AZHWY	ARIZONA STATE HIGHWAY
BC	BRASS CAP
BCF	BRASS CAP FLUSH
BCHH	BRASS CAP IN HANDHOLE
C	CONCRETE
CCTV	CLOSED CIRCUIT TELEVISION
℄	CENTER LINE
COMM	COMMUNICATION
CLSM	CONTROLLED LOW STRENGTH MATERIAL
CIP	CAST IRON PIPE
CIPP	CURED IN PLACE PIPE
CO	CLEANOUT
CONC	CONCRETE
CONT	CONTINUOUS
DIP	DUCTILE IRON PIPE
DTL	DETAIL
D/W	DRIVEWAY
ELEC	ELECTRIC
ELEV	ELEVATION
EX	EXISTING
HORIZ	HORIZONTAL
HDD	HORIZONTAL DIRECTION DRILLING
HDPE	HIGH DENSITY POLYETHYLENE
ICV	IRRIGATION CONTROL VALVE
INV	INVERT
IP	IRON PIPE IN HANDHOLE
MH	MANHOLE
M	MONUMENT LINE
MSA	MISCELLANEOUS SURVEY ABANDONED
NPI	NON PAY ITEM
OHE	OVERHEAD ELECTRIC
P	PAVEMENT
P.I.P.	PROTECT IN PLACE
PVC	POLYVINYL CHLORIDE
R/W	RIGHT-OF-WAY
SLC	SERVICE LATERAL CONNECTION
STA	STATION
STD	STANDARD
SWR	SEWER
TBM	TEMPORARY BENCH MARK
TCE	TEMPORARY CONSTRUCTION EASEMENT
TEL	TELEPHONE
TYP	TYPICAL
UNK	UNKNOWN DIMENSION
UON	UNLESS OTHERWISE NOTED
VCP	VITRIFIED CLAY PIPE
VERT	VERTICAL
WTR	WATER

GENERAL NOTES FOR STREET CONSTRUCTION

A. THE DEVELOPER/CONTRACTOR IS RESPONSIBLE FOR PAYING PERMIT FEES PRIOR TO CONSTRUCTION OF ANY STREET IMPROVEMENTS.

B. THE PAVING CONTRACTOR IS RESPONSIBLE FOR OBTAINING WATER AND SEWER AS-BUILT PLANS BEFORE START OF CONSTRUCTION TO DETERMINE THE LOCATION OF ALL EXISTING UTILITY FRAMES AND COVERS THAT MUST BE ADJUSTED TO FINISH GRADE.

C. THE PAVING CONTRACTOR SHALL NOT START CONSTRUCTION UNTIL CONFLICTING UNDERGROUND UTILITY CONSTRUCTION IS COMPLETED AND SERVICE STUBS TO ALL LOTS HAVE BEEN ADEQUATELY EXTENDED TO THE RIGHT-OF-WAY OR EASEMENT LINE.

D. IF THE EXISTING PAVEMENT DOES NOT MEET CITY REQUIREMENTS, THE DEVELOPER WILL BE REQUIRED TO REMOVE AND REPLACE THE PAVEMENT TO STREET CENTERLINE. THE CITY SHALL DETERMINE THE EXACT LIMITS OF PAVEMENT TO BE REMOVED AND REPLACED.

E. ALL EXISTING STREET MONUMENTS MUST BE PRESERVED. PRIOR TO CONSTRUCTION, MONUMENTS WILL BE REFERENCED HORIZONTALLY AND VERTICALLY. AFTER CONSTRUCTION, MONUMENTS SHALL BE RESET AND ANY NEW INFORMATION SHALL BE REFLECTED ON THE AS-BUILT PLANS.

F. THE MAXIMUM STAKE INTERVAL FOR GRADES OF 0.2% OR LESS SHALL BE 25 FEET FOR CONCRETE WORK AND 50 FEET FOR ASPHALT ROADWAY SECTION, EXCEPT ON HORIZONTAL OR VERTICAL CURVES WHERE A MAXIMUM STAKE INTERVAL OF 20 FEET FOR CONCRETE WORK SHALL BE REQUIRED. ALL CURB RETURNS SHALL BE STAKED AT THE P.C. AND THE MIDPOINT OF THE RETURN. NO GRADE STAKE INTERVAL SHALL EXCEED 50 FEET.

G. THE DEVELOPER IS RESPONSIBLE FOR THE INSTALLATION OF ALL NEW PAVEMENT MARKINGS AND THE REMOVAL OF ALL EXISTING PAVEMENT MARKING THAT ARE IN CONFLICT WITH THE NEW PAVEMENT MARKINGS.

H. NO PERSON SHALL USE ANY MECHANICAL EQUIPMENT FOR CLEARING, GRUBBING, ROAD CONSTRUCTION, TRENCHING, EXCAVATING, DEMOLITION OR ENGAGE IN ANY EARTHMOVING ACTIVITY WITHOUT FIRST OBTAINING A DUST CONTROL PERMIT FROM AIR POLLUTION CONTROL, MARICOPA COUNTY DEPARTMENT OF ENVIRONMENTAL SERVICES.

I. CONTRACTOR IS RESPONSIBLE FOR PAVEMENT REPLACEMENT AND REQUIRED TREATMENT IN ACCORDANCE WITH THE MOST RECENT GLENDALE PAVEMENT ORDINANCE.

GENERAL NOTES FOR SEWER MAIN CONSTRUCTION

A. THE DEVELOPER/CONTRACTOR IS RESPONSIBLE FOR PAYING PERMIT FEES PRIOR TO CONSTRUCTION OF ANY SEWER LINES.

B. MAG STANDARD DETAIL 404 SHALL APPLY WHETHER SHOWN ON THE APPROVED PLANS OR NOT.

C. CONFLICTS WITH THE EXISTING UTILITIES DISCOVERED DURING CONSTRUCTION SHALL BE CALLED TO THE ATTENTION OF THE CITY AND RESOLVED PRIOR TO PROCEEDING.

D. LOCATION OF ALL MANHOLES AND CLEANOUTS MUST BE REFERENCED AT ALL TIMES DURING CONSTRUCTION AND MADE AVAILABLE TO THE CITY'S WATER SERVICES DEPARTMENT.

E. ALL NEW SEWER MAINS SHALL BE INSPECTED BY CLOSED CIRCUIT TELEVISION METHODS ACCEPTABLE TO THE CITY. ANY DEFECTS DISCOVERED DURING TELEVISED INSPECTION SHALL BE CORRECTED AND RE-TELEVISED AT NO COST TO THE CITY. VIDEOTAPES OR CDS OF ALL TELEVISED INSPECTIONS SHALL BE PROVIDED TO THE CITY PRIOR TO FINAL ACCEPTANCE OF THE SEWER MAIN. THE TELEVISED INSPECTION WILL BE AFTER THE INSTALLATION OF DRY UTILITIES AND PAVING.

F. BEDDING AND BACKFILL OF ALL SEWER MAINS AND SERVICES IN CITY RIGHTS-OF-WAY OR EASEMENTS SHALL FOLLOW CITY OF GLENDALE STANDARD DETAIL G-690.

G. NO PERSON SHALL USE ANY MECHANICAL EQUIPMENT FOR CLEARING, GRUBBING, ROAD CONSTRUCTION, TRENCHING, EXCAVATING, DEMOLITION OR ENGAGE IN ANY EARTHMOVING ACTIVITY WITHOUT FIRST OBTAINING A DUST CONTROL PERMIT FROM AIR POLLUTION CONTROL, MARICOPA COUNTY DEPARTMENT OF ENVIRONMENTAL SERVICES.

H. PERFORM A DEFLECTION TEST OF THE TOTAL LENGTH OF ALL SEWER LINES MADE OF FLEXIBLE MATERIALS TO ENSURE THAT THE INSTALLATION MEETS OR EXCEEDS THE MANUFACTURER'S RECOMMENDATIONS AND RECORD THE RESULTS. (R18-9-E301.D.2.i / MAG 615.11)

I. TEST EACH SEGMENT OF THE SEWER LINE FOR LEAKAGE USING THE APPROPRIATE ASTM TEST FOR THE PIPE MATERIAL. (R18-9-E301.D.2.j / MAG 615.11)

J. EACH MANHOLE WILL BE TESTED ACCORDING TO R18-9-E301.D.3.e AND f.

K. CONTRACTOR SHALL VERIFY LOCATION OF EXISTING SEWER SERVICE CONNECTIONS PRIOR TO CONSTRUCTION.

SOUTHWEST GAS NOTES

1. GAS PIPING COATING/WRAPPING MAY CONTAIN ASBESTOS. CONFLICTING PIPING MUST BE REMOVED BY ONE OF SOUTHWEST GAS CORPORATION'S NESHAP CERTIFIED CONTRACTORS. THE CERTIFIED CONTRACTORS WILL REMOVE THE PIPE DURING THE WORK HOURS OF 7:00 AM TO 3:30 PM, MONDAY THROUGH FRIDAY. THE COSTS OF THE CERTIFIED NESHAP CONTRACTORS, ABANDONMENT MATERIALS, STORAGE AND TRANSPORTATION SHALL BE AT THE COST OF THE CONTRACTOR. THE CONTRACTOR SHALL EXCAVATE TO WITHIN 1 FOOT OF THE EXISTING GAS PIPING TO BE REMOVED. THE CONTRACTOR SHALL PROVIDE SHORING, PLATING, TRAFFIC CONTROL AND COORDINATION AS REQUIRED FOR SOUTHWEST GAS CORPORATION TO REMOVE THE GAS PIPING. THE CONTRACTOR SHALL CONTACT SOUTHWEST GAS CORPORATION AT LEAST ONE WEEK PRIOR TO CONSTRUCTION AT 602-484-5256 TO COORDINATE THE REMOVAL OF THE ABANDONED PIPE. TO HAVE SMALL SECTIONS OF 10 FOOT OR LESS OF POTENTIALLY CONFLICTING GAS PIPING REMOVED THE CONTRACTOR SHALL CONTACT SOUTHWEST GAS CORPORATION AT 602-271-4277.
2. DURING PROJECT CONSTRUCTION ALL GAS PIPELINE VALVES, LINE LOCATING STATIONS, TEST POINTS, UNDERGROUND VAULTS SHALL BE KEPT ACCESSIBLE AT ALL TIMES.
3. CONTACT SOUTHWEST GAS FOR EMERGENCIES AT 1-800-528-4277.
4. ONCE MECHANICAL TRENCHING IS IN PROGRESS, DO NOT ATTEMPT TO TRENCH WITHIN TWO FEET OF A GAS PIPE. THE TRENCHING SHALL BE DONE BY HAND IN ORDER TO PREVENT ANY DAMAGE TO THE GAS PIPE. IN THE EVENT THE CONTRACTOR SHOULD "HOOK" OR OTHERWISE STRAIN A GAS PIPE WHILE EXCAVATING, A CALL SHOULD BE PLACED TO (602)271-GASS (4277).
5. WHEN EXCAVATIONS ARE COMPLETE, ALL EXPOSED GAS PIPES SHALL BE PROTECTED. IF LEFT UNATTENDED, THE EXPOSED PIPE SHALL BE SURROUNDED WITH AT LEAST 6 INCHES BELOW AND 6 INCHES ABOVE WITH PORTLAND CEMENT CONCRETE FINE AGGREGATE SAND. IF THE TRENCH IS MORE THAN 3 FEET WIDE, THE PIPE MUST BE SUPPORTED IN A MANNER WHERE THE SUPPORTING MATERIAL DOES NOT DAMAGE THE PIPE OR THE PROTECTIVE WRAPPING. CONTACT SOUTHWEST GAS ENGINEERING AT 480-730-3855 TO REVIEW AND APPROVE ALL PROPOSED PIPE SUPPORT DESIGNS.
6. WHEN BACKFILLING, SOUTHWEST GAS REQUIRES BOTH SIX INCHES OF BEDDING AND SIX INCHES OF SHADING WITH SAND OR MATERIAL FREE OF ROCKS AND ABLE TO PASS THROUGH A 3/8 INCH SCREEN. DO NOT DROP BACKFILL DIRECTLY OVER THE GAS PIPE. DURING THE COMPACTION PROCESS, USE EXTRA CARE WHEN DIRECTLY OVER THE GAS PIPE IN ORDER TO AVOID AND DAMAGE.

LEGEND

- EXISTING EDGE OF VEGETATION
- EXISTING TREE TO REMAIN
- EXISTING SAGUARO CACTUS
- EXISTING PALM TREE
- EXISTING STREET SIGN
- EXISTING TRAFFIC SIGN
- EXISTING UTILITY POLE
- EXISTING GAS METER
- EXISTING MAIL BOX
- EXISTING GUY ANCHOR
- EXISTING STREET LIGHT
- EXISTING MANHOLE
- EXISTING VALVE
- EXISTING FIRE HYDRANT
- EXISTING WATER METER
- EXISTING SEWER MANHOLE
- EXISTING TRAFFIC SIGNAL
- EXISTING TELEPHONE BOX
- EXISTING GAS METER
- EXISTING ELECTRIC BOX
- PAVEMENT REPLACEMENT TYPE AND SQ. YD. QUANTITY PER M.A.G. DETAIL 200 & COG STD DTL G-319, COP STD DTL P-1200, OR ADOT STD DTL C-07.06 PER AGENCY ROW
- BACKFILL TYPE - SEE CITY OF GLENDALE STD DTL G-690 FOR COG ROW, MAG SPECIFICATIONS FOR COP ROW OR ADOT SPECIFICATIONS FOR ADOT ROW
- EXISTING CONCRETE SIDEWALK
- EXISTING DRIVEWAY
- EXISTING BRICK/PAVERS
- EXISTING RAILROAD
- EXISTING WIRE FENCE
- EXISTING MASONRY FENCE
- EXISTING CONCRETE CURB
- EXISTING EDGE OF PAVEMENT
- EXISTING CONTOUR LINE
- PROPERTY LINE
- RIGHT-OF-WAY LINE
- EASEMENT LINE
- CENTER LINE
- DISTRICT BOUNDARY OR CITY LIMITS
- EXISTING UNDERGROUND ELECTRICAL
- EXISTING OVERHEAD ELECTRICAL
- EXISTING TELEPHONE BURIED CABLE
- EXISTING CABLE TV
- EXISTING UNDERGROUND FIBER OPTIC
- EXISTING GAS LINE & SIZE
- EXISTING IRRIGATION LINE & SIZE (SMALLER THAN 18")
- EXISTING SEWER LINE (SMALLER THAN 18")
- EXISTING STORM DRAIN LINE (SMALLER THAN 18")
- EXISTING WATER LINE & SIZE (SMALLER THAN 18")
- EXISTING IRRIGATION LINE & SIZE (18" OR LARGER)
- EXISTING SEWER LINE & SIZE (18" OR LARGER)
- EXISTING STORM DRAIN LINE & SIZE (18" OR LARGER)
- EXISTING WATER LINE & SIZE (18" OR LARGER)
- NEW SEWER LINE
- EXISTING SEWER LINE WITH CIPP LINING IN PROFILE VIEW
- EXISTING SEWER MANHOLE TO BE REHABILITATED

consor
2432 W. PEORIA AVENUE, SUITE 1246
PHOENIX, AZ 85029
Phone: (602) 906-1901

CITY OF GLENDALE
ENGINEERING DEPARTMENT
5850 W. GLENDALE AVE.
GLENDALE, ARIZONA 85301 (623) 930-3630

Registered Professional Engineer (Civil) CERTIFICATE NO. 14588 MARK V. LEE 7-31-2024 Date Signed ARIZONA U.S.A.

Designed	Drawn	Checked
TPB	HC	MVL

No.	Date	Description
		REVISIONS

212231
SEWER & MANHOLE REHABILITATION, PHASE 6D
GENERAL NOTES, LEGEND & ABBREVIATIONS

SCALE:
NO SCALE

Contact Arizona 811 at least two full working days before you begin excavation
ARIZONA 811
Call 811 or click Arizona811.com

SHT. 4
OF 14

DSC #

PEC JOB NO.: W231441AZ FILE NAME: Base Bid 12C 161764-Notes 04.DWG PLOTTING DATE: - REVISION DATE: - AUTOCAD VER.: 2019

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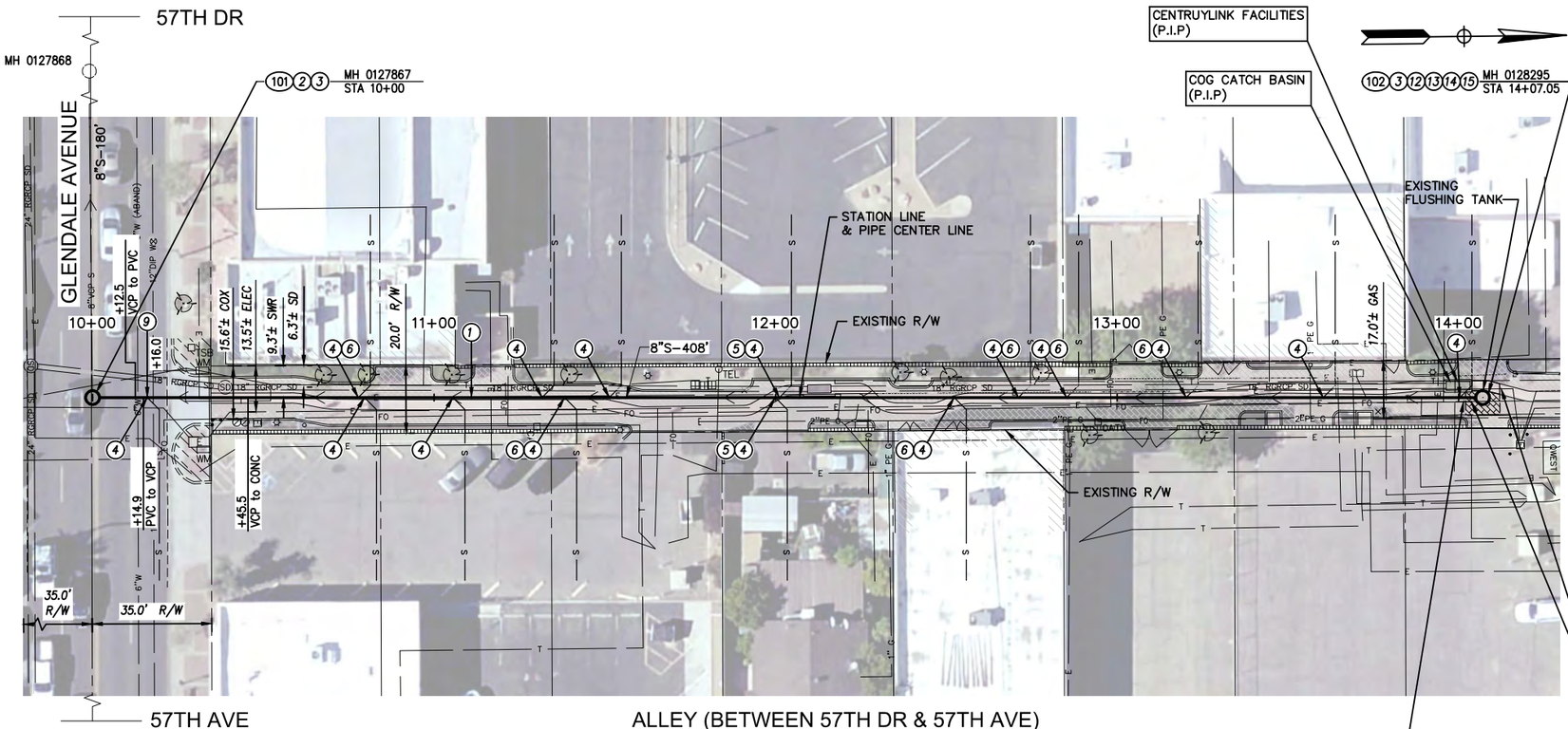
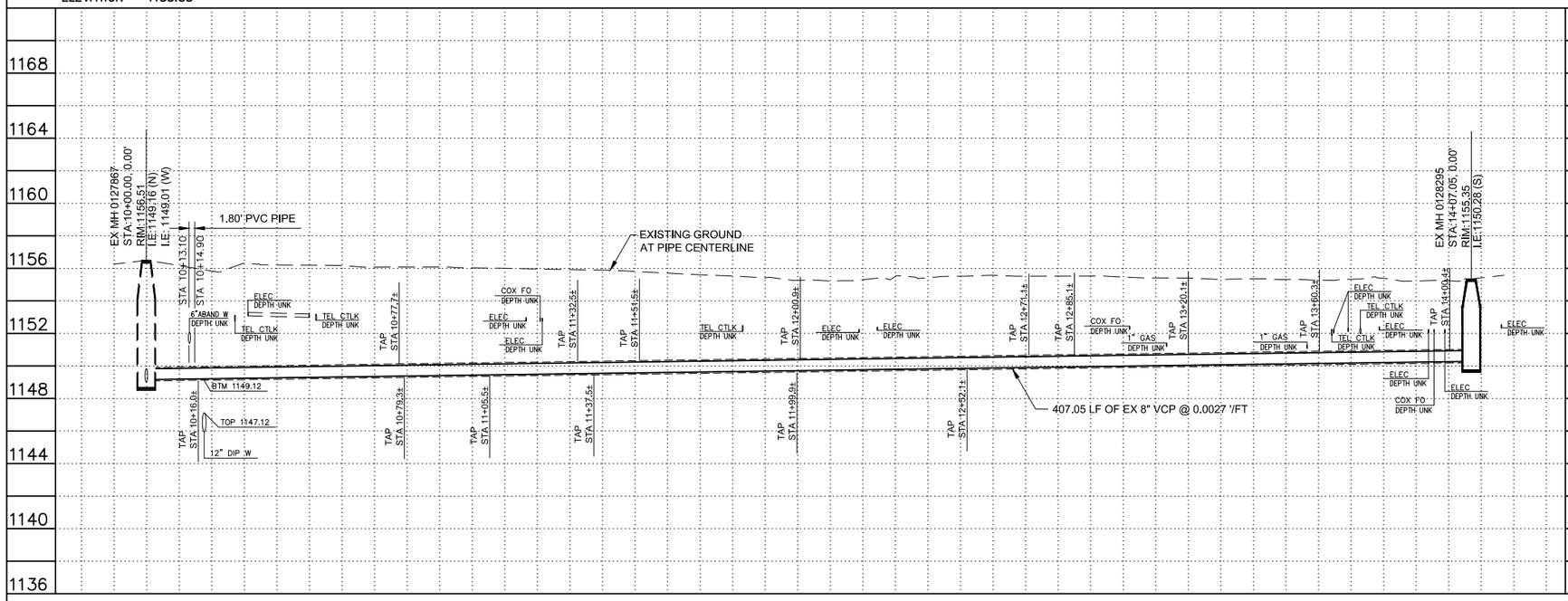


TEMPORARY BENCHMARK
BRASS CAP IN HANDHOLE AT INTERSECTION OF 57TH DRIVE & GLENN DRIVE
ELEVATION = 1153.35



CONSTRUCTION NOTES

(1)	CLEAN EXISTING 8" PIPE, INSTALL CIPP LINER PER SPECIFICATIONS NO. 02767	407 LF
(2)	REHABILITATE MANHOLE PER SCHEDULE DTL 1 ON SHT 13	1 EA
(3)	TERMINATE CIPP LINER AT MANHOLE WITH END SEAL & TAPER PER DTL 6 ON SHT 14 OR CIPP LINE THROUGH MANHOLE AND CUT OUT ACCESS HOLE AT BENCH AND SEAL EDGES PER DTL 7 ON SHT 14.	2 EA
(4)	CUT & REMOVE CIPP COUPON TO REINSTATE ALL TAPS STA 10+16.0 STA 10+77.7 STA 10+79.3 STA 11+05.5 STA 11+32.5 STA 11+37.5 STA 11+51.5 STA 11+99.9 STA 12+00.9 STA 12+52.1 STA 12+71.1 STA 12+85.1 STA 13+20.1 * STA 13+60.3 * STA 14+00.4	15 EA
(5)	INSTALL SLC SEAL STA 11+99.9 STA 12+00.9	2 EA
(6)	TRIM INTRUDING TAP FLUSH WITH PIPE WALL PRIOR TO CIPP INSTALLATION STA 10+77.7 STA 11+37.5 STA 12+52.1 STA 12+71.1 STA 12+85.1 STA 13+20.0	6 EA
(9)	POSSIBLE SAG IN PIPE; ADDITIONAL INVESTIGATION REQUIRED	1 EA
(12)	REMOVE & DISPOSE OF EXISTING MANHOLE AND FLUSHING TANK	1 EA
(13)	CONSTRUCT 5' DIA. MANHOLE PER MAG STD DTL 420-1, TYPE A; 30" FRAME AND COVER PER MAG STD DTL 423-2 AND COG STD DTL G-704 & COG 7.32; NO STEPS COAT INTERIOR OF MANHOLE WITH APPROVED CORROSION RESISTANT COATING PER SPECIFICATIONS; SEE GENERAL NOTES FOR SEWER MAIN CONSTRUCTION ON SHEET 4 FOR ADDITIONAL INFORMATION. (MH 0128295) STA 14+07.05	1 EA
(14)	REMOVE & REPLACE UNIT PAVERS IN KIND AND PATTERN	55 SF
(15)	REMOVE & REPLACE CONC VALLEY GUTTER IN KIND	25 SF

* ESTIMATED LOCATION

COORDINATE TABLE

NO.	NORTHING	EASTING	DESCRIPTION
101	923576.93	619202.51	MH 0127867
102	923983.95	619207.23	MH 0128295

NOTES:
1. CONTRACTOR TO VERIFY LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.
2. CONTRACTOR SHALL RESTORE ALL PAVEMENT STRIPING AND MARKINGS REMOVED OR DAMAGED TO MATCH EXISTING STRIPING CONFIGURATION. CONTRACTOR IS RESPONSIBLE TO DOCUMENT AND MATCH EXISTING PAVEMENT STRIPING AND MARKINGS.

CITY OF GLENDALE
ENGINEERING DEPARTMENT
5850 W. GLENDALE AVE.
GLENDALE, ARIZONA 85301 (623) 930-3630

Registered Professional Engineer (Civil) CERTIFICATE NO. 34588 MARK V. LEE 7-25-2024 Date Signed ARIZONA U.S.A.

Designed	Drawn	Checked
TPB	HC	MVL

No.	Date	Description
		REVISIONS

212231
SEWER & MANHOLE REHABILITATION, PHASE 6D
AREA 1
SEWER PLAN & PROFILE

SCALE:
1"=20' HORZ.
1"=4' VERT.

Contact Arizona 811 at least two full working days before you begin excavation
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consor 2432 W. PEORIA AVENUE, SUITE 1246
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Phone: (602) 906-1901

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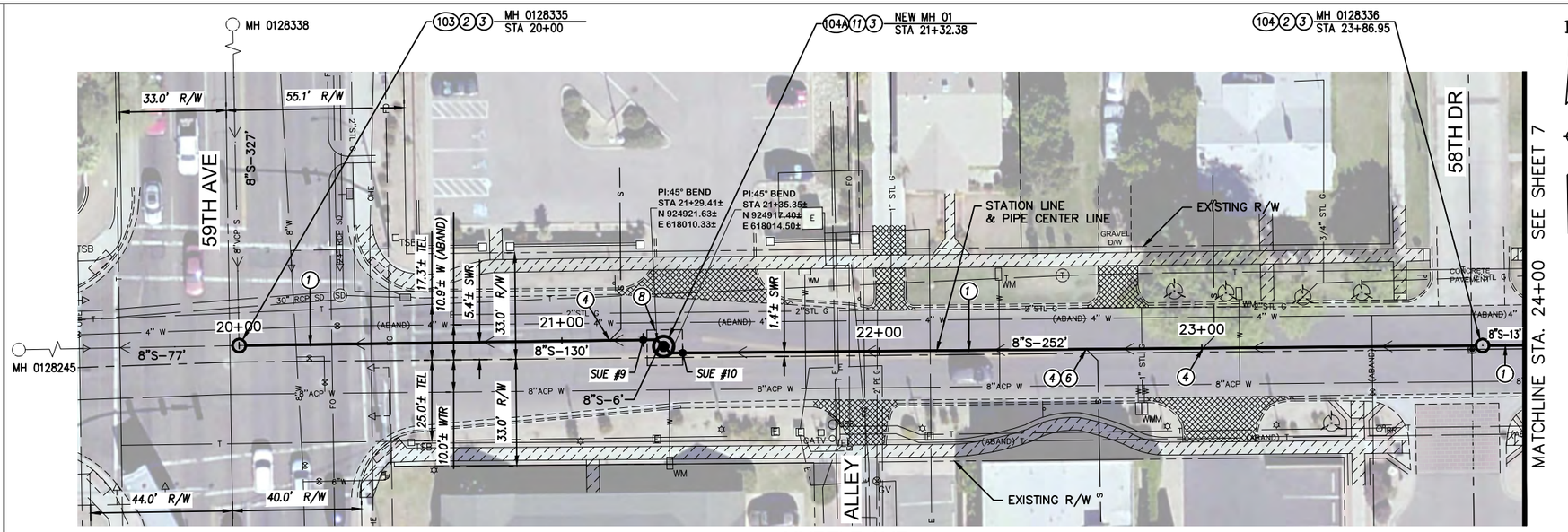


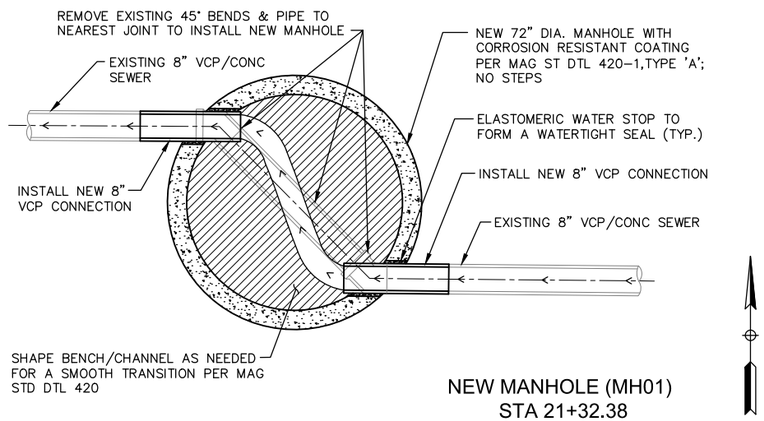
MYRTLE AVE

SUBSURFACE UTILITY EXPLORATION (SUE) TABLE

#	STATION, OFFSET DESCRIPTION, MATERIAL	ELEVATION
9	21+25.2, 0.0' COG 8" VCP Sewer	T.O.U. 1149.14 B.O.U. 1148.31
10	21+39.1, 0.0' COG 8" ACP Sewer	T.O.U. 1149.14 B.O.U. 1148.36

TEMPORARY BENCHMARK

BRASS CAP IN HANDHOLE AT INTERSECTION OF 57TH DRIVE & GLENN DRIVE
ELEVATION = 1153.35



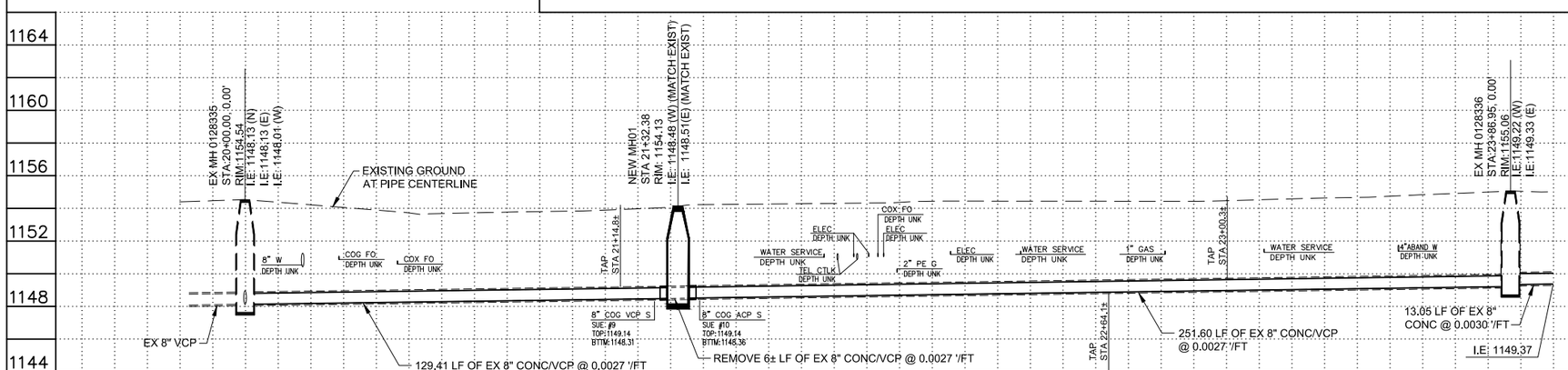
NEW MANHOLE (MH01)
STA 21+32.38
SCALE: ½"=1'-0"

NOTES:

1. CONTRACTOR TO VERIFY EXISTING PIPE LOCATIONS PRIOR TO CONSTRUCTION OF MANHOLE. NOTIFY ENGINEER OF ANY DISCREPANCIES.
2. REMOVE EXISTING 8" PIPE AS NECESSARY TO CONSTRUCT MANHOLE, CORE DRILL AND CONNECT PIPE.

CONSTRUCTION NOTES

(1)	CLEAN EXISTING 8" PIPE, INSTALL CIPP LINER PER SPECIFICATIONS NO. 02767	400 LF
(2)	REHABILITATE MANHOLE PER SCHEDULE DTL 1 ON SHT 13	2 EA
(3)	TERMINATE CIPP LINER AT MANHOLE WITH END SEAL & TAPER PER DTL 6 ON SHT 14 OR CIPP LINE THROUGH MANHOLE AND CUT OUT ACCESS HOLE AT BENCH AND SEAL EDGES PER DTL 7 ON SHT 14.	3 EA
(4)	CUT & REMOVE CIPP COUPON TO REINSTATE ALL TAPS STA 21+14.8 STA 22+64.1 STA 23+00.3	3 EA
(6)	TRIM INTRUDING TAP FLUSH WITH PIPE WALL PRIOR TO CIPP INSTALLATION STA 22+62.4	1 EA
(8)	REMOVE & REPLACE ASPHALT PAVEMENT PER MAG STD DTL 200 & COG STD DTL G-319	13 SY
(11)	REMOVE EXISTING 45° BENDS AND PIPE AS NEEDED TO INSTALL NEW 6' DIA MANHOLE PER MAG STD DTL 420-1, TYPE A & DETAIL ON THIS SHEET; 30" FRAME AND COVER PER MAG STD DTL 424-2 AND COG STD DTL G-704 & COG 7.32; NO STEPS COAT INTERIOR OF MANHOLE WITH APPROVED CORROSION RESISTANT COATING PER SPECIFICATIONS; (MH01) STA 21+32.38	1 EA



COORDINATE TABLE

NO.	NORTHING	EASTING	DESCRIPTION
103	924922.35	617880.92	MH 0128335
104	924914.80	618266.09	MH 0128336
104A	924919.51	618012.41	NEW MH 01

NOTES:

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Glendale ARIZONA

CITY OF GLENDALE
ENGINEERING DEPARTMENT
5850 W. GLENDALE AVE.
GLENDALE, ARIZONA 85301 (623) 930-3630

Registered Professional Engineer (Civil) CERTIFICATE NO. 74588 MARK V. LEE 7-30-2024 Date Signed ARIZONA U.S.

Designed	Drawn	Checked
TPB	HC	MVL

No.	Date	Description
		REVISIONS

212231
SEWER & MANHOLE REHABILITATION, PHASE 6D
AREA 1
SEWER PLAN & PROFILE

SCALE:
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1"=4' VERT.

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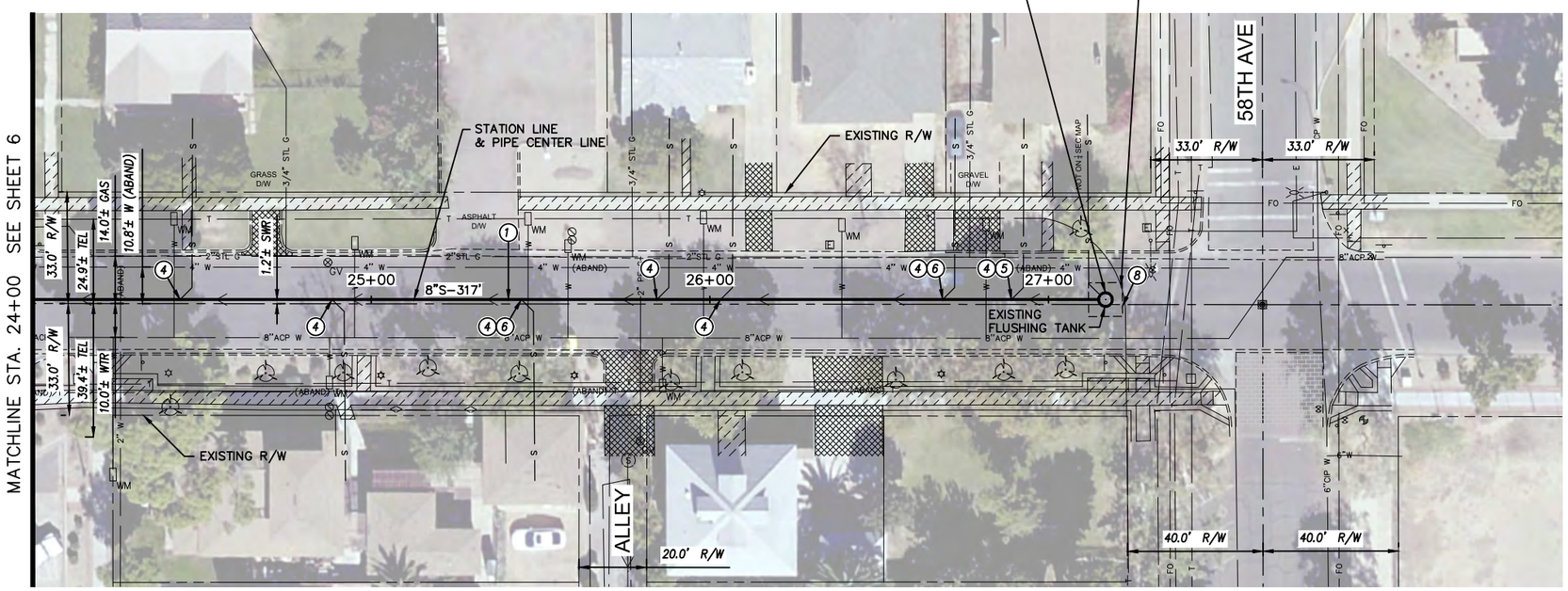
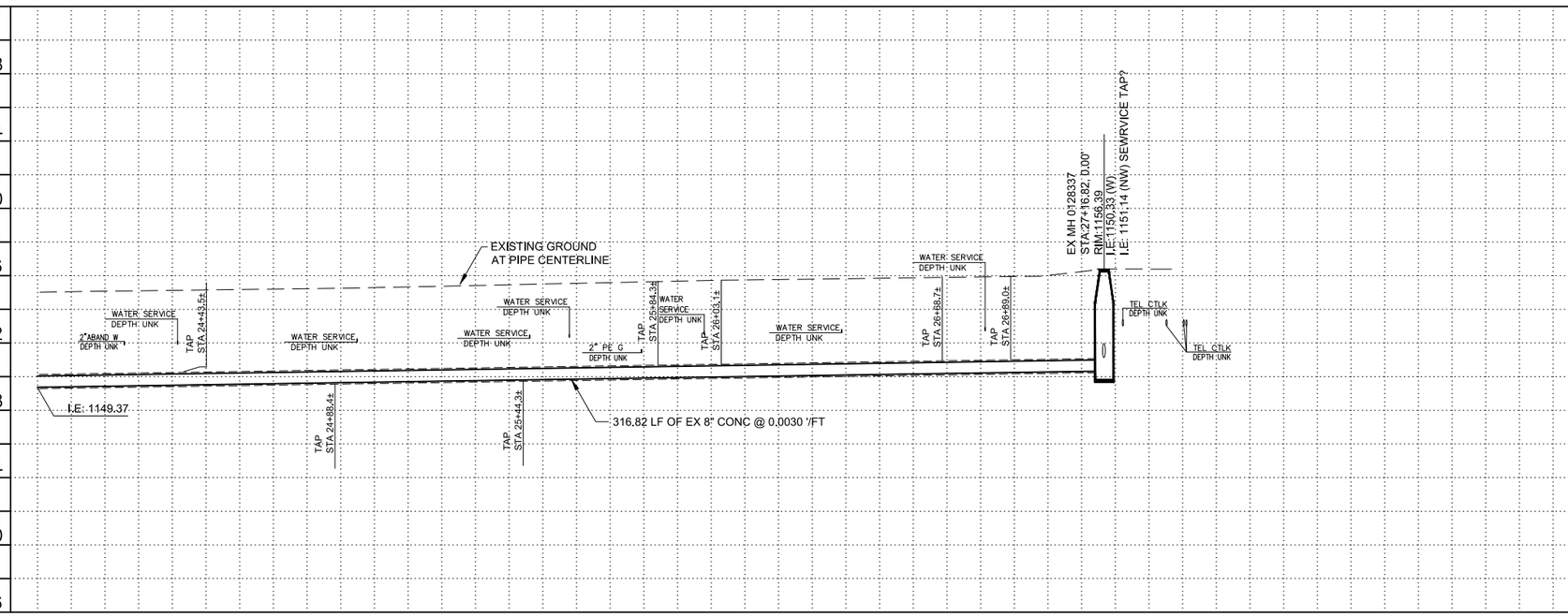


TEMPORARY BENCHMARK
BRASS CAP IN HANDHOLE AT INTERSECTION OF 57TH DRIVE & GLENN DRIVE
ELEVATION = 1153.35



CONSTRUCTION NOTES

(1)	CLEAN EXISTING 8" PIPE, INSTALL CIPP LINER PER SPECIFICATIONS NO. 02767	317 LF
(3)	TERMINATE CIPP LINER AT MANHOLE WITH END SEAL & TAPER PER DTL 6 ON SHT 14 OR CIPP LINE THROUGH MANHOLE AND CUT OUT ACCESS HOLE AT BENCH AND SEAL EDGES PER DTL 7 ON SHT 14.	1 EA
(4)	CUT & REMOVE CIPP COUPON TO REINSTATE ALL TAPS STA 24+43.5 STA 24+88.4 STA 25+44.3 STA 25+84.3 STA 26+03.1 STA 26+68.7 STA 26+89.0	7 EA
(5)	INSTALL SLC SEAL STA 26+89.0	1 EA
(6)	TRIM INTRUDING TAP FLUSH WITH PIPE WALL PRIOR TO CIPP INSTALLATION STA 25+44.3 STA 26+68.7	2 EA
(8)	REMOVE & REPLACE ASPHALT PAVEMENT PER MAG STD DTL 200 & COG STD DTL G-319	11 SY
(12)	REMOVE & DISPOSE OF EXISTING MANHOLE AND FLUSHING TANK	1 EA
(13)	CONSTRUCT 5' DIA. MANHOLE PER MAG STD DTL 420-1, TYPE A; 30" FRAME AND COVER PER MAG STD DTL 423-2 AND COG STD DTL G-704 & COG 7.32; NO STEPS COAT INTERIOR OF MANHOLE WITH APPROVED CORROSION RESISTANT COATING PER SPECIFICATIONS; SEE GENERAL NOTES FOR SEWER MAIN CONSTRUCTION ON SHEET 4 FOR ADDITIONAL INFORMATION. (MH 0128337) STA 27+16.82	1 EA

COORDINATE TABLE

NO.	NORTHING	EASTING	DESCRIPTION
105	924912.02	618595.94	MH 0128337

NOTES:
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CITY OF GLENDALE
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GLENDALE, ARIZONA 85301 (623) 930-3630

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Designed TPB | Drawn HC | Checked MVL

REVISIONS: No. | Date | Description

212231
SEWER & MANHOLE REHABILITATION, PHASE 6D
AREA 1
SEWER PLAN & PROFILE

SCALE:
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1"=4' VERT.

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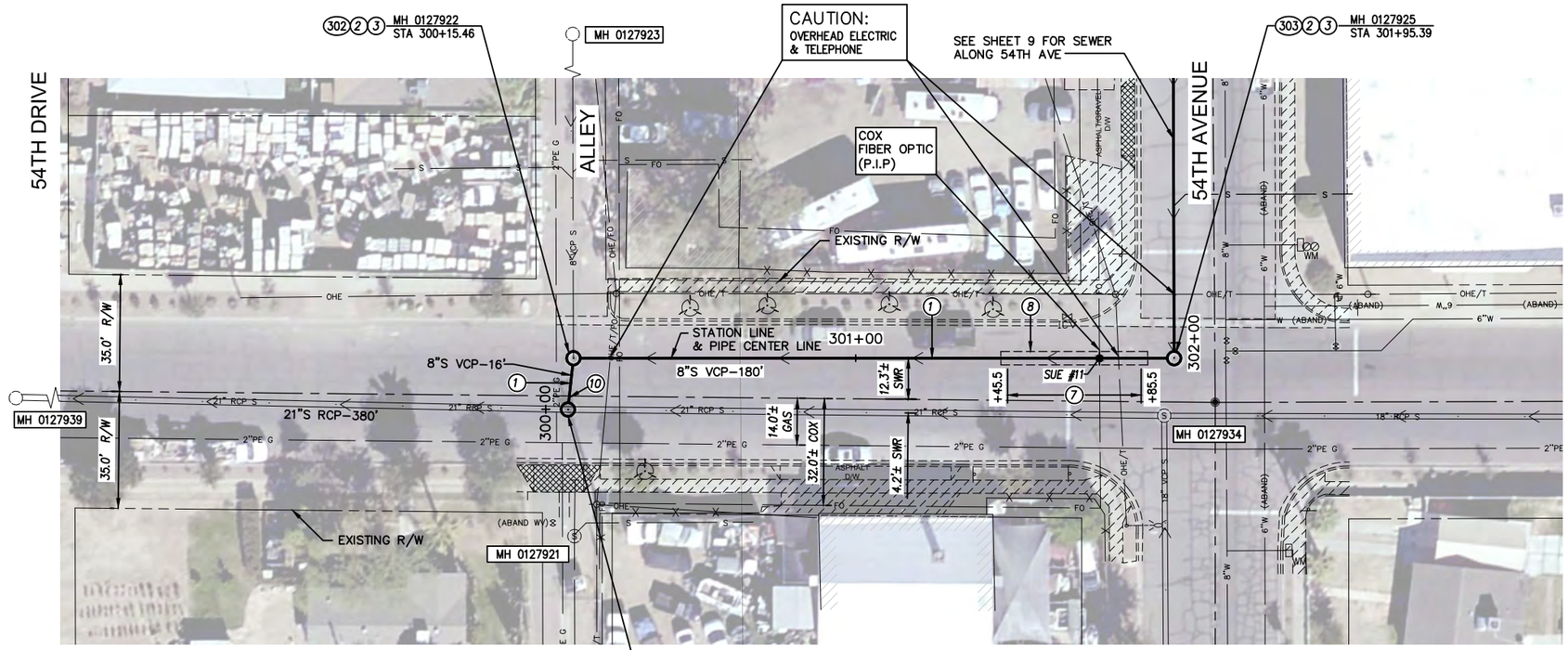
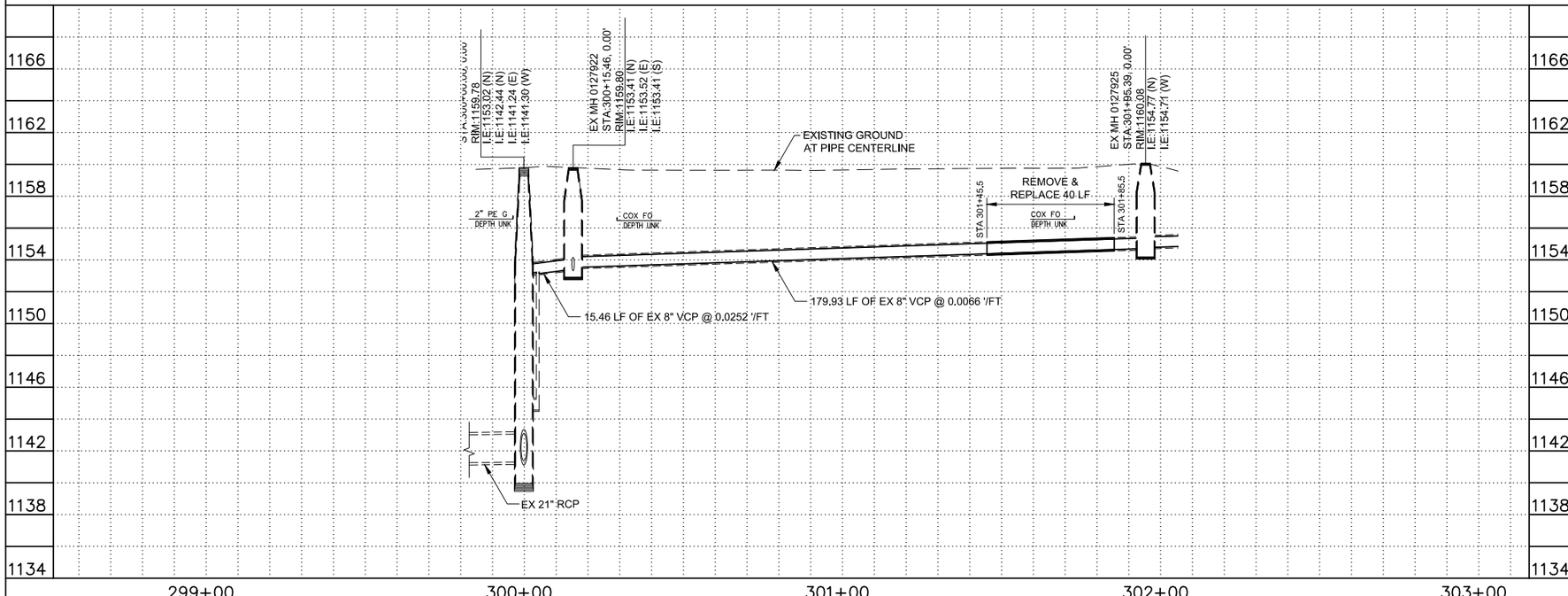


N

SUBSURFACE UTILITY EXPLORATION (SUE) TABLE

#	STATION, OFFSET DESCRIPTION, MATERIAL	ELEVATION
11	301+73.0, 0.0' Cox Fiber optic	T.O.U. B.O.U.

TEMPORARY BENCHMARK
BRASS CAP IN HANDHOLE AT INTERSECTION OF GLENDALE AVENUE & 55TH AVE
ELEVATION = 1159.96



CONSTRUCTION NOTES

(1)	CLEAN EXISTING 8" PIPE, INSTALL CIPP LINER PER SPECIFICATIONS NO. 02767	196 LF
(2)	REHABILITATE MANHOLE PER SCHEDULE DTL 1 ON SHT 13	3 EA
(3)	TERMINATE CIPP LINER AT MANHOLE WITH END SEAL & TAPER PER DTL 6 ON SHT 14 OR CIPP LINE THROUGH MANHOLE AND CUT OUT ACCESS HOLE AT BENCH AND SEAL EDGES PER DTL 7 ON SHT 14.	3 EA
(7)	REMOVE EX. 8" CONC SEWER PIPE & REPLACE WITH NEW 8" SEWER PIPE PRIOR TO CIPP INSTALLATION	40 LF
(8)	REMOVE & REPLACE ASPHALT PAVEMENT PER MAG STD DTL 200 & COG STD DTL G-319	20 SY
(10)	CUT & REMOVE CIPP COUPON TO REINSTATE DROP CONNECTION	1 EA

COORDINATE TABLE

NO.	NORTHING	EASTING	DESCRIPTION
301	922930.73	621112.04	EX MH 0138964
302	922946.08	621113.82	EX MH 0127922
303	922944.45	621293.75	EX MH 0127925

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Designed	Drawn	Checked
TPB	HC	MVL

No.	Date	Description
		REVISIONS

212231
SEWER & MANHOLE REHABILITATION, PHASE 6D
AREA 3
SEWER PLAN & PROFILE

SCALE:
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1"=4' VERT.

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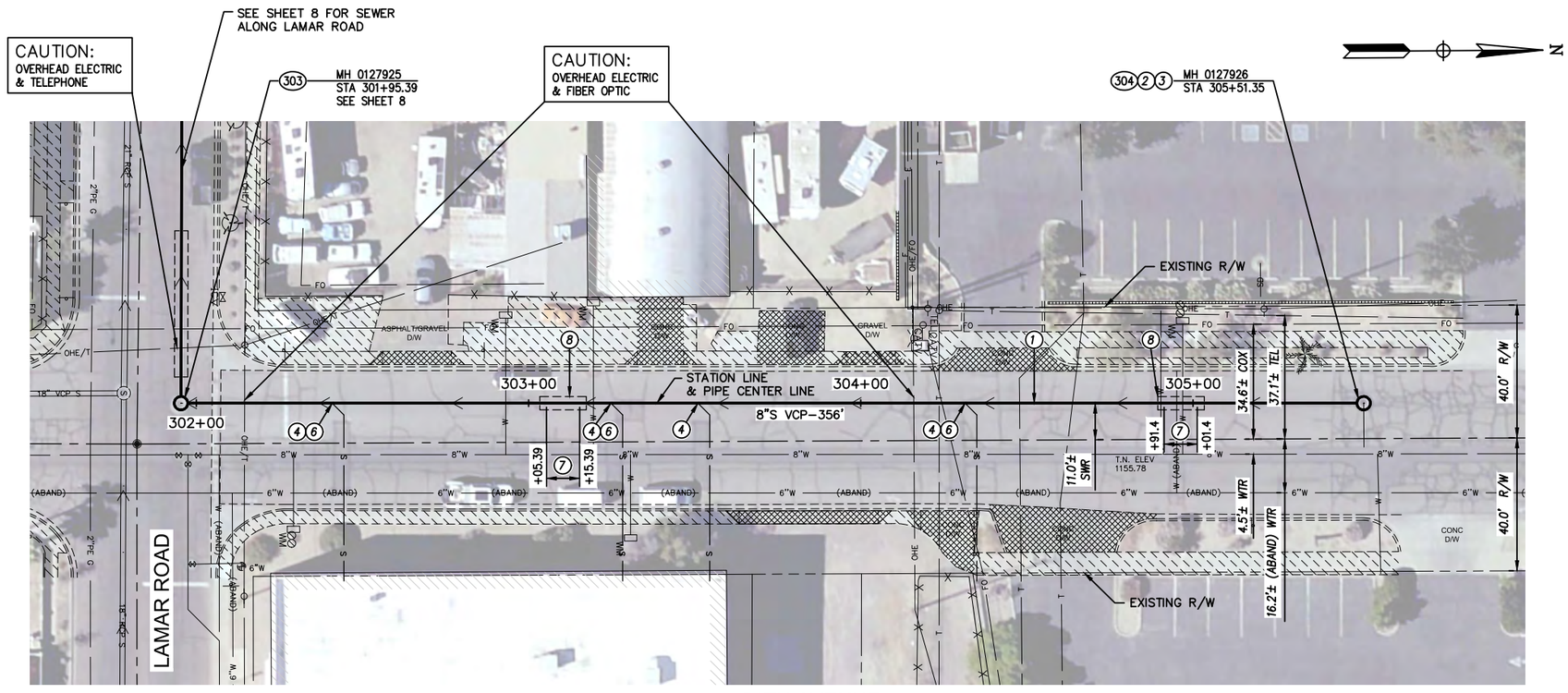
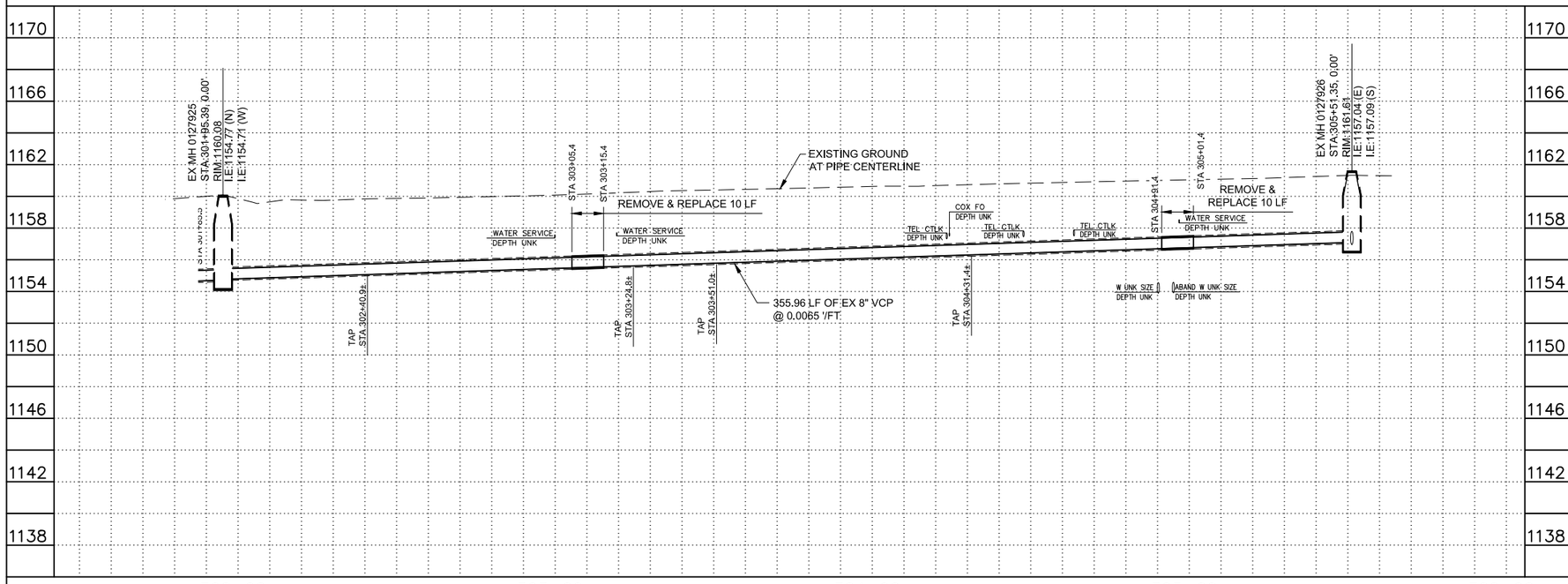


TEMPORARY BENCHMARK

BRASS CAP IN HANDHOLE AT INTERSECTION OF GLENDALE AVENUE & 55TH AVE
ELEVATION = 1159.96



CONSTRUCTION NOTES

1. CLEAN EXISTING 8" PIPE, INSTALL CIPP LINER PER SPECIFICATIONS NO. 02767 — 356 LF
2. REHABILITATE MANHOLE PER SCHEDULE DTL 1 ON SHT 13 — 1 EA
3. TERMINATE CIPP LINER AT MANHOLE WITH END SEAL & TAPER PER DTL 6 ON SHT 14 OR CIPP LINE THROUGH MANHOLE AND CUT OUT ACCESS HOLE AT BENCH AND SEAL EDGES PER DTL 7 ON SHT 14. — 1 EA
4. CUT & REMOVE CIPP COUPON TO REINSTATE ALL TAPS — 4 EA
   - STA 302+40.9
   - STA 303+24.8
   - STA 303+51.0
   - STA 304+31.4
6. TRIM INTRUDING TAP FLUSH WITH PIPE WALL PRIOR TO CIPP INSTALLATION — 3 EA
   - STA 302+40.9
   - STA 303+24.8
   - STA 304+31.4
7. REMOVE EX. 8" SEWER PIPE & REPLACE WITH NEW 8" SEWER PIPE PRIOR TO CIPP INSTALLATION; CONTRACTOR TO VERIFY LOCATION VIA CCTV PRIOR TO EXCAVATION — 20 LF
   - STA 303+05.4 TO STA 303+15.4±
   - STA 304+91.4 TO STA 305+01.4±
8. REMOVE & REPLACE ASPHALT PAVEMENT PER MAG STD DTL 200 & COG STD DTL G-319 — 12 SY

COORDINATE TABLE

NO.	NORTHING	EASTING	DESCRIPTION
303	SEE SHT 8		EX MH 0127925
304	923300.40	621296.07	EX MH 0127926

NOTES:

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Glendale ARIZONA

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Designed	Drawn	Checked
TPB	HC	MVL

No.	Date	Description
		REVISIONS

212231
SEWER & MANHOLE REHABILITATION, PHASE 6D
AREA 3
SEWER PLAN & PROFILE

SCALE:
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1"=4' VERT.

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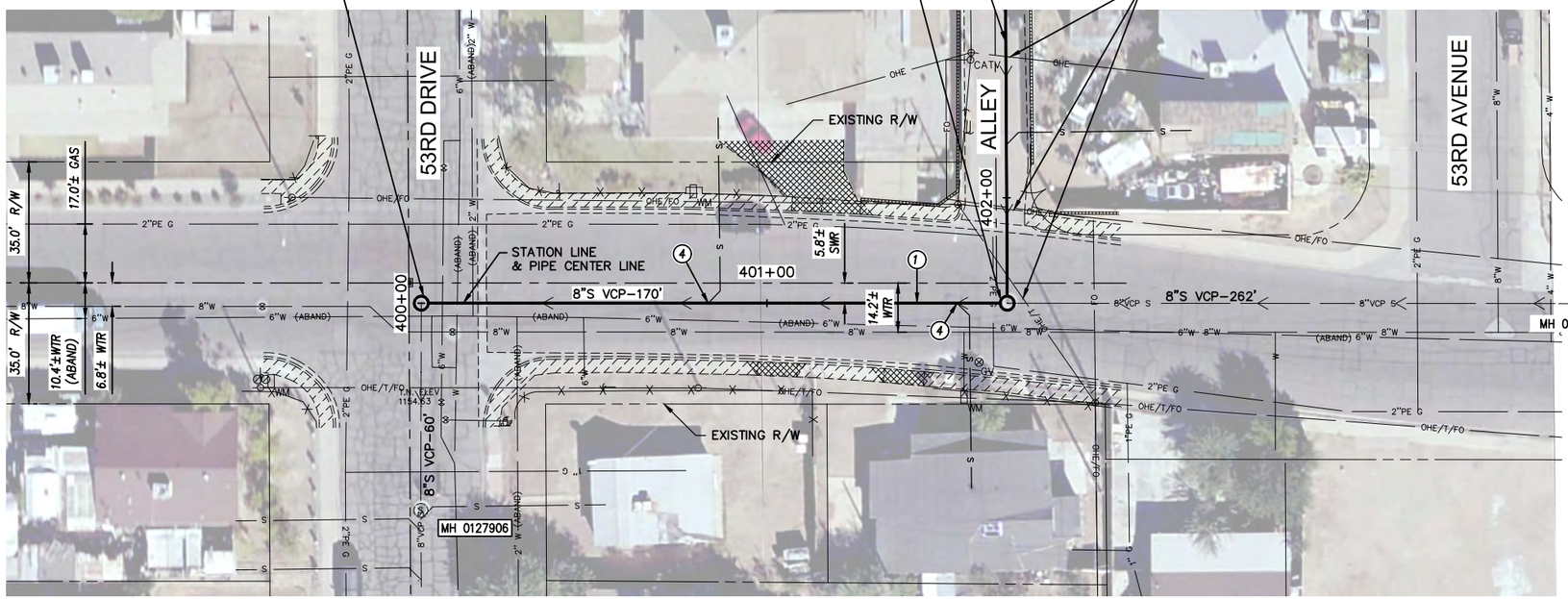
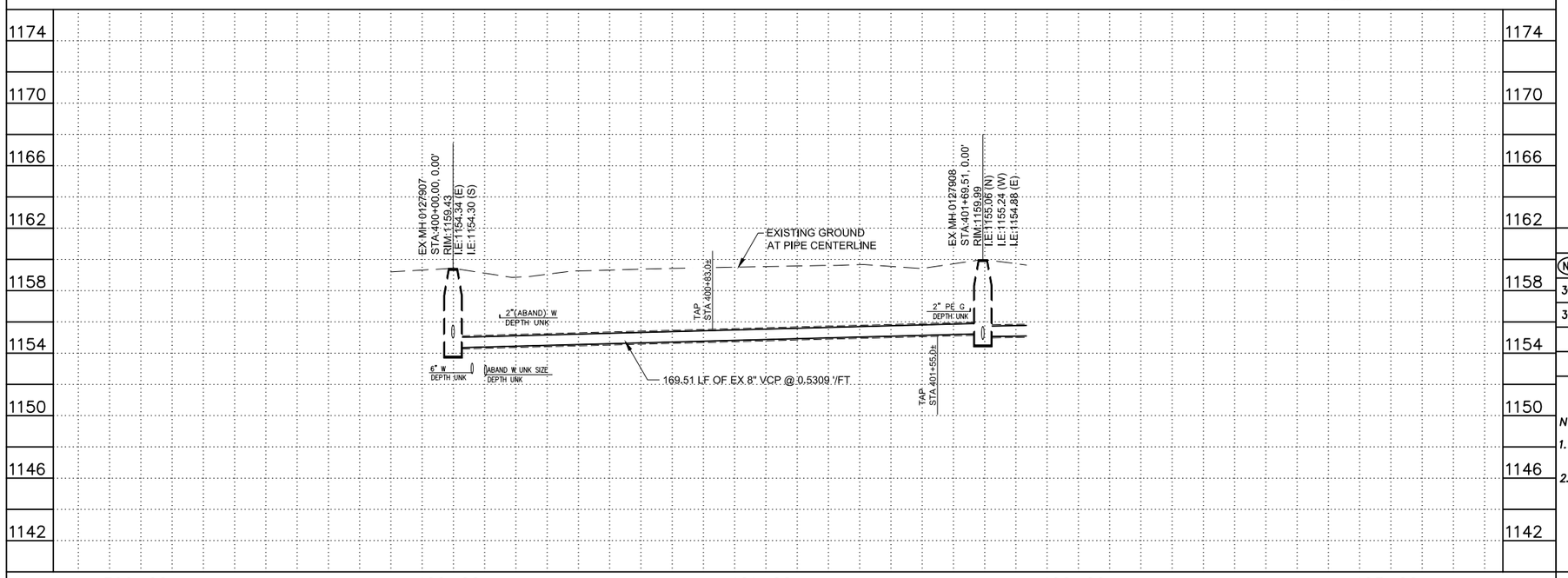


TEMPORARY BENCHMARK
BRASS CAP IN HANDHOLE AT INTERSECTION OF OCOTILLO RD & 52ND DRIVE
ELEVATION = 1158.06



CONSTRUCTION NOTES

1	CLEAN EXISTING 8" PIPE, INSTALL CIPP LINER PER SPECIFICATIONS NO. 02767	170 LF
2	REHABILITATE MANHOLE PER SCHEDULE DTL 1 ON SHT 13	2 EA
3	TERMINATE CIPP LINER AT MANHOLE WITH END SEAL & TAPER PER DTL 6 ON SHT 14 OR CIPP LINE THROUGH MANHOLE AND CUT OUT ACCESS HOLE AT BENCH AND SEAL EDGES PER DTL 7 ON SHT 14.	2 EA
4	CUT & REMOVE CIPP COUPON TO REINSTATE ALL TAPS STA 400+83.0 STA 401+55.0	2 EA

COORDINATE TABLE

NO.	NORTHING	EASTING	DESCRIPTION
305	922252.52	621683.55	EX MH 0127907
306	922250.46	621853.05	EX MH 0127908

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No.	Date	Description
		REVISIONS

212231
SEWER & MANHOLE REHABILITATION, PHASE 6D
AREA 3
SEWER PLAN & PROFILE

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1"=4' VERT.

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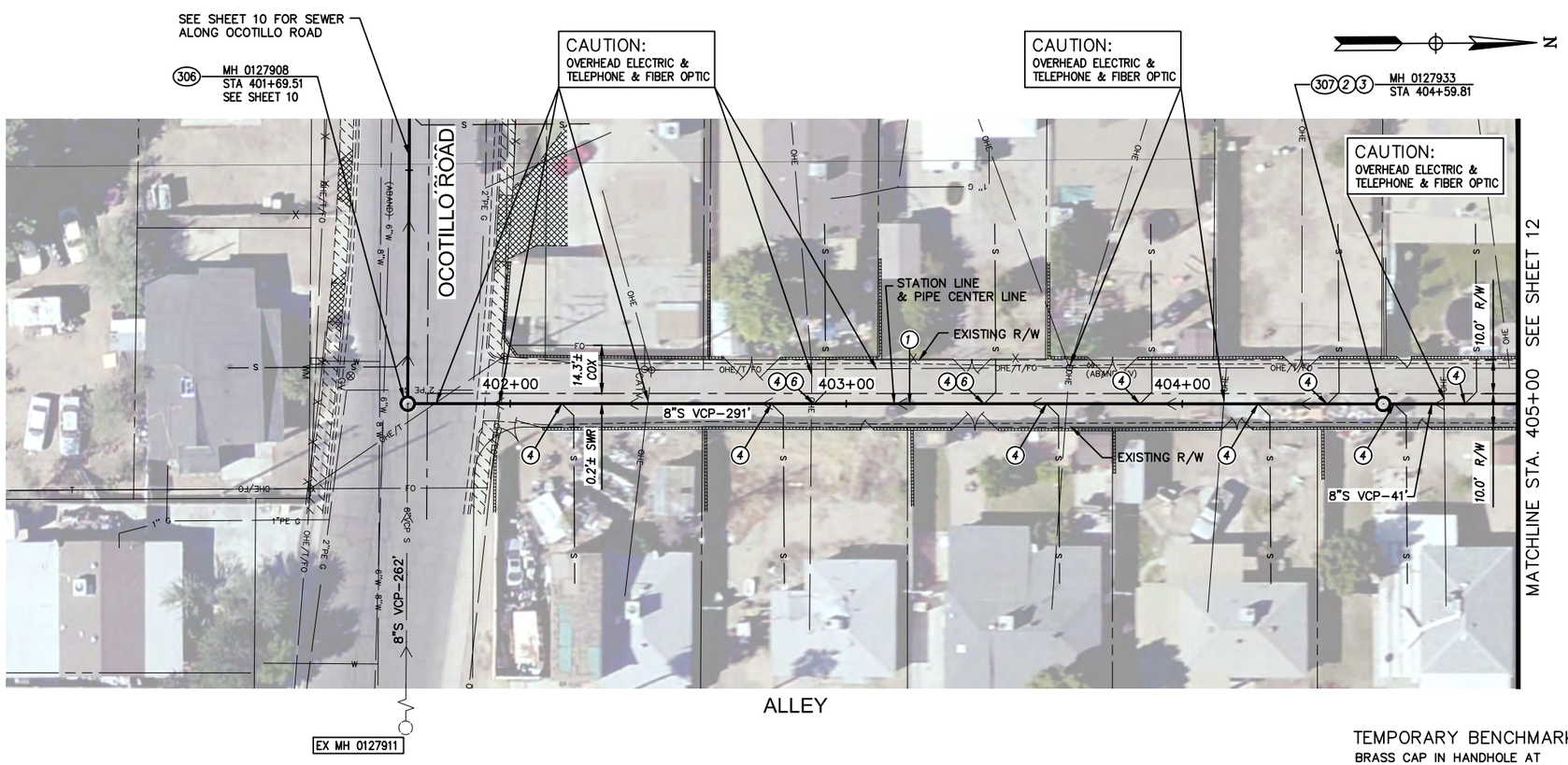
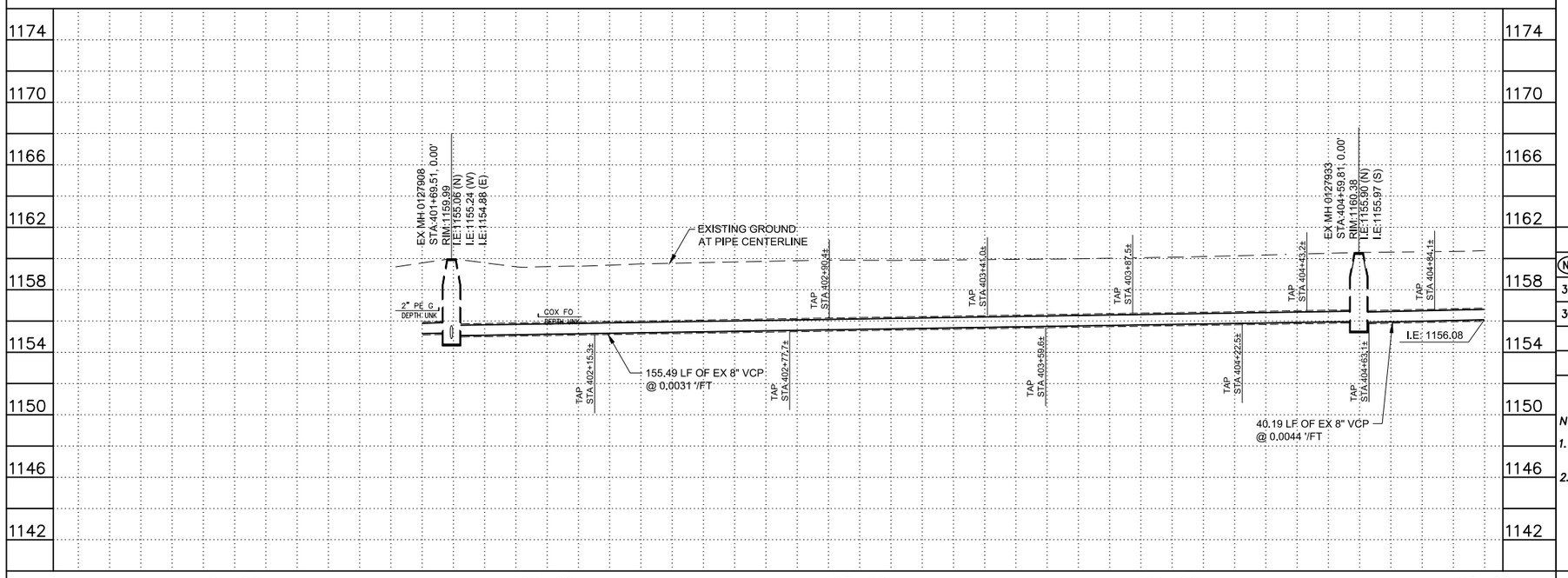


TEMPORARY BENCHMARK
BRASS CAP IN HANDHOLE AT INTERSECTION OF OCOTILLO RD & 52ND DRIVE
ELEVATION = 1158.06



CONSTRUCTION NOTES

(1)	CLEAN EXISTING 8" PIPE, INSTALL CIPP LINER PER SPECIFICATIONS NO. 02767	332 LF
(2)	REHABILITATE MANHOLE PER SCHEDULE DTL 1 ON SHT 13	1 EA
(3)	TERMINATE CIPP LINER AT MANHOLE WITH END SEAL & TAPER PER DTL 6 ON SHT 14 OR CIPP LINE THROUGH MANHOLE AND CUT OUT ACCESS HOLE AT BENCH AND SEAL EDGES PER DTL 7 ON SHT 14.	1 EA
(4)	CUT & REMOVE CIPP COUPON TO REINSTATE ALL TAPS STA 402+15.3 STA 402+77.1 STA 402+90.4 STA 403+41.0 STA 403+59.6 STA 403+87.5 STA 404+22.5 STA 404+43.2 STA 404+63.1 STA 404+84.1	10 EA
(6)	TRIM INTRUDING TAP FLUSH WITH PIPE WALL PRIOR TO CIPP INSTALLATION STA 402+90.4 STA 403+41.0	2 EA

COORDINATE TABLE

NO.	NORTHING	EASTING	DESCRIPTION
306	SEE SHT 10		EX MH 0127908
307	922540.75	621854.96	EX MH 0127933

NOTES:
1. CONTRACTOR TO VERIFY LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.
2. CONTRACTOR SHALL RESTORE ALL PAVEMENT STRIPING AND MARKINGS REMOVED OR DAMAGED TO MATCH EXISTING STRIPING CONFIGURATION. CONTRACTOR IS RESPONSIBLE TO DOCUMENT AND MATCH EXISTING PAVEMENT STRIPING AND MARKINGS.

consor
2432 W. PEORIA AVENUE, SUITE 1246
PHOENIX, AZ 85029
Phone: (602) 906-1901

Glendale ARIZONA

CITY OF GLENDALE
ENGINEERING DEPARTMENT
5850 W. GLENDALE AVE.
GLENDALE, ARIZONA 85301 (623) 930-3630

Registered Professional Engineer (Civil) CERTIFICATE NO. 74588 MARK V. LEE 7-31-2024 Date Signed ARIZONA U.S.A.

Designed	Drawn	Checked
TPB	HC	MVL

No.	Date	Description
1		
2		
3		
4		
5		

REVISIONS

212231
SEWER & MANHOLE REHABILITATION, PHASE 6D
AREA 3
SEWER PLAN & PROFILE

SCALE:
1"=20' HORZ.
1"=4' VERT.

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ARIZONA 811 Call 811 or click Arizona811.com

SHT. 11
OF 14

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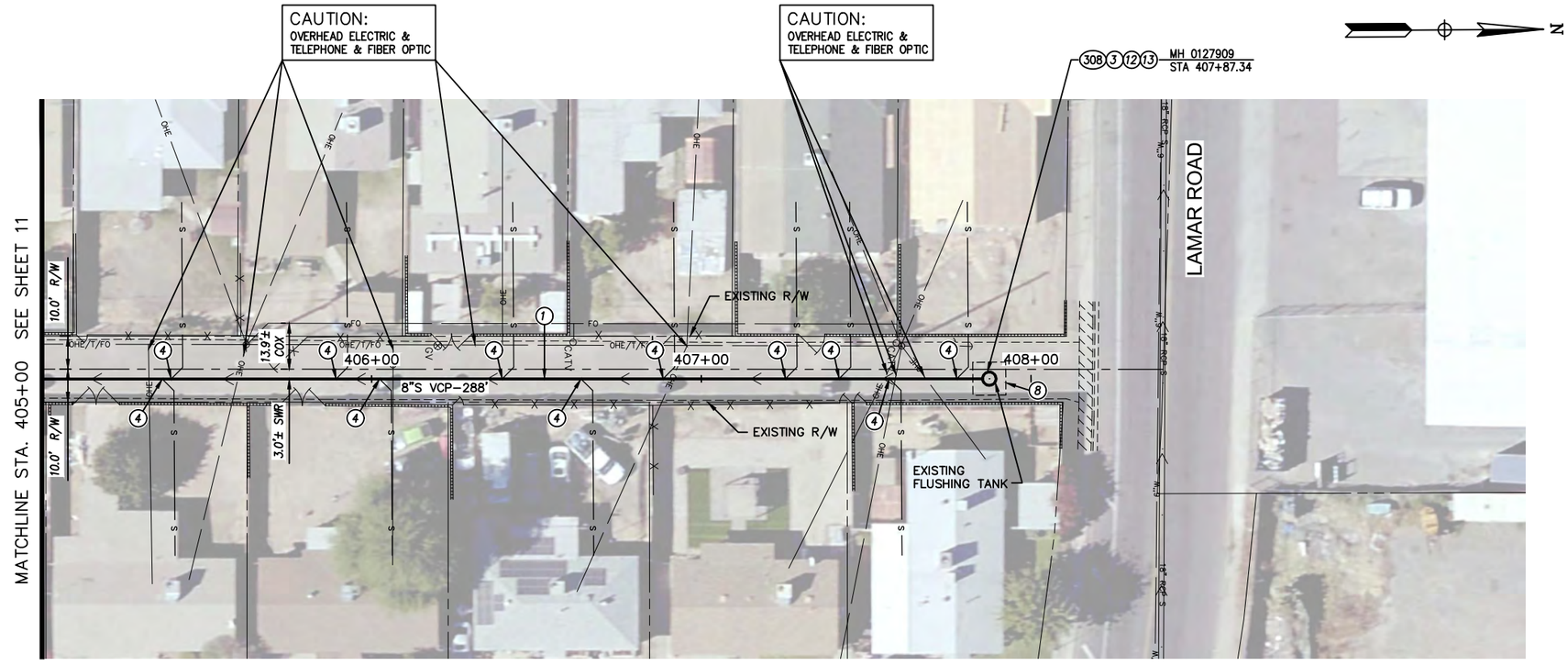
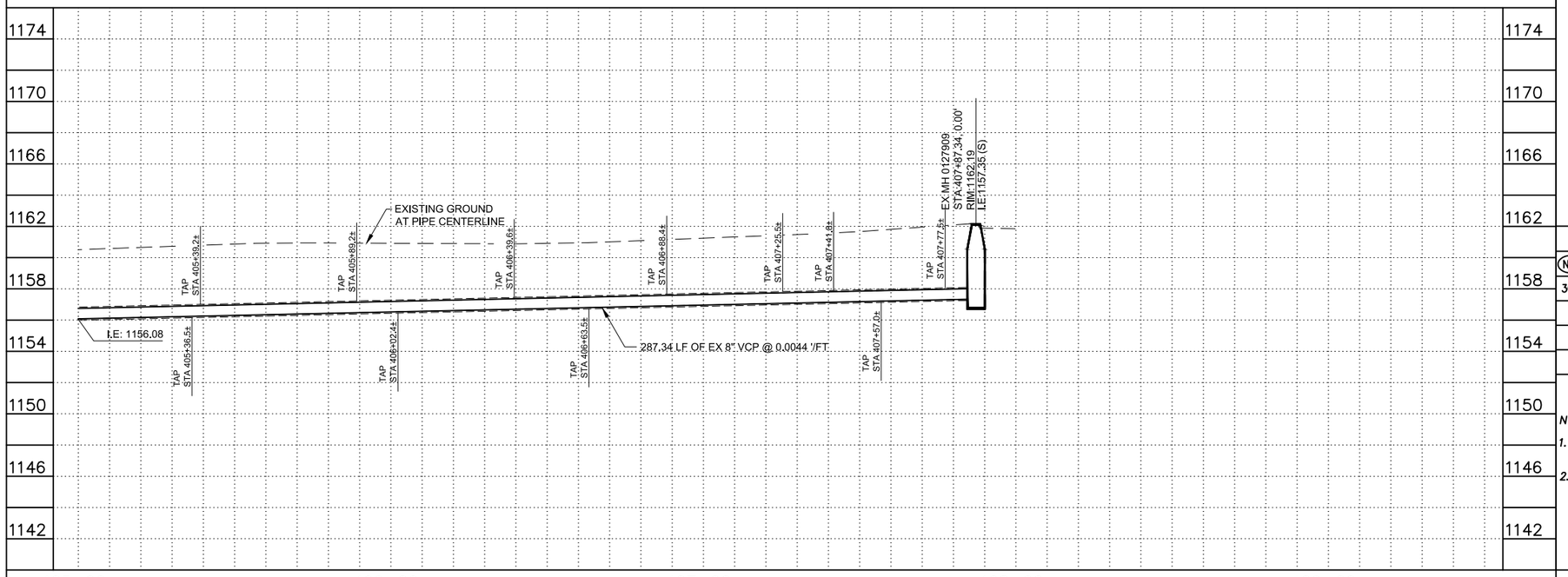


TEMPORARY BENCHMARK
BRASS CAP IN HANDHOLE AT INTERSECTION OF OCOTILLO RD & 52ND DRIVE
ELEVATION = 1158.06



CONSTRUCTION NOTES

(1)	CLEAN EXISTING 8" PIPE, INSTALL CIPP LINER PER SPECIFICATIONS NO. 02767	288 LF
(3)	TERMINATE CIPP LINER AT MANHOLE WITH END SEAL & TAPER PER DTL 6 ON SHT 14 OR CIPP LINE THROUGH MANHOLE AND CUT OUT ACCESS HOLE AT BENCH AND SEAL EDGES PER DTL 7 ON SHT 14.	1 EA
(4)	CUT & REMOVE CIPP COUPON TO REINSTATE ALL TAPS STA 405+36.5 STA 405+39.2 STA 405+89.2 STA 406+02.4 STA 406+39.6 STA 406+63.5 STA 406+88.4 STA 407+25.5 STA 407+41.8 STA 407+57.0 STA 407+77.5	11 EA
(8)	REMOVE & REPLACE ASPHALT PAVEMENT PER MAG STD DTL 200 & COG STD DTL G-319	11 SY
(12)	REMOVE & DISPOSE OF EXISTING MANHOLE AND FLUSHING TANK	1 EA
(13)	CONSTRUCT 5' DIA. MANHOLE PER MAG STD DTL 420-1, TYPE A; 30" FRAME AND COVER PER MAG STD DTL 423-2 AND COG STD DTL G-704 & COG 7.32; NO STEPS COAT INTERIOR OF MANHOLE WITH APPROVED CORROSION RESISTANT COATING PER SPECIFICATIONS; SEE GENERAL NOTES FOR SEWER MAIN CONSTRUCTION ON SHEET 4 FOR ADDITIONAL INFORMATION. (MH 0127909) STA 407+87.34	1 EA

COORDINATE TABLE

NO.	NORTHING	EASTING	DESCRIPTION
308	922868.28	621856.86	EX MH 0127909

NOTES:
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Designed	Drawn	Checked
TPB	HC	MVL

No.	Date	Description
		REVISIONS

212231
SEWER & MANHOLE REHABILITATION, PHASE 6D
AREA 3
SEWER PLAN & PROFILE

SCALE:
1"=20' HORZ.
1"=4' VERT.

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SHT. 12
OF 14

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MANHOLE REHABILITATION SCHEDULE

AREA	MANHOLE NUMBER	MANHOLE ID	JURISDICTION	COVER SIZE (IN)	BARREL DIAMETER (IN)	DEPTH (RIM TO INVERT) (FT)	MATERIAL	EXISTING CORROSION PROTECTION	PIPE CONNECTIONS (EA)	PIPE CONNECTIONS SIZE (CLOCK POSITION)	SURFACE MATERIAL AT MANHOLE	ASSESSMENT COMMENTS & DEFECT LOCATIONS	REHABILITATION CODE ① REMOVE & REPLACE FRAME & COVER (EA)	② ADJUST FRAME & COVER TO GRADE (EA)	③ REPAIR & COAT CHIMNEY, CONE, & WALL (SF)	④ REPAIR & COAT BENCH (EA)	⑤ REPAIR/RESHAPE & COAT CHANNEL (EA)	⑥ NEW 60-INCH MANHOLE (EA)	⑦ NEW 72-INCH MANHOLE (EA)	⑧ REMOVE FLUSHING TANK (EA)	⑨ INSPECT & ASSESS MANHOLE	- REMOVE STEPS (NPI)	⑩ INSTALL JUNCTION STRUCTURE (EA)
1	101	MH 0127867	COG ROW	24	48	7.5	Brick		2	8(6), 8(9)	Asphalt				94.2	1	1						
	102	MH 0128295	COG ROW	24	48	5.1	Brick		1	8(6)	Brick	Flush Tank (Flow direction south MH to Lower Need Raised Flush MH)						1		1			
	103	MH 0128335	COG ROW	24	48	6.5	Brick		3	8(6), 8(9), 8(12)	Asphalt		1			1	1						
	104	MH 0128336	COG ROW	24	48	5.7	Brick		2	8(6), 8(12)	Asphalt				72.0	1	1						
	104A	MH 01	COG ROW	30	72	5.6	Conc		2	8(6), 8(12)	Asphalt	New manhole to replace S-curve sewer pipe							1				
	105	MH 0128337	COG ROW	24	48	5.3	Brick		2	8(6), 8(7)	Asphalt	Flush Tank						1		1			
3	301	MH 0138964	COG ROW	24	48	18.5	Conc		4	21(6), 8up(9), 8lwr(9), 21(12)	Asphalt	Drop Manhole	1		232.2	1	1						
	302	MH 0127922	COG ROW	24	48	6.4	Brick		3	8(6), 8(12), 8(3)	Asphalt				80.3	1	1						
	303	MH 0127925	COG ROW	24	48	5.4	Brick		2	8(6), 8(9)	Asphalt				67.5	1	1						
	304	MH 0127926	COG ROW			4.3	Brick		2	8(6), 4(3)	Asphalt	Need to inspect									1		
	305	MH 0127907	COG ROW	24	48	4.7	Brick		2	8(6), 8(3)	Asphalt				59.3	1	1						
	306	MH 0127908	COG ROW	24	48	5.1	Conc		3	8(6), 8(9), 8(12)	Asphalt				64.2	1	1						
	307	MH 0127933	COG ROW	24	48	4.5	Conc		2	8(6), 8(12)	Asphalt				56.3	1	1						
	308	MH 0127909	COG ROW	24	48	4.8	Brick		1	8(6)	Asphalt							1		1			
												TOTAL	2	0	726.0	9	9	3	1	3	1	0	0

NOTES:

1. SEE DETAIL 2 FOR MANHOLE CLOCK POSITION REFERENCE.
2. SEE DETAIL 3 FOR MANHOLE REHABILITATION DIAGRAM & TERMINOLOGY.

DETAIL NO. 1

REHABILITATION CODES

① REMOVE & REPLACE MANHOLE FRAME, COVER & COLLAR PER MAG STD DET 422, & 423. COVER PER COG STD DTL G-704 (SEE DETAIL 8, SHEET 14).

② LOCATE & ADJUST MANHOLE FRAME & COVER TO GRADE PER MAG STD DET 422. COVER PER COG STD DTL G-704.

③ REPAIR & COAT INTERIOR SURFACE OF MANHOLE WITH APPROVED CORROSION PROTECTIVE COATING PER DETAILS 3 & 4 ON THIS SHEET & SPECIFICATIONS. SEE DETAIL 5, SHEET 14 FOR BRICK MANHOLE REPAIR & COATING.

④ REPAIR DEFECTIVE BENCH & COAT WITH APPROVED CORROSION PROTECTIVE COATING PER DETAILS & SPECIFICATIONS

⑤ REPAIR DEFECTIVE CHANNEL & COAT WITH APPROVED CORROSION PROTECTIVE COATING PER DETAILS & SPECIFICATIONS

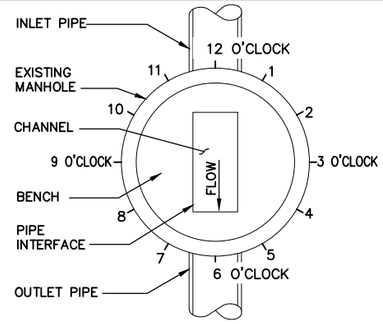
⑥ NEW 60-INCH DIAMETER MANHOLE PER MAG STD DET 420, TYPE A; 30" FRAME & COVER PER MAG STD DTL 423-2, COVER PER COG STD DTL G-704. NO STEPS; COAT INTERIOR OF MANHOLE WITH APPROVED CORROSION PROTECTIVE COATING

⑦ NEW 72-INCH DIAMETER MANHOLE PER MAG STD DET 420, TYPE A; 30" FRAME & COVER PER MAG STD DTL 423-2, COVER PER COG STD DTL G-704. NO STEPS; COAT INTERIOR OF MANHOLE WITH APPROVED CORROSION PROTECTIVE COATING

⑧ REMOVE AND DISPOSE OF EXISTING FLUSHING TANK

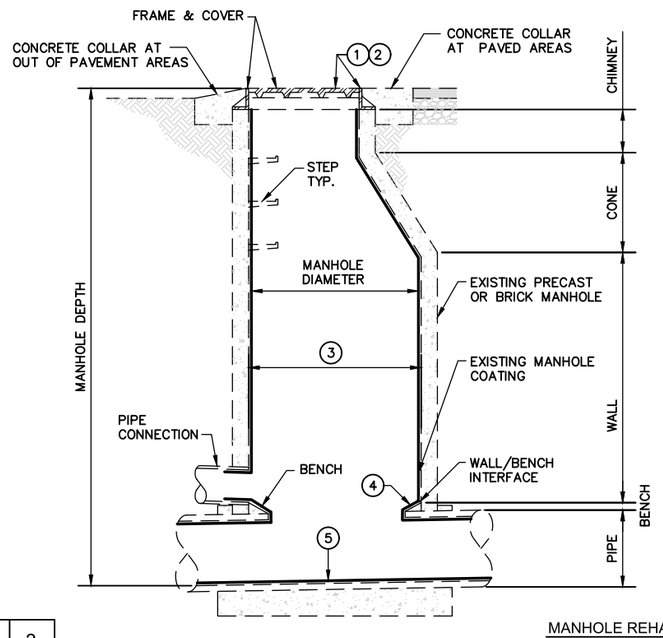
⑨ INSPECT AND ASSESS MANHOLE; EVALUATE REHAB WITH ENGINEER/OWNER

⑩ INSTALL JUNCTION STRUCTURE PER DETAILS.



DETAIL NO. 2

MANHOLE CLOCK POSITION REFERENCE
NOT TO SCALE



NOTES:

CIRCLED NUMBERS CORRESPOND TO REHABILITATION CODE LISTED IN SCHEDULE, SEE DETAIL 1 ON THIS SHEET. CONTRACTOR SHALL REFER TO PROJECT SPECIFICATIONS FOR DETAILED DESCRIPTION OF REHABILITATION WORK.

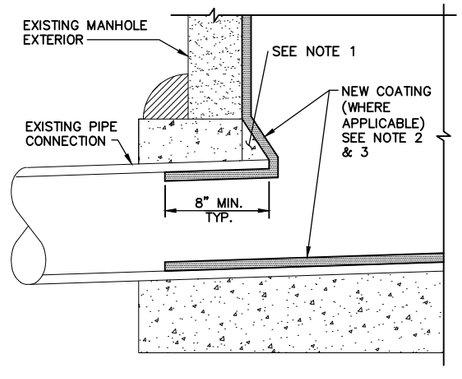
WHERE APPLICABLE, CONTRACTOR SHALL COAT ALL EXPOSED CONCRETE SURFACES AS SHOWN AND AS DESCRIBED IN THE SPECIFICATIONS. EXISTING CONCRETE SURFACE SHALL BE REPAIRED AND PREPPED PRIOR TO COATING APPLICATION IN ACCORDANCE WITH THE SPECIFICATIONS.

NEW COATING (WHERE APPLICABLE) SHALL OVERLAP INTO EXISTING PIPE A MINIMUM OF 8-INCHES AS SHOWN IN DETAIL 4 ON THIS SHEET. THE CONTRACTOR SHALL CREATE A WATER TIGHT SEAL AT THE MANHOLE TO PIPE INTERFACE. ROUGHEN PIPE SURFACE PRIOR TO COATING.

IF REQUIRED AND PRIOR TO COATING, THE CONTRACTOR SHALL TRIM INTRUDING PIPE CONNECTIONS ABOVE THE CHANNEL FLUSH WITH MANHOLE WALL.

DETAIL NO. 3

MANHOLE REHABILITATION DIAGRAM & TERMINOLOGY
NOT TO SCALE



NOTES:

1. IF REQUIRED AND IF LEDGE IS PRESENT ABOVE PIPE, THE CONTRACTOR SHALL GROUT UP TO 8" ABOVE PIPE PRIOR TO COATING. THEN COAT THE EXPOSED CONCRETE WITH COATING PER SPECIFICATIONS.
2. THE CONTRACTOR SHALL REHABILITATE ALL EXPOSED CONCRETE SURFACES OR EXISTING DEFECTIVE COATING SYSTEM. THE COATING SHALL BE 1/8" (OR 125 MILS) ON THE MANHOLE OR JUNCTION STRUCTURE. REFER TO THE MANHOLE REHABILITATION TABLE FOR APPROXIMATE COATING AREA AND TO THE SPECIFICATIONS FOR ADDITIONAL COATING REQUIREMENTS.
3. HOLIDAY TEST PER MAG SPECIFICATIONS 626.3.3

DETAIL NO. 4

TYPICAL COATING END TREATMENT
NOT TO SCALE

consor 2432 W. PEORIA AVENUE, SUITE 1246 PHOENIX, AZ 85029 Phone: (602) 906-1901

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ENGINEERING DEPARTMENT
5850 W. GLENDALE AVE.
GLENDALE, ARIZONA 85301 (623) 930-3630

Registered Professional Engineer (Civil) CERTIFICATE NO. 74588 MARK V. LEE 7-31-2024 Date Signed ARIZONA U.S.A.

Designed	Drawn	Checked
TPB	HC	MVL

No.	Date	Description
		REVISIONS

212231
SEWER & MANHOLE REHABILITATION, PHASE 6D

MANHOLE REHAB SCHEDULE & DETAILS

SCALE:
NO SCALE

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ARIZONA 811
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SHT. 13
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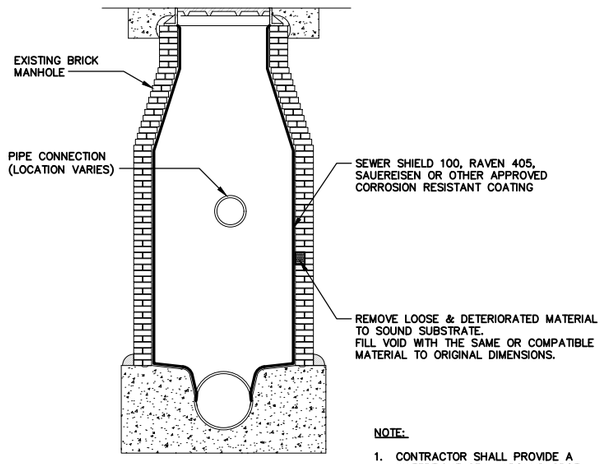
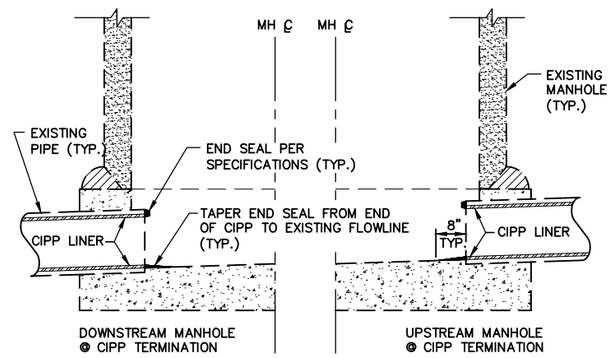


ELEVATION VIEW
NOT TO SCALE

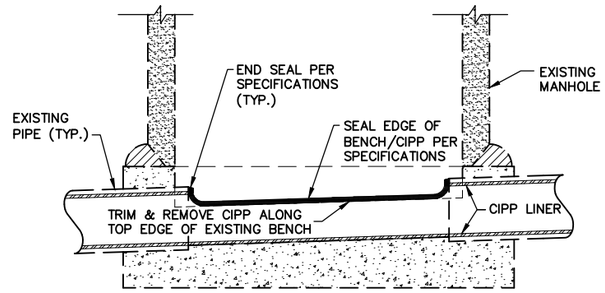
TYPICAL REPAIR & COATING ON BRICK MANHOLE
NOT TO SCALE

DETAIL NO. 5



CIPP TERMINATION AT MANHOLE DETAIL
NOT TO SCALE

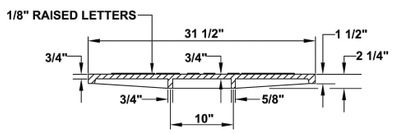
DETAIL NO. 6



CIPP LINE THROUGH MANHOLE DETAIL
NOT TO SCALE

DETAIL NO. 7

TOP VIEW



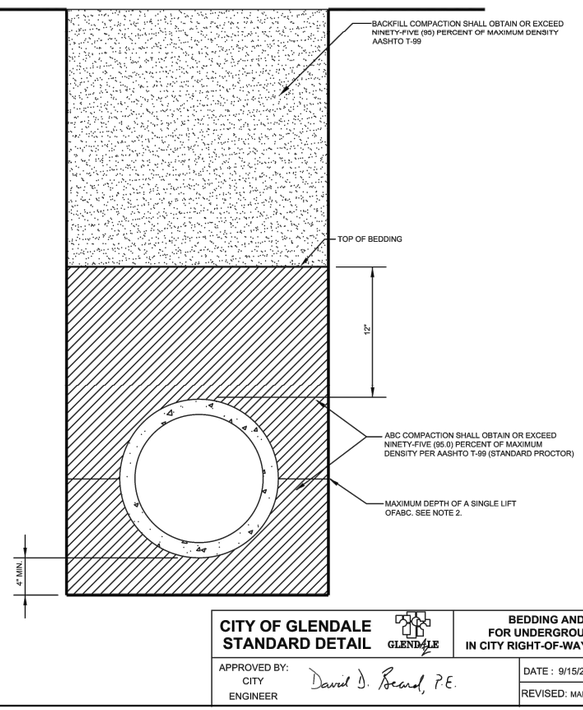
SECTION OF COVER

CITY OF GLENDALE STANDARD DETAIL	Glendale ARIZONA	MANHOLE COVER DETAIL	
APPROVED BY: CITY ENGINEER	David D. Pecard, P.E.	DATE: 10/20/2020 REVISED: OCT. 2020	DETAIL NO. G-704

DETAIL NO. 8

NOTES:

1. ABC FOR PIPES 6" AND LARGER SHALL BE SHAPED TO CONFORM TO THE BOTTOM OF PIPE PRIOR TO PLACEMENT OF THE PIPE
2. ABC TO BE PLACED WITH A MAXIMUM LIFT THICKNESS OF 8" COMPACTED
3. BACKFILL TO BE PLACED WITH A MAXIMUM LIFT THICKNESS OF 12", COMPACTED.
4. ABC SHALL CONFORM TO M.A.G. SEC. 702
5. WATER CONSOLIDATION SHALL NOT BE PERMITTED FOR THE TRENCH BACKFILL IN CITY OF GLENDALE RIGHTS OF WAY OR EASEMENTS.
6. MOISTURE CONTENT SHALL BETWEEN +2% TO -4% OF OPTIMUM MOISTURE CONTENT PER ASTM D-698.



CITY OF GLENDALE STANDARD DETAIL	GLENDALE	BEDDING AND BACKFILL FOR UNDERGROUND FACILITIES IN CITY RIGHT-OF-WAY AND EASEMENTS	
APPROVED BY: CITY ENGINEER	David D. Pecard, P.E.	DATE: 9/15/2014 REVISED: MARCH 2014	DETAIL NO. G-690

DETAIL NO. 9

consor
2432 W. PEORIA AVENUE, SUITE 1246
PHOENIX, AZ 85029
Phone: (602) 906-1901

CITY OF GLENDALE
ENGINEERING DEPARTMENT
5850 W. GLENDALE AVE.
GLENDALE, ARIZONA 85301 (623) 930-3630

Registered Professional Engineer (Civil) CERTIFICATE NO. 74588 MARK V. LEE 7-30-2024 Date Signed ARIZONA U.S.A.

Designed TPB | Drawn HC | Checked MVL

No.	Date	Description
		REVISIONS

212231
SEWER & MANHOLE REHABILITATION, PHASE 6D

MANHOLE DETAILS

SCALE:
NO SCALE

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SHT. 14
OF 14

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CITY OF GLENDALE

WATER SERVICES DEPARTMENT

SEWER AND MANHOLE REHABILITATION
PHASE 6D (AREA 1 & 3)
PROJECT NO. 212231

TECHNICAL SPECIFICATIONS

July 2024

Prepared by:

consor
2432 W. Peoria Avenue, Suite 1246
Phoenix, Arizona 85029
602-906-1901

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CITY OF GLENDALE
WATER SERVICES DEPARTMENT

SEWER AND MANHOLE REHABILITATION
PHASE 6D (AREA 1 & 3)
PROJECT NO. 212231

TECHNICAL SPECIFICATIONS

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SECTION 02100 MANHOLE REHABILITATION

SECTION 02603 CORROSION PROTECTIVE COATING SYSTEM

SECTION 02661 DIVERSION OF SEWAGE FLOW AND DEWATERING

SECTION 02760 SEWER AND STRUCTURE CLEANING

SECTION 02761 CCTV INSPECTION OF SANITARY SEWERS

SECTION 02767 CIPP LINING OF EXISTING SANITARY SEWERS

SECTION 03600 GROUT

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SECTION 02100

MANHOLE REHABILITATION

PART 1 - GENERAL

1.1 - DESCRIPTION

1.1.1. - Scope

This section specifies rehabilitation of existing sanitary sewer manholes due to deterioration, corrosion, damage, etc., and manholes not specifically scheduled for rehabilitation that may be altered with this project for other purposes such as bypass pumping suction/discharge pits. Rehabilitation will restore the manholes and provide protection against infiltration and corrosion to the manhole interior. Corrosion protection of existing manholes in the sewer project consists of the installment of an approved protective coating or replacement of the manhole.

Manholes shall be rehabilitated according to the Contract Documents.

1.1.2. - Requirements

A. CONTRACTOR shall furnish all labor, materials, and equipment required to clean, modify, and apply specified rehabilitation system to the structures indicated on the Contract Documents or to remove and/or remove and replace with manholes. CONTRACTOR shall comply with the local authority and all Occupational Safety and Health Administration (OSHA) requirements for confined space entry.

B. CONTRACTOR shall field verify all manhole dimensions prior to the purchase of materials to be used for the rehabilitation of manholes.

C. All materials specified by name brand or manufacturer shall be delivered unopened to the job in original containers. All safety precautions recommended by the manufacturer in printed instructions or special bulletins shall be obtained and followed.

D. Application of the specified rehabilitation system shall be performed by a contractor certified and trained by the manufacturer.

E. In this specification, unless otherwise specifically noted, the word “manhole” shall mean “sewer structure” and shall encompass sewer manholes, sewage lift station wet wells, sewer diversion structures, sewer junction structures, and other sewer structures. It also encompasses sewer pipes (or portions thereof) that are located within the sewer structure but does not include sewer pipes (or portions thereof) that are located outside of the limits of the structure.

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F. In this specification, “existing manholes” shall mean those manholes that are (or were) not constructed as part of this project work.

G. Where required by the Contract Documents; existing manholes shall be rehabilitated and an approved corrosion protective coating applied to their interior surfaces or a structural insert installed, as specified herein.

H. The approved coating system (as specified herein) shall be applied to all exposed brick, concrete, grout, mortar, and cementitious surfaces within the manhole, including unlined concrete pipes within the manhole, bench-to-pipe transitions, bench, risers, cones, adjusting rings, etc. Coating of the metallic manhole frame and cover is not required**.**

1.1.3. - References

Comply with the applicable provisions and recommendations of the following, unless otherwise shown or specified.

Reference	Title
ASTM C478	Standard Specification for Precast Concrete Manhole Sections
ASTM D16	Standard Terminology for Paint, Coatings, Materials, etc.
ASTM D412	Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubber and Thermoplastic Elastomers-Tension
ASTM D638	Standard Test Method for Tensile Properties of Plastics
ASTM D790	Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
ASTM D3359	Standard Test Methods for Measuring Adhesion by Tape Test
ASTM D3960	Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings
MAG 601	Trench Excavation, Backfilling and Compaction
MAG 625	Manhole Construction and Drop Sewer Connections
MAG 725	Portland Cement Concrete
MAG 741	Lining for Reinforced Concrete Sanitary Sewer Pipe
NASSCO MACP	National Association of Sewer Service Companies, Manhole Assessment and Certification Program

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1.2 - QUALITY ASSURANCE

Rehabilitated or restored manholes shall be inspected by the ENGINEER prior to coating and documented with photographs per PART 3 – POST-EXECUTION, literal D of this section.

1.3 - GUARANTEE

All structural rehabilitation work performed by the CONTRACTOR shall be guaranteed against faulty workmanship and/or materials for a period of one (1) year after final acceptance of work.

PART 2 - EXECUTION

2.1 - SEQUENCE OF REHABILITATION

If the manhole, bench, or channel are coded to be rehabilitated, then cleaning, coating, structural insert, and testing activities shall be done simultaneously.

The following numerals of sequence of rehabilitation include all the tasks that need to be performed to rehabilitate a manhole.

Refer to the Contract Documents to identify all manholes included for rehabilitation and which rehabilitation tasks are included for each manhole.

2.1.1. - Remove and Replace Manhole Collar, Frame and Cover

A. Removal of the existing defective collar, frame and cover is included in this item of work and shall be completed and disposed of by the CONTRACTOR at a suitable location for disposal.

B. Replacement and installation of the collar, frame and cover shall be per MAG Standard Details 422 and 423. Cast iron frames and covers shall be Class 35 with weights and dimensions in conformance with MAG Standard Detail 423.

C. Cleaning or coating of the adjustment rings shall be included in the replacement of the frame and cover. Cleaning and coating of the adjustment rings shall be per Cleaning and Preparation Activities of SECTION 02603.

2.1.2. - Repair and Coat Chimney, Cone and Wall

Repair and Coat Chimney, Cone and Wall of existing manholes shall include the following activities:

A. Cleaning the manhole, removing corroded/deteriorated materials from the manhole, and otherwise preparing the manhole for one of the approved coating systems per SECTION 02603.

B. Applying one of the approved coatings as specified herein SECTION 02603.

C. Testing the finished surface, as required herein SECTION 02603.

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D. Repairs to the interior of the manhole do not include the bench or channel. Repairs to the bench and channel are included as separate rehabilitation tasks.

E. For manholes coded for rehabilitation with an approved coating system, the entire manhole interior shall be coated including the adjustment rings, cone, riser section, bench, and channel. For manholes coded for rehabilitation with an approved structural insert system, any of the manhole components not protected by the structural insert shall be coated.

F. The coating system shall also extend to the water line of the manhole unless the channel consists of a corrosion resistant pipe material or has been lined through with cured-in-place pipe (CIPP). Coating edges shall be terminated at or below the water line by keying into the concrete with a minimum ¼-inch wide x ¼-inch deep saw cut. Prior to coating application, the saw cut shall be dried and vacuumed to remove all dust and residue. During coating application, a liberal amount of material shall be applied to the saw-cut area and smoothed level. At no time shall the existing reinforcement be cut or damaged during installation of the keyways.

G. Coating and structural insert shall include sealing between the adjustment rings and frame.

H. Replacement of adjustment rings is included in this item of work.

I. The outside of grading rings shall be neatly plastered with 1/2-inch of cement mortar as the Work progresses.

J. Grading rings shall be used for all manholes, where required. Grade rings shall be a maximum of 12-inches in height, constructed on the roof slab or cone section on which the manhole frame and cover shall be placed. The height of the grade rings shall be such as is necessary to bring the manhole frame to the proper grade.

K. Each grading ring shall be laid in a full bed of mortar and shall be thoroughly bonded.

L. Cleaning of the adjustment rings prior to the job shall be per SECTION 02603.

M. Coating of the existing adjustment rings shall be the same procedures as given for the entire manhole interior surfaces in SECTION 02603.

N. Removal of all existing manhole steps is included in this item of work. Unless otherwise noted, for existing manholes that have existing manhole steps installed in them, the CONTRACTOR shall remove said steps from the manhole. If the manhole steps are "strongly embedded" in the concrete (for manhole steps, this is defined as a pulling force of 100 pounds per step being insufficient to dislodge them from the concrete), the CONTRACTOR may cut them off flush with the surface of the surrounding manhole and leave the embedded portion in place in the concrete. When the manhole is fully prepared and ready for the coating system, any portion of the steps that remain embedded in the concrete shall not protrude above the surface of the concrete.

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and includes removal of existing steps by cutting the protruding parts as close as possible to the manhole surface.

O. The remaining nub shall be ground down and grouted over to form a smooth surface.

2.1.3. - Repair and Coat Bench

A. Cleaning of the manhole bench prior to the job shall be Cleaning and Preparation Activities of SECTION 02603.

B. Rebuilding of the bench shall include grouting in accordance with SECTION 03600, GROUT, as necessary to restore the bench to the original or better grade.

C. Benches shall be built up and given a uniform wood float finish. Care shall be taken to slope all benches for proper drainage to the invert. ALL manhole bench reconstruction work shall be done in accordance with MAG Standard Detail 420.

D. Rebuilt Benches shall be coated in accordance with the procedures as given for the entire manhole interior surfaces in SECTION 02603.

E. In order to reconstruct the benches, the CONTRACTOR will be required to provide dry working conditions in all manhole benches and invert areas to allow the concrete and other materials to set properly.

2.1.4. - Repair/Reshape and Coat Channel

A. Cleaning of the manhole channel prior to the job shall be per Cleaning and Preparation Activities of SECTION 02603.

B. Rebuilding and reshaping of the channels through manholes shall be constructed of Class “A” concrete per MAG Section 725; Portland Cement Concrete. Channels shall be properly formed to the sizes, cross sections, grades and shapes as per MAG Standard Detail 420-3 and as shown in the project plans.

C. Reshaped channel shall be coated in accordance with the procedures as given for the entire manhole interior surfaces in SECTION 02603.

D. In order to reconstruct the channels, the CONTRACTOR will be required to provide dry working conditions in all manhole channel areas to allow the concrete and other materials to set properly.

2.1.5. - New 60-inch Diameter Sanitary Sewer Manhole per MAG 420 & 423

A. At the locations shown on the plans the CONTRACTOR shall provide a new 60-inch diameter manhole. All work shall be in accordance with MAG Detail 420, Type A with a 30-inch frame and cover per MAG Detail 424-2.

B. No steps are to be installed in the new manhole.

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C. New manholes shall be coated with an approved corrosion protective coating in accordance with SECTION 02603.

2.1.6. - New 72-inch Diameter Sanitary Sewer Manhole per MAG 420 & 423

A. At the location shown on the plans the CONTRACTOR shall provide a new 72-inch diameter manhole. All work shall be in accordance with MAG Detail 420, Type A with a 30-inch frame and cover per MAG Detail 423-2.

B. No steps are to be installed in the new manhole.

C. New manholes shall be coated with an approved corrosion protective coating in accordance with SECTION 02603.

D. This work shall also include removal of 8-inch pipe and 45 degree bends as shown on the project plans and as needed to facilitate installation of new manhole.

2.1.7. - Remove and Dispose of Existing Manhole/Flushing Tank

A. At the locations shown on the plans the CONTRACTOR shall remove and dispose of existing manholes/flushing tanks. Work includes excavation of material sufficient to remove the existing structure in preparation for construction of a new manhole or new pipe installation.

B. The removed structure shall be disposed of by CONTRACTOR in a location approved for disposal of sanitary sewer structure.

2.1.8. - Usage of Temporary Flow-Through Plugs

A. Where determined necessary, the CONTRACTOR may install temporary flow-through plugs so that repair materials are installed over a dry substrate and are allowed to cure in accordance with manufacturer recommendations before coming in contact with sewage.

B. The CONTRACTOR shall insure that flow-through plugs are of adequate capacity and size to maintain flow throughout the rehabilitation process without sewer backup.

C. If sewage backup occurs, the CONTRACTOR shall be solely responsible for any cleanup, repair, property damage costs and claims, or resultant regulatory agency fines.

PART 3 - POST-EXECUTION

Upon completion of this rehabilitation project, the CONTRACTOR shall provide to the City with the Project Record Documents, which will include but not be limited to:

A. Exhibits and/or As-Builts drawing reflecting all changes made in the specifications and working drawings during the construction process, and show

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the exact dimensions, geometry, and location of all elements of the work completed for every manhole under the contract.

B. Change orders approved during the construction process and other modifications to the contract should be reflected on the final Exhibits and As-Builts.

C. Product data and specifications.

D. Photographic record of all the work performed and every manhole showing the pre-execution and the post-execution condition. Frame and cover, and adjustment ring replacements should also be documented.

E. Field test records.

PART 4 - MEASUREMENT AND PAYMENT

A. DEFINITION: Full compensation for all labor, materials and equipment required to clean manholes, prepare surface of manholes, remove manholes, construct new manholes, excavation, saw cutting, removal and replacement of surrounding finish grade materials, remove and replace frame and cover, adjusting rings, cone, shaft, bench, channel, etc., repair manhole walls, grouting, furnish and install coating and insert liner in accordance with manufacturer's recommendations and these technical specifications, all safety and support systems required to complete the work as described in these special provisions, restoration of adjacent site, and including any incidental items necessary to complete the work.

B. MEASUREMENT AND PAYMENT: Measurement and Payment of Manhole Rehabilitation shall be on a unit price for each item of work described as follows:

1. Remove and Replace Manhole Collar, Frame and Cover: measurement and payment shall be on a unit price bid per each for the work complete in place.
2. Repair and Coat Chimney, Cone and Wall: measurement and payment shall be on a unit price bid per square foot of manhole completely coated as described herein.
3. Repair and Coat Bench: measurement and payment shall be on a unit price bid per each for the work, complete in place.
4. Repair and Coat Channel: measurement and payment shall be on a unit price bid per each for the work, complete in place.
5. New 60-inch Diameter Sanitary Sewer Manhole per MAG 420 & 423: measurement and payment shall be on a unit price bid per each for the work complete in place.
6. New 72-inch Diameter Sanitary Sewer Manhole per MAG 420 & 423: measurement and payment shall be on a unit price bid per each for the work complete in place.

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7. Remove and Dispose of Existing Manhole/Flushing Tank: measurement and payment for removal and disposal of existing manhole/flushing tank shall be on a unit price bid per each for the work complete in place. + + END OF SECTION + +

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SECTION 02603

CORROSION PROTECTIVE COATING SYSTEM

PART 1 - GENERAL

1.1 - DESCRIPTION

1.1.1. - Scope

This section specifies the coating system used for the coating of the manholes as indicated in the Contract Documents.

The coating shall yield a hard, durable chemical resistant coating and shall be specifically designed to be applied on a dry surface. The finished coating shall provide a watertight seal and shall adhere to all components of the manhole and adjoining pipeline and any pipeline liner systems if present.

1.1.2. - Definitions

Specific coating terminology used in this section is in accordance with definitions contained in ASTM D16, ASTM D3960, and the following definitions:

Replacement of the adjustment rings shall include the following:

A. Dry Film Thickness (DFT): The thickness of one fully cured continuous application of coating.

B. Field Coat: The application or the completion of application of the coating system after installation of the surface at the site of the work.

C. Shop Coat: One or more coats applied in a shop or plant prior to shipment to the site of erection or fabrication, where the field or finishing coat is applied.

D. Tie Coat: An intermediate coat used to bond different types of paint coats. Coatings are used to improve the adhesion of a succeeding coat.

E. Volatile Organic Compound (VOC) Content: The portion of the coating that is a compound of carbon, is photochemically reactive, and evaporates during drying or curing, expressed in grams per liter or pounds per gallon.

F. Touch-Up Painting: The application of paint on areas of painted surfaces to repair marks, scratches, and areas where the coating has deteriorated to restore the coating film to an unbroken condition.

1.1.3. - References

This section contains references to the following documents. They are a part of this section as specified and modified. In case of conflict between the requirements

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of this section and those of the listed documents, the requirements of this section shall prevail.

Reference	Title
ASTM D16	Standard Terminology Relating for Paint, Related Coatings, Material, and Applications
ASTM D256	Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics
ASTM D638	Standard Test Method For Tensile Properties Of Plastics
ASTM D695	Standard Test Method for Compressive Properties of Rigid Plastics
ASTM D790	Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics
ASTM D3359	Standard Test Methods for Measuring Adhesion by Tape Test
ASTM D1653	Standard Test Methods for Water Vapor Transmission of Organic Coating Films
ASTM D3960	Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings
ASTM D4060	Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser
ASTM D4258	Standard Practice for Surface Cleaning Concrete for Coating
ASTM D4262	Standard Test Method for pH of Chemically Cleaned or Etched Concrete Surfaces
ASTM D4541	Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
NACE RP0274	High-Voltage Electrical Inspection of Pipeline Coatings
SSPC-SP13	Surface Preparation of Concrete

1.1.4. - Quality Assurance

A. STANARDIZATION: Materials and supplies provided shall be the standard products of manufacturers. Materials in each coating system shall be the products of a single manufacturer.

B. SPARK TESTING: Spark testing shall be used on all manholes that are coated to detect cracks and thin spots in the coating system. A 1/8-inch hole shall be drilled through the coating as a control for the holiday detector. A stainless-steel concrete anchoring bolt shall be installed in the manhole interior for grounding during spark testing. The entire interior surface of the manhole shall

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be spark tested per NACE RP0274 standard in the presence of the ENGINEER. Areas that fail the spark test as well as the 1/8-inch control hole shall be promptly repaired and retested. Subsequent inspections and repair work shall be at the expense of the CONTRACTOR. The spark testing will be performed by the CONTRACTOR and witnessed by the ENGINEER and shall be completed and any repairs made prior to the final acceptance inspection. Spark test results shall be provided in writing by the CONTRACTOR to the CITY.

C. PHYSICAL TESTING: Results of the following tests, performed on cured and coated concrete specimens, shall be provided.
   1. Compressive Strength – ASTM D695
   2. Water Vapor Transmission – ASTM D1653
   3. Impact Resistance – ASTM D256
   4. Abrasion Resistance – ASTM D4060
   5. Flexural Strength and Modulus of Elasticity – ASTM D790
   6. Tensile Strength – ASTM D638

D. ADHESION TESTING: At a minimum one in four of the manholes coated, the CONTRACTOR shall perform an adhesion test after proper cure in accordance with ASTM D4541 to demonstrate that the specified field coatings adhere to the substrate. Manholes to be tested will be chosen by the ENGINEER and the adhesion test shall be witnessed by the ENGINEER. Test results showing an adhesion rating of that specified by the manufacturer or better for all surfaces shall be considered acceptable provided the test results in failure at or within the substrate. If the test dolly should pull off with failure in the epoxy or coating additional testing will be required. Where unacceptable test results are obtained, the CONTRACTOR shall be responsible for removing and reapplying the specified coatings at no cost to the CITY. A failed test shall require testing two additional manholes at no additional cost to the CITY.

1.1.5. - Delivery and Storage

Materials shall be delivered to the job site in their original, unopened containers. Each container shall bear the manufacturer's name, coating type, batch number, date of manufacture, storage life, and special directions.

Materials shall be stored in enclosed structures and shall be protected from weather an excessive heat or cold. Flammable materials shall be stored in accordance with state and local codes. Materials exceeding storage life recommended by the manufacturer shall be removed from the site.

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PART 2 - PRODUCTS

The coating system shall be a trowel-able 100% solids epoxy monolithic surfacing system for use in coating new or existing manholes, wet wells, lift stations, treatment plants and other structures.

2.1 - MATERIALS

A. COATING: All pre-approved corrosion protective coating systems for application to existing manholes for the City of Glendale sewer rehabilitation projects are listed in the CITY's Design Standards.

B. PRIMER: Primer shall be as recommended by the manufacturer for each application.

C. UNDERLAYMENT: Underlayment applied prior to coating shall be as recommended by the manufacturer for each application.

D. INFILTRATION CONTROL: Manhole infiltration control material shall be as recommended by the manufacturer. Surface preparation and application shall be as recommended by the manufacturer.

2.2 - COATING SYSTEM APPLICATION PLAN

Coating System Application Plan shall be prepared that includes a description of the following:

A. Quality Assurance Procedures:

1. Training program to qualify personal in the correct storage and handling of coating materials, and the necessary safety requirements.
2. List of application and testing equipment to be used, including inspections confirming satisfactory conditions of equipment.
3. Detailed procedures and methods for surface preparation including repair and reprofiling as required, application of primer and final coating and testing.

B. Criteria for acceptance of the preparation of concrete and other manhole surfaces.

C. Plan for sewage diversion or the use of flow-through plugs, if required.

D. Method and material for sealing active leaks.

E. Detailed plan of surface preparation, including repair and reprofiling.

F. Details of application primer and finish coats, including required curing times.

G. Detailed environmental provisions such as shading from the sun.

H. Procedures for adhesion testing.

I. Dry film thickness testing.

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2.3 - PRODUCT DATA

Before materials are delivered to the job site, the CONTRACTOR shall provide the following information:

A. For the underlayment filler, primer, and finish coating, the CONTRACTOR shall furnish a Material Safety Data Sheet (MSDS).

B. For the underlayment filler and finish coating, the CONTRACTOR shall provide the manufacturer's application instructions, which shall include the following:

1. Surface preparation recommendations.
2. Primer type, where required.
3. Maximum dry and wet mil thickness per coat.
4. Minimum and maximum curing time between coats, including atmospheric conditions for each.
5. Curing time before submergence in liquid.
6. Thinner to be used with coating material.
7. Ventilation requirements.
8. Minimum atmospheric conditions during which the coating shall be applied.
9. Allowable application methods.
10. Maximum allowable moisture content.
11. Maximum storage life.

C. List of materials proposed to be used under this section and manufacturer's data for each material including test data referenced in part 1.1.4 C. of this section.

PART 3 - EXECUTION

3.1 - COATING APPLICATOR QUALIFICATIONS

A. The CONTRACTOR or SUBCONTRACTOR performing the work covered by this specification (also referred to herein as "the coating applicator") shall be an approved applicator of the manufacturer. It shall be the CONTRACTOR's responsibility to ensure that any SUBCONTRACTOR used for such work is an approved applicator.

3.2 - COATING SYSTEM APPLICATION

3.2.1. - Cleaning and Preparation of Surfaces to be Coated

A. The CONTRACTOR shall clean manholes to be rehabilitated per SSPC-SP13. Before application of the coating system, the surface must be clean and free of all contaminants including oil, grease, incompatible existing coatings, waxes,

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form release, curing compounds, efflorescence, sealers, salts, dust, and chemical contaminants. Suitable heaters shall be used as needed to produce a surface-dry condition. The surface will be vacuumed to make sure that loose particles are not present. The entire manhole interior including frame, walls and bench shall be cleaned using either abrasive blasting and/or high-pressure water blast as recommended by the coating and/or repair product manufacturer and approved by the ENGINEER. All concrete, brick or mortar that is not sound or has been damaged by chemical exposure shall be removed to a sound, neutralized surface. Manholes designated for spot repair or bench coating only shall be cleaned in their entirety as previously described.

Other manhole cleaning methods may be used in addition to abrasive blasting or water blasting, as necessary to properly clean and prepare the manhole, but shall not be used as a substitute for abrasive blasting or water blasting. Subject to CITY approval, other methods that may be used in addition to abrasive blasting or water blasting (but not as a substitute for them) are high pressure shotblasting, grinding, mechanical removal methods, chemical cleaning, detergent cleaning, hot water blasting and acid etching. If chemical cleaning or acid etching are used, the substrate shall be neutralized and washed of residue. The CONTRACTOR shall use whatever methods are required to properly clean and prepare the manhole for the coating system.

Unless otherwise noted, for existing manholes lined or coated with a previously applied corrosion protective coating, the CONTRACTOR shall entirely remove the existing liner/coating (including any underlayment layers) prior to performing other cleaning activities.

The CONTRACTOR shall also remove all dirt, rocks, rust, spalled masonry including mortar, concrete and brick, roots, sludge, grit and other deleterious materials and debris from the interior manhole. The finished interior surface shall consist of sound concrete or brick with adequate profile and porosity to provide a strong bond between the necessary repair materials and/or coating and the substrate.

During cleaning and preparation, methods shall be taken to prevent any debris from entering the downstream sewer mains.

B. CONTRACTOR shall also be responsible for any additional surface preparation beyond water blasting as required by the coating system manufacturer. Where additional preparation is required, the CONTRACTOR shall provide all labor, materials, and equipment as necessary, and at no additional cost to the CITY.

C. Visual Appearance of the Manhole – The prepared substrate shall have the appearance of sound concrete (or brick and/or mortar), free from discolored, white, chalky, and cracked areas.

D. Aural Observations – When struck with a metal hammer or tool, the prepared substrate shall exhibit the characteristic sound of solid, competent concrete (or brick).

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E. CONTRACTOR shall test prepared surfaces after cleaning but prior to application of the coating system to determine the pH and moisture content of the concrete, as required according to manufacturer's recommendations. Testing may include pH and Phenolphthalein as described below:

   pH testing – The ENGINEER shall use wetted litmus paper applied to the surface of the substrate to ensure that the pH of the substrate is 7 or higher. This test will be considered obligatory.

   Phenolphthalein testing – The ENGINEER shall apply a few drops of phenolphthalein to the surface of the concrete, which if the concrete is competent should yield a purple color.

   The ENGINEER is not obligated to use all of the above tests but may do so at CITY's sole discretion. Often visual, mechanical and/or aural observations and tests alone will be adequate, but the pH and/or phenolphthalein tests may be used if there is still some uncertainty.

F. The area between the manhole and the manhole ring and any other area that might exhibit movement or cracking due to expansion and contraction shall be grouted with a watertight, expansive grout, approved for use by the manufacturer's representative and the ENGINEER.

G. The CONTRACTOR shall apply an approved underlayment to the interior of all manholes on this project to reshape and re-profile portions of the interior surface of the manholes. Prior to any surface coating work in existing manholes, the CONTRACTOR shall fill all voids, including any left by the removal of manhole steps; removal of loose and spalled concrete material in accordance with cleaning and preparation recommendations; and removal of concrete where evidence of exposed reinforcement is visible in the interior of the manhole. These areas will require buildup and re-profiling of the manhole wall as needed such that the manhole and bench surface is restored to an even and uniform surface profile using one of the underlayment materials approved and recommended by the selected coating material manufacturers.

   The underlayment shall be installed over a clean surface prepared in accordance with the requirements of this specification. The CONTRACTOR shall employ whatever means necessary (e.g., humidity control, temperature control, additional blasting, mechanical surface preparation, etc.) to ensure proper curing of the underlayment layer, strong adherence of the underlayment layer to the prepared manhole surface, and strong adherence to any layer installed over the underlayment layer.

   The underlayment shall be applied throughout the entire manhole at a minimum ½-inch total cured thickness. Underlayment shall be hand troweled and in accordance with the manufacturer's recommendations. After installation, the underlayment shall be free of trowel marks and irregularities. Notwithstanding the thickness requirement, an additional underlayment thickness requirement may be required by the ENGINEER for existing manholes that exhibit extreme deterioration.

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3.2.2. - Coating Application Preparation

A. CONTRACTOR shall protect the newly lined sewer from debris, overspray, or any detrimental activity due to restoration of the manholes.

B. Manholes to be coated shall be cleaned in their entirety in accordance with the requirements of subsection 3.2.1 of this specification. The CONTRACTOR shall employ whatever means necessary (e.g., humidity control, temperature control, additional blasting, mechanical surface preparation, etc.) to ensure strong adherence of the surface coating layer(s) to any underlying and overlying layers and proper curing of the surface coating layer(s). If the surface coating is applied in two or more layers, the time between applications of the various layers shall be controlled to ensure proper bond between layers. Loose and protruding concrete shall be removed. Missing brick and mortar shall be filled using a grout as recommended by the coating manufacturer and approved by the ENGINEER. The grout filler shall be used to bring all areas of holes and pitting up to the nominal surface of the manhole so that there is an even interior surface in the manhole without waves, pits, or holes. Any exposed rebar shall be cleaned, and all areas of corrosion removed prior to application of the grout as recommended by the coating manufacturer and approved by the ENGINEER.

C. After surface preparation is complete, all materials dislodged during cleaning shall be removed from the work area. The CONTRACTOR shall be responsible for transporting and disposing, including all disposal fees, of any sediments and material removed from the sewer structures. All sediment and debris removed from the sewer structures shall be disposed off-site in a lawful manner. Hauling containers shall be watertight. On-site stockpiling of removed material will not be permitted.

   The CONTRACTOR is responsible for obtaining all necessary permits, fees, and approval from all regulatory agencies required to perform the work, including transport of sediments. Off-site disposal of all material removed from the sewer shall be the CONTRACTOR’s responsibility.

   A letter identifying the methods the CONTRACTOR plans to employ to remove sediment, debris, grease, scale, encrustations, and roots in the sewer structures to be repaired or coated shall be submitted to ENGINEER. The letter shall include a detailed explanation of the cleaning process and a schedule of activities and a list of the actions he plans to take to mitigate impact to the public during the cleaning operation.

   Any sediment or debris from cleaning operations larger than U.S. #8 sieve shall not be deposited downstream in the sewer main. Sedimentation deposited downstream, as determined by the ENGINEER, shall be removed at no cost to the CITY. The CONTRACTOR shall be thoroughly familiar with all phases of sewer structure cleaning to ensure the completion of this Contract without causing a health hazard or damage to the sewage system, public and private properties.

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3.2.3. - Coating System Installation

A. The CONTRACTOR shall install the coating system in the manholes after all removals, replacements, rebuilding, re-shaping, re-profiling, and adjustment activities are completed. Quantities of materials may vary significantly based on interior surface and conditions.

B. COATING TERMINATION: The CONTRACTOR shall submit shop drawings for approval detailing coating termination work.

C. ATMOSPHERIC CONDITIONS: Maintain sufficient forced air supply to provide and maintain a temperature of 50 to 90 degrees F and a circulating airflow inside the structures during the coating process or per manufacturer's recommendations.

D. REPAIR OF DEFECTS: CONTRACTOR shall repair all defects in the coating system where directed by the ENGINEER.

E. SPOT REPAIR AND BENCH COATING: The CONTRACTOR shall follow the coating manufacturer recommendations in regard to the distance the coating should be extended beyond the damaged area. If there is no recommendation from the coating manufacturer, the CITY shall provide direction to the CONTRACTOR.

3.2.4. - Coatings

A. GENERAL: Coating products shall not be used until the ENGINEER has inspected the materials and the coating manufacturer's technical representative has instructed the CONTRACTOR and ENGINEER in the surface preparation, mixing, and application of the coating. The coating manufacturer's technical representative must be a factory representative, not a local representative or an affiliate of the CONTRACTOR.

B. COATING SYSTEMS: Field coats shall consist of one or more finish coats to build up the coating to the specified dry film thickness. Unless otherwise specified, finish coats shall not be applied until other work in the area is complete and until all previous coats have been inspected.

C. COATING REQUIREMENTS: All items of equipment, or parts and surfaces of equipment, which are immersed when in service, with the exception of pumps and valves, shall have all surface preparation and coating work performed in the field.

3.2.5. - Application

A. WORKMANSHIP: Coated surfaces shall be free from runs, drops, ridges, waves, laps, and brush marks. Coats shall be applied so as to produce an even film of uniform thickness completely coating corners and crevices. Painting shall be done in accordance with the requirements of SSPC Paint Application Specification No. 1.

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The CONTRACTOR's equipment shall be designed for application of the materials specified. The coating shall be applied using a trowel or spray equipment to the proper thickness and surface characteristics as recommended by the coating manufacturer.

When possible, the application of the coating to the required minimum thickness shall be applied in a single coat sharply cut to line. Care shall be exercised to avoid over-coating or spattering on surfaces not to be coated.

B. ATMOSPHERIC CONDITIONS: Coatings shall be applied only to surfaces that are dry, and only under conditions of evaporation rather than condensation. Coatings shall not be applied during rainy, misty weather, or to surfaces upon which there is frost or moisture condensation. During damp weather, when the temperature of the surface to be coated is within 10 degrees F of the dew point, the surfaces shall be heated to prevent moisture condensation thereon. During coating, and for a period of at least 8 hours after the coating has been applied, the temperature of the surfaces to be coated, the coated surfaces, and the atmosphere in contact shall be maintained at or above 40 degrees F and 10 degrees F above the dew point. Paint, when applied, shall be approximately the same temperature as that of the surface on which it is applied. Fans or heaters shall be used inside enclosed areas where conditions causing condensation are severe.

C. PROTECTION OF COATED SURFACES: Items which have been coated shall not be handled, worked on, or otherwise disturbed, until the coating is completely dry and hard.

D. FILM THICKNESS AND CONTINUITY: Coating system thickness is the total thickness of finish coats. The coating system shall have a minimum wet film thickness of 125 mils applied in a single application where possible or as specified by the manufacturer.

   The surface area covered for various types of surfaces shall not exceed those recommended by the manufacturer. Coatings shall be applied to the thickness specified, and in accordance with these special provisions.

   In testing for continuity of coating about welds, projections (such as bolts and nuts), and crevices, the ENGINEER will determine the minimum conductivity for smooth areas of like coating where the dry mil thickness has been accepted. This conductivity shall then be taken as the minimum required for these rough or irregular areas. Pinholes and holidays shall be repainted to the required coverage.

E. SAFETY AND VENTILATION REQUIRMENTS: Requirements for safety and ventilation shall be in accordance with the Society for Protective Coatings (SSPC) Paint Application Guide No. 3.

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3.2.6. - Cleanup

Upon completion of coating, the CONTRACTOR shall remove surplus materials, protective coverings, and accumulated rubbish, and thoroughly clean all surfaces and repair any overspray or other paint-related damage.

PART 4 - MEASUREMENT AND PAYMENT

The application of corrosion protective coating system is part of the Manhole Rehabilitation described on SECTION 02100 and it is subjected to the scenario of manhole rehabilitation, which could be to fully coat a manhole or to partially coat a manhole as required for spot repairs.

Measurement and payment of Corrosion Protective Lining System is as described on PART 4 - MEASUREMENT AND PAYMENT, SECTION 02100.

+ + END OF SECTION + +

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SECTION 02661

DIVERSION OF SEWAGE FLOW AND DEWATERING

PART 1 - GENERAL

1.1 - DESCRIPTION

A. SCOPE

This section describes the requirements for temporary bypassing and dewatering of sewer pipes and structures during rehabilitation and installation. Temporary diversion of sewage flows is a key aspect of this project and includes the maintenance of service to the customer connections and/or making alternative arrangements for customers.

The CONTRACTOR is made aware that sewer pipe and structure rehabilitation may occur during the monsoon months with severe thunderstorms and possible flash flooding events. Adverse weather conditions may impact the capacity of the bypassing system. The CONTRACTOR shall be prepared for these weather conditions and alter procedures accordingly.

B. EXPERIENCE

CONTRACTOR shall utilize staff and/or a subcontractor that has been directly responsible for completion of a pipe rehabilitation project that required the bypass pumping of sewage flows.

1.2 - QUALITY ASSURANCE

The CONTRACTOR is solely responsible for maintaining the quality assurance of his work during the length of the project. The contractor is responsible for any costs associated with corrective measures required to replace or repair items not meeting the quality standards specified by the CITY.

A. BYPASS DESIGN: The actual design of the bypass arrangement shall be prepared by the CONTRACTOR and shall be submitted to the ENGINEER to determine conformance to project objectives. Means and methods of accomplishing the bypassing shall be the responsibility of the CONTRACTOR.

B. TESTING: The CONTRACTOR shall have the entire bypassing system in place and successfully pressure tested at 1.5 times the maximum operating pressure of the system before bypassing any sewage.

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1.3 - SUBMITTALS

At the Preconstruction Conference, the CONTRACTOR shall submit drawings and complete design data showing methods and equipment he proposes to utilize in sewer bypassing for approval by the ENGINEER. The submittal shall include the following information.

1. Drawings indicating the scheme and location of temporary sewer plugs and bypass discharge lines. The drawings shall also show the method and location for discharging the bypass lines as well as routing of bypass piping including placement in roadway or landscape area behind sidewalk, locations where bypass piping is to be recessed into the pavement, road closures, closure of pedestrian facilities, etc.

2. Capacities of pumps, prime movers, and standby equipment.

3. Design calculations proving adequacy of the system and selected equipment.

4. Standby power source.

5. Staffing plan.

6. Show suction and discharge points with elevations and stationing on the design plans.

7. Proposed noise control and exhaust control plans for pumping equipment.

8. Proposed plan for disruption of sewer service laterals.

9. Bypass piping inspection plan.

10. Odor control plan.

11. SSO response plan.

12. Emergency contacts, including names, job titles, email addresses, and 24-hour phone numbers.

1.4 - JOB CONDITIONS

A. AVAILABLE FLOW DATA

The CITY may be able to divert some of the sewer flows upstream of the project work sites, however, this is not guaranteed and shall be coordinated between the CITY, ENGINEER, and CONTRACTOR prior to the diversion design. The CITY Water Services Department may be able to provide available flow data however, this is not guaranteed. CONTRACTOR is responsible for obtaining current flow

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condition information at the time of construction. Any additional monitoring or gathering of flow data to properly size the bypass system is the responsibility of the CONTRACTOR. The CONTRACTOR shall include considerations for increased flows due to rainfall events, fluctuations of peak flows due to holidays, civic events, etc., equipment failure risks, etc., and provide adequate reserve capacity and redundancy to maintain sewer flows within the sewer pipe upstream and downstream of the bypass. The CITY is not responsible for any deviations in quantity of sewage flow at any time during the construction period. If necessary, the CONTRACTOR shall provide additional means of flow diversion at no additional cost to the CITY to handle deviations in quantity of sewage flow at any time during the construction period.

B. SERVICE OR COLLECTOR LINES

The CONTRACTOR shall determine the location of service lines connected to adjacent users or collector pipes at manholes of sanitary sewers to be bypassed.

1.5 - MEASUREMENT AND PAYMENT

A. DEFINITION: Full compensation for all labor, material, equipment, and monitoring required to temporarily bypass wastewater flows around the rehabilitation and/or replacement work and/or dewater pipelines in preparation for cleaning and rehabilitation or replacement. Bypass shall include standby pumps and piping. Also includes installation, maintenance and removal of bypass pumps and bypass pipes, noise suppression, odor control, plugging of sewers, vactoring, excavation and backfill of any required trenches, steel plating, sawcut, removal and repair or replacement of asphalt and concrete pavement, removal and repair or replacement of concrete curb, gutter and sidewalk, construction of suction and discharge structures to facilitate bypass pumping, landscape restoration, and all other incidentals necessary to complete the work in conformance with Plans and Specifications.

B. MEASUREMENT: Measurement of Diversion of Sewage Flow and Dewatering shall be on a lump sum basis. Intermediate measurements for payment shall be made by the ENGINEER on a percentage of project completed basis. The CONTRACTOR shall be responsible for additional costs associated with an underestimate of the means required to divert sewage flows during the construction period.

C. PAYMENT: Payment for Diversion of Sewage Flow and Dewatering shall be per the price bid on a lump sum basis. Intermediate payments for this work shall be made on a percentage of work completed basis.

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PART 2 - PRODUCTS

2.1 - MATERIALS

A. CONTRACTOR shall provide temporary pumps, conduits, and other equipment to bypass sewer flow around the CONTRACTOR's work area as required. CONTRACTOR shall furnish all necessary labor and supervision to set up and operate the pumping and bypass system. Critical grade sound attenuated pumps shall be provided for the bypass pumping as required unless otherwise approved – see Section 3.6 Noise Control. Sound measurements shall be made in accordance with American National Standard S.13-1971. Pumps and bypass lines shall be of adequate capacity and size to handle the required capacity. The bypass system shall be designed to normally maintain the wastewater flow below the top of the pipe without surcharging.

B. The CONTRACTOR shall maintain on site sufficient equipment and materials to ensure continuous and successful operation of the bypass and dewatering systems. The standby pumps shall be installed and fully operational at all times including all pumps, equipment and piping being in-place. Standby pumps shall be fueled and operational at all times. The CONTRACTOR shall maintain on site a sufficient number of valves, tees, elbows, connections, tools, sewer plugs, piping, and other parts of system hardware to ensure immediate repair or modification of any part of the system as necessary. Piping shall be leak free.

C. For bypassing systems with a required capacity equal to or less than 2 MGD and piping lengths greater than 1,000 feet, and for systems with required capacity greater than 2 MGD, the CONTRACTOR shall provide multiple bypass lines to convey 150% of the maximum anticipated flow (as determined by the CONTRACTOR). Redundant lines should be fully connected in the bypass system to allow the system to be switched over quickly in the event of a leak. In all cases, redundant standby pump(s) shall be on site and operational at all times in case of primary pump failure.

D. All pumps, generators, and other equipment shall be placed in spill containment impound or on a new plastic tarp to provide containment and protect against sewage spills, or the spill of gasoline, oil, and hydraulic fluid spills.

PART 3 - EXECUTION

The CONTRACTOR shall notify the ENGINEER a minimum of 48 hours prior to shutting down of a pipeline and start of bypassing.

3.1 - SERVICE LINES

Every effort shall be made by the CONTRACTOR to ensure that sewer service to customers is maintained during the course of the work. When disruptions are

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necessary, service to laterals shall be disrupted for a period of no more than eight hours. Laterals within residential areas shall only be disrupted during the period of 8:00 a.m. to 5:00 p.m. Monday through Friday. Laterals within business areas shall be addressed on a case-by-case basis. The CONTRACTOR shall provide a public information representative when he visits customers to discuss bypass pumping of services or making alternative arrangements with the customer for service outages. No matter what arrangement is made, the CONTRACTOR must cooperate with the ENGINEER to provide CITY documentation that all affected users have been contacted and arrangements made for disruption or alternate accommodations. This documentation must be submitted prior to the start of work on the section of sewer line affected.

3.2 - PUBLIC NOTIFICATIONS

The CONTRACTOR shall notify the ENGINEER and the CITY of any planned service interruptions at least two weeks prior to the event. The CONTRACTOR shall retain the services of a local Public Involvement firm to perform notification of the work to the public. At a minimum, the first notification shall be 5 days before the interruption of service. Much greater advance notice may be required if an alternate to pumping the customer's service is proposed by the CONTRACTOR. The second notification shall be 24 hours prior to the interruption of service. Notification shall be made door to door with printed handouts or door hangers. The information provided shall include, at a minimum, the reason for the interruption, the time period of the interruption, and a local 24-hour telephone hotline number for project information. ALL INFORMATION ON THE PRINTED HANDOUTS AND/OR DOOR HANGERS SHALL BE APPROVED BY THE CITY PRIOR TO DISTRIBUTION.

3.3 - MONITORING

The bypassing system shall not be shut down between shifts, on holidays or weekends, or during work stoppages without written permission from the ENGINEER. The bypass system will have an attendant around the clock whose only duty is to maintain the bypass pumping system until the bypassing of that specific pipeline is no longer required.

The CONTRACTOR shall inspect the entire bypass pumping system for leaks or spills on an hourly basis. The CONTRACTOR shall also create an inspection log and shall enter the time of inspection and the condition of the piping and the name of the inspector into the log for review by the ENGINEER.

3.4 - PUBLIC AND PRIVATE ACCESS

The CONTRACTOR shall maintain public and private access along project routes. Bypass lines shall be protected from damage due to traffic and shall not impede pedestrian or vehicular traffic routes unless otherwise allowed by approved traffic control plans. Bypass lines shall be buried at street crossings and business entrances unless otherwise approved by the ENGINEER. Temporary steel plating

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with milled edges may be used with approval for buried lines. Ramps protecting bypass lines shall be a minimum level of protection at accesses to private residences unless otherwise approved by the ENGINEER.

CONTRACTOR shall maintain pedestrian traffic and comply with ADA regulations for access to all residential and commercial property unless written approval is otherwise obtained from the property owner allowing for reduced access.

3.5 - DISCHARGE

In areas where flows are bypassed, all bypass flows shall be discharged as approved by the ENGINEER. Bypass discharge velocities shall not exceed 10 feet per second. The CONTRACTOR shall employ mitigation measures to protect the discharge structure from potential damage caused by discharge flows. Mitigation measures may include extending discharge piping deeper into the discharge structure or configuring the discharge piping to direct flows into the downstream pipe.

No bypassing to the ground surface, receiving waters, storm drains, or bypassing which results in soil or groundwater contamination or any potential health hazards shall be permitted. In addition, no backups and overflows onto private property shall be permitted.

3.6 - NOISE CONTROL

The CONTRACTOR shall perform all work in compliance with OSHA standards and in no case will noise levels be permitted which would interfere with the work of the CITY or others. Noise levels shall be in accordance with the City of Glendale noise ordinance.

The CONTRACTOR shall utilize sound attenuated bypass pumps with a maximum decibel rating of 70 decibels at 50 feet. Each internal combustion engine, used for any purpose on the job or related to the job, shall be equipped with a muffler of a type recommended by the manufacturer. No internal combustion engine shall be operated on the project without previously mentioned muffler.

Noisy portable equipment, such as generators or compressors, shall be located as far away from sensitive noise receptor areas as practicable. (Sensitive noise receptors are defined as occupied buildings with windows or doors facing the site). Noise barriers shall be constructed around noisy stationary construction equipment such as compressors or generators that have to be utilized at locations near (within 100 feet of) sensitive noise receptors as defined above. Idling equipment not actively utilized for extended periods of time shall be shutoff.

3.7 - DAMAGES

The CONTRACTOR shall repair, without cost to the CITY, any damage that may result from his negligence, inadequate or improper installation, maintenance, and operation of bypassing system, including mechanical or electrical failures.

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3.8 - ODOR CONTROL

The CONTRACTOR shall employ methods and procedures that mitigate the generation and discharge of objectionable odors to the surface environment at all times.

If odor complaints arise, the CONTRACTOR shall add ferric chloride to the wastewater flow upstream of bypass pumping operations to reduce odor. The CONTRACTOR shall make his own determination of flow characteristic for required dosing.

The CONTRACTOR shall add the ferric chloride from a location upstream that will allow 10 to 15 minutes reaction time before the flow enters the work area. The chemical dosing shall reduce odors generated from the wastewater stream to a level acceptable to the CITY. If this is not accomplished by adding the ferric chloride only, an additional control may be required. If odors are still unacceptable after addition of ferric chloride, the CONTRACTOR may also add hydrogen peroxide. The CONTRACTOR shall add hydrogen peroxide downstream to the flow that has been dosed with ferric chloride. The Hydrogen peroxide shall be added to allow a 5-minute reaction time before flow enters the work area. Any dosage combination of the two chemicals may be used to ensure continuous control of odors acceptable to the CITY.

3.9 - SANITARY SEWER OVERFLOWS

The CONTRACTOR shall take any and all precautions necessary to prevent backups and overflows on private property from blocked laterals during all sewer rehabilitation work. Special arrangements or supplemental bypasses may be required for some property owners.

CONTRACTOR is responsible for immediate and proper cleanup should any spill occur, regardless of amount.

3.10 - TERMINATION OF BYPASS

Bypass operations shall not be terminated until approvals are obtained from the ENGINEER for:

1. Pipe Rehabilitation

2. Manhole and/or Structure Rehabilitation

+ + END OF SECTION + +

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SECTION 02760

SEWER AND STRUCTURE CLEANING

PART 1 – GENERAL

1.1 DESCRIPTION

A. SCOPE:

This section specifies the requirements for cleaning and/or heavy cleaning the sewers and sewer structures prior to CCTV inspection, ENGINEER's inspection, and pipe or structure rehabilitation.

B. REQUIREMENTS:

The work to be done under this Contract consists of furnishing all labor and equipment to remove the accumulated corrosion, tuberculation, sediments and debris, down to sound, solid structural material of the sanitary sewer pipes and sewer manhole and structures.

The CONTRACTOR shall remove existing corrosion, tuberculation, sediment, debris, pipe supports, roots, scale, encrustations, and grease accumulations from the sanitary sewer pipes and structures to be inspected and/or rehabilitated and adequately prepare the surfaces for installation of CIPP liner, coating system and/or repair grout. All materials dislodged during cleaning shall be removed from the work area and carried to an approved disposal site.

Cleaning of the sewer is required prior to CCTV inspection of the sewer to view current line conditions.

1.2 SUBMITTALS

The following submittal shall be provided.

1. A letter identifying the methods the CONTRACTOR plans to employ to remove corrosion, tuberculation, sediment, debris, grease, scale, encrustations, and roots throughout the sewer pipe to be rehabilitated and in the sewer structures to be repaired or coated. The letter shall include a detailed explanation of the cleaning process and a schedule of activities, references where the CONTRACTOR

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has used the identified cleaning method successfully in the past and a list of the actions he plans to take to mitigate impact to the public during the cleaning operation.

1.3 MEASUREMENT AND PAYMENT

Heavy Cleaning of Existing Pipe (Allowance) where required to clean existing ductile iron pipe (DIP) due to excessive buildup of corrosion and tuberculation inside the pipe will be measured and paid for per hour of heavy cleaning that is completed. All tools, materials, personnel, and equipment required for removal of excessive tuberculation, corrosion, sediment, and other materials are included in this item of work.

No separate measurement or payment will be made for standard Sewer and Structure Cleaning of vitrified clay pipe (VCP), concrete, or polyvinyl chloride (PVC) pipe, the cost considered as included in CIPP lining of existing pipes or manhole rehabilitation depending on which work the cleaning is associated with.

PART 2 – MATERIALS

2.1 CHEMICAL ADDITIVES

No chemicals shall be used without written approval of the OWNER. In no case shall any chemical additive be used which might be considered hazardous or might be considered detrimental to organisms or equipment of a wastewater treatment plant, or detrimental to old or new pipe materials.

2.2 PRODUCT DATA

Copies of all disposal receipts shall be provided.

PART 3 – EXECUTION

3.1 GENERAL

The CONTRACTOR shall, at all times, conduct its work so as to prevent any blockage and minimize surcharging in the sewer manholes and connecting sewer pipelines. Damage to existing facilities as a result of the CONTRACTOR's work shall be promptly repaired in kind at the CONTRACTOR's expense.

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3.2 SEWER BYPASSING AND DEWATERING

If required, the sewer flow shall be bypassed during the cleaning of the sewers as specified in Section 02661.

3.3 CLEANING

The CONTRACTOR shall grit blast or hydro blast with a minimum 3,000 PSI water pressure for duration sufficient to clean to coating or lining manufacturer's recommendations the pipe or structure surface receiving a protective coating or lining.

A. Manholes and Pipes: Cleaning shall remove all loose coatings previously applied, sediment, rocks, debris, roots, grease accumulations and obstructions from the sewer to be rehabilitated and from the structures to be coated (if applicable). Cleaning of the sewer and structure interior surfaces shall remove all grease, scale, encrustation, and any other material from the surface that may impede application or performance of applied coatings. Multiple passes with cleaning equipment may be required at no additional cost to the OWNER.

   Sediment, material or debris from cleaning operations larger than U.S. #8 sieve shall not be deposited downstream in the sewer main. Sedimentation deposited downstream shall be removed at no cost to the OWNER.

   The CONTRACTOR shall be thoroughly familiar with all phases of sewer pipe and structure cleaning to ensure that surface preparation is adequate for coating or pipe rehabilitation to be installed without causing a health hazard or damage to the sanitary sewage system, public and private properties.

   The CONTRACTOR shall clean the sanitary sewer pipe and structures so that there is no visible residue, rocks, debris, roots, grease accumulation and/or obstructions. The CONTRACTOR shall clean the pipe and/or manhole structure adequately to ensure proper installation of the rehabilitation method proposed. CONTRACTOR shall clean all exposed rebar to remove areas of corrosion down to solid steel.

   Unless otherwise noted, for existing manholes or portions of the manhole lined or coated with a previously applied cured-in-place epoxy corrosion protective coating, the CONTRACTOR shall entirely remove the existing liner/coating (including any underlayment layers) prior to performing other cleaning activities.

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Pipe or manhole structures discovered by the CONTRACTOR or his Subcontractor to be physically deteriorated to the extent where cleaning may detrimentally impact the structural integrity of the existing pipe or manhole structure shall be brought to the attention of the OWNER prior to conducting cleaning operations. Once cleaning operations commence, the CONTRACTOR accepts all liability and responsibility for damage to existing pipes and structures.

It shall be the responsibility of the CONTRACTOR to repeat the cleaning process if root re-growth or other detrimental obstructions or residue becomes present at no additional cost to the OWNER.

B. Heavy Cleaning: Heavy cleaning shall be used for cleaning of existing ductile iron pipe (DIP) with excessive buildup of corrosion and tuberculation inside the pipe. Heavy cleaning includes additional cleaning of DIP using specialized mechanical equipment specific to the removal of interior coating and accumulation of corrosion and tuberculation within the pipe. Specialized equipment shall be chain flail or rotating sawblade. In each case, the CONTRACTOR shall use extreme caution when heavy cleaning so as not to damage the pipe.

Heavy cleaning shall remove all accumulation of corrosion and tuberculation from within the DIP such that the existing pipe diameter is restored in preparation for installation of cured-in-place pipe (CIPP) lining. All sediment, material, or debris from heavy cleaning operations larger than U.S. #8 sieve shall not be deposited downstream in the sewer main. Sedimentation deposited downstream shall be removed at no cost to the OWNER.

The CONTRACTOR shall be thoroughly familiar and experienced with heavy cleaning techniques and equipment to ensure that the existing pipe is not damaged, and the surface preparation is adequate for CIPP installation without causing a health hazard or damage to the sanitary sewage system, public and private properties.

3.4 DISPOSAL OF SEDIMENTS

The CONTRACTOR shall be responsible for transporting and disposing, including all disposal fees, of any sediments and material removed from the sewer or structures.

All sediment and debris removed from the sewer shall be disposed off-site in a lawful manner. Hauling containers shall be watertight. On-site stockpiling of removed material will not be permitted.

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The CONTRACTOR is responsible for obtaining all necessary permits, fees, and approval from all regulatory agencies required to perform the work, including transport of sediments. Off-site disposal of all material removed from the sewer shall be the CONTRACTOR's responsibility.

+ + END OF SECTION + +

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SECTION 02761

CCTV INSPECTION OF SANITARY SEWERS

PART 1 – GENERAL

1.1 DESCRIPTION

This specification defines the requirements for internal television inspection of existing sewer pipe before and after rehabilitation.

The CONTRACTOR shall inspect the sewer pipe interior using a color closed circuit television (CCTV) camera and document the inspection on video with audio location and date information, video title information, and hard copy inspection logs. A television inspection shall be performed after cleaning of the sewer as specified in Section 02760, Sewer and Structure Cleaning. The rehabilitated sewer will be CCTV inspected again in the same direction as the previous inspection after the lining of the sewer has been completed to ensure proper installation. The CONTRACTOR shall be responsible for properly inspecting the pipe.

1.2 QUALITY ASSURANCE

CONTRACTOR'S Qualifications: The CONTRACTOR shall have a minimum of three (3) years of experience in such work necessary to successfully meet this specification and provide references for five (5) sewer inspection projects involving remote CCTV pan and tilt inspection.

The CONTRACTOR shall have all operators who are successfully trained and certified through the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment and Certification Program (PACP). The CONTRACTOR shall provide copies of the PACP certification and project references for the operator.

A. PRE-REHABILITATION

The CONTRACTOR shall complete CCTV inspection of the interior of each pipe segment scheduled for rehabilitation prior to commencement of rehabilitation activities. The CCTV footage shall be reviewed by the ENGINEER for any obstructions or defects that would prohibit proper installation of the liner or repair sleeve.

The pre-rehabilitation CCTV inspection shall be approved by the ENGINEER prior to installation of the CIPP liner or repair sleeve. If the

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sewer line is determined not to be adequately cleaned, it shall be re-cleaned, and CCTV inspected by the CONTRACTOR at no additional cost to the OWNER. If the inspection is not completed such that all of the interior surface of the pipe is able to be viewed, the pipe shall be re-inspected at no additional cost to the OWNER.

B. POST – REHABILITATION

After rehabilitation of the pipe has been completed, the CONTRACTOR shall again complete CCTV inspection of the interior of each pipe that was rehabilitated. Inspection shall be sufficient to clearly see all the interior of the pipe and the newly installed CIPP liner or point repair sleeve. Any errors or required corrections for the rehabilitation method should be addressed by the Contractor.

The ENGINEER will review video recordings and logs to ensure compliance with the requirements listed in this specification and contract documents. If any portion of the liner/pipe is determined not acceptable, the liner/pipe shall be repaired or replaced, whichever the ENGINEER deems appropriate, and re-inspected by CCTV, at no additional cost to the OWNER.

1.3 SUBMITTALS

A. The following submittals shall be provided by the CONTRACTOR for review.
   1. CONTRACTOR reference projects per 02761-1.2.
   2. Operator PACP certificate and reference projects per 02761-1.2.
   3. Manufacturer's product literature for video equipment to be used.
   4. One copy each, of the finished video recordings/photographs and USB external hard drive, showing the existing sewer pipelines after cleaning and the sewer pipelines after liner installation, shall be submitted to the ENGINEER. The ENGINEER will review the recordings, not for accuracy of content, but to make sure that the required information is provided, and the recording is of acceptable quality. If the ENGINEER determines that the video recording is defective or not of adequate quality, the CONTRACTOR shall CCTV inspect again at the CONTRACTOR's expense.

1.4 MEASUREMENT AND PAYMENT

CCTV shall be incidental to the Work. Additional CCTV inspections required after the initial inspection, due to the failure of the initial inspection, shall be paid for by the CONTRACTOR.

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Part 2 – PRODUCTS

2.1 MATERIALS

A. TELEVISION INSPECTION CAMERA(S)

Camera(s) shall be intrinsically safe and shall be operative in 100 percent humidity conditions. Lighting intensity shall be remote controlled and shall be adjusted to minimize reflective glare. Lighting and camera quality shall provide a clear, in-focus picture of the entire inside periphery of the sewer.

B. VIDEO RECORDINGS

Video recordings of all sewer line inspections shall be made on high-quality color USB external hard drive. The audio portion of the composite videotape shall be sufficiently free from electrical interference and background noise to provide complete intelligibility of the oral report.

C. FOOTAGE COUNTER

A footage counter device, which measures the distance traveled by the camera in the sewer, shall be accurate to plus or minus 2 feet in 1,000 feet.

D. VIDEO TITLING

Video equipment shall include genlocking capabilities to the extent that computer generated data (i.e., footage, date, size, address and location, etc.) as determined by CITY can be overlaid onto video, and both indicated on the television monitor and permanently recorded on the inspection video.

E. FLOW IN SEWERS

During CCTV inspections, and continuously until completion of liner installation and inspection, the CONTRACTOR shall provide temporary dry conditions in the sewer pipelines. The bypassing requirements are provided in Section 02661, Diversion of Sewage Flow and Dewatering.

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Part 3 – EXECUTION

3.1 INSPECTION METHODS

A. VERBAL COMMENTARY

The CONTRACTOR shall record on the audio track of the video inspection recording narrative of the location, upstream and downstream control points, date, and time of the inspection.

B. ACCESS

The ENGINEER shall have access to observe the monitor and all other operations at all times. The system of cabling employed to transport the camera and transmit its signal shall not obstruct the camera's view.

C. INSPECTION RATE

The camera shall be pulled through the sewer in either direction, but all inspections at each location shall be in the same direction. Maximum rate of travel shall be 30 feet per minute when recording.

D. IMAGE PERSPECTIVE

The camera image shall be down the center axis of the pipe when the camera is in motion. The CONTRACTOR is required to provide a 360-degree view of the pipe interior. Points of interest shall also be video recorded and shall include, but not be limited to, defects, encrustations, mineral deposits, debris, sediment, any location determined not to be clean or part of a proper liner installation, or defects in the liner (including, but not limited to bumps, folds, tears, dimples, etc.).

E. SEWER IDENTIFICATION

All inspection documentation shall include the sewer location.

+ + END OF SECTION + +

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SECTION 02767

CIPP LINING OF EXISTING SEWERS

PART 1 – GENERAL

1.1 DESCRIPTION

A. SCOPE

This section specifies a cured-in-place pipe (CIPP) liner for the rehabilitation of sanitary sewer pipe as indicated on the plans. The CIPP liner is a flexible tube composed of either fiberglass or felt. The tube is impregnated with a thermosetting or ultraviolet (UV) activated resin. The liner is placed inside a deteriorated sewer pipe by either inversion or insertion. The liner is then cured via exposure to hot water, steam, or UV light. The finished product is a continuous watertight liner from manhole to manhole, tight fitting to the host pipe, and smooth interior surface.

The CONTRACTOR is made aware that the lining of the sewers may occur during the summer months with temperatures exceeding 115 degrees F and severe thunderstorms. The CONTRACTOR shall be prepared for these weather conditions and alter installation procedures accordingly.

This section also specifies service lateral connection (SLC) seal also referred to as Top Hats™. The SLC seals the point of connection from a main pipeline to a connecting lateral pipeline and is installed without excavation using a resin-impregnated, flexible laminate installed into the existing service lateral, lapping over the main pipeline, sealing the connection.

Removal of intruding tap is also included in this specification as part of the preparation work required prior to insertion of a CIPP liner. This work included trimming of the tap such that it is flush with the interior pipe wall.

1.2 QUALITY ASSURANCE

A. REFERENCES

This section contains references to the following documents. They are a part of this section as specified and modified. In case of conflict between the

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requirements of this section and those of the listed documents, the requirements of this section shall prevail.

Reference	Title
ASTM D543	Test Method for Resistance of Plastics to Chemical Reagents
ASTM D638	Test Method for Tensile Properties of Plastics
ASTM D790	Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
ASTM D883	Definitions and Terms Relating to Plastics
ASTM D1600	Abbreviations, Acronyms, and Codes for Terms Relating to Plastics
ASTM D2990	Test Method for Tensile, Compressive and Flexural Creep and Creep-Rupture of Plastics
ASTM D3567	Standard Practice for Determining Dimensions of “Fiberglass” (Glass-Fiber-Reinforced Thermosetting Resin) Pipe and Fittings
ASTM D5813	Standard Specification for Cured-in-Place Thermosetting Resin Sewer Piping Systems
ASTM F216	Rehabilitation of Existing Pipelines and Conduits by Inversion and Curing of a Resin Impregnated Tube
ASTM F412	Definitions of Terms relating to Plastic Piping Systems
ASTM F1216	Standard Practice for Rehabilitation of Existing Pipelines and Conduits by Inversion and Curing of a Resin Impregnated Tube
ASTM F1743	Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of Cured-in-Place Thermosetting Resin Pipe (CIPP)
ASTM F2019	Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pulled in Place Installation of Glass Reinforced Plastic (GRP) Cured-in-Place Thermosetting Resin Pipe (CIPP)
DIN EN 761	Plastic piping systems – Glass-reinforced thermosetting plastics (GRP) pipes – Determination of the creep factor under dry conditions

B. CIPP LINER SAMPLES AND TESTING

1. SAMPLE PREPARATION: The CONTRACTOR shall prepare samples of the installed CIPP liner for subsequent testing of its physical properties. Samples shall be prepared and tested using the flat plate sampling method in accordance with the procedures in Section 8.1 of ASTM F1216 or ASTM F1743, or Section 7 of ASTM 2019, as is applicable. For fiberglass tube that is UV light cured, restrained samples shall be taken at the manholes. The sample will be constructed on the

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same materials (tube and resin/catalyst) as is used for that given liner installation. The flat plate sample shall be large enough to provide five sample specimens for each Short Term Flexural (Bending) properties as per ASTM D790 and ASTM D638 respectively. The sample will be clamped in a mold and placed in the downtube during the curing period of the CIPP tube. The samples shall be removed after all the water is removed from the cured pipe tube.

2. SAMPLE LABELING: The CONTRACTOR shall individually label the samples with permanent ink with the following information:
    a. Date and time the sample was removed and bagged
    b. Sample location
    c. Liner length, diameter and thickness
    d. Resin
    e. Catalyst or hardener
    f. Installation method (inversion or pull-in)
    g. Curing process (hot water or steam

3. CHAIN OF CUSTODY: The CONTRACTOR shall prepare a chain of custody form for the CIPP samples and submit to the ENGINEER with the following documentation:
    a. Project name
    b. Project number
    c. Contractor name and person responsible for collecting samples
    d. Sample number (use manhole number or location where the sample was cured)
    e. Date and time the sample was removed and bagged
    f. Location of curing (downtube, silencer, outlet chamber, etc.)
    g. Type of restraint used

    The signed chain of custody form shall be presented to the ENGINEER, who will independently verify that the sample is the correct sample and has been properly bagged and labeled for shipment. The ENGINEER will sign the chain of custody form and sample so attesting. A copy of the delivery manifest and chain of custody form will be given to the ENGINEER after all signatures are affixed and the sample is ready for shipment.

4. SAMPLE TESTING. The cured sample shall be tested by an independent third-party testing laboratory, as recommended by the CIPP liner manufacturer and approved by the ENGINEER, for the following properties:
    a. The flexural (bending) properties of the cured resin shall have minimum initial test values as given in Table 1 of ASTM F1216, ASTM F1743, or ASTM F2019, whichever is applicable.

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b. 50-year Flexural Creep Modulus in accordance with ASTM D2990 at 10,000 hours or equal test as approved by the ENGINEER. If approved 10,000 hour tests are not available, CONTRACTOR shall use a minimum 50% reduction (50% retention) of Flexural Modulus of Elasticity (per ASTM F1216, ASTM F1743, or ASTM F2019 whichever is applicable) for all formula calculations.
c. Long term properties in accordance with ASTM D2990.
d. The CONTRACTOR shall be responsible for all costs associated with the testing of the liner physical properties.

Final payment to CONTRACTOR will not be made until test results are received. The CONTRACTOR shall be responsible for any deviation from the specified physical properties and those evaluated through testing. Failure to meet the specified physical properties will result in the CIPP liner being considered defective work which will be handled in accordance with MAG Section 106.

5. SAMPLING FREQUENCY: The above-stated sampling shall be performed for each truckload of shipped CIPP. For example: one flat plate sample from each CIPP delivery.

6. WALL THICKNESS: The wall thickness of the felt tube shall be ordered to the next standard 1.5 mm incremental thickness above the minimum calculated design thickness. Unless otherwise specified to provide for excess resin migration, the gap thickness of the wetting-out equipment shall be sized to allow an excess of 5 to 10 percent resin to pass during impregnation. The minimum wall thickness shall be determined at a minimum of three locations on a cut section of the CIPP flat plate sample using a method of measurement accurate to the nearest 0.005 inch. Thickness measurements do not take into account the outer or inner foil layers. The minimum value shall meet the requirements of Section 02767.

C. INSPECTION:

The ENGINEER shall inspect the CIPP after installation, which shall include end seals, seals at manholes, service reconnections, and SLC seals. The inspection will be performed and recorded using CCTV equipment in accordance with Section 02761. If visible defects are observed in the CIPP liner, it will result in the CIPP liner being considered defective work which will be handled in accordance with MAG Section 106.

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D. LAYER INSPECTION

The layers of the cured fiberglass CIPP sample shall be uniformly bonded. It shall not be possible to separate any two layers with a probe so that the layers separate cleanly. If separation of the layers occurs during inspection of the field samples, then new samples will be cut from the manhole and inspected. Any reoccurrence may cause rejection of the work.

E. CIPP LINER HANDLING:

The CONTRACTOR shall be responsible for the delivery, storage, handling, and installation of all materials for CIPP in accordance with the written manufacturer's requirements and recommendations.

CONTRACTOR shall exercise adequate care during transportation, handling, and installation to ensure the CIPP material is not torn, cut, exposed to direct sunlight, or otherwise damaged. If any part or parts of the CIPP materials becomes torn, cut, or otherwise damaged before or during insertion, it shall be repaired or replaced in accordance with the manufacturer's recommendations and approval by the ENGINEER before proceeding further, and at the CONTRACTOR'S expense.

E. WARRANTY:

The CONTRACTOR shall warrant the completed work against defects in workmanship and material for a period of one year from the date of final acceptance. The ENGINEER, while not acting as quality control agent for the CONTRACTOR, shall be allowed to view and document any portion of this contract, including but not limited to, verifying the type and quantities of resin used at any point during this work.

Testing for chemical resistance shall be performed on a previously prepared sample of the finished product, proposed for this project. A certified affidavit, signed by an officer of the company, shall be provided stating that the resin the tests apply to and the resin submitted for this project are the same.

Finished and cured CIPP liner properties specified in Part 2 shall be tested as specified. Previous test data will not be acceptable.

1.3 SUBMITTALS

The following submittals shall be provided:

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A. Certification showing the CONTRACTOR is currently licensed by the appropriate licensor to perform CIPP installation and curing. Certification shall be given to the ENGINEER before any materials are delivered to the job site.

B. A certified affidavit, signed by an officer of the company, shall be provided stating that the CONTRACTOR'S on-site Field Superintendent has received proper training by the manufacturer for the steam and hot water CIPP liner installation methods and procedures, as applicable. Certification shall be given to the ENGINEER before any materials are delivered to the job site.

C. The type of tube material, resin and catalyst/hardener to be used. Certification stating CIPP tube has been manufactured in accordance with ASTM F1216, ASTM F1743, or ASTM F2019, as applicable, and resin is, suitable for its intended use.

D. Prior to insertion, the CONTRACTOR shall provide data on the maximum allowable stresses, maximum pulling force (if pull-in-place method is used), and maximum elongation of the tube.

E. Shop drawings which detail short- and long-term properties (providing all supporting test data) of all component materials and construction and recommendations for material storage and temperature control, CIPP liner handling, insertion, curing, trimming, and finishing.

F. Materials, methods, and equipment to be used for end seals at manholes and structures.

G. Structural design calculations for each CIPP liner segment (manhole to manhole) for fully deteriorated pipe condition to include size, the recommended thicknesses, field measurements, and assumptions used as the basis for calculations which demonstrate that the liner has been properly sized to avoid the creation of wrinkles or folds. All calculations shall be signed and sealed by a Registered Civil Engineer in the state of Arizona and submitted in duplicate to the ENGINEER at least 10 working days prior to the start of work.

H. Detailed method for addressing CIPP sampling requirements including location and size of each sample, method of removal, method of liner repair.

I. CCTV Inspection reports as specified in Section 02761.

J. The CONTRACTOR shall provide a delivery manifest for each liner with the following information:
   1. The inversion location where the liner will be installed.
   2. Provide the manhole numbers for each end of the inversion.

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3. If the CONTRACTOR has assigned an inversion number provide that number as well.

K. Liner diameter, length, and thickness.

L. CIPP manufacturer's recommended installation procedures, including resin manufacturer's curing requirements.

M. Manhole connection details.

N. Third party laboratory test results of required testing.

O. Material safety data sheets for all hazardous chemicals used or expected to be on-site. At a minimum, sheets for the resin, catalyst, cleaners, and repair agents should be submitted.

P. Written warranties as required herein.

Q. Service Lateral Connection (SLC) Seal (Top Hat™):
1. Method, procedure, or information per the specifications to provide either an adhesive, water-tight seal to the host pipeline or a mechanical seal between the cured SLC and host pipeline connections.
2. Technical procedure or information regarding the control and mitigation of shrinkage and wrinkling during installation and cure.
3. Minimum of three (3) references from municipal or public wastewater service providers in which the system proposed was used in accordance with the specifications herein.
4. Wet-out procedures or information if wet-out at the manufacturing plant.
5. Physical properties test for the proposed technology in accordance with the specifications herein that meet the minimum requirements as identified herein.
6. Copy of the chemical resistance test for the proposed technology in accordance with the specifications herein that meets the minimum requirements herein.
7. MSDS Sheets.

R. Remove Intruding Tap:
1. Method, procedure, and information per the specifications to trim the end of an intruding tap that protrudes into the interior of the pipe. The end shall be trimmed such that it is flush with the interior wall of the pipe. This work shall be completed prior to insertion of the CIPP liner.
2. Equipment that is used to trim and remove the intruding tap.

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1.4 CONTRACTOR QUALIFICATIONS

A. The licensed CONTRACTOR, or Subcontractor, shall have CIPP lining experience on sanitary sewers of similar size to this project and as defined herein. The CONTRACTOR shall submit the attached CONTRACTOR Qualification Form. The minimum qualifying CONTRACTOR experience for this project is 3 or more projects totaling a minimum of 20,000 feet of CIPP liner successfully installed in sewers within the past 5 years. This experience shall be for projects completed within the United States with the same CIPP liner and resin combination proposed for this project. CONTRACTOR shall provide project lengths, diameters, date of installation, owner name and telephone number, CIPP liner manufacturer and resin type on the Qualification Form. References may be checked.

B. The CONTRACTOR shall provide a full-time project Superintendent for the project. The Superintendent shall meet all the same qualifications called out above for the CONTRACTOR. The CONTRACTOR shall submit the attached Superintendent Qualification Form six (6) working days after bid opening. All requested information must be provided. References may be checked.

C. Service Lateral Connection (Top Hat™): Current certification by manufacturer to install the system proposed in accordance with the specifications herein. Certification shall indicate the Contractor has been licensed or certified by the manufacturer for a minimum of two (2) years.

1.5 MEASUREMENT AND PAYMENT

CURED IN PLACE PIPE (CIPP)

A. Definition: Full compensation for all work associated with preparation and installation of fully deteriorated cured-in-place pipe (CIPP) liner as indicated in the Design Drawings and as described in these Technical Specifications. Work includes field measurement of existing interior pipe diameter prior to ordering materials; preparation of existing sewer pipe including standard cleaning of pipe including removal of sediments, roots, grease, and other materials; heavy cleaning for removal of tuberculation from DIP will be measured and paid for separately under item Heavy Cleaning of Existing Pipe (Allowance); pre- and post-construction CCTV inspection; removal of any objects protruding into the pipe such as service taps, removal of any gaskets hanging in the pipe at the joints, repair of severely offset joints, and other items as required to ensure a smooth profile once the CIPP is installed; wetting out of CIPP bag; transportation of CIPP to project locations; on-site storage of CIPP as required to prevent curing of CIPP prior to insertion; insertion of CIPP bag into the pipe via inversion or pull-in

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method; heated water or steam curing of the CIPP in accordance with the manufacturer's recommendations and the approved design; reopening of service taps; end seals; sampling, third-party testing; disposal of curing water; and all necessary safety and support systems required to perform the work.

B. Measurement: Measurement for CIPP lining of existing sewers shall be per linear foot along the longitudinal axis of the pipe and shall extend from center of upstream manhole to center of downstream manhole.

C. Payment: Payment for CIPP lining of existing sewers shall be per linear foot of CIPP installed at the appropriate diameter as called for on the plans including all work as described above.

SERVICE LATERAL CONNECTION (SLC) SEAL

A. Definition: Service lateral connection (SLC) seal (also known as Top Hat™) includes all materials, equipment, and labor necessary to install SLC seal at the locations shown on the plans with the intent of providing a seal at the existing sewer service connections where there may be a gap in the existing connection of the service lateral to the pipe.

B. Measurement: Measurement for SLC Seal (Top Hat™) shall be per each.

C. Payment: for SLC Seal (Top Hat™) will be made per the unit price bid per each for each unit installed at the locations shown in the plans.

REMOVE INTRUDING TAP

A. Definition: Remove Intruding Tap includes all materials, equipment, and labor necessary to remotely trim and remove the end of an existing service tap that intrudes into the interior of the mainline sewer pipe. The tap shall be trimmed such that the end is flush with the interior wall of the pipe so that it does not reflect through the new CIPP liner. Trimming of the service tap shall be completed by equipment compatible with such work. All work shall be completed prior to installation of the CIPP liner into the mainline sewer pipe.

B. Measurement: Measurement for Remove Intruding Tap shall be per each.

C. Payment: for Remove Intruding Tap will be made per the unit price bid per each for each unit installed at the locations shown in the plans.

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PART 2 – PRODUCTS

2.1 GENERAL

A. All materials and installation procedures provided by the CONTRACTOR for use in the CIPP installation process shall be equal to or exceed the requirements of Section 5 of ASTM F1216, Section 5 of ASTM F1743, or ASTM F2019, as is applicable.

B. CONTRACTOR shall be responsible for control of all material and process variables to provide a finished CIPP possessing the minimum properties specified in ASTM F1216, ASTM F1743, or ASTM F2019, as is applicable and supplemented herein.

C. The finished SLC seal product shall be fabricated from materials which when cured will be chemically resistant to withstand internal exposure to domestic sewage and shall meet the chemical resistance requirements of ASTM D-543. It shall also be compatible with the lining system materials utilized in the main sewer line.

2.2 CIPP TUBE

A. FABRIC TUBING:

FELT: The Felt tube shall consist of one or more layers of absorbent, flexible felt fabric. The layers may be woven or non-woven materials or combination thereof, capable of carrying resin, withstand installation pressures, sufficient strength to bridge missing pipe, and hold up under curing temperatures. The seams of the tube must be leak free and stronger than the non-seamed felt.

GLASS REINFORCED PLASTIC (GRP): The GRP tube shall consist of a seamless, spirally would fiberglass that is flexible and has strain values (expandable) up to ten (10) percent. The tube will not have a longitudinal seam, including a stitched seam, stitch-free-weld or bond, or stitch-free overlap. The tube shall be constructed to withstand installation pressures and have sufficient strength to bridge missing pipe.

B. CHEMICAL RESISTANCE

The chemical resistance tests should be completed in accordance with Test Method D543. Exposure should be for a minimum of one month at 73.4 degrees F. During this period, the CIPP test specimens should lose no more than 20 percent of their initial flexural strength and flexural modulus when tested in accordance with Section 8 of ASTM F1216 or ASTM F1743, or

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Section 6 of ASTM F2019, whichever is applicable, when subjected to the following solutions:

Chemical Solution	FELT TUBE Concentration [percent]	GRP TUBE Concentration [percent]
Tap Water (pH 6-9)	100	n/a
Nitric Acid	5	1
Phosphoric Acid	10	n/a
Sulfuric Acid	10	5
Gasoline	100	100
Vegetable Oil	100	100
Detergent	0.1	0.1
Soap	0.1	0.1

The CONTRACTOR shall be responsible for all costs associated with the chemical resistance tests.

Proof of meeting these requirements shall be provided to the engineer for approval at least seven (7) days prior to commencement of work.

C. PHYSICAL APPEARANCE:

The tube shall be free from defects, such as tears, holes, cuts, foreign materials, blisters, cracks, and other surface defects. The tube shall be homogenous across the entire wall thickness. No dry or unsaturated layers shall be evident.

2.3 RESINS

A. GENERAL

Resins shall be tinted for visibility and provide positive indication of adequate liner wet-out. Resins should be appropriate for conditions encountered in a sanitary sewer environment. Resins should withstand the corrosive effect of residential, commercial, and industrial effluents, liquids, and/or gases common to sewers. Resins should be resistant to abrasion caused by solids, grit, aggregate, and/or sand.

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B. TYPES OF RESIN

INVERSION METHOD: a general purpose, unsaturated, styrene-based thermoset resin and catalyst system or an epoxy resin and hardener that is compatible with the inversion process,

PULL-IN-PLACE METHOD: an isophthalic based polyester, or vinyl ester thermoset resin and catalyst or an epoxy resin and hardener that is compatible with pull-in-place installation.

C. STRUCTURAL PROPERTIES

The structural properties of the cured resin shall have minimum initial test values as given in Table 1 of ASTM F1216, ASTM F1743, or ASTM F2019, whichever is applicable, (and supplemented below in the table below). Properties for these or any other enhanced resins shall be substantiated with test data.

Test Property	**Test Method**	**FELT TUBE Minimum Value [psi]**	**GRP TUBE Minimum Value [psi]**
Flexural strength	ASTM D790	4,500	6,500
Flexural modulus	ASTM D790	300,000	725,000
50-year flexural creep modulus	ASTM D2990	150,000	

2.4 DIMENSIONS

A. LENGTH: CONTRACTOR shall make allowances in determining the tube length for stretch during installation and shrinkage during curing. The minimum length shall be that which continuously spans the distance from the center of the inlet manhole to the center of the outlet manhole. The CONTRACTOR shall verify the lengths in the field before the tube is cut and impregnated. Individual installation runs may include one or more manhole-to-manhole sections as approved by the ENGINEER and will only be allowed when no more than 20 lateral services are interrupted at one time. Installation of the liner shall be through existing or new manholes. Excavation for liner insertion shall not be permitted except to replace the manhole cones, if necessary and/or required. The maximum inversion installation shall be 660 linear feet without prior approval from the ENGINEER.

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B. DIAMETER: CONTRACTOR shall make allowances in determining the tube circumference for stretch during installation and shrinkage during curing. The tube shall be sized such that when installed it will tightly fit the internal circumference of the original pipe. The diameter of the existing pipes may be larger than the nominal inside diameter. It is the CONTRACTOR's responsibility to determine the required diameter of the liner prior to ordering materials.

C. THICKNESS: The nominal wall thickness shall be at least the calculated design thickness, or the minimum specified, and may be up to 15 percent greater except where felt layers overlap, in which case it may be in excess of this value. The wall thickness of the felt tube shall be ordered to the next standard 1.5 mm incremental thickness above the minimum calculated design thickness. Unless otherwise specified to provide for excess resin migration, the gap thickness of the wetting-out equipment shall be sized to allow an excess of 5 to 10 percent resin to pass during impregnation.

1. Fiberglass: The impregnated tube shall have a thickness that when compressed at installation pressures and cured will meet or exceed the design thickness in accordance with ASTM F1216, Appendix XI. The minimum allowable wall thickness for fiberglass CIPP is 2.8mm.

2.5 MANUFACTURER

A. CIPP LINER COMPOSITION:

1. FELT LINER: The felt tube shall have an inner film and outer film to prevent resin migration and contamination. The inner film and outer film must both be styrene gas barriers.

2. GRP LINER: The fiberglass tube shall be saturated with the appropriate resin using a resin bath to allow for the lowest possible amount of air entrapment. Vacuum-suction impregnation methods are not allowed due to the introduction of air using this method. The liner will then be formed into a spirally would shape for the purpose of being seamless in its cured state. An inner film and outer film material will be added that are both impervious to airborne styrene. The outer film will also have UV blocking characteristics. The inner membrane will be removed after the curing process is complete.

B. MANUFACTURERS:

All impregnation or "wet-out" of the tube must be done at an EPA-regulated, quality-controlled facility. Approved CIPP liner manufacturers are Insituform

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Technologies, Inliner Technologies, Spiniello Companies, Applied Felts, Inc., Reline America Inc., or equal.

2.6 DESIGN CRITERIA

A. The liner shall be designed for a "fully deteriorated" pipe condition in accordance with the procedures of ASTM F1216, Appendix XI and these special provisions. All material properties used in design calculations shall be long-term (time-corrected) values. The CONTRACTOR shall be familiar with the existing site conditions when preparing the liner design.

B. CONTRACTOR shall prepare design calculations for approval prior to performing the lining work. The submitted design calculations shall provide the following information as a minimum:

Project Number No. X through No. XX

Manhole to Manhole designation QS-XX-MHXX to QS-XX-MHXX

Pipe Nominal Diameter (inches)

Minimum Liner thickness (inches)

Proposed Liner Thickness (inches)

The CONTRACTOR shall note that the actual level of deterioration may vary within any given section of sewer.

C. The following parameters shall be assumed for the liner design:

1. Fully deteriorated host pipe
2. Safety factor of 2.0
3. Modulus of soil reaction, E'S = 1,500 psi (fully deteriorated)
4. Unit weight of soil = 140 pcf
5. The minimum ovality for straight runs shall be 5.0 percent
6. AASHTO H20 traffic loads
7. AREMA E-80 railroad loads
8. Head of groundwater of 5 feet above top of pipe

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9. Minimum 50-year service life

D. External Buckling Design: Where the CIPP is designed as a stand-alone pipe in a fully deteriorated condition, acceptable third-party testing and verification of design analysis techniques (ASTM F 1216, Section XI.2.2) shall be submitted by each manufacturer and/or CIPP product. This testing requirement can be accomplished with soil box testing.

2.7 CIPP TERMINATION POINTS

A. The CONTRACTOR shall provide shop drawings for approval detailing the proposed CIPP liner terminations.

2.8 SERVICE LATERAL CONNECTION (SLC) SEAL (TOP HAT™)

A. The SLC shall form a “tee” section with a lap inside the main pipe and a tube which shall extend continuously from the sewer main into the lateral for a minimum of 12-inches. Configuration of laterals or other obstructions that prevent the full installation of the SLC must be approved by the ENGINEER or CITY. Excavation for SLC installation shall not be permitted. The SLC shall be capable of sealing a combination of “tees” or “wyes” of varying angle. The resin shall be cured to form the tube into a hard, impermeable pipe-within-a-pipe.

B. When cured, the SLC shall seal the connection of the lateral to the mainline in a continuous tight-fitting, watertight pipe-within-a-pipe to eliminate any visible leakage between the lateral and mainline and shall provide a leak-proof seal to prevent root intrusion, infiltration, and exfiltration between a liner and a host pipe.

C. Seals installed with resins that do not bond to host pipeline shall include either (A) an adhesive epoxy compound applied at the edges of the seal both inside the lateral and around the brim inside the main line, or (B) a mechanical seal inside the lateral.

D. After inspection and cleaning of the mainline pipe, the Contractor shall proceed with installing the SLC seal. Rehabilitated mains shall have previously reinstated active lateral connections to the full diameter of the lateral connection and include any finished brushing for a smooth cut.

E. The SLC material shall be fabricated from either a non-woven felt or fiberglass laminate or combination thereof. The SLC manufacturer shall supply either technical procedure or information to control or mitigate shrinkage and wrinkling during cure.

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F. The SLC material shall be fabricated to neatly fit the internal circumference of the lateral pipeline, extends into the lateral pipeline a minimum of 12-inches, and laps over the main pipeline wall a minimum of 4-inches.

G. The SLC shall use a polyester resin, vinyl ester resin, or epoxy-resin. The watertight seal shall either be an adhesive epoxy compound or rubberized seal.

PART 3 – EXECUTION

3.1 PREPARATORY PROCEDURES

A. TRAFFIC CONTROL:

Traffic control devices and plans as approved by the CITY.

B. SEWER CLEANING:

Prior to CIPP tube installation, the CONTRACTOR shall clean or heavy clean the existing sewer in accordance with Section 02760. The CONTRACTOR shall clear the existing sewer of obstructions such as tuberculation, sediment or other solids or collapsed pipe that will prevent or hinder CIPP liner installation.

C. ODOR CONTROL

At the project site prior to bypassing sewage flow, the CONTRACTOR shall provide odor control measures, see Section 02661.

D. SEWER BYPASSING AND DEWATERING

The CONTRACTOR shall be responsible for bypassing flow around his work and dewatering of sewer lines in accordance with the requirements of Section 02661.

E. CCTV INSPECTION

Experienced personnel training in locating breaks, obstacles, and service connections by visual inspection shall perform inspection of the sewer main. The interior of the sewer shall be carefully inspected in accordance with Section 02761 to determine the location of conditions which may prevent proper installation of CIPP. CONTRACTOR shall furnish television inspection data to the ENGINEER.

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F. MEASUREMENT

The existing sewer lines may be larger than their nominal size due to corrosion of the pipe. It is the CONTRACTOR's responsibility to measure the actual inside diameter at different locations of the sewer to determine the appropriate size of CIPP liner to use.

G. SERVICE LATERAL CONNECTION (SLC) SEAL (TOP HAT™)

1. It is required that the service lateral be inactive during the time of installation. This is normally accomplished by turning off the services or requesting that the businessowner/homeowner relinquish its services during the required period of installation.

2. Line Obstructions - It shall be the responsibility of the CONTRACTOR to clear the line of obstructions that will prevent the insertion of the SLC material. If inspection reveals an obstruction that cannot be removed by conventional sewer cleaning equipment, the CONTRACTOR shall make an external point repair excavation to uncover and remove the obstruction. The CONTRACTOR shall inform the ENGINEER prior to the commencement of the Work.

3. The mainline pipe opening shall be prepared to accept the SLC and the mainline rehabilitated pipe shall be maximized to obtain the best possible connection.

4. The transition from the mainline pipe to the service lateral shall be smooth and continuous to provide adequate support for the SLC during installation and cure.

H. REMOVE INTRUDING TAP

Prior to CIPP insertion into the mainline sewer pipe, any intruding service taps shall have the end of the pipe remotely trimmed using an appropriate tool compatible with such work. The end of the service tap shall be trimmed flush with the interior wall of the pipe such that it will not reflect through the cured CIPP once installed.

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3.2 INSTALLATION PROCEDURES

A. GENERAL

All procedures performed by the CONTRACTOR in the CIPP installation shall be equal to or exceed the requirements of Section 7 of ASTM F1216, Section 7 in ASTM F1743, or Section 6 of ASTM F2019, as is applicable.

The CONTRACTOR shall designate the location where the CIPP felt tube would be impregnated with resin ("wet-out"). Locations shall be subject to approval by the ENGINEER and applicable local agencies. The CONTRACTOR shall allow the ENGINEER to inspect the materials and "wet-out" procedure.

If the "wet-out" location is not at the project site, the impregnated CIPP tube shall be transported to site under controlled environmental conditions. Transport vehicles shall include a tamper-resistant, sealed temperature-recording device which records the temperature of the liner at all times after leaving the wet-out site. The CONTRACTOR shall decide when to transport the impregnated CIPP tube to site and when to commence insertion with respect to weather conditions.

CONTRACTOR is responsible for obtaining construction/fire hydrant meters from the CITY and for paying all applicable deposit fees and water usage fees.

The CONTRACTOR shall ensure that the pressure inside of the CIPP tube exceeds the pressure exerted on the pipe by groundwater.

The exterior of the manufactured tube shall be marked along its length at regular intervals not to exceed five (5) feet. These marks shall be used as a gauge to measure elongation during insertion. Should the overall elongation of a reach exceed five percent (5%) of the overall length for fabric tube and two percent (2%) for GRP tube, the liner tube shall be rejected and replaced.

B. CIPP INSTALLATION PROCESS

CIPP installations will not be undertaken in weather conditions that could jeopardize the installation of the CIPP or be detrimental to the long-term performance of the CIPP. All equipment, labor, and materials required to complete the work must be ready on-site before installation begins. The felt CIPP liner will be installed by the inversion tube method or the pull/winch method. The fiberglass CIPP liner will be installed winching or pull-in-place method.

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1. INVERSION METHOD: The tube shall be impregnated with a liquid thermosetting resin and lowered into the manhole through an inversion tube. The inversion tube will then be filled with water or air where the weight of the water or air pressure will push the tube through the damaged pipe inside out, while pressing the resin impregnated side firmly against the inside walls of the damaged pipe. The smooth coated side of the liner shall become the new interior surface of the pipe.

2. PULL/WINCHING METHOD: The bottom half of the sewer pipe throughout the section to be lined shall be covered with a polyethylene foil or other suitable material to facilitate threading of the liner and reduce the risk of damage to the liner material. The tube liner shall be formed with a polyurethane coating on its interior surface. Rollers shall be installed in the upstream and downstream manholes to guide the liner into and out of the host pipe and to guard against chafing of the crowns at the entry and exit from the winch cable. The resin impregnated tube liner shall be lowered into the manhole. The tube shall then be pulled into position within the existing pipe with the aid of a power winch that is equipped with a device to monitor the force and prevent excessive tension. Should the pulling force exceed the manufacturer's recommendations, the tube shall be rejected and replaced. In addition, the tube liner shall use a sliding foil on the bottom one-third of the existing conduit during winching.

The CONTRACTOR shall cap each end of the liner and use liner restraints in the manholes. The CONTRACTOR shall introduce water or air into the liner to inflate the liner until it has a tight fit against the inner walls of the host pipe producing dimples at lateral and side connections and flared ends at manholes. All hoses/pipes used for introducing water or air shall be ramped during the installation and curing process to allow for the ease of vehicular and pedestrian traffic. All hoses/pipes shall be color-coded for identification to prevent the use of hoses/pipes used for water conveyance are not used for wastewater conveyance or vice versa.

C. SERVICE LATERAL CONNECTION (SLC) SEAL (TOP HAT™) INSTALLATION PROCESS

1. The resin impregnated tube shall be loaded inside a pressure apparatus. The pressure apparatus, attached to a robotic device, shall be positioned in the mainline pipe at the service connection. The robotic device, together with a television camera, shall be used to align the SLC repair with the service connection opening. Air pressure, supplied to the pressure apparatus through an air hose, shall be used to invert or expand the resin impregnated SLC into the

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lateral pipe. The pressure shall be adjusted to fully place the SLC into the lateral pipe and hold the tube tight to the pipe wall. Care shall be taken during the curing process not to over-stress the tube. The pressure apparatus shall include a bladder which shall inflate in the mainline pipe, effectively seating the SLC repair against the service connection.

2. After inversion or pull in is completed, recommended pressure is maintained on the impregnated tube for the duration of the curing process.

D. CIPP CURING

The curing process shall follow a step cure or similar approach recommended by the manufacturer and approved by the ENGINEER and shall be held at the top step for an adequate length of time as determined by the liner manufacturer to ensure that the design physical properties are attained.

1. HOT WATER CURING

a. CONTRACTOR shall use a flexible and impermeable calibration hose to inflate the tube. The calibration hose may or may not remain in the complete installation. Any dry tube or inflation hose material that enters the existing pipe that has not been previously vacuum impregnated with resin under controlled conditions cannot be included in the structural wall of the CIPP. The nominal thickness of this material shall be deducted from the field sample thickness measured in order to verify that the minimum specified wall thickness is achieved. Hose material remaining in the installation shall be compatible with the resin system used, shall bond permanently with the tube, and shall be translucent to facilitate post installation inspection. Hose materials which are to be removed after curing, shall be of non-bondable material. After the tube is inserted through the pipe section, the CONTRACTOR shall heat the water by circulating it through a boiler, where the hot water will cause the resin to cure.
b. The CONTRACTOR shall monitor the temperature of the tube liner during curing by remote temperature sensors placed at the interface of the existing pipe and the CIPP. A minimum of two temperature sensors shall be installed, one at either end of the length being lined. The curing process shall not be terminated until the temperature sensor readings indicate that a satisfactory cure has been completed. Any extended cure times shall not adversely affect the properties of the CIPP lining material.

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c. Circulation water shall cool down to at least 100 degrees F for 1 hour before releasing the hydrostatic head.
d. The rate of temperature rise and fall during heating and cooling shall not exceed 2 degrees F per minute.
e. The water shall be evacuated from the pipe at a controlled rate to prevent negative pressure in the pipe. The water shall not be released until the water is at an ambient air temperature.

2. STEAM CURING
   a. Steam source and air compressors are used to circulate the steam/air mixture through the pipe at a temperature recommended by the manufacturer causing the resin to harden.
   b. The CONTRACTOR shall monitor the temperature of the tube liner during curing by remote temperature sensors placed at the interface of the existing pipe and the CIPP. A minimum of two temperature sensors shall be installed, one at either end of the length being lined. The curing process shall not be terminated until the temperature sensor readings indicate that a satisfactory cure has been completed. Any extended cure times shall not adversely affect the properties of the CIPP lining material.
   c. The temperature of the air shall cool down to at least 140 degrees F for 1 hour before releasing air pressure.
   d. The outlet hose shall be equipped with a pressure regulating valve, temperature gauge, and pressures gauge.

3. ULTRAVIOLET CURING
   a. During the curing process, infrared sensors will record the curing parameters using a computer and database that are tamper proof. The curing parameters shall be controlled as determined by the manufacturers' quality protocol. The curing data shall consist of the following:
      1) Curing speed
      2) Light source working and wattage
      3) Inner air pressure
      4) Exothermic temperature
      5) Date and time
      6) Length of liner
   b. The ultraviolet curing apparatus shall operate between 200 to 400-nm ranges.
   c. The ultraviolet curing apparatus shall be pulled through the liner at a speed recommended by the manufacturer while a constant air pressure maintains inflation and pressing of the liner material tightly against the inner walls of the host pipe.

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E. SERVICE LATERAL CONNECTION (SLC) SEAL (TOP HAT™) CURING

1. Curing method shall be compatible with the resin selected. The initial cure shall be deemed to be completed when the SLC has been exposed to the UV light, heat source or held in place for the time period specified by the manufacturer.

2. The Contractor shall cool (if heat cured) the hardened SLC before relieving the pressure in the pressure apparatus. Cool-down may be accomplished by the introduction of cool air into the pressure apparatus. Care shall be taken to maintain proper pressure throughout the cure and cool-down period.

3. If cured by ambient-cure process, the Contractor shall maintain bladder pressure until SLC has completely cured per manufacturer's recommendations before relieving the pressure in the pressure apparatus.

4. SLC shall be cured in place by the manufacturer's suggested resin technology, using a polyester resin, vinyl ester resin, or epoxy-resin with a watertight seal which shall be comprised of either an adhesive epoxy compound or rubberized seal.

5. Material shall be impregnated with resin in a controlled environment and stored per manufacturer's recommendations for transport.

6. Method of cure shall be either heat-cure process, ultra-violet light exposure, or ambient-cure process and shall result in a cured in place seal per all specifications herein and meet the minimum physical properties represented herein.

7. Contractor shall maintain a visible, written log of all activities in accordance with manufacturer's recommendations and shall include time/location of wet out, time of insertion, time/location of lateral insertion, bladder pressure requirements, required cure time, actual cure time, and cool down duration.

3.3 FINISHED CIPP PRODUCT

A. FINISH:

The finished CIPP shall be continuous over the entire length of an installation run, manhole to manhole. The wall color of the interior CIPP surface after installation shall be a light reflective color so that a clear detailed examination with CCTV equipment may be made.

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B. DEFECTS:

Any defects or non-conforming work as determined by the ENGINEER shall be corrected at the CONTRACTOR'S expense.

1. UNDER THICKNESS LINER:

A minimum wall thickness at any point shall not be less than 90% of the design thickness, or the product will be considered unacceptable. An under-thickness liner may be brought into compliance by either:

a. Removal and replacement of the undersized liner, or
b. Install a second liner with full wall thickness as stated on the liner design submittal after acceptable surface preparation of the undersized liner interior. This option will be considered by the CITY on a case-by-case basis. The CITY will consider the loss of flow capacity and this option may be refused for that reason. The addition of a thin liner that makes up the difference of the under sizing is not an acceptable remedy because the structural properties are not additive if they are not cured simultaneously.

2. FLEXURAL TESTING FAILURE:

In the event of a failure of the flexural strength, flexural modulus or flexural creep tests, another flat plate sample shall be tested. Should the second sample fail, the liner shall be brought to compliance by either:

a. Removal and replacement of the undersized liner, or
b. Install a second liner with full wall thickness as stated on the liner design submittal after acceptable surface preparation of the undersized liner interior. This option will be considered by the CITY on a case-by-case basis. The CITY will consider the loss of flow capacity and this option may be refused for that reason. The addition of a thin liner that makes up the difference of the under sizing is not an acceptable remedy because the structural properties are not additive if they are not cured simultaneously.

3. WRINKLES:

a. Circumferential wrinkles in the bottom half of the finished liner pipe which exceed three (3) percent of the nominal diameter in height are unacceptable and shall be removed or repaired by the CONTRACTOR. Methods of repair shall be proposed by the CONTRACTOR and submitted to the ENGINEER for approval.

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b. Circumferential or longitudinal wrinkles in the finished liner pipe which reduce the hydraulic capacity of the pipe (wrinkles which exceed five (5) percent of the nominal pipe diameter) are unacceptable and shall be removed or repaired by the CONTRACTOR. Methods of repair shall be proposed by the CONTRACTOR and submitted to the ENGINEER for approval.
c. Wrinkles in the finished liner pipe that reduce the structural stability of the pipe are unacceptable. If a void between the wrinkle and the pipe exists, the CONTRACTOR shall repair or replace that section of the pipe. Methods of repair shall be proposed by the CONTRACTOR and submitted to the ENGINEER for approval.
d. Wrinkles in the finished CIPP that reduce the structural integrity of the CIPP are unacceptable. CONTRACTOR shall repair or replace that section of the pipe. Methods of repair shall be proposed by the CONTRACTOR and submitted to the ENGINEER for approval.

4. OTHER DEFECTS:

Other defects such as foreign inclusions, dry spots, pinholes, delamination, or wrinkling beyond the specification allowances, determined by the ENGINEER as affecting the integrity or strength of the CIPP, or as adversely affecting the hydraulic capacity of the CIPP, shall be repaired or replaced at the CONTRACTORS' expense. Methods of repair shall be proposed by the CONTRACTOR and submitted to the ENGINEER for approval.

C. GRP CIPP LINER

1. INNERFILM: The inner film of the fiberglass CIPP liner should be removed and discarded to provide optimal quality of the final product.

2. FLUSHING: Flushing of the UV cured fiberglass liner (to reduce styrene residual) is not required provided third party testing results document styrene residual levels (without flushing) are within acceptable defined levels.

D. CIPP TERMINATION POINTS (END SEALS):

1. End seals shall be not be installed until the CIPP pipe has relaxed for a minimum period of 24 hours.

2. The CIPP shall make a tight seal at the manhole opening with no annular gaps. The liner shall be cut neat and trimmed.

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3. The CONTRACTOR shall secure the connections between the CIPP and the connection liner end seals. The securing materials shall adequately bond with the host CIPP pipe per CIPP manufacturer's specifications and shall be significantly different in color from the liner.

4. The CONTRACTOR shall furnish and apply epoxy resin to CIPP liner end seal at all upstream and downstream ends of the CIPP liner to form a watertight seal.

E. SERVICE RECONNECTIONS:

1. After the curing is complete, existing lateral service connections shall be re-established. The cut liner shall have no jagged edges and shall be sanded smooth. The CONTRACTOR shall provide a seal, recommended by the lining manufacturer, at the service connection so that no leakage of fluids may infiltrate between the liner and the existing sewer surface. Seals must be submitted and approved prior to use.
2. Reinstate service laterals using only remote internal methods (prior to CIPP acceptance).
3. Where the CIPP liner does not create dimples at the service connections or in other ways indicate the locations, the exact location shall be determined from the internal inspection data. It shall be the CONTRACTOR's responsibility to accurately locate and reinstate all service connections after the CIPP installation and curing has been completed. All service connections shall be reinstated to a minimum of 95% of the original opening, centered on the lateral opening.
4. Any misplaced cuts made by the remote internal method while reinstating service laterals will be repaired using approved materials and a remote internal method at no additional cost to OWNER.

3.4 FINISHED SERVICE LATERAL CONNECTION (SLC) SEAL (TOP HAT™) PRODUCT

A. DEFECTS

1. The finished SLC shall be free of dry spots, lifts and de-lamination. The lateral SLC shall not inhibit the closed-circuit television post video inspection of the mainline or service lateral pipes. Frayed ends of the SLC repair shall be removed prior to acceptance.

2. During the warranty period, any defects which will affect the integrity or strength of the SLC shall be repaired at the CONTRACTOR'S

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expense in a manner mutually agreed upon by the Manufacturer, CITY and the CONTRACTOR.

B. PROPERTIES

1. The structural performance of the finished pipe shall be adequate to accommodate all anticipated loads throughout its design life. No cured-in-place pipe rehabilitation technology will be allowed that requires bonding to the existing pipe for any part of its structural strength.

3.5 FINISHED LIQUID WASTE DISPOSAL

The CONTRACTOR shall obtain the ENGINEER'S written approval prior to the disposal of the water and/or condensate from the curing process into the sanitary sewage system.

3.6 CLEANUP

Following inspection, the CONTRACTOR shall clean up the entire project area. The CONTRACTOR shall dispose of all excess material and debris not incorporated into the permanent installation off-site.

+ + END OF SECTION + +

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SECTION 03600

GROUT

PART 1 - GENERAL

1.1 - DESCRIPTION

This section specifies grout for uses other than masonry or annular space grouting.

1.1.1. - References

This section contains references to the following documents. They are a part of this section as specified and modified. In case of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

Reference	Title
ASTM C33	Concrete Aggregates
ASTM C40	Organic impurities in Fine Aggregates for Concrete
ASTM C88	Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C117	Material Finer than 75 um (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C136	Sieve Analysis of Fine and Coarse Aggregates
ASTM C150	Portland Cement
ASTM C289	Potential Reactivity of Aggregates (Chemical Method)
ASTM C494	Chemical Admixtures for Concrete
ASTM 3881	Epoxy-Resin-Base Bonding Systems for Concrete
ASTM D2419	Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate
ASTM E329	Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction
CRD-C621-91	Corps of Engineers Specification for Nonshrink Grout

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1.1.2. - Quality Assurance

To demonstrate conformance with the specified requirements for grout, the CONTRACTOR shall provide the services of an independent testing laboratory that complies with the requirements of ASTM E329. The testing laboratory shall sample and test grout materials as required in this section. Costs of testing laboratory services shall be borne by the CONTRACTOR.

1.2 - MEASUREMENT AND PAYMENT

No separate measurement or payment for this item. Grouting shall be considered incidental to the Work for which grouting is necessary, such as, manhole installation and sewer connection to manholes.

PART 2 - PRODUCTS

2.1 - MATERIALS

2.1.1. - Cement

Portland cement shall be ASTM C150 Type II or Type V, low alkali, containing less than 0.60 percent alkalis.

2.1.2. - Aggregate

A. GENERAL: Aggregate shall be nonreactive and shall be washed before use. When sources of aggregate are changed, test reports shall be provided for the new material. The tests specified shall be performed prior to commencing grout work.

B. FINE AGGREGATE: Fine aggregate shall be hard, dense, durable particles of either sand or crushed stone regularly graded from coarse to fine and shall conform to ASTM C33 as modified herein. When tested in accordance with ASTM C136, gradation shall be such that 100 percent by weight will pass a standard No. 8 mesh sleeve and no less than 45 percent by weight will pass a standard No. 40 mesh sieve.

Variation from the specified gradations in individual tests will be acceptable if the average of three consecutive tests is within the specified limits and the variation is within the permissible variation listed below:

U.S. standard sieve size	Permissible variation in individual tests [percent]
30 or coarser	2
50 or finer	0.5

Other tests shall be in accordance with the following specifications:

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Test	Test Method	Requirements
Organic Impurities	ASTM C40	Color lighter than Amount of Material Standard
Passing No. 200 Sieve	ASTM C117	3% maximum by weight
Soundness	ASTM C88	10% maximum loss with sodium sulfate
Reactivity	ASTM C289	Innocuous aggregate
Sand Equivalent	ASTM D2419	Minimum 80

2.1.3. - Admixtures

A. GENERAL: Admixtures shall be compatible with the grout. Calcium chloride or admixtures containing calcium chloride are not acceptable. Admixtures shall be used in accordance with the manufacturer's recommendations and shall be added separately to the grout mix.

B. WATER REDUCING RETARDER: Water reducing retarder shall be ASTM C494 Type D and shall be Master Builders Pozzolith 300-R, Sika Corporation Plastiment, or equal.

C. LUBRICANT FOR CEMENT PRESSURE GROUTING: Lubricant additive for cement pressure grouting shall be Intrusion Prepakt Intrusion Aid, Sika Intraplast N, or equal.

D. Water for washing aggregate, for mixing and for curing shall be free from oil and deleterious amounts of acids, alkalis, and organic materials; shall not contain more than 1000 mg/1 of chlorides as C1, nor more than 1300 mg/1 of sulfates as SO_4; and shall not contain an amount of impurities that may cause a change of more than 25 percent in the setting time of the cement nor a reduction of more than 5 percent in the compressive strength of the grout at 14 days when compared with the result obtained with distilled water. Additionally, water used for curing shall not contain an amount of impurities sufficient to discolor the grout.

2.1.4. - Bonding Compounds

Epoxy resin bonding compounds shall be used for wet areas and shall be Sika Chemical Corporation, Sikadur 32 Hi-Mod, 32 Hi-Mod LPL, or 35 Hi-Mod LV 350, 370, or 390m as applicable; or equal.

Non-epoxy bonding compounds shall be used for dry areas and shall be Burke Company, Acrylic Bondcrete; Imperial Chemical Industrial, Inc., Thoro System Products, Acryl 60; Thoro Bond; or equal.

A. CURING COMPOUND

Curing compound shall be Master Builders, MasterSeal; A.C. Horn Inc., Horn ClearSeal EM 180, Burke Company Spartan Cote WB Cure Seal Hardener; or

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equal, conforming to ASTM C309. Curing compounds shall be clear and shall be applied in accordance with the manufacturer's instructions.

2.2 - GROUT

2.2.1. - Cement Grout

Cement grout shall be a mixture of one part cement, two parts sand, proportioned by volume, admixtures for pressure grouting, and sufficient water to form a workable mix.

2.2.2. - Non-shrink Grout

Non-shrink grout is available with both metallic and nonmetallic aggregate. Metallic aggregate grout shall be Master Builders Embeco 636, Burke Company Metallic Spec Grout, Sonneborn Ferroligh G Redimix, or equal. Nonmetallic aggregate grout shall be Five Star Products, Inc. Five Star Grout, Master Builders Masterflow 713, Burke Company Non-Ferrous, Non-Shrink Grout, or equal.

2.2.3. - Epoxy Grout for Crack Repair and Dowel Anchorage

Except as noted below, epoxy grout shall be a high modulus, two-component, moisture insensitive, 100 percent solids, thermosetting modified polyamide epoxy compound. The consistency shall be a paste form capable of not sagging in horizontal or overhead anchoring configurations. Material shall conform to ASTM C881 Type 1, Grade 3, such as Adhesive Owning Concresive 1440 series, Sika Corporation Sikadur Hi-Mod Series, Adhesive Technology Corporation Solidbond 200 or equal, and shall have a heat deflection temperature in excess of 130 degrees F.

Epoxy for pressure grouting/crack injection shall be a two-component, moisture insensitive, high modulus, injection grade, 100 percent solids, blend of epoxy-resin compounds. The consistency shall be as required to achieve complete penetration in hairline cracks and larger. Material shall conform to ASTM C881 Type 1 Grade 1, such as Sika Corporation Sikadur 52, Adhesive Owning Company SCB products, Adhesive Technology Corporation SLV 300 series, or equal.

2.2.4. - Polymer Concrete (for Resurfacing or Patching)

Polymer concrete (for resurfacing or patching) shall consist of a liquid binder and dry aggregate mixed together to make a mortar or grout of a consistency as required for the application. The liquid binder shall be a chemical and oil resistant, stress relieved, low modulus, moisture insensitive, two-component epoxy-resin compound. The consistency shall be similar to lightweight oil for proper mixing with aggregate. Material shall conform to ASTM C881 Type 3 Grade 1, such as Sika Corporation Sikadur Lo-Mod series, Adhesive Owning Concresive 1470, Adhesive Technology Corporation 400 series, or equal.

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The aggregate shall be oven dry in sealed packages until time of mixing, and shall be of size and consistency compatible with recommendations of manufacturer of liquid binder for intended application.

2.3 - PRODUCT DATA

2.3.1. - Manufacturer's Data

Manufacturer's data shall be provided for the following.

A. Bonding compounds

B. Nonshrink grout

C. Pressure grout

D. Retardants

E. Epoxy grout

F. Polymer concrete

2.3.2. - Laboratory Test Reports

Test reports on previously tested materials shall be accompanied by the manufacturer's statement that the previously tested material is the same type, quality, manufacture, and make as that proposed for use in this project. Test reports are required for the following:

A. Cement

B. Aggregates

C. Retardants

D. Bonding compounds

E. Epoxy resin

2.3.3. - Evidence of Testing Laboratory Competence

The CONTRACTOR shall require that the laboratory provide directly to CITY evidence of the most recent inspection of its facilities by the Cement and Concrete Reference Laboratory of the National Bureau of Standards. The evidences shall show that deficiencies mentioned in the report of that inspection have been corrected. The evidence of inspection shall be provided prior to delivery of materials to the job site.

JOB SITE COPY
THESE PLANS SHALL BE KEPT AT THE JOBSITE AND BE AVAILABLE TO CITY OF GLENDALE INSPECTORS DURING WORKING HOURS. PLANS SHALL NOT BE ALTERED WITHOUT BUILDING OFFICIALS APPROVAL.

PART 3 - EXECUTION

3.1 - GENERAL

Bonding compound for use with grout shall be recommended by grout manufacturer. Primer, if required for polymer concrete, shall be provided per manufacturer's recommendation.

3.2 - CEMENT GROUT

Cement grout shall be used for filling nonbearing portions of equipment pads and pressure grouting.

Except for the specialized equipment for pressure grouting, mixing and placing apparatus shall be similar to that normally used for cast-in-place concrete. Grout shall be mixed for a period of at least 1 minute. Diluted grout shall be agitated to keep ingredients mixed.

3.3 - NONSHRINK GROUT

Nonshrink, nonmetallic aggregate grout shall be used for the bearing surfaces of machinery and equipment bases, column base plates and bearing plates. Nonshrink metallic aggregate grout shall be used for setting anchor bolts and grouting reinforcing steel holes. Grout shall meet the requirements of CRD-C621 and shall be placed in accordance with manufacturer's instructions.

Holes required for grouting shall be blown clean with compressed air and left free of dust or standing water. Horizontal holes for grouting shall be drilled at a slight downward angle to facilitate holding the grout until setting is complete. Bolts or reinforcing steel installed in horizontal grout holes shall be centered in the drilled hole.

3.4 - EPOXY GROUT

A. Epoxy grout shall be used for repairing cracks, repairing structural concrete, and may be used for setting reinforcing dowels or anchor bolts into holes for grouting. Concrete shall be primed in accordance with the grout manufacturer's instructions.

B. Use of epoxy grout for anchorage of bolts or reinforcing dowels shall be subject to the following conditions:

   1. Use shall be limited to locations where exposure, on an intermittent or continuous basis, to acid concentrations higher than 10 percent, to chlorine gas, or to machine or diesel oils, is extremely unlikely.

   2. Use shall be limited to applications where exposure to fire or exposure to concrete or rod temperature above the product's heat deflection temperature or 120 degrees F (whichever is less) is extremely unlikely. Overhead applications (such as pipe supports) because of the above concerns shall be disallowed.

JOB SITE COPY
THESE PLANS SHALL BE KEPT AT THE JOBSITE AND BE AVAILABLE TO CITY OF GLENDALE INSPECTORS DURING WORKING HOURS. PLANS SHALL NOT BE ALTERED WITHOUT BUILDING OFFICIALS APPROVAL.

3. Approval from CITY for specific application and from supplier of equipment to be anchored is applicable.
4. Anchor diameter and grade of steel shall be per contract documents or per equipment supplier specifications. Anchor shall be threaded or deformed full length of embedment and shall be free or rust, scale, grease, and oils.
5. Embedment depth and hole diameter shall be as specified.
6. Holes shall have rough surfaces, such as can be achieved using a rotary percussion drill.
7. Holes shall be blown clean with compressed air and be free of dust or standing water prior to application of grout.
8. Anchor shall be left undisturbed and unloaded for full curing period.
9. Anchors shall not be placed on concrete below 25 degrees F.

+ + END OF SECTION + +

SCOPE OF WORK

SEWER & MANHOLE REHABILITATION, PHASE 6B & 6D
COG PROJECT NUMBER: 212231
GMP-002 REV-1

PROJECT OVERVIEW

This GMP-002 includes the scopes of work for both the Sewer & Manhole Rehabilitation Phase 6B & 6D projects. Phase 6B includes rehabilitation of approximately 2,494 L.F. of existing 12-inch sewer lines, rehabilitation of 11 each existing manholes, installation of 1 new 60-inch manhole installation, removal of existing manhole and replacement with new junction structure, and 35 L.F. of 12-inch sewer removal and replacement. Phase 6D includes rehabilitation of approximately 2.466 L.F. of existing 8-inch sewer lines, rehabilitation of 11 each existing manholes, removal of 3 each existing flushing tanks and replacing with 3 each new 60-inch manholes, and removal of 2 each 45-bends and installation of a new 72-inch manhole. The work includes installing cured-in-place-pipe (CIPP) liner in existing sewer pipe, the replacement of deteriorated sewer pipe, connecting all associated lateral and service connections, and the repair and coating of existing manholes. Some sewer line sections will require the replacement of moderately short sections of deteriorated sewer pipe prior to the installation of the CIPP liner.

SCOPE OF WORK BID ITEMS:

General Items

1) Mobilization & Demobilization:
   a) Mobilization and demobilization of equipment, shoring, and steel plates.
   b) Mobilization for CIPP lining subcontractor.
   c) Furnishing and installing 2 each project signs.
   d) Dust permit.
   e) Construction water meter and construction water.
   f) Street Sweeping.

2) Indirect Project Management Cost
   a) Project Manager – Half-Time Project Manager
   b) Project Engineer – Half-Time Project Engineer
   c) Project Superintendent – Full-Time Project Superintendent
   d) Waste management service and trash disposal.
   e) Water and ice for the crews
   f) Yard rental for project materials, equipment, and personnel.
   g) Project Sanitation portable restrooms, handwashing station, and disinfection supplies.
   h) Temporary fence rental for project security.
   i) ST&S, Safety Supplies, Training, Fall Protection, and small tools – Per Direct Labor Manhours.

Phase 6B

3) Clean Existing 12-inch Sewer
   a) Labor and equipment to complete cleaning and Pre-CIPP CCTV inspection of existing 12-inch sewer lines.

4) Install 12-inch CIPP Liner
   a) Labor, equipment, materials, and subcontractor costs to complete the installation of 12-inch CIPP liner.

5) Post-CIPP CCTV Inspect (Pano)
   a) Subcontractor costs for performing Post-CIPP liner inspection with Pano camera.

6) Remove & Replace Frame & Cover
   a) Labor, equipment, and materials for removing existing manhole frames and covers and replacing with new sewer manhole frames and cover per Project Drawings.

7) Adjust Frame & Cover to Grade
   a) Labor, equipment, and materials for removing existing manhole frames and covers and replacing with new sewer manhole frames and cover per Project Drawings.

8) Repair & Coat Chimney, Cone, & Wall
   a) Subcontractor costs for repairing and coating manhole chimneys, cones, and wall identified on the plans to be rehabilitated.

9) Repair & Coat Bench
   a) Subcontractor costs for repairing and coating manhole benches identified on the plans to be rehabilitated.

10) Repair/Reshape & Coat Channel
   a) Subcontractor costs for repairing/reshaping and coating manhole channels identified on the plans to be rehabilitated.

11) Inspect & Assess Manhole
   a) Subcontractor costs to perform man entry into designated manhole to inspect and assess manhole condition and, if needed, determine preliminary rehabilitation scope.

12) CIPP Liner End Seal or Line Through & Cut Out Access
   a) Labor, equipment, materials, and subcontractor costs for install CIPP end seals at all new CIPP liner termination points or lining through manholes and cutting out a coupon for sewer access.

13) Cut & Remove CIPP Coupon to Reinstate Tap
   a) Labor, equipment, materials, and subcontractor costs for cutting CIPP coupon out to reinstate lateral.

14) Remove Intruding Gasket
   a) Labor and equipment to remove intruding gaskets via cutter inside the pipe.

15) Remove & Replace Existing 12-inch Sewer
   a) Labor, equipment, and materials to remove the existing sewer line, replace, and backfill new sewer line pipe prior to CIPP lining per Project Drawings.

16) Remove & Replace Asphalt
   a) Labor, equipment, material, subcontractor costs for replacing asphalt per Project Drawings.

17) Construct 5-foot Diameter Manhole
   a) Labor, equipment, material, and subcontractor costs for excavating, installing, and backfilling new 60-inch manhole per Project Drawings.

18) Remove Existing Manhole
   a) Labor, equipment, and vendor costs for excavating and performing removal of existing sewer manhole at the intersection of 67th Ave and Butler Dr.

19) Install New Concrete Junction Structure
   a) Labor, equipment, material, and subcontractor costs for furnishing and installing the proposed Armorock precast polymer structure per alternate design provided by Armorock in lieu of constructing junction structure per Project Drawings.
   b) The new structure per the alternate design will be constructed as a 96-inch round structure with a flat top adjusted to final grade.

20) 39-inch Sewer Bypass Setup & Teardown
   a) The bypass is based on flow data provided by the City of Glendale indicating a peak flow of 8.304 MGD and bypass design flow of 12.456 MGD.
   b) Includes labor, equipment, materials, and subcontractor costs for performing bypass setup (trenching, bypass pipe fusion and installation, cone removals at suction location and discharge location, pump installation and setup, temporary backfill of bypass trenches with ABC, milling and recessing plates, and bypass start-up) and bypass teardown and restoration (pump and bypassing piping removal, ½ sack slurry backfilling bypass pipe trenches, reinstalling manhole cones and coating repairs, and final concrete and asphalt restoration) for the 39-inch sewer bypass required for 12-inch sewer line removal and replacement, existing manhole removal, and installation of new junction structure.
   c) Includes installing secondary containment underneath pumps and tarping and sealing as best as possible the suction and discharge location to contain odors.

21) 39-inch Sewer Bypass Operation
   a) Includes labor and equipment for bypass pump watch/monitoring.
   b) Includes bypass equipment rental for complete bypass system.
   c) Secondary containment for pumps, fuel for pumps, tarping of suction and discharge locations as a standard for odor mitigation efforts. Additional odor mitigation above and beyond tarping will be priced and compensated through the odor control allowance line item within the GMP.

Phase 6D

22) Clean Existing 8-inch Sewer
   a) Labor and equipment to complete cleaning and pre-CIPP CCTV inspection of existing 8-inch sewer lines per Project Drawings.

23) Install 8-inch CIPP Liner
   a) Labor, equipment, materials, and subcontractor costs to complete the installation of 8-inch CIPP liner.

24) Post-CIPP CCTV Inspect (Pano)
   a) Subcontractor costs for performing post-CIPP liner inspection with Pano camera.

25) Remove & Replace Frame & Cover
   a) Labor, equipment, and materials for removing existing manhole frames and covers and replacing with new sewer manhole frames and cover per Project Drawings.

26) Repair & Coat Chimney, Cone, & Wall
   a) Subcontractor costs for repairing and coating manhole chimneys, cones, and wall identified on the plans to be rehabilitated.

27) Repair & Coat Bench
   a) Subcontractor costs for repairing and coating manhole benches identified on the plans to be rehabilitated.

28) Repair/Reshape & Coat Channel
   a) Subcontractor costs for repairing/reshaping and coating manhole channels identified on the plans to be rehabilitated.

29) Inspect & Assess Manhole
   a) Subcontractor costs to perform man entry into designated manhole to inspect and assess manhole condition and, if needed, determine preliminary rehabilitation scope.

30) CIPP Liner End Seal or Line Through & Cut Out Access
   a) Labor, equipment, materials, and subcontractor costs for install CIPP end seals at all new CIPP liner termination points or lining through manholes and cutting out a coupon for sewer access.

31) Cut & Remove CIPP Coupon to Reinstate Tap
   a) Labor, equipment, materials, and subcontractor costs for cutting CIPP coupon out to reinstate lateral.

32) Install SLC
   a) Labor, equipment, and subcontractor costs to furnish and install top hots at service locations per Project Drawings

33) Cut Intruding Tap Prior to CIPP
   a) Labor, equipment, and subcontractor costs to cut intruding taps identified on Project Drawings prior to CIPP installation.

34) Remove & Replace Existing 8-inch Sewer
   a) Labor, equipment, and materials to remove the existing 8-inch sewer line and replace it with new 8” VCP and backfill new sewer line pipe prior to CIPP lining per Project Drawings.

35) Remove & Replace Asphalt
   a) Labor, equipment, material, subcontractor costs for replacing asphalt per Project Drawings.

36) Remove Existing 45-Bends and Install New 6-foot Diameter Manhole
   a) Labor, equipment, material, and subcontractor costs for excavating, installing, and backfilling new 72-inch manhole per Project Drawings.

37) Remove Flushing Tank & Install New 5-Foot Diameter Manhole
   a) Labor, equipment, and subcontractor costs to remove existing flushing tanks and install new 60-inch manholes per Project Drawings.

38) Traffic Control (Allowance)
   a) Allowance for all costs associated with Traffic Control, including, but not limited to; traffic control plans, permits, device rental, labor and equipment, sandbags, flags and dowels, pedestrian relocations, visual message boards, etc.

39) Off-Duty Officers (Allowance)
   a) Allowance for all required Off-Duty Officers.

40) Survey/GIS (Allowance)
   a) Allowance to capture Project specific GIS and as-built data for the city.

41) Quality Control Material Testing (Allowance)

a) All costs associated with third party material testing on the project include but are not limited to compaction, concrete cylinder, sieve analysis, proctor, etc.

42) Odor Control (Allowance)
   a) Allowance for reimbursement of any required odor control for Phase 6B 67th Ave and Butler 39-inch sewer bypass.
   b) Allowance will be utilized for any odor mitigation efforts above standard tarping and sealing of suction or discharge pits. Generally, an odor scrubber is deployed, or upstream chemical injection or dosing is completed as an additional mitigation effort.

43) Pavement Sealing & Striping (Allowance)
   a) Allowance for reimbursement of required pavement sealing and striping.
   b) Allowance estimated amount is based on pavement sealing and striping areas impacted during the 67th Ave and Butler Bypass trenching and new structure and pipe installation at intersection.

44) Paver & Hardscape Restoration Phase 6D Sheet 5 Sta. 14+07 (Allowance)
   a) Allowance for all labor, equipment, materials, and subcontractor costs associated with restoring any hardscape (pavers, concrete, etc.) at the location called out for the existing flushing tank to be removed and replace with a new 60-inch manhole.

~~45) Extra Work (Allowance)~~ Moved into Owners Contingency
   ~~a) Additional work that is located during the investigation or pre rehabilitation work that was unforeseen in the original assessment including but not limited to point repairs, coating repairs, manhole ring and cover replacement, CIPP, or manhole replacement or manhole insert installation.~~
   ~~b) Additional bypass work related to the additional rehabilitation or complication due to unknown or unforeseen conditions.~~
   ~~c) Additional hardscape surface restorations or landscape restorations as a result from the additional rehabilitation.~~
   ~~d) Additional work caused by upstream flow conditions that cause nuisance flows that surcharge into the line that need additional plugging efforts to accommodate work being completed on the project.~~

46) Owner's Contingency
   a) Owner's Contingency is based on 10% of the Project Direct Cost, excluding allowance and contingency totals.
   b) This contingency is for additional Owner directed scope of work.

PHASE 6B: CONCEPTUAL BYPASS DRAWING
67TH AVE & BUTLER DRIVE

City of Glendale, AZ

Sanitary Sewer Flow Monitoring

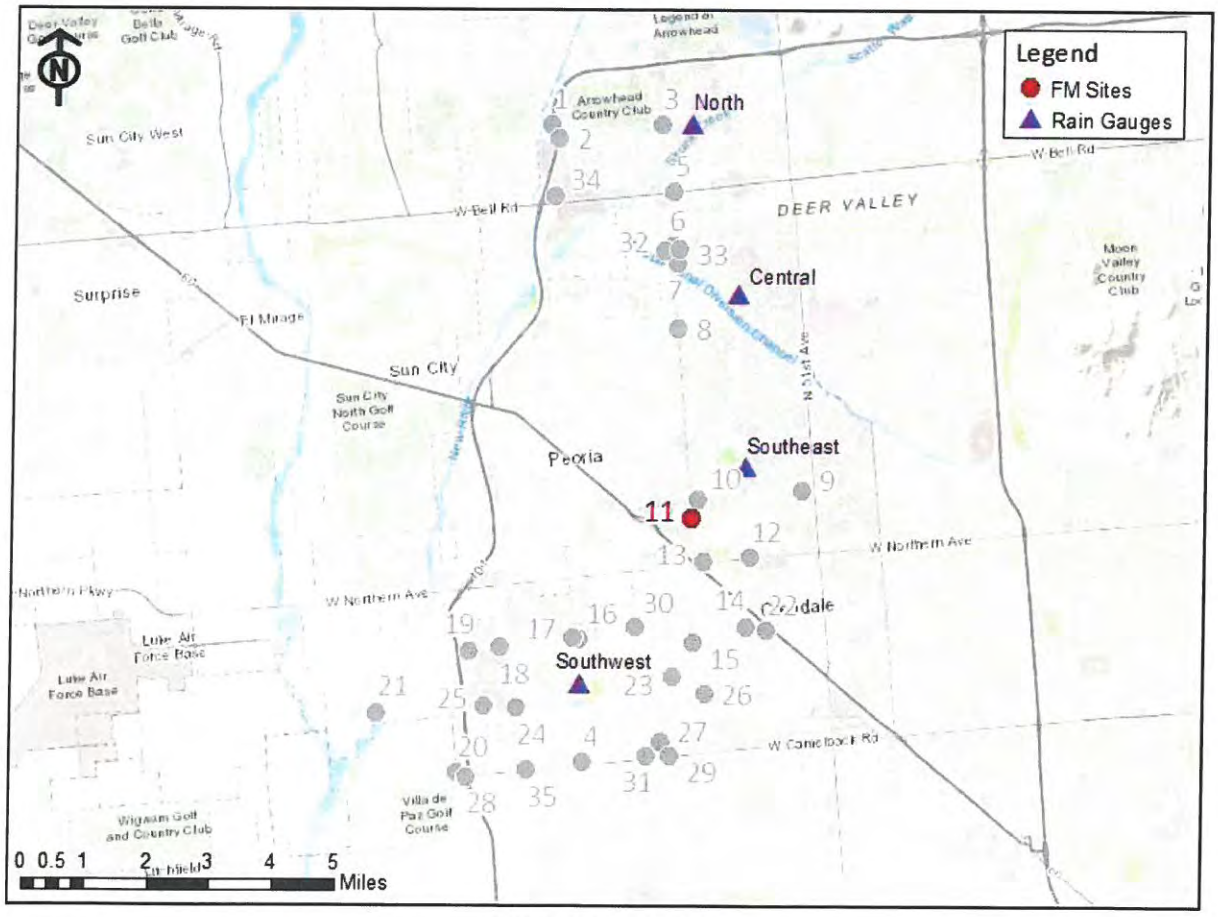
December 16, 2019 - January 12, 2020

Monitoring Site: Site 11

City Manhole: 26-13-082

Location: N 67th Avenue south of W Alice Avenue

Data Summary Report



Vicinity Map: Site 11

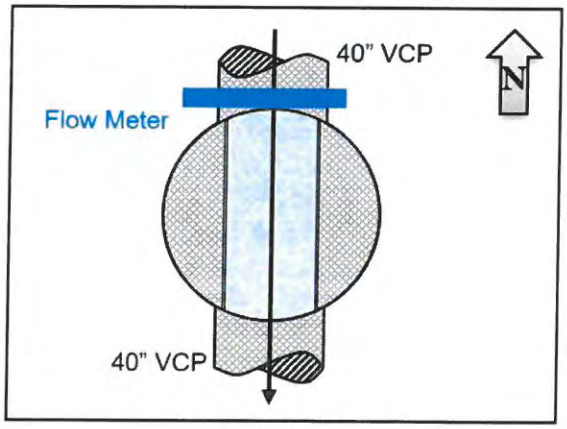
SITE 11

Site Information

Location:	N 67th Avenue south of W Alice Avenue
City Manhole:	26-13-082
Coordinates:	112.2029° W, 33.5632° N
Rim Elevation (Earth):	1,155 feet
Pipe Diameter:	40 inches
ADWF:	4.256 mgd
Peak Measured Flow:	8.304 mgd

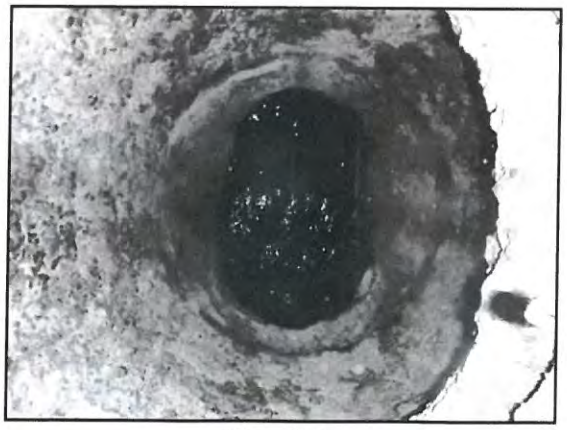
Satellite Map

Sanitary Map



Flow Sketch

Street View

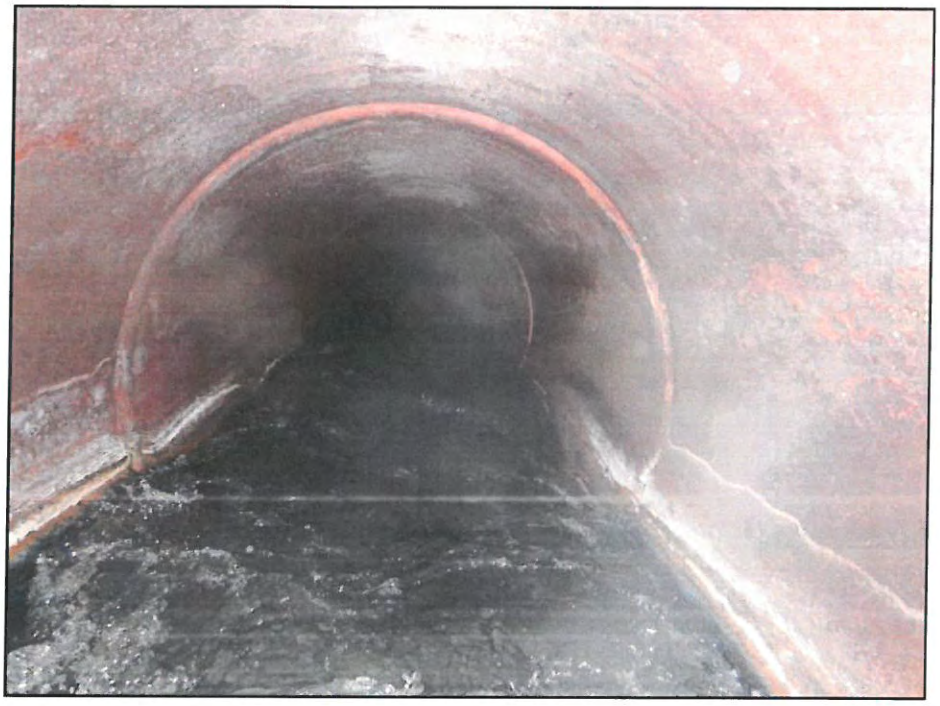


Plan View

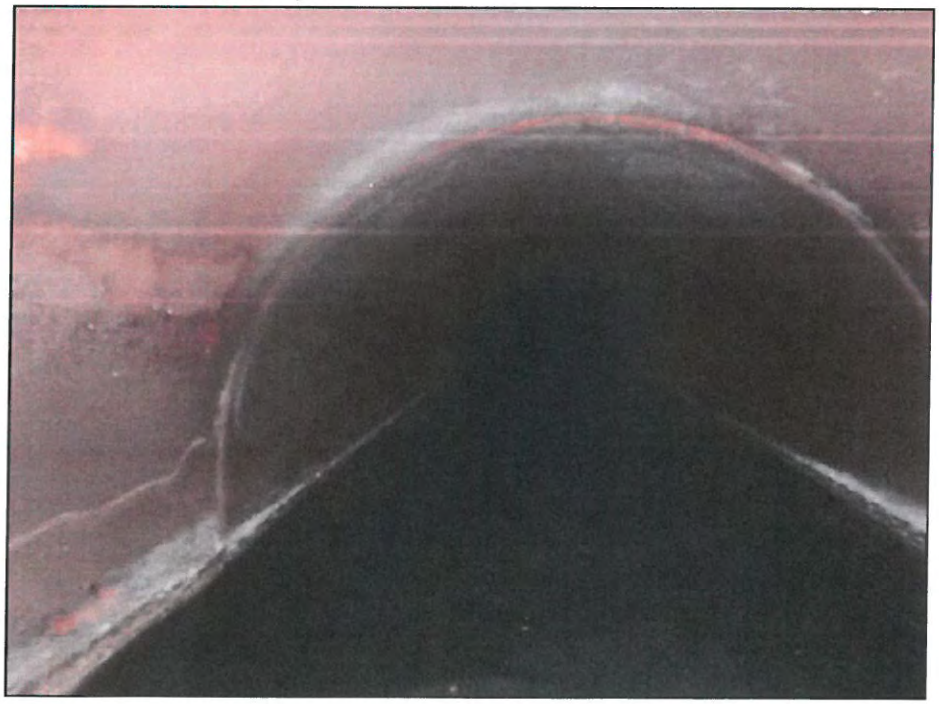
SITE 11

Additional Site Photos

Effluent Pipe



Monitored Influent Pipe

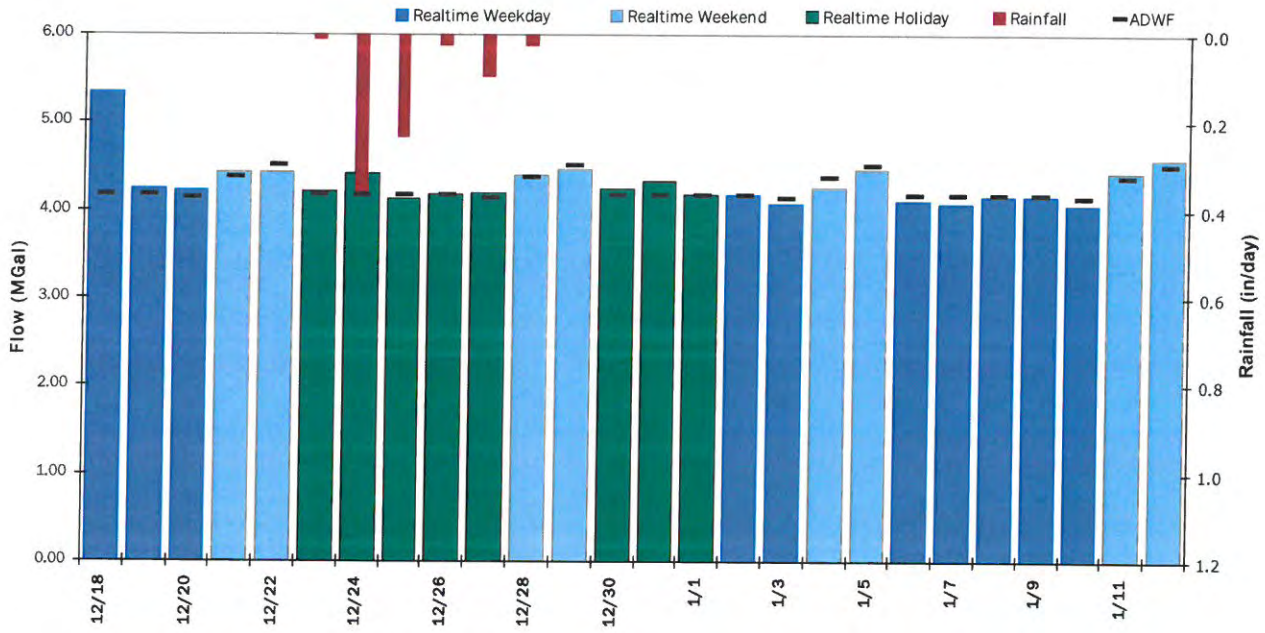


SITE 11

Period Flow Summary: Daily Flow Totals

Avg Period Flow: 4.308 MGal Peak Daily Flow: 5.342 MGal Min Daily Flow: 4.067 MGal

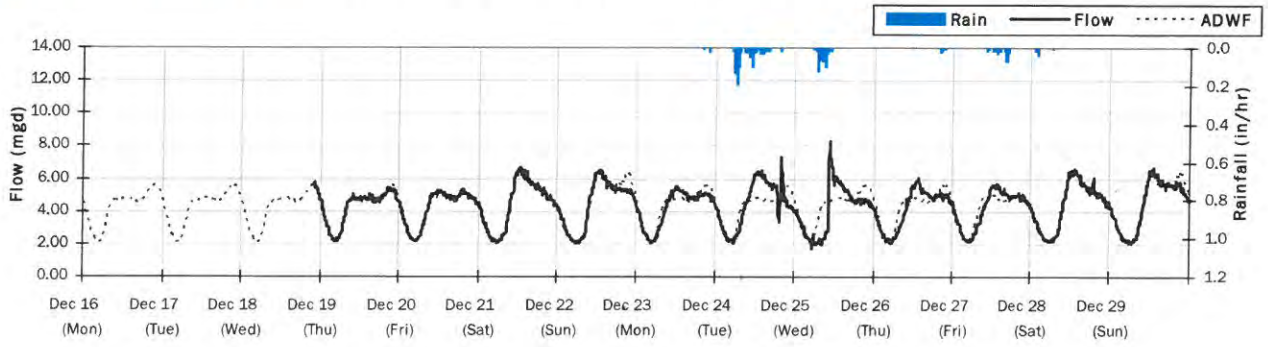
Total Period Rainfall: 0.74 inches

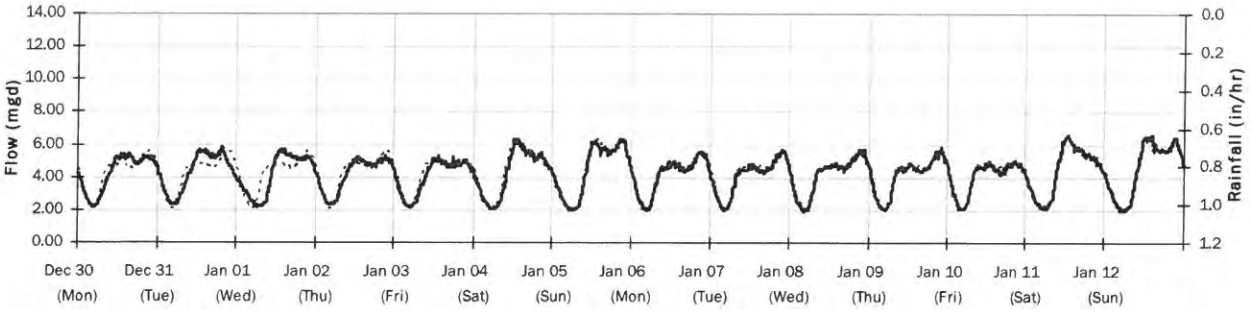


SITE 11

Flow Summary: 12/16/2019 to 1/12/2020

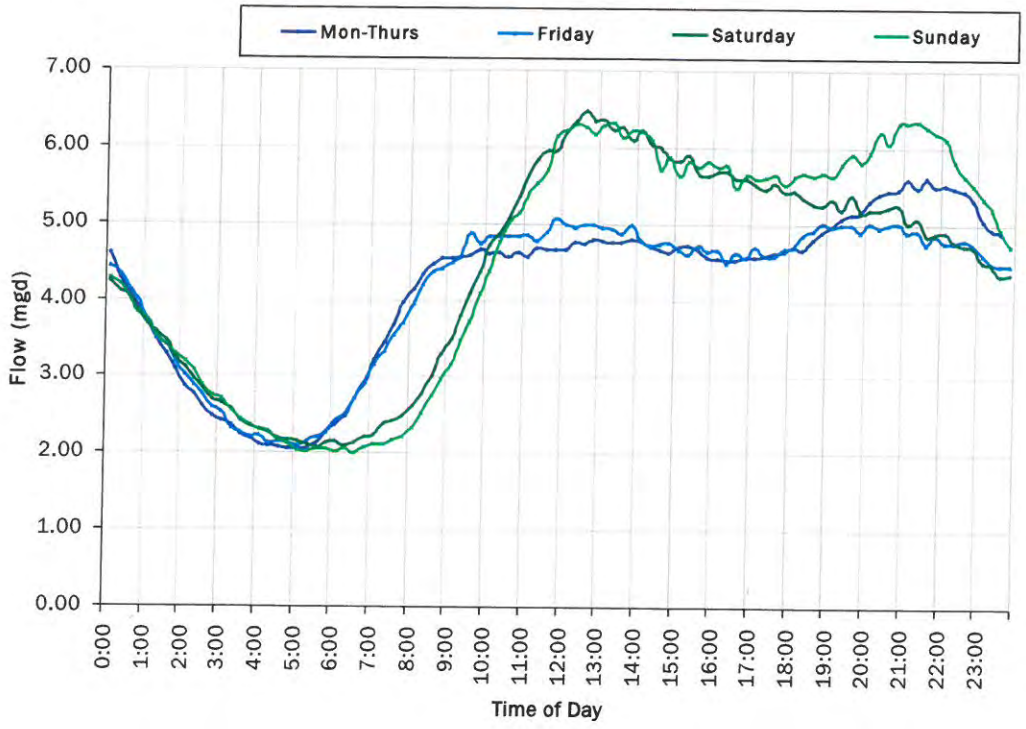
Total Period Rainfall: 0.74 inches Avg Flow: 4.271 mgd Peak Flow: 8.304 mgd Min Flow: 1.696 mgd





SITE 11

Average Dry Weather Flow Hydrographs

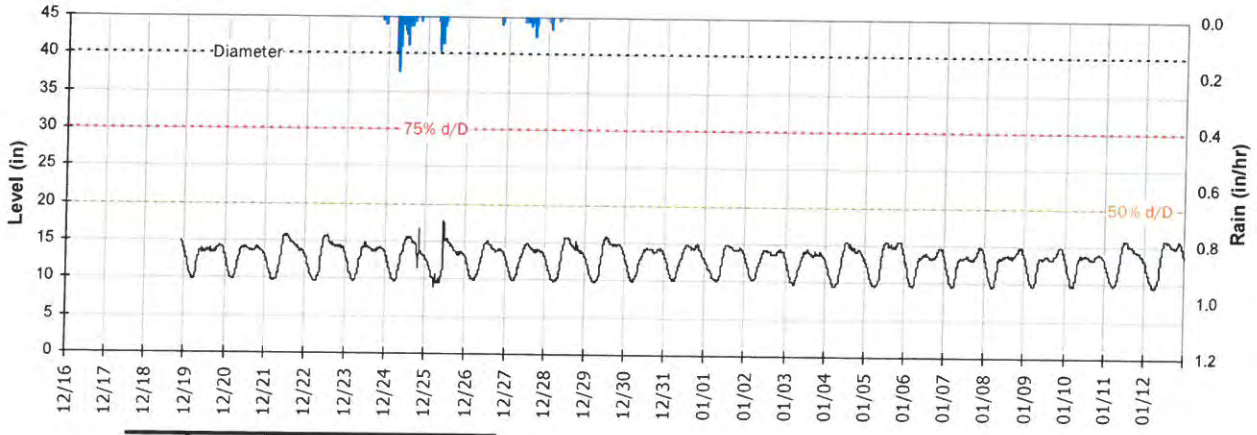


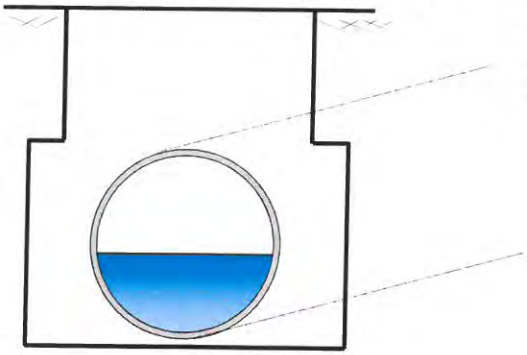
ADWF:
4.256 *mgd*

SITE 11

Site Capacity and Surcharge Summary

Realtime Flow Levels with Rainfall Data over Monitoring Period

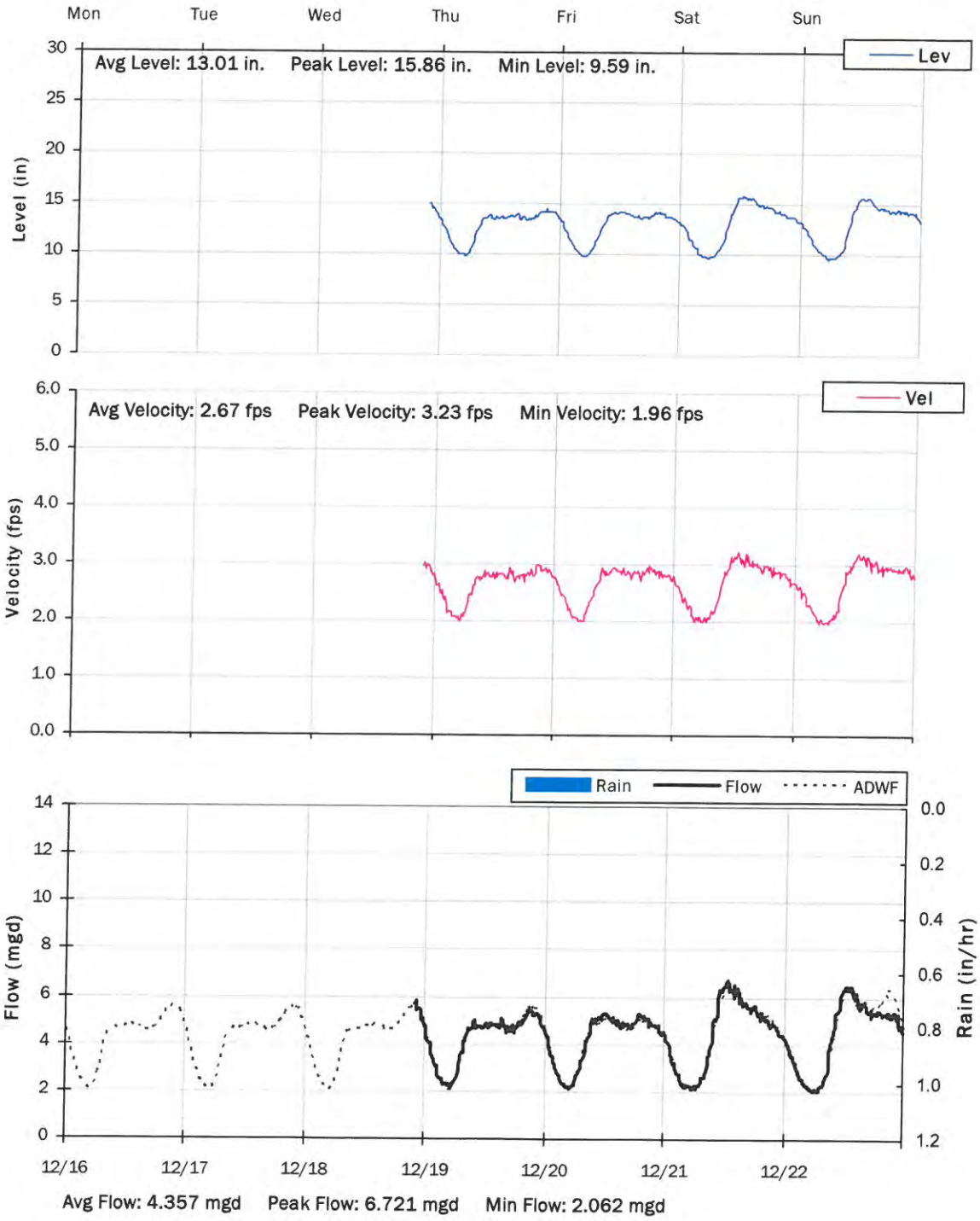




Pipe Diameter:	40	*inches*
Peak Measured Level:	17.7	*inches*
Peak d/D Ratio:	0.44	

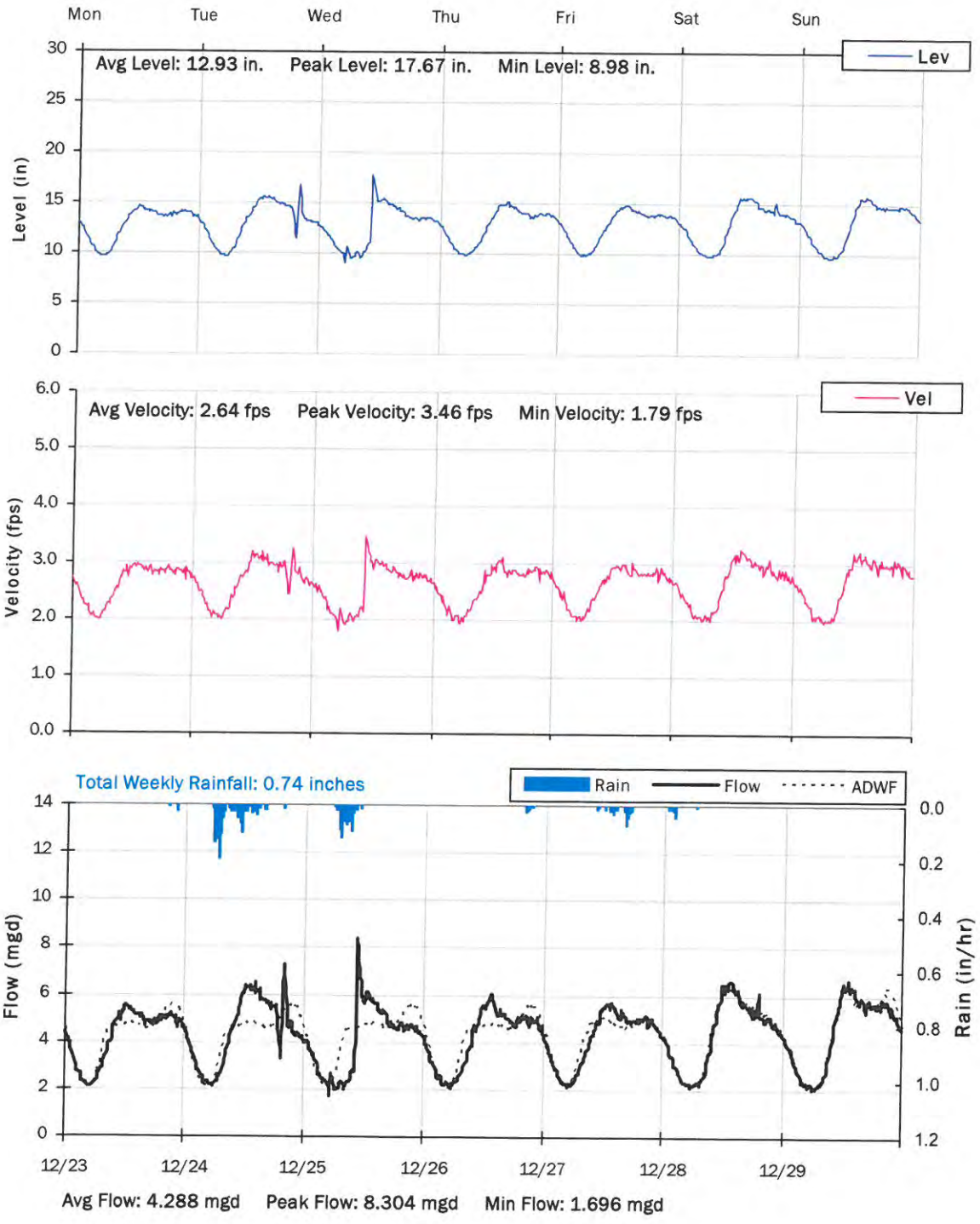
SITE 11

Weekly Level, Velocity and Flow Hydrographs
12/16/2019 to 12/23/2019



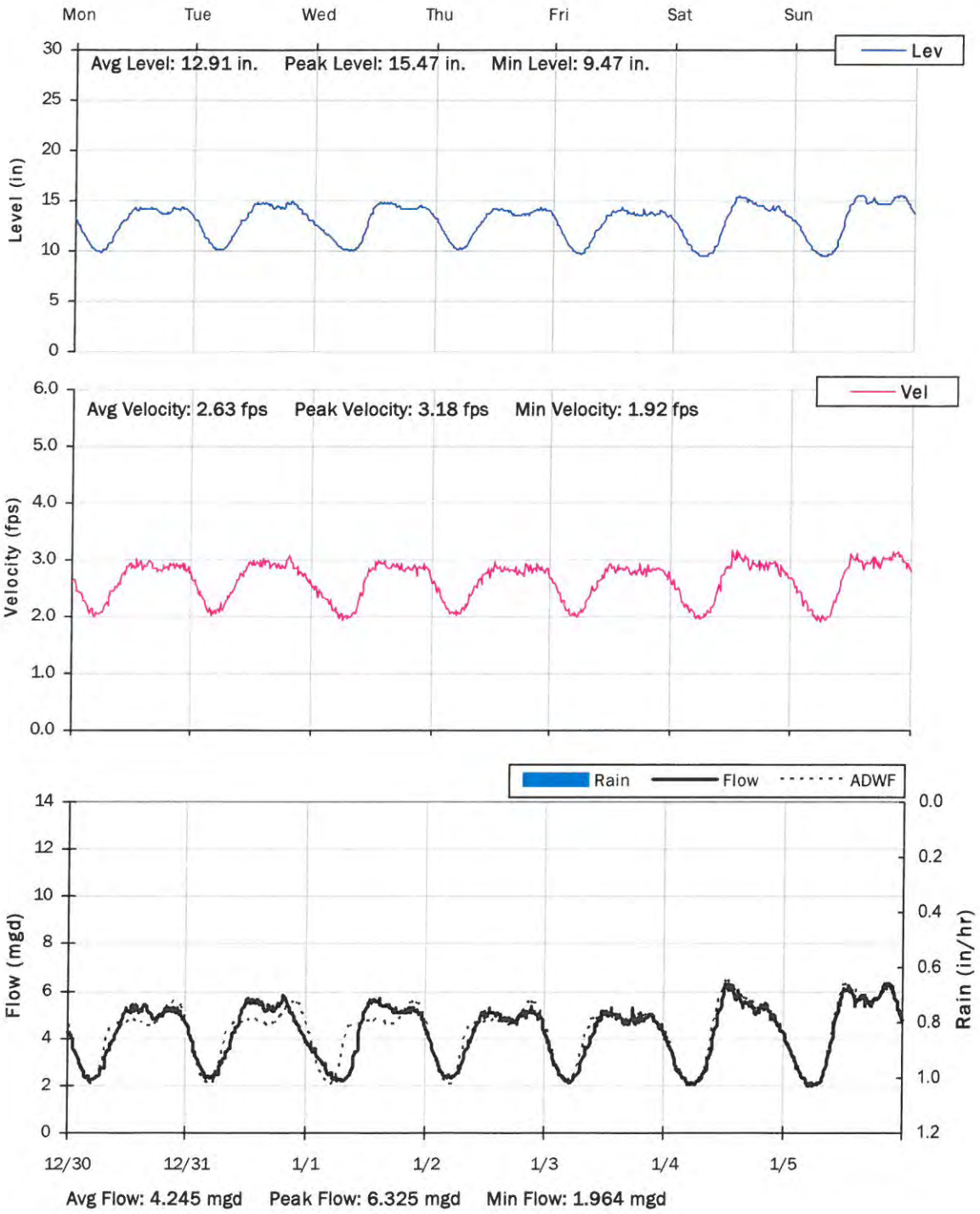
SITE 11

Weekly Level, Velocity and Flow Hydrographs
12/23/2019 to 12/30/2019



SITE 11

Weekly Level, Velocity and Flow Hydrographs
12/30/2019 to 1/6/2020



SITE 11

Weekly Level, Velocity and Flow Hydrographs

1/6/2020 to 1/13/2020

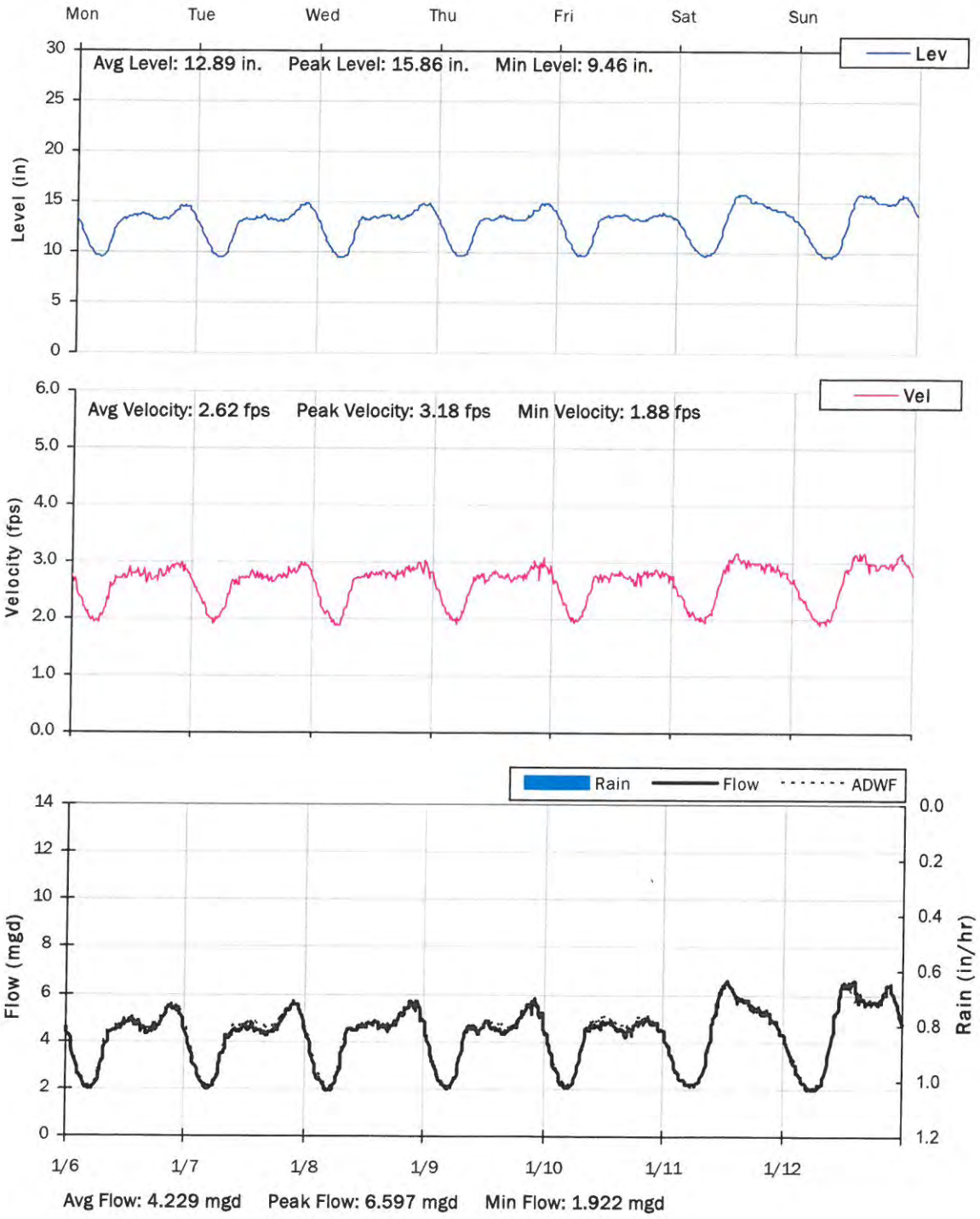


EXHIBIT F
Statement of All Clarifications and Assumptions (if any)

(3 pages - To be Incorporated by Amendment)

Exhibit F: Clarification & Assumptions

SEWER & MANHOLE REHABILITATION, PHASE 6B & 6D
COG PROJECT NUMBER: 212231
GMP-002 REV-1

1. Mobilization/Demobilization for this GMP-002 is a onetime round trip for personnel, equipment, and supplies. Project delays that result in demobilization of personnel and/or equipment are not included, and any additional costs incurred are a change in scope.
2. No temporary signals are included in GMP and if required they will be reimbursed through Project Contingency.
3. Any costs associated with Permits, Paving Permit/Fees, Waterline and Trench Permit/Fees and Haul Permit/Fees are not included in the GMP, except for the dust control permit fee.
4. Dust Control permit is included in the mobilization item of the GMP.
5. Costs associated with City and/or ADOT permit and plan review fees, Quality Assurance (QA) (i.e. City/ADOT inspection and testing) costs, impact fees, and utility company fees, water meters/meter installations except for construction water, and/or any other fees not specifically identified within this GMP, are not anticipated and, if required, shall be reimbursed through Owners Contingency.
6. This GMP does not include costs for the remediation of hazardous waste materials.
7. Traffic Control Allowance includes anticipated costs for traffic control labor and equipment for setup and teardown, barricade device rental, sandbags, and flags with dowels. Traffic control item will be cost reimbursable with appropriate backup documentation plus applicable mark-ups, insurance, bond, and taxes per the contract.
8. Traffic control at 67th Ave and Butler must be a 24 hour and 7 day a week setup and left turn restriction will be required to accommodate the work from all directions.
9. Traffic control at 67th Ave and Butler will not be able to travel east west through the intersection during the installation of the new sewer structure, pipe, and manhole.
10. Traffic control during CIPP lining must stay up full shift due to curing and reinstatements of lateral connections.
11. Excludes any costs associated with blasting or hydraulic breakers of any kind.
12. Project schedule is estimated at a 5-month duration; thus Indirect/General Conditions costs were estimated at 5 months for this GMP and will be billed monthly.
13. Includes a Owners Contingency to cover material escalation costs related to aggregates, asphalt, pipeline, CIPP liner materials as compared to the vendor/supplier quote. This will be cost reimbursable with appropriate back-up documentation showing the cost impacts on the project from GMP to construction plus applicable mark-ups, insurance, bond, and taxes per the contract.
14. Excludes costs for repair of pre-existing damage to any private and public roadways used to access this project. If required, costs to be reimbursed from Owners Contingency.
15. GMP assumes access can be granted to CMAR for suitable staging and installation of the sewer replacements and rehabilitation efforts at the various sections of right of way (ROW).
16. GMP excludes costs for utility relocation. If any utility relocations are required, CMAR shall be reimbursed through the Owners Contingency.

17. Costs for Private Irrigation or any other unmarked utility damaged and/or relocated as part of this project to be compensated out of Owners Contingency line items.
18. Allowance bid item has been included to cover costs associated with pavement sealing and striping. Estimated allowance amount is based on assuming pavement sealing and striping for the pavement areas impacted by the bypass and new installation work scopes for project Phase 6B at 67th Ave and Butler.
19. CMAR expectation is to close sidewalks and bike paths in the construction zone and route pedestrians to the nearest ADA compliant crossing and detour pedestrians to the opposite of the roadway around the work zone.
20. Survey/GIS Allowance includes costs to record asset data directly associated with the rehabilitation scope of work and incorporating that data into the GIS system.
21. Off-Duty Officer Allowance will be utilized for Off-Duty Officers as designated by the City of Glendale traffic department and will be cost reimbursable with appropriate backup plus applicable mark-up, insurance, bond, and taxes.
22. Allowances are only anticipated/estimated costs and overruns of the Allowances will be compensated through Owners Contingency.
23. 8-inch sewer replacement/point repair scope of work does not include air testing. New pipe sections installed will be CCTV inspected and approved by the Engineer prior to CIPP lining.
24. All specialty asphalt, concrete, and/or paver unless expressed explicitly on the plans would be compensated through Owners Contingency.
25. Unit Price Contract Administration: This GMP will be administered as a Measured Quantity/Unit Price, Guaranteed Not-to-Exceed Contract. The Schedules of Values is defined by the individual work/pay items plus fee structure, and markups. Final contract price/payout will be based on field measured, final completed quantities at the approved unit prices, approved allowance and/or contingency utilization, and approved change orders. It is understood that these City approved prices including mark-ups are the "Cost of the Work". The mark-up structure on the Schedule of Values will apply to Change Orders and/or Extra Work, allowances, and contingencies. Pay Item under-runs and/or unused items shall fall to Owners Contingency for the duration of the project. Quantity over-runs shall be paid at the unit price established in the Schedule of Values for the pay item and shall be paid from Owner Contingency or extra work allowance.
26. Any additional point repairs or SLC seals/tops hats not identified on the plans that are deemed required shall be reimbursed via extra work allowance.
27. For Phase 6D 8" sewer line rehabilitation, B&F plans on managing flow with a vactor trailer since flows were observed to be manageable with a vactor trailer. If flows exceed the capabilities of the vactor trailer, B&F shall be reimbursed through extra work allowance for vactor bypass required to complete 8" sewer line rehabilitation. If backwaters due to upstream conditions are causing nuisance flows that effect our ability to access and rehabilitate the pipe and/or manholes the extra time to set additional plugs will be compensated through the extra work allowance or Owner Contingency.
28. For Phase 6D, CMAR GMP is based on full 8-hour street restrictions allowing 8 full hours of work to be performed on site by CMAR crews.

29. For Phase 6B, specifically the 12" sewer cleaning, pipe preparation, CIPP lining, and manhole rehabilitation, CMAR GMP is based on full 8-hour street restrictions allowing 8 full hours of work to be performed on site by CMAR crews.
30. In the proposal for pipe cleaning, if not designated on the plans or called out specifically is estimated as a standard three-pass cleaning with a vactor combo truck and operators. If the line requires additional cleaning after the three-pass cleaning the CMAR will notify the City and Inspector and track the time after approval as heavy cleaning which is $350.00 and hour for vactor truck and $575.00 per hour when and vactor and CCTV truck are required to complete the work. These rates are consistent with mechanical cleaning efforts as well which required both a camera truck and vactor combo truck to complete the work.
31. For Phase 6B, specifically the bypass scope of work and new pipe and structure scope of work, 24-hour traffic control setups will be required for the 67th Ave and Butler Drive work area.
32. The project will utilize the designated odor control allowance when tarping and covering measures are found unacceptable. This will be requested and approved by the City prior to utilization. CMAR will utilize either a portable odor scrubber or chemical injection based on direction received from the City or designated consultant.
33. Public outreach is not included in the GMP. CMAR as completed on prior project will distribute door hangers provided by the public outreach or City prior to disruption of work. CMAR will coordinate and review and provide updates to keep properly informed throughout the project.
34. Public hotline number to be provided by the City or designated public outreach company.
35. Escalation in material cost with proven backup on materials the price escalation will be compensated through owner's contingency.

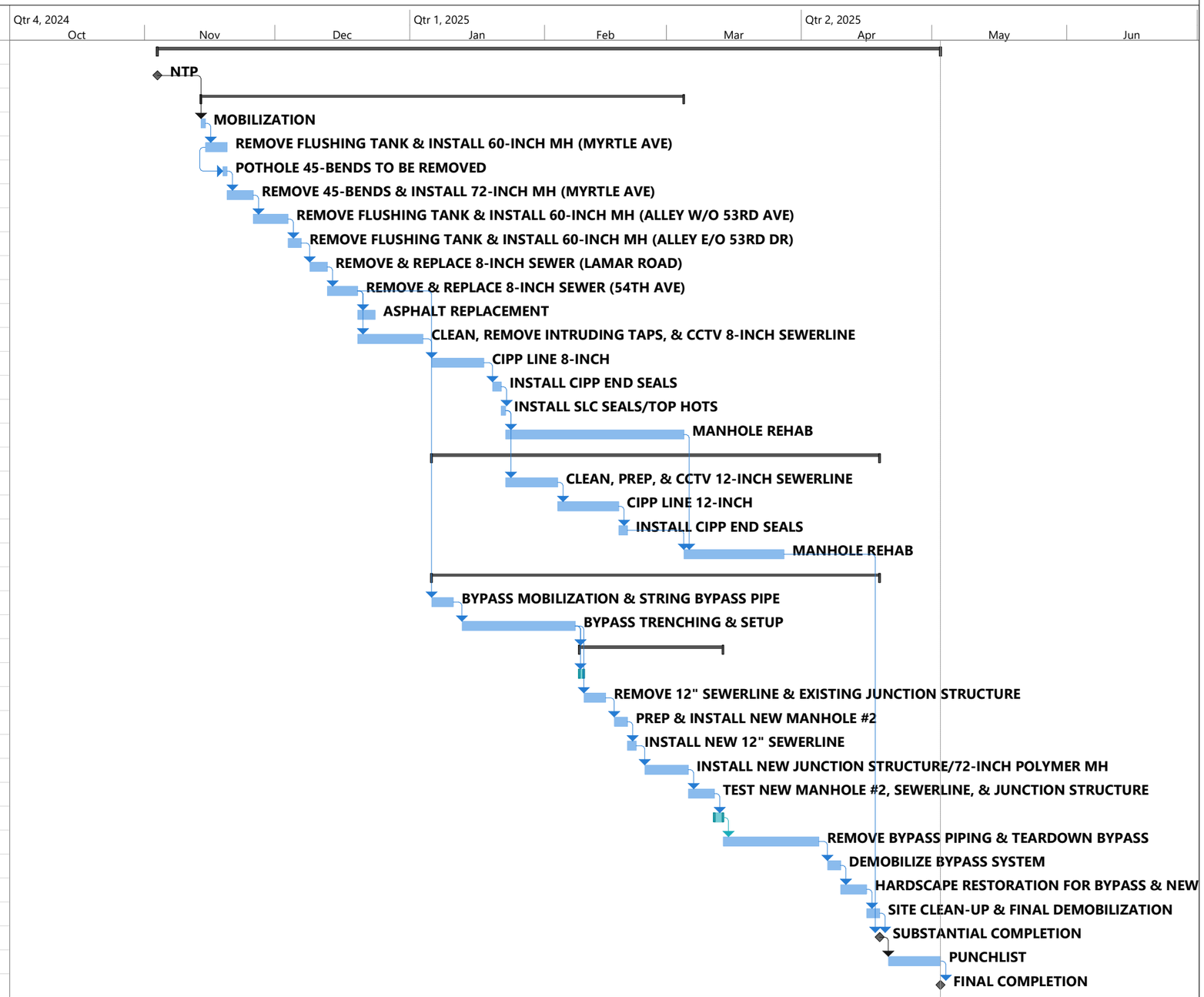
EXHIBIT G
Schedule of Major Milestones

(1 pages - To be Incorporated by Amendment)

212231 SEWER & MANHOLE REHAB, PHASE 6B & 6D

EXHIBIT G: PROJECT SCHEDULE

ID	Task Name	Duration
1	**SEWER & MANHOLE REHABILITATION PHASE 6B & 6D**	**124 days**
2	NTP	0 days
3	**PHASE 6D**	**73 days**
4	MOBILIZATION	1 day
5	REMOVE FLUSHING TANK & INSTALL 60-INCH MH (MYRTLE AVE)	3 days
6	POTHOLE 45-BENDS TO BE REMOVED	1 day
7	REMOVE 45-BENDS & INSTALL 72-INCH MH (MYRTLE AVE)	4 days
8	REMOVE FLUSHING TANK & INSTALL 60-INCH MH (ALLEY W/O 53RD AVE)	4 days
9	REMOVE FLUSHING TANK & INSTALL 60-INCH MH (ALLEY E/O 53RD DR)	3 days
10	REMOVE & REPLACE 8-INCH SEWER (LAMAR ROAD)	4 days
11	REMOVE & REPLACE 8-INCH SEWER (54TH AVE)	5 days
12	ASPHALT REPLACEMENT	2 days
13	CLEAN, REMOVE INTRUDING TAPS, & CCTV 8-INCH SEWERLINE	7 days
14	CIPP LINE 8-INCH	10 days
15	INSTALL CIPP END SEALS	2 days
16	INSTALL SLC SEALS/TOP HOTS	1 day
17	MANHOLE REHAB	29 days
18	**PHASE 6B**	**75 days**
19	CLEAN, PREP, & CCTV 12-INCH SEWERLINE	8 days
20	CIPP LINE 12-INCH	10 days
21	INSTALL CIPP END SEALS	2 days
22	MANHOLE REHAB	17 days
23	**67TH AVE & BUTLER SEWER & STRUCTURE REPLACEMENT**	**75 days**
24	BYPASS MOBILIZATION & STRING BYPASS PIPE	5 days
25	BYPASS TRENCHING & SETUP	20 days
26	**BYPASS START-UP & OPERATION**	**24 days**
27	PERFORM 24 HOUR STARTUP TEST ON BYPASS	1 day
28	REMOVE 12" SEWERLINE & EXISTING JUNCTION STRUCTURE	5 days
29	PREP & INSTALL NEW MANHOLE #2	3 days
30	INSTALL NEW 12" SEWERLINE	2 days
31	INSTALL NEW JUNCTION STRUCTURE/72-INCH POLYMER MH	8 days
32	TEST NEW MANHOLE #2, SEWERLINE, & JUNCTION STRUCTURE	4 days
33	REMOVE PLUGS AND TURN OFF BYPASS	2 days
34	REMOVE BYPASS PIPING & TEARDOWN BYPASS	16 days
35	DEMOBILIZE BYPASS SYSTEM	3 days
36	HARDSCAPE RESTORATION FOR BYPASS & NEW SEWER INSTALL	4 days
37	SITE CLEAN-UP & FINAL DEMOBILIZATION	3 days
38	SUBSTANTIAL COMPLETION	0 days
39	PUNCHLIST	10 days
40	FINAL COMPLETION	0 days



Project: Project Schedule
Date: Wed 10/30/24

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