WWE
Wright Water Engineers, Inc.
2490 West 26th Ave., Suite 100A
Denver, Colorado 80211
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(303) 480-1020 FAX
www.wrightwater.com
e-mail:wlorenz@wrightwater.com

January 8, 2018

Via: Electronic Submittal

PCD Project No. PPR-17-043

El Paso County
Engineering Division
200 South Cascade Avenue, Suite 100
Colorado Springs, CO 80903-2208

Re: **Amendment #1 to the Drainage Letter for the Forest Lakes Metropolitan District Water Intake and Treatment Plant Project**

Wright Water Engineers, Inc. (WWE), on behalf of the Forest Lakes Metropolitan District (FLMD), has prepared this El Paso County Drainage Letter Amendment #1 in response to verbal El Paso County comments received on January 4, 2018. This Amendment #1 to the original "Drainage Letter for the Forest Lakes Metropolitan District Water Intake and Treatment Plant Project" dated November 11, 2017 (original drainage letter) addresses these additional comments from El Paso County.

Purpose of Amendment

On January 4, 2018, El Paso County contacted WWE and requested additional documentation regarding the potential discharge of emergency overflow water from the two 18" diameter emergency overflow pipes, one from the water treatment plant (WTP) clearwell and the other from the Backwash Reclaim Basin (see Attachment E in the original drainage letter for the location of these pipes). El Paso County requested WWE provide a summary of the potential impacts this emergency overflow discharge may have on downstream stormwater infrastructure during a 100-year storm event.

This Amendment #1 provides a summary of the maximum potential overflow discharge from each emergency overflow pipe followed by an analysis of the capacity of the downstream infrastructure to convey this additional emergency discharge during a 100-year storm event.

Proposed Clearwell and Backwash Reclaim Basin Emergency Overflow Rates

The proposed WTP site has two emergency overflow locations, the clearwell inside the WTP and the Backwash Reclaim Basin located outside and east of the WTP. The following provides a summary of the potential emergency overflow discharge rate for each location.

Clearwell Emergency Overflow

In order for an overflow to occur from the clearwell the following situation would need to occur:

- Both high service pumps are inoperable,

- the clearwell is completely full,
- and the monitoring system in the WTP is not signaling an alarm to shut down production.

In this situation, the overflow rate from the clearwell into the 18" diameter overflow pipe is equal to the maximum amount of treated water that the plant is able to produce. The WTP has a treatment capacity of 0.5 million gallons per day (mgd) or 350 gallons per minute (gpm). Therefore, the flow from the clearwell into the overflow pipe would be 350 gpm or 0.78 cfs.

Backwash Reclaim Basin Emergency Overflow

In order for an overflow to occur from the Backwash Reclaim Basin the following situation would need to occur:

- Both backwash recycle pumps are inoperable,
- the Backwash Reclaim Basin is completely full,
- and a filter backwash cycle occurs in the plant.

In this situation, the overflow rate from the Backwash Reclaim Basin into the 18" diameter overflow pipe is equal to the maximum amount of backwash water that the plant is able to produce. The WTP has a high rate backwash rate of 1050 gpm, and only one filter is backwashed at a time. Therefore, the flow from the Backwash Reclaim Basin into the overflow pipe would be 1050 gpm or 2.34 cfs.

This results in a total emergency overflow rate from both locations of 3.12 cfs.

Capacity of Downstream Stormwater Drainage Infrastructure During a 100-year Event and Emergency Overflow Condition

As shown on Attachment E in the original drainage letter, both 18" diameter overflow pipes route to the now existing stormwater drainage system for the Forest Lakes Filings 2A & 2B project. These 18" diameter overflow pipes eventually discharge into an existing 24" RCP which ties into an existing 48" RCP. According to the previously approved Forest Lakes Filings 2A and 2B project, at the tie-in point (Sta. 6+01.45), the 48" RCP has a 100-year flowrate of 176.5 cfs which is maintained until the pipe outfalls into the existing detention basin ±500 LF downstream. See Attachment A1 for the stormwater utility drawings from the Forest Lakes Filing 2A and 2B project.

The added flowrate of 3.12 cfs, as a result of an emergency overflow situation occurring during a 100-year storm event, will result in a 1.8% increase in the flowrate of the existing 48" RCP. This is within the carrying capacity of the 48" RCP trunk line. In order to demonstrate the emergency overflows will have a negligible impact on the existing infrastructure, WWE developed a Hydraflow Storm Sewer hydraulic model for the existing 48" RCP line using the Forest Lakes Filings 2A and 2B design sheets. As shown in Attachment B1, the addition of the emergency overflow discharge during a 100-year design storm is estimated to cause a ±0.04' increase at the downstream outfall of the existing 48".

Summary and Conclusions

In summary, construction of the FLMD WTP will not adversely affect the downstream drainage infrastructure associated with the March 2016 "Preliminary & Final Drainage Report for Forest Lakes Filings 2A & 2B" prepared by Classic Consulting Engineers & Surveyors. The downstream drainage infrastructure has sufficient carrying capacity to convey potential emergency overflow discharges from the WTP during a 100-year event.

Sincerely,

WRIGHT WATER ENGINEERS, INC.

By _____
Hayes A. Lenhart, P.E.
Associate Water Resources Engineer

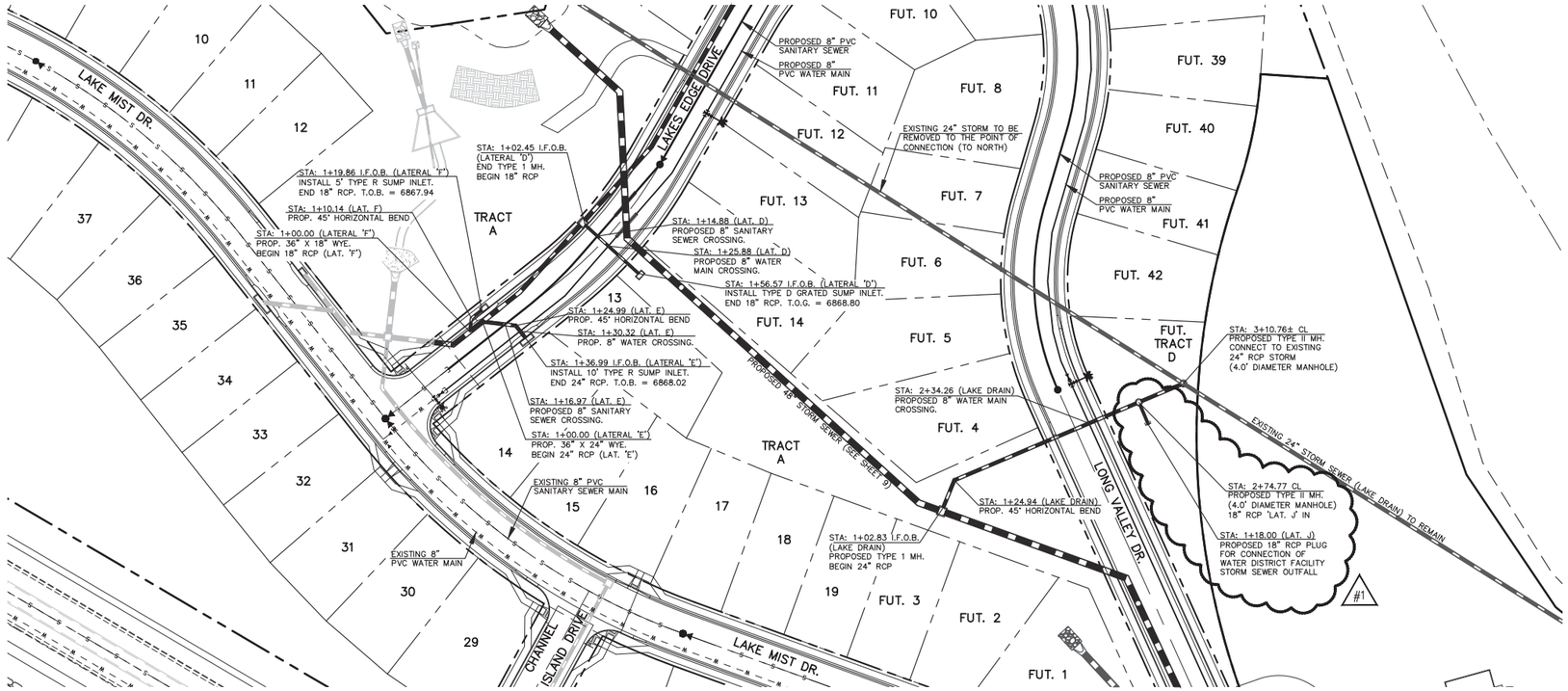
Reviewed By _____
Wayne F. Lorenz, P.E.
Chief Design Engineer

Attachments

Attachment A1 – Forest Lakes Filling No. 2b Storm Sewer Plans (Sheets 9 and 10)
Attachment B1 – Hydraflow Storm Sewers Model Results

Z:\Project Files\02-03\031-090\031-090.300\Engineering\Site Development Plan - El Paso County\Drainage Letter\FLMD WTP - Drainage Letter Amendment #1.docx

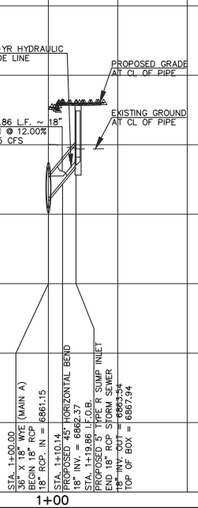
Attachment A1



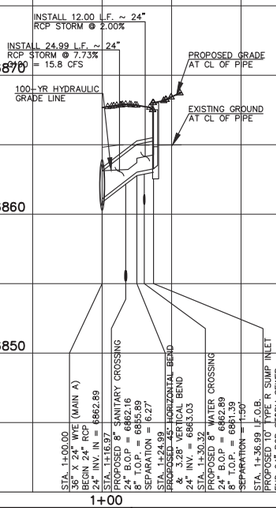
STORM SEWER:
ALL STORM SEWER AND DETENTION/WATER QUALITY PONDS ARE TO BE OWNED AND MAINTAINED BY THE FOREST LAKES METROPOLITAN DISTRICT.

NOTE:
EXISTING UTILITIES SHOWN IN AN APPROXIMATE WAY ONLY. ALL EXISTING UTILITIES TO BE POTHOLED AND VERIFIED BOTH HORIZONTALLY & VERTICALLY PRIOR TO CONSTRUCTION & CONFLICTS REPROTED TO ENGINEER.

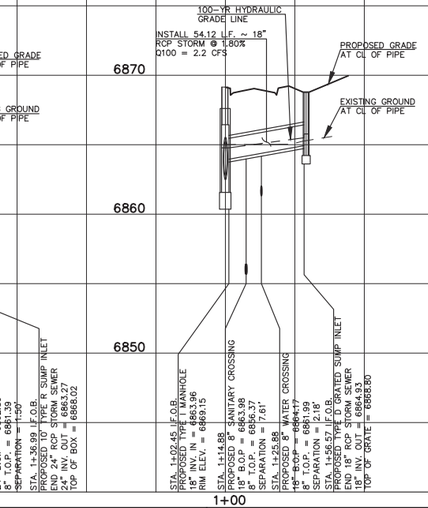
PROPOSED PRIVATE 18" RCP LAT 'F' TO 5' TYPE R SUMP INLET



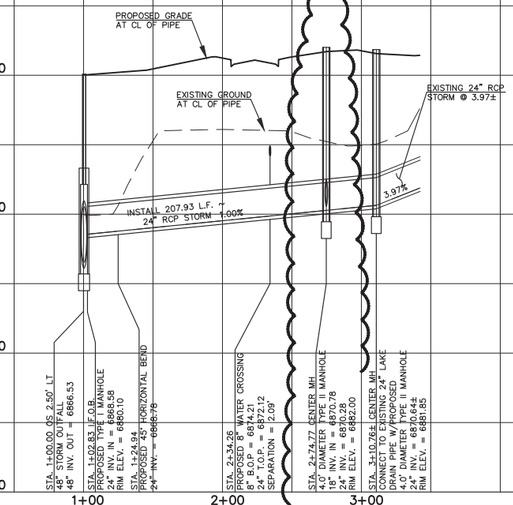
PROPOSED PRIVATE 24" RCP LAT 'E' TO 10' TYPE R SUMP INLET



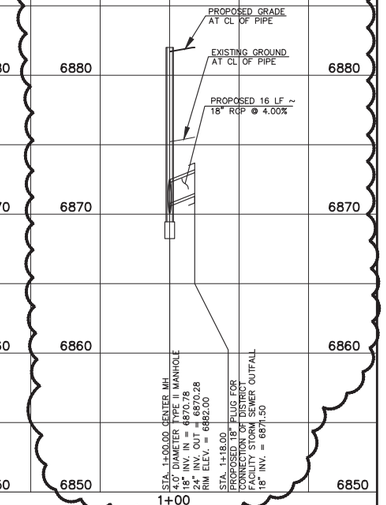
PROPOSED PRIVATE 18" RCP LAT 'D' TO TYPE D GRATED INLET



PROPOSED PRIVATE 24" RCP TO EXISTING LAKE DRAIN (EMERGENCY DRAIN ONLY)



PROPOSED PRIVATE 18" RCP LATERAL 'J' FOR CONNECTION



LEGEND

PROPOSED FIRE HYDRANT	EXISTING FIRE HYDRANT
PROPOSED WATER MAIN	EXISTING WATER MAIN
PROPOSED SANITARY SEWER MAIN	EXISTING SANITARY SEWER MAIN
PROPOSED STORM SEWER	EXISTING STORM SEWER
PROPOSED STORM INLET	EXISTING STORM INLET
ROW/BOUNDARY LINE	EXISTING GAS MAIN
	EXISTING ELECTRIC

48 HOURS BEFORE YOU DIG, CALL UTILITY LOCATORS
811
UTILITY NOTIFICATION CENTER OF COLORADO
IT'S THE LAW

THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE CAUSED BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

NO.	REVISION	DATE
1	ADD MANHOLE AND 18" STUB (LAT. J) FOR DISTRICT CONNECTION	11/01/17

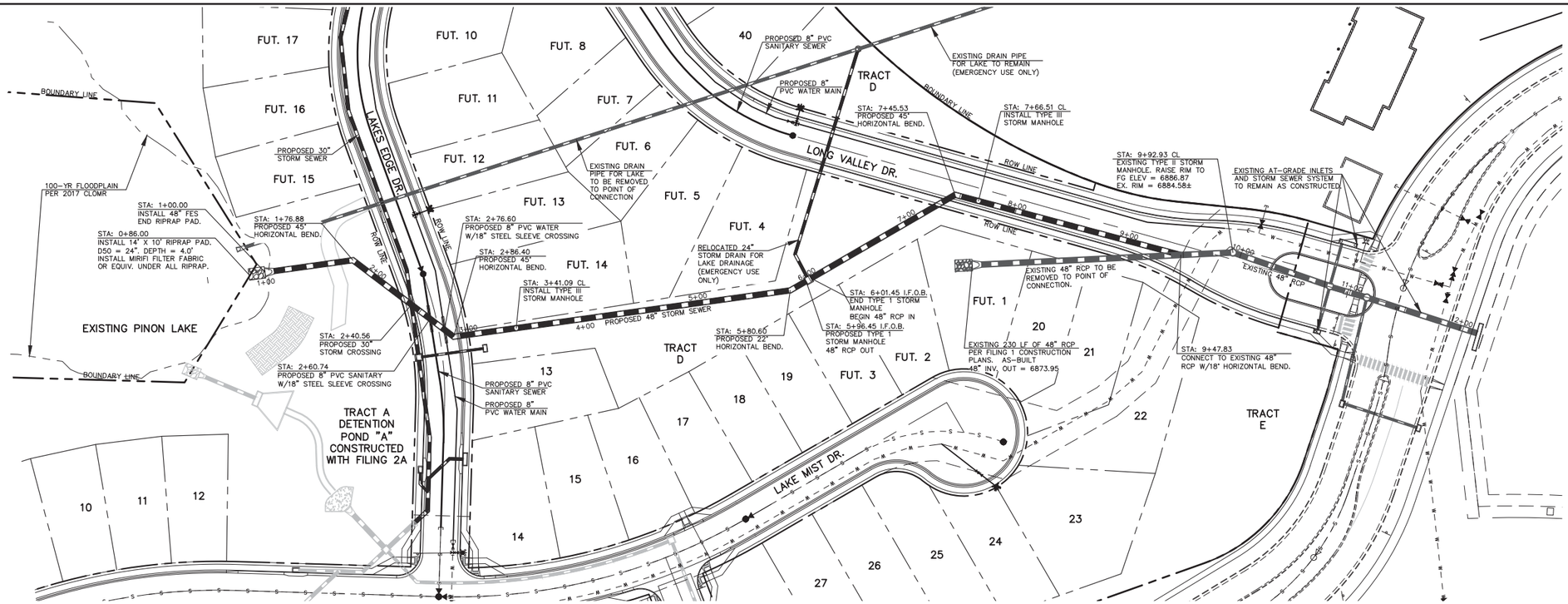
REVIEW:
PREPARED UNDER MY DIRECT SUPERVISION FOR AND ON BEHALF OF CLASSIC CONSULTING ENGINEERS AND SURVEYORS, LLC

KYLE R. CAMPBELL, COLORADO P.E. #29794 — DATE

CLASSIC CONSULTING ENGINEERS & SURVEYORS
619 N. Cascade Avenue, Suite 200 (719)785-0790
Colorado Springs, Colorado 80903 (719)785-0799(Fax)

FOREST LAKES FILING NO. 2B
STORM SEWER PLAN
LAT 'D', LAT 'E', LAT 'F', LAKE DRAIN
PLAN & PROFILE

DESIGNED BY	MAL	SCALE		DATE	12/21/15
DRAWN BY	MAL	(H) 1"= 50'		SHEET	10 OF 11
CHECKED BY		(V) 1"= 5'		JOB NO.	1175.02



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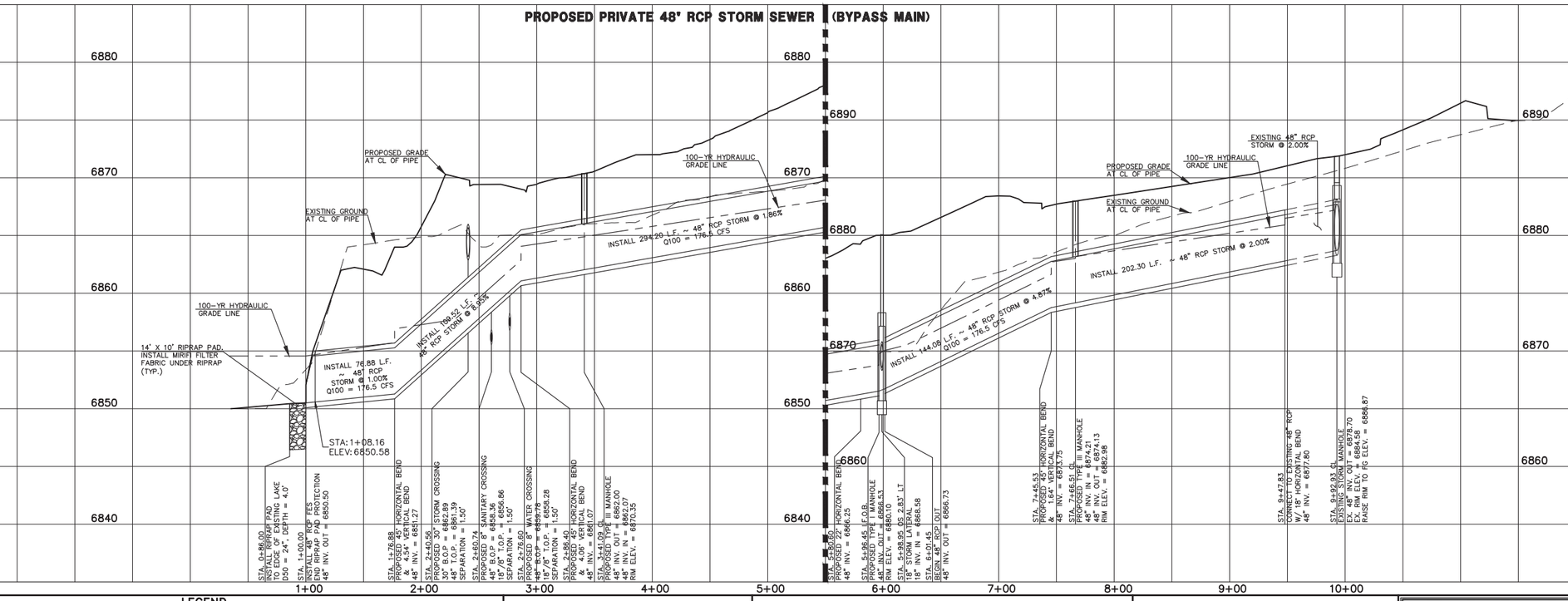
PROPOSED PRIVATE 48" RCP STORM SEWER (BYPASS MAIN)



LEGEND

PROPOSED FIRE HYDRANT	EXISTING FIRE HYDRANT
PROPOSED WATER MAIN	EXISTING WATER MAIN
PROPOSED SANITARY SEWER MAIN	EXISTING SANITARY SEWER MAIN
PROPOSED STORM SEWER	EXISTING STORM SEWER
PROPOSED STORM INLET	EXISTING STORM INLET
ROW/BOUNDARY LINE	EXISTING GAS MAIN
	EXISTING ELECTRIC

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NO.	REVISION	DATE

REVIEW:

PREPARED UNDER MY DIRECT SUPERVISION FOR AND ON BEHALF OF CLASSIC CONSULTING ENGINEERS AND SURVEYORS, LLC

KYLE R. CAMPBELL, COLORADO P.E. #29794 DATE

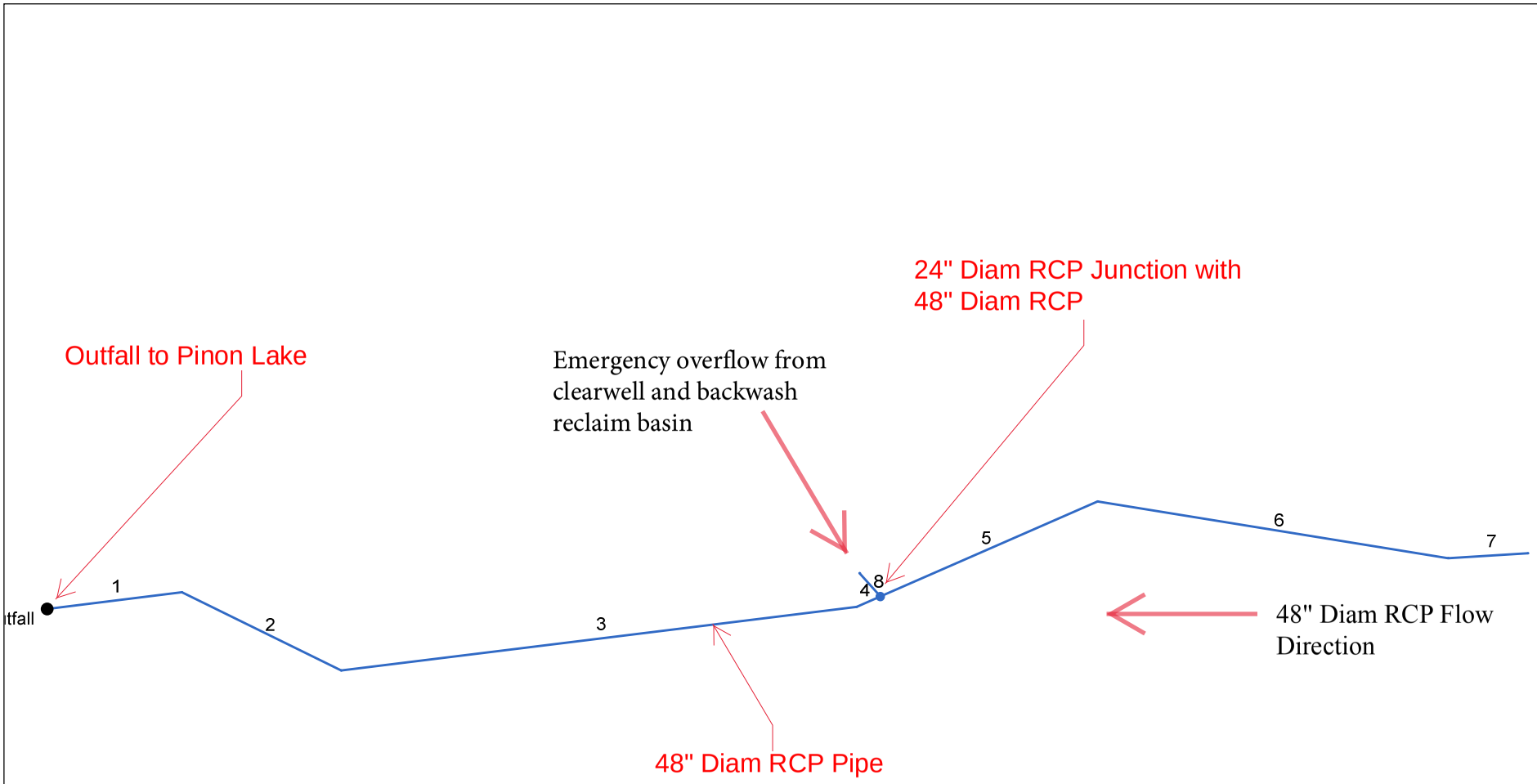
CLASSIC CONSULTING ENGINEERS & SURVEYORS
619 N. Cascade Avenue, Suite 200 (719)785-0790
Colorado Springs, Colorado 80903 (719)785-0799(Fax)

FOREST LAKES FILING NO. 2B
STORM SEWER PLAN
48" BYPASS MAIN
PLAN & PROFILE

DESIGNED BY	MAL	SCALE		DATE	12/21/15
DRAWN BY	MAL	(H) 1"=	50'	SHEET	9 OF 11
CHECKED BY		(V) 1"=	5'	JOB NO.	1175.02

Attachment B1

Hydraflow Storm Sewers Extension for Autodesk® AutoCAD® Civil 3D® Plan



Project File: Existing 48in RCP Storm Sewer w Emerg. Overflows.stm	Number of lines: 8	Date: 1/5/2018

My Report

100-year flow conditions without clearwell and backwash reclaim basin overflow

Line No.	Line ID	Flow Rate (cfs)	Line Size (in)	Line Type	Line Length (ft)	Invert Dn (ft)	Invert Up (ft)	Line Slope (%)	HGL Dn (ft)	HGL Up (ft)	Minor Loss (ft)	HGL Jnct (ft)	DnStm Ln No	Junct Type	Gnd/Rim El Dn (ft)	Gnd/Rim El Up (ft)	
1		176.50	48	Cir	76.880	6850.50	6851.27	1.00	6854.50	6855.66	2.30	6857.96	Outfall	None	6850.50	6864.00	
2		176.50	48	Cir	109.520	6851.27	6861.07	8.95	6857.96	6864.83	n/a	6864.83	1	None	6864.00	6869.00	
3		176.50	48	Cir	294.200	6861.07	6866.25	1.76	6864.98	6870.01	n/a	6870.01	2	None	6869.00	6880.00	
4		176.50	48	Cir	15.850	6866.25	6866.53	1.77	6870.17	6870.29	n/a	6870.29	3	MH	6880.00	6880.00	
5		176.50	48	Cir	144.080	6866.73	6873.75	4.87	6870.44	6877.51	n/a	6877.51	4	None	6880.00	6883.00	
6		176.50	48	Cir	202.300	6873.75	6877.80	2.00	6877.67	6881.56	n/a	6881.56	5	None	6883.00	6886.00	
7		176.50	48	Cir	45.100	6877.80	6878.70	2.00	6881.71	6882.46	n/a	6882.46	6	None	6886.00	6887.00	
8		0.01	24	Cir	22.110	6868.58	6868.78	0.90	6873.51	6873.51	0.00	6873.51	4	None	6880.00	6880.50	

Project File: Existing 48in RCP Storm Sewer.stm | Number of lines: 8 | Date: 1/5/2018

NOTES: ** Critical depth

My Report

100-year flow conditions with clearwell and backwash reclaim basin overflow

Line No.	Line ID	Flow Rate (cfs)	Line Size (in)	Line Type	Line Length (ft)	Invert Dn (ft)	Invert Up (ft)	Line Slope (%)	HGL Dn (ft)	HGL Up (ft)	Minor Loss (ft)	HGL Jnct (ft)	DnStm Ln No	Junct Type	Gnd/Rim El Dn (ft)	Gnd/Rim El Up (ft)	
1		179.62	48	Cir	76.880	6850.50	6851.27	1.00	6854.50	6855.70	2.38	6858.09	Outfall	None	6850.50	6864.00	
2		179.62	48	Cir	109.520	6851.27	6861.07	8.95	6858.09	6864.84	2.49	6864.84	1	None	6864.00	6869.00	
3		179.62	48	Cir	294.200	6861.07	6866.25	1.76	6864.99	6870.02	1.43	6870.02	2	None	6869.00	6880.00	
4		179.62	48	Cir	15.850	6866.25	6866.53	1.77	6870.17	6870.30	3.33	6870.30	3	MH	6880.00	6880.00	
5		176.50	48	Cir	144.080	6866.73	6873.75	4.87	6870.56	6877.51	n/a	6877.51	4	None	6880.00	6883.00	
6		176.50	48	Cir	202.300	6873.75	6877.80	2.00	6877.67	6881.56	n/a	6881.56	5	None	6883.00	6886.00	
7		176.50	48	Cir	45.100	6877.80	6878.70	2.00	6881.71	6882.46	n/a	6882.46	6	None	6886.00	6887.00	
8		3.12	24	Cir	22.110	6868.58	6868.78	0.90	6873.61	6873.62	0.02	6873.63	4	None	6880.00	6880.50	

Project File: Existing 48in RCP Storm Sewer w Emerg. Overflows.stm | Number of lines: 8 | Date: 1/5/2018

NOTES: ** Critical depth