

To: El Paso County Engineering Division
From: Mike Bramlett, PE
Date: November 25, 2020
Subject: Sand Creek Center Tributary Channel Improvements

The purpose of this letter is to provide design information for the existing conditions of the Sand Creek Center Tributary Drainageway, located east of the Solace Apartments site. This letter will also discuss the proposed improvements for the channel, design methodology, and the modeling results. For further information on the previous evaluation of the channel in its existing conditions and conceptual design, see the *Sand Creek – Center Tributary Channel Analyses Report for Solace Apartments* by JR Engineering. For further information concerning drainage for the Solace Apartments Site, see the *Final Drainage Report for Solace Apartments*, by JR Engineering.

#### **Project General Discussion**

The Sand Creek Center Tributary Channel is located in Section 7, Township 14 South, Range 65 West of the 6<sup>th</sup> Principal Meridian in El Paso County, Colorado. The site is part of the Solace Apartments project and is located on the eastern edge of the project. As part of the proposed improvements for the Solace Apartments Project, this reach of the Sand Creek Center Tributary will also be improved. The sections upstream and downstream of the site have already undergone improvements, and the channel in its current state shows extensive flooding in a 100 year event. In addition to improvements to the Sand Creek Center Tributary Channel, the channels secondary drainageway located to the west of the channel in Paonia Street will also be improved with an overflow channel that will direct flow present in the secondary drainageway into the main channel and avoid further flooding of the Paonia Street extension into the Solace Apartments site.

#### **Channel Flows**

# Please state where this convergence occurs.

Evaluation of the flows present in the Sand Creek Center Tributary and its secondary drainageway were discussed in detail in the *Sand Creek – Center Tributary Channel Analysis for Solace Apartments* by JR Engineering. Since the initial analysis of the channel took place, JR Engineering was able to acquire the modeling data used by FEMA for determination of flood plain modeling shown in FEMA FIRM 08041C0752G. JR Engineering assumes FEMA's flows to be accurate, and thus utilized these as the basis for our model. The main channel contains 820 cfs of flow and the secondary channel contains 217 cfs. The flow in the main channel then jumps up to 1,037 cfs at the convergence of the secondary drainageway. Downstream an existing channel coming from nearby Valley Road (east) converges with the main channel, we then utilized FEMA's 1,100 cfs to model the remaining portion of the channel.

## **Existing Channel Conditions**

In its existing conditions the Sand Creek Center Tributary Channel along the Solace site consists of a natural channel overgrown with trees and bushes along the sides of the channel with the bottom being relatively clean and free of obstacles. The 1,350 LF reach of the Sand Creek Center Tributary Channel located incorporated with the Solace site is undeveloped, as compared to the majority of channels in the basin which have had some improvement. Downstream and upstream sections of the Sand Creek Center Tributary Channel are concrete lined. The secondary Drainageway located in Paonia Street flows south from Omaha Blvd to the Solace Apartments site where flow splits between an existing concrete channel running east to the main Sand Creek Center Tributary Channel, and a swale flowing south where it eventually rejoins the main channel at the Galley Road crossing. It is anticipated that the concrete channel will divert 42 cfs from the 217cfs present in the secondary drainageway, with 175 cfs flowing south down the existing swale. There is also an existing channel coming from Valley Road to the east. This channel intersects the main channel approximate halfway between the north and south limits of the site, adding 63 cfs to the main channel, as discussed in the Channel Flows section above. In its existing conditions, the Sand Creek Center Tributary Channel FEMA firm panel 08041C0752G, depicts 100 year flooding extending into the adjacent properties to the east and onto Paonia Street improvements to the west. The existing channel currently overtops the Galley Road crossing; primarily due to the capacity of the culverts at the crossing rather than the channel's current conditions.

## **Proposed Channel Improvements**

As determined by the Sand Creek Drainage Basin Planning Study (DBPS) & and JR Engineering Sand Creek – Center Tributary Channel Analysis for Solace Apartments, this section of the Sand Creek Center Tributary will require improvements to ensure adequate capacity in the channel and protection against erosive velocities. In order to be consistent with improvements already made in the surrounding area and to align with the recommendations made by the DBPS, JR Engineering is proposing concrete lining of the channel along the Solace site, along with widening of the existing channel and modification to the channel alignment in this area. JR Engineering is also proposing the addition of a USBR Type III Stilling Basin and 10 foot sloped concrete drop in the channel, in order to force a hydraulic jump in the channel and reduce velocities present in the channel while still matching existing grades for the majority of channel alignment. The design methodology of the sloped drop and USBR Type III Stilling Basin are based on the design procedure for Stilling Basins presented in the Federal Highway Administrations Hydraulic Engineering Circular No. 14, Chapter 8. Calculation for stilling basin and accessories sizing can be found in the Appendix of this letter. The proposed channel section shall be a trapezoidal channel section with a 10' bottom width, with a minimum channel depth of 6.5' and side slopes varying from 3:1 to 2:1 along the channel's alignment. The channel shall be lined with concrete for a depth of 4.5' to protect the channel from the erosive velocities present in the channel, with an average depth of flow in a 100 year event for the proposed channel being approximately 3' this will provide a freeboard of 1'-1.5' from the top of the concrete lining to the 100 year water surface. The concrete section shall typically be a 6" thick concrete apron for the channel, with sections of the section of channel located within the sloped drop and stilling basin being a 12" thick concrete apron. In accordance with the DBPS the channel shall be designed with a stable slope of 1% for the majority of the channel. For further details please see the Channel Improvement Plans included in the Appendix of this letter. In order to reduce the velocities present in the

	3730 Sinton Road, Suite 219
is needed for freeboard (refer to (	Colorado Springs, CO 80907
DCMV1_Section 10.5.5)and 303	-740-9393 • Fax: 303-721-9019
whether the provided freeboard	www.jrengineering.com
meets the criteria.	

channel and avoid excessively steep slopes for extended portions of the channel's alignment, a 100' long sloped drop structure, with a total vertical drop of 10', will be placed at the upstream end of the channel. At the base of the drop will be a USBR Type III Stilling Basin that will include chute blocks, baffle blocks and a sill wall to decrease the velocity of the water coming down the sloped drop and force a hydraulic jump. This basin will also include a low flow channel through the sill wall located at the through the structure at lower flows and prevent ponding of drop and stilling basin can be found in the channel improver indicate the bypass flow that will enter the two

# Paonia Street Secondary Drainageway Improvements

inlets. Does the roadway have the capacity for this bypass flow? Please address.

Part of the Sand Creek Center Tributary Improvements also includes the addition of a diversion channel that will direct flows present in the Paonia Street Secondary Drainageway into the main channel. This diversion will be known as the Overflow Channel for the remainder of this letter. The Overflow Channel shall be a concrete and riprapped lined channel with varying widths and depths that will convey the flows present in Paonia Street into the main channel. The diversion channel shall be concrete from the edge of Paonia to the right-of-way, after which it will become a riprap trapezoidal channel section with a typical bottom width of 20' and a depth of 2'-3'. The channel will run east from Paonia until it intersects with the proposed Sand Creek Center Tributary Channel alignment, where it will outfall just upstream of the proposed sloped drop in the channel. Just south of the diversion channel and will not be detained by any of the onsite detention ponds. For further detail on the diversion channel and will not be detained by any of the onsite detention ponds. For further detail on the diversion channel please see the channel improvement plans, and for detail on the type R inlets see the exert of the Solace Construction Drawings, both shown in the Appendix of this letter.

# **Modeling Results**

The proposed conditions of the channel and its second Drainageway were modeled using GeoHecRas to determine the extents of the 100 year floodplain for the site. Flow rates from the model were used based on those discussed in the Channel Flows section and Existing Conditions section of this letter. The model was run with downstream boundary conditions for each reach using critical depths, and the entirety of the model was ran using steady flow conditions. The model was contains four separate reaches, with the main reach modeling the proposed alignment and conditions for the Sand Creek Center Tributary Channel. The other reaches modeling the Paonia Street Overflow Channel, the existing concrete overflow channel at Paonia and an existing channel that runs east to west from Valley Street and intersects the Sand Creek Center Tributary Channel, each reach intersection were modeled using the energy equation. The model used manning's values (n) of 0.013 for the concrete lining, 0.033 for the riprap of the overflow channel, and 0.03 for the any location outside of the concrete or riprap extents as they were determined to be most similar to a grassed area with some weeds. The results of the GeoHecRas model show that the proposed improvements to the channel substantially reduce the extents of the flood plain in the channel and contain the 100 year flood plain within the concrete extents of the channel. The results also show a maximum velocity in the channel of 10.32 ft/s in a 100 year event, showing that the concrete lining of the channel will provide sufficient protection from erosive velocities present in the channel. The GeoHecRas model for the proposed conditions also shows overtopping of the channel crossing at Galley Road, which is consistent with the flood data presented by the FEMA FIRM 08041C0752G. Flooding of

> 3730 Sinton Road, Suite 219 Colorado Springs, CO 80907 303-740-9393 • Fax: 303-721-9019 www.jrengineering.com

the roadway is due to the insufficient capacity of the culvert crossing in this area, with the current configuration of three 48" CMP culverts only providing 365 cfs of capacity of the 1,100 cfs flow at the crossing. Flooding of the Galley Road Crossing could be alleviated by upsizing of the culvert(s), these improvements will be necessary when the County deems the historic overtopping of Galley Road to be above acceptable tolerance. *The channel improvements did not results in any change to existing overtopping of Galley Road as this is due to insufficient capacity of the culverts at this crossing, which will ultimately be addressed at a later date.* Further details on the model results can be found in the Appendix.

## Summary

The analysis of the proposed improvements of the Sand Creek Center Tributary Drainageway and its secondary drainageway located in Paonia Street show significant reduction of the flood plain extents, with it now being contained within the channel extents and no longer extensively flooding properties adjacent the proposed Solace Apartment Site. The proposed diversion channel also redirects flow that would otherwise flood the proposed extension of Paonia Street back into the channel, thus alleviating the risk of the roadway flooding in a 100 year event.

Please contact me should you have any questions or concerns regarding this letter at 303-267-6240.

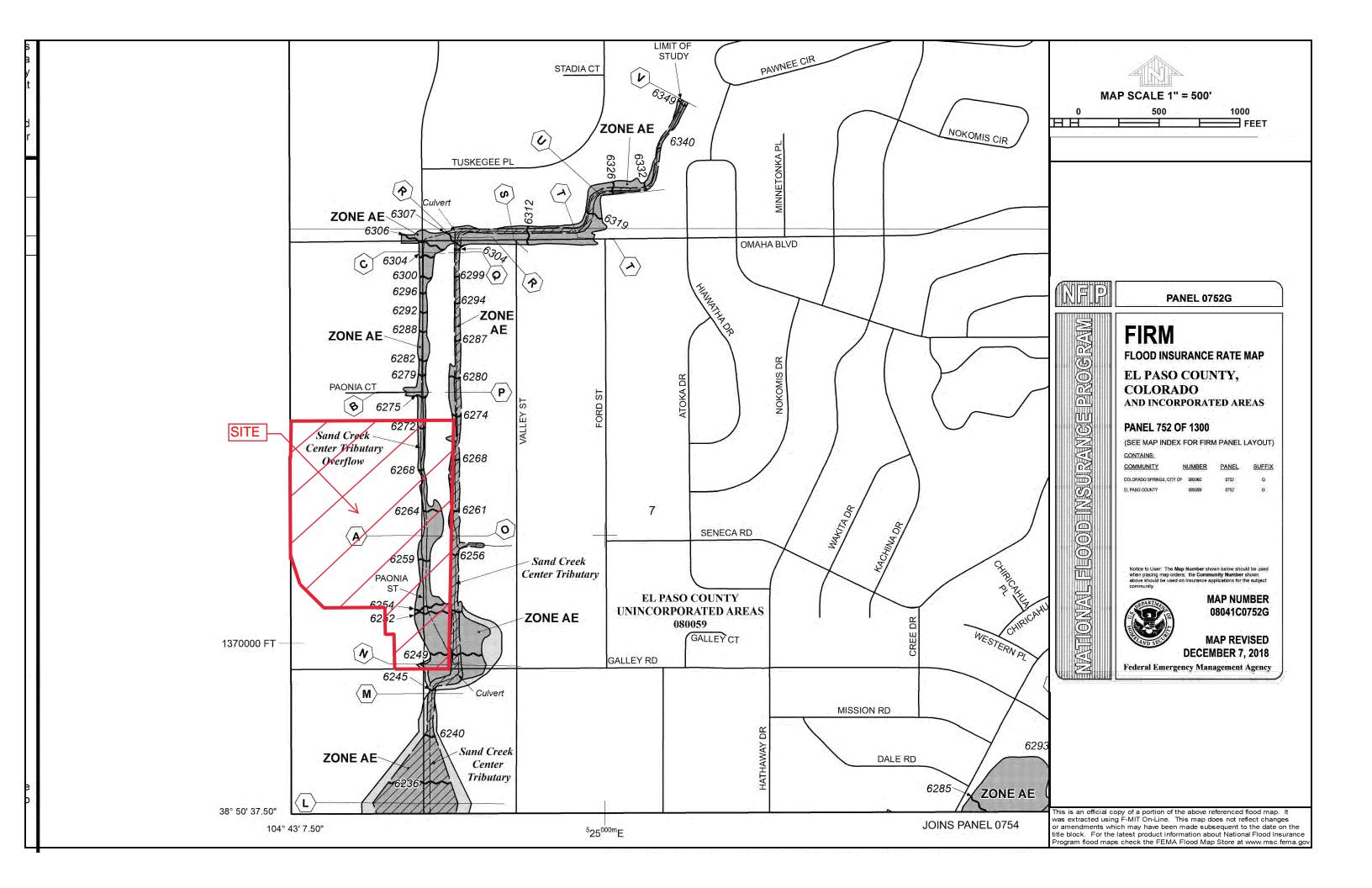
Sincerely, JR ENGINEERING, LLC

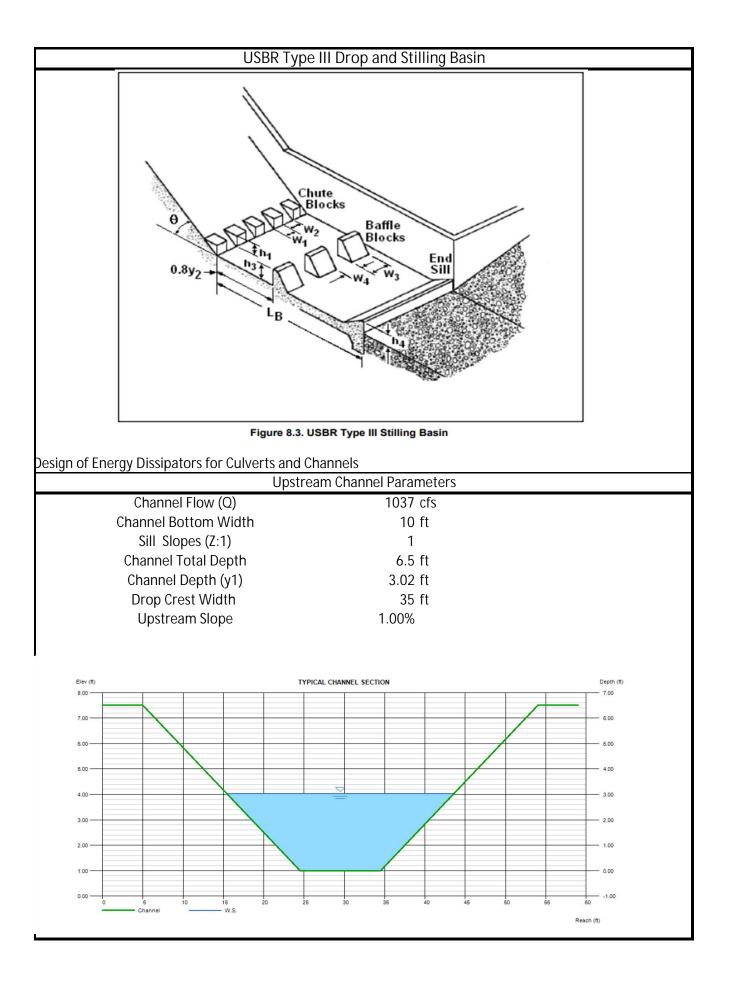
Mike Bunlitt

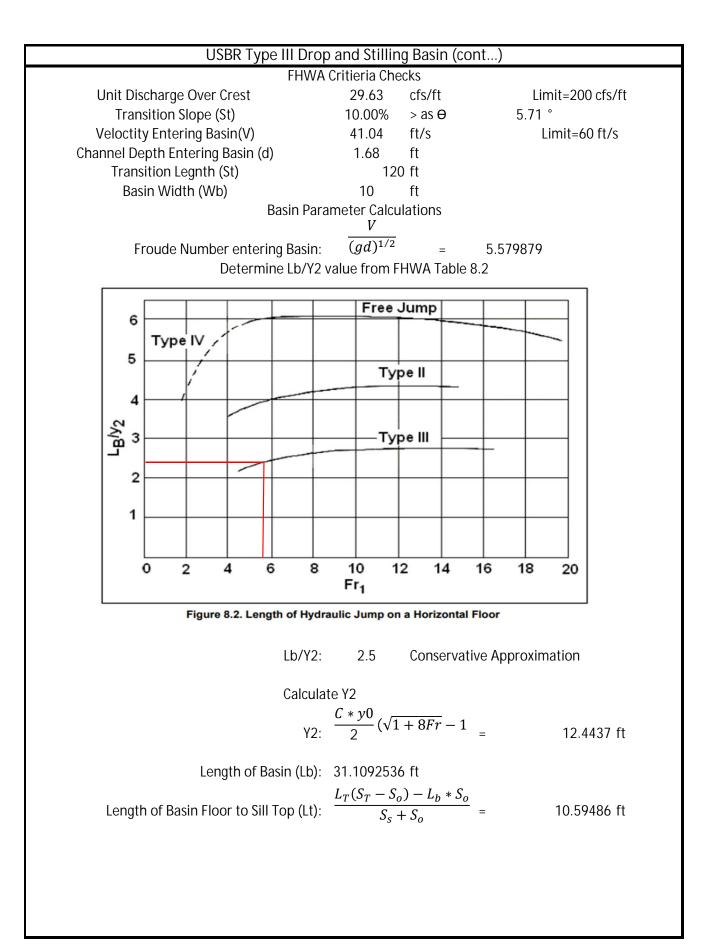
Mike Bramlett, PE JR Engineering

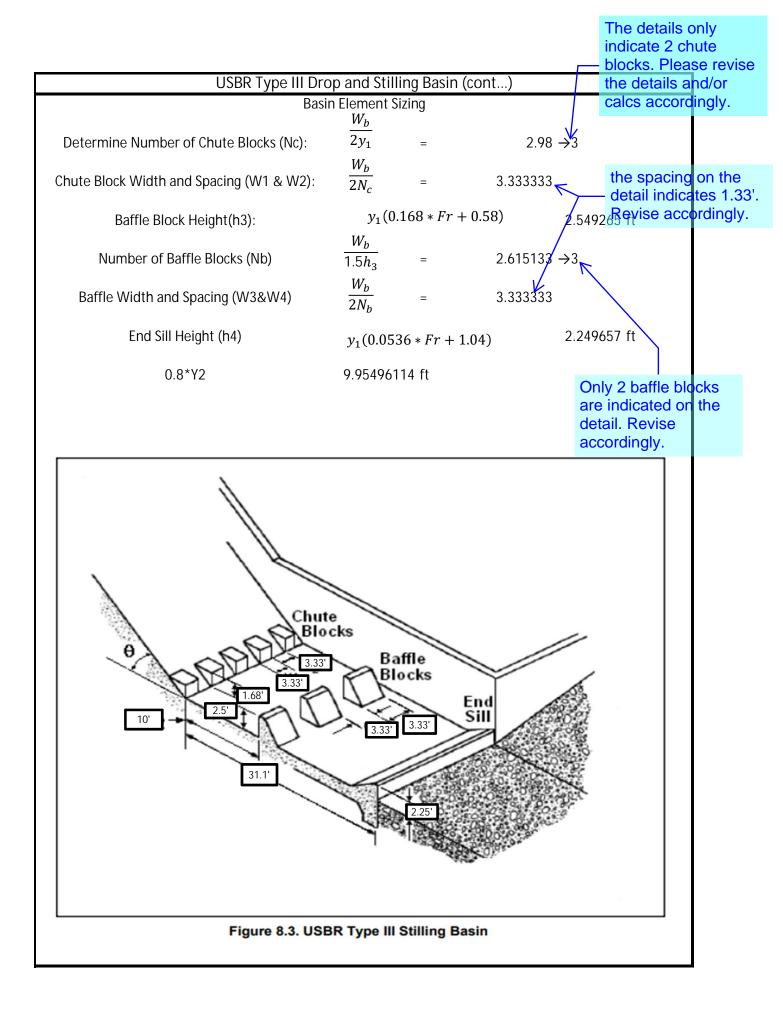
This will be discussed with my manager and/or the County Engineer as to whether any improvements to this crossing are required.

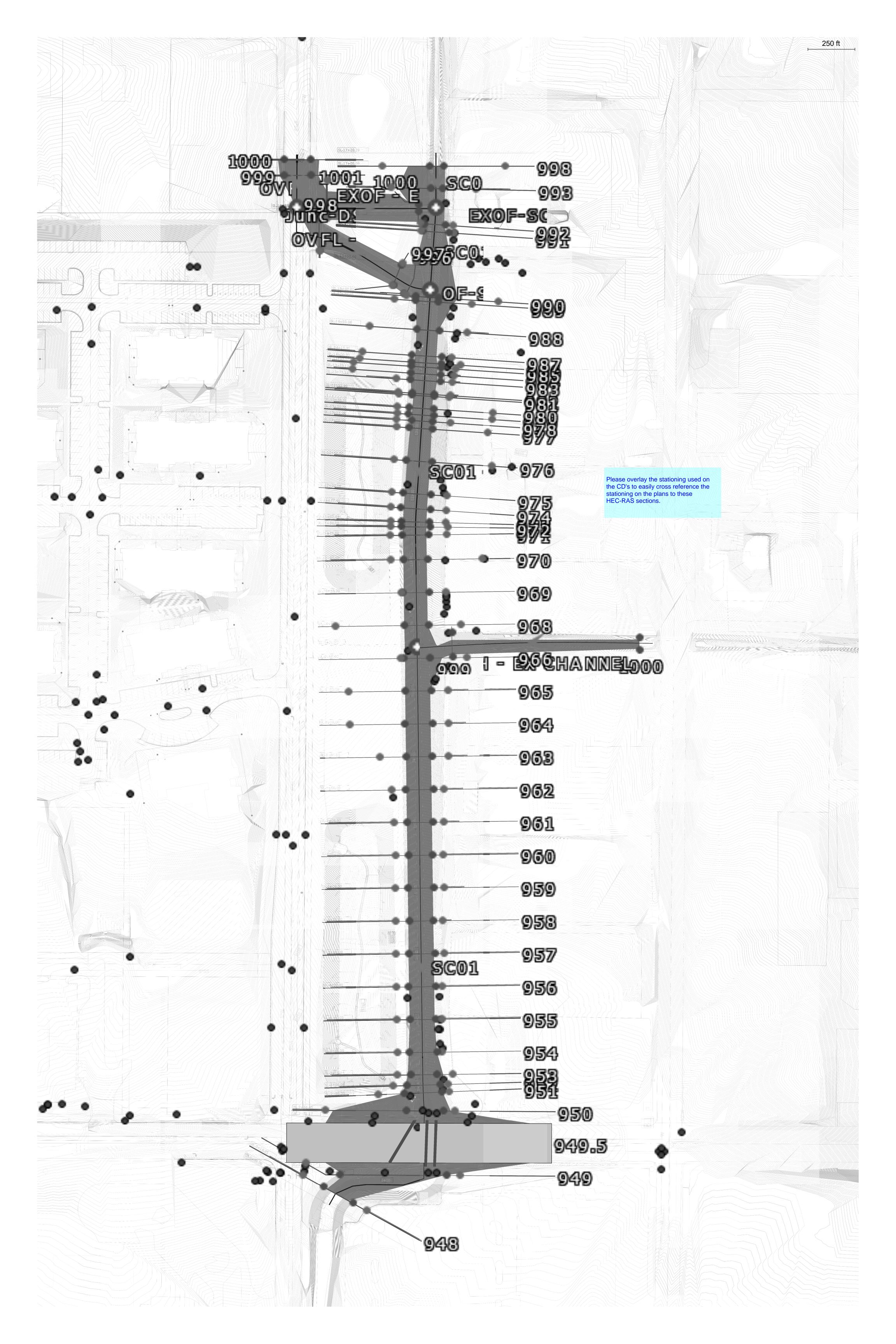
3730 Sinton Road, Suite 219 Colorado Springs, CO 80907 303-740-9393 • Fax: 303-721-9019 www.jrengineering.com

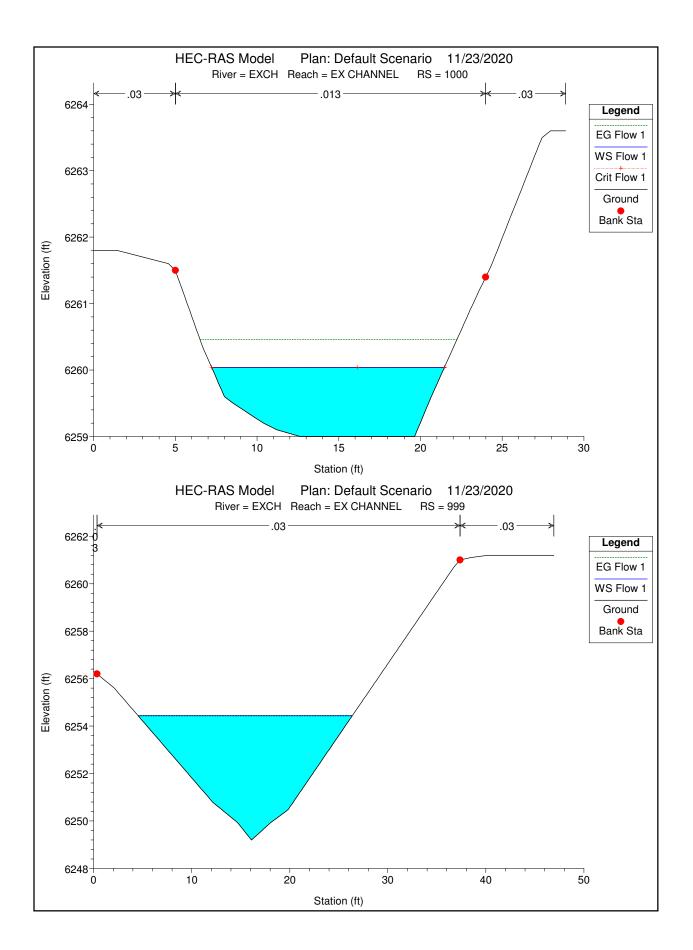


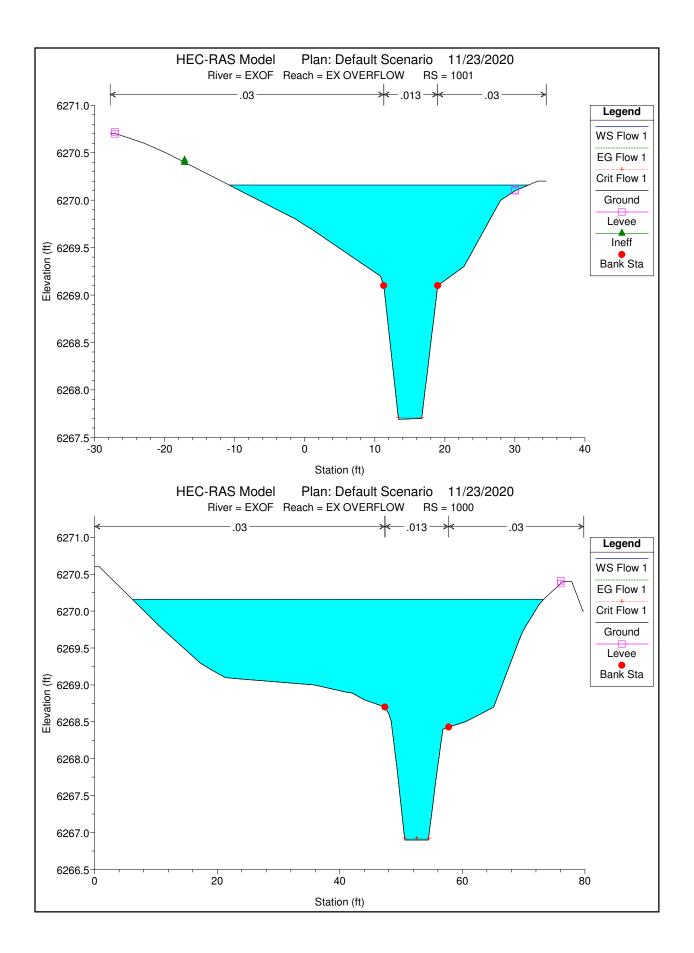


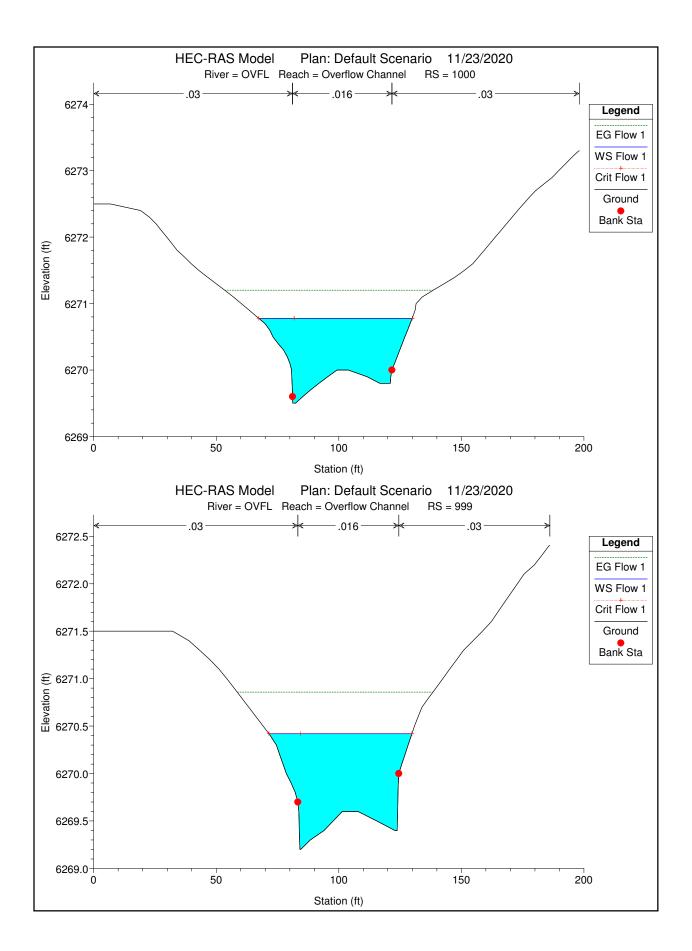


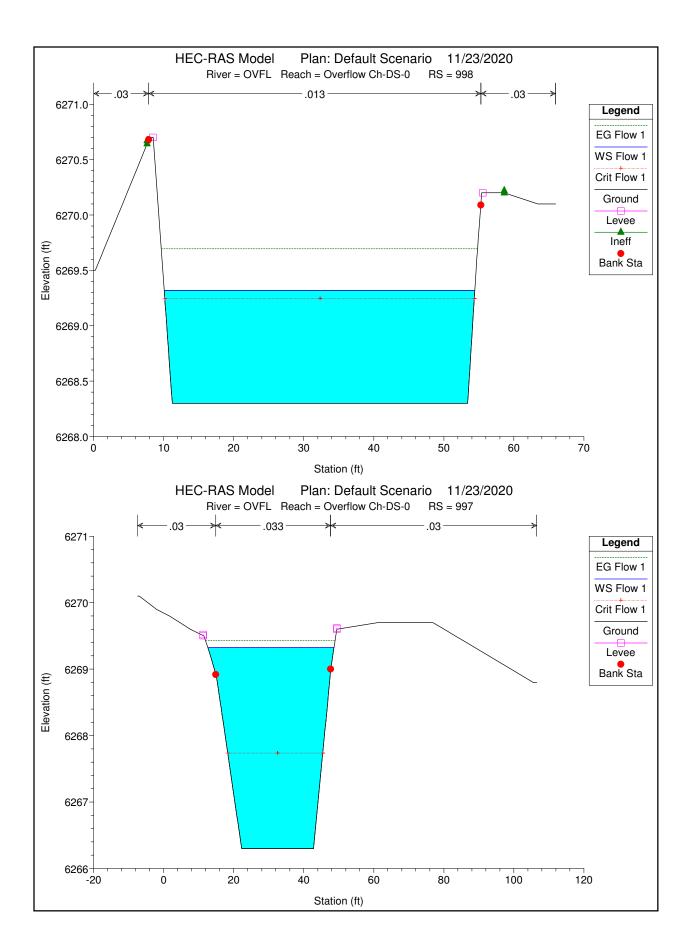


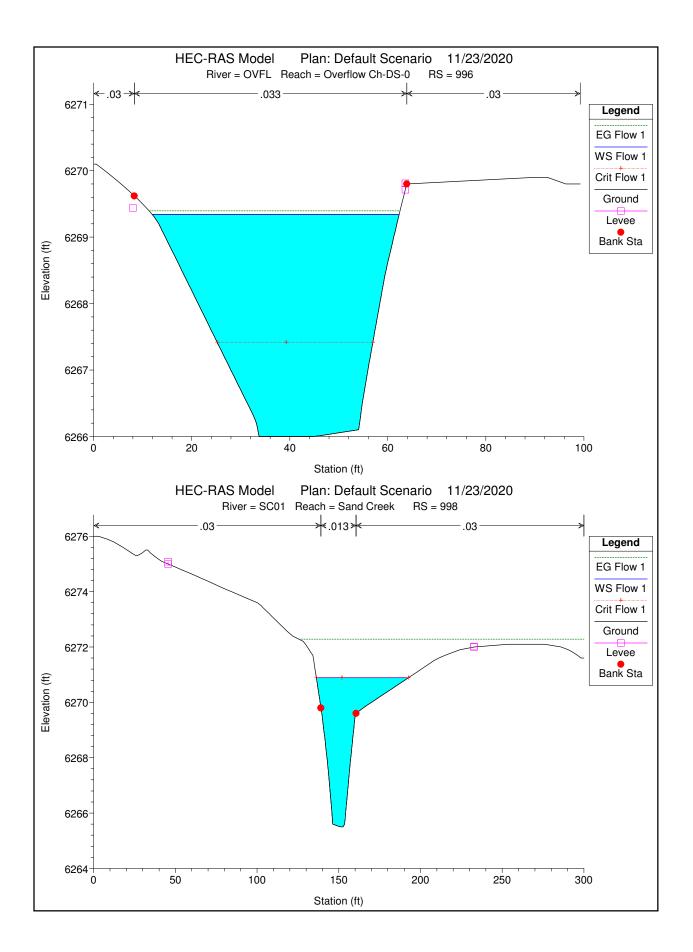


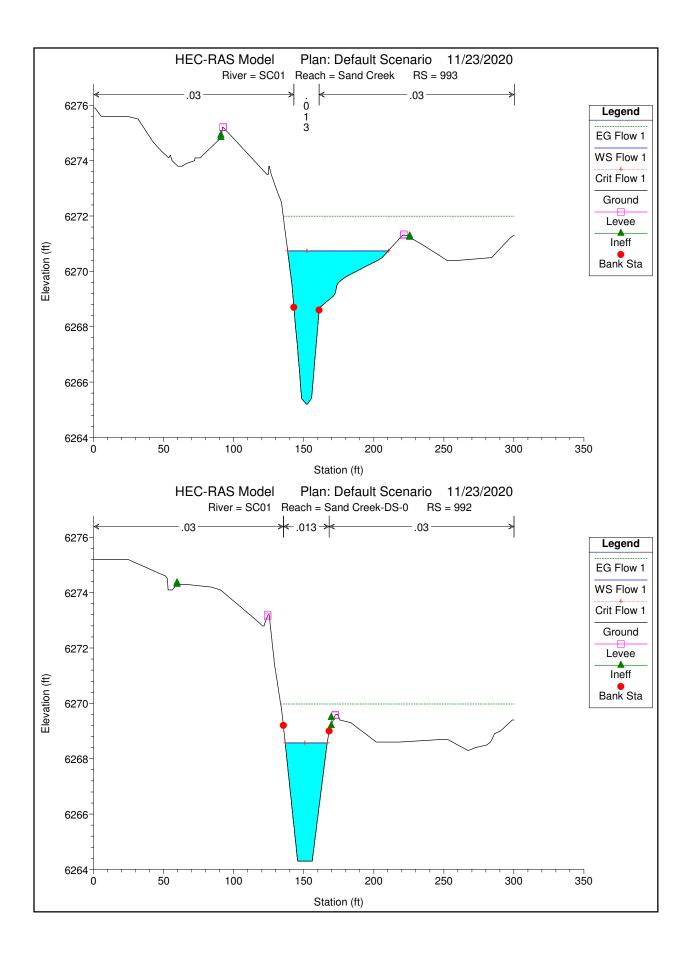


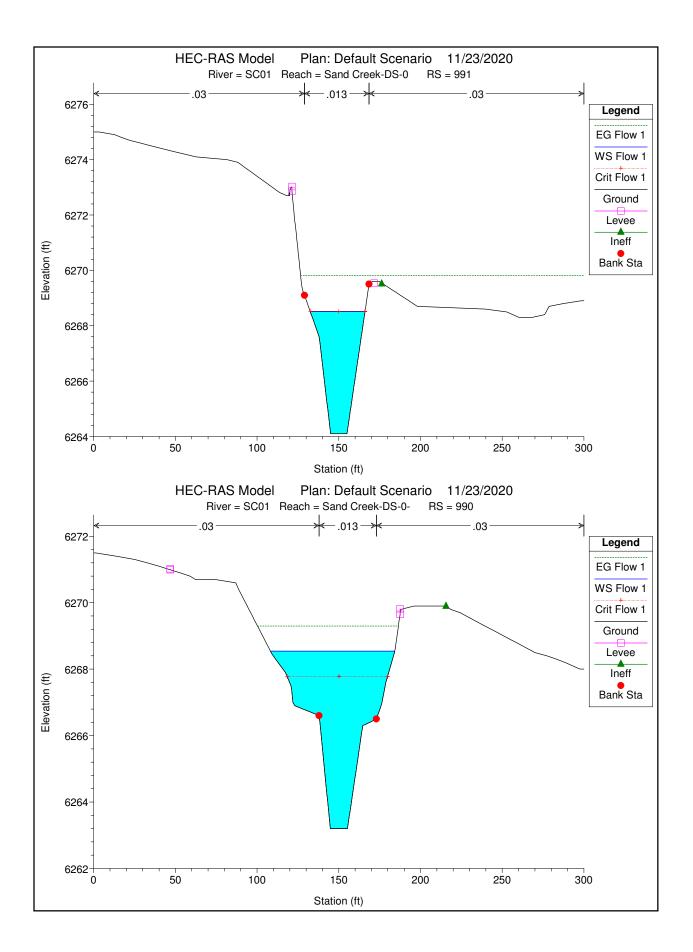


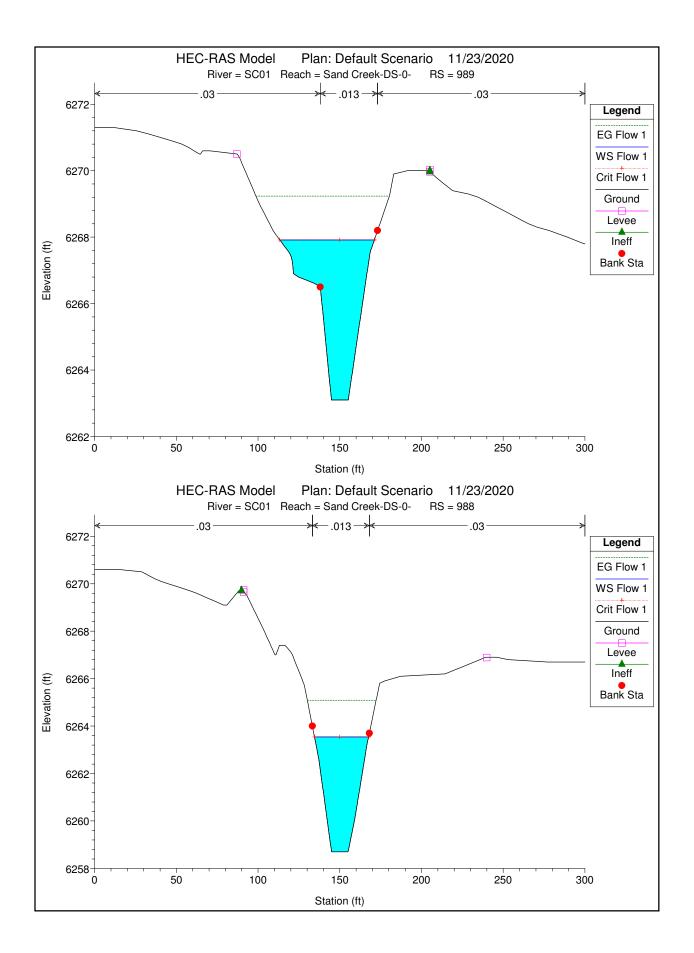


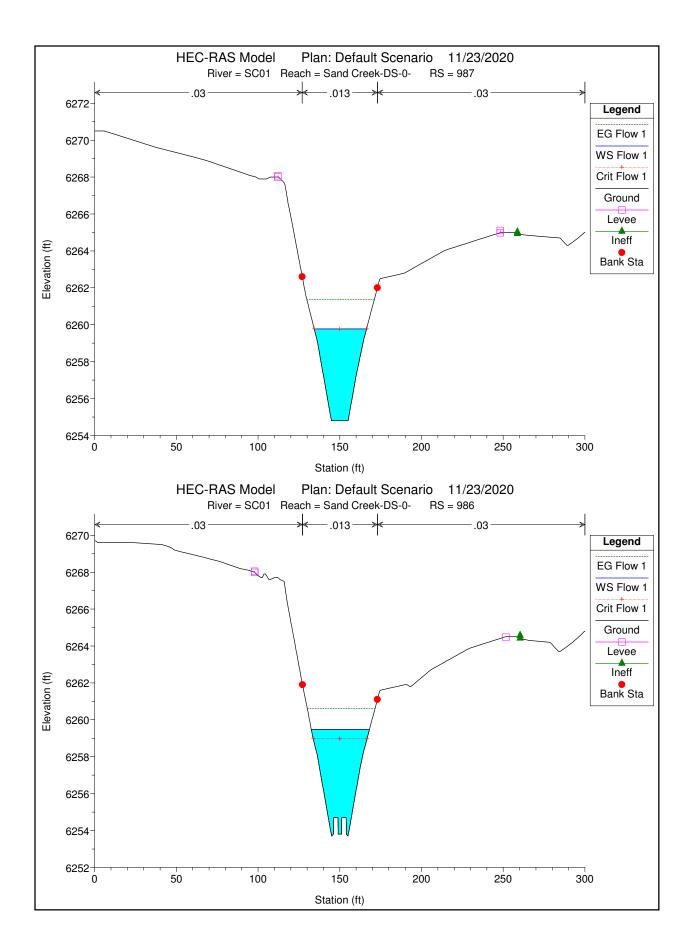


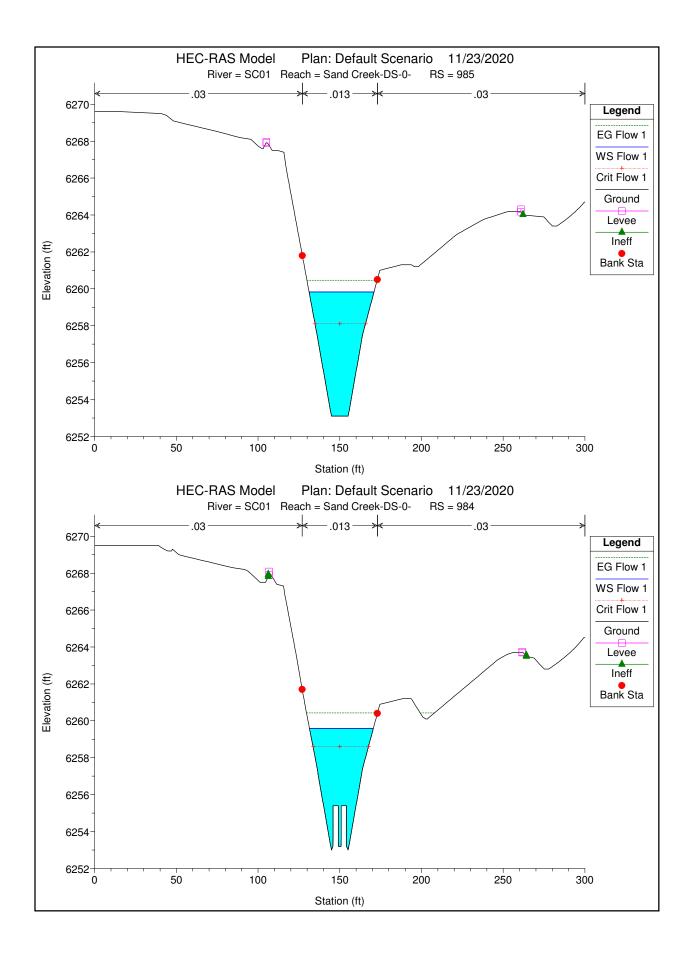


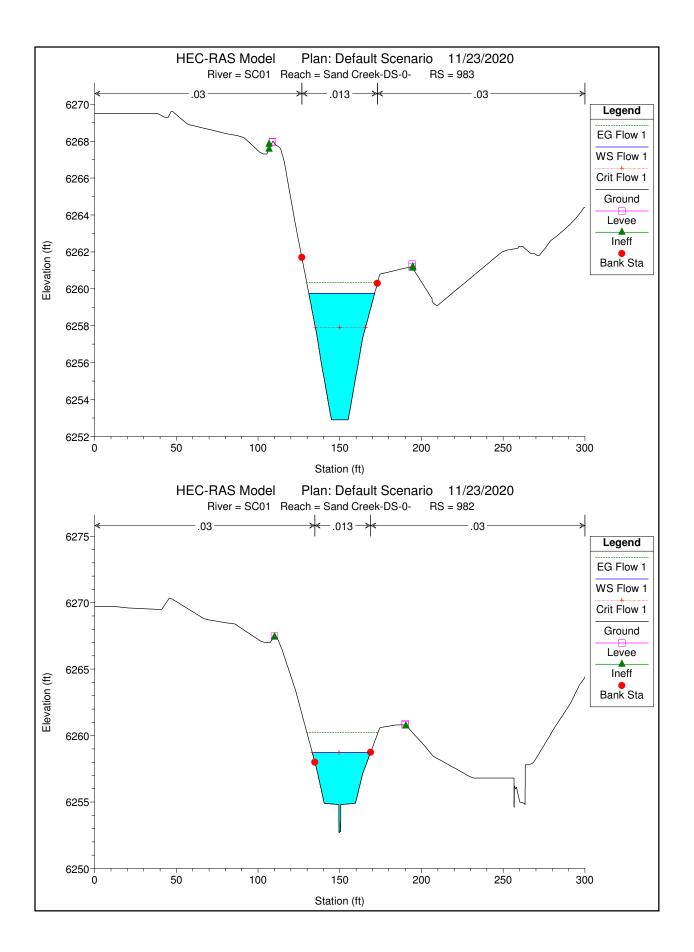


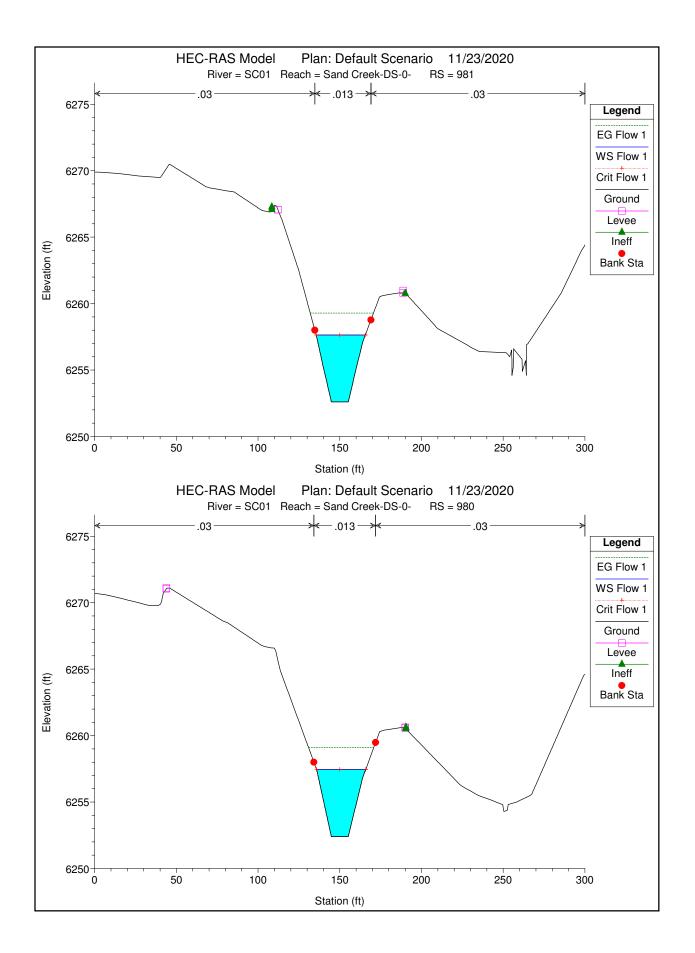


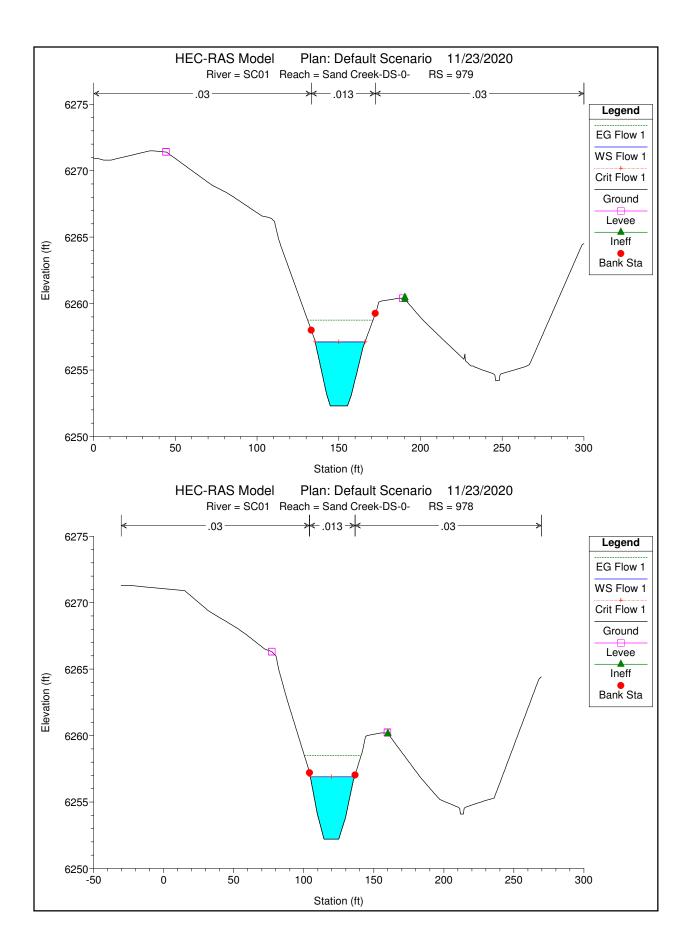


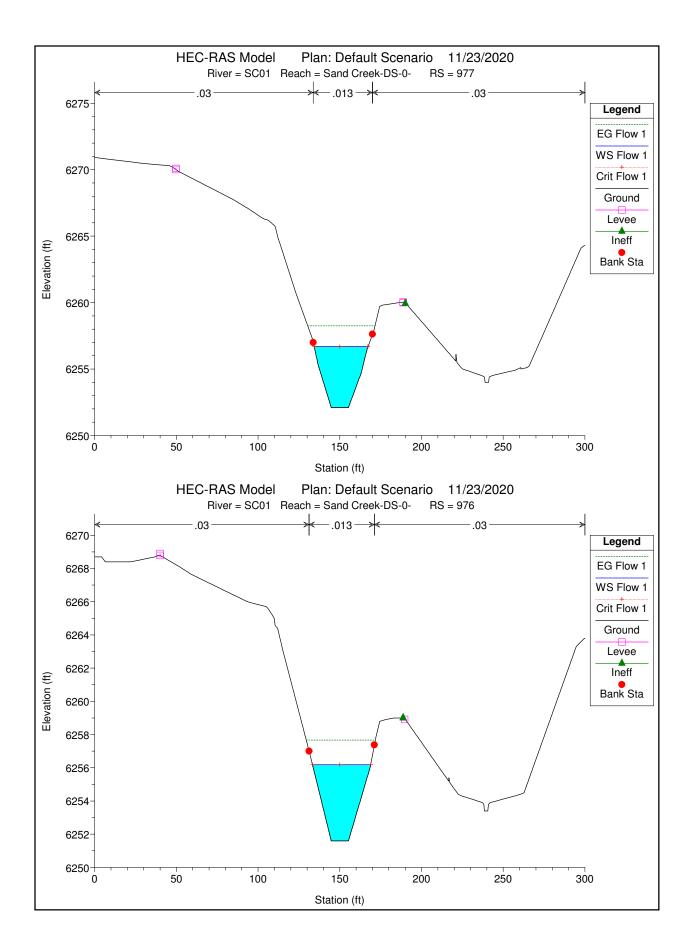


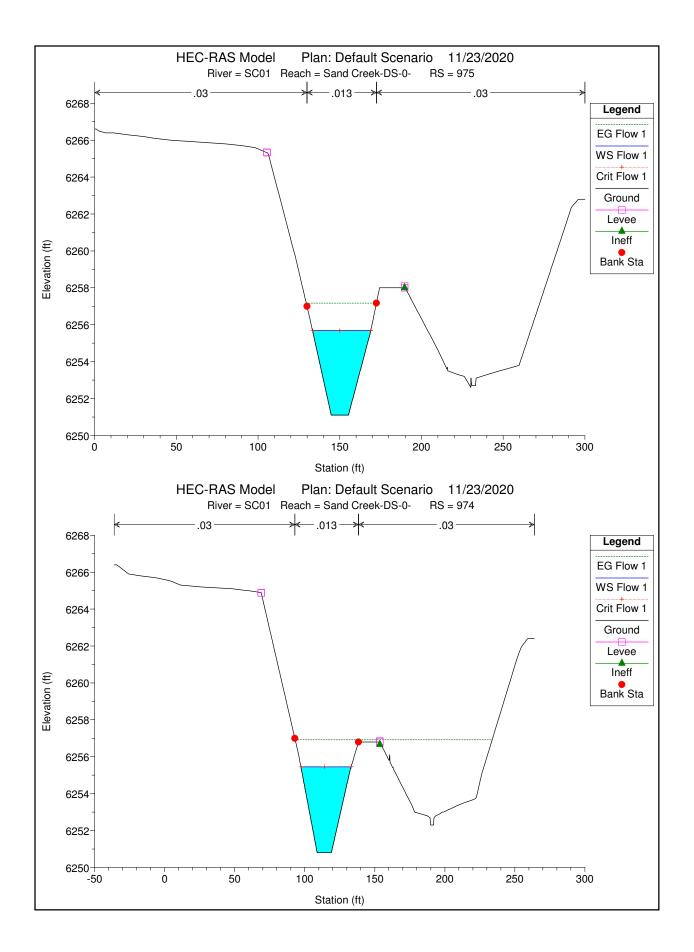


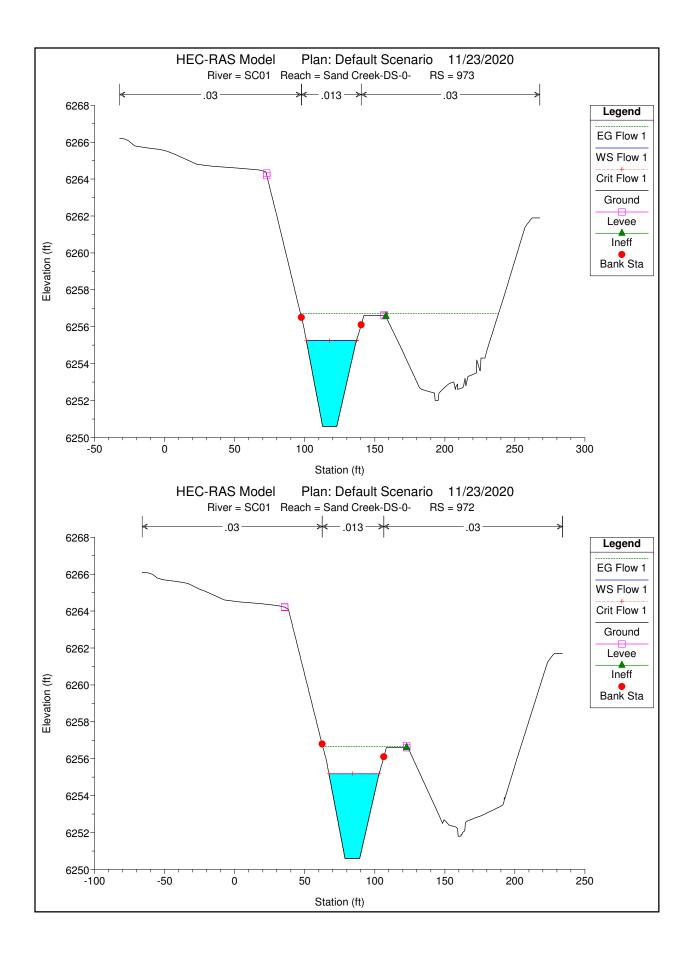


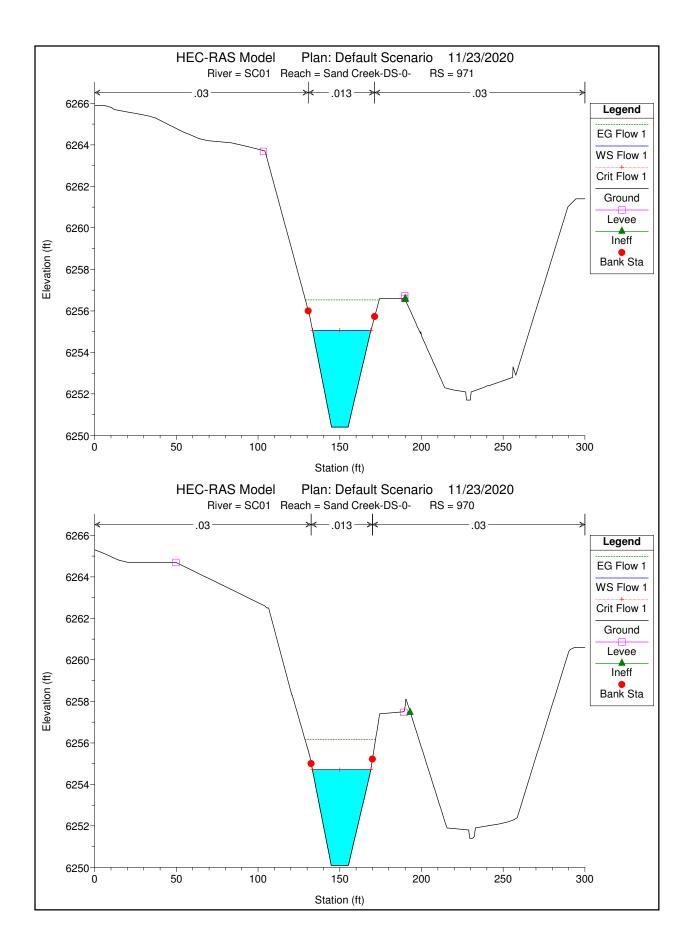


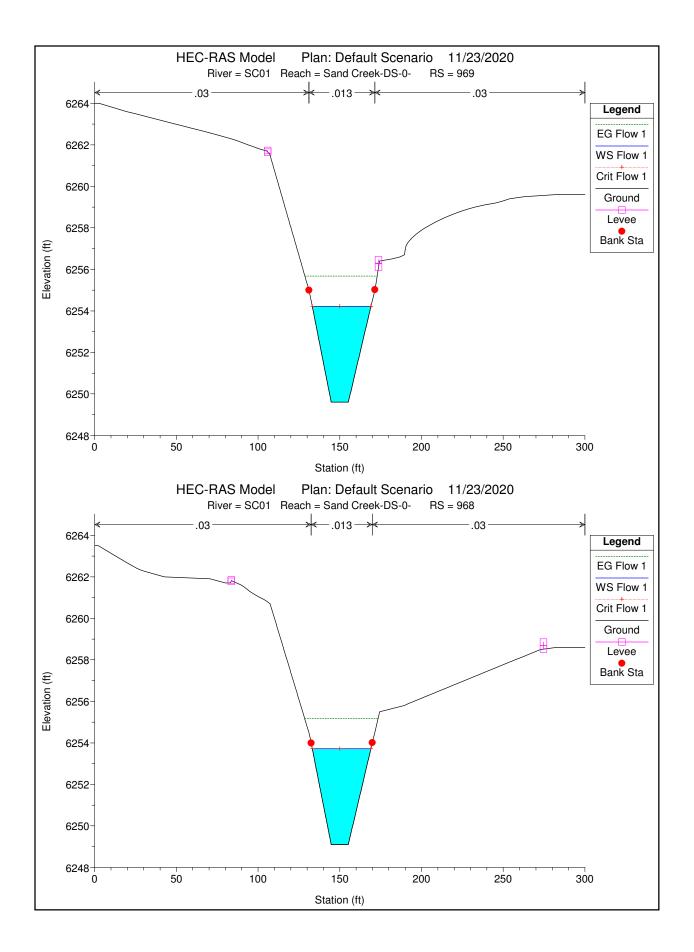


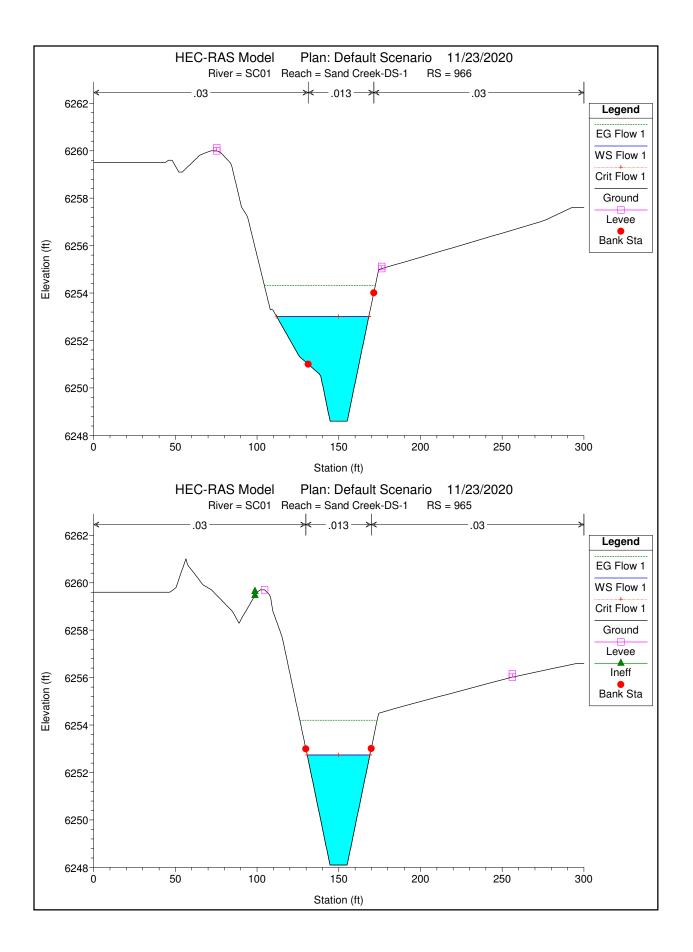


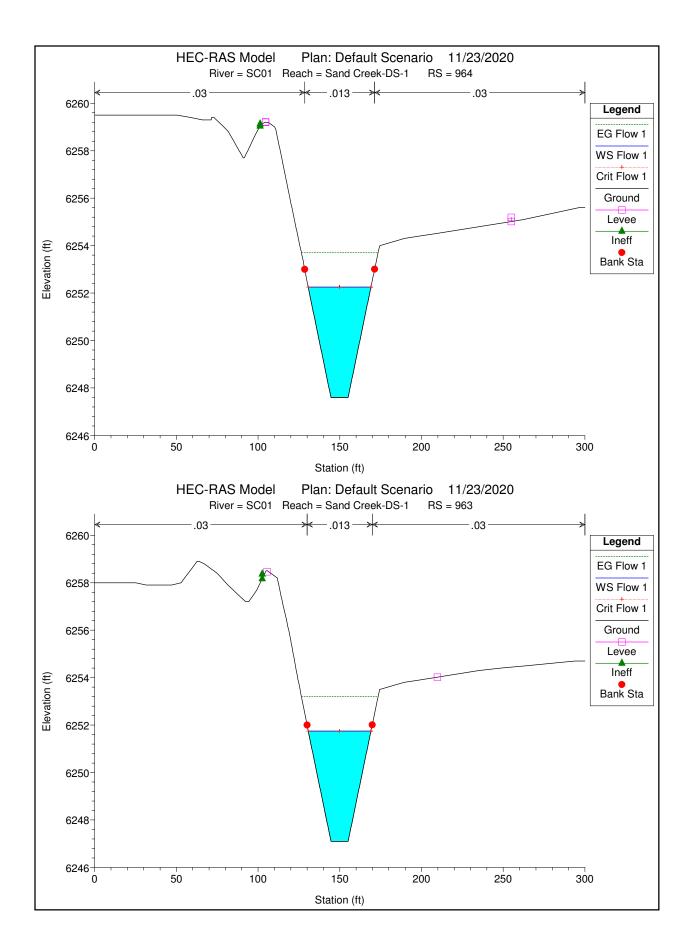


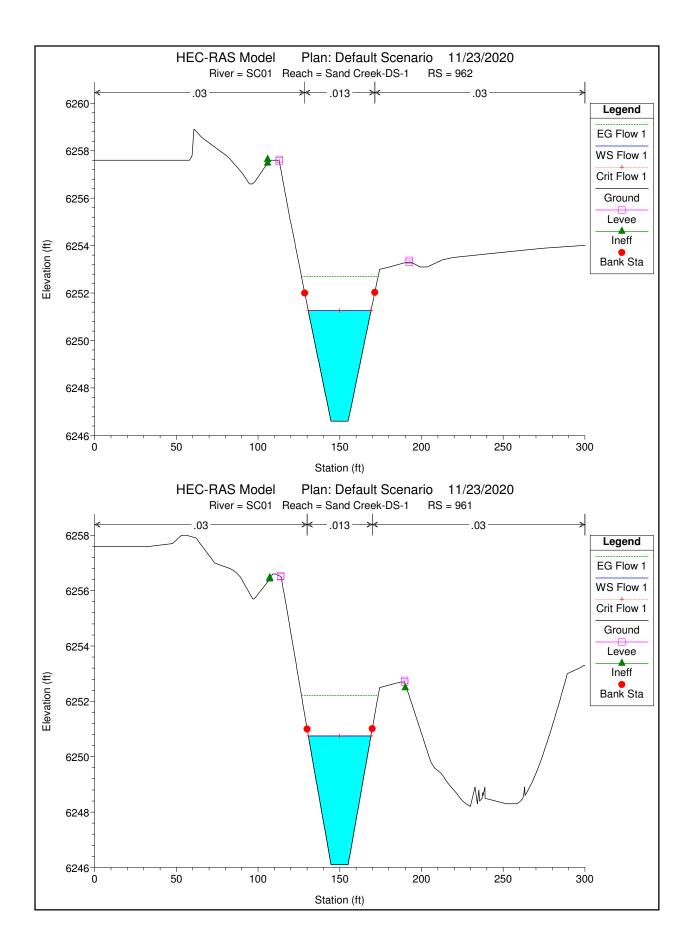


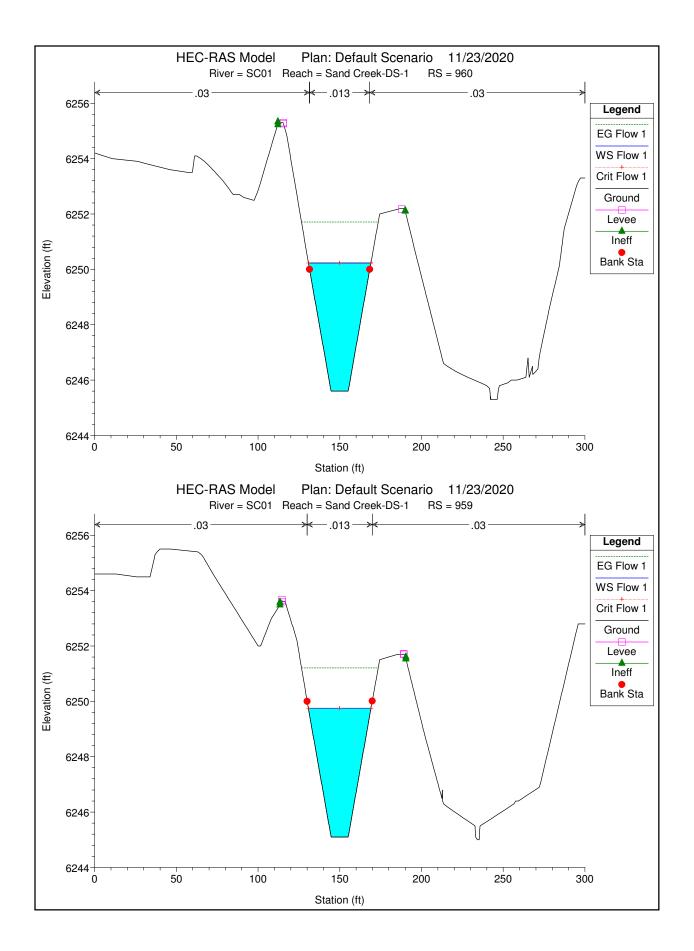


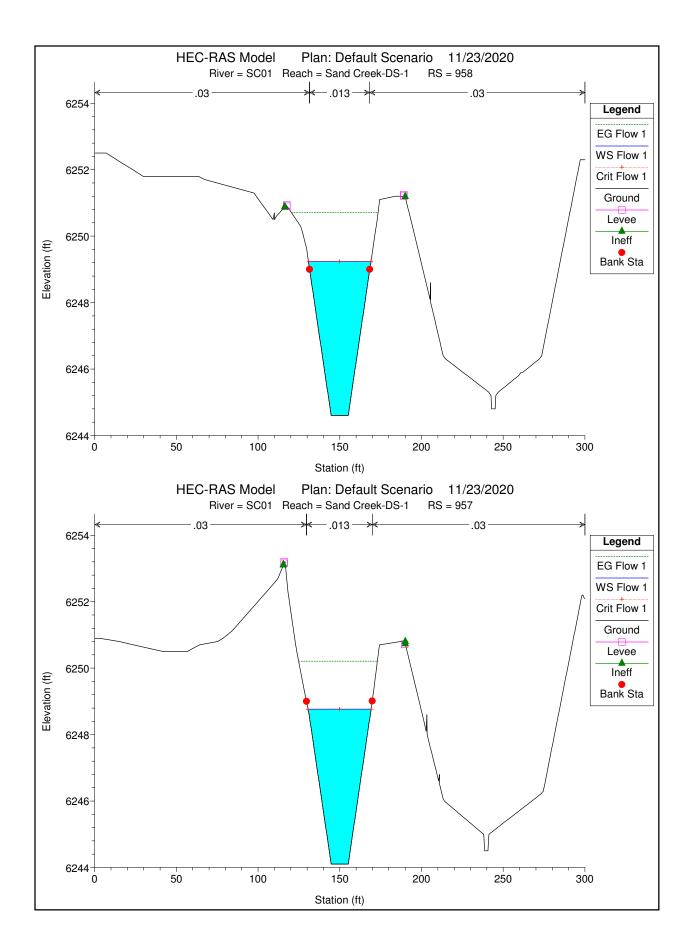


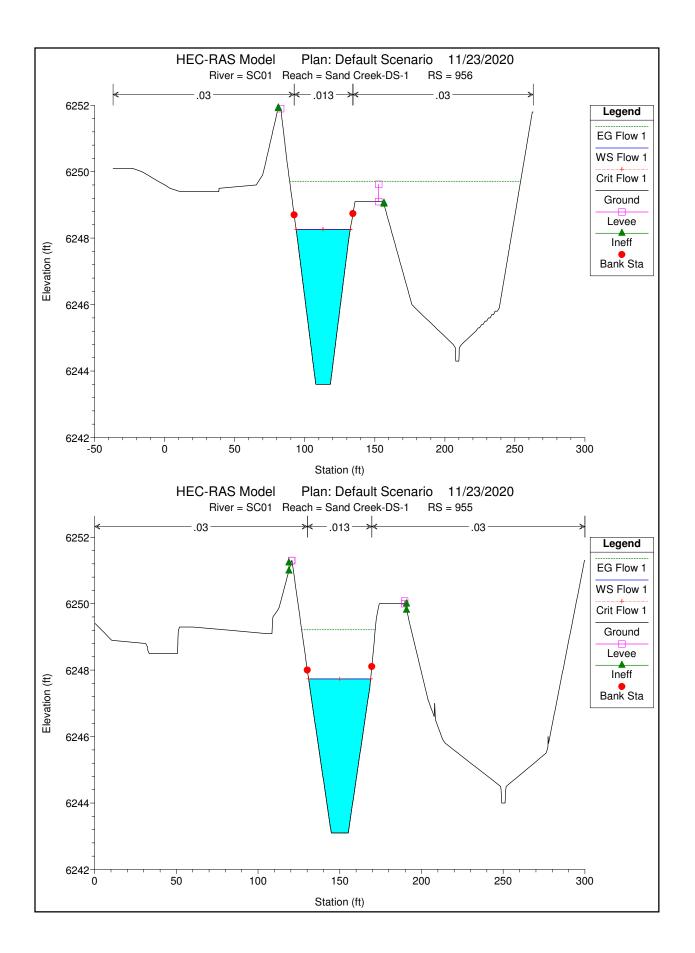


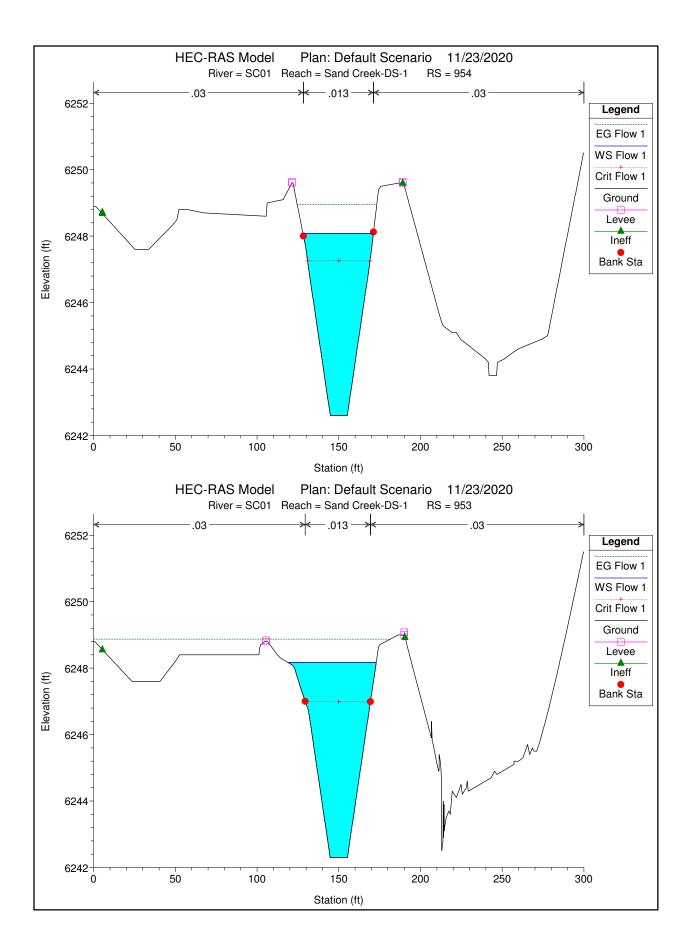


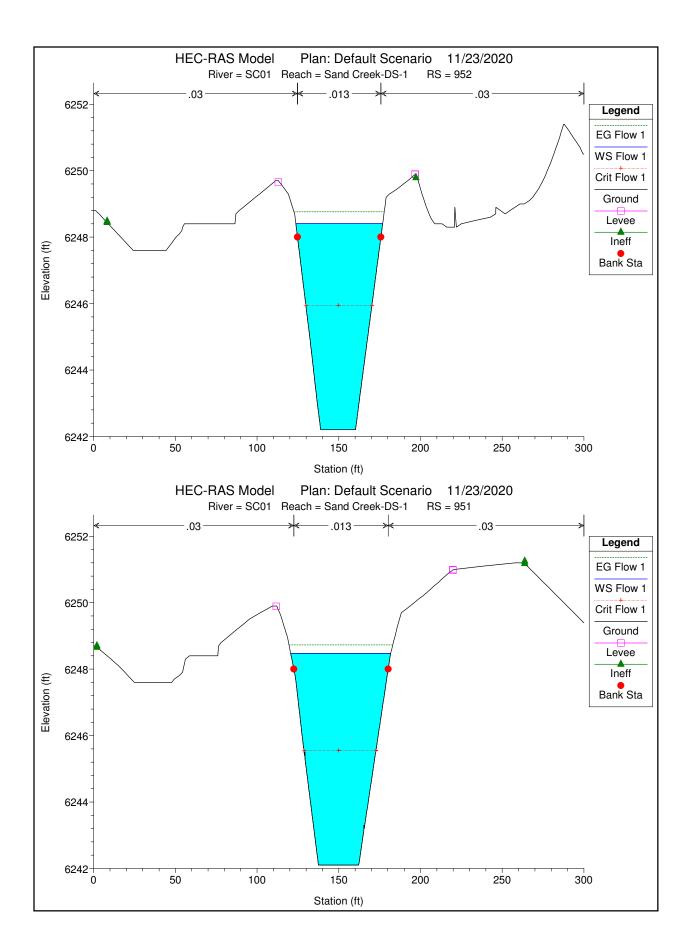


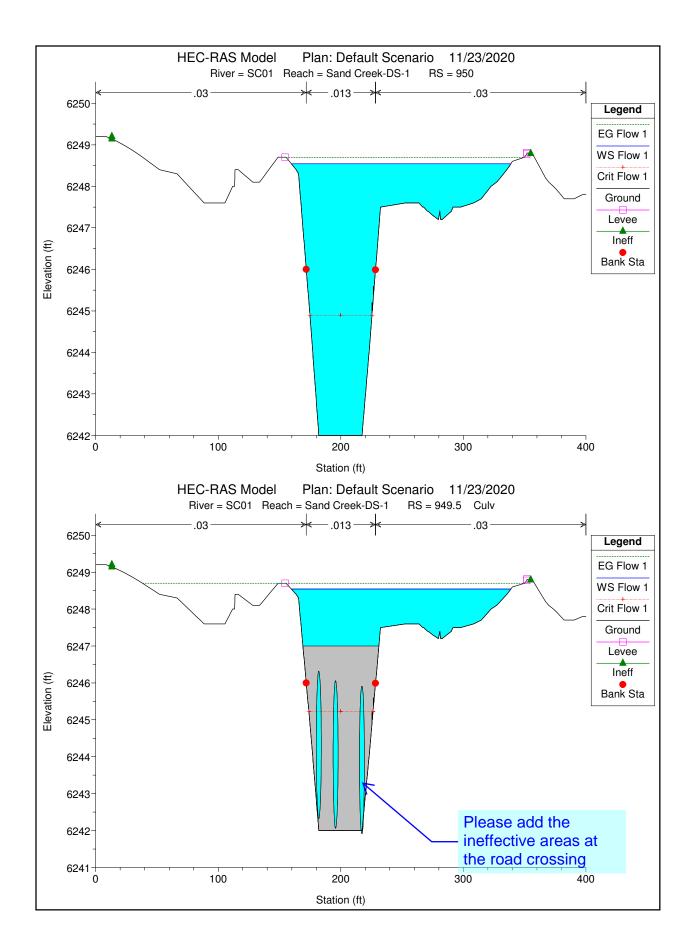


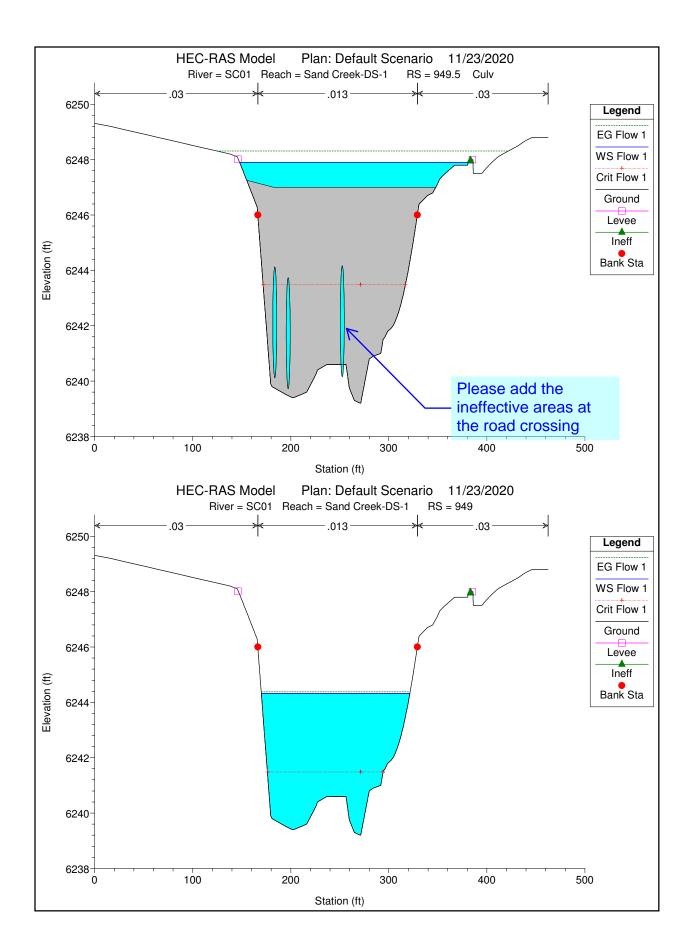


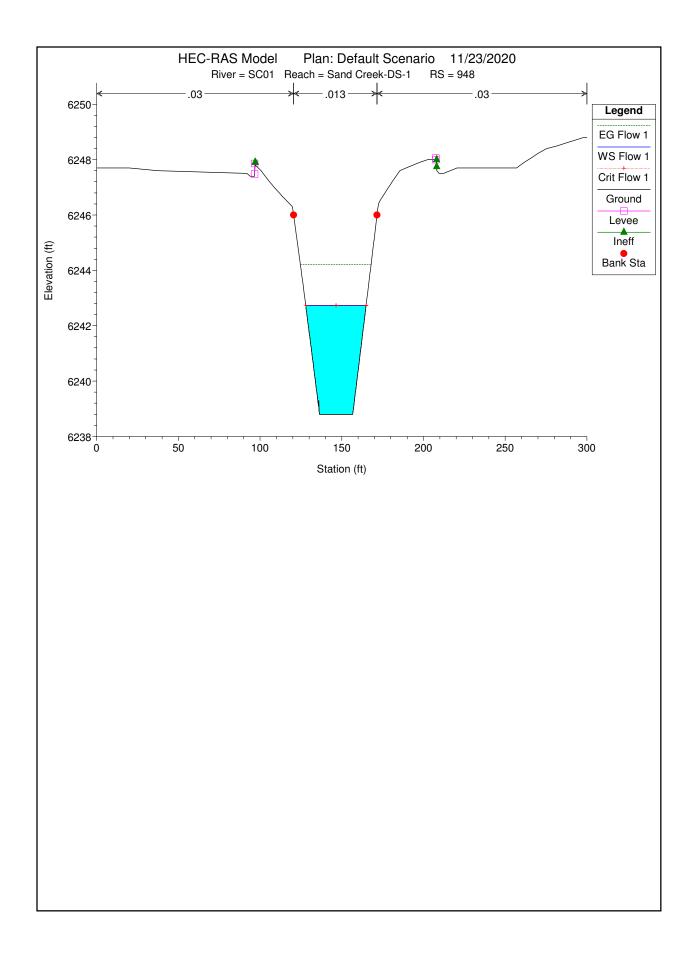












#### please include the table summary for the overflow modeling



IEC-RAS Plan: Default Scenario Profile: Flow 1												
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev			OF	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Sand Creek	998	Flow 1	820.00	6265.50	6270.89	6270.89	6272.28	0.001362	9.64	103.80	56.32	0.8
Sand Creek	993	Flow 1	820.00	6265.20	6270.74	6270.74	6272.00	0.001080	9.43	128.24	71.77	0.
Sand Creek-DS-0	992	Flow 1	820.02	6264.30	6268.57	6268.57	6269.98	0.001829	9.51	86.27	30.02	0.
Sand Creek-DS-0	991	Flow 1	820.02	6264.10	6268.51	6268.51	6269.81	0.001850	9.15	89.57	33.50	0.
Sand Creek-DS-0-	990	Flow 1	1037.00	6263.20	6268.54	6267.78	6269.30	0.000697	7.21	181.85	76.02	0.
Sand Creek-DS-0-	989	Flow 1	1037.00	6263.10	6267.92	6267.92	6269.24	0.001524	9.40	128.51	57.84	0.
Sand Creek-DS-0-	988	Flow 1	1037.00	6258.70	6263.54	6263.54	6265.09	0.001791	9.98	103.92	33.08	0.
Sand Creek-DS-0-	987	Flow 1	1037.00	6254.80	6259.78	6259.78	6261.38	0.001842	10.16	102.05	32.04	1.
Sand Creek-DS-0-	986	Flow 1	1037.00	6253.70	6259.48	6258.97	6260.62	0.001362	8.59	120.68	35.59	0.
Sand Creek-DS-0-	985	Flow 1	1037.00	6253.10	6259.83	6258.11	6260.46	0.000526	6.39	162.41	39.72	0.
Sand Creek-DS-0-	984	Flow 1	1037.00	6253.00	6259.59	6258.60	6260.43	0.001060	7.37	140.67	39.07	0.
Sand Creek-DS-0-	983	Flow 1	1037.00	6252.90	6259.75	6257.91	6260.35	0.000491	6.22	166.73	40.29	0.
Sand Creek-DS-0-	982	Flow 1	1037.00	6252.70	6258.72	6258.72	6260.24	0.002055	9.91	105.15	35.64	1.
Sand Creek-DS-0-	981	Flow 1	1037.00	6252.60	6257.64	6257.64	6259.29	0.001815	10.32	100.46	30.11	1.
Sand Creek-DS-0-	980	Flow 1	1037.00	6252.40	6257.46	6257.46	6259.10	0.001807	10.30	100.70	30.18	0.
Sand Creek-DS-0-	979	Flow 1	1037.00	6252.30	6257.12	6257.12	6258.76	0.001808	10.28	100.87	30.54	1.
Sand Creek-DS-0-	978	Flow 1	1037.00	6252.20	6256.90	6256.90	6258.49	0.001775	10.13	102.38	31.51	0.1
Sand Creek-DS-0-	977	Flow 1	1037.00	6252.10	6256.69	6256.69	6258.25	0.001800	10.03	102.00	32.94	1.
Sand Creek-DS-0-	976	Flow 1	1037.00	6251.60	6256.19	6256.19	6257.67	0.001803	9.76	106.20	35.57	1.
Sand Creek-DS-0-	975	Flow 1	1037.00	6251.10	6255.68	6255.68	6257.17	0.001823	9.79	105.88	35.61	1.
Sand Creek-DS-0-	974	Flow 1	1037.00	6250.80	6255.45	6255.45	6256.92	0.001804	9.74	106.50	35.84	1.
Sand Creek-DS-0-	973	Flow 1	1037.00	6250.60	6255.25	6255.25	6256.72	0.001805	9.74	106.46	35.84	1.
Sand Creek-DS-0-	972	Flow 1	1037.00	6250.60	6255.19	6255.19	6256.67	0.001830	9.78	106.04	35.87	1.
Sand Creek-DS-0-	971	Flow 1	1037.00	6250.40	6255.06	6255.06	6256.53	0.001787	9.71	106.75	35.79	0.
Sand Creek-DS-0-	970	Flow 1	1037.00	6250.10	6254.71	6254.71	6256.17	0.001777	9.71	106.85	35.74	0.
Sand Creek-DS-0-	969	Flow 1	1037.00	6249.60	6254.22	6254.22	6255.68	0.001780	9.69	106.96	35.89	0.
Sand Creek-DS-0-	968	Flow 1	1037.00	6249.10	6253.72	6253.72	6255.18	0.001784	9.71	106.85	35.86	0.
Sand Creek-DS-1	966	Flow 1	1100.00	6248.60	6253.01	6253.01	6254.32	0.001599	9.39	133.91	56.36	0.
Sand Creek-DS-1	965	Flow 1	1100.00	6248.10	6252.74	6252.74	6254.20	0.001793	9.71	113.30	38.38	1.
Sand Creek-DS-1	964	Flow 1	1100.00	6247.60	6252.25	6252.25	6253.70	0.001768	9.67	113.80	38.39	0.1
Sand Creek-DS-1	963	Flow 1	1100.00	6247.10	6252.25	6251.75	6253.21	0.001781	9.69	113.49	38.34	0.
Sand Creek-DS-1	962	Flow 1	1100.00	6246.60	6251.75	6251.26	6252.71	0.001765	9.66	113.49	38.40	0.
Sand Creek-DS-1	961	Flow 1	1100.00	6246.10	6250.75	6250.75	6252.21	0.001780	9.69	113.51	38.34	0.9
Sand Creek-DS-1	960	Flow 1	1100.00	6245.60	6250.75	6250.23	6252.21	0.001780	9.09	112.70	38.20	0.
Sand Creek-DS-1	959	Flow 1	1100.00	6245.60	6250.23	6249.75	6251.71	0.001736	9.77	112.70	38.33	0.
Sand Creek-DS-1	959	Flow 1	1100.00	6245.10	6249.75	6249.75	6251.21	0.001779	9.69	113.53	38.20	0.
Sand Creek-DS-1	957	Flow 1	1100.00	6244.00	6249.23	6249.23	6250.21	0.001730	9.78	112.00	38.65	0.
Sand Creek-DS-1	956	Flow 1	1100.00	6243.60	6248.26	6248.26	6249.71	0.001773	9.66	113.88	38.69	0.
Sand Creek-DS-1	955	Flow 1	1100.00	6243.60	6246.26	6246.26	6249.71	0.001781	9.66	112.83	36.69	1.
Sand Creek-DS-1	955		1100.00	6243.10	6247.74	6247.74	6249.22	0.001796	9.75	146.77	43.06	0.
		Flow 1										
Sand Creek-DS-1	953	Flow 1	1100.00	6242.30	6248.17	6246.98	6248.87	0.000558	6.73	169.62	54.05	0.
Sand Creek-DS-1	952	Flow 1	1100.00	6242.20	6248.41	6245.95	6248.76	0.000247	4.77	230.80	53.15	0.
Sand Creek-DS-1	951	Flow 1	1100.00	6242.10	6248.47	6245.55	6248.73	0.000171	4.07	270.88	61.19	0.
Sand Creek-DS-1	950	Flow 1	1100.00	6242.00	6248.54	6244.90	6248.70	0.000080	3.21	440.74	179.09	0.
Sand Creek-DS-1	949.5	<b>E</b> 1 4	Culvert					0.0005		550.15		
Sand Creek-DS-1	949	Flow 1	1100.00	6239.20	6244.32	6241.48	6244.38	0.000053	1.97	558.40	151.48	0.
Sand Creek-DS-1	948	Flow 1	1100.00	6238.80	6242.73	6242.73	6244.22	0.001785	9.79	112.41	36.93	0.9

Provide the HECRAS Profile.

Please provide input/output data. Additionally we request that an electronic copy of the HEC modeling be provided. The electronic file may be sent via email.

### ABBREVIATIONS

AD AH ARCH	ACRE ALGEBRAIC DIFFERENCE AHEAD ARCHITECT AMERICAN SOCIETY OF CIVIL	FL FL FC FL
BB BK BNDY	AVENUE BOX BASE BACK BOUNDARY	FL FI GI GI GI
BOV BFV BLVD BW C&G	BOTTOM OF PIPE BLOW OFF VALVE BUTTERFLY VALVE BOULEVARD BOTTOM OF WALL CURB & GUTTER CABLE TELEVISION CATCH BASIN	GL GF H( HI HI
CBC	CONCRETE BOX CULVERT COLORADO DEPARTMENT OF TRANSPORTATION	H ( H f
CDS CFS CL CLOMR	CUL-DE-SAC CUBIC FEET PER SECOND CENTER LINE CONDITIONAL LETTER OF MAP REVISION	IE IN IN
CR CSP	CLEAR CORRUGATED METAL PIPE CLEAN OUT CONCRETE CIRCLE CORRUGATED STEEL PIPE	LE LF LN LC LF
CT CTRB	COURT CONCRETE THRUST REDUCER BLOCK	LT M. MI
CY DBPS	CUBIC YARD	MI
	DRAINAGE EASEMENT DIAMETER	N N
DIP DR DRC DU E EA	DUCTILE IRON PIPE DRIVE DESIGN REVIEW COMMITTEE DWELLING UNITS EAST EACH	01 01 01 01 01 01 01
EGL EL ELEC	ENERGY GRADE LINE ELEVATION ELECTRIC	P( P[
EOA ESMT EST EX	EDGE OF ASPHALT EASEMENT ESTIMATE EXISTING	PE PI Pi

L	PROPERTY LINE
R	PROPOSED
RC	POINT OF REVERSE CURVATURE
T	POINT OF TANGENCY
V VC	PLUG VALVE
СР	RADIUS REINFORCED CONCRETE PIPE
D	ROAD
OW	Right of way
Τ	RIGHT SOUTH
TE	STEEL
AN	SANITARY SEWER
Т	SQUARE FEET STREET
TA	STATION
TM	STORM SEWER
Y	SQUARE YARD
' Y—IN B	SQUARE YARD INCH THRUST BLOCK
BC	TOP BACK OF CURB
BW	TOP BACK OF WALK
EL	TELEPHONE
OA	TOP OF ASPHALT
OB	TOP OF BOX
OC	TOP OF CURB OR CONCRETE
OF	TOP OF FOUNDATION
OP	TOP OF PIPE
W	TOP OF WALL
YP	TYPICAL
DFCD	CONTROL DISTRICT
E	UTILITY EASEMENT
&DE	UTILITY & DRAINAGE EASEMENT
GE	UNDERGROUND ELECTRIC
CP	VITRIFIED CLAY PIPE
PC	VERTICAL POINT OF CURVATURE
PI	VERTICAL POINT OF INTERSECTION
PT	VERTICAL POINT OF TANGENCY
TC	VEHICLE TRACKING CONTROL
/	WEST
/L	WATER LINE
/M	WATER MAIN
/RD	WATER RESOURCES
/S	DEPARTMENT WATER SURFACE
/SE	WATER SURFACE ELEVATION
/TR	WATER

 $\overline{\ }$ 

#### **BASIS OF BEARINGS**

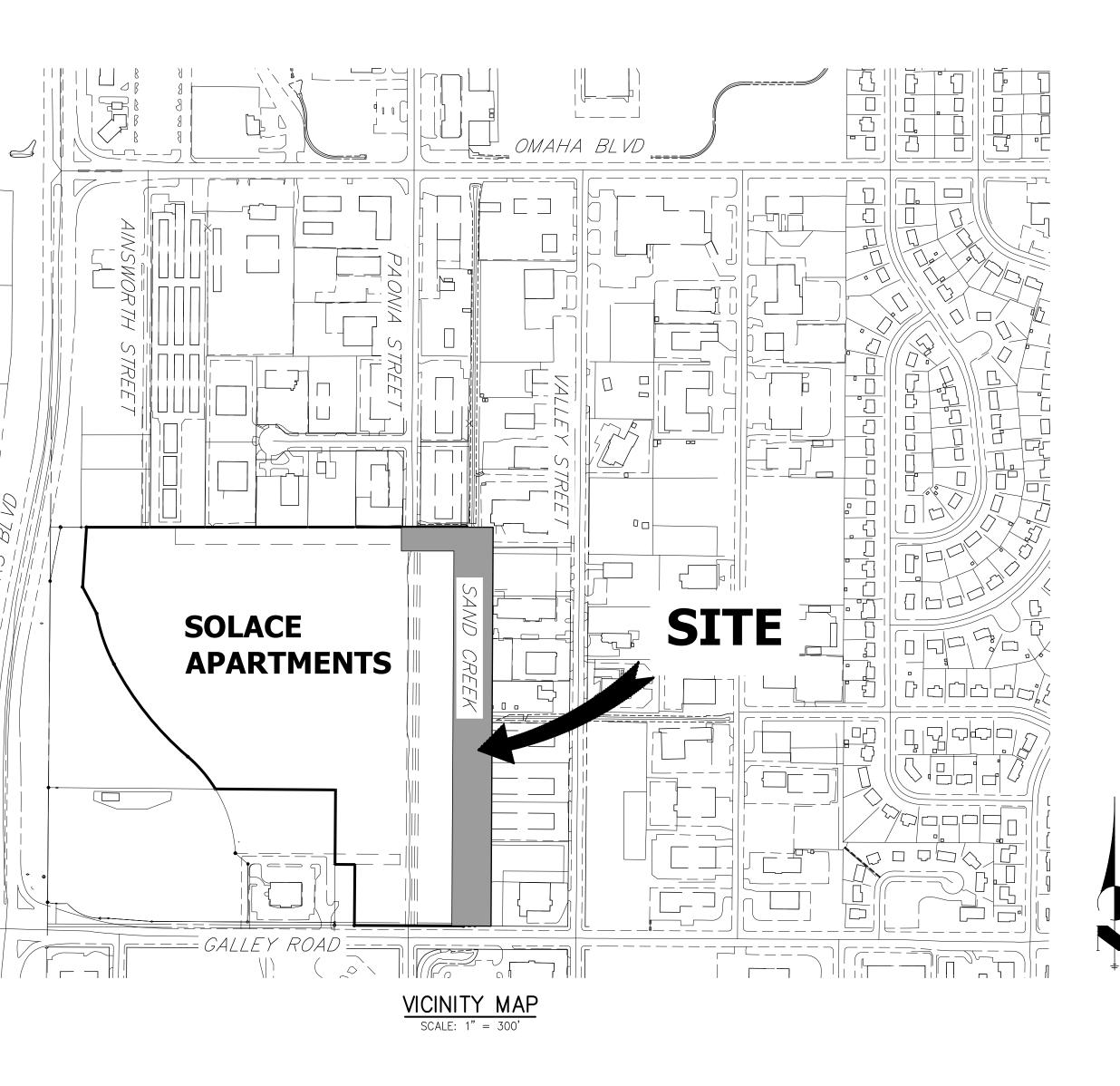
#### **BENCHMARK**

THE LOCATIONS OF EXISTING ABOVE GROUND AND 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 ABOVE GROUND AND UNDERGROUND UTILITIES.

# **SOLACE APARTMENTS - SAND CREEK CENTER TRIBUTARY**

A PORTION OF SECTION 7, TOWNSHIP 14 SOUTH, RANGE 65 WEST OF THE 6TH P.M. EL PASO COUNTY, COLORADO

**CHANNEL IMPROVEMENTS** 



### SHEET INDEX

1 2 3 4-6 7 8 9 10	COVER SHEET GENERAL NOTES SITE AND DEMO PLAN CHANNEL PLAN AND PROFILES CHANNEL DETAILS DROP STRUCTURES PLAN AND PROFILE DROP STRUCTURE DETAIL SHEETS PAONIA STREET OVERFLOW PLAN
TOTAL	10

#### OWNER/DEVELOPER STATEMENT

I, THE OWNER/DEVELOPER HAVE READ AND WILL COMPLY THE REQUIREMENTS SPECIFIED IN THESE DETAILED PLANS SPECIFICATIONS.

DANE OLMSTEAD

JACKSON DEARBORN PARTNERS 404 S. WELLS ST. SUITE 400 CHICAGO, IL 60607

# APPLICANT/OWNER

JACKSON DEARBORN PARTNERS 404 S. WELLS ST. SUITE 400 CHICAGO, IL 60607 P~734.216.2577

### **CIVIL ENGINEER**

JR ENGINEERING 5475 TECH CENTER DR SUITE 235 COLORADO SPRINGS, CO 80919 CONTACT: MIKE BRAMLETT C~719.659.7679

### **PLANNER**

N.E.S. INC. 619 N. CASCADE AVE SUITE 200 COLORADO SPRINGS, CO 80903 CONTACT: TAMARA BAXTER P~719.471.0073

## **GEOTECHNICAL ENGINEER**

CTL THOMPSON, INC 5170 MARK DABLING BLVD COLORADO SPRINGS, CO 80918 P~719.528.8300



J·R ENGINEERING

CTLITHOMPSON

INCORPORATED

	EL PASO COUNTY STATEMENT	1"=300'	N/A	11/16/20	JBP	JBP	
	COUNTY PLAN REVIEW IS PROVIDED ONLY FOR GENERAL CONFORMANCE WITH COUNTY DESIGN CRITERIA. THE COUNTY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, DIMENSIONS, AND/OR ELEVATIONS WHICH SHALL BE CONFIRMED AT THE JOB SITE. THE COUNTY THROUGH THE APPROVAL OF THIS DOCUMENT ASSUMES NO	H-SCALE	V-SCALE	DATE	DESIGNED BY	DRAWN BY	CHFCKFD BY
Know what's below. Call before you dig.	RESPONSIBILITY FOR COMPLETENESS AND/OR ACCURACY OF THIS DOCUMENT. FILED IN ACCORDANCE WITH THE REQUIREMENTS OF THE EL PASO COUNTY LAND DEVELOPMENT CODE, DRAINAGE CRITERIA MANUAL, VOLUMES 1 AND 2, AND ENGINEERING CRITERIA MANUAL AS AMENDED. IN ACCORDANCE WITH ECM SECTION 1.12, THESE CONSTRUCTION DOCUMENTS WILL BE VALID FOR CONSTRUCTION FOR A PERIOD OF 2 YEARS FROM THE DATE SIGNED BY THE EL PASO COUNTY ENGINEER. IF CONSTRUCTION HAS NOT STARTED WITHIN THOSE 2 YEARS, THE PLANS WILL NEED TO BE RESUBMITTED FOR APPROVAL, INCLUDING PAYMENT OF REVIEW FEES AT THE PLANNING AND COMMUNITY DEVELOPMENT DIRECTORS DISCRETION.	REK CENTER	-LN UTAF		ER SHEET		
TEMENT ID WILL COMPLY WITH ALL OF DETAILED PLANS AND	JENNIFER IRVINE, P.E. DATE COUNTY ENGINEER/ECM ADMINISTRATOR ENGINEER'S STATEMENT STANDARD DETAILS SHOWN WERE REVIEWED ON US GAS TO THEIR APPLICATION ON THIS PROJECT			-	COVER		
DATE	MIKE A. BRAMLETT, P.E. COLORADO P.E. 32314	SH	EET	1	0	F 1	10
					0 - 4	7 4 7	`

FOR AND ON BEHALF OF JR ENGINEERING

PREPARED FOR	JACKSON DEARBORN PARTNERS THESE DRAWINGS ARE APPROVED BY THE			UTILAGU, ILL QUQU/ ONLY FOR THE PURPOSES Defice dijone designaten ry written		(734) 216-2577		
	JACKS J.R. ENGINEERING A Westrian Company Centennial 303–740–9393 • Colorado Springs 719–593–2593 Fort Collins 970–491–9888 • wwwjrengineering.com							
BY DATE								
1"=300' No. REVISION		20						
H-SCALE 1"=30C	V-SCALE N/A	DATE 11/16/20	DESIGNED BY JBP	DRAWN RY		CHECKED BY		
SAND CREEK CENTER	TRIBUTARY		COVER SHEEL					

JOB NO. 25174.00

#### LAYER LINETYPE LEGEND

	EXISTING		P	ROPOSED	
MATCH LINE					-
SECTION LINE	 				
BOUNDARY LINE					_
PROPERTY LINE	 				_
EASEMENT LINE	 				_
RIGHT OF WAY	 				_
CENTERLINE	 				—
FENCE	 	- — — X — — — — —	× -	X	
GUARDRAIL		<u> </u>	• •		—
CABLE TV	 - — TV — — —	- — — TV — — — -	——————————————————————————————————————	TV	_
ELECTRIC	 - — E — — —	- — E — — -	———— E —	———— E ————	
FIBER OPTIC	 — — F0 — — —	- — — FO — — — -	———— FO —	FO	—
GAS MAIN	 	- — — G — — — — — — — — — — — — — — — —	G —	G	
IRRIGATION MAIN	 — — <i>IRR</i> — — —	- — — <i>IRR</i> — — – •	IRR—	IRR	—
OVERHEAD UTILITY	 - — OHU— — —	- — — OHU	OHU	OHU	
SANITARY SEWER	 - <i>— S — — —</i>			•	_
STORM DRAIN	 				_
TELEPHONE	 	- — <i>T</i> — — -	— т —	———— T ————	
WATER MAIN	 — — <i>W</i> — — —	- — — <i>W</i> — — –		•	_
SWALE/WATERWAY FLOWLINE					_
DIVERSION DITCH					
TOP OF SLOPE	 ,			•	
TOE OF SLOPE	 L			ů ů	—
100 YEAR FLOODPLAIN	 	— 100YR — -		- 100YR	
5 YEAR HGL		-	· · · · · · · ·	···· ··· ··· ···	
100 YEAR HGL		-	· · · ·	·	

#### STANDARD NOTES FOR EL PASO COUNTY CONSTRUCTION PLANS

- 1. ALL DRAINAGE AND ROADWAY CONSTRUCTION SHALL MEET THE STANDARDS AND SPECIFICATIONS OF THE CITY OF COLORADO SPRINGS/EL PASO COUNTY DRAINAGE CRITERIA MANUAL, VOLUMES 1 AND 2, AND THE EL PASO COUNTY ENGINEERING CRITERIA MANUAL.
- 2. CONTRACTOR SHALL BE RESPONSIBLE FOR THE NOTIFICATION AND FIELD NOTIFICATION OF ALL EXISTING UTILITIES. WHETHER SHOWN ON THE PLANS OR NOT, BEFORE BEGINNING CONSTRUCTION. LOCATION OF EXISTING UTILITIES SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. CALL 811 TO CONTACT THE UTILITY NOTIFICATION CENTER OF COLORADO (UNCC).
- 3. CONTRACTOR SHALL KEEP A COPY OF THESE APPROVED PLANS, THE GRADING AND EROSION CONTROL PLAN, THE STORMWATER MANAGEMENT PLAN (SWMP), THE SOIL AND GEOTECHNICAL REPORT, AND THE APPROPRIATE DESIGN AND CONSTRUCTION STANDARDS AND SPECIFICATIONS AT THE JOB SITE AT ALL TIMES, INCLUDING THE FOLLOWING: 3.1. EL PASO COUNTY ENGINEERING CRITERIA MANUAL (ECM)
- 3.2. CITY OF COLORADO SPRINGS/ EL PASO COUNTY DRAINAGE CRITERIA MANUAL, VOLUMES 1 AND 2 3.3. COLORADO DEPARTMENT OF TRANSPORTATION (CDOT) STANDARD SPECIFICATIONS AND BRIDGE CONSTRUCTION

3.4. CDOT M&S STANDARDS

- 4. NOTWITHSTANDING ANYTHING DEPICTED IN THESE PLANS IN WORDS OR GRAPHIC REPRESENTATION, ALL DESIGN AND CONSTRUCTION RELATED TO ROADS, STORM DRAINAGE AND EROSION CONTROL SHALL CONFORM TO THE STANDARDS AND REQUIREMENTS OF THE MOST RECENT VERSIONS OF THE RELEVANT ADOPTED EL PASO COUNTY STANDARDS, INCLUDING THE LAND DEVELOPMENT CODE, THE EINGEERIONG CRITERIA MANUAL, THE DRAINAGE CRITERIA MANUAL, AND THE DRAINAGE CRITERIA MANUAL VOLUME 2. ANY DEVIATIONS FROM REGULATIONS AND STANDARDS MUST BE REQUESTED, AND APPROVED, IN WRITING. ANY MODIFICATIONS NECESSARY TO MEET CRITERIA AFTER-THE-FACT WILL BE ENTIRELY THE DEVELOPER'S RESPONSIBILITY TO RECTIFY.
- 5. IT IS THE DESIGN ENGINEER'S RESPONSIBILITY TO ACCURATELY SHOW EXISTING CONDITIONS, BOTH ONSITE AND OFFSITE, ON THE CONSTRUCTION PLANS. ANY MODIFICATIONS NECESSARY DUE TO CONFLICTS, OMISSIONS, OR CHANGED CONDITIONS WILL BE ENTIRELY THE DEVELOPER'S RESPONSIBILITY TO RECTIFY.
- 6. CONTRACTOR SHALL SCHEDULE A PRE-CONSTRUCTION MEETING WITH EL PASO COUNTY PLANNING AND COMMUNITY DEVELOPMENT INSPECTIONS, PRIOR TO STARTING CONSTRUCTION.
- 7. IT IS THE CONTRACTOR'S RESPONSIBILITY TO UNDERSTAND THE REQUIREMENTS OF ALL JURISDICTIONAL AGENCIES TO OBTAIN ALL REQUIRED PERMITS, INCLUDING BUT NOT LIMITED TO EL PASO COUNTY EROSION AND STORMWATER QUALITY CONTROL PERMIT (ESQCP), REGIONAL BUILDING FLOODPLAIN DEVELOPMENT PERMIT, U.S. ARMY CORPS OF ENGINEERS-ISSUED 401 AND/OR 404 PERMITS, AND COUNTY AND STATE FUGITIVE DUST PERMITS.
- 8. CONTRACTOR SHALL NOT DEVIATE FROM THE PLANS WITHOUT FIRST OBTAINING WRITTEN APPROVAL FROM THE DESIGN ENGINEER AND PCD. CONTRACTOR SHALL NOTIFY THE DESIGN ENGINEER IMMEDIATELY UPON DISCOVERY OF ANY ERRORS OR INCONSISTENCIES. 9. ALL STORM DRAIN PIPE SHALL BE CLASS III RCP UNLESS OTHERWISE NOTED AND APPROVED BY PLANNING AND COMMUNITY
- DEVELOPMENT. 10. CONTRACTOR SHALL COORDINATE GEOTECHNICAL TESTING PER ECM STANDARDS. PAVEMENT DESIGN SHALL BE APPROVED BY EL PASO COUNTY PCD PRIOR TO PLACEMENT OF CURB AND GUTTER AND PAVEMENT.
- 11. ALL CONSTRUCTION TRAFFIC MUST ENTER/EXIT THE SITE AT APPROVED CONSTRUCTION ACCESS POINTS.
- 12. SIGHT VISIBILITY TRIANGLES ARE IDENTIFIED IN THE PLANS SHALL BE PROVIDED AT ALL INTERSECTIONS. OBSTRUCTIONS GREATER THAN 18 INCHES ABOVE FLOWLINE ARE NOT ALLOWED IN SIGHT TRIANGLES.
- 13. SIGNING AND STRIPING SHALL COMPLY WITH EL PASO COUNTY DEPARTMENT OF PUBLIC WORKS AND MUTCD CRITERIA.
- 14. CONTRACTOR SHALL OBTAIN ANY PERMITS REQUIRED BY EL PASO COUNTY DEPARTMENT OF PUBLIC WORKS, INCLUDING WORK WITHIN THE RIGHT-OF-WAY AND SPECIAL TRANSPORT PERMITS.
- 15. THE LIMITS OF CONSTRUCTION SHALL REMAIN WITHIN THE PROPERTY LINE UNLESS OTHERWISE NOTED. THE OWENER/DEVELOPER SHALL OBTAIN WRITTEN PERMISSION AND EASEMENTS, WHERE REQUIRED, FROM ADJOINING PROPERTY OWNER(S) PRIOR TO ANY OFF-SITE DISTURBANCE, GRADING, OR CONSTRUCTION.

ITIES LEC	<u>GEND</u>
EXISTING	PROPOSED
D	۲
D	
Mkr San <sup>O</sup>	
Ś	
0—	●
S	•4
Mkr W <sup>0</sup>	
Q	◄
(	•
0	X
۶۲	\$_[
O <sub>WELL</sub>	•WELL
$\bigotimes$	٠
$\bowtie$	•
	→
	- <del>+</del> -
Þ	►[
	<b>↓</b>
	<b>•</b> •
Mkr G <sup>O</sup>	
	EXISTING

Γ

#### DRAINAG MONUMENTATION LEGEND ALUMINUM CAP - FOUND •<sub>AC</sub> BRASS CAP - FOUND ●<sub>BC</sub> BENCHMARK – FOUND -CROSS - FOUND MONUMENT - SET Ο MONUMENT - FOUND (DEFAULT) MONUMENT - FOUND (ALTERNATE 1) MONUMENT - FOUND (ALTERNATE 2) MONUMENT - FOUND (alternate 3) MONUMENT - FOUND IDENTIFIER (alternate 4) MONUMENT - FOUND (ALTERNATE 5) MONUMENT - FOUND ٢ (ALTERNATE 6) MONUMENT - FOUND ۲ (ALTERNATE 7) NAIL & WASHER - FOUND ●NAIL & WASHER PANEL – FOUND $\mathbf{A}$ SUB-BASIN (DEVELOPED) PK NAIL – FOUND PK NAIL ROW MONUMENT - FOUND ROW MARKER — FOUND • IDENTIFIER + SECTION CORNER - FOUND DRAINAGE PO SECTION CORNER - SET QUARTER-SECTION CORNER - FOUND IDENTIFIER ( QUARTER-SECTION CORNER - SET SECTION CENTER - FOUND $\bigcirc$ SECTION CENTER - FOUND

Δ

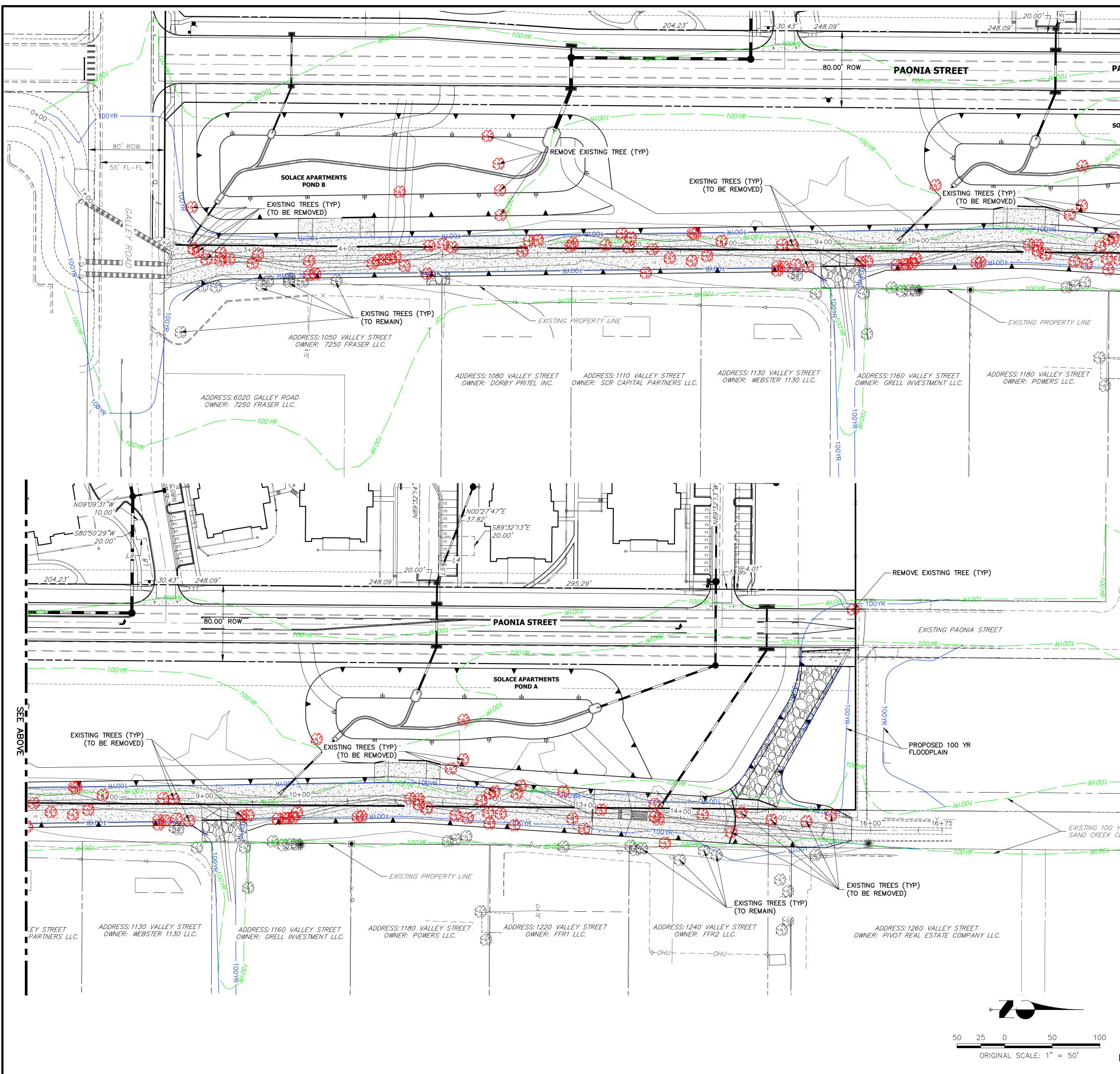
CONTROL/TRAVERSE POINT - SET

DRY UTILITIES

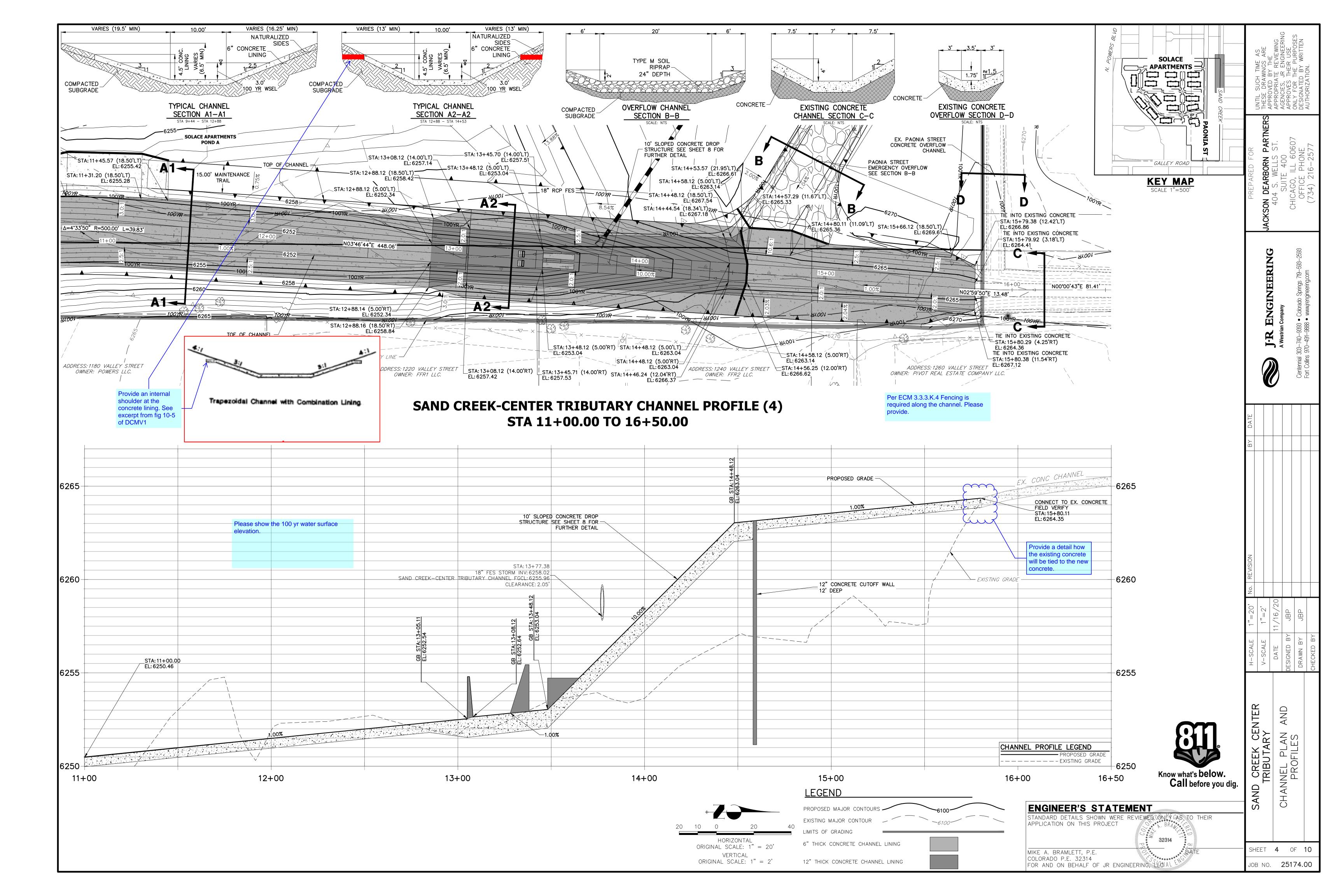
PLUG

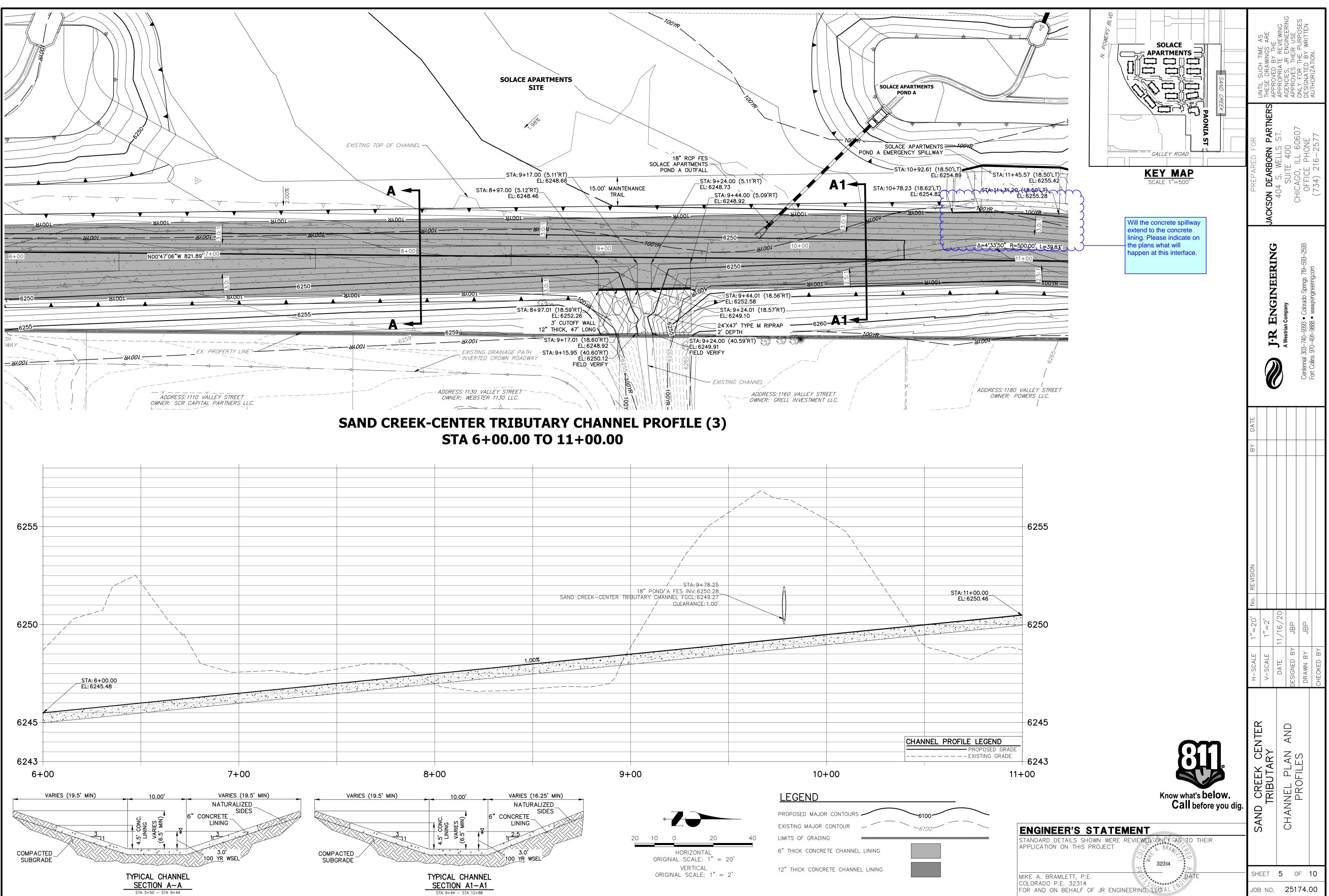
CABLE TV MARKER	Mkr TV
CABLE TELEVISION PEDESTAL	Ī
ELECTRIC MARKER	Mkr E
ELECTRIC SERVICE MARKER	<u>/</u> E
ELECTRICAL PEDESTAL	[
ELECTRICAL METER	(
ELECTRICAL MANHOLE	(
FIBER-OPTIC MARKER	Mkr FO
IRRIGATION PEDESTAL	
TELEPHONE MARKER	Mkr T
TELEPHONE PEDESTAL	[
TELEPHONE MANHOLE	(
UTILITY POLE	-(
GUY ANCHOR	(
GUY POLE	(

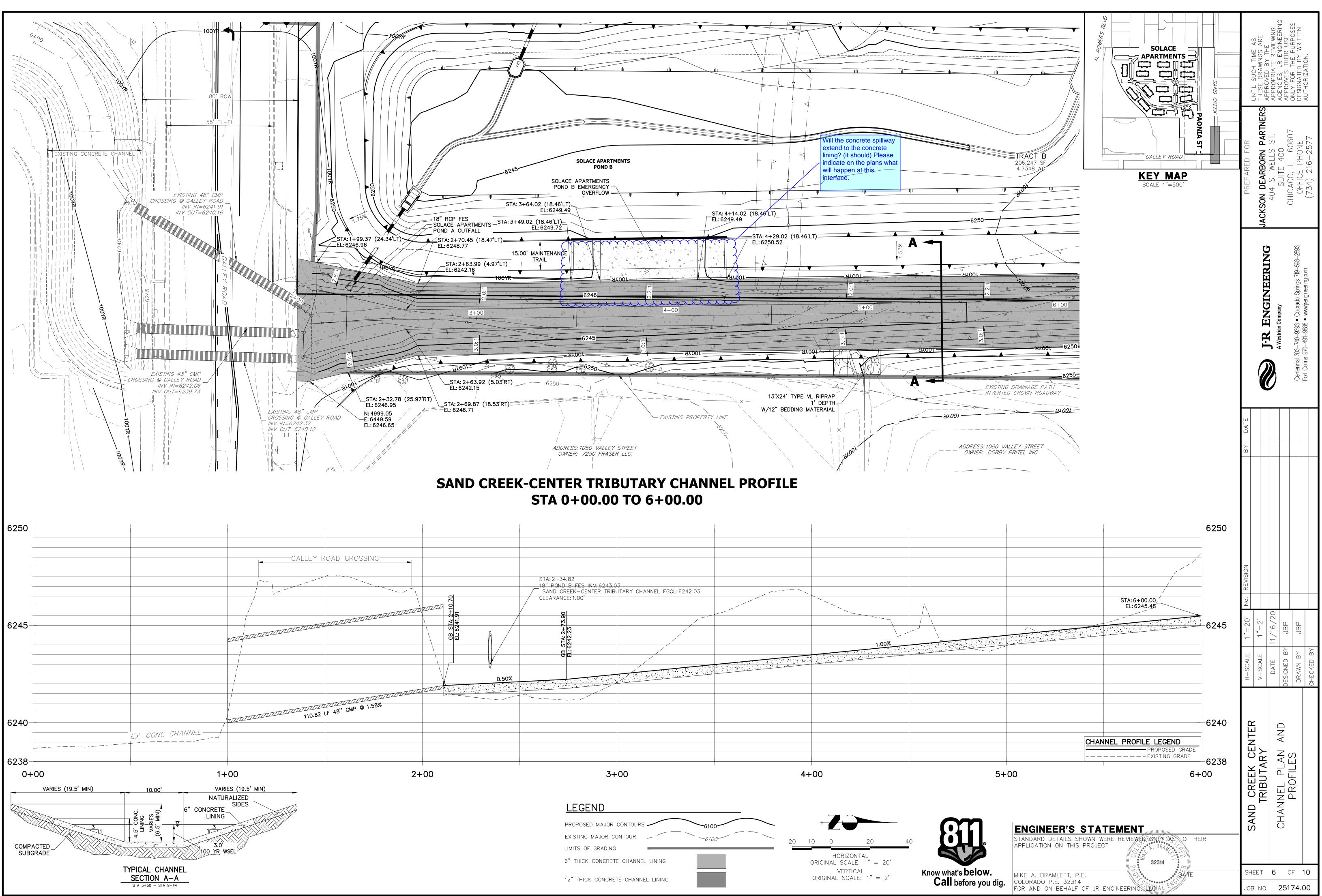
DRAINAGE REPO	ORT PLAN	<u>IS</u> <u>LA</u>	NDSCAPE LEC	<u>Gend</u>	E AS S ARE THE EVIEWING VGINEERING	R USE PURPOSES WRITTEN
	KEY	TREE – CONIFERO	EXISTING	PROPOSED	SUCH TIME DRAWINGS VED BY TH PRIATE RE IES, JR EN	S THEIF R THE I ED BY CATION.
BASIN DESIGNATION (NO COEFFICIENT)	# #.#	TREE – DECIDUOU SHRUB/BUSH	۲/۱۱/۲ ۱۰۲۷		UNTIL THESE APPRO ACENC	APPROVES THE ONLY FOR THE DESIGNATED BY AUTHORIZATION
BASIN DESIGNATION (1 COEFFICIENT)	<b>#</b> #.# #	SHRUBS AND BUSI IRRIGATION BOX IRRIGATION SPRINK	(Control of the second		PARTNERS ST.	60607 501E 2577
BASIN DESIGNATION (2 COEFFICIENTS)	<b>#</b> #.# # #	IRRIGATION SPRING IRRIGATION VALVE BOLLARD FLAGPOLE	KLER © © & <i>FP</i> ●		PREPARED FOR DEARBORN P. 04 S. WELLS S SLITTE ADD	, ILL E PH( 216-1
ANALISYS POINT IDENTIFIER	#	TLAGFOLL	μp		JACKSON DEARBORN 404 S. WELLS	CHICAGO OFFIC (734)
BASIN DESIGNATION (HISTORIC)	# #.#				JACKS	
BASIN DESIGNATION (DEVELOPED)	# #.#				<b>ING</b>	593-2593
SUB-BASIN DESIGNATION (DEVELOPED)	# #.#				ENGINEERING	Centennial 303–740–9393 • Colorado Springs 719–593–2593 Fort Collins 970–491–9888 • www.jrengineering.com
DRAINAGE PIPE IDENTIFIER	##				ENGII Company	<ul> <li>Colorado</li> <li>3 www.jreng</li> </ul>
DRAINAGE POINT IDENTIFIER (HEXAGONAL)	<b>(##</b> )				J-R ENG A Westrian Company	)3—740—9393 70—491—9886
DRAINAGE POINT IDENTIFIER (TRIANGULAR)	<u>?</u>					Centennial 30 Fort Collins 9
SWMM DESIGNATION 1	#					
SWMM DESIGNATION 2	#				DATE	
SWMM DESIGNATION 3	#					
SWMM DESIGNATION 4						
	?					
	<u> </u>				NO	
					No. REVISION	
					50	MRU MRU MRU
					11 /	× ×
					H–SCALE V–SCALE DATE	DESIGNED B DRAWN BY CHECKED B'
			$\mathbf{O}$	<b>71</b>	ARY ACTER	
			Know what's Call be	below. fore you dig.		
		ENGINEER'S STA		<u></u>	SAND	Ď
		STANDARD DETAILS SHOWN APPLICATION ON THIS PROJI	WERE REVIEWED ON UY G	AS TO THEIR		
		MIKE A. BRAMLETT, P.E. COLORADO P.E. 32314 FOR AND ON BEHALF OF JR		DATE NCINIT	- SHEET 2	OF 10 25174.00

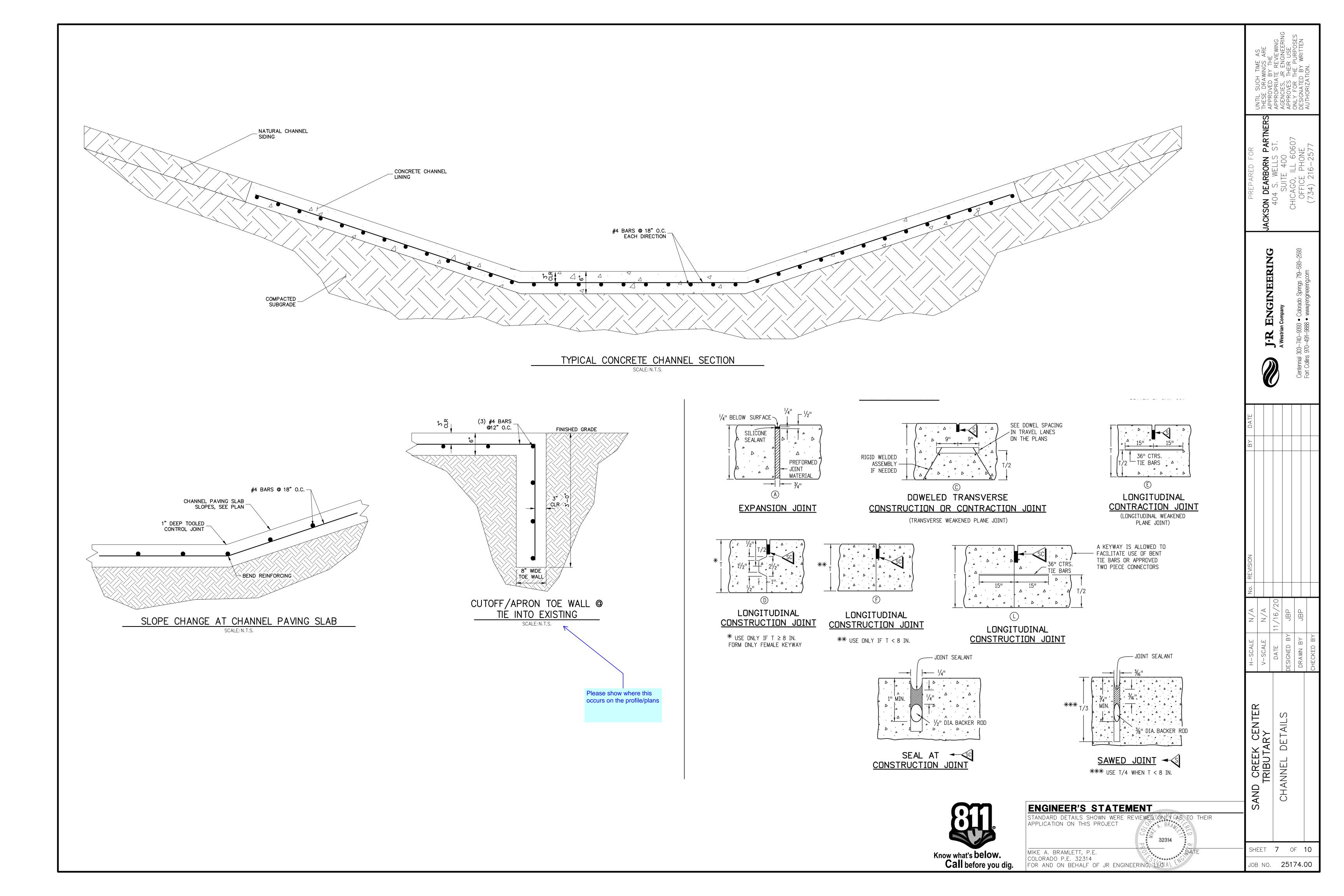


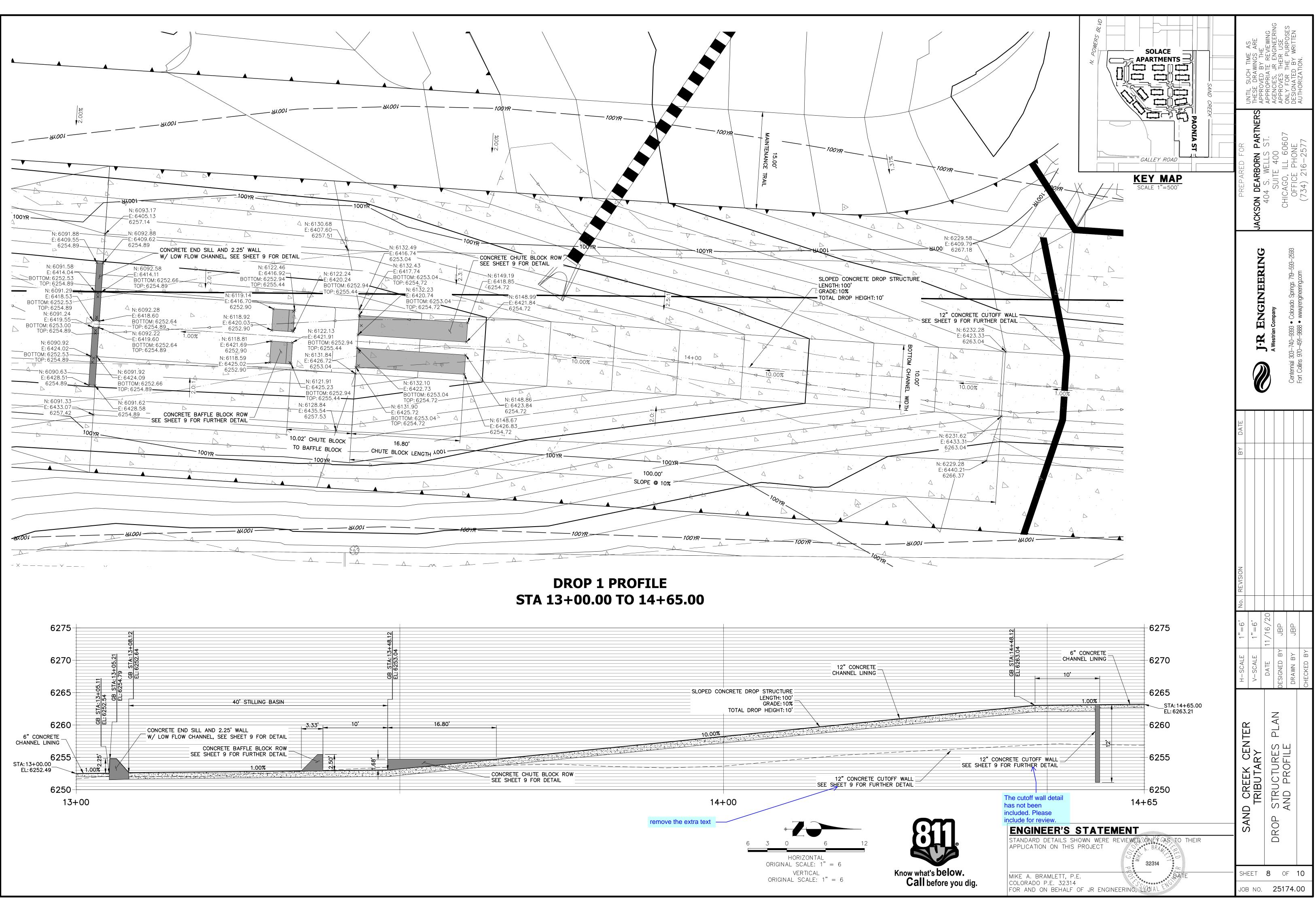
		K	SOLACE PARTMENTS DALLEY ROAD EY MAP DALE 1"=500'	 JACKSON DEARBORN PARTNERS 404 S. WELLS ST. APPROPRIATE REVIEWING	SUITE 400 AGENCIES, JR EN APPROVES THEIR APPROVES THEIR ONLY FOR THE F	UFFICE PHONE DESIGNATED BT WRITTEN (734) 216-2577 AUTHORIZATION.
ADDRESS: 1220 VALLEY STREET OWNER: FFR1 LLC.				J-R ENGINEERING	A Westrian Company Centennial 303–740–9393 • Colorado Soninos 719–593–2593	Fort Collins 970–491–9888 • www.jrengineering.com
1001XR 				BY DATE		
YR FEMA FLOODPLAIN CENTER TRIBUTARY				H-SCALE 1"=50' No. REVISION V-SCALE N/A DATE 11/16/20		B B
	ENGINEER'S STANDARD DETAILS SHOWN APPLICATION ON THIS PROV		ONRE CASE TO THEIR S2314	SAND CREEK CENTER TRIBUTARY	SITE AND DEMO PLAN	
Know what's <b>below.</b> Call before you dig.	MIKE A. BRAMLETT, P.E. COLORADO P.E. 32314 FOR AND ON BEHALF OF J		 DATE	 SHEET <b>3</b> JOB NO.	OF 25174	10 .00

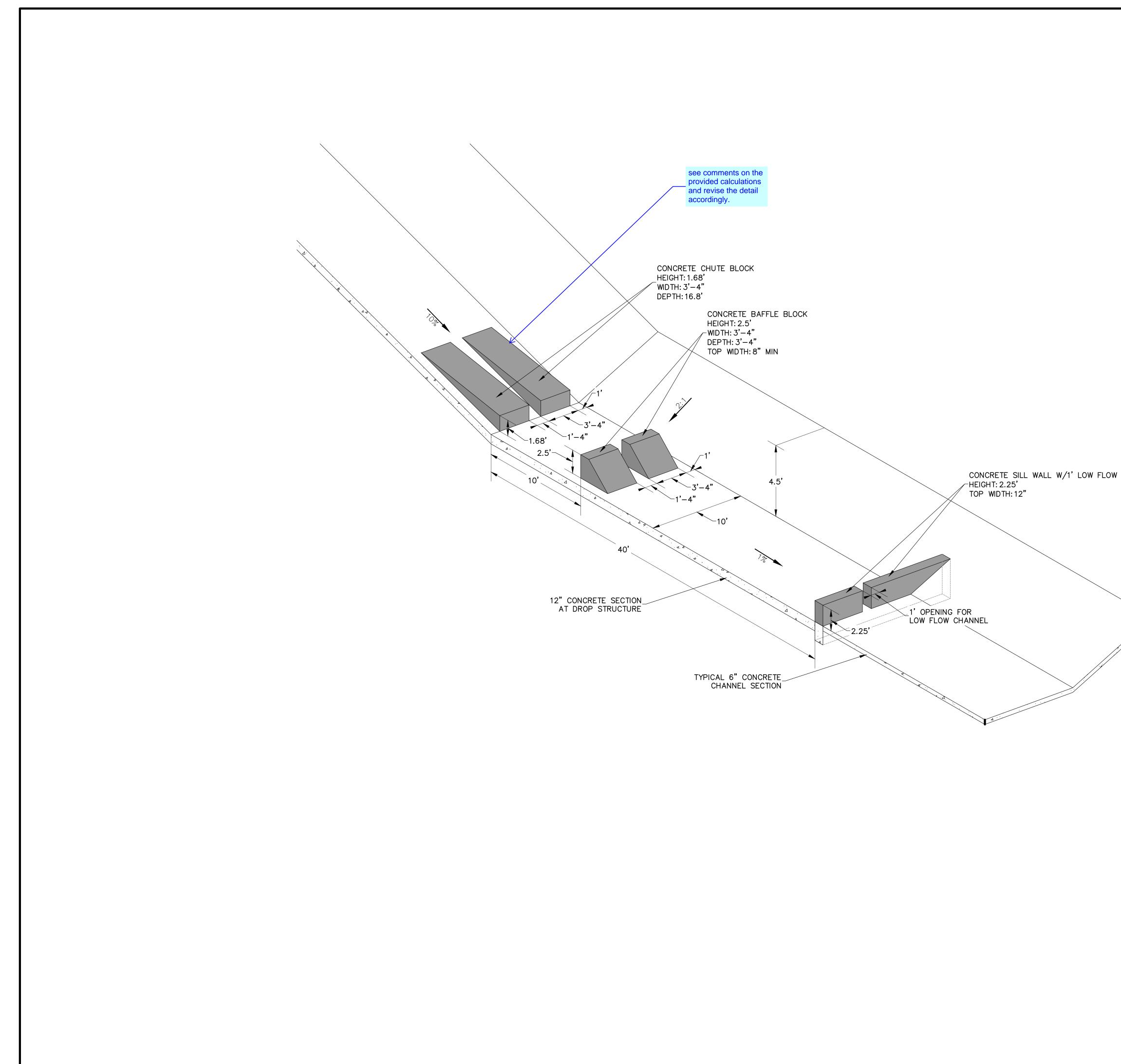




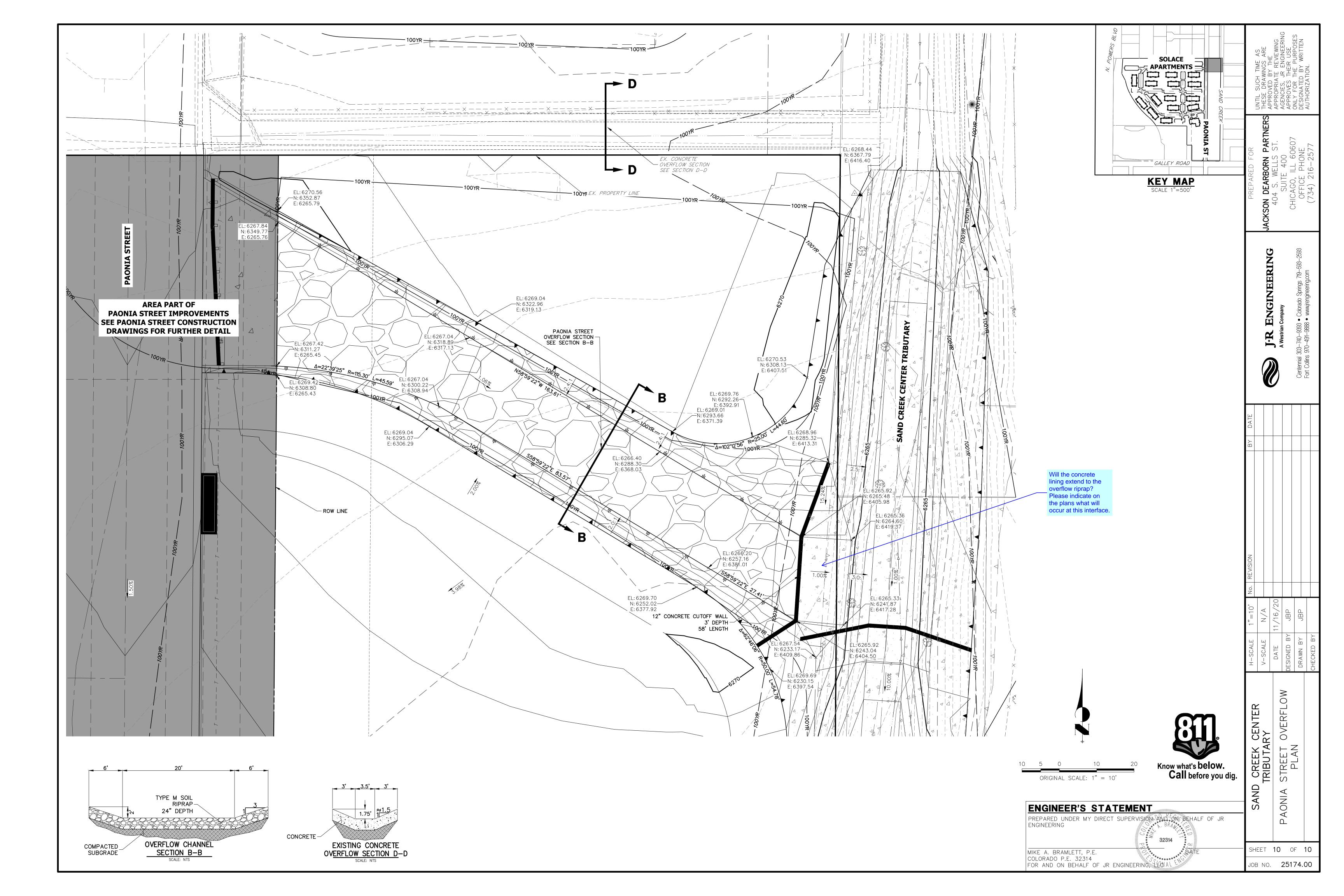


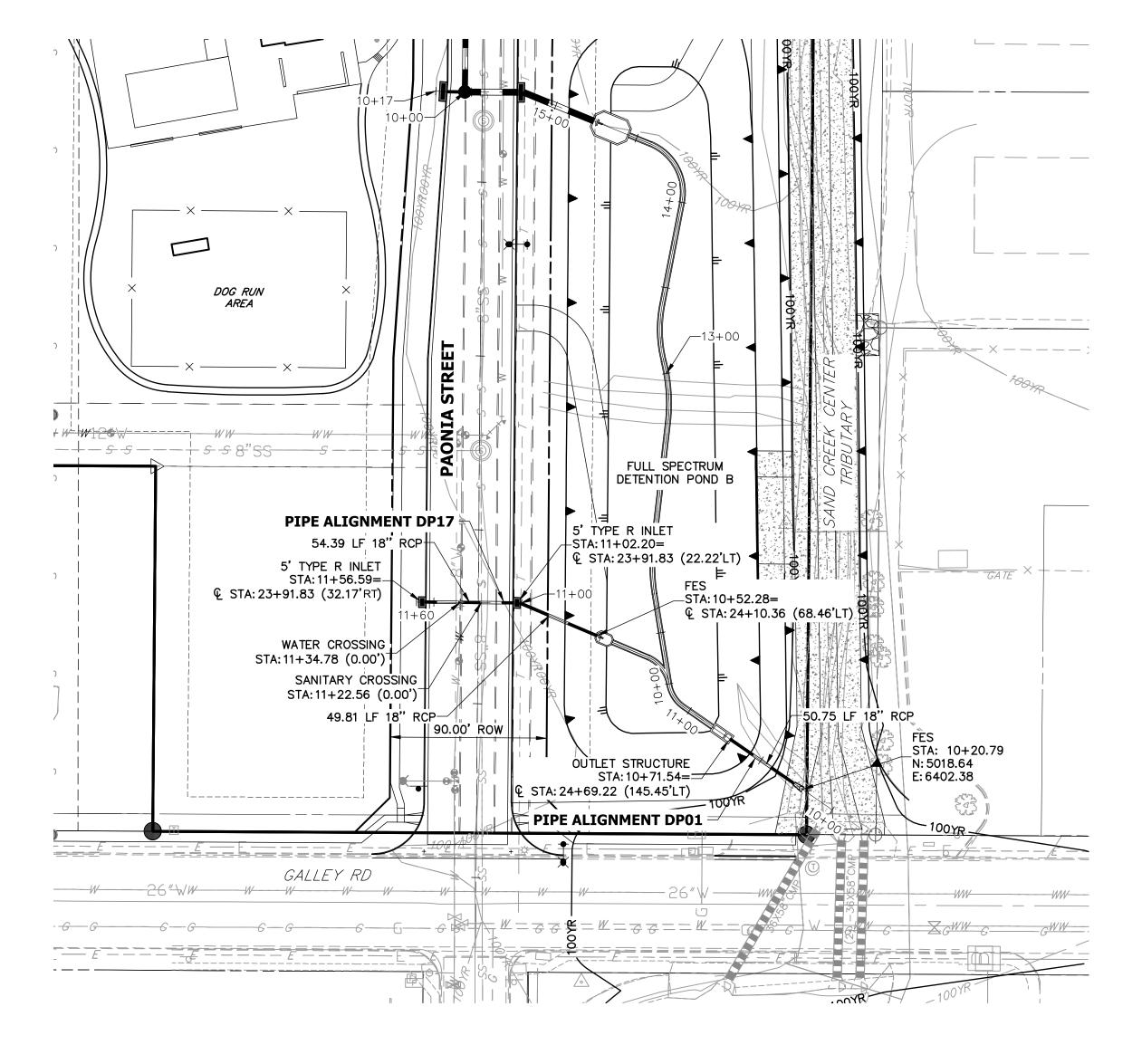




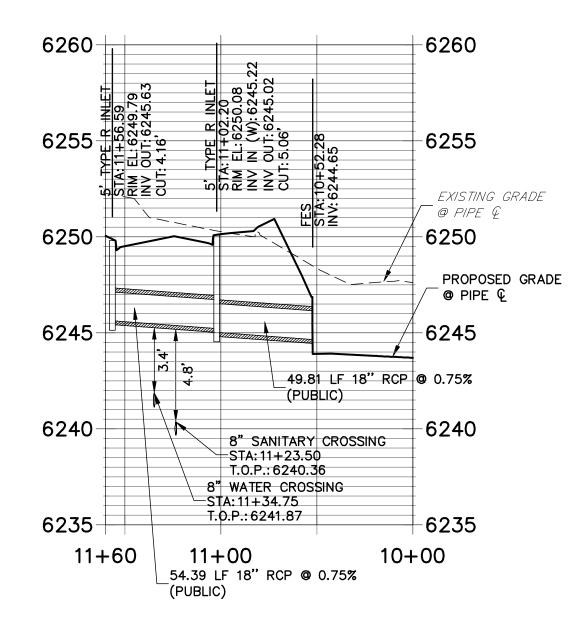


			UNTIL SUCH TIME AS THESE DRAWINGS ARE APPROVED BY THE APPROPRIATE REVIEWING AGENCIES, JR ENGINEERING AGENCIES, JR ENGINEERING APPROVES THEIR USE ONLY FOR THE PURPOSES DESIGNATED BY WRITTEN AUTHORIZATION.		
			PREPARED FOR JACKSON DEARBORN PARTNERS 404 S. WELLS ST. 8UITE 400 CHICAGO, ILL 60607 0FFICE PHONE 0FFICE PHONE (734) 216-2577		
		J:R ENGINEERING A Westrian Company Centennial 303–740–9393 • Colorado Springs 719–593–2593 Fort Collins 970–491–9888 • www.jrengineering.com			
CHANNEL OPENING		BY DATE			
		H-SCALE N/A No. REVISION V-SCALE N/A	11/16 11/16		CHECKED BY
	ENGINEER'S STATEMENT STANDARD DETAILS SHOWN WERE REVIEWED ONLY CAS TO THEIR APPLICATION ON THIS PROJECT	SAND CREEK CENTER	JRE DETAIL		
Know what's below. Call before you dig.	MIKE A. BRAMLETT, P.E. COLORADO P.E. 32314 FOR AND ON BEHALF OF JR ENGINEERING	SHEET		OF 10 174.00	

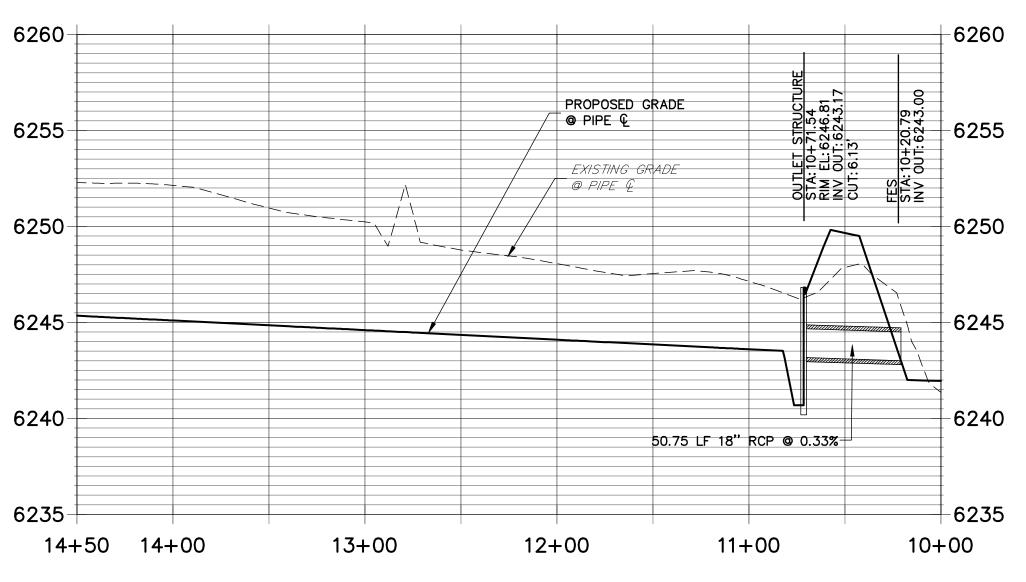




# **DP17 PROFILE** STA 10+00.00 TO 11+60.00







- DISTRICT.

