

DEPARTMENT OF PUBLIC WORKS

Contract Document

Contract No. 201631819

33RD STREET OUTFALL (31ST AND 36TH STREET OUTFALL PROJECT) SEGMENT - BLAKE ST. TO ARAPAHOE ST.

DECEMBER 2, 2016



NOTICE OF APPARENT LOW BIDDER

Concrete Works of Colorado, Inc, 1260 Rock Creek Circle Lafayette, CO 80026

The EXECUTIVE DIRECTOR OF PUBLIC WORKS has considered the Bids submitted on February14, 2017, for work to be done and materials to be furnished in and for:

CONTRACT NO. 201631819 33rd Street Outfall (31st and 36th Street Outfall Project) Segment – Blake St. To Arapahoe St.

as set forth in detail in the Contract Documents for the City and County of Denver, Colorado. It appears that your Bid is fair, equitable, and to the best interest of the City and County; therefore, said Bid is hereby accepted at the bid price contained herein, subject to the approval and execution of the Contract Documents by the City in accordance with the Charter of the City and County of Denver, and to your furnishing the items specified below. The award is based on the total bid items: bid item numbers 01-52.13 thru 50-1 (Fifty-Nine[59]total bid items) base bid plus add alternate #1, the total estimated cost thereof being: No Cents (\$6,556,720.00)).

It will be necessary for you to appear forthwith at the office of the Department of Public Works, Contract Administration, 201 W. Colfax Ave., Dept 614, Denver, Colorado 80202, to receive the said Contract Documents, execute the same and return them to the Department of Public Works, Contract Administration within the time limit set forth in the Bid Package Documents.

In accordance with the requirements set forth in the Contract Documents, you are required to furnish the following documents:

- a. Insurance Certificates: General Liability and Automotive Liability, Workman's Compensation and Employer Liability;
- b. Payment and Performance Bond along with One original Power of Attorney relative to Performance and/or Payment Bond; and,

All construction Contracts made and entered into by the City and County of Denver are subject to Affirmative Action and Equal Opportunity Rules and Regulations, as adopted by the Manager of Public Works, and each contract requiring payment by the City of one-half million dollars (\$500,000.00) or more shall first be approved by the City Council acting by ordinance and in accordance with Section B1.12.2 of the Charter of the City and County of Denver.



cc:

NOTICE OF APPARENT LOW BIDDER

CONTRACT NO. 201631819 Page 2

Prior to issuance of Notice to Proceed, all Equal Opportunity requirements must be completed. Additional information may be obtained by contacting the Director of Contract Compliance at (720-913-1700).

The Bid Security submitted with your Bid, will be returned upon execution of the Contract and furnishing of the Performance Bond. In the event you should fail to execute the Contract and to furnish the performance Bond within the time limit specified, said Bid Security will be retained by the City and County of Denver as liquidated damages, and not as a penalty for the delay and extra work caused thereby.

Dated at Denver, Colorado this 28 day of February 2017.

CITY AND COUNTY OF DENVER

Ву

Jose M. Cornejo, P.E.

Executive Director of Public Works

Don Korte, (Treasury/Tax Compliance), DSBO Coordinator, Project Manager, (PW-Aud), File.



DEPARTMENT OF PUBLIC WORKS / WASTEWATER MANAGEMENT DIVISION

BID FORM SUBMITTAL PACKAGE

Contract No. 201631819

33RD STREET OUTFALL (31ST AND 36TH STREET OUTFALL PROJECT) SEGMENT - BLAKE ST. TO ARAPAHOE ST.

DECEMBER 2, 2016

CITY AND COUNTY OF DENVER

DEPARTMENT OF PUBLIC WORKS

Wastewater Management Division

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This Checklist is provided solely for the assistance of the bidders, and need <u>not</u> be returned by Bidders with your BID FORM PACKAGE.

BIDDER'S CHECKLIST

These forms comprise the Bid Form and Submittal Package. Designated forms must be completed and turned in <u>at the time of Bid Opening</u>. Bidders should refer to the Contract Documents, particularly the Instructions to Bidders, accompanying this package, in completing these forms.

FORM/ PAGE NO.	COMMENTS	COMPLETE
BF-4 – BF-5	 a.) Legal name, address, Acknowledgment signature and attestation (if required.) 	
BF-6+	a.) Fill in Legal Name	2
	b.) Fill in individual bid item dollars and totals in Numerical	
	figures only	
	c.) Complete all blanks	
	d.) Legal name required	,
BF-7	a.) Write out bid sub-totals and bid totals in words and figures in the blank form space(s) provided	
	b.) Ensure Textura® Construction Payment Management	
	System Fee is calculated based on chart on pg. BF-3 and	
	write % and fee in the space provided, include in bid total.	
BF-8	a.) List all subcontractors who are performing work on this	
	project	
BF-9-BF-10	a.) Complete all blanks	1
	b.) Acknowledge all addenda	9
BF-11	a.) Fill in all Bid Bond blanks	ম্জ্র্ড্র
	b.) Signatures required	
	c.) Corporate Seal if required	
	d.) Dated	
	e.) Attach Surety Agents Power of Attorney or Certified or	
	cashier's check made out to the Manager of Revenue	
	referencing Bidder's Company and Contract Number.	
BF-12- BF-15	a.) Each bidder, as a condition of responsiveness to this	D'
	solicitation, shall complete and return the "Diversity and	
	Inclusiveness in City Solicitations Information Request	
	Form" with their Bid.	
BF-16 – BF-39	a.) Attachment A – See DBE Enclosure Checklist	Ø
BF-40 – BF-46	Each bidder, as a condition of responsiveness to this solicitation, shall complete and return all certifications.	V

Textura ® Construction Payment Management System (CPM System)

Contractor recognizes and agrees that it shall be required to use the Textura® Construction Payment Management System (CPM System) for this Project. All fees associated with the CPM System are to be paid by the Contractor for billings for work performed. Bidders are required, when preparing a bid, to enter the price of the CPM service on the line provided for the service. The fee is all inclusive of all subcontractor, project and subscription fees associated with the CPM system. The bidder will calculate the fee based on a percentage of their total bid, and then should include it on the line item provided in the bid form labeled "Textura® Construction Payment Management System Fee". This expense becomes part of the contract and billable to the City. All costs including but not limited to costs associated with training, entering data or utilizing Textura other than the Textura Construction Payment Management System Fee are overhead and shall not be reimbursed by the City. Contractor is responsible for any tax on Textura fee. As with other taxes, the City will not reimburse Contractor for this cost and therefore this cost should be included in Contractor's bid. Textura will invoice the awarded contractor directly.

PROJECT SIZE	FEE (% OF BID)
< \$1,000,000	0.22% (.0022)
\$1,000,001 - \$5,000,000	0.17% (.0017)
\$5,000,001 - \$20,000,000	0.12% (.0012)
\$20,000,001 - \$50,000,000	0.10% (.0010)
\$50,000,001 - \$100,000,000	0.08% (.0008)
\$100,000,001 - \$500,000,000	0.05% (.0005)
> \$500,000,000	CONTACT TEXTURA FOR PROGRAM PRICING

For more information:

http://www.denvergov.org/content/denvergov/en/contract-administration/bidding-process.html

CITY AND COUNTY OF DENVER

DEPARTMENT OF PUBLIC WORKS

Wastewater Management Division

BID FORM AND SUBMITTAL PACKAGE ACKNOWLEDGMENT

CONTRACT NO. 201631819

33rd Street Outfall (31st and 36th Street Outfall Project) Segment - Blake St to Arapahoe St.

BIDDER:	Concrete vvorks of Colorado, Inc.	
	(Legal Name per Colorado Secretary of State)	
ADDRESS:	1260 Rock Creek Circle	
	Lafayette, CO 80026	

The undersigned bidder states that the undersigned bidder has received and had an opportunity to fully and thoroughly examine a complete set of the Contract Documents for CONTRACT NO. 201631819, 33RD STREET OUTFALL (31ST AND 36TH STREET OUTFALL PROJECT) SEGMENT - BLAKE ST. TO ARAPAHOE ST., made available to the undersigned bidder pursuant to Notice of Invitation for Bids dated December 2, 2016.

The undersigned bidder acknowledges that a complete and final set of the Contract Documents for the referenced Project, the components of which are identified below, are bound and maintained as the record set of Contract Documents by the Contract Administration Division of the Department of Public Works and that this Record Set is available for examination by the undersigned

The undersigned bidder, having thoroughly examined each of the components identified below and contained in Contract Documents, HEREBY SUBMITS THIS BID FORM AND SUBMITTAL PACKAGE, fully understanding that the Contract Documents, as defined in Paragraph I of the contract, including this executed Bid Form and Submittal Package, constitute all of the terms, conditions and requirements upon which this submission is based and further understanding that, by submission of this Bid Form and Submittal Package, the City shall rely on the representations and commitments of the undersigned bidder contained herein.

The following completed documents comprising this Bid Form and Submittal Package will be included with and, by this reference, are expressly incorporated into the Contract Documents specified at Paragraph 1 of the Contract:

Bid Form and Submittal Package Acknowledgment

Form Bid Form

Bid Bond

Attachment A

Part A Specified Federal Requirements Part B DBE Program Requirements

Form of DBE Participation

DBE Affidavit

DBE Prime Affidavit (if applicable)

DBE Schedule of DBE Participation

DBE Letter(s) of Intent

Solicitation Statistics

Employer Certification of Workforce Disadvantage Business Outreach

Unavailability Certification

Certification Regarding Debarment

Certification of Compliance with Prohibition Against

Employment of Illegal Aliens

Certification Regarding Lobbying

Buy America Certification

Organizational Conflict of Interest Certification

Bidders Representation Regarding Contingent Fee

The following designated documents constitute that portion of the Contract Documents made available by the Notice of Invitation for Bids, but not included in the Bid Form and Submittal Package:

Notice of Invitation for Bids Instructions to Bidders Addenda (as applicable)

Equal Employment Opportunity Provisions (Appendix A and Appendix F)

Contract Form

General Contract Conditions Special Contract Conditions

Performance and Payment Bond

Notice to Apparent Low Bidder

Notice to Proceed

Contractor's Certification of Payment Form

Final/Partial Lien Release Form

Final Receipt

Change Orders (as applicable)

Federal Requirements (as applicable)

Prevailing Wage Rate Schedule(s)

Technical Specifications

Contract Drawings

Accepted Shop Drawings

Insurance Provision

The undersigned bidder expressly assumes responsibility for the complete contents of these designated documents as bound together with the Bid Form and Submittal Package submitted herewith and designated the Contract Documents.

IN WITNESS WHEREOF, the undersigned bidder has signed personally or by duly authorized officer or agent and duly attested.

BIDDER:

Name: Concrete Works of Colorado, Inc.

Dan Ann Flatabas

Title: Contracts Manager

ATTEST:

[SEAL]

CITY AND COUNTY OF DENVER

DEPARTMENT OF PUBLIC WORKS Wastewater Management Division

BID FORM

CONTRACT NO. 201631819

33rd Street Outfall (31st and 36th Street Outfall Project) Segment - Blake St. to Arapahoe St.

TO:

The Manager of Public Works City and County of Denver c/o Contract Administration 201 West Colfax, Dept. 614 Denver, Colorado 80202

BIDDER Concrete Works of Colorado, Inc.

The Undersigned Bidder, having examined the plans, technical specifications, and remainder of the proposed Contract Documents as designated and enumerated in the General and Special Contract Conditions and any and all addenda thereto; having investigated the location of and conditions affecting the proposed Work; and being acquainted with and fully understanding the extent and character of the Work covered by this bid, and all factors and conditions affecting or which may be affected by Work, HEREBY SUBMITS THIS BID, pursuant to an advertisement of a Notice of Invitation for Bids as published on December 2, 2016, to furnish all required materials, tools, appliances, equipment and plant; to perform all necessary labor and to undertake and complete: CITY OF DENVER CONTRACT NO. 201631819, 33rd Street Outfall (31st and 36th Street Outfall Project) Segment - Blake St to Arapahoe St. in Denver, Colorado, in full accordance with and conformity to the Plans, Technical Specifications, and Contract Documents hereto attached or by reference made a part hereof, at and for the following price(s) set forth on this Bid Form.

The following documents, which taken as a whole constitute the Contract Documents for this Project, and which are incorporated herein, by reference, were made available to the Bidder as provided in the Advertisement of Notice of Invitation for Bids, were received by the bidder, and form the basis for this bid:

Advertisement of Notice of Invitation for Bids Instructions to Bidders Bid Bond Addenda (as applicable) DBE Enclosures Accepted Shop Drawings Certificate of Insurance Bid Form Contract Form General Contract Conditions Special Contract Conditions

Performance and Payment Bond Notice to Apparent Low Bidder

Notice to Proceed

Contractor's Certification of Payment Form

Final/Partial Lien Release Form

Final Receipt

Change Orders (as applicable)

Federal Requirements Construction Contracts Prevailing Wage Rate Schedule(s) Technical Specifications Contract Drawings Federal Certifications

Equal Employment Opportunity Provisions (RTD Appendix B and Appendices A, B, E and F

Bid Form

Pay Item #	Bid Item Description		stima Quant		Estimated Cost	
01-52.13	TEMPORARY OFF	ICE FACILITIES				
	at the unit price of \$	76,000.00	1	LS	\$	76,000.00
	Î.	ump sum				
2-1.2a	REMOVE 6" CONC	RETE CURB AND/OR				
	at the unit price of \$	5.00	3,100	LF	\$	15,500.00
	p	per linear foot				
2-1.4	REMOVE HANDICA	AP CONCRETE CURB RAMP				
	at the unit price of \$	3.00	1,175	SF	\$	3,525.00
	p	er square foot				
2-2.1	REMOVE CONCRE	TE SIDEWALK				
	at the unit price of \$	3.00	1,390	SF	\$	4,170.00
	_	er square foot	.,	<u>.</u>	-	4,170.00
2-2.2		TE DRIVEWAY PAVING				
2-2.2	at the unit price of \$	4.00	350	SF	\$	1,400.00
		er square foot	330	OI	φ	1,400.00
2-3.3	REMOVE CONCRE		0.400	0.5	4	10 000 00
	at the unit price of \$	3.00	3,400	SF	\$	10,200.00
		er square foot				
2-11.1a		8 8" SANITARY SEWER PIPE				
	at the unit price of \$	43.00	47	LF	\$_	2,021.00
	p	er linear foot				
2-11.2b		10" STORM SEWER PIPE				
	at the unit price of \$	40.00	322	LF	\$_	12,880.00
	p	er linear foot				
2-11.2e	REMOVE EXISTING	18" STORM SEWER PIPE				
	at the unit price of \$	40.00	701	LF	\$	28,040.00
	p	er linear foot				
2-11.2f		21" STORM SEWER PIPE	0.10			
	at the unit price of \$	40.00	212	LF	\$	8,480.00
	po	er linear foot				
2-11.2g		24" STORM SEWER PIPE				
	at the unit price of \$	40.00	466	LF	\$	18,640.00
	pe	er linear foot				

Pay Item #	Bid Item Description and Unit Price			Estimated Quantity		
2-11.4k	REMOVE 48" X 70 48" (span) x 72" (rise Street intersection	ut				
	at the unit price of \$	140.00	30	LF	\$	4,200.00
		per linear foot			-	
2-11.5c	ABANDON EXIST	ING 12" SEWER PIPE				
	at the unit price of \$	29.00	42	LF	\$	1,218.00
		per linear foot				A
2-12.2	REMOVE EXISTIN	IG STORM MANHOLE				
	at the unit price of \$	1,500.00	6	EA	\$	9,000.00
		each			_	
2-13.1	REMOVE EXISTIN	IG STORM INLET				
	at the unit price of \$	1,500.00	10	EA	\$	15,000.00
		each				
2-17.3	REMOVE AND RE	PLACE/RELOCATE SIGN				
	at the unit price of \$	387.00	43	EA	\$	16,641.00
		each				
2-17.7	RELOCATE EXIST	TING UTILITY				
		relocation in public ROW				
	at the unit price of \$	2,796.00	9	LS	\$_	25,164.00
		lump sum				
02-22.13	VIBRATION ASSE	SSMENT				
	at the unit price of \$	47,000.00	1	LS	\$	47,000.00
		lump sum				
3-2		ITAMINATED MATERIALS PAHOE DISPOSAL SITE				
	at the unit price of \$	15.00	38,000	TON	\$	570,000.00
		per ton				
3-7a	HEALTH & SAFET	Y PLAN				
	at the unit price of \$	2,766.00	1	LS	\$	2,766.00
		lump sum				
3-7b	MATERIAL MANAG	GEMENT PLAN				
	at the unit price of \$	22,014.00	1	LS	\$	22,014.00
		lump sum				
5-2a	SUBGRADE MATE	RIAL (SELECT BACKFILL)				
	at the unit price of \$	20.00	10,400	TON	\$	208,000.00
		per ton	390 1 1	10		200,000.00

Section Sect	Bid Item Description and Unit Price				Estima Quant				
Description			DLLED	OW STREN	GTH MATERIAL	.S			112022
CRUSHED GRAVEL BASE COURSE (CDOT CLASS 6 ROAD BASE) 12" thick aggregate base course under road at the unit price of \$	he uni	he unit	price of	15	3.00	130	CY	\$	19,890.00
12" thick aggregate base course under road at the unit price of \$ 35.00				per cubic yar	^r d				
## at the unit price of \$ 35.00	ASS	ASS 6	ROAD	BASE)	•				
Per ton Per									
8-1.1b 6" DIP AWWA C151, CLASS 50 WATER LINE Potential waterline replacement at Walnut and Arapahoe at the unit price of \$ 250.00	ne uni	ne unit	price of		5.00	4,550) TON	\$_	159,250.00
Potential waterline replacement at Walnut and Arapahoe at the unit price of \$ 250.00				• > 20 (20 (20 (20 (20 (20 (20 (20 (20 (20					
at the unit price of \$ 250.00 40 LF \$	ential	ential w				E			
NSTALL 6" WATER VALVE			price of	25	0.00	40) LF	\$	10,000.00
Potential waterline replacement at Walnut and Arapahoe at the unit price of \$ 1,800.00 2 EA \$ 12-1.1 6" CURB AND GUTTER 2' PAN (CD0T T2, IIB) at the unit price of \$ 27.00 3,100 LF \$ per linear foot 12-1.8 HANDICAP CONCRETE CURB RAMP at the unit price of \$ 23.00 1,175 SF \$ per square foot 12-2.1 CONCRETE SIDEWALK at the unit price of \$ 11.00 1,390 SF \$ per square foot 12-5.1 CONCRETE DRIVEWAY PAVING at the unit price of \$ 14.00 350 SF \$ per square foot 12-5.5 CONCRETE ALLEY PAVING Minimum 8" thick at the unit price of \$ 16.00 3,400 SF \$ per square foot 12-5.5 Per square foot				per linear foo	t			-	
12-1.1 6" CURB AND GUTTER 2' PAN (CD0T T2, IIB) at the unit price of \$ 27.00 3,100 LF \$ per linear foot	ential v	ential w pahoe	/aterline	eplacement at	Walnut and				
12-1.1 6" CURB AND GUTTER 2' PAN (CD0T T2, IIB) at the unit price of \$ 27.00	ne unit	ne unit p	price of	1,80	0.00	. 2	EA	\$	3,600.00
at the unit price of \$ 27.00 3,100 LF \$ per linear foot 12-1.8 HANDICAP CONCRETE CURB RAMP at the unit price of \$ 23.00 1,175 SF \$ per square foot 12-2.1 CONCRETE SIDEWALK at the unit price of \$ 11.00 1,390 SF \$ per square foot 12-5.1 CONCRETE DRIVEWAY PAVING at the unit price of \$ 14.00 350 SF \$ per square foot 12-5.5 CONCRETE ALLEY PAVING Minimum 8" thick at the unit price of \$ 16.00 3,400 SF \$ per square foot				each					
per linear foot 12-1.8 HANDICAP CONCRETE CURB RAMP at the unit price of \$ 23.00	CURI	CURB	AND (UTTER 2' PA	N (CD0T T2, IIE	3)			
HANDICAP CONCRETE CURB RAMP at the unit price of \$ 23.00	e unit	ne unit p	price of	2	7.00	3,100	LF	\$	83,700.00
at the unit price of \$ 23.00 1,175 SF \$ per square foot 12-2.1 CONCRETE SIDEWALK at the unit price of \$ 11.00 1,390 SF \$ per square foot 12-5.1 CONCRETE DRIVEWAY PAVING at the unit price of \$ 14.00 350 SF \$ per square foot 12-5.5 CONCRETE ALLEY PAVING Minimum 8" thick at the unit price of \$ 16.00 3,400 SF \$ per square foot				per linear foot	t				
per square foot 12-2.1 CONCRETE SIDEWALK at the unit price of \$ 11.00 1,390 SF \$ per square foot 12-5.1 CONCRETE DRIVEWAY PAVING at the unit price of \$ 14.00 350 SF \$ per square foot 12-5.5 CONCRETE ALLEY PAVING Minimum 8" thick at the unit price of \$ 16.00 3,400 SF \$ per square foot	NDIC	NDICA	P CON	CRETE CURE	BRAMP				
12-2.1 CONCRETE SIDEWALK at the unit price of \$ 11.00 1,390 SF \$ per square foot 12-5.1 CONCRETE DRIVEWAY PAVING at the unit price of \$ 14.00 350 SF \$ per square foot 12-5.5 CONCRETE ALLEY PAVING Minimum 8" thick at the unit price of \$ 16.00 3,400 SF \$ per square foot	e unit	ne unit p	price of	23	3.00	1,175	SF	\$	27,025.00
at the unit price of \$ 11.00 1,390 SF \$ per square foot 12-5.1 CONCRETE DRIVEWAY PAVING at the unit price of \$ 14.00 350 SF \$ per square foot 12-5.5 CONCRETE ALLEY PAVING Minimum 8" thick at the unit price of \$ 16.00 3,400 SF \$ per square foot				per square fo	ot				
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12-5.1 CONCRETE DRIVEWAY PAVING at the unit price of \$ 14.00 350 SF \$ per square foot 12-5.5 CONCRETE ALLEY PAVING Minimum 8" thick at the unit price of \$ 16.00 3,400 SF \$ per square foot	e unit	e unit p	orice of	1	1.00	1,390	SF	\$	15,290.00
at the unit price of \$				per square for	ot				
per square foot 12-5.5 CONCRETE ALLEY PAVING Minimum 8" thick at the unit price of \$ 16.00 3,400 SF \$ per square foot	NCRE	NCRET	TE DRI	EWAY PAVI	NG				
CONCRETE ALLEY PAVING Minimum 8" thick at the unit price of \$ 16.00 3,400 SF \$ per square foot	e unit	e unit p	orice of		14.00	350	SF	\$	4,900.00
Minimum 8" thick at the unit price of \$ 16.00 3,400 SF \$ per square foot				per square for	ot				
per square foot				Y PAVING					
	e unit	e unit p	orice of		16.00	3,400	SF	\$	54,400.00
16-1 SECURITY FENCE				per square foo	ot				
6' high			Y FENC	E					
at the unit price of \$ 6.00 1,000 LF \$	e unit	e unit p	orice of S		6.00	1,000	LF	\$	6,000.00
per linear foot				per linear foot					

Pay Item #	Bid Item Descrip		stimated Quantity		Estimated Cost	
20-2ce	ASPHALT SURFA N=100, 64-22.	ACE COURSE, SX, RAP 20%,				
	at the unit price of \$	5.00	15,600	SY-IN	\$	78,000.00
		per square yard inch				
20-3ce	ASPHALT BASE 64-22.	COURSE, S, RAP 20%, N=100,				
	at the unit price of \$	5.00	46,700	SY-IN	\$	233,500.00
		per square yard inch				
20-4	ASPHALT ROTO	MILL				
	at the unit price of \$	5.00	1,020	SY-IN	\$	5,100.00
		per square yard inch				
34-2.3d	15" DIAMETER C	-76 RCP, CLASS III				
	at the unit price of \$		116	LF	\$	18,212.00
		per linear foot			1.012	
34-2.3e	18" DIAMETER C	-76 RCP, CLASS III				
	at the unit price of \$	160.00	76	LF	\$	12,160.00
		per linear foot				
34-2.3g	24" DIAMETER C	-76 RCP, CLASS III				
	at the unit price of \$	180.00	60	LF	\$	10,800.00
		per linear foot				
34-6.2	PRECAST RCBC DESIGN)	(SPECIAL SIZE AND/OR				
		precast (<10 ft cover)				
	at the unit price of \$	1,969.00	267	LF	\$_	525,723.00
		per linear foot				
34-6.2	PRECAST RCBC DESIGN)	(SPECIAL SIZE AND/OR				
		precast (<10 ft cover)				
	at the unit price of \$	1,897.00	496	LF	\$	940,912.00
		per linear foot				
34-6.2	PRECAST RCBC (DESIGN)	(SPECIAL SIZE AND/OR				
		precast (>10 ft cover)				
	at the unit price of \$	2,031.00	600	LF	\$ 1	,218,600.00
		per linear foot				

Pay Item #	Bid Item Description		stima Quan		Estimated Cost	
34-7.1a	8" DIAMETER AST	M D-3034 SDR 35, PVC PIPE	-			
		onnection to box around sta.				
	at the unit price of \$	124.00	10	LF	\$	1,240.00
	p	er linear foot				
34-12.1a	4' DIAMETER PREC TYPE A BASE & CO	CAST MANHOLE WITH DNCENTRIC CONE				
		ser at Walnut Junction Structure				
	at the unit price of \$	2,309.00	1	EA	\$	2,309.00
	е	ach				
34-12.2a	5' DIAMETER PREC TYPE A BASE & CO stand alone manhole	CAST MANHOLE WITH DNCENTRIC CONE				
	at the unit price of \$	5,003.00	2	EA	\$	10,006.00
	70 No. 3	ach	_		Ψ_	10,000.00
34-12.2a	5' DIAMETER PREC TYPE A BASE & CC 5' diameter manhole ris at the unit price of \$		6	EA	\$	22,350.00
	ea	ach				
34-12.7	Walnut Transition Struc	PECIAL STRUCTURE cture				
	at the unit price of \$	162,860.00	1	EA	\$	162,860.00
	ea	ach				
34-15.1a	SANITARY SEWER VERIFICATION	TAP LOCATION AND				
	at the unit price of \$	498.00	25	EA	\$	12,450.00
	ea	ach				
34-15.3	UTILITY EXPLORAT	ORY INVESTIGATION				
	at the unit price of \$	463.00	40	EA	\$	18,520.00
	ea	ach				
34-16.1a	#14 INLET (L=6')					
200 00000	at the unit price of \$	8,845.00	7	EΑ	\$	61,915.00
	ea	ich			·	01,010.00
34-16.1b	#14 INLET (L=9')					
O-10.10	at the unit price of \$	10,248.00	1	EA	\$	10,248.00
		ch			-	

Pay Item #	Bid Item Descrip	Estimated Quantity			Estimated Cost	
34-16.3a	DOUBLE #16 IN	LET WITH OPEN THROAT				
	at the unit price of \$	9,444.00	4	EA	\$	37,776.00
		each				
40-1	SEEDING AND M	ULCHING				
	at the unit price of \$	0.22	10,000	SF	\$	2,200.00
		per square foot				
40-3	SODDING					
	at the unit price of \$	1.00	10,000	SF	\$	10,000.00
		per square foot				
40-4b	RELOCATE EXIS	ITING SPRINKLER LINE				
	at the unit price of \$	12.00	200	LF	\$	2,400.00
		per linear foot				
40-10	REPLACE BUSHI	ES AND/OR SHRUBS				
	at the unit price of \$	83.00	10	EA	\$	830.00
		each			30/4	
41-1	TRAFFIC CONTR	OL				
	at the unit price of \$	130,000.00	1	LS	\$	130,000.00
		lump sum				The second second
43-1d	STORM WATER N See SCS 23.0	MANAGEMENT (SCENARIO 4)				
	at the unit price of \$	104,173.00	1	LS	\$	104,173.00
		lump sum				
45-2	QUALITY CONTR	OL TESTING				
	at the unit price of \$	21,794.00	1	LS	\$	21,794.00
		lump sum			5.V-	
46-2	EPOXY PAVEMEN	NT MARKING				
	at the unit price of \$	17.00	150	SF	\$	2,550.00
		per square foot			_	\$100 B. D. C.
47-1	CONSTRUCTION					
77-1	at the unit price of \$	30,000.00	1	LS	\$	30,000.00
		lump sum			_	
47-2	SURVEY MONUM	100 SEC. 200-200-200				
+1-2	at the unit price of \$	553.00	15	⊏Δ	•	8,295.00
¥		each	13		Ψ	0,290.00
EO 1	MODULIZATION					
50-1	MOBILIZATION at the unit price of \$		4	10	¢	
	142	150,000.00	1	LS	\$_	150,000.00
		lump sum				

Bid Form - Add Alternate #1

Pay Item #	Bid Item Descripti	Estimated Quantity			Estimated Cost	
01-52.13	TEMPORARY OFF	ICE FACILITIES				
	at the unit price of \$	4,602.00	1	LS	\$	4,602.00
	ĵ	lump sum				
2-1.2a	REMOVE 6" CONC	CRETE CURB AND/OR				
	at the unit price of \$	5.00	970	LF	\$	4,850.00
	,	per linear foot				- 1. To 1. T
2-1.4	REMOVE HANDICA	AP CONCRETE CURB RAMP				
	at the unit price of \$	3.00	450	SF	\$	1,350.00
	ķ	per square foot			***	
2-2.1	REMOVE CONCRE					
	at the unit price of \$	3.00	900	SF	\$	2,700.00
		per square foot		٥,	_	2,700.00
2-3.3		TE ALLEY PAVING				
2 0.0	at the unit price of \$	3.00	770	SF	\$	2,310.00
	-	per square foot	770	Oi	Ψ_	2,010.00
2-11.2b						
2-11.20	at the unit price of \$	G 10" STORM SEWER PIPE	95	LF	\$	0.000.00
	ATT promited the desired at Artesta, a territorial and the second at the Artesta and the Artesta and the Artesta and Artesta a	40.00 per linear foot	95	LF	Φ	3,800.00
0.44.0-						
2-11.2e	at the unit price of \$	G 18" STORM SEWER PIPE	200		•	
	1	40.00	300	LF	\$_	12,000.00
	150	per linear foot				
2-12.2		S STORM MANHOLE				
	at the unit price of \$	1,500.00	1	EA	\$	1,500.00
	е	each				
2-13.1	REMOVE EXISTING	AT HARRIS DOWN				
	at the unit price of \$	1,500.00	3	EA	\$	4,500.00
	е	each				
2-17.3		PLACE/RELOCATE SIGN				
	at the unit price of \$	387.00	12	EA	\$	4,644.00
	е	ach				
2-17.7	RELOCATE EXISTI					
		elocation in public ROW				
	at the unit price of \$	2,800.00	2	LS	\$	5,600.00
	lu	ımp sum				

Bid Item Description a	Estimated Quantity			Estimated Cost	
VIBRATION ASSESSMENT					
at the unit price of \$	14,207.00	1	LS	\$	14,207.00
lump	sum				
at the unit price of \$	15.00	2,500	TON	\$	37,500.00
per to	on				
HEALTH & SAFETY PL	AN				
at the unit price of \$	2,766.00	1	LS	\$	2,766.00
lump	sum				
MATERIAL MANAGEM	ENT PLAN				
at the unit price of \$	14,049.00	1	LS	\$	14,049.00
lump	sum				
SUBGRADE MATERIAL	(SELECT BACKFILL)				
at the unit price of \$	20.00	2,000	TON	\$	40,000.00
per to	n				
CONTROLLED LOW ST	RENGTH MATERIALS				
at the unit price of \$	153.00	100	CY	\$	15,300.00
per cu	bic yard				
CLASS 6 ROAD BASE)		1,200	TON	\$_	42,000.00
per to	n				
6" DIP AWWA C151, CL at the unit price of \$	ASS 50 WATER LINE 250.00	100	LF	\$	25,000.00
per lin	ear foot				
	LVE				
at the unit price of \$	1,800.00	4	EA	\$	7,200.00
each					
6" CURB AND GUTTER at the unit price of \$	2' PAN (CD0T T2, IIB) 27.00	970	LF	\$	26,190.00
per line	ear foot				
HANDICAP CONCRETE	CURB RAMP				
at the unit price of \$	23.00	450	SF	\$	10,350.00
per sa	uare foot	0.000	10/55		
	VIBRATION ASSESSM at the unit price of \$ Iump HAULING OF CONTANTO DENVER/ARAPAHO (DADS) at the unit price of \$ per to HEALTH & SAFETY PL at the unit price of \$ Iump MATERIAL MANAGEM at the unit price of \$ per to CONTROLLED LOW ST (CLSM) at the unit price of \$ per cu CRUSHED GRAVEL BACLASS 6 ROAD BASE) 12" thick aggregate base co at the unit price of \$ per to 6" DIP AWWA C151, CL at the unit price of \$ per line INSTALL 6" WATER VA at the unit price of \$ each 6" CURB AND GUTTER at the unit price of \$ per line HANDICAP CONCRETE at the unit price of \$	HAULING OF CONTAMINATED MATERIALS TO DENVER/ARAPAHOE DISPOSAL SITE (DADS) at the unit price of \$ 15.00 per ton HEALTH & SAFETY PLAN at the unit price of \$ 2,766.00 lump sum MATERIAL MANAGEMENT PLAN at the unit price of \$ 14,049.00 lump sum SUBGRADE MATERIAL (SELECT BACKFILL) at the unit price of \$ 20.00 per ton CONTROLLED LOW STRENGTH MATERIALS (CLSM) at the unit price of \$ 153.00 per cubic yard CRUSHED GRAVEL BASE COURSE (CDOT CLASS 6 ROAD BASE) 12" thick aggregate base course under road at the unit price of \$ 35.00 per ton 6" DIP AWWA C151, CLASS 50 WATER LINE at the unit price of \$ 250.00 per linear foot INSTALL 6" WATER VALVE at the unit price of \$ 1,800.00 each 6" CURB AND GUTTER 2" PAN (CDOT T2, IIB) at the unit price of \$ 27.00 per linear foot HANDICAP CONCRETE CURB RAMP	VIBRATION ASSESSMENT at the unit price of \$ 14,207.00 1 Iump sum HAULING OF CONTAMINATED MATERIALS TO DENVER/ARAPAHOE DISPOSAL SITE (DADS) at the unit price of \$ 15.00 2,500 Per ton HEALTH & SAFETY PLAN at the unit price of \$ 2,766.00 1 Iump sum MATERIAL MANAGEMENT PLAN at the unit price of \$ 14,049.00 1 Iump sum SUBGRADE MATERIAL (SELECT BACKFILL) at the unit price of \$ 20.00 2,000 Per ton CONTROLLED LOW STRENGTH MATERIALS (CLSM) at the unit price of \$ 153.00 100 Per cubic yard CRUSHED GRAVEL BASE COURSE (CDOT CLASS 6 ROAD BASE) 12" thick aggregate base course under road at the unit price of \$ 35.00 1,200 Per ton 6" DIP AWWA C151, CLASS 50 WATER LINE at the unit price of \$ 1,800.00 4 the unit price of \$ 1,800.00 4 Each 6" CURB AND GUTTER 2' PAN (CDOT T2, IIB) at the unit price of \$ 27.00 970 Per linear foot HANDICAP CONCRETE CURB RAMP at the unit price of \$ 23.00 450	VIBRATION ASSESSMENT at the unit price of \$ 14,207.00 1 LS Iump sum HAULING OF CONTAMINATED MATERIALS TO DENVER/ARAPAHOE DISPOSAL SITE (DADS) at the unit price of \$ 15.00 2,500 TON per ton HEALTH & SAFETY PLAN at the unit price of \$ 2,766.00 1 LS Iump sum MATERIAL MANAGEMENT PLAN at the unit price of \$ 14,049.00 1 LS Iump sum SUBGRADE MATERIAL (SELECT BACKFILL) at the unit price of \$ 20,00 2,000 TON per ton CONTROLLED LOW STRENGTH MATERIALS (CLSM) at the unit price of \$ 153.00 100 CY per cubic yard CRUSHED GRAVEL BASE COURSE (CDOT CLASS 6 ROAD BASE) 12" thick aggregate base course under road at the unit price of \$ 35.00 1,200 TON per ton 6" DIP AWWA C151, CLASS 50 WATER LINE at the unit price of \$ 250.00 100 LF per linear foot INSTALL 6" WATER VALVE at the unit price of \$ 2,700 970 LF ach 6" CURB AND GUTTER 2" PAN (CDOT T2, IIB) at the unit price of \$ 2,700 970 LF per linear foot HANDICAP CONCRETE CURB RAMP at the unit price of \$ 23.00 450 SF	VIBRATION ASSESSMENT at the unit price of \$ 14,207.00

Pay Item #	Bid Item Descrip	otion and Unit Price		Estima Quant		Estimated Cost
12-1.8		CRETE CURB RAMP				
	fruncated domes at	rete curb ramp including offwhite t NW corner Curtis and Arapahoe				
	at the unit price of		90) SF	\$	1,980.00
		per square foot			Ψ_	1,500.00
12-2.1	CONCRETE SID	34 THE STATE OF TH				
12-2.1	at the unit price of \$		900) SF	\$	0.000.00
	at the ant price of	The second of the second secon	900) or	Φ_	9,900.00
10.01		per square foot				
12-2.1	CONCRETE SIDI	EWALK valk at NW corner Curtis and				
	Arapahoe	alk at NW corner Curtis and				
	at the unit price of \$	13.00	230	SF	\$	2,990.00
		per square foot			37	V
12-5.5	CONCRETE ALL	EY PAVING				
	Minimum 8" thick					
	at the unit price of \$	14.00	770	SF	\$	10,780.00
		per square foot				
16-1	SECURITY FENC	E				
	6' high					
	at the unit price of \$	6.00	300	LF	\$	1,800.00
		per linear foot				
20-2ce	ASPHALT SURFA	ACE COURSE, SX, RAP 20%,				
	N=100, 64-22.	, , , , , , , ,				
	at the unit price of \$	5.00	4,000	SY-IN	\$	20,000.00
		per square yard inch				
20-3ce	ASPHALT BASE	COURSE, S, RAP 20%, N=100,				
	64-22.					
	at the unit price of \$	5.00	12,000	SY-IN	\$	60,000.00
		per square yard inch				
20-4	ASPHALT ROTO	MILL				
	at the unit price of \$	5.00	150	SY-IN	\$	750.00
		per square yard inch				
34-2.3d	15" DIAMETER C	-76 RCP, CLASS III				
	at the unit price of \$	157.00	61	LF	\$	9,577.00
		per linear foot				
34-2.3e	18" DIAMETER C	-76 RCP, CLASS III				
=	at the unit price of \$	163.00	20	LF	\$	3,260.00
	in containing	per linear foot	20	-1	Ψ	0,200.00

Pay Item #	Bid Item Descripti	on and Unit Price		Estimated Quantity		Estimated Cost
34-2.3g	24" DIAMETER C-7	76 RCP, CLASS III				
	at the unit price of \$	180.00	30	LF	\$	5,400.00
	k	per linear foot			-	101
34-6.2	DESIGN)	SPECIAL SIZE AND/OR				
	10' x 8' precast box cu					
	at the unit price of \$	2,031.00	340	LF	\$	690,540.00
	p	er linear foot				
34-12.2a	5' DIAMETER PREC TYPE A BASE & Co stand alone manhole	CAST MANHOLE WITH ONCENTRIC CONE				
	at the unit price of \$	5 000 00	1	Ε.Δ	ø	
	- A	5,003.00	1	EA	\$_	5,003.00
2		ach				
34-12.2a	TYPE A BASE & CO					
	5' diameter manhole ri			1202-06	1920	
	at the unit price of \$	3,725.00 ach	2	EA	\$	7,450.00
34-15.1a	SANITARY SEWER VERIFICATION at the unit price of \$	TAP LOCATION AND 830.00	5	ΕA	\$	4,150.00
	ea	ach				
34-15.3	UTILITY EXPLORAT	TORY INVESTIGATION				
	at the unit price of \$	347.00	15	EA	\$	5,205.00
	ea	ach			Ψ	0,200.00
34-16.1a						
54-10.1a	#14 INLET (L=6') at the unit price of \$	8,845.00	2	Ε.Δ	•	00 505 00
	, , , , , , , , , , , , , , , , , , ,		3	EA	>	26,535.00
		ach				
34-16.1b	#14 INLET (L=9')					
	at the unit price of \$	10,248.00	1	EA	\$	10,248.00
	ea	ach				
10-1	SEEDING AND MUL	CHING				
	at the unit price of \$	1.00	2,400	SF	\$	2,400.00
	ре	er square foot				
10-3	SODDING					
	at the unit price of \$	2.00	2,400	SF	\$	4,800.00
			2,400	SF	φ	4,000.00

Pay Item #	Bid Item Description	on and Unit Price		stima Quant		Estimated Cost
40-4b	RELOCATE EXISIT	ING SPRINKLER LINE				
	at the unit price of \$	19.00	50	LF	\$	950.00
	р	er linear foot				
40-10	REPLACE BUSHES	S AND/OR SHRUBS				
	at the unit price of \$	83.00	3	EA	\$	249.00
	е	ach				
41-1	TRAFFIC CONTRO	L				
	at the unit price of \$	19,550.00	1	LS	\$	19,550.00
	lu	ımp sum			-	
43-1d	STORM WATER MA	ANAGEMENT (SCENARIO 4)				
	at the unit price of \$	18,665.00	1	LS	\$	18,665.00
	fu	imp sum				
45-2	QUALITY CONTRO	L TESTING				
	at the unit price of \$	5,629.00	1	LS	\$	5,629.00
	lu	mp sum				
16-2	EPOXY PAVEMENT	MARKING				
	at the unit price of \$	17.00	50	SF	\$	850.00
	pe	er square foot				
1 7-1	CONSTRUCTION SI	URVEYING				
	at the unit price of \$	7,301.00	1	LS	\$	7,301.00
	lui	mp sum				
17-2	SURVEY MONUMEN	NTATION				
	at the unit price of \$		2	EA	\$	1,106.00
	ea	ach			· /	

		Also P
		330.837.00
Bid Items Total Amount (I	Fifty-nine (59) items 01-52.13 thru 50-1)	s 5,306,989.00
Textura ® Fee from table of	on Page BF-3 0.12 % of Bid Items Total Amount	s 6,368:38
Bid Items Total Amount p	lus Textura® Fee equals Total Bid Amount	\$ 5,306,989.00 5,330,837.00 x \$ 6,368.38 \$ 5,313,387.38
Total Bid Amount Five million, Three hund	dred Thirteen thousand, Three hundred Fifty-seven o	0 ./
	Dollars (\$_5,313,357.38	337,334.00)
Γο extend the storm sewer sys	stem and its associated facilities from Arapahoe St. to Cur d One thousand, Eight dollars and zero cents	
To extend the storm sewer sys	stem and its associated facilities from Arapahoe St. to Cur	
One million, Two hundred f the Manager mails a writter Jundersigned Bidder shall, in a Notice: (i) execute the attache	stem and its associated facilities from Arapahoe St. to Cur d One thousand, Eight dollars and zero cents	rtis St. on 33 rd Street. r's business address stated on this Bid Form, the d shall, within five (5) days after the date of the h the required proofs of insurance; and (iii)
One million, Two hundred If the Manager mails a writter Undersigned Bidder shall, in a Notice: (i) execute the attache furnish the required bond in the	Dollars (\$ 1,201,008.00 In Notice of Apparent Low Bidder, addressed to the Bidder accordance with the Contract Documents, be ready to, and addressed form of Contract in conformity with this bid; (ii) furnis	rtis St. on 33 rd Street. r's business address stated on this Bid Form, the d shall, within five (5) days after the date of the the required proofs of insurance; and (iii) y company acceptable to the Manager. Cut, is hereby offered as Surety on said bond. If
one million, Two hundred one million, Two hundred of the Manager mails a writter Undersigned Bidder shall, in a Notice: (i) execute the attache furnish the required bond in the Hartford Fire Insurance such surety is not approved by Enclosed with this bid is 5% of Total Amount Bid he property of the City as liquotifies the Undersigned Bidder of the City as liquotified by the City as liqu	Dollars (\$ 1,201,008.00 Notice of Apparent Low Bidder, addressed to the Bidde accordance with the Contract Documents, be ready to, and addressed form of Contract in conformity with this bid; (ii) furnishe sum of the full amount of this bid, executed by a surety ce Company , a corporation of the State of Connectice.	r's business address stated on this Bid Form, the d shall, within five (5) days after the date of the h the required proofs of insurance; and (iii) y company acceptable to the Manager. Cut, is hereby offered as Surety on said bond. If shall be furnished. Instructions to Bidders, in the amount of tof this bid guarantee is to be paid to and become onsidered to be the best by the City; (ii) the City signed Bidder fails to execute the Contract in the
one million, Two hundred one million, Two hundred one million, Two hundred on the Manager mails a writter Undersigned Bidder shall, in a Notice: (i) execute the attache furnish the required bond in the Hartford Fire Insurance such surety is not approved by Enclosed with this bid is 5% of Total Amount Bid the property of the City as liquotifies the Undersigned Bidd form prescribed or to furnish the content of the City as liquotifies the Undersigned Bidd form prescribed or to furnish the content of the city as liquotifies the Undersigned Bidd form prescribed or to furnish the city as the city of the City as liquotifies the Undersigned Bidd form prescribed or to furnish the city of the city as liquotifies the Undersigned Bidd form prescribed or to furnish the city of the city as liquotifies the Undersigned Bidd form prescribed or to furnish the city of the city of the city of the city as liquotifies the Undersigned Bidd form prescribed or to furnish the city of the c	Dollars (\$ 1,201,008.00 In Notice of Apparent Low Bidder, addressed to the Bidder accordance with the Contract Documents, be ready to, and addressed form of Contract in conformity with this bid; (ii) furnishe sum of the full amount of this bid, executed by a surety to the Manager, another and satisfactory surety company see a bid guarantee, as defined in the attached I . The Undersigned Bidder agrees that the entire amount unidated damages, and not as a penalty, if: (i) the bid is color that it is the Apparent Low Bidder; and (iii) the Undersigned Bidder agrees that the entire amount (iii) the Undersigned Bidder; and (iii) the Undersigned Bidder agrees that the entire amount (iii) the Undersigned Bidder agrees that the entire amount (iii) the Undersigned Bidder agrees that the entire amount (iii) the Undersigned Bidder agrees that the entire amount (iii) the Undersigned Bidder agrees that the entire amount (iii) the Undersigned Bidder agrees that the entire amount (iii) the Undersigned Bidder agrees that the entire amount (iii) the Undersigned Bidder agrees that the entire amount (iii) the Undersigned Bidder agrees that the entire amount (iii) the Undersigned Bidder agrees that the entire amount (iii) the Undersigned Bidder agrees that the entire amount (iii) the Undersigned Bidder agrees that the entire amount (iii) the Undersigned Bidder agrees that the entire amount (iii) t	r's business address stated on this Bid Form, the d shall, within five (5) days after the date of the h the required proofs of insurance; and (iii) company acceptable to the Manager. Cut, is hereby offered as Surety on said bond. If shall be furnished. Instructions to Bidders, in the amount of tof this bid guarantee is to be paid to and become onsidered to be the best by the City; (ii) the City signed Bidder fails to execute the Contract in the days after the date of such notification.
One million, Two hundred If the Manager mails a writter Undersigned Bidder shall, in a Notice: (i) execute the attache furnish the required bond in the The Hartford Fire Insurance such surety is not approved by Enclosed with this bid is 5% of Total Amount Bid the property of the City as liquentifies the Undersigned Bidd form prescribed or to furnish the The following persons, firms	Dollars (\$ 1,201,008.00 Dollars (\$ 1,201,008.	rtis St. on 33 rd Street. r's business address stated on this Bid Form, the d shall, within five (5) days after the date of the h the required proofs of insurance; and (iii) y company acceptable to the Manager. Cut, is hereby offered as Surety on said bond. If shall be furnished. Instructions to Bidders, in the amount of tof this bid guarantee is to be paid to and become onsidered to be the best by the City; (ii) the City signed Bidder fails to execute the Contract in the days after the date of such notification. Let in this bid:

The Undersigned Bidder proposes to subcontract the following Work in accordance with General Contract Conditions, Title 5, SUBCONTRACTS, and represents that, to the greatest degree practical, all subcontractors known at the time of bid submittal have been identified.

Item of Work	Percent (%) of	Proposed Subcontractor and Address
	Total;	
Asphalt milling	Work	Alpha Milling Company
Aspiral Hilling	.015%	6015 W 56th Ave., Arvada, CO 80002
Dayoment madring aire releasts	0.200/	Colorado Barricade Co.
Pavement marking, sign relocate	0.29%	2295 S. Lipan St., Denver, CO 80223
		HCL Engineering
Surveying	0.55%	9570 Kingston Ct., Ste 310, Englewood, CO 80112
		J.P. Meyer Trucking & Construction, Inc.
Trucking/hauling	10.00%	21999 Tall Grass Trail #5, Golden, CO 80403
		Martinez Associates , Inc.
Materials testing & vibration monitoring	1.21%	14828 W. 6th Ave., Unit 9-B, Golden, CO 80204
	i.i	Mile High Paving
Asphalt paving	5.29%	12200 A West 50th Pl., Wheat Ridge, CO 80033
Seeding, mulching, sodding, irrigation,		Smith Environmental & Engineering
stormwater mgmt, health & safety plan,	0.90%	1490 W. 121st Ave., Ste. 101, Westminster, CO 80234
material management plan	-	
3		
98-35	-	
	-	
95	3 1	
	-	

(Copy this page if additional room is required.)

The undersigned Bidder acknowledges the right of the City to reject any or all bids submitted, to waive informalities in bids and to readvertise this Project for bids.

The undersigned certifies that it has carefully checked all words and figures and all statements made in these Bid Forms.

This bid is submitted upon the declaration that neither, I (we), nor, to the best of my (our) knowledge, none of the members of my (our) firm or company have either directly or indirectly entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this bid.

Business	Address of Bidder: 1260 Rock Cre	eek Circle			
City, State	e, Zip Code: Lafayette, CO	80026			
Telephon	e Number of Bidder: 303-665-293	3, EXT 110	Fax No	303-665-2996	
Contact N	lame for this Project: ReaAnn Flet	cher			
Social Sec	curity or Federal Employer ID Numb	er of Bidder: 84	1-0819993		
Name and	l location of the last work of this kind	d herein contemp	lated upon which th	he Bidder was engaged:	
City and	County of Denver - North Univer	rsity Outfall (CC	N) Phase II (Con	tract No. 201418272)	
For inforn	nation relative thereto, please refer to);			
Name:	Jason Wennen, P.E City and C	ounty of Denve	Public Works		
Title:	Senior Engineer				
Address:_	201 W. Colfax, Dept. 614, Denve	er, CO 80202			
The under	signed acknowledges receipt, unders	tanding, and full	consideration of th	e following addenda to the Contract D	ocuments:
	Addenda Number_	1 I	Date1/23/17		
	Addenda Number_	2 <u>I</u>	Date 1/31/17		
	Addenda Number_	3 <u>r</u>	Date 1/2/17	3	
Dated this	day ofFebru	ary	, 20_17_		

ignature of Bidder:			
If an Individual:	N/A		doing business
	as		
If a Partnership:			
			,General Partner.
If a Corporation:	Concrete Works of	Colorado, Inc.	
	a Colorado	A 0 0	, Corporation,
	by: Kealer	Glitile	, its President.
Attest:	ReaAnn Fleto	her, Contracts M	anager, for: Marc Lenart, Preside
Secretary) & Had	M/L(Corporate Seal)		Works of Co
Joint Venture, signature of al	l Joint Venture participants.	11/4	0 = = 5
		IN/A	PE S
	p()or()Limited Liability		Corporation Corporation
Ву:		(If a Corpora	tion)
Title:		Attest:	
		Secretary	(Corporate Seal)
Firm:			
	p() or() Limited Liability (
Ву:		(If a Corporat	tion)
Title:		Attest:	
		Secretary	(Corporate Seal)
Firm:			
Corporation (), Partnership	() or () Limited Liability (ompany	
Ву:		(If a Corporat	ion)
Title:		Attest:	AC ACT
		Secretary	(Corporate Seal)

CITY AND COUNTY OF DENVER DEPARTMENT OF PUBLIC WORKS

Wastewater Management Division

BID BOND

KNOW ALL MEN BY THESE PRESENTS:	
THAT Concrete Works of Colorado, Inc.	, as Principal, and
Hartford Fire Insurance Company	, a corporation organized and existing under and by virtue of the
laws of the State of Connecticut , and a	uthorized to do business within the State of Colorado, as Surety, are held and firmly
of the bid	o, as Obligce, in full and just sum of Five percent (5%) of the total amount
and truly to be made, we bind ourselves, our heirs, these presents:), lawful money of the United States, for the payment of which sum, well executors, administrators, successors and assigns, jointly and severally, firmly by
	submitting its bid, dated February 14 , 2017, for the
construction of: Contract No. 201631819, 33rd	submitting its bid, dated <u>February 14</u> , 2017, for the Street Outfall (31st and 36th Street Outfall Project) Segment - Blake St. to
Arapahoe St., as set forth in detail in the Contrac	Documents for the City and County of Denver, Colorado, and said Obligee has
required as a condition for receiving said bid that the	e Principal deposit specified bid security in the amount of not less than five percent
(5%) of the amount of said bid, as it relates to work	to be performed for the City, conditioned that in event of failure of the Principal to
execute the Contract, for such construction and turn	ish required Performance and Payment Bond if the contract is offered him that said
	d damages, and not as a penalty, for the Principal's failure to perform.
prescribed form presented to him for signature, onto	hat if the aforesaid Principal shall, within the period specified therefor, on the into a written contract with the Obligee in accordance with his bid as accepted and
give Performance and Payment Bond with good and	sufficient surety or sureties, upon the form prescribed by the Obligee, for the faithful
performance and the proper fulfillment of said Conti	ract, or in the event of withdrawal of said bid within the time specified, or upon the
payment to the Obligee of the sum determined upon	herein, as liquidated damages and not as penalty, in the event the Principal fails to
enter into said contract and give such Performance a	and Payment Bond within the time specified, then this Obligation shall be null and
void, otherwise to remain in full force and effect.	
Signed, sealed and delivered this <u>14th</u>	day of February , 20 17 .
ATTEST	Concrete Works of Colorado, Inc.
Thomas a Olan	Principal O 11
TOTAL & CHOK	By Kialinstith
Secretary of the Committee	Rea Ann Fletcher
Works of	Title Contracts Manager
0011111111110	
(8)	Hartford Fire Insurance Company
[0_ ====	^
IIIn.	Surety
(01)	By Marley Chengs
Seal if Bidder is Copporation	Darlene Krings, Attorney-in-Fact
Attach Power-of-Attorney)	[SEAL]
ration (ower-or-rationicy)	[SEAL]

(Attach Power-of-Attorney)

POWER OF ATTORNEY

Direct Inquiries/Claims to: THE HARTFORD **BOND, T-12**

One Hartford Plaza Hartford, Connecticut 06155 Bond.Claims@thehartford.com

call: 888-266-3488 or fax: 860-757-5835 Agency Name: FLOOD & PETERSON INSURANCE INC

KNOW ALL PERSONS BY THESE PRESENTS THAT:

Agency Code: 34-340869 Hartford Fire Insurance Company, a corporation duly organized under the laws of the State of Connecticut Hartford Casualty Insurance Company, a corporation duly organized under the laws of the State of Indiana Hartford Accident and Indemnity Company, a corporation duly organized under the laws of the State of Connecticut Hartford Underwriters Insurance Company, a corporation duly organized under the laws of the State of Connecticut Twin City Fire Insurance Company, a corporation duly organized under the laws of the State of Indiana Hartford Insurance Company of Illinois, a corporation duly organized under the laws of the State of Illinois Hartford Insurance Company of the Midwest, a corporation duly organized under the laws of the State of Indiana Hartford Insurance Company of the Southeast, a corporation duly organized under the laws of the State of Florida

having their home office in Hartford, Connecticut, (hereinafter collectively referred to as the "Companies") do hereby make, constitute and appoint, up to the amount of Unlimited :

Katherine E. Dill, K'Anne E. Vogel, Loree Vanderhye, Melanie Lathouwers, Russell D. Lear, Chris Richmond, Russell Michels, Darlene Krings, Diane Clementson, Kelly T. Urwiller, Jennifer Winter, Wesley J. Butorac, Steven J. Blohm of GREELEY, Colorado

their true and lawful Attorney(s)-in-Fact, each in their separate capacity if more than one is named above, to sign its name as surety(ies) only as delineated above by X, and to execute, seal and acknowledge any and all bonds, undertakings, contracts and other written instruments in the nature thereof, on behalf of the Companies in their business of guaranteeing the fidelity of persons, guaranteeing the performance of contracts and executing or guaranteeing bonds and undertakings required or permitted in any actions or proceedings allowed by law.

In Witness Whereof, and as authorized by a Resolution of the Board of Directors of the Companies on May 6, 2015 the Companies have caused these presents to be signed by its Senior Vice President and its corporate seals to be hereto affixed, duly attested by its Assistant Secretary. Further, pursuant to Resolution of the Board of Directors of the Companies, the Companies hereby unambiguously affirm that they are and will be bound by any mechanically applied signatures applied to this Power of Attorney



John Gray, Assistant Secretary

M. Ross Fisher, Senior Vice President

STATE OF CONNECTICUT

COUNTY OF HARTFORD

Hartford

On this 11th day of January, 2016, before me personally came M. Ross Fisher, to me known, who being by me duly sworn, did depose and say: that he resides in the County of Hartford, State of Connecticut; that he is the Senior Vice President of the Companies, the corporations described in and which executed the above instrument; that he knows the seals of the said corporations; that the seals affixed to the said instrument are such corporate seals; that they were so affixed by authority of the Boards of Directors of said corporations and that he signed his name thereto by like authority.

Nora M. Stranko Notary Public My Commission Expires March 31, 2018

I, the undersigned, Assistant Vice President of the Companies, DO HEREBY CERTIFY that the above and foregoing is a true and correct copy of the Power of Attorney executed by said Companies, which is still in full force effective as of February 14, Signed and sealed at the City of Hartford.

















Kevin Heckman, Assistant Vice President



Office of Economic Development
Division of Small Business Opportunity
201 W. Colfax Ave, Dept. 907
Deriver, Co 80202
p: 720.913.1998
f: 720.913.1009
www.denvergov.org/dsbo

Diversity and Inclusiveness * in City Solicitations Information Request Form

Type in your response, print out, sign and date; or print out and complete manually. Please print legibly.

Denver Executive Order No. 101 establishes strategies between the City and private industry to use diversity and inclusiveness to promote economic development in the City and County of Denver and to encourage more businesses to compete for City contracts and procurements. The Executive Order requires, among other things, the collection of certain information regarding the practices of the City's contractors and consultants toward diversity and inclusiveness and encourages/requires City agencies to include diversity and inclusiveness policies in selection criteria where legally permitted in solicitations for City services or goods.

Answer each question below. Missing or incomplete responses will be recorded as "no", "not applicable", or "none". A proposal or response to a solicitation by a contractor/consultant that does not include this <u>completed</u> form shall be deemed non-responsive and rejected.

Business Email Address:reaar	nnf@cwc-email.com	
Please include the Email address City and County of Denver: _read		ting this solicitation for the
Agency Name:Arts and VenueAuditor OfficeCommunity PlanningDenver International AirportEnvironmental HealthFire Department	Purchasing DivisionHuman ServicesEconomic DevelopmentParks and RecreationPolice Department X_Public Works	Sheriff Department Technology Services Other
		ject) Segment - Blake St. to Arapahoe St.
BID / RFP No.: Contract No. 20		
Name of Contractor/Consultant: _		
What industry is your business? _	Heavy/Highway Construction	1
Address: 1260 Rock Creek Circle		
Lafayette, CO 80026		
Business Phone No.: 303-665-29 Business Facsimile No.: 303-66		

OED - Executive Order No. 101
Diversity and Inclusiveness in City Solicitations Information Request Form
Rev. 12/29/2015

 How many employees does your company employ?
1-10
1.1. How many of your company's employees are:
Full-time Part-Time
2. Do you have a Diversity and Inclusiveness Program? Yes No
If No, and your company size is less than 10 employees continue to question 11. Complete and sign the form.
If Yes, does it address: 2.1 Employment and retention? 2.2 Procurement and supply chain activities? 2.3 Customer service? Yes No No
3. Provide a detailed narrative of your company's diversity and inclusiveness principles and programs. This may include, for example, (i) diversity and inclusiveness employee training programs, equal opportunity policies, and the budget amount spent on an annual basis for workplace diversity; or (ii) diversity and inclusiveness training and information to improve customer service.
Concrete Works follows all State and Federal employment laws including posting all required EEO materials on bulletin boards in company common areas and jobsites. All new CWC employees are given a company handbook which includes the company EEO policies.
Does your company regularly communicate its diversity and inclusiveness policies to employees? If Yes, how does your company regularly communicate its diversity and Inclusiveness policies to employees? (select all that apply)
Employee Training Pamphlets Public EEO postings Other - Employee Handbook Not Applicable

5.	plans	respond your co	mpany <mark>m</mark> ay	have to adopt such a pro	gram.	
				tten company EEO policy a groups and to be diverse ir		
	subc	contractor	selection.			
	How o	often do	ou provide	training in diversity and i	nclusiven	ness principles?
	20	Monthly Quarterly		☐ Annually☒ Not Applicable		Other
.1	Wha	t percen	tage of the t	total number of employee	s genera	lly participate?
) - 25% 26 - 50%		☐ 51 - 75% ☐ 76 - 100%	X	Not Applicable
5	ne ar suppli	mount ar ier divers	d description ity and inclu	on of budget spent on an	annual ba	and outreach programs, and asis for procurement and
5	Conci	rete Work	d description ity and inclusion s actively utility projects. (on of budget spent on an	municipali projects' t	ities' MWBE and DBE
	Concilists for award	rete Work or all of o ded to sub	d description ity and inclusion s actively utility or projects. (ocontractors	on of budget spent on an ausiveness. lizes the state and various in the state and various in the state and various in the state and suppliers from the MWI and suppliers from the MWI dinclusiveness committee.	municipali projects' t BE and DI	ities' MWBE and DBE
	Concilists for award	rete Work or all of o ded to sub	d description ity and inclusive actively utility projects. (accontractors active activ	on of budget spent on an ausiveness. lizes the state and various in the state and various in the state and various in the state and suppliers from the MWI and suppliers from the MWI dinclusiveness committee.	municipali projects' t BE and DI	ities' MWBE and DBE total values are routinely BE lists.
. []] 2	Concilists for award	rete Work or all of o ded to sub u have a s, how of lonthly uarterly	d description ity and inclusive sactively utilizer projects. Of the contractors is diversity and then does it reduced that you ded that you	on of budget spent on an ausiveness. lizes the state and various in th	municipali projects' t BE and DI	ities' MWBE and DBE total values are routinely BE lists. Yes X No No Committee

9. Do you have	efforts?	Yes	X No		
10. Does your co	ompany integra ve/manager per	te diversity and inclu <mark>si</mark> or f <mark>o</mark> rmance evaluation pla	compete	ncies Yes	X No
11. Would you li program?	ke information (detailing how to impleme	ent a Dive	rsity and Inc	lusiveness
p. og.am.	Yes	X No			
If yes, please en	nail X0101@der	vergov.org.			
I attest that the my knowledge.	information repr	resented herein is true, o	correct and	d complete,	to the best of
Reale	Slitel		Feb. 14	‡, 2017	
Signature of Pers	son Completing	Form	Date		
ReaAnn Fletcher	, Contracts Mana	ger			
Printed Name of	Person Complet	ting Form			

NOTE: Attach additional sheets or documentation as necessary for a complete response.

^{*&}quot;Diversity and inclusiveness program" means a program that invites values, perspectives and contributions of people from diverse backgrounds, and integrates diversity into its hiring and retention policies, training opportunities, and business development methods to provide an equal opportunity for each person to participate, contribute, and succeed within the organization's workplace. "Diversity" encompasses a wide variety of human differences, including differences such as race, age, gender, gender identity, sexual orientation, ethnicity, physical disabilities, appearance, historically underutilized and disadvantaged persons, as well as social identities such as religion, marital status, socio-economic status, lifestyle, education, parental status, geographic background, language ability, and veteran status."

Attachment A

Civil Rights/Equal Employment Opportunity/ DBE Program Requirements

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PART A SPECIFIED FEDERAL REQUIREMENTS

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3.	GENERAL REQUIREMENTS	BF-21 through BF-26

APPENDICES

A. Form of DBE Participation Report

B. DBE Enclosures

Enclosure 1A	DBE Affidavit
Enclosure 1B	DBE Affidavit
Enclosure 2	Schedule of DBE Subcontractor Participation
Enclosure 3	Letter of Intent to Perform as a Subcontractor
Enclosure 4	Solicitation Statistics
Enclosure 5	Employer Certification of Workforce
Enclosure 6	Disadvantaged Business Outreach
Enclosure 7	DBE Unavailability Certification

PART A

SPECIFIED FEDERAL REQUIREMENTS

The Contractor shall perform its obligations and shall require each Subcontractor to perform its respective obligations under this Contract and the Subcontracts in accordance with, the following requirements. The Contractor shall insert this Part A, Attachment A and its enclosures (Civil Rights/WIN Requirements) into each Subcontract regardless of the tier.

1. CIVIL RIGHTS REQUIREMENTS APPLICABLE TO THE CONTRACT

1.1 CIVIL RIGHTS

Nondiscrimination - In accordance with Title VI of the Civil Rights Act, as amended, 42 U.S.C. § 2000d, section 303 of the Age Discrimination Act of 1975, as amended, 42 U.S.C. § 6102, section 202 of the Americans with Disabilities Act of 1990, 42 U.S.C. § 12132, and Federal transit law at 49 U.S.C. § 5332, Contractor agrees that it will not discriminate against any employee or applicant for employment because of race, color, religion, national origin, sex, age, or disability. In addition, Contractor agrees to comply with applicable Federal implementing regulations and other implementing requirements FTA may issue.

Equal Employment Opportunity - The following equal employment opportunity requirements apply to the underlying Contract:

Race, Color, Creed, National Origin, Sex- In accordance with Title VII of the Civil Rights Act, as amended, 42 U.S.C. § 2000e, and Federal transit laws at 49 U.S.C. § 5332, Contractor agrees to comply with all applicable equal employment opportunity requirements of U.S. Department of Labor (U.S. DOL) regulations, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor," 41 CFR Parts 60 et seq., (which implement Executive Order No. 11246, "Equal Employment Opportunity," as amended by Executive Order No. 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," 42 U.S.C. § 2000e note), and with any applicable Federal statutes, executive orders, regulations, and Federal policies that may in the future affect activities undertaken in the course of this Contract. Contractor agrees to take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, national origin, sex, or age. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. In addition, Contractor agrees to comply with any implementing requirements FTA may issue.

Age- In accordance with section 4 of the Age Discrimination in Employment Act of 1967, as amended, 29 U.S.C. § 623 and Federal transit law at 49 U.S.C. § 5332, Contractor agrees to refrain from discrimination against present and prospective employees for reason of age. In addition, Contractor agrees to comply with any implementing requirements FTA may issue.

Disabilities- In accordance with section 102 of the Americans with Disabilities Act, as amended, 42 U.S.C. § 12112, Contractor agrees that it will comply with the requirements of U.S. Equal Employment Opportunity Commission, "Regulations to Implement the Equal Employment Provisions of the Americans with Disabilities Act," 29 CFR Part 1630, pertaining to employment of persons with disabilities. In addition, Contractor agrees to comply with any implementing requirements FTA may issue.

PART B DISADVANTAGED BUSINESS ENTERPRISES PROGRAM REQUIRMENTS

1. DEFINITIONS

Unless the context requires otherwise, capitalized terms used in this Attachment A shall have the meanings given to them in the Instructions to Bidders. The following capitalized terms shall have the meanings set out below:

Contract Goal (DBE goal) means a goal determined by such factors as the type of work involved, the location of the work and the availability of the DBEs for the work of the particular contract.

Contractor means any Project Contractor that subcontracts with a DBE for performance of the Work, as applicable.

Commercially Useful Function occurs when a DBE firm is responsible for execution of the work of the contract and is carrying out its responsibilities by actually performing, managing and supervising the work involved in substance as contemplated by the federal regulations codified at 49 CFR Part 26. The DBE firm must also be responsible for materials and supplies used on the contract, for negotiating price, determining quality and quantity, ordering the material, installing (where applicable) and paying for the materials itself.

Disadvantaged Business Enterprise (DBE) means each of the following:

- that is at least 51% owned and controlled by one or more Socially and Economically Disadvantaged individuals or, in the case of a corporation, such individuals must own at least 51 percent of each class of voting stock outstanding and 51 percent of the aggregate of all stock outstanding; In the case of a partnership, 51 percent of each class of partnership interest must be owned by socially and economically disadvantaged individuals; In the case of a limited liability company, at least 51 percent of each class of member interest must be owned by socially and economically disadvantaged individuals;
 - (i) whose eligible principle(s) personal net worth does not exceed \$1,320,000. The personal net worth excludes the equity of the eligible principle's primary residence and the equity of the eligible principle's firm
 - (ii) whose average annual gross receipts for the past 3 years cannot exceed \$22.41 million
 - (iii) whose management and daily operations are controlled by one or more of the Socially and Economically Disadvantaged individuals who owns it; and
 - (iv) that is certified as a "Disadvantaged Business Enterprise" in the state's Unified Certification Program.

DBE Enclosures means the certificates and forms provided in Appendix B of this Attachment.

DBE Goals has the meaning given to it in Section 3.1 of this Attachment.

DBE Liaison means a representative of the Contractor with direct and independent access to the Contractor's project manager and/or chief operating officer. This can be a collateral duty. The DBE Liaison has management responsibility for implementing, managing and reporting on achievement of the DBE Goals, ensuring compliance with 49 CFR Part 26, communicating subcontracting, business development and supportive services activity at all tiers. The DBE liaison is also responsible for serving as the point of contact with RTD's Disadvantaged Business Office for all reporting, submission of properly completed forms/documents, and for responding to any compliance issues/matters.

DBE Participation Report has the meaning given to it in Section 3.10 of this Attachment.

Small Business Office or SBO means the RTD Department responsible for administering the DBE/SBE Programs.

2. OVERVIEW OF RTD'S DBE PROGRAM POLICY

RTD's policy is to ensure nondiscrimination in the award and administration of the District's construction contracts, professional service contracts, and in the procurement of common goods and services. The Contractor shall comply with and implement requirements of RTD's DBE Program and 49 CFR Part 26 in the award and administration of Subcontracts under this Agreement. The Contractor shall not discriminate on the basis of race, color, religion, national origin, sex, age, or disability in the performance of this Contract. The Contractor shall ensure that the nondiscrimination clause(s)/ flow-down provisions found in Section I be incorporated in all subcontract agreements regardless of tier. It is RTD's intention to create a level playing field on which DBE's can compete fairly for federally funded contracts. Failure by the Contractor to comply with or implement these requirements is a material breach of this Contract, which may result in the termination of this Contract or such other remedy as RTD deems appropriate. RTD's commitment to the DBE Goals is not intended to and shall not be used as a justification to discriminate against any qualified company or group of companies.

Additionally:

- (i) The average annual gross receipts for the past 3 years cannot exceed \$22.41 million. This amount includes any affiliate businesses owned in whole or part by any applicant owner or stockholder regardless of their ownership interest.
- (ii) The personal net worth of the eligible principle(s) of a DBE firm must be less than \$1,320,000 (on an individual basis) excluding the equity of the eligible principle's primary residence and the equity of the eligible principle's firm. At least 51% of the owners/stockholders must meet the personal net worth criteria for the business to be eligible. Applicants cannot transfer ownership solely for the purpose of qualifying for the DBE Program. If it comes to RTD's attention, that there has been a transfer of an owner's assets, RTD may request the certifying authority under the Colorado UCP to evaluate transfers of ownership within the past two years to determine compliance with the personal net worth requirements.
- (iii) To count a Disadvantaged business' participation toward the goal established for this contract, the proposed DBE(s) must be certified as a DBE(s) with the City and County of Denver or CDOT (Colorado UCP) under the NAICS code that coincides with the scope of work that they will execute in the project. The DBE firm must be certified as a DBE and perform a "commercially useful function" as defined in this Attachment. Prime contractors should also be sure that the DBE is certified as of the date that the City receives this bid/proposal unless some other time frame is required by the nature of the project delivery method, project duration or when the DBE is approved by RTD to be added to the Contractor's Schedule of Participation.

3. GENERAL REQUIREMENTS

3.1 DBE GOALS

Unless otherwise indicated in the Contract or an addendum to the Contract, for Invitations for Bids (IFB), the contract will be awarded to the lowest responsive and responsible bidder. For Request for Proposals (RFP) with best value criteria, the contract will be awarded to the responsive and responsible proposer or proposers who best meet the Evaluation Criteria, cost and other factors considered (including DBE Program requirements and DBE approach/strategy). A bidder/proposer who fails or refuses to complete and return the required enclosures to this Attachment will be deemed non-responsive. The specified DBE participation goal applies to all post selection negotiations. The contractor's commitment to the percentage of certified DBE utilization during the term of this contract will be stated in the DBE Affidavit (Enclosure 1A). All extensions, amendments, and options of the contract are subject to review by RTD's SBO. The SBO may determine that a modification may impact the Contractor's ability to comply with its initial commitment. However, a partial waiver of the goal will not be considered until the end of the contract and the totality of the Contractor's compliance efforts are assessed to determine its ability to comply with the initial commitment. The SBO will evaluate all decisions to self- perform scopes of work where DBE availability was present, yet not solicited, not utilized or disregarded.

RTD has specified a % DBE Participation goal. During the entire project duration the Contractor shall ensure:

(i) that at least % (calculated by Dollar value) of the Work be performed by DBEs. If this contract involves an alternative project delivery method or the project duration is multi-year, RTD may specify that certain percentages of participation be attributable to specific phases of the project. If that is the case, this section will reflect the additional requirements including the requirements associated with a DBE Plan/Program submission.

or

(ii) demonstrate with satisfactory documentation that it has made good faith efforts to meet the DBE Goal, as applicable. Contractors failing to meet the specified DBE goal are required to submit DBE Unavailability Certification, in the form set out in the Attachment A (Enclosure 7: DBE Unavailability Certification) along with complete documentation of good faith efforts to meet the goal. Failure to provide complete documentation/detailed written explanations of good faith efforts will result in the bid/proposal being deemed non-responsive. Appendix A of 49 CFR Part 26 shall serve as the criteria for evaluating compliance with the good faith efforts requirements. Additionally, bidders/proposers are required to solicit the support and assistance of RTD's SBO if they are unable to meet the DBE participation goal assigned to this contract.

Multi-Year and Design Build Project Requirements

To be considered a responsive bidder/proposer, when a DBE goal is specified for design-build projects, a bidder/proposer must meet the goal referred to in the bid specification by committing to meet the DBE participation goal for each phase of the design build process in its DBE Plan specifically identifying certified DBE firms that will be performing services or providing supplies in the first year of the design/build contract (in both the design and construction phases, as applicable) and Attachment A enclosures or make a good faith effort to attain the goal. The documentation evidencing good faith efforts shall be submitted with the bid/proposal. At a minimum, the bidder/proposer must identify the value of both the design and construction services to be spent during the first year (unless a greater timeframe is specified/required in the instructions to bidders/proposers.

- (a) The DBE participation goal applies to the total value of <u>all</u> work performed under the contract which includes the value of all change orders, amendments and modifications. Any partial waiver determination will be made at or near the conclusion of the contract when the totality of the circumstances can be taken into consideration and the Contractor's efforts can be objectively evaluated. Material supplies are credited for 60% of their contract value unless they are deemed to be a broker or transaction expediter in which case only the fee or commission may be counted toward the goal (so long as the DBE is performing a commercially useful function). If it is determined that the DBE is not performing a commercially useful function, then no participation credit shall be attributable to their participation on the contract.
- (b) To count DBE participation toward the goal established for this contract, the proposed DBE(s) must be certified as a DBE(s) with the City and County of Denver or CDOT under the appropriate NAICS code that coincides with the scope of work that they will execute on the project/contract. Additionally, the DBE firm must be certified as a DBE and perform a "commercially useful function" as defined in this document.

3.2 JOINT VENTURES

(a) A Joint Venture is an association of a DBE firm and one or more other firms to carry out a single, for-profit business enterprise,

for which the parties combine their property, capital, efforts, skills and knowledge, and in which the DBE is responsible for a distinct, clearly defined portion of the work of the contract and whose share in the capital contribution, control, management, risks, and profits of the joint venture are commensurate with its ownership interest.

(b) RTD will count toward its DBE goal a portion of the total dollar value of a contract with a joint venture equal to the distinct, clearly defined portion of the work of the contract that the DBE performs with its own forces toward the DBE goal(s) and such services/supplies/NAICS codes are approved for DBE participation credit. The joint venture agreement MUST specify the services, dollar value, reporting structure and details of the DBEs performance requirements associated with the percentage of the joint venture ownership.

3.3 DBE Liaison

- (a) The Contractor shall designate a DBE Liaison who shall be responsible for the following:
 - day-to-day operational components of the DBE Program:
 - (ii) effectively responding to and reporting to the SBO on the status of any DBE contractor/supplier;
 - (iii) submitting executed DBE subcontracts/purchase orders and any subsequent material amendments thereto to the SBO within thirty (30) days of the Subcontractor Agreement Execution (however, no DBE shall commence any work or provide any material/supply without an executed subcontract/purchase order);
 - (iv) interfacing with the SBO regarding DBEs' issues and obtaining approvals for all DBE replacements, substitutions or terminations; and
 - (v) carrying out or implementing technical assistance activities so that the playing field is level for DBEs.
 - (vi) prepare, complete and submit all required compliance documentation, inclusive of subcontract agreements, schedule of participation enclosure, monthly payment forms
 - (vii) ensure all contractual requirements of the DBE program inclusive but not limited to prompt payment, termination/substitution/replacement/reduction of scope, changes, non-discrimination are complied with and in their subcontract agreements with all of their subcontractors regardless of tier
 - (viii) a representative of the Contractor having management responsibility for implementing, managing and reporting on achievement of the DBE Goals, communicating subcontracting, business development and supportive services activity at all tiers, ensuring compliance with the non-discrimination provisions and the affirmative action and equal employment opportunity provisions.
 - (ix) Monitoring lower tier subcontractors and suppliers to ensure that they comply with the DBE Program requirements and the DBE Plan submitted by the prime contractor.
 - (x) In lower value or shorter duration contracts, the DBE Liaison responsibilities may be a collateral responsibility.
 - (xi) The DBE Liaison shall submit a written monthly report detailing the activities and documentation of good faith efforts of the previous month as well as submitting DBE Participation Reports, all additional requested forms and shall schedule monthly meetings with the SBO to address any issues or concerns.

Flow-Down Provisions:

The Contractor must include the following provisions in their subcontract agreements with their DBE subcontractors as well as ensure that tiered-contractors comply with this Section and insert the provisions of this Section into all lower tiered subcontractor agreements: 3.4 prompt payment provisions, 3.5 DBE Removal/Termination/substitution/Reduction of Scope provisions, and 3.7 Changes provisions. The contractor will be required to submit to the RTD Small Business Office all DBE subcontracts/purchase orders within 30 days of the execution of its contract with RTD or issuance of the notice to proceed (whichever occurs first). However, in no event shall a DBE perform any service or procure any supply unless RTD's SBO has a copy of the executed subcontract agreement or purchase order.

3.4 PROMPT PAYMENT OF DBE SUBCONTRACTORS

- (a) The Contractor shall ensure that:
 - i. each Contractor shall pay its respective DBE Subcontractors any undisputed amount owed to such Subcontractor within 30 days of receipt of the subcontractor's receipt by such Contractor, regardless of whether such Contractor has been paid for such invoice by City;
 - ii. approval of invoices is not unreasonably delayed and that invoices shall be either approved or rejected with written notice of deficiency or dispute to the payee DBE Subcontractor within ten days of receipt of invoice by the Contractor; and
 - iii. each Contractor makes prompt and full payment of any retainage kept by such Contractor to its respective subcontractors DBE within 30 days after such DBE's work has been accepted and completed by Contractor, unless claim is filed against a subcontractor;
 - iv. failure to comply with the above may give just cause to withhold payment from Contractor until payment to the subs is satisfied. Depending on extent of failure to comply with the above, such failure may also be construed to be a breach of contract.
 - v. The Contractor shall ensure that tiered subcontractors comply with this Section and insert the provisions of this Section into all lower tiered subcontractor agreements.
 - vi. Joint Check Utilization: A joint check is a two party check between a DBE, a prime contractor and a regular dealer of materials/supplies. All joint check arrangements must be pre-approved by the SBO and must strictly adhere to the joint check requirements set forth in USDOT guidance regarding same. At a minimum, the request must be initiated by the DBE and remedy a financial hardship for a specific period of time. There are monthly reporting requirements that must be complied with in order to receive DBE participation credit. The SBO will closely monitor the use of joint checks to ensure that the independence of the DBE firm is not compromised. Joint check usage will not be approved merely for the convenience of the prime contractor.

3.5 DBE REMOVAL/TERMINATION/SUBSTITUTION/REDUCTION OF SCOPE FROM CONTRACT

- (a) A Contractor must have good cause to remove/terminate/substitute/replace a DBE contractor and such removal/termination/substitution requires the consent and approval of RTD's SBO. This section also includes reductions to the DBEs scope of services and/or commitment values. No DBE subcontract may contain a "termination for convenience" clause/provision because any termination for convenience provision/clause is contrary to the objectives of this part. To initiate the termination, substitution, removal or replacement process with a DBE contractor/supplier (regardless of the tier), the Contractor or lower tier contractor/subcontractor must do the following:
 - i. Before transmitting to RTD's SBO its request to terminate and/or substitute a DBE contractor, the contractor must give notice in writing to the DBE contractor and RTD SBO. The notice must include its request to terminate and/or substitute, replace and/or remove the DBE, the reason for the request and all documentation to support its claim. The Contractor must submit a copy of the notice and support documentation to RTD's SBO at the time the original letter is sent to the DBE contractor;
 - ii. the Contractor must give the DBE contractor five (5) business days to respond to the notice and provide the SBO with reasons, if any, why it objects to the proposed termination of its DBE contract and why the SBO should not consent the Contractor's action;
 - iii. RTD's SBO will then open a formal investigation inclusive of review of all documentation, conduct interviews and site visits, if necessary. The Contractor carries the burden of proof to demonstrate good cause for the termination and/or substitution:
 - iv. If RTD's SBO determines the Contractor has good cause to terminate the /DBE firm, the SBO will provide written consent of /DBE removal and the requirements to substitute work to another DBE firm. If RTD's SBO finds that good cause does not exist to terminate the DBE firm, the SBO will provide a written denial of the request to terminate/replace the DBE contractor and will immediately request a corrective action plan from the Contractor.
 - v. For purposes of good cause to remove, replace, terminate or replace a DBE the following circumstances should exist: (1) failure or refusal to execute a written contract without good cause, (2) failure or refusal to perform the work of its subcontract in a way consistent with normal industry practice and the contractor has not acted in bad faith, (3) failure to meet the contractor's reasonable bonding or insurance requirements, (4) insolvency, bankruptcy or credit unworthiness that creates a risk for the contract, (5) ineligibility to work on public works project because of suspension or debarment proceedings, (6) a determination that the DBE is not a responsible contractor, (7) voluntary withdrawal from the project by written notification that has been

- verified, (8) ineligibility to receive DBE participation credit for the type of work to be performed, (9) other documented good cause that compels the replacement of the DBE.
- vi. If the contractor is approved to replace/remove/terminate the DBE, the contractor must make good faith efforts to replace the DBE with another certified DBE and shall not self-perform the work/services.
- (b) The Contractor shall ensure that tiered subcontractors comply with this Section and insert the provisions of this Section into all lower tiered subcontractor agreements, regardless of their certification status.

3.6 GOOD FAITH EFFORTS

(a) To award a contract to a bidder/proposer that has failed to meet the DBE contract goals, the RTD SBO Manager will decide whether the contractor made a "good faith" effort to actively, effectively and aggressively seek DBEs to meet those goals prior to bid/proposal submission and in its commitments as set forth in their Schedule of Participation/the DBE Plan to continue its efforts to meet the DBE participation goals for subsequent phases of the project. Contractors are also responsible for collecting good faith effort documentation of all major non-DBE subcontractors/suppliers as part of their responsibility to implement the DBE Program.

The kinds of efforts that are considered demonstrative of a "good faith" effort include, but are not limited to, the following:

- i. Whether the contractor solicited through all reasonable and available means (e.g. attendance at pre-bid meetings, advertising and/or written notices) the interest of all certified DBEs who have the capability to perform the work of the contract. The bidder must solicit this interest within sufficient time to allow the DBEs to respond to the solicitation. The bidder must determine with certainty if the DBEs are interested by taking appropriate steps to follow up initial solicitations.
- ii. Whether the contractor selected portions of the work to be performed by DBEs in order to increase the likelihood that the DBE goals will be achieved. This includes, where appropriate, breaking out contract work items into economically feasible units to facilitate DBE participation, even when the prime contractor might otherwise prefer to perform these work items with its own forces.
- iii. Whether the contractor provided interested DBEs with adequate information about the plans, specifications, and requirements of the contract in a timely manner to assist them in responding to a solicitation.
- iv. Whether the contractor negotiated in good faith with interested DBEs. It is the bidder's responsibility to make a portion of the work available to DBE subcontractors and suppliers and to select those portions of the work or material needs consistent with the available DBE subcontractors and suppliers, so as to facilitate DBE participation. The fact that a bidder may perform 100% of the work with its own workforce is not sufficient justification to fail to negotiate with DBEs or not to meet the DBE participation goal assigned to a project.
- v. Evidence of such negotiation includes the names, addresses, and telephone numbers of DBEs that were considered; a description of the information provided regarding the plans and specifications for the work selected for subcontracting; and evidence as to why additional agreements could not be reached for DBEs to perform the work.
- vi. Whether the contractor made efforts to assist interested DBEs in obtaining bonding, lines of credit, or insurance as required by the recipient or contractor.
- Whether the contractor made efforts to assist interested DBEs in obtaining necessary equipment, supplies, materials, or related assistance or services.
- viii. Whether the contractor effectively used the services of available minority/women community organizations, contractors' groups and other organizations to provide assistance in the recruitment and placement of DBEs, including RTD's SBO.
- ix. Whether other bidders/proposers on the procurement met the DBE goals and submitted an acceptable DBE Plan demonstrating compliance with the DBE Program requirements for a design-build project.
- (b) If, after reviewing the "good faith efforts" documentation submitted by the contractor, the RTD SBO Manager determines that "good faith efforts" were met, the contract will be recommended for award to the contractor. If the SBO Manager determines that the contractor failed to meet the "good faith efforts" requirements, the contractor will be informed in writing that their submittal was deemed non-responsive to the Attachment A requirements and will not be considered for contract award. The contractor may appeal the decision of the RTD SBO Manager to the Good Faith Efforts (GFE) Committee. If the contractor wishes to appeal, they must do so in writing to the RTD Senior Manager of Materials Management within 5 business days of being informed of the decision of the RTD SBO Manager that their submission was non-compliant.

- (c) If the decision of the SBO Manager is appealed in writing, with in the 5 day submission window, the GFE Committee will review the documentation initially submitted by the contractor and no other information under this Section to decide whether the DBE requirements have been satisfied through "good faith efforts".
- (d) If the written appeal request is received after the 5 business day submission window, it will be disallowed and the determination of the RTD SBO Manager that the submission was non-compliant will stand.
- (e) If the GFE committee determines that "good faith efforts" were met, the contract will be recommended for award to the contractor. If the GFE Committee determines that the contractor has failed to meet the good faith effort requirements, the contractor will be informed in writing. The contractor has an opportunity for administrative reconsideration of the determination of the GFE committee. If the contractor requests administrative consideration, they must do so in writing to the RTD Senior Manager of Materials Management within 5 business days of receiving the decision of the GFE Committee that their submission was non-compliant. If the written administrative consideration request is received after the 5 business day submission window, it will be disallowed and the determination of the GFE committee that the submission was non-compliant will stand.
- (f) The reconsideration official will be a member of RTD staff who did not take part in the initial "good faith" effort decision. The reconsideration official will review the documentation initially submitted and no other information under this Section to decide whether the DBE requirements have been satisfied through good faith efforts.
- (g) If the reconsideration official determines that "good faith" efforts were met, the contract will be recommended for award to the contractor. If the reconsideration official determines that the contractor has failed to meet the "good faith effort requirements, the contractor will be informed in writing. The result of the reconsideration process is not administratively appealable to the Department of Transportation.

3.7 CHANGES

- (a) The DBE participation goal shall apply to the performance/dollar value of all obligations under this Contract, including any Changes, Modifications, Amendments and Change Orders whether initiated by the contractor or RTD. Post award requests for partial waivers may be considered by RTD's SBO but a final determination shall not be rendered until the contract has been substantially completed and the Contractor lacks the ability to satisfy the DBE participation goal.
- (b) Changes to the value or scope of work committed to a DBE must be pre-approved by the SBO and must be for good cause as set forth in the termination, substitution, replacement provisions set forth in section 3.5 above.

3.8 REQUIREMENTS OF ATTACHMENT A ENCLOSURES

- (a) The Contractor must complete and return all applicable Enclosures in the forms set out in this Attachment with bid/proposal.
 All enclosures must also be submitted with the bid/proposal.
- (b) The Enclosure 2 Schedule of Participation enclosure subsequent to the award must be submitted with the addition of each identified DBE firm.
- (c) The Enclosure 3 Letter of Intent (LOI) enclosure subsequent to the award must be submitted with the addition of each identified DBE firm.
- (d) The Contractor completing the Attachment A Enclosures is advised to contact the RTD's SBO at (303) 299-2111 if they have any questions or concerns prior to submitting bid/proposal documentation. Additional Attachment A documentation will not be accepted after the contractor submits their bid/proposal to the City.

As a condition of the award, the contractor must use those DBEs listed to perform the specific work items or supply the materials as committed in the Enclosure 2 Schedule of Participation and Enclosure 3 Letter(s) of Intent (LOI) and the contractor is not entitled to any payment for work or materials performed by its own or any other forces if the work or supplies were committed to a DBE, unless it receives prior written consent by RTD Small Business Office for a replacement of the DBE for good cause.

(e) Failure to return all required DBE Enclosures will result in your bid/proposal being deemed non-responsive. Modification of any Enclosure documentation will result in your bid/proposal being deemed non-responsive.

Periodically, after award of the contract, RTD's SBO in conjunction with the contractor may determine that an enclosure is more beneficial with modifications or that an additional enclosure is necessary to more effectively report the status of DBE participation or performance and resolution of DBE concerns/issues. RTD has the right to ask for a modification. Such a revised enclosure shall be incorporated into contract as an additional requirement.

- 3.9 REPORTING, AUDITS, REVIEWS AND ORIENTATION REQUIREMENTS
- (a) The Contractor shall submit at least monthly, a DBE Participation Report in the form set out in Appendix A (Form of DBE Participation Report). The Contractor shall submit each completed DBE Participation Report to RTD's SBO.
- (b) The Contractor acknowledges that the SBO has the right to independently confirm the information contained in the submitted DBE Participation Reports by soliciting such information from each DBE Subcontractor as may be required to verify payments received, distribution of payments received, subcontracting practices, participation credit, and sharing of resources/personnel. The Contractor shall not attempt to dissuade any such DBE contractor from disclosing any such information or cooperating in any investigation initiated by the SBO.
- (c) The Contractor shall submit to RTD's SBO a Subcontractors Participation and Payment Form documenting all payments made to all DBEs and non-DBEs on a form provided/approved by RTD's SBO.
- (d) The DBE contractor shall submit to RTD's SBO a summary of payments received from its contractor, regardless of their lower tier, on a form approved by RTD's SBO.
- (e) The DBE contractor may be selected to participate in a commercially useful function review or a DBE compliance review before their contract can be closed by RTD. DBEs are required to fully cooperate with RTD's SBO or its designee in the compliance review process. The commercially useful function review process will be initiated with a request for documents relating to contract performance and management of the actual work performed on the contract. The scope and intensity of each commercially useful function review will depend on the specific facts and circumstances. The commercially useful function is purposed to verify the amount of DBE participation credit, to ensure that work is actually performed by the DBE consistent with the DBE Program requirements and/or to ensure that there is no activity engaged in by the DBE that would be inconsistent with the intent and objectives of the DBE Program. The commercially useful function review is more formal and will be initiated with an orientation/explanation process and closed out with a briefing and determination. The DBE contractor may be subjected to an informal compliance review by RTD's SBO or its designee with or without notice. The informal compliance review will generally be conducted at the work site where RTD actually observes and assesses the services/supplies being provided by the DBE.
- (f) The Contractor or any of its lower tier non-DBE subcontractors may be selected for a DBE compliance review to ensure that they are in compliance with the DBE Program requirements. This process will be initiated in a formal manner with written notice and instructions sent to the Contractor or its major subcontractor. The process will conclude with a close-out interview or debriefing where the Contractor or non-DBE firm will be given an opportunity to refute the determination or add to any corrective action requested by RTD. The contractor must cooperate with any DBE Program audit or compliance review. Failure to cooperate can result in part or all of the DBE participation credit being denied/removed from counting toward the DBE participation goal for the contract.
- All DBEs are required to participate in the RTD's DBE Orientation Program if awarded an RTD contract, subcontract or purchase order before commencing work or providing supplies on this contract. Failure to participate in the DBE orientation program may result in a denial of DBE participation credit for the project/contract. For good cause, the orientation may be delayed if pre-approved by RTD. DBEs may be required to repeat the orientation if there are changes to the DBE Program requirements, changes in the DBE regulations, changes in the DBE personnel, or if the DBE is experiencing challenges in complying with the reporting requirements.

ATTACHMENT A DBE ENCLOSURE CHECKLIST

This checklist will help you verify all the required enclosures are complete and submitted as required. Submit this checklist as the front page of your Attachment A Enclosures. Attachment A Enclosures are to be submitted with bid/proposal. Failure to submit a completed checklist with your Attachment A Enclosures may result in your proposal to be deemed Non-Responsive. Modification of any Attachment A Enclosure prior to the official award of the contract will result in your proposal being deemed Non-Responsive. All enclosures must be submitted with the bid/proposal. If you have any questions concerning the completion of any of the Enclosures, please contact RTD's Disadvantaged Business Office at (303) 299-2111.

[] Form of DBE Participation

This form must be submitted monthly by all prime contractors throughout the entire duration of the contract. This form needs to be submitted directly to the RTD SBO.

[Enclosure 1A: DBE Affidavit

This form must be completed, signed and notarized by all Prime Contractors, whether DBE or not, to acknowledge the percentage of DBE participation and indicate intent to comply with the DBE goal

[] Enclosure 1B: DBE Prime Affidavit

This form must be completed, notarized and signed only if the bidder/proposer is a DBE submitting a proposal/bid as a Prime Contractor. This form, if applicable, must be submitted with a current DBE certificate by all **DBE** prime contractors to affirm DBE status.

Enclosure 2: Schedule of DBE Participation

This form must be submitted by all Prime contractors including DBE Prime contractors. It must contain the following information: names and addresses of certified DBE participating subcontractors, the work they are to perform and the dollar value of each proposed certified DBE contract. The Contractor subsequent to award must update and submit this form with the addition of each identified DBE firm. The Contractor is required to enter into subcontract agreements or issue purchase orders to all DBEs within thirty (30) days of notice to proceed.

[] Enclosure 3: Letter of Intent to Perform as a Subcontractor

This form must be submitted by the Contractor. It must contain the following information: names and addresses of certified DBE participating subcontractors, the work they are to perform and the dollar value of each proposed certified DBE contract and be signed by the DBE subcontractor. The Contractor subsequent to the award must submit this form with the addition of a DBE. A copy of the current DBE Certificate for each listed DBE subcontractor must be attached.

[/ Enclosure 4: Solicitation Statistics

This form is for statistical purposes only. It is for the prime and all companies the prime receives bids from on subcontract work.

Enclosure 5: Employer Certification of Workforce

This form defines the make-up of the company's work force and must be filed by every prime contractor with 50 or more employees or has a contract of \$50,000 or more.

[| Enclosure 6: Disadvantaged Business Outreach

This form provides current outreach program information for contracted prime and subcontractors.

[] Enclosure 7: Unavailability Certification

This form must be submitted - along with complete documentation of good faith efforts - with the bid/proposal by a prime contractor who has failed to meet the specified DBE goal.

APPENDIX A FORM OF DBE PARTICIPATION REPORT

PRIME CONTRACTOR MONTHLY REPORT FORM E REPORT OF PAYMENTS TO DBES

CONTRACT INFORMATION					Contract Duration:					
Original Contract Value:	,				Contract No.:					
Change Orders Values:					Name and leasing of Delease	Desirate				
Current Contract Value:		F 1			Name and Address of Prime Contractor	Prime Contractor				
Total Payments Received To Date:						Retnond "Vest" or "Marie or "Annie or	O management			
Payments Received This Month:	*		Did your firm or an aff	illate rord or lease equi	Old your firm or an affiliate rord or lease equipment or issue a joint check to a DBE?	eck to a DBE?	Motor descriptions of the			
Campletion Date:			Old any DBE utilize or Old any DBE subcont	nployees(or former emy act any portion of the w	Old any DBE utilize employees(or former employees) of your firm or an affiliate? Old any DBE subconfisct any portion of the wants to a new DBE subconfisct and second firms	an offiliate?				
		r.	Has the scope of work	or subcontract amoun	Has the scope of work or subcontract amount changed for any DBE since the last report?	ince the last report?		1.1		
Name of DBE Subcontractor and/or Non DBE Subcontractor	Project Task	DBE or Non DBE	Original Contract Amount	Original Contract +/- Amount C.O.	Payment This Month	Billed This Month	Total Payments	Pending Oversil C.O.'s Work C Amount and Completed	Oversil Work Completed	Confract P.O. Submitted
TOTAL										
COMMENTS										

SEND COMPLETED FORM TO:
SBO Office
Regional Transportation Detrict
1600 Blake Street BLK-31, Derwer, Colcade 08202; Fax: 302-269-2051
If You Need Assistance in Filling Out This Form, Please contact (303) 299-2111

Telephone: Date:

APPENDIX B - DBE ENCLOSURES

ENCLOSURE 1A- DBE AFFIDAVIT

THIS PAGE MUST BE COMPLETED BY ALL PRIME PROPOSERS/BIDDERS TO INDICATE THE PERCENTAGE OF DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION.

The undersigned contractor hereby agrees that the goal established for DBE participation and its commitment in this project through subcontracting or entering into a joint venture with Disadvantaged Business Enterprise(s) in conformity with the Requirements, Terms, and Conditions of this Attachment is: % - DBE (Disadvantaged Business Enterprise) THIS PERCENTAGE RELATES TO DBE SUBCONTRACTING ONLY AND IS CONSISTENT WITH THE DISADVANTAGED BUSINESS ENTERPRISE STATEMENT LISTED IN THE BID/PROPOSAL FORM. THIS BIDDER/PROPOSER IS COMMITED TO COMPLY WITH OR EXCEED THE ABOVE GOAL. Business Name: Concrete Works of Colorado, Inc. Contact Name: ReaAnn Fletcher 1260 Rock Creek Circle Address: City, State, ZIP: Lafayette, CO 80026 Phone: 303-665-2933, EXT 110 Fax: 303-665-2996 I DO SOLEMNLY DECLARE AND AFFIRM UNDER THE PENALTIES OF PERJURY THAT THE CONTENTS OF THE FOREGOING STATEMENTS ARE TRUE AND CORRECT, AND THAT I AM AUTHORIZED, ON BEHALF OF Concrete Works of Colorado, Inc. TO MAKE THIS AFFIDAVIT. (Name of Business Entity) 2/14/17 ReaAnn Fletcher Contracts Manager (Affiant Print Name) (Date) (Title) (Affiant's Signature) State of Colorado City and County of Denver On this 14th day of February 2017 , before me, the undersigned officer, personally appeared ReaAnn Fletcher , known to me to be the person described in the foregoing Affidavit, and acknowledged that he (she) executed the same in the capacity therein stated and for the purposes therein contained. In witness thereof, I hereunto set my hand and official seal. My Commission Expires: 5-5-3030 Rhonda J Olson Notary Public) (SEANOtary Public

Contract No. 201631819 33rd Outfall - 3 BF - 30

December 2, 2016

STATE OF COLORADO Notary ID 20004010550 My Commission Expires May 5, 2020

APPENDIX B – DBE ENCLOSURES ENCLOSURE 1B- DBE AFFIDAVIT

THIS PAGE MUST BE COMPLETED BY THE DISADVANTAGED BUSINESS ENTERPRISE PRIME CONTRACTOR (PROPOSER/BIDDER)

(Title)
(Name of Corporation or Joint Venture)
.
siness Enterprise (DBE) and am certified as of the date that the RTD Γransportation District in Attachment A for
and that I will provide
vith this enclosure.
HE PENALTIES OF PERJURY THAT THE CONTENTS OF THE CT, AND THAT I AM AUTHORIZED, ON BEHALF OF THE
(Title)
, before me, the undersigned officer, personally
me to be the person described in the foregoing Affidavit, and
; ; ; , before me, the undersigned officer, personally me to be the person described in the foregoing Affidavit, and city therein stated and for the purposes therein contained.
(Notary Public) (SEAL)
S I

APPENDIX B – DBE ENCLOSURES ENCLOSURE 2 – SCHEDULE OF [DBE] PARTICIPATION

NAME OF CONTRACTO	R: Concrete Works of Colorado, Inc
Contract No.:	201631819
Total Proposed Cost: US\$	\$6,514,365.38

DBE FIRM NAME	TYPE OF WORK (ELECTRICAL, PAVING, ETC.) AND CONTRACT ITEMS OR PART THEREOF TO BE PERFORMED	PROJECTED START & COMPLETION DATES FOR DBE	AGREED PRICE TO BE PAID TO DBE
J.P. Meyer Trucking &			
Construction, Inc.	Trucking/hauling	08/2017 - 12/2017	\$652,000.00

- 1. Please list all DBEs involved on the contract including the Prime Contractor if it is a DBE. DBE must be certified in area of work specified on project; work performed for which they are not certified to perform will not count towards goal. A current DBE certification for each listed DBE must accompany this enclosure. Failure to provide proof of current DBE certification for any or all listed DBEs will eliminate such listed DBE's participation, and work performed by such DBE will not count towards satisfaction of the DBE Goal. If additional pages are required to list all contracted DBE, photocopy this enclosure as required to make a complete list.
- 2. Contracts with DBEs for materials or supplies will be counted toward the DBE Goal as follows:
- (i) materials or supplies obtained from a DBE manufacturer will be counted at 100% toward the DBE Goal; and
- (ii) materials or supplies obtained from a DBE regular dealer will be counted at 60% toward the DBE Goals. Please refer to 49 CFR §26.55 for specifics with respect to how DBE participation is counted toward DBE Goal.
- 3. Contractor must submit copies of all DBE subcontracts, purchase orders or change orders within 30 Days of execution of the notice to proceed. Failure to submit will result in a determination that no DBE participation credit shall a DBE work on the project or provide equipment, materials or supplies for DBE participation credit without an executed subcontract agreement or purchase order.

Office of Economic Development Division of Small Business Opportunity

201 W Colfax Ave, Dept 907
Denver, CO 80202
p: 720,913.1999
f: 720,913.1809
www.denvergov.org/dabo

Denver International Airport Airport Office Building, Sulte 7810 8500 Pena Blvd Denver, CO 80249 p: 303.342-2180 f: 303.342.2190 www.flydenver.com

DENVER OFFICE OF ECONOMIC DEVELOPMENT

January 4, 2017

Jean Meyer
J.P. Meyer Trucking & Construction. Inc.
21999 Tall Grass Trail, #5
Golden, CO 80403

Dear Jean Meyer:

The City and County of Denver, Division of Small Business Opportunity (DSBO) is in receipt of your renewal application for J.P. Meyer Trucking & Construction, Inc.

We are extending your certification while your application is in process. Therefore, J.P. Meyer Trucking & Construction, Inc. will have the following certification(s) until April 4, 2017.

Airport Concessionaire Disadvantaged Business Enterprise (ACDBE)
Disadvantaged Business Enterprise (DBE)
Emerging Business Enterprise (EBE)
Minority/Women Business Enterprise (MWBE)
Small Business Enterprise (SBE)
Small Business Enterprise-Concessions (SBEC)

Review of your documentation will begin in the near future. Please note that at any time during this review, a Certification Analyst may request additional information to complete the review.

Please notify our office immediately, if there are any changes in legal status, management, control, or ownership of your business, contact information, etc. from that provided on the documentation submitted to our office.

If you have any questions, please contact us at (303) 342-2434 or via email at certificationinfo@denvergov.org. Thank you.

Sincerely.

LaQuisha Shaw Certification Team (303) 342-2204

DenverGov.org | 311

APPENDIX B - DBE ENCLOSURES ENCLOSURE 3 - LETTER OF INTENT TO PERFORM AS A DBE SUBCONTRACTOR

Contract No. 201631819	9			
The undersigned [*] (the pursuant to a contract (the	e Contractor) intends to engage the DBE Contract) between the Co	undersigned DBE to perform	m work in connection with the Pro	ject
an inc	dividual	a corporation		
a part	tnership	a joint venture		
The DBE status of the ur that is certified as of the	ndersigned DBE is confirmed on the date on which the DBE Contract is	ne attached schedule of DBE sexecuted.	participation and represents a com	pany
Item	Projected Commencement Date	Projected Completion Date	Agreed Price to be Paid to DBE	
Trucking/hauling	Aug., 2017	Dec., 2017	\$652,000.00	
% of the Dollar va suppliers. The undersigne upon the Proposer's exec	alue of the DBE Contract will be st	ublet and/or awarded to non-l BE will enter into the DBE C	DBE contractors and/or non-DBE contract for the above work conditions.	ioned
Concrete Works of Co		-0 m	L 10 1 1	
NAME OF CONTRACTOR	OR		ickies of Construction	1100
OWNER/REPRESENTA 1260 Rock Creek Circ	TIVE cle, Lafayette, CO 80026	OWNER/REPRESENTA	Merco MyB Grass Trail Golden	· C080407
ADDRESS reaannf@cwc-email.c	com	ADDRESS	- 01	
MATE ADDRESS	Hitchi	EMAH. ADDRESS	g3@wildGoe. No	<u> </u>
SIGNATURE Contracts Manager	2/14/17	SIGNATURE	residet 1-31-2017	
ritLe	DATE	TITLE	DATE	-

APPENDIX B – DBE ENCLOSURES ENCLOSURE 4 – SOLICITATION STATISTICS

RTD is required to create and maintain bidder statistics for all firms bidding on prime contracts and bidding or quoting Subcontracts on USDOT-assisted projects per 49 CFR Part 26.11. The Contractor is required to make copies of this form, send a copy with its initial contact to each Subcontractor (whether DBE or non-DBE) and require each Subcontractor to return a completed form with its Subcontract bid to the Contractor. The Contractor must submit all completed forms with each submission of DBE Enclosures to the SBO.

Status as a DBE or Non-DBE (check one):
RTD DBE Non-DBE _X
Annual Gross Receipts of the Firm: (check one):
U.S.\$0 to U.S.\$500,000
U.S.\$500,000 to U.S.\$1,000,000
U.S.\$1 Million to U.S.\$5 Million
U.S.\$5 Million to U.S.\$10 Million
U.S.\$10 Million to U.S.\$20.41 Million
Above U.S.\$20.41 Million X
Age of the firm: 37 yrs Signature: Reconstitution
Name: ReaAnn Fletcher
Title: Contracts Manager
Date: Feb. 14, 2017

Firm Address (Office Reporting): 1260 Rock Creek Circle, Lafayette, CO 80026

Firm Name: Concrete Works of Colorado, Inc.

Concrete Works of Colorado, Inc.

	T	T		1				T			1	
	Other	1										
	ō	M										
F = Female	tinent an icans	[I										
11	Subcontinent Asian Americans	M										
	Pacific	T.										
	Asian-Pacific Americans	M										
	Native Americans	ഥ										
	Nat	Σ								-		-
ale	Hispanic Americans	ĹL,		-								-
M = Male	Hisp	M	2					24		2		28
	Black Americans	Н	-									-
	BIS	M										
ees in ent	Total Female Employees	Minorities	_	-			2					7
Total Employees in Establishment	Total Male Employees Including	MINIORINES	14	m	3	-		34		4		59
	Total Employees Including	ramonnes	15	4	3	-	2	2 6		4		99
Job Categories			Officials & Managers	Professionals	Technicians	Sales	Office & Clerical	Craft Workers (skilled)	Operatives (semi-skilled)	Laborers (unskilled)	Service Workers	TOTAL

December 2, 2016

APPENDIX B - DBE ENCLOSURES ENCLOSURE 4 - SOLICITATION STATISTICS

Firm Name: Firm Address (Office Reporting):	
Status as a DBE or Non-DBE (check one):	
RTD DBE Non-DBE	
Annual Gross Receipts of the Firm: (check one):	
U.S.\$0 to U.S.\$500,000	
U.S.\$500,000 to U.S.\$1,000,000	
U.S.\$1 Million to U.S.\$5 Million_X	
U.S.\$5 Million to U.S.\$10 Million	
U.S.\$10 Million to U.S.\$20.41 Million	
Above U.S.\$20.41 Million	
Age of the firm: 37	
Signature: Jewi My	
Name: Ago Mago	
Title:	
Date: 1-31-2017	

Continuals Con	Job Categories		Total Employees in Establishment	yees in		M :: Male	/ale					11:	F = Female		
S. Managers Minorities M F M M		Total Employees Including Minorities	Total Male Employees Including	Total Female Employees	Black	-	spanic	Nati	cans	Asian-	Pacific	Subcor	tinent an	8	p
ionals tians tens ten				Minorities		×	tr.	×	L	Σ	174	Σ	F	Σ	12
trians scientists E. Clerical orders Orders (unskilled)	Officials & Managers			d		-									·
S S S S S S S S S S S S S S S S S S S	Professionals				-	-									
& Clerical orkers res (semi- Workers Workers	Technicians							+					1		
orkers orkers s (unskilled) Workers	Sales				-	-									
orkers res (semi- res (semi- res (unskilled)) Vorkers The semi-	Office & Clerical														
ves (semi- s (unskilled) Workers	Craft Workers (skilled)					-		-				1			
S (unskilled) Workers Y	Operatives (semi- skilled)					-		+				N	\top		
Workers Y	aborers (unskilled)							+		1		\top			
3	service Workers					A									
	OTAL			7	+	~		-			+	V			

December 2, 2016

Contract No. 201631819 33rd Outfall - 3

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APPENDIX B - DBE ENCLOSURES ENCLOSURE 4 – SOLICITATION STATISTICS

Firm Name: HCL Engineering & Surveying, LLC	
Firm Address (Office Reporting): 9570 Kingston (Court, Suite 310, Englewood, CO 80112
Status as a DBE or Non-DBE (check one): <u>DBE</u>	
RTD DBE X Non-DBE	
Annual Gross Receipts of the Firm: (check one):	
U.S.\$0 to U.S.\$500,000	U.S.\$500,000 to U.S.\$1,000,000
U.S.\$1 Million to U.S.\$5 Million_X	U.S.\$5 Million to U.S.\$10 Million
U.S.\$10 Million to U.S.\$20.41 Million	Above U.S.\$20.41 Million
Age of the firm: <u>18-yrs</u>	
Signature: P. Herrem	
Name: Jasper L. Herrera	
Title: President	
Date: February 1, 2017	

Contract No. 201631819 33rd Outfall - 3

December 2, 2016

APPENDIX B – DBE ENCLOSURES ENCLOSURE 4 – SOLICITATION STATISTICS

Firm Name: Chacon Yaving Inc. Firm Address (Office Reporting): 1701 E. 114# Northalenn,	CD8	0233		
Status as a DBE or Non-DBE (check one):				
RTD DBE				rlar
Annual Gross Receipts of the Firm: (check one):				
U.S.\$0 to U.S.\$500,000		87	10	1
U.S.\$500,000 to U.S.\$1,000,000	0	way.	01	5
U.S.\$1 Million to U.S.\$5 Million			31	1 2
U.S.\$5 Million to U.S.\$10 Million				
U.S.\$10 Million to U.S.\$20.41 Million				
Above U.S.\$20.41 Million				0.1
Age of the firm:		37		1000
Signature:				
Name: Michael A. Leathers	0.7	April 1863		<u>4</u> 0
Title: Estimator / Project Manager	2			
Date: 02-13-2017	4	1 100		

		Total Employees in	yees in)		M = Male	ale					<u> </u>	F = Female		
Job Categories	Total Employees	Total Male Employees	Total Female Employees	Ame	Black Americans	Hisp	Hispanic Americans	Native	ve	Asian-Pacific Americans	Pacific	Subcontinent Asian Americans	ubcontinent Asian Americans	Đ	Other
	Minorities	Minorities	Including Minorities	×	Ħ	M	ഥ	Σ	고	×	īТ	Σ	ţ r	×	ĮT.
Officials & Managers	7	3	_			R	_							_	
Professionals	B	Ø	Ø			,									
Technicians	Ø	þ	Ø		12										
Sales	7	3	1			10	/							-	
Office & Clerical	3	1	6			Ø	X							-	
Craft Workers (skilled)	13	13	Ø			5	D								
Operatives (semi- skilled)	Ø	Ø	Ø												
Laborers (unskilled)	B	Ø	Ø												
Service Workers	Ø	Ø	B												
TOTAL	46	30	H	100		The state of the s	7		-					3	
		,			-										

December 2, 2016

APPENDIX B – DBE ENCLOSURES ENCLOSURE 4 – SOLICITATION STATISTICS

Firm Name: Martinez Associates
Firm Address (Office Reporting): 14828 West 6th Ave. Unit 9-8
Status as a DBE or Non-DBE (check one):
RTD DBE Non-DBE
Annual Gross Receipts of the Firm: (check one):
U.S.\$0 to U.S.\$500,000
U.S.\$500,000 to U.S.\$1,000,000
U.S.\$1 Million to U.S.\$5 Million_X
U.S.\$5 Million to U.S.\$10 Million
U.S.\$10 Million to U.S.\$20.41 Million
Above U.S.\$20.41 Million
Age of the firm: 6 yes
Signature:
Name: James MARINE
Fitte: Presides
Date: 2/13/17

Martinez Assocs.

Job Categories		Total Employees in Establishment	rees in			M = Male	le le					11	F = Female		
	Total Employees Including	Total Male Employees Including	Total Female Employees	Bla	Black Americans	Hispanic Americans	mic	Native Americans	cans	Asian-Pacific Americans	acific	Subcontinent Asian Americans	rtinent an icans	地区	草花
		Saminamar	Minorities	M	Įτί	M	দ	Z	ш	M	타	M	ir.	×	H
Officials & Managers	_	-				_									
Professionals	2	7													_
	12	00	4			_									N
	1														_
Office & Clerical	_		_			_									
Craft Workers (skilled)															
Operatives (semi- skilled)															
Laborers (unskilled)											•				
Service Workers															
	<u>「</u>	-	9			M							_		4

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APPENDIX B – DBE ENCLOSURES ENCLOSURE 4 – SOLICITATION STATISTICS

RTD is required to create and maintain bidder statistics for all firms bidding on prime contracts and bidding or quoting Subcontracts on USDOT-assisted projects per 49 CFR Part 26.11. The Contractor is required to make copies of this form, send a copy with its initial contact to each Subcontractor (whether DBE or non-DBE) and require each Subcontractor to return a completed form with its Subcontract bid to the Contractor. The Contractor must submit all completed forms with each submission of DBE Enclosures to the SBO.

Status as a I	OBE or Non-DBE (check one):	i i
RTD DBE_	Non-DBE X	-
Annual Gros	ss Receipts of the Firm: (check one):	
U.S.\$0 to U.	.S.\$500,000	
U.S.\$500,00	0 to U.S.\$1,000,000	
U.S.\$1 Milli	on to U.S.\$5 Million	
U.S.\$5 Milli	on to U.S.\$10 Million X	
U.S.\$10 Mil	lion to U.S.\$20.41 Million	
Above U.S.\$	320.41 Million	
Age of the fi	rm: _4	
Signature:	12/5	
Name:	Rodney Sowal	
Title:	Estimator	
Date:	02/13/2017	

Firm Address (Office Reporting): 2295 S. Lipan Street, Denver CO 80223

Firm Name: Colorado Barricade Co

Colorado Barricade Co.

Job Categories		Total Employees in Establishment	yees in tent			M = Male	ile					H =	F = Female		
	Total Employees Including	Total Male Employees Including	Total Female Employees	Ame	Black Americans	Hispanic	anic	Native	ive	Asian-Pacific Americans	acific	Subcor Asi Amer	Subcontinent Asian Americans	Other	ler
	Minorities	Minorities	Including	×	tri	M	ĮΤι	M	tri	M	Lz.	M	[Ti	M	tri
Officials & Managers	i i	7	70											1	10
Professionals	0	0	:2												
Technicians	U	C	0												
		2													
Office & Clerical	20	=	6			_	w	_	24					2	9
Craft Workers (skilled)	W	W	0											. 56	
Operatives (semi- skilled)	=	=	0			60								SO	
Laborers (unskilled)	33	32		4		Ç								22	
Service Workers	0	£ 2	0												
	80	40)	91	C	0	=	N	べ	O		٥	0	0	3/1	

December 2, 2016

Contract No. 201631819 33rd Outfall - 3

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APPENDIX B – DBE ENCLOSURES ENCLOSURE 4 – SOLICITATION STATISTICS

Firm Name: A LATA MILLIA COMPANY Firm Address (Office Reporting): 6015 W. 56th Avenue
Firm Address (Office Reporting): 6015 W. 56th Ayenne ARVADA, CO 80002
Status as a DBE or Non-DBE (check one):
RTD DBE Non-DBE X
Annual Gross Receipts of the Firm: (check one):
U.S.\$0 to U.S.\$500,000
U.S.\$500,000 to U.S.\$1,000,000
U.S.\$1 Million to U.S.\$5 Million
U.S.\$5 Million to U.S.\$10 Million
U.S.\$10 Million to U.S.\$20.41 Million_X
Above U.S.\$20.41 Million
Age of the firm: 19 yes
Signature:
Name: DOUGJONES
Title: SE GM
Date: 1 31 17

Job Categories		Total Employees in Establishment	rees in			M = Male	Je					F=F	F = Female		
	Total Employees Including	Total Male Employees Including	Total Female Employees	Amei	Black Americans	Hispanic Americans	anic	Native Americans	cans	Asian-Pacific Americans	acific	Subcontinent Asian Americans	tinent an cans	Other	ner.
	Minorities	Minorities	Including	M	ㄸ	M	ഥ	×	ţ.	×	ţr4	×	Ħ	M	124
Officials & Managers	5	0				Q									
Professionals															
Technicians	3	3												3	
Sales														31131	
Office & Clerical			9												3
Craft Workers (skilled)													_		
Operatives (semiskilled)	41	49	_	7		27				_				1	
Laborers (unskilled)					38.1				2.						
Service Workers															
TOTAL	53	53	3	4		99				_				二	4

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APPENDIX B – DBE ENCLOSURES ENCLOSURE 4 – SOLICITATION STATISTICS

RTD is required to create and maintain bidder statistics for all firms bidding on prime contracts and bidding or quoting Subcontracts on USDOT-assisted projects per 49 CFR Part 26.11. The Contractor is required to make copies of this form, send a copy with its initial contact to each Subcontractor (whether DBE or non-DBE) and require each Subcontractor to return a completed form with its Subcontract bid to the Contractor. The Contractor must submit all completed forms with each submission of DBE Enclosures to the SBO.

Status as a DBE or Non-DBE (check one):
RTD DBE ✓ Non-DBE
Annual Gross Receipts of the Firm: (check one):
U.S.\$0 to U.S.\$500,000
U.S.\$500,000 to U.S.\$1,000,000
U.S.\$1 Million to U.S.\$5 Million
U.S.\$5 Million to U.S.\$10 Million
U.S.\$10 Million to U.S.\$20,41 Million
Above U.S.\$20.41 Million
Age of the firm: 8 YEARS . Signature:
Name: Diana Buch
Title: SALES REP
Date: 02/01/2017

Firm Name: AGGREGATE LOGISTICS

Firm Address (Office Reporting): PO BOX 393 Timnath, Co

Aggregate Logistics

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	Other	(T4	-									
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F = Female	tinent an cans	T.										
4	Subcontinent Asian Americans	Σ										
	acific	Ľ.										
	Asian-Pacific Americans	×										
	ve	Œ.										
	Native Americans	Σ										
<u>ə</u>	cans	tr'										
M = Male	Hispanic Americans	Σ					E					
	cans	ĬT.										
	Black Americans	M										
ees in	Total Female Employees	Minorities				-	-					n
Total Employees in Establishment	Total Male Employees Including	Millionines										
	Total Employees Including	MIIIOIIIICS	<i>s</i> -			ю	-					Ω
Job Categories			Officials & Managers	Professionals	Technicians	Sales	Office & Clerical	Craft Workers (skilled)	Operatives (semi- skilled)	Laborers (unskilled)	Service Workers	TOTAL

December 2, 2016

Contract No. 201631819 33rd Outfall - 3

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APPENDIX B – DBE ENCLOSURES ENCLOSURE 4 – SOLICITATION STATISTICS

Firm Name: Smith Environmental & Engineering Firm Address (Office Reporting): 1490 w., 121st Ave., 5te 101 Westminster, co 80234
Status as a DBE or Non-DBE (check one):
RTD DBE Non-DBEX
Annual Gross Receipts of the Firm: (check one):
U.S.\$0 to U.S.\$500,000
U.S.\$500,000 to U.S.\$1,000,000
U.S.\$1 Million to U.S.\$5 Million
U.S.\$5 Million to U.S.\$10 Million_X_
U.S.\$10 Million to U.S.\$20.41 Million
Above U.S.\$20.41 Million
Age of the firm: $\frac{16 \text{ yrs}}{4}$.
Signature: Let 21
Name: Peter L. Smith
Title: Vice President/Principal
Date: January 23, 2017

Smith Environmental & Engineering

Job Categories		Total Employees in Establishment	yees in nent			M = Male	ale					표 표	= Female		
	Total Employees Including	Total Male Employees Including	Total Female Employees	Bl	Black Americans	Hispanic Americans	anic	Native Americans	ve	Asian-Pacific Americans	Pacific	Subcontinent Asian Americans	ntinent an icans	Other	er
	Minorines	Minorines	Minorities	Σ	Œ	Σ	ш	×	Į.	Σ	F	Σ	Ŀ	Σ	표
Officials & Managers	8	9	2												
Professionals	7	4	3												
Technicians	9	9	0												
Sales	1	1	1												
Office & Clerical	4	0	4												
Craft Workers (skilled)	2	2	0												
Operatives (semiskilled)	10	10	0	7		_									
Laborers (unskilled)															
Service Workers															
TOTAL	37	28	6												
								1							

December 2, 2016

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APPENDIX B - DBE ENCLOSURES ENCLOSURE 4 - SOLICITATION STATISTICS

Firm Name: Mile High Paving
Firm Address (Office Reporting):
12200 A. West Soth Place
Wheat Ridge, CO 80033
Status as a DBE or Non-DBE (check one):
RTD DBE Non-DBE
Annual Gross Receipts of the Firm: (check one):
U.S.\$0 to U.S.\$500,000
U.S.\$500,000 to U.S.\$1,000,000
0.3.3500,000 to 0.3.31,000,000
U.S.\$1 Million to U.S.\$5 Million
U.S.\$5 Million to U.S.\$10 Million
U.S.\$10 Million to U.S.\$20.41 Million
Above U.S.\$20.41 Million
Age of the firm: 15 Lov port-1 D. c. 5, 2013
Signature: Mark J. Sandebi
Name: Mark L. Sandaf-r
Title: Estimator / Project Manager
Date: Februry 13, 2017

S Employees I I I I I I I I I I I I I I I I I I			Total Employees in Establishment	yees in ncnl			M = Male	el el					ii.	F = Female		
3 0 F M F M F M F M F M F M F M F M F M F	Emple Inclu	oyces oding	Total Male Employees Including	Female Employees	Ame	ack ricans	Hispa	unic	Nati	ve	Asian-	Pacific icans	Subcor Asi Amer	thinent lan icans	0 3	p 7
3 0 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2			Composition	Minorities	Σ	4	Σ	ш,	Σ	7.	Z	114	×	F	Σ	CL.
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3 0 1 1 1 2 2 3 4 4 5 1 1 2 1 2 3 4 5 5 1 1 2 1 2 3 4 5 5 1 1 2 1 2 3 5 1 5 1 1 1 2 3 5 1 3 5 1 5 1 1 3 5 1 3 5 1 5 1 1 3 5 1 3 5 1 5 1								T								
2 3 15 1 8		100	2	0											~	
30 3 1511		A	0	4				-	T						7	-
7 7 1 30 3 1511		10115						-								-
30 3 15 1		7	7				7									
30 3 151	1	7	7													
30 3		-	_												-	13
		33	20	2			7	_							130	1

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APPENDIX B – DBE ENCLOSURES ENCLOSURE 4 – SOLICITATION STATISTICS

Firm Name: Legacy Traffic Management Firm Address (Office Reporting): 1390 5 Charokee St Denver Co Seecs Status as a DBE or Non-DBE (check one):
RTD DBE Non-DBE
Annual Gross Receipts of the Firm: (check one):
U.S.\$0 to U.S.\$500,000
U.S.\$500,000 to U.S.\$1,000,000
U.S.\$1 Million to U.S.\$5 Million_X
U.S.\$5 Million to U.S.\$10 Million
U.S.\$10 Million to U.S.\$20.41 Million
Above U.S.\$20.41 Million
Age of the firm: 3 years
Signature:
Name: Tony CKCIC
Title: Estimator
Date: 1/20/17

Legacy Traffic Mgint

Job Categories	2	Fotal Employees in Establishment	yees in sent			M = Male	nle					i.	F = Female		
	Total Employees Including	Total Male Employees Including	Total Female Employees	Ame	Black Americans	Hispanic	anic icans	Nalive Americans	ve cans	Asian-Pacifi Americans	Asian-Pacific Americans	Subcontinent Asian Americans	itinent an icans	Olher	Jer.
	Minorities	Minorities	Including Minorities	Z	H	Z	iz.	Σ	ш	Σ	lä,	Σ	T.	Σ	iz.
Officials & Managers	4	8	Ŋ												
Professionals						16 - 2 - 2 - 2									
Technicians				00			-								
Sales					-										
Office & Clerical															
Crait Workers (skilled)															
Operatives (semi- skilled)		The state of the s													
Laborers (unskilled)															
Service Workers															
TOTAL	933	8	5	σ			7								

December 2, 2016

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APPENDIX B – DBE ENCLOSURES ENCLOSURE 4 – SOLICITATION STATISTICS

RTD is required to create and maintain bidder statistics for all firms bidding on prime contracts and bidding or quoting Subcontracts on USDOT-assisted projects per 49 CFR Part 26.11. The Contractor is required to make copies of this form, send a copy with its initial contact to each Subcontractor (whether DBE or non-DBE) and require each Subcontractor to return a completed form with its Subcontract bid to the Contractor. The Contractor must submit all completed forms with each submission of DBE Enclosures to the SBO.

Firm Address (Office Reporting):
Status as a DBE or Non-DBE (check one).
RTD DBE Non-DBE
Annual Gross Receipts of the Firm: (check one):
U.S.\$0 to U.S.\$500,000
U.S.\$500,000 to U.S.\$1,000,000
U.S.\$1 Million to U.S.\$5 Million
U.S.\$5 Million to U.S.\$10 Million
U.S.\$10 Million to U.S.\$20.41 Million
Above U.S.\$20.41 Million
Age of the firm: 5 yR
Signature:
Name: Annie DEKOWZAN
Title: OWNER
Date: 1/25/17

Firm Name: ATZ CONSTRUCTION SERVICES, LIC

Job Categories	Total	Total Employees in Establishment Total Male To	yecs in nent Total	18	Black	M Male Hispanic	ale	Native	, se	Asian-Pacific	Pacifi		0	F = Female	0
	Employees Including	Employees	Female Employees	Ашс	Americans	Americans	icans	Americans	cans	Americans	icans				Asian
	Saliton inco	Chillomin	Minorities	Σ	i.	Σ	14.	Σ	tt.	Σ	in.		Σ	Z F	-
Officials & Managers			j												
Professionals														-	-
Technicians														-	
Sales														-	+
Office & Clerical						T								-	-
Craft Workers (skilled)															
Operatives (semi- skilled)															
Laborers (unskilled)											T				
Service Workers															
TOTAL	C	O	_										1		

December 2, 2016

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APPENDIX B – DBE ENCLOSURES ENCLOSURE 5 – EMPLOYER CERTIFICATION OF WORKFORCE¹

The undersigned certifies that he/she is legally authorized to make the statements and representations contained in this report and that the statements and representations contained herein are true and correct to the best of his/her knowledge and belief.

Firm Name: Concrete Works of Colorado, INc.

Owners (individuals or holding companies with any ownership interest in your firm):

Ownership Interest (by %)	Ethnicity (natural persons)	Gender (natural nersons)
Marc Lenart - 100%	Caucasian	Male

Signature:

ame: ReaAnn Fletcher

Title: Contracts Manager

Please note that this data may be obtained by visual survey or post-employment records. Neither visual surveys nor post-employment records are prohibited by Federal, State or local law. Current utilization as of Feb. 14, 2017 : 47% minority employees Date of Execution: Feb. 14, 2017

NOTE: Submission of the Employer Certification of Workforce form is voluntary. Unless this form is marked 'confidential' upon submission, RTD cannot guarantee confidentiality of the information contained in this Employer Certification of Workforce form.

Contract No. 201631819 33rd Outfall - 3

DESCRIPTION OF JOB CATEGORIES

Officials and Managers - Occupations requiring administrative personnel who set board policies, exercise full responsibility for execution of these policies, and ndividual departments or special phases of the operations.

Professionals - Occupations requiring either college education or experience of such kind and amount as to provide a comparable background.

Technicians – Occupations requiring a combination of specific scientific knowledge and manual skill which can be obtained through about 2 years of post high school education, such as is offered in many technical institutes and junior colleges, or through equivalent on-the-job training.

Sales - Occupations engaging wholly or primarily in selling.

Office and clerical - Includes all clerical-type work, regardless of level of difficulty, where the activities are predominately non-manual though some manual work directly involved with altering or transporting the products is included. Craft Worker (skilled) - Manual workers of relatively high skill level having a thorough and comprehensive knowledge of the processes involved in their work. Exercises considerable independent judgment and usually requires an extensive period of training.

Operatives (semi-skilled) - Workers who operate machines or processing equipment or perform other factory-related duties of intermediate skill level which can be mastered in a few weeks and require only limited training. Laborers (unskilled) - Workers in manual occupations which generally require no special training perform rudimentary duties that may be learned in a few days and require the application of little or no independent judgment.

Service Workers - Workers in both protective and unprotective service occupations.

RACE/ETHNIC IDENTIFICATION

White (not Hispanic origin) - All persons having origins in any of the original peoples of Europe, North Africa, or the Middle East

Black Americans (not Hispanic origin) - All persons having origins in any of the Black racial groups of Africa

Hispanic Americans - All persons of Mexican, Puerto Rican, Cuban, Dominican, Central or South American, or other Spanish or Portuguese culture or origin, regardless

Malaysia, Indonesia, the Philippines, Brunei, Samoa, Guam, the U.S. Trust Territories of the Pacific Islands (Republic of Palau), the Commonwealth of the Northern Asian-Pacific Americans - All persons whose origins are from Japan, China, Taiwan, Korea, Burma (Myanmar), Vietnam, Laos, Cambodia (Kampuchea), Thailand, Marianas Islands, Macao, Fiji, Tonga, Kirbati, Juvalu, Nauru, Federated States of Micronesia, or Hong Kong

Subcontinent Asian Americans - All persons whose origins are from India, Pakistan, Bangladesh, Bhutan, the Maldives Islands, Nepal or Sri Lanka

Native American - All persons having origins in any of the original peoples of North America, including American Indians, Eskimos, Aleuts, or Native Hawaiians

As part of RTD's ongoing outreach activities to the Denver metro Disadvantaged business community, it is our goal to identify and to establish a relationship with the Disadvantaged business outreach programs sponsored by the prime and subcontractors we partner with.

The prime and all contracted subcontractors are requested to provide the following information pertaining to their current DBE outreach efforts – additional sheets may be used if necessary:

Contract No. 201631819 Bidder/Proposer:
Concrete Works of Colorado, Inc.
Subcontractor – if applicable:
Disadvantaged Business Outreach Contact (if none, list contact for the Contract): ReaAnn Fletcher, Contracts Manager
Phone: 303-665-2933, EXT 110 Fax: 303-665-2996
Email: reaannf@cwc-email.com
Website: www.concreteworksofcolorado.com
Currently Sponsored Disadvantaged Business Outreach Activities: None.
How can RTD assist you in your current Disadvantaged business outreach efforts? N/A
Would you be interested becoming involved in current and future RTD-sponsored outreach activities and committees: [] Yes

As part of RTD's ongoing outreach activities to the Denver metro Disadvantaged business community, it is our goal to identify and to establish a relationship with the Disadvantaged business outreach programs sponsored by the prime and subcontractors we partner with.

The prime and all contracted subcontractors are requested to provide the following information pertaining to their current DBE outreach efforts – additional sheets may be used if necessary:

KIDC	ontract Name and Number:		
Contra Bidder Conc	ct No. 201631819 /Proposer: rete Works of Colorado,	Inc.	
Subcon J.P.	tractor – if applicable: Meyer Trucking & Const	truction, Inc. (DBE)	
Disadvi Jear	nntaged Business Outreach (nie Meyer	Contact (if none, list contact for t	the Contract):
Phone:	303-426-0966	Fax: 303-412-066	1
Email:	jeanmey3@wildblue.ne		
Website	:		
Current		Business Outreach Activities:	N/A
How car		rrent Disadvantaged business out	reach efforts? N/A
Vould ye { } Ye f so, how	. [1]	nvolved in current and future RT	D-sponsored outreach activities and committees:

APPENDIX B - DBE ENCLOSURES ENCLOSURE 6- SMALL BUSINESS OUTREACH

As part of RTD's ongoing outreach activities to the Denver metro small business community, it is our goal to identify and to establish a relationship with the small business outreach programs sponsored by the prime and subcontractors we partner with.

The prime and all contracted subcontractors are requested to provide the following information pertaining to their current DBE outreach efforts – additional sheets may be used if necessary:

RTD Contract Name and Number:

Contract No. 201631819

Proposer:
Concrete Works of Colorado, Inc.
Subcontractor – if applicable:
HCL Engineering & Surveying, LLC
Small Business Outreach Contact (if none, list contact for the RFP):
J. Lloyd Herrera, PE
Phone: <u>303-773-1605</u> Fax: <u>303-773-3297</u>
Email: jherrera@hclengineering.com
Website: www.hclengineering.com
Currently Sponsored Small Business Outreach Activities:
How can RTD assist you in your current small business outreach efforts?
Would you be interested becoming involved in current and future RTD-sponsored outreach activities and committees: [X] Yes [] No
If so, how?

As part of RTD's ongoing outreach activities to the Denver metro Disadvantaged business community, it is our goal to identify and to establish a relationship with the Disadvantaged business outreach programs sponsored by the prime and subcontractors we partner with.

The prime and all contracted subcontractors are requested to provide the following information pertaining to their current DBE outreach efforts – additional sheets may be used if necessary:

Contract No. 201631819
CONNETE WORKS OF COURRADO
Subcontractor - if applicable: MARTINEZ ASSOCIATES, INC.
Disadvantaged Business Outreach Contact (if none, list contact for the Contract):
Phone: 303-459-2216 Fax: 303-428-2230
Email: JAMESTIO MARTINEZT ESTING COM
Website: WWW. MARTINEZTESTING. COM
Currently Sponsored Disadvantaged Business Outreach Activities:
N/A.
How can RTD assist you in your current Disadvantaged business outreach efforts?
N/A
Would you be interested becoming involved in current and future RTD-sponsored outreach activities and committees [X] Yes [] No
If so, how? Small BUSINESS DITREACH

As part of RTD's ongoing outreach activities to the Denver metro Disadvantaged business community, it is our goal to identify and to establish a relationship with the Disadvantaged business outreach programs sponsored by the prime and subcontractors we partner with.

The prime and all contracted subcontractors are requested to provide the following information pertaining to their current DBE outreach efforts – additional sheets may be used if necessary:

Contract No. 201631819 Bidder/Proposer:	res of Colorado, Inc.	
Subcontractor - if applies		+
Colorado Ba	urricade Co.	
Disadvantaged Business	Outreach Contact (if none, list contact for the Contract):	N/A
Phone:	Fax:	
Email:		
Website:		
Currently Sponsored Dis-	advantaged Business Outreach Activities:	
	NIA	
		N/A
	in your current Disadvantaged business outreach efforts?	
	n/h	
Would you be interested [] Yes [] No	becoming involved in current and future RTD-sponsored ou	streach activities and committees
If so, how?	N/X	

As part of RTD's ongoing outreach activities to the Denver metro Disadvantaged business community, it is our goal to identify and to establish a relationship with the Disadvantaged business outreach programs sponsored by the prime and subcontractors we partner with.

The prime and all contracted subcontractors are requested to provide the following information pertaining to their current DBE outreach efforts – additional sheets may be used if necessary:

Contract No. 201631819
Bidder/Proposer: Alth Millians Company
Subcontractor - if applicable: NA
Disadvantaged Business Outreach Contact (if none, list contact for the Contract):
Phone: 303-428-2899 Fax: 303-428-2347
Email: DJONES PALPHAMILLING. COM
Website: ALPHAMILLING. COM
Currently Sponsored Disadvantaged Business Outreach Activities:
NONE Z PERFORM AU WORK IN-HOUSE
How can RTD assist you in your current Disadvantaged business outreach efforts?
4/4
Would you be interested becoming involved in current and future RTD-sponsored outreach activities and committees [] Yes No If so, how?

As part of RTD's ongoing outreach activities to the Denver metro Disadvantaged business community, it is our goal to identify and to establish a relationship with the Disadvantaged business outreach programs sponsored by the prime and subcontractors we partner with.

The prime and all contracted subcontractors are requested to provide the following information pertaining to their current DBE outreach efforts – additional sheets may be used if necessary:

RTD Contract Name and Number	er:
Contract No. 201631819 Bidder/Proposer:	
Subcontractor – if applicable: AGGREGATE LOGISTICS	
Disadvantaged Business Outread	ch Contact (if none, list contact for the Contract):
Phone: 720-421-5222	Fax:
Email; DIANA@AGGREAGTELOG	SISTICS.COM
Website: AGGREGATELOGISTICS	S.COM
	ged Business Outreach Activities:
How can RTD assist you in your	current Disadvantaged business outreach efforts?
Would you be interested becomin	ng involved in current and future RTD-sponsored outreach activities and committees:
If so, how?	
4.00	

As part of RTD's ongoing outreach activities to the Denver metro Disadvantaged business community, it is our goal to identify and to establish a relationship with the Disadvantaged business outreach programs sponsored by the prime and subcontractors we partner with.

The prime and all contracted subcontractors are requested to provide the following information pertaining to their current DBE outreach efforts — additional sheets may be used if necessary:

RTD Contract Name and Number:	
Contract No. 201631819 Bidder/Proposer:	
Subcontractor – if applicable: Smith Environmental & Engineering	g (non DBE)
Disadvantaged Business Outreach Contact (if none, list contact for the Contract):	Peter L. Smith
Phone: (720) 887-4928 Fax: (720) 887-4680	
Email:petersmith@smithdelivers.com	
Website: _www.smithdelivers.com	
Currently Sponsored Disadvantaged Business Outreach Activities: N/A	
How can RTD assist you in your current Disadvantaged business outreach efforts?	N/A
Would you be interested becoming involved in current and future RTD-sponsored or [] Yes [X] No If so, how?	utreach activities and committees:
Disadvantaged Business Outreach Contact (if none, list contact for the Contract): Phone: (720) 887-4928 Fax: (720) 887-4680 Email: petersmith@smithdelivers.com Website: www.smithdelivers.com Currently Sponsored Disadvantaged Business Outreach Activities: N/A How can RTD assist you in your current Disadvantaged business outreach efforts?	Peter L. Smith N/A

As part of RTD's ongoing outreach activities to the Denver metro Disadvantaged business community, it is our goal to identify and to establish a relationship with the Disadvantaged business outreach programs sponsored by the prime and subcontractors we partner with.

The prime and all contracted subcontractors are requested to provide the following information pertaining to their current DBE outreach efforts – additional sheets may be used if necessary:

RTD Contract Name and Num	ber:
Contract No. 201631819 Bidder/Proposer:	
	Mile High Paving, co
	ach Contact (if none, list contact for the Contract);
Phone:	Fax:
Email:	
Currently Sponsored Disadvant	aged Business Outreach Activities:
The state of the s	r current Disadvantaged business outreach efforts?
Would you be interested become [] Yes [] No	ing involved in current and future RTD-sponsored outreach activities and committees;

As part of RTD's ongoing outreach activities to the Denver metro Disadvantaged business community, it is our goal to identify and to establish a relationship with the Disadvantaged business outreach programs sponsored by the prime and subcontractors we partner with.

The prime and all contracted subcontractors are requested to provide the following information pertaining to their current DBE outreach efforts – additional sheets may be used if necessary:

As part of RTD's ongoing outreach activities to the Denver metro Disadvantaged business community, it is our goal to identify and to establish a relationship with the Disadvantaged business outreach programs sponsored by the prime and subcontractors we partner with.

The prime and all contracted subcontractors are requested to provide the following information pertaining to their current DBE outreach efforts – additional sheets may be used if necessary:

Contract No. 201631819 Bidder/Proposer: ATZ CONSTRUCTION SERVICES LLC
Subcontractor - if applicable:
Disadvantaged Business Outreach Contact (if none, list contact for the Contract):
Phone: 720 - 429 -34 Z 3 Fax:
Email: ATZCONSTRUCTIONSCRUCES @ GMAIL. COM
Website:
Currently Sponsored Disadvantaged Business Outreach Activities:
How can RTD assist you in your current Disadvantaged business outreach efforts?
Would you be interested becoming involved in current and future RTD-sponsored outreach activities and committee [] Yes
If so, how?

APPENDIX B – DBE ENCLOSURES ENCLOSURE 7– DBE UNAVAILABILITY CERTIFICATION

	ment Log: (attac		a construction		CAL C
Newspaper/Publica		Type of Publication Minority/General/Trade		Dates of Advertisement	
Selected portions of the	ne work to be per	formed by	[DBEs]		
Work Categories	Type of (Subcontra Suppli	ctor or	Contractor's Est Budget	imated	Additional Comments
Made efforts to assist equipment, supplies, r		in obtainin	ng bonding, lines of	credit, ii	nsurance or any necessary
Hist am specific offer	s made by Contr	actor]			

Date Contacted	Name of DBE Firm	Contact Person	Phone #	Work Category
Followed up	with initial contacts			
Date	Name of DBE	Phone #	Bidding (Yes or No)	Additional Comments
Sign				
Contacted the	e following other agencie	s organizations in re	cruitment of DRF in	cluding PTD:
	ate			
	ate	Organization	Phone	#
				1800
s shown by the	documentation provided t	a PTD, wa faal that	yo hayo mada asad	California Company
is shown by the	accumentation provided t	o KID, we leef that	we have made good	iann eriort to attain the
ignature:				

Certifications

CERTIFICATION REGARDING DEBARMENT, SUSPENSION, PROPOSED DEBARMENT, AND OTHER RESPONSIBILITY MATTERS

INSTRUCTIONS FOR CERTIFICATION

- By signing and submitting this proposal, the Proposer is providing the certification set out above.
- 2. The inability of a person to provide the certification required will not necessarily result in denial of participation in this covered transaction. The Proposer shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with RTD's determination whether to enter into this transaction. However, failure of the Proposer to furnish a certification or an explanation shall disqualify such person from participation in this transaction.
- 3. This certification is a material representation of fact upon which reliance is placed when RTD determines to enter into this transaction. If it is later determined that the Proposer knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, RTD may terminate this transaction for cause or default. This certification concerns a matter which may be within the jurisdiction of an agency of the United States and the making of a false, fictitious, or fraudulent certification may render the maker subject to prosecution under Section 1001, Title 18, United States Code.
- 4. The Proposer shall provide immediate written notice to RTD if at any time the Proposer learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.
- 5. The terms "covered transaction," "debarred," "suspended," "ineligible," "lower tier covered transaction," "participant," "person," "primary covered transaction," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of the rules implementing Executive Orders 12549 and 12689. You may contact RTD for assistance in obtaining a copy of those regulations (2 CFR Part 180).
- 6. The Proposer agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by RTD.
- 7. The Proposer further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Covered Transactions," provided by the department or agency entering into this covered transaction, without

- modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.
- 8. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that it is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the ineligibility of its principals. Each participant may, but is not required to, check the Nonprocurement List.
- 9. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
- 10. Except for transactions authorized by RTD, as provided herein, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

<u>Certification of Compliance with</u> <u>Prohibition Against Employment of Illegal Aliens</u>

Pursuant to C.R.S. §§ 8-17.5-101 et.seq and in accordance with that provision of this Contract entitled Prohibition against Employment of Illegal Aliens:

- I, the undersigned, a duly authorized representative of Contractor, hereby certify that, at the time of this Certification:
 - The Contractor does not knowingly employ or contract with an illegal alien who will perform Work under this Contract; and
 - The Contractor will participate in the E-Verify Program or the Department Program, as those terms are defined in C.R.S. §8-17.5-101, in order to confirm the employment eligibility of all employees who are newly hired for employment to perform Work under this Contract.

NAME OF CONTRACTOR:	Concrete Works of Co	lorado, Inc.	
20 E 200 MET 200 COM 200 S 200 THE SERVICE .	(please print)		
Solicitation or Contract No.	201631819		
FOR CONTRACTOR:			
Ruluali	lelu	Feb. 14, 2017	
Signature		Date	
ReaAnn Fletcher			
Name (please print)			
Contracts Manager			
Title (please print)			

CERTIFICATION REGARDING LOBBYING

The undersigned,	ReaAnn Fletcher
certifies, to the best of his	or her knowledge and belief, that:

- (1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
- (2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for making lobbying contacts to an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form--LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions [as amended by "Government wide Guidance for New Restrictions on Lobbying," 61 Fed. Reg. 1413 (1/19/96). Note: Language in paragraph (2) herein has been modified in accordance with Section 10 of the Lobbying Disclosure Act of 1995 (P.L. 104-65, to be codified at 2 U.S.C. 1601, et seq.)]
- (3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31, U.S.C. § 1352 (as amended by the Lobbying Disclosure Act of 1995). Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

Pursuant to 31 U.S.C. § 1352(c)(1)-(2)(A), any person who makes a prohibited expenditure or fails to file or amend a required certification or disclosure form shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such expenditure or failure.

The Contractor, Concrete Works of Colorado, Inc.

certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C.A. 3801, et seq., apply to this certification and disclosure, if any.

Signature of Contractor's Authorized Official

ReaAnn Fletcher, Contracts Manager Name and Title of Contractor's Authorized Official

Feb. 14, 2017 Date

BUY AMERICA CERTIFICATION

Certification Requirement for Procurement of Steel, Iron, or Manufactured Products

Contractor must complete either the Certificate of Compliance or Certificate of Non-Compliance

Certificate of Compliance with 49 USC 5323(j)(1)

The Contractor hereby certifies that it will meet the requirements of 49 USC 5323(j)(1) and the applicable regulations in 49 CFR Part 661.5.

ORGANIZATIONAL CONFLICT OF INTEREST CERTIFICATION

The Offeror is is not aware of any information bearing on the existence of any potential organizational conflict of interest. If the Offeror is aware of information bearing on whether a potential conflict may exist, the Offeror shall provide a disclosure statement describing this information.

Signature

ReaAnn Fletche

Title Contracts Manager

Date Feb. 14, 2017

BIDDERS REPRESENTATION

REGARDING

CONTINGENT FEE

THE BIDDER REPRESENTS:

- That it (Kab), (has not), employed or retained any company or person (other than a full-time, bona fide employee working solely for the Bidder) to solicit or secure this contract, and
- b. That it (1/24), (has not), paid or agreed to pay to any company or person (other than a full-time, bona fide employee working solely for the Bidder) any fee, commission, percentage, or brokerage fee, contingent upon or resulting from the award of this Contract.

The Bidder agrees to furnish information relating to (a) and (b) above as requested by the Contracting Officer. (For interpretation of the representation, including the term "bona fide employee," see Code of Federal Regulations, Title 48, Subpart 3.4.)

EXECUTION OF STANDARD FORM 119: If the Bidder indicates above that it has represented that it has employed or retained a company or person (other than a full-time, bona fide employee working solely for the Bidder-Contractor) to solicit or secure this Contract, or that it has paid for, agreed to pay any fee, commission, percentage, or brokerage fee to any company or person contingent upon or resulting from the award of this Contract, it may be requested by the Contracting Officer to furnish a completed Standard Form 199, "Contractor's Statement of Contingent or Other Fees." If the Bidder has previously furnished a complete Standard Form 119 to the RTD, it my accompany its offer with a signed statement, (a) indicating when such completed form was previously furnished, (b) identifying by number the previous Request for Proposal or Contract, if any, in connection with such form was submitted, and (c) representing that the statement in such form is applicable to this offer.

Signature Realin Hill
ReaAnn Fletcher Title Contracts Manager
Date Feb. 14, 2017

- 21. Bid Item 34-15.1 Sanitary Sewer Tap Location and Verification. There are quantities of 25 in the base bid and 5 in the alternate. What is a specific description of the work required for this item? CITY RESPONSE: See Measurement and Payment for this item.
- 22. In general, the bid items for the concrete flatwork removals and the flatwork replacement quantities from the plans don't match up reasonably close to the quantities in the bid schedule. Could these quantities be checked and revised, if necessary? CITY RESPONSE: See response to question no. 10. The quantities will not be adjusted for bidding purposes.
- 23. A question about item 34-15.3 on the Statement of Quantities and Statement of Quantities Add Alt 1. The unit listed is 'each'. Can 'each' be defined further? (feet, hour, etc.?) CITY RESPONSE: See the Measurement and Payment for this item.

This ADDENDUM shall be attached to, become a part of, and be returned with the Bid Proposal.

City Engineer

1.25.17

Date

The undersigned bidder acknowledges receipt of this Addendum. The Proposal submitted herewith is in accordance with the stipulations set forth herein.

ADDENDUM NO. _1_

DATE: Jan. 23, 2017

Contract No. 201631819 33rd Outfall 3

ADD- #1

January 23, 2017

This ADDENDUM shall be attached to, become a pa	art of, and be returned with the Bid Proposal.
	Lesley B. Thomas City Engineer
	Date
The undersigned bidder acknowledges receipt of this Adaccordance with the stipulations set forth herein.	dendum. The Proposal submitted herewith is in
	CONCRETE WORKS OF COLORADO, INC
	Contractor
ADDENDUM NO. 2	DATE: Jan. 31, 2017

	Lesley B. Thomas City Engineer
The undersigned bidder acknowledges receipt of this Addendum. accordance with the stipulations set forth herein.	The Proposal submitted herewith is in
	CONCRETE WORKS OF COLORADO, INC. Contractor
ADDENDUM NO. 3	DATE: _Feb. 2, 2017

This ADDENDUM shall be attached to, become a part of, and be returned with the Bid Proposal.



DEPARTMENT OF PUBLIC WORKS / WASTEWATER MANAGEMENT DIVISION

BID DOCUMENTS PACKAGE

Contract No. 201631819

33RD STREET OUTFALL (31ST AND 36TH STREET OUTFALL PROJECT) SEGMENT - BLAKE ST. TO ARAPAHOE ST.

DECEMBER 2, 2016

DEPARTMENT OF PUBLIC WORKS ENGINEERING DIVISION

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CITY AND COUNTY OF DENVER DEPARTMENT OF PUBLIC WORKS

33sr Street Outfall (31st and 36th Street Outfall Project) Segment – Blake St. to Arapahoe St. 201631819

Item No.	Description	Estimated Quantity	
01-52.13	TEMPORARY OFFICE FACILITIES	1	LS
2-1.2a	REMOVE 6" CONCRETE CURB AND/OR GUTTER	3,100	LF
2-1.4	REMOVE HANDICAP CONCRETE CURB RAMP	1,175	SF
2-2.1	REMOVE CONCRETE SIDEWALK	1,390	SF
2-2.2	REMOVE CONCRETE DRIVEWAY PAVING	350	SF
2-3.3	REMOVE CONCRETE ALLEY PAVING	3,400	SF
2-11.1a	REMOVE EXISTING 8" SANITARY SEWER PIPE	47	LF
2-11.2b	REMOVE EXISTING 10" STORM SEWER PIPE	322	LF
2-11.2e	REMOVE EXISTING 18" STORM SEWER PIPE	701	LF
2-11.2f	REMOVE EXISTING 21" STORM SEWER PIPE	212	LF
2-11.2g	REMOVE EXISTING 24" STORM SEWER PIPE	466	LF
2-11.4k	REMOVE 48" X 76" HE PIPE	30	LF
2-11.5c	ABANDON EXISTING 12" SEWER PIPE	42	LF
2-12.2	REMOVE EXISTING STORM MANHOLE	6	EA
2-13.1	REMOVE EXISTING STORM INLET	10	EA
2-17.3	REMOVE AND REPLACE/RELOCATE SIGN	43	EA
2-17.7	RELOCATE EXISTING UTILITY	9	LS
02-22.13	VIBRATION ASSESSMENT	1	LS
3-2	HAULING OF CONTAMINATED MATERIALS TO DENVER/ARAPAHOE DISPOSAL SITE (DADS)	38,000	TON



CITY AND COUNTY OF DENVER DEPARTMENT OF PUBLIC WORKS

33sr Street Outfall (31st and 36th Street Outfall Project) Segment – Blake St. to Arapahoe St. 201631819

Item No.	Description	Estimated Quantity	<u>, </u>
3-7a	HEALTH & SAFETY PLAN	1	LS
3-7b	MATERIAL MANAGEMENT PLAN	1	LS
5-2a	SUBGRADE MATERIAL (SELECT BACKFILL)	10,400	TON
5-7	CONTROLLED LOW STRENGTH MATERIALS (CLSM)	130	CY
5-8	CRUSHED GRAVEL BASE COURSE (CDOT CLASS 6 ROAD BASE)	4,550	TON
12-1.1	6" CURB AND GUTTER 2' PAN (CD0T T2, IIB)	3,100	LF
12-1.8	HANDICAP CONCRETE CURB RAMP	1,175	SF
12-2.1	CONCRETE SIDEWALK	1,390	SF
12-5.1	CONCRETE DRIVEWAY PAVING	350	SF
12-5.5	CONCRETE ALLEY PAVING	3,400	SF
16-1	SECURITY FENCE	1,000	LF
20-2ce	ASPHALT SURFACE COURSE, SX, RAP 20%, N=100, 64-22.	15,600	SY-IN
20-3ce	ASPHALT BASE COURSE, S, RAP 20%, N=100, 64-22.	46,700	SY-IN
20-4	ASPHALT ROTOMILL	1,020	SY-IN
34-2.3d	15" DIAMETER C-76 RCP, CLASS III	116	LF
34-2.3e	18" DIAMETER C-76 RCP, CLASS III	76	LF
34-2.3g	24" DIAMETER C-76 RCP, CLASS III	60	LF



CITY AND COUNTY OF DENVER DEPARTMENT OF PUBLIC WORKS

33sr Street Outfall (31st and 36th Street Outfall Project) Segment – Blake St. to Arapahoe St. 201631819

Item No.	Description	Estimated Quantit	у
34-6.2	PRECAST RCBC (SPECIAL SIZE AND/OR DESIGN)	267	LF
34-6.2	PRECAST RCBC (SPECIAL SIZE AND/OR DESIGN)	496	LF
34-6.2	PRECAST RCBC (SPECIAL SIZE AND/OR DESIGN)	600	LF
34-7.1a	8" DIAMETER ASTM D-3034 SDR 35, PVC PIPE	10	LF
34-12.1a	4' DIAMETER PRECAST MANHOLE WITH TYPE A BASE & CONCENTRIC CONE	1	EA
34-12.2a	5' DIAMETER PRECAST MANHOLE WITH TYPE A BASE & CONCENTRIC CONE	3	EA
34-12.2a	5' DIAMETER PRECAST MANHOLE WITH TYPE A BASE & CONCENTRIC CONE	5	EA
34-12.7	CAST-IN-PLACE SPECIAL STRUCTURE	1	EA
34-15.1a	SANITARY SEWER TAP LOCATION AND VERIFICATION	25	EA
34-15.3	UTILITY EXPLORATORY INVESTIGATION	40	EA
34-16.1a	#14 INLET (L=6')	7	EA
34-16.3a	DOUBLE #16 INLET WITH OPEN THROAT	4	EA
40-1	SEEDING AND MULCHING	10,000	SF
40-3	SODDING	10,000	SF
40-4b	RELOCATE EXISITING SPRINKLER LINE	200	LF



CITY AND COUNTY OF DENVER DEPARTMENT OF PUBLIC WORKS

$33 sr\ Street\ Outfall\ (31^{st}\ and\ 36^{th}\ Street\ Outfall\ Project)\ Segment-Blake\ St.\ to\ Arapahoe\ St.$ 201631819

Item No.	Description	Estimated Quantity	/
40-10	REPLACE BUSHES AND/OR SHRUBS	10	EA
41-1	TRAFFIC CONTROL	1	LS
43-1d	STORM WATER MANAGEMENT (SCENARIO 4) See SCS 23.0	1	LS
45-2	QUALITY CONTROL TESTING	1	LS
46-2	EPOXY PAVEMENT MARKING	150	SF
47-1	CONSTRUCTION SURVEYING	1	LS
47-2	SURVEY MONUMENTATION	15	EA
50-1	MOBILIZATION	1	LS



Department of Public Works - Engineering Division Wastewater Capital Projects Management

Statement of Quantities

33rd Street Outfall (Blake to Arapahoe) Add Alt 1

id Item	Description	Estimated ty	Units
01-52.13	TEMPORARY OFFICE FACILITIES	1	LS
2-1.2a	REMOVE 6" CONCRETE CURB AND/OR GUTTER	970	LF
2-1.4	REMOVE HANDICAP CONCRETE CURB RAMP	450	SF
2-2.1	REMOVE CONCRETE SIDEWALK	900	\mathbf{SF}
2-3.3	REMOVE CONCRETE ALLEY PAVING	770	SF
2-11.2b	REMOVE EXISTING 10" STORM SEWER PIPE	95	LF
2-11.2e	REMOVE EXISTING 18" STORM SEWER PIPE	300	LF
2-12.2	REMOVE EXISTING STORM MANHOLE	1	EA
2-13.1	REMOVE EXISTING STORM INLET	3	EA
2-17.3	REMOVE AND REPLACE/RELOCATE SIGN	12	EA
2-17.7 Add'l Info:	RELOCATE EXISTING UTILITY Coordination of utility relocation in public ROW	2	LS
02-22.13	VIBRATION ASS ESSMENT	1	LS
3-2	HAULING OF CONTAMINATED MATERIALS TO DENVER/ARAPAHOE DISPOSAL SITE (DADS)	2,500	TON
3-7a	HEALTH & SAFETY PLAN	1	LS
3-7b	MATERIAL MANAGEMENT PLAN	1	LS
5-2a	SUBGRADE MATERIAL (SELECT BACKFILL)	2,000	TON
5-7	CONTROLLED LOW STRENGTH MATERIALS (CLSM)	100	CY
5-8 Add'l Info:	CRUSHED GRAVEL BASE COURSE (CDOT CLASS 6 ROAD BASE) 12" thick aggregate base course under road	1,200	TON
8-1.1b	6" DIP AWWA C151, CLASS 50 WATER LINE	100	LF
8-1.2b	INSTALL 6" WATER VALVE	4	EA
12-1.1	6" CURB AND GUTTER 2' PAN (CD0T T2, IIB)	970	LF
12-1.8	HANDICAP CONCRETE CURB RAMP	450	SF
12-2.1	CONCRETE SIDEWALK	900	SF



Department of Public Works - Engineering Division Wastewater Capital Projects Management

Statement of Quantities

33rd Street Outfall (Blake to Arapahoe) Add Alt 1

id Item	Description	Estimated ty	Units
12-5.5 Add'l Info:	CONCRETE ALLEY PAVING Minimum 8" thick	770	SF
16-1 Add'l Info:	SECURITY FENCE 6' high	300	LF
20-2ae	ASPHALT SURFACE COURSE, SX, RAP 20%, N=50, 64-22.	4,000	SY-IN
20-3icf	ASPHALT BASE COURSE, SG, RAP 20%, N=100, 76-28.	12,000	SY-IN
20-4	ASPHALT ROTOMILL	150	SY-IN
34-2.3d	15" DIAMETER C-76 RCP, CLASS III	61	LF
34-2.3g	24" DIAMETER C-76 RCP, CLASS III	30	LF
34-6.2 Add'l Info:	PRECAST RCBC (SPECIAL SIZE AND/OR DESIGN) 10' x 8' precast box culvert	340	LF
34-12.2a <i>Add'l Info:</i>	5' DIAMETER PRECAST MANHOLE WITH TYPE A BASE & CONCENTRIC CONE stand alone manhole	1	EA
34-12.2a Add'l Info:	5' DIAMETER PRECAST MANHOLE WITH TYPE A BASE & CONCENTRIC CONE 5' diameter manhole riser above box culvert	2	EA
34-15.1a	SANITARY SEWER TAP LOCATION AND VERIFICATION	5	EA
34-15.3	UTILITY EXPLORATORY INVESTIGATION	15	EA
34-16.1a	#14 INLET (L=6')	3	EA
40-1	SEEDING AND MULCHING	2,400	SF
40-3	SODDING	2,400	SF
40-4b	RELOCATE EXISITING SPRINKLER LINE	50	LF
40-10	REPLACE BUSHES AND/OR SHRUBS	3	EA
41-1	TRAFFIC CONTROL	1	LS
43-1d	STORM WATER MANAGEMENT (S CENARIO 4) See SCS 23.0	1	LS
45-2	QUALITY CONTROL TESTING	1	LS



Department of Public Works - Engineering Division Wastewater Capital Projects Management

Statement of Quantities

33rd Street Outfall (Blake to Arapahoe) Add Alt 1

id Item	Description	Estimated ty	Units
46-2	EPOXY PAVEMENT MARKING	50	SF
47-1	CONSTRUCTION SURVEYING	1	LS
47-2	SURVEY MONUMENTATION	2	EA

33rd Outfall-3a **S -3** Add Alt. 1 December 2, 2016

CITY AND COUNTY OF DENVER

DEPARTMENT OF PUBLIC WORKS ENGINEERING DIVISION

NOTICE OF INVITATION FOR BIDS CITY OF DENVER CONTRACT NO. 201631819

33rd Street Outfall (31st and 36th Street Outfall Project) Segment - Blake St. to Arapahoe St.

BID SCHEDULE: 11:00 AM, Local Time February 2, 2017

Sealed bids will be received in Room 6.G.7, 201 W. Colfax Ave., Denver, CO 80202, beginning at 10:30 a.m., no later than 11:00 a.m., on bid day. All properly delivered bids will then be publicly opened and read aloud.

Bids submitted prior to 10:30 a.m. on the specified bid opening date/time shall be presented at the Office of Contract Administration, Attention: Public Works Contract Administration, 201 W. Colfax Avenue, Department 614, Denver, Colorado 80202.

Prior to submitting a bid, the bidder shall consult the Contractor's Bulletin Board located at 201 W. Colfax, 2nd Floor, Denver, Colorado, 80202 and/or www.work4denver.com.

GENERAL STATEMENT OF WORK:

This project is to improve the drainage conditions in the Basins 0062-01 & 4500-02 (bounded by S. Platte River to East 13th Ave. and from North Williams Street to North Grant Street) during a 5 year storm event. This phase of the project is to construct the storm sewer system and its associated facilities along 33rd Street corridor starting at the Blake Street and ending at Arapahoe Street. Also included is the Add Alt. 1 between Arapahoe and Curtis Streets on the same corridor.

ESTIMATED CONSTRUCTION COST:

The estimated cost of construction for this project is between \$8,432,000 and \$9,319,000.

TEXTURA CONSTRUCTION PAYMENT MANAGEMENT:

Bidders are required, when preparing a bid, to agree that it shall use the Textura® Construction Payment Management System (CPM System) for this Project and recognizes that all fees associated with the CPM System are to be paid by the awarded Contractor for billings for work performed. Use the pricing scale provided in Instructions to Bidders to price the Textura service appropriately. For details on the company and service contact the Textura® Corporation 866-TEXTURA or www.texturacorp.com.

DOCUMENTS AND BID INFORMATION AVAILABLE:

Contract Documents complete with Technical Specifications and, if applicable, construction drawings will be available on the first day of publication at: www.work4denver.com. To download digital Contract Documents at a cost of \$10.00 per download, reference eBid Document Number #4744334. Contact QuestCDN at 952-233-1632 or info@questcdn.com for assistance.

PRE-BID CONFERENCE:

A pre-bid conference will be held for this Project at 10:00 a.m., local time, on December 14, 2016. This meeting will take place at: Wastewater Building, 2000 W. 3rd Ave., 3rd floor conference room, Denver, CO 80223.

DEADLINE TO SUBMIT QUESTIONS: January 12, 2017 at 2:00 p.m. local time.

PREOUALIFICATION REQUIREMENTS:

Each bidder must be prequalified as a 1E (4) Piped Sewer at the \$9,000,000 monetary level in accordance with the City's Rules and Regulations Governing Prequalification of Contractors. Each bidder must have submitted a prequalification application a minimum of ten (10) calendar days prior to the bid opening date. Applications must be submitted to the Department of Public Works, Prequalification Section, 201 West Colfax Avenue, Department 614, Denver, Colorado 80202. To view the Rules and Regulations and to obtain a prequalification application, please visit our website at www.denvergov.org/prequalification or call 720-865-2539 for prequalification information ONLY.

DISADVANTAGED BUSINESS ENTERPRISE (DBE) PARTICIPATION:

Federally-funded construction, reconstruction, remodeling, and professional design services contracts made and entered into by the City and County of Denver are subject to Federal Statutes and Regulations regarding Disadvantaged Business Enterprise participation and all Disadvantaged Business Enterprises Utilization.

The RTD Small Business Office is authorized to establish project goals for expenditures on construction, reconstruction and remodeling and professional design services work let by the City and County of Denver for this project. The specific goal for this project is:

10% Disadvantaged Business Enterprise (DBE)

The project goal must be met with certified participants as set forth in 49 CFR Part 26. For compliance with good faith effort requirements, as set forth in Part 26, the DBE solicitation level required for this project is 100% of the City and Denver's certified DBE's and 100% of the State of Colorado's Department of Transportation (CDOT's) certified DBE's.

The Director of the Division of Small Business Opportunity urges all participants in the construction, reconstruction, remodeling, and professional design services projects not to discriminate against women and minorities or any other persons and to assist in achieving these goals.

MISCELLANEOUS:

Contracts for construction, reconstruction, and remodeling are subject to the City prevailing wage rate requirements established pursuant to Section 20-76, D.R.M.C.

As its best interest may appear, the City and County of Denver reserves the right to reject any or all bids and to waive informalities in bids.

Publication Dates: December 2, 5, 6, 2016
Published In: The Daily Journal

If applicable, a shortened version of this Notice of Invitation for Bids and the Statement of Quantities can be viewed on the City and County of Denver website at: www.work4denver.com

CITY AND COUNTY OF DENVER DEPARTMENT OF PUBLIC WORKS

Wastewater Management Division

INSTRUCTIONS TO BIDDERS

IB-1 INSTRUCTION TO BIDDERS

These Instructions to Bidders are a part of the Contract Documents and are intended to serve as a guide to bidders. They are general in nature and may be amended or supplemented as needed to support any one specific invitation to bid. Each bidder shall prepare its bid in strict compliance with all requirements of the Contract Documents and by careful application of these instructions.

IB-2 BIDDING

The copy of the Contract Documents contains the Bid Form and Submittal Package for this Project, which must be used to submit a bid hereunder. The bidder must fully complete, execute and submit this Bid Form and Submittal Package, along with any other specified components of the Contract Documents, as its bid for the referenced Project.

A bidder is not required to submit as part of its bid the entire set of Contract Documents distributed by the City pursuant to the Notice of Invitation for Bids, if the bidder executes and submits the Bidder Acknowledgment Form included with the Bid Form and Submittal Package as part of its bid. However, each bidder, by submitting its bid, shall be conclusively presumed to have received and reviewed all of the information contained in the Contract Documents as this term is further defined herein.

Each bid must be enclosed in a sealed envelope, must be addressed to the Manager and must show on the face of the envelope the full name of the bidder, the City Project number, and descriptive title of the Project for which the bid is made.

The advertisement for Notice of Invitation for Bids will identify where and when the bid must be delivered.

IB-3 CONTRACT DOCUMENTS AS PUBLISHED BY CITY

Each bidder shall be responsible for, and shall be deemed to have received, all the information contained in the Contract Documents as distributed by the City pursuant to the Notice of Invitation for Bids, including addenda, whether or not such bidder has reviewed all or part of the Contract Documents in either its hard copy form or in any other format. If organizations or companies other than the City or its design professional distribute the City's Contract Documents for review by prospective bidders, whether in hard copy or via electronic or other media, neither the City nor its design professional shall be responsible for the content, completeness or accuracy of any information distributed or transmitted by any such organization or company.

IB-4 COMPLETING AND SIGNING THE BID FORMS

The bidder must complete the Bid Form by legibly writing or printing in ink, in words and figures as required, all the bidder's prices offered for the Work to be performed. All blank spaces, which require a response of the bidder, must be properly completed in full. If in the process of evaluating a bid, words and figures, as written on the Bid Form by the bidder, do not agree, the written words will govern.

For Bid Forms requiring unit price bids, the bidder shall write in the Bid Form spaces provided a unit price for each item for which a quantity is given and shall also write the product of each unit price and the quantity specified in the "Amount" or "Total" space provided.

Each bidder must sign the Bid Form and give the bidder's current business address. If an individual, the signature must be of the individual offering the bid; if a partnership, the signature must be that of a general partner; and if a corporation, both the president and the secretary must sign and the seal of the corporation must be affixed. Signatures of other persons may be acceptable if the bid contains sufficient evidence, satisfactory to the City in its sole discretion, to indicate that the other persons are authorized to bind the bidder.

IB-5 UNACCEPTABLE BIDS

The City will not accept bids from Bidders not prequalified with the Department of Public Works (if prequalification is required for this project), in arrears to the City upon debt or contract, or which are defaulters (as surety or otherwise) upon any obligation to the City.

IB-6 INFORMAL AND UNBALANCED BIDS

Any alteration, interlineation, erasure, omission, deletion or addition by the bidder to the Bid Form and Submittal Package or other parts of the Contract Documents submitted with the Bid Form and Submittal Package, as originally issued to the bidder, shall render the accompanying bid informal and may constitute cause for rejection.

Any unauthorized addition, conditional or alternate bids, failure to provide a unit price, lump sum amount or authorized alternate item specified or other irregularities of any kind which tend to render the bid incomplete, indefinite or ambiguous shall render the bid informal and may constitute cause for rejection.

Bids that are unbalanced so that each item does not reasonably carry its own proportion of cost or that contain inadequate or unreasonable prices for any item may be rejected. Bids which have not acknowledged all addenda to the Contract Documents issued for this bid may also be rejected.

The right is reserved by the City to reject any or all bids and to waive any informalities where it is deemed by the City to be in the best interests of the City to do so.

IB-7 ONLY ONE BID ACCEPTED

The City will accept only one bid for the same work from any one bidder. This includes bids that may be submitted under different names by one business enterprise.

IB-8 BID GUARANTEE

As a guarantee of good faith on the part of the bidder, each bid must be accompanied by a bid guarantee, consisting of either a certified or cashier's check made payable without condition to the order of the City and County of Denver or a bid bond written by an approved corporate surety in favor of the City and County of Denver. If the bid of a bidder is acceptable and the bidder is notified by the Manager that it is considered to be the Apparent Low Bidder and said bidder fails to execute a contract in the form prescribed or to furnish a performance and payment bond with a legally responsible and approved surety or to furnish the required evidence of insurance or satisfy all conditions precedent to contract execution within five (5) days after such notice is made by the City, said bid guarantee shall be forfeited to the City as liquidated damages and not as a penalty.

The bid guarantee shall be in the amount of five percent (5%) of the total bid unless otherwise specified in the Notice of Invitation for Bids and on the form appearing in the Contract Documents in the Bid Form and Submittal Package. Failure to submit a properly executed bid guarantee, on the form provided herein may, in the City's sole discretion, constitute cause for rejection.

Following award and execution of the Contract by the Apparent Low Bidder, or earlier in the sole discretion of the City, bid guarantees of all but the Apparent Low Bidder will be returned. When the Apparent Low Bidder executes the Contract and delivers to the City satisfactory performance and payment bonds, required insurance documentation, and has satisfied all conditions precedent to contract execution by the City, and after approval, if any, by the Council of the City of the proposed Contract with the Apparent Low Bidder, the bid guarantee of the Apparent Low Bidder shall be returned. Such return shall be made within one hundred twenty (120) days from date bids are opened unless otherwise specified in the Special Contract Conditions.

IB-9 SITE INSPECTION AND INVESTIGATIONS

Prior to submitting a bid, the bidder is invited to inspect the work site and its surroundings. Although the bidder is not required to make such an inspection before bidding, for purposes of the Contract it shall be conclusively presumed that by failing to make such an inspection, the bidder has waived the right to later claim additional compensation or time extensions for conditions which would have been evident had the site been inspected.

Drawings and Technical Specifications, defining the Work to be done, were prepared on the basis of interpretation by the design professionals of information derived from investigations of the work site. Such

information and data are subject to sampling errors, and the interpretation of the information and data depends to a degree on the judgment of the design professional. In view of this, the bidder is invited to make such additional investigations as the bidder's judgment dictates the need for such investigations. Information about the degree of difficulty of the Work to be done cannot totally be derived from either the Drawings or Technical Specifications or from the Manager or his representatives.

Since the bid information cannot be guaranteed, the Contractor shall have assumed the risks attendant to successful performance of the Work and shall never make claim for additional compensation or time extensions on the grounds that the nature or amount of work to be done was not understood by the bidder at the time of the bidding.

IB-10 INCONSISTENCIES

Any seeming inconsistencies or ambiguities between different provisions of the Contract Documents or any point which the bidder believes requires a decision or interpretation by the City must be inquired into by the bidder by addressing a formal written communication to the Manager of Public Works and sending or delivering it to the offices of the Division of Public Works advertising this Project for bid at least forty-eight (48) hours, excluding Saturdays, Sundays, and holidays, before the time set for the opening of bids.

Information about the decision or interpretation made in response to any inquiry will be posted on the Contractor's Bulletin Board (refer to IB-12 CONTRACTOR'S BULLETIN BOARD, for the location of the Contractor's Bulletin Board). If the matter raised requires, in the sole discretion of the Manager, that an addendum to the bid documents be issued, such addendum will be published and each bidder shall be required to acknowledge the addendum by signing and identifying it in the Bid Form when submitting the bid.

After bids are opened, all bidders must abide by the formal response of the Manager, as to any interpretation. The City shall not be bound and the bidder shall not rely on any oral communication, interpretation clarification or determination of the Contract Documents prior to bid opening.

IB-11 WITHDRAWAL OF BID

A bidder may withdraw its bid at any time prior to the time for receipt of bids set forth in the Notice of Invitation for Bids by making written request upon the Manager of Public Works. After such time, no bid may be withdrawn or modified.

Such request must be signed by the persons authorized to bind the bidder as defined in IB-4, COMPLETING AND SIGNING BID FORMS.

IB-12 CONTRACTOR'S BULLETIN BOARD

It shall be conclusively presumed that the bidder has, before submitting any bid, read and shall take full responsibility for all addenda, posted decisions, and other information relevant to the bid posted by the City on the Contractor's Bulletin Board. The Contractor's Bulletin Board is located on the 2nd floor at 201 W. Colfax Avenue, Denver, CO 80202.

IB-13 PRE-BID MEETING

Bidders are urged to attend the pre-bid meeting(s) scheduled for this Project. Attendance is not mandatory; however, bidders will be held responsible for all information presented at such meeting(s).

IB-14 ADDENDA

As its best interests may require, the City may issue addenda to the Contract Documents. Such addenda shall be posted on the Contractor's Bulletin Board and made available to all persons having purchased a set of Contract Documents as set forth in the Notice of Invitation for Bids contained herein. All bidders must acknowledge receipt of all addenda on the Bid Form at the time of submission of the bid.

IB-15 BID OPENING

Bidders are invited to be present at the bid opening. Unless otherwise suspended, delayed or canceled by posted notice from the Manager, bid opening will occur at the time and place designated in the Notice of Invitation for Bid.

IB-16 EVALUATION OF BIDS AND BASIS OF BID SELECTION

Bids will be evaluated after being read in open meeting at the place designated for such bid opening. All low bidders' bids will be reviewed for responsiveness to the requirements of the Contract Documents and whether or not the bids contain irregularities which could give any bidder an unfair advantage.

Selection will be made on the basis of the lowest, total, responsible, responsive, qualified bid, which bid shall include the total base bid set forth on the Bid Form, plus the total of any alternates set forth on the Bid Form and selected by the City during evaluation. Alternates, if any are included in the bid, will be selected in the priority shown on the Bid Form, subject to the limits of available funds. Bid selection will be subject to all requirements and special bidder qualifications contained herein and subject to approval of such resulting Contract in accordance with the Charter and Revised Municipal Code of the City and County of Denver. In addition to all other specified requirements, the City will correct arithmetical errors in all bids and corrected totals only will be considered as the basis of selection.

Upon concluding that the bid is, in fact, the lowest, total, responsive bid to the bidding conditions and that of a responsible, qualified bidder, the City will notify the Apparent Low Bidder.

As its best interests may appear, the City and County of Denver reserves the right to waive informalities in bids, to reject any and all bids and to re-bid the Project.

IB-17 NOTICE TO APPARENT LOW BIDDER

The Notice to Apparent Low Bidder, a form of which is included in the Contract Special Conditions Section of the Contract Documents, is issued by the City directly to the selected bidder and informs the bidder that the Manager intends to seek approval of the execution of the Contract by the City in accordance with the Charter and Revised Municipal Code of the City and County of Denver. Specifically, it informs the bidder of its obligations with respect to execution of the Contract and instructs the bidder on how to proceed toward execution of the Contract. The City reserves the right to notify the Apparent Low Bidder, at any time within one hundred twenty (120) days from the date of the opening of the bids, that approval to contract with the Apparent Low Bidder shall be sought in accordance with the Charter and Revised Municipal Code of the City and County of Denver.

In accordance with the terms and conditions contained in the Bid Form and Submittal Package and any additional requirements set forth in the Notice to Apparent Low Bidder or elsewhere in the Contract Documents, the Apparent Low Bidder shall execute the Contract Form contained in the Contract Documents made available by the City for execution in the appropriate number of counterparts. The Apparent Low Bidder shall return the fully executed Contract Document sets, along with any supplemental documents required herein, to the City and shall comply with all other conditions precedent to Contract execution within five (5) days of the date of issuance of the Notice to Apparent Low Bidder by the City. Failure to comply with each of these requirements within five (5) days of the date of issuance of the Notice to Apparent Low Bidder by the City shall render the bid non-responsive and may constitute cause for rejection.

Issuance of such Notice shall not, however, constitute a commitment on the part of the City or create any rights in the Apparent Low Bidder to any contract with the City.

IB-18 EXECUTION OF CONTRACT

The process of executing a contract requires action by both the apparent low bidder and the City. After it notifies the Apparent Low Bidder, the City will prepare the Contract Documents by incorporating all of the documents submitted by the Apparent Low Bidder into one or more executable copies. Upon notification that contract documents are ready for execution the Apparent Low Bidder who shall execute the contract documents. At this time, the successful bidder shall also provide certain supplemental documents for incorporation into the Contract Documents. These supplemental documents shall include: the properly executed Certificate of Insurance Forms evidencing the apparent low bidder's satisfactory compliance with the insurance requirements set forth in the Contract Documents; a properly executed Payment and Performance Bond Form and appropriate Power of Attorney evidencing the Apparent Low Bidder's satisfactory compliance with the bonding requirements set forth in the Contract Documents; and

documentation of compliance with any other conditions precedent to execution of the Contract by the City set forth in the Contract Documents. The insurance and bond forms contained in the Contract Special Conditions Section of the Contract Documents must be used in satisfying these supplemental document requirements.

These documents are then delivered to the City within the prescribed time period for examination of the documents to determine whether or not the Contractor has correctly executed the Contract and has correctly provided the required supplemental documents and that these documents are satisfactorily and properly completed. From here, all of the documents are forwarded to the City Attorney who will, if the insurance and bonding offered is acceptable and if all other elements of the Contract Documents are in order, recommend that the Manager and the Mayor approve the documents and, when required by the City Charter, prepare an ordinance for submittal to City Council authorizing the execution of the Contract. The City Attorney shall in all applicable instances submit the proposed contract and ordinance to City Council. After City Council approval, the Contract shall be reviewed by the City Attorney and routed for execution by the Mayor, the Clerk for attestation and the Auditor for countersignature and registration. When the total process of contract execution is complete, a Notice to Proceed will be issued and a single executed copy of the Contract will be delivered to the Contractor. Any work performed or materials purchased prior to the issuance of the Notice to Proceed, is at the Contractor's risk.

IB-19 BONDING REQUIREMENTS

In accordance with the provisions of General Contract Conditions, Title 15, PERFORMANCE AND PAYMENT BONDS, the minimum bonding requirements for this Contract are set forth in the form **CITY AND COUNTY OF DENVER PERFORMANCE AND PAYMENT BOND** contained in the Special Conditions Section of the Contract Documents. Upon receipt of Notice to Apparent Low Bidder, the apparent low bidder must cause this form bond to be purchased, executed and furnished, along with appropriate Powers of Attorney <u>and</u> a surety authorization letter (in form similar to the one attached), to the City.

IB-20 INSURANCE REQUIREMENTS

The minimum insurance requirements for this Contract are set forth in the Special Conditions Section of the Contract Documents. Bidders are urged to consider, in preparing a bid hereunder, that each condition, requirement or specification set forth in the form certificate must be complied with by the Contractor and all subcontractors performing Work on the Project, unless such requirements are specifically accepted in writing by the City's Risk Management Office. The Contractor must either include all subcontractors performing work hereunder as insureds under each required policy or furnish a separate certificate for each subcontractor. In either case, the Contractor shall insure that each subcontractor complies with all of the coverage requirements.

IB-21 PERMITS AND LICENSES

All permits, licenses and approvals required in the prosecution of the work shall be obtained and paid for by the Contractor.

IB-22 WAGE RATE REQUIREMENTS

In preparing any bid hereunder, the Contractor must comply with and should carefully consider all requirements and conditions of the City's Payment of Prevailing Wages Ordinance, Sections 20-76 through 20-79, D.R.M.C. and any determinations made by the City pursuant thereto.

At the time of the preparation of the Contract Documents, the then-current prevailing wage rates applicable to this Project shall be bound within the Contract Documents made available to potential bidders for the Project. If, more than ten (10) days prior to the actual date of bid opening, the Career Service Board determines that prevailing wages rates different from those bound in the Contract Documents are applicable to one or more of the various classes of laborers, mechanics and workers encompassed by this Project, such different prevailing wage rates shall be provided in an addendum. If different prevailing wage rates are determined by the Career Service Board ten (10) or less days prior to the actual date of bid opening, the City will determine on a case by case basis in its sole discretion whether such different prevailing wage rates are to be included in an addendum. In conjunction with such determination, the City may elect, in its sole discretion, to postpone the date of bid opening on the Project. In any event, the bidder will be held, at the actual date of bid opening, to those prevailing wage rates incorporated into the Contract Documents and as modified by any such addenda.

These prevailing wage rates shall be considered the **minimum** City prevailing wage rates to be paid by all contractors or subcontractors for a period not to exceed one (1) year from the date of the Contract. Increases in prevailing wages subsequent to the date of the Contract for a period not to exceed one (1) year shall not be mandatory on either the contractor or subcontractors. Future increases in prevailing wages on contracts whose period of performance exceeds one (1) year shall be mandatory for the contractor and subcontractors only on the yearly anniversary date of the Contract. The **minimum** City prevailing wage rate for any such subsequent yearly period or portion thereof shall be the wage rates in effect on the yearly anniversary date of the contract which begins such subsequent period. In no event shall any increases in prevailing wages over the amounts thereof as stated in such Technical Specifications and addenda thereto result in any increased liability on the part of the City and the possibility and risk of any such increase is assumed by all contractors entering into any such contract with the City. Decreases in prevailing wages subsequent to the date of the contract for a period not to exceed one year (1) shall not be permitted. Decreases in prevailing wages on contracts whose period of performance exceeds one (1) year shall not be effective except on the yearly anniversary date of the contract.

IB-23 TAX REQUIREMENTS

<u>General</u>. Bidders are referred to the General Contract Condition 323, TAXES, as to taxes to which they may be subject in performing the Work under this Contract, including but not limited to sales and use taxes and the Denver Occupational Privilege Tax. The following instructions are to be considered along with the General Contract Conditions and not in lieu of them.

<u>Sales and Use Tax.</u> Construction and building materials sold to contractors and subcontractors for use on structures, roads, streets, highways, and other public works owned by the City and County of Denver are exempt from state, RTD, and Cultural Facilities District sales and use taxes. However, such materials will be subject to sales and use taxes imposed by the City and County of Denver.

It is the responsibility of the Contractor and its subcontractors to apply to the Colorado Department of Revenue ("CDOR") for a certificate, or certificates, of exemption indicating that their purchase of construction or building materials is for a public project, and to deliver to the City copies of such applications as soon as possible after approval by the CDOR. Bidders shall not include in their bid amounts the exempt state, RTD, and Cultural Facilities District Sales and Use Taxes.

<u>Denver Occupational Privilege Tax</u>. Any employee working for a contractor, or a subcontractor, who earns over \$500 working in Denver during a calendar month, is subject to the payment of the Employee Occupational Privilege Tax. The Contractor and any subcontractor must pay the Business Occupational Privilege Tax for each of its employees who is subject to such tax.

IB-24 DIVERSITY AND INCLUSIVENESS IN CITY SOLICITATIONS

Each bidder shall, as a condition of responsiveness to this solicitation, complete and return the "Diversity and Inclusiveness in City Solicitations Information Request Form" with their Bid.

Using the "Diversity and Inclusiveness in City Solicitations Information Request Form" provided please state whether you have a diversity and inclusiveness program for employment and retention, procurement and supply chain activities, or customer service and provide the additional information requested on the form. The information provided on the "Diversity and Inclusiveness in City Solicitations Information Request Form" will provide an opportunity for City contractors to describe their own diversity and inclusiveness practices. Contractors are not expected to conduct intrusive examinations of its employees, managers, or business partners in order to describe diversity and inclusiveness measures. Rather, the City simply seeks a description of the contractor's current practices, if any.

Diversity and Inclusiveness information provided by City contractors in response to City solicitations for services or goods will be collated, analyzed, and made available in reports consistent with City Executive Order No. 101. However, no personally identifiable provided by or obtained from contractor's will be in such reports

IB-25 DISADVANTAGED BUSINESS ENTERPRISE (DBE) REQUIREMENTS

1. **DEFINITIONS**

Unless the context requires otherwise, capitalized terms used in Attachment A shall have the meanings given to them below. However, if there is a conflict, the definitions in this section shall prevail. In addition, the following capitalized terms shall have the meanings set out below:

Contract Goal (DBE goal) means a goal determined by such factors as the type of work involved, the location of the work and the availability of the DBEs for the work of the particular contract.

Contractor means any Project Contractor that subcontracts with a DBE for performance of the Work, as applicable.

Commercially Useful Function occurs when a DBE firm is responsible for execution of the work of the contract and is carrying out its responsibilities by actually performing, managing and supervising the work involved in substance as contemplated by the federal regulations codified at 49 CFR Part 26. The DBE firm must also be responsible for materials and supplies used on the contract, for negotiating price, determining quality and quantity, ordering the material, installing (where applicable) and paying for the materials itself.

Disadvantaged Business Enterprise (DBE) means each of the following:

- (i) that is at least 51% owned and controlled by one or more Socially and Economically Disadvantaged individuals or, in the case of a corporation, such individuals must own at least 51 percent of each class of voting stock outstanding and 51 percent of the aggregate of all stock outstanding; In the case of a partnership, 51 percent of each class of partnership interest must be owned by socially and economically disadvantaged individuals; In the case of a limited liability company, at least 51 percent of each class of member interest must be owned by socially and economically disadvantaged individuals;
 - (i) whose eligible principle(s) personal net worth does not exceed \$1,320,000. The personal net worth excludes the equity of the eligible principle's primary residence and the equity of the eligible principle's firm
 - (ii) whose average annual gross receipts for the past 3 years cannot exceed \$22.41 million
 - (iii) whose management and daily operations are controlled by one or more of the Socially and Economically Disadvantaged individuals who owns it; and
 - (iv) that is certified as a "Disadvantaged Business Enterprise" in the state's Unified Certification Program.

DBE Enclosures means the certificates and forms provided in Appendix B of Attachment A.

DBE Goals has the meaning given to it in Section 3.1 of Attachment A.

DBE Liaison means a representative of the Contractor with direct and independent access to the Contractor's project manager and/or chief operating officer. This can be a collateral duty. The DBE Liaison has management responsibility for implementing, managing and reporting on achievement of the DBE Goals, ensuring compliance with 49 CFR Part 26, communicating subcontracting, business development and supportive services activity at all tiers. The DBE liaison is also responsible for serving as the point of contact with RTD's Disadvantaged Business Office for all reporting, submission of properly completed forms/documents, and for responding to any compliance issues/matters.

DBE Participation Report has the meaning given to it in Section 3.10 of Attachment A.

Small Business Office or SBO means the RTD Department responsible for administering the DBE/SBE Programs.

2. OVERVIEW OF RTD'S DBE PROGRAM POLICY

- (a) RTD's policy is to ensure nondiscrimination in the award and administration of the District's construction contracts, professional service contracts, and in the procurement of common goods and services. The Contractor shall comply with and implement requirements of RTD's DBE Program and 49 CFR Part 26 in the award and administration of Subcontracts under this Agreement. The Contractor shall not discriminate on the basis of race, color, religion, national origin, sex, age, or disability in the performance of this Contract. The Contractor shall ensure that the nondiscrimination clause(s)/ flow-down provisions found in Section I be incorporated in all subcontract agreements regardless of tier. It is RTD's intention to create a level playing field on which DBE's can compete fairly for federally funded contracts. Failure by the Contractor to comply with or implement these requirements is a material breach of this Contract, which may result in the termination of this Contract or such other remedy as RTD deems appropriate. RTD's commitment to the DBE Goals is not intended to and shall not be used as a justification to discriminate against any qualified company or group of companies.

 Additionally:
 - (i) The average annual gross receipts for the past 3 years cannot exceed \$22.41 million. This amount includes any affiliate businesses owned in whole or part by any applicant owner or stockholder regardless of their ownership interest.
 - (ii) The personal net worth of the eligible principle(s) of a DBE firm must be less than \$1,320,000 (on an individual basis) excluding the equity of the eligible principle's primary residence and the equity of the eligible principle's firm. At least 51% of the owners/stockholders must meet the personal net worth criteria for the business to be eligible. Applicants cannot transfer ownership solely for the purpose of qualifying for the DBE Program. If it comes to RTD's attention, that there has been a transfer of an owner's assets, RTD may request the certifying authority under the Colorado UCP to evaluate transfers of ownership within the past two years to determine compliance with the personal net worth requirements.
 - (iii) To count a Disadvantaged business' participation toward the goal established for this contract, the proposed DBE(s) must be certified as a DBE(s) with the City and County of Denver or CDOT (Colorado UCP) under the NAICS code that coincides with the scope of work that they will execute in the project. The DBE firm must be certified as a DBE and perform a "commercially useful function" as defined in Attachment A. Prime contractors should also be sure that the DBE is certified as of the date that RTD receives this bid/proposal unless some other time frame is required by the nature of the project delivery method, project duration or when the DBE is approved by RTD to be added to the Contractor's Schedule of Participation.

3. GENERAL REQUIREMENTS

3.1 DBE GOALS

Unless otherwise indicated in the Contract or an addendum to the Contract, for Invitations for Bids (IFB), the contract will be awarded to the lowest responsive and responsible bidder. For Request for Proposals (RFP) with best value criteria, the contract will be awarded to the responsive and responsible proposer or proposers who best meet the Evaluation Criteria, cost and other factors considered (including DBE Program requirements and DBE approach/strategy). A bidder/proposer who fails or refuses to complete and return the required enclosures to Attachment A will be deemed non-responsive. The specified DBE participation goal applies to all post selection negotiations. The contractor's commitment to the percentage of certified DBE utilization during the term of this contract will be stated in the DBE Affidavit (Enclosure 1A). All extensions, amendments, and options of the contract are subject to review by RTD's SBO. The SBO may determine that a modification may impact the Contractor's ability to comply with its initial commitment. However, a partial waiver of the goal will not be considered until the end of the contract and the totality of the Contractor's compliance efforts are assessed to determine its ability to comply with the initial commitment. The SBO will evaluate all decisions to self- perform scopes of work where DBE availability was present, yet not solicited, not utilized or disregarded.

RTD has specified a % DBE Participation goal. During the entire project duration the Contractor shall ensure:

(i) that at least % (calculated by Dollar value) of the Work be performed by DBEs. If this contract involves an alternative project delivery method or the project duration is multi-year, RTD may specify that certain percentages of participation be attributable to specific phases of the project. If that is the case, this

section will reflect the additional requirements including the requirements associated with a DBE Plan/Program submission.

or

demonstrate with satisfactory documentation that it has made good faith efforts to meet the DBE Goal, as applicable. Contractors failing to meet the specified DBE goal are required to submit DBE Unavailability Certification, in the form set out in Attachment A (Enclosure 7: DBE Unavailability Certification) along with complete documentation of good faith efforts to meet the goal. Failure to provide complete documentation/detailed written explanations of good faith efforts will result in the bid/proposal being deemed non-responsive. Appendix A of 49 CFR Part 26 shall serve as the criteria for evaluating compliance with the good faith efforts requirements. Additionally, bidders/proposers are required to solicit the support and assistance of RTD's SBO if they are unable to meet the DBE participation goal assigned to this contract.

Multi-Year and Design Build Project Requirements

To be considered a responsive bidder/proposer, when a DBE goal is specified for design-build projects, a bidder/proposer must meet the goal referred to in the bid specification by committing to meet the DBE participation goal for each phase of the design build process in its DBE Plan specifically identifying certified DBE firms that will be performing services or providing supplies in the first year of the design/build contract (in both the design and construction phases, as applicable) and Attachment A enclosures or make a good faith effort to attain the goal. The documentation evidencing good faith efforts shall be submitted with the bid/proposal. At a minimum, the bidder/proposer must identify the value of both the design and construction services to be spent during the first year (unless a greater timeframe is specified/required in the instructions to bidders/proposers.

- (a) The DBE participation goal applies to the total value of <u>all</u> work performed under the contract which includes the value of all change orders, amendments and modifications. Any partial waiver determination will be made at or near the conclusion of the contract when the totality of the circumstances can be taken into consideration and the Contractor's efforts can be objectively evaluated. Material supplies are credited for 60% of their contract value unless they are deemed to be a broker or transaction expediter in which case only the fee or commission may be counted toward the goal (so long as the DBE is performing a commercially useful function). If it is determined that the DBE is not performing a commercially useful function, then no participation credit shall be attributable to their participation on the contract.
- (b) To count DBE participation toward the goal established for this contract, the proposed DBE(s) must be certified as a DBE(s) with the City and County of Denver or CDOT under the appropriate NAICS code that coincides with the scope of work that they will execute on the project/contract. Additionally, the DBE firm must be certified as a DBE and perform a "commercially useful function" as defined in Attachment A.

3.2 **JOINT VENTURES**

- (a) A Joint Venture is an association of a DBE firm and one or more other firms to carry out a single, for-profit business enterprise, for which the parties combine their property, capital, efforts, skills and knowledge, and in which the DBE is responsible for a distinct, clearly defined portion of the work of the contract and whose share in the capital contribution, control, management, risks, and profits of the joint venture are commensurate with its ownership interest.
- (b) RTD will count toward its DBE goal a portion of the total dollar value of a contract with a joint venture equal to the distinct, clearly defined portion of the work of the contract that the DBE performs with its own forces toward the DBE goal(s) and such services/supplies/NAICS codes are approved for DBE participation credit. The joint venture agreement MUST specify the services, dollar value, reporting structure and details of the DBEs performance requirements associated with the percentage of the joint venture ownership.

3.3 DBE LIAISON

- (a) The Contractor shall designate a DBE Liaison who shall be responsible for the following:
 - (i) day-to-day operational components of the DBE Program:
 - (ii) effectively responding to and reporting to the SBO on the status of any DBE contractor/supplier;
 - (iii) submitting executed DBE subcontracts/purchase orders and any subsequent material amendments thereto to the SBO within thirty (30) days of the Subcontractor Agreement Execution (however, no DBE shall commence any work or provide any material/supply without an executed subcontract/purchase order);
 - (iv) interfacing with the SBO regarding DBEs' issues and obtaining approvals for all DBE replacements, substitutions or terminations; and
 - (v) carrying out or implementing technical assistance activities so that the playing field is level for DBEs.
 - (vi) prepare, complete and submit all required compliance documentation, inclusive of subcontract agreements, schedule of participation enclosure, monthly payment forms
 - (vii) ensure all contractual requirements of the DBE program inclusive but not limited to prompt payment, termination/substitution/replacement/reduction of scope, changes, non-discrimination are complied with and in their subcontract agreements with all of their subcontractors regardless of tier
 - (viii) a representative of the Contractor having management responsibility for implementing, managing and reporting on achievement of the DBE Goals, communicating subcontracting, business development and supportive services activity at all tiers, ensuring compliance with the non-discrimination provisions and the affirmative action and equal employment opportunity provisions.
 - (ix) Monitoring lower tier subcontractors and suppliers to ensure that they comply with the DBE Program requirements and the DBE Plan submitted by the prime contractor.
 - (x) In lower value or shorter duration contracts, the DBE Liaison responsibilities may be a collateral responsibility.
 - (xi) The DBE Liaison shall submit a written monthly report detailing the activities and documentation of good faith efforts of the previous month as well as submitting DBE Participation Reports, all additional requested forms and shall schedule monthly meetings with the SBO to address any issues or concerns.

Flow-Down Provisions:

The Contractor must include the following provisions in their subcontract agreements with their DBE subcontractors as well as ensure that tiered-contractors comply with this Section and insert the provisions of this Section into all lower tiered subcontractor agreements: 3.4 prompt payment provisions, 3.5 DBE Removal/Termination/substitution/Reduction of Scope provisions, and 3.7 Changes provisions. The contractor will be required to submit to the RTD Small Business Office all DBE subcontracts/purchase orders within 30 days of the execution of its contract with RTD or issuance of the notice to proceed (whichever occurs first). However, in no event shall a DBE perform any service or procure any supply unless RTD's SBO has a copy of the executed subcontract agreement or purchase order.

3.4 PROMPT PAYMENT OF DBE SUBCONTRACTORS

- (a) The Contractor shall ensure that:
 - i. each Contractor shall pay its respective DBE Subcontractors any undisputed amount owed to such Subcontractor within 30 days of receipt of the subcontractor's receipt by such Contractor, regardless of whether such Contractor has been paid for such invoice by City;
 - ii. approval of invoices is not unreasonably delayed and that invoices shall be either approved or rejected with written notice of deficiency or dispute to the payee DBE Subcontractor within ten days of receipt of invoice by the Contractor; and
 - iii. each Contractor makes prompt and full payment of any retainage kept by such Contractor to its respective subcontractors DBE within 30 days after such DBE's work has been accepted and completed by Contractor, unless claim is filed against a subcontractor;

- iv. failure to comply with the above may give just cause to withhold payment from Contractor until payment to the subs is satisfied. Depending on extent of failure to comply with the above, such failure may also be construed to be a breach of contract.
- v. The Contractor shall ensure that tiered subcontractors comply with this Section and insert the provisions of this Section into all lower tiered subcontractor agreements.
- vi. Joint Check Utilization: A joint check is a two party check between a DBE, a prime contractor and a regular dealer of materials/supplies. All joint check arrangements must be pre-approved by the SBO and must strictly adhere to the joint check requirements set forth in USDOT guidance regarding same. At a minimum, the request must be initiated by the DBE and remedy a financial hardship for a specific period of time. There are monthly reporting requirements that must be complied with in order to receive DBE participation credit. The SBO will closely monitor the use of joint checks to ensure that the independence of the DBE firm is not compromised. Joint check usage will not be approved merely for the convenience of the prime contractor.

3.5 DBE REMOVAL/TERMINATION/SUBSTITUTION/REDUCTION OF SCOPE FROM CONTRACT

- (a) A Contractor must have good cause to remove/terminate/substitute/replace a DBE contractor and such removal/termination/substitution requires the consent and approval of RTD's SBO. This section also includes reductions to the DBEs scope of services and/or commitment values. No DBE subcontract may contain a "termination for convenience" clause/provision because any termination for convenience provision/clause is contrary to the objectives of this part. To initiate the termination, substitution, removal or replacement process with a DBE contractor/supplier (regardless of the tier), the Contractor or lower tier contractor/subcontractor must do the following:
 - i. Before transmitting to RTD's SBO its request to terminate and/or substitute a DBE contractor, the contractor must give notice in writing to the DBE contractor and RTD SBO. The notice must include its request to terminate and/or substitute, replace and/or remove the DBE, the reason for the request and all documentation to support its claim. The Contractor must submit a copy of the notice and support documentation to RTD's SBO at the time the original letter is sent to the DBE contractor;
 - ii. the Contractor must give the DBE contractor five (5) business days to respond to the notice and provide the SBO with reasons, if any, why it objects to the proposed termination of its DBE contract and why the SBO should not consent the Contractor's action;
 - iii. RTD's SBO will then open a formal investigation inclusive of review of all documentation, conduct interviews and site visits, if necessary. The Contractor carries the burden of proof to demonstrate good cause for the termination and/or substitution:
 - iv. If RTD's SBO determines the Contractor has good cause to terminate the /DBE firm, the SBO will provide written consent of /DBE removal and the requirements to substitute work to another DBE firm. If RTD's SBO finds that good cause does not exist to terminate the DBE firm, the SBO will provide a written denial of the request to terminate/replace the DBE contractor and will immediately request a corrective action plan from the Contractor.
 - v. For purposes of good cause to remove, replace, terminate or replace a DBE the following circumstances should exist: (1) failure or refusal to execute a written contract without good cause, (2) failure or refusal to perform the work of its subcontract in a way consistent with normal industry practice and the contractor has not acted in bad faith, (3) failure to meet the contractor's reasonable bonding or insurance requirements, (4) insolvency, bankruptcy or credit unworthiness that creates a risk for the contract, (5) ineligibility to work on public works project because of suspension or debarment proceedings, (6) a determination that the DBE is not a responsible contractor, (7) voluntary withdrawal from the project by written notification that has been verified, (8) ineligibility to receive DBE participation credit for the type of work to be performed, (9) other documented good cause that compels the replacement of the DBE.
 - vi. If the contractor is approved to replace/remove/terminate the DBE, the contractor must make good faith efforts to replace the DBE with another certified DBE and shall not self-perform the work/services.

(b) The Contractor shall ensure that tiered subcontractors comply with this Section and insert the provisions of this Section into all lower tiered subcontractor agreements, regardless of their certification status.

3.6 GOOD FAITH EFFORTS

(a) To award a contract to a bidder/proposer that has failed to meet the DBE contract goals, the RTD SBO Manager will decide whether the contractor made a "good faith" effort to actively, effectively and aggressively seek DBEs to meet those goals prior to bid/proposal submission and in its commitments as set forth in their Schedule of Participation/the DBE Plan to continue its efforts to meet the DBE participation goals for subsequent phases of the project. Contractors are also responsible for collecting good faith effort documentation of all major non-DBE subcontractors/suppliers as part of their responsibility to implement the DBE Program.

The kinds of efforts that are considered demonstrative of a "good faith" effort include, but are not limited to, the following:

- i. Whether the contractor solicited through all reasonable and available means (e.g. attendance at prebid meetings, advertising and/or written notices) the interest of all certified DBEs who have the capability to perform the work of the contract. The bidder must solicit this interest within sufficient time to allow the DBEs to respond to the solicitation. The bidder must determine with certainty if the DBEs are interested by taking appropriate steps to follow up initial solicitations.
- ii. Whether the contractor selected portions of the work to be performed by DBEs in order to increase the likelihood that the DBE goals will be achieved. This includes, where appropriate, breaking out contract work items into economically feasible units to facilitate DBE participation, even when the prime contractor might otherwise prefer to perform these work items with its own forces.
- iii. Whether the contractor provided interested DBEs with adequate information about the plans, specifications, and requirements of the contract in a timely manner to assist them in responding to a solicitation.
- iv. Whether the contractor negotiated in good faith with interested DBEs. It is the bidder's responsibility to make a portion of the work available to DBE subcontractors and suppliers and to select those portions of the work or material needs consistent with the available DBE subcontractors and suppliers, so as to facilitate DBE participation. The fact that a bidder may perform 100% of the work with its own workforce is not sufficient justification to fail to negotiate with DBEs or not to meet the DBE participation goal assigned to a project.
- v. Evidence of such negotiation includes the names, addresses, and telephone numbers of DBEs that were considered; a description of the information provided regarding the plans and specifications for the work selected for subcontracting; and evidence as to why additional agreements could not be reached for DBEs to perform the work.
- vi. Whether the contractor made efforts to assist interested DBEs in obtaining bonding, lines of credit, or insurance as required by the recipient or contractor.
- vii. Whether the contractor made efforts to assist interested DBEs in obtaining necessary equipment, supplies, materials, or related assistance or services.
- viii. Whether the contractor effectively used the services of available minority/women community organizations, contractors' groups and other organizations to provide assistance in the recruitment and placement of DBEs, including RTD's SBO.
- ix. Whether other bidders/proposers on the procurement met the DBE goals and submitted an acceptable DBE Plan demonstrating compliance with the DBE Program requirements for a design-build project.
- (b) If, after reviewing the "good faith efforts" documentation submitted by the contractor, the RTD SBO Manager determines that "good faith efforts" were met, the contract will be recommended for award to the contractor. If the SBO Manager determines that the contractor failed to meet the "good faith efforts" requirements, the contractor will be informed in writing that their submittal was deemed non-responsive to the Attachment A requirements and will not be considered for contract award. The contractor may appeal the decision of the RTD SBO Manager to the Good Faith Efforts (GFE) Committee. If the contractor wishes to appeal, they must do so in writing to the RTD Senior Manager of Materials Management within 5 business days of being informed of the decision of the RTD SBO Manager that their submission was non-compliant.

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- (c) If the decision of the SBO Manager is appealed in writing, with in the 5 day submission window, the GFE Committee will review the documentation initially submitted by the contractor and no other information under this Section to decide whether the DBE requirements have been satisfied through "good faith efforts".
- (d) If the written appeal request is received after the 5 business day submission window, it will be disallowed and the determination of the RTD SBO Manager that the submission was non-compliant will stand.
- (e) If the GFE committee determines that "good faith efforts" were met, the contract will be recommended for award to the contractor. If the GFE Committee determines that the contractor has failed to meet the good faith effort requirements, the contractor will be informed in writing. The contractor has an opportunity for administrative reconsideration of the determination of the GFE committee. If the contractor requests administrative consideration, they must do so in writing to the RTD Senior Manager of Materials Management within 5 business days of receiving the decision of the GFE Committee that their submission was non-compliant. If the written administrative consideration request is received after the 5 business day submission window, it will be disallowed and the determination of the GFE committee that the submission was non-compliant will stand.
- (f) The reconsideration official will be a member of RTD staff who did not take part in the initial "good faith" effort decision. The reconsideration official will review the documentation initially submitted and no other information under this Section to decide whether the DBE requirements have been satisfied through good faith efforts.
- (g) If the reconsideration official determines that "good faith" efforts were met, the contract will be recommended for award to the contractor. If the reconsideration official determines that the contractor has failed to meet the "good faith effort requirements, the contractor will be informed in writing. The result of the reconsideration process is not administratively appealable to the Department of Transportation.

3.7 CHANGES

- (a) The DBE participation goal shall apply to the performance/dollar value of all obligations under this Contract, including any Changes, Modifications, Amendments and Change Orders whether initiated by the contractor or RTD. Post award requests for partial waivers may be considered by RTD's SBO but a final determination shall not be rendered until the contract has been substantially completed and the Contractor lacks the ability to satisfy the DBE participation goal.
- (b) Changes to the value or scope of work committed to a DBE must be pre-approved by the SBO and must be for good cause as set forth in the termination, substitution, replacement provisions set forth in section 3.5 above.

3.8 REQUIREMENTS OF ATTACHMENT A ENCLOSURES

- (a) The Contractor must complete and return all applicable Enclosures in the forms set out in Attachment A with bid/proposal. All enclosures must also be submitted with the bid/proposal.
- (b) The Enclosure 2 Schedule of Participation enclosure subsequent to the award must be submitted with the addition of each identified DBE firm.
- (c) The Enclosure 3 Letter of Intent (LOI) enclosure subsequent to the award must be submitted with the addition of each identified DBE firm.
- (d) The Contractor completing the Attachment A Enclosures is advised to contact the RTD's SBO at (303) 299-2111 if they have any questions or concerns prior to submitting bid/proposal documentation. Additional Attachment A documentation will not be accepted after the contractor submits their bid/proposal to the City.

As a condition of the award, the contractor must use those DBEs listed to perform the specific work items or supply the materials as committed in the Enclosure 2 Schedule of Participation and Enclosure 3 Letter(s) of Intent (LOI) and the contractor is not entitled to any payment for work or materials performed by its own or any other forces if the work or supplies were committed to a DBE, unless it receives prior written consent by RTD Small Business Office for a replacement of the DBE for good cause.

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(e) Failure to return all required DBE Enclosures will result in your bid/proposal being deemed non-responsive. Modification of any Enclosure documentation will result in your bid/proposal being deemed non-responsive.

Periodically, after award of the contract, RTD's SBO in conjunction with the contractor may determine that an enclosure is more beneficial with modifications or that an additional enclosure is necessary to more effectively report the status of DBE participation or performance and resolution of DBE concerns/issues. RTD has the right to ask for a modification. Such a revised enclosure shall be incorporated into contract as an additional requirement.

3.9 REPORTING, AUDITS, REVIEWS AND ORIENTATION REQUIREMENTS

- (a) The Contractor shall submit at least monthly, a DBE Participation Report in the form set out in Appendix A (Form of DBE Participation Report). The Contractor shall submit each completed DBE Participation Report to RTD's SBO.
- (b) The Contractor acknowledges that the SBO has the right to independently confirm the information contained in the submitted DBE Participation Reports by soliciting such information from each DBE Subcontractor as may be required to verify payments received, distribution of payments received, subcontracting practices, participation credit, and sharing of resources/personnel. The Contractor shall not attempt to dissuade any such DBE contractor from disclosing any such information or cooperating in any investigation initiated by the SBO.
- (c) The Contractor shall submit to RTD's SBO a Subcontractors Participation and Payment Form documenting all payments made to all DBEs and non-DBEs on a form provided/approved by RTD's SBO.
- (d) The DBE contractor shall submit to RTD's SBO a summary of payments received from its contractor, regardless of their lower tier, on a form approved by RTD's SBO.
- (e) The DBE contractor may be selected to participate in a commercially useful function review or a DBE compliance review before their contract can be closed by RTD. DBEs are required to fully cooperate with RTD's SBO or its designee in the compliance review process. The commercially useful function review process will be initiated with a request for documents relating to contract performance and management of the actual work performed on the contract. The scope and intensity of each commercially useful function review will depend on the specific facts and circumstances. The commercially useful function is purposed to verify the amount of DBE participation credit, to ensure that work is actually performed by the DBE consistent with the DBE Program requirements and/or to ensure that there is no activity engaged in by the DBE that would be inconsistent with the intent and objectives of the DBE Program. The commercially useful function review is more formal and will be initiated with an orientation/explanation process and closed out with a briefing and determination. The DBE contractor may be subjected to an informal compliance review by RTD's SBO or its designee with or without notice. The informal compliance review will generally be conducted at the work site where RTD actually observes and assesses the services/supplies being provided by the DBE.
- (f) The Contractor or any of its lower tier non-DBE subcontractors may be selected for a DBE compliance review to ensure that they are in compliance with the DBE Program requirements. This process will be initiated in a formal manner with written notice and instructions sent to the Contractor or its major subcontractor. The process will conclude with a close-out interview or debriefing where the Contractor or non-DBE firm will be given an opportunity to refute the determination or add to any corrective action requested by RTD. The contractor must cooperate with any DBE Program audit or compliance review. Failure to cooperate can result in part or all of the DBE participation credit being denied/removed from counting toward the DBE participation goal for the contract.

(g) All DBEs are required to participate in the RTD's DBE Orientation Program if awarded a contract, subcontract or purchase order before commencing work or providing supplies on this contract. Failure to participate in the DBE orientation program may result in a denial of DBE participation credit for the project/contract. For good cause, the orientation may be delayed if pre-approved by RTD. DBEs may be required to repeat the orientation if there are changes to the DBE Program requirements, changes in the DBE regulations, changes in the DBE personnel, or if the DBE is experiencing challenges in complying with the reporting requirements.

IB-26 DISCLOSURE OF INFORMATION

All submissions and other materials provided or produced pursuant to this Invitation for Bids may be subject to the Colorado Open Records Law, C.R.S. 24-72-201, et seq. As such, bidders are urged to review these disclosure requirements and any exceptions to disclosure of information furnished by another party and, prior to submission of a bid to the City, appropriately identify materials that are not subject to disclosure. In the event of a request to the City for disclosure of such information, the City shall advise the bidder of such request to give the bidder an opportunity to object to the disclosure of designated confidential materials furnished to the City. In the event of the filing of a lawsuit to compel such disclosure, the City will tender all such material to the court for judicial determination of the issue of disclosure and each bidder agrees to intervene in such lawsuit to protect and assert its claims of privilege against disclosure of such material. Each bidder further agrees to defend, indemnify and save and hold harmless the City, its officers, agents and employees, from any claim, damages, expense, loss or costs arising out of the bidder's intervention to protect and assert its claims of privilege against disclosure under the Open Records Law including, but not limited to, prompt reimbursement to the City of all reasonable attorney fees, costs and damages that the City may incur directly or may be ordered to pay by such court.

IB-27 GENERAL BIDDING INFORMATION

Bidders are instructed to contact the Contract Administrator designated below for this Project for pre-bid, post-bid and general City bidding information. Bidders can also visit www.work4denver.com for information, both general and project specific. The Contract Administrator assigned to this project is Debby Gibson who can be reached via email at debby.gibson @denvergov.org.

IB-28 FEDERAL REQUIREMENTS

This project is funded, in whole or in part, by federal funding made available through the Federal Transit Administration ("FTA") and administered by the Regional Transportation District ("RTD"). As such, each bidder must review and comply with certain bid requirements (the "Federal Forms") in formulating and submitting its bid for the Project, and, if awarded a contract pursuant to this bid, must comply with certain "Federal Requirements." Required Federal Forms are included in the Bid Form and Bid Document Package. The Federal Requirements are attached to the Bid Document Package, along with required Certifications at pages at BDP-66 through BDP-76. The Contractor will ensure that all of its subcontractors and suppliers of any tier comply with all applicable Federal Requirements. The Contractor shall be presumed to have considered and completed all Federal Requirements and Forms as part of its bid and shall be presumed to have carefully considered and accounted for all costs of complying with the Federal Requirements in formulating and submitting a bid hereunder.

IB-29 PAYMENT PROCEDURE REQUIREMENTS

Contractor recognizes and agrees that it shall be required to use the Textura® Construction Payment Management System (CPM System) for this Project. All fees associated with the CPM System are to be paid by the Contractor for billings for work performed. Bidders are required, when preparing a bid, to enter the price of the CPM service on the line provided for the service. The fee is all inclusive of all subcontractor, project and subscription fees associated with the CPM system. The bidder will calculate the fee based on a percentage of their total bid, and then should include it on the line item provided in the bid form labeled "Textura® Construction Payment Management System Fee". This expense becomes part of the contract and billable to the City. Textura will invoice the awarded contractor directly. All costs including but not limited to costs associated with training, entering data or utilizing Textura other than the Textura Construction Payment Management System Fee are overhead and shall not be reimbursed by the City. Contractor is responsible for tax on Textura fee. As with other taxes, the City will not reimburse Contractor for this cost and therefore this cost should be included in Contractor's bid. Textura will invoice the awarded contractor directly.

PROJECT SIZE	FEE (% OF BID)
< \$1,000,000	0.22% (.0022)
\$1,000,001 - \$5,000,000	0.17% (.0017)
\$5,000,001 - \$20,000,000	0.12% (.0012)
\$20,000,001 - \$50,000,000	0.10% (.0010)
\$50,000,001 - \$100,000,000	0.08% (.0008)
\$100,000,001 - \$500,000,000	0.05% (.0005)
> \$500,000,000	CONTACT TEXTURA FOR PROGRAM PRICING

For more information:

http://www.denvergov.org/content/denvergov/en/contract-administration/bidding-process.html

RULES AND REGULATIONS REGARDING

EQUAL EMPLOYMENT OPPORTUNITY

Promulgated and adopted by the Manager of Public Works pursuant to and by authority of Article III, Division 2, Chapter 28 of the Revised Municipal Code of the City and County of Denver, and for the purpose of insuring that contractors, subcontractors and suppliers soliciting and receiving compensation for contract work from or through the City and County of Denver provide equal opportunity in employment without regard to race, color, creed, sex, national origin, age, religion, marital status, political opinion or affiliation or mental or physical handicap and meet certain requirements for the hiring, training, promotion, and treatment during employment of members of ethnic groups subject to differential treatment, including persons of African descent (Black), Spanish-surnamed (Hispanic), Asian-American and American Indian Groups.

RULE I - DEFINITIONS

- A. "City" means the City and County of Denver.
- B. "Manager" shall mean the Manager of Public Works for the City and County of Denver.
- C. "Contract" means a contract entered into with the City and County of Denver, financed in whole or in part by local resources or funds of the City and County of Denver, for the construction of any public building or prosecution or completion of any public work.
- D. "Contractor" means the original party to a contract with the City and County of Denver, also referred to as the "general" or "prime" contractor.
- E. "Director" means the Director of the Division of Small Business Opportunity.
- F. "Subcontractor" means any person, company, association, partnership, corporation, or other entity which assumes by subordinate agreement some or all of the obligations of the general or prime contractor.
- G. The phrase "Bidding Specifications" as used in Article III, Division 2 of Chapter 28 of the Revised Municipal Code shall include BID CONDITION, INVITATION TO BID, and NOTICE OF PROPOSAL.
- H. "Affirmative Action Program" means a set of specific and result-oriented procedures or steps to which a contractor commits himself to apply every good faith effort to employ members of ethnic minority groups, to include persons of African descent (Black), Spanish surnamed (Hispanic), Asian-American, American Indians, and persons with mental or physical handicap.
- I. "Division of Small Business Opportunity" means the City agency established pursuant to Article III, Division 1 of Chapter 28 of the Denver Revised Municipal Code.

RULE II - NOTICE OF HEARING

When results of conciliation efforts are unsatisfactory to the Manager and he is informed in accordance with Article III, Division 2 of Chapter 28 of the Revised Municipal code that a contractor or subcontractor has apparently failed to meet affirmative action and equal employment opportunity requirements after a reasonable period of notice to correct deficiencies, the Manager will, prior to imposition of any sanctions, afford the general contractor a hearing in order to determine whether the contractor or his subcontractors have failed to comply with the affirmative action and equal employment opportunity requirements of Article III, Division 2 of Chapter 28 of the Revised Municipal Code or of the contract. Written notice of such hearing shall be delivered personally or sent by certified mail, return receipt requested, to the contractor and to any subcontractor involved, at least ten (10) days prior to the date scheduled for the hearing.

RULE III - HEARING

- A. Contractors will appear at hearings and may be represented by counsel, and may present testimony orally and other evidence.
- B. Hearings shall be conducted by one or more hearing examiners designated as such by the Manager.
- C. The Director of the Division of Small Business Opportunity may participate in hearings as a witness.
- D. Hearings shall be held at the place specified in the notice of hearing.
- E. All oral testimony shall be given under oath or affirmation and a record of such proceedings shall be made.
- F. All hearings shall be open to the public.
- G. The hearing officer shall make recommendations to the Manager who shall make a final decision.

REGULATIONS

REGULATION NO. 1 - ORDINANCE:

The Rules and Regulations of the Manager shall be inserted in the bidding specifications for every contract for which bidding is required.

REGULATION NO. 2 - EXEMPTIONS:

Each contract and subcontract, regardless of the dollar amount, shall be subject to affirmative action requirements unless specifically exempted in writing individually by the Manager. Exemptions apply only to "affirmative action" in equal employment opportunity, and are not to be construed as condonation in any manner of "discrimination" or "discriminatory practices" in employment because of race, color, creed, sex, age, national origin, religion, marital status, political opinion or mental or physical handicap.

REGULATION NO. 3 - DIRECTOR OF CONTRACT COMPLIANCE:

The Director of the Division of Small Business Opportunity shall perform the duties assigned to such official by Article III, Division 2 Chapter 28 of the Revised Municipal Code and by the Manager. (1) The Director of the Division of Small Business Opportunity or designated representatives shall inform bidders and contractors of affirmative action procedures, programs, and goals in accordance with the Ordinance at prebid and pre-construction conference; (2) make regular on-site inspections; (3) supply contractors and subcontractors with report forms to be completed by them when requested, and furnished to the Director of the Division of Small Business Opportunity; and (4) review payroll records, employment records and practices of general contractors and their subcontractors and suppliers during the performance of any contract. The Director of the Division of Small Business Opportunity shall promptly report apparent affirmative action deficiencies to the Manager.

REGULATION NO. 4 - GOALS AND TIMETABLES:

In general, goals and timetables should take into account anticipated vacancies and the availability of skills in the market place from which employees should be drawn. In addition, where discrimination in employment by a general contractor or any of his subcontractors is indicated, a corrective action program will take into account the need by the general contractor and his subcontractors to correct past discriminatory practices and reach goals of minority manpower utilization on a timely basis through such recruiting and advertising efforts as are necessary and appropriate.

REGULATION NO. 5 - AWARD OF CONTRACTS:

It shall be the responsibility of the Director of the Division of Small Business Opportunity to determine the affirmative action capability of bidders, contractors and subcontractors and to recommend to the Manager the award of contracts to those bidders, contractors and subcontractors and suppliers who demonstrate the ability and willingness to comply with the terms of their contract.

REGULATION NO. 6 - PUBLICATION AND DUPLICATION:

Copies of these Rules and Regulations as amended by the Manager from time to time, shall as soon as practicable and after Notice being published will be made a part of all City Contracts.

REGULATION NO. 7 - NOTICE TO PROCEED:

Prior to issuance of the Notice to Proceed a sign-off will be required of the Director of the Division of Small Business Opportunity or his designee.

REGULATION NO. 8 - CONTRACTS WITH SUBCONTRACTORS:

To the greatest extent possible, the contractor shall make a good faith effort to contract with minority contractors, subcontractors and suppliers for services and supplies by taking affirmative actions which include but are not limited to the following:

- 1. Advertise invitations for subcontractor bids in minority community news media.
- 2. Contact minority contractor organizations for referral of prospective subcontractors.
- 3. Purchase materials and supplies from minority material suppliers.

REGULATION NO. 9 - AGENCY REFERRALS:

It shall be no excuse that the union with which the contractor or subcontractor has an agreement providing for referral, exclusive or otherwise, failed to refer minority employees.

REGULATION NO. 10 - CLAUSES:

The Manager shall include the appropriate clauses in every contract and the contractor shall cause to be inserted in every subcontract the appropriate clauses:

- 1. APPENDIX A: City and County of Denver Equal Opportunity Clause ALL CONTRACTS funded only with City and County of Denver monies.
- 2. APPENDIX B: Equal Opportunity Clause (11246) ALL FEDERAL ASSISTED.
- 3. APPENDIX C: Section 3 Assurance of Compliance HUD ASSISTED PROJECTS.
- 4. APPENDIX D: Section 3 Clause HUD ASSISTED PROJECTS.

All amendments to the appendices shall be included by reference.

REGULATION NO. 11 - SHOW CAUSE NOTICES:

When the Manager has reasonable cause to believe that a contractor has violated Article III, Division 2 of Chapter 28 of the Denver Revised Municipal Code, he may issue a notice requiring the contractor to show cause, within fifteen (15) days why enforcement procedures, or other appropriate action to insure compliance, should not be instituted.

REGULATION NO. 12 - BID CONDITIONS - AFFIRMATIVE ACTION REQUIREMENTS - EQUAL EMPLOYMENT OPPORTUNITY:

1. APPENDIX E: The Bid Conditions - Affirmative Action Requirements - Equal Employment

Opportunity as amended and published by the U.S. Department of Labor Employment Standards Administration, Office of Federal Contract Compliance, shall be inserted verbatim for bidding specification for every non-exempt

contract involving the use of Federal funds.

2. APPENDIX F: The Bid Conditions - Affirmative Action Requirements - Equal Employment

> Opportunity as published by the Department of Public Works, City and County of Denver, shall be inserted verbatim as bidding specifications for every non-

exempt contract using City funds.

CITY AND COUNTY OF DENVER DEPARTMENT OF PUBLIC WORKS

APPENDIX A

CITY AND COUNTY OF DENVER EQUAL OPPORTUNITY CLAUSE - ALL CONTRACTS

- 1. The Contractor will not discriminate against any employee or applicant for employment because of race, creed, color, sex, age, national origin, religion, marital status, political opinion or affiliation, or mental or physical handicap. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, creed, color, sex, age, national origin, religion, marital status, political opinion or affiliation, or mental or physical handicap. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.
- 2. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor state that all qualified applicants will receive consideration for employment without regard to race, creed, color, sex, age, national origin, religion, marital status, political opinion or affiliation, or mental or physical handicap.
- 3. The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided, advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
- 4. Each Contractor will comply with all provisions of Article III, Division 2 of Chapter 28 of the Revised Municipal Code, and the rules, regulations, and relevant orders of the Manager and the Director.
- 5. The Contractor will furnish all information and reports required by Article III, Division 2 of Chapter 28 of the Revised Municipal Code, and by rules, regulations and orders of the Manager and Director or pursuant thereto, and will permit access to his books, records, and accounts by the Manager, Director, or their designee for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
- 6. In the event of the Contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations or orders, this contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further City contracts in accordance with procedures authorized in Article III, Division 2, Chapter 28 of the Revised Municipal Code, or by rules, regulations, or order of the Manager.
- 7. The Contractor will include Regulation 12, Paragraph 2 and the provisions of paragraphs (1) through (6) in every subcontract of purchase order unless exempted by rules, regulations, or orders of the Manager issued pursuant to Article III, Division 2, Chapter 28 of the Revised Municipal Code, so that such provisions will be binding on each subcontractor or supplier. The Contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance.

The applicant further agrees to be bound by the above equal opportunity clauses with respect to its own employment practices when it participates in City contracts. The Contractor agrees to assist and cooperate actively with the Manager and the Director in obtaining compliance of subcontractors and suppliers with the equal opportunity clause and the rules, regulations and relevant orders of the Manager, and will furnish the Manager and the Director such information as they may require for the supervision of compliance, and will otherwise assist the Manager and Director in the discharge of the City's primary responsibility for securing compliance. The Contractor further agrees to refrain from entering into any contract or contract modification

subject to Article III, Division 2 of Chapter 28 of the Revised Municipal Code with a contractor debarred from, or who has not demonstrated eligibility for, City contracts.

The Contractor will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by the Manager and Director. In addition, the Contractor agrees that failure or refusal to comply with these undertakings the Manager may take any or all of the following actions:

- A. Cancellation, termination, or suspension in whole or in part of this contract.
- B. Refrain from extending any further assistance to the applicant under the program with respect to which the failure occurred until satisfactory assurance of future compliance has been received from such applicant.
- C. Refer the case to the City Attorney for appropriate legal proceedings.

SUBCONTRACTS: Each prime Contractor or Subcontractor shall include the equal opportunity clause in each of its subcontracts.

APPENDIX B

EQUAL EMPLOYMENT OPPORTUNITY CLAUSE

During the performance of this contract, the contractor agrees as follows:

1. The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to the following:

Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

- 2. The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive considerations for employment without regard to race, color, religion, sex, or national origin.
- 3. The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
- 4. The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, as amended, and of the rules, regulations, and relevant orders of the Secretary of Labor.
- 5. The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
- 6. In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedure authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
- 7. The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provision, including sanctions for noncompliance: Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency the contractor may request the United States to enter into such litigation to protect the interests of the United States.

EQUAL EMPLOYMENT OPPORTUNITY IS THE LAW

Discrimination is Prohibited by the Civil Rights Act of 1964 and by Executive Order No. 11246

Title VII of the Civil Rights Act of 1964

Administered by: The Equal Employment Opportunity Commission

Prohibits discrimination because of Race, Color, Religion, sex, or National Origin by Employers with 25 or more employees, by Labor Organizations with a hiring hall of 25 or more members, by Employment Agencies, and b Joint Labor-Management Committees for Apprenticeship or Training.

ANY PERSON who believes that he or she has been discriminated against SHOULD CONTACT:

The Equal Employment Opportunity Commission (EEOC) 2401 E Street, NW Washington, D.C. 20506

Executive Order No. 11256

Administered by: The Office of Federal Contract Compliance Programs

Prohibits discrimination because of Race, Color, Religion, Sex, or National Origin, and requires affirmative action to ensure equality of opportunity in all aspects of employment, by all Federal Government Contractors and Subcontractors, and by Contractors Performing Work Under a Federal Assisted Construction Contract, regardless of the number of employees in either case.

ANY PERSON who believes that he or she has been discriminated against SHOULD CONTACT:

The Office of Federal Contract Compliance Programs
U. S. Department of Labor
Washington, D.C. 20210

APPENDIX E

Notice of Requirement for Affirmative Action to Ensure Equal Employment Opportunity (Executive Order 11246, as amended)

- 1. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.
- 2. The goals and timetables for minority and female participation, expressed in percentage terms for the contractor's aggregate workforce in each trade on all construction work in the covered area are as follows:

Timetables: Until Further Notice

Goals:

(a) Minority Participation in Each Trade: 13.8 percent

(b) Female Participation in Each Trade: <u>6.9</u> percent

These goals are applicable to all the contractor's construction work (whether or not it is Federal on Federally-assisted) performed in the covered area. If the contractor performs construction work in a geographic area located outside of the covered area, it shall apply the goal established for such geographic area where the work is actually performed. With regard to this second area, the contractor also is subject to the goal for both its Federally involved and non-Federally involved construction.

The contractor's compliance with the executive order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a, and its efforts to meet the goal. The hours of minority employment and training must be substantially uniform throughout the length of the contract, and in each grade, and the contract shall make a good faith effort to employ minorities evenly on each of its projects. The transfer of minority employees or trainees from contractor to contractor or from project to project, for the sole purpose of meeting the contractor's goal, shall be a violation of the contract, the executive order, and the regulations in 41 CFR Part 60-4. Compliance with the goal will be measured against the total work hours performed.

- 3. The contractor shall provide written notification to the Director, OFCCP, within 10 working days of award of any construction subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address, and telephone number of the subcontractor; employee identification number; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographic area in which the contract is performed.
- 4. As used in this notice and in the contract resulting from this solicitation, the "covered area" is the City and County of Denver, Colorado.

STANDARD FEDERAL ASSURANCES

NOTE: As used below the term "contractor" shall mean and include the "Party of the Second Part," and the term "sponsor" shall mean the "City".

During the term of this contract, the contractor, for itself, its assignees and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

- 1. <u>Compliance with Regulations</u>. The contractor shall comply with the Regulations relative to nondiscrimination in federally assisted programs of the Department of Transportation (hereinafter "DOT") Title 49, Code of Federal Regulations, Part 21, as they may be amended from time to time (hereinafter referred to as the Regulations), which are herein incorporated by reference and made a part of this contract.
- 2. <u>Nondiscrimination</u>. The contractor, with regard to the work performed by it during the contract, shall not discriminate on the grounds of race, color, sex, creed or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor shall not participate either directly or indirectly in the discrimination prohibited by section 21.5 of the Regulations, including employment practices when the contract covers a program set forth in Appendix B of the Regulations.
- 3. <u>Solicitations for Subcontractors, Including Procurements of Materials and Equipment.</u> In all solicitations either by competitive bidding or negotiations made by the contractor for work to be performed under a subcontract, including procurements or materials or leases of equipment, each potential subcontractor or supplier shall be notified by the contractor of the contractor's obligations under this contract and the Regulations relative to nondiscrimination on the grounds of race, color, or national origin.
- 4. <u>Information and Reports.</u> The contractor shall provide all information and reports required by the Regulations or directives issued pursuant thereto and shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the to be pertinent to ascertain compliance with such Regulations, orders, and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish this information, the contractor shall so certify to the sponsor, as appropriate, and shall set forth what efforts it has made to obtain the information.
- 5. <u>Sanctions for Noncompliance</u>. In the event of the contractor's noncompliance with the nondiscrimination provisions of this contract, the sponsor shall impose such contract sanctions as it may determine to be appropriate, including, but not limited to:
 - a. Withholding of payments to the contractor under the contract until the contractor complies, and/or
 - b. Cancellation, termination, or suspension of the contract, in whole or in part.
- 6. <u>Incorporation of Provisions</u>. The contractor shall include the provisions of paragraphs 1 through 5 in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Regulations or directives issued pursuant thereto. The contractor shall take such action with respect to any subcontract or procurement as the sponsor or may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, the contractor may request the sponsor to enter into such litigation to protect the interests of the sponsor and, in addition, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY CONSTRUCTION CONTRACT SPECIFICATIONS (41 CFR 60-4.3) (VERSION 2, 4/23/90)

- 1. As used in these specifications:
 - a. "Covered area" means the geographical area described in the solicitation from which this contract resulted;
 - b. "Director" means Director, Office of Federal Contract Compliance Programs (OFCCP), U.S. Department of Labor, or any person to whom the Director delegates authority;
 - c. "Employer identification number" means the Federal social security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941;
 - d. "Minority" includes:
 - (1) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);
 - (2) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin regardless of race);
 - (3) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and
 - (4) American Indian or Alaskan native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).
- 2. Whenever the contractor, or any subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.
- 3. If the contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors shall be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each contractor or subcontractor participating in an approved plan is individually required to comply with its obligations under the EEO clause and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other contractors or subcontractors toward a goal in an approved Plan does not excuse any covered contractor's or subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.
- 4. The contractor shall implement the specific affirmative action standards provided in paragraphs 7a through 7p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered construction contractors performing construction work in a geographical area where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement

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contracting officers. The contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

- 5. Neither the provisions of any collective bargaining agreement nor the failure by a union with whom the contractor has a collective bargaining agreement to refer either minorities or women shall excuse the contractor's obligations under these specifications, Executive Order 11246 or the regulations promulgated pursuant thereto.
- 6. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees shall be employed by the contractor during the training period and the contractor shall have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees shall be trained pursuant to training programs approved by the U.S. Department of Labor.
- 7. The contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The contractor shall document these efforts fully and shall implement affirmative action steps at least as extensive as the following:
 - a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the contractor's employees are assigned to work. The contractor, where possible, will assign two or more women to each construction project. The contractor shall specifically ensure that all foremen, superintendents, and other onsite supervisory personnel are aware of and carry out the contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.
 - b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.
 - c. Maintain a current file of the names, addresses, and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source, or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the contractor by the union or, if referred, not employed by the contractor, this shall be documented in the file with the reason therefore along with whatever additional actions the contractor may have taken.
 - d. Provide immediate written notification to the Director when the union or unions with which the contractor has a collective bargaining agreement has not referred to the contractor a minority person or female sent by the contractor, or when the contractor has other information that the union referral process has impeded the contractor's efforts to meet its obligations.
 - e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the contractor's employment needs, especially those programs funded or approved by the Department of Labor. The contractor shall provide notice of these programs to the sources compiled under 7b above.
 - f. Disseminate the contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with

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- all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.
- g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination, or other employment decisions including specific review of these items with onsite supervisory personnel such a superintendent, general foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.
- h. Disseminate the contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the contractor's EEO policy with other contractors and subcontractors with whom the contractor does or anticipates doing business.
- i. Direct its recruitment efforts, both oral and written, to minority, female, and community organizations, to schools with minority and female students; and to minority and female recruitment and training organizations serving the contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the contractor shall send written notification to organizations, such as the above, describing the openings, screening procedures, and tests to be used in the selection process.
- j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable provide after school, summer, and vacation employment to minority and female youth both on the site and in other areas of a contractor's workforce.
- k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.
- l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel, for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.
- m. Ensure that seniority practices, job classifications, work assignments, and other personnel practices do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the contractor's obligations under these specifications are being carried out.
- n. Ensure that all facilities and company activities are non-segregated except that separate or single user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.
- o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.
- p. Conduct a review, at least annually, of all supervisor's adherence to and performance under the contractor's EEO policies and affirmative action obligations.
- 8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7a through p). The efforts of a contractor association, joint contractor union, contractor community, or other similar groups of which the contractor is a member and

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participant, may be asserted as fulfilling any one or more of its obligations under 7a through p of these specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the contractor. The obligation to comply, however, is the contractor's and failure of such a group to fulfill an obligation shall not be a defense for the contractor's noncompliance.

- 9. A single goal for minorities and a separate single goal for women have been established. The contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, if the particular group is employed in a substantially disparate manner (for example, even though the contractor has achieved its goals for women generally,) the contractor may be in violation of the Executive Order if a specific minority group of women is underutilized.
- 10. The contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.
- 11. The contractor shall not enter into any subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.
- 12. The contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination, and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.
- 13. The contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.
- 14. The contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government, and to keep records. Records shall at least include for each employee, the name, address, telephone number, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.
- 15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

CITY AND COUNTY OF DENVER DEPARTMENT OF PUBLIC WORKS ENGINEERING DIVISION

APPENDIX F

AFFIRMATIVE ACTION REQUIREMENTS

EQUAL EMPLOYMENT OPPORTUNITY

For All Non-Exempt Construction Contracts to Be Awarded by the City and County of Denver, Department of Public Works.

NOTICE

EACH BIDDER, CONTRACTOR OR SUBCONTRACTOR (HEREINAFTER THE CONTRACTOR) MUST FULLY COMPLY WITH THE REQUIREMENTS OF THESE BID CONDITIONS AS TO EACH CONSTRUCTION TRADE IT INTENDS TO USE ON THIS CONSTRUCTION CONTRACT, AND ALL OTHER CONSTRUCTION WORK (BOTH CITY AND NON-CITY) IN THE DENVER AREA DURING THE PERFORMANCE OF THIS CONTRACT OR SUBCONTRACT. THE CONTRACTOR COMMITS ITSELF TO THE GOALS FOR MINORITY MANPOWER UTILIZATION, AS APPLICABLE, AND ALL OTHER REQUIREMENTS, TERMS AND CONDITION OF THESE BID CONDITIONS BY SUBMITTING A PROPERLY SIGNED BID.

THE CONTRACTOR SHALL APPOINT A COMPANY EXECUTIVE TO ASSUME THE RESPONSIBILITY FOR THE IMPLEMENTATION OF THE REQUIREMENTS, TERMS AND CONDITIONS OF THESE BID CONDITIONS.

/s/

Manager of Public Works City and County of Denver

EQUAL OPPORTUNITY PROVISIONS (Cont'd)

A. REQUIREMENTS - AN AFFIRMATIVE ACTION PLAN:

Contractors shall be subject to the provisions and requirements of these bid conditions including the goals and timetables for minority* and female utilization, and specific affirmative action steps set forth by the Office of Contract Compliance. The contractor's commitment to the goals for minority, and female utilization as required constitutes a commitment that it will make every good faith effort to meet such goals.

1. GOALS AND TIMETABLES:

The goals and timetables for minority and female participation, expressed in percentage terms for the contractor's aggregate workforce in each trade are as follows:

GOALS FOR MINORITY PARTICIPATION FOR EACH TRADE

From January 1, 1982 to Until Further Notice

21.7% - 23.5%

GOALS FOR FEMALE PARTICIPATION FOR EACH TRADE

> From January 1, 1982 to Until Further Notice

> > 6.9%

The goals for minority and female utilization above are expressed in terms of hours of training and employment as a proportion of the total number of hours to be worked by the contractor's aggregate workforce, which includes all supervisory personnel, in each trade, on all projects for the City and County of Denver during the performance of its contract (i.e., The period beginning with the first day of work on the City and County of Denver funded construction contract and ending with the last day of work).

The hours of minority and female employment and training must be substantially uniform throughout the length of the contract in each trade and minorities and females must be employed evenly on each of a contractor's projects. Therefore, the transfer of minority or female employees from contractor to contractor or from project to project for the purpose of meeting the contractor's goals shall be a violation of these Bid Conditions.

If the Contractor counts the nonworking hours of apprentices they must be employed by the Contractor during the training period; the Contractor must have made a commitment to employ apprentices at the completion of their training subject to the availability of employment opportunities; and the apprentices must be trained pursuant to training programs approved by the Bureau of Apprenticeship and Training.

* "Minority" is defined as including, Blacks, Spanish Surname Americans, Asian-Americans, and American Indians, and includes both men and minority women.

2. SPECIFIC AFFIRMATIVE ACTION STEPS:

No contractor shall be found to be in noncompliance solely on account of its failure to meet its goals, but will be given an opportunity to demonstrate that the contractor has instituted all the specific affirmative action steps specified and has made every good faith effort to make these steps work toward the attainment of its goals within the timetables, all to the purpose of expanding minority and female utilization in its aggregate workforce. A contractor, who fails to comply with its obligation under the Equal Opportunity Clause of its contract and fails to achieve its commitments to the goals for minority and female utilization has the burden of proving that it has engaged in an Affirmative Action Program directed at increasing minority and female utilization and that such efforts were at least as extensive and as specific as the following:

a. The Contractor should have notified minority and female organizations when employment opportunities were available and should have maintained records of the organization's response.

- b. The Contractor should have maintained a file of the names and addresses of each minority and female referred to it by any individual or organization and what action was taken with respect to each such referred individual, and if the individual was not employed by the Contractor, the reasons. If such individual was sent to the union hiring hall for referral and not referred back by the union or if referred, not employed by the Contractor, the file should have documented this and their reasons.
- c. The Contractor should have promptly notified the Department of Public Works, and the Division of Small Business Opportunity when the union or unions with which the Contractor has collective bargaining agreements did not refer to the contractor a minority or female sent by the contractor, or when the Contractor has other information that the union referral process has impeded efforts to meet its goals.
- d. The Contractor should have disseminated its EEO policy within its organization by including it in any employee handbook or policy manual; by publicizing it in company newspapers and annual reports and by advertising such policy at reasonable intervals in union publications. The EEO policy should be further disseminated by conducting staff meetings to explain and discuss the policy; by posting of the policy; and by review of the policy with minority and female employees.
- e. The Contractor should have disseminated its EEO policy externally by informing and discussing it with all recruitment sources; by advertising in news media, specifically including minority and female news media; and by notifying and discussing it with all subcontractors.
- f. The Contractor should have made both specific and reasonably recurrent written and oral recruitment efforts. Such efforts should have been directed at minority and female organizations, schools with substantial minority and female enrollment, and minority and female recruitment and training organizations within the Contractor's recruitment area.
- g. The Contractor should have evidence available for inspection that all tests and other selection techniques used to select from among candidates for hire, transfer, promotion, training, or retention are being used in a manner that does not violate the OFCCP Testing Guidelines in 41 CFR Part 60-3.
- h. The Contractor should have made sure that seniority practices and job classifications do not have a discriminatory effect.
- i. The Contractor should have made certain that all facilities are not segregated by race.
- j. The Contractor should have continually monitored all personnel activities to ensure that its EEO policy was being carried out including the evaluation of minority and female employees for promotional opportunities on a quarterly basis and the encouragement of such employees to seek those opportunities.
- k. The Contractor should have solicited bids for subcontracts from available minority and female subcontractors engaged in the trades covered by these Bid Conditions, including circulation of minority and female contractor associations.

NOTE: The Director and the Division of Small Business Opportunity will provide technical assistance on questions pertaining to minority and female recruitment sources, minority and female community organizations, and minority and female news media upon receipt of a request for assistance from a contractor.

3. NON - DISCRIMINATION:

In no event may a contractor utilize the goals and affirmative action steps required in such a manner as to cause or result in discrimination against any person on account of race, color, religion, sex, marital status, national origin, age, mental or physical handicap, political opinion or affiliation.

4. **COMPLIANCE AND ENFORCEMENT:**

In all cases, the compliance of a contractor will be determined in accordance with its obligations under the terms of these Bid Conditions. All contractors performing or to perform work on projects subject to these Bid Conditions hereby agree to inform their subcontractors in writing of their respective obligations under the terms and requirements of these Bid Conditions, including the provisions relating to goals of minority and female employment and training.

A. CONTRACTORS SUBJECT TO THESE BID CONDITIONS:

In regard to these Bid Conditions, if the Contractor meets the goals set forth therein or can demonstrate that it has made every good faith effort to meet these goals, the Contractor shall be presumed to be in compliance with Article III, Division 2 of Chapter 28 of the Revised Municipal Code, the implementing regulations and its obligations under these Bid Conditions. In the event, no formal sanctions or proceedings leading toward sanctions shall be instituted unless the contracting or administering agency otherwise determines that the contractor is violating the Equal Opportunity Clause.

- 1. Where the Division of Small Business Opportunity finds that a contractor failed to comply with the requirements of Article III, Division 2 of Chapter 28 of the Revised Municipal Code or the implementing regulations and the obligations under these Bid Conditions, and so informs the Manager, the Manager shall take such action and impose such sanctions, which include suspension, termination, cancellation, and debarment, as may be appropriate under the Ordinance and its regulations. When the Manager proceeds with such formal action it has the burden of proving that the Contractor has not met the goals contained in these Bid Conditions. The Contractor's failure to meet its goals shall shift to it the requirement to come forward with evidence to show that it has met the good faith requirements of these Bid Conditions.
- 2. The pendency of such proceedings shall be taken into consideration by the Department of Public Works in determining whether such contractor can comply with the requirements of Article III, Division 2 of Chapter 28 of the Revised Municipal Code, and is therefore a "responsible prospective contractor".
- 3. The Division of Small Business Opportunity shall review the Contractor's employment practices during the performance of the contract, if the Division of Small Business Opportunity determines that the Contractor's Affirmative Action Plan is no longer an acceptable program, the Director shall notify the Manager.

B. OBLIGATIONS APPLICABLE TO CONTRACTORS:

It shall be no excuse that the union with which the Contractor has a collective bargaining agreement providing for exclusive referral failed to refer minority or female employees. Discrimination in referral for employment, even if pursuant to provisions of a collective bargaining agreement, is prohibited by the National Labor Relations Act, as amended, Title VI of the Civil Rights Act of 1964, as amended, and Article III, Division 2 of Chapter 28 of the Revised Municipal Code. It is the policy of the Department of Public Works that contractors have a responsibility to provide equal employment opportunity, if they wish to participate in City and County of Denver contracts. To the extent they have delegated the responsibility for some of their employment practices to a labor organization and, as a result, are prevented from meeting their obligations pursuant to Article III, Division 2, Chapter 28 of the Revised Municipal Code, such Contractors cannot be considered to be in compliance with Article III, Division 2, Chapter 28 of the Revised Municipal Code, or its implementing rules and regulations.

C. GENERAL REQUIREMENTS:

Contractors are responsible for informing their subcontractors in writing regardless of tier, as to their respective obligations. Whenever a Contractor subcontracts a portion of work in any trade covered by these Bid Conditions, it shall include these Bid Conditions in such subcontracts and each subcontractor shall be bound by these Bid Conditions to the full extent as if it were the prime contractor. The Contractor shall not, however, be held accountable for the failure of its subcontractors to fulfill their obligations under these Bid Conditions. However, the prime contractor shall give notice to the Director of any refusal or failure of any subcontractor to fulfill the obligations under these Bid Conditions. A subcontractor's failure to comply will be treated in the same manner as such failure by a prime contractor.

- 1. Contractors hereby agree to refrain from entering into any contract or contract modification subject to Article III, Division 2, Chapter 28 of the Revised Municipal Code with a contractor debarred from, or who is determined not to be a "responsive" bidder for the City and County of Denver contracts pursuant to the Ordinance.
- 2. The Contractor shall carry out such sanctions and penalties for violation of these Bid Conditions and the Equal Opportunity Clause including suspension, termination and cancellation of existing subcontracts and debarment from future contracts as may be ordered by the Manager pursuant to Article III, Division 2, Chapter 28 of the Revised Municipal Code and its implementing regulations.
- 3. Nothing herein is intended to relieve any contractor during the term of its contract from compliance with Article III, Division 2, Chapter 28 of the Revised Municipal Code, and the Equal Opportunity Clause of its contract with respect to matters not covered in these Bid Conditions.
- 4. Contractors must keep such records and file such reports relating to the provisions of these Bid Conditions as shall be required by the Office of Contract Compliance.
- 5. Requests for exemptions from these Bid Conditions must be made in writing, with justification, to the Manager of Public Works, 201 W. Colfax, Dept. 608, Denver, Colorado 80202, and shall be forwarded through and with the endorsement of the Director.

CITY AND COUNTY OF DENVER

DEPARTMENT OF PUBLIC WORKS ENGINEERING DIVISION

CITY OF DENVER CONTRACT NO. 201631819

33rd Street Outfall (31st and 36th Street Outfall Project) Segment - Blake St. to Arapahoe St.

CONTRACT

THIS CONTRACT AND AGREEMENT, made and entered into, by and between the City and County of Denver, a municipal corporation of the State of Colorado, hereinafter referred to as the "City," party of the first part, and

hereinafter referred to as the "Contractor," party of the second part,

CONCRETE WORKS OF COLORADO, INC.

1260 Rock Creek Circle Lafayette, CO 80026

WITNESSETH, Commencing on **December 2, 2016,** and for at least three (3) days the City advertised that sealed bids would be received for furnishing all labor, tools, supplies, equipment, materials, and everything necessary and required for the following:

CITY OF DENVER CONTRACT NO. 201631819

WHEREAS, bids pursuant to said advertisement have been received by the Manager of Public Works, who has recommended that a Contract for said work be made and entered into with the above named Contractor who was the lowest, responsive, qualified bidder therefore, and

WHEREAS, said Contractor is now willing and able to perform all of said work in accordance with said advertisement and its bid.

NOW THEREFORE, in consideration of the compensation to be paid the Contractor, the mutual agreements hereinafter contained, and subject to the terms hereinafter stated, it is mutually agreed as follows:

1. CONTRACT DOCUMENTS

It is agreed by the parties hereto that the following list of documents, instruments, technical specifications, plans, drawings and other materials which are attached hereto and bound herewith, incorporated herein by reference or otherwise referenced in these documents constitute and shall be referred to either as the "Contract Documents" or the "Contract," and all of said documents, instruments, technical specifications, Plans, Drawings and other materials taken together as a whole constitute the Contract between the parties hereto, and they are as fully a part of this agreement as if they were set out verbatim and in full herein:

Advertisement of Notice of Invitation for Bids
Instructions to Bidders
Bid Bond
Addenda (as applicable)
DBE Enclosures
Equal Employment Opportunity Provisions (Appendices A, B, E and F)
Bid Form
Commitment to DBE Participation
Contract Form
General Contract Conditions

Special Contract Conditions

(Including, but not limited to the RTD/Federal Requirements referenced in SC-15 and attached hereto.)

Performance and Payment Bond
Notice to Apparent Low Bidder
Notice to Proceed
Contractor's Certification of Payment Form
Final/Partial Lien Release Form
Certificate of Contract Release
Change Orders (as applicable)
Federal Requirements

Prevailing Wage Rate Schedule(s)

Technical Specifications

Contract Drawings

Accepted Shop Drawings

2. SCOPE OF WORK

The Contractor agrees to and shall furnish all labor, tools, supplies, equipment, materials and everything necessary for and required to do, perform and complete all of the Work described, drawn, set forth, shown and included in said Contract Documents.

3. TERMS OF PERFORMANCE

The Contractor agrees to undertake the performance of the Work under this Contract within ten (10) days after being notified to commence work by issuance of a Notice to Proceed in substantially the form contained herein from the Manager and agrees to fully complete said Work within 365 (Three Hundred Sixty Five Days) consecutive calendar days from the effective date of said Notice, plus such extension or extensions of time as may be granted in accordance with the provisions of the General Contract Conditions and any applicable Special Contract Conditions.

4. TERMS OF PAYMENT

The City agrees to pay the Contractor for the performance of all of the Work required under this Contract, and the Contractor agrees to accept as the Contractor's full and only compensation therefore, such sum or sums of money as may be proper in accordance with the price or prices set forth in the Contractor's Bid Form hereto attached and made a part hereof for bid item numbers 01-52.1 thru 50-1 Fifty-nine (59) items, the total estimated cost thereof being Six Million Five Hundred Fifty Six Thousand Seven Hundred Twenty Dollars and No Cents (\$6,556,720.00). Adjustments to said Contract Amount and payment of amounts due hereunder shall be made in accordance with the provisions of the General Contract Conditions and any applicable Special Contract Conditions.

5. NO DISCRIMINATION IN EMPLOYMENT

In connection with the performance of the Work under this Contract, the Contractor agrees not to refuse to hire, discharge, promote or demote, or to discriminate in matters of compensation against any person otherwise qualified, solely because of race, color, religion, national origin, gender, age, military status, sexual orientation, marital status, or physical or mental disability; and the Contractor further agrees to insert the foregoing provision in all subcontracts hereunder.

6. DBE AND EQUAL OPPORTUNITY REQUIREMENTS

The Contractor agrees to comply with all requirements of the City and RTD's Equal Employment Opportunity programs and RTD's Disadvantaged Business Enterprise program, and any rules, regulations and guidelines set forth thereunder for such programs. This compliance shall include the obligation to maintain throughout the term of the contract that level of DBE participation upon which the Contract was initially awarded, unless otherwise authorized by the law or any rules, regulations or guidelines.

7. WAGE RATE REQUIREMENTS

In performance of all Work hereunder, the Contractor agrees to comply with and be bound by all requirements and conditions of the City's Payment of Prevailing Wages Ordinance, Sections 20-76 through 20-79, D.R.M.C. and any determinations made by the City pursuant thereto.

8. APPLICABILITY OF LAWS

The Agreement between the Contractor and the City shall be deemed to have been made in the City and County of Denver, State of Colorado and shall be subject to, governed by, and interpreted and construed by or in accordance with the laws of the State of Colorado and the Charter, Revised Municipal Code, Rules, Regulations, Executive Orders and fiscal rules of the City. As such, the Contractor shall at all times comply with the provisions of the Charter, Revised Municipal Code, Rules, Regulations, Executive Orders and fiscal rules of the City, and those State of Colorado and Federal Laws, Rules and Regulations, which in any manner limit, control or apply to the actions or operations of the Contractor, any subcontractors, employees, agents or servants of the Contractor engaged in the Work or affecting the materials and equipment used in the performance of the Work, as the same may be, from time to time, promulgated, revised or amended. The Charter and Revised Municipal Code of the City and County of Denver, as the same may be amended from time to time, are hereby expressly incorporated into this Agreement as if fully set out herein by this reference.

9. APPROPRIATION

The amount of money which has been appropriated and encumbered for the purpose of this contract, to date, is equal to or in excess of the Contract Amount. The Manager, upon reasonable written request, will advise the Contractor in writing of the total amount of appropriated and encumbered funds which remain available for payment for all Work under the Contract.

The issuance of any change order or other form or order or directive by the City which would cause the aggregate payable under the contract to exceed the amount appropriated for the contract is expressly prohibited. In no event shall the issuance of any change order or other form of order or directive by the City be considered valid or binding if it requires additional compensable work to be performed, which work will cause the aggregate amount available under the Contract to exceed the amount appropriated and encumbered for this Contract, unless and until such time as the Contractor has been advised in writing by the Manager that a lawful appropriation, sufficient to cover the entire cost of such additional work, has been made.

It shall be the responsibility of the Contractor to verify that the amounts already appropriated for this Contract are sufficient to cover the entire cost of such work, and any work undertaken or performed in excess of the amount appropriated is undertaken or performed in violation of the terms of this contract, without the proper authorization for such work, and at the Contractor's own risk.

10. APPROVALS

In the event this Contract calls for the payment by the City of five hundred thousand dollars (\$500,000.00) or more, approval by the Board of Councilmen of the City and County of Denver, acting by ordinance, in accordance with Section 3.2.6 of the Charter of the City and County of Denver, is and shall be an express condition precedent to the lawful and binding execution and effect and performance of this contract.

11. ASSIGNMENT

The Contractor shall not assign any of its rights, benefits, obligations or duties under this Contract except upon the prior written consent and approval of the Manager City to such assignment.

12. DISPUTES RESOLUTION PROCESS

It is the express intention of the parties to this Contract that all disputes of any nature whatsoever regarding the Contract including, but not limited to, any claims for compensation or damages arising out of breach or default under this Contract, shall be resolved by administrative hearing pursuant to the provisions of Section 56-106, D.R.M.C. The Contractor expressly agrees that this dispute resolution process is the only dispute resolution mechanism that will be recognized by the parties for any claims put forward by the Contractor, notwithstanding any other claimed theory of entitlement on the part of the Contractor or its subcontractors or suppliers.

13. CONTRACT BINDING

It is agreed that this Contract shall be binding on and inure to the benefit of the parties hereto, their heirs, executors, administrators, assigns and successors.

14. PARAGRAPH HEADINGS

The captions and headings set forth herein are for convenience of reference only and shall not be construed so as to define or limit the terms and provisions hereof.

15. SEVERABILITY

It is understood and agreed by the parties hereto that, if any part, term, or provision of this Contract, except for the provisions of this Contract requiring prior appropriation and limiting the total amount to be paid by the City, is by the courts held to be illegal or in conflict with any law of the State of Colorado, the validity of the remaining portions or provisions shall not be affected, and the rights and obligations of the parties shall be construed and enforced as if the Contract did not contain the particular part, term or provision held to be invalid.

16. ELECTRONIC SIGNATURES AND ELECTRONIC RECORDS:

Contractor consents to the use of electronic signatures by the City. The Agreement, and any other documents requiring a signature hereunder, may be signed electronically by the City in the manner specified by the City. The Parties agree not to deny the legal effect or enforceability of the Agreement solely because it is in electronic form or because an electronic record was used in its formation. The Parties agree not to object to the admissibility of the Agreement in the form of an electronic record, or a paper copy of an electronic document, or a paper copy of a document bearing an electronic signature, on the ground that it is an electronic record or electronic signature or that it is not in its original form or is not an original.

Contract Control Number:	
IN WITNESS WHEREOF, the parties h Denver, Colorado as of	ave set their hands and affixed their seals at
SEAL	CITY AND COUNTY OF DENVER
ATTEST:	By
APPROVED AS TO FORM:	REGISTERED AND COUNTERSIGNED
By	By
	By



IN WITNESS WHEREOF, the parties have executed this agreement and affixed their seals at Denver, Colorado as of the day first above written.

Contract Control Number:

201631819

Vendor Name:

CONCRETE WORKS OF COLORADO, INC.

Name: RICHARD J. BRASHER, JR. (please print)

Title: VICE PRESIDENT (please print)

ATTEST: [if required]

Name: REA ANN FLETCHER (please print)

Title: CONTRACTS MANAGER (please print)



CITY AND COUNTY OF DENVER DEPARTMENT OF PUBLIC WORKS

Construction Contract General Conditions

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CITY AND COUNTY OF DENVER

DEPARTMENT OF PUBLIC WORKS ENGINEERING DIVISION

SPECIAL CONTRACT CONDITIONS

SC-1 CONSTRUCTION SPECIFICATIONS

Except as amended herein or in the attached Technical Specifications, all Work performed under the terms of this Contract shall be governed by the applicable provisions of the following latest editions:

City and County of Denver:

Standard Specifications for Construction, GENERAL CONTRACT CONDITIONS, (2011 Edition)

Transportation Standards and Details for the Engineering Division

City and County of Denver Traffic Standard Drawings

Wastewater Management Division

- Standard Detail Drawings
- Public Works Wastewater Capital Projects Management Standard Construction Specifications

Colorado Department of Transportation:

Standard Specifications for Road and Bridge Construction (Sections 200 through 700 of the 2011 Edition)

Federal Highway Administration:

Manual on Uniform Traffic Control Devices for Streets & Highways (MUTCD)

Building & Fire Codes:

Building Code of the City and County of Denver (International Building Code 2009 Series, City and County of Denver Amendments 2011)

National Fire Protection Association Standards
(As referenced in the Building Code of the City and County of Denver)

The aforementioned City and County of Denver documents are available for review at the Capital Projects Management Office, 201 W. Colfax Ave., Dept. 506, (5th floor), Denver, CO 80202. The *Standard Specifications for Construction*, *GENERAL CONTRACT CONDITIONS* is available at: http://www.denvergov.org/dpw contract admin/ContractAdministration/ContractorReferenceDocuments/t abid/440535/Default.aspx. *Transportation Standards and Details for the Engineering Division* and the Wastewater Management Division – *Standard Detail Drawings*, are available at http://www.denvergov.org.

The "Colorado Department of Transportation Standard Specifications for Road and Bridge Construction" is available for review on CDOT's website at http://www.coloradodot.info/ and can be purchased from the Colorado Department of Transportation.

The Manual on Uniform Traffic Control Devices for Streets & Highways is available for review at the Federal Highway Administration Website at: www.fhwa.dot.gov, The FHWA website also contains purchasing information.

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SC-2 ENGINEERING DIVISION / CITY ENGINEER

The Engineering Division is a unit of the Department of Public Works and is supervised by the City Engineer, who is subordinate to the Manager of Public Works. This Division is responsible for the planning, design, construction, operation and maintenance of all of the City's transportation facilities and the planning, design and construction of all of the City's wastewater facilities, except for the City's Municipal Airport System. All references to the Transportation Division or the Deputy Manager of Public Works for Transportation are deleted and replaced with references to the Engineering Division and City Engineer, respectively.

SC-3 CITY DELEGATION OF AUTHORITY

With reference to General Contract Condition 109, DEPUTY MANAGER and General Contract Condition 212, CITY'S CONTRACT ADMINISTRATION LINE OF AUTHORITY, the Manager hereby designates the City Engineer (the "Director") as the City official responsible for those certain actions and decisions designated as the responsibility of the Deputy Manager under the General Conditions and delegates to the Director the authority necessary to undertake those responsibilities under this Contract. The Director shall have supervisory responsibility over the Project Manager. Additionally, Contractor questions concerning the Plans and Technical Specifications shall be directed to:

Denver Department of Public Works /Engineering Division,

Project ManagerNameTelephoneCity Project ManagerSteve Choi(303) 446-3648

<u>Consultant</u> <u>Name</u> <u>Telephone</u>

Design Consultant Contact

Wilson and Company (785) 626-0115

SC-4 LIQUIDATED DAMAGES

Should the Contractor fail to complete all Work within the Contract Time allocated under the Contract Form at Paragraph 3, TERMS OF PERFORMANCE, the Contractor shall become liable to the City and County of Denver for liquidated damages, and not as a penalty, at the rate of \$1,500.00 for each Day that the Contractor exceeds the time limits herein specified, all in accordance with provisions of General Contract Condition 602, LIQUIDATED DAMAGES; ADMINISTRATIVE COSTS; ACTUAL DAMAGES.

Representative hourly rates for the City administrative costs described in General Contract Condition 602.2 shall be as follows for this Project:

Project Manager \$69 per hour
Project Engineer \$63 per hour
Inspector \$49 per hour
Surveying, if necessary \$100 per hour

SC-5 SUBCONTRACTS

In accordance with General Contract Condition 501, SUBCONTRACTS no limit shall apply to that percentage of the Work which may be sublet providing that the subcontractors receive prior approval in accordance with General Contract Condition 502, SUBCONTRACTOR ACCEPTANCE.

SC-6 RESERVED

SC-7 PAYMENTS TO CONTRACTORS

The application for payment shall be submitted through Textura® Corporations Construction Management Website. Contractor recognizes and agrees that it shall be required to use the Textura Construction Payment Management System for this Project. Contractor further agrees that, to the fullest extent possible within the CPM System, the City shall be entitled to all non-Confidential records, reports, data and other information related to the project that are available to Contractor through the CPM System, including, but not limited to, information related to Contractor and subcontractor billings. To that end, Contractor agrees that it will activate any available settings within the CPM System that are necessary to grant the City access to such non-Confidential information related to the contract and the project. Applications for payment shall be based on the Contract Unit Prices or the approved Schedule of Values described in GC 903.1

Project No. 201631819 BDP -50 December 2, 2016

In accordance with General Contract Condition 902, PAYMENT PROCEDURE, the party(ies) responsible for review of all Pay Applications shall be:

Agency/FirmNameTelephonePublic Works/Engineering DivisionDave Shaw(720) 271-8125

In accordance with General Contract Condition 906, APPLICATIONS FOR PAYMENT, each Application submitted shall include the following:

- 1. The estimate of Work completed shall be based on the approved schedule of values or unit prices, as applicable, and the percent of the Work complete.
- 2. Each Application for Payment shall include each and every independent subcontractor's payroll information including pay dates and pay amounts.
- The Contractor shall also submit to the Auditor and other appropriate officials of the City in a timely fashion, information required by General Contract Condition 1004, REPORTING WAGES PAID.

In accordance with General Contract condition 907, RELEASES AND CONTRACTORS CERTIFICATION OF PAYMENT, Applications for Payment must be accompanied by completed Partial or Final Claim Release Form, as appropriate, from EACH subcontractor and supplier, <u>AND/OR</u> the Contractors' Certification of Payment Form. The forms, Final/Partial Release and Certificate of Payment (Subcontractor/Supplier) and the Contractor's Certification of Payment, both of which must be used are attached hereto.

SC-8 CONSTRUCTION INSPECTION BY THE CITY

General Condition 1701, AUTHORITY OF INSPECTORS, is modified as follows:

- 1701.1 Persons who are employees of the City or who are under contract to the City or the City as lessee will be assigned to inspect and test the Work. These persons may perform any tests and observe the Work to determine whether or not designs, materials used, manufacturing and construction processes and methods applied, and equipment installed satisfy the requirements of the drawings and specifications, accepted Shop Drawings, Product Data and Samples, and the General Contractor's warranties and guarantees. The General Contractor shall permit these inspectors unlimited access to the Work and provide means of safe access to the Work, which cost shall be included as a Cost of the Work without any increase to the Guaranteed Maximum Price. In addition, General Contractor shall provide whatever access and means of access are needed to off-site facilities used to store or manufacture materials and equipment to be incorporated into the Work and shall respond to any other reasonable request to further the inspector's ability to observe or complete any tests. Such inspections shall not relieve the General Contractor of any of its quality control responsibilities or any other obligations under the Contract. All inspections and all tests conducted by the City are for the convenience and benefit of the City. These inspections and tests do not constitute acceptance of the materials or Work tested or inspected, and the City may reject or accept any Work or materials at any time prior to the inspections pursuant to G.C. 2002, whether or not previous inspections or tests were conducted by the inspector or a City representative.
- .2 Building Inspection will perform building code compliance inspections for structures designed for human occupancy. It is the General Contractor's responsibility to schedule and obtain these inspections. If a code compliance inspection results in identification of a condition which will be at variance to the Contract Documents, the General Contractor shall immediately notify the Project Manager and confirm such notification with formal correspondence no later than forty-eight (48) hours after the occurrence.
- .3 When any unit of government or political subdivision, utility or railroad corporation is to pay a portion of the cost of the Work, its respective representatives shall have the right to inspect the Work. This inspection shall not make any unit of government or political subdivision, utility or railroad corporation a party to the Contract, and shall not interfere with the rights of either party.

SC-9 DISPOSAL OF NON-HAZARDOUS WASTE AT DADS

In accordance with the Landfill Agreement made between the City and Waste Management of Colorado, Inc., bidders will be required to haul dedicated loads (non-hazardous entire loads of waste) to the Denver-

Project No. 201631819 BDP -51 December 2, 2016 33rd Outfall - 3

Arapahoe Disposal Site ("DADS") for disposal. DADS is located at Highway 30 and Hampden Avenue in Arapahoe County, Colorado. The City will pay all fees associated with such disposal but the bidder shall be responsible for the costs of transporting the loads. Non-hazardous waste is defined as those substances and materials not defined or classified as hazardous by the Colorado Hazardous Waste Commission pursuant to C.R.S. §25-15-101(6), as amended from time to time, and includes construction debris, soil and asbestos. Bidders shall not use Gun Club Road between I-70 and Mississippi Avenue as a means of access to DADS.

SC-10 PROHIBITION ON USE OF CCA-TREATED WOOD PRODUCTS

The use of any wood products pressure-treated with chromated copper arsenate (CCA) is prohibited. Examples of CCA-treated wood products include wood used in play structures, decks, picnic tables, landscaping timbers, fencing, patios, walkways and boardwalks.

SC-11 TERMINOLOGY

Terminology used in Colorado Department of Transportation (CDOT) Standards and Specifications and City and County of Denver (CCD) Standards and Specifications may differ but shall be considered interchangeable where appropriate. Examples are Department of Public Works (CCD) and Department (CDOT), Project Manager (CCD) and Engineer (CDOT), Traffic Maintenance Plan (CCD) and Traffic Control Plan (CDOT).

SC-12 TECHNICAL SPECIFICATIONS

Section 106 of the CDOT Standard Specifications is hereby incorporated into this contract except where conflicts exist between Section 106 and the General Contract Conditions or Special Contract Conditions. Where conflicts exist, the General Contract Conditions or Special Contract Conditions shall govern.

SC-13 MODIFICATION TO GENERAL CONTRACT CONDITION 405

General Contract Condition 405 is hereby revised for this project as follows:

G.C. 405.2 shall include the following:

Shop Drawings shall be submitted in accordance with Section 105.02 of the CDOT Standard Specifications. Any work performed by the Contractor prior to receipt of approved shop drawings is at the sole risk of the Contractor.

SC-14 MODIFICATION TO GENERAL CONTRACT CONDITION 809

General Contract Condition 809 is hereby revised for this project as follows:

Add G.C. 809.3 as follows:

.3 Fossils may be uncovered during excavation for the project. The Colorado Department of Transportation will furnish a paleontologist to monitor project excavations. The Contractor shall notify the Engineer at least five working days prior to the start of excavation operations to allow for scheduling of the monitor. The paleontologist, Mr. Steve Wallace, can be contacted at (303) 757-9632.

If fossils are encountered, they will be evaluated and, if deemed important, removed prior to further excavation. When directed, the Contractor shall excavate the site in such manner as to preserve the fossils uncovered and shall remove them as directed by the Engineer.

SC-15 FEDERAL REQUIREMENTS

This Project is funded, in whole or in part, by federal funding made available through the Federal Transit Administration ("FTA") and administered by the Regional Transportation District ("RTD"). As such, performance under this contract is subject to certain "Federal Requirements" contained or referenced in the Federal Requirements section of this document. The Contractor shall thoroughly review and shall strictly comply with all Federal Requirements in performing its Work under this contract and shall require that all subcontractors and suppliers comply with all applicable Federal Requirements.

SC-16 ATTORNEY'S FEES

Colorado Revised Statute 38-26-107 requires that in the event any person or company files a verified statement of amounts due and unpaid in connection with a claim for labor and materials supplied on this project, the City shall withhold from payments to the Contractor sufficient funds to insure the payment of any such claims. Should the City and County of Denver be made a party to any lawsuit to enforce such

Project No. 201631819 BDP -52 December 2, 2016

unpaid claims or any lawsuit arising out of or relating to such withheld funds, the Contractor agrees to pay to the City its costs and a reasonable attorney's fee which cost shall be included as a Cost of the Work.

Because the City Attorney Staff does not bill the City for legal services on an hourly basis, the Contractor agrees a reasonable fee shall be computed at the rate of one hundred dollars per hour of City Attorney time.

SC-17 CONTRACT FORMS

In accordance with the terms and conditions of the Contract Documents, the City requires the use of certain form documents in complying with or satisfying various obligations, notifications and conditions in contracting with the City or performing Work hereunder. These form documents are referenced by title throughout the Contract Documents for mandatory use as directed. The following are the forms that shall be detached and utilized in accordance with the Contract Documents:

- 1. Performance and Payment Bond
- 2. Performance and Payment Bond Surety Authorization Letter (Sample)

The following are forms that will be issued by the City during construction:

- 1. Notice to Apparent Low Bidder (Sample)
- 2. Notice to Proceed (Sample)
- 3. Certificate of Contract Release (Sample)

SC-18: INSURANCE

General Condition 1601 is hereby deleted in its entirety and replaced with the following:

- **(1) General Conditions:** Contractor agrees to secure, at or before the time of execution of this Agreement, the following insurance covering all operations, goods or services provided pursuant to this Agreement. Contractor shall keep the required insurance coverage in force at all times during the term of the Agreement, or any extension thereof, during any warranty period, and for eight (8) years after termination of the Agreement. The required insurance shall be underwritten by an insurer licensed or authorized to do business in Colorado and rated by A.M. Best Company as "A-"VIII or better. Each policy shall contain a valid provision or endorsement requiring notification to the City in the event any of the required policies be canceled or non-renewed before the expiration date thereof. Such written notice shall be sent to the parties identified in the Notices section of this Agreement. Such notice shall reference the City contract number listed on the signature page of this Agreement. Said notice shall be sent thirty (30) days prior to such cancellation or non-renewal unless due to non-payment of premiums for which notice shall be sent ten (10) days prior. If such written notice is unavailable from the insurer, contractor shall provide written notice of cancellation, non-renewal and any reduction in coverage to the parties identified in the Notices section by certified mail, return receipt requested within three (3) business days of such notice by its insurer(s) and referencing the City's contract number. If any policy is in excess of a deductible or selfinsured retention, the City must be notified by the Contractor. Contractor shall be responsible for the payment of any deductible or self-insured retention. The insurance coverages specified in this Agreement are the minimum requirements, and these requirements do not lessen or limit the liability of the Contractor. The Contractor shall maintain, at its own expense, any additional kinds or amounts of insurance that it may deem necessary to cover its obligations and liabilities under this Agreement.
- Proof of Insurance: Contractor shall provide a copy of this Agreement to its insurance agent or broker. Contractor may not commence services or work relating to the Agreement prior to placement of coverage. Contractor certifies that the certificate of insurance attached as part of the Contract Documents, preferably an ACORD certificate, complies with all insurance requirements of this Agreement. The City requests that the City's contract number be referenced on the Certificate. The City's acceptance of a certificate of insurance or other proof of insurance that does not comply with all insurance requirements set forth in this Agreement shall not act as a waiver of Contractor's breach of this Agreement or of any of the City's rights or remedies under this Agreement. The City's Risk Management Office may require additional proof of insurance, including but not limited to policies and endorsements.
- (3) <u>Additional Insureds:</u> For Commercial General Liability and Auto Liability, Contractor and subcontractor's insurer(s) shall name the City and County of Denver, its elected and appointed officials, employees and volunteers as additional insured.

Project No. 201631819 BDP -53 December 2, 2016

- **Waiver of Subrogation:** For all coverages, Contractor's insurer shall waive subrogation rights against the City.
- (5) <u>Subcontractors and Subconsultants:</u> All subcontractors and subconsultants (including independent contractors, suppliers or other entities providing goods or services required by this Agreement) shall be subject to all of the requirements herein and shall procure and maintain the same coverages required of the Contractor. Contractor shall include all such subcontractors as additional insured under its policies (with the exception of Workers' Compensation) or shall ensure that all such subcontractors and subconsultants maintain the required coverages. Contractor agrees to provide proof of insurance for all such subcontractors and subconsultants upon request by the City.
- (6) Workers' Compensation/Employer's Liability Insurance: Contractor shall maintain the coverage as required by statute for each work location and shall maintain Employer's Liability insurance with limits of \$100,000 per occurrence for each bodily injury claim, \$100,000 per occurrence for each bodily injury caused by disease claim, and \$500,000 aggregate for all bodily injuries caused by disease claims. Contractor expressly represents to the City, as a material representation upon which the City is relying in entering into this Agreement, that none of the Contractor's officers or employees who may be eligible under any statute or law to reject Workers' Compensation Insurance shall effect such rejection during any part of the term of this Agreement, and that any such rejections previously effected, have been revoked as of the date Contractor executes this Agreement.
- (7) <u>Commercial General Liability:</u> Contractor shall maintain a Commercial General Liability insurance policy with limits of \$1,000,000 for each occurrence, \$1,000,000 for each personal and advertising injury claim, \$2,000,000 products and completed operations aggregate, and \$2,000,000 policy aggregate.
- (8) <u>Business Automobile Liability:</u> Contractor shall maintain Business Automobile Liability with limits of \$1,000,000 combined single limit applicable to all owned, hired and non-owned vehicles used in performing services under this Agreement

(9) Additional Provisions:

- (a) For Commercial General Liability, the policies must provide the following:
 - (i) That this Agreement is an Insured Contract under the policy;
 - (ii) Defense costs in excess of policy limits;
 - (iii) A severability of interests or separation of insureds provision (no insured vs. insured exclusion); and
 - (iv) A provision that coverage is primary and non-contributory with other coverage or self-insurance maintained by the City.
- (b) For claims-made coverage:
 - The retroactive date must be on or before the contract date or the first date when any goods or services were provided to the City, whichever is earlier
- (c) Contractor shall advise the City in the event any general aggregate or other aggregate limits are reduced below the required per occurrence limits. At their own expense, and where such general aggregate or other aggregate limits have been reduced below the required per occurrence limit, the Contractor will procure such per occurrence limits and furnish a new certificate of insurance showing such coverage is in force.

SC-19 GREENPRINT DENVER REQUIREMENTS

In accordance with the City and County of Denver Executive Order 123: Greenprint Denver Office and Sustainability Policy, as amended, Contractor shall adhere to sections of Executive Order 123 pertinent to the construction of the built environment. This includes but is not limited to: all construction and renovation of buildings shall follow instructions and memorandum for high performance buildings; horizontal projects shall include the use of fly ash concrete and recycled aggregate where possible; and, all projects shall recycle construction and demolition waste, and install materials that contain recycled content whenever possible using the U.S. Green Building Council Leadership in Energy and Environmental Design (LEED) as guidance. Non-hazardous solid waste that is eligible for reuse or recycling is not subject to the DADS disposal requirement defined in SC-12.

A completed "Greenprint Denver Closeout Form for Construction Projects" shall be delivered to the Project Manager as a submittal requirement of Final Acceptance.

http://www.denvergov.org/constructioncontracts/Home/ContractorResources/tabid/443154/Default.aspx

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CITY AND COUNTY OF DENVER DEPARTMENT OF PUBLIC WORKS

PERFORMANCE AND PAYMENT BOND

THE CONDITION OF THE FOREGOING OBLIGATION IS SUCH THAT:

WHEREAS, the above bounden Contractor has entered into a written contract with the aforesaid City for furnishing all labor and tools, supplies, equipment, superintendence, materials and everything necessary for and required to do, perform and complete the construction of CONTRACT NO. 201631819, FEDERAL PROJECT NO:, 33RD STREET OUTFALL (31ST AND 36TH STREET OUTFALL PROJECT) SEGMENT - BLAKE ST. TO ARAPAHOE ST., Denver, Colorado, and has bound itself to complete the project within the time or times specified or pay liquidated damages, all as designated, defined and described in the said Contract and Conditions thereof, and in accordance with the Plans and Technical Specifications therefore, a copy of said Contract being made a part hereof;

NOW, THEREFORE, if the said Contractor shall and will, in all particulars well and truly and faithfully observe, perform and abide by each and every Covenant, Condition and part of said Contract, and the Conditions, Technical Specifications, Plans, and other Contract Documents thereto attached, or by reference made a part thereof and any alterations in and additions thereto, according to the true intent and meaning in such case, then this obligation shall be and become null and void; otherwise, it shall remain in full force and effect;

PROVIDED FURTHER, that if the said Contractor shall satisfy all claims and demands incurred by the Contractor in the performance of said Contract, and shall fully indemnify and save harmless the City from all damages, claims, demands, expense and charge of every kind (including claims of patent infringement) arising from any act, omission, or neglect of said Contractor, its agents, or employees with relation to said work; and shall fully reimburse and repay to the City all costs, damages, and expenses which it may incur in making good any default based upon the failure of the Contractor to fulfill its obligation to furnish maintenance, repairs or replacements for the full guarantee period provided in the Contract Documents, then this obligation shall be null and void; otherwise it shall remain in full force and effect;

PROVIDED FURTHER, that if said Contractor shall at all times promptly make payments of all amounts lawfully due to all persons supplying or furnishing it or its subcontractors with labor and materials, rental machinery, tools or equipment used or performed in the prosecution of work provided for in the above Contract and that if the Contractor will indemnify and save harmless the City for the extent of any and all payments in connection with the carrying out of such Contract, then this obligation shall be null and void; otherwise it shall remain in full force and effect:

PROVIDED FURTHER, that if the said Contractor fails to duly pay for any labor, materials, team hire, sustenance, provisions, provender, gasoline, lubricating oils, fuel oils, grease, coal, or any other supplies or materials used or consumed by said Contractor or its subcontractors in performance of the work contracted to be done, or fails to pay any person who supplies rental machinery, tools or equipment, all amounts due as the result of the use of such machinery, tools or equipment in the prosecution of the work, the Surety will pay the same in any amount not exceeding the amount of this obligation, together with interest as provided by law;

PROVIDED FURTHER, that the said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract, or to contracts with others in connection with this project, or the work to be performed thereunder, or the Technical Specifications and Plans accompanying the same, shall in any way affect its obligation on this bond and it does hereby waive notice of any change, extension of time, alteration or addition to the terms of the Contract, or contracts, or to the work, or to the Technical Specifications and Plans.

	Concrete Works of Colorado, Inc.
	Contractor Contractor
Attest:	
Right Alt.	Ву:
Socratory Dea A. L. ELETANES CONTRACTS	MGR. Hartford Fire Insurance Company
Secretary REA ANN FLETCHER, CONTRACTS	Surety Surety
Works of Co.	Surety
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11 18	Attorney-In-Fact Darlene Krings
==	
- 6	
(Accompany this bond with Attorney-in-Fact's authority	ority from the Surety to execute bond, certified to include the
date of the bond).	
APPROVED AS TO FORM:	APPROVED FOR THE CITY AND COUNTY OF
Attorney for the City and County of Denver	DENVER
the state of the s	
	(X Out)
	By
Ву:	
Ву:	MAYOR
By:	MAYOR
Ву:	By: M. Coruno

VICE PRESIDENT

POWER OF ATTORNEY

Direct Inquiries/Claims to: THE HARTFORD **BOND, T-12** One Hartford Plaza

Hartford, Connecticut 06155 Bond.Claims@thehartford.com call: 888-266-3488 or fax: 860-757-5835

KNOW ALL PERSONS BY THESE PRESENTS THAT:

Agency Name: FLOOD & PETERSON INSURANCE INC

Agency Code: 34-340869

X	Hartford Fire Insurance Company, a corporation duly organized under the laws of the State of Connecticut
X	Hartford Casualty Insurance Company, a corporation duly organized under the laws of the State of Indiana
Х	Hartford Accident and Indemnity Company, a corporation duly organized under the laws of the State of Connecticut
	Hartford Underwriters Insurance Company, a corporation duly organized under the laws of the State of Connecticut
	Twin City Fire Insurance Company, a corporation duly organized under the laws of the State of Indiana
	Hartford Insurance Company of Illinois, a corporation duly organized under the laws of the State of Illinois
	Hartford Insurance Company of the Midwest, a corporation duly organized under the laws of the State of Indiana
	Hartford Insurance Company of the Southeast, a corporation duly organized under the laws of the State of Florida

having their home office in Hartford, Connecticut, (hereinafter collectively referred to as the "Companies") do hereby make, constitute and appoint, up to the amount of Unlimited :

Katherine E. Dill, K'Anne E. Vogel, Loree Vanderhye, Melanie Lathouwers, Russell D. Lear, Chris Richmond, Russell Michels, Darlene Krings, Diane Clementson, Kelly T. Urwiller, Jennifer Winter, Wesley J. Butorac, Steven J. Blohm of GREELEY, Colorado

their true and lawful Attorney(s)-in-Fact, each in their separate capacity if more than one is named above, to sign its name as surety(ies) only as delineated above by Q, and to execute, seal and acknowledge any and all bonds, undertakings, contracts and other written instruments in the nature thereof, on behalf of the Companies in their business of guaranteeing the fidelity of persons, guaranteeing the performance of contracts and executing or guaranteeing bonds and undertakings required or permitted in any actions or proceedings allowed by law.

In Witness Whereof, and as authorized by a Resolution of the Board of Directors of the Companies on May 6, 2015 the Companies have caused these presents to be signed by its Senior Vice President and its corporate seals to be hereto affixed, duly attested by its Assistant Secretary. Further, pursuant to Resolution of the Board of Directors of the Companies, the Companies hereby unambiguously affirm that they are and will be bound by any mechanically applied signatures applied to this Power of Attorney.



John Gray, Assistant Secretary

M. Ross Fisher, Senior Vice President

STATE OF CONNECTICUT

COUNTY OF HARTFORD

Hartford

On this 11th day of January, 2016, before me personally came M. Ross Fisher, to me known, who being by me duly sworn, did depose and say: that he resides in the County of Hartford, State of Connecticut; that he is the Senior Vice President of the Companies, the corporations described in and which executed the above instrument; that he knows the seals of the said corporations; that the seals affixed to the said instrument are such corporate seals; that they were so affixed by authority of the Boards of Directors of said corporations and that he signed his name thereto by like authority.

lora M. Stranko Notary Public My Commission Expires March 31, 2018

I, the undersigned, Assistant Vice President of the Companies, DO HEREBY CERTIFY that the above and foregoing is a true and correct copy of the Power of Attorney executed by said Companies, which is still in full force effective as of Signed and sealed at the City of Hartford















Kevin Heckman, Assistant Vice President



PERFORMANCE AND PAYMENT BOND SURETY AUTHORIZATION (SAMPLE)

FAX NUMBER:

720-913-3183

TELEPHONE NUMBER:

720-913-3267

Assistant City Attorney

201 W. Colfax Avenue, Dept. 1207

Denver, Colorado 80202

RE:

(Company name)

Concrete Works of Colorado, Inc.

Contract No:

201631819

Project Name:

33rd Street Outfall (31st and 36th Street Outfall Project) Segment - Blake

St. to Arapahoe St.

Contract Amount:

\$6,556,720.00

Performance and Payment Bond No.: 34BCSHN9956

Dear Assistant City Attorney,

The Performance and Payment Bonds covering the above captioned project were executed by this agency, through Hartford Fire Insurance Company insurance company, on March 7, 2017

We hereby authorize the City and County of Denver, Department of Public Works, to date all bonds and powers of attorney to coincide with the date of the contract.

If you should have any additional questions or concerns, please don't hesitate to give me a call at (970) 266-7102

Thank you.

Sincerely.

Attorney-in-Fact

Denver Public Works/Office of the Executive Director 201 West Colfax Avenue, Dept 608 | Denver, CO 80202 www.denvergov.org/dpw p. 720.865.8630 | f. 720.865.8795

311 | POCKETGOV.COM | DENVERGOV.ORG | DENVER 8 TV



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY) 3/6/2017

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

ocitinoate notaei in nea or a	aon chaorschicht(s).		
PRODUCER		CONTACT Mary Cole, CIC	
Flood and Peterson		PHONE (A/C, No, Ext): (720)977-6004 FAX (A/C, No): (720)	977-7113
PO Box 578		E-MAIL ADDRESS: MCole@floodpeterson.com	
		INSURER(S) AFFORDING COVERAGE	NAIC #
Greeley	CO 80632	INSURER A: Travelers Insurance Co	85363
INSURED		INSURER B :Pinnacol Assurance	41190
Concrete Works Of Colorado, Inc.		INSURER C: Catlin Specialty Insurance Co	10092
1260 Rock Creek Cir	cle	INSURER D Hanover Insurance Group	58505
		INSURER E:	
Lafayette	CO 80026	INSURER F:	

COVERAGES CERTIFICATE NUMBER:CL15102906806

REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR		POLICY EFF (MM/DD/YYYY)	POLICY EXP	LIMIT	s	
	GENERAL LIABILITY	INOIN	WVD		(,	(,	EACH OCCURRENCE	\$	1,000,000
	X COMMERCIAL GENERAL LIABILITY						DAMAGE TO RENTED PREMISES (Ea occurrence)	\$	300,000
A	CLAIMS-MADE X OCCUR			DTC0325D5832PHX16	11/1/2016	11/1/2017	MED EXP (Any one person)	\$	5,000
	X PD Ded: \$5,000						PERSONAL & ADV INJURY	\$	1,000,000
							GENERAL AGGREGATE	\$	2,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						PRODUCTS - COMP/OP AGG	\$	2,000,000
	POLICY X PRO- JECT LOC							\$	
	AUTOMOBILE LIABILITY						COMBINED SINGLE LIMIT (Ea accident)	\$	1,000,000
A	X ANY AUTO						BODILY INJURY (Per person)	\$	
	ALL OWNED SCHEDULED AUTOS			DT810325D5832COF16	11/1/2016	11/1/2017	,	\$	
	X HIRED AUTOS X NON-OWNED AUTOS						PROPERTY DAMAGE (Per accident)	\$	
								\$	
	X UMBRELLA LIAB X OCCUR						EACH OCCURRENCE	\$	10,000,000
A	EXCESS LIAB CLAIMS-MADE						AGGREGATE	\$	10,000,000
	DED X RETENTION\$ 10,000			DTSMCUP325D5832TIL16	11/1/2016	11/1/2017		\$	
В	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY						X WC STATU- TORY LIMITS OTH- ER		
	ANY PROPRIETOR/PARTNER/EXECUTIVE	N/A					E.L. EACH ACCIDENT	\$	500,000
	(Mandatory in NH)			4062790	11/1/2016	11/1/2017	E.L. DISEASE - EA EMPLOYEE	\$	500,000
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - POLICY LIMIT	\$	500,000
C	Professional/ Pollution			SUABA31231511	11/1/2016	11/1/2017	\$1,000,000 / \$5,000 Ded		
D	Installation Floater			RH4A76952300	11/1/2016	11/1/2017	\$1,500,000 / Ded: \$1,000		

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

Re: Contract No. 201631819, 33rd Street Outfall (31st and 36th Street Outfall Project) Segment - Blake St. to Arapahoe St.

The City and County of Denver, its elected and appointed officials, employees and volunteers are named as Additional Insured as required by written contract but only as respects to liability arising out of work performed by the named insured. The coverage is primary and non-contributory to any other valid and/or collectible insurance to the fullest extent the law allows per policy terms and conditions. Waiver of subrogation applies.

CANCELL ATION

CERTIFICATE HOLDER	CANCELLATION
City and County of Denver Department of Public Works	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.
201 W. Colfax Ave	AUTHORIZED REPRESENTATIVE
Denver, CO 80202	
	W Morgan, CLCS, CISR/ Whitney Morgan

CERTIFICATE HOLDER



PERFORMANCE AND PAYMENT BOND SURETY AUTHORIZATION (SAMPLE)

FAX NUMBER:	720-913-3183
TELEPHONE NUMBER:	720-913-3267
Assistant City Attorney 201 W. Colfax Avenue, Dept. 120' Denver, Colorado 80202	7
RE: (Company name)	
Contract No: Project Name:	201631819 33rd Street Outfall (31st and 36th Street Outfall Project) Segment - Blake St. to Arapahoe St.
Contract Amount: Performance and Paymen	•
Dear Assistant City Attorney,	
The Performance and Payment Bo	ands covering the above captioned project were executed by this agency, through insurance
company, on	
We hereby authorize the City and attorney to coincide with the date of	County of Denver, Department of Public Works, to date all bonds and powers of of the contract.
If you should have any additional o	questions or concerns, please don't hesitate to give me a call at
Thank you.	
Sincerely,	

Denver Public Works/Office of the Executive Director 201 West Colfax Avenue, Dept 608 | Denver, CO 80202 www.denvergov.org/dpw p. 720.865.8630 | f. 720.865.8795

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December 2, 2016



Gentlemen:

NOTICE OF APPARENT LOW BIDDER (SAMPLE)

Date			
To:			

The MANAGER OF PUBLIC WORKS has considered the Bids submitted on _for work to be done and materials to be furnished in and for:

CONTRACT No. 201631819 33rd Street Outfall (31st and 36th Street Outfall Project) Segment - Blake St. to Arapahoe St.

as set forth in detail in the Contract Documents for the City and County of Denver, Colorado. It appears that your Bid is fair, equitable, and to the best interest of the City and County; therefore, said Bid is hereby accepted at the bid price contained herein, subject to execution of the Contract Documents and your furnishing the items specified below, the total cost thereof (Contract Amount Written), (Contract Amount Numeric).

It will be necessary for you to appear forthwith at the office of the Department of Public Works, Finance and Administration, 201 W. Colfax Ave., Dept. 506, Denver, Colorado 80202, to receive the said Contract Documents, execute the same and return them to the Department of Public Works, Engineering Division, Project Management Office within the time limit set forth in the Bid Proposal.

In accordance with the requirements set forth in the Contract Documents, you are required to furnish the following documents:

- a. One original plus four copies of the Power of Attorney relative to Performance and/or Payment Bond; and,
- b. One copy of listing of subcontractors showing items of work each sub-contractor will perform and the percent of total work.
- c. Accurate ACORD Certificate of Insurance

All construction Contracts made and entered into by the City and County of Denver are subject to Affirmative Action and Equal Opportunity Rules and Regulations, as adopted by the Manager of Public Works, and each contract requiring payment by the City of one-half million dollars (\$500,000.00) or more shall first be approved by the City Council acting by ordinance and in accordance with Section 3.2.6 of the Charter of the City and County of Denver.

Prior to issuance of Notice to Proceed, all Equal Opportunity requirements must be completed. Additional information may be obtained by contacting the Director of Contract Compliance at (720-913-1700).

NOTICE OF APPARENT LOW BIDDER

(SAMPLE)

CONTRACT	NO.	201631819
Page 2		

The Bid Security submitted with your Bid, will be returned upon execution of the Contract and furnishing of the
Performance Bond. In the event you should fail to execute the Contract and to furnish the performance Bond within
the time limit specified, said Bid Security will be retained by the City and County of Denver as liquidated damages,
and not as a penalty for the delay and extra work caused thereby.

Dated at Denver, Colorado this day of _	20
	CITY AND COUNTY OF DENVER
	ByManager of Public Works

Denver Public Works/Office of the Executive Director 201 West Colfax Avenue, Dept 608 | Denver, CO 80202 www.denvergov.org/dpw p. 720.865.8630 | f. 720.865.8795

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Current Date

(SAMPLE)

Name Company Street City/State/Zip

CITY OF DENVER CONTRACT NO. 201631819, 33rd Street Outfall (31st and 36th Street Outfall Project) Segment - Blake St. to Arapahoe St.

NOTICE TO PROCEED

In accordance with General Contract Condition 302 of the Standard Specifications for Construction, General Contract Conditions, 2011 Edition, you are hereby authorized and directed to proceed on <u>201631819 33rd Street Outfall (31st and 36th Street Outfall Project) Segment - Blake St. to Arapahoe St.</u> with the work of constructing contract number, as set forth in detail in the contract documents for the City and County of Denver.

With a contract time of 365 (Three Hundred Sixty Five Days) calendar days, the project must be complete on or before .

If you have not already done so, you must submit your construction schedule, in accordance with General Contract Condition 306.2.B, to the Project Manager within 10 days. Additionally, you must submit your tax exempt certificate, and copies of your subcontractors' certificates, in accordance with General Contract Condition 323.5, to the Project Manager as soon as possible. Failure to submit these certificates will delay processing of payment applications.

Very truly yours,

Lesley B. Thomas City Engineer

By:

Denver Public Works/Office of the Executive Director 201 West Colfax Avenue, Dept 608 | Denver, CO 80202 www.denvergov.org/dpw p. 720.865.8630 | f. 720.865.8795

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DEPARTMENT OF PUBLIC WORKS ENGINEERING DIVISION

FINAL/PARTIAL RELEASE AND CERTIFICATE OF PAYMENT (SUBCONTRACTOR/SUPPLIER)

(502		Date:	, 20
(CITY PROJECT NAME AT	ND NUMBER)	<u> </u>	, · · ·
		Subcontract #:	
(NAME OF CONTRA	ACTOR)	0.1 (37.1	Φ
		Subcontract Value:	\$ ent: \$
(NAME OF SUBCONTRACT	OR/SUPPLIER)		ent. \$
Check Applicable Box:	Old Self Lillity	Total Paid to Date:	\$
DBE		Date of Last Work:	
The Undersigned hereby certifies that all co undersigned for any work, labor or services above referenced Project or used in connecti duly paid in full.	performed and for any	materials, supplies or equi	pment provided on the
The Undersigned further certifies that each of to be incurred, on their behalf, costs, charge above referenced Project have been duly pair	es or expenses in conne		
In consideration of \$ representing of the Total Paid to Date, also referenced about the undersigned this day of City and County of Denver (the "City"), the above referenced Contractor from all claim unknown, of every nature arising out of or in	ove, and other good and , 20, the above referenced City is, liens, rights, liabilitie	valuable consideration red Undersigned hereby releat Project, the City's premise es, demands and obligation	ceived and accepted by uses and discharges the as and property and the ons, whether known or
As additional consideration for the payments harmless the City, its officers, employees, a all costs, losses, damages, causes of action connection with any claim or claims agai performance of the Work Effort and whi subcontractors of any tier or any of their rep	gents and assigns and the n, judgments under the nst the City or the Co ich may be asserted b	ne above-referenced Contr subcontract and expense ontractor which arise out y the Undersigned or an	actor from and against es arising out of or in of the Undersigned's
It is acknowledged that this release is for Contractor.	the benefit of and may	be relied upon by the C	ity and the referenced
The foregoing shall not relieve the under subcontract, as the subcontract may have Undersigned's work effort including, wit indemnities.	e been amended, which	ch by their nature survi	ve completion of the
STATE OF COLORADO) s. CITY OF)			
Signed and sworn before me this day of, 20	By:	(Name of Subcontracto	
	J		
Notary Public/Commissioner of Oaths My Commission Expires	Title:		

			Office of Economic Development							
		City and County of Denver			Compliance Unit					
				^	4 - 14	201 W. Colfax Ave., Dept. 907				
		Division of Small Business Oppor				•				
DENVER"								Phone: 72	20.913.1999	
Contractor's/Consultant's Certification of Payment (CCP)						Payment (CCP)	Fax: 720.913.1803			
	·					·				
Prime Contractor or Consultant:	e Contractor or Consultant: Phone:					Project Manager:				
Pay Application #:		Pay Period:				Amount Requested: \$				
Project #:		Project Name:								
Current Completion Date:		Percent Complete:				Prepared By:				
(I) - Original Contract Amount: \$					m - Curr	ent Contract Amount: \$				
(i) - Original Contract Amount. \$		٨	В	С	D D	E	E	G	н	
	M/W/S/	^	-		%	-	Amount Paid on the		Paid %	
	DBE/	Original Contract	% Bld	Current Contract Amount	Revised	Requested Amount of this	Previous Pay	Net Paid	Achieved	
Prime/Subcontractor/Supplier Name	NON	Amount	(AII)	Including Amendments	(G/II)	Pay Application	Application #	To Date	(G/II)	
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Totals		and the fall of					fo all automateur'		te essteri	
The undersigned certifies that the information contained in this document is true, accurate and that the payments shown have been made to all subcontractors and suppliers used on this project and listed herein. Please use an additional form, if more space is necessary.										
Prepared By (Signature):				Date:						
Page of										
COMPLERM_027 rev 022311										



Instructions for Completing the Contractor/Consultant Certification of Payment Form

Office of Economic Development Division of Small Business Opportunity Compliance Unit 201 W. Colfax Ave., Dept. 907 Denver, CO 80202 Phone: 720-913-1999 Fax: 720-913-1803 dsbo@denvergov.org

Note: The attached Contractor/Consultant Certification of Payment form must be completed by the Contractor/
Subconsultant and all subcontractors/subconsultant or suppliers used on the project at any tier and submitted with each
pay application. The Contractor/Consultant is responsible for the accuracy of all information provided and is required to
have each subcontractor/subconsultant or supplier fill out the appropriate forms. Please be sure to complete all
information requested at the top of the form, including the name of the person who prepared this form.

If you reproduce this form, you must continue to list each of the originally listed firms, as well as any additional firms used during the performance period of the contract.

If you have any questions, please call the Compliance Unit of DSBO at 720.913.1999.

Instructions for Completing the Contractor/Consultant Certification of Payment Form, per Column

<u>Contractor/Subcontractor or Subconsultant/Supplier Name</u>: In the space provided, list all subcontractors/ subconsultants and suppliers used on the project. For all M/W/S/DBEs use the exact name listed in the DSBO Directory.

M/W/S/DBE/NON: For each name listed, indicate whether the entity is a certified M/W/S/DBE.

Column A: Provide the contract amount, as listed at bid time, for the Contractor/Consultant and each

subcontractor/subconsultant or supplier.

Column B: Provide the percentage portion of each listed subcontractor/subconsultant or supplier contract amount

(Column A) compared to the total original contract amount in (I).

Column C: Provide the original contract amount (Column A) for each subcontractor/subconsultant or supplier plus any

awarded alternate and/or change order amounts applicable. If an alternate/change order does not apply

to the listed firm, re-enter the original contract amount (Column A).

Column D: Provide the percent portion of each listed subcontractor/subconsultant or supplier contract amount

(Column C) compare to the current total contract amount in (II).

Column E: Provide the amount requested for work performed or materials supplied by each listed

subcontractor/subconsultant or supplier for this pay application. The sum of the items in this column

should equal the estimated amount requested for this pay application.

Column F: Provide the amount paid to each subcontractor/subconsultant or supplier on the previous pay

application. Enter the previous pay application number in the column heading. The sum of the items listed in this column should equal the warrant amount paid to the Contractor/Consultant on the previous pay application. The amounts paid to the subcontractor/subcontractor or suppliers should be the actual

amount of each check issued.

Column G: Provide the net paid to date for the Contractor/Subconsultant and each listed subcontractor/subconsultant

or supplier.

Column H: Provide the percent portion of the net paid to date (Column G) for the Contractor/Subconsultant and each

listed subcontractor/subconsultant or supplier of the current total contract amount in (II).

COMP-REF-031

Rev 032211 JG



Date

Name Company Street City/State/Zip

(SAMPLE)

RE: Certificate of Contract Release for CITY OF DENVER CONTRACT NO. 201631819, 33rd Street Outfall (31st and 36th Street Outfall Project) Segment - Blake St.. to Arapahoe St.

Certificate of Contract Release

Received this date of the City and County of Denver, as full	and final payment of the cost of the ir	nprovements
provided for in the foregoing contract,	dollars and	cents
(\$), in cash, being the remainder of the full amount said cash also covering and including full payment for the cundersigned in the construction of said improvements, and all in said City and County of Denver from any and all claims or digrowing out of said contract.	cost of all extra work and material furn acidentals thereto, and the undersigned he	ished by the reby releases
And these presents are to certify that all persons performing wo under the foregoing contract have been paid in full and this pay	•	-
Contractor's Signature	Date Signed	
If there are any questions, please contact me by telephone at (7	20) 913-XXXX. Please return this docum	nent via

Denver Public Works/Office of the Executive Director 201 West Colfax Avenue, Dept 608 | Denver, CO 80202 www.denvergov.org/dpw p. 720.865.8630 | f. 720.865.8795

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facsimile at (720) 913-1805 and mail to original to the above address.

FEDERAL REQUIREMENTS

The Contractor shall comply with and perform its obligations under this Contract in accordance with the following requirements and provisions, as applicable, and ensure that (where relevant) this Exhibit is incorporated into and appended to each contract or subcontract entered into for the work to be performed under this Contract:

1. FEDERAL REQUIREMENTS APPLICABLE TO ARCHITECTURAL AND ENGINEERING CONTRACTS AND SUBCONTRACTS

1.1 Disadvantaged Business Enterprises Requirements

In accordance with Section 3 of this Exhibit.

1.2 Incorporation of FTA Terms

The provisions of this contract include, in part, certain Standard Terms and Conditions required by the United States Department of Transportation (*DOT*), whether or not expressly set forth in the contract provisions. All contractual provisions required by DOT, as set forth in FTA Circular 4220.1F, dated November 01, 2008, as may be amended, are hereby incorporated by reference. Anything to the contrary herein notwithstanding, all FTA mandated terms shall be deemed to control in the event of a conflict with other provisions contained in the contract. The Contractor shall not perform any act, fail to perform any act, or refuse to comply with any RTD requests which would cause RTD to be in violation of the FTA terms and conditions. The incorporation of FTA terms has unlimited flow down.

1.3 Federal Changes

All applicable FTA regulations, policies, procedures and directives, as may be amended or promulgated from time to time during the term of this contract.

1.4 No Government Obligation to Third Parties

The Contractor acknowledges and agrees that, notwithstanding any concurrence by the Federal Government in or approval of the contract or the solicitation or award of the underlying contracts or subcontracts, absent the express written consent by the Federal Government, the Federal Government is not a party to this contract and subcontracts and shall not be subject to any obligations or liabilities to RTD, the City, or any other party (whether or not a party to the contract or other subcontracts) pertaining to any matter resulting from the contract.

1.5 Selection of Architects and Engineers (Brooks Act)

All applicable provisions of 40 U.S.C. § 1101, et seq. The Contractor shall use competitive proposal procedures based on the Brooks Act when contracting for architectural and engineering services as defined in 40 U.S.C. § 1101.

1.6 Debarment

(i) Federal Executive Order no. 12549 (Feb. 18, 1986), (ii) Federal Executive Order no. 12689 (Aug. 16, 1989), (iii) 31 U.S.C. § 6101 note (Section 2455, Pub. L. 103-355, 108 Stat. 3327) and (iv) 49 CFR Part 29 "Governmentwide Debarment and Suspension (Nonprocurement)".

1.7 Lobbying

31 U.S.C. § 1352 (as amended by the Lobbying Disclosure Act of 1995) and 31 U.S.C. 3801, et seq.

1.8 Program Fraud and False or Fraudulent Statements and Related Acts

The provisions of the Program Fraud Civil Remedies Act of 1986, as amended, 31 U.S.C. § 3801 *et seq.* and USDOT regulations, "Program Fraud Civil Remedies", 49 CFR Part 31.

1.9 Civil Rights

- (a) 49 U.S.C. § 5332 (Nondiscrimination in Federal Public Transportation Programs);
- (b) Title VI of the Civil Rights Act of 1964, as amended, 42 U.S.C. §§ 2000d *et seq.*, and with USDOT regulations, "Nondiscrimination in Federally-Assisted Programs of the Department of Transportation Effectuation of Title VI of the Civil Rights Act", 49 CFR Part 21;
- (c) All applicable requirements of Title IX of the Education Amendments of 1972, as amended, 20 U.S.C. §§ 1681 *et seq.*, and any Federal regulations that prohibit discrimination on the basis of sex that may be applicable;
- (d) The Age Discrimination Act of 1975, as amended, 42 U.S.C. §§ 6101 *et seq.*, and any U.S. Health and Human Services implementing regulations, "Nondiscrimination on the Basis of Age in Programs or Activities Receiving Federal Financial Assistance", 45 CFR Part 90;
- (e) The Age Discrimination in Employment Act, 29 U.S.C. §§ 621 through 634 and any U.S. Equal Employment Opportunity Commission implementing regulations, "Age Discrimination in Employment Act", 29 CFR Part 1625;
- (f) All equal employment opportunity provisions of 49 U.S.C. § 5332, with Title VII of the Civil Rights Act of 1964, as amended, 42 U.S.C. § 2000e, and Federal implementing regulations and any subsequent amendments thereto, except to the extent FTA determines otherwise in writing, and any applicable Federal equal employment opportunity directives that may be issued from time to time; and
- (g) All applicable equal employment opportunity requirements of U.S. Department of Labor regulations, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor", 41 CFR Parts 60 *et seq.*, which implement Executive Order No. 11246, "Equal Employment Opportunity", as amended by Executive Order No. 11375, "Amending Executive Order No. 11246 Relating to Equal Employment Opportunity", 42 U.S.C. § 2000e, and also with any Federal laws, regulations, and directives that may in the future affect construction undertaken as part of the project.

1.10 Fly America Requirements

49 U.S.C. § 40118 (the *Fly America Act*) and the General Services Administration's regulations at 41 CFR Part 301-10.

1.11 Access Requirements For Persons With Disabilities

- (a) 49 U.S.C. § 5301(d);
- (b) All applicable provisions of Section 504 of the Rehabilitation Act of 1973, as amended by 29 U.S.C. § 794;
- (c) The Americans with Disabilities Act of 1990, as amended, 42 U.S.C. §§ 12101 et seq.; and
- (d) The Architectural Barriers Act of 1968, as amended, 42 U.S.C. §§ 4151 et seq..

1.12 Energy Conservation Requirements

(a) All applicable mandatory energy efficiency standards and policies within applicable State energy conservation plans issued in accordance with the Energy Policy and Conservation Act, 42 U.S.C. §§ 6321 *et seq.*; and

(b) The Requirements of FTA regulations, "Requirements for Energy Assessments", 49 CFR Part 622, Subpart C.

1.13 Clean Water Requirements

All applicable standards, orders or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. § 1251 *et seq.*

The Contractor shall report all violations thereof to RTD, to FTA and to the appropriate Environmental Protection Agency Regional Office.

1.14 Clean Air Requirements

All applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. §§ 7401 et sea.

The Contractor shall report all violations to RTD, to FTA and to the appropriate Environmental Protection Agency Regional Office.

1.15 Access to Records and Reports.

- (a) For a period of three years following final payment, the Contractor shall maintain, preserve and make available to RTD, the FTA Administrator, the Comptroller General of the United States, and any of their authorized representatives, access at all reasonable times to any books, documents, papers and records of the Contractor which are directly pertinent to this work for the purposes of making audits, examinations, excerpts and transcriptions. The Contractor also agrees, pursuant to 49 CFR 633.17, to provide the FTA Administrator or his or her authorized representatives, including any project management oversight contractor, access to Contractor's records and sites pertaining to a major capital project, defined at 49 U.S.C. § 5302(a)1, which is receiving federal financial assistance through the programs described at 49 U.S.C. §§ 5307, 5309 or 5311.
- (b) The Contractor shall maintain and RTD shall have the right to examine and audit all records and other evidence sufficient to reflect properly all prices, costs or rates negotiated and invoiced in performance of this work. This right of examination shall include inspection at all reasonable times of the Contractor's offices engaged in performing the work.
- (c) If this Contract is completely or partially terminated, the Contractor shall make available the records relating to the work terminated until 3 years after any resulting final termination settlement. The Contractor shall make available records relating to appeals or to litigation or the settlement of claims arising under or relating to work until such appeals, litigation, or claims are finally resolved.

2. FEDERAL REQUIREMENTS APPLICABLE TO CONSTRUCTION CONTRACTS AND SUBCONTRACTS

2.1 Disadvantaged Business Enterprises Requirements

In accordance with Section 3 of this Exhibit.

2.2 Incorporation of FTA Terms

The provisions of this contract include, in part, certain Standard Terms and Conditions required by the United States Department of Transportation (*DOT*), whether or not expressly set forth in the contract provisions. All contractual provisions required by DOT, as set forth in FTA Circular 4220.1F, dated November 01, 2008, as may be amended, are hereby incorporated by reference. Anything to the contrary herein notwithstanding, all FTA mandated terms shall be deemed to control in the event of a conflict with other provisions contained in the contract. The Contractor shall not perform any act, fail to perform any act, or refuse to comply with any RTD requests which would cause RTD to be in violation of the FTA terms and conditions. The incorporation of FTA terms has unlimited flow down.

2.3 FTA regulations and policies

All applicable FTA regulations, policies, procedures and directives, as may be amended from time to time during the term of this contract.

2.4 No Government Obligation to Third Parties

The Contractor acknowledges and agrees that, notwithstanding any concurrence by the Federal Government in or approval of the contract or the solicitation or award of the underlying contracts or subcontracts, absent the express written consent by the Federal Government, the Federal Government is not a party to this contract and subcontracts and shall not be subject to any obligations or liabilities to RTD, the Contractor, or any other party (whether or not a party to the contracts or other contracts) pertaining to any matter resulting from the contract.

2.5 Debarment

(i) Federal Executive Order no. 12549 (Feb. 18, 1986), (ii) Federal Executive Order no. 12689 (Aug. 16, 1989), (iii) 31 U.S.C. § 6101 note (Section 2455, Pub. L. 103-355, 108 Stat. 3327) and (iv) 49 CFR Part 29 "Governmentwide Debarment and Suspension (Nonprocurement)".

2.6 Lobbying

31 U.S.C. § 1352 (as amended by the Lobbying Disclosure Act of 1995) and 31 U.S.C. 3801, et seq.

2.7 Program Fraud and False or Fraudulent Statements and Related Acts

The provisions of the Program Fraud Civil Remedies Act of 1986, as amended, 31 U.S.C. § 3801 *et seq.* and USDOT regulations, "Program Fraud Civil Remedies", 49 CFR Part 31.

2.8 Civil Rights

- (a) 49 U.S.C. § 5332 (Nondiscrimination in Federal Public Transportation Programs);
- (b) Title VI of the Civil Rights Act of 1964, as amended, 42 U.S.C. §§ 2000d *et seq.*, and with USDOT regulations, "Nondiscrimination in Federally-Assisted Programs of the Department of Transportation Effectuation of Title VI of the Civil Rights Act", 49 CFR Part 21;
- (c) All applicable requirements of Title IX of the Education Amendments of 1972, as amended, 20 U.S.C. §§ 1681 *et seq.*, and any Federal regulations that prohibit discrimination on the basis of sex that may be applicable;
- (d) The Age Discrimination Act of 1975, as amended, 42 U.S.C. §§ 6101 *et seq.*, and any U.S. Health and Human Services implementing regulations, "Nondiscrimination on the Basis of Age in Programs or Activities Receiving Federal Financial Assistance", 45 CFR Part 90;
- (e) The Age Discrimination in Employment Act, 29 U.S.C. §§ 621 through 634 and any U.S. Equal Employment Opportunity Commission implementing regulations, "Age Discrimination in Employment Act", 29 CFR Part 1625;
- (f) All equal employment opportunity provisions of 49 U.S.C. § 5332, with Title VII of the Civil Rights Act of 1964, as amended, 42 U.S.C. § 2000e, and Federal implementing regulations and any subsequent amendments thereto, except to the extent FTA determines otherwise in writing, and any applicable Federal equal employment opportunity directives that may be issued from time to time; and
- (g) All applicable equal employment opportunity requirements of U.S. Department of Labor regulations, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor", 41 CFR Parts 60 *et seq.*, which implement Executive Order No. 11246, "Equal Employment Opportunity", as amended by Executive Order No. 11375, "Amending Executive Order No. 11246 Relating to Equal Employment Opportunity", 42 U.S.C. § 2000e, and also with any Federal laws, regulations, and directives that may in the future affect construction undertaken as part of the project.

2.9 Fly America Requirements

49 U.S.C. § 40118 (the *Fly America Act*) and the General Services Administration's regulations at 41 CFR Part 301-10.

2.10 Access Requirements For Persons With Disabilities

- (a) 49 U.S.C. § 5301(d);
- (b) All applicable provisions of Section 504 of the Rehabilitation Act of 1973, as amended by 29 U.S.C. § 794;
- (c) The Americans with Disabilities Act of 1990, as amended, 42 U.S.C. §§ 12101 et seq.; and
- (d) The Architectural Barriers Act of 1968, as amended, 42 U.S.C. §§ 4151 et seq..

2.11 Energy Conservation Requirements

- (a) All applicable mandatory energy efficiency standards and policies within applicable State energy conservation plans issued in accordance with the Energy Policy and Conservation Act, 42 U.S.C. §§ 6321 *et seq.*; and
- (b) The Requirements of FTA regulations, "Requirements for Energy Assessments", 49 CFR Part 622, Subpart C.

2.12 Clean Water Requirements

All applicable standards, orders or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. § 1251 *et seq.*

The Contractor shall report all violations thereof to RTD, to FTA and to the appropriate Environmental Protection Agency Regional Office.

2.13 Clean Air Requirements

All applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. §§ 7401 et seq.

The Contractor shall report all violations to RTD, to FTA and to the appropriate Environmental Protection Agency Regional Office.

2.14 Contract Work Hours and Safety Standards Act

All applicable requirements of the Contract Work Hours and Safety Standards Act 40 U.S.C. 3702 *et seq.*, and all applicable implementing regulations.

2.15 Seismic Safety Requirements

The standards for Seismic Safety required in USDOT Seismic Safety Regulations, 49 CFR Part 41j.

2.16 Recycled Products

All requirements of Section 6002 of the Resource Conservation and Recovery Act (RCRA), as amended by 42 U.S.C. 6962, including the regulatory provisions of 40 CFR Part 247, and Executive Order 12873, as they apply to the procurement of the items designated in Subpart B of 40 CFR Part 247.

2.17 Buy America

49 U.S.C. 5323(j) and 49 CFR Part 661. The Contractor shall obtain Buy America certifications from each contractor, supplier and vendor and shall provide copies of such certifications to RTD.

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2.18 Cargo Preference Requirements

All applicable requirements of 42 U.S.C. 1241 and 46 CFR 381.

2.19 Access to Records and Reports.

- (a) For a period of three years following final payment, the Contractor shall maintain, preserve and make available to RTD, the FTA Administrator, the Comptroller General of the United States, and any of their authorized representatives, access at all reasonable times to any books, documents, papers and records of the Contractor which are directly pertinent to this work for the purposes of making audits, examinations, excerpts and transcriptions. The Contractor also agrees, pursuant to 49 CFR 633.17, to provide the FTA Administrator or his or her authorized representatives, including any project management oversight contractor, access to Contractor's records and sites pertaining to a major capital project, defined at 49 U.S.C. § 5302(a)1, which is receiving federal financial assistance through the programs described at 49 U.S.C. §§ 5307, 5309 or 5311.
- (b) The Contractor shall maintain and RTD shall have the right to examine and audit all records and other evidence sufficient to reflect properly all prices, costs or rates negotiated and invoiced in performance of this work. This right of examination shall include inspection at all reasonable times of the Contractor's offices engaged in performing the work.
- (c) If this Contract is completely or partially terminated, the Contractor shall make available the records relating to the work terminated until 3 years after any resulting final termination settlement. The Contractor shall make available records relating to appeals or to litigation or the settlement of claims arising under or relating to work until such appeals, litigation, or claims are finally resolved.

2.20 Davis-Bacon and Copeland Anti-Kickback Acts

The provisions of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 and any rulings and interpretations issued by the Secretary of the United Stated Department of Labor.

(a) Davis-Bacon -

(1) Minimum wages. (i) All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto. , regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in §5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: *Provided*, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis-Bacon poster (WH–1321) shall be posted at all times by the Contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

- (ii)(A) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:
- (I) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

- (2) The classification is utilized in the area by the construction industry; and
- (3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.
- (B) If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.
- (C) In the event the Contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.
- (D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii) (B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.
- (iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the Contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.
- (iv) If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.
- (2) Withholding. RTD shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the Contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the Contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the contract, RTD may, after written notice to the Contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.
- (3) Payrolls and basic records. (i) Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the Contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. The Contractor, if employing apprentices or trainees under approved programs, shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.
- (ii)(A) The Contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the Federal Transit Administration if the agency is a party to the contract, but if the agency is not such a Project No. 201631819

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party, the Contractor will submit the payrolls to the City, and upon request, to RTD for transmission to the Federal Transit Administration. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH–347 is available for this purpose from the Wage and Hour Division Web site at http://www.dol.gov/esa/whd/forms/wh347instr.htm or its successor site. The Contractor is responsible for the submission of copies of payrolls by all subcontractors. The Contractor and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the Federal Transit Administration if the agency is a party to the contract, but if the agency is not such a party, the Contractor will submit them to the City, as the case may be, for transmission to the Federal Transit Administration,, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the sponsoring government agency (or the applicant, sponsor, or owner).

- (B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the Contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:
- (1) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;
- (2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;
- (3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.
- (C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH–347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.
- (D) The falsification of any of the above certifications may subject the Contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.
- (iii) The Contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the (write the name of the agency) or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the Contractor or subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the Contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.
- (4) Apprentices and trainees (i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the Contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where the Contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or subcontractor's registered program shall

be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

- (ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.
- (iii) *Equal employment opportunity*. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.
- (5) *Compliance with Copeland Act requirements*. The Contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.
- (6) Subcontracts. The Contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as RTD may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The Contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.
- (7) Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of this contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.
- (8) Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.
- (9) Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the Contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.
- (10) Certification of eligibility. (i) The Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
- (ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
- (iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.
- (b) Contract Work Hours and Safety Act Provisions -

- (1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics (which terms are expanded to include watchmen and guards by 29 CFR 5.5(b)) shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.
- (2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (b)(1) of this section the Contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, the Contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (b)(1) of this section, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (b)(1) of this section.
- (3) Withholding for unpaid wages and liquidated damages. The City shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the Contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.
- (4) Subcontracts. The Contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (b)(1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The Contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (b)(1) through (4) of this section.
- (c) In addition to the clauses contained in paragraph (b), in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in §5.1, the Agency Head shall cause or require the contracting officer to insert a clause requiring that the Contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Further, the Agency Head shall cause or require the contracting officer to insert in any such contract a clause providing that the records to be maintained under this paragraph shall be made available by the Contractor or subcontractor for inspection, copying, or transcription by authorized representatives of City and the Department of Labor, and the Contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

3. DISADVANTAGED BUSINESS ENTERPRISES PROGRAMS

- **A.** The Contractor shall comply with all requirements of Title 49, Code of Federal Regulations, Part 26, Participation by Disadvantaged Business Enterprises ("DBEs") in Department of Transportation Financial Assistance Programs in the performance of the work. The goal for participation of DBEs is **10%**.
- **B.** The Contractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. RTD's commitment to the DBE goal is not intended to, and shall not be used as a justification to, discriminate against any qualified company or group of companies.
- **C.** The City shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of this DOT-assisted contract. Failure by the City to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as RTD deems appropriate in accordance with 49 CFR 26.13(b). Each subcontract for the work shall include the assurance in this paragraph in accordance with 49 CFR 26.13(b).
- **D.** The Contractor shall cooperate with RTD with regard to maximum utilization of DBEs and will use its best efforts to insure that DBEs shall have the maximum practicable opportunity to compete for subcontract Work under this contract. The Contractor shall assist RTD in verifying compliance with the DBE requirements of this contract by submitting or requiring its prime subcontractor to submit the forms included in the Bid Form and Submittal document as Attachment A. Upon completion of the work, the Contractor shall submit a summary of payments, by subcontract, made to all subcontractors to RTD's Business Opportunity and Outreach Officer.

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Prompt Payment of DBE Subcontractors

The Contractor shall ensure that:

- (i) its contractor shall pay its DBE subcontractors for satisfactory performance of their contracts, as that concept is described in 49 C.F.R. 26.29(c), no later than 30 days from receipt of each payment a duly submitted invoice for payment, regardless of whether such the Contractor has been paid for such invoice;
- (ii) approval of invoices is not unreasonably delayed and that invoices shall be either approved or rejected with written notice of deficiency or dispute to the payee subcontractor within ten days of receipt of invoice by the contractor; and
- (iii) the contractor makes prompt and full payment of any retainage kept by contractor to its DBE subcontractors within 30 days after such DBE's work has been satisfactorily completed.

E. Defaulting DBE Subcontractors/Termination of Subcontracts

- (iv)The Contractor shall not terminate a DBE subcontractor performing work related to this contract without RTD's prior written consent, which RTD is prohibited from providing unless the Contractor has shown good cause, as that term is described in 49 C.F.R. 26.53(f)(3), to terminate the DBE subcontractor.
- (v)The Contractor shall require that its subcontractors not terminate a DBE subcontractor performing work related to this contract without RTD's prior written consent, which RTD is prohibited from providing unless the Contractor has shown good cause, as that term is described in 49 C.F.R. 26.53(f)(3), to terminate the DBE subcontractor.
- (vi)The Contractor will follow the notice and opportunity for response identified in 49 C.F.R. 26.53(f)(4) and (5). The Contractor shall make good faith efforts to engage another DBE subcontractor to perform at least the same amount of work.
- **F.** RTD will follow the procedures set forth in 49 CFR. 26.53 and Appendix A to 49 CFR Part 26 in determining whether the Contractor has demonstrated good faith efforts in meeting the DBE Goals.
- **G.** The Contractor shall submit, or require that its prime subcontractor submit, at least monthly a participation report (a *DBE Participation Report*) in the form set out in Attachment A. At the completion of the work, the Contractor shall submit to RTD a summary of payments made to all DBEs.

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DEPARTMENT OF PUBLIC WORKS

Addenda

Contract No. 201631819

33RD STREET OUTFALL (31ST AND 36TH STREET OUTFALL PROJECT) SEGMENT - BLAKE ST. TO ARAPAHOE ST.

DECEMBER 2, 2016

CITY AND COUNTY OF DENVER DEPARTMENT OF PUBLIC WORKS

CONTRACT NO. 201631819 PROJECT NAME: 33RD STREET OUTFALL (31ST AND 36TH STREET OUTFALL) SEGMENT – BLAKE TO ARAPAHOE ST.

ADDENDUM NO. 1 TO CONTRACT DOCUMENTS

Bidders are hereby instructed that the drawings, specifications, and other contract documents are modified, corrected, supplemented and/or superseded for the above mentioned project as hereinafter described in the following attachments:

BID FORM AND SUBMITTAL PACKAGE - BASE BID

• Remove pages BF-6.1 through BF-6.6 November 30, 2016 and replace with BF-6.1 through BF-6.6 dated January 23, 2017 (6 pages attached)

BID FORM AND SUBMITTAL PACKAGE - ADD ALTERNATE 1

• Remove pages BF-6.1 through BF-6.5 dated November 30, 2016 and replace with BF-6.1 through BF-6.5 dated January 23, 2017 (5 pages attached)

BID DOCUMENT PACKAGE – BASE BID

• Remove pages SQ-1 through SQ-4 dated December 2, 2016 and replace with SQ-1 through SQ-3 dated January 23, 2017 (3 pages attached)

BID DOCUMENT PACKAGE – ADD ALTERNATE 1

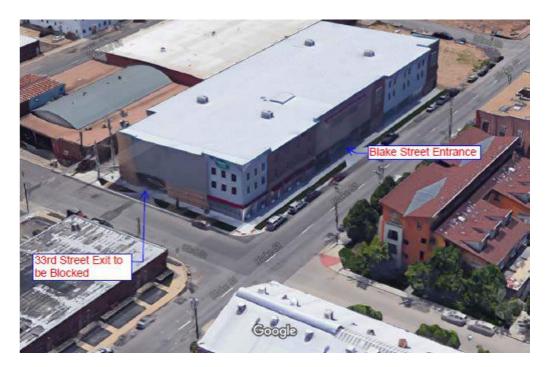
• Remove pages SQ-1 through SQ-3 dated December 2, 2016 and replace with SQ-1 through SQ-3 dated January 23, 2017 (3 pages attached)

MODIFICATIONS TO PROJECT-START-DATE DUE TO 2017 COLORADO CLASSIC BYCYCLE RACE

• The City will issue a Notice-To-Proceed (NTP) to the winning contractor on or around July 1, 2017; procurement of material can begin at that time. Actual mobilization to the project site will not be allowed until August 15, 2017, after the completion of the Colorado Classic 2017 bicycle race.

ADDITIONAL REQUIREMENTS

As part of the work, the exit door for RiNo Self Storage building as shown in the below aerial will need to be blocked.



The building is currently configured to only allow one way traffic through the loading bay area with cars, and large trucks entering from the Blake Street entrance and exiting out the 33rd Street exit door. The winning contractor will be required to coordinate a reconfiguration within the building working with the building owner to install a new access key pad that will allow for entry-and-exit only off of Blake Street. The building owner has already procured an estimate for the work and the cost will need to be paid directly to the business owner. All bidders should plan to reimburse the building owner for this work with a cost not-to-exceed \$4,000.00. All bidders should also account for all time it will take to coordinate this work with the building management. No access agreements will need to be procured as the building owner will be employing the access controls contractor directly. All costs for this item will be paid for under bid item 41-1 "Traffic Control".

QUESTIONS AND ANSWERS

- 1. In the base bid schedule, there are three bid items for the Precast RCBC. None of the bid items specifies the size of the RCBC. Also, it appears that there are only two different sizes of RCBC, not three. Will there be three bid items for the RCBC? Could you revise the bid schedule descriptions to accurately describe each item?
 - CITY RESPONSE: Sizes are specified under the bid schedule notes. There are only two different sizes (10' x 8' and 11' x 8'). A 10' x 8' RCBC has two bid items based on the depth (less or greater than 10 feet cover).
- 2. Plan Sheet STM2-2, the length of the 10'x 8' RCBC in the "Add Alternate" is shown as 440 LF. The quantity looks like is should be 340 LF. Please check and revise if necessary.

CITY RESPONSE: Correct, the Add Alternate is listed from Sta. 42+00 to 45+40 with a quantity of 340 LF, which is shown on the "Add Alternate" bid schedule.

- 3. There is no asphalt removal item in the bid. Plan Sheet DMO1-1 shows the asphalt removals required. Please add bid items to both the Base Bid and Alternate for removal of asphalt. CITY RESPONSE: Asphalt removal is incidental to new asphalt paving work that requires replacement. See the Measurement and Payment.
- 4. There are restoration items including Seeding and Mulching, Sodding, Relocate Existing Sprinkler Line, Replace Bushes and/or Shrubs. I haven't been able to find plan sheets that show this work to verify quantities. Please identify the plan sheets where this work is shown, or provide plans and details for this work.

CITY RESPONSE: The restoration items are included on the bid form for use as needed along the corridor at the discretion of the Construction Project Manager and are not specifically identified at locations on the plans.

5. Bid Item 2-17.7 Relocate Existing Utility – quantity is 9 lump sums. What are the existing utilities that are to be relocated that are included in this quantity of 9? Is this item for the coordination efforts only with the utility owner each of the relocations?

CITY RESPONSE: The existing utilities to be relocated under these items are as follows:

- a. Overhead lines at the alley between Blake and Walnut Street Century link and Comcast have agreed to coordinate with the winning contractor to lower their overhead lines to ground level. The contractor will be responsible for temporarily burying the lines so that they can be crossed as an underground utility. After the reinforced concrete box is installed the contractor will be responsible for excavating to expose the lines so that they can be re-hung on the existing poles. Xcel Energy has agreed to work with the winning contractor to coordinate the de-energizing of the overhead lines at this location. One-month advanced notice shall be given to Xcel to coordinate the work.
- b. Overhead lines at the alley between Walnut and Larimer Street identical as item a above.
- c. Overhead lines at the alley between Larimer Street and Lawrence Street identical as item a above.
- d. Add Alternate Overhead lines at the alley between Arapahoe Street and Curtis Street-Century link has agreed to coordinate with the winning contractor to lower their overhead lines to ground level. The contractor will be responsible for temporarily burying the lines so that they can be crossed as an underground utility. After the reinforced concrete box is installed the contractor will be responsible for excavating to expose the lines so that they can be re-hung on existing poles. Comcast and Xcel Energy will underground their utilities prior to the contractors work the contractor should plan to coordinate this work while on site to make sure it takes place prior to concrete box installation.
- 6. Note 8 on Sheet 4 of 61 states "The Contractor shall fill space between waterline and new sanitary or Storm Sewer with Flowfill when separation is less than 1 foot, per DWD requirements". Is this flowfill included in the quantity for "Controlled Low Strength Materials (CLSM)" or is it incidental to each case where this occurs?

CITY RESPONSE: Flowfill will be paid using this bid item for "Controlled Low Strength Materials (CLSM)" and the quantity has been approximated for the project. Due to the uncertainty of this item, there may be more or less quantity used for utility crossings.

- 7. There is no bid item for Asphalt Removal. Can you add an item for asphalt removal? **CITY RESPONSE:** See response to question No. 3.
- 8. The quantity for Asphalt Paving is more than is shown on the paving plans. Can you check this quantity and adjust accordingly?
 - CITY RESPONSE: No, the quantity will not be reduced. A buffer is included in this item to accommodate unknown asphalt conditions project wide. Once construction starts, the existing asphalt conditions adjacent to the work will be evaluated and a determination of replacement will be made.
- 9. There is 129 LF of 21" Storm Pipe Removal that is in the Alternate section of the project but there is no bid item for "Remove Existing 21" Storm Sewer Pipe in the alternate bid items. Can you add an item to the alternate for Remove existing 21" Storm Sewer Pipe?
 - CITY RESPONSE: The callouts for removal of "369 LF 18" STM Sewer" and "129 LF 21" STM Sewer" on Sheet 3 are not correct. Add Alternate 1 should not include any 21" storm sewer removal and the correct quantity should be 300 LF of 18" Storm Sewer for Add Alternate 1. The correct quantity for removal of the 18" Storm Sewer is shown on the "Add Alternate 1" bid schedule.
- 10. Removal and replacement quantities for Concrete flatwork items are much greater than the actual removals shown on the removal plan on sheet 3 of 61. Where is the rest of the concrete flatwork removal (and replacement) to match the quantity in the bid form?
 - CITY RESPONSE: The additional quantity was added to cover flat work conditions that may not be apparent at the time of bid. Once construction starts, the existing flat work conditions adjacent to the work will be evaluated and a determination of replacement will be made.
- 11. In the Contract under article 3 "Terms of Performance" it states that the work will be "fully complete" "within 365 (Three Hundred Sixty Five Days) consecutive calendar days from the effective date of the notice to proceed". Does this time frame include both the Base Bid and Alternate or does this just include the time allowed to complete the Base Bid only?
 - CITY RESPONSE: The original 365 consecutive calendar days include both the Base bid and Add Alternate to complete the work.
- 12. If the 365 days only includes the Base Bid, what additional time would be allowed if the Alternate is also awarded?
 - CITY RESPONSE: See response to question no. 11.
- 13. What will the DBE percentage goal applied to the total of the <u>Base Bid</u> or the total of the <u>Base Bid</u> and the Alternate? Please clarify.
 - CITY RESPONSE: It applies to both the Base Bid and the Add Alternate if chosen.

- 14. Is a copy of the prebid meeting agenda/questions available?

 CITY RESPONSE: Yes, the pre-bid agenda is available to all plan holders. The questions raised at the pre-bid were directed to be submitted via email to Debby Gibson, Contract Administrator.
- 15. The storm sewer is crossing gas lines, fiber optics, and electric lines in several places and also in the same alignment as the storm sewer. Is the city going to relocate the gas line prior to our work? When will this work be done? Will Xcel relocate the same time we are working and will we have to wait on them?
 - CITY RESPONSE: The City started the relocation process. Some of the gas relocations have been completed by Xcel. The contractor will be responsible for coordinating any utility relocations needed to complete the work. All contractors should review the Wastewater Capital project Management Standard Construction Specifications Section 3.0 for direction on how utility relocations should be handled. All utility relocations not specifically addressed in question 5 above shall be incidental to concrete structures, reinforced concrete box and pipe installation, and paid as such per these items measurement and payment descriptions.
- 16. What condition is the brick storm sewer in (good or crumbling)? Does it have a base constant flow and what is the flow? What is the maximum flow the city has seen in the storm sewer?
 CITY RESPONSE: The condition of the existing brick storm sewer is unknown but is believed to be described as "good" rather than "crumbling". The brick storm sewer line showed no signs of significant degradation during previous inspections and is expected to maintain its integrity for many years since the existing brick storm sewer systems will remain in use with the outfall. Care will be needed when removing a portion of this old brick pipe as to prevent damage to any of the pipe that is to remain. Base flow is unknown, but previous inspections occurred with basically no flow in the pipe. Maximum flow in the system is most likely during the spring and summer months and would correspond to surcharging of the Walnut Street system with the HGL to near the ground surface.
- 17. When is this work expected to actually start?

 CITY RESPONSE: See "MODIFICATIONS TO PROJECT-START-DATE DUE TO 2017 COLORADO CLASSIC BYCYCLE RACE" on the cover page above.
- 18. Does the city have a specific place for the temporary office facility?

 CITY RESPONSE: No specific location for the office facility has been identified.
- 19. Security fence bid item where is this intended to be used?
 CITY RESPONSE: This item is intended to be used as necessary at the discretion of the Construction Project Manager and is not specifically identified at locations on the plans.
- 20. In the base bid schedule, the descriptions of the bid items are not as clear as the descriptions provide for these same type of items in the alternate bid. It also appears that the bid quantities don't match the plans. Please revise the bid item descriptions to be more accurate and the quantities.
 - CITY RESPONSE: The descriptions for the same bid items for the base bid and the add alternate are identical. Additional note "(>10 ft cover)" is added in the Notes field for the bid item 34-6.2 in the add alternate bid schedule. The bid item descriptions cannot be revised as they are the standards in the data base. See response to the question no.10 regarding the quantities in question.

- 21. Bid Item 34-15.1 Sanitary Sewer Tap Location and Verification. There are quantities of 25 in the base bid and 5 in the alternate. What is a specific description of the work required for this item? CITY RESPONSE: See Measurement and Payment for this item.
- 22. In general, the bid items for the concrete flatwork removals and the flatwork replacement quantities from the plans don't match up reasonably close to the quantities in the bid schedule. Could these quantities be checked and revised, if necessary?
 CITY RESPONSE: See response to question no. 10. The quantities will not be adjusted for bidding purposes.
- 23. A question about item 34-15.3 on the Statement of Quantities and Statement of Quantities Add Alt 1. The unit listed is 'each'. Can 'each' be defined further? (feet, hour, etc.?) CITY RESPONSE: See the Measurement and Payment for this item.

This ADDENDUM shall be attached to, become a part of, and be returned with the Bid Proposal.

Lesley B. Thomas
City Engineer

1.25.4

Date

The undersigned bidder acknowledges receipt of this Addendum. The Proposal submitted herewith is in accordance with the stipulations set forth herein.

Contractor

ADDENDUM NO. _1_

DATE:

Bid Form

Pay Item #	Bid Item Description and Unit Price		stimated Quantity	
01-52.13	TEMPORAR OFFICE FACILITIES at the unit price of \$	1	LS \$	\$
	lump sum			
2-1.2a	REMOVE 6 CONCRETE CUR AND OR GUTTER	0.400		•
	at the unit price of \$ per linear foot	3,100	LF \$.
2-1.4	REMOVE HANDICAP CONCRETE CUR RAMP at the unit price of \$	1 175	SF S	\$
	per square foot	1,170	Ö. ,	
2-2.1	REMOVE CONCRETE SIDE AL at the unit price of \$	1,390	SF \$	\$
	per square foot			
2-2.2	REMOVE CONCRETE DRIVE A PAVING at the unit price of \$	350	SF \$	\$
	per square foot			
2-3.3	REMOVE CONCRETE ALLE PAVING at the unit price of \$	3,400	SF ;	<u> </u>
	per square foot			
2-11.1a	REMOVE E ISTING 8 SANITAR SE ER PIPE at the unit price of \$	47	LF \$	£
	per linear foot			
2-11.2b	REMOVE E ISTING 10 STORM SE ER PIPE at the unit price of \$	322	LF \$	£
	per linear foot			
2-11.2e	REMOVE E ISTING 18 STORM SE ER PIPE at the unit price of \$	701	LF \$	<u> </u>
	per linear foot			
2-11.2f	REMOVE E ISTING 21 STORM SE ER PIPE at the unit price of \$	212	LF ;	<u> </u>
	per linear foot			
2-11.2g	REMOVE E ISTING 24 STORM SE ER PIPE at the unit price of \$	466	LF ;	<u> </u>
	per linear foot			

Pay Item #	Bid Item Description and Unit Price		stimate Quantit	Estimated Cost
2-11.4k	REMOVE 48 76 HE PIPE 48" (span) x 72" (rise) brick storm sewer pipe at Walnut Street intersection at the unit price of \$	30	LF	\$
2-11.5c	per linear foot A ANDON E ISTING 12 SE ER PIPE at the unit price of \$	42	LF	\$
2-12.2	per linear foot REMOVE E ISTING STORM MANHOLE at the unit price of \$	6	EA	\$
2-13.1	each REMOVE E ISTING STORM INLET at the unit price of \$	10	EA	\$
2-17.3	each REMOVE AND REPLACE RELOCATE SIGN at the unit price of \$ each	43	EA	\$
2-17.7	RELOCATE E ISTING UTILIT Coordination of utility relocation in public ROW at the unit price of \$ lump sum	9	LS	\$
02-22.13	VI RATION ASSESSMENT at the unit price of \$ lump sum	1	LS	\$
3-2	HAULING OF CONTAMINATED MATERIALS TO DENVER ARAPAHOE DISPOSAL SITE (DADS) at the unit price of \$ per ton	38,000	TON	\$
3-7a	HEALTH & SAFET PLAN at the unit price of \$	1	LS	\$
3-7b	Iump sum MATERIAL MANAGEMENT PLAN at the unit price of \$	1	LS	\$
5-2a	SU GRADE MATERIAL (SELECT AC FILL) at the unit price of \$ per ton	10,400	TON	\$

Pay Item #	Bid Item Description and Unit Price		stimate Quantit		Estimated Cost
5-7	CONTROLLED LO STRENGTH MATERIALS (CLSM) at the unit price of \$	130	CY	\$_	
5-8	per cubic yard CRUSHED GRAVEL ASE COURSE (CDOT CLASS 6 ROAD ASE) 12" thick aggregate base course under road at the unit price of \$	4 550	TON	\$	
	per ton	4,000	1011	Ψ_	
8-1.1b	6 DIP A A C151, CLASS 50 ATER LINE Potential waterline replacement at Walnut and Arapahoe at the unit price of \$ per linear foot	40	LF	\$_	
8-1.2b	INSTALL 6 ATER VALVE Potential waterline replacement at Walnut and Arapahoe at the unit price of \$	2	EA	\$_	
12-1.1	each 6 CUR AND GUTTER 2 PAN (CD0T T2, II) at the unit price of \$	3,100	LF	\$_	
12-1.8	per linear foot HANDICAP CONCRETE CUR RAMP at the unit price of \$	1,175	SF	\$_	
12-2.1	per square foot CONCRETE SIDE AL at the unit price of \$	1,390	SF	\$_	
12-5.1	per square foot CONCRETE DRIVE A PAVING at the unit price of \$	350	SF	\$_	
12-5.5	per square foot CONCRETE ALLE PAVING Minimum 8" thick at the unit price of \$	3,400	SF	\$_	
16-1	per square foot SECURIT FENCE 6' high				
	at the unit price of \$per linear foot	1,000	LF	\$_	

Pay Item #	Bid Item Description and Unit Price	_	Estimated Quantity			
20-2ce	ASPHALT SURFACE COURSE, S , RAP 20% N=100, 64-22. at the unit price of \$	%, 15,600	SY-IN	\$		
	per square yard inch	_	.	Ψ_		
20-3ce	ASPHALT ASE COURSE, S, RAP 20%, N=1 64-22.	00,				
	at the unit price of \$	46,700	SY-IN	\$_		
	per square yard inch					
20-4	ASPHALT ROTOMILL	4 000	O)/ INI	•		
	at the unit price of \$per square yard inch	1,020	SY-IN	\$		
34-2.3d	15 DIAMETER C-76 RCP, CLASS III at the unit price of \$	116	LF	\$		
	per linear foot	=		_		
34-2.3e	18 DIAMETER C-76 RCP, CLASS III at the unit price of \$	76	LF	\$		
	per linear foot	_				
34-2.3g	24 DIAMETER C-76 RCP, CLASS III at the unit price of \$	60	LF	\$_		
	per linear foot					
34-6.2	PRECAST RC C (SPECIAL SI E AND OR DESIGN)					
	11' x 8' box culvert - precast (<10 ft cover) at the unit price of \$	267	LF	\$		
	per linear foot					
34-6.2	PRECAST RC C (SPECIAL SI E AND OR DESIGN)					
	10' x 8' box culvert - precast (<10 ft cover) at the unit price of \$	496	LF	\$_		
	per linear foot					
34-6.2	PRECAST RC C (SPECIAL SI E AND OR DESIGN)					
	10' x 8' box culvert - precast (>10 ft cover) at the unit price of \$	600	LF	\$_		
	per linear foot					

Pay Item #	Bid Item Description and Unit Price	Estimated Quantity		Estimated Cost	
34-7.1a	8 DIAMETER ASTM D-3034 SDR 35, PVC PIPE Private storm sewer connection to box around sta. 28+73 at the unit price of \$ per linear foot	10	LF	\$_	
34-12.1a	4 DIAMETER PRECAST MANHOLE ITH T PE A ASE & CONCENTRIC CONE 4' diameter manhole riser at Walnut Junction Structure at the unit price of \$ each	1	EA	\$_	
34-12.2a	5 DIAMETER PRECAST MANHOLE ITH T PE A ASE & CONCENTRIC CONE stand alone manhole at the unit price of \$ each	3	EA	\$_	
34-12.2a	5 DIAMETER PRECAST MANHOLE ITH T PE A ASE & CONCENTRIC CONE 5' diameter manhole riser above box culvert at the unit price of \$ each	5	EA	\$_	
34-12.7	CAST-IN-PLACE SPECIAL STRUCTURE Walnut Transition Structure at the unit price of \$ each	1	EA	\$_	
34-15.1a	SANITAR SE ER TAP LOCATION AND VERIFICATION at the unit price of \$ each	25	EA	\$_	
34-15.3	utilit E PLORATOR INVESTIGATION at the unit price of \$	40	EA	\$_	
34-16.1a	each 14 INLET (L=6) at the unit price of \$ each	7	EA	\$_	
34-16.3a	DOU LE 16 INLET ITH OPEN THROAT at the unit price of \$	4	EA	\$_	

Pay Item #	Bid Item Descrip	tion and Unit Price	Estimated Quantity		Price		Estimated Cost
40-1	SEEDING AND M at the unit price of \$	ULCHING	10,000	SF	\$		
		per square foot					
40-3	SODDING at the unit price of \$		10,000	SF	\$		
		per square foot	·		_		
40-4b	RELOCATE E IS at the unit price of \$	ITING SPRIN LER LINE	200	LF	\$		
		per linear foot			_		
40-10	REPLACE USHE at the unit price of \$	ES AND OR SHRU S	10	EA	\$_		
		each					
41-1	TRAFFIC CONTR at the unit price of \$	OL	1	LS	\$		
		lump sum			_		
43-1d	STORM ATER N See SCS 23.0	MANAGEMENT (SCENARIO	4)				
	at the unit price of \$		1	LS	\$_		
		lump sum					
45-2	UALIT CONTR at the unit price of \$	OL TESTING	1	LS	\$		
		lump sum					
46-2	EPO PAVEMEI at the unit price of \$	NT MAR ING	150	SF	\$_		
		per square foot					
47-1	CONSTRUCTION at the unit price of \$	SURVE ING	1	LS	\$		
		lump sum			_		
47-2	SURVE MONUM at the unit price of \$	IENTATION	15	EA	\$		
		each					
50-1	MO ILI ATION at the unit price of \$		1	LS	\$		
		lump sum			_		

Bid Form - Add Alternate #1

Pay Item #	Bid Item Description and Unit Price		stimat Quanti		Estimated Cost
01-52.13	TEMPORAR OFFICE FACILITIES at the unit price of \$	1	LS	\$_	
2-1.2a	REMOVE 6 CONCRETE CUR AND OR GUTTER	070	. –		
	at the unit price of \$per linear foot	970	LF	\$_	_
2-1.4	REMOVE HANDICAP CONCRETE CUR RAMP at the unit price of \$	450	SF	\$_	
0.0.4	per square foot				
2-2.1	at the unit price of \$	900	SF	\$_	
2-3.3	per square foot REMOVE CONCRETE ALLE PAVING				
	at the unit price of \$	770	SF	\$_	
2-11.2b	per square foot REMOVE E ISTING 10 STORM SE ER PIPE at the unit price of \$	95	LF	\$	
	per linear foot				
2-11.2e	REMOVE E ISTING 18 STORM SE ER PIPE at the unit price of \$	300	LF	\$_	
2-12.2	per linear foot REMOVE E ISTING STORM MANHOLE at the unit price of \$	1	ΕA	¢	
	each	'	LA	Φ_	
2-13.1	REMOVE E ISTING STORM INLET at the unit price of \$	3	EA	\$_	
	each				
2-17.3	REMOVE AND REPLACE RELOCATE SIGN at the unit price of \$	12	EA	\$_	
	each				
2-17.7	RELOCATE E ISTING UTILIT Coordination of utility relocation in public ROW at the unit price of \$	2	LS	\$_	
	lump sum				

Pay Item #	Bid Item Description and Unit Price		stimate Quantity	
02-22.13	VI RATION ASSESSMENT at the unit price of \$	1	LS	\$
	lump sum			
3-2	HAULING OF CONTAMINATED MATERIALS TO DENVER ARAPAHOE DISPOSAL SITE (DADS)			
	at the unit price of \$	2,500	TON	\$
	per ton			
3-7a	HEALTH & SAFET PLAN at the unit price of \$	1	LS	\$
	lump sum			
3-7b	MATERIAL MANAGEMENT PLAN at the unit price of \$	1	LS	\$
	lump sum			
5-2a	SU GRADE MATERIAL (SELECT AC FILL) at the unit price of \$	2,000	TON	\$
	per ton			
5-7	CONTROLLED LO STRENGTH MATERIALS (CLSM) at the unit price of \$	100	CY	\$
	per cubic yard			
5-8	CRUSHED GRAVEL ASE COURSE (CDOT CLASS 6 ROAD ASE) 12" thick aggregate base course under road at the unit price of \$	1,200	TON	\$
	per ton			
8-1.1b	6 DIP A A C151, CLASS 50 ATER LINE at the unit price of \$	100	LF	\$
	per linear foot			
8-1.2b	INSTALL 6 ATER VALVE at the unit price of \$	4	EA	\$
	each			
12-1.1	6 CUR AND GUTTER 2 PAN (CD0T T2, II) at the unit price of \$	970	LF	\$
	per linear foot			
12-1.8	HANDICAP CONCRETE CUR RAMP at the unit price of \$	450	SF	\$
	per square foot			

Pay Item #	Bid Item Description and Unit Price		stimate Quantit	
12-1.8	HANDICAP CONCRETE CUR RAMP Red handicap concrete curb ramp including offwhite truncated domes at NW corner Curtis and Arapahoe at the unit price of \$	90	SF	\$
	per square foot			
12-2.1	concrete side AL at the unit price of \$	900	SF	\$
	per square foot			
12-2.1	CONCRETE SIDE AL Red concrete sidewalk at NW corner Curtis and Arapahoe at the unit price of \$	230	SF	\$
	per square foot			
12-5.5	CONCRETE ALLE PAVING Minimum 8" thick at the unit price of \$	770	SF	\$
	per square foot			
16-1	SECURIT FENCE 6' high at the unit price of \$	300	LF	\$
	per linear foot	000	_,	Ψ
20-2ae	ASPHALT SURFACE COURSE, S , RAP 20%, N=50, 64-22. at the unit price of \$	4,000	SY-IN	\$
	per square yard inch	•		,
20-3icf	ASPHALT ASE COURSE, SG, RAP 20%, N=100, 76-28. at the unit price of \$	12,000	SY-IN	\$
	per square yard inch			
20-4	ASPHALT ROTOMILL at the unit price of \$	150	SY-IN	\$
	per square yard inch			
34-2.3d	15 DIAMETER C-76 RCP, CLASS III at the unit price of \$	61	LF	\$
	per linear foot			
34-2.3g	24 DIAMETER C-76 RCP, CLASS III at the unit price of \$	30	LF	\$
	per linear foot			

Pay Item #	Bid Item Description and Unit Price	Estimated Quantity		Estimated Cost	
34-6.2	PRECAST RC C (SPECIAL SI E AND OR DESIGN) 10' x 8' precast box culvert (>10ft cover) at the unit price of \$	340	LF	\$_	
	per linear foot				
34-12.2a	5 DIAMETER PRECAST MANHOLE ITH T PE A ASE & CONCENTRIC CONE stand alone manhole at the unit price of \$	1	EA	\$_	
	each				
34-12.2a	5 DIAMETER PRECAST MANHOLE ITH T PE A ASE & CONCENTRIC CONE 5' diameter manhole riser above box culvert at the unit price of \$ each	2	EA	\$_	
34-15.1a	SANITAR SE ER TAP LOCATION AND VERIFICATION at the unit price of \$	5	EA	\$_	
	each				
34-15.3	UTILIT E PLORATOR INVESTIGATION at the unit price of \$	15	EA	\$_	
	each				
34-16.1a	14 INLET (L=6) at the unit price of \$	3	EA	\$_	
	each				
40-1	SEEDING AND MULCHING at the unit price of \$	2,400	SF	\$_	
	per square foot				
40-3	SODDING at the unit price of \$	2,400	SF	\$_	
	per square foot				
40-4b	RELOCATE E ISITING SPRIN LER LINE at the unit price of \$	50	LF	\$_	
	per linear foot				
40-10	REPLACE USHES AND OR SHRU S at the unit price of \$	3	EA	\$	
	each			-	

Pay Item #	Bid Item Description and Unit Price		Estimated Quantity		Estimated Cost
41-1	TRAFFIC CONTROL				
	at the unit price of \$	1	LS	\$	
	lump sum				
43-1d	STORM ATER MANAGEMENT (SCENARIO 4) See SCS 23.0				
	at the unit price of \$	1	LS	\$	
	lump sum				
45-2	UALIT CONTROL TESTING at the unit price of \$	1	LS	\$	
	lump sum	·		Ψ_	
46-2	EPO PAVEMENT MAR ING at the unit price of \$	50	SF	\$	
	per square foot				
47-1	CONSTRUCTION SURVE ING at the unit price of \$	1	LS	\$	
	lump sum				
47-2	SURVE MONUMENTATION at the unit price of \$	2	EA	\$	
	each			_	



Department of Public Works - Engineering Division Wastewater Capital Projects Management

Statement of Quantities

33rd Street Outfall (Blake to Arapahoe)

id Item	Description	Estimated ty	Units
01-52.13	TEMPORARY OFFICE FACILITIES	1	LS
2-1.2a	REMOVE 6"CONCRETE CURB AND/OR GUTTER	3,100	LF
2-1.4	REMOVE HANDICAP CONCRETE CURB RAMP	1,175	SF
2-2.1	REMOVE CONCRETE SIDEWALK	1,390	SF
2-2.2	REMOVE CONCRETE DRIVEWAY PAVING	350	SF
2-3.3	REMOVE CONCRETE ALLEY PAVING	3,400	SF
2-11.1a	REMOVE EXISTING 8"SANITARY SEWER PIPE	47	LF
2-11.2b	REMOVE EXISTING 10"STORM SEWER PIPE	322	LF
2-11.2e	REMOVE EXISTING 18"STORM SEWER PIPE	701	LF
2-11.2f	REMOVE EXISTING 21"STORM SEWER PIPE	212	LF
2-11.2g	REMOVE EXISTING 24"STORM SEWER PIPE	466	LF
2-11.4k Add'l Info:	REMOVE 48" X 76" HE PIPE 48" (span) x 72" (rise) brick storm sewer pipe at Walnut Street intersection	30	LF
2-11.5c	ABANDON EXISTING 12"SEWER PIPE	42	LF
2-12.2	REMOVE EXISTING STORM MANHOLE	6	EA
2-13.1	REMOVE EXISTING STORM INLET	10	EA
2-17.3	REMOVE AND REPLACE/RELOCATE SIGN	43	EA
2-17.7 Add'l Info:	RELOCATE EXISTING UTILITY Coordination of utility relocation in public ROW	9	LS
02-22.13	VIBRATION ASSESSMENT	1	LS
3-2	HAULING OF CONTAMINATED MATERIALS TO DENVER/ARAPAHOE DISPOSAL SITE (DADS)	38,000	TON
3-7a	HEALTH & SAFETY PLAN	1	LS
3-7b	MATERIAL MANAGEMENT PLAN	1	LS
5-2a	SUBGRADE MATERIAL (SELECT BACKFILL)	10,400	TON
5-7	CONTROLLED LOW STRENGTH MATERIALS (CLSM)	130	CY

S -1

33rd Outfall-3



Department of Public Works - Engineering Division Wastewater Capital Projects Management

Statement of Quantities

33rd Street Outfall (Blake to Arapahoe)

id Item	Description	Estimated ty	Units
5-8 Add'l Info:	CRUSHED GRAVEL BASE COURSE (CDOT CLASS 6 ROAD BASE) 12" thick aggregate base course under road	4,550	TON
8-1.1b Add'l Info:	6"DIP AWWA C151, CLASS 50 WATER LINE Potential waterline replacement at Walnut and Arapahoe	40	LF
8-1.2b Add'l Info:	INSTALL 6"WATER VALVE Potential waterline replacement at Walnut and Arapahoe	2	EA
12-1.1	6" CURB AND GUTTER 2' PAN (CD0T T2, IIB)	3,100	LF
12-1.8	HANDICAP CONCRETE CURB RAMP	1,175	SF
12-2.1	CONCRETE SIDEWALK	1,390	SF
12-5.1	CONCRETE DRIVEWAY PAVING	350	SF
12-5.5 Add'l Info:	CONCRETE ALLEY PAVING Minimum 8" thick	3,400	SF
16-1 Add'l Info:	SECURITY FENCE 6' high	1,000	LF
20-2ce	ASPHALT SURFACE COURSE, SX, RAP 20%, N=100, 64-22.	15,600	SY-IN
20-3ce	ASPHALT BASE COURSE, S, RAP 20%, N=100, 64-22.	46,700	SY-IN
20-4	ASPHALT ROTOMILL	1,020	SY-IN
34-2.3d	15"DIAMETER C-76 RCP, CLASS III	116	LF
34-2.3e	18"DIAMETER C-76 RCP, CLASS III	76	LF
34-2.3g	24"DIAMETER C-76 RCP, CLASS III	60	LF
34-6.2 Add'l Info:	PRECAST RCBC (SPECIAL SIZE AND/OR DESIGN) 11' x 8' box culvert - precast (<10 ft cover)	267	LF
34-6.2 Add'l Info:	PRECAST RCBC (SPECIAL SIZE AND/OR DESIGN) 10' x 8' box culvert - precast (<10 ft cover)	496	LF
34-6.2 Add'l Info:	PRECAST RCBC (SPECIAL SIZE AND/OR DESIGN) 10' x 8' box culvert - precast (>10 ft cover)	600	LF
34-7.1a Add'l Info:	8"DIAMETER ASTM D-3034 SDR 35, PVC PIPE Private storm sewer connection to box around sta. 28+73	10	LF

Date Printed: Monday, Jan 23, 2017



Department of Public Works - Engineering Division Wastewater Capital Projects Management

Statement of Quantities

33rd Street Outfall (Blake to Arapahoe)

id Item	Description	Estimated ty	Units
34-12.1a Add'l Info:	4' DIAMETER PRECAST MANHOLE WITH TYPE A BASE & CONCENTRIC CONE 4' diameter manhole riser at Walnut Junction Structure	1	EA
34-12.2a Add'l Info:	5' DIAMETER PRECAST MANHOLE WITH TYPE A BASE & CONCENTRIC CONE stand alone manhole	3	EA
34-12.2a Add'l Info:	5' DIAMETER PRECAST MANHOLE WITH TYPE A BASE & CONCENTRIC CONE 5' diameter manhole riser above box culvert	5	EA
34-12.7 Add'l Info:	CAST-IN-PLACE SPECIAL STRUCTURE Walnut Transition Structure	1	EA
34-15.1a	SANITARY SEWER TAP LOCATION AND VERIFICATION	25	EA
34-15.3	UTILITY EXPLORATORY INVESTIGATION	40	EA
34-16.1a	#14 INLET (L=6')	7	EA
34-16.3a	DOUBLE #16 INLET WITH OPEN THROAT	4	EA
40-1	SEEDING AND MULCHING	10,000	SF
40-3	SODDING	10,000	SF
40-4b	RELOCATE EXISITING SPRINKLER LINE	200	LF
40-10	REPLACE BUSHES AND/OR SHRUBS	10	EA
41-1	TRAFFIC CONTROL	1	LS
43-1d	STORM WATER MANAGEMENT (SCENARIO 4) See SCS 23.0	1	LS
45-2	QUALITY CONTROL TESTING	1	LS
46-2	EPOXY PAVEMENT MARKING	150	SF
47-1	CONSTRUCTION SURVEYING	1	LS
47-2	SURVEY MONUMENTATION	15	EA
50-1	MOBILIZATION	1	LS



Department of Public Works - Engineering Division Wastewater Capital Projects Management

Statement of Quantities

33rd Street Outfall (Blake to Arapahoe) Add Alt 1

id Item	Description	Estimated ty	Units
01-52.13	TEMPORARY OFFICE FACILITIES	1	LS
2-1.2a	REMOVE 6" CONCRETE CURB AND/OR GUTTER	970	LF
2-1.4	REMOVE HANDICAP CONCRETE CURB RAMP	450	\mathbf{SF}
2-2.1	REMOVE CONCRETE SIDEWALK	900	\mathbf{SF}
2-3.3	REMOVE CONCRETE ALLEY PAVING	770	\mathbf{SF}
2-11.2b	REMOVE EXISTING 10"STORM SEWER PIPE	95	LF
2-11.2e	REMOVE EXISTING 18"STORM SEWER PIPE	300	LF
2-12.2	REMOVE EXISTING STORM MANHOLE	1	EA
2-13.1	REMOVE EXISTING STORM INLET	3	EA
2-17.3	REMOVE AND REPLACE/RELOCATE SIGN	12	EA
2-17.7 Add'l Info:	RELOCATE EXISTING UTILITY Coordination of utility relocation in public ROW	2	LS
02-22.13	VIBRATION ASSESSMENT	1	LS
3-2	HAULING OF CONTAMINATED MATERIALS TO DENVER/ARAPAHOE DISPOSAL SITE (DADS)	2,500	TON
3-7a	HEALTH & SAFETY PLAN	1	LS
3-7b	MATERIAL MANAGEMENT PLAN	1	LS
5-2a	SUBGRADE MATERIAL (SELECT BACKFILL)	2,000	TON
5-7	CONTROLLED LOW STRENGTH MATERIALS (CLSM)	100	CY
5-8 Add'l Info:	CRUSHED GRAVEL BASE COURSE (CDOT CLASS 6 ROAD BASE) 12" thick aggregate base course under road	1,200	TON
8-1.1b	6"DIP AWWA C151, CLASS 50 WATER LINE	100	LF
8-1.2b	INSTALL 6" WATER VALVE	4	EA
12-1.1	6" CURB AND GUTTER 2' PAN (CD0T T2, IIB)	970	LF
12-1.8	HANDICAP CONCRETE CURB RAMP	450	SF

Date Printed: Monday, Jan 23, 2017



Department of Public Works - Engineering Division Wastewater Capital Projects Management

Statement of Quantities

33rd Street Outfall (Blake to Arapahoe) Add Alt 1

id Item	Description	Estimated ty	Units	
12-1.8 Add'l Info:	HANDICAP CONCRETE CURB RAMP Red handicap concrete curb ramp including offwhite truncated domes at NW corner Curtis and Arapahoe	90	SF	
12-2.1	CONCRETE SIDEWALK	900	SF	
12-2.1 Add'l Info:	CONCRETE SIDEWALK Red concrete sidewalk at NW corner Curtis and Arapahoe	230	SF	
12-5.5 Add'l Info:	CONCRETE ALLEY PAVING Minimum 8" thick	770	SF	
16-1 Add'l Info:	SECURITY FENCE 6' high	300	LF	
20-2ae	ASPHALT SURFACE COURSE, SX, RAP 20%, N=50, 64-22.	4,000	SY-IN	
20-3icf	ASPHALT BASE COURSE, SG, RAP 20%, N=100, 76-28.	12,000	S Y-IN	
20-4	ASPHALT ROTOMILL	150	SY-IN	
34-2.3d	15"DIAMETER C-76 RCP, CLASS III	61	LF	
34-2.3g	24"DIAMETER C-76 RCP, CLASS III	30	LF	
34-6.2 Add'l Info:	PRECAST RCBC (SPECIAL SIZE AND/OR DESIGN) 10' x 8' precast box culvert (>10ft cover)	340	LF	
34-12.2a Add'l Info:	5' DIAMETER PRECAST MANHOLE WITH TYPE A BASE & CONCENTRIC CONE stand alone manhole	1	EA	
34-12.2a Add'l Info:	5' DIAMETER PRECAST MANHOLE WITH TYPE A BASE & CONCENTRIC CONE 5' diameter manhole riser above box culvert	2	EA	
34-15.1a	SANITARY SEWER TAP LOCATION AND VERIFICATION	5	EA	
34-15.3	UTILITY EXPLORATORY INVESTIGATION	15	EA	
34-16.1a	#14 INLET (L=6')	3	EA	
40-1	SEEDING AND MULCHING	2,400	SF	
40-3	SODDING	2,400	SF	
40-4b	RELOCATE EXISITING SPRINKLER LINE	50	LF	

Date Printed: Monday, Jan 23, 2017



Department of Public Works - Engineering Division Wastewater Capital Projects Management

Statement of Quantities

33rd Street Outfall (Blake to Arapahoe) Add Alt 1

id Item	Description	Estimated ty	Units
40-10	REPLACE BUSHES AND/OR SHRUBS	3	EA
41-1	TRAFFIC CONTROL	1	LS
43-1d	STORM WATER MANAGEMENT (SCENARIO 4) See SCS 23.0	1	LS
45-2	QUALITY CONTROL TESTING	1	LS
46-2	EPOXY PAVEMENT MARKING	50	SF
47-1	CONSTRUCTION SURVEYING	1	LS
47-2	SURVEY MONUMENTATION	2	EA

CITY AND COUNTY OF DENVER DEPARTMENT OF PUBLIC WORKS

CONTRACT NO. 201631819 PROJECT NAME: 33RD STREET OUTFALL (31ST AND 36TH STREET OUTFALL) SEGMENT – BLAKE TO ARAPAHOE ST.

ADDENDUM NO. 2 TO CONTRACT DOCUMENTS

Bidders are hereby instructed that the drawings, specifications, and other contract documents are modified, corrected, supplemented and/or superseded for the above mentioned project as hereinafter described in the following attachments:

CITY AND COUNTY OF DENVER DEPARTMENT OF PUBLIC WORKS

Contract No. 201631819
33rd Street Outfall (31st and 36th Street Outfall Project) Segment – Blake St. to Arapahoe St.

POSTPONEMENT OF ID OPENING

Notice is hereby given that Sealed Bids for Contract No. 201631819, 33rd Street Outfall (31st and 36th Street Outfall) Segment – Blake St. to Arapahoe St. are hereby postponed from February 2, 2017. Sealed bids will be received at 201 W. Colfax Ave., Denver, CO 80202 no later than:

11:00 a.m., Local Time February 14, 2017 Room 6.G.7

Prior to submitting a bid, the bidder shall consult the Contractor's bulletin board, located on the 2nd floor at 201 W. Colfax Avenue, Denver, CO 80202 and www.work4denver.com.

BID FORM AND SUBMITTAL PACKAGE – BASE BID

• Remove pages BF-6.1 through BF-6.6 January 23, 2017 and replace with BF-6.1 through BF-6.6 dated January 30, 2017 (6 pages attached)

BID FORM AND SUBMITTAL PACKAGE – ADD ALTERNATE 1

• Remove pages BF-6.1 through BF-6.5 dated January 23, 2017 and replace with BF-6.1 through BF-6.5 dated January 30, 2017 (5 pages attached)

BID DOCUMENT PACKAGE – BASE BID

• Remove pages SQ-1 through SQ-4 dated January 23, 2017 and replace with SQ-1 through SQ-3 dated January 30, 2017 (3 pages attached)

BID DOCUMENT PACKAGE – ADD ALTERNATE 1

• Remove pages SQ-1 through SQ-3 dated January 23, 2017 and replace with SQ-1 through SQ-3 dated January 30, 2017 (3 pages attached)

ADDITIONAL REQUIREMENTS

The 10K race is planned on the weekend of August 19 & 20, 2017. Walnut Street will be used as the main route during the race that will cross the 33rd Street. The contractor is to plan and take all necessary steps not to affect the race at the intersection of Walnut and 33rd Streets during the above dates.

QUESTIONS AND ANSWERS

- 1. Where can I find the "Measurement and Payment" for the bid items? I can't find any special provisions for the bid items or a description of the measurement and payment. For example, Bid Item 34-15.1 Sanitary Sewer Tap Location and Verification and the asphalt paving items, to which the asphalt removal is incidental.
 - CITY RESPONSE: The "Measurement and Payment" can be found in the City and County of Denver web site. Search for "Wastewater Capital Projects Management Standard Construction Specifications". Click "Full PDF Portfolio" and look for the last section of the subject standard construction specifications.
- 2. There are still a few discrepancies in the bid quantities of manholes and inlets. A) From the plans, there is one Type 14 Inlet (9') in both the Base Bid area and the Add Alternate area, but there is no bid item for this. B) From the plans, there is one run of 18" RCP in the Add Alternate area, but there is no bid item for this. This pipe run goes to the Type 14 Inlet (9') that is missing from the bid items. C) In the base bid, quantities for the 5' manholes doesn't match the plan sheets. 5' Stand Alone MH quantity, per the plans, should be 3 each (there are 2 on the bid schedule) 5' Riser MH quantity, per the plans, should be 5 each (there are 6 on the bid schedule). CITY RESPONSE: A) The Base Bid and Add Alternate #1 should each include one Type 14 Inlet (9'). B) The Add Alternate #1 should include 20 LF of 18" RCP to connect to the Type 14 Inlet (9'). C) The Base Bid should include 2-5' dia. standalone manholes (one each at Lawrence and Arapahoe) and 6-5'dia. manhole risers {Walnut (1), Larimer (1), Lawrence (2), and Arapahoe (2) for a total of 6}. The standalone manholes only occur at lateral junctions and not at connections to the RCBC. See the revised schedules for the Base Bid and the Add Alternate #1.
- 3. On the Base Bid items number 20-2ce and 20-3ce are used for the asphalt replacement item and are what we normally see. On the Add Alternate Items 20-2ae and 20-3icf are used for the asphalt replacement and are not typically used. We believe that the Add Alternate items are incorrect but need clarification for bidding.
 - CITY RESPONSE: Both Add Alternate #1 items 20-2ae and 20-3icf are removed and replaced with the correct items 20-2ce and 20-3ce in the Add Alternate #1 bid schedule.

This ADDENDUM shall be attached to, become a pa	art of, and be returned with the Bid Proposal.
	Lesley B. Thomas City Engineer
	Date
The undersigned bidder acknowledges receipt of this A accordance with the stipulations set forth herein.	ddendum. The Proposal submitted herewith is in
	Contractor
ADDENDUM NO. 2	DATE:

Bid Form

Pay Item #	Bid Item Description and Unit Price		stimated Quantity	
01-52.13	TEMPORAR OFFICE FACILITIES at the unit price of \$	1	LS \$	
	lump sum			
2-1.2a	REMOVE 6 CONCRETE CUR AND OR GUTTER			
	at the unit price of \$	3,100	LF \$	
	per linear foot			
2-1.4	REMOVE HANDICAP CONCRETE CUR RAMP at the unit price of \$	1,175	SF \$	
	per square foot		-	
2-2.1	REMOVE CONCRETE SIDE AL at the unit price of \$	1,390	SF \$	
	per square foot			
2-2.2	REMOVE CONCRETE DRIVE A PAVING at the unit price of \$	350	SF \$	
	per square foot			
2-3.3	REMOVE CONCRETE ALLE PAVING at the unit price of \$	3,400	SF \$	
	per square foot		-	
2-11.1a	REMOVE E ISTING 8 SANITAR SE ER PIPE at the unit price of \$	47	LF \$	
	per linear foot			
2-11.2b	REMOVE E ISTING 10 STORM SE ER PIPE at the unit price of \$	322	LF \$	
	per linear foot		-	
2-11.2e	REMOVE E ISTING 18 STORM SE ER PIPE at the unit price of \$	701	LF \$	
	per linear foot		-	
2-11.2f	REMOVE E ISTING 21 STORM SE ER PIPE at the unit price of \$	212	LF \$	
	per linear foot		-	
2-11.2g	REMOVE E ISTING 24 STORM SE ER PIPE at the unit price of \$	466	LF \$	
	per linear foot		r.	

33rd Outfall-3 BF-6.1 (Add.#2) Date Printed : Jan 31, 2017

Pay Item #	Bid Item Description and Unit Price		Estimated Quantity			
2-11.4k	REMOVE 48 76 HE PIPE 48" (span) x 72" (rise) brick storm sewer pipe at Walnut Street intersection at the unit price of \$	30	LF	\$		
	per linear foot					
2-11.5c	A ANDON E ISTING 12 SE ER PIPE at the unit price of \$	42	LF	\$_		
	per linear foot					
2-12.2	REMOVE E ISTING STORM MANHOLE at the unit price of \$	6	EA	\$		
	each					
2-13.1	REMOVE E ISTING STORM INLET at the unit price of \$	10	EA	\$		
	each					
2-17.3	REMOVE AND REPLACE RELOCATE SIGN at the unit price of \$	43	EA	\$_		
	each					
2-17.7	RELOCATE E ISTING UTILIT Coordination of utility relocation in public ROW at the unit price of \$	9	LS	\$		
	lump sum			·-		
02-22.13	VI RATION ASSESSMENT					
	at the unit price of \$	1	LS	\$		
	lump sum					
3-2	HAULING OF CONTAMINATED MATERIALS TO DENVER ARAPAHOE DISPOSAL SITE (DADS)	29,000	TON	¢		
	at the unit price of \$ per ton	38,000	ION	⊅		
0.70	•					
3-7a	at the unit price of \$	1	LS	\$_		
	lump sum					
3-7b	MATERIAL MANAGEMENT PLAN at the unit price of \$	1	LS	\$_		
	lump sum					
5-2a	SU GRADE MATERIAL (SELECT AC FILL) at the unit price of \$	10,400	TON	\$_		
	per ton					

33rd Outfall-3 BF-6.2 (Add. #2) Date Printed : Jan 31, 2017

5-7 CONTROLLED LO STRENGTH MATERIALS (CLSM) at the unit price of \$	mated Cost	Estima Cos		stimate Quantit		otion and Unit Price	Pay Item #
CRUSHED GRAVEL ASE COURSE (CDOT CLASS 6 ROAD ASE) 12" thick aggregate base course under road at the unit price of \$ per ton 8-1.1b 6 DIP A A C151, CLASS 50 ATER LINE Potential waterline replacement at Walnut and Arapahoe at the unit price of \$ per linear foot 8-1.2b INSTALL 6 ATER VALVE Potential waterline replacement at Walnut and Arapahoe at the unit price of \$ 2 EA \$ per linear foot 12-1.1 6 CUR AND GUTTER 2 PAN (CDOT T2, II) at the unit price of \$ 3,100 LF \$ per linear foot 12-1.8 HANDICAP CONCRETE CUR RAMP at the unit price of \$ 1,175 SF \$ per square foot 12-2.1 CONCRETE SIDE AL at the unit price of \$ 2 S per square foot 12-5.1 CONCRETE DRIVE A PAVING at the unit price of \$ 2 S per square foot 12-5.5 CONCRETE ALLE PAVING Minimum 8" thick at the unit price of \$ 3,400 SF \$ per square foot 13-1 SECURIT FENCE 6" high			\$_	CY	130	\$	5-7
CLASS 6 ROAD ASE) 12" thick aggregate base course under road at the unit price of \$ per ton 8-1.1b 6 DIP A A C151, CLASS 50 ATER LINE Potential waterline replacement at Walnut and Arapahoe at the unit price of \$ per linear foot 8-1.2b INSTALL 6 ATER VALVE Potential waterline replacement at Walnut and Arapahoe at the unit price of \$ 2 EA \$ each 12-1.1 6 CUR AND GUTTER 2 PAN (CDOT T2, II) at the unit price of \$ 3,100 LF \$ per linear foot 12-1.8 HANDICAP CONCRETE CUR RAMP at the unit price of \$ 1,175 SF \$ per square foot 12-2.1 CONCRETE SIDE AL at the unit price of \$ 1,390 SF \$ per square foot 12-5.1 CONCRETE DRIVE A PAVING at the unit price of \$ 350 SF \$ per square foot 12-5.5 CONCRETE ALLE PAVING Minimum 8" thick at the unit price of \$ 3,400 SF \$ per square foot 16-1 SECURIT FENCE 6' high						per cubic yard	
8-1.1b 6 DIP A A C151, CLASS 50 ATER LINE Potential waterline replacement at Walnut and Arapahoe at the unit price of \$ per linear foot 8-1.2b INSTALL 6 ATER VALVE Potential waterline replacement at Walnut and Arapahoe at the unit price of \$ 2 EA \$ each 12-1.1 6 CUR AND GUTTER 2 PAN (CD0T T2, II) at the unit price of \$ 3,100 LF \$ per linear foot 12-1.8 HANDICAP CONCRETE CUR RAMP at the unit price of \$ 1,175 SF \$ per square foot 12-2.1 CONCRETE SIDE AL at the unit price of \$ 1,390 SF \$ per square foot 12-5.1 CONCRETE DRIVE A PAVING at the unit price of \$ 9 per square foot 12-5.5 CONCRETE ALLE PAVING Minimum 8" thick at the unit price of \$ per square foot 16-1 SECURIT FENCE 6' high			\$	TON	4,550	ASE) e base course under road \$	5-8
Potential waterline replacement at Walnut and Arapahoe at the unit price of \$ per linear foot 8-1.2b INSTALL 6 ATER VALVE Potential waterline replacement at Walnut and Arapahoe at the unit price of \$ 2 EA \$ 12-1.1						•	0.4.45
8-1.2b INSTALL 6 ATER VALVE Potential waterline replacement at Walnut and Arapahoe at the unit price of \$ each 12-1.1 6 CUR AND GUTTER 2 PAN (CDOT T2, II) at the unit price of \$ per linear foot 12-1.8 HANDICAP CONCRETE CUR RAMP at the unit price of \$ per square foot 12-2.1 CONCRETE SIDE AL at the unit price of \$ per square foot 12-5.1 CONCRETE DRIVE A PAVING at the unit price of \$ per square foot 12-5.5 CONCRETE ALLE PAVING Minimum 8" thick at the unit price of \$ per square foot 12-5.5 SECURIT FENCE 6' high			\$	LF	40	replacement at Walnut and	8-1.10
Potential waterline replacement at Walnut and Arapahoe at the unit price of \$ 2 EA \$ 3 EA \$ 2 EA \$ 2 EA \$ 3 EA \$ 2 EA \$ 3 EA \$ 2 EA \$ 3 EA \$ EA \$ 2 EA \$ 3 EA \$ EA \$ 2 EA \$ 3 EA \$ EA \$ EA \$ EA \$ EA \$ EA \$ EA							0 1 2h
12-1.1 6 CUR AND GUTTER 2 PAN (CD0T T2, II) at the unit price of \$ per linear foot 12-1.8 HANDICAP CONCRETE CUR RAMP at the unit price of \$ per square foot 12-2.1 CONCRETE SIDE AL at the unit price of \$ per square foot 12-5.1 CONCRETE DRIVE A PAVING at the unit price of \$ per square foot 12-5.5 CONCRETE ALLE PAVING Minimum 8" thick at the unit price of \$ per square foot 12-6.1 SECURIT FENCE 6' high			\$	EA	2	replacement at Walnut and	0-1.20
at the unit price of \$ per linear foot 12-1.8 HANDICAP CONCRETE CUR RAMP at the unit price of \$ 1,175 SF \$ per square foot 12-2.1 CONCRETE SIDE AL at the unit price of \$ 1,390 SF \$ per square foot 12-5.1 CONCRETE DRIVE A PAVING at the unit price of \$ 350 SF \$ per square foot 12-5.5 CONCRETE ALLE PAVING Minimum 8" thick at the unit price of \$ 3,400 SF \$ per square foot 16-1 SECURIT FENCE 6' high						each	
12-1.8 HANDICAP CONCRETE CUR RAMP at the unit price of \$			\$_	LF	3,100	•	12-1.1
at the unit price of \$ per square foot 12-2.1 CONCRETE SIDE AL at the unit price of \$ 1,390 SF \$ per square foot 12-5.1 CONCRETE DRIVE A PAVING at the unit price of \$ 350 SF \$ per square foot 12-5.5 CONCRETE ALLE PAVING Minimum 8" thick at the unit price of \$ 3,400 SF \$ per square foot 16-1 SECURIT FENCE 6' high						per linear foot	
12-2.1 CONCRETE SIDE AL at the unit price of \$ per square foot 12-5.1 CONCRETE DRIVE A PAVING at the unit price of \$ per square foot 12-5.5 CONCRETE ALLE PAVING Minimum 8" thick at the unit price of \$ per square foot 16-1 SECURIT FENCE 6' high			\$_	SF	1,175	\$	12-1.8
at the unit price of \$ per square foot 12-5.1 CONCRETE DRIVE A PAVING at the unit price of \$ per square foot 12-5.5 CONCRETE ALLE PAVING Minimum 8" thick at the unit price of \$ per square foot 16-1 SECURIT FENCE 6' high						per square foot	
12-5.1 CONCRETE DRIVE A PAVING at the unit price of \$ per square foot 12-5.5 CONCRETE ALLE PAVING Minimum 8" thick at the unit price of \$ per square foot 16-1 SECURIT FENCE 6' high			\$_	SF	1,390		12-2.1
at the unit price of \$ per square foot 12-5.5 CONCRETE ALLE PAVING Minimum 8" thick at the unit price of \$ 3,400 SF \$ per square foot 16-1 SECURIT FENCE 6' high						per square foot	
12-5.5 CONCRETE ALLE PAVING Minimum 8" thick at the unit price of \$ 3,400 SF \$ per square foot 16-1 SECURIT FENCE 6' high			\$	SF	350		12-5.1
Minimum 8" thick at the unit price of \$ 3,400 SF \$ per square foot 16-1 SECURIT FENCE 6' high						per square foot	
per square foot 16-1 SECURIT FENCE 6' high			_	0-			12-5.5
16-1 SECURIT FENCE 6' high			\$	SF	3,400		
6' high						per square foot	
						CE	16-1
at the unit price of \$ 1,000 LF \$			\$	LF	1,000		
per linear foot						per linear foot	

33rd Outfall-3 BF-6.3 (Add. #2) Date Printed : Jan 31, 2017

Pay Item #	Bid Item Description and Unit Price	Estimated Quantity	Estimated Cost
20-2ce	ASPHALT SURFACE COURSE, S , RAP 20%, N=100, 64-22.		
	at the unit price of \$	15,600 SY-IN \$_	
	per square yard inch		
20-3ce	ASPHALT ASE COURSE, S, RAP 20%, N=100, 64-22.		
	at the unit price of \$	46,700 SY-IN \$_	
	per square yard inch		
20-4	ASPHALT ROTOMILL		
	at the unit price of \$	1,020 SY-IN \$_	
	per square yard inch		
34-2.3d	15 DIAMETER C-76 RCP, CLASS III at the unit price of \$	116 LF \$	
	per linear foot		
34-2.3e	18 DIAMETER C-76 RCP, CLASS III at the unit price of \$	76 LF \$	
	per linear foot	· -	
34-2.3g	24 DIAMETER C-76 RCP, CLASS III at the unit price of \$	60 LF \$	
	per linear foot	· -	
34-6.2	PRECAST RC C (SPECIAL SI E AND OR DESIGN)		
	11' x 8' box culvert - precast (<10 ft cover) at the unit price of \$	267 LF \$ _	
	per linear foot		
34-6.2	PRECAST RC C (SPECIAL SI E AND OR DESIGN)		
	10' x 8' box culvert - precast (<10 ft cover) at the unit price of \$	496 LF \$ _	
	per linear foot		
34-6.2	PRECAST RC C (SPECIAL SI E AND OR DESIGN)		
	10' x 8' box culvert - precast (>10 ft cover) at the unit price of \$	600 LF \$ _	
	per linear foot		

33rd Outfall-3 BF-6.4 (Add. #2) Date Printed : Jan 31, 2017

Pay Item #	Bid Item Description and Unit Price		stimated Quantity	Estimated Cost
34-7.1a	8 DIAMETER ASTM D-3034 SDR 35, PVC PIPE Private storm sewer connection to box around sta. 28+73 at the unit price of \$ per linear foot		LF \$	<u> </u>
34-12.1a	4 DIAMETER PRECAST MANHOLE ITH T PE A ASE & CONCENTRIC CONE 4' diameter manhole riser at Walnut Junction Structure at the unit price of \$ each		EA \$	<u> </u>
34-12.2a	5 DIAMETER PRECAST MANHOLE ITH T PE A ASE & CONCENTRIC CONE stand alone manhole at the unit price of \$	2	EA \$)
34-12.2a	each 5 DIAMETER PRECAST MANHOLE ITH T PE A ASE & CONCENTRIC CONE 5' diameter manhole riser above box culvert at the unit price of \$ each	6	EA \$	3
34-12.7	CAST-IN-PLACE SPECIAL STRUCTURE Walnut Transition Structure at the unit price of \$ each	1	EA \$	<u> </u>
34-15.1a	SANITAR SE ER TAP LOCATION AND VERIFICATION at the unit price of \$ each	25	EA \$	3
34-15.3	UTILIT E PLORATOR INVESTIGATION at the unit price of \$each	40	EA \$	3
34-16.1a	14 INLET (L=6) at the unit price of \$	7	EA \$	3
34-16.1b	each 14 INLET (L=9) at the unit price of \$ each	1	EA \$	3

33rd Outfall-3 BF-6.5 (Add. #2) Date Printed : Jan 31, 2017

Pay Item #	Bid Item Description and Unit Price		Estimated Quantity		Estimated Cost
34-16.3a	DOU LE 16 INLET ITH OPEN THROAT at the unit price of \$	4	EA	\$	
40-1	each SEEDING AND MULCHING at the unit price of \$	10,000			
	per square foot		OI.	Ψ_	
40-3	SODDING at the unit price of \$	10,000	SF	\$_	
	per square foot				
40-4b	RELOCATE E ISITING SPRIN LER LINE at the unit price of \$	200	LF	\$_	
	per linear foot				
40-10	REPLACE USHES AND OR SHRU S at the unit price of \$	_ 10	EA	\$_	
	each				
41-1	TRAFFIC CONTROL at the unit price of \$	1	LS	\$	
	lump sum	_			
43-1d	STORM ATER MANAGEMENT (SCENARIO See SCS 23.0	0 4)			
	at the unit price of \$	_ 1	LS	\$_	
	lump sum				
45-2	UALIT CONTROL TESTING at the unit price of \$	1	LS	\$	
	lump sum	=		Ψ_	
46-2	EPO PAVEMENT MAR ING				
	at the unit price of \$	150	SF	\$	
	per square foot				
47-1	CONSTRUCTION SURVE ING			_	
	at the unit price of \$ lump sum	_ 1	LS	\$_	
47.0	·				
47-2	SURVE MONUMENTATION at the unit price of \$	15	ΕA	\$	
	each	_		·	
50-1	MO ILI ATION				
	at the unit price of \$	_ 1	LS	\$	
	lump sum				

33rd Outfall-3 BF-6.6 (Add. #2) Date Printed : Jan 31, 2017

Bid Form - Add Alternate #1

Pay Item #	Bid Item Description and Unit Price	Estimated Quantity		Estimated Cost	
01-52.13	TEMPORAR OFFICE FACILITIES at the unit price of \$	1	LS	\$	
	lump sum				
2-1.2a	REMOVE 6 CONCRETE CUR AND OR GUTTER				
	at the unit price of \$	970	LF	\$	
	per linear foot				
2-1.4	at the unit price of \$	450	SF	\$_	
	per square foot				
2-2.1	REMOVE CONCRETE SIDE AL at the unit price of \$	900	SF	\$_	
	per square foot				
2-3.3	REMOVE CONCRETE ALLE PAVING at the unit price of \$	770	SF	\$_	
	per square foot				
2-11.2b	REMOVE E ISTING 10 STORM SE ER PIPE at the unit price of \$	95	LF	\$	
	per linear foot				
2-11.2e	REMOVE E ISTING 18 STORM SE ER PIPE at the unit price of \$	300	LF	\$_	
	per linear foot				
2-12.2	REMOVE E ISTING STORM MANHOLE at the unit price of \$	1	EA	\$_	
	each				
2-13.1	REMOVE E ISTING STORM INLET at the unit price of \$	3	EA	\$	
	each			_	
2-17.3	REMOVE AND REPLACE RELOCATE SIGN at the unit price of \$	12	EA	\$	
	each				
2-17.7	RELOCATE E ISTING UTILIT Coordination of utility relocation in public ROW at the unit price of \$	2	LS	\$	
	lump sum				

33rd Outfall- Add Alternate #1 BF-6.1 (Add. #2) Date Printed : Jan 31, 2017

Pay Item #	Bid Item Description and Unit Price	Estimated Quantity		Estimated Cost	
02-22.13	VI RATION ASSESSMENT at the unit price of \$	1	LS	\$	
	lump sum				
3-2	HAULING OF CONTAMINATED MATERIALS TO DENVER ARAPAHOE DISPOSAL SITE (DADS)				
	at the unit price of \$	2,500	TON	\$	
	per ton				
3-7a	HEALTH & SAFET PLAN at the unit price of \$	1	LS	\$_	
	lump sum				
3-7b	MATERIAL MANAGEMENT PLAN at the unit price of \$	1	LS	\$_	
	lump sum				
5-2a	SU GRADE MATERIAL (SELECT AC FILL) at the unit price of \$	2,000	TON	\$_	
	per ton				
5-7	CONTROLLED LO STRENGTH MATERIALS (CLSM) at the unit price of \$	100	CY	\$	
	per cubic yard			-	
5-8	CRUSHED GRAVEL ASE COURSE (CDOT CLASS 6 ROAD ASE) 12" thick aggregate base course under road at the unit price of \$	1 200	TON	¢	
	per ton	1,200	TON	Φ_	
8-1.1b	6 DIP A A C151, CLASS 50 ATER LINE at the unit price of \$	100	LF	\$	
	per linear foot			_	
8-1.2b	INSTALL 6 ATER VALVE at the unit price of \$	4	EA	\$_	
	each				
12-1.1	6 CUR AND GUTTER 2 PAN (CD0T T2, II) at the unit price of \$	970	LF	\$_	
	per linear foot				
12-1.8	HANDICAP CONCRETE CUR RAMP at the unit price of \$	450	SF	\$_	
	per square foot				

33rd Outfall- Add Alternate #1 BF-6.2 (Add. #2) Date Printed : Jan 31, 2017

Pay Item #	Bid Item Description and Unit Price		stimate Quantit		Estimated Cost
12-1.8	HANDICAP CONCRETE CUR RAMP Red handicap concrete curb ramp including offwhite truncated domes at NW corner Curtis and Arapahoe at the unit price of \$	90	SF	\$_	
	per square foot				
12-2.1	concrete side AL at the unit price of \$	900	SF	\$	
	per square foot				
12-2.1	CONCRETE SIDE AL Red concrete sidewalk at NW corner Curtis and Arapahoe at the unit price of \$	230	SF	\$_	
	per square foot				
12-5.5	CONCRETE ALLE PAVING Minimum 8" thick at the unit price of \$	770	SF	\$_	
	per square foot				
16-1	SECURIT FENCE 6' high at the unit price of \$	300	LF	\$	
	per linear foot	000		Ψ_	
20-2ce	ASPHALT SURFACE COURSE, S , RAP 20%, N=100, 64-22. at the unit price of \$	4 000	SY-IN	\$	
	per square yard inch	1,000	01	Ψ_	
20-3ce	ASPHALT ASE COURSE, S, RAP 20%, N=100, 64-22.				
	at the unit price of \$	12,000	SY-IN	\$	
	per square yard inch				
20-4	at the unit price of \$	150	SY-IN	\$_	
	per square yard inch				
34-2.3d	15 DIAMETER C-76 RCP, CLASS III at the unit price of \$	61	LF	\$_	
	per linear foot				
34-2.3e	18 DIAMETER C-76 RCP, CLASS III at the unit price of \$	20	LF	\$_	
	per linear foot				

33rd Outfall- Add Alternate #1 BF-6.3 (Add. #2) Date Printed : Jan 31, 2017

Pay Item #	Bid Item Description and Unit	Price	Estimated Quantity		Estimated Cost
34-2.3g	24 DIAMETER C-76 RCP, CLA at the unit price of \$) LF	\$	
	per linear foot			-	
34-6.2	PRECAST RC C (SPECIAL SIDESIGN) 10' x 8' precast box culvert (>10ft coat the unit price of \$) LF	\$	
	per linear foot				
34-12.2a	5 DIAMETER PRECAST MANH T PE A ASE & CONCENTRIC stand alone manhole at the unit price of \$	CONE	I EA	\$_	
34-12.2a	each 5 DIAMETER PRECAST MANH T PE A ASE & CONCENTRIC 5' diameter manhole riser above box at the unit price of \$ each	CONE	2 EA	\$_	
34-15.1a	SANITAR SE ER TAP LOCATION at the unit price of \$ each		5 EA	\$_	
34-15.3	utilit E PLORATOR INVEState the unit price of \$	STIGATION 15	5 EA	\$_	
34-16.1a	14 INLET (L=6) at the unit price of \$		в ЕА	\$_	
34-16.1b	each 14 INLET (L=9) at the unit price of \$ each		I EA	\$_	
40-1	SEEDING AND MULCHING at the unit price of \$) SF	\$_	
40-3	per square foot SODDING at the unit price of \$) SF	\$	
	per square foot				

33rd Outfall- Add Alternate #1 BF-6.4 (Add. #2) Date Printed : Jan 31, 2017

Pay Item #	Bid Item Description and Unit Price		stimat Quanti		Estimated Cost
40-4b	RELOCATE E ISITING SPRIN LER LINE at the unit price of \$	50	LF	\$_	
	per linear foot				
40-10	REPLACE USHES AND OR SHRU S at the unit price of \$	3	EA	\$	
	each				
41-1	TRAFFIC CONTROL at the unit price of \$	1	LS	\$	
	lump sum				
43-1d	STORM ATER MANAGEMENT (SCENARIO 4) See SCS 23.0			•	
	at the unit price of \$	1	LS	\$_	
45.0	lump sum				
45-2	ualit control testing at the unit price of \$	1	LS	\$_	
	lump sum				
46-2	EPO PAVEMENT MAR ING at the unit price of \$	50	SF	\$_	
	per square foot				
47-1	CONSTRUCTION SURVE ING at the unit price of \$	1	LS	\$	
	lump sum			-	
47-2	SURVE MONUMENTATION				
_	at the unit price of \$	2	EA	\$_	
	each				

33rd Outfall- Add Alternate #1 BF-6.5 (Add. #2) Date Printed : Jan 31, 2017



Department of Public Works - Engineering Division Wastewater Capital Projects Management

Statement of Quantities

33rd Street Outfall (Blake to Arapahoe)

id Item	Description	Estimated ty	Units
01-52.13	TEMPORARY OFFICE FACILITIES	1	LS
2-1.2a	REMOVE 6"CONCRETE CURB AND/OR GUTTER	3,100	LF
2-1.4	REMOVE HANDICAP CONCRETE CURB RAMP	1,175	SF
2-2.1	REMOVE CONCRETE SIDEWALK	1,390	SF
2-2.2	REMOVE CONCRETE DRIVEWAY PAVING	350	SF
2-3.3	REMOVE CONCRETE ALLEY PAVING	3,400	SF
2-11.1a	REMOVE EXISTING 8"SANITARY SEWER PIPE	47	LF
2-11.2b	REMOVE EXISTING 10"STORM SEWER PIPE	322	LF
2-11.2e	REMOVE EXISTING 18"STORM SEWER PIPE	701	LF
2-11.2f	REMOVE EXISTING 21"STORM SEWER PIPE	212	LF
2-11.2g	REMOVE EXISTING 24"STORM SEWER PIPE	466	LF
2-11.4k Add'l Info:	REMOVE 48" X 76" HE PIPE 48" (span) x 72" (rise) brick storm sewer pipe at Walnut Street intersection	30	LF
2-11.5c	ABANDON EXISTING 12"SEWER PIPE	42	LF
2-12.2	REMOVE EXISTING STORM MANHOLE	6	EA
2-13.1	REMOVE EXISTING STORM INLET	10	EA
2-17.3	REMOVE AND REPLACE/RELOCATE SIGN	43	EA
2-17.7 Add'l Info:	RELOCATE EXISTING UTILITY Coordination of utility relocation in public ROW	9	LS
02-22.13	VIBRATION ASSESSMENT	1	LS
3-2	HAULING OF CONTAMINATED MATERIALS TO DENVER/ARAPAHOE DISPOSAL SITE (DADS)	38,000	TON
3-7a	HEALTH & SAFETY PLAN	1	LS
3-7b	MATERIAL MANAGEMENT PLAN	1	LS
5-2a	SUBGRADE MATERIAL (SELECT BACKFILL)	10,400	TON
5-7	CONTROLLED LOW STRENGTH MATERIALS (CLSM)	130	CY



Department of Public Works - Engineering Division Wastewater Capital Projects Management

Statement of Quantities

33rd Street Outfall (Blake to Arapahoe)

id Item	Description	Estimated ty	Units
5-8 Add'l Info:	CRUSHED GRAVEL BASE COURSE (CDOT CLASS 6 ROAD BASE) 12" thick aggregate base course under road	4,550	TON
8-1.1b Add'l Info:	6"DIP AWWA C151, CLASS 50 WATER LINE Potential waterline replacement at Walnut and Arapahoe	40	LF
8-1.2b Add'l Info:	INSTALL 6"WATER VALVE Potential waterline replacement at Walnut and Arapahoe	2	EA
12-1.1	6" CURB AND GUTTER 2' PAN (CD0T T2, IIB)	3,100	LF
12-1.8	HANDICAP CONCRETE CURB RAMP	1,175	SF
12-2.1	CONCRETE SIDEWALK	1,390	SF
12-5.1	CONCRETE DRIVEWAY PAVING	350	SF
12-5.5 Add'l Info:	CONCRETE ALLEY PAVING Minimum 8" thick	3,400	SF
16-1 Add'l Info:	SECURITY FENCE 6' high	1,000	LF
20-2ce	ASPHALT SURFACE COURSE, SX, RAP 20%, N=100, 64-22.	15,600	SY-IN
20-3ce	ASPHALT BASE COURSE, S, RAP 20%, N=100, 64-22.	46,700	SY-IN
20-4	ASPHALT ROTOMILL	1,020	SY-IN
34-2.3d	15"DIAMETER C-76 RCP, CLASS III	116	LF
34-2.3e	18"DIAMETER C-76 RCP, CLASS III	76	LF
34-2.3g	24"DIAMETER C-76 RCP, CLASS III	60	LF
34-6.2 Add'l Info:	PRECAST RCBC (SPECIAL SIZE AND/OR DESIGN) 11' x 8' box culvert - precast (<10 ft cover)	267	LF
34-6.2 Add'l Info:	PRECAST RCBC (SPECIAL SIZE AND/OR DESIGN) 10' x 8' box culvert - precast (<10 ft cover)	496	LF
34-6.2 Add'l Info:	PRECAST RCBC (SPECIAL SIZE AND/OR DESIGN) 10' x 8' box culvert - precast (>10 ft cover)	600	LF
34-7.1a Add'l Info:	8"DIAMETER ASTM D-3034 SDR 35, PVC PIPE Private storm sewer connection to box around sta. 28+73	10	LF



Department of Public Works - Engineering Division Wastewater Capital Projects Management

Statement of Quantities

33rd Street Outfall (Blake to Arapahoe)

id Item	Description	Estimated ty	Units
34-12.1a Add'l Info:	4' DIAMETER PRECAST MANHOLE WITH TYPE A BASE & CONCENTRIC CONE 4' diameter manhole riser at Walnut Junction Structure	1	EA
34-12.2a Add'l Info:	5' DIAMETER PRECAST MANHOLE WITH TYPE A BASE & CONCENTRIC CONE stand alone manhole	2	EA
34-12.2a Add'l Info:	5' DIAMETER PRECAST MANHOLE WITH TYPE A BASE & CONCENTRIC CONE 5' diameter manhole riser above box culvert	6	EA
34-12.7 Add'l Info:	CAST-IN-PLACE SPECIAL STRUCTURE Walnut Transition Structure	1	EA
34-15.1a	SANITARY SEWER TAP LOCATION AND VERIFICATION	25	EA
34-15.3	UTILITY EXPLORATORY INVESTIGATION	40	EA
34-16.1a	#14 INLET (L=6')	7	EA
34-16.1b	#14 INLET (L=9')	1	EA
34-16.3a	DOUBLE #16 INLET WITH OPEN THROAT	4	EA
40-1	SEEDING AND MULCHING	10,000	\mathbf{SF}
40-3	SODDING	10,000	SF
40-4b	RELOCATE EXISITING SPRINKLER LINE	200	LF
40-10	REPLACE BUSHES AND/OR SHRUBS	10	EA
41-1	TRAFFIC CONTROL	1	LS
43-1d	STORM WATER MANAGEMENT (SCENARIO 4) See SCS 23.0	1	LS
45-2	QUALITY CONTROL TESTING	1	LS
46-2	EPOXY PAVEMENT MARKING	150	SF
47-1	CONSTRUCTION SURVEYING	1	LS
47-2	SURVEY MONUMENTATION	15	EA
50-1	MOBILIZATION	1	LS



Department of Public Works - Engineering Division Wastewater Capital Projects Management

Statement of Quantities

33rd Street Outfall (Blake to Arapahoe) Add Alt 1

id Item	Description	Estimated ty	Units
01-52.13	TEMPORARY OFFICE FACILITIES	1	LS
2-1.2a	REMOVE 6"CONCRETE CURB AND/OR GUTTER	970	LF
2-1.4	REMOVE HANDICAP CONCRETE CURB RAMP	450	\mathbf{SF}
2-2.1	REMOVE CONCRETE SIDEWALK	900	\mathbf{SF}
2-3.3	REMOVE CONCRETE ALLEY PAVING	770	SF
2-11.2b	REMOVE EXISTING 10"STORM SEWER PIPE	95	LF
2-11.2e	REMOVE EXISTING 18"STORM SEWER PIPE	300	LF
2-12.2	REMOVE EXISTING STORM MANHOLE	1	EA
2-13.1	REMOVE EXISTING STORM INLET	3	EA
2-17.3	REMOVE AND REPLACE/RELOCATE SIGN	12	EA
2-17.7 Add'l Info:	RELOCATE EXISTING UTILITY Coordination of utility relocation in public ROW	2	LS
02-22.13	VIBRATION ASSESSMENT	1	LS
3-2	HAULING OF CONTAMINATED MATERIALS TO DENVER/ARAPAHOE DISPOSAL SITE (DADS)	2,500	TON
3-7a	HEALTH & SAFETY PLAN	1	LS
3-7b	MATERIAL MANAGEMENT PLAN	1	LS
5-2a	SUBGRADE MATERIAL (SELECT BACKFILL)	2,000	TON
5-7	CONTROLLED LOW STRENGTH MATERIALS (CLSM)	100	CY
5-8 Add'l Info:	CRUSHED GRAVEL BASE COURSE (CDOT CLASS 6 ROAD BASE) 12" thick aggregate base course under road	1,200	TON
8-1.1b	6"DIP AWWA C151, CLASS 50 WATER LINE	100	LF
8-1.2b	INSTALL 6" WATER VALVE	4	EA
12-1.1	6" CURB AND GUTTER 2' PAN (CD0T T2, IIB)	970	LF
12-1.8	HANDICAP CONCRETE CURB RAMP	450	SF



Department of Public Works - Engineering Division Wastewater Capital Projects Management

Statement of Quantities

33rd Street Outfall (Blake to Arapahoe) Add Alt 1

id Item	Description	Estimated ty	Units
12-1.8 Add'l Info:	HANDICAP CONCRETE CURB RAMP Red handicap concrete curb ramp including offwhite truncated domes at NW corner Curtis and Arapahoe	90	SF
12-2.1	CONCRETE SIDEWALK	900	SF
12-2.1 Add'l Info:	CONCRETE SIDEWALK Red concrete sidewalk at NW corner Curtis and Arapahoe	230	SF
12-5.5 Add'l Info:	CONCRETE ALLEY PAVING Minimum 8" thick	770	SF
16-1 Add'l Info:	SECURITY FENCE 6' high	300	LF
20-2ce	ASPHALT SURFACE COURSE, SX, RAP 20%, N=100, 64-22.	4,000	SY-IN
20-3ce	ASPHALT BASE COURSE, S, RAP 20%, N=100, 64-22.	12,000	SY-IN
20-4	ASPHALT ROTOMILL	150	SY-IN
34-2.3d	15"DIAMETER C-76 RCP, CLASS III	61	LF
34-2.3e	18"DIAMETER C-76 RCP, CLASS III	20	LF
34-2.3g	24"DIAMETER C-76 RCP, CLASS III	30	LF
34-6.2 Add'l Info:	PRECAST RCBC (SPECIAL SIZE AND/OR DESIGN) 10' x 8' precast box culvert (>10ft cover)	340	LF
34-12.2a Add'l Info:	5' DIAMETER PRECAST MANHOLE WITH TYPE A BASE & CONCENTRIC CONE stand alone manhole	1	EA
34-12.2a Add'l Info:	5' DIAMETER PRECAST MANHOLE WITH TYPE A BASE & CONCENTRIC CONE 5' diameter manhole riser above box culvert	2	EA
34-15.1a	SANITARY SEWER TAP LOCATION AND VERIFICATION	5	EA
34-15.3	UTILITY EXPLORATORY INVESTIGATION	15	EA
34-16.1a	#14 INLET (L=6')	3	EA
34-16.1b	#14 INLET (L=9')	1	EA
40-1	SEEDING AND MULCHING	2,400	SF



Department of Public Works - Engineering Division Wastewater Capital Projects Management

Statement of Quantities

33rd Street Outfall (Blake to Arapahoe) Add Alt 1

id Item	Description	Estimated ty	Units
40-3	SODDING	2,400	SF
40-4b	RELOCATE EXISITING SPRINKLER LINE	50	LF
40-10	REPLACE BUSHES AND/OR SHRUBS	3	EA
41-1	TRAFFIC CONTROL	1	LS
43-1d	STORM WATER MANAGEMENT (SCENARIO 4) See SCS 23.0	1	LS
45-2	QUALITY CONTROL TESTING	1	LS
46-2	EPOXY PAVEMENT MARKING	50	SF
47-1	CONSTRUCTION SURVEYING	1	LS
47-2	SURVEY MONUMENTATION	2	EA

33rd Outfall-3a S -3 (Add. #2) Date Printed : Jan 31, 2017

CITY AND COUNTY OF DENVER DEPARTMENT OF PUBLIC WORKS

CONTRACT NO. 201631819

PROJECT NAME: 33RD STREET OUTFALL (31ST AND 36TH STREET OUTFALL) SEGMENT – BLAKE TO ARAPAHOE ST.

ADDENDUM NO. 3 TO CONTRACT DOCUMENTS

Bidders are hereby instructed that the drawings, specifications, and other contract documents are modified, corrected, supplemented and/or superseded for the above mentioned project as hereinafter described in the following attachments:

QUESTIONS AND ANSWERS

- It was discussed at the Pre-bid meeting that the City would waive Permit Fees for this project but
 it has not been noted in writing either on the prebid notes or in an Addendum. (This includes
 Street Occupancy/Street Closure Permits etc.) Can you clarify that the City will be waiving the
 Permit Fees for this project? (We understand that the Permits will still be applied for and
 followed, but it was discussed that the fees would be waived by the City.)
 CITY RESPONSE: All City permit fees will be waived as this is the City capital project.
- ROW Permits/Street Occupancy Fees Is the Contractor to include these fees in the bid or will these fees be waived by the City?
 CITY RESPONSE: See response to the question No.2.
- 3. For bid item 34-15.3 for base and Add Alt 1, where is the 'actual number of field locations or verifications required'? In the bid documents (statement of quantities) for item 34-15.3 Utility Exploration BF 6.5 (Add #2), listed is 40 each for base bid. The Add Alt 1 for the same item is 15 each. In the drawings, Utility 1-2 and 1-3 list 43 items: 28 base bid area, 15 in Add Alt 1 area. In the measurement and payment document listed from the city it says, 'The measurement for payment of this item will be the actual number of field locations or verifications required for construction...as required in Contract Documents, or as directed by the Construction Project Manager.'

CITY RESPONSE: As the actual number of locations or verifications for this item will be determined in the field, each quantity for Base Bid and Add Alternate #1 is estimated. All potholes completed under Bid Item 34-15.3 will be at the direction and approval of the City Project Manager.

This ADDENDUM shall be attached to, become a part of, ar	nd be returned with the Bid Proposal.
	Lesley B. Thomas City Engineer
	Date
The undersigned bidder acknowledges receipt of this Addendum accordance with the stipulations set forth herein.	. The Proposal submitted herewith is in
	Contractor
ADDENDUM NO. 3	DATE:



PREVAILING WAGE RATES Contract No. 201631819

33RD STREET OUTFALL (31ST AND 36TH STREET OUTFALL PROJECT) SEGMENT - BLAKE ST. TO ARAPAHOE ST.

DECEMBER 2, 2016

General Decision Number: CO160019 01/08/2016 CO19

Superseded General Decision Number: CO20150019

State: Colorado

Construction Type: Highway

Counties: Denver and Douglas Counties in Colorado.

HIGHWAY CONSTRUCTION PROJECTS

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.15 for calendar year 2016 applies to all contracts subject to the Davis-Bacon Act for which the solicitation was issued on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.15 (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2016. The EO minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number Publication Date Ω 01/08/2016

* CARP9901-008 05/01/2013

	Rates	Fringes
CARPENTER (Form Work Only)	\$ 25.00	5.39
ELEC0068-016 03/01/2011		

Rates Fringes TRAFFIC SIGNALIZATION: Traffic Signal Installation Zone 1.....\$ 26.42 4.75%+8.68 Zone 2.....\$ 29.42 4.75%+8.68

TRAFFIC SIGNAL INSTALLER ZONE DEFINITIONS

Zone 1 shall be a 35 mile radius, measured from the following addresses in each of the following cities:

Colorado Springs - Nevada & Bijou Denver - Ellsworth Avenue & Broadway Ft. Collins - Prospect & College Grand Junction - 12th & North Avenue

Pueblo - I-25 & Highway 50

All work outside of these areas shall be paid Zone 2 rates.

._____

ENGI0009-008 10/23/2013

Rates Fringes

POWER EQUIPMENT OPERATOR:

(2) 1 1 - 11		
(3)-Hydraulic Backhoe		
(Wheel Mounted, under 3/4		
yds), Hydraulic Backhoe		
(Backhoe/Loader		
combination), Drill Rig		
Caisson (smaller than		
Watson 2500 and similar),		
Loader (up to and	0.4 50	0.15
including 6 cu. yd.)\$	24.73	9.15
(3)-Loader (under 6 cu.		
yd.)	0.4 57.2	0.15
Denver County\$	24./3	9.15
(3)-Motor Grader (blade-		
rough)	04 72	0 15
Douglas County\$	24.73	9.15
<pre>(4)-Crane (50 tons and under), Scraper (single</pre>		
bowl, under 40 cu. yd)\$	24 88	9.15
(4)-Loader (over 6 cu. yd)	24.00	9.13
Denver County\$	24 88	9.15
(5)-Drill Rig Caisson	21.00	J. ±3
(Watson 2500 similar or		
larger), Crane (51-90		
tons), Scraper (40 cu.yd		
and over),\$	25.04	9.15
(5)-Motor Grader (blade-		
finish)		
Douglas County\$	25.04	9.15
(6)-Crane (91-140 tons)\$		9.15
SUCO2011-004 09/15/2011		
	Rates	Fringes
1		J
		Fringes 5.08
CARPENTER (Excludes Form Work)\$		J
CARPENTER (Excludes Form Work)\$ CEMENT MASON/CONCRETE FINISHER	19.27	5.08
CARPENTER (Excludes Form Work)\$ CEMENT MASON/CONCRETE FINISHER Denver\$	19.27 20.18	5.08
CARPENTER (Excludes Form Work)\$ CEMENT MASON/CONCRETE FINISHER	19.27 20.18	5.08
CARPENTER (Excludes Form Work)\$ CEMENT MASON/CONCRETE FINISHER Denver\$	19.27 20.18	5.08
CARPENTER (Excludes Form Work)\$ CEMENT MASON/CONCRETE FINISHER Denver\$ Douglas\$	19.27 20.18 18.75	5.08
CARPENTER (Excludes Form Work)\$ CEMENT MASON/CONCRETE FINISHER Denver\$ Douglas\$	19.27 20.18 18.75	5.08 5.75 3.00
CARPENTER (Excludes Form Work)\$ CEMENT MASON/CONCRETE FINISHER Denver\$ Douglas\$	19.27 20.18 18.75	5.08 5.75 3.00
CARPENTER (Excludes Form Work)\$ CEMENT MASON/CONCRETE FINISHER Denver	19.27 20.18 18.75 35.13	5.08 5.75 3.00
CARPENTER (Excludes Form Work)\$ CEMENT MASON/CONCRETE FINISHER Denver	19.27 20.18 18.75 35.13	5.08 5.75 3.00 6.83
CARPENTER (Excludes Form Work)\$ CEMENT MASON/CONCRETE FINISHER Denver	19.27 20.18 18.75 35.13	5.08 5.75 3.00 6.83
CARPENTER (Excludes Form Work)\$ CEMENT MASON/CONCRETE FINISHER Denver	19.27 20.18 18.75 35.13	5.08 5.75 3.00 6.83
CARPENTER (Excludes Form Work)\$ CEMENT MASON/CONCRETE FINISHER Denver	19.27 20.18 18.75 35.13	5.08 5.75 3.00 6.83
CARPENTER (Excludes Form Work)\$ CEMENT MASON/CONCRETE FINISHER Denver	19.27 20.18 18.75 35.13 13.02 12.89	5.08 5.75 3.00 6.83 3.20 3.20
CARPENTER (Excludes Form Work)\$ CEMENT MASON/CONCRETE FINISHER Denver	19.27 20.18 18.75 35.13 13.02 12.89	5.08 5.75 3.00 6.83
CARPENTER (Excludes Form Work)\$ CEMENT MASON/CONCRETE FINISHER Denver	19.27 20.18 18.75 35.13 13.02 12.89	5.08 5.75 3.00 6.83 3.20 3.20
CARPENTER (Excludes Form Work)\$ CEMENT MASON/CONCRETE FINISHER Denver	19.27 20.18 18.75 35.13 13.02 12.89	5.08 5.75 3.00 6.83 3.20 3.20
CARPENTER (Excludes Form Work)\$ CEMENT MASON/CONCRETE FINISHER Denver	19.27 20.18 18.75 35.13 13.02 12.89	5.08 5.75 3.00 6.83 3.20 3.20
CARPENTER (Excludes Form Work)\$ CEMENT MASON/CONCRETE FINISHER Denver	19.27 20.18 18.75 35.13 13.02 12.89	5.08 5.75 3.00 6.83 3.20 3.20 3.21
CARPENTER (Excludes Form Work)\$ CEMENT MASON/CONCRETE FINISHER Denver	19.27 20.18 18.75 35.13 13.02 12.89	5.08 5.75 3.00 6.83 3.20 3.20
CARPENTER (Excludes Form Work)\$ CEMENT MASON/CONCRETE FINISHER Denver	19.27 20.18 18.75 35.13 13.02 12.89	5.08 5.75 3.00 6.83 3.20 3.20 3.21
CARPENTER (Excludes Form Work)\$ CEMENT MASON/CONCRETE FINISHER Denver	19.27 20.18 18.75 35.13 13.02 12.89	5.08 5.75 3.00 6.83 3.20 3.20 3.21
CARPENTER (Excludes Form Work)\$ CEMENT MASON/CONCRETE FINISHER Denver	19.27 20.18 18.75 35.13 13.02 12.89	5.08 5.75 3.00 6.83 3.20 3.20 3.21
CARPENTER (Excludes Form Work)\$ CEMENT MASON/CONCRETE FINISHER Denver	19.27 20.18 18.75 35.13 13.02 12.89 12.62 13.89	5.08 5.75 3.00 6.83 3.20 3.20 3.21

LABORER		
Asphalt Raker\$		4.25
Asphalt Shoveler\$		4.25
Asphalt Spreader\$	18.58	4.65
Common or General		
Denver\$	16.76	6.77
Douglas\$	16.29	4.25
Concrete Saw (Hand Held)\$	16.29	6.14
Landscape and Irrigation\$	12.26	3.16
Mason Tender-		
Cement/Concrete		
Denver\$	16.96	4.04
Douglas\$		4.25
Pipelayer		
Denver\$	13.55	2.41
Douglas\$		2.18
Traffic Control (Flagger)\$		3.05
Traffic Control (Sets	J.33	3.03
Up/Moves Barrels, Cones,		
Install Signs, Arrow		
Boards and Place		
Stationary Flags)(Excludes		
Flaggers)\$	12 42	3.22
rlaggers)	12.43	3.44
DAINTED (Comor Only)	16.00	2.87
PAINTER (Spray Only)\$	16.99	2.0/
DOWED FOLLTOWENE ODEDATION:		
POWER EQUIPMENT OPERATOR:		
Asphalt Laydown	00.65	0 70
Denver\$		8.72
Douglas\$	23.67	8.47
Asphalt Paver	0.4 0.5	. 10
Denver\$		6.13
Douglas\$	25.44	3.50
Asphalt Roller	00.10	
Denver\$		7.55
Douglas\$		6.43
Asphalt Spreader\$	22.67	8.72
Backhoe/Trackhoe		
Douglas\$		6.00
Bobcat/Skid Loader\$		4.28
Boom\$	22.67	8.72
Broom/Sweeper		
Denver\$		8.72
Douglas\$		8.22
Bulldozer\$	26.90	5.59
Concrete Pump\$	21.60	5.21
Drill		
Denver\$	20.48	4.71
Douglas\$	20.71	2.66
Forklift\$	15.91	4.68
Grader/Blade		
Denver\$	22.67	8.72
Guardrail/Post Driver\$	16.07	4.41
Loader (Front End)		
Douglas\$	21.67	8.22
Mechanic		
Denver\$	22.89	8.72
Douglas\$		8.22
Oiler		
Denver\$	23.73	8.41

Douglas\$ Roller/Compactor (Dirt and Grade Compaction)	24.90	7.67
Denver\$		5.51
Douglas\$ Rotomill\$		4.86 4.41
Screed	10.22	4.41
Denver\$		8.38
Douglas\$		1.40
Tractor\$	13.13	2.95
TRAFFIC SIGNALIZATION:		
Groundsman	15 00	2 41
Denver\$		3.41
Douglas\$	18.67	7.17
TRUCK DRIVER		
Distributor		
Denver\$		5.82
Douglas\$	16.98	5.27
Dump Truck	15.05	- OF
Denver\$		5.27
Douglas\$		5.27
Lowboy Truck\$		5.27
Mechanic\$	26.48	3.50
Multi-Purpose Specialty & Hoisting Truck		
Denver\$	17 49	3.17
Douglas\$		2.88
Pickup and Pilot Car	20.03	2.00
Denver\$	14.24	3.77
Douglas\$		3.68
Semi/Trailer Truck\$		4.13
Truck Mounted Attenuator\$		3.22
Water Truck		
Denver\$	26.27	5.27
Douglas\$		2.58

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.



TECHNICAL SPECIFICATIONS

Contract No. 201631819

33RD STREET OUTFALL (31ST AND 36TH STREET OUTFALL PROJECT) SEGMENT - BLAKE ST. TO ARAPAHOE ST.

DECEMBER 2, 2016

33RD STREET OUTFALL

Blake St. to Arapahoe St. - Base Bid Arapahoe St. to Curtis St. - Add Alternate 1

PROJECT SPECIFICATIONS

(100% Submittal)

October 2016

Denver Contract No: CE 201101768 Wilson & Company Project No: 11-600-402-00

Prepared for:

City and County of Denver Public Works Engineering Division Wastewater Capital Projects Management 2000 West 3rd Avenue Denver, CO 80223

Prepared by:

Wilson & Company 999 18th Street Suite 2600 Denver, CO 80202



Sections

- Supplementation to Specifications
- Appendix A Geotechnical Design Report Geocal
- Appendix B Materials Management Plan Pinyon Environmental

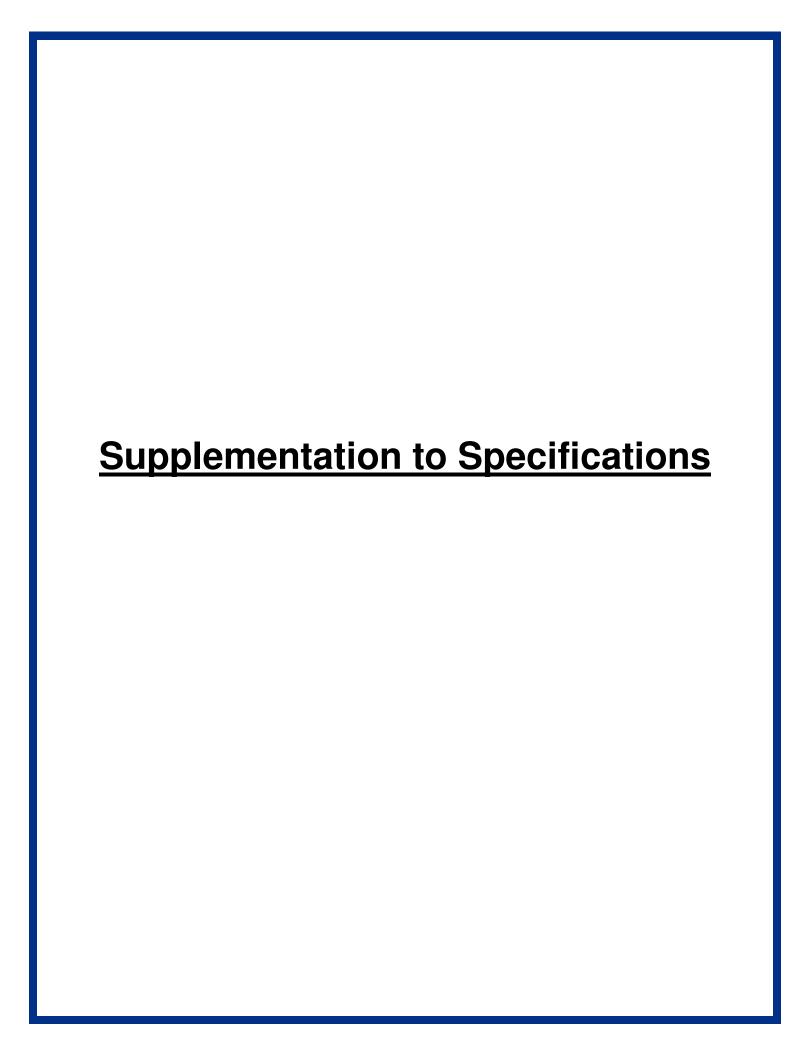


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Supplementation of Section 11.0 – Structures and Appurtenances	

SUPPLEMENTATION OF SECTION 1.0 SCOPE

Section 1.0 of the Wastewater Capital Projects Management Standard Construction Specifications is hereby supplemented for this project as follows: Section 1.0 shall include the following:

In addition, the Colorado Department of Transportation Standard Specifications for Roadway and Bridge Construction, (Sections 105.10 and 105.11) adopted in 2011 shall be used as indicated herein. All relevant revisions to these sections of the CDOT standard special provisions shall be used for this project and can be found at https://www.codot.gov/business/designsupport/2011-construction-specifications/2011-Specs/standard-special-provisions.

References to CCD, City, Department, or Engineer in the Standard Construction Specifications and/or Project Special Provisions refer to the City and County of Denver Project Manager.

Standard Construction Details

It is the intent of the City to use applicable details from the City of Denver's Wastewater Management Division Standard Details, and the Denver Water Department's Standard Drawings, most recent editions. Drainage related appurtenances shall be constructed as shown in the City and County of Denver (CCD), Department of Public Works documents for storm and sanitary sewer construction. These documents can be found at the following web address: https://www.denvergov.org/content/denvergov/en/wastewater-management/capital-projects-management/engineering-and-permits.html.

SUPPLEMENTATION OF SECTION 3.0 EXISTING FACILITIES

Section 3.0 of the Wastewater Capital Projects Management Standard Construction Specifications is hereby supplemented for this project to add the following sections:

UTILITIES

Known utilities within the limits of this project are:

UTILITY COMPANY ADDRESS	CONTACT NAME EMAIL	TELEPHONE
Century Link 5325 Zuni Street Denver, CO 80221	Lisa Hauswirth Lisa.hauswirth@centurylink.com	720-578-3715
Comcast 8000 E. Iliff Ave. Denver, CO 80231	Kip West kip_west@cable.comcast.com	O: 303-603-2832 C: 720-347-9992
Denver Wastewater 2000 West 3 rd Avenue Denver, CO 80223	Steve Choi Steve.choi@denvergov.org	303-446-3648
Denver Water 1600 West 12 th Avenue Denver, CO 80204	Ray Batts Rapheal.Batts@denverwater.org	720-345-1069
Level 3 Communications 14200 E. Jewell Avenue Aurora, CO 80012	Guido Aguillard guido.aguillard@level3.com	303-566-6045
MCI/Verizon 24055 East 6 th Avenue Aurora, CO 80018	David McAllister david.mcallister@verizon.com	801-301-0937
Xcel Energy – Electric and Gas 1123 West 3rd Avenue Denver, CO 80223	Daniel Nival Daniel.nival@xcelenergy.com	303-571-3659
Zayo Group 400 Centennial Parkway, Suite 200 Louisville, CO 80027	James Black Jamesr.black@zayo.com	719-216-8508

The work described in these plans and specifications requires coordination between the Contractor and the utility companies in accordance with subsection 105.11 in conducting their respective operations as necessary to complete the utility work with minimum delay to the project.

In no way shall the contents of this utility specification contradict the Wastewater Capital Projects Management Standard Construction Specification. Any discrepancies identified by the Contractor shall be brought to the attention of the Project Engineer for clarification and resolution.

PART 1 - CONTRACTOR SHALL PERFORM THE WORK LISTED BELOW:

Coordinate project construction with performance by the utility owner of each utility work element listed in Part 2 below. Perform preparatory work specified in Part 2 for each utility work element. Provide an accurate construction schedule that includes all utility work elements to the owner of each impacted utility. Provide each utility owner with periodic updates to the schedule. Conduct necessary utility coordination meetings, and provide other necessary accommodations as directed by the Engineer. Notify each utility owner in writing, with a copy to the Engineer, prior to the time each utility work element

is to be performed by the utility owner. Provide notice, as specified in Part 2, immediately prior to the time the utility work must begin to meet the project schedule.

Provide traffic control, as directed by the Engineer, for any utility work performed by the utility owner within the project limits expected to be coordinated with construction. However, traffic control for utility work outside of typical project work hours shall be the responsibility of the utility owner.

Perform each utility work element for every utility owner listed in Part 1. Notify each utility owner in advance of any work being done by the Contractor to its facility, so that the utility owner can coordinate its inspections for final acceptance of the work with the Engineer. Obtain written acceptance from the utility owner for work performed by Contractor.

All Utility Companies

The Contractor will contact each utility company a minimum of 2 business days, unless otherwise noted, prior to working in the utility company's area so that the utility company can provide an inspector and/or complete any necessary adjustments or relocations.

If a need for utility work by either the Contractor or a utility company arises, the following shall apply:

The Contractor shall be responsible for coordinating the adjustment of utilities on this project. The Contractor shall keep each utility company advised of any work being performed in the vicinity of their facilities, so that each utility company can coordinate any needed locates, adjustments or inspections. Contractor shall provide the appropriate utility company ample notice, but not less than two (2) working days, prior to commencing activities in the vicinity of their facilities. Any additional work performed by the Contractor on behalf of the impacted utility company shall not be paid for by the City and County of Denver, but shall be paid by the utility company requiring the work, unless otherwise agreed to in writing by the Engineer.

Century Link

The Contractor shall notify CenturyLink two weeks in advance of excavating beneath CenturyLink's overhead cable in the alleys between Blake St. and Walnut St., Walnut St. and Larimer St., Larimer St. and Lawrence St., and Arapahoe St. and Curtis St. so CenturyLink can lower its cable to the ground where it will be protected. After the storm box has been installed beneath the cable, CenturyLink shall raise the cable to its original location.

The Contractor shall notify CenturyLink two weeks in advance of excavating in the vicinity of CenturyLink's buried conduits in Curtis St. so CenturyLink can schedule the removal of the concrete encasement and support of the conduits during installation of the storm box in 33rd St. and the storm lateral south of 33rd St.

The Contractor shall notify CenturyLink two weeks in advance of excavating in the vicinity of CenturyLink's buried conduit crossing 33rd St. between Lawrence St. and Arapahoe St. and shall support the conduit during installation of the storm box.

The Contractor shall protect CenturyLink's poles and overhead facilities in the project area and shall notify CenturyLink two weeks in advance of working in the vicinity of these facilities.

Comcast

The Contractor shall notify Comcast two weeks in advance of excavating beneath Comcast's overhead cable in the alleys between Blake St. and Walnut St., Walnut St. and Larimer St., and Larimer St. and Lawrence St. so Comcast can lower its cable to the ground where it will be protected. After the storm box has been installed beneath the cable, Comcast shall raise the cable to its original location.

The Contractor shall coordinate with Comcast regarding the cable crossing 33rd St. at the alley between Arapahoe and Curtis St. which was to have been buried prior to construction. The Contractor shall support the buried conduit during installation of the storm sewer.

Denver Wastewater - sanitary

The Contractor shall remove the abandoned sanitary sewer crossing 33rd St. in the alley between Blake St. and Walnut St. as needed to facilitate installation of the storm sewer.

The Contractor shall protect in place all Denver Wastewater facilities during construction including the new sanitary sewer on the north side of 33rd St. between Blake St. and the alley between Blake St. and Walnut Street which was installed during a previous phase of this project; and the 12-inch sanitary sewer on the south side of 33rd St. between Downing St. and the alley between Blake St. and Walnut St.

The Contractor shall adjust all sanitary manholes along 33rd St. as needed.

The Contractor shall coordinate inspections with Denver Wastewater. The Contractor shall provide the utility owner written notice 5 days immediately prior to required inspections.

Denver Water:

All work shall be done by a contractor who has been pre-qualified by Denver Water. A list of pre-qualified contractors for the installation of 12-inch and smaller mains is available from Denver Water. All materials and workmanship shall be in conformance with Denver Water's current Engineering Standards, Material Specifications and Drawings. All main installations/system modifications shall be approved and inspected by Denver Water.

The Contractor shall field adjust the 6-inch waterline in 33rd St. at Walnut St. as needed to facilitate construction of the junction structure as shown in the plans.

The Contractor shall relocate the 6-inch waterline in 33rd St. at Curtis St. as shown in the plans.

The Contractor shall support all waterlines crossing the storm main and storm laterals when they are exposed for work to be conducted beneath them.

The Contractor shall protect the waterlines in Walnut St. and Curtis St. as shown in the plans.

The Contractor shall place flowfill between waterlines and storm sewers when the separation between the two pipes is less than one foot.

The Contractor shall adjust existing Denver Water valves in areas of grade change. The adjustment of the existing water valve shall be to ½" to ½" below final grade of the roadway surface. All work shall include all items necessary to complete the work, and materials necessary to provide a complete functional installation of the water valve. The Contractor shall coordinate inspections with Denver Water. The Contractor shall provide the utility owner written notice 5 days immediately prior to required inspections.

Level 3 Communication

The Contractor shall notify Level 3 two weeks prior to working in the vicinity of Level 3's facilities.

The Contractor shall coordinate with Level 3 regarding the relocation of its fiber run between Walnut St. and Curtis St. which is to be completed prior to construction. The Contractor shall protect the new Level 3 fiber run during installation of the storm sewer.

The Contractor shall support Level 3's buried facilities when they are exposed for work to be conducted beneath them. This shall include the new fiber run in 33rd St. and the conduits crossing 33rd St. in the alley between Blake St. and Walnut St., the alley between Lawrence St. and Larimer St., and on the west side of Curtis St.

The Contractor shall protect in place the existing manhole in the sidewalk west of Lawrence St. and the manhole south of 33rd St. in Curtis St.

MCI/Verizon

The Contractor shall notify MCI/Verizon two weeks in advance of excavating in the vicinity of MCI/Verizon's buried conduits in Curtis St. so MCI/Verizon can schedule the removal of the concrete encasement and support of the conduits during installation of the storm box in 33rd St. and the storm lateral south of 33rd St.

Xcel Energy – electric distribution

The Contractor shall notify Xcel Energy two weeks in advance of excavating beneath Xcel's overhead crossings of 33rd St. in the alleys between Blake St. and Walnut St., Walnut St. and Larimer St., Larimer St. and Lawrence St. so Xcel can temporarily de-energize the lines. After the storm box has been installed beneath each crossing, Xcel shall re-energize each line.

The Contractor shall notify Xcel Energy two weeks in advance of working in the vicinity of Xcel's overhead street line feeds, including those crossing 33rd St. in the alley between Walnut St. and Larimer St., Larimer St., Lawrence St. and Arapahoe St. to schedule an outage so Xcel can temporarily disconnect the lines.

The Contractor shall coordinate with Xcel Energy regarding the electric crossings of 33rd St. east of Curtis St. and at the alley between Arapahoe St. and Curtis St. which are to be buried prior to construction.

The Contractor shall notify Xcel Energy seven days in advance of exposing Xcel's buried electric facilities for work to be conducted beneath them, including the conduit east of Lawrence St., east of Curtis St., and at the alley between Arapahoe St. and Curtis St. The Contractor shall support the conduits in place every ten feet.

The Contractor shall protect in place Xcel's overhead facilities along 33rd St.

Xcel Energy - gas

The Contractor shall coordinate with Xcel Energy regarding the gas line in 33rd St. between Larimer St. and Lawrence St. which is to be relocated prior to construction as shown in the plans.

The Contractor shall coordinate with Xcel Energy regarding the gas line in 33rd St. west from Curtis St. which may be relocated prior to construction as shown in the plans.

The Contractor shall coordinate with Xcel Energy regarding the gas line in 33rd St. east from Curtis St. which is to be relocated prior to construction as shown in the plans.

The Contractor shall support Xcel Energy's gas lines when they are exposed for work to be conducted beneath them if the length of the exposed pipe exceeds the maximum allowable unsupported pipe span shown on the table below from Xcel.

COA	Table 7.6.1 TED STEEL F	– Maximum Un PIPE		ipe Span LASTIC P	
(see notes 1, 2, & 4)		(see notes 1, 3, & 4)			
Nominal Pipe Diameter (in)	Pipe Wall Thickness (in)	Allowable Unsupported Length (ft)	Nominal Pipe Diameter (in)	SDR	Allowable Unsupported Length (ft)
3/4	.113	11	1/2 CTS	7.0	4
5/4	.110	' '	3/4 IPS	11.0	5
1	.133	13	1 CTS	11.5	5
		13	1 IPS	11.0	5
1 1/4	.140	14	1-1/4 IPS	10.0	6
1-1/2	.145	15	1-1/2 IPS	11.0	7
2	.154	18	2 IPS	11.0	7
3	.156 .216	22 21	3 IPS	11.5	9
4	.156 .237	25 24	4 IPS	11.5	10
6	.188 .250	30 30	6 IPS	11.5	12
8	.219 .250	35 35	8 IPS	11.5	14
10	.219 .250	39 39		***************************************	
12	.250	42			
16	.250	48			
18	.250	51			
20	.250	54			
24	.312	59			
26	.375	61			
30	.375	66			

Zayo Group

The Contractor shall notify Zayo two weeks in advance of excavating in the vicinity of Zayo's facilities in Arapahoe St. and 33rd St.

The Contractor shall support Zayo's buried facilities in Arapahoe St. when they are exposed for work to be conducted beneath them in 33^{rd} St. and south of 33^{rd} St.

The Contractor shall coordinate with Zayo regarding the fiber run in 33rd St. between Arapahoe St. and Downing St. which is to be relocated prior to construction. The Contractor shall protect Zayo's new fiber run during construction.

PART 2 - UTILITY OWNERS SHALL PERFORM THE WORK LISTED BELOW:

Although the Contractor shall provide traffic control for utility work expected to be coordinated with construction, traffic control for utility work outside of typical project work hours or outside of project limits shall be the responsibility of the utility owner. The utility owner shall prepare and submit to the

Engineer a Method of Handling Traffic for utility work to be performed outside typical project work hours or outside of project limits. The utility owner shall obtain acceptance of the Method of Handling Traffic from the Engineer prior to beginning the utility work to be performed outside typical project work hours or outside of project limits.

This work will be performed by the utility owners as necessary to avoid conflicts with construction activities. New locations shall be as indicated in the plans. Utility owners shall comply with schedule requirements of the Contractor and make every effort not to impact the overall construction schedule. Unless otherwise approved by the Engineer, abandoned aboveground appurtenances such as pedestals shall be removed and abandoned underground utilities and manholes/handholds shall be abandoned in place.

Utility owners are responsible for obtaining all necessary permits from the City and County of Denver, as required.

Century Link

Upon two weeks' advance notice by the Contractor, CenturyLink shall lower its overhead cable to facilitate installation of the storm sewer beneath the overhead cable. This includes the overhead cable in the alleys between Blake St. and Walnut St., Walnut St. and Larimer St., Larimer St. and Lawrence St., and Arapahoe St. and Curtis St. After the storm box has been installed beneath the cable, CenturyLink shall raise the cable to its original location. It is expected to take one day to lower and one day to raise the cable at each location.

Upon two weeks' advance notice by the Contractor, CenturyLink shall remove the concrete encasement surrounding the conduits in Curtis St. where they will be exposed and supported in place during installation of the storm box in 33rd St. and the storm lateral south of 33rd St. CenturyLink shall replace the encasement during backfill. It is expected to take one day to remove the encasement and one day to replace the encasement at each location.

Comcast

Upon two weeks' advance notice by the Contractor, Comcast shall lower its overhead cable to facilitate installation of the storm sewer beneath the overhead cable. This includes the overhead cable in the alleys between Blake St. and Walnut St., Walnut St. and Larimer St., and Larimer St. and Lawrence St. After the storm box has been installed beneath the cable, Comcast shall raise the cable to its original location. It is expected to take one day to lower and one day to raise the cable at each location.

Comcast shall replace the overhead cable crossing 33rd St. at the alley between Arapahoe and Curtis St. with an underground crossing. This work is expected to be completed prior to construction.

Denver Wastewater - sanitary

Denver Wastewater shall inspect utility work performed by the Contractor listed in Part 1 above. The Contractor shall provide the utility owner written notice 5 days immediately prior to each required inspection.

Denver Water:

Denver Water shall inspect utility work performed by the Contractor listed in Part 1 above. The Contractor shall provide the utility owner written notice 5 days immediately prior to each required inspection.

Level 3 Communications

Level 3 shall abandon its fiber run and manholes in 33rd St. between Walnut St. and Curtis St. and install a new fiber run in 33rd St. with new manholes in Walnut St. and near Lawrence St. as shown in the plans. This work is expected to be completed prior to construction.

MCI/Verizon

Upon two weeks' advance notice by the Contractor, MCI/Verizon shall remove the concrete encasement surrounding the conduits in Curtis St. where they will be exposed and supported in place during installation of the storm box in 33rd St. and the storm lateral south of 33rd St. MCI/Verizon shall replace the encasement during backfill operations. It is expected to take one day to remove the encasement and one day to replace the encasement at each location.

Xcel Energy – electric

Upon receiving two weeks' advance notification by the Contractor, Xcel forces shall de-energize Xcel's overhead crossings of 33rd St. in the alleys between Blake St. and Walnut St., Walnut St. and Larimer St., Larimer St. and Lawrence St. Xcel shall re-energize the lines after the storm box has been installed beneath each crossing.

Upon receiving two weeks' advance notification by the Contractor, Xcel forces shall schedule an outage and temporarily disconnect the street light feeds, including those crossing 33rd St. in the alley between Walnut St. and Larimer St., Lawrence St. and Arapahoe St.

Xcel Energy shall bury the overhead lines crossing 33rd St. east of Curtis St. and on the west side of the alley between Arapahoe St. and Curtis St. This work is expected to be completed prior to construction.

Xcel Energy shall coordinate with the Contractor regarding the buried crossings of 33rd St. east of Curtis St. and at the alley between Arapahoe St. and Curtis St. which shall be supported in place during construction.

Xcel Energy - Gas

Xcel Energy shall relocate the gas line in 33^{rd} St. between Larimer St. and Lawrence St. as shown in the plans. This work is expected to be completed prior to construction.

Xcel Energy shall relocate the gas line in 33rd St. west from Curtis St. if needed as shown in the plans. This work is expected to be completed prior to construction.

Xcel Energy shall relocate the gas line in 33^{rd} St. east from Curtis St. as shown in the plans. This work is expected to be completed prior to construction.

Xcel Energy shall coordinate with the Contractor when Xcel's gas lines need to be supported in place by the Contractor for work to be conducted beneath them.

Zayo Group

Zayo shall abandon its fiber run in 33rd St. between Arapahoe St. and Downing St. and shall install a new fiber run in 33rd St. as shown in the plans. This work is expected to be completed prior to construction.

GENERAL:

The Contractor shall comply with Article 1.5 of Title 9, CRS ("Excavation Requirements") when excavating or grading is planned in the area of underground utility facilities. The Contractor shall notify all affected utilities at least two (2) business days, not including the actual day of notice, prior to commencing such operations. The Contractor shall contact the Utility Notification Center of Colorado (UNCC) at phone no. **811 or 1-800-922-1987**, to have locations of UNCC registered lines marked by member companies. All other underground facilities shall be located by contacting the respective owner. Utility service laterals shall also be located prior to beginning excavation or grading.

The locations of utility facilities as shown on the plan and profile sheets were obtained from the best available information. No warranty is made for the adequacy or accuracy of subsurface information provided. The Contractor shall cooperate with the utility owners in their relocation operations as provided in subsection 105.11 of the Standard Specifications for Road and Bridge Construction. No guarantee is made that utility conflicts will be resolved prior to construction activities and any delays resulting from utility relocation work shall be dealt with in accordance with subsection 108.08 of the Standard Specifications for Road and Bridge Construction as amended.

All costs incidental to the foregoing requirements will not be paid for separately, but shall be included in the work.

SUPPLEMENTATION OF SECTION 11.0 STRUCTURES AND APPURTENANCES

Section 11.0 of the Wastewater Capital Projects Management Standard Construction Specifications is hereby supplemented for this project to add the following sections:

Section 11.0.1 shall include the following:

11.01.1 General

Except where otherwise indicated in these Wastewater Capital Projects Management Standard Construction Specifications, manholes, special structures, box culverts, vaults, storm inlets, pedestrian and bicycle railing, and other miscellaneous structures and appurtenances shall conform to the details included in these Specifications or as shown on the drawings. All concrete and reinforcing for structures shall conform to the requirements set forth in the 2011 Standard Specifications for Road and Bridge Construction, by the Colorado Department of Transportation, as described below, or otherwise modified herein.

1. CDOT Section 601 Structural Concrete

CDOT Section 601 Structural Concrete shall be utilized and revised as follows:

Class D Concrete will be utilized for all structural concrete work; using ¾" nominal sized aggregate (100% passing the 1" sieve and 90% to 100% passing the ¾" sieve).

Type V Portland Cement will be used.

CDOT Subsection 601.05 shall be revised to include:

The concrete used in upper deck slabs shall have a maximum substitution of fly ash for portland cement of 10% by weight.

CDOT Subsection 601.19 shall be revised as follows: Method of measurement shall be deleted. Method utilized will be as specified elsewhere in the Contract Documents.

CDOT Subsection 601.20 shall be revised as follows: Basis of payment will be deleted. Basis of payment utilized will be as specified elsewhere in the Contract Documents.

2. CDOT Section 602 Reinforcing Steel

CDOT Section 602 Reinforcing Steel shall be utilized and revised as follows:

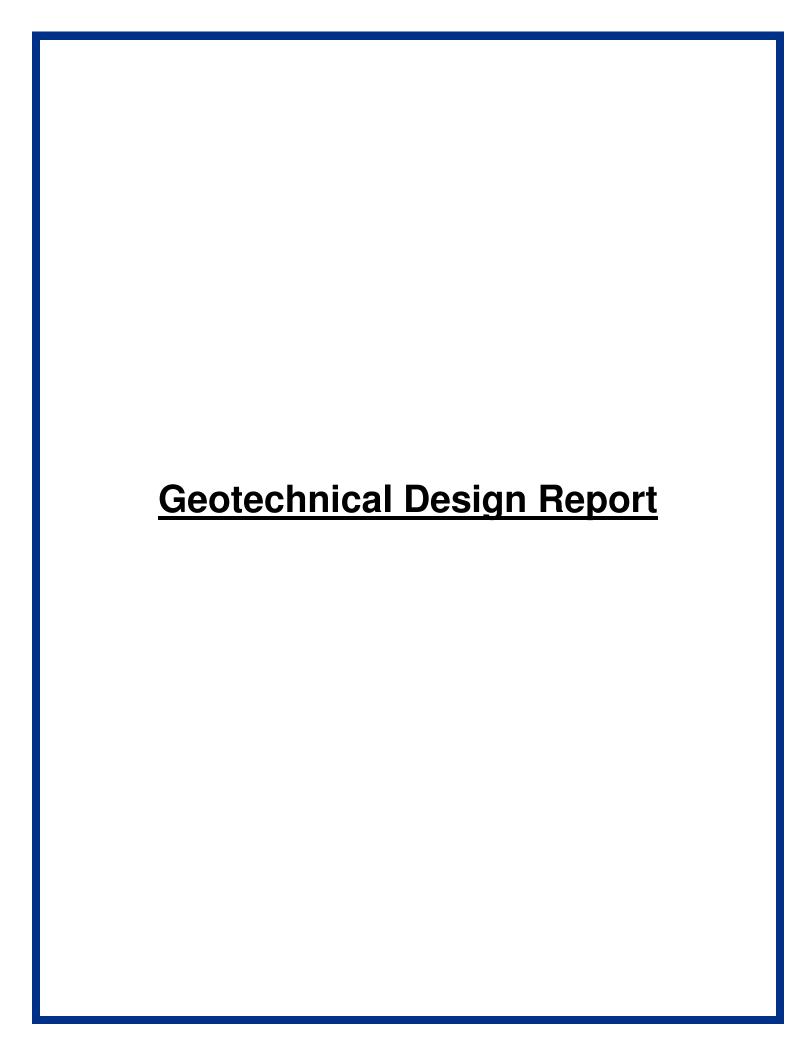
Subsection 602.02 shall be revised as follows: Epoxy coated reinforcing steel will not be utilized unless otherwise specified in the Contract Documents.

CDOT Subsection 602.07 shall be revised as follows:

Method of measurement will be deleted. Method utilized will be as included otherwise in the Contract Documents.

CDOT Subsection 602.08 shall be revised as follows:

Basis of payment will be deleted. Basis of payment will be as included otherwise in the Contract Documents.







January 14, 2016 (Revised January 28, 2016)

Mr. Jeffrey Holste, P.E. Wilson & Company, Inc. 5755 Mark Dabling Blvd., Suite 220 Colorado Springs, Colorado 80919

Re: Technical Memorandum No. 4

Revised Pavement Design Recommendations

Proposed 33rd Street Outfall

City and County of Denver, Colorado

Dear Jeff:

This Technical Memorandum provides the results of revised pavement design calculations, using new information based on the results of a traffic study recently conducted for the Proposed 33rd Street Outfall project, provided by Wilson & Company, Inc. The pavement sections presented in this memorandum are based on the laboratory test results, the Metropolitan Government Pavement Engineers Council (MGPEC) design procedures, and the AASHTO 1993 Pavement Design Guide, in general accordance with the Colorado Department of Transportation (CDOT) design procedures. The revised pavement design calculations are provided to supplement the pavement design recommendations provided in following report:

 Revised Geotechnical Design Report – Proposed 33rd Street Outfall - City and County of Denver, Colorado, dated October 21, 2014. Rev. March 25, 2015

Design Traffic Loading

The provided traffic study was conducted on Tuesday, November 10, 2015, and consisted of recording the 24 hour traffic volume and vehicle type distribution at five locations in the general project area. Future traffic projections (year 2040), were also provided for each of the traffic study locations. The design traffic loading was calculated as the average of the 2015 traffic volume and the future traffic volume, and the MGPEC vehicle equivalency factors were applied to calculate the 20 year design ESAL. The MGPEC Vehicle Classifications and Equivalency Factors used are summarized in the following table.

Mr. Jeff Holste, P.E.
Technical Memorandum No. 4
33rd Street Outfall – Revised Pavement Design Recommendations
January 14, 2016 (Revised January 28, 2016)
Page 2

	Vehicle Type / Classification	Vehicle Equivalency Factor	
Α	School Bus	2.578	
В	Type 3-Heavy; 3 Axle Trash/Concrete Truck	1.693	
С	Passenger Car / Motorcycle	0.0045	
D	H-10; 2 Axle / Light Delivery Truck	0.617	
E	RTD Bus	3.848	
F	Type 352; 5 Axle / Tractor Trailer	1.788	
G	Other 2 Axle Single Unit Truck	1.587	
Н	Other 3 Axle; Tractor Trailer	3.157	
I	Light 3 Axle Single Unit Truck	0.290	
K	Commercial Carrier Bus	2.730	

The traffic information provided, based on the November, 2015 traffic study, is summarized in the following table. Based on the information provided, we understand that no growth is expected for Blake Street, Larimer Street, and 33rd Street, and a 25% increase in traffic volume is estimated for M.L.K. Jr., Boulevard and Downing Street. The 20 year design ESALs calculated for each of traffic study locations is shown below. A copy of the Traffic Study and the ESAL calculations are provided in the Attachments.

Location	2015 ADT	2040 ADT	Design ADT	Design ESAL ₂₀
Blake St. s/o 33 rd St.	2,716	2,716 (no growth)	2,716	2,628,655
Larimer St. s/o 33 rd St.	3,431	3,431 (no growth)	3,431	4,003,898
33 rd St. e/o Larimer St.	733	733 (no growth)	733	638,227
M.L.K. Jr. Blvd. e/o Downing St.	8,448	10,560 (25% growth)	9,504	8,093,149
Downing St. s/o 33 rd St.	12,691	15,864 (25% growth)	14,278	14,011,542

We understand that there is a low volume of traffic in the east-west direction along 33rd Street, compared to the higher volume of traffic on the north-south crossing streets (Blake St. and Larimer St.). For 33rd Street, a pavement designed for the east-west traffic along 33rd Street alone would not provide adequate support of the stop-and-go traffic and combined traffic loading at the intersections along 33rd Street.

The CDOT pavement design guidelines recommend that a high-performance pavement section be provided for intersections with a combined traffic loading of 3 Million ESALs from the intersecting roadways, which provides support for stop-and-go traffic. It is recommended that this intersection pavement section be extended 300 linear feet in each direction for intersecting roadways carrying two-way traffic, or 300 linear feet on the deceleration side and 100 linear feet on the acceleration side for one-way traffic. CDOT recommends that the intersection pavement section be continuous for roadways with less than approximately ½ mile between adjacent intersections.

For intersection pavement design along 33rd Street, a combined design ESAL of 4,642,125 was calculated by summing the design ESALs for 33rd Street and Larimer Street, and an ESAL of 3,266,882 was calculated for the intersection of 33rd Street and Blake Street.

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Subgrade Soil Strength

The pavement subgrade soils encountered in the project area were primarily granular, well graded to poorly graded sand with silt and gravel or silty to clayey sand with gravel. AASHTO soil classifications commonly ranged from A-1-a to A-2-4, although soils classifying as clayey sand (AASHTO A-2-6 to A-6) were also encountered in smaller quantities. During construction, the clayey materials, where encountered, should be removed from the subgrade for support of new pavements. The R-value and Resilient Modulus used for design are summarized below.

Location	R-Value	Resilient Modulus
Blake St. s/o 33 rd St.	30	5,137
33 rd St.	25	4,362
Downing St. s/o 33 rd St.	20	3,705
M.L.K. Jr. Blvd. e/o Downing St.	20	3,705

Pavement Thicknesses

The revised pavement sections are summarized in the following table. Hot Mix Asphalt Pavement (HMAP) and Portland Cement Concrete Pavement (PCCP) sections were calculated using the MGPEC software, the above design parameters, and are based on a 20 year design life. Composite HMAP over Aggregate Base Course (ABC) sections were calculated using the WinPAS software. A copy of the MGPEC and WinPAS software printouts are included in the Attachments.

	MGPEC	Sections	WinPAS Sections (AASHTO 1993)	
Location	HMAP Thickness, inches ¹	PCCP Thickness, inches ²	HMAP over ABC Thicknesses, inches	
Blake St. s/o 33 rd St.	8	8	8½/6	7 / 12
33 rd St. Mainline	6	6½	7/6	5½ / 12
33 rd & Blake St. Intersection	81/2	8½	8¾ / 6	71/4 / 12
33 rd & Larimer St. Intersection	9	9	9½/6	7¾ / 12
Downing St. s/o 33 rd St.	11½	11	12½/6	10¾ / 12
MLK Jr. Boulevard	10½	10	11½/6	9¾ / 12

¹ For HMAP, MGPEC recommends a minimum of 12 inches of chemically stabilized subgrade.

Due to the presence of potentially shallow utilities and in order to reduce the required subgrade preparation along Blake Street, a full depth section of 10 inches HMAP may be considered, in lieu of the composite pavement sections shown above.

We understand that a composite section consisting of 8 inches HMAP over 12 inches ABC is being considered for the length of 33rd Street to account for the increased traffic loading at the intersections. This section is slightly thicker than the calculated composite pavement section and should provide adequate support for the 33rd Street traffic over the design life. We understand that a composite section consisting of 8 inches PCCP over 6 inches ABC is being considered for the concrete pavement section on 33rd Street between Blake Street and the Coors field parking lot.

² PCCP should be placed on a minimum of 6 inches of ABC

Mr. Jeff Holste, P.E.
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33rd Street Outfall – Revised Pavement Design Recommendations
January 14, 2016 (Revised January 28, 2016)
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This section is slightly thicker than the existing section based on pavement core samples obtained for this project and should provide adequate support for the 33rd Street traffic over the design life. We understand that portions of the Coors field parking lot and entrance roadway will also be reconstructed. Traffic information for this area was not available, but due to the relatively low volume of traffic expected, composite pavement sections consisting of 8 inches HMAP over 12 inches ABC or 8 inches PCCP over 6 inches ABC may be considered for new pavements in the Coors field parking area.

Limitations

This Technical Memorandum has been prepared in accordance with generally accepted geotechnical engineering practices used in this area at the time this report was written, and has been prepared for design purposes. The conclusions and recommendations are based upon the data obtained from borings drilled at the approximate location shown in the previous reports submitted to Wilson & Co., and the proposed construction. The nature and extent of the variations at the site may not become evident until excavation is performed. If during construction, soil, bedrock, fill, or groundwater conditions appear to be different from those described, this office should be advised so that reevaluation of our recommendations may be made.

Our professional services were performed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical engineers practicing in this locality at this time. No warranty, expressed or implied, is made. We prepared the report as an aid in design of the proposed project. This Technical Memorandum is not a specification or bidding document. Any contractor reviewing this Technical Memorandum must draw their own conclusions regarding site conditions and specific construction techniques to be used.

If you have any questions, or if we can be of further service, please call us at (303) 337-0338.

Sincerely,

GEOCAL

By: Walter J. Zitz, P.E. Project Engineer

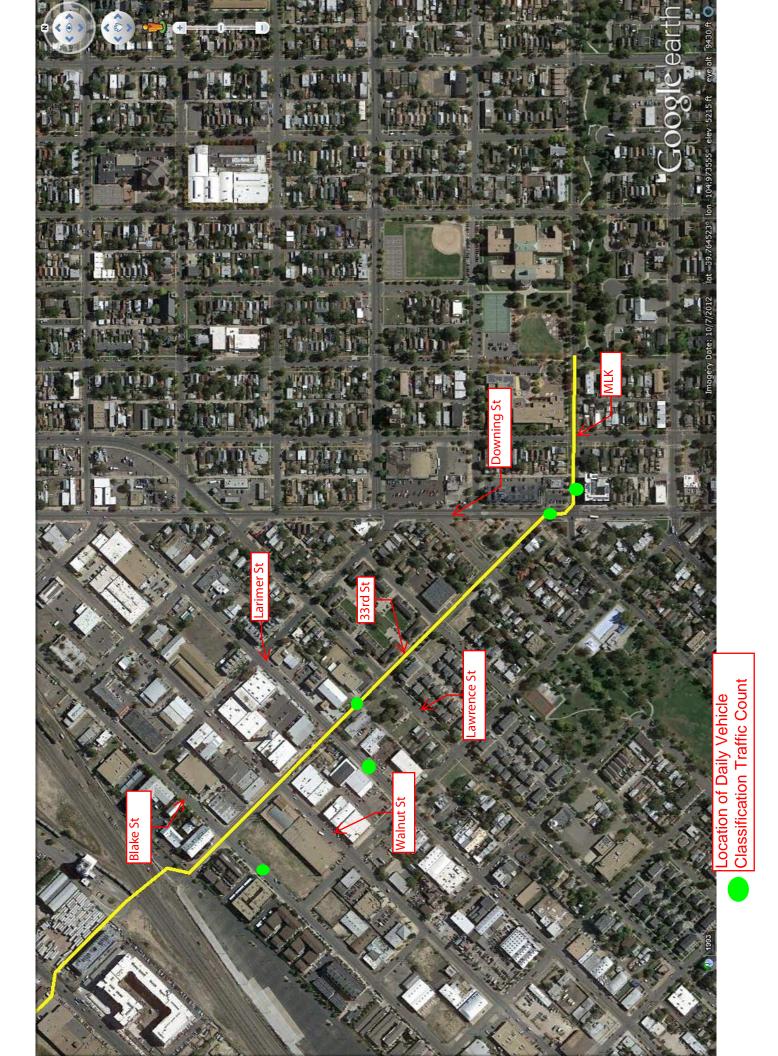
Reviewed By: Ronald J. Vasquez, P.E. Principal Engineer

WJZ/G11.1411.004

Attachments: Traffic Study

ESAL Calculations

MGPEC and WinPAS Pavement Design Software Printouts



Summary of ADT Traffic Counts Collected on November 10, 2015

Blake Street s/o 33rd

Diake Officer 3/0 3314	
Vehicle	
Classification	
Designation ADT	Total
Α	0
В	30
C-Motorcycles	19
C-Cars	2118
D	274
E	12
F	9
G	181
Н	0
	73
K	0
Total ADT	2716

Larimer Street s/o 33rd

Vehicle Classification			
Designation ADT	SB	NB	Total
Α	0	0	0
В	42	4	46
C-Motorcycles	15	10	25
C-Cars	1919	692	2611
D	288	85	373
E	47	0	47
F	13	1	14
G	184	45	229
Н	0	0	0
I	69	17	86
K	0	0	0
Total ADT	2577	854	3431

33rd Street e/o Larimer

Vehicle Classification			
Designation ADT	WB	EB	Total
Α	0	0	0
В	13	11	24
C-Motorcycles	1	1	2
C-Cars	290	306	596
D	37	42	79
E	1	0	1
F	1	2	3
G	15	13	28
Н	0	0	0
	0	0	0
K	0	0	0
Total ADT	358	375	733

Martin Luther King e/o Downing

Vehicle Classification Designation ADT	Total
Α	31
В	9
C-Motorcycles	27
C-Cars	7350
D	527
E	93
F	7
G	233
Н	138
	33
K	0
Total ADT	8448

Downing Street s/o 33rd

Vehicle			
Classification			
Designation ADT	SB	NB	Total
Α	8	11	19
В	70	94	164
C-Motorcycles	5	16	21
C-Cars	4837	5716	10553
D	445	527	972
E	100	106	206
F	11	6	17
G	287	352	639
Н	0	0	0
	40	60	100
K	0	0	0
Total ADT	5803	6888	12691

2040 ADT Traffic Forecasts

lake Street s o 33rd

lake Street S 0 33rd	
Vehicle Classification	
Designation ADT	Total
Α	0
	30
C-Motorcycles	19
C-Cars	2118
D	274
E	12
F	9
G	181
Н	0
I	73
	0
Total ADT	2716

No gro th rate per DRCOG CCD

Larimer Street s o 33rd

Vehicle			
Classification			
Designation ADT	S	N	Total
Α	0	0	0
	42	4	46
C-Motorcycles	15	10	25
C-Cars	1919	692	2611
D	288	85	373
E	47	0	47
F	13	1	14
G	184	45	229
Н	0	0	0
I	69	17	86
	0	0	0
Total ADT	2577	854	3431

No gro th rate per DRCOG CCD

33rd Street e o Larimer

Vehicle Classification Designation ADT		E	Total
Α	0	0	0
	13	11	24
C-Motorcycles	1	1	2
C-Cars	290	306	596
D	37	42	79
E	1	0	1
F	1	2	3
G	15	13	28
Н	0	0	0
	0	0	0
	0	0	0
Total ADT	358	375	733

No gro th rate per DRCOG CCD

Martin Luther ing e o Do ning

Martin Luther ing e	o bo fillig
Vehicle Classification	
Designation ADT	Total
Α	39
	11
C-Motorcycles	34
C-Cars	9188
D	659
E	116
F	9
G	291
Н	173
I	41
	0
Total ADT	10560

25% gro th rate per DRCOG CCD

Do ning Street s o 33rd

Vehicle			
Classification			
Designation ADT	S	N	Total
Α	10	14	24
	88	118	205
C-Motorcycles	6	20	26
C-Cars	6046	7145	13191
D	556	659	1215
Е	125	133	258
F	14	8	21
G	359	440	799
Н	0	0	0
	50	75	125
	0	0	0
Total ADT	7254	8610	15864

25% gro th rate per DRCOG CCD

					ı						
33rd Ctroct 0/0 arimor		Number	Number of Lanes (per direction) =	r direction) =	1						
Join Sileel e/U Lailliel			% in D	% in Design Lane= 60%	%09						
Vehicle Type/Classification (MGPEC)		Α	В	၁	Q	Е	Ч	9	Н	_	¥
Vehicle Type Load Factor (MGPEC)		2.578	1.693	0.0045	0.617	3.848	1.788	1.587	3.157	0.29	2.73
2015 ADT (observed)	733	0	54	869	6/	1	3	28	0	0	0
Precent of types	100.00%	%00:0	3.27%	81.58%	10.78%	0.14%	0.41%	3.82%	%00:0	%00:0	%00'0
Future ADT (Projected-No Growth)	733	0	54	869	6/	1	3	28	0	0	0
20-Yr Design ADT	733	0	24	869	6/	1	3	28	0	0	0
Roadway ESAL	1,063,712	0	296,614	19,644	355,824	28,090	39,157	324,383	0	0	0
Larimer St s/o 33rd Design Lane ESAL	638,227	727									

)				
DISKS C4500 5/0 33rd			Total Numbe	Total Number of Lanes = 2	2						
DIAKE SILEEL S/U SSIU			% in D	% in Design Lane= 60%	%09						
Vehicle Type/Classification (MGPEC)		Α	В	0	Q	Е	Ь	9	Н		У
Vehicle Type Load Factor (MGPEC)		2.578	1.693	0.0045	0.617	3.848	1.788	1.587	3.157	0.29	2.73
2015 ADT (observed)	2,716	0	30	2,137	274	12	6	181	0	73	0
Precent of types	100.00%	%00:0	1.10%	%89'82	10.09%	0.44%	0.33%	%99'9	%00:0	7.69%	%00:0
Future ADT (Projected-No Growth)	2,716	0	30	2,137	274	12	6	181	0	73	0
20-Yr Design ADT	2,716	0	30	2,137	274	12	6	181	0	73	0
Roadway ESAL	4,381,091	0	370,767	70,200	1,234,123	337,085	117,472	2,096,903	0	154,541	0
Blake St s/o 33rd Design Lane ESAL	2,628,655	922									

1 grimer Otreet 6/6 33rd		Numbe	Number of Lanes (per direction) =	r direction) =	1						
			% in D	% in Design Lane= 60%	%09						
Vehicle Type/Classification (MGPEC)		Α	В	၁	Q	Е	Ъ	9	Н		У
Vehicle Type Load Factor (MGPEC)		2.578	1.693	0.0045	0.617	3.848	1.788	1.587	3.157	0.29	2.73
2015 ADT (observed)	3,431	0	46	2,636	373	47	14	525	0	98	0
Precent of types	100.00%	%00:0	1.34%	%88.92	10.87%	1.37%	0.41%	%/9'9	%00:0	2.51%	%00:0
Future ADT (Projected-No Growth)	3,431	0	46	2,636	373	47	14	525	0	98	0
20-Yr Design ADT	3,431	0	46	2,636	373	47	14	525	0	98	0
Roadway ESAL	6,673,164	0	568,509	86,593	1,680,029	1,320,249	182,734	2,652,988	0	182,062	0
Larimer St s/o 33rd Design Lane ESAL	4,	868'800									

)									
Downing Stroot 5/0 33rd		Number	Number of Lanes (per direction) =	r direction) =	1						
			% in D	% in Design Lane= 60%	%09						
Vehicle Type/Classification (MGPEC)		٧	В	၁	O	Е	Н	9	Н		×
Vehicle Type Load Factor (MGPEC)		2.578	1.693	0.0045	0.617	3.848	1.788	1.587	3.157	0.29	2.73
2015 ADT (observed)	12,691	19	164	10,574	972	506	17	639	0	100	0
Precent of types	100.00%	0.15%	1.29%	83.32%	%99°L	1.62%	0.13%	5.04%	%00.0	%61.0	%00:0
Future ADT (Projected)	15,864	24	202	13,217	1,215	258	21	462	0	125	0
20-Yr Design ADT	14,280	22	185	11,896	1,094	232	19	719	0	113	0
Roadway ESAL	23,352,570	414,027	2,286,397	390,784	4,927,485	6,516,973	247,996	8,329,687	0	239,221	0
Downing St s/o 33rd Design Lane ESAL	14,011	,011,542									

			Total Numbe	Total Number of Lanes = 2	2						
INITY E/O DOWIIIII			% in D	% in Design Lane= 60%	%09						
Vehicle Type/Classification (MGPEC)		A	В	၁	Q	Е	ч	9	Н		У
Vehicle Type Load Factor (MGPEC)		2.578	1.693	0.0045	0.617	3.848	1.788	1.587	3.157	0.29	2.73
2015 ADT (observed)	8,448	31	6	1377	527	66	7	233	138	33	0
Precent of types	100.00%	0.37%	0.11%	87.32%	6.24%	1.10%	%80'0	2.76%	1.63%	0.39%	%00:0
Future ADT (Projected)	10,561	39	11	9,222	629	116	6	291	173	41	0
20-Yr Design ADT	905'6	35	10	8,300	293	105	8	797	156	37	0
Roadway ESAL	13,488,582	628,679	123,589	272,655	2,670,931	2,949,492	104,419	3,035,296	3,595,192	78,329	0
Larimer St s/o 33rd Design Lane ESAL	8,	093,149									

SUBDIVISION			DESIGN				
Subdivision 3	33rd Street (Outfall					
	Blake St. s/o						
From	- · · · · ·	-					
То							
Formation C	Qs - Colluvi	ium					
Township			Range		Section	0 Quart	er NW
TRAFFIC							
Classification C Residential Lots 0	Commercial)	Сог	Speed Limit mmercial Acre	0 s 0	Ente	ered ESALS Industrial Acres	2,628,655 0
SUBGRADE							
Soil Type	Sand		SHTO A-1	-		urface Drainage	No
R Value Swell 0%		UNC	0		silient Modu		0 05 0/
Swell 0% Std Proctor No	•	uid Limit Proctor		Plasticity Ind timum Moistu		% Passing 200 Max Density	440
Sid Fiocioi No) IVIOU I	FIOCIOI	NO Op		, ,	_	μσ.
				Load Trans	sfer 2.8 D	Doweled and Tied	l
MATERIALS COSTS	S						
Hot Mix Asphalt (Concrete	1.80	\$/sqyd/in	Crack Sea	I - HMAP	0.32	\$/sqyd
Portland Cement		3.00	\$/sqyd/in	Milling - Hl		1.25	\$/sqyd/in
Aggregate Base		0.59	\$/sqyd/in		MAP Mainte		\$/sqyd
Chemical Stabliz	-		\$/sqyd/in		Crack And		\$/sqyd
Moisture Treated	d Subgrade	0.25	\$/sqyd/in		urface Grind	•	\$/sqyd/in
Fog Seal		0.25	\$/sqyd	-	CP Mainten		\$/sqyd
Chip Seal		0.75	\$/sqyd	Annual Inte		7.0	%
Slurry Seal		1.25	\$/sqyd	Annual Infl	ation Rate	3.0	%
PAVEMENT DESIG	N OPTIONS	-					
Option One		Portland	Cement Cond	crete Pavemei		Inches Thick	
-				ruction Cost	\$168,960	Per Lane Mile	
			30 yr N	<i>Maintenance</i>		Per Lane Mile	
				Total Cost	\$197,429	Per Lane Mile	
Option Two		Hot Mix	Asphalt Paver	ment	11.5	Inches Thick	
Not Recommer	nded		Const	ruction Cost	\$145,728	Per Lane Mile	
			30 yr N	<i>Maintenance</i>	\$78,533	Per Lane Mile	
				Total Cost	\$224,262	Per Lane Mile	
Option Three		Hot Mix	Asphalt Paver	ment	8.0	Inches Thick	
		Che	mical Stabilize	ed Subgrade	12.0	Inches Thick	
			Const	ruction Cost	\$168,960	Per Lane Mile	
			30 yr I	<i>Maintenance</i>	\$78,533	Per Lane Mile	
				Total Cost	\$247,494	Per Lane Mile	

SUBDIVISION		PAVE	IVIEIN	DESIGN	IO MIGPE	CSIANI	DAKDS	
Subdivision	33	rd Street C	Outfall					
Street		d Street	Janan					
From								
То								
Formation	Qs	- Colluvi	um					
Township				Range		Section	0 Q	uarter NW
TRAFFIC	-							
Classification Residential Lots	Coi 0	mmercial	Coi	Speed Limit mmercial Acre	25 s 0	Ente	ered ESAL Industrial Ad	,
SUBGRADE	-							
Soil Type		Sand	AA	SHTO A-2-4		Subs	urface Draina	ge No
R Value		_	UNC	0		silient Modu		
Swell 0%		•	ıid Limit		Plasticity Inc		% Passing	
Std Proctor N	No	Mod F	Proctor	No Op	timum Moistu	re 16 %	Max Densit	y 118 _{pcf}
					Load Trans	sfer 2.8 D	Doweled and	Γied
MATERIALS COS	TS							
Hot Mix Asphai	lt Co	ncrete	1.80	\$/sqyd/in	Crack Sea	I - HMAP	0.	32 \$/sqyd
Portland Ceme	nt C	oncrete	3.00	\$/sqyd/in	Milling - Hl	MAP	1.	25 \$/sqyd/in
Aggregate Bas	e Co	ourse	0.59	\$/sqyd/in	Annual - H	IMAP Mainte	enance 0.	05 <i>\$/sqyd</i>
Chemical Stabi	lized	l Subgrad	0.80	\$/sqyd/in	Clean/Sea	l Crack And	Joints 0.	72 \$/sqyd
Moisture Treate	ed S	ubgrade	0.25	\$/sqyd/in	Portland S	urface Grina	ling 1.	50 \$/sqyd/in
Fog Seal			0.25	\$/sqyd		CP Mainten		05 \$/sqyd
Chip Seal			0.75	\$/sqyd	Annual Inte		7.	
Slurry Seal			1.25	\$/sqyd	Annual Infl	lation Rate	3.	0 %
PAVEMENT DESI	GN	OPTIONS	-					
Option One			Portland	l Cement Cond	crete Paveme		Inches Thick	
-					truction Cost	\$137,280	Per Lane Mi	le
				30 yr I	Maintenance		Per Lane Mi	
					Total Cost	\$165,749	Per Lane Mi	le
Option Two			Hot Mix	Asphalt Paver	ment	9.5	Inches Thic	κ
				Cons	truction Cost	\$120,384	Per Lane M	
				30 yr I	<i>Maintenance</i>	\$78,533	Per Lane M	
					Total Cost	\$198,918	Per Lane M	ile
Option Three			Hot Mix	Asphalt Paver	ment	6.0	Inches Thick	k
			Che	emical Stabilize	-	12.0	Inches Thic	κ
					truction Cost	\$143,616	Per Lane M	ile
				30 yr I	Maintenance	\$78,533	Per Lane M	
					Total Cost	\$222,150	Per Lane M	le

SUBDIVISION		LAAL		DESIG	14 10	WIGEL	COIAI	וטאו	100		
Subdivision	33	rd Street C	Outfall								
Street		d & Blake		ction							
From											
То											
Formation	Qs	- Colluvi	ium								
Township				Rang	ge		Section		0 Quarte	er NW	
TRAFFIC	-										
Classification Residential Lots	Coi 0	mmercial	Сол	Speed Lim mmercial Ad		30 0	Eı	ntered <i>Ind</i>	ESALS lustrial Acres	3,266	6,882 0
SUBGRADE	-										
Soil Type		Sand		SHTO A-1		_			e Drainage	N	0
R Value			UNC	22 0	0 (D/		silient Mod		5137	٠ ٥٢	0/
Swell 0% Std Proctor N	No	· =	uid Limit Proctor			asticity Ind			Passing 200		
Sid Flociol 1	NO	IVIOU I	-100101	INU	-	ım Moistur . –	•		ax Density	118	pcf
MATERIALS COS	TS				L	oad Trans	sfer 2.8	Dowe	eled and Tied		
			4.00	Φ/ //					0.00	•	, ,
Hot Mix Asphal			1.80	\$/sqyd/ir		Crack Seal			0.32		/sqyd
Portland Ceme Aggregate Bas			3.00 0.59	\$/sqyd/ir \$/sqyd/ir		Лilling - НN Annual - НI		tonon	1.25 ce 0.05	-	yd/in /sqyd
Chemical Stabl				\$/sqyd/ir \$/sqyd/ir		Clean/Seal					/sqyd
Moisture Treate		_	0.25	\$/sqyd/ir		Portland Su			1.50		yd/in
Fog Seal	<i>-</i>	abgrado	0.25	\$/sqya		Annual PC		•			/sqyd
Chip Seal			0.75	\$/sqyc		Annual Inte			7.0	,	%
Slurry Seal			1.25	\$/sqyc		Annual Infla	ation Rate		3.0		%
PAVEMENT DESI	GN	OPTIONS	-								
Option One			Portland	l Cement C	oncrete	e Pavemen	nt 8	.5 Inc	hes Thick		
paren eme				Co	nstruci	ion Cost	\$179,52	0 Pei	r Lane Mile		
				<i>30</i> y	yr Main	tenance			r Lane Mile		
					Т	otal Cost	\$207,98	9 Pei	r Lane Mile		
Option Two			Hot Mix	Asphalt Pa	vemen	t	12.0		hes Thick		
Not Recomm	end	ed				ion Cost	\$152,06		r Lane Mile		
				<i>30</i> y		tenance	\$78,53		r Lane Mile		
					To	otal Cost	\$230,59	8 Pe	r Lane Mile		
Option Three			Hot Mix	Asphalt Pa	vemen	t	8.5	i Inc	hes Thick		
			Che	emical Stabi	ilized S	ubgrade	12.0	Inc	hes Thick		
						ion Cost	\$175,29		r Lane Mile		
				30		itenance	\$78,53		r Lane Mile		
					T	otal Cost	\$253,83	0 <i>P</i> e	r Lane Mile		

SUBDIVISION		LAAL	-1411-14	DESIGN		LCS	IAN	יואט	ND 3		
Subdivision	33	rd Street C	Outfall								
Street		d & Larim		ection							
From											
То											
Formation	Qs	- Colluvi	um								
Township				Range		Sec	ction		0 Quarte	r NW	
TRAFFIC	-										
Classification Residential Lots	Coi 0	mmercial	Coi	Speed Limit mmercial Acr	30 es 0		Ent	ered Indi	ESALS ustrial Acres	4,642	2 ,125 0
SUBGRADE	-										
Soil Type		Sand		SHTO A-1					e Drainage	N	0
R Value			UNC	00. 04		Resilien			5137	0.5	0/
Swell 0% Std Proctor	No	· =	uid Limit Proctor		Plasticity		6 15 or		Passing 200		%
Sid Procior 1	NO	IVIOU I	-100101	INO C	ptimum Moi		15%		ax Density	118	pcf
MATERIALS COS	TS				Load Tr	ransfer	2.8 [Dowe	led and Tied		
				*							
Hot Mix Asphai			1.80	\$/sqyd/in		Seal - HN	<i>IAP</i>		0.32		/sqyd
Portland Ceme			3.00	\$/sqyd/in	Milling -	· HMAP - HMAP	Mainta		1.25	-	yd/in
Aggregate Bas Chemical Stabi			0.59 0.80	\$/sqyd/in \$/sqyd/in		- niviar Seal Crad					/sqyd /sqyd
Moisture Treate		_	0.25	\$/sqyd/in		d Surfac			1.50		yd/in
Fog Seal	<i>-</i>	abgrado	0.25	\$/sqyd		PCCP N		•	0.05		/sqyd
Chip Seal			0.75	\$/sqyd		Interest			7.0	7.	%
Slurry Seal			1.25	\$/sqyd		Inflation			3.0		%
PAVEMENT DESI	GN	OPTIONS	-								
Option One			Portland	l Cement Coi	ncrete Pavei	ment	9.0	Incl	nes Thick		
opaon one				Con	struction Co	st \$19	90,080	Per	Lane Mile		
				30 yr	Maintenand	e \$2	28,469	Per	Lane Mile		
					Total Co	ost \$21	18,549	Per	Lane Mile		
Option Two			Hot Mix	Asphalt Pave	ement		12.5	Incl	hes Thick		
Not Recomm	end	ed		Con	struction Co	st \$15	58,400		Lane Mile		
				30 yr	Maintenand		78,533		Lane Mile		
					Total Co.	st \$23	36,934	Per	Lane Mile		
Option Three			Hot Mix	Asphalt Pave	ement		9.0	Incl	hes Thick		
			Che	mical Stabiliz	zed Subgrad	de	12.0	Incl	hes Thick		
				Con	struction Co		81,632	Per	Lane Mile		
				30 yr	Maintenand		78,533		Lane Mile		
					Total Co.	st \$26	60,166	Per	Lane Mile		

SUBDIVISION		PAVE		I DESIGN	IO WIGHE	CSIANI	DAKDS			
Subdivision	33	Brd Street	Outfall							
Street		wning St	o atian							
From		9								
То										
Formation	Qs	- Colluvi	um							
Township				Range		Section	0	Quarte	r NW	
TRAFFIC	-									
Classification Residential Lots	Coi 0	mmercial	Coi	Speed Limit mmercial Acre	35 s 0	Ent	ered ES Industrial	ALS Acres	14,011	,542 0
SUBGRADE	-									
Soil Type		Sand		SHTO A-2-4			urface Dra	_	No	0
R Value		-	UNC	0		silient Modu		_		
Swell 0%		•	uid Limit		Plasticity Inc			ing 200	445	%
Std Proctor N	VO	Mod I	Proctor	No Op	otimum Moistu	ıre 17 %	Max Dei	nsity	115	pcf
					Load Tran	sfer 2.8 D	Doweled ar	nd Tied		
MATERIALS COS	TS									
Hot Mix Asphai	lt Co	oncrete	1.80	\$/sqyd/in	Crack Sea	al - HMAP		0.32	\$/	sqyd
Portland Ceme	nt C	Concrete	3.00	\$/sqyd/in	Milling - Hi	MAP		1.25	\$/sq	yd/in
Aggregate Bas	e Co	ourse	0.59	\$/sqyd/in	Annual - H	HMAP Mainte	enance	0.05	\$/	sqyd
Chemical Stabi	lized	l Subgrad	0.80	\$/sqyd/in	Clean/Sea	al Crack And	Joints	0.72		sqyd
Moisture Treate	ed S	Subgrade	0.25	\$/sqyd/in		Surface Grind	•	1.50		yd/in
Fog Seal			0.25	\$/sqyd		CCP Mainten	ance	0.05	\$/	sqyd
Chip Seal			0.75	\$/sqyd	Annual Int			7.0		%
Slurry Seal			1.25	\$/sqyd	Annual Inf	lation Rate		3.0		%
PAVEMENT DESI	GN	OPTIONS	-							
Option One			Portland	d Cement Con	crete Paveme	nt 11.0	Inches Ti	nick		
				Cons	truction Cost	\$232,320	Per Lane	Mile		
				30 yr I	Maintenance	\$28,469	Per Lane	Mile		
					Total Cost	\$260,789	Per Lane	Mile		
Option Two			Hot Mix	Asphalt Pave	ment	15.0	Inches T	hick		
Not Recomm	end	ed		Cons	truction Cost	\$190,080	Per Lane	Mile		
				30 yr I	Maintenance	\$78,533	Per Lane	Mile		
					Total Cost	\$268,614	Per Lane	Mile		
Option Three			Hot Mix	Asphalt Pave	ment	11.5	Inches T	hick		
			$Ch\epsilon$	emical Stabilize	ed Subgrade	12.0	Inches T			
					truction Cost		Per Lane			
				30 yr i	Maintenance	\$78,533	Per Lane			
					Total Cost	\$291,846	Per Lane	Mile		

SUBDIVISION				10 WIGEL			
Subdivision	33rd Stree	t Outfall					
Street	MLK Jr Blv						
From							
То							
Formation	Qs - Collu	vium					
Township			Range		Section	0 Quar	ter NW
TRAFFIC							
	Commercia 0		Speed Limit mmercial Acre	30 s 0	Ent	ered ESALS Industrial Acres	8,093,149 0
SUBGRADE							
Soil Type	Sand		SHTO A-2-4	5		urface Drainage	No
R Value Swell 0%	20	UNC	0		silient Modu		0 49 0/
Std Proctor N		quid Limit I Proctor		Plasticity Inc otimum Moistu		% Passing 20 Max Density	445
Sia Fractor IN	o iviou	FIOCIOI	NO Op		, -	-	Poi
				Load Trans	sfer 2.8 D	Doweled and Tied	l
MATERIALS COST	rs						
Hot Mix Asphalt	Concrete	1.80	\$/sqyd/in	Crack Sea	I - HMAP	0.32	\$/sqyd
Portland Cemen	t Concrete	3.00	\$/sqyd/in	Milling - Hl	MAP	1.25	\$/sqyd/in
Aggregate Base	Course	0.59	\$/sqyd/in	Annual - H	IMAP Mainte	enance 0.05	\$/sqyd
Chemical Stabliz	zed Subgra	d 0.80	\$/sqyd/in	Clean/Sea	I Crack And	Joints 0.72	\$/sqyd
Moisture Treate	d Subgrade	0.25	\$/sqyd/in	Portland S	urface Grind	ling 1.50	\$/sqyd/in
Fog Seal		0.25	\$/sqyd		CP Mainten	ance 0.05	\$/sqyd
Chip Seal		0.75	\$/sqyd	Annual Inte	erest Rate	7.0	%
Slurry Seal		1.25	\$/sqyd	Annual Infl	lation Rate	3.0	%
PAVEMENT DESIG	OPTION	'S _					
Option One		Portland	d Cement Cond	crete Paveme	nt 10.0	Inches Thick	
			Cons	truction Cost	\$211,200	Per Lane Mile	
			30 yr I	Maintenance	\$28,469	Per Lane Mile	
				Total Cost	\$239,669	Per Lane Mile	
Option Two		Hot Mix	Asphalt Pavel	ment	14.0	Inches Thick	
Not Recomme	ended		•	truction Cost	\$177,408	Per Lane Mile	
				Maintenance	\$78,533	Per Lane Mile	
			-	Total Cost	\$255,942	Per Lane Mile	
Option Three			Asphalt Pave		10.5	Inches Thick	
		Che	emical Stabilize	ed Subgrade	12.0	Inches Thick	
			Cons	truction Cost	\$200,640	Per Lane Mile	
			30 yr i	Maintenance	\$78,533	Per Lane Mile	
				Total Cost	\$279,174	Per Lane Mile	

Pavement Thickness Design According to

1993 AASHTO Guide for Design of Pavements Structures

American Concrete Pavement Association

Flexible Design Inputs

Project Name: 33rd Street Outfall Route: Blake St. s/o 33rd Location: Denver, Colorado

Owner/Agency:

Design Engineer: MGPEC - AASHTO Equivalent Design

Flexible Pavement Design Evaluation

Structural Number 4.43 Total Flexible ESALs 2,628,655 Reliability 90.00 perc Overall Standard Deviation 0.44	Subgrade Resilient Modulus Initial Serviceability nt Terminal Serviceability	5,137.00 psi 4.50 2.50
--	--	-------------------------------------

Layer Material	Layer Coefficient	Drainage Coefficient	Layer Thickness	Layer SN
Asphalt Cement Concrete	0.44	1.00	8.43	3.71
Graded Stone Base	0.12	1.00	6.00	0.72
			ΣSN	4.43

Pavement Thickness Design According to

1993 AASHTO Guide for Design of Pavements Structures

American Concrete Pavement Association

Flexible Design Inputs

Project Name: 33rd Street Outfall

Route: 33rd St. Location: Denver, Colorado

Owner/Agency:

Design Engineer: MGPEC - AASHTO Equivalent Design

Flexible Pavement Design Evaluation

Structural Number3.80Total Flexible ESALs638,227Reliability90.00Overall Standard Deviation0.44	percent	Subgrade Resilient Modulus Initial Serviceability Terminal Serviceability	4,362.00 psi 4.50 2.50
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Layer Material	Layer Coefficient	Drainage Coefficient	Layer Thickness	Layer SN
Asphalt Cement Concrete	0.44	1.00	6.99	3.08
Graded Stone Base	0.12	1.00	6.00	0.72
			ΣSN	3.80

Pavement Thickness Design According to

1993 AASHTO Guide for Design of Pavements Structures

American Concrete Pavement Association

Flexible Design Inputs

Project Name: 33rd Street Outfall
Route: 33rd & Blake Intersection
Location: Denver, Colorado

Owner/Agency:

Design Engineer: MGPEC - AASHTO Equivalent Design

Flexible Pavement Design Evaluation

Structural Number 4.56 Total Flexible ESALs 3,266,882 Reliability 90.00 Overall Standard Deviation 0.44	percent	Subgrade Resilient Modulus Initial Serviceability Terminal Serviceability	5,137.00 psi 4.50 2.50
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Layer Material	Layer Coefficient	Drainage Coefficient	Layer Thickness	Layer SN
Asphalt Cement Concrete	0.44	1.00	8.73	3.84
Graded Stone Base	0.12	1.00	6.00	0.72
			ΣSN	4.56

Pavement Thickness Design According to

1993 AASHTO Guide for Design of Pavements Structures

American Concrete Pavement Association

Flexible Design Inputs

Project Name: 33rd Street Outfall

Route: 33rd & Larimer Intersection

Location: Denver, Colorado

Owner/Agency:

Design Engineer: MGPEC - AASHTO Equivalent Design

Flexible Pavement Design Evaluation

Structural Number Total Flexible ESALs Reliability Overall Standard Deviation	4.80 4,642,125 90.00 percent 0.44	Subgrade Resilient Modulus Initial Serviceability Terminal Serviceability	5,137.00 psi 4.50 2.50
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Layer Material	Layer Coefficient	Drainage Coefficient	Layer Thickness	Layer SN
Asphalt Cement Concrete	0.44	1.00	9.27	4.08
Graded Stone Base	0.12	1.00	6.00	0.72
			ΣSN	4.80

Pavement Thickness Design According to

1993 AASHTO Guide for Design of Pavements Structures

American Concrete Pavement Association

Flexible Design Inputs

Project Name: 33rd Street Outfall Route: Downing Street Location: Denver, Colorado

Owner/Agency:

Design Engineer: MGPEC - AASHTO Equivalent Design

Flexible Pavement Design Evaluation

Structural Number Total Flexible ESALs Reliability Overall Standard Povietion	6.15 14,011,542 90.00	percent	Subgrade Resilient Modulus Initial Serviceability Terminal Serviceability	3,705.00 psi 4.50 2.50
Overall Standard Deviation	0.44			

Layer Material	Layer Coefficient	Drainage Coefficient	Layer Thickness	Layer SN
Asphalt Cement Concrete	0.44	1.00	12.34	5.43
Graded Stone Base	0.12	1.00	6.00	0.72
			ΣSN	6.15

Pavement Thickness Design According to

1993 AASHTO Guide for Design of Pavements Structures

American Concrete Pavement Association

Flexible Design Inputs

Project Name: 33rd Street Outfall Route: MLK Jr Boulevard Location: Denver, Colorado

Owner/Agency:

Design Engineer: MGPEC - AASHTO Equivalent Design

Flexible Pavement Design Evaluation

Structural Number Total Flexible ESALs Reliability	5.73 8,093,149 90.00	percent	Subgrade Resilient Modulus Initial Serviceability Terminal Serviceability	3,705.00 psi 4.50 2.50
Overall Standard Deviation	0.44			

Layer Material	Layer Coefficient	Drainage Coefficient	Layer Thickness	Layer SN
Asphalt Cement Concrete	0.44	1.00	11.39	5.01
Graded Stone Base	0.12	1.00	6.00	0.72
			ΣSN	5.73

33rd Street Outfall

		WinP/	WinPAS Section			Alterna	Alternative Section	u
	Calculated			Recommended Calculated	Calculated			Recommended
Location	HMAP (in)	ABC (in)	SN	HMAP/ABC (in)	HMAP (in)	ABC (in)	SN	HMAP/ABC (in)
Blake St s/o 33rd St	8.43	9	4.43	8.5 / 6	08'9	12	4.43	7 / 12
33rd St Mainline	66.9	9	3.80	9//	5.36	12	3.80	5.5 / 12
33rd & Blake St Intersection	8.73	9	4.56	8.75 / 6	7.09	12	4.56	7.25 / 12
33rd & Larimer St Intersection	9.27	9	4.80	9.5/6	7.64	12	4.80	7.75 / 12
Downing St s/o 33rd	12.34	9	6.15	12.5 / 6	10.70	12	6.15	10.75 / 12
MLK Jr Blvd	11.39	9	5.73	11.5 / 6	9.75	12	5.73	9.75 / 12





May 11, 2015

Mr. Jeffrey Holste, P.E. Wilson & Company, Inc. 5755 Mark Dabling Boulevard Suite 220 Colorado Springs, Colorado 80919

Re: Addendum No. 1 – Geotechnical Design Report Arkins Ct. to Brighton Blvd. Proposed 33rd Street Outfall City and County of Denver, Colorado

Dear Jeff:

Geocal, Inc. has completed a subsurface exploration for the proposed 33rd Street Outfall project, the results of which have been submitted in a report titled *Revised Geotechnical Design Report – Proposed 33rd Street Outfall, City and County of Denver, Colorado*, dated October 21, 2014 and revised on March 25, 2015. A Geotechnical Baseline Report (GBR) and a Geotechnical Data Report (GDR) were also prepared for the above referenced project under separate titles. The recommendations presented in the above mentioned reports remain valid except as modified herein. This addendum should be used in conjunction with our Revised Geotechnical Design Report.

Since submittal of our Revised Geotechnical Design Report, we understand that the City and County of Denver (CCD) plans to develop the existing Gordons property between Arkins Court and Brighton Boulevard along the proposed 33rd Street Outfall alignment. The proposed improvements are expected to include the addition of a new road (Festival Street) from 33rd Street north to 35th Street.

This addendum presents the results of additional subsurface exploration conducted for the 33rd Street Outfall between Arkins Ct. Brighton Blvd. and for the 33rd Street/Festival Street improvements.

SUBSURFACE EXPLORATION

The subsurface exploration was conducted on April 28, 2015 and included drilling four exploratory borings at the approximate locations shown on Figure 1, Locations of Exploratory Borings. Three of the boring were drilled to depths ranging from approximately 5 feet to 10 feet for pavement design purposes, and the remaining boring (Boring 3-PSB) was drilled to a depth of approximately 25 feet to obtain information for traffic signal pole foundations and the 33rd Street outfall structure. The borings were drilled with a truck-mounted Central Mine Equipment (CME) 55 truck mounted drill rig equipped with 3¼ inch inside diameter (ID) hollow-stem augers. The borings were logged by a representative of Geocal, Inc.

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Soil samples were collected using a nominal 2 inch inside diameter California spoon sampler with brass liners. The sampler was driven into the various strata with blows from a 140 pound hammer falling 30 inches, in general accordance with the ASTM D3550 test standard. Penetration resistance values, when properly evaluated, indicate the relative density or consistency of the soils or hardness of the bedrock. Bulk samples of the auger cuttings were obtained from the upper 4 feet of the borings. The samples were visually classified in the field and transported to our laboratory for review by our Project Engineer. Selected samples were programmed for laboratory testing.

After drilling, the borings were backfilled with auger cuttings mixed with bentonite chips and with make-up sand material and the asphalt pavement was patched using compacted cold patch asphalt.

Logs of the subsurface conditions encountered are shown on the attached Figure 2. A description of the material types encountered and symbols used on the logs are shown on the Legend and Notes for Exploratory Borings shown on Figure 3.

Groundwater was not encountered in the borings at the time of drilling, however, groundwater monitoring wells were also installed onsite, to provide groundwater level measurements and for environmental monitoring purposes by Pinyon Environmental.

SUBSURFACE CONDITIONS

The following paragraphs provide a generalized description of the subsurface conditions encountered. For more detailed information, refer to the boring logs shown on Figure 2.

Two of the exploratory borings were drilled in the parking area and encountered the pavement sections summarized in the following table:

Boring ID	Asphalt Pavement (inches)	Aggregate Base Course (inches)
Boring 1-PGT	3¾	41/4
Boring 2-PGT	4	4

The asphalt pavement was in fair condition, the aggregate base course (ABC) generally consisted of sand with silt and gravel. Below the ABC and at the ground surface in the remainder of the borings, artificial fill was encountered which extended to 4 feet deep in Boring 1-PGT to 15 feet in Boring 3-PSB. The artificial fill generally consisted of silty sand with gravel and was occasionally clayey, loose to medium dense, and with fine to coarse gravel. A layer of debris was encountered within the artificial fill in Boring 3-PSB extending from approximately 7 feet to 12 feet deep. The debris fill consisted of coal dust, coke, and brick debris. Natural sands were encountered below the artificial fill in Boring 1-PGT, Boring 3-PGT, and Boring 3-PSB. The sands were poorly graded, silty to clayey, loose to medium dense, and moist. The natural sands extended to the total depth explored in Boring 3-PGT.

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Sedimentary bedrock (claystone) was encountered at depths of 5 feet and 1½ feet in Boring 1-PGT and Boring 2-PGT, respectively, and was encountered at a depth of 22 feet in Boring 3-PSB. The claystone bedrock was moist and high plasticity.

Groundwater was not encountered at the depths explored at the time of drilling. Groundwater levels can be expected to fluctuate with varying seasonal and weather conditions, and is directly influenced with the level of the nearby South Platte River.

LABORATORY TESTING

Laboratory tests conducted on selected soil samples consisted of swell-compression, gradation and Atterberg limits, R-value, and water soluble sulfates concentration. Laboratory test results are shown on the attached Figures 4 through 7 and are summarized in Table 1. Laboratory test results are generally consistent with those presented in the 33rd Street Outfall report.

Swell-Compression Tests: Swell-compression tests (ASTM D4546) were conducted on samples of claystone bedrock. The results are shown on Figure 4 indicate that the claystone samples showed low to high swell potential under light loading and wetting and low to moderate swell pressures. The samples exhibited low to moderate compressibility under increased loading.

Gradation and Atterberg Limits Tests: Soil samples were classified in accordance with the American Association of State Transportation Officials (AASHTO) classification system and on the Unified Soil Classification System (USCS). These classification systems are based on the Liquid Limit (ASTM D423), Plastic Limit (ASTM D424), and grain size distribution (ASTM D422). These parameters provide qualitative information on the suitability of the soils for use in engineering applications. These test results are shown on Figures 5 and 6.

The combined gradation and Atterberg limits test results indicate a broad range of soils were encountered onsite; the samples of artificial fill ranged from well graded gravel with sand to clayey sand, with AASHTO soil classifications ranging from A-1-a to A-4(4). The claystone bedrock samples tested had moderate to high plasticity.

R-Value: The R-value is an indication of the soil's ability to transfer traffic loading in the lateral direction. R-value testing was conducted on a combined bulk sample of auger cuttings from the upper four feet from Boring 1-PGT, Boring 2-PGT, and Boring 3-PGT. R-value test results are shown on Figure 7 and indicate an R-value of 14 for the sample of clayey sand with gravel tested, indicating poor to fair pavement support characteristics for the near surface soils encountered.

Water Soluble Sulfates: The water soluble sulfate test is a measurement of the potential degree of sulfate attack on concrete exposed to the onsite soils and bedrock. The relative degree of attack is based on levels of severity described in the American Concrete Institute (ACI) Section 318. The concentration of water-soluble sulfates measured on the selected samples ranged from "not detected" to 0.05%, indicating a negligible level of sulfate attack for concrete exposed to the onsite soils. Based on these results, no special requirements for sulfate resistance are required for concrete exposed to the on-site soils.

Mr. Jeffrey Holste, P.E. Addendum No. 1 – Geotechnical Design Report Arkins Ct. to Brighton Blvd. Geotechnical Design Report Proposed 33rd Street Outfall May 11, 2015 Page 4

LIMITATIONS

This Addendum No. 1 has been prepared in accordance with generally accepted geotechnical engineering practices used in this area at the time this report was written, and has been prepared for design purposes. The conclusions and recommendations are based upon the data obtained from the borings drilled at the approximate locations shown on Figure 1 and the proposed construction. The nature and extent of the variations at the site may not become evident until excavation is performed. If during construction, soil, bedrock, fill, or groundwater conditions appear to be different from those described, this office should be advised so that re-evaluation of our recommendations may be made. Onsite observation of foundation bearing materials and testing of fill placement by a representative of this office is recommended.

Our professional services were performed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical engineers practicing in this locality at this time. No warranty, expressed or implied, is made. We prepared the report as an aid in design of the proposed project. This Addendum No. 1 is not a specification or bidding document. Any contractor reviewing this Addendum No. 1 must draw their own conclusions regarding site conditions and specific construction techniques to be used.

If you have any questions, or if we can be of further service, please call us at (303) 337-0338.

Sincerely.

GEOCAL

By: Walter J. Zitz, P.E.

Project Engineer

J. Vasquez, P.E.

Principal Engineer

WJZ/G11.1411.004

Attachment:

Figure 1 – Locations of Exploratory Borings

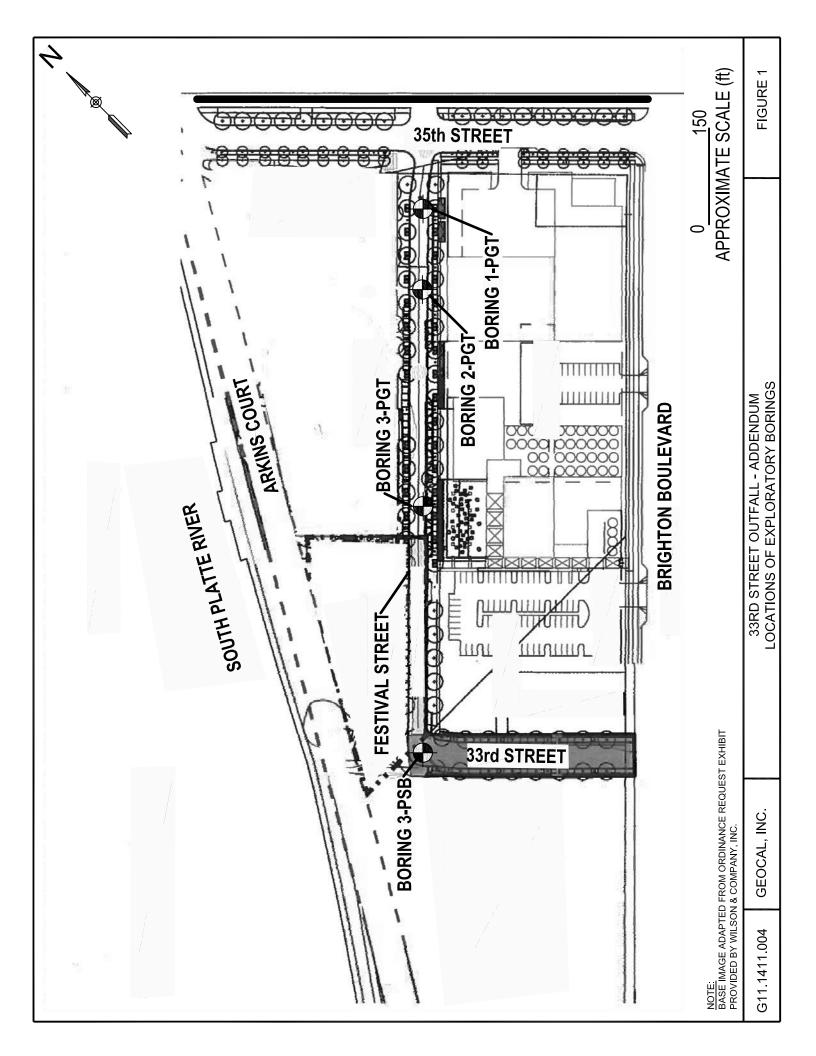
Figure 2 - Logs of Exploratory Borings

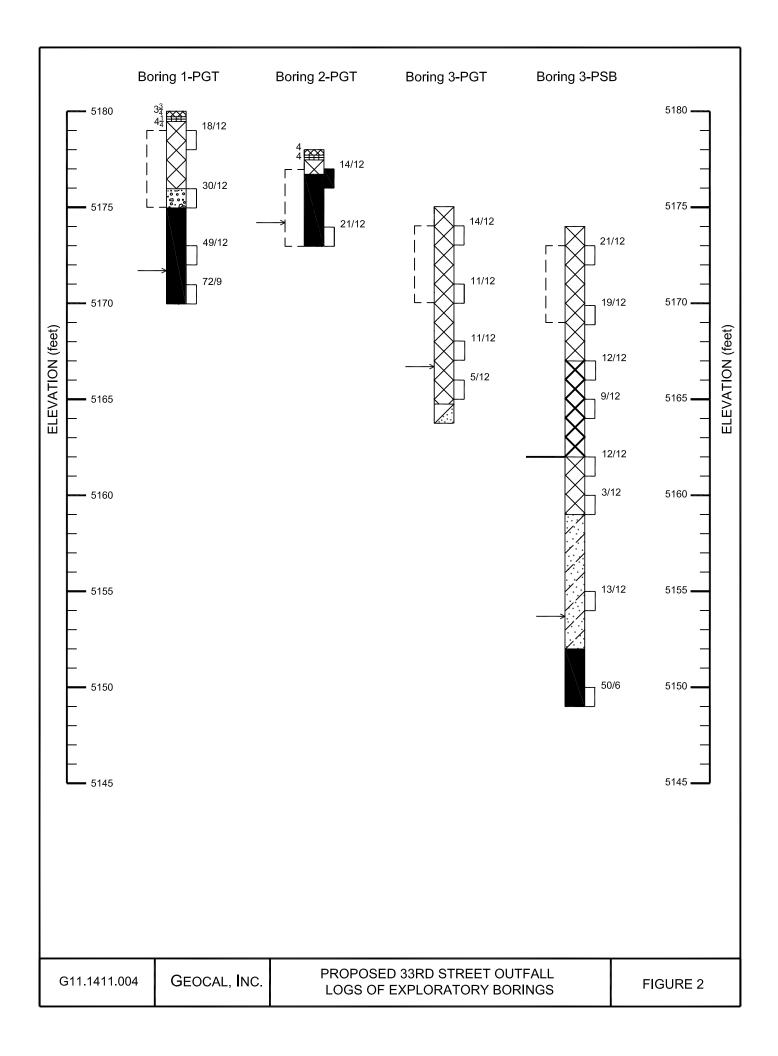
Figure 3 – Legend and Notes for Exploratory Borings

Figure 4 – Swell-Compression Test Results Figures 5 and 6 - Gradation Test Results

Figure 7 – R-Value Test Report

Table 1 – Summary of Laboratory Test Results





<u>LEG</u>	<u>END</u>
$3\frac{3}{4}$	ASPHALT, thickness in inches shown to the left of the log.
⁴ ¹ ⊞	AGGREGATE BASE COURSE, sand with silt and gravel. Thickness in inches shown to the left of the log.
	FILL, silty to clayey sand with gravel, loose to medium dense, non-plastic to low plasticity, moist, grayish to dark brown, fine to coarse gravel, fine to coarse gravel.
\boxtimes	DEBRIS FILL, debris, coal dust and slag, moist, non-plastic, fine to coarse coal/slag fragments, possible asbestos contamination.
	SAND with SILT, loose, low plasticity, moist, light brown to brown, very fine to coarse sand, trace gravel.
9. 0. 9. 0. 9. 0.	SAND and GRAVEL, medium dense, moist, orangish brown, fine to coarse grained sand, fine to coarse gravel.
	SAND with CLAY, to clayey sand, silt, trace gravel, medium dense, moist, low plasticity, brown, fine to coarse sand, fine gravel, laminated.
	CLAYSTONE BEDROCK, hard, moist, low to high plasticity, brownish gray to blue-gray, contains variable amounts of fine to medium sand, occasional coal seams.
	Drive sample blow count, indicates that 18 blows from a 140 pound hammer falling 30 inches were required to drive the California or Split Spoon sampler 12 inches.
	Indicates 2 inch I.D. California liner drive sample.
	Indicates drive sample, Standard Penetration Test, $1\frac{3}{8}$ inch I.D. split spoon sample.
	Indicates depth at which caved material accumulated.
Г 	Indicates disturbed bulk sample.

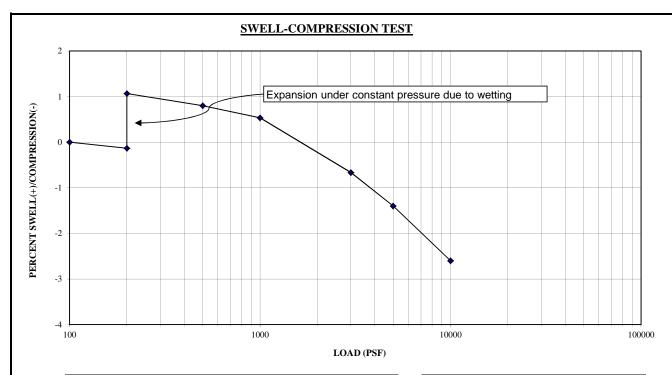
NOTES

- 1. The borings were drilled on April 28, 2015 with CME-55 drill rig equipped with $3\frac{1}{4}$ -inch inside diameter hollow-stem augers.
- 2. Locations of the borings shown on Figure 1 are approximate.

Approximate pipe/culvert invert elevation.

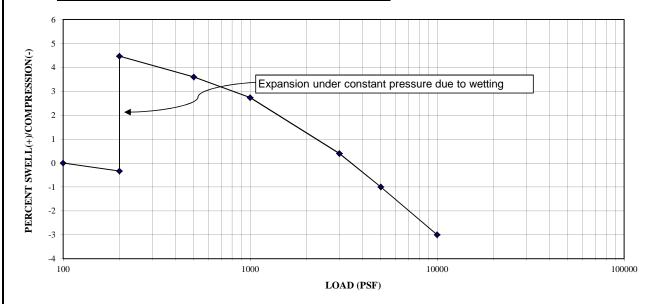
- 3. The borings are drawn to approximate elevations, estimated from contours provided by Wilson & Company.
- 4. The lines between strata represent approximate boundaries between material types. Transitions between materials may actually be gradual.
- 5. Groundwater was not encountered in the borings at the time of drilling, however, fluctuations in the water level may occur with time.

G11.1411.004	GEOCAL, INC.	PROPOSED 33RD STREET OUTFALL LEGEND AND NOTES FOR EXPLORATORY BORINGS	FIGURE 3
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Sample Location	1-PGT
Sample Depth	7 feet
Sample Description	Claystone bedrock
USCS Classification	
AASHTO Classification	

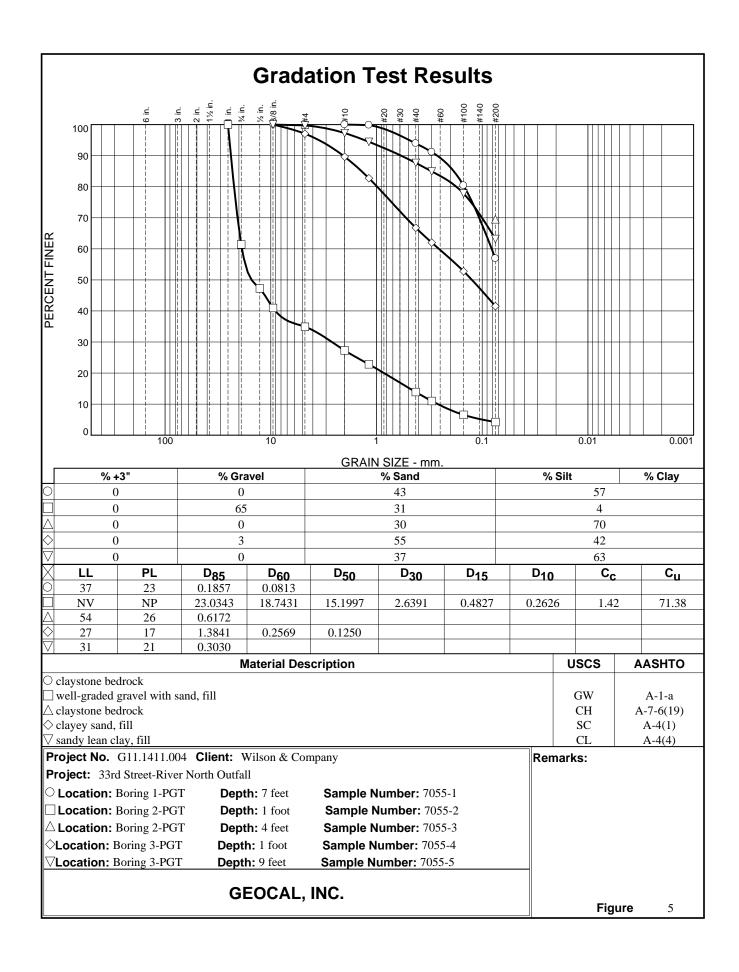
Dry Density	109 pcf
Moisture Content	19.0 %
Volume Change	1.2 %
Swell Pressure	1,650 psf

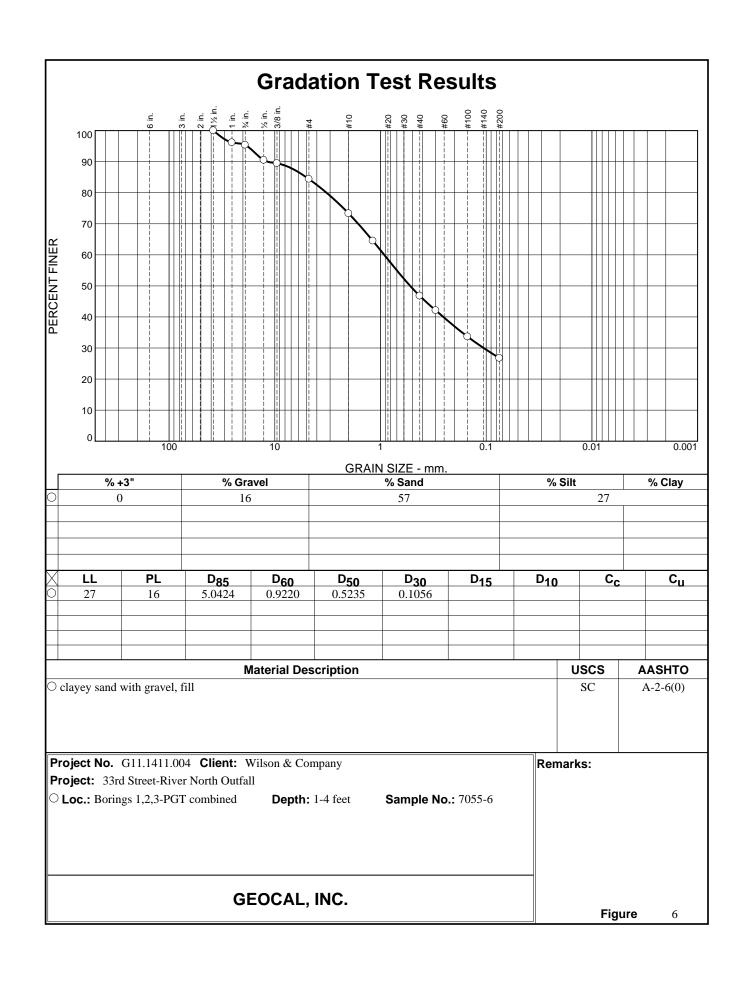


Sample Location	2-PGT
Sample Depth	4 feet
Sample Description	Claystone bedrock
USCS Classification	
AASHTO Classification	

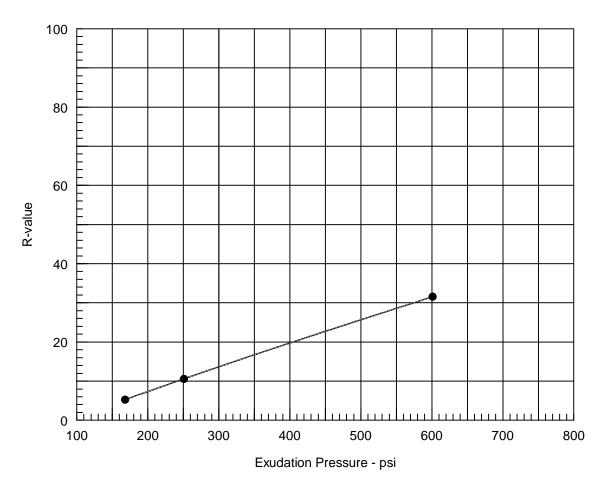
Dry Density	98 pcf
Moisture Content	25.2 %
Volume Change	4.8 %
Swell Pressure	3,500 psf

Croom Inc	33rd Street Outfall	JOB NO.	G11.1411.004
GEOCAL, INC.	SWELL - COMPRESSION TEST RESULTS	FIGURE NO.	4









Resistance R-Value and Expansion Pressure - AASHTO T 190

No.	Compact. Pressure psi	Density pcf	Moist.	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	300	123.0	10.9	0.45	140	2.46	251	11	11
2	350	123.7	9.6	1.82	103	2.52	601	32	32
3	250	121.3	11.9	0.30	150	2.49	168	5	5

Test Results	Material Description
R-value at 300 psi exudation pressure = 14	clayey sand with gravel, fill
Project No.: G11.1411.004 Project: 33rd Street-River North Outfall	Tested by: H. Redzic Checked by: W. Zitz, P.E.
Location: Borings 1,2,3-PGT combined Sample Number: 7055-6 Depth: 1-4 feet Date: 5/8/2015	Remarks: Test performed in accordance with Colorado procedure CP-L 3101.
R-VALUE TEST REPORT GEOCAL, INC.	Figure 7

mpany Ouffall		Soil or Bedrock Description	- - -	Claystone begrock Well-graded gravel with sand, fill	Claystone bedrock	Clayey sand, fill	Sandy lean clay, fill	Clayey sand with gravel, fill									
Wilson & Company 33rd Street Outfall	AASHTO	Class. (Group	Index)	A-1-a		A-4(1)	A-4(4)	A-2-6(0)									
Client: Project Name:	R Value	at 300psi Exudation	Pressure					14									
	Water	Soluble Sulfates	(%)		0.05	Not detected											
ULTS	Swell	Pressure	(psf)	ncoʻl	3,500												
TABLE 1 SUMMARY OF LABORATORY TEST RESULTS	Atterberg Limits	Plasticity Index	(%)	<u>∓</u> 8	28	10	10	7									
TABLE 1 30RATOR	Atterb	Liquid	(%)	is N	54	27	31	27									
RY OF LAB	Percent	Passing No. 200	Sieve	4	70	42	63	27									
SUMMA	Gradation	Sand	(%)	3 43	30	22	37	22									
	Grac	Gravel	(%)	0 9	0	က	0	16									
	Natural	Dry Density	(bct)	80	86	114	101										
40	Natural	Moisture	(%)	0.61	25.2	13.9	11.4										
G11.1411.004	ocation	Depth	(feet)		4	_	6	4									
Project#:	Sample Location	Boring	No.	2-PGT	2-PGT	3-PGT	3-PGT	1,2,3-PGT									





REVISED GEOTECHNICAL DESIGN REPORT

Proposed 33rd Street Outfall City and County of Denver, Colorado

Prepared For

Wilson & Company, Inc. Attn: Jeffrey Holste, P.E. 5755 Mark Dabling Boulevard, Suite 220 Colorado Springs, Colorado 80919

> October 21, 2014 REVISED March 25, 2015



Centennial, Colorado 80112



REVISED GEOTECHNICAL DESIGN REPORT

Proposed 33rd Street Outfall City and County of Denver, Colorado

By: Walter J. Zitz, P.E. Project Engineer **Prepared For**

20098 20098

Reviewed by: Ronald J. Vasquez, P.E. Principal Engineer Wilson & Company, Inc. Attn: Jeffrey Holste, P.E. 5755 Mark Dabling Boulevard, Suite 220 Colorado Springs, Colorado 80919

> October 21, 2014 REVISED March 25, 2015 G11.1411.000

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1.0 PURPOSE AND SCOPE

This *revised* geotechnical design report contains the results of our geotechnical exploration and foundation design recommendations for the outfall structure and pavement design recommendations for the proposed 33rd Street Outfall in Denver, Colorado. A subsurface exploration and laboratory testing program was conducted to obtain information on soil, bedrock, and groundwater conditions within the area of the proposed storm sewer and outfall. The subsurface conditions encountered were logged and soil and bedrock samples were visually classified by a Geocal representative. The logs and samples collected were reviewed by our project engineer. Selected samples were programmed for laboratory testing to evaluate strength, compressibility or swell characteristics, index properties, and other engineering properties. Results of the field exploration and laboratory testing programs were evaluated to develop recommendations for geotechnical design of the proposed storm sewer and pavement section.

This report has been prepared to summarize the data obtained and to present our conclusions and recommendations based on the proposed construction and subsurface conditions encountered during our field exploration. This revision is provided to include the results of an additional subsurface exploration conducted to the southwest of 3330 Brighton Boulevard. Our services were provided in accordance with our Subconsultant Agreement with Wilson & Company, No. 11-600-402-00, dated November 11, 2011, and our proposal titled Geotechnical Engineering Services Supplemental Proposal – 31st and 36th Streets Outfalls Design Project – 33rd Street Alignment Corridor – City and County of Denver, Colorado, and dated February 14, 2012.

2.0 Proposed Construction

The currently proposed construction consists of installation of a gravity fed storm sewer that will consist of a combination large diameter reinforced concrete pipe and concrete box culverts that will improve the overall storm sewer drainage capacity of the area roughly bounded by 31st Street (south), 33rd Street (north), and Lafayette Street (east), to the South Platte River (west). The proposed alignment will start near the intersection of Martin Luther King, Jr. Boulevard and Lafayette Street and continue west along Martin Luther King, Jr. Boulevard to Downing Street. The conduit will then follow Downing Street northward a short distance and then turn northwest and follow 33rd Street west to the South Platte River where the outfall will be located. The conduit will be approximately 4 feet in diameter and will discharge into an approximately 20 feet by 4 feet box at the outfall. The invert depths of the conduit will vary from about 8 feet to 30 feet below existing grades along the proposed alignment. The overall length of the alignment is approximately 4,600 feet (0.87 mile). The majority of the alignment will be constructed utilizing cut and cover methods and will be constructed within City and County of Denver (CCD) streets.

Two portions of the proposed outfall are expected to be constructed using tunnel construction techniques. These segments consist of an approximately 200 foot segment that crosses beneath the existing UPRR facility and an approximately 350 foot segment extending southeast across the southern side of a currently asphalt paved parking area and site of the future Source Hotel at 3330 Brighton Boulevard. The portion of the alignment west of the Union Pacific Railroad (UPRR) tracks will cross through existing private property with the exception of the portions of the alignment that will cross Brighton Boulevard and Arkins Court and the final section northwest of Arkins Court which is within Denver Parks and Recreation property. A geotechnical data report (GDR), and geotechnical baseline report (GBR) have been prepared by Geocal for the tunnel portions of the proposed alignment beneath the UPRR facility and southwest of 3330 Brighton Boulevard.

If the proposed construction is significantly different from that described, Geocal, Inc. should be notified to re-evaluate the recommendations contained in this report.

3.0 SITE CONDITIONS

Planned alignment of the new storm drain traverses an area consisting of mostly originally gently to very gently west and northwest sloping topographic terraces associated with the pre-controlled floodplain of the South Platte River. The original surface has been moderately to extensively modified by grading and construction activities related to (from west to east):

- South Platte River bank modifications (including informal dumping, purposeful in-fills of slope irregularities and drainages and construction of a recreational pathway), includes the project outfall and portions of Arkins Court (alignment stationing approximately 10+00 to 11+50).
- Mixed-use light industrial and multi-track railroad development and cross-street construction, between Arkins Court and about Blake Street (11+50 to 27+50).
- Construction of City arterial and connector streets, which covers all of the project's footprint east of Blake Street, and related intersections and trenching associated with various storm water controls and other utilities.

The present day channel of the northward-flowing South Platte River occupies a position at or near its original (pre-modern modifications) location in the area of the planned outfall. The river flows year-round although flow depths vary considerably due to storm events, snow melt, and upstream dam release rates. The river is classified as a "flood-prone principal stream" by the U.S. Army Corps of Engineers (defined in the project area as the portion confined by its steep banks; approximately coincident with the west shoulder of Arkins Court). In the area of the outfall, the steep river bank and east side right-of-way of Arkins Court are lined with large mature deciduous trees; the bank includes an 8-foot wide concrete paved segment of the Platte River Recreational Trail.

The existing grade east of Arkins Court (Station 11+50) to about Lawrence Street (Station 38+75), slopes very gently downward to the west across a series of lower to intermediate level floodplain terraces that slope subtly down to the west. East to Lawrence Street to the end of the project near MLK Jr. Boulevard and Lafayette Street, the ground surface is very gently rolling as associated with an eroded upper level terrace and transition into the greater Park Hill-City Park Highlands just to the east.

Major surficial features associated with the plan alignment, and immediately surrounding land use, east of the Platte River bank includes:

- Arkins Court (centering at about 11+50): a two-lane asphalt-paved major connector street that runs parallel to the South Platte River.
- Arkins Court to Rail Yard (11+50 to 22+00): former and current mixed use light industrial and service properties with low rise buildings and concrete or asphalt-paved or bare soil sites of former buildings; includes northeast-southwest trending Brighton Boulevard (centering at about 16+50) as a 4-lane, asphalt-paved undivided major arterial roadway. The proposed alignment (16+80 to 20+30) crosses a paved parking area located on the southern end of the private property at 3330 Brighton Boulevard, site of the future Source Hotel.
- Rail Yard (22+00 to 24+00): multiple northeast-southwest heavy rail through-tracks and local industrial spurs (Union Pacific Railroad) and parallel light rail track pairs (Regional Transportation District); includes associated signaling and switching facilities.
- Coors Field Parking Lot (24+00 to 25+00): a major asphalt-paved parking area with concrete bus loading ramp on west next to the rail yard fence; the lot extends significant distances north and south of the alignment.
- 33rd Street (near Blake Street to Downing Street, 25+00 to near 48+25): extends southeast-northwest as an undivided two lane connector street, asphalt-paved (except for a short concreted-paved segment west of Blake Street as a driveway entrance to the parking lot); right angle two-lane connector street simple intersections (un-signaled) each block with occasional intra-block alley intersections. Offsetting properties west of Lawrence Street (38+00) are occupied mostly by low-rise mixed-use light industrial and commercial businesses; to the east the properties are mostly occupied by two-story residential apartments or individual single-story houses with some interspaced vacant lots.
- Downing Street offset between 33rd Street and MLK Jr. Boulevard (centering on about 48+25 to 50+00): the street is a major north-south, two-lane arterial with a painted median-turn lane; the northwest and southwest quadrants include triangular islands formed by the skewed intersections with 33rd Street and Champa Street that are occupied by a public bus transfer lot and small public park, respectively.
- MLK, Jr. Boulevard to Lafayette Street (Station 50+00 to about Station 53+50/Lateral Station 1+00 to 5+04): the asphalt-paved street is a major east-west connector with a signaled simple right-angle intersection at Marion Street and a simple T-intersection (non-signalized) at Lafayette Street; the offsetting properties are occupied by relatively large multi-story residential apartment buildings on the south side of MLK Jr. Boulevard, small stand-alone retail businesses and, at the northeast corner with Marion Street, a major public school campus complex covering multi-City blocks.

4.0 SITE GEOLOGY

Published quadrangle scale geologic mapping indicates that the project corridor crosses original (pre-construction) material assigned to three major unconsolidated soil deposits (from west to east):

- 1) Post-Piney Creek Alluvium (South Platte River east bank to about Brighton Boulevard, 10+00 to 16+50): as lower floodplain deposits typified by interbeds and mixtures of clay, silt and sand with lessor gravel; lenses of humic bog clay and silt a few feet thick have been reported in the general area; total thickness is usually no greater than about five feet.
- 2) Broadway Alluvium (Brighton Boulevard to about Downing Street/MLK Jr. Boulevard, this includes the project area; Station 16+50 to 50+00): as channel to intermediate terrace floodplain deposits of mostly generally well-stratified grain-supported (limited clay-silt matrix) sand and pebble gravel with a few feet of the upper portion (where not removed by construction) commonly containing clayey-pebbly silt; total thickness is reported to range up to about 15 feet.
- 3) Eolian Sand (MLK Jr. Boulevard and east): windborne deposits of generally massive clay, fine sandy silt and fine sand with local areas containing large amounts of only clay and silty clay; anticipated at less than 10 feet thick in the project area, although likely overlies deposits of older Broadway Alluvium.

Bedrock is not exposed near the project corridor. Published soil thickness maps indicate about 20 feet of total soil overburden on the west (along the axis of South Platte River) to over 60 feet at the east (MLK Jr. Boulevard). Published results of previous drilling in the area and mapping of the closest exposure (around the intersection of I-25 and I-70 about one mile northeast of the project's outfall) assign sedimentary bedrock to the Arapahoe-Denver Formation Undifferentiated; it is interpreted to extend under project area soils. The unit's upper portion is commonly dominated by well-stratified layers of claystone and siltstone with lesser interbeds and lenses of clayey sandstone and occasionally conglomerate. Structural dip is interpreted to slope gently downward in a generally easterly direction.

Published hydrographic mapping indicates groundwater table to average about 20 feet deep through the project area and to lie within alluvial aquifers. Groundwater flow direction (from published mapping of the water table's altitude) is towards the South Platte River with nearby alluvial aquifers indicated to be in communication with channel flow and subject to changes in water table level as river flow fluctuates.

5.0 SUBSURFACE EXPLORATION

The original subsurface exploration activities were conducted in February and March of 2012 to evaluate two proposed alignments at 35th Street and 33rd Street in order to select a preferred alignment. A preferred alignment (33rd Street) was chosen by Wilson & Company and the CCD. A supplemental subsurface exploration program was conducted within the preferred alignment in March, April, and May of 2013. Four borings were drilled for the tunnel study and 18 borings were drilled for the final alignment study. An additional 4 borings were drilled near 3330 Brighton Boulevard on February 20, 2015. Approximate locations of the borings are shown on Figures 1A through 1F, Locations of Exploratory Borings. The deeper borings were advanced with hollow-stem augers and the shallow pavement borings were advanced with solid stem augers. Samples were collected with 2 inch inside diameter (I.D.) California liner samplers and with 1% inch I.D. split spoon samplers. The California liner samples were obtained in general accordance with ASTM D3550-01. The standard split spoon samples were obtained in general accordance with ASTM D1586. When properly evaluated, penetration resistance values indicate the relative density or consistency of soils and hardness of bedrock. Samples were visually classified by a Geocal field geologist then returned to our laboratory for review by our Project Engineer. Bulk samples were obtained from the upper five feet for the borings drilled within the existing pavement. The borings were backfilled with either cuttings or a gravel and bentonite mixture and compacted with the weight of the drill rig. In existing pavement areas, the surface was patched with cold patch asphalt that was compacted in lifts. Selected samples were programmed for laboratory testing.

Logs of the subsurface conditions encountered are shown on the attached Logs of Exploratory Borings, Figures 2A through 2D. A description of the material types encountered and symbols used on the logs are shown on the Legend and Notes for Exploratory Borings, Figures 3A and 3B. Groundwater conditions were recorded while drilling, and PVC pipe was installed in Borings GW-2, GW-3 and GW-4 to provide follow-up groundwater level measurements. Groundwater monitoring wells were installed in Boring 1 on Arkins Street, Boring 4 off Brighton Boulevard and at an offset location adjacent to Boring GW-1 at the southeast corner of the parking area at 3330 Brighton Boulevard. The monitoring wells were installed to for environmental monitoring purposes (performed by Pinyon Environmental). The monitoring wells installed in

these borings were constructed in accordance with appropriate State of Colorado regulations and were registered with the Office of the State Engineer, Department of Water Resources by Pinyon Environmental.

6.0 SUBSURFACE CONDITIONS

Nineteen borings were drilled through asphalt pavement; one boring was drilled through a concrete pavement with aggregate base course; and two borings encountered topsoil at the ground surface. One boring was drilled in an area with no pavement or topsoil at the ground surface. The pavement section and topsoil thicknesses, where encountered, are shown on the logs. Aggregate base course was encountered beneath the asphalt pavement in Boring 7, Boring 15, Boring 16, and Boring GW-4 and varied in thickness from approximately $2\frac{1}{2}$ inches to 9 inches. The pavement sections encountered in the borings are:

Table 6-1
Pavement Sections Encountered in Exploratory Borings

Boring ID	Street	Asphalt Pavement (Inches)	Concrete Pavement (Inches)	Aggregate Base Course (Inches)
Boring 2	Arkins Court	81/2		
Boring 4	Brighton Boulevard (Shoulder Area)	5		
Boring 5	33 rd Street		7½	5½
Boring 6	Blake Street	5		
Boring 7	33 rd Street	3		9
Boring 8	33 rd Street	4		
Boring 9	33 rd Street	5		
Boring 10	33 rd Street	3		
Boring 11	33 rd Street	4		
Boring 12	33 rd Street	51/4		
Boring 13	33 rd Street	3		
Boring 14	Downing Street	5		
Boring 15	Martin Luther King Jr. Boulevard	8		4
Boring 16	Martin Luther King Jr. Boulevard	8		6
Boring 17	Arkins Court	5½		
Boring 18	Arkins Court	8		
Boring GW-1	3330 Brighton Boulevard (parking lot)	4		
Boring GW-2	3330 Brighton Boulevard (parking lot)	3		
Boring GW-3	3330 Brighton Boulevard (parking lot)	3		
Boring GW-4	3330 Brighton Boulevard (parking lot)	5		21/2

Artificial (man-placed) fill was encountered in each of the borings along the proposed alignment, the depth and composition of which was highly variable. Borings 3, 5, 16, 17, and 18 were terminated in artificial fill at depths of 5 feet to 15 feet below existing grades. In the remaining borings, the artificial fill continued to depths of approximately 2 feet to 12 feet. The fill generally consisted of clayey to silty sands with variable amounts of gravel with some sandy clay zones. The material was commonly highly variable in content, consistency, and density. Moisture contents were generally moist and color varied (light to dark brown, mottled mixed browns and grays). The soils portion of the fill ranged from non-plastic to high plasticity. In Borings 4, 7, 17, 18, and GW-1 through GW-3 debris was encountered in the fill and consisted of concrete, asphalt, brick, glass, ash, and other miscellaneous trash. In Boring 2, organic material was encountered in the artificial fill at a depth of about 9 feet. In Boring GW-1 a layer of asphalt pavement 6 inches thick was encountered within the artificial fill at a depth of approximately 3 feet. In summary, the existing fill continued to depths of approximately 2 feet to greater than 15 feet below existing grades.

Beneath the artificial fill, interbedded deposits of clays, sands, and gravels were encountered and continued to variable depths. Claystone bedrock was encountered in six borings. The natural soils and bedrock materials are identified as follows:

- **Borings 7, 9, 11, 13, and 15**: The artificial fill continued to a depth of approximately 2 feet in each boring and was underlain by very loose to medium dense, moist, brown, silty to gravelly sand. The sand and gravel were generally fine to coarse. The sand continued to the bottom of these borings at a depth of 5 feet below grade.
- Borings Geo 3, Geo 4, and TB-1 through TB-4: Between 2 feet to 3 feet of artificial fill was encountered at the surface of each boring and consisted of silty to clayey sand with variable amount of gravel that was medium dense, moist, and fine to coarse grained, with low plasticity clay (where encountered). Beneath the artificial fill and extending to between 33 feet to 34 feet deep were natural soils of sand, gravel and clay soils. The granular soils (sand and gravel) varied from loose to dense, fine to coarse grained, contained small to large gravel, and were moist to wet below the groundwater. Fine grained soil (clay) seams were encountered at depths of about 16 ½ feet and 18 feet were about 2½ feet to 7 feet thick and had high plasticity, variable amounts of fine grained sand, and were moist. Bedrock was encountered at approximate depths of 34½ feet and 33 feet in the borings and continued to the maximum extent of the explorations (40 feet). The bedrock consisted of claystone that was hard to very hard, moist, had medium to high plasticity, and contained variable amounts of fine to medium grained sand.

- Borings 6, 8, 10, and 12: The artificial fill continued to a depth of approximately 2 feet in each boring and was underlain by interbedded deposits of clay, sand, and gravel. The clays were generally soft to hard, moist, brown, medium to high plasticity, and contained variable amounts of fine to coarse sand. The granular deposits were generally loose to very dense, moist to wet, brown, and fine to coarse. The interbedded soil deposits continued to the bottom of these borings at depths of 30 feet to 40 feet below existing grades.
- Borings 1, 2, 4, 14, and GW-1 through GW-4: The artificial fill continued to depths of approximately 2 to 15 feet in these borings and was underlain by clay, sand, and sedimentary bedrock. The clay, where encountered, was generally soft, moist, brown, low plasticity, silty, and contained some fine to medium sand. The sands were very loose to very dense, moist, brown, fine to coarse, and contained variable amounts of fine to coarse gravel. In Boring 4, the artificial fill continued to a depth of approximately 9 feet and was underlain by claystone bedrock. In Borings 2, 4, and 14, the soil deposits continued to depths of approximately 61/2 feet to 38 feet and were underlain by claystone and sandstone bedrock. In Borings 1, 2, GW-1, GW-2, and GW-4, the claystone was fresh to slightly weathered, hard to very hard, moist, blue gray, medium to high plasticity, and contained trace to some fine sand. Sandstone bedrock was encountered in Boring GW-3 at approximately 13 below grade and continued to the maximum depth of the boring 21½ feet. A sandstone interbed was encountered in Boring 1 from 18 feet to 22 feet. The sandstone was hard, moist, blue gray, and clayey. Also in Boring 1, a thin coal seam was encountered at a depth of approximately 24½ feet. In Borings 4 and 14, the claystone was weathered from the depth encountered, 9 feet and 38 feet, respectively, to depths of 18 feet and 40 feet, respectively. Boring 14 was terminated in the weathered claystone at a depth of 40 feet. In Boring 4, the claystone was fresh to slightly weathered, hard to very hard, moist, blue gray, medium to high plasticity, and contained trace to some fine sand and continued to the bottom of the boring at a depth of 30 feet.
- Borings 16, 17, and 18: The artificial fill continued to the bottom of each of these borings at depths of approximately 5 feet to 15 feet below existing grades.

Upon completion of drilling Boring 1, an offset location was drilled to accommodate soil sampling by Pinyon Environmental, Inc. At the offset location, split-spoon sampler refusal was encountered on concrete debris at a depth of approximately 4½ feet.

With the exception of Borings 1, Geo 3, Geo 4, 6, GW-1, GW-2, and GW-4, groundwater was not encountered during drilling. Groundwater was encountered during drilling in Boring 1 at a depth of 20 feet. As previously described, groundwater monitoring wells were installed in Boring 1 and Boring 4 to provide for future groundwater readings. Upon completion of drilling Boring 1, the groundwater level was 7½ feet below the ground surface. Groundwater was encountered in Borings Geo 3, Geo 4, and 6 at depths of approximately 23 feet to 27½ feet. In Borings GW-1 and GW-2, groundwater was encountered at depths of approximately 24 feet at the time of drilling, and rose approximately ½ foot in Boring GW-2 four days after

drilling. Groundwater was encountered at the surface of the claystone bedrock in Boring GW-4 at the time of drilling and rose approximately 1 foot after four days.

The groundwater levels can be expected to fluctuate with time, both seasonally and over longer periods. Borings not subjected to monitoring well construction were backfilled with a combination of auger cuttings, gravel and bentonite that was compacted with the weight of the drill rig. Borings drilled in existing pavement areas were patched with a minimum of 9 inches of cold patch asphalt that was compacted in lifts.

7.0 GEOTECHNICAL LABORATORY TESTING

Laboratory tests performed on selected soil and bedrock samples included swell-compression, gradations, Atterberg limits, R-value, direct shear, water soluble sulfates, and chemical tests. Tests for heavy metals were performed by Colorado Analytical Laboratories, Inc. Laboratory test results are shown in Figures 4 through 34 and are summarized in Tables 1 and 2.

Swell-Compression Tests: Swell-compression tests are a direct measurement of compressive or expansive potential for a particular sample. Measurements were made by loading the sample in a consolidometer to a light surcharge pressure, subjecting the sample to wetting, then allowing the specimen to swell or compress. After stabilization, additional loads were applied with each load increment given the opportunity to stabilize.

Swell-compression tests were performed on samples of sandy fat clay and claystone bedrock. The results shown on Figures 4 and 5 indicate that the bedrock samples showed moderate to high swell potential under light load and wetting with moderate to high swell pressures and low to moderate compressibility under increased loading. The sample of sandy fat clay tested showed low swell potential and moderate to high compressibility under increased loading.

Gradation and Atterberg Limit Tests: These test results are shown on Figures 6 through 17 and summarized in Table 1. The gradation test is a mechanical measurement of the distribution of particle sizes. For an assessment of the particle distribution finer than the No. 200 sieve, the hydrometer test was used to extend the gradation into the silt and clay zone for the fine-grained soils encountered within the proposed tunnel construction area under the UPRR. The majority of soils tested were granular with zones of fine grained soils (clay). Soils in the outfall location and along Arkins Court varied from poorly graded sand with silt and gravel to clayey sand. Soils encountered in Brighton Boulevard and the 3330 Brighton Boulevard tunnel area generally classified as silty, clayey sand with gravel. Soils within the tunnel area under the UPRR generally classified as sand with gravel and with some fat clay. Soils encountered within 33rd Street, Blake Street, Downing Street, and Martin Luther King Jr. Boulevard were silty to clayey sand with gravel.

The Atterberg limits test defines the consistency of the soils at different moisture contents, and the stages of consistency measured were the Liquid Limit (LL) and the Plastic Limit (PL). The LL is the moisture content above which the soil behaves as a viscous liquid, and the PL is the moisture content below which the soil no longer behaves plastically. The mathematical difference between the LL and PL is the Plasticity Index (PI). The Atterberg limit properties provide qualitative indication of the swell or consolidation potential, and aid in evaluating the support characteristics for pavement or other minor structures.

Together, the gradation and Atterberg limits tests were used to classify the soils in accordance with the American Association of State Highway and Transportation Officials (AASHTO) and the Unified Soil Classification System (USCS). These classifications help provide a general qualitative assessment of engineering properties. The test results indicate the soils encountered varied from A-1-a to A-7-6(65) based on AASHTO classifications. Group Indices ranged from 0 to 65. The USCS designations were typically silty sand (SM), sandy clay (CL), and clayey sand (SC) although zones of poorly graded and well graded sands (SP and SW) were also encountered. Isolated zones of fat clay (CH) soils were encountered in the proposed tunnel areas. The test results also indicate that the soils encountered generally ranged from non-plastic to low plasticity with occasional medium to high plasticity soils.

The claystone bedrock samples exhibited high plasticity which indicates that a swell potential could exist when these materials are subjected to wetting.

R-Value: The R-value is an indication of the soil's ability to transfer traffic loading in the lateral direction. R-value testing was conducted on bulk samples from Borings 2, 4, 7, 10, 13, 16, 17 and 18. R-value test results ranged from 22 to 69 as shown on Figures 18 through 26, and summarized in Table 1. These results indicate fair to very good pavement support characteristics for the near surface soils encountered.

Unconfined Compressive Strength Test: Unconfined compressive strength tests were conducted on selected soil and bedrock samples. The unconfined compressive strength is a measurement of the compressive strength under axial loading without lateral confinement. The results shown on Figures 27 through 31 indicate that the sample of lean clay with sand tested had an unconfined compressive strength of approximately 1,500 psf. The results indicate unconfined compressive strengths ranging from approximately 5,500 psf to 12,600 psf for the samples of claystone bedrock tested.

Direct Shear Tests: Direct shear tests were conducted on selected samples of granular soils. The samples were saturated, loaded with a normal pressure and sheared on the horizontal plane at a controlled strain rate. The test is useful in evaluating the friction angle of granular soils, and the results are shown on Figures 32 through 34. The results indicate peak friction angles ranging from 35 degrees to 47 degrees.

Water Soluble Sulfate: The water soluble sulfate test is a measurement of the potential degree of sulfate attack on concrete exposed to the onsite soils. The relative degree of attack is based on negligible, moderate, severe, and very severe as described in American Concrete Institute (ACI) Section 318. The concentration of water-soluble sulfates measured in representative soil samples are shown in Table 2. The concentrations ranged from 'not detected' to 0.43% and indicate a negligible to severe degree of sulfate attack on concrete exposed to the onsite soils. Cement used for concrete exposed to on-site soils should be Type V in order to help resist potential sulfate degradation of the concrete.

Corrosion Test Results: Analytical tests for corrosion potential were performed by Colorado Analytical, and those results are contained in Appendix A. Tests were performed on selected samples for pH, sulfide and chloride concentrations. The results of the corrosion potential tests are summarized in Appendix A and should be reviewed by a corrosion specialist.

Heavy Metals Test Results: Selected samples from borings drilled in Arkins Court and 33rd Street were submitted to Colorado Analytical for heavy metals analysis (RCRA-8). Results of the analysis are included in the Appendix A.

8.0 FOUNDATION RECOMMENDATIONS

Thrust Blocks. The invert depths for the conduit are anticipated to be approximately 8 feet to 27 feet below the existing ground surface. At those depths, the soils and bedrock will be variable and may consist of artificial fill, sandy clays, clayey sands, silty sand, and claystone bedrock. Most of the natural soils are expected to be suitable for support of lightly loaded structures and a maximum allowable (vertical and lateral) soil bearing pressure of 2,000 pounds per square foot (psf) may be used for thrust block design. The allowable soil bearing pressure is in addition to the weight of the overlying soils. The maximum allowable soil bearing pressure of 2,000 psf may be increased by ½ for transient loading.

Outfall Structure. The outfall structure will likely be exposed to the erosive forces of the South Platte River; and as such, we recommend that the outfall structure be supported on a drilled shaft foundation system if sufficient scour protection cannot be installed to protect the bearing surface of the outfall structure. The ability of the claystone bedrock to carry structural loading had been based on an analysis of the penetration tests and our experience with the design and performance of similar structures.

Results of the swell-consolidation tests indicate that with stress release and with the addition of water, some expansion of the bedrock can be expected. We do not believe this will be an important design consideration since the minimum dead load on the foundation will be adequate to prevent uplift on the shafts. When confined, the bedrock in this formation has a high shear strength and is not expected to settle excessively under high unit load.

The design and construction criteria presented below should be observed for a straight drilled shaft foundation system. The construction details should be considered when preparing project documents.

- Drilled shafts should be designed for an allowable end bearing pressure of 30,000 pounds per square foot (psf) and a skin friction of 3,000 psf for that portion of the pier in competent non-weathered bedrock. The upper 3 feet of pier penetration into bedrock should be ignored in all load calculations but can be utilized to fulfill minimum penetration requirements/and minimum length requirements. Uplift on the piers can be resisted by utilizing 75% of the allowable skin friction value plus the weight of the pier.
- 2) Shafts should penetrate a minimum of 8 feet into competent bedrock and should have a minimum length of 15 feet. These are geotechnical parameters and greater lengths may be required based on structural requirements.
- 3) Required drilled shaft penetration should be balanced against potential net tensile forces due to expansion of the bedrock on the site. For design purposes, the uplift force on each drilled shaft can be determined on the basis of the following equation:

$$U_p = \pi^* D^* 8 \text{ kips/ft}$$

Where: U_p = the uplift force in kips, and D = the drilled shaft diameter in feet

Uplift forces on drilled shafts should be resisted by a combination of dead-load and skin friction from shaft penetration below a depth of 10 feet and in the bearing strata.

4) Shafts should be designed to resist lateral loads assuming the following design parameters for use with the computer program LPILE:

Table 8-1 Recommended Parameters for LPILE Analyses

Soil Type (p-y Curve Model Type)	Effective Unit Weight (pcf)	Cohesion C (psf)	Friction Angle, φ (degrees)	k-static (pci)	k-cyclic (pci)	€50		
Artificial Fill (Sand, Reese)	115	0	28	25				
Natural Sand Above Water Table (Sand, Reese)	120	0	32	90				
Natural Sand Below Water Table (Sand, Reese)	58	0	32	60				
Bedrock (Stiff Clay w/out Free Water)	125	6,000	0	2,000	800	0.004		

 ε_{50} = equal to strain at 50% of the peak strength

The drilled shaft should be reinforced full depth for the applied axial, lateral, and uplift stresses imposed. The amount of reinforcing steel needed to resist heave caused by expansive soil or bedrock should be determined by the net tensile force created by the uplift force on each drilled shaft, with allowance for dead-load.

- 6) A 4-inch void should be provided beneath grade beams to prevent the swelling from exerting uplift forces on the grade beams and to concentrate shaft loadings. A void should be provided beneath necessary pile caps and between the shafts.
- 7) The minimum spacing requirements between shafts on the site should be 3 diameters from center to center. At this spacing, no reduction in axial soil modulus values is required. Drilled shafts grouped less than 3 diameters center to center should be studied on an individual basis to determine the appropriate reduction in both lateral and axial capacity.
- 8) A maximum length to diameter ratio of 25 is recommended to facilitate proper cleaning and observation of the shaft hole.
- 9) Concrete utilized in the shaft should be a fluid mix with sufficient slump so it will fill the void between reinforcing steel and the shaft hole. A slump in the range of 5 inches to 7 inches is recommended.
- Based on the results of our field exploration, laboratory test results, analyses, and our experience with similar projects, settlement for a properly constructed 2 to 4 foot diameter shafts may be approximately ½ inch to ¾ inch when designed with the criteria presented herein. The settlement of closely spaced shafts may be larger and should be studied on an individual basis.
- 11) Shaft holes should be properly cleaned prior to the placement of concrete.
- The presence of water in the exploratory boring at the outfall structure and proximity to the river indicates that the use of casing and dewatering equipment in the shaft holes will be required to reduce water infiltration and accumulation. If water cannot be removed prior to placement of concrete, the tremie method should be used after the hole has been well cleaned. In no case should concrete be placed in more than two (2) inches of water unless the tremie method is used.
- The drilling contractor should mobilize equipment of sufficient size and operating conditions to achieve the required claystone bedrock penetration. If drilling refusal is encountered in these materials, our office should be notified to evaluate the conditions and to establish that true refusal has been met with adequate drilling equipment.
- Care should be taken to prevent forming mushroom shapes at the tops of the shafts, because this can reduce the dead load to the bearing materials, and increase uplift pressures on the shafts.
- 15) Coarse gravel and cobbles were observed in the river channel and along the bank in the vicinity of the outfall structure. If encountered, these conditions could complicate the drilling process and may reduce the effectiveness of casing or prevent seating the casing in the upper bedrock surface. The drilling contractor should be made aware of this information and should be prepared for these drilling conditions.
- 16) A representative of Geocal should observe the drilling operations on a full time basis.

General. Artificial fill will likely be encountered and some may contain a significant amount of debris, some of which could be man-sized. Debris laden soils should not be used for support of the pipe, thrust blocks, or other structures. These debris laden soils should be over-excavated and replaced with suitable engineered fill where structure support is needed. The depth of over-excavation will be a function of the composition and consistency or density of the fill. Where debris is not excessive, then over-excavation may only be needed to establish a firm surface to support new fill. Where debris is excessive, several feet of over excavation may be needed. Potholing may aid in the decision making process.

During construction, soft or loose soils encountered at the bottom or sides of the foundation thrust block excavations should be removed and replaced with compacted soils. Sub-excavated material, excluding debris or other deleterious material, may be reused as engineered fill, or trench backfill. Engineered fill should be placed in controlled, uniform lifts and compacted to at least 95% of the maximum standard Proctor density (ASTM D698) at moisture contents within 2% of optimum. In general, bearing should be provided by firm natural soils or on new engineered fill placed in accordance with the compaction criteria.

Claystone material should not be used as engineered fill nor should intact claystone bedrock be used to provide direct support of the pipe or thrust blocks or other minor structures. If claystone is encountered at the level of the conduit, the risk of excessive movement can be reduced by overexcavating vertically and laterally at least 3 feet beyond the bearing surface and replacing the expansive materials with non-expansive and relatively impervious soils. This condition could be encountered near Boring 4 where excavation into claystone bedrock is anticipated based on the planned invert elevations.

9.0 RETAINING STRUCTURES

We understand that retaining walls for both the outfall structure and wing-walls for the structure will be cast-in-place concrete, and will be restrained for the outfall structure and cantilevered for the wing walls. Retaining walls for the outfall structure should be supported on the same foundation system as the outfall

structure as detailed above. Retaining structures which are laterally supported and can be expected to undergo only a slight amount of deflection should be designed for lateral earth pressures based on the "atrest" earth pressure condition. Cantilevered retaining structures which rotate and/or deflect sufficiently to mobilize the internal soil strength of the wall backfill may be designed for the "active" earth pressure condition. The following ultimate earth pressure coefficients are recommended for imported CDOT Class 1 material and for existing granular material expected to be encountered at the outfall structure location. Use of clay or fine grained soils for backfill of the outfall retaining walls or wing walls is not recommended. The following values assume placement and compaction in accordance with CCD and CDOT standard specifications.

Table 9-1
Recommended Retaining Wall Design Parameters

	Active	At-Rest	Passive	Unit Weight	Friction Angle
Material	(K _a)	(K _o)	(K _p)	γ _T , (pcf)	φ, (degrees)
Imported Class 1	0.28	0.44	3.54	135	34
Existing Granular Soils	0.33	0.50	3.00	125	30

For granular backfill, lateral wall movements or rotation equal to 1% of the wall height is typically required to develop the full active case, whereas lateral movement equal to at least 2% of the wall height is normally required to establish full passive resistance. Suitable factors of safety should be applied to the above ultimate values to limit strain needed to reach ultimate strength, particularly in the case of passive resistance where large strains are needed to mobilize resistance. Equivalent fluid unit weights may be taken as follows:

Above groundwater:	$\gamma_{\sf eq}$	=	$\gamma_{T/S}$ x $K_{a,o,p}$
Below groundwater:	$\gamma_{\sf eq}$	=	$(\gamma_{T/S}$ - 62.4) x $K_{a,o,p}$
Where,	Y T/S	=	soil total or saturated unit weight as appropriate
	$K_{a,o,p}$	=	appropriate earth pressure coefficient

The above parameters are for a horizontal backfill and no surcharge load to the backfill. Retaining structures should be designed for appropriate surcharge pressures such as from vehicular traffic, snow, and other potential surcharges. The buildup of water behind a wall or an upward sloping backfill surface will increase the lateral pressures on the wall(s) and should be considered in the designs. An under-drain should be provided to help reduce hydrostatic pressure buildup, unless the wall is designed to accommodate the additional pressure.

Structure backfill should be placed and compacted in accordance with CCD and CDOT standard specifications for structure backfill. Care should be taken not to over-compact the backfill or use large equipment adjacent to the wall because this could cause excessive lateral loading.

10.0 UNDER-DRAIN

Below grade structures (retaining walls) should be provided with an under-drain system which will help reduce the buildup of hydrostatic pressures. The under-drain system should consist of a perforated PVC pipe surrounded by free draining granular material placed at the bottom of the wall backfill and sloped at a minimum 0.5% grade to a suitable gravity outlet. Free draining granular material used in the drain system should conform to Class B filter material as specified in the CDOT standard specifications.

11.0 Excavation and Site Grading

Excavation of the onsite soils should be feasible with conventional heavy-duty construction equipment. The re-use of onsite materials will be a function of where the material obtained from and its intended use. Soils used for trench backfill and for engineered fill should be non-expansive, and placed in uniform lift thicknesses not exceeding eight inches. Imported material should meet Denver Metro Wastewater Reclamation District's criteria and compaction should meet Denver Wastewater specifications with typical requirements being 95% of the material's maximum dry density as determined by the standard Proctor (ASTM D698) at moisture contents within 2% of optimum. Debris laden material should be wasted offsite to an acceptable landfill.

Temporary excavation slopes and shoring requirements for trenches and excavations should be evaluated according to OSHA criteria by the contractor's "competent person." The majority of soils

encountered within the project area are classified as Type C material by OSHA requirements. The contractor should also be required to follow applicable state and federal regulations for trench and worker safety, including properly designed slopes and bracing systems. Site grading should be planned to provide positive surface drainage away from trench excavations. The contractor should also design temporary shoring and bracing systems to maintain the stability of trenches particularly under elevated groundwater conditions. Shoring systems may include trench boxes, sheet piles or tie-back walls, slurry walls, or combination of systems.

Potentially expansive claystone bedrock was encountered. Where expansive claystone is encountered at planned bearing or pipe level, there is some risk that lightly loaded structures such as pipelines and vaults will experience differential movements (heave) due to the claystone being subjected to wetting. Differential movements of several inches are possible over relatively short distances where the bearing elevation of the pipe is placed on or near claystone bedrock. The risk of excessive undesirable movement can be reduced by over-excavating the claystone at least 3 feet vertically and laterally beyond the bearing level and replacing potentially expansive claystone with low permeability, non expansive soils. Greater over-excavation depths would help further reduce the risk of movement. Precautions should be taken to reduce the potential for water to wet the expansive soils or bedrock. Sources of water could include groundwater, leakage from the conduit, or surface water infiltration.

The natural moisture content of the soils encountered also varied and the contractor should be prepared for conditions that will require moisture conditioning (drying or wetting) of the soils if the soils are to be reused as backfill and/or roadway subgrade. Compaction should be to at least 95% of the maximum Standard Proctor density within two percent of optimum moisture.

Relatively thick deposits of undocumented artificial fill are known to exist throughout most of the planned alignment based on existing mapping and exploratory borings. These artificial fill deposits are expected to vary in composition and depth, and will sometimes be greater in extent than what was encountered during our field work. The potential exists for oversized material, deleterious, or foreign materials to exist within the fill, and especially when construction is adjacent to drainages that are not in their original location. Foreign, deleterious or otherwise unsuitable material that is encountered should be wasted and not be used for trench backfill or support of the pipe, pavements or other structures. Material to be wasted should be taken to an acceptable landfill.

Movement monitoring: The ground surface in proposed tunneling locations should be monitored for ground movement during tunnel installation. As a minimum, surface survey points on at least 15-foot intervals above the tunnel construction should be checked frequently. The ground surface above the tunnel should also be observed for ground loss, and the contractor should have a plan to mitigate or correct excessive ground loss or settlement. Relatively large and deep excavations are proposed. Structures and utilities close to the excavation may be susceptible to movement if the excavation is unbraced or not adequately braced.

In general, structures that lie within the zone of the excavation defined by an imaginary plane extending upward from the bottom of the excavation on a 2:1 horizontal to vertical slope will need to be evaluated on a case by case basis. Additional monitoring, bracing, underpinning, or other measures to protect adjacent structures or utilities may be needed.

12.0 **DEWATERING**

Groundwater was encountered in four of the exploratory borings (Boring 1, Boring Geo-4, Boring Geo-3, Boring 6, Boring GW-1, Boring GW-2, and Boring GW-4). Although groundwater was not encountered in the remainder of the borings, water levels should be expected to vary seasonally, with precipitation events, and over longer time periods. Pumping, sump wells, or diversion trenches may be possible solutions for a water control plan; however, the use of well points external to the excavations may be required, especially in areas with non-cohesive soils (sand/silt/gravel).

The dewatering plan should be designed to maintain the stability of the excavations (base and slopes), and to protect nearby structures including utilities. Groundwater encountered within the excavations in non-cohesive soils can lead to blow-outs or heaving of the soils. Dewatering within non-cohesive soils should be designed to lower the groundwater level at least three feet below the bottom of the planned excavation to aid in the stability of the excavation and to protect nearby structures. Deeper dewatering depths may be needed if liquefaction becomes a problem during fill placement.

13.0 PAVEMENT DESIGN RECOMMENDATIONS

A pavement section is a layered system designed to distribute concentrated traffic loads to the subgrade without overstressing the subgrade soils. Performance of the pavement structure is a function of a number of factors including but not limited to the physical properties of the subgrade soils, drainage, and traffic loading. The pavement sections presented in this report are based on laboratory test results and Metropolitan Government Pavement Engineers Council (MGPEC) Pavement Design Standards and Construction Specifications Manual and on the American Association of State Transportation Officials (AASHTO) 1993 pavement design guide, in general accordance with the Colorado Department of Transportation (CDOT) design procedures. We understand that three main portions of roadway will likely be reconstructed as part of this project. The three roadways include Arkins Court which will likely be raised for approximately 350 lineal feet north and south of 33rd Street to allow for installation of the outfall structure, 33rd Street from Blake Street to Downing, and Martin Luther King Jr. Boulevard from Downing Street to a block past Marion Street. There will also be crossing of Brighton Boulevard and Downing Street, however, it is anticipated that these areas will be patched to match existing conditions. A summary of the pavement design parameters are provided below in Table 13-1.

Table 13-1
Pavement Design Parameters

Design Parameter	Value
Design Speed	30 mph
ESAL for 20-year design – Arkins Court	5,262,000 ¹
ESAL for 20-year design – 33 rd Street	7,862,000 ¹
ESAL for 20-year design – MLK Jr. Boulevard	7,862,000 ¹
Resilient Modulus for Arkins Court	7,123 psf
Resilient Modulus for 33rd Street	4,362 psf
Resilient Modulus for MLK Jr. Boulevard	3,705 psf
Drainage Coefficient	1.0
Load Transfer Coefficient (doweled & tied)	2.8

¹ ESAL values were estimated using MGPEC procedures by estimating acres of commercial property served by roadways.

Design Traffic Loading: Traffic data for the project area was not available. Therefore, we estimated ESALs following the MGPEC procedure. We utilized the MGPEC design procedures for commercial roadways to estimate of the number of 18-kip ESALs that will be applied to the pavement

structure during a 20 year period. For Arkins Court, we estimated 20 acres and for 33rd Street and Martin Luther King Jr. Boulevard we estimated 30 acres.

Subgrade Soil Strength Coefficients: The pavement subgrade soils encountered within Arkins Court generally consisted of A-1-b material with some A-2-4 material encountered in the northern boring. R-values ranged from 69 to 46 for material encountered in Arkins Court. We utilized a design R-value of 40 for Arkins Court to estimate the design resilient modulus of 7,123 psf. The pavement subgrade soils encountered within 33rd Street generally consisted A-1-a to A-2-4 material. R-values ranged from 57 to 31 for the material encountered in 33rd Street. We utilized a design R-value of 25 for 33rd Street to estimate the design resilient modulus of 4,362 psf. The pavement subgrade soils encountered within Martin Luther King Jr. Boulevard generally consisted of A-2-4 to A-6 material. An R-value of 22 was measured for the A-6 material and a design R-value of 20 was utilized for Martin Luther King Jr. Boulevard to estimate a design resilient modulus of 3,705 psf.

Pavement Thicknesses: The recommend pavement sections are summarized in Table 13-2. Pavement sections were calculated using the above design parameters, assuming a 20-year design life, and using the MGPEC software and WinPAS software developed by the American Concrete Pavement Association (ACPA), based on the AASHTO 1993 pavement design methodology. MGPEC software printouts are presented in Appendix B.

Table 13-2
Pavement Sections by Location

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	MGPEC	Sections	WinPAS Sections (Based on AASHTO 1993)							
Location	Hot-Mix Asphalt Pavement	Portland Cement Concrete	<u>-</u>	over Aggregate icknesses, inches						
	Thickness, inches ¹	Pavement Thickness, inches	HMAP ²	ABC ³						
Arkins Court	9	9	8½	6						
33rd Street	11	10	11	6						
MLK Jr. Boulevard	10½	10	11½	6						

¹ For HMAP, MGPEC recommends a minimum of 12 inches of chemically stabilized subgrade.

² HMAP = hot mix asphalt pavement

³ ABC = aggregate base course

The above recommended pavement sections assume that the Portland Cement Concrete Pavement (PCCP) is tied and dowelled. Concrete pavement should be tied to the curbs and dowelled as well as being placed on a minimum 6 inches of aggregate base course material. The aggregate base course should meet specifications in accordance with Item 7 of the MGPEC Specifications and have a minimum R-value of 78. This layer will help reduce the potential for fines to migrate through the joints which could lead to loss of support.

Hot Mix Asphalt Pavement (HMAP): HMAP should consist of a bituminous plant mix composed of a mixture of aggregate and bituminous material that meets the requirements of a job-mix formula established by a qualified engineer. The following grading and binder types are recommended for the Arkins Court, Brighton Boulevard, 33rd Street, Downing Street, and Martin Luther King Jr. Boulevard:

Table 13-3
Asphalt Grading and Binder Recommendations by Area

Location	Mix Type
Arkins Court, Brighton Boulevard, 33 rd Street, Downing Street, Martin Luther King Jr. Boulevard – Top Lift	SX (100) 64-22
Arkins Court, Brighton Boulevard, 33 rd Street, Downing Street, Martin Luther King Jr. Boulevard – Lower Lifts	S (100) PG 64-22

Grading SX has a finer aggregate gradation and may be used for the top lift. This layer may help reduce surface water penetration and oxidation of the HMA surface, which in turn may help reduce long-term maintenance. Construction should be performed in accordance with MGPEC standards

Portland Cement Concrete Pavement: PCCP should meet the requirements outlined in Item 11 of the MGPEC *Pavement Design Standards & Construction Specifications*, 2001 Edition (MGPEC Specifications). However, Item 11 of MGPEC Specifications does not fully address fast-track or high-early concrete that may be needed to meet the construction/operational constrains of the project. Therefore, if fast-track or high-early PCCP is required, the PCCP should meet the requirements for Class E concrete specified in CDOT's standard special provision for Section 601 Structural Concrete.

Alkali-Silica reactivity (ASR) has been an increasing concern with PCCP in the last few years. Two ways to decrease the potential for ASR are to use high quality aggregates and to use Class F fly ash.

Typically more than 0.1 percent expansion when aggregates are tested by ASTM C-1260 (mortar bar

method) is unacceptable. Consideration should be given to lowering this to 0.08 percent to decrease the potential for adverse reactions and therefore increase durability of the PCCP. In conjunction with this at least 15% Class F fly ash should be specified.

The potential for warping or curling of PCCP can be reduced by using slip-form pavers that can handle a lower slump mix, specifying smaller panels (i.e. smaller joint spacing), and for Class E PCCP, covering with curing blankets with a minimum R-value of 0.5 as soon as they can be placed without marring the surface. The maximum joint spacing should be 15 feet.

Aggregate Base Course: Aggregate base course (ABC) material should meet the MGPEC specifications and have a minimum R-value of 78. The material should be compacted to at least 95% of the maximum dry density as determined by AASHTO T-180. During construction, any existing aggregate base course material that is identified to be of high quality may be reused as new base course provided the material is not mixed with onsite soils or otherwise degraded, and has an R-value of at least 78. Otherwise, existing aggregate base course that is uncovered during construction should be either incorporated into the embankment (subgrade) or some modification to the pavement section determined if the material is to be reused as aggregate base course (with an R-value less than 78).

Subgrade Stabilization: Chemical stabilization should not be required for this project, but may be considered an option. Given the constrains of the site (keeping business access open, limited road closures allowed) chemical stabilization may be problematic because of the time required to place, mix, cure, compact, and achieve required strength any of the chemical stabilization methods. If chemically stabilized subgrade is the selected subgrade stabilization alternative, alternative cement kiln dust (CKD) and Portland cement are the common stabilizing agents with the shortest "placement to paving strength" time frame. Fly ash could also be used but our experience indicates that the required strength may be difficult to attain. A site mix design should be prepared that meets specifications in Item 5 of the MGPEC Specifications, and have a minimum unconfined compressive strength of 250 psi in 5 days of moist curing at 100°F. For planning purposes 9% CKD or 6% Portland cement by weight may be assumed for preliminary mix design purposes.

Subgrade Preparation: Old pavement, debris, and any otherwise unsuitable materials should be removed to a minimum depth of 2 feet below the pavement subgrade and replaced with soils having a minimum design R-value as specified under **Subgrade Soil Strength Coefficients**. Unsuitable materials should be removed so that new pavements are supported by at least 2 feet of soils meeting the minimum R-value requirements. Fill should be placed and compacted in accordance with MGPEC specifications. At a minimum, the upper 12 inches of subgrade should be scarified, moisture conditioned as necessary, and compacted. The subgrade should be thoroughly proof-rolled prior to paving with pneumatic-tired vehicle weighing at least 40,000 pounds. Areas that deform (rut or deflect) excessively under the wheel loads should be repaired prior to paving. The contractor should anticipate subgrade soil conditions with above optimum moisture conditions. Over excavation, drying and/or mixing of dryer soils and re-compaction may be needed. Coarse aggregate and use of geo-grid reinforcement may be used in local soft areas. Cement treated subgrade or a geotextile stabilization cloth in combination with coarse aggregate may also be considered.

Drainage, Frost Potential, And Utilities: The collection and diversion of surface drainage away from paved areas is extremely important for the satisfactory performance of the pavement. The design of surface drainage should be carefully considered to remove all water from paved areas. The predominant soil types are sand with gravel and sandy clay that is moderately frost susceptible. Frost heave potential can be reduced through proper surface drainage and construction control.

Maintenance: Periodic maintenance of paved areas will extend pavement life. The scheduled maintenance programs as listed Section 5 of the MGPEC Specifications should be followed for "Commercial, Industrial and Arterial" pavement designs for either HMAP or PCCP.

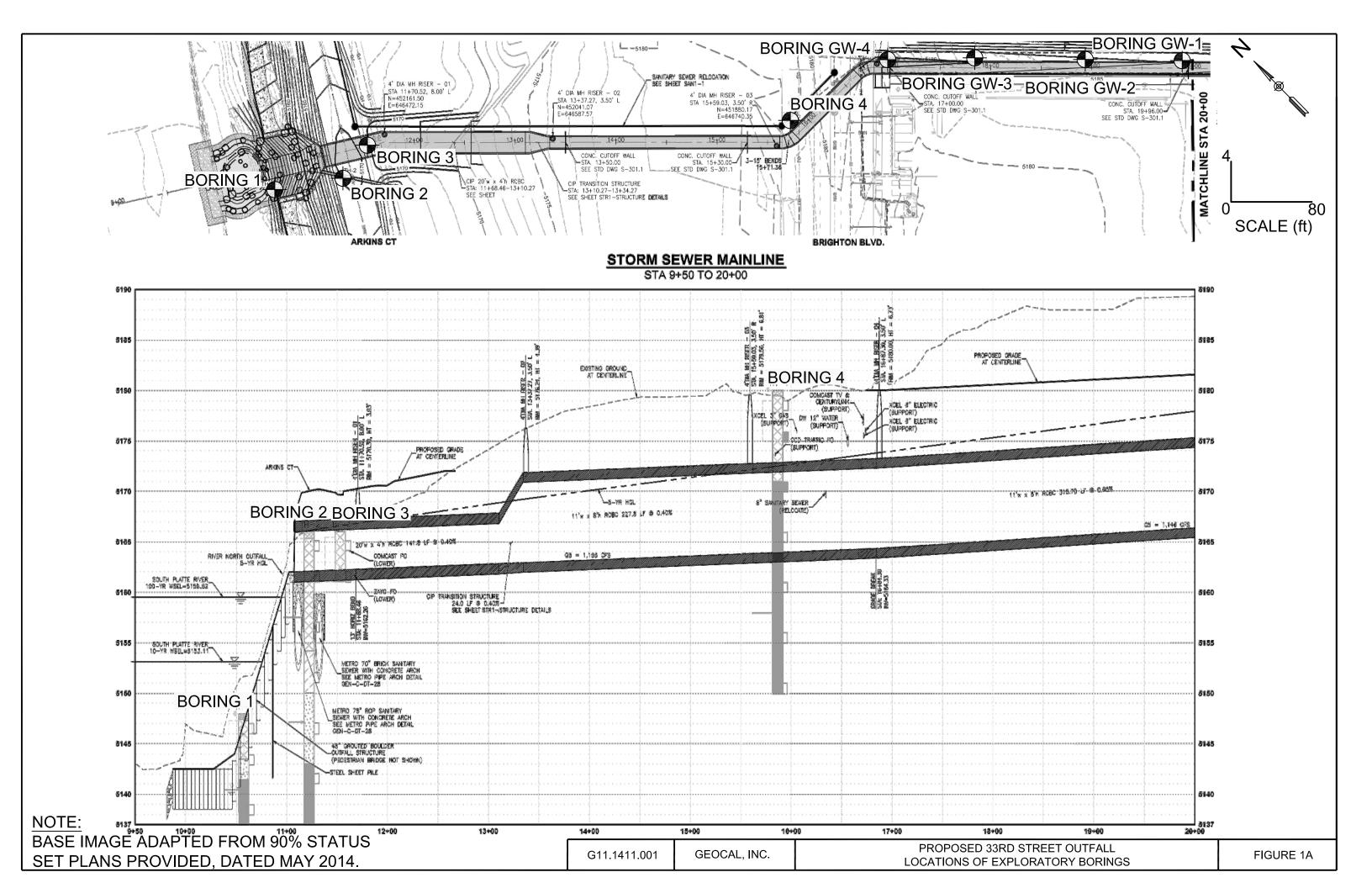
14.0 LIMITATIONS

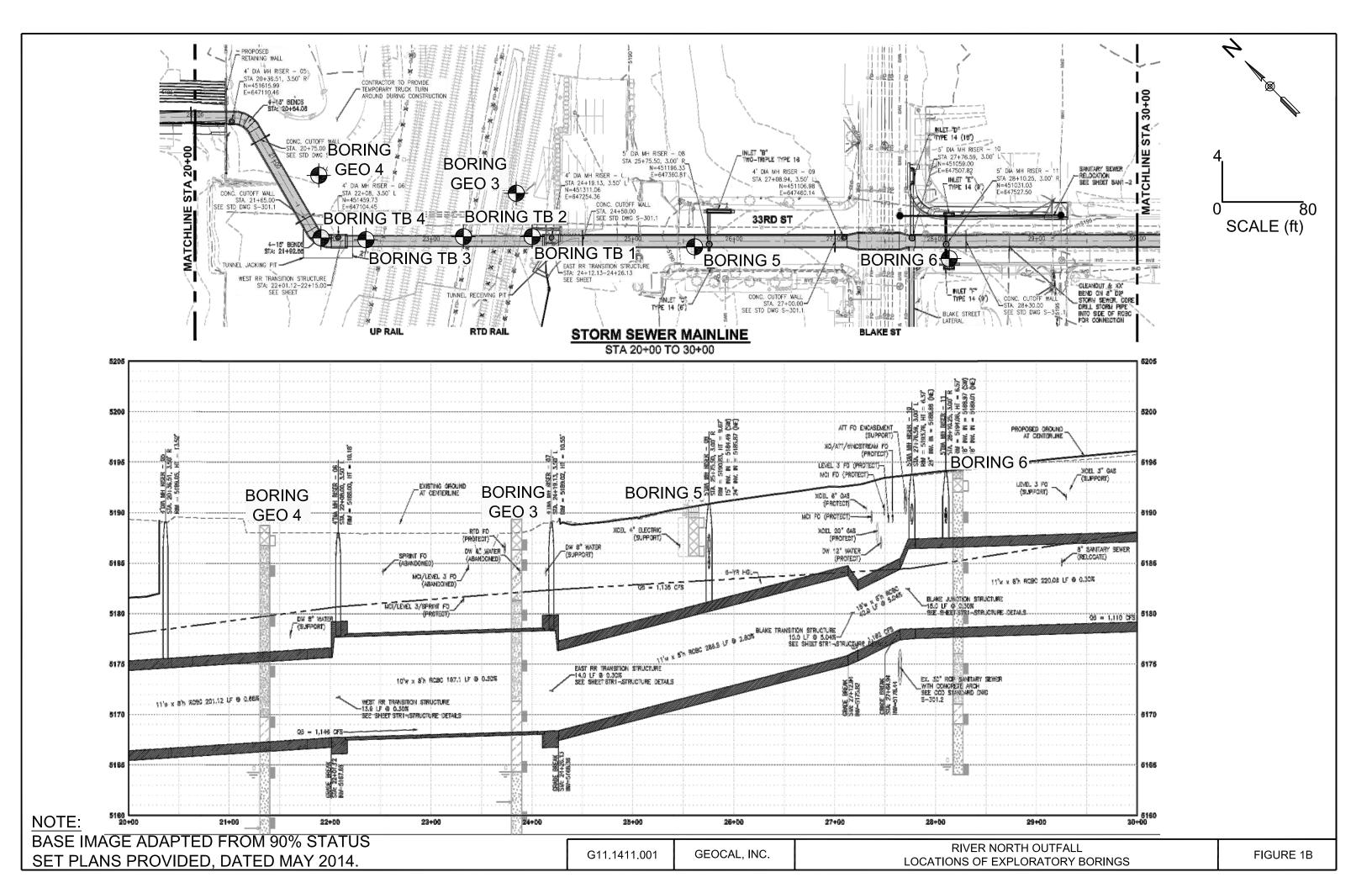
This report has been prepared in accordance with generally accepted geotechnical engineering practices used in this area at the time this report was written, and has been prepared for design purposes.

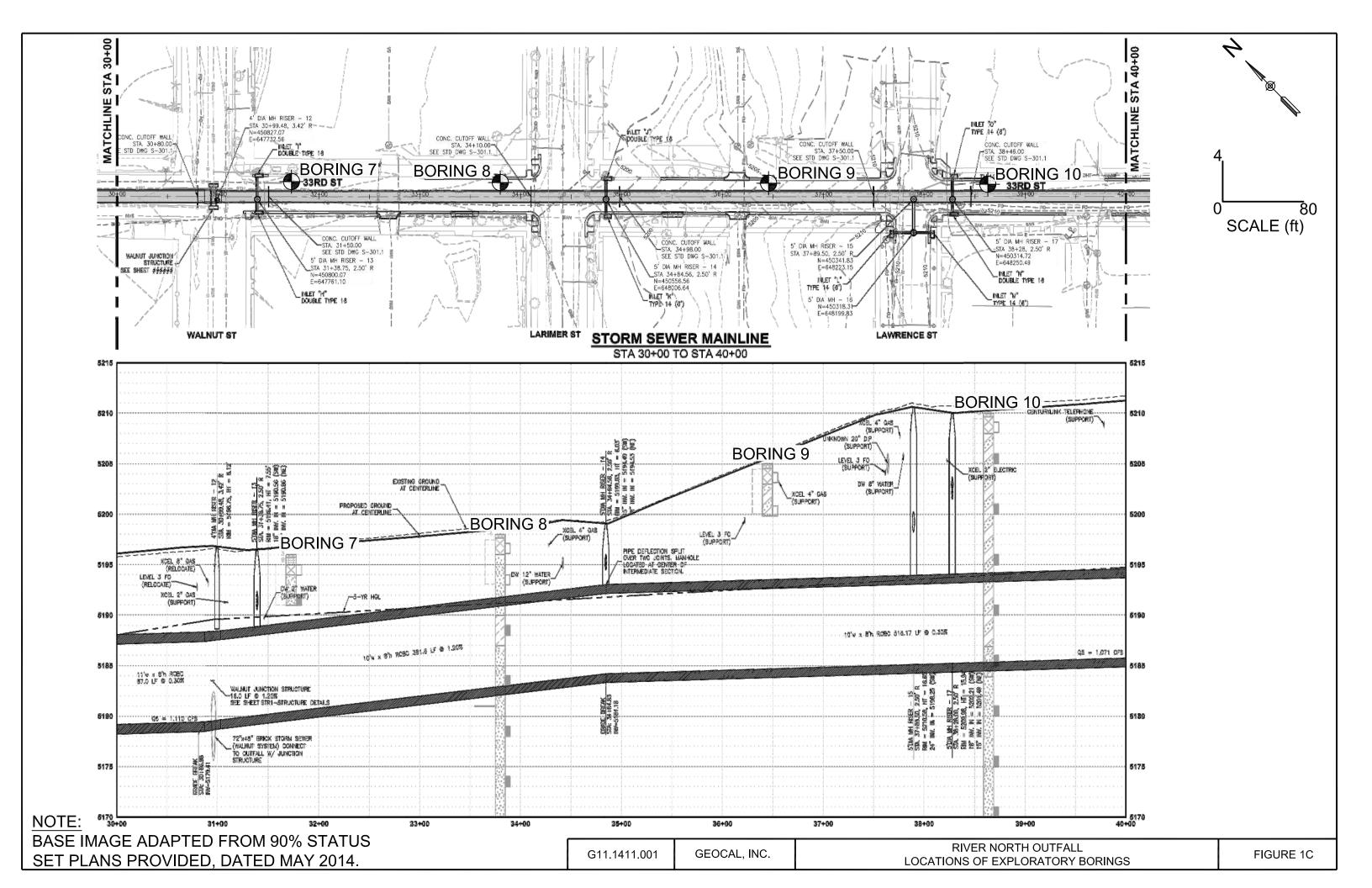
The conclusions and recommendations are based upon the data obtained from the borings drilled at the approximate locations shown on Figures 1A through 1F and the proposed construction. The nature and extent of the variations between the borings may not become evident until excavation is performed. If during construction, soil, bedrock, fill, or groundwater conditions appear to be different from those described, this office should be advised so that re-evaluation of our recommendations may be made. Onsite observation of foundation bearing materials and testing of fill placement by a representative of this office is recommended.

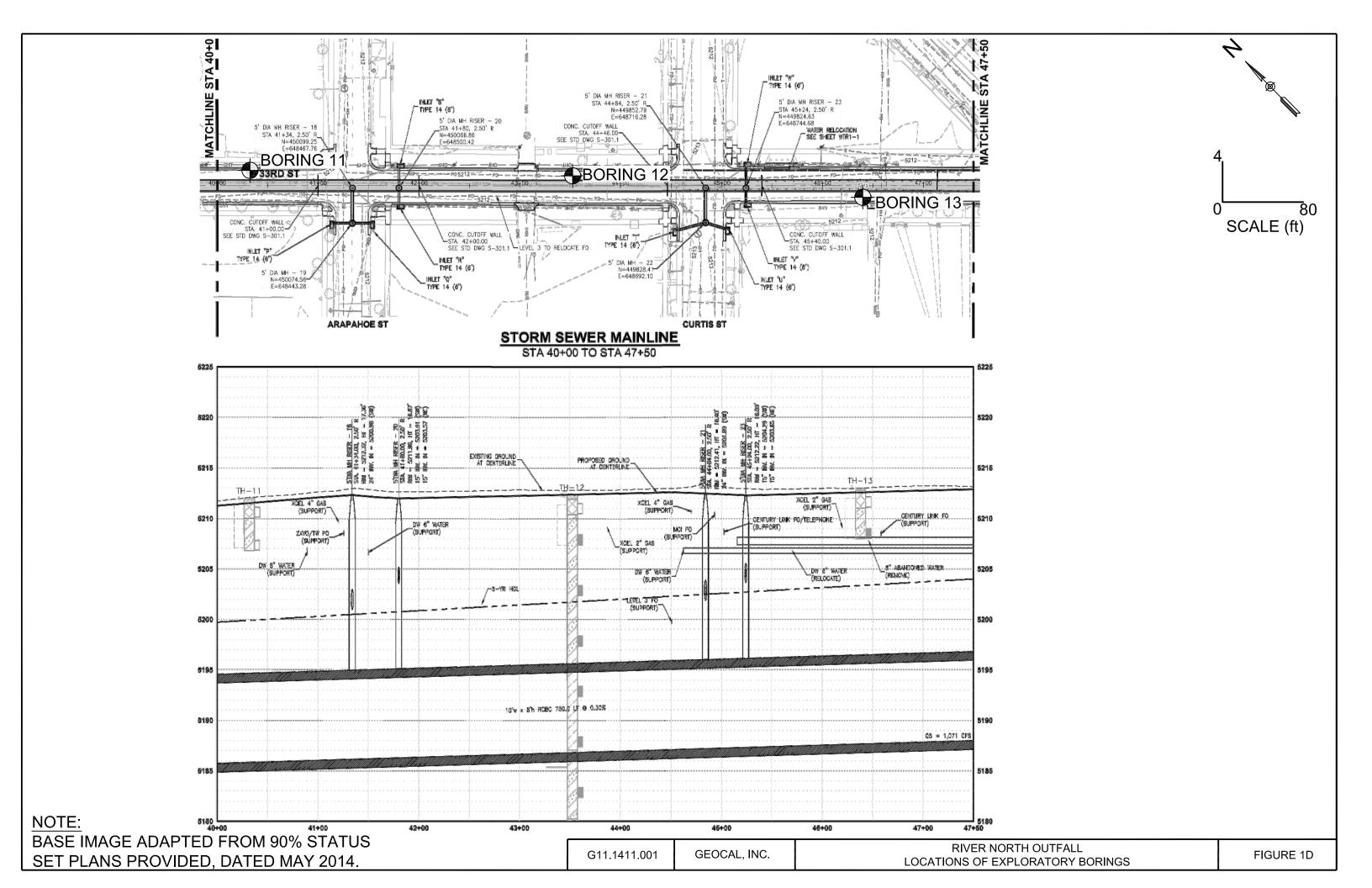
It is recommended that the Geotechnical Engineer be retained to provide a general review of final design plans and specifications in order to confirm that grading and foundation recommendations have been interpreted and implemented. In the event that any changes to the proposed project are planned, the conclusions and recommendations contained in this report should be reviewed and the report modified or supplemented as necessary.

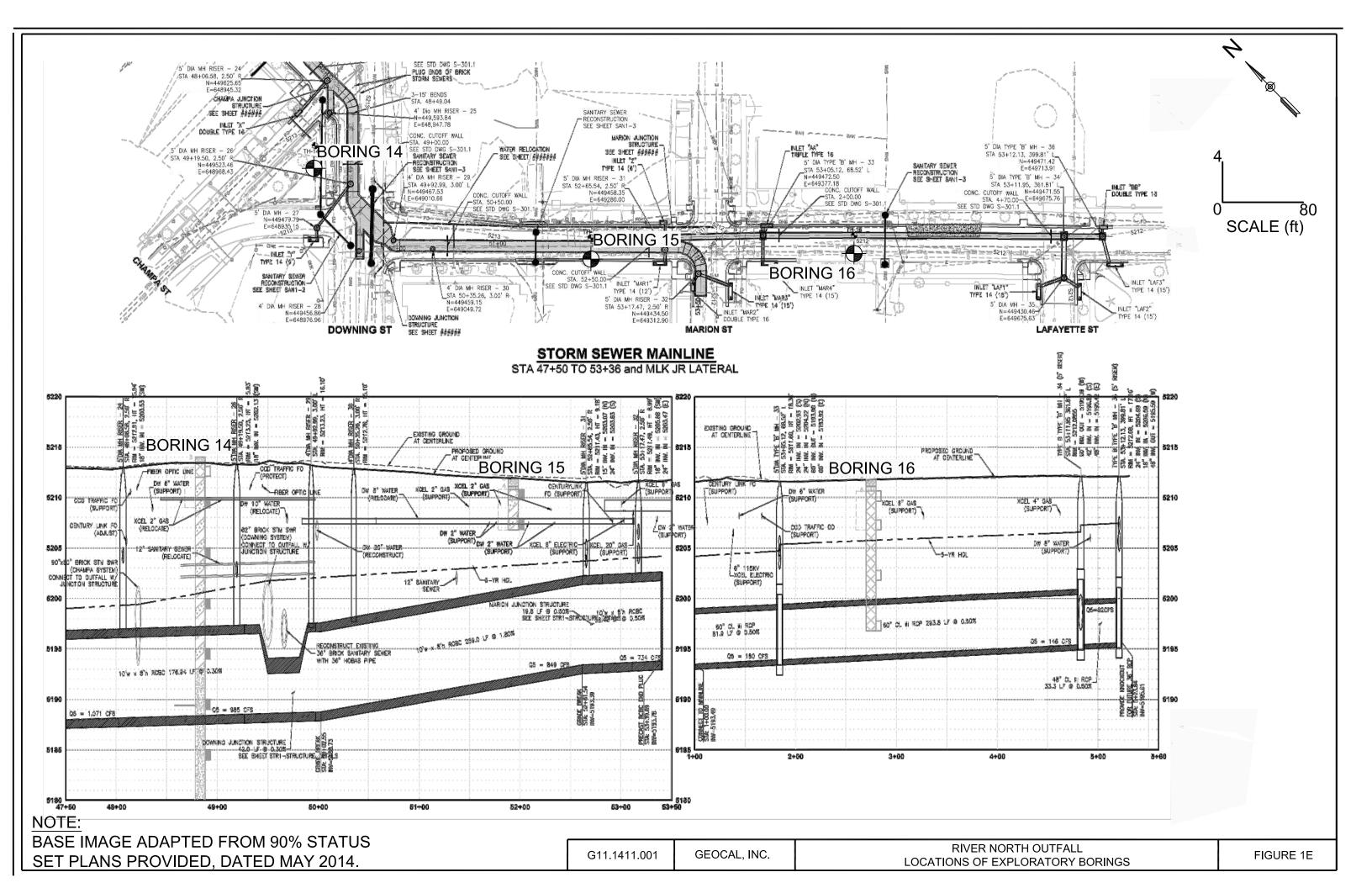
Our professional services were performed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical engineers practicing in this locality at this time. No warranty, expressed or implied, is made. We prepared the report as an aid in design of the proposed project. This report is not a specification or bidding document. Any contractor reviewing this report must draw their own conclusions regarding site conditions and specific construction techniques to be used.

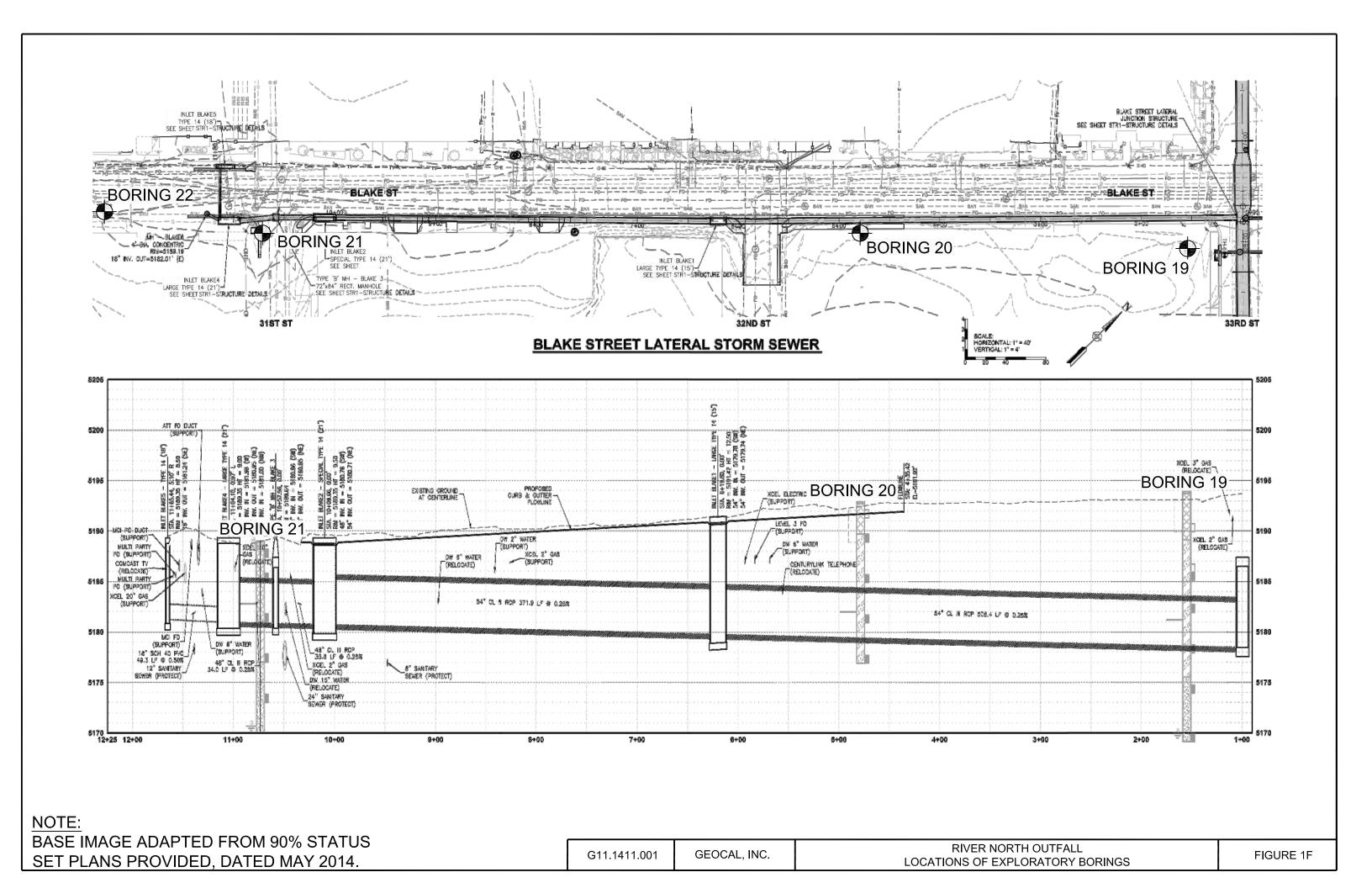


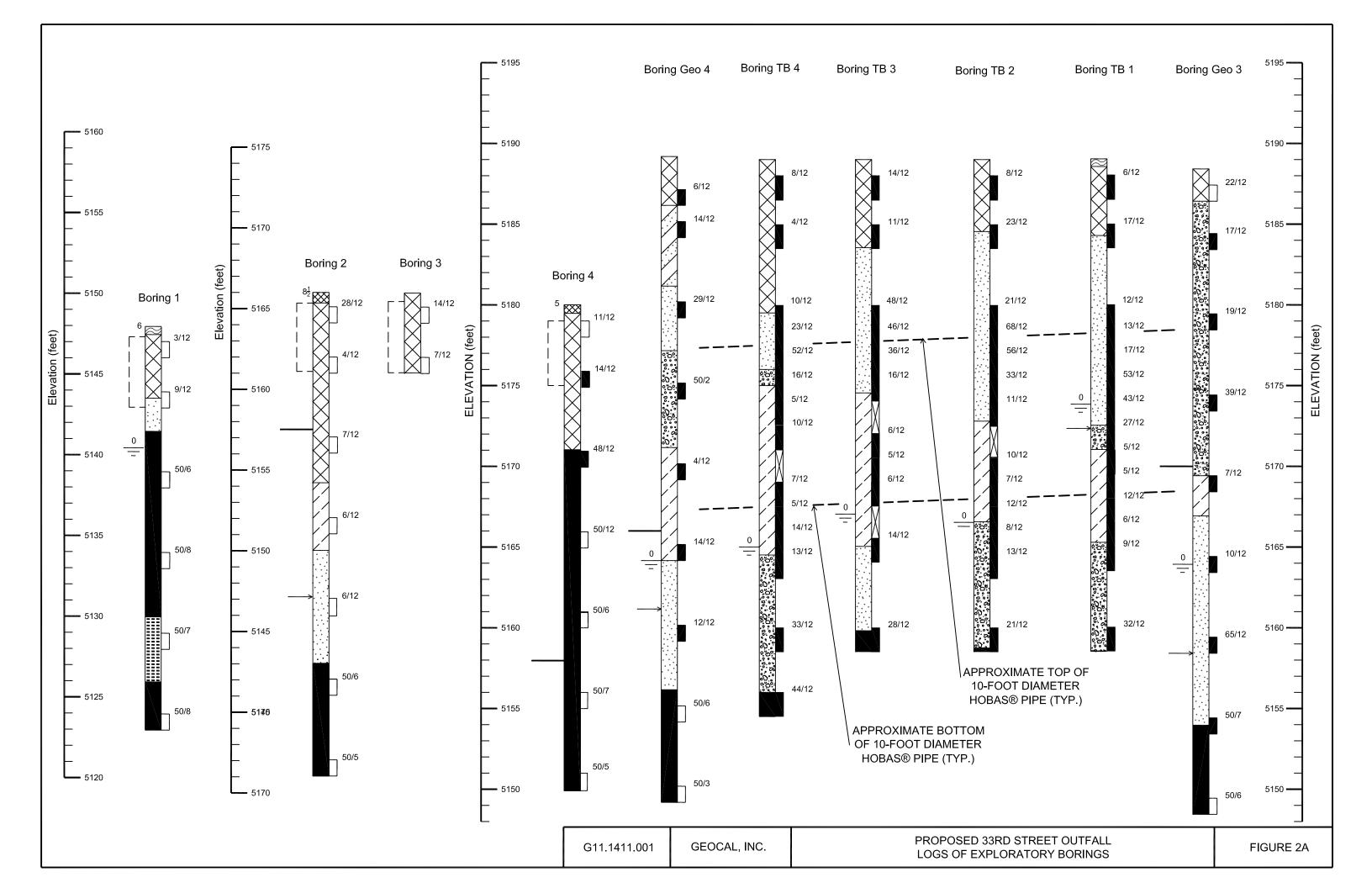


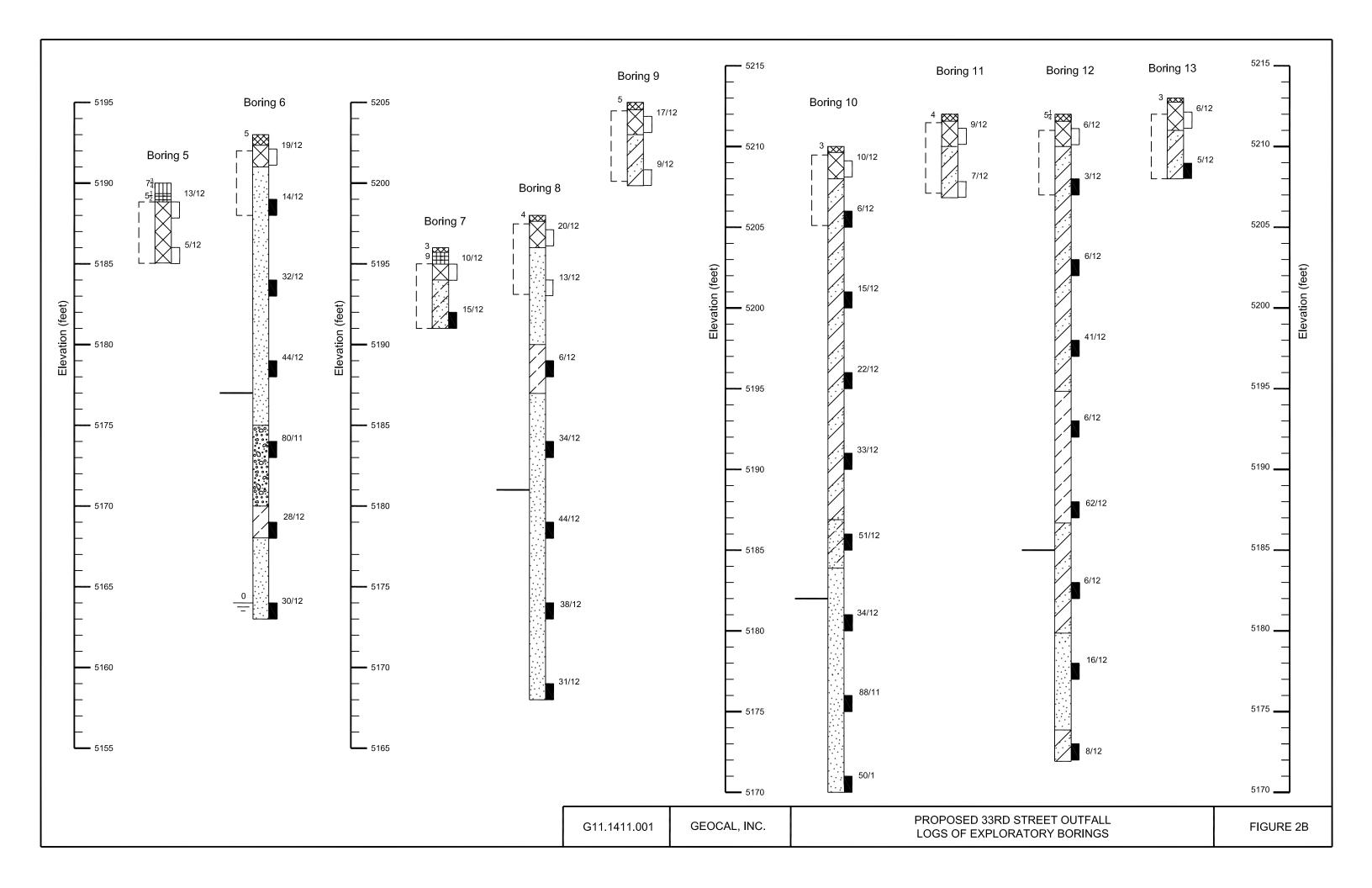


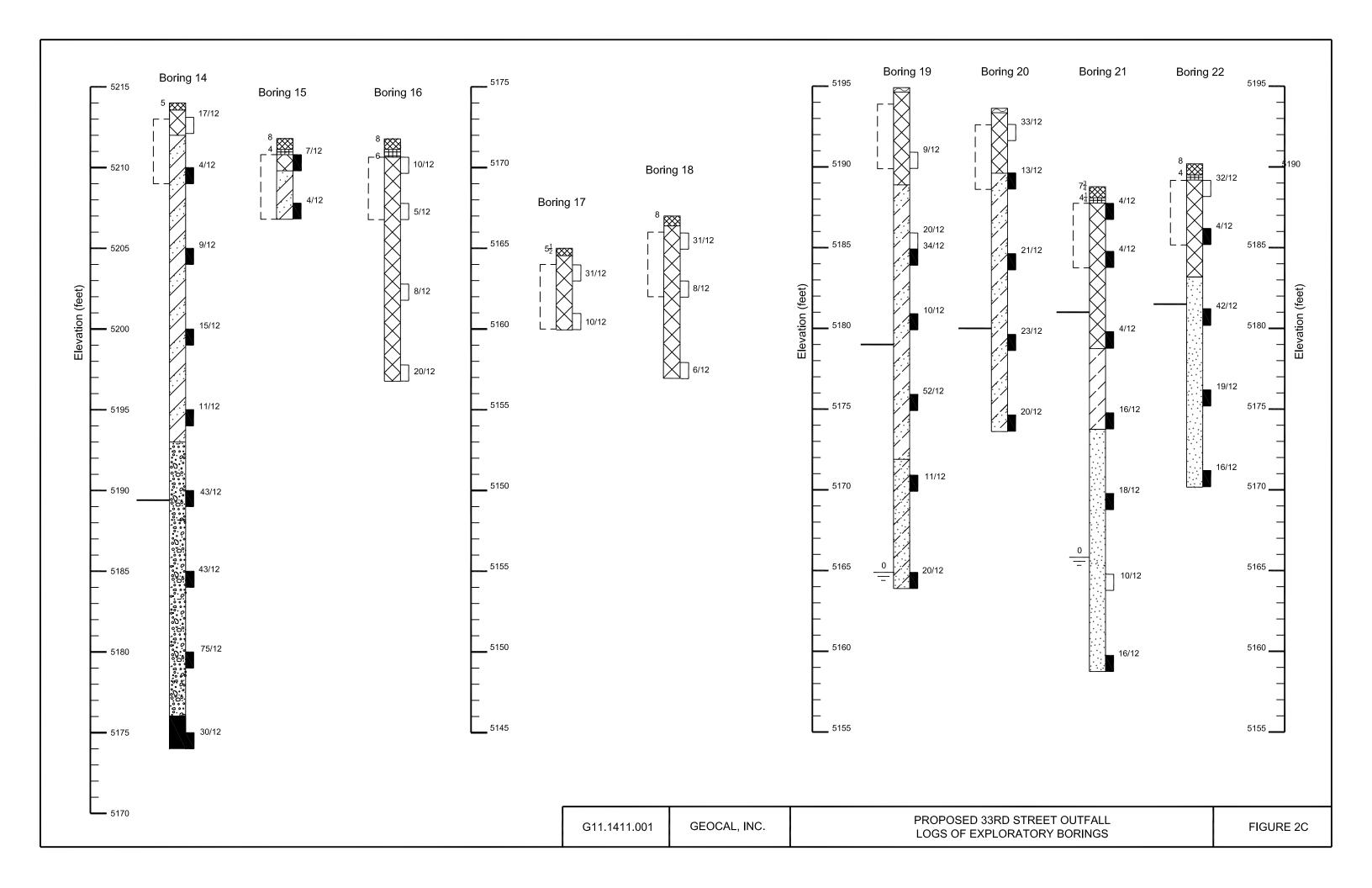


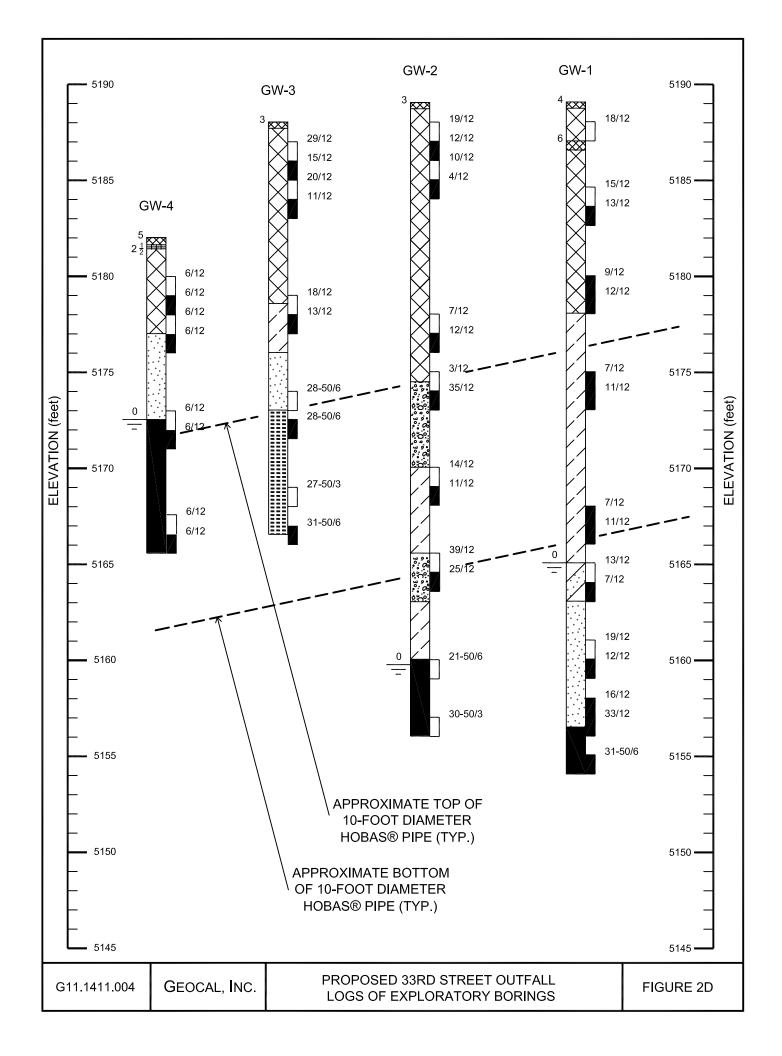












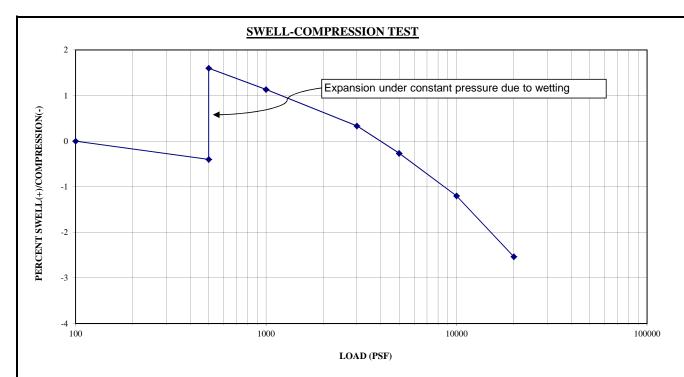
LEGE			
	TOPSOIL		
6 XX	ASPHALT, thickness in inches shown to the left of the log.		
7 ³ / ₄	CONCRETE PAVEMENT, thickness in inches shown to left of log.		
⁶ ⊞⊞	AGGREGATE BASE COURSE, sand with silt, moist, brown, fine to coarse sand. Thickness in inches shown to the left of the log.		
	FILL, silty to clayey sand with gravel to clay with sand, very loose to medium dense, debris, brick and building materials encountered periodically, moist, light to dark brown to black, fine to coarse sand, non-plastic to low plasticity, fine to coarse gravel.		
	CLAY, some sand and silt, trace gravel, soft to very stiff, moist, low to high plasticity, brown to dark brown, fine to coarse sand.		
	SAND and GRAVEL, dense to very hard, moist, light brown to brown, fine to coarse sand, fine to coarse gravel.		
	SAND, loose to very dense, moist to wet, light brown to brown, fine to coarse sand, fine gravel.		
	SAND with CLAY, to clayey sand, silt, trace gravel, very dense, moist, low plasticity, brown, fine to coarse sand, fine gravel.		
	SAND with SILT, very loose to dense, moist, light brown to brown, very fine to coarse sand, trace fine gravel.		
	CLAYSTONE BEDROCK, hard to very hard, moist, low to high plasticity, brownish gray to blue-gray, contains variable amounts of fine to medium sand, occasional coal seams.		
	SANDSTONE BEDROCK, hard, moist, blue-gray, fine to medium grained, clayey.		
	PROPOSED SORD CIDEET OUTFALL		

Drive sample blow count, Indicates that 20 blows from a 140 pound hammer falling 30 inches were required to drive the California or Split Spoon sampler 12 inches. Indicates 2 inch I.D. California liner drive sample. Indicates drive sample, Standard Penetration Test, 1\frac{3}{8} inch I.D. split spoon sample. Indicates Shelby Tube sample. Indicates depth to water level and number of days after drilling measurement was made. Indicates depth at which caved material accumulated. Indicates disturbed bulk sample. Approximate pipe/culvert invert elevation.

NOTES

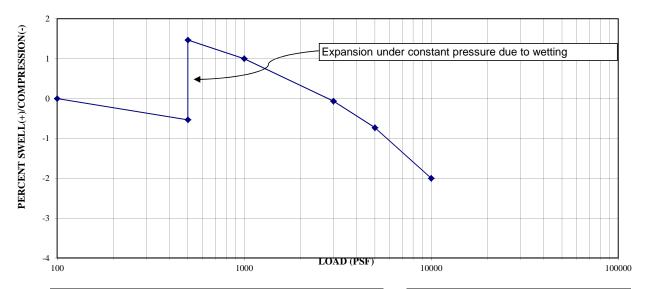
- 1. Borings GEO-3 and GEO-4 were drilled February and March 2012. Borings 1 through 18 were drilled on March to May, 2013. Borings 19 through 22 were drilled on January, 2014, Borings TB 1 through TB 4 were drilled on May, 2014, Borings GW-1 through GW-4 were drilled on February 2015. The borings were drilled with CME-55 or CME-75 drill rigs equipped with 4-inch or 3³/₄-inch inside diameter hollow-stem or 4-inch solid-stem augers.
- 2. Locations of borings shown on Figures 1A through 1F are approximate.
- 3. Borings are drawn to approximate elevations, elevations were provided by Wilson & Company or were estimated from contours provided by Wilson & Company.
- 4. The lines between strata represent approximate boundaries between material types. Transitions between materials may actually be gradual.
- 5. Water level readings shown on the logs were made at the time of drilling and under the conditions indicated. Fluctuations in the water level may occur with time.

G11.1411.001 GEOCAL, INC. PROPOSED 33RD STREET OUTFALL LEGEND AND NOTES FOR EXPLORATORY BORINGS FIGURE 3B



Sample Location	Boring 1	
Sample Depth	9 feet	
Sample Description	Claystone bedrock	
USCS Classification		
AASHTO Classification		

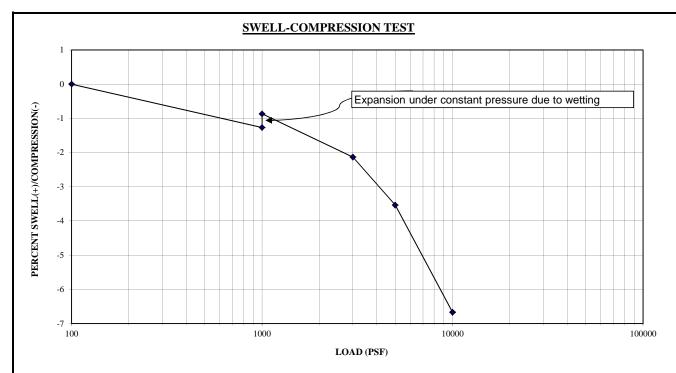
Dry Density	117 pcf
Moisture Content	14.9 %
Volume Change	2.0 %
Swell Pressure	4,000 psf



Sample Location	Boring 4	
Sample Depth	14 feet	
Sample Description	Claystone bedrock	
USCS Classification		
AASHTO Classification		

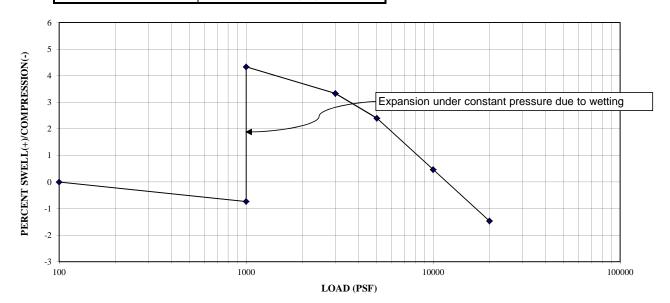
Dry Density	106 pcf
Moisture Content	20.6 %
Volume Change	2.0 %
Swell Pressure	2,900 psf

Proposed 33rd Street Outfall	JOB NO.	G11.1411.001
SWELL - COMPRESSION TEST RESULTS	FIGURE NO.	4



Sample Location	Boring GW-2	
Sample Depth	19 feet	
Sample Description	Sandy fat clay	
USCS Classification	СН	
AASHTO Classification	ion A-7-6(27)	

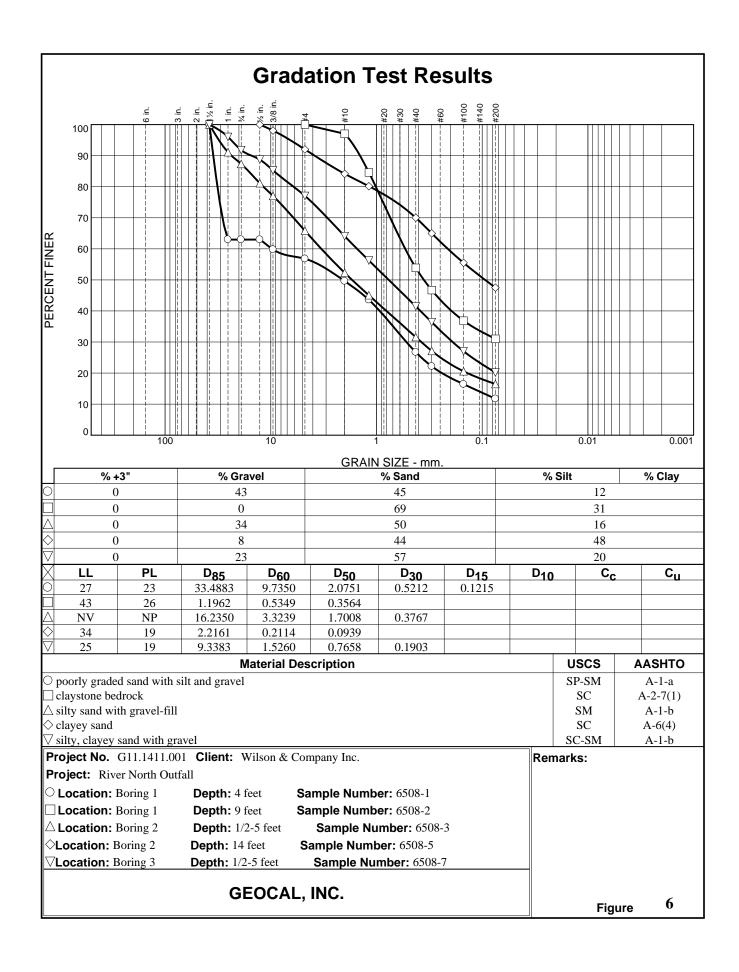
Dry Density	77 pcf
Moisture Content	44.7 %
Volume Change	0.4 %
Swell Pressure	1,150 psf

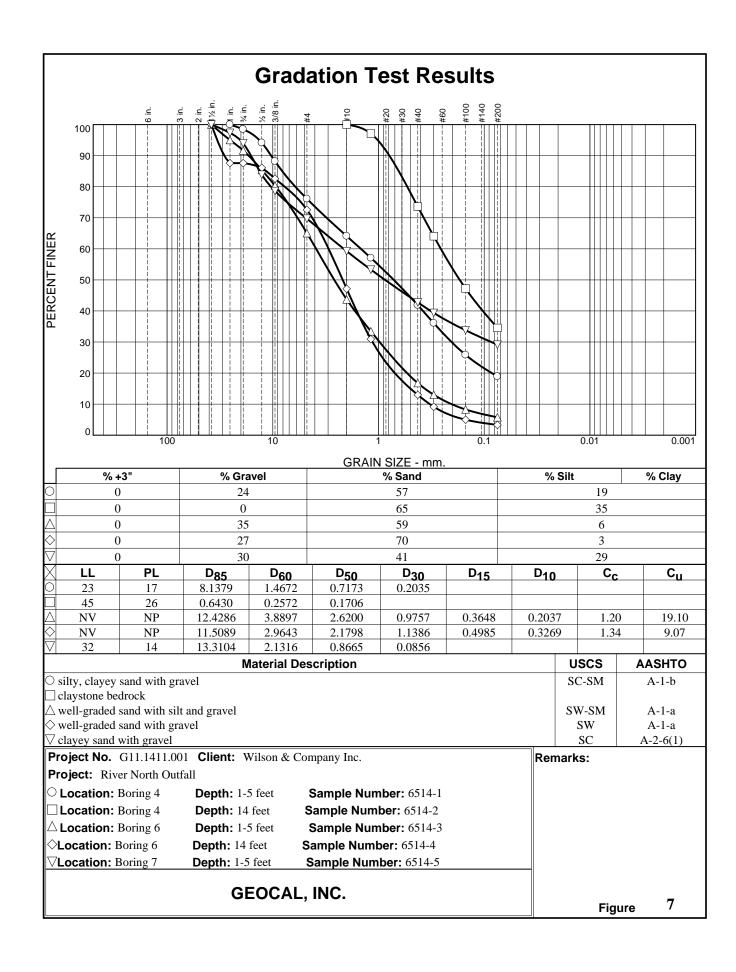


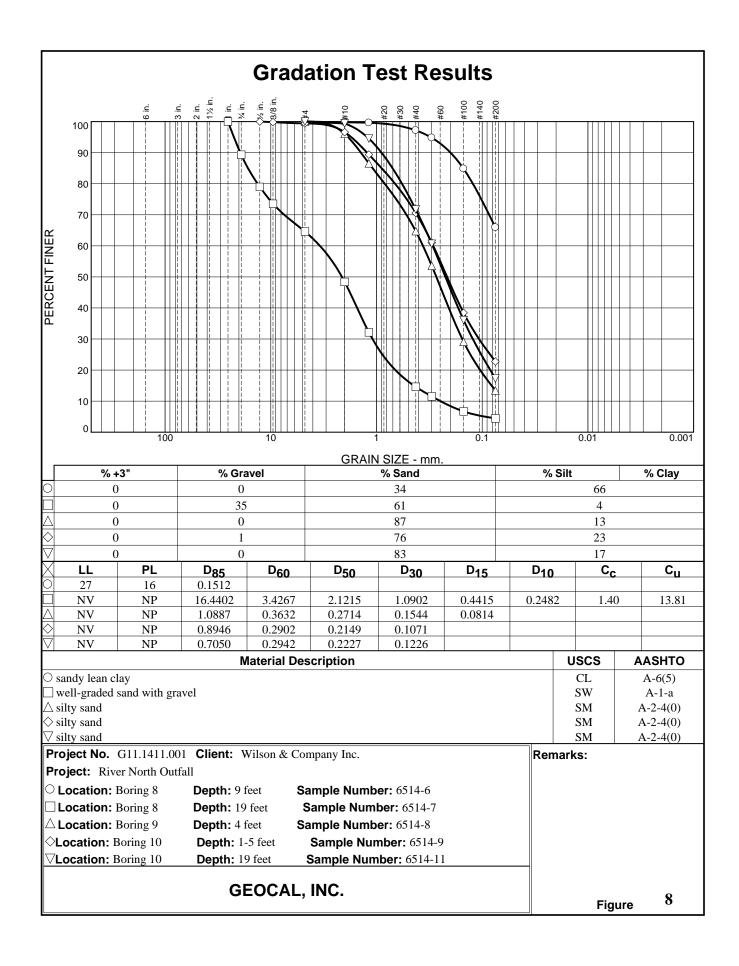
Sample Location	Boring GW-4	
Sample Depth	9 feet	
Sample Description	Claystone bedrock	
USCS Classification		
AASHTO Classification		

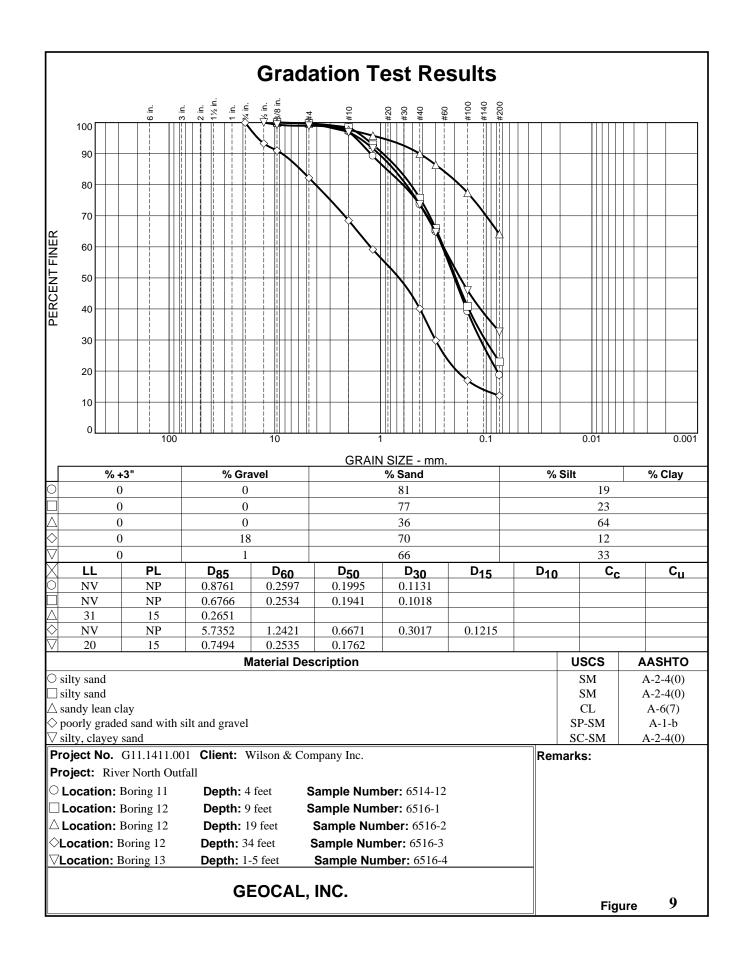
Dry Density	109 pcf
Moisture Content	18.9 %
Volume Change	5.1 %
Swell Pressure	13,000 psf

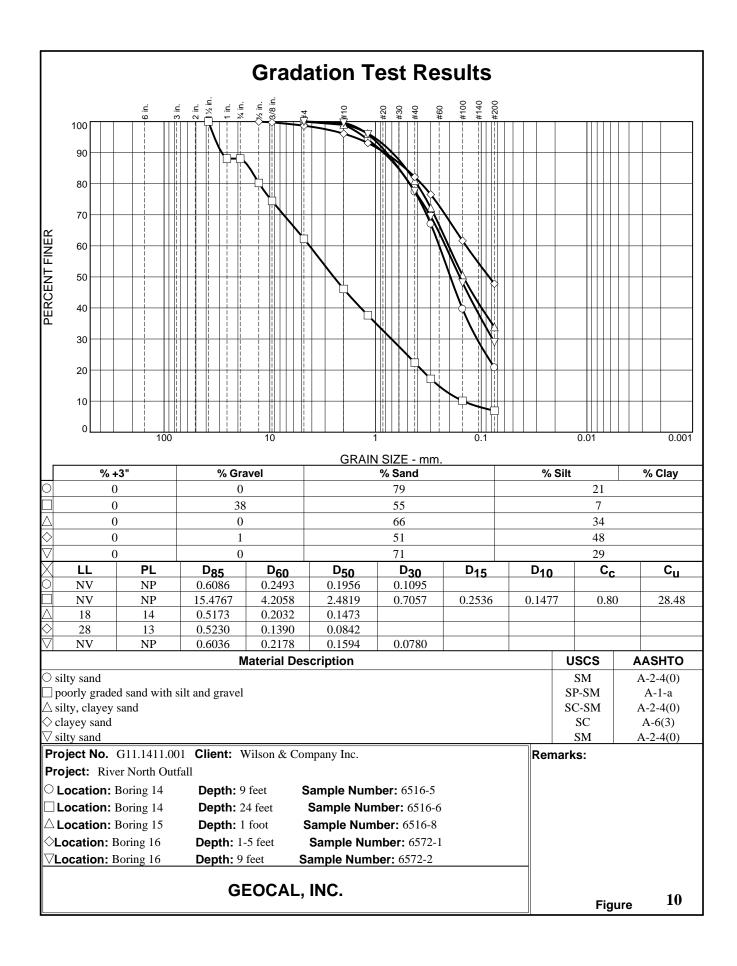
Cross Iss	Proposed 33rd Street Outfall	JOB NO.	G11.1411.004
GEOCAL, INC.	SWELL - COMPRESSION TEST RESULTS	FIGURE NO.	5

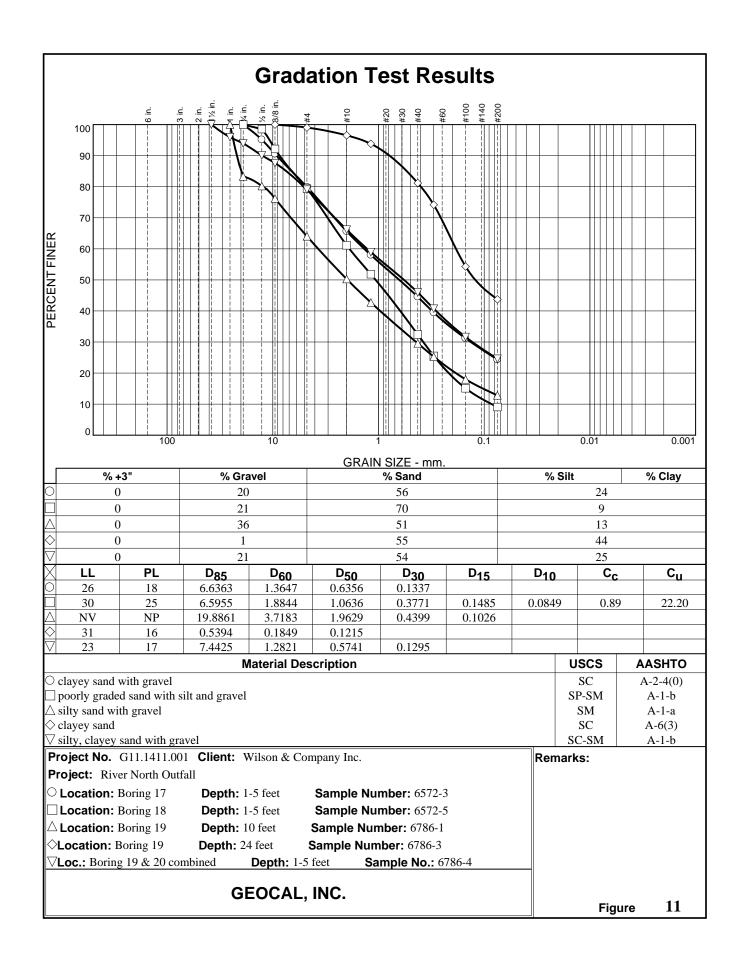


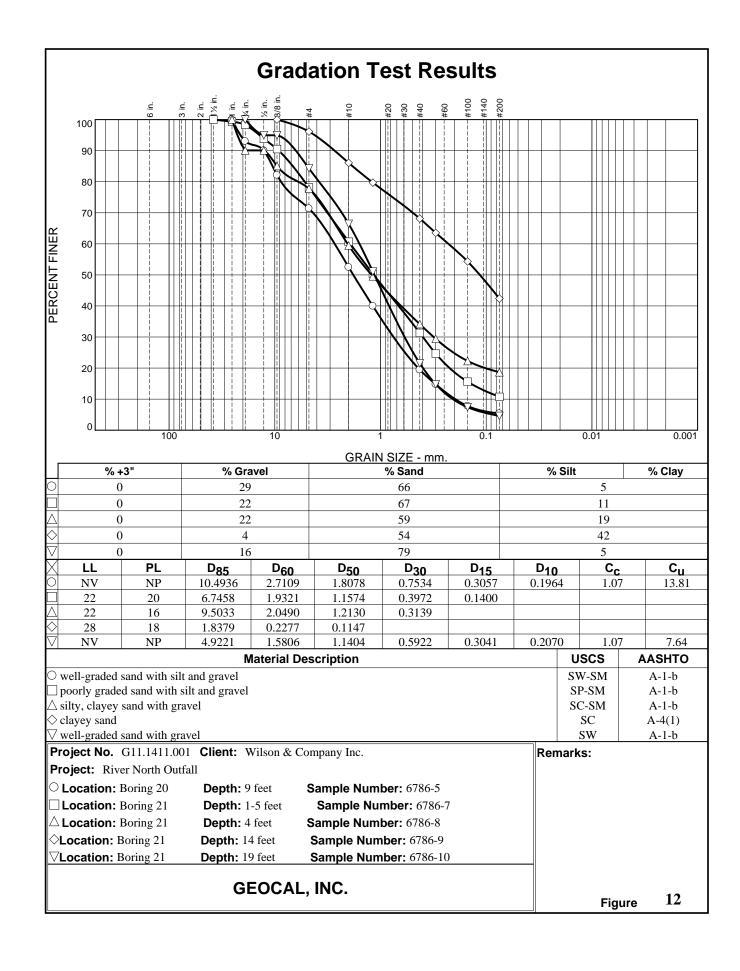


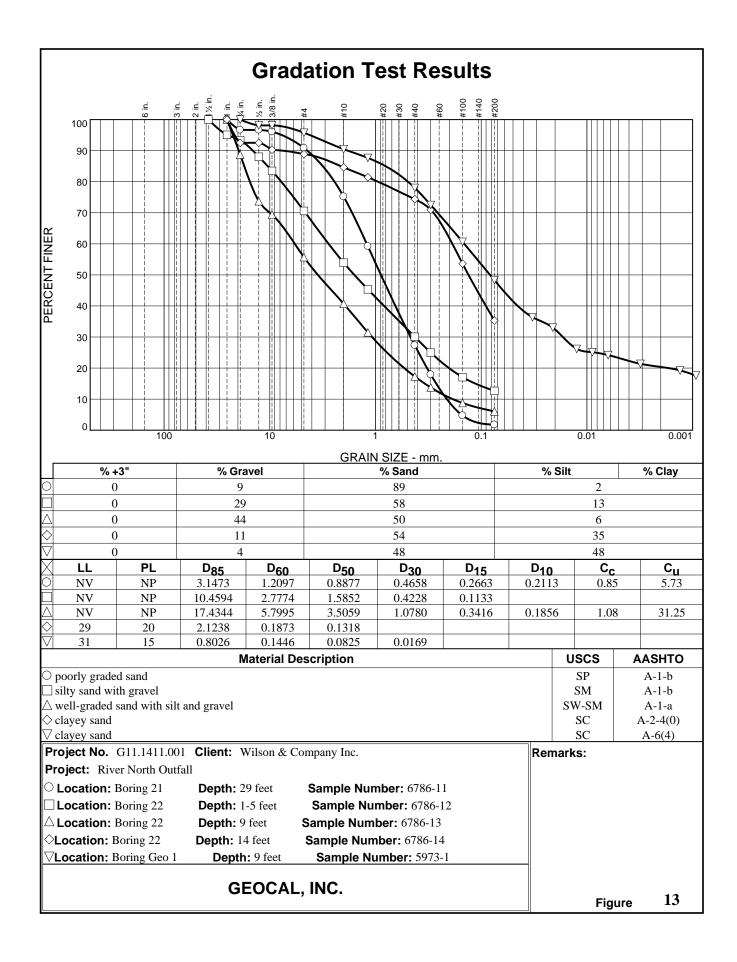


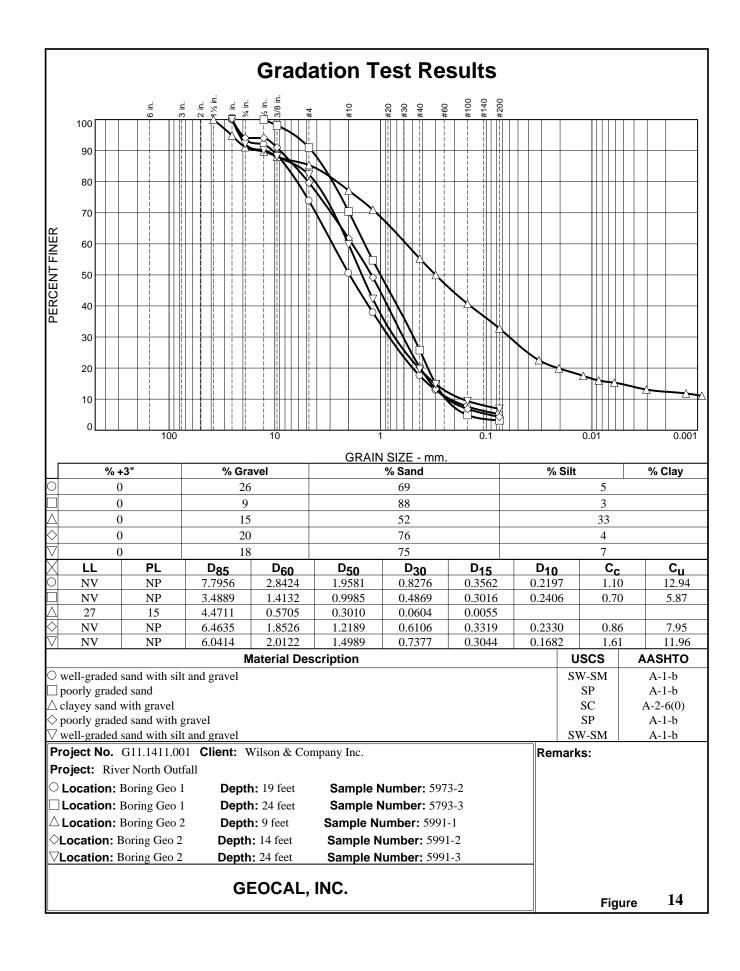


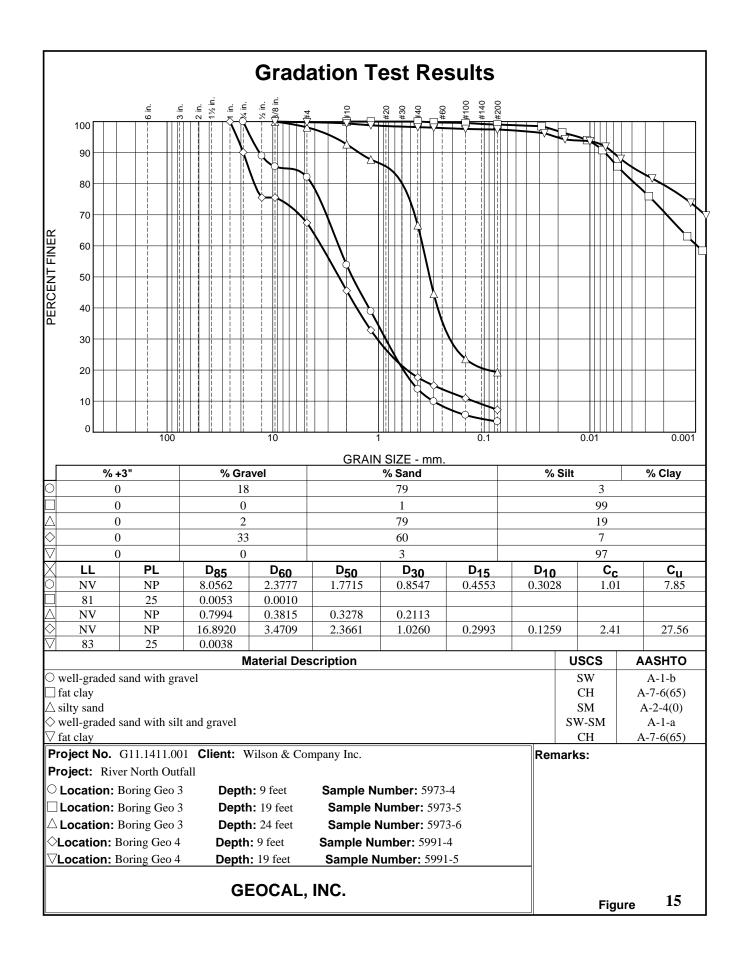


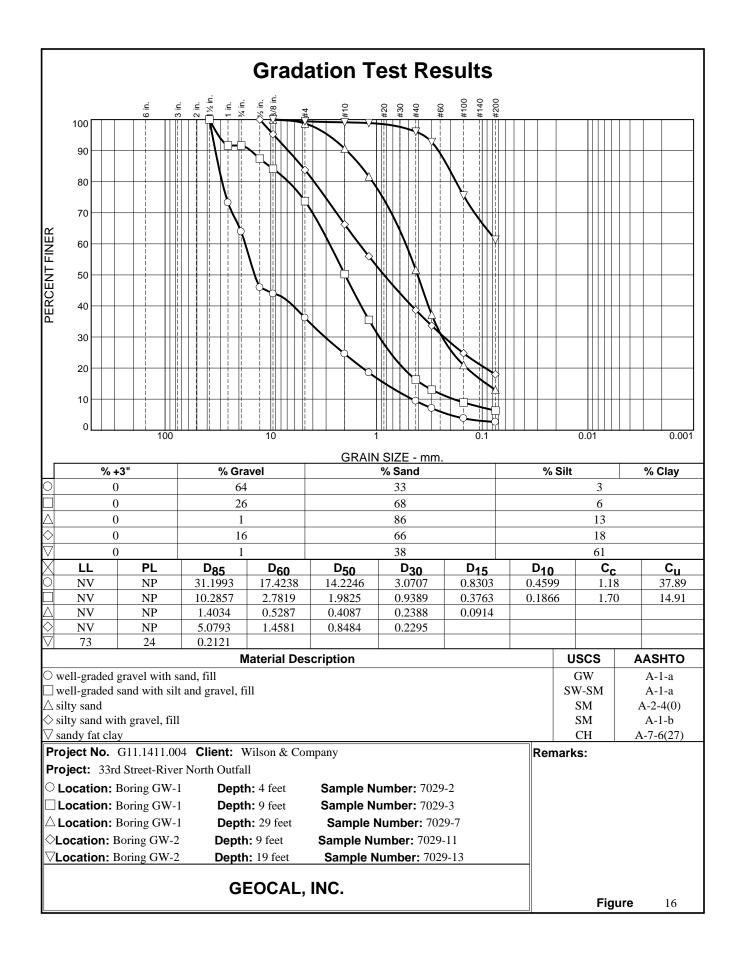


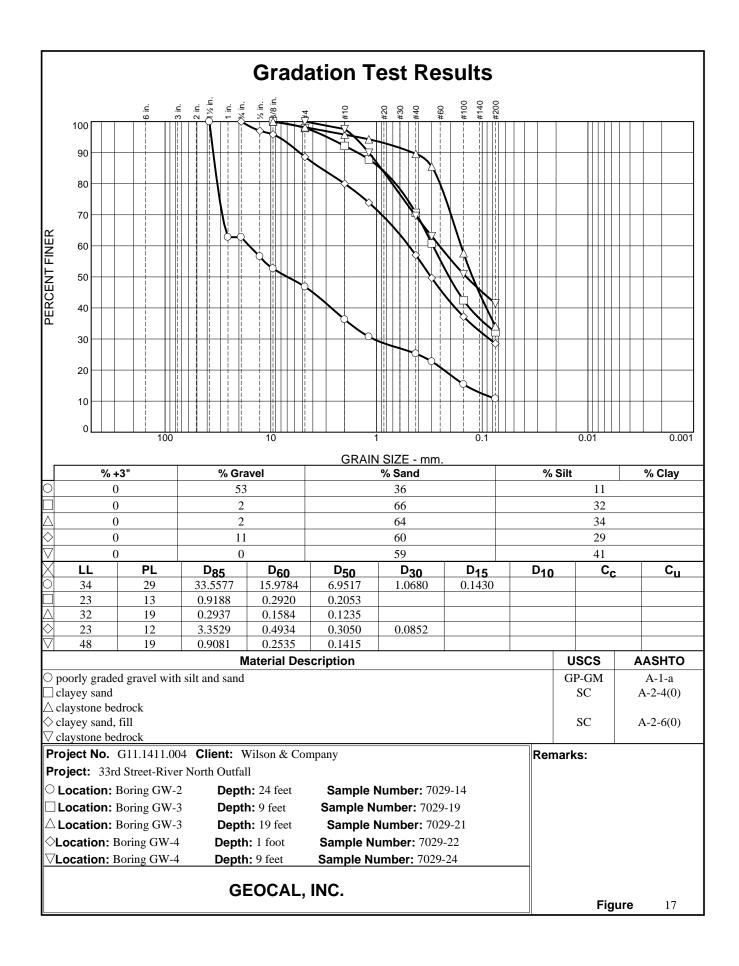












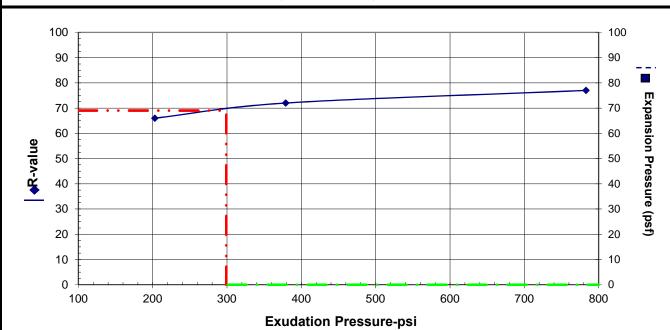
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Phone: (303) 337-0338 Fax: (303) 337-0247

R-Value Test Results

AASHTO T-190, ASTM D 2844; CP-L 3101 & 3102



No.	Compact. Pressure (psi)	Density (pcf)	Moist. %	Expansion Pressure (psf)	Horizontal Press. psi at 2000 lbf	Sample Height (in.)	Exudation Pressure (psi)	R Value	Corrected R Value
1	350	111.9	11.2	9.0	33	2.62	783.0	75.0	77
2	350	110.3	12.3	0.0	39	2.60	379.0	70.0	72
3	300	108.5	14 2	0.0	48	2 60	203.0	63.0	66

(POI)			(601)	at 2000 ibi	(111.)	(P31)		Value
350	111.9	11.2	9.0	33	2.62	783.0	75.0	77
350	110.3	12.3	0.0	39	2.60	379.0	70.0	72
300	108.5	14.2	0.0	48	2.60	203.0	63.0	66
-			-			-		-

Test Results Material Description Sample Classification R-value at 300 psi exudation pressure: ASTM: SM AASHTO: A-1-b Tested By: H. Redzic Project Number: G11.1411.001 Project Name: River North Outfall Checked By: G. Burgess, P.E. Sample Location: Boring 2 @ 1/2-5' Reviewed By: 0 Sample Number: 6508-3 Date Test Run: 7/10/2013

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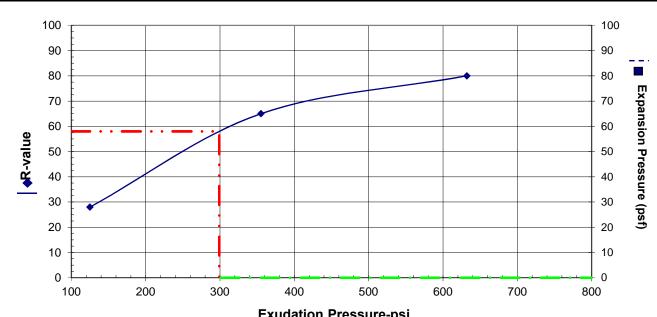
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R-Value Test Results

AASHTO T-190, ASTM D 2844; CP-L 3101 & 3102



LVIIdation	Droceliro nei
EXUUALIUII	Pressure-psi

No.	Compact. Pressure (psi)	Density (pcf)	Moist. %	Expansion Pressure (psf)	Horizontal Press. psi at 2000 lbf	Sample Height (in.)	Exudation Pressure (psi)	R Value	Corrected R Value
1	300	119.8	9.0	9.0	106	2.48	125.0	28.0	28
2	350	121.7	7.7	26.0	48	2.50	355.0	65.0	65
3	350	124.0	6.7	39.0	28	2.48	632.0	80.0	80

Test Results

Material Description

R-value at 300 psi exudation pressure:

Sample Classification ASTM: 0

AASHTO: 0

Project Number: G11.1411.001 Project Name: River North Outfall Sample Location: Boring 4 @ 1-5 feet

Sample Number: 6514-1 Date Test Run: 7/10/2013

Tested By: H. Redzic Checked By: G. Burgess, P.E.

Reviewed By: 0

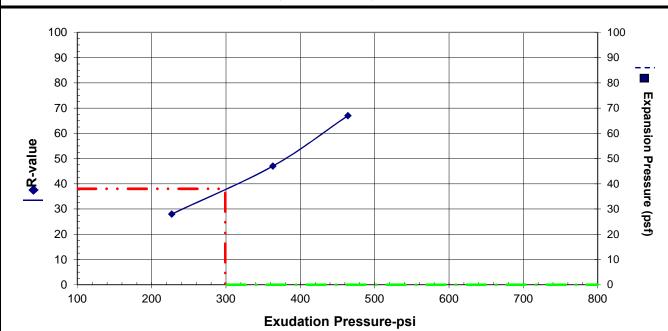
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R-Value Test Results

AASHTO T-190, ASTM D 2844; CP-L 3101 & 3102



No.	Compact. Pressure (psi)	Density (pcf)	Moist. %	Expansion Pressure (psf)	Horizontal Press. psi at 2000 lbf	Sample Height (in.)	Exudation Pressure (psi)	R Value	Corrected R Value
1	350	124.3	6.8	218.0	47	2.46	464.0	67.0	67
2	300	123.6	7.4	157.0	77	2.52	363.0	47.0	47
3	250	123.2	8.4	26.0	108	2.51	227.0	28.0	28

Test Results

R-value at 300 psi exudation pressure: 38

Material Description

Sample Classification ASTM: SC

AASHTO: A-2-6(1)

Project Number: G11.1411.001
Project Name: River North Outfall
Sample Location: Boring 7 @ 1-5 feet

Sample Number: 6514-5 Date Test Run: 7/9/2013 Tested By: H. Redzic Checked By: G. Burgess, P.E.

Reviewed By: 0

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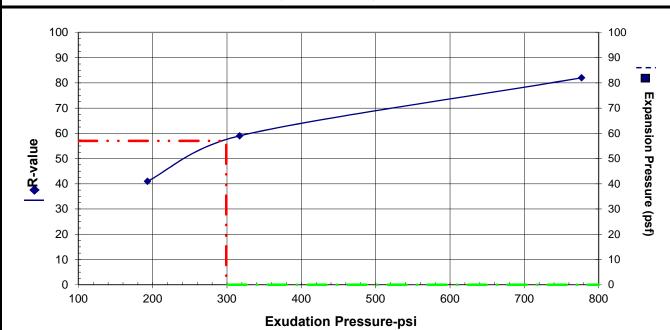
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R-Value Test Results

AASHTO T-190, ASTM D 2844; CP-L 3101 & 3102



No.	Compact. Pressure (psi)	Density (pcf)	Moist. %	Expansion Pressure (psf)	Horizontal Press. psi at 2000 lbf	Sample Height (in.)	Exudation Pressure (psi)	R Value	Corrected R Value
1	350	115.4	11.2	13.0	74	2.48	193.0	41.0	41
2	300	116.4	9.9	22.0	45	2.50	317.0	59.0	59
3	250	118 4	8 4	48.0	24	2 49	777 0	82.0	82

Test Results

Material Description

R-value at 300 psi exudation pressure: 57

Sample Classification ASTM: SM

AASHTO: A-2-4(0)

Project Number: G11.1411.001
Project Name: River North Outfall
Sample Location: Boring 10 @ 1-5 feet

Sample Number: 6514-9 Date Test Run: 7/9/2013 Tested By: H. Redzic Checked By: G. Burgess, P.E.

Reviewed By: 0

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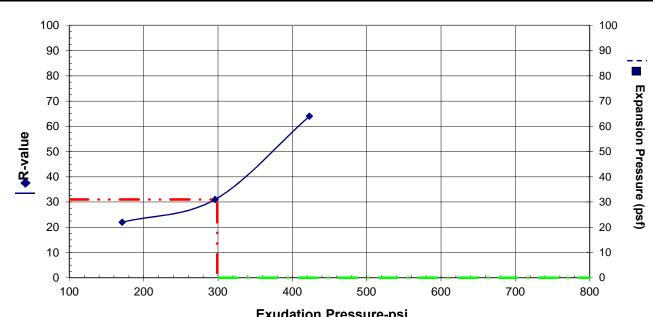
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R-Value Test Results

AASHTO T-190, ASTM D 2844; CP-L 3101 & 3102



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	No.	Compact. Pressure (psi)	Density (pcf)	Moist. %	Expansion Pressure (psf)	Horizontal Press. psi at 2000 lbf	Sample Height (in.)	Exudation Pressure (psi)	R Value	Corrected R Value
	1	300	119.6	9.8	0.0	114	2.50	171.0	22.0	22
	2	350	120.6	9.2	22.0	99	2.49	296.0	31.0	31
ſ	3	350	121.2	8.7	35.0	48	2.47	423.0	64.0	64

Test Results

Material Description

R-value at 300 psi exudation pressure:

Sample Classification ASTM: SC-SM

AASHTO: A-2-4(0)

Project Number: G11.1411.001 Project Name: River North Outfall

Sample Location: Boring 13 @ 1-5 feet

Sample Number: 6516-4 Date Test Run: 7/9/2013

Tested By: H. Redzic Checked By: G. Burgess, P.E.

Reviewed By: 0

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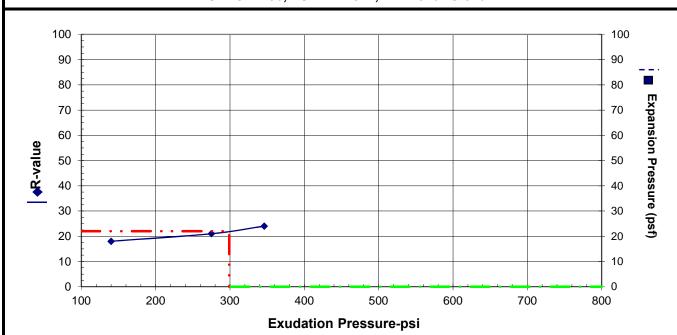
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R-Value Test Results

AASHTO T-190, ASTM D 2844; CP-L 3101 & 3102



No.	Compact. Pressure (psi)	Density (pcf)	Moist. %	Expansion Pressure (psf)	Horizontal Press. psi at 2000 lbf	Sample Height (in.)	Exudation Pressure (psi)	R Value	Corrected R Value
1	110	112.3	14.0	26.0	126	2.53	140.0	18.0	18
2	140	114.7	12.6	35.0	121	2.50	275.0	21.0	21
2	250	117 1	11.2	440	117	2.49	246.0	24.0	24

No.	Pressure (psi)	(pcf)	%	Pressure (psf)	Press. psi at 2000 lbf	Height (in.)	Pressure (psi)	Value	R Value
1	110	112.3	14.0	26.0	126	2.53	140.0	18.0	18
2	140	114.7	12.6	35.0	121	2.50	275.0	21.0	21
3	250	117.1	11.2	44.0	117	2.48	346.0	24.0	24

R-value at 300 psi exudation pressure:

Sample Classification

Material Description

ASTM: SC AASHTO: A-6(3)

Project Number: G11.1411.001 Project Name: River North Outfall Sample Location: Boring 16 @ 1-5 feet

Test Results

Sample Number: 6572-1 Date Test Run: 7/10/2013

Tested By: H. Redzic Checked By: G. Burgess, P.E.

Reviewed By: 0

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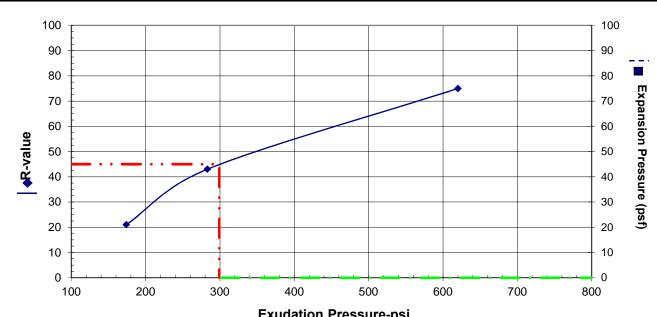
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R-Value Test Results

AASHTO T-190, ASTM D 2844; CP-L 3101 & 3102



Exudation	Pressure-psi	
	i icasuic-pai	

No.	Compact. Pressure (psi)	Density (pcf)	Moist. %	Expansion Pressure (psf)	Horizontal Press. psi at 2000 lbf	Sample Height (in.)	Exudation Pressure (psi)	R Value	Corrected R Value
1	300	123.0	9.7	9.0	115	2.44	174.0	22.0	21
2	350	123.7	9.3	17.0	80	2.45	283.0	43.0	43
3	350	124.5	8.2	52.0	31	2.43	620.0	76.0	75

Test Results

Material Description

R-value at 300 psi exudation pressure:

Sample Classification ASTM: SC

AASHTO: A-2-4(0)

Project Number: G11.1411.001 Project Name: River North Outfall Sample Location: Boring 17 @ 1-5 feet

Sample Number: 6572-3 Date Test Run: 7/10/2013

Tested By: H. Redzic Checked By: G. Burgess, P.E.

Reviewed By: 0

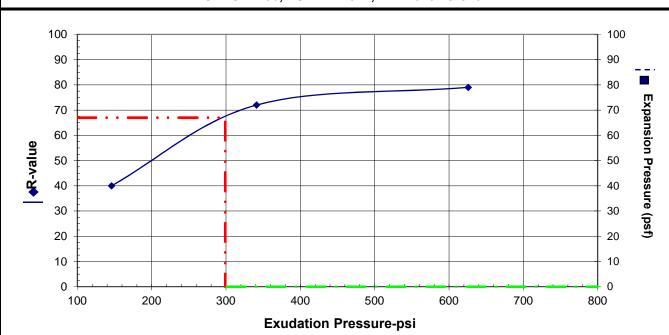
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R-Value Test Results

AASHTO T-190, ASTM D 2844; CP-L 3101 & 3102



No.	Compact. Pressure (psi)	Density (pcf)	Moist. %	Expansion Pressure (psf)	Horizontal Press. psi at 2000 lbf	Sample Height (in.)	Exudation Pressure (psi)	R Value	Corrected R Value
1	350	118.6	9.6	13.0	88	2.50	146.0	40.0	40
2	350	119.5	8.6	35.0	38	2.50	341.0	72.0	72
વ	350	120.5	7.6	52.0	27	2.50	626.0	79 N	70

Test Results

R-value at 300 psi exudation pressure: 67

67 Sample Classification

ASTM: SP-SM AASHTO: A-1-b

Material Description

Project Number: G11.1411.001
Project Name: River North Outfall
Sample Location: Boring 18 @ 1-5 feet

Sample Number: 6572-5 Date Test Run: 7/10/2013 Tested By: H. Redzic Checked By: G. Burgess, P.E.

Reviewed By: 0

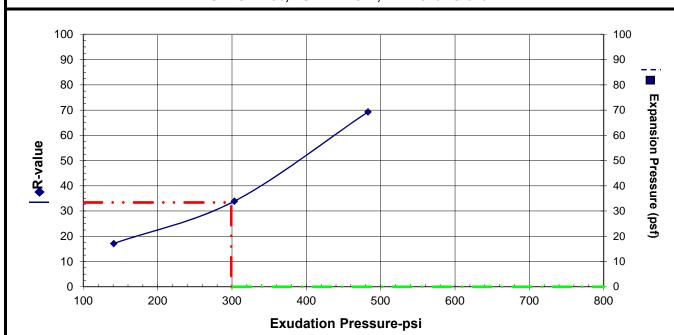
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R-Value Test Results

AASHTO T-190, ASTM D 2844; CP-L 3101 & 3102



No.	Compact. Pressure (psi)	Density (pcf)	Moist. %	Expansion Pressure (psf)	Horizontal Press. psi at 2000 lbf	Sample Height (in.)	Exudation Pressure (psi)	R Value	Corrected R Value
1	300	123.1	8.2	96.0	44	2.46	483.0	69.3	69
2	200	120.2	9.1	43.7	99	2.45	303.2	33.9	34
3	150	117.3	10.1	30.6	127	2.53	140.9	17.1	17

Test Results

R-value at 300 psi exudation pressure: 33.4

Sample Classification USCS: 0

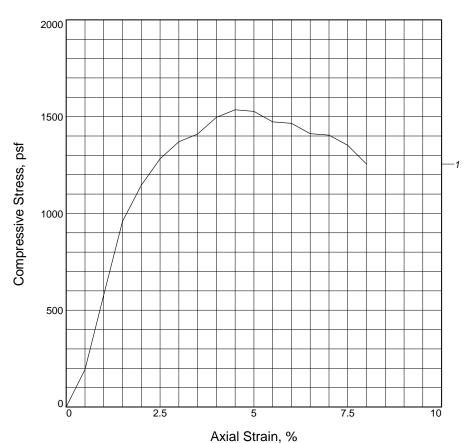
Material Description

AASHTO: 0

Project Number: G11.1411.002
Project Name: River North Outfall
Sample Location: B-19 @ 1-5 feet

Sample Number: 6786-4 Date Test Run: 2/19/2014 Tested By: H. Redzic Checked By: W. Zitz Reviewed By: S. Bruer, P.E.





Sample No.	1	
Unconfined strength, psf	1535	
Undrained shear strength, psf	768	
Failure strain, %	4.5	
Strain rate, in./min.	0.05	
Water content, %	46.0	
Wet density, pcf	107.7	
Dry density, pcf	73.7	
Saturation, %	99.6	
Void ratio	1.2009	
Specimen diameter, in.	1.94	
Specimen height, in.	4.00	
Height/diameter ratio	2.06	

Description: Lean clay with sand

LL = 65 PL = 23 PI = 42 GS= 2.60 Type:

Project No.: G11.1411.003

Date Sampled: 5/23/2014

Remarks:

Client: Wilson & Company

Project: 33rd Street Outfall- Tunnel Borings

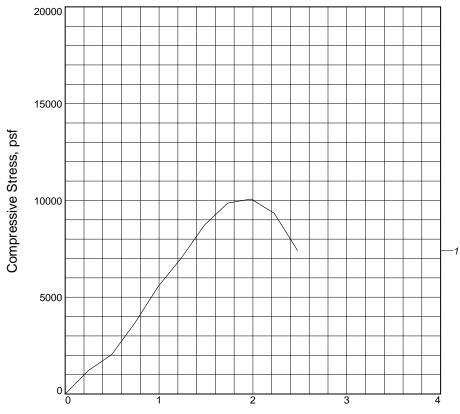
Location: TB-2

Sample Number: 6855-23 Depth: 16.5 feet

UNCONFINED COMPRESSION TEST

GEOCAL, INC.





Axial Strain, %

Sample No.	1	
Unconfined strength, psf	10075	
Undrained shear strength, psf	5038	
Failure strain, %	2.0	
Strain rate, in./min.	0.05	
Water content, %	29.5	
Wet density, pcf	122.1	
Dry density, pcf	94.3	
Saturation, %	103.6	
Void ratio	0.7541	
Specimen diameter, in.	1.94	
Specimen height, in.	4.04	
Height/diameter ratio	2.08	

Description: claystone bedrock

LL = PL = PI = GS = 2.65 Type:

Project No.: G11.1411.004

Date Sampled:

Remarks:

Client: Wilson & Company

Project: 33rd Street-River North Outfall

Location: Boring GW-2

Sample Number: 7039-1 Depth: 24 feet

UNCONFINED COMPRESSION TEST

GEOCAL, INC.



Unconfined Compressive Strength of Cohesive Soils

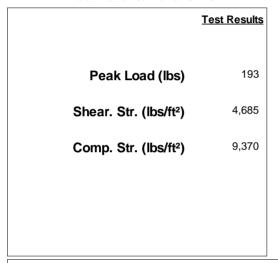
Stress (-Lbs / Inches 2) vs Extension (-Inches)

Specimen ID $\,^{GW-2}$

Test Number 58

Report Number 76

Test Date 3/24/2015 7:51:44 AM

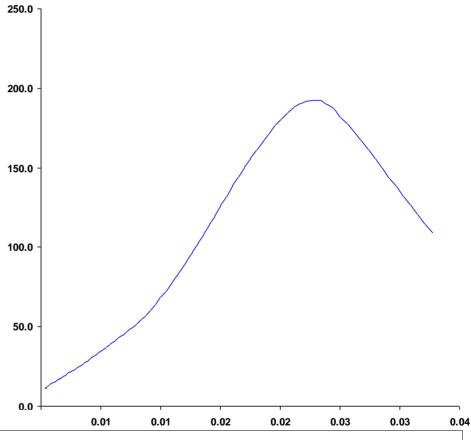


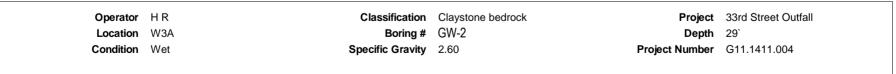
Testing Machine STM-20 1002582 Load Cell S/N (TVI000000), Units (Lbs) 22480

Crosshead Speed (Inches / min) or Rate 0.5

Extension or Position Measured by XHD_100 (XHD100)

By : ______ Date : _____





Template No 216

24-Mar-15

GEOCAL



Unconfined Compressive Strength of Cohesive Soils

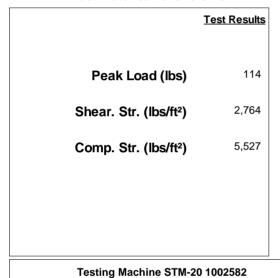
Stress (-Lbs / Inches 2) vs Extension (-Inches)

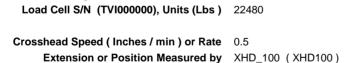
Specimen ID GW-4

Test Number 59

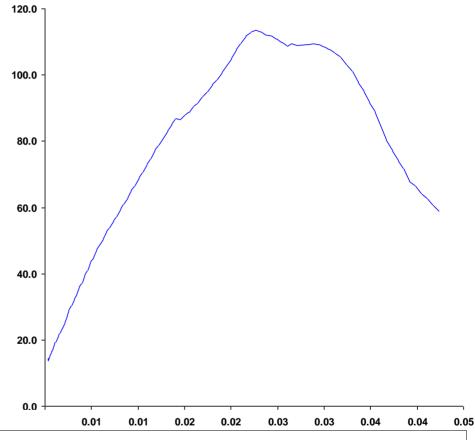
Report Number 77

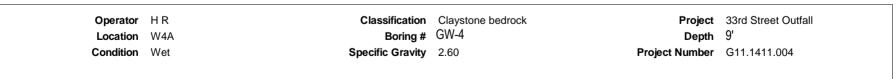
Test Date 3/24/2015 8:15:44 AM





By:_ Date:





Template No 216

24-Mar-15

GEOCAL



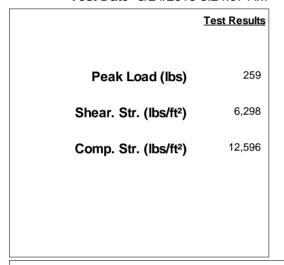
Unconfined Compressive Strength of Cohesive Soils

Stress (-Lbs / Inches 2) vs Extension (-Inches)

Specimen ID GW-4
Test Number 60

Report Number 78

Test Date 3/24/2015 8:24:07 AM



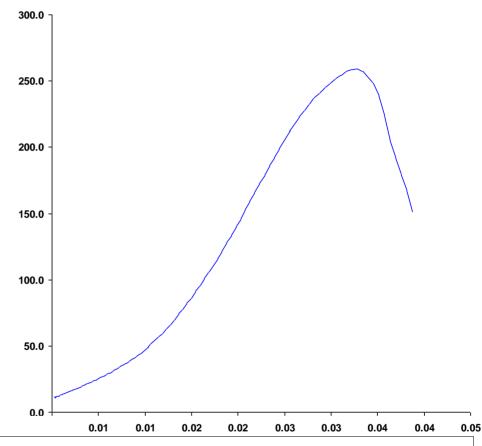
Testing Machine STM-20 1002582

Load Cell S/N (TVI000000), Units (Lbs) 22480

Crosshead Speed (Inches / min) or Rate 0.5

Extension or Position Measured by XHD_100 (XHD100)







Template No 216 24-Mar-15 Figure 31 GEOCAL



7290 S. Fraser Street Centennial, Colorado 80112 (303) 337-0338 www.geocal.us

DIRECT SHEAR

AASHTO T 236-08;ASTM D 3080-04 (modified for consolidated, undrained conditions)

Job Name: Proposed River North Outfall March 11, 2015

Location: Boring GW-1 @ 9 feet; Sample-7029-3 PEAK SHEAR ANGLE (Ø): 47°

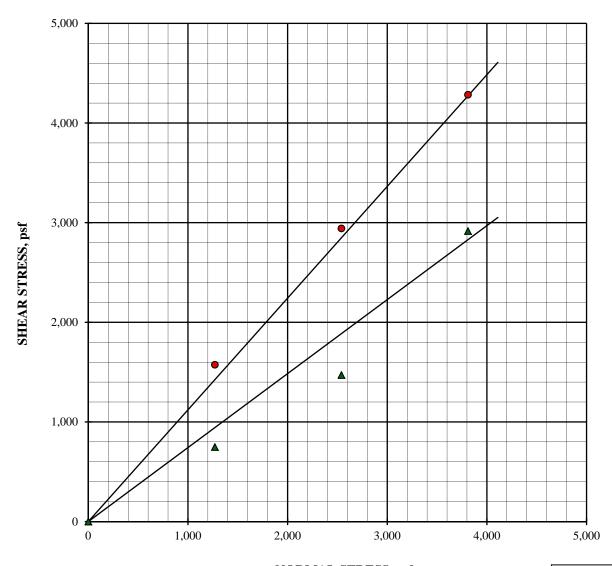
Classification: Well-Graded Sand with Silt and Gravel (SW-SM) COHESION (C): 0.000 psf

Compacted to 95% Relative Compaction RESIDUAL SHEAR ANGLE (Ø): 40°

Initial Dry Density: 106.3 pcf COHESION (C): 0.000 psf

Initial Moisture Content: 12.5 %

SHEAR STRESS vs. NORMAL STRESS



NORMAL STRESS, psf



7290 S. Fraser Street Centennial, Colorado 80112 (303) 337-0338 www.geocal.us

DIRECT SHEAR

AASHTO T 236-08;ASTM D 3080-04 (modified for consolidated, undrained conditions)

Job Name: Proposed River North Outfall March 11, 2015

Location: Boring GW-1 @ 29 feet; Sample-7029-7 PEAK SHEAR ANGLE (Ø): 43°

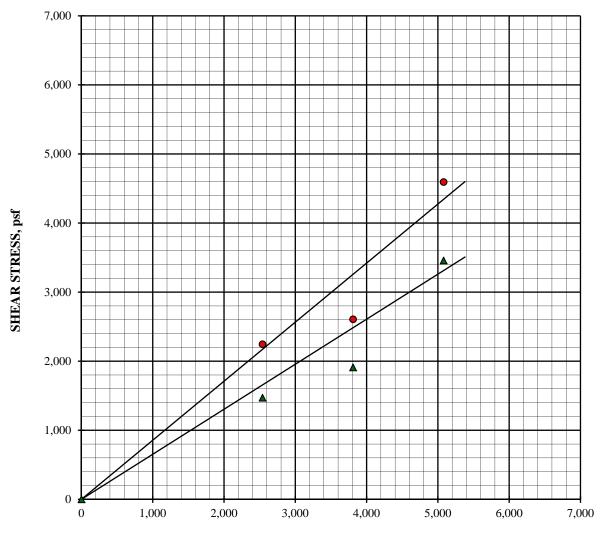
Classification: Silty Sand (SM) COHESION (C): 0.000 psf

Compacted to 95% Relative Compaction RESIDUAL SHEAR ANGLE (Ø): 38°

Initial Dry Density: 106.6 pcf COHESION (C): 0.000 psf

Initial Moisture Content: 12.5 %

SHEAR STRESS vs. NORMAL STRESS



NORMAL STRESS, psf



7290 S. Fraser Street Centennial, Colorado 80112 (303) 337-0338 www.geocal.us

DIRECT SHEAR

AASHTO T 236-08;ASTM D 3080-04 (modified for consolidated, undrained conditions)

Job Name: Proposed River North Outfall March 11, 2015

Location: Boring GW-2 @ 24 feet; Sample-7029-14 PEAK SHEAR ANGLE (Ø): 35°

Classification: Poorly Graded Gravel with Silt and Sand (GP-GM) COHESION, peak (C): 508 psf

Compacted to 95% Relative Compaction

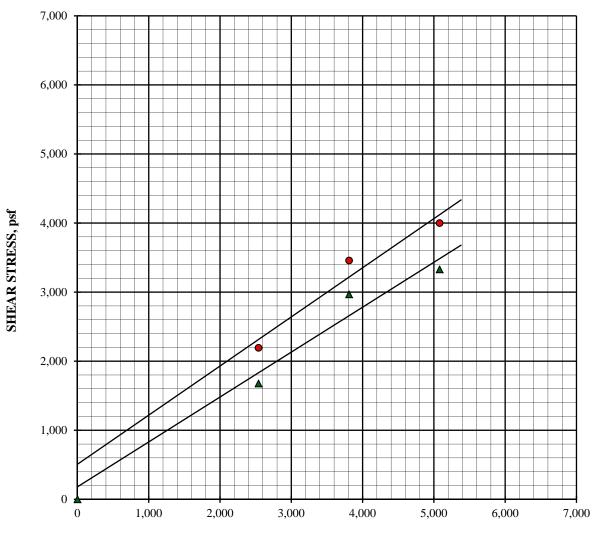
RESIDUAL SHEAR ANGLE (Ø): 33°

Initial Dry Density: 106.4 pcf

COHESION, residual (C): 181 psf

Initial Moisture Content: 8.4 %

SHEAR STRESS vs. NORMAL STRESS



NORMAL STRESS, psf

TABLE 1

SUMMARY OF LABORATORY TEST RESULTS

Project #: **G11.1411.001**

Client:

Wilson and Company, Inc.

Project Name:

Proposed 33rd Street Outfall

Sample	Location	Natural	Natural	Grad	ation	Percent	Atterb	erg Limits	Swell	R Value	AASHTO	
		Moisture	Dry			Passing	Liquid	Plasticity	Pressure	at 300psi	Class.	Soil or Bedrock
Boring	Depth	Content	Density	Gravel	Sand	No. 200	Limit	Index		Exudation	(Group	Description
No.	(feet)	(%)	(pcf)	(%)	(%)	Sieve	(%)	(%)	(psf)	Pressure	Index)	
1	4	8.6	121	43	45	12	27	4			A-1-a	Poorly graded sand with silt and gravel - Fill
1	9	14.9	117	0	69	31	43	27	4,000			Claystone bedrock
2	1/2-5			34	50	16	NV	NP		69	A-1-b	Silty sand with gravel - Fill
2	9	41.8	65									Organic material - Fill
2	14	19.4	101	8	44	48	34	15			A-6(4)	Clayey sand
2	19	2.5	101									Poorly graded sand with gravel
3	1/2-5			23	57	20	25	6			A-1-b	Silty, clayey sand with gravel - Fill
4	1-5			24	57	19	23	6		58	A-1-b	Silty, clayey sand with gravel - Fill
4	14	20.6	106	0	65	35	45	19	2,900			Claystone bedrock
Geo-4	9	2.7		33	60	7	NV	NP			A-1-a	Well-graded sand with silt and gravel
Geo-4	19	48.7		0	3	97	83	58			A-7-6(65)	Fat clay
Geo-3	9	2.1		24	72	4	NV	NP			A-1-b	Poorly graded sand with gravel
Geo-3	19	46.4		0	1	99	81	56			A-7-6(65)	Fat clay
Geo-3	24	26.9		2	79	19	NV	NP			A-2-4(0)	Silty sand
6	1-5			35	59	6	NV	NP			A-1-a	Well-graded sand with silt and gravel
6	14	1.9		27	70	3	NV	NP			A-1-a	Well-graded sand with gravel
7	1-5			30	41	29	32	18		38	A-2-6(1)	Clayey sand with gravel
8	9	14.9		0	34	66	27	11			A-6(5)	Sandy lean clay
8	19	1.9		35	61	4	NV	NP			A-1-a	Well-graded sand with gravel
9	4	6.3	99	0	87	13	NV	NP			A-2-4(0)	Silty sand
10	1-5			1	76	23	NV	NP		57	A-2-4(0)	Silty sand
10	19	5.8		0	83	17	NV	NP			A-2-4(0)	Silty sand
11	4	5.5	107	0	81	19	NV	NP			A-2-4(0)	Silty sand
12	9	4.9		0	77	23	NV	NP			A-2-4(0)	Silty sand
12	19	17.8		0	36	64	31	16			A-6(7)	Sandy lean clay
12	34	4.4		18	70	12	NV	NP			A-1-b	Poorly graded sand with silt and gravel
13	1-5			1	66	33	20	5		31	A-2-4(0)	Silty, clayey sand
14	9	6.7		0	79	21	NV	NP			A-2-4(0)	Silty sand
14	24	2.1		38	55	7	NV	NP			A-1-a	Poorly graded sand with silt and gravel
15	1	7.9		0	66	34	18	4			A-2-4(0)	Silty, clayey sand
16	1-5			1	51	48	28	15		22	A-6(3)	Clayey sand - Fill
16	9	7.8	101	0	71	29	NV	NP			A-2-4(0)	Silty sand - Fill
17	1-5			20	56	24	26	8		46	A-2-4(0)	Clayey sand with gravel - Fill
17	4	25.1	86									Silty sand - Fill
18	1-5			21	70	9	30	5		67	A-1-b	Poorly graded sand with silt and gravel - Fill
18	4	17.5	94				-			-		Clayey sand with gravel - Fill

TABLE 1

SUMMARY OF LABORATORY TEST RESULTS

Project #: **G11.1411.001**

Client:

Wilson and Company, Inc.

Project Name:

Proposed 33rd Street Outfall

Sample	Location	Natural	Natural	Grad	ation	Percent	Atterb	erg Limits	Swell	R Value	AASHTO	
		Moisture	Dry			Passing	Liquid	Plasticity	Pressure	at 300psi	Class.	Soil or Bedrock
Boring	Depth	Content	Density	Gravel	Sand	No. 200	Limit	Index		Exudation	(Group	Description
No.	(feet)	(%)	(pcf)	(%)	(%)	Sieve	(%)	(%)	(psf)	Pressure	Index)	
1	4	8.6	121	43	45	12	27	4			A-1-a	Poorly graded sand with silt and gravel - Fill
1	9	14.9	117	0	69	31	43	27	4,000			Claystone bedrock
2	1/2-5			34	50	16	NV	NP		69	A-1-b	Silty sand with gravel - Fill
2	9	41.8	65									Organic material - Fill
2	14	19.4	101	8	44	48	34	15			A-6(4)	Clayey sand
2	19	2.5	101									Poorly graded sand with gravel
3	1/2-5			23	57	20	25	6			A-1-b	Silty, clayey sand with gravel - Fill
4	1-5			24	57	19	23	6		58	A-1-b	Silty, clayey sand with gravel - Fill
4	14	20.6	106	0	65	35	45	19	2,900			Claystone bedrock
Geo-4	9	2.7		33	60	7	NV	NP			A-1-a	Well-graded sand with silt and gravel
Geo-4	19	48.7		0	3	97	83	58			A-7-6(65)	Fat clay
Geo-3	9	2.1		24	72	4	NV	NP			A-1-b	Poorly graded sand with gravel
Geo-3	19	46.4		0	1	99	81	56			A-7-6(65)	Fat clay
Geo-3	24	26.9		2	79	19	NV	NP			A-2-4(0)	Silty sand
6	1-5			35	59	6	NV	NP			A-1-a	Well-graded sand with silt and gravel
6	14	1.9		27	70	3	NV	NP			A-1-a	Well-graded sand with gravel
7	1-5			30	41	29	32	18		38	A-2-6(1)	Clayey sand with gravel
8	9	14.9		0	34	66	27	11			A-6(5)	Sandy lean clay
8	19	1.9		35	61	4	NV	NP			A-1-a	Well-graded sand with gravel
9	4	6.3	99	0	87	13	NV	NP			A-2-4(0)	Silty sand
10	1-5			1	76	23	NV	NP		57	A-2-4(0)	Silty sand
10	19	5.8		0	83	17	NV	NP			A-2-4(0)	Silty sand
11	4	5.5	107	0	81	19	NV	NP			A-2-4(0)	Silty sand
12	9	4.9		0	77	23	NV	NP			A-2-4(0)	Silty sand
12	19	17.8		0	36	64	31	16			A-6(7)	Sandy lean clay
12	34	4.4		18	70	12	NV	NP			A-1-b	Poorly graded sand with silt and gravel
13	1-5			1	66	33	20	5		31	A-2-4(0)	Silty, clayey sand
14	9	6.7		0	79	21	NV	NP			A-2-4(0)	Silty sand
14	24	2.1		38	55	7	NV	NP			A-1-a	Poorly graded sand with silt and gravel
15	1	7.9		0	66	34	18	4			A-2-4(0)	Silty, clayey sand
16	1-5			1	51	48	28	15		22	A-6(3)	Clayey sand - Fill
16	9	7.8	101	0	71	29	NV	NP			A-2-4(0)	Silty sand - Fill
17	1-5			20	56	24	26	8		46	A-2-4(0)	Clayey sand with gravel - Fill
17	4	25.1	86									Silty sand - Fill
18	1-5			21	70	9	30	5		67	A-1-b	Poorly graded sand with silt and gravel - Fill
18	4	17.5	94				-			-		Clayey sand with gravel - Fill

TABLE 1
SUMMARY OF LABORATORY TEST RESULTS

G11.1411.004

Project #:

Client: V

Wilson & Company

Project Name: Proposed 33rd Street Outfall

Sample Lo	ocation	Natural	Natural		Gradatio	n	Atterbe	rg Limits	Unconfined	Swell Pressure (psf)/Swell (%)	AASHTO	
Boring	Depth	Moisture Content	Dry Density	Gravel	Sand	Passing No. 200	Liquid Limit	Plasticity Index	Compressive Strength	at 1 ksf surcharge	Class. (Group	Soil or Bedrock Description
No.	(feet)	(%)	(pcf)	(%)	(%)	Sieve	(%)	(%)	(psf)	(%)	Index)	
GW-1	1	13.0	116									Silty, clayey sand, fill
GW-1	4	2.0	114	64	33	3	NV	NP			A-1-a	Well-graded gravel with sand, fill
GW-1	9			26	68	6	NV	NP			A-1-a	Well-graded sand with silt and gravel, fill
GW-1	14											Sandy lean clay
GW-1	19	39.9	78									Sandy lean clay
GW-1	24	21.5	100									Silty, clayey sand
GW-1	29	12.5		1	86	13	NV	NP			A-2-4(0)	Silty sand
GW-1	34	15.8	113									Claystone bedrock
GW-2	1											Silty, clayey sand with gravel, fill
GW-2	4	-	108									Silty sand with gravel, fill
GW-2	9	33.1	79	16	66	18	NV	NP			A-1-b	Silty sand with gravel, fill
GW-2	14	1.5	124									Sandy gravel
GW-2	19	44.7	77	1	38	61	73	49		1,150 / 0.4	A-7-6(27)	Sandy fat clay
GW-2	24	29.5	94						10,075		A-1-a	Poorly graded gravel with silt and sand
GW-2	29	17.9	110						9,370			Claystone bedrock
GW-2	34	15.5	115	53	36	11	34	5				Claystone bedrock
GW-3	1											Clayey sand with gravel, fill
GW-3	4											Silty sand with gravel, fill
GW-3	9	11.3	117	2	66	32	23	10			A-2-4(0)	Clayey sand
GW-3	14	24.7	101									Sandstone bedrock
GW-3	19	17.0	113	2	64	34	32	13				Claystone bedrock
GW-4	1	10.4	123								A-2-6(0)	Clayey sand, fill
GW-4	4	6.7	118	11	60	29	23	11				Clayey sand, fill
GW-4	9	18.9	109	0	59	41	48	29	5,527	13,000 / 5.1		Claystone bedrock
GW-4	14	16.2	114						12,596			Claystone bedrock

TABLE 2 SUMMARY OF LABORATORY CHEMICAL TEST RESULTS Client:

Project Name:

Wilson & Company Proposed 33rd Street Outfall

Sample L	ocation	Natural	Natural	Water	Laboratory		Chloride		AASHTO	
		Moisture	Dry	Soluble	Resistivity	рН	Water	Sulfide	Class.	Soil or Bedrock
Boring	Depth	Content	Density	Sulfates	,	F	Soluble		(Group	Description
No.	(feet)	(%)	(pcf)	(%)	(ohm-cm)		(%)		Index)	
1	1/2-5	5.9	., ,	0.43	700	7.6	0.0763	Positive	A-1-b	Silty sand with gravel - Fill
3	1/2-5	8.8		0.11	400	7.8	0.2127	Positive	A-1-b	Silty, clayey sand with gravel - Fill
Geo-4	19	48.7		0.01	630	7.6	0.0034	Positive	A-7-6(65)	Fat clay
Geo-3	9			0.01	16,000	7.8	0.0014	Negative	A-1-b	Poorly graded sand with gravel
Geo-3	19	2.1		0.03	900	7.2	0.0043	Positive	A-7-6(65)	Fat clay
Geo-3	24	46.4		0.02	3,200	7.6	0.0038	Negative	A-2-4(0)	Silty sand
6	1-5	26.9		0.02	14,000	8.1	0.0012	Trace	A-1-a	Well-graded sand with silt and gravel
10	1-5	6.0		0.02	4,400	8.3	0.0038	Negative	A-2-4(0)	Silty sand with gravel
12	19	17.8		0.02					A-2-4(0)	Silty sand
14	24	2.1		0.01					A-1-a	Poorly graded sand with silt and gravel
15	1	7.9		0.08	420	7.8	0.1049	Negative	A-2-4(0)	Silty, clayey sand
16	1-5			0.03	620	7.7	0.0293	Positive	A-6(3)	Clayey sand - Fill
17	1-5			0.01	590	8.1	0.0295	Positive	A-2-4(0)	Clayey sand with gravel - Fill
18	1-5			0.28	1,020	7.8	0.0255	Positive	A-1-b	Poorly graded sand with silt and gravel - Fill

Project #:

G11.1411.001

TABLE 2
SUMMARY OF LABORATORY CHEMICAL TEST RESULTS

Project #: **G11.1411.004**

Client: Wilson & Company
Project Name: Proposed River North Outfall

Sample L	ocation	Natural	Natural	Water	Laboratory		Chloride	AASHTO	
Boring	Depth	Moisture Content	Dry Density	Soluble Sulfates	Resistivity	рН	Water Soluble	Class. (Group	Soil or Bedrock Description
No.	(feet)	(%)	(pcf)	(%)	(ohm-cm)	7.4	(%)	Index)	
GW-1	1	13.0	116		2,000	7.1	0.0278		Silty, clayey sand, fill
GW-1	4	2.0	114	Not detected				A-1-a	Well-graded gravel with sand, fill
GW-1	14			Not detected					Sandy lean clay
GW-1	19	39.9	78		1,100	7.4	0.0188		Sandy lean clay
GW-2	1			Not detected					Silty sandy clay with gravel, fill
GW-2	4		108		4,500	7.4	0.0150		Silty sand with gravel, fill
GW-2	9	33.1	79	0.37				A-1-b	Silty sand with gravel, fill
GW-2	14	1.5	124		11,700	5.7	0.0158		Sandy gravel
GW-3	9	11.3	117		3,180	6.4	0.0122	A-2-4(0)	Clayey sand
GW-3	14	24.7	101	0.01					Sandstone bedrock
GW-4	1	10.4	123		3,950	6.5	0.0180	A-2-6(0)	Clayey sand, fill
GW-4	4	6.7	118	0.02	·				Clayey sand, fill

APPENDIX A

COLORADO ANALYTICAL LABORATORY CHEMICAL AND HEAVY METAL TEST RESULTS



Report To: Husein Redzic

Company: Geocal

7290 S. Fraser St Centennial CO 80112 Task No: 130411010

Date Received 4/11/13

Reported: 10/4/13 **Client PO: 3273**

Client Project: River North Outfall

G11.1411.001

Customer Sample ID

6514-10 B-10 @ 14 Ft.

Sample Date/Time: 4/11/13

Lab Number: 130411010-06

Matrix: Soil - Environmental

Test	Result	Reporting Limit	Method	Date Analyzed	Analyzed By
Total Metals - Dry Weight	<u>Basis</u>				
Arsenic	1.43 mg/kg	0.05	SW-846-6020	4/19/13	SAN
Barium	65.5 mg/kg	0.1	SW-846-6020	4/19/13	SAN
Cadmium	< 0.1 mg/kg	0 .1	SW-846-6020	4/19/13	SAN
Chromium	2.3 mg/kg	0.1	SW-846-6020	4/19/13	SAN
Lead	6.9 mg/kg	0.1	SW-846-6020	4/19/13	SAN
Mercury	< 0.05 mg/kg	0.05	SW-846 7471	4/19/13	VDB
Selenium	0.14 mg/kg	0.05	SW-846-6020	4/19/13	SAN
Silver	0.1 mg/kg	0.1	SW-846-6020	4/19/13	SAN

ASA = "Methods of Soil Analysis, Parts 1 and 2", Second Edition, American Society of Agronomy and Soil Science Society of America. Madison, Wi, 1982. SW-846 = "Test Methods for Evaluating Solid Waste"; USEPA; November 1986 AB-DTPA = "Soil Testing Methods Used at Colorado State University for the Evaluation of Ferthity, Salinity and Trace Element Toxicity"; Colorado State University Technical Bulletin LTB88-2; Jan 1998; SM Workman, PN Softenpour and RH

DATA APPROVED FOR RELEASE BY



Report To: Husein Redzic

Company: Geocal

7290 S. Fraser St Centennial CO 80112 Task No: 130411010

Date Received 4/11/13

Reported: 10/4/13 **Client PO: 3273**

Client Project: River North Outfall

G11.1411.001

Customer Sample ID

6516-7 B-14 Bulk Sample @ 1-5 Ft.

Sample Date/Time: 4/11/13

Lab Number: 130411010-07

Matrix: Soil - Environmental

Test	Result	Reporting Limit	Method	Date Analyzed	Analyzed By
Total Metals - Dry Weight	<u>Basis</u>				
Arsenic	1.24 mg/kg	0.05	SW-846-6020	4/19/13	SAN
Barium	103.9 mg/kg	0.1	SW-846-6020	4/19/13	SAN
Cadmium	0.2 mg/kg	0.1	SW-846-6020	4/19/13	SAN
Chromium	11.2 mg/kg	0.1	SW-846-6020	4/19/13	SAN
Lead	21.3 mg/kg	0.1	SW-846-6020	4/19/13	SAN
Mercury	< 0.05 mg/kg	0.05	SW-846 7471	4/19/13	VDB
Selenium	< 0.05 mg/kg	0.05	SW-846-6020	4/19/13	SAN
Silver	< 0.1 mg/kg	0.1	SW-846-6020	4/19/13	SAN

ASA = "Methods of Soil Analysis, Parts 1 and 2", Second Edition, American Society of Agronomy and Soil Science Society of America. Madison, WI, 1982. SW-846 = "Test Methods for Evaluating Solid Weste"; USEPA: November 1986 AB-DTPA = "Soil Testing Methods Used at Colorado State University for the Evaluation of Fertity, Selinity and Trace Element Toxicity"; Colorado State University Technical Bulletin LTB39-2; Jan 1998; SM Workman, PN Softanpour and RH

DATA APPROVED FOR RELEASE BY



TASK NO: 130411010

Report To: Husein Redzic

Company: Geocal

7290 S. Fraser St. Centennial CO 80112 Bill To: Husein Redzic

Company: Geocal

7290 S. Fraser St Centennial CO 80112

Task No.: 130411010

Client PO: 3273

Client Project: River North Outfall G11.1411.001

Date Received: 4/11/13

Date Reported: 10/4/13

Matrix: Soil - Geotech

Customer Sample ID 6514-3

Sample Date/Time:

Lab Number:

130411010-01

Test	Result	Method
Chloride - Water Soluble	0.0012 %	AASHTO T291-91/ ASTM D4327

Sulfide

Trace

AWWA C105

Customer Sample ID 6508-7

Sample Date/Time:

Lab Number:

130411010-02

Test	Result	Method
Chloride - Water Soluble	0.2127 %	AASHTO T291-91/ ASTM D4327
Sulfide	Positive	AWWA C105

Customer Sample ID 6508-3

Sample Date/Time:

Lab Number:

130411010-03

Test	Result	Method
Chloride - Water Soluble	0.0763 %	AASHTO T291-91/ ASTM D4327
Sulfide	Positive	AWWA C105

Customer Sample ID 6514-9

Sample Date/Time:

Lab Number:

130411010-04

Test	Result	Method
Chloride - Water Soluble	0.0038 %	AASHTO T291-91/ ASTM D4327

Sulfide

Negative

AWWA C105

Abbreviationsi References:

AASHTO - American Association of State Highway and Transportation Officials. ASTM - American Society for Tesling and Materials. ASA - American Society of Agronomy.

DIPRA - Ductile Iron Pipe Research Association Handbook of Ductile Iron Pipe.

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Page 1 of 1



TASK NO: 130524015

Report To: Husein Redzic

Company: Geocal

7290 S. Fraser St Centennial CO 80112 Bill To: Husein Redzic

Company: Geocal

7290 S. Fraser St Centennial CO 80112

Task No.: 130524015

Client PO: 3306

Client Project: River North Outfall G11.1411.001

Date Received: 5/24/13 Date Reported: 10/4/13

Matrix: Soil - Geotech

Customer Sample ID 6572-3 (B-17 @ 1-5)

Sample Date/Time:

Lab Number:

130524015-01

Test Result Method Sulfide **Positive** AWWA C105

Customer Sample ID 6572-5 (B-18 @ 1-5)

Sample Date/Time:

Lab Number:

130524015-02

Test Result Method Sulfide Positive AWWA C105

Abbreviations/ References:

AASHTO - American Association of State Highway and Transportation Officials. ASTM - American Society for Testing and Materials. ASA - American Society of Agronomy.

DIPRA - Ductile Iron Pipe Research Association Handbook of Ductile Iron Pipe.

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TASK NO: 130603012

Report To: Husein Redzic

Company: Geocal

7290 S. Fraser St Centennial CO 80112 Bill To: Husein Redzic

Company: Geocal

7290 S. Fraser St Centennial CO 80112

Task No.: 130603012 Client PO: 3313

Client Project: River North Outfall G11.1411.001

Date Received: 6/3/13 Date Reported: 10/4/13

Matrix: Soil - Geotech

Customer Sample ID 8-16 @ 1-5 Ft. (6572-1)

Sample Date/Time:

Lab Number:

130603012-01

Test	Result	Method
Sulfide	Positive	AWWA C105

Abbreviational References:

AASHTO - American Association of State Highway and Transportation Officials. ASTM - American Society for Testing and Materials. ASA - American Society of Agronomy.

DIPRA - Ductile Iron Pipe Research Association Handbook of Ductile Iron Pipe.

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APPENDIX B

MGPEC PAVEMENT DESIGN PRINTOUTS

PAVEMENT DESIGN TO MGPEC STANDARDS

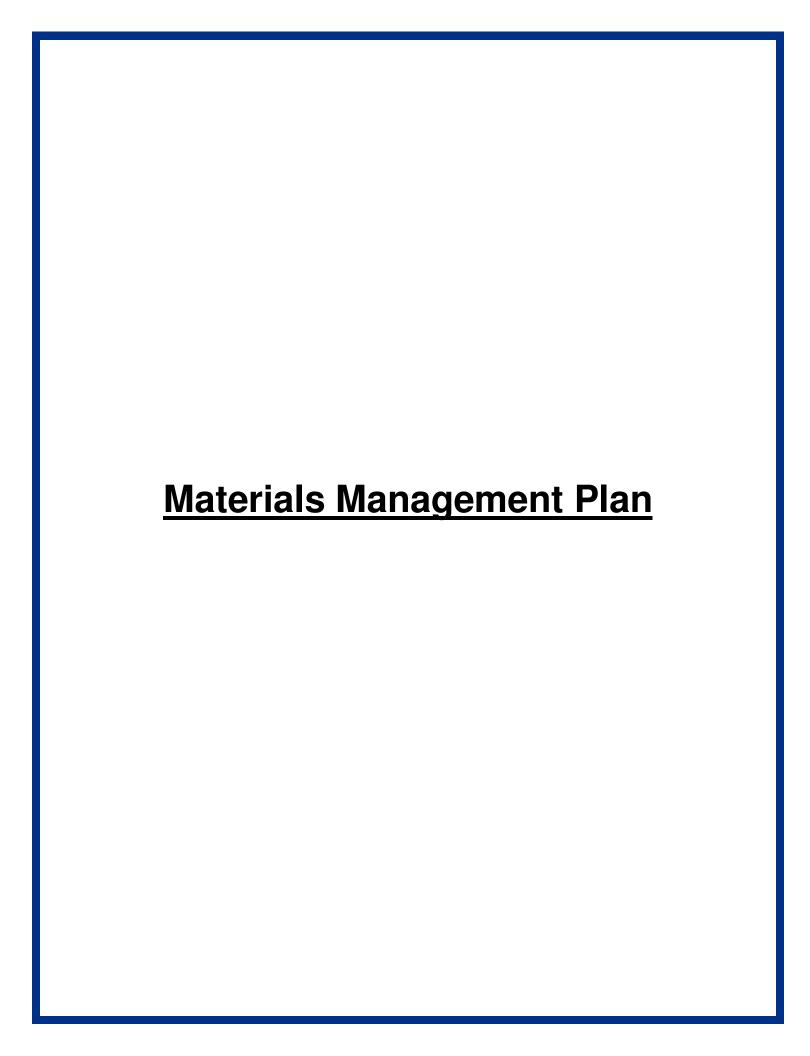
SUBDIVISION			DESIGN		OUTAIN		
Subdivision							
Street	Arkins Cour	t					
From	31st Street						
To	35th Street						
Formation	Qs - Collu						
Township			Range		Section	0 Quart	er NW
TRAFFIC							
Classification (Residential Lots	Commercial 0		Speed Limit mmercial Acres	30 s 20	Comp	uted ESALS Industrial Acres	5,262,000 0
SUBGRADE							
Soil Type	Sand		SHTO A-2-4	_		urface Drainage	No
R Value Swell 0%	40	UNC	0		silient Modu		14 0/
		quid Limit		Plasticity Ind		% Passing 200 Max Density	
Std Proctor N	o ivioa	Proctor	NO Op	timum Moistu	, ,	-	118 pcf
				Load Trans	sfer 2.8 D	Doweled and Tied	
MATERIALS COST	rs						
Hot Mix Asphalt	Concrete	1.80	\$/sqyd/in	Crack Sea	I - HMAP	0.32	\$/sqyd
Portland Cemen	nt Concrete	3.00	\$/sqyd/in	Milling - HI	MAP	1.25	\$/sqyd/in
Aggregate Base	e Course	0.59	\$/sqyd/in	Annual - H	MAP Mainte	enance 0.05	\$/sqyd
Chemical Stabliz	zed Subgra	d 0.80	\$/sqyd/in	Clean/Sea	Crack And	Joints 0.72	\$/sqyd
Moisture Treate	d Subgrade		\$/sqyd/in		urface Grind	-	\$/sqyd/in
Fog Seal		0.25	\$/sqyd		CP Mainten		\$/sqyd
Chip Seal		0.75	\$/sqyd	Annual Inte		7.0	%
Slurry Seal		1.25	\$/sqyd	Annual Infl	ation Rate	3.0	%
PAVEMENT DESIG	OPTION	S –					
Option One		Portland	d Cement Cond	rete Pavemer	nt 9.0	Inches Thick	
			Const	ruction Cost	\$190,080	Per Lane Mile	
			30 yr N	<i>Maintenance</i>	\$28,469	Per Lane Mile	
				Total Cost	\$218,549	Per Lane Mile	
Option Two		Hot Mix	Asphalt Paver	nent	12.5	Inches Thick	
Not Recomme	ended		Const	ruction Cost	\$158,400	Per Lane Mile	
			30 yr N	Maintenance	\$78,533	Per Lane Mile	
				Total Cost	\$236,934	Per Lane Mile	
Option Three		Hot Mix	Asphalt Paver	nent	9.0	Inches Thick	
		Che	emical Stabilize	ed Subgrade	12.0	Inches Thick	
			Const	ruction Cost	\$181,632	Per Lane Mile	
			30 yr N	/laintenance	\$78,533	Per Lane Mile	
				Total Cost	\$260,166	Per Lane Mile	

PAVEMENT DESIGN TO MGPEC STANDARDS

SUBDIVISION			DESIGN	10 11101 L	OIAN		
Subdivision							
Street 3	33rd Street						
	Blake Street						
	Downing						
	Qs - Colluvi	um					
Township			Range		Section	0 Quart	er NW
TRAFFIC							
Classification C Residential Lots 0	Commercial)		Speed Limit nmercial Acre	30 s 30	Comp	uted ESALS Industrial Acres	7,862,000
SUBGRADE							
Soil Type	Sand		SHTO A-2-4	_		urface Drainage	No
R Value	_	UNC	0		silient Modu		
Swell 0%	•	ıid Limit	28 %	Plasticity Ind		% Passing 200	440
Std Proctor No) Moa F	Proctor	No <i>Op</i>	timum Moistu	re 16%	Max Density	118 pcf
				Load Trans	sfer 2.8 D	oweled and Tied	
MATERIALS COST	S						
Hot Mix Asphalt	Concrete	1.80	\$/sqyd/in	Crack Sea	I - HMAP	0.32	\$/sqyd
Portland Cement	t Concrete	3.00	\$/sqyd/in	Milling - Hl	MAP	1.25	\$/sqyd/in
Aggregate Base	Course	0.59	\$/sqyd/in	Annual - H	IMAP Mainte	nance 0.05	\$/sqyd
Chemical Stabliz	ed Subgrad	0.80	\$/sqyd/in	Clean/Sea	I Crack And	Joints 0.72	\$/sqyd
Moisture Treated	d Subgrade	0.25	\$/sqyd/in	Portland S	urface Grind	ling 1.50	\$/sqyd/in
Fog Seal		0.25	\$/sqyd		CCP Maintena	ance 0.05	\$/sqyd
Chip Seal		0.75	\$/sqyd	Annual Inte	erest Rate	7.0	%
Slurry Seal		1.25	\$/sqyd	Annual Infl	lation Rate	3.0	%
PAVEMENT DESIG	N OPTIONS	_					
Option One		Portland	Cement Cond	rete Pavemei	nt 10.0	Inches Thick	
 			Const	ruction Cost	\$211,200	Per Lane Mile	
			30 yr N	<i>Maintenance</i>	\$28,469	Per Lane Mile	
				Total Cost	\$239,669	Per Lane Mile	
Option Two	ļ	Hot Mix	Asphalt Paver	nent	14.5	Inches Thick	
Not Recommer	nded		Const	ruction Cost	\$183,744	Per Lane Mile	
			30 yr N	<i>Maintenance</i>	\$78,533	Per Lane Mile	
				Total Cost	\$262,278	Per Lane Mile	
Option Three		Hot Mix	Asphalt Paver	nent	11.0	Inches Thick	
		Che	mical Stabilize	ed Subgrade	12.0	Inches Thick	
			Const	ruction Cost	\$206,976	Per Lane Mile	
			30 yr N	<i>l</i> aintenance	\$78,533	Per Lane Mile	
				Total Cost	\$285,510	Per Lane Mile	

PAVEMENT DESIGN TO MGPEC STANDARDS

SUBDIVISION		LIVILIA	DESIGN	10 MGF LC	JIANDA		
Subdivision							
Street	MLK Jr Bo	ulevard					
From	Downing						
То	Lafayette						
Formation	Qs - Collu	ıvium					
Township			Range		Section	0 Quarte	er NW
TRAFFIC							
Classification Residential Lots	Commercia 0		Speed Limit mmercial Acres	30 s 30	Compute In	d ESALS dustrial Acres	7,862,000
SUBGRADE							
Soil Type	Sand		SHTO A-2-4			ace Drainage	No
R Value	20	UNC	0		lient Modulus		40.0/
Swell 0%		iquid Limit		Plasticity Index		0	
Std Proctor	No Mod	d Proctor	No <i>Op</i>	timum Moisture	, 0	Max Density	115 pcf
				Load Transfe	<i>er</i> 2.8 Dow	eled and Tied	
MATERIALS COS	TS						
Hot Mix Aspha	It Concrete	1.80	\$/sqyd/in	Crack Seal -	HMAP	0.32	\$/sqyd
Portland Ceme	ent Concrete	3.00	\$/sqyd/in	Milling - HMA	4P	1.25	\$/sqyd/in
Aggregate Bas		0.59	\$/sqyd/in	Annual - HM	IAP Maintenai	nce 0.05	\$/sqyd
Chemical Stab	_		\$/sqyd/in		Crack And Joi		\$/sqyd
Moisture Treat	ed Subgrade		\$/sqyd/in		face Grinding		\$/sqyd/in
Fog Seal		0.25	\$/sqyd		P Maintenand		\$/sqyd
Chip Seal		0.75	\$/sqyd	Annual Inter		7.0	%
Slurry Seal		1.25	\$/sqyd	Annual Inflat	tion Rate	3.0	%
PAVEMENT DESI	GN OPTION	vs _					
Option One		Portland	d Cement Cond	rete Pavement	10.0 <i>In</i>	ches Thick	
opaon one			Const	ruction Cost	\$211,200 Pe	er Lane Mile	
			30 yr N	<i>Maintenance</i>	\$28,469 Pe	er Lane Mile	
				Total Cost	\$239,669 Po	er Lane Mile	
Option Two		Hot Mix	Asphalt Paver	nent	14.0 In	ches Thick	
Not Recomm	ended		Const	ruction Cost	\$177,408 P	er Lane Mile	
			30 yr N	<i>Maintenance</i>	\$78,533 P	er Lane Mile	
				Total Cost	\$255,942 P	er Lane Mile	
Option Three		Hot Mix	Asphalt Paver	ment	10.5 <i>In</i>	ches Thick	
		Che	emical Stabilize	ed Subgrade	12.0 In	ches Thick	
			Const	ruction Cost		er Lane Mile	
			30 yr N	/laintenance	\$78,533 P	er Lane Mile	
				Total Cost	\$279,174 P	er Lane Mile	





August 10, 2016

Materials Management Plan

33rd Street Outfall Segment – Blake Street to Champa Street Denver, Colorado

Prepared For:

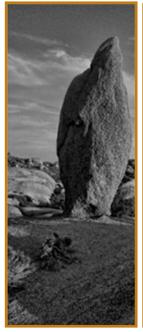
City and County of Denver, Department of Environmental Health 200 West 14th Avenue, Department 310 Denver, Colorado 80204

On Behalf Of:

Wilson & Company Inc., Engineers & Architects 95755 Mark Dabling Boulevard, Suite 220 Colorado Springs, Colorado 80919

Pinyon Project No.:

1/13-378-01.8003











August 10, 2016

Materials Management Plan

33rd Street Outfall Segment – Blake Street to Champa Street Denver, Colorado

Prepared For:

City and County of Denver, Department of Environmental Health 200 West 14th Avenue, Department 310 Denver, Colorado 80204

On Behalf Of:

Wilson & Company Inc., Engineers & Architects 95755 Mark Dabling Boulevard, Suite 220 Colorado Springs, Colorado 80919

Pinyon Project No.:

1/13-378-01.8003

Prepared by:

Timothy R. Grenier, E.I.T. Environmental Engineer

Reviewed by:

Brian R. Partington Principal – Project Delivery

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Appendix F	City and County of Denver – Asbestos-Contaminated Soil Management Standard Operating Procedure



I. Introduction

Pinyon Environmental, Inc. (Pinyon), was retained by Wilson & Company, Inc. (Wilson), to prepare this Materials Management Plan (MMP) for construction of the City and County of Denver's (CCODs) 33rd Street Outfall project. This MMP has been developed to assist field operations, particularly construction, in preparing for identification and management of contaminated soil and/or groundwater. In support of the MMP, Pinyon completed limited subsurface investigations for soil contamination during the geotechnical drilling program, to assess the need for contaminated materials management during construction of the project. These data are summarized herein.

This MMP has been prepared to ensure, when properly implemented by the future-selected Contractor (Contractor), that work activities will be completed in such a way as to protect human health and the environment. Further, this MMP has been prepared to minimize potential delays, and to develop approved standard procedures that will be implemented as needed in the event that regulated materials are encountered during construction. It is the responsibility of the Contractor to follow all appropriate regulations, obtain the proper permits, and utilize field personnel trained to identify potential contamination. In the event that any discrepancy is noted between this MMP and any applicable regulation, the regulation will take precedence, unless a variance has been previously approved by the regulatory agency.

The MMP contains references to the entire 33rd Street Outfall line; however, this version specifically applies to the outfall section between Blake Street and Champa Street (Figure 1). Pinyon understands that there are at least four phases to the outfall construction, with each phase covered by a phase-specific MMP. The outfall section extending from the South Platte River outfall to the Mountain Cement property is covered in an MMP previously produced by Pinyon, dated May 21, 2015 (Pinyon, 2015a). The segment extending from the Mountain Cement property to Walnut Street is covered in an MMP previously produced by Pinyon, dated November 2, 2015 (Pinyon, 2015b).

I.I Proposed Action

The CCOD plans construction of storm sewer infrastructure for the project known as the "33rd Street Outfall." The project plan is to place a new storm sewer outfall to the South Platte River, at approximately 33rd Street and Arkins Court. The 33rd Street alignment extends approximately 4,200 feet from the South Platte River outfall near Arkins Court and 33rd Street to the intersection of Martin Luther King (MLK) Boulevard & Lafayette Street. A lateral storm sewer will also be constructed along Blake Street between 30th Street and 33rd Street, tying in at 33rd Street (Figure 1). For purposes of this MMP, the entire length of the outfall will be referred to as the "33rd Street Outfall," and the segment between Blake Street and Champa Street will be referred to as "the Site."

Current land use in the areas of the 33rd Street Outfall include (CCOD, 2012):

- West of Downing Street Industrial (11, 12, etc.) (e.g., factories, manufacturing, auto services, food processing, warehouses), and residential (e.g., single-family homes, apartments and condominiums)
- Along Downing Street Retail/Commercial (B4) (e.g., auto service, retail stores, office condominium, restaurant, Laundromat, medical building), and residential (R3) (e.g., apartments and single family homes)
- There are also several vacant properties along the alignment

With the exception of areas adjacent to the South Platte River, groundwater along the 33rd Street Outfall is generally located at depths from approximately 15 to 35 feet below ground surface (bgs), and is presumed to flow towards the South Platte River (CCOD, 2012). Groundwater was measured at 29 feet bgs near Blake Street and was not encountered in the three other deep borings completed between Blake Street and Champa



Street (four other borings were completed at the Site, but only to depths of five feet bgs) (Geocal, 2014). The other three deep borings ranged in depth from 30 to 40 feet bgs; groundwater was not encountered at these borings. Table 6-I provides the total boring depths, approximate depth of excavation for the installation of the outfall, and the depth of groundwater. Based on the plan and profile drawings, the depth to groundwater at Blake Street, and the lack of groundwater in the other geotechnical borings, groundwater is not likely to be encountered during construction (Geocal, 2014). Additional information regarding physical characteristics is presented in Section 2.2.

1.2 Key Parties and Responsibilities

The key parties, their contact information and project responsibilities, are outlined below:

Organization	Role/Responsibility	Contact Information
City and County of Denver Department of Public Works	City Project Manager	Steve Choi, Senior Engineer Phone: 303-446-3648 Email: steve.choi@denvergov.org
Wilson & Company, Inc., Engineers & Architects	Engineering, Project Management	Jeffrey C. Holste, PE, Project Engineer 5755 Mark Dabling Boulevard., Suite 220 Colorado Springs, Colorado 80919 719-302-6745 (direct) 719-520-5800 (main office) 719-520-0108 (fax) www.wilsonco.com
City and County of Denver, Department of Environmental Health	Environmental Chemist	Lisa Farrell 200 W.est 14 th Avenue, Suite 310 Denver, Colorado 80204 Phone: 720-865-5439 Email: Lisa.Farrell@denvergov.org
Contractor	Construction	TBD
Environmental Consultant	Environmental oversight quality assurance to identify potentially contaminated soil and potential asbestos	Brian Partington (or TBD) Pinyon Environmental, Inc. 9100 West Jewell Avenue Phone: 303-980-5200 Email: Partington@pinyon-env.com

1.3 Potential Environmental Concerns

The CCOD, Environmental Quality Division (EQ) completed an INTEROFFICE MEMORANDUM (CCOD, 2012) which assessed the potential to encounter contaminated soil and groundwater during construction. Other documents and investigations were also completed by others along the 33rd Street Outfall. The following table is a list of properties that may have impacted soil and groundwater at the Site. The locations of these potential environmental concerns can be found on Figure 2 and further details on the properties are provided in Appendix A.



Table I-I Potential Environmental Concerns at the Site

Property Address/Location	Potential Environmental Concerns
	Potential residual contaminants in soil and
3225 Blake Street	groundwater could include petroleum
	hydrocarbons, metals, and PAHs
3300 Blake Street	Potential residual contaminants in soil and
3300 biake street	groundwater could include metals.
	Potential residual contaminants in soil and
3309 Blake Street	groundwater could include coal and coal fines,
	PAHs, petroleum hydrocarbons, and metals.
	Potential residual contaminants in soil and
3263 Walnut Street	groundwater could include solvents, PAHs,
	petroleum hydrocarbons, ACMs, and metals.
	Potential residual contaminants in soil and
3254-3258 Walnut Street	groundwater could include PAHs, petroleum
	hydrocarbons, metals, and ACMs.
	Potential residual contaminants in soil and
3201 Walnut Street	groundwater could include coal and coal fines,
	PAHs, petroleum hydrocarbons, ACMs, and metals.
	Potential residual contaminants in soil and
3300 Walnut Street	groundwater could include solvents, petroleum
	hydrocarbons, and metals.
	Potential residual contaminants in soil and
3261 Champa Street	groundwater could include solvents, petroleum
·	hydrocarbons, and metals.
	Potential residual contaminants in soil and
3255 Champa Street (3175 Downing Street)	groundwater could include petroleum
	hydrocarbons, ACMs, and metals.
	Potential residual contaminants in soil and
3301 Downing Street (915 33rd Street)	groundwater could include petroleum
,	hydrocarbons, ACMs, and metals.

Notes:

PAH — Polycyclic Aromatic Hydrocarbon ACM — Asbestos-Containing Material



2. Site Characterization Activities

2.1 Soil Sampling

The following table displays the soil samples and analysis completed at or near the Site.

Table 2-1 Soil Characterization

Date	Soil Samples Collected	Soil Analysis
5/2/13	B-14@1'	RCRA 8 Metals
7/26/13	ENV-1, ENV-2, ENV-3	RCRA 8 Metals, TPH, VOCs
1/27/14	B-19, B-20	RCRA 8 Metals, TPH, VOCs

Notes:

NC – No sample collected

RCRA – Resource Conservation and Recovery Act

TPH - Total Petroleum Hydrocarbons

VOC – Volatile Organic Compounds

The samples listed in the table were collected at or near the Site. Other soil samples were collected during these sampling events. Those samples were collected from areas far enough away from the Site that they are not representative of Site soil conditions.

A total of six soil samples were collected during three sampling events at or near the Site (Figure I). Volatile organic compound (VOC) and metal results, except for arsenic, were compared to the Environmental Protection Agency (EPA) Regional Screening Level (RSL) for residential and industrial soil (EPS, 2016; Appendix B). Arsenic was compared to the Colorado Department of Public Health and Environment (CDPHE) *Risk Management Guidance for Evaluating Arsenic Concentrations in Soil* (CDPHE, 2011a). Additionally, the EPA Record of Decision (ROD) for residential soils in the Vasquez Boulevard/Interstate-70 (VB/I70) Superfund site establishes a cleanup goal of 70 mg/kg for arsenic (EPA, 2003). The boundary of the VB/I70 Superfund site extends northwest along 33rd Street then proceeds to the northeast along Blake Street; therefore, the portions of the outfall between Blake Street and Walnut Street are within the boundaries of the Superfund site. Total petroleum hydrocarbon (TPH) results were compared to the Department of Labor and Employment, Division of Oil and Public Safety (OPS) threshold value of 500 milligrams per kilogram (mg/kg).

2.2 Soil Sampling Results

Table 2-2 Soil Analytical Results (detected parameters)

				Sample ID (Sample Date)					
Ar	nalyte	EPA RSL Residential Soil ¹ (mg/kg)	EPA RSL Industrial Soil ¹ (mg/kg)	B- 4@ ' 5/2/ 3	ENV-I 7/26/13	ENV-2 7/26/16	ENV-3 7/26/13	B-19 1/27/14	B-20 1/27/14
Dept	th (feet)			0- I	2.5-5.0	2.5-5.0	9.0- 10.0	1.0-5.0	2.5-5.0
Metals by	Arsenic ²	П	П	2.32 J	5.21	1.40 J	1.31 J	3.86	1.23 J
SW846 3050B/	Barium	1,500	22,000	60.6	179	58.8	134	104	35.6
6010C and 7471 (mg/kg)	Cadmium	7.1	98	0.432 J	0.987	0.916	<0.545	0.132 J	<0.486



				Sample ID (Sample Date)						
Analyte		EPA RSL Residential Soil ¹ (mg/kg)	EPA RSL Industrial Soil ¹ (mg/kg)	Industrial 14@15 Soil 5/2/13	B- 14@1' 5/2/13	ENV-I 7/26/13	ENV-2 7/26/16	ENV-3 7/26/13	B-19 1/27/14	B-20 1/27/14
Dept	th (feet)			0- I	2.5-5.0	2.5-5.0	9.0- 10.0	1.0-5.0	2.5-5.0	
Metals	Chromium	12,000	180,000	7.40	11.9	6.16	15.1	7.21	1.76	
by SW846	Lead	400	800	15.8	201	43.8	13.5	8.11	1.79	
3050B/ 6010C	Mercury	1.1	4.6	0.0232	0.446	0.109	0.00572 J	0.0138	<0.0116	
and 7471	Selenium	39	580	<2.75	<3.51	<3.08	<3.27	1.40 J	<2.91	
(mg/kg)	Silver	39	580	<0.110	1.55	1.41	1.42	0.251 J	0.111 J	
TPH by 8015C (mg/kg)	DRO	NV	NV	NA	90.9	<50.0	<50.0	<50.0	<50.0	

Notes:

2 - Value is from CDPHE Risk Management Guidance for Evaluating Arsenic Concentrations in Soil (CDPHE, 2014)

NV - No Regulatory Value

mg/kg- milligrams per kilogram

DRO - Diesel Range Organics

RSL - Regional Screening Level

EPA - Environmental Protection Agency

J - Greater than the detection limit but less than the reporting limit

2.2.1 Soil Results Discussion

None of the samples exceeded their respective regulatory values. Had TPH values exceeded the OPS threshold value of 500 mg/kg, the sample would have been further analyzed for polycyclic aromatic hydrocarbons (PAHs). Based on the sampling results and the previous site uses, it is not anticipated that contaminants of concern will be encountered above the EPA RSLs and other applicable standards. However, this MMP will help guide on-Site activities should unexpected soil impacts be encountered. The laboratory analytical report is included as Appendix C.

2.3 Groundwater Sampling

Groundwater is not expected to be encountered during construction, and was not encountered during drilling activities. Groundwater samples were not collected from the Site.

^{1 -} Values are from EPA Regional Screening Levels with a Total Hazard Quotient (EPA, 2016)

< - Concentration is below the laboratory detection limit



3. Health and Safety

There is a potential for increased risk to the health of workers during excavation at the Site. Awareness by site personnel of these hazards is of the highest priority. Therefore, a Health and Safety Plan (HASP) must be developed by the Contractor. The Contractor's field personnel must conduct work in Level D attire until the Contractor's Health and Safety Officer (HSO) determines that additional protection may be required. The MMP Supervisor will provide the HSO with information, as available, to assist in that determination.

If it is determined that additional protection is required, staff will be brought on site to continue the work using higher-level personal protective equipment (PPE) as determined by the Contractor's HSO. Site personnel must be provided with a copy of the HASP for review, and site personnel must be aware of and agree to the HASP requirements. The Contractor will be required to employ the proper personnel, monitoring equipment, and PPE to provide a safe working environment for its employees, consultants and sub-contractors. The provisions of this MMP are summarized below, and will be incorporated into the HASP. However, in no way shall the HASP be limited to these provisions.

- Workers and managers associated with intrusive site activities will be required to undergo a one-time
 health and safety orientation meeting at the start of the project, to include a brief onsite description of site
 conditions. This briefing can be conducted in coordination with asbestos awareness training.
- A site-specific safety management plan will be prepared as required by the construction contract, and it will incorporate information as required by 29 CFR 1910 and 29 CFR 1926.
- The general contractor may share its HASP with its subcontractors or require each subcontractor to prepare its own plan.
- All work will be performed in accordance with the requirements of the Occupational Health and Safety Administration (OSHA), 29 CFR 1910.
- It is the Contractor's responsibility to employ workers with the appropriate level of training (e.g., 24 hours or 40 hours), when implementing this MMP, in accordance with 29 CFR 1910.120 for the task being completed. Workers who may come into contact with potentially contaminated media will provide documentation of appropriate OSHA safety training, in accordance with 29 CFR 1910.120, to the HSO. Any worker who cannot provide training certification will be denied access to the Site.
- If required, personnel monitoring will be performed under the supervision of the health and safety officer.
- No personnel shall enter an excavation unless standard procedures have been followed and hazards have been controlled or eliminated.



4. Environmental Responsibilities

4.1 Contractor Responsibilities

The Contractor will be responsible for implementation and maintenance of environmental controls and ensure that:

- All necessary equipment and personnel (i.e. health and safety officer, foreman, laborers, etc.) is provided to implement the MMP
- Work will be coordinated with the MMP Supervisor and the CCOD Project Manager prior to beginning work to review the implementation of MMP requirements
- Asbestos awareness training is provided to site personnel who will conduct soil work
- The MMP is adhered to at all times
- Ensure that their subcontractors adhere to the MMP
- Contaminated material that has been disturbed is not reused on-site
- Contaminated material that has been disturbed is not disposed of into storm drains, sanitary sewers, streams, irrigation facilities or waterways
- Non-salvageable, non-hazardous solid waste materials removed by the Contractor are removed from the Site and disposed of at the Denver Arapahoe Disposal Site (DADS) in accordance with local, state and federal laws
- The MMP Supervisor will be qualified to verify implementation of this MMP

4.2 MMP Supervisor Requirements and Training

Prior to implementation of the MMP, the project team will retain an MMP Supervisor in a quality assurance (QA) role to independently verify that the requirements of this plan are adhered to. The MMP Supervisor will be responsible for the following:

- Be a competent individual experienced with a) field identification of potentially contaminated material and potential environmental finds (e.g. abandoned underground storage tanks, asbestos awareness), b) characterization, c) management, and d) disposal
- Complete daily field notes
- Track and/or sign tickets and manifests for material hauled offsite for either reuse or disposal
- Ensure adherence to the MMP
- Provide daily updates to CCOD
- Notify CCOD immediately of any unexpected environmental conditions



- Be on-site to verify site operations on an as-needed basis when potentially contaminated media have been encountered
- Verify or perform field screening of soil in adherence to this plan (see Section 5.0)
- Complete logs thoroughly detailing QA site activities
- Identify unknown soils or materials and direct implementation of the MMP

4.3 Tier I – Front-Line Workers

Tier I workers include all personnel that would be responsible for mitigating potentially regulated materials. Those workers could include equipment operators and laborers actually handling materials in accordance with this MMP. These workers must:

- Complete work as directed by the MMP Supervisor, and in accordance with this MMP.
- Complete work in accordance with the requirements of the OSHA, 29 CFR 1910.120. The level or training
 in accordance with CFR 1910.120 shall be determined and confirmed by the HSO.
- Complete, at minimum, OSHA 2-hour asbestos awareness training.

4.4 Tier 2 – Excavation Workers

Tier 2 employees include all personnel that could possibly discover hazardous materials during the course of work, but will not be responsible for management of these wastes. These employees include, but are not limited to front-line equipment operators, foremen and operators that will complete typical excavation activities during the project, but will not complete handling of these materials after discovery.

These personnel will be responsible for the following:

- Be trained on identification of hazardous materials by the MMP Supervisor.
- In the event that suspected materials are identified, immediately stop work, and contact the MMP Supervisor
 of the discovery.
- Complete work in accordance with the requirements of the OSHA, 29 CFR 1910.120. The level or training
 in accordance with CFR 1910.120 shall be determined and confirmed by the HSO.
- Complete, at minimum, OSHA 2-hour asbestos awareness training.

4.5 Tier 3 – Other Workers

Tier-3 workers include all workers that would not complete sub-surface work activities. As the possibility for "other workers" to encounter hazardous materials on this project is very low, training requirements do not apply.



5. Soil Handling Procedures

Project activities include excavations where impacted soils are not anticipated, but may be encountered. Because of the heterogeneous nature of the soil, it is important that the Contractor be aware of the possibility of encountering other special and/or hazardous wastes and know how to manage those wastes, which is a key purpose of this MMP.

5.1 Procedures

The following procedures will apply to all excavation activities conducted at the project by the Contractor:

- The Contractor will be responsible for providing all necessary equipment and personnel (including health and safety officers, foremen, laborers, etc.) to implement this MMP.
- The Contractor will be responsible for coordinating with the MMP Supervisor, DADS, the CCOD Project Manager, and the Engineer prior to work commencement, in order to verify that work adheres to the provisions of this MMP.
- If unknown/unidentified underground storage tanks, drums, odorous soil, stained soil, asbestos-cement pipe, transite, building debris or waste materials are encountered during the project, the Contractor shall immediately stop work in the area of the discovery until the CCOD Project Manager makes a determination of how to proceed. The Contractor shall immediately notify the CCOD Project Manager of the discovery. Following discussions with the CCOD Project Manager, additional characterization, remediation, and/or analyses may be required. Work may continue in other areas of the project site while the discovery is resolved.

5.1.1 General Procedures

Although not anticipated, other special and/or hazardous wastes could include items such as drums, chemical or fuel containers, batteries, tar, sludge, petroleum-hydrocarbon impacted soil, materials that are hazardous waste, and equipment potentially containing polychlorinated biphenyls (PCBs) (e.g., transformers, light ballasts, voltage regulators, capacitors, and circuit breakers). These materials may be present in small quantities and can be difficult to characterize. Upon identification of special and/or hazardous wastes, excavation at that location will cease until additional assessment by the MMP Supervisor can be completed, and the City is contacted. The MMP Supervisor will attempt to assess special wastes, including prudent and safe observation of the following:

- Markings and or labels on containers/drums, condition of the containers/drums (e.g., rust, holes, damage, corrosion) and other indications of contents
- Indications of unsafe conditions, including swelling drums, leaking, fumes, odors, etc.
- Conditions of materials associated with the special waste
- Assessment for evidence of release, obtained by utilizing field instruments (i.e. Photoionization detector [PID], combustible gas indicator [CGI] and professional judgment)

Only under the direction of the MMP Supervisor, will handling of any special wastes be completed. When handling is required, the following precautions will be taken:

• Handling will be minimized whenever possible.

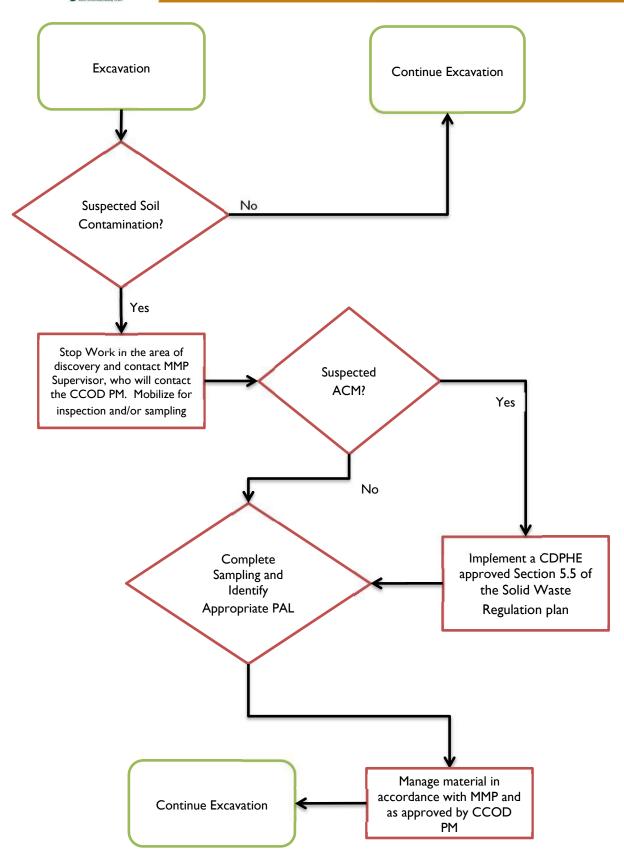


- When necessary, handling will be employed by mechanical means including the use of site excavation equipment.
- Pressurized/swelling drums, suspected explosives, potentially shock-sensitive materials or other potentially
 dangerous items will not be handled until a person with appropriate experience with these situations has
 been consulted.
- All special wastes will be placed on 6-mil plastic sheeting and covered, until additional assessment has been
 completed by the MMP Supervisor (the time frame will allow for laboratory testing and obtaining a profile
 and manifest for disposal).
- All stockpiles of special waste will be covered immediately or containerized, and will remain covered or containerized until final removal.
- Soil stockpiles of potentially contaminated soil or other materials will be limited to a maximum of 500 cubic yards each.
- Implementation of stormwater best-management practices (BMPs) for stockpiles of potentially contaminated material will be completed to prevent potentially contaminated storm water runoff.
- Stockpile areas will be securely fenced to prevent contact with unauthorized personnel and the public.
- Suspicious materials will be further evaluated by the MMP Supervisor (Section 4.2). When additional
 assessment of this material indicates that the material does not meet applicable regulatory requirements
 for disposal as a non-hazardous waste, the MMP Supervisor will arrange for off-site disposal at a licensed
 hazardous waste facility, or other appropriate disposal site.
- The material will be characterized and manifests will be obtained before it is disposed off-site, and the material will be disposed as soon as possible.
- Any special wastes that are generated will be managed in accordance with the applicable local, state and federal regulations.
- Where suspicious material is determined to be non-hazardous by the MMP Supervisor through additional assessment, the material may be disposed as non-hazardous solid waste at DADS.

5.2 Process Flow

The following process-flow chart presents a general flow of procedures that will be followed in the event that suspected contaminated soils are identified.







5.3 Predetermined Action Levels for Soil Management

Predetermined Action Levels (PALs) will be used to determine if the soil generated at this project is acceptable for reuse, or requires transport off-site for disposal at an appropriate landfill. The CDPHE, Department of Environmental Health (DEH) *Guidance for Third Party Reuse of Excess Soil from City Projects* Interoffice Memorandum will be used to determine if the soil generated at this project is acceptable for reuse, or requires transport off-site for disposal at an appropriate landfill (Appendix D).

5.3.1 Exposure Scenarios

CDPHE Groundwater Projection values in conjunction with EPA RSLs will be used for comparison to soil data (Appendix B). In additional to the City's guidance for reuse (Appendix D), the following guidance is applicable for evaluating soil concentrations for varying exposure scenarios:

- CDPHE Groundwater Protection Guidance values were developed by CDPHE to protect groundwater from potentially leachable constituents in soil. For volatile constituents, the CDPHE-Hazardous Materials and Waste Management Division Groundwater Protection Values Soil Cleanup Table (CDPHE, 2014) values will be used for comparison to soil data.
- **EPA RSL Residential Soil** Soil concentration values that are considered appropriate for residential areas.
- **EPA RSL Industrial Soil** Soil concentration values that are considered appropriate for commercial and industrial properties.

The application of these values for making material handling decisions is discussed in the following sections.

5.3.2 Non-Impacted/Unrestricted Reuse

Soils with chemical concentrations within acceptable guidelines for their respective RSLs for residential soil and CDPHE groundwater protection values may be reused at on- or off-site locations, assuming the receiving facility has agreed to accept this material. This material must be free from any construction/demolition debris, and free of ACMs. If the soil would be reused at a third party property, procedures and guidance described in Appendix D (Guidance for Third Party Reuse of Excess Soil from City Projects) will be followed.

Detailed documentation of the on- or off-site disposition will be maintained by the MMP Supervisor. Documentation should include:

- Analytical data
- How and where the soils are used on the project
- A reference to the proximity to groundwater

If logistically there is no place to reuse this soil on or off site, it may be disposed of at DADS.

5.3.3 Impacted-Restricted Reuse

Soil with chemical concentrations above RSLs for residential property, but below RSLs for worker protection (commercial or industrial property), may be reused at an on-site or off-site commercial or industrial property without limitation, assuming:



- The groundwater protection levels have been met
- It is free of construction/demolition debris, including ACMs
- The owner of the receiving property approves it
- The soil is capped with an engineered barrier such as concrete or asphalt

If groundwater protection values have not been met, soil must be placed greater than ten feet above the static groundwater level.

Soil that is proposed to be used at a City-owned park must meet the requirements noted in Section 5.3.2. Therefore, material that is classified in the Impacted-Restricted Reuse category cannot be reused at a City-owned park.

Soil with chemical concentrations above or below the RSLs for residential use, but below RSLs for industrial (commercial and worker protection) use, which contains some amount of debris (and therefore is considered by CDPHE as a "solid waste"), and which contains no associated asbestos, may be reused at City-owned properties, assuming the groundwater protection levels have been met. If groundwater protection values have not been met, soil must be placed greater than ten feet above the static groundwater level. No reuse of soil which contains debris on non-City owned property is permitted, even if it does not contain asbestos, without obtaining a beneficial reuse designation from the CDPHE (may require additional confirmation sampling to confirm that the soil does not contain chemicals of concern and/or asbestos).

Detailed documentation of the on- and off-site disposition will be maintained by the MMP Supervisor. Documentation should include:

- The analytical data
- How and where the soils are used on the project
- A reference to the proximity to groundwater (must be ten feet above static water level if it does not meet the groundwater protection values)
- Whether clean cover material will be placed above the material

5.3.4 Health Risk – Restricted Reuse or Disposal

For soils that fall in the health-risk category (above industrial use [commercial or worker protection]), it will be necessary to complete a risk evaluation, compare concentrations to background concentrations, or reuse the soil with an engineered barrier to eliminate exposure. If risk analysis is technically or financially prohibitive, or prolongs the project, landfill disposal should be selected as the mitigation option. The MMP Supervisor should be consulted to recommend additional alternatives.

Generally, soils that fall into this category are as follows:

- Have chemical concentrations that exceed the CDPHE RSLs for Industrial Use
- Are not characteristically hazardous



5.3.5 Hazardous Waste

If sample analysis indicates that the soil is designated as hazardous waste, the soil will be containerized immediately in a lined roll-off box, labeled, and transported to a designated storage area on-site or off-site pending off-site disposal at a hazardous waste disposal facility. These wastes will be manifested and transported to the disposal facility in accordance with state and federal regulations. Once identified as hazardous waste, this material may not be stored on site longer than 90 days.

The disposal facility chosen to accept the hazardous waste will be decided based on the location of the materials and the location of an appropriate disposal facility. The Clean Harbors LLC, Deer Trail Landfill is the only facility within Colorado licensed to accept hazardous waste. Facilities in Utah and Texas are the closest other licensed hazardous waste disposal facilities. Transportation and manifesting of these waste materials on public highways, streets, or roadways will be in accordance with 49 CFR and any applicable Colorado Department of Transportation (CDOT) regulations.

Note: Certain waste streams are specifically excluded in the Solid Waste Regulations (CDPHE, 2011b). The MMP Supervisor will be responsible for ultimate classification for disposal.



6. Construction Water Handling Procedures

Groundwater was measured at around 29 feet bgs near Blake Street and was not encountered in the three other deep borings completed between Blake Street and Champ Street (four other borings were completed at the Site, but only to depths of five feet bgs) (Geocal, 2014). The deep borings ranged in depth from 30 to 40 feet bgs; groundwater was not encountered at these borings. Table 6-I provides the total boring depths, approximate depth of excavation for the installation of the outfall, and the depth of groundwater. Based on the plan and profile drawings, the depth to groundwater at Blake Street, and the lack of groundwater in the other geotechnical borings, groundwater is not likely to be encountered during construction (Geocal, 2014).

Table 6-I Excavation and Groundwater Depths

Boring Number	Boring Location	Total Depth of Boring (feet below ground surface)	Approximate Bottom of Excavation (feet below ground surface)*	Groundwater Depth (feet below ground surface)
Boring 6	Approximately 40 feet southeast of the Blake Street and 33 rd Street intersection	30	19	29
Boring 7	Approximately 40 feet southeast of the Walnut Street and 33rd Street intersection	5	21	Groundwater not encountered
Boring 8	Approximately 20 feet northwest of the Larimer Street and 33rd Street intersection	30	18	Groundwater not encountered
Boring 9	Approximately 100 feet northwest of the Lawrence Street and 33rd Street intersection	5	23	Groundwater not encountered
Boring 10	Approximately 40 feet southeast of the Lawrence Street and 33rd Street intersection	40	27	Groundwater not encountered
Boring 11	Approximately 80 feet northwest of the Arapahoe Street and 33 rd Street intersection	5	28	Groundwater not encountered
Boring 12	Approximately 100 feet northwest of the Curtis Street and 33rd Street intersection	40	28	Groundwater not encountered
Boring 13	Approximately 150 feet southeast of the Curtis Street and 33 rd Street intersection	5	28	Groundwater not encountered



Boring Number	Boring Location	Total Depth of Boring (feet below ground surface)	Approximate Bottom of Excavation (feet below ground surface)*	Groundwater Depth (feet below ground surface)
Boring 14	Approximately 20 feet south of the Champa Street and Downing Street intersection	40	28	Groundwater not encountered

Notes:

Although it is considered to be unlikely to encounter groundwater during this Project, groundwater that may unexpectedly be encountered during subsurface construction activities may require sampling and analysis prior to discharge as part of the CDPHE Water Quality Control Division (WQCD) permitting process. Water from dewatering operations shall not be directly discharged into any waters of the State, including wetlands, irrigation ditches, canals, or storm sewers, unless allowed by a permit. Unless prohibited by law or otherwise specified in the Contract, the water from dewatering operations shall be contained in basins in locations approved by the engineer, treated for discharge in accordance with the CDPHE-WQCD permit(s), or shall be hauled away from the project for proper disposal in accordance with applicable laws and regulations.

Evaluation of water disposition will be conducted in coordination with the MMP Supervisor and the CCOD Project Manager. If results of sampling indicate that groundwater has been impacted at concentrations exceeding the appropriate CDPHE standard, the Contractor must understand that the CDPHE will not allow this water to be discharged without appropriate permitting and/or treatment.

In the event that groundwater is encountered, it will be containerized and scheduled for off-site disposal. If the volume of groundwater generated is such that containment and hauling the water for off-site disposal is cost or logistically prohibitive, it may be necessary for a discharge or a dewatering permit to be obtained from the CDPHE. This process is addressed below, but is not expected to be necessary due to the assumption that groundwater will not be encountered or minimal quantities that can be containerized and shipped offsite.

It is the responsibility of the Contractor to obtain all applicable CDPHE-WQCD permits for dewatering and discharge of groundwater, and to abide by the requirements of the permit(s). The Contractor may apply for and obtain a Colorado Discharge Permit System (CDPS) General Permit for Construction Dewatering (COG0700000) from the CDPHE-WQCD if excessive groundwater quantities will require management. This application must be submitted to CDPHE at least 30 days prior to dewatering activities. If the Contractor intends to treat groundwater for discharge into a waters of the State, it is likely that the Contractor will need to apply for and obtain a Remediation Activities Discharge to Surface Water permit (COG315000). If so, this application must be submitted at least 45 days prior to the anticipated date of discharge, and must be considered complete by the CDPHE before the CDPHE review and approval process begins. An application for remediation would need to concisely show how the Contractor intends to treat the water to meet the surface-water standards applicable for the discharge. In the case that dewatering activities are required and a permit is obtained, the contractor must prepare a Remediation Activities Management Plan (RAMP) prior to any discharge activities taking place. In accordance with permit procedures, the Contractor shall fill out and submit monthly Discharge Monitoring Reports (DMRs) to CDPHE-WQCD for the life of the permit. Copies of monthly submittals shall be provided to the CCOD.

^{* -} Bottom of excavation is from the plan and profile drawing included in the Geocal, Geotechnical Design Report (Geocal, 2014). It was assumed that the total excavation depth, including over excavation, is two feet below the bottom of the outfall line.



The following are some general provisions; however, any requirements noted on the permit(s) take precedence over this MMP:

- Untested groundwater or groundwater that does not meet the discharge standards will not be discharged onto the ground, or into sanitary or storm sewers.
- Groundwater that does meet discharge standards as evaluated by the MMP Supervisor may be discharged
 in accordance with applicable federal, state and local regulations, or may be used on-site for moisture
 treatment of engineered fill material, or for dust suppression (assuming it meets Colorado Ground Water
 Standards). Use of groundwater for moisture treatment or dust suppression must be confirmed to be in
 compliance with water rights before implementation.
- Where chemical concentrations in groundwater are above permit limits, the water will be either be permitted and treated on-site or transported off-site and disposed at a licensed treatment facility.
- The MMP Supervisor will discuss treatment and/or disposal options with the CCOD, and the CCOD will
 provide direction to the Contractor, who will be responsible for water treatment and/or disposal in
 accordance with the Contractor's approved permits.

6.1 Leachate

Materials excavated from below the groundwater table have the potential to generate liquids; however, groundwater is unlikely to be encountered during the Project and it is unlikely that excavated material will generate significant liquids. However, if saturated materials are encountered, stockpile areas will be constructed to drain material before re-use as engineered fil, or transport for off-site disposal.

Generated liquids will drain to a central sump which must be of sufficient capacity to prevent overtopping. The sump will be excavated into the ground and sloped to a central location. It will also be lined with 10-mil polyethylene sheeting; a layer of gravel will be implemented to hold the sheeting in place and will extend beyond the edge of the sheeting. A berm will be placed around the sump to prevent surface water from commingling with the generated leachate water. Liquids accumulated within the sump will be submitted for analysis by the Contractor and coordinated with the MMP Supervisor. If constituents in the water exceed the surface water standards or CDPHE-WQCD permit limits (if applicable), the water must either be disposed at a licensed disposal facility with appropriate waste profiles and manifests or be treated to meet those standards before discharge (in accordance with the discharge permit). Solid wastes generated during this process must also be evaluated in accordance with sampling procedures prior to disposal; if this material will require disposal offsite, it must pass the paint filter test (U.S. EPA Method 9095A) prior to disposal at a licensed solid waste disposal facility.



7. Other

7.1 Dust

In accordance with 5 CCR 1001 – Air Quality Control Commission (AQCC) Regulations, the Contractor will obtain an Air Pollution Emissions Notice (APEN) and Application for Construction Permit. The Contractor will implement best management practices to minimize dust, such as the following:

- The Contractor shall take reasonable measures to prevent particulate matter from becoming airborne and to prevent the visible discharge of fugitive particulate emissions beyond the property boundary on which the emissions originate. The measures taken must be effective in the control of fugitive emissions at all times on the site, including periods of inactivity such as evenings, weekends, and holidays as well as any other period of inactivity.
- The Contractor shall conduct construction operations and take all necessary reasonable measures to eliminate or minimize raising dust resulting from any stored materials, equipment or operations used during construction of the work.
- Blowing dust and airborne particulates shall be controlled by wetting or other means, if approved by the Project Manager. Dust control agents shall be applied in accordance with manufacturer's recommendations.
- The Contractor shall provide and apply dust control at all times, including holidays and weekends, as
 required to abate dust nuisance on and about the Site that is a direct result of construction activities. The
 Contractor shall be required to provide sufficient quantities of equipment and personnel for dust control
 sufficient to prevent dust nuisance on and about the Site.

7.2 Asbestos Containing Material

If suspected asbestos-containing material (ACM) is encountered, including buried utilities, work in that area must stop immediately and the City Project Manager and Engineer shall be notified immediately. A Colorado Asbestos Building Inspector (CABI) with at least six month of asbestos in soils experience will collect a sample, and submit it for polarized light microscopy (PLM) analysis by a National Voluntary Laboratory Accreditation Program (NVLAP) accredited laboratory. If asbestos is discovered in the sample, workers must comply with Section 5.5 of the Solid Waste Regulations, or Regulation No. 8 of the Air Quality Control Commission Regulations, whichever is the more appropriate regulation for the situation, as confirmed by the MMP Supervisor and/or CABI.

7.3 Decontamination of Heavy Equipment

Equipment that has come into contact with special waste as identified by the MMP Supervisor will be decontaminated prior to leaving the project site to prevent potentially contaminated material from being spread off-site. Gross removal of material from equipment will be completed using hand tools such as shovels, brooms and brushes. If the MMP Supervisor finds it necessary, more thorough decontamination may be required such as pressure washing. Spent decontamination water will be collected in basins and pumped into water containers. The Contractor will be responsible for analyzing the waste-water and working with the City to determine final disposal options in accordance with all applicable federal, state and local regulations.

7.4 Site Security

The Contractor will be responsible for maintaining effective project access control.



7.5 Soil Stockpiles

If soils require stockpiling due to the presence of potentially contaminated materials or construction/urban fill debris with possible asbestos, the material must be placed on and covered with 6-mil plastic. Stockpiles must have erosion control measures in place to reduce the amount of soil transported by wind and runoff. Best management practices (BMPs) to mitigate potential stockpile erosion include:

- Minimizing the amount of soil disturbed at one time
- Prevent runoff from off-site areas from flowing across disturbed areas
- Slow down the runoff flowing across the Site
- Remove sediment from on-site runoff before it leaves the Site

7.6 Complaints

Any complaints received by the Contractor will be immediately reported to the City Project Manager. Complaints should be addressed within 24 hours.

7.7 Disposal

The Contractor shall direct non-recyclable, non-hazardous wastes from the City-owned or controlled property or facilities to the DADS landfill for disposal. The CCOD has submitted a waste profile, which has been accepted, to Waste Management for the adjacent segment of the 33rd Outfall structure. The Contractor may coordinate with CCOD to dispose of waste from this project under the existing waste profile.



8. Waste Characterization Protocols

The following presents protocols to characterize special and/or suspicious waste, which have not been previously characterized for disposal. When potentially contaminated material is encountered, the Contractor and MMP Supervisor will be responsible for coordinating with the City for sampling, waste profiling, and agency notifications. The Contractor and MMP Supervisor will be responsible for evaluating special wastes (for disposal purposes) in accordance with 6 CCR 1007-3, Section 262.11., and in accordance with all other applicable federal, state and local regulations. This evaluation must identify whether the wastes are characteristic or listed hazardous waste.

8.1 Waste Identification

For the purpose of this MMP, soils generated during construction of the project will be assumed to meet the Non-Impacted/Unrestricted Reuse PAL (Section 5.3.2), if it meets all the following conditions:

- Is either natural soils, or engineered fills such as roadway fill
- There is no visual or olfactory indication of contamination (e.g., staining, streaking, odor), or if field screening results (PID) are less than 50 units above background conditions
- There is no indication of the presence of solid waste (e.g., foreign materials including demolition debris, municipal solid waste, coal ash, slag)

8.2 20-Times Rule

Waste Management (the operator of DADS) will accept solid material where concentrations are less than 20 times the hazardous listing for characteristic waste (20 Times Rule), except for PCBs, as discussed in Section 8.6. The EPA Toxicity Characteristic Leaching Procedure (TCLP) Maximum Concentrations of Contaminants is presented as Appendix E. As an example, the regulatory level of lead (a Resource Conservation and Recovery Act [RCRA] regulated metal) is 5.0 milligrams per liter (mg/L) when analyzed by TCLP. The Waste Management acceptable limit, when analyzed by totals analysis, would then be less than 100 mg/kg, using the 20 Times Rule. If concentrations of any contaminant exceeds the 20 Times Rule by totals analysis, then analysis for TCLP is required. If the TCLP results exceed the toxicity characteristic maximum concentration (Appendix E) then the material will require disposal at a hazardous waste disposal site in accordance with CDPHE requirements.

If final analytical results are below the 20 Times Rule concentrations, the material then may be transported to DADS for disposal as non-hazardous solid waste. If the material exceeds regulatory levels, then hazardous waste disposal will be required, in accordance with all applicable regulations.

8.3 Petroleum Hydrocarbons

Petroleum hydrocarbons could potentially be encountered during construction of this project as a result of local industrial uses. If the Contractor or MMP Supervisor classifies materials (using PID, odor, staining, etc.) as potentially impacted by petroleum hydrocarbons, the material will be segregated as previously discussed in Section 7.5. If this material has not been previously profiled, one composite sample of soil for every 500 cubic yards of stockpiled soil will be acquired by the MMP Supervisor, and will be analyzed for:

- VOCs using EPA Method 8260
- RCRA 8 metals using EPA Method 6010/7471



- TPH (diesel and gasoline range) by EPA Method 8015B
- PCBs using EPA Method 8082
- Reactivity, Corrosivity, and Ignitability (SW846)

If material appears to be consistent based on field evaluation techniques, the 500 cubic yard requirement may be adapted, as approved by the City Project Manager.

8.4 Asbestos-Containing Materials

ACMs will be characterized and managed accordance with the City's Asbestos-Contaminated Soil Management Standard Operating Procedure (CCOD, 2010; Appendix F).

8.5 Slag, Coal, Ash

If slag, coal, or ash is identified, then the material will be tested for:

- VOCs by EPA Method 8260
- PAHs by EPA Method 8270
- PCBs using EPA Method 8082
- RCRA 8 metals using EPA Method 6010/7471
 - o Samples should be placed on hold for analysis of the TCLP pending the results of totals analysis
- Reactivity, Corrosivity, and Ignitability (SW846)

8.6 Electrical Equipment (PCBs)

If any electrical equipment suspected of containing PCBs is identified, it will be segregated, tested, and, depending on PCB concentrations, delivered off-site for disposal at a PCB-permitted disposal facility. Until testing is completed, any electrical equipment visually identified during excavation will be assumed to contain PCBs. Equipment determined to be free of PCBs may then be disposed as solid waste, or recycled. Waste Management will accept materials where PCB concentrations are less than 50 parts per million. If this material will be disposed at DADS, the MMP Supervisor will work with the City to complete a WM PCB Certification, which must include copies of analytical reports confirming the PCB concentrations.

8.7 Cleanup Goals and Regulatory Standards

Concentrations of metals will be compared, by the MMP Supervisor, to the Industrial RSL and the PALs as discussed in Section 5.3. If off-site disposal at a licensed Subtitle D landfill (DADS) is required, the 20-Times Rule and the Hazardous Material Limit will be evaluated. The following table presents these standards for the RCRA eight metals:



Table 8-1 RCRA 8 Metals Soil Regulatory Limits

	RSLs (milligram	s per kilogram)	20 Times Rule	Hazardous Material
Metal	Resident	Industrial	(milligrams per kilogram)	Limit (milligrams per liter)
Arsenic ^{1, 2}	11/	70	100	5.0
Barium	1,500	19,000	2,000	100
Cadmium	7.1	98	20	1.0
Chromium	12,000	15,000	100	5.0
Lead	400	800	100	5.0
Mercury	1.1	4.6	4.0	0.2
Selenium	39	580	20	1.0
Silver	39	580	100	5.0

Notes:

Regarding corrosivity, the limits in the samples collected will be between 2.0 and 12.6 pH units. The material must not be reactive, and the ignitability must be greater than 140°F.

The Subtitle-D landfill that may be utilized for waste disposal is DADS landfill, located at 3500 South Gun Club Road, Aurora, Colorado.

If the material is, as evidenced through analytical testing, determined to be characteristically hazardous, the material must be transported to an appropriately licensed facility, permitted to accept the particular characteristic waste. Additional coordination with the City will be required in this event.

¹ - In Colorado, arsenic occurs naturally, and often at concentrations greater than the RSLs. The CDPHE released guidance related to evaluating arsenic concentrations in soil, specifically regarding screening data collected from sites where historical use does not indicate the potential for arsenic contamination (CDPHE, 2011a). The guidance is based on the collection of over 2,700 samples from 44 counties in Colorado. The average concentration of arsenic in soils based on this sampling was 11 mg/kg. The CDPHE has adopted a policy that if arsenic concentrations are lower than 11 mg/kg, and releases of arsenic could not have occurred at the site, the CDPHE will require no further action to address arsenic in soil. Ultimate concurrence regarding this concentration must be provided by the CDPHE for decision-making purposes regarding disposal of material generated during construction at this project.

²- The EPA Record of Decision (ROD) for residential soils in the VB/I70 Superfund site establishes a cleanup goal of 70 mg/kg for arsenic (EPA, 2003). Therefore, in the areas within the VB/I70 Superfund site (between Blake Street and Walnut Street), the second value will be utilized.



8.8 Other Solid Waste

Other types of waste are not anticipated to be discovered during construction of this project. However, if encountered, the MMP Supervisor will coordinate with the City Project Manager to select analytical methods appropriate for characterizing that material in accordance with the U.S. EPA Method SW846.



9. Imported Materials

Any soils, including embankment and/or topsoil, brought to the Site must meet the Non-Impacted/Unrestricted Reuse PAL as described above in Section 5.3.2.

For each source of imported embankment or topsoil:

- The Contractor shall assure and certify that unacceptable levels of hazardous waste and substances, including but not limited to those defined in the 40 CFR Part 261 Subparts C and D, and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Section 101(14) as amended, are not incorporated into the project as a result of importing embankment or topsoil materials.
- The Contractor shall submit such certification to the Department of Environmental Health and Project Manager, signed and stamped (or sealed) by one of the following:
 - o A qualified environmental consultant
 - Certified industrial hygienist (CIH)
 - Certified hazardous materials manager (CHMM)
 - Registered professional engineer (PE)
 - Certified Safety Professional (CSP)
 - Registered Environmental Manager (REM)
- Additionally, the material must be visually evaluated by a CABI, and be determined free of any confirmed
 or suspected ACMs, solid waste, debris, and demolition materials.

If Contractor source material for embankment or topsoil, originating outside of the project limits, is placed at the project and is at any time found to be contaminated with unacceptable levels of hazardous waste or substances, the Contractor shall remove the contaminated material from the project, dispose of it in accordance with applicable laws and regulations, and make necessary restoration.

The cost of complying with these requirements, including sampling, testing, and corrective action by the Contractor, will not be paid for separately, and shall be included in the work.

9.1 Sample Analysis and Frequency

Representative samples of proposed import fill shall be collected at a minimum frequency of every 1,000 cubic yards. Samples shall be analyzed for the following constituents:

- VOCs by EPA Method 8260
- PAHs by EPA Method 8270
- RCRA 8 metals using EPA Method 6010/7471

The City EQ may adjust the frequency of sample analysis, and analysis requirements.



9.2 Imported Fill Documentation

Certification documentation shall be provided to the City Project Manager and EQ for approval prior to being brought to the project site.



10. Reporting

Upon project completion, the MMP Supervisor will prepare a summary report detailing the work performed at the project specifically related to the implementation of this MMP. The report will include the following:

- Property description
- Work description
- Copies of all field logs which detail daily operations
- Summary of analytical results
- Copies of all analytical reports
- Waste manifests for all solid waste, soil, water or other material transported offsite for disposal
- Maps showing the locations of site features related to this MMP, including sample locations, location of
 wastes discovered, final disposition of soil reused at the site, and any other important features identified
 during the course implementation of this MMP
- Representative site photographs detailing work performed
- Summary of the environmental professional onsite observations
- Summary of materials that were managed and the procedures used
- Quantities and disposition of materials managed
- Any other documentation detailing important features related to this project

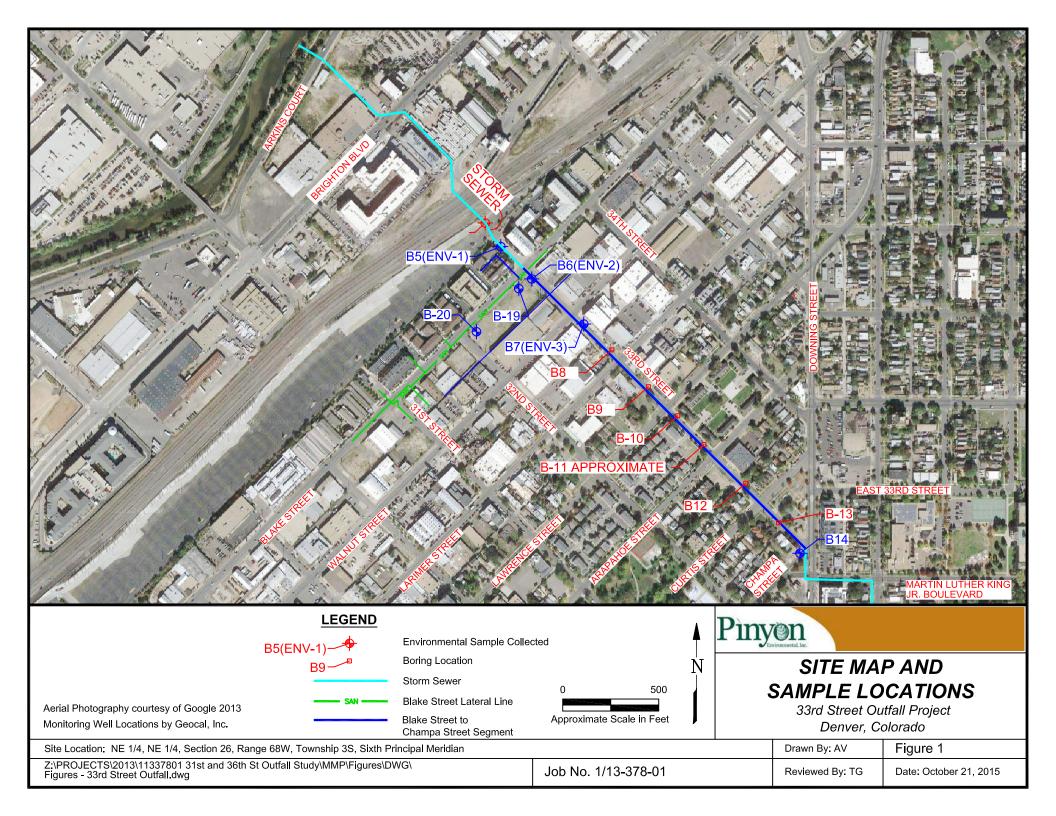


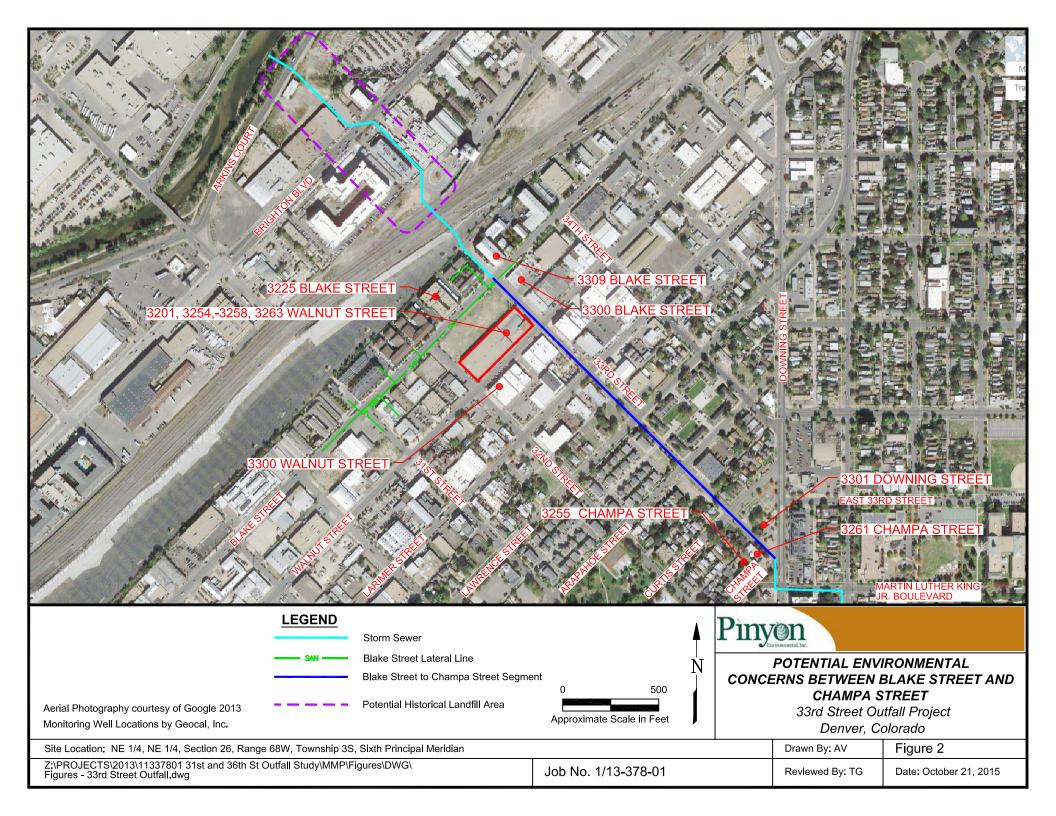
11. References

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- Pinyon, 2015a. "Materials Management Plan, 33rd Street Outfall Segment Arkins Court to Mountain Cement" Pinyon Environmental, Inc., May 21, 2015.
- Pinyon, 2015b. "Materials Management Plan, 33rd Street Outfall Segment Mountain Cement to Walnut Street" Pinyon Environmental, Inc., November 2, 2015.



Figures







Appendix A Potential Environmental Concerns

The CCOD, Environmental Quality Division (EQ) provided an *INTEROFFICE MEMORANDUM* (CCOD, 2012) which assessed the potential to encounter contaminated soil and groundwater during construction. Other documents and investigations were also completed by others, along the 33rd Street Outfall, as described in the following text. It should be noted that the information regarding environmental conditions presented below was summarized from the CCOD report, unless otherwise noted. The locations of potential environmental concerns near the Site are shown on Figure 2.

- 3225 Blake Street Property east of the railroad corridor to Blake Street was used for the storage of machinery in 1897 and for storage of coal in 1904 by the Denver City Tramway Company (Sanborn maps). During this time frame Sanborn maps show the portion of 33rd Street alignment north of this property as "closed." Potential residual contaminants in soil and groundwater could include coal fines, PAHs, petroleum hydrocarbons, ACMs, and metals.
- 3300 Blake Street The property was occupied by a manufacturer of leather goods from 1929 through 1951. It was converted to an office by 1956 (Sanborn maps). Potential residual contaminants in soil and groundwater could include metals.
- 3309 Blake Street The 1965 reverse city directory lists the Silver Corp and the Silver Engineering Works at this address. The 1970 directory lists CF&I Engineers, Inc., for the address. Potential residual contaminants in soil and groundwater could include coal and coal fines, PAHs, petroleum hydrocarbons, and metals.
- 3263 Walnut Street Truck repair was performed at this location from 1951 through 1956. In 1961 it was shown as a soda bottling plant (Sanborn maps). Reverse city directories indicate it was a beverage plant in 1965. Potential residual contaminants in soil and groundwater could include solvents, PAHs, petroleum hydrocarbons, ACMs, and metals.
- 3254-3258 Walnut Street This site was an oil reclaiming plant and a roofing material warehouse in 1929. By 1937, the 3258 Walnut Street property and the property behind it (3269 Larimer Street) had warehouses containing "insulating material." The 3258 Walnut St. property continued to be used for warehousing insulting material through 1961. The 3254 Walnut property was listed as CAPCO Inc., and Ceiling and Part Co., in a 1965 reverse directory. Potential residual contaminants in soil and groundwater could include PAHs, petroleum hydrocarbons, metals and asbestos.
- 3201 Walnut Street The property was from 1929 through 1937 the Bundy Coal Company's coal yard (Sanborn maps). Reverse city directories indicate United States Steel was at the address in 1970. Potential residual contaminants in soil and groundwater could include coal and coal fines, PAHs, petroleum hydrocarbons, ACMs, and metals.
- 3300 Walnut Street From 1937 through 1958 the property was known as Liquid Carbonic Corporation, manufacturers of carbon dioxide gas (Sanborn maps). Reverse city directories list Liquid Carbonic at the address in 1965. The 1970 directory lists Chalk-Chuck Company and Thomas Machine Mfg. at the address. Warren Plating Corporation and Barger-Knight were additions per the 1976 directory listing. By 1980 Warren Plating Corporation was dropped from the listing and no businesses were listed for the address in 1985. Barnell Manufacturing Inc., and The Jemm Company, were listed at the address in the 1995 and 1998 directories. Potential residual contaminants in soil and groundwater could include solvents, petroleum hydrocarbons, and metals.



- 3261 Champa Street Body and fender repair and painting was performed at this property from 1961 through 1967 (Sanborn maps). Potential residual contaminants in soil and groundwater could include solvents, petroleum hydrocarbons, and metals.
- 3255 Champa Street (3175 Downing Street) A filling station was located at this address from 1925 through 1961 (Sanborn maps). The site was located at the park-like triangular area northwest of the current intersection of Downing Street and Martin Luther King Boulevard. Potential residual contaminants in soil/groundwater could include petroleum hydrocarbons, ACMs, and metals.
- **3301 Downing Street (915 33rd Street)** A filling station is shown at the property from 1951 through 1958 (Sanborn maps). Potential residual contaminants in soil and groundwater could include petroleum hydrocarbons, ACMs, and metals.



Appendix B Environmental Protection Agency Regional Screening Levels

Key: I = IRIS;	P = PPRTV; A =							e FAQ #27); H = HEAST; F = See FAQ; J = New Jersey; O = EPA Office of Water												olied (Se	ee User Guid
	T				; n = non	cancer	; * = whei	re: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF:	=1; m = Concer	tration may ex	ceed o	ceiling limit (See				nay exc	eed Csat (Se	e User Guide		^	W-4 001 -
	I OXICI	ity and Che	mical-specific I	information				Contaminant					Screenii	ng Leve	eis				Protection of	rouna ۱	vvater SSLs
	k k	RfD _o	k RfC _i	k v															Risk-based		MCL-based
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(mg/kg-day)-1	y (ug/m ³) ⁻¹ y	day)	v \	y I gen (GIARS	ABS	(mg/kg)	Analyte	CAS No.	(mg/kg)	kev .	(ma/ka) ke	ey (ug/m³)	kev	(ug/m ³)		(ug/L) key	(ug/L)	(mg/kg)	kev	(mg/kg)
	y (ug/iii) y		171 / 1	y i gon i		0.1	(IIIg/kg)				ncy n	())		ксу	(ug/III)			(ug/L)	1.8E-03	ncy n	(mg/kg)
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	2.2E-06 I		9.0E-03	I V	1		1.1E+05	Acetaldehyde	75-07-0	8.2E+00	n	3.4E+01 r	n 9.4E-01	n	3.9E+00		1.9E+00 n		3.8E-04	n	
		2.0E-02			1	0.1		Acetochlor	34256-82-1	1.3E+02	n	1.6E+03 r	1				3.5E+01 n		2.8E-02	n	
		9.0E-01	I 3.1E+01 /	A V	1		1.1E+05	Acetone	67-64-1	6.1E+03	n	6.7E+04 r	1 3.2E+03	n	1.4E+04	n 1	I.4E+03 n		2.9E-01	n	
			2.0E-03)	X	1	0.1		Acetone Cyanohydrin	75-86-5	2.8E+05	nm	1.2E+06 nr	m 2.1E-01	n	8.8E-01	n					
			6.0E-02	I V	1		1.3E+05	Acetonitrile	75-05-8	8.1E+01	n	3.4E+02 r	n 6.3E+00	n	2.6E+01	n 1	I.3E+01 n		2.6E-03	n	
		1.0E-01	1	V	1		2.5E+03	Acetophenone	98-86-2	7.8E+02	n	1.2E+04 n				1	1.9E+02 n		5.8F-02	n	
3 85+00	C 1.3E-03 C	1.02-01		•	1	0.1	2.02.00	Acetylaminofluorene, 2-	53-96-3	1.4E-01	C	6.0E-01		С	9.4E-03		1.6E-02 c		7.2E-05	C	
3.0⊑+00	C 1.3E-03 C	5.0E-04	I 2.0E-05	L 1/	1		2.3E+04	Acetylaminondorene, 2- Acrolein	107-02-8	1.4E-01 1.4E-02		6.0E-01 C	2.2E-03		8.8F-03		4.2F-03 n		8.4E-07	n	
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		5.0E-01	I 1.0E-03		1			Acrylic Acid	79-10-7	9.9E+00	n	4.2E+01 r		n	4.4E-01		2.1E-01 n		4.2E-05	n	
5.4E-01	I 6.8E-05 I	4.0E-02	A 2.0E-03	I V	1		1.1E+04	Acrylonitrile	107-13-1	2.5E-01	C**	1.1E+00 c ⁴	** 4.1E-02	C**	1.8E-01	C** 5	5.2E-02 c**		1.1E-05	C**	
			6.0E-03 F)	1	0.1		Adiponitrile	111-69-3	8.5E+05	nm	3.6E+06 ni	m 6.3E-01	n	2.6E+00	n					
5.6E-02	С	1.0E-02	1			0.1		Alachlor	15972-60-8	9.7E+00	C**	4.1E+01 c			2.02.00		1.1E+00 c*	2.0E+00	8.7E-04	c*	1.6E-03
0.0L-02	O	1.0F-03				0.1		Aldicarb	116-06-3	6.3E+00	n	8.2E+01 r					2.0E+00 n	3.0E+00	4.9E-04	n	7.5E-04
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		1.0E-03	1			0.1		Aldicarb Sulfone	1646-88-4	6.3E+00	n	8.2E+01 r	1			2	2.0E+00 n	2.0E+00	4.4E-04	n	4.4E-04
					1	0.1		Aldicarb sulfoxide	1646-87-3									4.0E+00			8.8E-04
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		5.0E-03	I 1.0E-04	X V	1		1.1E+05	Allyl Alcohol	107-18-6	3.5E-01	n	1.5E+00 r	1.0E-02	n	4.4E-02	n 2	2.1E-02 n		4.2E-06	n	
2 1F-02	C 6.0E-06 C		1.0E-03		1			Allyl Chloride	107-10-0	1.7E-01	n	6.9E-01 r		n	4.40E-01		2.1F-01 n		6.7E-05	n	
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		9.0E-03	1			0.1		Ametryn	834-12-8	5.7E+01	n	7.4E+02 r					I.5E+01 n		1.6E-02	n	
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		8.0E-02	Р			0.1		Aminophenol, m-	591-27-5	5.1E+02	n	6.6E+03 r	1				l.6E+02 n		6.1E-02	n	
		2.0E-02	P			0.1		Aminophenol, p-	123-30-8	1.3E+02	n	1.6E+03 r	1				1.0E+01 n		1.5E-02	n	
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			C 5.0E-05								- 11		1 5.2E-03	- 11	2.2E-02				0.05.00	- 11	
		5.0E-02	<u> </u>			0.1		Asulam \\ // <==== \\ //	3337-71-1	3.2E+02	n	4.1E+03 r	1				1.0E+02 n		2.6E-02	n	
2.3E-01	С	3.5E-02	1		1	0.1		Atrazine U U U 😂 😂 0 d	1912-24-9	2.4E+00	C*	1.0E+01 c				3	3.0E-01 c	3.0E+00	2.0E-04	С	1.9E-03
8.8E-01	C 2.5E-04 C				1	0.1		Auramine	492-80-8	6.2E-01	С	2.6E+00 c	1.1E-02	С	4.9E-02	c 6	3.7E-02 c		6.1E-04	С	
		4.0E-04	1		1	0.1		Avermectin B1	65195-55-3	2.5E+00	n	3.3E+01 r	n			8	8.0E-01 n		1.4E+00	n	
		3.0E-03	A 1.0E-02 A	Δ		0.1		Azinphos-methyl	86-50-0	1.9E+01	n	2.5E+02 r	1.0E+00	n	4.4E+00		5.6E+00 n		1.7E-03	n	
1 1E 01	1 2 45 05 1	0.0L-00	A 1.0L-02 /	` \/	4	0.1		Azobenzene.	103-33-3	5.6E+00	C	2.6E+01		C	4.0F-01		1.2E-01 c		9.3F-04	c	
1.1E-01	I 3.1E-05 I	4.05.00	D 70F 00 F	, v		0.4					-			-							
			P 7.0E-06 F			0.1		Azodicarbonamide	123-77-3	8.6E+02	п	4.0E+03 r	7.3E-04	п	3.1E-03		2.0E+03 n		6.8E-01	n	
		2.0E-01	I 5.0E-04 H		0.07			Barium	7440-39-3	1.5E+03	n	2.2E+04 r		n	2.2E-01		3.8E+02 n	2.0E+03	1.6E+01	n	8.2E+01
5.0E-01	C 1.5E-01 C		C 2.0E-04 (C M	0.025			Barium Chromate	10294-40-3	3.0E-01	С	6.2E+00 c	6.8E-06	С	8.2E-05	C 4	4.1E-02 c			С	
		3.0E-01	1	V	1			Benfluralin	1861-40-1	2.3E+03	n	3.5E+04 r	1			1	1.7E+02 n		5.6E+00	n	
		5.0E-02			1	0.1		Benomyl	17804-35-2	3.2E+02	n	4.1E+03 r	1			C	9.7E+01 n		8.5E-02	n	
		2.0E-01	1		1	0.1		Bensulfuron-methyl	83055-99-6	1.3E+03	n	1.6E+04 r	1				3.9E+02 n		1.0E-01	n	
		3.0F-02	i			0.1		Bentazon	25057-89-0	1.9F+02	n	2.5E+03 r					5.7F+01 n		1.0E-01 1.2F-02	n	
4.05.00		****	-		-		4.05.05				- 11									- 11	
4.0E-03	P	1.0E-01	1	V	1		1.2E+03	Benzaldehyde	100-52-7	1.7E+02	C**	8.2E+02 c					I.9E+01 c*		4.1E-03	C*	
5.5E-02	I 7.8E-06 I	4.0E-03	I 3.0E-02	I V	1		1.8E+03	Benzene	71-43-2	1.2E+00	C**	5.1E+00 c ⁴		C**	1.6E+00		4.6E-01 c**	5.0E+00	2.3E-04	C**	2.6E-03
1.0E-01	X	3.0E-04	X		1	0.1		Benzenediamine-2-methyl sulfate, 1,4-	6369-59-1	1.9E+00	n	2.3E+01 c ⁴	**			(6.0E-01 n		1.7E-04	n	
		1.0E-03	Р	V	1		1.3E+03	Benzenethiol	108-98-5	7.8E+00	n	1.2E+02 r	1			1	I.7E+00 n		1.1E-03	n	
2.3E+02	I 6.7E-02 I	3.0E-03	1	М	1	0.1		Benzidine	92-87-5	5.3E-04		1.0E-02			1.8E-04		1.1E-04 c		2.8E-07	c	
2.JLTU2	1 0.7L-02 T			IVI		0.1			92-87-5 65-85-0	5.3E-04 2.5E+04				C	1.02-04		7.5F+03 n				
		4.0E+00			1			Benzoic Acid			n								1.5E+00	n	
1.3E+01				V	1		3.2E+02	Benzotrichloride	98-07-7	5.3E-02	С	2.5E-01 c	:				3.0E-03 c		6.6E-06	С	
		1.0E-01	P		1	0.1		Benzyl Alcohol	100-51-6	6.3E+02	n	8.2E+03 r	1				2.0E+02 n		4.8E-02	n	
1.7E-01	I 4.9E-05 C	2.0E-03	P 1.0E-03 F	P V	1		1.5E+03	Benzyl Chloride	100-44-7	1.1E+00	C**	4.8E+00 c	** 5.7E-02	C**	2.5E-01	C** 8	8.9E-02 c**		9.8E-05	C**	
	2.4E-03 I	2.0E-03	I 2.0E-05		0.007			Beryllium and compounds	7440-41-7	1.6E+01	n	2.3E+02 r	1.2E-03	C**	5.1E-03	C** 2	2.5E+00 n	4.0E+00	1.9E+00	n	3.2E+00
		9.0F-03	P			0.1		Bifenox	42576-02-3	5.7E+01	n	7.4E+02 r					I.0E+01 n		7.6F-02	n	
		1.5E-02	1			0.1		Biphenthrin	82657-04-3	9.5E+01	n	1.4E+02 I					3.0E+01 n		1.4E+02	n	
0.05.00			1 4050:			U. I		F			-11		4.05.55		1.05.01						
8.0E-03	1	5.0E-01	I 4.0E-04		1			Biphenyl, 1,1'-	92-52-4	4.7E+00	n	2.0E+01 r		n	1.8E-01		B.3E-02 n		8.7E-04	n	
		4.0E-02	1	V	1		1.0E+03	Bis(2-chloro-1-methylethyl) ether	108-60-1	3.1E+02	n	4.7E+03 n					7.1E+01 n		2.6E-02	n	
		3.0E-03	P		1	0.1		Bis(2-chloroethoxy)methane	111-91-1	1.9E+01	n	2.5E+02 r	1			5	5.9E+00 n		1.3E-03	n	
1.1E+00	I 3.3E-04 I			V	1		5.1E+03	Bis(2-chloroethyl)ether	111-44-4	2.3E-01	С	1.0E+00 c	8.5E-03	С	3.7E-02	C '	1.4E-02 c		3.6E-06	С	
	I 6.2E-02 I			V	1			Bis(chloromethyl)ether	542-88-1	8.3E-05	c	3.6E-04		c	2.0E-04		7.2E-05 c		1.7E-08	c	
		5.0E-02		V	1		4.2⊏₹03				0		4.0⊑-05	C	2.UE-U4						
	. 0.22 02 .		1		1	0.1		Bisphenol A	80-05-7	3.2E+02	п	4.1E+03 r					7.7E+01 n		5.8E+00	n	
	. 0.22 02 .							Boron And Borates Only	7440-42-8	1.6E+03	n	2.3E+04 r	1 2.1E+00	n	8.8E+00	n 4	I.0E+02 n			n	
	. 0.22 02 1	2.0E-01	I 2.0E-02 I		1														1.3E+00	- 11	
	0.22 02 1	2.0E-01 2.0E+00	P 2.0E-02 F	PV	1 1			Boron Trichloride	10294-34-5	1.6E+04	n		m 2.1E+00	n	8.8E+00	n 4	1.2E+00 n		1.3E+00	n	
	0.22 02 1	2.0E-01 2.0E+00	P 2.0E-02 F	PV	1 1 1			Boron Trichloride	10294-34-5		n n	2.3E+05 nr	m 2.1E+00		8.8E+00	n 4			1.3E+00		
2.2E+02	1 0.22 02 1	2.0E-01 2.0E+00 4.0E-02		PV	1 1 1			Boron Trichloride Boron Trifluoride	10294-34-5 7637-07-2	1.6E+04 3.1E+02		2.3E+05 nr 4.7E+03 r	m 2.1E+00 n 1.4E+00	n		n 4 n 2	1.2E+00 n 2.6E+00 n	1.0F+01		n n	7 7F-02
2.2E+02 7.0E-01	I X 6.0E-04 X	2.0E-01 2.0E+00	P 2.0E-02 F	PV	1 1 1		2 4E+03	Boron Trichloride	10294-34-5	1.6E+04	n n c*	2.3E+05 nr	m 2.1E+00 n 1.4E+00	n	8.8E+00	n 4 n 2	1.2E+00 n	1.0E+01	8.5E-04 2.1E-06		7.7E-02

Key: I = IRIS; P = PPRTV; A = ATSDR; C = Cal EPA; X = APPENI										ied (See User Guid
Toxicity and Chemical-specific Information		SL < 10X c SL; SSL values are based on DAF=1; m = Concen Contaminant	tration may exce	eed ceiling limit (See	Screening		may exceed Usat (Se	e User Guide		round Water SSLs
		Contaminant			OCICCIIII	ECVCIS				
					Desident Air	1-4			Risk-based	MCL-based
e (inging e (ingini e o muta-	Csat		Resident Soil	Industrial Soil	Resident Air	Industrial Ai		MCL	SSL	SSL
(mg/kg-day) ⁻¹ y (ug/m ³) ⁻¹ y day) y) y I gen		Analyte CAS No.	(mg/kg) k	ey (mg/kg) k	ey (ug/m³)	key (ug/m³)	key (ug/L) key	(ug/L)	(mg/kg)	key (mg/kg)
8.0E-03 6.0E-02 V	1 6.8E+02 Bromobenzene	108-86-1	2.9E+01		n 6.3E+00	n 2.6E+01	n 6.2E+00 n		4.2E-03	n
4.0E-02 X V	1 4.0E+03 Bromochloromethane	74-97-5			n 4.2E+00	n 1.8E+01	n 8.3E+00 n	0.05.04(5)	2.1E-03	n
6.2E-02 3.7E-05 C 2.0E-02 V 7.9E-03 1.1E-06 2.0E-02 V	1 9.3E+02 Bromodichloromethane 1 9.2E+02 Bromoform	75-27-4 75-25-2		c 1.3E+00 ** 8.6F+01	c 7.6E-02 c* 2.6F+00	c 3.3E-01 c 1.1F+01	c 1.3E-01 c c 3.3E+00 c*	8.0E+01(F) 8.0E+01(F)	3.6E-05 8.7E-04	c 2.2E-02 c* 2.1E-02
1.4E-03 5.0E-03 V	1 3.6E+03 Bromomethane	74-83-9				n 2.2E+00	n 7.5E-01 n	0.01101(1)	1.9F-04	n 2.1L-02
5.0E-03 H V	1 Bromophos	2104-96-3			n 5.2E-01	11 2.22.00	3.5E+00 n		1.5E-02	n
2.0E-02 I	1 0.1 Bromoxynil	1689-84-5		n 1.6E+03	n		3.3E+01 n		2.8E-02	n
2.0E-02 I V	1 Bromoxynil Octanoate	1689-99-2		n 2.3E+03	n		1.4E+01 n			n
3.4E+00 C 3.0E-05 I 2.0E-03 I V	1 6.7E+02 Butadiene, 1,3-	106-99-0			** 9.4E-02	c** 4.1E-01	c** 1.8E-02 c*			c*
1.0E-01 I V	1 7.6E+03 Butanol, N-	71-36-3			ns		2.0E+02 n		4.1E-02	n
2.0E+00 P 3.0E+01 P V	1 2.1E+04 Butyl alcohol, sec-	78-92-2	1.3E+04			n 1.3E+04	n 2.4E+03 n		5.0E-01	n
5.0E-02 I V	1 Butylate	2008-41-5		n 5.8E+03			4.6E+01 n		4.5E-02	n
2.0E-04 C 5.7E-08 C	1 0.1 Butylated hydroxyanisole	25013-16-5	2.7E+03		c 4.9E+01	c 2.2E+02	c 1.5E+02 c		2.9E-01	С
3.6E-03 P 3.0E-01 P 5.0F-02 P V	1 0.1 Butylated hydroxytoluene	128-37-0		c* 6.4E+02 (3.4E+00 c*			C*
5.0E-02 P V 1.0E-01 X V	1 1.1E+02 Butylbenzene, n- 1 1.5E+02 Butylbenzene, sec-	104-51-8 135-98-8			ns ns		1.0E+02 n 2.0E+02 n		3.2E-01 5.9E-01	n n
1.0E-01 X V	1 1.8E+02 Butylbenzene, sec-	98-06-6			is is		6.9E+01 n		1.6E-01	n n
1.0E-01 X V 2.0E-02 A	1 1.8E+02 Butylbenzene, tert- 1 0.1 Cacodylic Acid	98-06-6 75-60-5		ns 1.2E+04 r n 1.6E+03			6.9E+01 n 4.0E+01 n		1.6E-01 1.1E-02	n n
	0.025 0.001 Cadmium (Diet)	75-60-5		n 9.8E+01	n		4.0L101 II		1.112-02	"
1.8E-03 5.0E-04 1.0E-05 A	0.05 0.001 Cadmium (Water)	7440-43-9			1.0E-03	n 4.4E-03	n 9.2E-01 n	5.0E+00	6.9E-02	n 3.8E-01
	0.025 Calcium Chromate	13765-19-0		c 6.2E+00		c 8.2E-05	c 4.1E-02 c			C 0.02 01
5.0E-01 I 2.2E-03 C	1 0.1 Caprolactam	105-60-2		n 4.0E+04	n 2.3E-01	n 9.6E-01	n 9.9E+02 n		2.5E-01	n
1.5E-01 C 4.3E-05 C 2.0E-03 I	1 0.1 Captafol	2425-06-1	3.6E+00 c			c 2.9E-01	c 4.0E-01 c**			C**
2.3E-03 C 6.6E-07 C 1.3E-01 I	1 0.1 Captan	133-06-2	2.4E+02 c	** 1.0E+03 (* 4.3E+00	c 1.9E+01	c 3.1E+01 c**			C**
1.0E-01 I	1 0.1 Carbaryl	63-25-2		n 8.2E+03	n		1.8E+02 n		1.7E-01	n
5.0E-03 I	1 0.1 Carbofuran	1563-66-2			n		9.4E+00 n	4.0E+01		n 1.6E-02
1.0E-01 7.0E-01 V	1 7.4E+02 Carbon Disulfide 1 4.6E+02 Carbon Tetrachloride	75-15-0 56-23-5		n 3.5E+02 c* 2.9F+00		n 3.1E+02 c* 2.0F+00	n 8.1E+01 n c* 4.6F-01 c*	5.05.00		n
7.0E-02 6.0E-06 4.0E-03 1.0E-01 V 1.0E-01 P V	1 4.6E+02 Carbon Letrachloride 1 5.9E+03 Carbonyl Sulfide	56-23-5 463-58-1				c* 2.0E+00 n 4.4E+01	c* 4.6E-01 c* n 2.1E+01 n	5.0E+00	1.8E-04 5.1E-02	c* 1.9E-03
1.0E-01 P V	1 0.1 Carbonyl Suilde Carbosulfan	463-58-1 55285-14-8		n 8.2E+01	n 1.0E+01	n 4.4E+01	5.1E+01 n		1.2E-01	n n
1.0E-02 T	1 0.1 Carboxin	5234-68-4		n 8.2E+03	n		1.9E+02 n		1.0E-01	n
9.0E-04 I	1 Ceric oxide	1306-38-3			m 9.4E-02	n 3.9E-01	n 1.52.702 11		1.02-01	"
1.0E-01 I V	1 Chloral Hydrate	302-17-0			n 5.42-02	11 0.52-01	2.0E+02 n		4.0F-02	n
1.5E-02 I	1 0.1 Chloramben	/ /33-90-4	9.5E+01	n 1.2E+03	n		2.9E+01 n		7.0E-03	n
4.0E-01 H	1 0.1 Chloranil	118-75-2	1.3E+00	c 5.7E+00	С		1.8E-01 c		1.5E-04	С
3.5E-01 1.0E-04 5.0E-04 7.0E-04 V	1 0.04 Chlordane	12789-03-6	1.7E+00 c	** 7.7E+00 c	** 2.8E-02	c** 1.2E-01	c** 2.0E-02 c**	2.0E+00	2.7E-03	c** 2.7E-01
1.0E+01 4.6E-03 C 3.0E-04	1 0.1 Chlordecone (Kepone)	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	5.4E-02	c* 2.3E-01	c 6.1E-04	c 2.7E-03	c 3.5E-03 c*			C*
7.0E-04 A	1 0.1 Chlorfenvinphos	470 90 6		n 5.7E+01	n		1.1E+00 n			n
2.0E-02	1 0.1 Chlorimuron, Ethyl-	90982-32-4		n 1.6E+03	n		3.9E+01 n		1.3E-02	n
1.0E-01 1.5E-04 A V	1 2.8E+03 Chlorine	7782-50-5	1.8E-02	n 7.8E-02		n 6.4E-02	n 3.0E-02 n		1.4E-05	n
3.0E-02 2.0E-04 V	1 Chlorine Dioxide	10049-04-4			n 2.1E-02	n 8.8E-02	n 4.2E-02 n	4.05.00		n
3.0E-02 I 5.0E+01 I V	1 Chlorite (Sodium Salt) 1 1.2E+03 Chloro-1,1-difluoroethane 1-	7758-19-2 75-68-3		n 3.5E+03 ns 2.3E+04 r	n ns 5.2E+03	n 2.2F+04	6.0E+01 n n 1.0E+04 n	1.0E+03	5.2E+00	n n
3.0E-04 2.0E-02 H 2.0E-02 V	1 7.9E+02 Chloro-1,3-butadiene, 2-	126-99-8				c 4.1E-02	c 1.9E-02 c		9.8E-06	C
4.6E-01 H	1 0.1 Chloro-2-methylaniline HCL 4-	0 3165-93-3			C 9.4L-03	C 4.1L-02	1.7E-01 c		1.5E-04	C
1.0E-01 P 7.7E-05 C 3.0E-03 X	1 0.1 Chloro-2-methylaniline 4-	95-69-2		** 2.3E+01 (c 1.6E-01	c 7.0E-01 c**		4.0E-04	C**
2.7E-01 X V	1 1.2E+04 Chloroacetaldehyde, 2-	107-20-0			C		2.9E-01 c			C
	1 0.1 Chloroacetic Acid	79-11-8						6.0E+01		1.2E-02
3.0E-05 I	1 0.1 Chloroacetophenone, 2-	532-27-4	4.3E+03	n 1.8E+04	n 3.1E-03	n 1.3E-02	n			
2.0E-01 P 4.0E-03 I	1 0.1 Chloroaniline, p-	106-47-8		** 1.1E+01 (3.7E-01 c*			C*
2.0E-02 5.0E-02 P V	1 7.6E+02 Chlorobenzene	108-90-7		n 1.3E+02		n 2.2E+01	n 7.8E+00 n	1.0E+02	5.3E-03	n 6.8E-02
1.1E-01 C 3.1E-05 C 2.0E-02 I	1 0.1 Chlorobenzilate	510-15-6	4.9E+00		c* 9.1E-02	c 4.0E-01	c 3.1E-01 c*		1.0E-03	C*
3.0E-02 X	1 0.1 Chlorobenzoic Acid, p-	74-11-3	1.9E+02	n 2.5E+03	n	- 4.05.05	5.1E+01 n		1.3E-02	n
3.0E-03 P 3.0E-01 P V 4.0E-02 P V	1 2.9E+02 Chlorobenzotrifluoride, 4- 1 7.3E+02 Chlorobutane, 1-	98-56-6 109-69-3	2.1E+01 3.1E+02			n 1.3E+02	n 3.5E+00 n 6.4E+01 n		1.2E-02 2.6E-02	n n
4.0E-02 P V 5.0E+01 I V	1 7.3E+02 Chlorobutane, 1- 1 1.7E+03 Chlorodifluoromethane	75-45-6			ns 5.2E+03	n 2.2E+04	n 1.0E+04 n			n n
2.0E-02 P V	1 1.1E+05 Chloroethanol, 2-	75-45-6 107-07-3		n 2.3E+04 r		11 2.25+04	4.0E+04 n			n n
3.1E-02 C 2.3E-05 I 1.0E-02 I 9.8E-02 A V	1 2.5E+03 Chloroform	67-66-3				c* 5.3E-01	c* 2.2E-01 c*	8.0E+01(F)		c* 2.2E-02
9.0E-02 V	1 1.3E+03 Chloromethane	74-87-3	1.1E+01		n 9.4E+00	n 3.9E+01	n 1.9E+01 n			n
2.4E+00 C 6.9E-04 C V	1 9.3E+03 Chloromethyl Methyl Ether	107-30-2	2.0E-02	c 8.9E-02	c 4.1E-03	c 1.8E-02	c 6.5E-03 c		1.4E-06	c
3.0E-01 P 3.0E-03 P 1.0E-05 X	1 0.1 Chloronitrobenzene, o-	88-73-3		c* 7.7E+00 (7 1.02 00	n 4.4E-03	n 2.4E-01 c*		2.2E-04	C*
6.0E-02 P 7.0E-04 P 2.0E-03 P	1 0.1 Chloronitrobenzene, p-	100-00-5			** 2.1E-01	n 8.8E-01	n 1.2E+00 c**			C**
5.0E-03 I V	1 2.7E+04 Chlorophenol, 2-	95-57-8	3.9E+01	n 5.8E+02	n		9.1E+00 n		8.9E-03	n
4.0E-04 C V	1 6.2E+02 Chloropicrin	76-06-2			n 4.2E-02	n 1.8E-01	n 8.3E-02 n		2.5E-05	n
3.1E-03 C 8.9E-07 C 1.5E-02 I	1 0.1 Chlorothalonil	1897-45-6				c 1.4E+01	c 2.2E+01 c**		5.0E-02 2.3F-02	C**
2.0E-02 I V 2.0E-02 X V	1 9.1E+02 Chlorotoluene, o- 1 2.5E+02 Chlorotoluene, p-	95-49-8 106-43-4	1.6E+02 1.6E+02		ns ns		2.4E+01 n 2.5E+01 n		2.3E-02 2.4E-02	n n
2.4E+02 C 6.9E-02 C	1 0.1 Chlorozotocin	54749-90-5				c 1.8E-04	c 3.2E-04 c		7.1E-08	C
2.4E+02 C 6.9E-02 C 2.0E-01 I	1 0.1 Chlorpropham	101-21-3	1.3E+03	n 1.6E+04	n 4.7E-00	0 1.0E-04	2.8E+02 n		7.1E-08 2.6E-01	n
1.0E-03 A	1 0.1 Chlorpyrifos	2921-88-2		n 8.2E+01	n		8.4E-01 n		1.2E-02	n
1.0E-02 H	1 0.1 Chlorpyrifos Methyl	5598-13-0	6.3E+01	n 8.2E+02	n		1.2E+01 n		5.4E-02	n
5.0E-02 I	1 0.1 Chlorsulfuron	64902-72-3	3.2E+02	n 4.1E+03	n		9.9E+01 n		8.3E-02	n
1.0E-02 I	1 0.1 Chlorthal-dimethyl	1861-32-1	6.3E+01	n 8.2E+02	n		1.2E+01 n		1.5E-02	n
8.0E-04 H	1 0.1 Chlorthiophos	60238-56-4	5.1E+00	n 6.6E+01	n		2.8E-01 n		7.3E-03	n
1.5E+00 I	0.013 Chromium(III), Insoluble Salts	16065-83-1	1.2E+04	n 1.8E+05 r	m		2.2E+03 n		4.0E+06	n

Key: I = IRIS			e FAQ #27); H = HEAST; F = See FAQ; J = New Jersey; O = EPA Office of Wate e: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF										ed (See User Gu
	Toxicity and Chemical-specific Information	- Horicancer, - whe	Contaminant	- I, III - Conce	Titration may e.	kceed celling ii	III (See U	Screenin		nay exceed Csat (S	ee oser Guio		round Water SSL
	k RfD ₀ RfC _i ky		Ontarillari					00.00	I I				
SEO	IKI KI """ KI " KIVI I							Dooidant Air	Industrial Air			Risk-based	MCL-based
	c (inging c (ingini c o mata-	C _{sat}		04041	Resident Soil	Industria		Resident Air			MCL	SSL	SSL
(mg/kg-day)	¹ y (ug/m ³)- ¹ y day) y) y I gen GI		Analyte Analyte	CAS No.	(mg/kg)	key (mg/k	3,	(ug/m³)	key (ug/m³)	key (ug/L) key	(ug/L)	(mg/kg)	key (mg/kg)
5.0E-01	J 8.4E-02 S 3.0E-03 I 1.0E-04 I M 0.1		Chromium(VI)	18540-29-9	3.0E-01	c* 6.3E+	00 c*	1.2E-05	c 1.5E-04	c 3.5E-02 c		6.7E-04	C
		013	Chromium, Total	7440-47-3	0.05.04	4.45	00			0.05.04	1.0E+02	4.45.00	1.8E+05
	1.3E-02	1 0.1	Clofentezine Cobalt	74115-24-5 7440-48-4	8.2E+01 2.3E+00	n 1.1E+ n 3.5E+		3.1F-04	c** 1.4F-03	2.3E+01 n c** 6.0E-01 n		1.4E+00 2.7E-02	n
	9.0E-03 P 3.0E-04 P 6.0E-06 P 6.2F-04 I V M	1	Cobalt Coke Oven Emissions	8007-45-2	2.3E+00	II 3.5E+	UI N	1.6E-03	0 1.12 00	C 6.0E-01 N		2.7E-02	n
	4.0E-02 H	1		7440-50-8	3.1E+02	n 4.7E+	02 5	1.6E-03	c 2.0E-02	8.0E+01 n	1.3E+03	2.8E+00	n 4.6E+01
	4.0E-02 H 5.0E-02 I 6.0E-01 C	1 0.1	Copper Cresol. m-	108-39-4	3.1E+02 3.2E+02	n 4.7E+		6.3E+01	n 2.6F+02	n 9.3E+01 n	1.3E+03		
	5.0E-02 6.0E-01 C	1 0.1	Cresol, ni-	95-48-7	3.2E+02 3.2F+02	n 4.1E+	00 11	6.3E+01	11 2:02:02	n 9.3E+01 n			n
													n
	1.0E-01 A 6.0E-01 C 1.0E-01 A	1 0.1 1 0.1	Cresol, p- Cresol, p-chloro-m-	106-44-5 59-50-7	6.3E+02 6.3E+02	n 8.2E+ n 8.2E+		6.3E+01	n 2.6E+02	n 1.9E+02 n 1.4E+02 n			n n
	1.0E-01 A 6.0E-01 C	1 0.1		1319-77-3	6.3E+02			6.3E+01	n 2.6E+02	n 1.5E+02 n			
1.9E+00			Cresols	123-73-9	3.7E-01	n 8.2E+ c* 1.7E+		0.3E+01	n 2.6E+02	4.0F-02 c*			n c*
1.95+00	1.0E-03 P V	1 2.7E+02	Crotonaldehyde, trans- Cumene	98-82-8	1.9E+02	n 9.9E+		4.2E+01	n 1.8F+02	n 4.5E+01 n			n
0.05.04													
2.2E-01 8.4E-01	C 6.3E-05 C	1 0.1 1 0.1	Cupferron	135-20-6	2.5E+00	c 1.0E+		4.5E-02	c 1.9E-01	c 3.5E-01 c		6.1E-04	c c*
8.4E-01	H 2.0E-03 H	1 0.1	Cyanazine Cvanides	21725-46-2	6.5E-01	c* 2.7E+	00 c*			8.8E-02 c*		4.1E-05	C
	4.05.00	,	-9	500.04.0	7.05.00	1.05	00			0.05.00			
	1.0E-03 I	4	~Calcium Cyanide	592-01-8	7.8E+00	n 1.2E+				2.0E+00 n			n
	5.0E-03	1 0.50.05	~Copper Cyanide	544-92-3	3.9E+01	n 5.8E+		9 25 02	n 2 FF 04	1.0E+01 n	2.05.02		n 2.05.00
	6.0E-04 I 8.0E-04 S V 1.0F-03 I V	9.5E+05	~Cyanide (CN-)	57-12-5	2.3E+00	n 1.5E+		8.3E-02	n 3.5E-01	n 1.5E-01 n	2.0E+02	1.5E-03	n 2.0E+00
		1	~Cyanogen	460-19-5	7.8E+00					2.0E+00 n			n
	9.0E-02 I V	4	~Cyanogen Bromide	506-68-3	7.0E+02	n 1.1E+				1.8E+02 n			n
	5.0E-02 I V	1 105	~Cyanogen Chloride	506-77-4	3.9E+02	n 5.8E+		0.05.05	0.55.	1.0E+02 n		4.55.00	п
	6.0E-04 8.0E-04 V	1 1.0E+07	~Hydrogen Cyanide	74-90-8	2.3E+00	n 1.5E+		8.3E-02	n 3.5E-01	n 1.5E-01 n			n
	2.0E-03 I 5.0F-03 I 0	1	~Potassium Cyanide	151-50-8 506-61-6	1.6E+01 3.9E+01	n 2.3E+ n 5.8F+				4.0E+00 n 8.2E+00 n			n
		.04	~Potassium Silver Cyanide										n
		.04	~Silver Cyanide	506-64-9	7.8E+02	n 1.2E+				1.8E+02 n	0.05.55		n
	1.0E-03 2.0E-04 P	1	~Sodium Cyanide	143-33-9	7.8E+00	n 1.2E+				2.0E+00 n	2.0E+02		n
	2.02 01 1		~Thiocyanates	NA TO D	1.6E+00	n 2.3E+	•			4.0E-01 n			n
	2.0E-04 X V	1	~Thiocyanic Acid	463-56-9	1.6E+00	n 2.3E+				4.0E-01 n			n
	5.0E-02 I	1	~Zinc Cyanide	557-21-1	3.9E+02	n 5.8E+				1.0E+02 n			n
	6.0E+00 I V		Cyclohexane	110-82-7	6.5E+02	ns 2.7E+		6.3E+02	n 2.6E+03	n 1.3E+03 n			n
2.3E-02		1 0.1	Cyclohexane, 1,2,3,4,5-pentabromo-6-chloro-	87-84-3	2.4E+01	c 1.0E+				2.4E+00 c			С
	5.0E+00 I 7.0E-01 P V	1 5.1E+03	Cyclohexanone	108-94-1	2.8E+03	n 1.3E+			n 3.1E+02	n 1.4E+02 n			n
	5.0E-03 P 1.0E+00 X V	1 2.8E+02	Cyclohexene	110-83-8	3.1E+01	n 3.1E+	-	1.0E+02	n 4.4E+02	n 7.0E+00 n			n
	2.0E-01 I V	1 2.9E+05	Cyclohexylamine Cyclohexylamine	108-91-8	1.6E+03	n 2.3E+				3.8E+02 n			n
	2.5E-02	1 0.1	Cyfluthrin \\ C	68359-37-5	1.6E+02	n 2.1E+				1.2E+01 n			n
	5.0E-03 I	1 0.1	Cyhalothrin U U V3 CT CT	68085-85-8	3.2E+01	n 4.1E+				1.0E+01 n			n
	1.0E-02 I	1 0.1	Cypermethrin	52315-07-8	6.3E+01	n 8.2E+				2.0E+01 n			n
	7.5E-03 I	1 0.1	Cyromazine	66215-27-8	4.7E+01	n 6.2E+				1.5E+01 n			n
	I 6.9E-05 C	1 0.1	DDD	72-54-8	2.3E+00	c 9.6E+		4.1E-02	c 1.8E-01	c 3.2E-02 c		7.5E-03	С
3.4E-01	I 9.7E-05 C V	1	DDE, p,p'- ————————————————————————————————————	72-55-9	2.0E+00	c 9.3E+		2.9E-02	c 1.3E-01	c 4.6E-02 c			С
3.4E-01	I 9.7E-05 I 5.0E-04 I	1 0.03		50-29-3	1.9E+00	c** 8.5E+		2.9E-02	c 1.3E-01	c 2.3E-01 c**			C**
	3.0E-02 I	1 0.1	Dalapon	75-99-0	1.9E+02	n 2.5E+				6.0E+01 n	2.0E+02		n 4.1E-02
1.8E-02	C 5.1E-06 C 1.5E-01 I	1 0.1	Daminozide I I I I I I I I I I I I I I I I I I I	1596-84-5	3.0E+01	c* 1.3E+		5.5E-01	c 2.4E+00	c 4.3E+00 c*			c*
7.0E-04	I 7.0E-03 I	1 0.1	Decabromodiphenyl ether, 2,2',3;3',4,4',5,5',6,6'- (BDE-209)	1163-19-5	4.4E+01	n 5.7E+	02 n			1.4E+01 n		7.8E+00	n
	4.0E-05	1 0.1	Demeton	8065-48-3	2.5E-01	n 3.3E+				4.2E-02 n			n
1.2E-03	I 6.0E-01 I	1 0.1	Di(2-ethylhexyl)adipate	103-23-1	4.5E+02	c** 1.9E+				6.5E+01 c*	4.0E+02		c* 2.9E+01
6.1E-02	H 70504 4	1 0.1	Diallate	2303-16-4	8.9E+00	c 3.8E+				5.4E-01 c			С
	7.0E-04 A	1 0.1	Diazinon	333-41-5	4.4E+00	n 5.7E+				1.0E+00 n			n
0.0= -:	1.0E-02 X V	1	Dibenzothiophene	132-65-0	7.8E+01	n 1.2E+				6.5E+00 n	0.05.51		n
8.0E-01	P 6.0E-03 P 2.0E-04 P 2.0E-04 I V M	1 9.8E+02	Dibromo-3-chloropropane, 1,2-	96-12-8	5.3E-03	c* 6.4E-		1.7E-04	c 2.0E-03	c* 3.3E-04 c	2.0E-01		c 8.6E-05
	4.0E-04 X V	1 1.6E+02	Dibromobenzene, 1,3-	108-36-1	3.1E+00	n 4.7E+				5.3E-01 n		5.1E-04	11
0.45.00	1.0E-02 I V	4 0.05	Dibromobenzene, 1,4-	106-37-6	7.8E+01	n 1.2E+				1.3E+01 n	0.05.04/5		n -* 0.45.00
8.4E-02	1 2.0E-02 I V	1 8.0E+02	Dibromochloromethane	124-48-1	8.3E+00	c* 3.9E+		4.75.00	- 0.05.00	8.7E-01 c*	8.0E+01(F)		c* 2.1E-02
2.0E+00	I 6.0E-04 I 9.0E-03 I 9.0E-03 I V	1 1.3E+03	Dibromoethane, 1,2-	106-93-4	3.6E-02	c 1.6E-		4.7E-03	c 2.0E-02	c 7.5E-03 c	5.0E-02		c 1.4E-05
	4.0E-03 X V	1 2.8E+03	Dibromomethane (Methylene Bromide)	74-95-3	2.4E+00	n 9.9E+		4.2E-01	n 1.8E+00	n 8.3E-01 n		2.1E-04	n
	3.0E-04 P	1 0.1 1 0.1	Dibutyltin Compounds Dicamba	NA 1918-00-9	1.9E+00 1.9E+02	n 2.5E+ n 2.5E+				6.0E-01 n 5.7E+01 n		1.5F-02	n n
	3.0E-02 I		11 11					0.75.07	- 0.05.05				**
	4.2E-03 P V	1 5.5E+02	Dichloro-2-butene, 1,4-	764-41-0	2.1E-03	c 9.4E-		6.7E-04	c 2.9E-03	c 1.3E-03 c			C
	4.2E-03 P V 4.2E-03 P V		Dichloro-2-butene, cis-1,4-	1476-11-5 110-57-6	7.4E-03 7.4F-03	c 3.2E-		6.7E-04 6.7F-04	c 2.9E-03 c 2.9E-03	c 1.3E-03 c		6.2E-07 6.2F-07	С
5.0E-02			Dichloro-2-butene, trans-1,4- Dichloroacetic Acid	79-43-6	7.4E-03 1.1E+01			0.7E-04	c 2.9E-03	1.5E+00 c**	6.0F+01		c** 1.2E-02
5.0E-02	I 4.0E-03 I	1 0.1						0.45.64	- 0.05,01				
5.4F-03	9.0E-02 2.0E-01 H V	3.8E+02	Dichlorobenzene, 1,2-	95-50-1 106-46-7	1.8E+02 2.6F+00	n 9.3E+ c 1.1F+			n 8.8E+01	n 3.0E+01 n	6.0E+02		n 5.8E-01
	C 1.1E-05 C 7.0E-02 A 8.0E-01 I V	1 0.4	Dichlorobenzene, 1,4-				• •	2.6E-01	c 1.1E+00	c 4.8E-01 c	7.5E+01		c 7.2E-02
4.5E-01	I 3.4E-04 C	1 0.1	Dichlorobenzidine, 3,3'-	91-94-1	1.2E+00	c 5.1E+		8.3E-03	c 3.6E-02	c 1.3E-01 c			C
	9.0E-03 X	1 0.1	Dichlorobenzophenone, 4,4'-	90-98-2	5.7E+01	n 7.4E+		1.0F+01	n 4.4F+01	7.8E+00 n			n
	2.0E-01 I 1.0E-01 X V		Dichlorodifluoromethane	75-71-8	8.7E+00	n 3.7E+				n 2.0E+01 n		0.00	n
5.7E-03	C 1.6E-06 C 2.0E-01 P V	1 1.7E+03	Dichloroethane, 1,1-	75-34-3	3.6E+00	c 1.6E+		1.8E+00	c 7.7E+00	c 2.8E+00 c			C
9.1E-02	I 2.6E-05 I 6.0E-03 X 7.0E-03 P V		Dichloroethane, 1,2-	107-06-2	4.6E-01	c** 2.0E+		1.1E-01		c** 1.7E-01 c**	5.0E+00		c** 1.4E-03
	5.0E-02 2.0E-01 V		Dichloroethylene, 1,1-	75-35-4	2.3E+01	n 1.0E+		2.1E+01	n 8.8E+01	n 2.8E+01 n	7.0E+00		n 2.5E-03
	2.0E-03 I V	1 2.4E+03	Dichloroethylene, 1,2-cis-	156-59-2	1.6E+01	n 2.3E+				3.6E+00 n	7.0E+01		n 2.1E-02
	2.0E-02 I V	1 1.9E+03	Dichloroethylene, 1,2-trans-	156-60-5	1.6E+02	n 2.3E+				3.6E+01 n	1.0E+02		n 3.1E-02
	3.0E-03 I	1 0.1	Dichlorophenol, 2,4-	120-83-2	1.9E+01	n 2.5E+				4.6E+00 n	7.05		n
	1.0E-02	1 0.05	Dichlorophenoxy Acetic Acid, 2,4-	94-75-7	7.0E+01	n 9.6E+				1.7E+01 n	7.0E+01		n 1.8E-02
	8.0E-03 I	1 0.1	Dichlorophenoxy)butyric Acid, 4-(2,4-	94-82-6	5.1E+01	n 6.6E+	02 n			1.2E+01 n		1.1E-02	n

Key: I = IRIS; P = PPRTV; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #27); H = HEAST; F = See FAQ; J = New Jersey; O = EPA Office of Water; E = see user guide Section 2.3.5; L = see user guide on lead; M = mutagen; S = see user guide Section 5; V = volatile; R = RBA applied (See User Guide) for Arsenic notice); c = cancer; n = noncancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF=1; m = Concentration may exceed ceiling limit (See User Guide); s = Concentration may exceed (See User Guide)										lied (See User Guide	
Toxicity and Chemical-specific Information	1; m = Conce	ntration may exce	eed ceiling limit (Sei	Screenin		nay exceed Usat (Se	e User Guia		Ground Water SSLs		
	Toxicity and Chemical-specific Information Contaminant						g Ecvels				
	C _{sat}					Resident Air	Industrial Air			Risk-based	MCL-based
or o le lor le (ing/kg- le (ing/in le o mula-		Applyto	CAS No.	Resident Soil	Industrial Soil			Tapwater	MCL (ug/L)	SSL (mg/kg)	SSL (mg/kg)
(mg/kg-day) ⁻¹ y (ug/m ³) ⁻¹ y day) y) y I gen GI 3.6E-02 C 1.0E-05 C 9.0E-02 A 4.0E-03 I V		Analyte Dichloropropane, 1,2-	78-87-5	(mg/kg) k	ey (mg/kg) F	(ug/m³) c** 2.8E-01	key (ug/m³) c** 1.2E+00	key (ug/L) key c** 4.4E-01 c**	(ug/L) 5.0E+00	(mg/kg) 1.5E-04	key (mg/kg) c** 1.7E-03
2.0E-02 P V			142-28-9			ns 2.0E-01	C 1.2E+00	3.7E+01 n	3.0⊑+00	1.3E-04 1.3E-02	n 1.7E-03
3.0E-03 I	1 0.1	Dichloropropanol, 2,3-	616-23-9			n		5.9E+00 n		1.3E-02	n
1.0E-01 4.0E-06 3.0E-02 2.0E-02 V			542-75-6		c** 8.2E+00	** 7.0E-01	c** 3.1E+00	c** 4.7E-01 c**		1.7E-04	C**
2.9E-01 8.3E-05 C 5.0E-04 5.0E-04	1 0.1	Dichlorvos	62-73-7	1.9E+00 d	c** 7.9E+00	c** 3.4E-02	c** 1.5E-01	c** 2.6E-01 c**		8.1E-05	C**
1.0E-04 I	1 0.1		141-66-2			n		2.0E-01 n		4.7E-05	n
8.0E-02 P 3.0E-04 X V 1.6E+01 4.6E-03 5.0E-05	1 2.6E+02		77-73-6 60-57-1		0. 12 0 1	n 3.1E-02 c* 6.1F-04	n 1.3E-01	n 6.3E-02 n		2.2E-04 7.1E-05	n c*
3.0E-04 C 5.0E-03 I	1 0.1		NA	3.4E-02 0	c** 1.4E-01	9.4E-03	c 2.7E-03 c* 4.1E-02	c 1.8E-03 c*		7.1E-05	C.
2.0E-03 P 2.0E-04 P	1 0.1	Diethanolamine	111-42-2	1.3E+01	n 1.6E+02	n 2.1E-02	n 8.8E-02	n 4.0E+00 n		8.1E-04	n
3.0E-02 P 1.0E-04 P	1 0.1		112-34-5	1.9E+02	n 2.4E+03	n 1.0E-02	n 4.4E-02	n 6.0E+01 n		1.3E-02	n
6.0E-02 P 3.0E-04 P	1 0.1	Diethylene Glycol Monoethyl Ether	111-90-0			n 3.1E-02	n 1.3E-01	n 1.2E+02 n		2.4E-02	n
1.0E-03 P V			617-84-5		n 1.2E+02	n		2.0E+00 n		4.1E-04	n
3.5E+02 C 1.0E-01 C 8.0F-02 I	1 0.1 1 0.1		56-53-1 43222-48-6		c 6.6E-03 n 6.6E+03	c 2.8E-05	c 1.2E-04	c 5.1E-05 c		2.8E-05 2.5F+01	c n
2.0E-02 I	1 0.1		35367-38-5	5.1E+02 1.3E+02	n 1.6E+03	n n		2.9E+01 n		3.3E-02	n n
4.0E+01 V			75-37-6			ns 4.2E+03	n 1.8E+04	n 8.3E+03 n		2.8E+00	n
4.4E-02 C 1.3E-05 C V	1	Dihydrosafrole	94-58-6	9.9E+00	c 4.5E+01	c 2.2E-01	c 9.4E-01	c 3.0E-01 c		1.9E-04	C
7.0E-01 P V			108-20-3	2.2E+02	n 9.4E+02	n 7.3E+01	n 3.1E+02	n 1.5E+02 n		3.7E-02	n
8.0E-02 I V			1445-75-6			ns		1.6E+02 n		4.5E-02	n
2.0E-02 2.0E-04	1 0.1 1 0.1		55290-64-7 60-51-5		n 1.6E+03 n 1.6E+01	n		4.0E+01 n 4.0E-01 n		8.8E-03 9.0E-05	n n
2.0E-04 I	1 0.1	11 11 11	119-90-4			C		4.0E-01 n		9.0E-05 5.8E-05	C
1.7E-03 P 6.0E-02 P	1 0.1	Dimethyl methylphosphonate	756-79-6			D**		4.6E+01 c**		9.6E-03	c**
4.6E+00 C 1.3E-03 C	1 0.1	Dimethylamino azobenzene [p-]	60-11-7	1.2E-01	c 5.0E-01	c 2.2E-03	c 9.4E-03	c 5.0E-03 c		2.1E-05	С
5.8E-01 H	1 0.1		21436-96-4			С		1.3E-01 c		1.2E-04	С
2.0E-01 P 2.0E-03 X	1 0.1		95-68-1	2.7E+00 d	o** 1.1E+01 n 2.3E+02	c*		3.7E-01 c* 3.5E+00 n		2.1E-04	C*
2.0E-03 I V	1 8.3E+02 1 0.1		121-69-7 119-93-7		c 2.1E-01	n c		3.5E+00 n 6.5E-03 c		1.3E-03 4.3E-05	n c
1.0E-01 P 3.0E-02 I V			68-12-2	2.6E+02		n 3.1E+00	n 1.3E+01	n 6.1E+00 n		1.2E-03	n
1.0E-04 X 2.0E-06 X V			57-14-7	5.7E-03	n 2.4E-02	n 2.1E-04	n 8.8E-04	n 4.2E-04 n		9.3E-08	n
5.5E+02 C 1.6E-01 C V		Dimethylhydrazine, 1,2-	540-73-8	8.8E-04	c 4.1E-03	c 1.8E-05	c 7.7E-05	c 2.8E-05 c		6.5E-09	С
2.0E-02 I	1 0.1	Dimethylphenol, 2,4-	105-67-9		n 1.6E+03	n		3.6E+01 n		4.2E-02	n
6.0E-04 I	1 0.1		576-26-1	3.8E+00	n 4.9E+01	n		1.1E+00 n		1.3E-03	n
1.0E-03 I 4.5E-02 C 1.3E-05 C V	1 0.1		95-65-8 513-37-1		n 8.2E+01 c 4.8E+00	n c 2.2E-01	c 9.4E-01	1.8E+00 n c 3.3E-01 c		2.1E-03 1.1F-04	n c
4.5E-02 C 1.5E-05 C 8.0E-05 X	1 0.1		534-52-1	5.1E-01	n 6.6E+00	n 2.2E-01	0 9.4⊑-01	1.5E-01 n		2.6E-04	n
2.0E-03 I	1 0.1		131-89-5	1.3E+01	n 1.6E+02	n		2.3E+00 n		7.7E-02	n
1.0E-04 P	1 0.1		528-29-0		n 8.2E+00	n		1.9E-01 n		1.8E-04	n
1.0E-04 I	1 0.1		99-65-0	6.3E-01	n 8.2E+00	n		2.0E-01 n		1.8E-04	n
1.0E-04 P	1 0.1		100-25-4		n 8.2E+00	n -		2.0E-01 n		1.8E-04	n
2.0E-03 I 6.8E-01 I	1 0.1 1 0.1		51-28-5 NA		n 1.6E+02 c 3.4E+00	n C		3.9E+00 n 1.1E-01 c		4.4E-03 1.5E-04	n c
3.1E-01 C 8.9E-05 C 2.0E-03 I	1 0.102		121-14-2			c* 3.2E-02	c 1.4E-01	c 2.4E-01 c*		3.2E-04	c*
1.5E+00 P 3.0E-04 X	1 0.099	Dinitrotoluene, 2,6-	-606-20-2	3.6E-01 d	c** 1.5E+00	c*		4.9E-02 c*		6.7E-05	c*
2.0E-03 S	1 0.006		35572-78-2		n 2.3E+02	n		3.9E+00 n		3.0E-03	n
2.0E-03 S	1 0.009		19406-51-0			n		3.9E+00 n		3.0E-03	n
4.5E-01 X 9.0E-04 X 1.0E-03 I	1 0.1 1 0.1		25321-14-6 88-85-7			c* n		1.0E-01 c* 1.5E+00 n	7.0E+00	1.4E-04 1.3E-02	c* n 6.2E-02
1.0E-03 1 1.0E-01 5.0E-06 3.0E-02 3.0E-02 V			123-91-1				c** 2.5E+00	c** 4.6E-01 c*	7.0L100	9.4E-05	0.2E-02 C*
		Dioxins		3.02.00		5.52.51	2.02.00				
6.2E+03 1.3E+00	1 0.03		NA	1.0E-04	c 4.7E-04	c 2.2E-06	c 9.4E-06	c 1.3E-05 c		1.7E-05	C
1.3E+05 C 3.8E+01 C 7.0E-10 I 4.0E-08 C V	1 0.03		1746-01-6			c** 7.4E-08	c* 3.2E-07	c* 1.2E-07 c*	3.0E-05	5.9E-08	c* 1.5E-05
3.0E-02 I 8.0E-04 X	1 0.1 1 0.1		957-51-7 127-63-9		n 2.5E+03 n 6.6E+01	n		5.3E+01 n 1.5E+00 n		5.2E-01 3.6E-03	n n
8.0E-04 X 2.5E-02 I	1 0.1		122-39-4		n 2.1E+03	n		3.1E+01 n		5.8E-02	n n
8.0E-01 2.2E-04	1 0.1		122-55-4			c 1.3E-02	c 5.6E-02	c 7.8E-02 c		2.5E-04	C
2.2E-03 I	1 0.1	Diquat	85-00-7	1.4E+01	n 1.8E+02	n		4.4E+00 n	2.0E+01	8.3E-02	n 3.7E-01
7.1E+00 C 1.4E-01 C	1 0.1		1937-37-7			c 2.0E-05	c 8.8E-05	c 1.1E-02 c		5.3E+00	С
7.4E+00 C 1.4E-01 C 6.7E+00 C 1.4E-01 C	1 0.1		2602-46-2 16071-86-6	7.3E-02 8.1E-02	c 3.1E-01 c 3.4E-01	c 2.0E-05 c 2.0E-05	c 8.8E-05 c 8.8E-05	c 1.1E-02 c c 1.2E-02 c		1.7E+01 1.6E-01	C
6.7E+00 C 1.4E-01 C 4.0E-05 I	1 0.1		298-04-4	8.1E-02 2.5E-01	n 3.3E+00	n 2.UE-U5	0.8E-U5	5.0E-02 n		1.6E-01 9.4E-05	n
1.0E-02 I V	1		505-29-3	7.8E+01	n 1.2E+03	n		2.0E+01 n		9.7E-03	n
2.0E-03 I	1 0.1	Diuron	330-54-1	1.3E+01	n 1.6E+02	n		3.6E+00 n		1.5E-03	n
4.0E-03 I	1 0.1		2439-10-3		n 3.3E+02	n		8.0E+00 n		4.1E-02	n
2.5E-02 V	1	EPTC Endouden	759-94-4 115-29-7	2.0E+02	n 2.9E+03	n		3.8E+01 n		2.0E-02	n
6.0E-03 I V 2.0E-02 I	1 0.1		115-29-7	4.7E+01 1.3E+02	n 7.0E+02 n 1.6E+03	n n		1.0E+01 n 3.8E+01 n	1.0E+02	1.4E-01 9.1E-03	n 2.4E-02
2.0E-02 3.0E-04	1 0.1		72-20-8		n 1.6E+03 n 2.5E+01	n n		3.8E+01 n 2.3E-01 n	1.0E+02 2.0E+00	9.1E-03 9.2E-03	n 2.4E-02 n 8.1E-02
9.9E-03 1.2E-06 6.0E-03 P 1.0E-03 V	1 1.1E+04		106-89-8	1.9E+00	n 8.2E+00	n 1.0E-01	n 4.4E-01	n 2.0E-01 n	2.02.00	4.5E-05	n
2.0E-02 I V		Epoxybutane, 1,2-	106-88-7	1.6E+01	n 6.7E+01	n 2.1E+00	n 8.8E+00	n 4.2E+00 n		9.2E-04	n
4.0E-02 P	1 0.1		111-77-3		n 3.3E+03	n		8.0E+01 n		1.6E-02	n
5.0E-03	1 0.1		16672-87-0		n 4.1E+02	n		1.0E+01 n		2.1E-03	n
5.0E-04 I 1.0E-01 P 6.0E-02 P V			563-12-2 111-15-9	3.2E+00 2.6E+02	n 4.1E+01 n 1.4E+03	n 6.3E+00	n 2.6E+01	4.3E-01 n n 1.2E+01 n		8.5E-04 2.5E-03	n n
1.0L=01 F 0.0L=02 F V	. 2.46704	Landy State of Proceeding L	.11-10-0	2.02102	ILIUU	0.32100	.1 2.0L 101	1.22101 11		2.02-00	

Key: I = IRIS; P				ee FAQ #27); H = HEAST; F = See FAQ; J = New Jersey; O = EPA Office of Wate ere: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF-									ed (See User Guir
	Toxicity and Chemical-s		· Horicancer, - wire	Contaminant	- 1, III - COIICE	itration may ex	ceed ceiling little (na Levels	may exceed Csat (Se	e Oser Guiu		ound Water SSLs
		RfC _i		Outdiman					I I				
k	K ···-o K	' KIVI										Risk-based	MCL-based
SFO e		mg/m³ e o muta-	C _{sat}			Resident Soil	Industrial Soi	Resident A			MCL	SSL	SSL
(mg/kg-day) ⁻¹ y	(ug/m ³) ⁻¹ y day) y) y I gen GIAE		Analyte	CAS No.	(mg/kg)	key (mg/kg)	key (ug/m ³)	key (ug/m³)	key (ug/L) key	(ug/L)	(mg/kg) k	key (mg/kg)
	9.0E-02 P 2.		1.1E+05	Ethoxyethanol, 2-	110-80-5	5.2E+02	n 4.7E+03	n 2.1E+01	n 8.8E+01	n 3.4E+01 n		6.8E-03	n
	9.0E-01 I 7.	.0E-02 P V 1	1.1E+04	Ethyl Acetate	141-78-6	6.2E+01	n 2.6E+02	n 7.3E+00	n 3.1E+01	n 1.4E+01 n		3.1E-03	n
	5.0E-03 P 8.	.0E-03 P V 1	2.5E+03	Ethyl Acrylate	140-88-5	4.7E+00	n 2.1E+01	n 8.3E-01	n 3.5E+00	n 1.4E+00 n			n
	1.	.0E+01 I V 1	2.1E+03		75-00-3	1.4E+03	n 5.7E+03	ns 1.0E+03	n 4.4E+03	n 2.1E+03 n		5.9E-01	n
	2.0E-01 I	V 1		Ethyl Ether	60-29-7	1.6E+03	n 2.3E+04	ns		3.9E+02 n		8.8E-02	n
	3.	.0E-01 P V 1		Ethyl Methacrylate	97-63-2	1.8E+02	n 7.6E+02	n 3.1E+01	n 1.3E+02	n 6.3E+01 n		1.5E-02	n
	1.0E-05 I	1	0.1	Ethyl-p-nitrophenyl Phosphonate	2104-64-5	6.3E-02	n 8.2E-01	n		8.9E-03 n		2.8E-04	n
1.1E-02 C	2.5E-06 C 1.0E-01 I 1.	.0E+00 I V 1	4.8E+02		100-41-4	5.8E+00	c* 2.5E+01	c* 1.1E+00	c* 4.9E+00	c* 1.5E+00 c*	7.0E+02	1.7E-03	c* 7.8E-01
	7.0E-02 P	1	0.1	Ethylene Cyanohydrin	109-78-4	4.4E+02	n 5.7E+03	n		1.4E+02 n		2.8E-02	n
	9.0E-02 P	V 1		Ethylene Diamine	107-15-3	7.0E+02	n 1.1E+04	n		1.8E+02 n			n
	2.0E+00 I 4.	.0E-01 C 1	0.1	Ethylene Glycol	107-21-1	1.3E+04	n 1.6E+05	nm 4.2E+01	n 1.8E+02	n 4.0E+03 n		8.1E-01	n
	1.0E-01 I 1.		0.1	Ethylene Glycol Monobutyl Ether	111-76-2	6.3E+02	n 8.2E+03	n 1.7E+02	n 7.0E+02	n 2.0E+02 n			n
3.1F-01 C	8.8E-05 C 3.	.0E-02 C V 1		Ethylene Oxide	75-21-8	1.8E-01	c 7.9E-01	c 3.2E-02	c* 1.4E-01	c* 5.1E-02 c		1.1E-05	С
	1.3E-05 C 8.0E-05 I	1	0.1	Ethylene Thiourea	96-45-7	5.1E-01	n 6.6E+00	n 2.2E-01	c 9.4E-01	c 1.6E-01 n			n
	1.9E-02 C	V 1		Ethyleneimine	151-56-4	2.7E-03	c 1.2F-02	c 1.5E-04	c 6.5E-04	c 2.4E-04 c			С
0.02.701	3.0E+00 I	1	0.1	Ethylphthalyl Ethyl Glycolate	84-72-0	1.9E+04	n 2.5E+05	nm	0.02-04	5.8E+03 n			n
	2.5E-04 I	1	0.1	Fenamiphos	22224-92-6	1.6E+00	n 2.1E+01	n		4.4E-01 n			n
	2.5E-04 I	1	0.1	Fenoropathrin	39515-41-8	1.6E+00	n 2.1E+03	n		6.4F+00 n			n
	2.5E-02 I	1	0.1	Fenyalerate	51630-58-1	1.6E+02	n 2.1E+03	n		5.0E+01 n		3.2E+01	n
	1.3F-02 I	1	0.1	Fluometuron	2164-17-2	8.2E+01	n 1.1E+03	n		2.4E+01 n			n
		.3E-02 C 1	0.1	Fluoride	16984-48-8	3.1E+02	n 4.7E+03	n 1.4E+00	n 5.7E+00	n 8.0E+01 n			n n
		.3E-02 C 1		Fluoride Fluorine (Soluble Fluoride)	7782-41-4	3.1E+02 4.7E+02	n 7.0E+03	n 1.4E+00			4.0E+03		n 6.0E+02
		.02-02-0	0.1						11 3.7 ⊑ ∓00		4.02703		
	8.0E-02 I 2.0E-02 I	1	0.1	Fluridone	59756-60-4 56425-91-3	5.1E+02	n 6.6E+03 n 1.6F+03	n		1.4E+02 n 3.4F+01 n			n
	2.0E-02 I 7.0F-04 I	1	0.1 0.1	Flurprimidol Flusilazole	85509-19-9	1.3E+02 4.4E+00	n 1.6E+03 n 5.7F+01	n n		3.4E+01 n 1.1E+00 n			n n
													**
	6.0E-02 I	1	0.1	Flutolanil	66332-96-5	3.8E+02	n 4.9E+03	n -		9.5E+01 n			n -
3.5E-03 I	1.0E-02 I 1.0E-01 I	1	0.1 0.1	Fluvalinate Folnet	69409-94-5 133-07-3	6.3E+01 1.6E+02	n 8.2E+02 c** 6.6E+02	n o*		2.0E+01 n 2.0E+01 c**		2.9E+01 4.7F-03	n c**
	1.0E-01 I							C [*]					
1.9E-01 I		1	0.1	Fomesafen	72178-02-0	2.9E+00	c 1.2E+01	С		3.9E-01 c			С
	2.0E-03 I	1	0.1	Fonofos	944-22-9	1.3E+01	n 1.6E+02	n		2.4E+00 n			n
		.8E-03 A V 1	4.2E+04		50-00-0	1.7E+01	c** 7.3E+01		c** 9.4E-01	c** 4.3E-01 c**			0**
		.0E-04 X V 1	1.1E+05	Formic Acid	64-18-6	2.9E+00	n 1.2E+01	n 3.1E-02	n 1.3E-01	n 6.3E-02 n			n
	3.0E+00 I	1	0.1	Fosetyl-AL	39148-24-8	1.9E+04	n 2.5E+05	nm		6.0E+03 n		7.9E+01	n
				Furans COSTON COSTON	V /CED								
	1.0E-03 X	V 1	0.03	~Dibenzofuran)),	132-64-9	7.3E+00	n 1.0E+02	n		7.9E-01 n			n
	1.0E-03 I	V 1	0.03 6.2E+03		110-00-9	7.3E+00	n 1.0E+02	n		1.9E+00 n			n
		.0E+00 I V 1		~Tetrahydrofuran \\ Company \	/109-99-9	1.8E+03	n 9.4E+03	n 2.1E+02	n 8.8E+02	n 3.4E+02 n			n
3.8E+00 H		1	0.1	Furazolidone	67-45-8	1.4E-01	c 6.0E-01	С		2.0E-02 c			С
	3.0E-03 I 5.	.0E-02 H V 1	1.0E+04	Furfural	98-01-1	2.1E+01	n 2.6E+02	n 5.2E+00	n 2.2E+01	n 3.8E+00 n		8.1E-04	n
1.5E+00 C		1	0.1	Furium	531-82-8	3.6E-01	c 1.5E+00	c 6.5E-03	c 2.9E-02	c 5.1E-02 c		6.8E-05	С
3.0E-02 I	8.6E-06 C	1	0.1	Furmecyclox	60568-05-0	1.8E+01	c 7.7E+01	c 3.3E-01	c 1.4E+00	c 1.1E+00 c		1.2E-03	С
	4.0E-04 I	1	0.1	Glufosinate, Ammonium	77182-82-2	2.5E+00	n 3.3E+01	n		8.0E-01 n		1.8E-04	n
	8.	.0E-05 C 1	0.1	Glutaraldehyde // // // // // // // // // // // // //	111-30-8	1.1E+04	n 4.8E+04	n 8.3E-03	n 3.5E-02	n			
	4.0E-04 I 1.	.0E-03 H V 1	1.1E+05	Glycidyl	765-34-4	2.3E+00	n 2.1E+01	n 1.0E-01	n 4.4E-01	n 1.7E-01 n		3.3E-05	n
	1.0E-01 I	1	0.1	Glyphosate	1071-83-6	6.3E+02	n 8.2E+03	n		2.0E+02 n	7.0E+02	8.8E-01	n 3.1E+00
	1.0E-02 X	V 1		Guanidine	113-00-8	7.8E+01	n 1.2E+03	n		2.0E+01 n		4.5E-03	n
	2.0E-02 P	1	0.1	Guanidine Chloride	50-01-1	1.3E+02	n 1.6E+03	n		4.0E+01 n			n
	5.0E-05 I	1	0.1	Haloxyfop, Methyl	69806-40-2	3.2E-01	n 4.1E+00	n		7.6E-02 n			n .
4.5E+00 I	1.3E-03 I 5.0E-04 I	V 1		Heptachlor	76-44-8	1.3E-01	c* 6.3E-01	c* 2.2E-03	c 9.4E-03	c 1.4E-03 c*	4.0E-01		c* 3.3E-02
	2.6E-03 1.3E-05	V 1		Heptachlor Epoxide	1024-57-3	7.0E-02	c** 3.3E-01	c** 1.1E-03	c 4.7E-03	c 1.4E-03 c**	2.0E-01		c** 4.1E-03
	2.0E-03 I	V 1		Hexabromobenzene	87-82-1	1.6E+01	n 2.3E+02	n200	00	4.0E+00 n			n200
	2.0E-04 I	1	0.1	Hexabromodiphenyl ether, 2,2',4,4',5,5'- (BDE-153)	68631-49-2	1.3E+00	n 1.6E+01	n		4.0E-01 n			n
1.6E+00 I	4.6E-04 8.0E-04	V 1		Hexachlorobenzene	118-74-1	2.1E-01	c* 9.6E-01	c* 6.1E-03	c 2.7E-02	c 9.8E-03 c	1.0E+00	1.2E-04	c 1.3E-02
7.8E-02	2.2E-05 1.0E-03 P	V 1	1.7E+01	Hexachlorobutadiene	87-68-3		c** 5.3F+00	c* 1.3F-01	c 5.6F-01	c 1.4F-01 c**			C 1.5L-02
	1.8E-03 8.0E-03 A	1	0.1	Hexachlorocyclohexane, Alpha-	319-84-6	8.6E-02	c 3.6E-01	c 1.6E-03	c 6.8E-03	c 7.2E-03 c			c
	5.3E-04 I	1	0.1	Hexachlorocyclohexane, Alpha-	319-85-7	3.0E-01	c 1.3E+00	c 5.3E-03	c 2.3E-02	c 2.5E-02 c			C
	3.1E-04 C 3.0E-04 I	1	0.04	Hexachlorocyclohexane, Gamma- (Lindane)	58-89-9		c** 2.5E+00	c* 9.1E-03	c 4.0E-02	c 4.2E-02 c**	2.0E-01		c** 1.2E-03
	5.1E-04 C 5.0E-04 T	1	0.04	Hexachlorocyclohexane, Technical	608-73-1	3.0E-01	c 1.3E+00	c 5.5E-03	c 2.4E-02	c 2.5E-02 c	2.02-01		C 1.2E-03
1.02.700		.0E-04 I V 1	1.6E+01	Hexachlorocyclopentadiene	77-47-4	1.8E-01	n 7.5E-01	n 2.1E-02	n 8.8E-02	n 4.1E-02 n	5.0E+01		n 1.6E-01
4.0E-02 I		.0E-04 I V I	1.0E+01	Hexachloroethane	67-72-1		c** 8.0E+00	c** 2.6E-01	c* 1.1E+00	c* 3.3E-01 c**	3.0⊑∓01		n 1.6E-01 °**
4.UE-U2	1.1E-05 C 7.0E-04 I 3. 3.0F-04 I	.uL-UZ I V 1	0.1	Hexachlorophene Hexachlorophene	67-72-1 70-30-4	1.8E+00 1.9F+00	n 2.5E+01	2.0E-01	c 1.1E+00	6.0F-01 n			n
1.1E-01 I	3.0E-04 I	1	0.015	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4	6.1E+00	c** 2.8E+01	c*		7.0E-01 n			n o**
1.1E-01		05.05.1.1/							n 44F.00				
		.0E-05 I V 1	3.4E+03		822-06-0	3.1E-01	n 1.3E+00	n 1.0E-03	n 4.4E-03	n 2.1E-03 n			n
	4.0E-04 P	1	0.1	Hexamethylphosphoramide	680-31-9	2.5E+00	n 3.3E+01	7.05.51	0.45.55	8.0E-01 n			n
		.0E-01 I V 1	1.4E+02	Hexane, N-	110-54-3	6.1E+01	n 2.5E+02	ns 7.3E+01	n 3.1E+02	n 1.5E+02 n			n
	2.0E+00 P	05.00 1.1/	0.1	Hexanedioic Acid	124-04-9	1.3E+04	n 1.6E+05	nm	- 405.51	4.0E+03 n			n
		.0E-02 I V 1	3.3E+03	Hexanone, 2-	591-78-6	2.0E+01	n 1.3E+02	n 3.1E+00	n 1.3E+01	n 3.8E+00 n			n
	3.3E-02 I	1	0.1	Hexazinone	51235-04-2	2.1E+02	n 2.7E+03	n		6.4E+01 n			n
	2.5E-02 I	1	0.1	Hexythiazox	78587-05-0	1.6E+02	n 2.1E+03	n		1.1E+01 n			n
	3.0E-04 I	1	0.1	Hydramethylnon	67485-29-4	1.9E+00	n 2.5E+01	n		5.9E-01 n			n
		.0E-05 P V 1		Hydrazine	302-01-2	2.3E-01	c 1.1E+00	c 5.7E-04	c** 2.5E-03	c** 1.1E-03 c**			D**
3.0E+00 I	4.9E-03 I	1		Hydrazine Sulfate	10034-93-2	2.3E-01	c 1.1E+00	c 5.7E-04	c 2.5E-03	c 2.6E-02 c			С
		.0E-02 I V 1		Hydrogen Chloride	7647-01-0	2.8E+06	nm 1.2E+07	nm 2.1E+00	n 8.8E+00	n 4.2E+00 n			n
		.4E-02 C V 1		Hydrogen Fluoride	7664-39-3	3.1E+02	n 4.7E+03	n 1.5E+00		n 2.8E+00 n			n
	2.	.0E-03 I V 1		Hydrogen Sulfide	7783-06-4	2.8E+05	nm 1.2E+06	nm 2.1E-01	n 8.8E-01	n 4.2E-01 n			n

(Key: I = IRIS: P = PPRTV; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #27); H = HEAST; F = See FAQ; J = New Jersey; O = EPA Office of Water; E = see user quide Section 2.3.5; L = see user quide on lead; M = mutagen; S = see user quide Section 5; V = volatile; R = RBA applied (See User Guide Office) for Arsenic notice); c = cancer; n = noncancer; * = where: n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c 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n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c S Protection of Ground Water SSI s Toxicity and Chemical-specific Information Contaminant Screening Levels RfD_o MCL-based Risk-based SFO IUR (mg/kgmg/m³ C_{sat} Industrial Ai e o muta-Resident So ndustrial Soi Fapwate MCL SSL SSL day) I gen ABS (mg/kg) CAS No. (ug/m³) (ug/L) (mg/kg) Analyte (ma/ka) (mg/kg) (ua/L) mg/kg-day)⁻¹ (ma/ka) 123-31-9 6.0F-02 P 4.0F-02 P 0.1 Hydroguinone 9.0F+00 3.8F+01 1.3F+00 (8.7F-04 1.3E-02 0.1 lmazalil 35554-44-0 8.2F+01 1.1F+03 1.9F+01 3 2F_01 2.5F-01 0.1 mazaquin 81335-37-7 1.6F+03 2.1F+04 4.9F+02 2.4F+00 0.1 1.6E+03 2.5E-01 Imazethapy 81335-77-5 4.7E+02 4.1E-01 1.0F-02 Iodine 7553-56-2 7.8F+01 1.2F+03 2.0F+01 r 1.2F+00 4.0F-02 0.1 Inrodione 36734-19-7 2.5F+02 3.3F+03 7.4F+01 r 2.2F-02 7439-89-6 5.5F+03 1.4F+03 r 7.0F-01 8.2F+04 3.5F+01 3.0F-01 1 0F+04 Isobutyl Alcohol 78-83-1 2.3F+03 3.5F+04 5.9F+02 r 1 2F-01 9.5E-04 I I 2.0E+00 C 0.1 2 1F+02 n 8 8F+02 2 0F-01 78-59-1 5.7F+02 2.4F+03 n 7.8F+01 c⁴ 2 6F-02 sonhorone 1.5E-02 33820-53-1.2E+02 4.0E+00 9.2E-02 opropalin 1.1E+05 67-63-0 2.4F+03 4.1E+01 2.0E+00 2.0E-01 P V 8.4E-03 Isopropano 1.0E-01 0.1 Isopropyl Methyl Phosphonic Acid 1832-54-8 6.3E+02 8.2E+03 2.0E+02 4.3E-02 5.0F-02 0.1 82558-50-7 3.2E+02 4.1E+03 7.3E+01 2.0E-01 Isoxaben NA 6.3F+01 3.0F-01 A V 4.3F+07 nm 1.8F+08 nm 2.0E-03 0.1 actofen 77501-63-4 1.6F+02 1.2E-01 1.3F+01 2.5F+00 ead Compounds 7758-97-6 5.0E-01 C 1.5E-01 C 2.0E-02 C 2.0E-04 C M 0.025 ~Lead Chromate 4.1E-02 8.2E-05 8.5E-03 C 1.2E-05 C Lead Phosphate 7446-27-7 8.2E+01 3.8E+02 2.3E-01 1.0E+00 9.1E+00 8.5F-03 C 1.2F-05 C Lead acetate 1.0F+00 9.2E+00 1.8E-03 Lead and Compounds 1.4E+01 8.5E-03 C 1.2E-05 C 2.0E-03 -Lead subacetate 1335-32-6 2.3E-01 1.0E-07 2.4E+00 ~Tetraethyl Lead 7.8E-04 4.7E-07 78-00-2 1.3E-04 5.0E-06 541-25-3 5.8E-01 9.0E-03 3.8E-06 3.8E+02 Lewisite 0.1 330-55-2 1.6E+02 3.3E+00 Linuron 2 0F-03 Lithium 7439-93-2 1 6F+01 4.0E+00 1.2E+00 5.0E-04 MCPA 94-74-6 3.2E+00 7.5E-01 2.0E-04 1.0E-02 мсрв 94-81-5 1.5E+01 5.8E-03 1.0F-03 0.1 MCPP 93-65-2 6.3E+00 8.2F+01 1.6F+00 4.7E-04 2.0E-02 Malathion 121-75-5 1.3E+02 3.9E+01 1.0F-02 0.1 1.0F-01 1 7 0F-04 C 0.1 Maleic Anhydride 108-31-6 6.3E+02 8.0E+03 n 3.1E-01 1 9F+02 3.8F-02 7.3E-02 4.1F+04 5.0E-01 0.1 Maleic Hydrazide 123-33-1 3.2E+03 1.0E+03 2.1E-01 Malononitrile 4.1F-05 8018-01-7 5.0F-03 0.1 Maneb 12427-38-2 3.2E+01 4 1F+02 9.8F+00 1.4E-02 1.4E-01 | 5.0E-05 7439-96-5 Manganese (Diet) 2.4E-02 S 5.0E-05 I Manganese (Non-diet) 7439-96-5 2.6E+03 5.2E-03 n 2.2E-02 n 4.3E+01 2 8F+00 9.0E-05 H 0.1 Mephosfolan 950-10-7 5.7F-01 7.4F+00 1.8F-01 2.6E-04 3.0E-02 0.1 Mepiquat Chloride 1.9E+02 2.5E+03 6.0E+01 2.0E-02 Mercury Compounds 3.1E-02 n 1.3E-01 3.0E-04 | 3.0E-04 S 0.07 ~Mercuric Chloride (and other Mercury salts) 7487-94-7 2.3F+00 3.5F+01 n 5.7E-01 3.0E-04 I V 3.1F+0 ~Mercury (elemental) 7439-97-6 1.1E+00 4.6E+00 3.1E-02 n 1.3E-01 6.3E-02 3.3E-03 1.0E-01 ~Methyl Mercury 22967-92-6 7.8F-01 1.2F+01 2.0F-01 0.1 8 0F-05 ~Phenylmercuric Acetate 62-38-4 5.1F-01 6.6F+00 1.6F-01 5.0F-05 3.0E-05 Merphos 150-50-5 2 3F-01 3.5F+00 6.0F-02 5.9F-03 3.0F-05 Merphos Oxide 78-48-8 1 9F-01 2.5F+00 8.5F-03 4 2F-05 6.0F-02 0.1 Metalaxyl 57837-19-3.8F+02 4.9F+03 1.2F+02 3.3F-02 1.0F-04 | 1.3.0F-02 P V 4.6E+03 Methacrylonitrile 126-98-7 7.5F-01 1.0F+01 3.1E+00 1.3E+01 1 9F-01 4.3F-05 5.0F-05 0.1 Methamidophos 10265-92-6 3 2F-01 4 1F+00 1 0F-01 2 1F-05 2 0F+00 | 2 0F+01 | V 1 1E+05 Methanol 67-56-1 1 2F+04 1 2F+05 nms 2 1F+03 8.8F+03 n 2.0F+03 4 1F-01 Methidathior 950-37-8 6.3F+00 8.2F+01 1 0F+00 4 7F-04 Methomyl 2.5F-02 0.1 16752-77-5 1.6F+02 2.1F+03 5.0F+01 1.1F-02 4.9E-02 C 1.4E-05 C 0.1 Methoxy-5-nitroaniline, 2-99-59-2 1.1E+01 4.7E+01 2 0F-01 c 1.5E+00 5.3E-04 2.2F+00 5.0F-03 Methoxychlor 72-43-5 3.2F+01 4.1F+02 3.7F+00 r 2.0F-01 8.0F-03 P 1.0F-03 P V 1.2E+05 Methoxyethanol Acetate, 2n 4.4F-01 110-49-6 1.1F+01 5.1F+01 1.0F-01 n 2.1F-01 4.2F-05 5.0F-03 P 2.0F-02 I V 1.1E+05 Methoxyethanol, 2-109-86-4 3.3F+01 3.5F+02 2.1F+00 n 8.8F+00 n 2.9F+00 5.9F-04 79-20-9 7 8F+03 2 0F+03 1.0F+00 X 2 9F+04 Methyl Acetate 4 1F-01 2.0E-02 P V 6.8F+03 Methyl Acrylate 96-33-3 1.5F+01 6 1F+01 2 1F+00 8 8F+00 n 4.2F+00 8 9F-04 6.0E-01 | 5.0E+00 | V 2.8E+04 Methyl Ethyl Ketone (2-Butanone) 78-93-3 2.7E+03 1.9F+04 5.2E+02 2.2E+03 n 5.6E+02 1.2E-01 1.0F-03 X 1.0F-03 P 2.0F-05 X V 1.8F+05 Methyl Hydrazine 60-34-4 1.0F-01 4.4F-01 8.8F-03 n 4.2F-03 9.4F-07 3.4E+03 Methyl Isobutyl Ketone (4-methyl-2-pentanone) 3.1F+02 1.3F+03 3.0F+00 I V 108-10-1 3.3F+03 1.4F+04 ns n 6.3F+02 1.4F-01 1.0E+04 Methyl Isocyanate 1.0E-03 C V 624-83-9 2.1E-01 4.4E-01 5.9E-05 1.4F+00 | 7.0F-01 | V 2.4F+03 Methyl Methacrylate 80-62-6 4.4F+02 1.9F+03 7.3F+01 3.1F+02 n 1.4F+02 3.0F-02 2.5F-04 Methyl Parathion 298-00-0 1.6F+00 2.1F+01 4.5F-01 7.4F-04 6.0E-02 0.1 Methyl Phosphonic Acid 993-13-5 3.8E+02 4.9E+03 1.2E+02 2.4E-02 6.0E-03 H 4.0E-02 H V 3.2E+01 3.9E+02 Methyl Styrene (Mixed Isomers) 25013-15-4 2.6E+02 4.2E+00 1.8F+01 2.3E+00 3.8E-03 9.9E-02 C 2.8E-05 C 0.1 66-27-3 Methyl methanesulfonate 5.5E+00 2.3E+01 1.0E-01 4.4E-01 c 7.9E-01 1.6E-04 8.9E+03 Methyl tert-Butyl Ether (MTBE) 1.8E-03 C 2.6E-07 C 3.0E+00 I V 4.7F+0 3.2E-03 3.0F-04 X Methyl-1.4-benzenediamine dihydrochloride. 2-615-45-2 1.9F+00 2.5F+01 6.0F-01 3.6F-04 9.0E-03 P 2.0F-02 X Methyl-5-Nitroaniline, 2-99-55-8 6.0F+01 8.2F+00 c⁴ 0.1 2.6F+02 4.6F-03 8.3E+00 C 2.4E-03 C Methyl-N-nitro-N-nitrosoguanidine, N-1.2E-03 5.1E-03 1.3E-01 C 3.7E-05 C Methylaniline Hydrochloride, 2-636-21-5 4.2E+00 1.8E+01 3.3E-0° 6.0E-01 2.6E-04 1.0E-02 A 0.1 Methylarsonic acid 124-58-3 6.3E+01 8.2E+02 2.0F+01 5.8E-03 2.0E-04 0.1 Methylbenzene, 1-4-diamine monohydrochloride, 2-1.3F+00 1.0E-01 X 0.1 Methylbenzene-1,4-diamine sulfate, 2-3.0E-04 X 2.2E+01 C 6.3E-03 C c 1.6E-04 c 1.9E-03 c 1.1E-03 2.2E-03 Methylcholanthrene, 3-5.5E-03 1.0E-01

Key: I = IRIS; P = PPRTV;					ee FAQ #27); H = HEAST; F = See FAQ; J = New Jersey; O = EPA Office of Water											olied (Se	e User Guid
Toy	tor Arsenic notice) xicity and Chemical-specific		noncance	er; ^ = wne	re: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF= Contaminant	=1; m = Conce	ntration may ex	xceea c	ceiling limit (See	Screenir			nay exceed Usat (Se	e User Guide	Protection of C	around V	Nater SSI s
102	1 1	IIIOIIIatioii			Contaminant					Screenii	ig Level	13			Frotection of	JIOUIIU V	valer Joles
k	k RfD _o k RfC _i	k v													Risk-based	1	MCL-based
SFO e IUR e	e (mg/kg- e (mg/m³	e o muta-		C _{sat}			Resident Soil	10	Industrial Soil	Resident Ai	ir Ir	ndustrial Air	Tapwater	MCL	SSL		SSL
(mg/kg-day) ⁻¹ y (ug/m ³) ⁻¹ y	y day) y)	y I gen GIAE	BS ABS	(mg/kg)	Analyte	CAS No.	(mg/kg)	key	(mg/kg) ke	ey (ug/m³)	key	(ug/m³)	key (ug/L) key	(ug/L)	(mg/kg)	key	(mg/kg)
2.0E-03 I 1.0E-08 I		IV M 1		3.3E+03	Methylene Chloride	75-09-2	3.5E+01	n	3.2E+02	n 6.3E+01		2.6E+02	n 1.1E+01 n	5.0E+00	2.7E-03	n	1.3E-03
1.0E-01 P 4.3E-04 C	C 2.0E-03 P	M 1	0.1		Methylene-bis(2-chloroaniline), 4,4'-	101-14-4	1.2E+00	C*		** 2.4E-03	С	2.9E-02	c 1.6E-01 c*		1.8E-03	C*	
4.6E-02 1.3E-05 (1	0.1		Methylene-bis(N,N-dimethyl) Aniline, 4,4'-	101-61-1	1.2E+01	С		c 2.2E-01	С	9.4E-01	c 4.8E-01 c		2.6E-03	С	
1.6E+00 C 4.6E-04 C			0.1		Methylenebisbenzenamine, 4,4'-	101-77-9	3.4E-01	С		c 6.1E-03	С	2.7E-02	c 4.7E-02 c		2.1E-04	С	
	6.0E-04		0.1		Methylenediphenyl Diisocyanate	101-68-8	8.5E+04	n		m 6.3E-02	n	2.6E-01	n				
	7.0E-02 H	V 1		5.0E+02	Methylstyrene, Alpha-	98-83-9	5.5E+02	ns		ns			7.8E+01 n		1.2E-01	n	
	1.5E-01 I	1	0.1		Metolachlor	51218-45-2	9.5E+02	n	1.22 01	n			2.7E+02 n		3.2E-01	n	
	2.5E-02 I	1	0.1		Metribuzin	21087-64-9	1.6E+02	n	2.1E+03	n			4.9E+01 n		1.5E-02	n	
	2.5E-01 I		0.1		Metsulfuron-methyl	74223-64-6	1.6E+03	n	2.1E+04				4.9E+02 n		1.9E-01	n	
	3.0E+00 P	V 1		3.4E-01	Mineral oils	8012-95-1	2.3E+04	ns	3.5E+05 nr				6.0E+03 n		2.4E+02	n	
1.8E+01 C 5.1E-03 C		V 1			Mirex	2385-85-5	3.6E-02	C*		c 5.5E-04	С	2.4E-03	c 8.8E-04 c		6.3E-04	С	
	2.0E-03 I	1	0.1		Molinate	2212-67-1	1.3E+01	n	1.6E+02	n			3.0E+00 n		1.7E-03	n	
	5.0E-03 I				Molybdenum	7439-98-7	3.9E+01	n	5.8E+02	n			1.0E+01 n	4.05.00	2.0E-01	n	
	1.0E-01 I	1			Monochloramine	10599-90-3	7.8E+02	n		n			2.0E+02 n	4.0E+03	4.45.00	n	
	2.0E-03 P 2.5E-02 I	1	0.1 0.1		Monomethylaniline Myclobutanil	100-61-8 88671-89-0	1.3E+01 1.6E+02	n	1.6E+02 2.1E+03	n			3.8E+00 n 4.5E+01 n		1.4E-03 5.6E-01	n n	
		1			7			11									
	3.0E-04 X 2.0F-03 I	1	0.1		N,N'-Diphenyl-1,4-benzenediamine	74-31-7	1.9E+00 1.6F+01	П	2.5E+01 2.3F+02				3.6E-01 n 4.0F+00 n		3.7E-02	n	
	3.0E-02 X 1.0E-01	P V 1			Naled Naphtha, High Flash Aromatic (HFAN)	300-76-5 64742-95-6	1.6E+01 2.3E+02	n	2.3E+02 I 3.5E+03 I	n n 1.0E+01	n	4.4E+01	4.0E+00 n n 1.5E+01 n		1.8E-03	n n	
1.8F+00 C 0.0F+00 C		1 V 1	0.1		Naphthylamine, 2-	91-59-8	3.0E-01	n C		n 1.0E+01	-11	7.4LTUI	3.9E-02 c		2.0E-04	C	
1.0E+00 C 0.0E+00 C	1.0E-01 I	1	0.1		Napropamide	91-59-8 15299-99-7	6.3E+02	r r	8.2E+03	n			3.9E-02 c 1.6E+02 n		2.0E-04 1.1E+00	C n	
2.6F_04_0	C 1.1E-02 C 1.4E-05	C 1	0.1		Nickel Acetate	373-02-4	6.3E+02 6.7E+01	n		n 1.5E-03	n	6.1E-03	n 2.2E+01 n		4.5E-03	n n	
2.6E-04 C			0.1		Nickel Carbonate	3333-67-3	6.7E+01	n		n 1.5E-03	n	6.1E-03	n 2.2E+01 n		4.JL-03	n	
2.6E-04 C			0.1		Nickel Carbonyl	13463-39-3	8.2E+01	n n		n 1.5E-03	n n	6.1E-03 6.1E-03	n 2.2E+01 n n 2.9F-03 n			n n	
2.6E-04 C		C 0.04	4		Nickel Hydroxide	12054-48-7	8.2E+01	n	1.1E+03	n 1.5E-03	n	6.1E-03	n 2.0E+01 n			n	
2.6F-04 C					Nickel Oxide	1313-99-1	8.4F+01	n		n 2.1E-03	n	8.8F-03	n 2.0E+01 n			n	
2.4E-04 I	I 1.1E-02 C 1.4E-05				Nickel Refinery Dust	NA	8.2E+01	n		n 1.5E-03	n	6.1E-03	n 2.2E+01 n		3.2E+00	n	
2.6E-04 C					Nickel Soluble Salts	7440-02-0	1.5E+02	n		n 9.4E-03		3.9E-02	n 3.9E+01 n		2.6E+00	n	
1.7E+00 C 4.8E-04 I	I 1.1E-02 C 1.4E-05				Nickel Subsulfide	12035-72-2	4.1E-01	С	1.9E+00	c 1.5E-03	n	6.1E-03	n 4.5E-02 c			С	
2.6E-04 (0.1		Nickelocene	1271-28-9	6.7E+01	n	8.1E+02			6.1E-03	n 2.2E+01 n			n	
	1.6E+00 I	1			Nitrate	14797-55-8	1.3E+04	n		m			3.2E+03 n	1.0E+04		n	
		1			Nitrate + Nitrite (as N)	NA								1.0E+04			
	1.0E-01 I	1			Nitrite	14797-65-0	7.8E+02	n	1.2E+04	n			2.0E+02 n	1.0E+03		n	
	1.0E-02 X 5.0E-05	X 1	0.1		Nitroaniline, 2-	88-74-4	6.3E+01	n	8.0E+02	n 5.2E-03	n	2.2E-02	n 1.9E+01 n		8.0E-03	n	
2.0E-02 P	4.0E-03 P 6.0E-03		0.1		Nitroaniline, 4-	100-01-6	2.5E+01	n		** 6.3E-01	n	2.6E+00	n 3.8E+00 c**			C**	
4.0E-05 I		I V 1		3.1E+03	Nitrobenzene ()	98-95-3	5.1E+00	C**		** 7.0E-02	C*	3.1E-01	c* 1.4E-01 c**			C**	
	3.0E+03 P	1	0.1		Nitrocellulose	9004-70-0	1.9E+07	nm		m			6.0E+06 n		1.3E+03	n	
	7.0E-02 H	1	0.1		Nitrofurantoin	67 20 9	4.4E+02	n		n			1.4E+02 n		6.1E-02	n	
1.3E+00 C 3.7E-04 C		1	0.1		Nitrofurazone	59-87-0	4.2E-01	С		c 7.6E-03	С	3.3E-02	c 6.0E-02 c		5.4E-05	С	
1.7E-02 P	1.0E-04 P	1	0.1		Nitroglycerin	55-63-0	6.3E-01	n	8.2E+00	n			2.0E-01 n		8.5E-05	n	
0.05.55	1.0E-01 I	1	0.1	4.05.0	Nitroguanidine	556-88-7	6.3E+02	n	8.2E+03	n ** 0.05.01	_++	4.45.00	2.0E+02 n		4.8E-02	n -**	
8.8E-06 F 2.7E-03 F					Nitromethane	75-52-5 79-46-9	5.4E+00 1.4E-02	C**		** 3.2E-01 c 1.0E-03	C**	1.4E+00 4.5E-03	c** 6.4E-01 c** c 2.1E-03 c		1.4E-04 5.4E-07	C**	
		M 1	0.1	4.9E+03	Nitropropane, 2-	759-73-9									5.4E-07 2.2F-07		
2.7E+01 C 7.7E-03 C 1.2F+02 C 3.4F-02 C		M 1	0.1 0.1		Nitroso-N-ethylurea, N-	759-73-9 684-93-5	4.5E-03	С		c 1.3E-04 c 3.0E-05	C	1.6E-03 3.6E-04	c 9.2E-04 c		2.2E-07 4.6E-08	C	
1.2E+02 C 3.4E-02 C 5.4E+00 I 1.6E-03 I	I	V 1	0.1		Nitroso-N-methylurea, N-U U U O C O C O Nitroso-di-N-butylarnine, N-	924-16-3	1.0E-03 9.9E-02	C	1.9E-02 4.6F-01	c 3.0E-05 c 1.8E-03	C	7.7E-03	c 2.1E-04 c		4.6E-08 5.5E-06	C C	
7.0E+00 1.0E-03	·	v 1	0.1		Nitroso-di-N-propylamine, N-	621-64-7	7.8E-02	C		c 1.4E-03	C	6.1E-03	c 1.1E-02 c		8.1E-06	C	
2.8E+00 2.0E-03 C		1	0.1		Nitrosodiethanolamine, N-	1116-54-7	1.9E-01	C		c 1.4E-03		1.5E-02	c 2.8E-02 c		5.6E-06	C	
1.5E+02 4.3E-02	Ī	M 1	0.1		Nitrosodiethylamine, N-	55-18-5	8.1E-04	c		c 2.4E-05		2.9E-04	c 1.7F-04 c		6.1E-08	C	
5.1E+01 1.4E-02	I 8.0E-06 P 4.0E-05		0.1	2.4E+05		62-75-9	2.0E-03	C*	3.4E-02	* 7.2E-05	C*	8.8E-04	c* 1.1F-04 c*		2.7E-08	C*	
4.9E-03 2.6E-06 (1	0.1		Nitrosodiphenylamine, N-	86-30-6	1.1E+02	c		c 1.1E+00	c	4.7F+00	c 1.1E-04 C		6.7E-02	С	
2.2E+01 I 6.3E-03 C		V 1	0.1	1.1E+05	Nitrosomethylethylamine, N-	10595-95-6	2.0E-02	C	9.1E-02	c 4.5E-04	c	1.9E-03	c 7.1E-04 c		2.0E-07	c	
6.7E+00 C 1.9E-03 C		1	0.1		Nitrosomorpholine [N-]	59-89-2	8.1E-02	С		c 1.5E-03	С	6.5E-03	c 1.2E-02 c		2.8E-06	С	
9.4E+00 C 2.7E-03 C		1	0.1		Nitrosopiperidine [N-]	100-75-4	5.8E-02	c		c 1.0E-03		4.5E-03	c 8.2E-03 c		4.4E-06	c	
2.1E+00 6.1E-04	I	1	0.1		Nitrosopyrrolidine, N-	930-55-2	2.6E-01	С	1.1E+00	c 4.6E-03	С	2.0E-02	c 3.7E-02 c		1.4E-05	c	
	1.0E-04 X	1	0.1		Nitrotoluene, m-	99-08-1	6.3E-01	n		n			1.7E-01 n		1.6E-04	n	
2.2E-01 P	9.0E-04 P	V 1		1.5E+03	Nitrotoluene, o-	88-72-2	3.2E+00	C**		**			3.1E-01 c**		3.0E-04	C**	
1.6E-02 P	4.0E-03 P	1	0.1		Nitrotoluene, p-	99-99-0	2.5E+01	n		**			4.3E+00 c**			C**	
	3.0E-04 X 2.0E-02	P V 1		6.9E+00	Nonane, n-	111-84-2	1.1E+00	n	7.2E+00 r	ns 2.1E+00	n	8.8E+00	n 5.3E-01 n		7.5E-03	n	
	4.0E-02 I	1	0.1		Norflurazon	27314-13-2	2.5E+02	n	3.3E+03				7.7E+01 n		5.0E-01	n	
	3.0E-03 I	1	0.1		Octabromodiphenyl Ether	32536-52-0	1.9E+01	n	2.5E+02	n			6.0E+00 n		1.2E+00	n	
	5.0E-02 I	1	0.006		Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0	3.9E+02	n		n			1.0E+02 n		1.3E-01	n	
	2.0E-03 H	1	0.1		Octamethylpyrophosphoramide	152-16-9	1.3E+01	n	1.6E+02	n			4.0E+00 n		9.6E-04	n	
	5.0E-02 I	1	0.1		Oryzalin	19044-88-3	3.2E+02	n	4.1E+03	n			8.1E+01 n		1.5E-01	n	
	5.0E-03 I	1	0.1		Oxadiazon	19666-30-9	3.2E+01	n		n			4.7E+00 n		4.8E-02	n	
	2.5E-02 I	1	0.1		Oxamyl	23135-22-0	1.6E+02	n		n			5.0E+01 n	2.0E+02	1.1E-02	n	4.4E-02
	3.0E-03 I	1	0.1		Oxyfluorfen	42874-03-3	1.9E+01	n	2.5E+02	n			3.2E+00 n		2.5E-01	n	
	1.3E-02 I	1	0.1		Paclobutrazol	76738-62-0	8.2E+01	n		n			2.3E+01 n		4.6E-02	n	
	4.5E-03 I	1	0.1		Paraquat Dichloride	1910-42-5	2.8E+01	n		n -			9.0E+00 n		1.2E-01	n	
	6.0E-03 H	1	0.1		Parathion	56-38-2	3.8E+01	n	4.9E+02	1			8.6E+00 n		4.3E-02	n	
	5.0E-02 H	V 1			Pebulate	1114-71-2	3.9E+02	n	5.8E+03	n			5.6E+01 n		4.5E-02	n	
	4.0E-02 I 2.0E-03 I	V 1	0.1	3.1E-01	Pendimethalin	40487-42-1 32534-81-9	2.5E+02 1.6E+01	n ns	3.3E+03 r 2.3E+02 r				1.8E+01 n 4.0E+00 n		2.1E-01 1.7E-01	n n	
		v 1	0.1	3. IE-U1	Pentabromodiphenyl ether Pentabromodiphenyl ether 2.2' 4.4' 5. (RDE 99)			IIS n		ns n							
	1.0E-04 I 8.0F-04 I	V 1	0.1		Pentabromodiphenyl ether, 2,2',4,4',5- (BDE-99) Pentachlorobenzene	60348-60-9 608-93-5	6.3E-01	n	8.2E+00 9.3E+01	0			2.0E-01 n		8.7E-03 2.4E-03	n n	
i e	0.UE-U4 I	v 1			r Citacino obelizene	000-93-5	6.3E+00	n	J.3E∓UI I				3.2E-01 n		2.40-03	11	

19			See FAQ #27); H = HEAST; F = See FAQ; J = New Jersey; O = EPA Office of W										ed (See User G
10 1 1 1 1 1 1 1 1 1													
1		ation	Contaminant					Screening	g Levels			Protection of Gr	ound water 53
Angeles (1967) 1	IKI IKI " IKI "-IKIVI											Risk-based	MCL-bas
100 P	SFO e IUR e (mg/kg- e (mg/m³ e o r	uta- C _{sat}			Resident Soi	I Indus	strial Soil	Resident Air	Industrial Ai	r Tapwater	MCL	SSL	SSL
100 P	ng/kg-day)-1 v (ug/m³)-1 v day) v) v l	en GIABS ABS (ma/ka	Analyte	CAS No.	(mg/kg)	key (n	ng/kg) ke	/ (ua/m³)	key (ua/m ³)	key (ug/L) key	(ug/L)	(mg/kg) k	ey (mg/kg
Auto-				76-01-7		c 3.6	6E+01 c	, , ,	, , , , ,		,		
ACCOUNT 1985		1											
ACC Company		1 0.25						5 5F-01	c 2.4F+00		1.0F+00		
Cartifor 1 36 36 36 36 36 36 36				78-11-5				0.0L-01	0 2.42.00		1.02.00		
19-644								1.05+02	n 4.4E+02				
1,000 1,00	1.0E+00 F V	3.92+0		109-00-0	0. IE+UI	11 3.4	+E+U2 II	1.00+02	11 4.45702	11 2.15+02 11		1.05+00	11
Fig. 64	7.05.04	4		7700 00 0	E EE 100	. 01	DE 101 %			1.4E+00 n			
1,000 1,00													
770-04 1 1 1 1 1 1 1 1 1											4.55.04(5)		
28.00 1 2.00 2]									1.5E+U1(F)		
2550 P V 1 Photoschem-Schroder Shringh Schroder Shringh Shri		1											
2006 1		1											
22.50 C 2.50 C		1											
2.65 1.26													
3.00 1 2.00 0 0 0 0 0 0 0 0 0	2.2E-03 C 6.3E-07 C	1 0.1	Phenacetin			c 1.0	DE+03 c	4.5E+00	c 1.9E+01	c 3.4E+01 c		9.7E-03	С
4 18-20 1 1 1 1 1 1 1 1 1													
SEF-06 X	3.0E-01 I 2.0E-01 C	1 0.1	Phenol	108-95-2	1.9E+03	n 2.5	5E+04 n	2.1E+01	n 8.8E+01	n 5.8E+02 n		3.3E-01	n
SEF-06 X	4.0E-03 I	1 0.1	Phenol, 2-(1-methylethoxy)-, methylcarbamate	114-26-1	2.5E+01	n 3.3	3E+02 n			7.8E+00 n		2.5E-03	n
1.56.07 1.56													n
1,500 1	6.0E-03 I	1 0.1	Phenylenediamine, m-	108-45-2	3.8E+01	n 4.9	9E+02 n					3.2E-03	n
15CO 1	4.7E-02 H				1.2E+01	c 4.9	9E+01 c						С
1966													
Section Fig. 1													
30E-04 V 1													
2-06-02 1 0 1 0.1 Problem 772-116 1.56-02 0 1.56-10 0 3.76-01 0 3.20-03 0								3.1F-02	n 1.3F-01				
A SE-01 P	2.0E-02 I			732-11-6	1.3E+02				31			8.2E-03	n
4 5 7 7 1 - Ammirum malphosphale 1778-80 385-90 757-90 76 775-90 76 775-90 76 775-90 76 775-90					1								
4	4 9F+01 P	1		13776-88-0	3.8F+05	nm 5.	7E+06 pm	,		9.7F+04 n			n
4		1											
4.6F-01 P		1											**
ASE-01 P		1											
4 9E-01 P 1 - Disagnesiam prosphate 77,504,114 8 9E-05 m 5,7E-06 m 9,7E-04 n 9 n 9 NE-04		4											
4 45010 P			The state of the s										
## 48E-01 P 1		1											
4 65-01 P 1 1Morammontanian phospholips		1			3.8E+05								
4.9E-01 P													
4,8E-01 P		1											
4 6EF-01 P 1 1Monograpesium phosphate 778-78-80 3EF-05 cm 5.7E-06 cm 9.7E-04 n 0 n 0 n 0 n 0 n 0 n 0 n 0 n 0 n 0 n		1		7722-76-1									
4.8E-01 P		1											
4.8E-01 P		1											
4 95-01 P 1 - Polybrasphora aod, - Polybrasphora ao		1											
4.9E-01 P		1											
4.9E+01 P 1		1											
A SE-01 P		1											
4-9E-01 P	1.02.01	1	~Sodium acid pyrophosphate					1					n
4.9E-01 P		1	~Sodium aluminum phosphate (acidic)	7785-88-8	3.8E+05	nm 5.7	7E+06 nm	1		9.7E+04 n			n
4.9E+01 P		1	~Sodium aluminum phosphate (anhydrous)	10279-59-1	3.8E+05			1		9.7E+04 n			n
4 9E+01 P		1						1					n
4 9E+01 P	4.9E+01 P	1	~Sodium hexametaphosphate	10124-56-8	3.8E+05	nm 5.7	7E+06 nm	1		9.7E+04 n			n
A 9E+01 P		1						1					n
4.9E+01 P	4.9E+01 P	1		7785-84-4				1					n
4.9E+01 P		1	~Sodium tripolyphosphate	7758-29-4	3.8E+05	nm 5.7	7E+06 nm	1		9.7E+04 n			n
4.9E+01 P	4.9E+01 P	1	~Tetrapotassium phosphate	7320-34-5		nm 5.7		1					n
4.9E+01 P 1 1	4.9E+01 P	1		7722-88-5	3.8E+05		7E+06 nm	1					
4.9E-01 P 1	4.9E+01 P	1						1					n
4,9E+01 P	4.9E+01 P	1											
4.9E+01 P		1						1		9.7E+04 n			n
4.9E+01 P 1 1 1 1 1 1 1 1		1											
3.0E-04 3.0E-04 V 1 Phosphire 789-51-2 2.3E+00 n 3.5E+01 n 3.1E-02 n 1.3E-01 n 5.7E-02 n 1.3E-04 n 1		1											
4.9E+01		1							n 1.3E-01				
2.0E-05 V 1 Phosphorus, White 7723-14-0 1.6E-01 n 2.3E+00 n 4.0E-02 n 1.5E-04 n 1.4E-02 1.2.4E-06 C 2.0E-02 1 1 0.1 -Bis(2-ethylhexyl)phthalate 117-81-7 3.9E+01 c** 1.6E+02 c** 1.2E+00 c 5.1E+00 c 5.6E+00 c** 6.0E+00 c** 1.4E+01 c** 1.6E+01 c*		1	The state of the s										
Phthalates Pht		1											
1.4E-02 2.4E-06 C 2.0E-02	2.0L-00 1				1.32-01	2.0	00 11						
1.9E-03 P 2.0E-01 I 1 0.1 -Butyl Berzyl Phthalate 85-68-7 2.9E-02 c** 1.2E-03 c* 1.6E+01 c* 2.4E-01 c* 1.0E+00 I 1 0.1 -Butylphthaly Butylglycolate 85-70-1 6.3E+03 n 8.2E+04 n 1.3E+03 n 3.1E+01 n 3.1E+01 n 8.0E-01 I 1 0.1 -Dibutyl Phthalate 84-68-2 5.1E+03 n 6.6E+04 n 1.5E+03 n 6.1E+01 n 2.3E-01 n 1.0E-01 I V 1 -Dibutyl Phthalate 84-68-2 5.1E+03 n 6.6E+04 n 1.5E+03 n 6.1E+01 n 1.0E-01 I V 1 -Dibutylterepthhalate 120-61-6 7.8E+02 n 1.2E+04 n 1.5E+03 n 6.1E+01 n 1.0E+02 n 1.0E+00 I 1.0E+00 I 1 0.1 -Dibutylterepthhalate 61-N- 117-84-0 6.3E+01 n 8.2E+02 n 1.2E+04 n 1.5E+03 n 6.8E-01 n 1.0E+00 I 1.0E+00 I 1 0.1 -Dibutylterepthhalate 61-N- 117-84-0 6.3E+01 n 8.2E+02 n 1.2E+04 n 1.5E+03 n 6.8E-01 n 1.0E+00 I 1.0E+	1.4F-02 2.4F-06 C 2.0F-02	1 01	Titilaacoo	117-81-7	3 9F+01	C** 16	3F+02 c*	1.2F+00	c 5.1E+00	c 5.6F+00 c**	6.0F+00	1.3F+00 (** 1.4E+0
1.0E+00 1 0.1 -Buýlphtalýl Bukylglycolate								1.22100	3 J. IL 100		0.02100		
1.0E-01 1													
8.0E-01 0.1													
1.0E-01 V 1 -Dimethylterephthalate 12.61-6 7.8E+02 n 1.2E+04 n 1.9E+02 n 4.9E-02 n 1.0E-02 P 1 0.1 -Octyl Phthalate di-N 117-84-0 6.3E+01 n 8.2E+02 n 2.0E+01 n 5.7E+00 n 1.0E-00 1 2.0E+00 1 2.0E+02 C 1 0.1 -Phthalic Anhydride 85-44-9 1.3E+04 n 1.6E+05 nm 2.1E+00 n 8.8E+00 n 3.9E+03 n 1.0E-04 X 1 0.1 Picramic Acid (2.4mino-4.6-dinitrophenol) 96-91-3 6.3E-01 n 8.2E+00 n 8.2E+00 n 2.0E-01 n 1.0E-04 X 1 0.1 Picramic Acid (2.4mino-4.6-dinitrophenol) 96-91-3 6.3E-01 n 8.2E+00 n 2.0E-01 n 1.0E-02 1 1 0.1 Picramic Acid (2.4,6-Trinitrophenol) 88-89-1 5.7E+00 n 7.4E+01 n 1.8E+00 n 1.0E-02 1 1 0.1 Picramic Acid (2.4,6-Trinitrophenol) 96-91-3 6.3E-01 n 7.4E+01 n 1.8E+00 n 1.0E-02 1 1 0.1 Picramic Acid (2.4,6-Trinitrophenol) 96-91-3 6.3E-01 n 7.4E+01 n 1.8E+00 n 1.0E-02 1 1 0.1 Picramic Acid (2.4,6-Trinitrophenol) 96-91-3 6.3E-01 n 7.4E+01 n 1.8E+00 n 1.0E-02 1 1 0.1 Picramic Acid (2.4,6-Trinitrophenol) 96-91-3 6.3E-01 n 7.4E+01 n 1.8E+00 n 1.0E-02 1 1 0.1 Picramic Acid (2.4,6-Trinitrophenol) 96-91-3 8.2E+00 n 7.4E+01 n 1.8E+00 n 1.0E-02 1 1 0.1 Picramic Acid (2.4,6-Trinitrophenol) 96-91-3 96-9													
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2.0E+00 I 2.0E-02 C 1 0.1 ~-Phthalic Anhydride 85-44-9 1.3E+04 n 1.6E+05 nm 2.1E+00 n 8.8E+00 n 3.9E+03 n 8.5E-01 n 7.0E-02 I 1 0.1 Pictoram 1918-02-1 4.4E+02 n 5.7E+03 n 1.4E+02 n 5.7E+03 n 1.4E+02 n 5.0E+02 1.3E-02 n 1.4E+02 n 5.0E+04 n 1.0E+04 n 1.0E+0													
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3.0E+01 C 8.6E-03 C 7.0E-06 H 1 0.1 Polybrominated Biphenyls 59536-65-1 1.8E-02 c** 7.7E-02 c** 3.3E-04 c 1.4E-03 c 2.6E-03 c** c**													
	3.0E+01 C 8.6E-03 C 7.0E-06 H	1 0.1	Polybrominated Biphenyls	59536-65-1	1.8E-02	c** 7.	7E-02 c**	3.3E-04	c 1.4E-03	c 2.6E-03 c**		(**

Key: I = IRIS: P = PPRTV: A = ATSDR: C = Cal EPA: X = APPENDIX PPRTV SCREEN (See FAQ #27); H = HEAST: F = See FAQ: J = New Jersey: O = EPA Office of Water: E = see user quide Section 2.3.5; L = see user quide Section 2.3.5; L = see user quide Section 5: V = volatile: R = RBA applied (See User Guide Section 2.3.5; L = see user quide Section 2.3. for Arsenic notice); c = cancer; n = noncancer; * = where: n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c S Protection of Ground Water SSI s Toxicity and Chemical-specific Information Contaminant Screening Levels RfD. MCL-based Risk-based SFO IUR (mg/kgmg/m³ C_{sat} Industrial Ai e o muta-Resident Sc Industrial Soi Fapwate MCL SSL SSL (ug/m³) I gen ABS (mg/kg) CAS No. (mg/kg) (ug/m³) (ug/m³)(ug/L) (mg/kg) day) (ma/ka) (ua/L) mg/kg-day) (ma/ka) Polychlorinated Biphenyls (PCBs) 7.0F-02 S 2.0F-05 S 7.0E-05 I 0 14 ~Aroclor 1016 12674-11-2 5.1F+00 1 3F-02 2.0F+00 S 5.7F-04 0.14 Aroclor 1221 11104-28-2 2.0F-01 8.3F-01 4.9F-03 2.1F-02 4.7F-03 8.0F-05 2.0E+00 S 5.7E-04 S 0.14 11141-16-5 1.7E-01 -Aroclor 1232 4.9E-03 4.7E-03 8.0E-05 2.0F+00 S 5.7F-04 S 0.14 ~Aroclor 1242 53469-21-9 9.5F-01 4.9F-03 7.8F-03 1.2F-03 2.0F+00 S 5.7F-04 S 0.14 ~Aroclor 1248 12672-29-6 2.3F-01 9.5F-01 4.9F-03 2.1F-02 С 7.8F-03 1.2F-03 2.0F+00 S 5.7F-04 S 2.0F-05 I ~Aroclor 1254 11097-69-1 1.2F-01 9.7F-01 7.8F-03 c 0.14 4.9F-03 2.1F-02 2.0F-03 7.8F-03 2.0F+00 S 5.7F-04 S 0 14 ~Aroclor 1260 11096-82-5 2 4F-01 9 9F-01 4 9F-03 2 1F-02 5.5F-03 11126-42-4 6 0F-04 0.14 ~Aroclor 5460 3.5F+00 4 4F+01 2 0F-01 1 2F+00 ~Heptachlorobiphenyl, 2,3,3',4,4',5,5'- (PCB 189) 3.9E+00 E 1.1E-03 E 2.3E-05 F 1.3F-03 F V 0.14 39635-31-9 4.0E-03 2.8E-03 2.5E-03 3.9E+00 ~Hexachlorobiphenyl, 2.3',4,4',5,5'- (PCB 167) 52663-72-6 5 1F-01 4 0F-03 E 1.1E-03 E 2.3E-05 E 1.3E-03 E V 0.14 1.1E-02 1.7E-03 3 9F+00 E 1.1E-03 E 2.3E-05 F 13F-03 F V 0.14 -Hexachlorobiphenyl, 2,3,3',4,4',5'- (PCB 157) 69782-90-7 1.2E-01 2.5E-03 1.1E-02 c* 4.0E-03 c c* 5.0E-01 c* 1.7E-03 F 1.1F-03 F 2.3F-05 F 1.3F-03 F V 0 14 ~Hexachlorobiphenyl, 2,3,3',4,4',5- (PCB 156) 38380-08-4 1.7E-03 3.9F+03 F 1.1F+00 F 2.3F-08 F 1.3F-06 F V ~Hexachlorobiphenyl, 3.3' 4.4' 5.5'- (PCB 169). 32774-16-6 0.14 1.2F-04 5.1F-04 2.5F-06 1.1F-05 4.0F-06 c 1.7F-06 c* F 1.1F-03 F 0.14 Pentachlorobiphenyl, 2', 3, 4, 4', 5- (PCB 123) 65510-44-3 2.5F-03 1.1F-02 3.9F+00 2.3F-05 F 1.3F-03 F V 1.2F-01 4.9F-01 4.0F-03 c 1.0F-03 31508-00-6 E 1.1E-03 E Pentachlorobiphenyl, 2,3',4,4',5- (PCB 118) 32598-14-4 3.9F+00 E 1.1E-03 E 2.3E-05 E 1.3E-03 E V Pentachlorobiphenyl, 2.3.3',4,4'- (PCB 105 4 9F-01 4 0F-03 1.0E-03 0.14 3.9E+00 E 1.1E-03 E 2.3E-05 E 13E-03 E V 0.14 Pentachlorobiphenyl, 2,3,4,4',5- (PCB 114) 74472-37-0 1.2E-01 C** 5.0E-01 2.5E-03 1.1E-02 4.0E-03 c 1.0E-03 c* E 3.8E+00 E 7.0E-09 E 4.0E-07 E V Pentachlorobiphenyl, 3,3',4,4',5- (PCB 126) 57465-28-8 1.2E-06 3.0F-07 Polychlorinated Biphenyls (high risk) 1336-36-3 0.14 6.8E-03 7.8E-02 4.0E-01 ~Polychlorinated Biphenyls (low risk) 1336-36-3 2.8E-02 5.0E-01 С 7.0E-02 I 2.0E-05 0.14 ~Polychlorinated Biphenyls (lowest risk) 1336-36-3 E 3.8E-03 E Tetrachlorobiphenyl, 3,3',4,4'- (PCB 77) 32598-13-3 1.6E-01 7.4E-04 3.2E-03 1.3F+01 7.0E-06 E 4.0E-04 E 0.14 70362-50-4 3.9E+01 E 1.1E-02 E 2.3E-06 Tetrachlorobiphenyl, 3,4,4',5- (PCB 81) 1.2E-02 2.5E-04 1.1E-03 4.0E-04 c 6.2E-05 С* 6 0F-04 0.1 Polymeric Methylene Diphenyl Diisocyanate (PMDI) 9016-87-9 3.6E+05 Polynuclear Aromatic Hydrocarbons (PAHs) 0.13 83-32-9 6.0E-02 -Acenaphthene 4.5E+03 5.5E-01 3.0E-01 0.13 -Anthracene 120-12-7 1.8E+03 2.3F+04 1.8E+02 r 5.8E+00 7.3F-01 E 1.1E-04 C 56-55-3 1.6F-01 2 9F+00 1.2E-02 4 2F-03 0.13 -Benzfalanthracene 1.2E+00 C 1.1E-04 C 0.13 ~Benzo(j)fluoranthene 205-82-3 4.2E-01 1.8E+00 2.6E-02 1.1E-01 6.5E-02 7 8F-02 7.3E+00 I 1.1E-03 C 0.13 ~Benzo[a]pyrene 50-32-8 1 6F-02 2 9F-01 9.2E-04 1.1E-02 3.4E-03 2.0E-01 4 0F-03 2.4E-01 7.3F-01 4.1F-02 Benzo[b]fluoranthene 7.3E-02 E 1.1E-04 C М 207-08-0 3.4E-01 8 0F-02 0.13 ~Chloronaphthalene, Beta-94:58:7 4 8F+02 6.0F±03 7.5F+01 3.9F-01 7.3E-03 E 1.1E-05 C 218-01-1.6E+01 2.9E+02 1.1E+00 0.13 ~Chrysene 9.2E-02 3.4E+00 1.2E+00 7.3E+00 E 1.2E-03 C М 0.13 53-70-3 1.6E-02 8.4E-04 1.0E-02 3.4E-03 1.3F-02 ~Dibenz[a.h]anthracene 2.9E-01 1.2E+01 C 1.1E-03 C 0.13 -Dibenzo(a,e)pyrene 192-65 4.2F-02 1 8F-01 2.6F-03 1.1F-02 6.5F-03 8.4F-02 2.5E+02 C 7.1E-02 C ~Dimethylbenz(a)anthracene, 7,12 57 N7 / 4 6E 04 1.4E-05 1 OF 04 O OF OF 4 0F-02 0.13 ~Fluoranthene 206-44-0 2.4E+02 3.0F+03 8 0F+01 8 9F+00 4 0F-02 0.13 ~Fluorene 86-73-7 2 4F+02 3.0F±03 2 9F+01 5.4F-01 7.3E-01 E 1.1E-04 C -Indeno[1,2,3-cd]pyrene 193-39-5 1.6E-01 2.9E+00 3.4E-02 1.3E-01 0.13 1.1E-01 2.9E-02 0.13 3.9F+0 ~Methylnaphthalene, 90-12-0 1.8F+01 7.3F+01 1.1F+00 c 6.0F-03 4 0F-03 0.13 ~Methylnanhthalene 91-57-6 2 4F+01 3.0F+02 3.6F+00 1 9F-02 3.4E-05 C 2.0E-02 I 3.0E-03 I V 91-20-3 3.8F+00 1 7F+01 8.3E-02 3.6E-01 1.7F-01 c 5.4F-04 1 2F+00 C 1.1E-04 C 0.13 -Nitropyrene, 4-57835-92-4 4 2F-01 1.8F+00 2.6E-02 c 1.1E-01 1 9F-02 3.3F-03 3.0F-02 0.13 -Pyrene 129-00-0 1.8F+02 2.3F+03 1.2F+01 1.3F+00 2 0F-02 0.1 Potassium Perfluorobutane Sulfonate 29420-49-3 1.3F+02 1.6F+03 4 0F+01 2 2F-02 1.5F-01 I 9.0F-03 0.1 Prochloraz 67747-09-5 3.6F+00 c* 1.5F+01 3.8F-01 c 1.9F-03 6.0F-03 Profluralin 26399-36-0 4 7F+01 7.0F+02 2.6F+00 r 1 6F-01 1.5F_02 1610-18-0 9 5F+0 1.2F+03 2 5F+01 1.2F-02 rometryn 4 0F-03 0.1 7287-10-6 2 5F+01 3 3F+02 6.0F+00 9 NF-03 1.3E-02 0.1 1918-16-7 8.2E+01 1.1E+03 2.5E+01 1.5E-02 ropachlor 5.0F-03 0.1 ropanil 709-98-8 3.2F+01 4.1F+02 8.2F+00 I 4.5F-03 2.0F-02 0.1 ropargite 2312-35-8 1.3F+02 1.6F+03 1.6F+01 1.2F+00 2.0F-03 1.1F+05 ropargyl Alcohol 107-19-7 1.6F+01 2.3F+02 4.0F+00 r 8.1F-04 139-40-2 3.4F+01 2 0F-02 onazine 1.3F+02 1.6F+03 3 0F-02 2 0F-02 0.1 122-42-9 1.3F+02 3.5F+01 2 2F-02 ronham 1.6F+03 1.3E-02 0.1 60207-90-8.2E+01 1.1F+03 2.1E+01 6.9E-02 opiconazole 8.0F-03 I \ 3.3F+04 Propionaldehyde 123-38-6 7.5F+00 3.1F+01 1.7F+00 3.4F-04 1.0F-01 X 1.0F+00 X \ 2.6E+02 Propyl benzene 103-65-1 3.8F+02 2.4F+03 1.0F+02 4.4F+02 n 6.6F+01 1.2F-01 ns 3.5E+02 Propylene 6.3E+02 6.0E-01 57-55-6 2.0F+01 ropylene Glycol 1.3F+05 nm 1.6F+06 nm 4.0F+04 8.1F+00 2.7F-04 A 0.1 ropylene Glycol Dinitrate 6423-43-4 3.9F+04 1.6F+05 2.8F-02 1.2F-01 nm 7.0E-01 H 2.0E+00 I V 1.1E+05 Propylene Glycol Monomethyl Ether 107-98-2 4.1E+03 3.7E+04 2.1E+02 8.8E+02 3.2E+02 6.5E-02 2.4E-01 | 3.7E-06 7.8E+04 75-56-9 2.1E+00 2.7E-01 5.6E-05 3.0E-02 I V Propylene Oxide 0.1 ropyzamide 23950-58-5 4.7E+02 6.2E+03 1.2E+02 1.2E-01 1.0E-03 5.3E+05 Pyridine 6.8E-04 3.2F+00 4.1F+01 5.1F-01 4.3F-03 5.0F-04 Quinalphos 3.0E+00 7.7F-01 2.4F-02 Quinoline 91-22-5 1.8F-01 7.8F-05 9.0E-03 3.0E-02 A Refractory Ceramic Fibers 4.3E+06 1.8E+07 3.1E+00 3.0E-02 10453-86-8 0.1 1.9E+02 2.5E+03 6.7E+00 4.2E+00 Resmethrin 5.0E-02 299-84-3 4.1E+01 3.7E-01 Ronnel Rotenone 3.2F+00 4.0E-03 2.2E-01 C 6.3E-05 C 1.6E-02 c 1.9E-01 Safrole 1.0E+01 С c 9.6E-02

	Toxicity and Ch				niouniour,		re: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF= Contaminant	1, 111 – 001100	ilitation may e	,xcccu (ooming mink (000 00	Screening L		may oxoood oodi (e	00 0001 0410	Protection of	Ground	Water SSL
	k k RfDo	k RfC _i	kv										Ĭ				Risk-based		MCL-base
SFO	e IUR e (mg/kg-	e (mg/m³	e o muta			C _{sat}			Resident Soi	1 1	ndustrial So	oil	Resident Air	Industrial A	rapwater	MCL	SSL		SSL
g/kg-day)	⁻¹ y (ug/m ³) ⁻¹ y day) 5.0E-03	у)	y I gen	GIABS	ABS ((mg/kg)	Analyte Selenious Acid	CAS No. 7783-00-8	(mg/kg) 3.9E+01	key	(mg/kg) 5.8E+02	key	(ug/m³) ke	y (ug/m³)	key (ug/L) key 1.0E+01 n	(ug/L)	(mg/kg)	key	(mg/kg)
	5.0E-03 5.0E-03	1 2.0E-02	C	1			Selenium Selenium	7782-49-2	3.9E+01	n n	5.8E+02	n n	2.1E+00 r	8.8E+00		5.0E+01	5.2E-02	n n	2.6E-01
	5.0E-03			1			Selenium Sulfide	7446-34-6	3.9E+01	n	5.8E+02	n	2.1E+00 i			3.0L101		n	2.02-01
	9.0E-02	1		1	0.1		Sethoxydim	74051-80-2	5.7E+02	n	7.4E+03	n			1.0E+02 n		9.3E-01	n	
	5.0E-03	3.0E-03	С	1 0.04			Silica (crystalline, respirable) Silver	7631-86-9 7440-22-4	4.3E+05 3.9E+01	nm n	1.8E+06 5.8E+02	nm n	3.1E-01 r	1.3E+00	9.4E+00 n		8.0E-02	n	
1.2E-01				1	0.1		Simazine	122-34-9	4.5E+00	C**	1.9E+01	C*			6.1E-01 c*	4.0E+00	3.0E-04	C*	2.0E-03
	1.3E-02	T		1	0.1		Sodium Acifluorfen	62476-59-9	8.2E+01	n	1.1E+03	n			2.6E+01 n		2.1E-01	n	
	4.0E-03 C 1.5E-01 C 2.0E-02	1	с м	1 0.025			Sodium Azide Sodium Dichromate	26628-22-8 10588-01-9	3.1E+01 3.0E-01	n	4.7E+02 6.2E+00	n	6.8F-06	0.05.05	8.0E+00 n c 4.1E-02 c			n	
		C 2.0E-04	C M	0.025	0.1		Sodium Dichromate Sodium Diethyldithiocarbamate	148-18-5	2.0E+00	C*	8.5E+00	C	6.8E-06	8.2E-05	2.9E-01 c		1.8E-04	C	
	5.0E-02	A 1.3E-02	С	1	0.1		Sodium Fluoride	7681-49-4	3.9E+02	n	5.8E+03	n	1.4E+00 r	5.7E+00			1.02 01	n	
	2.0E-05	1		1	0.1		Sodium Fluoroacetate	62-74-8	1.3E-01	n	1.6E+00	n			4.0E-02 n		8.1E-06	n	
	1.0E-03 8.0F-04	Н		1			Sodium Metavanadate Sodium Tungstate	13718-26-8 13472-45-2	7.8E+00 6.3E+00	n n	1.2E+02 9.3E+01	n n			2.0E+00 n 1.6F+00 n			n n	
	8.0E-04	P		1			Sodium Tungstate Dihydrate	10213-10-2	6.3E+00	n	9.3E+01	n			1.6E+00 n			n	
2.4E-02	H 3.0E-02	T		1	0.1		Stirofos (Tetrachlorovinphos)	961-11-5	2.3E+01	C**	9.6E+01	C*			2.8E+00 c*		8.2E-03	C*	
5.0E-01	C 1.5E-01 C 2.0E-02 6.0E-01	C 2.0E-04	C M	0.025			Strontium Chromate	7789-06-2	3.0E-01 4.7E+03	С	6.2E+00 7.0E+04	С	6.8E-06	8.2E-05	c 4.1E-02 c 1.2E+03 n		4.05.04	С	
	6.0E-01 3.0E-04			1	0.1		Strontium, Stable Strychnine	7440-24-6 57-24-9	4.7E+03 1.9E+00	n n	7.0E+04 2.5E+01	n n			1.2E+03 n 5.9E-01 n		4.2E+01 6.5E-03	n n	
	2.0E-01	I 1.0E+00	ΙV	1		8.7E+02	Styrene	100-42-5	6.0E+02	n	3.5E+03	ns	1.0E+02 r	4.4E+02	n 1.2E+02 n	1.0E+02	1.3E-01	n	1.1E-01
	3.0E-03	Р		1	0.1		Styrene-Acrylonitrile (SAN) Trimer	NA	1.9E+01	n	2.5E+02	n			4.8E+00 n			n	
	1.0E-03		Х	1	0.1		Sulforulbia (4 ablarabanzana) 1.11	126-33-0 80-07-9	6.3E+00 5.1E+00	n n	8.2E+01 6.6E+01	n n	2.1E-01 r	8.8E-01	n 2.0E+00 n 1.1F+00 n		4.4E-04 6.5E-03	n	
	8.0E-04	1.0E-03	CV	1	0.1		Sulfonylbis(4-chlorobenzene), 1,1'- Sulfur Trioxide	7446-11-9	5.1E+00 1.4E+05	n nm	6.0E+01	n nm	1.0E-01	4.4E-01			0.5E-03	n n	
		1.0E-03		1			Sulfuric Acid	7664-93-9	1.4E+05	nm	6.0E+05	nm	1.0E-01 r	4.4E-01	n				
2.5E-02	I 7.1E-06 I 5.0E-02			1	0.1		Sulfurous acid, 2-chloroethyl 2-[4-(1,1-dimethylethyl)phenoxy]-1-methylethyl ester	140-57-8	2.2E+01	C*	9.2E+01	c*	4.0E-01	1.7E+00			1.5E-02	C*	
	3.0E-02 7.0F-02	H		1	0.1		TCMTB Tebuthiuron	21564-17-0 34014-18-1	1.9E+02 4.4F+02	n n	2.5E+03 5.7E+03	n n			4.8E+01 n		3.3E-01 3.9F-02	n n	
	2.0E-02	H		1	0.1		Temephos	3383-96-8	1.3E+02	n	1.6E+03	n			4.0E+01 n		7.6E+00	n	
	1.3E-02	1		1	0.1		Terbacil	5902-51-2	8.2E+01	n	1.1E+03	n			2.5E+01 n		7.5E-03	n	
	2.5E-05 1.0F-03	H	V	1		3.1E+01	Terbufos	13071-79-9	2.0E-01	n	2.9E+00	n			2.4E-02 n		5.2E-05	n	
	1.0E-03 1.0E-04			1	0.1 0.1		Terbutryn Tetrabromodiphenyl ether, 2,2',4,4'- (BDE-47)	886-50-0 5436-43-1	6.3E+00 6.3E-01	n n	8.2E+01 8.2E+00	n n			1.3E+00 n 2.0E-01 n		1.9E-03 5.3E-03	n n	
	3.0E-04	1	V	1			Tetrachlorobenzene; 1,2,4,5	95-94-3	2.3E+00	n	3.5E+01	n			1.7E-01 n		7.9E-04	n	
2.6E-02	I 7.4E-06 I 3.0E-02	1	V	1		6.8E+02	Tetrachloroethane, 1,1,1,2-	630-20-6	2.0E+00	С	8.8E+00	С	3.8E-01				2.2E-04	C*	
2.0E-01 2.1E-03	I 5.8E-05 C 2.0E-02	I 4.0F-02	٧	1		1.9E+03 1.7E+02	Tetrachloroethylene	79-34-5 -127-18-4	6.0E-01 8.1E+00	n	2.7E+00 3.9F+01	n	4.8E-02 d	2.1E-01 1.8E+01		5.0E+00	3.0E-05 1.8F-03	c n	2.3E-03
L. 1L-00	3.0E-02			1	0.1	1.72.02	Tetrachlorophenol, 2,3,4,8-	58-90-2	1.9E+02	n	2.5E+03	n	4.22.00	1.02.01	2.4E+01 n	0.0L100	1.8E-02	n	2.02-00
2.0E+01			V	1			Tetrachlorotoluene, p- alpha, alpha, alpha-	5216-25-1	3.5E-02	С	1.6E-01	С			1.3E-03 c		4.5E-06	С	
	5.0E-04	8.0E+01	LV	1	0.1	2.1E+03	Tetraethyl Dithiopyrophosphate Tetrafluoroethane, 4,1,1,2	3689-24-5 811-97-2	3.2E+00 1.0E+04	n ns	4.1E+01 4.3E+04	n ns	8.3E+03	3.5E+04	7.1E-01 n n 1.7E+04 n		5.2E-04 9.3E+00	n n	
	2.0E-03		1 V	1	7E-04	2. IL 103	Tetryl (Trinitrophenylmethylnitramine)	479-45-8	1.6E+01	n	2.3E+02	n	0.3L103	J.JL104	3.9E+00 n		3.7E-02	n	
	2.0E-05			1			Thallic Oxide	1314-32-5	1.6E-01	n	2.3E+00	n			4.0E-02 n			n	
	1.0E-05 1.0E-05			1			Thallium (I) Nitrate Thallium (Soluble Salts)	10102-45-1 7440-28-0	7.8E-02 7.8E-02	n n	1.2E+00 1.2E+00	n			2.0E-02 n 2.0E-02 n	2.0E+00	1.4E-03	n n	1.4E-0
	1.0E-05	X	V	1			Thallium Acetate	563-68-8	7.8E-02	n	1.2E+00	n			2.0E-02 II	Z.0L100	4.1E-06	n	1.46-01
	2.0E-05		V	1			Thallium Carbonate	6533-73-9	1.6E-01	n	2.3E+00	n			4.0E-02 n		8.3E-06	n	
	1.0E-05 1.0E-05	_		1			Thallium Chloride Thallium Salanita	7791-12-0	7.8E-02	n	1.2E+00	n			2.0E-02 n			n	
	1.0E-05 2.0E-05	S X		1			Thallium Selenite Thallium Sulfate	12039-52-0 7446-18-6	7.8E-02 1.6E-01	n n	1.2E+00 2.3E+00	n n			2.0E-02 n 4.0E-02 n			n n	
	1.3E-02	1		1	0.1		Thifensulfuron-methyl	79277-27-3	8.2E+01	n	1.1E+03	n			2.6E+01 n		7.8E-03	n	
	1.0E-02 7.0F-02			1	0.1 0.008		Thiobencarb Thiodigh col	28249-77-6	6.3E+01	n	8.2E+02	n			1.6E+01 n		5.5E-02 2.8F-02	n	
	7.0E-02 3.0E-04	X H		1	0.008		Thiodiglycol Thiofanox	111-48-8 39196-18-4	5.4E+02 1.9E+00	n n	7.9E+03 2.5E+01	n n			1.4E+02 n 5.3E-01 n		2.8E-02 1.8E-04	n n	
	8.0E-02	İ		1	0.1		Thiophanate, Methyl	23564-05-8	5.1E+02	n	6.6E+03	n			1.6E+02 n		1.4E-01	n	
	5.0E-03			1	0.1		Thiram	137-26-8	3.2E+01	n	4.1E+02	n			9.8E+00 n		1.4E-02	n	
	6.0E-01	1.0E-04	A V	1			Titanium Tetrachloride	7440-31-5 7550-45-0	4.7E+03 1.4E+04	n	7.0E+04 6.0E+04	n n	1.0E-02 r	4.4E-02	1.2E+03 n n 2.1E-02 n	_	3.0E+02	n n	
	8.0E-02	I 5.0E+00	I V	1	8	8.2E+02	Toluene	108-88-3	4.9E+02	n	4.7E+03	ns	5.2E+02 r	2.2E+03	n 1.1E+02 n	1.0E+03	7.6E-02	n	6.9E-01
05.5	1.1E-05 C	8.0E-06	CV	1			Toluene-2,4-diisocyante	584-84-9	6.4E-01	n	2.7E+00	n	8.3E-04 r	3.5E-03			2.5E-05	n	
.8E-01	X 2.0E-04 1.1E-05 C	X 8.0E-06	C.V	1	0.1	1.7E+03	Toluene-2,5-diamine Toluene-2,6-diisocyante	95-70-5 91-08-7	1.3E+00 5.3E-01	n n	1.3E+01 2.2E+00	c** n	8.3E-04 r	3.5E-03	4.0E-01 n n 1.7E-03 n		1.2E-04 2.6E-05	n n	
.6E-02	P 5.1E-05 C	0.0∟-00	J .	1	0.1		Toluidine, o- (Methylaniline, 2-)	95-53-4	3.4E+01	C	1.4E+02	C	5.5E-02				2.0E-03	C	
.0E-02	P 4.0E-03			1	0.1		Toluidine, p-	106-49-0	1.8E+01	C**	7.7E+01	C**			2.5E+00 c**	1	1.1E-03	C**	
	3.0E+00	P 6.0E-01	V	1		3.4E-01	Total Petroleum Hydrocarbons (Aliphatic High) Total Petroleum Hydrocarbons (Aliphatic Low)	NA NA	2.3E+04 5.2E+01	ns	3.5E+05 2.2E+02	nms ns	6.3E+01 I	2.6E+02	6.0E+03 n ! n 1.3E+02 n		2.4E+02 8.8E-01	n n	
	1.0E-02			1		6.9E+00	Total Petroleum Hydrocarbons (Aliphatic Low) Total Petroleum Hydrocarbons (Aliphatic Medium)	NA NA	9.6E+00	ns	4.4E+01	ns	1.0E+01 I				1.5E-01	n n	
	4.0E-02	Р		1	0.1		Total Petroleum Hydrocarbons (Aromatic High)	NA	2.5E+02	n	3.3E+03	n			8.0E+01 n		8.9E+00	n	
	4.0E-03	P 3.0E-02		1		1.8E+03	Total Petroleum Hydrocarbons (Aromatic Low)	NA	8.2E+00	n	4.2E+01	n	3.1E+00 I	1.3E+01	n 3.3E+00 n		1.7E-03	n	
1F+00	4.0E-03 I 3.2E-04 I	P 3.0E-03	P V	1	0.1		Total Petroleum Hydrocarbons (Aromatic Medium) Toxaphene	NA 8001-35-2	1.1E+01 4.9E-01	n c	6.0E+01 2.1E+00	n c	3.1E-01 r 8.8E-03 d			3.0E+00	2.3E-03 1.1E-02	n c	4.6E-01
.12100	7.5E-03	I		1	0.1		Tralomethrin	66841-25-6	4.9E-01 4.7E+01	n	6.2E+02	n	0.0L-03 (J.UL-UZ	1.5E+01 n	3.0L100	5.8E+00	n	4.0L-0
		A					Tri-n-butyltin		2.3E+00								8.2E-03		

(Key: I = IRIS: P = PPRTV; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #27); H = HEAST; F = See FAQ; J = New Jersey; O = EPA Office of Water; E = see user quide Section 2.3.5; L = see user quide on lead; M = mutagen; S = see user quide Section 5; V = volatile; R = RBA applied (See User Guide Office) for Arsenic notice); c = cancer; n = noncancer; * = where: n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; 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** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c SL; ** = where n SL < 100X c S Protection of Ground Water SSI s Toxicity and Chemical-specific Information Contaminant Screening Levels RfD_o MCL-based Risk-based SFO IUR (mg/kgmg/m³ C_{sat} Industrial Ai e o muta-Resident So ndustrial Soi Fapwate MCL SSL SSL day) y I gen ABS (mg/kg) CAS No. (ug/m³) (ug/L) (mg/kg) Analyte (mg/kg) (mg/kg) (ua/L) mg/kg-day) (ma/ka) 43121-43-3 3.0F-02 L 0.1 Triadimeton 1.9F+02 2.5F+03 5.5F+01 4.4F-02 1.3E-02 Triallate 2303-17-5 1.0F+02 1.5F+03 1.2F+01 2 6F-02 1.0F-02 Triasulfuron 82097-50-5 6.3F+01 8.2F+02 2.0F+01 2.1F-02 0.1 101200-48-0 5.1E+01 1.6E+01 r 8.0E-03 Tribenuron-methyl 6.1E-03 5.0F-03 Tribromobenzene, 1,2,4-615-54-3 5.8F+02 4.5F+00 r 6.4F-03 9.0E-03 P C** 126-73-8 1.0F-02 0.1 Tributyl Phosphate 6.0F+01 2.6F+02 5.2F+00 c* 2.5F-02 0.1 1.9F+00 2.5F+01 6.0F-01 r 3.0F-04 Tributyltin Compounds NA 5.7F-01 2.9E+01 3 0F-04 Tributyltin Oxide 56-35-9 1.9F+00 2.5F+01 I 3.0E+01 H V 9.1E+02 Trichloro-1,2,2-trifluoroethane, 1,1,2-3.1E+03 n 1.3E+04 3.0F+01 76-13-1 4 0F+03 1 7F+04 n 5.5F+03 1 4F+01 ns ns 7.0E-02 2.0E-02 0.1 Trichloroacetic Acid 76-03-9 1.1E+00 6.0E+01 2.2E-04 1.2E-02 Trichloroaniline HCl. 2.4.6 33663-50-1.9F+0 7.9E+01 2.7E+00 7.4E-03 2.9E-02 0.1 7.0E-03 3.0E-05 0.1 Trichloroaniline, 2,4,6-634-93-5 1.9E-01 2.5E+00 4.0E-02 3.6E-04 8 0F-04 X Trichlorobenzene, 1,2,3-87-61-6 6.3E+00 9.3E+01 7.0E-01 2.1E-03 2.9F-02 P 1.0F-02 | 2.0F-03 P V 4.0F+02 Trichlorobenzene, 1.2.4-2.0F-01 5.8F+00 4.0F-01 120-82-1 2.6F+01 1.2F-03 2.0F+00 1 5.0F+00 I V 6.4F+02 Trichloroethane, 1.1.1-71-55-6 8.1E+02 3.6F+03 2.2F+03 n 8.0F+02 2.0F+02 7.0F-02 5.2F+02 2.8F-01 ns ns 2.2E+03 Trichloroethane, 1,1,2-5.7E-02 | 1.6E-05 | I 2.0E-04 X V 79-00-5 4.6E-02 | 4.1E-06 | 5.0E-04 I 2.0E-03 I V 6.9E+02 Trichloroethylene 79-01-6 4 1F-01 8.8E-01 2 8F-01 5.0E+00 1.0E-04 1.8E-03 3.0E-01 1.2E+03 Trichlorofluoromethane 75-69-4 2.3E+03 ns 3.5E+04 5.2E+02 3.3E-01 1.0F-01 Trichlorophenol, 2,4,5-1.2E+02 4.0F-01 1.1E-02 | 3.1E-06 | Frichlorophenol, 2,4,6 9.1E-01 c 4.0E+00 1.0E-02 0.1 Trichlorophenoxyacetic Acid, 2,4,5-93-76-5 6.3E+01 1.6E+01 8.0E-03 Frichlorophenoxypropionic acid, -2,4,5 2.8E-02 93-72-1 5.1E+01 1.1E+01 6.1E-03 1.3E+03 Trichloropropane, 1,1,2-598-77-6 3.9E+01 5.8E+02 8.8E+00 3.5E-03 5.0E-03 3.0E+01 I 1.4E+03 Trichloropropane, 1,2,3 96-18-4 5.1E-03 7.5E-04 3.2E-07 3.0E-03 X 3.0E-04 P V 3.1E+02 Trichloropropene, 1,2,3-96-19-5 7.3E-02 3.1E-02 1.3E-01 6.2E-02 3.1E-05 2.0E-02 Fricresyl Phosphate (TCP) 1330-78-5 1.3E+02 1.6E+01 1.5E+00 3.0E-03 58138-08-2 Fridiphane 1.8E+00 1.3E-02 7.0E-03 I V 2.8E+04 Triethylamine 121-44-8 1.2E+01 4.8F+01 7.3E-01 1.5E+00 4.4E-04 2.0E+00 riethylene Glycol 112-27-6 1.3F+04 1.6E+05 4.0E+03 8 8F-01 2.0E+01 P V 4.8E+03 Trifluoroethane, 1,1,1-420-46-2 1.5E+03 6.2E+03 2.1E+03 4.2E+03 1.3E+01 7.7E-03 7.5E-03 Trifluralin 1582-09-8 5.9F+01 4.2E+02 2.6E+00 c⁴ 8.4E-02 2.0E-02 1.0E-02 512-56-5.0E-03 P V 7.0E-03 P V 2.9E+02 Trimethylbenzene, 1,2,3-2.2E+02 Trimethylbenzene, 1,2,4-95-63-6 5.8F+00 2.4F+01 7.3F-01 3.1F+00 1.5F+00 2.1E-03 1.0E-02 1.8E+02 Trimethylbenzene, 1,3,5 108-67-8 7.8E+01 1.2E+03 1.2E+01 1.7E-02 1 0F-02 3.0E+01 rimethylpentene, 2,4,4-25167-70-8 7.8E+01 1.2E+03 6.5E+00 2 2F-02 3.0E-02 0.019 Trinitrobenzene, 1,3,5-99-35-4 2.2F+02 3.2F+03 5.9F+01 2.1E-01 3.0E-02 5 0F-04 0.032 rinitrotoluene, 2,46-118-96-7 3.6F+00 9.8F-01 5 7F-03 2 0F-02 0.1 Friphenylphosphine Oxide 791-28-6 1.3E+02 1.6F+03 3.6F+01 1.5F-01 2 0F-02 0.1 Tris(1,3-Dichloro-2-propyl) Phosphate 13674-87-8 1.3F+02 1.6F+03 3.6F+01 r 8 0F-01 Fris(1-chloro-2-propyl)phosphate 13674-84-5 6.3E+01 8.2E+02 1.9E+01 6.5E-02 1.0E-02 0.1 C 6.6E-04 C 4.7E+02 Tris(2,3-dibromopropy()phosphate 126-72-7 2.8F-01 1.3F+00 4.3E-03 1.9E-02 6.8F-03 1.3F-04 7.0F-03 P 0.1 2 0F-02 Tris(2-chloroethyl)phosphate 115-96-8 2 7F+01 1 1F+02 3.8E+00_c⁴ 3.8F-03 3.2E-03 1.0E-01 0.1 Fris(2-ethylhexyl)phosphate-78-42-2 1 7F+02 7 2F+02 2.4E+01 c 1.2E+02 8 0F-04 Tungsten 7440-33-7 6.3F+00 9.3F+01 1.6F+00 2 4F-01 1.8F-02 1.4E+01 3.0F-03 | 1.4.0F-05 A Uranium (Soluble Salts) NA 2.3F+01 3.5F+02 4.2F-03 n 6.0F+00 2.7F+00 1.0E+00 C 2.9E-04 C 0.1 Urethane 51-79-6 1 2F-01 2.3F+00 3.5E-03 4.2E-02 c 2.5E-02 5.6F-06 9.0F-03 | 7.0F-06 P 8.3F-03. P 0.026 Vanadium Pentoxide 1314-62-1 6 6F+01 8 4F+02 3 4F-04 c** 1.5E-03 c** 1.5E+01 5.0F-03 S 1.0F-04 A 0.026 Vanadium and Compounds 7440-62-2 3.9F+01 5.8F+02 1 0F-02 4 4F-02 n 8.6F+00 8 6F+00 1.0F-03 1020-77-7 7.8F+00 1.2E+02 1.1F+00 8.9F-04 2 5F-02 Vinclozolin 50471-44-8 1.6F+02 2.1F+03 4 4F+01 3.4F_02 9.1E+01 1.0E+00 H 2.0E-01 I V 2.8E+03 Vinyl Acetate 108-05-4 3.8E+02 2.1E+01 n 8.8E+01 n 4.1E+01 8.7E-03 3.2F-05 F 3.0F-03 I V 2.5F+03 Vinyl Bromide 593-60-2 1.2F-01 5.2F-01 8.8F-02 3.8F-01 1.8F-01 c 5.1F-05 7.2F-01 | 4.4F-06 | I 1.0E-01 I V M 3.9E+03 Vinyl Chloride 2.0F+00 6.9F-04 3.0F-03 75-01-4 5.9F-02 1.7F+00 1.7E-01 C* 2.8F+00 1.9F-02 6.5F-06 3.0F-04 Warfarin 81-81-2 1.9F+00 2.5F+01 5.6F-01 5.9F-04 S 1.0F-01 S V 3 9F+02 Xviene P-106-42-3 5.6F+01 2.4F+02 4 4F+01 1 9F+01 2 0F-01 1 9F-02 2 0F-01 S 10F-01 S V 108-38-3 4 4F+01 3 9F+02 Xviene m-5.5F+01 2 4F+02 1.0F+01 1 9F+01 1 9F-02 2.0E-01 S 1.0E-01 S V 4.3E+02 Xylene, o-95-47-6 6.5E+01 2.8E+02 1.0E+01 4.4E+01 n 1.9E+01 1.9E-02 9.9F+00 2.0F-01 I 1.0F-01 I V 2.6F+02 Xylenes 1330-20-7 5.8F+01 2.5F+02 1.0F+01 1.9F+01 1.0F+04 1.9F-02 3.0F-04 3.5F+01 Zinc Phosphide 1314-84-7 2.3F+00 6.0F-01 7440-66-6 3.7E+01 3.0E-01 6.0E+02 Zinc and Compounds 5.0F-02 0.1 7ineb 12122-67-3.2F+02 4.1F+03 9.9F+01 r 2.9F-01 8.0E-05 7irconium 7440-67-7 6.3F-01 9.3F+00 1.6E-01 4.8F-01



Appendix C Laboratory Analytical Reports



February 04, 2014

Pinyon

Brian Partington

9100 West Jewell Avenue, Suite 200

Lakewood

CO 80232

Project Name - 33rd St Outfall

Project Number - 11337801

Attached are your analytical results for 33rd St Outfall received by Origins Laboratory, Inc. January 27, 2014. This project is associated with Origins project number X401273-01.

The analytical results in the following report were analyzed under the guidelines of EPA Methods. These methods are identified as follows; "SW" are defined in SW-846, "EPA" are defined in 40CFR part 136 and "SM" are defined in the most current revision of Standard Methods For the Examination of Water and Wastewater.

The analytical results apply specifically to the samples and analyses specified per the attached Chain of Custody. As such, this report shall not be reproduced except in full, without the written approval of Origin's laboratory.

Unless otherwise noted, the analytical results for all soil samples are reported on a wet weight basis. All analytical analyses were performed under NELAP guidelines unless noted by a data qualifier.

Any holding time exceedances, deviations from the method specifications or deviations from Origins Laboratory's Standard Operating Procedures are outlined in the case narrative.

Thank you for selecting Origins for your analytical needs. Please contact us with any questions concerning this report, or if we can help with anything at all.

Origins Laboratory, Inc. 303.433.1322 o-squad@oelabinc.com







Pinyon

9100 West Jewell Avenue, Suite 200

Lakewood

CO

80232

Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

CROSS REFERENCE REPORT

	ONO	OO INEI EINEI	VOL INCI OINT		
Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received	
B-19	X401273-01	Soil	January 27, 2014 8:30	01/27/2014 14:00	
B-22	X401273-02	Soil	January 27, 2014 9:41	01/27/2014 14:00	
B-21	X401273-03	Soil	January 27, 2014 10:51	01/27/2014 14:00	
B-20	X401273-04	Soil	January 27, 2014 12:39	01/27/2014 14:00	

Origins Laboratory, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



Pinyon

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Lakewood

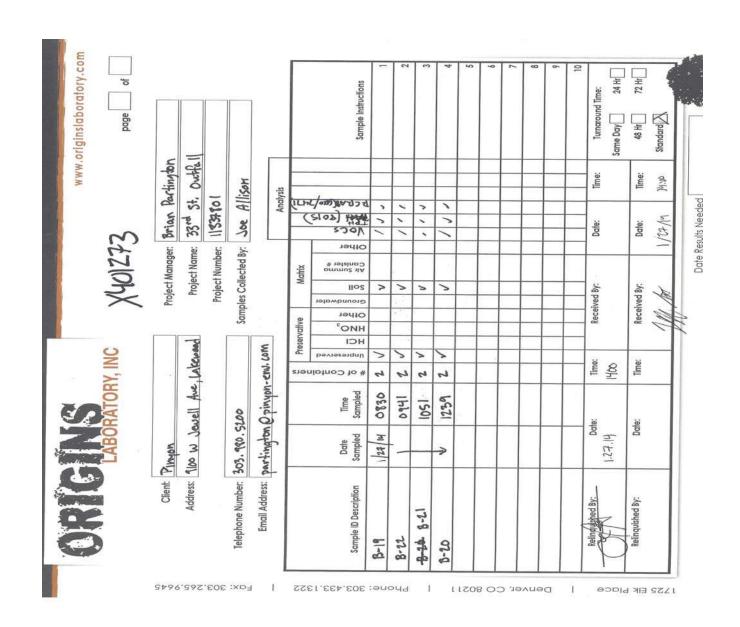
CO

80232

Brian Partington

Project Number: 11337801

Project: 33rd St Outfall



Origins Laboratory, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



Pinyon

9100 West Jewell Avenue, Suite 200

Lakewood

CO

80232

Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

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Pinyon	
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Origins Laboratory, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



9100 West Jewell Avenue, Suite 200

Lakewood

CO

80232

Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

B-19 1/27/2014 8:30:00AM

		Reporting						
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

GEL Laboratories, LLC X401273-01 (Soil)

Metals by SW846 3050B/6010C

Arsenic	3.86	3.21	mg/kg dry	1	1363143	01/30/2014	01/31/2014	
Barium	104	0.535	"	"	"	"	02/03/2014	
Cadmium	0.132	0.535	"	"	"	"	01/31/2014	J
Chromium	7.21	0.535	"	"	"	"	"	
Lead	8.11	1.07	"	"	"	"	"	
Selenium	1.40	3.21	"	"	"	"	"	J
Silver	0.251	0.535	"	"	"	"	"	J

Metals by SW846 7471A

Mercury 0.0138	0.0132 mg/kg dry	1	1363210	01/31/2014	02/03/2014
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TPH-Carbon Chain by EPA Method 8015C

Gasoline (C6-C10)	ND	50.0	mg/kg	1	4A28013	01/28/2014	01/28/2014	
Diesel (C10-C28)	ND	50.0	u .	"	"	"	II	
Residual Range Organics (C28-C36)	ND	100	II .	"	"	II .	H	
TPH - Carbon Chain Total	ND	50.0	"	"	"	"	"	
Surrogate: o-Terphenyl	93.4 %	59-131			11	II .	n	

VOC by EPA 8260C

1,1,1,2-Tetrachloroethane ND 2.0 ug/kg 1 4A30006 01/30/2014 01/30/2014

Origins Laboratory, Inc.



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Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

B-19 1/27/2014 8:30:00AM

		Reporting						
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

Origins Laboratory, Inc. X401273-01 (Soil)

VOC by EPA 8260C

1,1,2,2-Tetrachloroethane ND 2.0 ' <td< th=""><th>1,1,1-Trichloroethane</th><th>ND</th><th>2.0</th><th>ug/kg</th><th>1</th><th>4A30006</th><th>01/30/2014</th><th>01/30/2014</th></td<>	1,1,1-Trichloroethane	ND	2.0	ug/kg	1	4A30006	01/30/2014	01/30/2014
1,1-Dichloroethane ND 2.0 " " " " " " " " " " " " " " " " " " "	1,1,2,2-Tetrachloroethane	ND	2.0	"	"	II .	"	"
1,1-Dichloroethene ND 2.0 " " " " " " " " " " " " " " " " " " "	1,1,2-Trichloroethane	ND	2.0	п	"	II .	"	II .
1,1-Dichloropropene ND 2.0 " " " " " " " " " " " " " " " " " " "	1,1-Dichloroethane	ND	2.0	п	"	II .	"	II .
1,2,3-Trichlorobenzene ND 5.0 " " " " " " " " " " " " " " " " " " "	1,1-Dichloroethene	ND	2.0	п	"	II .	"	II .
1,2,3-Trichloropropane ND 5.0 " " " " " " " " " " " " " " " " " " "	1,1-Dichloropropene	ND	2.0	п	"	II .	"	II .
1,2,4-Trichlorobenzene ND 5.0 " " " " " " " " " " " " " " " " " " "	1,2,3-Trichlorobenzene	ND	5.0	п	"	II .	"	II .
1,2,4-Trimethylbenzene ND 2.0 " " " " " " " " " " " " " " " " " " "	1,2,3-Trichloropropane	ND	5.0	п	"	II .	"	II .
1,2-Dibromo-3-chloropropane ND 10.0 " " " " " " " " " " " " " " " " " " "	1,2,4-Trichlorobenzene	ND	5.0	п	"	II .	"	II .
1,2-Dibromoethane (EDB) ND 2.0 " " " " " " " " " " " " " " " " " " "	1,2,4-Trimethylbenzene	ND	2.0	п	"	II .	"	II .
1,2-Dichlorobenzene ND 2.0 " " " " " " " " " " " " " " " " " " "	1,2-Dibromo-3-chloropropane	ND	10.0	п	"	II .	"	II .
1,2-Dichloroethane ND 2.0 " " " " " " " " " " " " " " " " " " "	1,2-Dibromoethane (EDB)	ND	2.0	п	"	II .	"	II .
1,2-Dichloropropane ND 2.0 " " " " " " " " " " " " " " " " " " "	1,2-Dichlorobenzene	ND	2.0	п	"	II .	"	II.
1,3,5-Trimethylbenzene ND 2.0 " " " " " " " 1,3-Dichlorobenzene ND 2.0 " " " " " " " " 1,3-Dichloropropane ND 2.0 " " " " " " " " " "	1,2-Dichloroethane	ND	2.0	п	"	II .	"	II .
1,3-Dichlorobenzene ND 2.0 " " " " " " 1,3-Dichloropropane ND 2.0 " " " " " " "	1,2-Dichloropropane	ND	2.0	"	"	H .	"	"
1,3-Dichloropropane ND 2.0 " " " " " "	1,3,5-Trimethylbenzene	ND	2.0	"	"	H .	"	"
1,0-Didition optopatie	1,3-Dichlorobenzene	ND	2.0	"	"	H .	"	"
1,4-Dichlorobenzene ND 2.0 " " " " " "	1,3-Dichloropropane	ND	2.0	"	"	п	"	"
	1,4-Dichlorobenzene	ND	2.0	"	"	II	"	"

Origins Laboratory, Inc.



9100 West Jewell Avenue, Suite 200

Lakewood

CO

80232

Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

B-19 1/27/2014 8:30:00AM

		Reporting						
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

Origins Laboratory, Inc. X401273-01 (Soil)

VOC by EPA 8260C

2,2-Dichloropropane	ND	2.0	ug/kg	1	4A30006	01/30/2014	01/30/2014
2-Butanone	ND	10.0	п	"	"	II .	II .
2-Chlorotoluene	ND	2.0	п	"	"	II .	"
2-Hexanone	ND	10.0	п	"	"	II .	"
4-Chlorotoluene	ND	2.0	п	"	"	II .	"
4-Isopropyltoluene	ND	2.0	п	"	"	II .	"
4-Methyl-2-pentanone	ND	10.0	п	"	"	II .	"
Acetone	ND	16.0	п	"	"	II .	"
Benzene	ND	2.0	п	"	"	II .	"
Bromobenzene	ND	2.0	п	"	"	II .	"
Bromochloromethane	ND	2.0	п	"	"	II .	"
Bromodichloromethane	ND	2.0	п	"	"	II .	"
Bromoform	ND	2.0	п	"	"	II .	"
Bromomethane	ND	2.0	п	"	"	II .	"
Carbon disulfide	ND	5.0	п	"	"	II .	"
Carbon tetrachloride	ND	2.0	п	"	"	II .	"
Chlorobenzene	ND	2.0	п	"	"	II .	"
Chloroethane	ND	5.0	н	"	"	II .	"
Chloroform	ND	2.0	п	"	"	II .	II .

Origins Laboratory, Inc.



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Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

B-19 1/27/2014 8:30:00AM

		Reporting						
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

Origins Laboratory, Inc. X401273-01 (Soil)

VOC by EPA 8260C

Chloromethane	ND	2.0	ug/kg	1	4A30006	01/30/2014	01/30/2014
cis-1,2-Dichloroethene	ND	2.0	"	"	"	"	"
cis-1,3-Dichloropropene	ND	2.0	II	"	"	II .	п
Dibromochloromethane	ND	2.0	W .	"	"	"	II.
Dibromomethane	ND	2.0	W .	"	"	"	II.
Ethylbenzene	ND	2.0	W .	"	"	"	II.
Hexachlorobutadiene	ND	5.0	W .	"	"	"	II.
lodomethane	ND	15.0	W .	"	"	"	II.
Isopropylbenzene	ND	2.0	W .	"	"	"	II.
m,p-Xylene	ND	4.0	W .	"	"	"	II .
Methyl tert-Butyl Ether	ND	2.0	W .	"	"	"	II.
Methylene Chloride	ND	10.0	W .	"	"	"	II .
Naphthalene	ND	10.0	W .	"	"	"	II.
n-Butylbenzene	ND	2.0	"	"	"	"	"
n-Propylbenzene	ND	2.0	"	"	"	"	"
o-Xylene	ND	2.0	"	"	"	"	"
sec-Butylbenzene	ND	2.0	"	"	"	"	"
Styrene	ND	2.0	"	"	"	"	"
tert-Butylbenzene	ND	2.0	"	"	II.	"	"

Origins Laboratory, Inc.



9100 West Jewell Avenue, Suite 200

Lakewood

CO

80232

Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

B-19

1/27/2014 8:30:00AM

		Reporting						
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

Origins Laboratory, Inc. X401273-01 (Soil)

VOC by EPA 8260C

Tetrachloroethene	ND	2.0	ug/kg	1	4A30006	01/30/2014	01/30/2014	
Toluene	ND	2.0	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	2.0	"	"	u u	"	"	
trans-1,3-Dichloropropene	ND	2.0	"	"	· ·	"	n .	
Trichloroethene	ND	2.0	"	"	· ·	"	n .	
Trichlorofluoromethane	ND	2.0	"	"	· ·	"	n .	
Vinyl chloride	ND	2.0	"	"	"	п	II	
Surrogate: 1,2-Dichloroethane-d4	105 %	70-130			"	n .	и	
Surrogate: Toluene-d8	99.1 %	70-130			"	"	"	
Surrogate: 4-Bromofluorobenzene	103 %	70-130			"	"	ıı .	

Origins Laboratory, Inc.



9100 West Jewell Avenue, Suite 200

Lakewood

CO

80232

Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

B-22 1/27/2014 9:41:00AM

		Reporting						
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

GEL Laboratories, LLC X401273-02 (Soil)

Metals by SW846 3050B/6010C

Arsenic	2.52	3.18	mg/kg dry	1	1363143	01/30/2014	01/31/2014	J
Barium	81.2	0.529	"	"	· ·	"	02/03/2014	
Cadmium	0.162	0.529	"	"	"	"	01/31/2014	J
Chromium	5.11	0.529	"	"	"	"	"	
Lead	5.43	1.06	"	"	"	"	"	
Selenium	1.23	3.18	"	"	"	"	"	J
Silver	0.216	0.529	II .	"	"	n .	II .	J
M - 4 - L - L OVA/O 4 C 7 4 7 4 A								

Metals by SW846 7471A

Mercury	0.00878	0.0121	mg/kg dry	1	1363210	01/31/2014	02/03/2014	J
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TPH-Carbon Chain by EPA Method 8015C

Gasoline (C6-C10)	ND	50.0	mg/kg	1	4A28013	01/28/2014	02/04/2014	
Diesel (C10-C28)	ND	50.0	"	"	"	"	н	
Residual Range Organics (C28-C36)	ND	100	u .	"	"	"	II	
TPH - Carbon Chain Total	ND	50.0	"	"	II	"	"	
Surrogate: o-Terphenyl	84.5 %	59-131			11	II .	n	

5 1 5

VOC by EPA 8260C

1,1,1,2-Tetrachloroethane	ND	2.0	ug/kg	1	4A30006	01/30/2014	01/30/2014
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Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

B-22 1/27/2014 9:41:00AM

		Reporting						
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

Origins Laboratory, Inc. X401273-02 (Soil)

VOC by EPA 8260C

1,1,2,2-Tetrachloroethane ND 2.0 ' <td< th=""><th>1,1,1-Trichloroethane</th><th>ND</th><th>2.0</th><th>ug/kg</th><th>1</th><th>4A30006</th><th>01/30/2014</th><th>01/30/2014</th></td<>	1,1,1-Trichloroethane	ND	2.0	ug/kg	1	4A30006	01/30/2014	01/30/2014
1,1-Dichloroethane ND 2.0 " " " " " " " " " " " " " " " " " " "	1,1,2,2-Tetrachloroethane	ND	2.0	"	"	II .	"	"
1,1-Dichloroethene ND 2.0 " " " " " " " " " " " " " " " " " " "	1,1,2-Trichloroethane	ND	2.0	п	"	II .	"	II .
1,1-Dichloropropene ND 2.0 " " " " " " " " " " " " " " " " " " "	1,1-Dichloroethane	ND	2.0	п	"	II .	"	II .
1,2,3-Trichlorobenzene ND 5.0 " " " " " " " " " " " " " " " " " " "	1,1-Dichloroethene	ND	2.0	п	"	II .	"	II .
1,2,3-Trichloropropane ND 5.0 " " " " " " " " " " " " " " " " " " "	1,1-Dichloropropene	ND	2.0	п	"	II .	"	II .
1,2,4-Trichlorobenzene ND 5.0 " " " " " " " " " " " " " " " " " " "	1,2,3-Trichlorobenzene	ND	5.0	п	"	II .	"	II .
1,2,4-Trimethylbenzene ND 2.0 " " " " " " " " " " " " " " " " " " "	1,2,3-Trichloropropane	ND	5.0	п	"	II .	"	II .
1,2-Dibromo-3-chloropropane ND 10.0 " " " " " " " " " " " " " " " " " " "	1,2,4-Trichlorobenzene	ND	5.0	п	"	II .	"	II .
1,2-Dibromoethane (EDB) ND 2.0 " " " " " " " " " " " " " " " " " " "	1,2,4-Trimethylbenzene	ND	2.0	п	"	II .	"	II .
1,2-Dichlorobenzene ND 2.0 " " " " " " " " " " " " " " " " " " "	1,2-Dibromo-3-chloropropane	ND	10.0	п	"	II .	"	II .
1,2-Dichloroethane ND 2.0 " " " " " " " " " " " " " " " " " " "	1,2-Dibromoethane (EDB)	ND	2.0	п	"	II .	"	II .
1,2-Dichloropropane ND 2.0 " " " " " " " " " " " " " " " " " " "	1,2-Dichlorobenzene	ND	2.0	п	"	II .	"	II.
1,3,5-Trimethylbenzene ND 2.0 " " " " " " " 1,3-Dichlorobenzene ND 2.0 " " " " " " " " 1,3-Dichloropropane ND 2.0 " " " " " " " " " "	1,2-Dichloroethane	ND	2.0	п	"	II .	"	II .
1,3-Dichlorobenzene ND 2.0 " " " " " " 1,3-Dichloropropane ND 2.0 " " " " " " "	1,2-Dichloropropane	ND	2.0	"	"	H .	"	"
1,3-Dichloropropane ND 2.0 " " " " " "	1,3,5-Trimethylbenzene	ND	2.0	"	"	H .	"	"
1,0-Didition optopatie	1,3-Dichlorobenzene	ND	2.0	"	"	H .	"	"
1,4-Dichlorobenzene ND 2.0 " " " " " "	1,3-Dichloropropane	ND	2.0	"	"	п	"	"
	1,4-Dichlorobenzene	ND	2.0	"	"	II	"	"

Origins Laboratory, Inc.



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Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

B-22 1/27/2014 9:41:00AM

		Reporting						
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

Origins Laboratory, Inc. X401273-02 (Soil)

VOC by EPA 8260C

2,2-Dichloropropane	ND	2.0	ug/kg	1	4A30006	01/30/2014	01/30/2014
2-Butanone	ND	10.0	u	"	"	"	u u
2-Chlorotoluene	ND	2.0	"	"	"	"	II .
2-Hexanone	ND	10.0	"	"	"	"	II
4-Chlorotoluene	ND	2.0	"	"	"	"	II
4-Isopropyltoluene	ND	2.0	"	"	"	"	II
4-Methyl-2-pentanone	ND	10.0	"	"	"	"	II
Acetone	ND	16.0	"	"	"	"	II
Benzene	ND	2.0	"	"	"	"	II
Bromobenzene	ND	2.0	"	"	"	"	II
Bromochloromethane	ND	2.0	II .	"	"	II .	II .
Bromodichloromethane	ND	2.0	u	"	"	"	u u
Bromoform	ND	2.0	u	"	"	"	II .
Bromomethane	ND	2.0	"	"	"	"	II .
Carbon disulfide	ND	5.0	"	"	"	"	II
Carbon tetrachloride	ND	2.0	"	"	"	"	II
Chlorobenzene	ND	2.0	u	"	"	II .	II .
Chloroethane	ND	5.0	u	"	"	"	II
Chloroform	ND	2.0	u	"	"	II .	II .

Origins Laboratory, Inc.



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B-22 1/27/2014 9:41:00AM

		Reporting						
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

Origins Laboratory, Inc. X401273-02 (Soil)

VOC by EPA 8260C

Chloromethane	ND	2.0	ug/kg	1	4A30006	01/30/2014	01/30/2014
cis-1,2-Dichloroethene	ND	2.0	"	"	n .	"	"
cis-1,3-Dichloropropene	ND	2.0	II.	"	"	п	II .
Dibromochloromethane	ND	2.0	II.	"	n .	II .	"
Dibromomethane	ND	2.0	II.	"	n .	II .	"
Ethylbenzene	ND	2.0	II.	"	n .	II .	"
Hexachlorobutadiene	ND	5.0	II.	"	n .	II .	"
lodomethane	ND	15.0	II.	"	n .	II .	"
Isopropylbenzene	ND	2.0	II.	"	n .	II .	"
m,p-Xylene	ND	4.0	II.	"	n .	II .	"
Methyl tert-Butyl Ether	ND	2.0	"	"	n	"	"
Methylene Chloride	ND	10.0	"	"	n .	"	"
Naphthalene	ND	10.0	II.	"	n .	II .	"
n-Butylbenzene	ND	2.0	II.	"	n .	II .	"
n-Propylbenzene	ND	2.0	"	"	n	"	"
o-Xylene	ND	2.0	"	"	n	"	"
sec-Butylbenzene	ND	2.0	"	"	n	"	"
Styrene	ND	2.0	"	"	n .	"	"
tert-Butylbenzene	ND	2.0	"	"	"	u	"
sec-Butylbenzene Styrene	ND ND	2.0 2.0	"	"	11	11	"

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Project Number: 11337801

Project: 33rd St Outfall

B-22 1/27/2014 9:41:00AM

		Reporting						
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

Origins Laboratory, Inc. X401273-02 (Soil)

VOC by EPA 8260C

Tetrachloroethene	ND	2.0	ug/kg	1	4A30006	01/30/2014	01/30/2014	
Toluene	ND	2.0	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	2.0	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	2.0	"	"	"	"	n	
Trichloroethene	ND	2.0	"	"	"	"	"	
Trichlorofluoromethane	ND	2.0	"	"	"	"	n	
Vinyl chloride	ND	2.0	"	"	"	11	п	
Surrogate: 1,2-Dichloroethane-d4	107 %	<i>70-130</i>			"	"	и	
Surrogate: Toluene-d8	98.3 %	70-130			"	"	n .	
Surrogate: 4-Bromofluorobenzene	104 %	70-130			"	"	n .	

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Project Number: 11337801

Project: 33rd St Outfall

B-21 1/27/2014 10:51:00AM

Reporting								
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

GEL Laboratories, LLC X401273-03 (Soil)

Metals by SW846 3050B/6010C

Arsenic	2.50	3.17	mg/kg dry	1	1363143	01/30/2014	01/31/2014	J
Barium	70.2	0.528	"	"	"	"	02/03/2014	
Cadmium	0.153	0.528	"	"	· ·	"	01/31/2014	J
Chromium	5.95	0.528	"	"	"	"	"	
Lead	11.6	1.06	"	"	· ·	•	"	
Selenium	1.01	3.17	"	"	"	"	"	J
Silver	0.254	0.528	"	"	· ·	•	"	J

Metals by SW846 7471A

Mercury 0.0156	0.0128 mg/kg dry	1 136	63210 01/31/20	14 02/03/2014
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TPH-Carbon Chain by EPA Method 8015C

Gasoline (C6-C10)	ND	50.0	mg/kg	1	4A28013	01/28/2014	01/28/2014	
Diesel (C10-C28)	ND	50.0	"	"	"	"	"	
Residual Range Organics (C28-C36)	ND	100	"	"	"	II	"	
TPH - Carbon Chain Total	ND	50.0	"	"	"	"	"	
Surrogate: o-Terphenyl	104 %	59-131			11	"	n.	

VOC by EPA 8260C

1,1,1,2-Tetrachloroethane ND 2.0 ug/kg 1 4A30006 01/30/2014 01/30/2014

Origins Laboratory, Inc.



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Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

B-21 1/27/2014 10:51:00AM

		.,						
		Reporting						
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

Origins Laboratory, Inc. X401273-03 (Soil)

VOC by EPA 8260C

ND	2.0	ug/kg	1	4A30006	01/30/2014	01/30/2014
ND	2.0	"	"	H .	"	"
ND	2.0	"	"	H .	"	"
ND	2.0	"	"	H .	"	"
ND	2.0	"	"	H .	"	"
ND	2.0	"	"	H .	"	"
ND	5.0	"	"	H .	"	"
ND	5.0	"	"	H .	"	"
ND	5.0	"	"	H .	"	"
ND	2.0	"	"	H .	"	"
ND	10.0	"	"	H .	"	"
ND	2.0	"	"	H .	"	"
ND	2.0	"	"	H .	"	"
ND	2.0	"	"	H .	"	"
ND	2.0	"	"	"	"	"
ND	2.0	"	"	"	"	"
ND	2.0	"	"	"	"	"
ND	2.0	"	"	II	"	"
ND	2.0	"	"	"	"	"
	ND N	ND 2.0 ND 2.0 ND 2.0 ND 2.0 ND 2.0 ND 5.0 ND 5.0 ND 5.0 ND 5.0 ND 2.0 ND 2.0 " ND 5.0 " ND 5.0 " ND 5.0 " ND 2.0 "	ND 2.0 " " ND 5.0 " " ND 5.0 " " ND 5.0 " " ND 2.0 " "	ND 2.0 " " " " " ND 2.0 " " " ND 2.0 " " " ND 5.0 " " " " ND 5.0 " " " ND 5.0 " " " ND 10.0 " " " " " ND 10.0 " " " " " " ND 10.0 " " " " " " " ND 10.0 " " " " " " " " " ND 10.0 " " " " " " " " " " " " " " " " " "	ND 2.0 " " " " " " " " ND 2.0 " " " " " " " " " " " ND 2.0 " " " " " " " " " " " " " " " " " " "	

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B-21 1/27/2014 10:51:00AM

		.,						
		Reporting						
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

Origins Laboratory, Inc. X401273-03 (Soil)

VOC by EPA 8260C

2,2-Dichloropropane	ND	2.0	ug/kg	1	4A30006	01/30/2014	01/30/2014
2-Butanone	ND	10.0	п	"	"	II .	п
2-Chlorotoluene	ND	2.0	u	"	"	II .	II .
2-Hexanone	ND	10.0	п	"	"	II .	II .
4-Chlorotoluene	ND	2.0	п	"	"	II .	II .
4-Isopropyltoluene	ND	2.0	п	"	"	II .	II .
4-Methyl-2-pentanone	ND	10.0	u	"	"	II .	II .
Acetone	ND	16.0	u	"	"	II .	II .
Benzene	ND	2.0	u	"	"	II .	II .
Bromobenzene	ND	2.0	II .	"	"	II .	II .
Bromochloromethane	ND	2.0	п	"	"	II .	II .
Bromodichloromethane	ND	2.0	п	"	"	II .	п
Bromoform	ND	2.0	п	"	"	II .	II .
Bromomethane	ND	2.0	п	"	"	II .	п
Carbon disulfide	ND	5.0	п	"	"	II .	II .
Carbon tetrachloride	ND	2.0	п	"	"	II .	II .
Chlorobenzene	ND	2.0	п	"	"	II .	II .
Chloroethane	ND	5.0	п	"	"	II .	II .
Chloroform	ND	2.0	п	"	"	II .	II .

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B-21 1/27/2014 10:51:00AM

		.,						
		Reporting						
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

Origins Laboratory, Inc. X401273-03 (Soil)

VOC by EPA 8260C

Chloromethane	ND	2.0	ug/kg	1	4A30006	01/30/2014	01/30/2014
cis-1,2-Dichloroethene	ND	2.0	"	"	"	"	"
cis-1,3-Dichloropropene	ND	2.0	"	"	"	"	"
Dibromochloromethane	ND	2.0	II .	"	"	II .	"
Dibromomethane	ND	2.0	II .	"	"	II .	"
Ethylbenzene	ND	2.0	11	"	"	II .	"
Hexachlorobutadiene	ND	5.0	11	"	"	II .	"
lodomethane	ND	15.0	11	"	"	II .	"
Isopropylbenzene	ND	2.0	"	"	"	II	"
m,p-Xylene	ND	4.0	"	"	"	u.	"
Methyl tert-Butyl Ether	ND	2.0	"	"	"	u.	"
Methylene Chloride	ND	10.0	"	"	"	u.	"
Naphthalene	ND	10.0	"	"	"	u.	"
n-Butylbenzene	ND	2.0	"	"	"	u.	"
n-Propylbenzene	ND	2.0	"	"	"	u.	"
o-Xylene	ND	2.0	"	"	"	u.	"
sec-Butylbenzene	ND	2.0	"	"	"	"	"
Styrene	ND	2.0	"	"	"	"	"
tert-Butylbenzene	ND	2.0	"	"	"	n	"

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Project: 33rd St Outfall

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		Reporting						
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

Origins Laboratory, Inc. X401273-03 (Soil)

VOC by EPA 8260C

Tetrachloroethene	ND	2.0	ug/kg	1	4A30006	01/30/2014	01/30/2014	
Toluene	ND	2.0	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	2.0	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	2.0	"	"	"	"	"	
Trichloroethene	ND	2.0	"	"	"	n	"	
Trichlorofluoromethane	ND	2.0	"	"	"	"	u	
Vinyl chloride	ND	2.0	"	II	"	п	п	
Surrogate: 1,2-Dichloroethane-d4	106 %	<i>70-130</i>			"	"	и	
Surrogate: Toluene-d8	99.0 %	70-130			"	"	ıı .	
Surrogate: 4-Bromofluorobenzene	102 %	70-130			"	"	n .	

Origins Laboratory, Inc.



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Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

B-20 1/27/2014 12:39:00PM

		Reporting						
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

GEL Laboratories, LLC X401273-04 (Soil)

Metals by SW846 3050B/6010C

Araania	1.23	2.91	mg/kg dry	1	1363143	01/30/2014	01/31/2014	
Arsenic								J
Barium	35.6	0.486	"	"	"	"	02/03/2014	
Cadmium	ND	0.486	"	"	"	"	01/31/2014	U
Chromium	1.76	0.486	"	"	"	"	"	
Lead	1.79	0.971	II .	"	"	II .	II .	
Selenium	ND	2.91	"	"	"	"	"	U
Silver	0.111	0.486	"	"	II .	II .	"	J
Metals by SW846 7471A Mercury	ND	0.0116	mg/kg dry	1	1363210	01/31/2014	02/03/2014	U

TPH-Carbon Chain by EPA Method 8015C

Gasoline (C6-C10)	ND	50.0	mg/kg	1	4A28013	01/28/2014	02/04/2014	
Diesel (C10-C28)	ND	50.0	"	"	"	II .	II .	
Residual Range Organics (C28-C36)	ND	100	"	"	"	II .	II .	
TPH - Carbon Chain Total	ND	50.0	"	"	"	"	n .	
Surrogate: o-Terphenyl	79.2 %	59-131			"	"	п	

VOC by EPA 8260C

1,1,1,2-Tetrachloroethane ND 2.0 ug/kg 1 4A30006 01/30/2014 01/30/2014

Origins Laboratory, Inc.



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Project Number: 11337801

Project: 33rd St Outfall

B-20 1/27/2014 12:39:00PM

		Reporting						
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

Origins Laboratory, Inc. X401273-04 (Soil)

VOC by EPA 8260C

1,1,1-Trichloroethane	ND	2.0	ug/kg	1	4A30006	01/30/2014	01/30/2014
1,1,2,2-Tetrachloroethane	ND	2.0	"	"	"	II .	II .
1,1,2-Trichloroethane	ND	2.0	"	"	"	II .	II .
1,1-Dichloroethane	ND	2.0	"	"	"	II .	II .
1,1-Dichloroethene	ND	2.0	"	"	"	II .	п
1,1-Dichloropropene	ND	2.0	"	"	"	II .	п
1,2,3-Trichlorobenzene	ND	5.0	"	"	"	II	п
1,2,3-Trichloropropane	ND	5.0	"	"	"	II .	п
1,2,4-Trichlorobenzene	ND	5.0	"	"	"	II	п
1,2,4-Trimethylbenzene	ND	2.0	II .	"	"	u.	II.
1,2-Dibromo-3-chloropropane	ND	10.0	II .	"	"	u.	II.
1,2-Dibromoethane (EDB)	ND	2.0	II .	"	"	u.	W .
1,2-Dichlorobenzene	ND	2.0	II .	"	"	u.	II.
1,2-Dichloroethane	ND	2.0	"	"	"	u.	"
1,2-Dichloropropane	ND	2.0	"	"	"	"	"
1,3,5-Trimethylbenzene	ND	2.0	"	"	"	"	"
1,3-Dichlorobenzene	ND	2.0	"	"	"	"	"
1,3-Dichloropropane	ND	2.0	"	"	"	"	"
1,4-Dichlorobenzene	ND	2.0	II .	"	"	II .	"

Origins Laboratory, Inc.



9100 West Jewell Avenue, Suite 200

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Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

B-20 1/27/2014 12:39:00PM

		Reporting						
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

Origins Laboratory, Inc. X401273-04 (Soil)

VOC by EPA 8260C

2,2-Dichloropropane	ND	2.0	ug/kg	1	4A30006	01/30/2014	01/30/2014
2-Butanone	ND	10.0	u u	"	"	"	II .
2-Chlorotoluene	ND	2.0	u u	"	"	"	II .
2-Hexanone	ND	10.0	II	"	"	"	II .
4-Chlorotoluene	ND	2.0	II	"	"	II .	II .
4-Isopropyltoluene	ND	2.0	W .	"	"	II	"
4-Methyl-2-pentanone	ND	10.0	II	"	"	II .	II .
Acetone	ND	16.0	II	"	"	"	II .
Benzene	ND	2.0	II	"	"	II .	II .
Bromobenzene	ND	2.0	W .	"	"	II	"
Bromochloromethane	ND	2.0	W .	"	"	II	II .
Bromodichloromethane	ND	2.0	W .	"	"	II	II .
Bromoform	ND	2.0	II	"	"	II .	II .
Bromomethane	ND	2.0	II	"	"	"	п
Carbon disulfide	ND	5.0	II	"	"	"	п
Carbon tetrachloride	ND	2.0	W .	"	"	II	II .
Chlorobenzene	ND	2.0	W .	"	"	II	"
Chloroethane	ND	5.0	II	"	"	11	II .
Chloroform	ND	2.0	II	"	"	"	II

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Project Number: 11337801

Project: 33rd St Outfall

B-20 1/27/2014 12:39:00PM

Reporting									
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes	

Origins Laboratory, Inc. X401273-04 (Soil)

VOC by EPA 8260C

Chloromethane	ND	2.0	ug/kg	1	4A30006	01/30/2014	01/30/2014
cis-1,2-Dichloroethene	ND	2.0	"	"	"	"	"
cis-1,3-Dichloropropene	ND	2.0	"	"	"	"	"
Dibromochloromethane	ND	2.0	"	"	II .	"	"
Dibromomethane	ND	2.0	"	"	II .	"	"
Ethylbenzene	ND	2.0	"	"	"	"	"
Hexachlorobutadiene	ND	5.0	"	"	"	"	"
lodomethane	ND	15.0	"	"	"	"	"
Isopropylbenzene	ND	2.0	"	"	"	"	"
m,p-Xylene	ND	4.0	"	"	"	"	"
Methyl tert-Butyl Ether	ND	2.0	"	"	"	n .	"
Methylene Chloride	ND	10.0	"	"	"	n .	"
Naphthalene	ND	10.0	"	"	"	"	"
n-Butylbenzene	ND	2.0	"	"	"	"	"
n-Propylbenzene	ND	2.0	"	"	"	n .	n
o-Xylene	ND	2.0	"	"	"	n .	n
sec-Butylbenzene	ND	2.0	"	"	"	n .	"
Styrene	ND	2.0	"	"	"	"	"
tert-Butylbenzene	ND	2.0	"	"	"	"	"

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Project Number: 11337801

Project: 33rd St Outfall

B-20 1/27/2014 12:39:00PM

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	Reporting						
Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

Origins Laboratory, Inc. X401273-04 (Soil)

VOC by EPA 8260C

Analyte

Tetrachloroethene	ND	2.0	ug/kg	1	4A30006	01/30/2014	01/30/2014	
Toluene	ND	2.0	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	2.0	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	2.0	"	"	"	"	"	
Trichloroethene	ND	2.0	"	"	"	"	n	
Trichlorofluoromethane	ND	2.0	"	"	"	"	n	
Vinyl chloride	ND	2.0	II	"	II	11	п	
Surrogate: 1,2-Dichloroethane-d4	105 %	70-130			"	"	и	
Surrogate: Toluene-d8	99.0 %	70-130			"	"	ıı .	
Surrogate: 4-Bromofluorobenzene	102 %	<i>70-130</i>			"	"	n .	

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Project Number: 11337801

Project: 33rd St Outfall

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control Origins Laboratory, Inc.

		Reporting		Spike	Course		0/ DEC		DDD	
		reporting		Spike	Source		%REC		RPD	
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes

Batch 4A30006 - EPA 5030 (soil)

Blank (4A30006-BLK1)				Prepared: 01/30/2014 Analyzed: 01/30/2014
1,1,1,2-Tetrachloroethane	ND	4.0	ug/kg	
1,1,1-Trichloroethane	ND	4.0	II .	
1,1,2,2-Tetrachloroethane	ND	4.0	"	
1,1,2-Trichloroethane	ND	4.0	II .	
1,1-Dichloroethane	ND	4.0	II .	
1,1-Dichloroethene	ND	4.0	u u	
1,1-Dichloropropene	ND	4.0	u u	
1,2,3-Trichlorobenzene	ND	10.0	"	
1,2,3-Trichloropropane	ND	10.0	"	
1,2,4-Trichlorobenzene	ND	10.0	"	
1,2,4-Trimethylbenzene	ND	4.0	"	
1,2-Dibromo-3-chloropropane	ND	20.0	"	
1,2-Dibromoethane (EDB)	ND	4.0	"	
1,2-Dichlorobenzene	ND	4.0	"	
1,2-Dichloroethane	ND	4.0	u u	
1,2-Dichloropropane	ND	4.0	u u	
1,3,5-Trimethylbenzene	ND	4.0	u u	
1,3-Dichlorobenzene	ND	4.0	u u	
1,3-Dichloropropane	ND	4.0	u u	
1,4-Dichlorobenzene	ND	4.0	u u	
2,2-Dichloropropane	ND	4.0	u u	
2-Butanone	ND	20.0	"	
2-Chlorotoluene	ND	4.0	u u	
2-Hexanone	ND	20.0	"	
4-Chlorotoluene	ND	4.0	"	
4-Isopropyltoluene	ND	4.0	"	

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Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control Origins Laboratory, Inc.

		Reporting		Spike	Course		0/ DEC		DDD	
		reporting		Spike	Source		%REC		RPD	
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes

Batch 4A30006 - EPA 5030 (soil)

Blank (4A30006-BLK1)				Prepared: 01/30/2014 Analyzed: 01/30/2014
4-Methyl-2-pentanone	ND	20.0	ug/kg	
Acetone	ND	32.0	"	
Benzene	ND	4.0	II .	
Bromobenzene	ND	4.0	"	
Bromochloromethane	ND	4.0	"	
Bromodichloromethane	ND	4.0	"	
Bromoform	ND	4.0	"	
Bromomethane	ND	4.0	"	
Carbon disulfide	ND	10.0	"	
Carbon tetrachloride	ND	4.0	II .	
Chlorobenzene	ND	4.0	"	
Chloroethane	ND	10.0	"	
Chloroform	ND	4.0	"	
Chloromethane	ND	4.0	"	
cis-1,2-Dichloroethene	ND	4.0	"	
cis-1,3-Dichloropropene	ND	4.0	"	
Dibromochloromethane	ND	4.0	"	
Dibromomethane	ND	4.0	"	
Ethylbenzene	ND	4.0	"	
Hexachlorobutadiene	ND	10.0	"	
lodomethane	ND	30.0	"	
Isopropylbenzene	ND	4.0	"	
m,p-Xylene	ND	8.0	II .	
Methyl tert-Butyl Ether	ND	4.0	II .	
Methylene Chloride	ND	20.0	II .	
Naphthalene	ND	20.0	u u	

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Project Number: 11337801

Project: 33rd St Outfall

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike	Source	%REC	%REC Limits	RPD	RPD Limit	Notes
Analyte	Nesuit	LIIIII	Office	Level	Result	%REC	Limits	RPD	Limit	Notes

Batch 4A30006 - EPA 5030 (soil)

Blank (4A30006-BLK1)					Prepared: 01/30/2014 Analyzed: 01/30/2014
n-Butylbenzene	ND	4.0	ug/kg		
n-Propylbenzene	ND	4.0	"		
o-Xylene	ND	4.0	"		
sec-Butylbenzene	ND	4.0	"		
Styrene	ND	4.0	n .		
tert-Butylbenzene	ND	4.0	n .		
Tetrachloroethene	ND	4.0	II .		
Toluene	ND	4.0	"		
trans-1,2-Dichloroethene	ND	4.0	"		
trans-1,3-Dichloropropene	ND	4.0	"		
Trichloroethene	ND	4.0	"		
Trichlorofluoromethane	ND	4.0	"		
Vinyl chloride	ND	4.0	"		
Surrogate: 1,2-Dichloroethane-d4	64		ug/L	62.5	103 70-130
Surrogate: Toluene-d8	62		"	62.5	99.4 70-130
Surrogate: 4-Bromofluorobenzene	64		n .	62.5	<i>102 70-130</i>

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Project Number: 11337801

Project: 33rd St Outfall

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control Origins Laboratory, Inc.

		Reporting		Spike	Source		%REC		RPD	
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes

Batch 4A30006 - EPA 5030 (soil)

LCS (4A30006-BS1)				Pi	repared: 01/30/201	4 Analyzed: 01/30/20	14
1,1,1,2-Tetrachloroethane	175	4.0	ug/kg	200	87.6	70-130	
1,1,1-Trichloroethane	205	4.0	"	200	102	70-130	
1,1,2,2-Tetrachloroethane	209	4.0	"	200	104	70-130	
1,1,2-Trichloroethane	209	4.0	"	200	104	70-130	
1,1-Dichloroethane	198	4.0	"	200	99.1	70-130	
1,1-Dichloroethene	200	4.0	"	200	99.9	70-130	
1,1-Dichloropropene	191	4.0	"	200	95.5	70-130	
1,2,3-Trichlorobenzene	199	10.0	"	200	99.6	70-130	
1,2,3-Trichloropropane	197	10.0	"	200	98.4	70-130	
1,2,4-Trichlorobenzene	200	10.0	"	200	100	70-130	
1,2,4-Trimethylbenzene	203	4.0	"	200	102	70-130	
1,2-Dibromo-3-chloropropane	209	20.0	"	200	105	70-130	
1,2-Dibromoethane (EDB)	216	4.0	"	200	108	70-130	
1,2-Dichlorobenzene	196	4.0	"	200	97.9	70-130	
1,2-Dichloroethane	213	4.0	"	200	107	70-130	
1,2-Dichloropropane	210	4.0	"	200	105	70-130	
1,3,5-Trimethylbenzene	209	4.0	"	200	104	70-130	
1,3-Dichlorobenzene	195	4.0	"	200	97.5	70-130	
1,3-Dichloropropane	205	4.0	"	200	102	70-130	
1,4-Dichlorobenzene	191	4.0	"	200	95.7	70-130	
2,2-Dichloropropane	192	4.0	"	200	96.1	70-130	
2-Butanone	1080	20.0	"	1000	108	70-130	
2-Chlorotoluene	220	4.0	"	200	110	70-130	
2-Hexanone	1030	20.0	"	250	412	70-130	J-0
4-Chlorotoluene	192	4.0	"	200	95.8	70-130	
4-Isopropyltoluene	199	4.0	II	200	99.5	70-130	

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Project Number: 11337801

Project: 33rd St Outfall

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control Origins Laboratory, Inc.

		Reporting		Spike	Source		%REC		RPD	
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes

Batch 4A30006 - EPA 5030 (soil)

LCS (4A30006-BS1)				Pro	epared: 01/30/201	4 Analyzed: 01/30/2014	
4-Methyl-2-pentanone	1100	20.0	ug/kg	1000	110	70-130	
Acetone	1070	32.0	"	250	429	70-130	J-02
Benzene	196	4.0	"	200	98.2	70-130	
Bromobenzene	184	4.0	"	200	92.1	70-130	
Bromochloromethane	207	4.0	"	200	104	70-130	
Bromodichloromethane	209	4.0	"	200	104	70-130	
Bromoform	227	4.0	"	200	113	70-130	
Bromomethane	204	4.0	"	200	102	70-130	
Carbon disulfide	972	10.0	"	1000	97.2	70-130	
Carbon tetrachloride	199	4.0	"	200	99.5	70-130	
Chlorobenzene	198	4.0	"	200	99.1	70-130	
Chloroethane	202	10.0	"	200	101	70-130	
Chloroform	183	4.0	"	200	91.5	70-130	
Chloromethane	206	4.0	"	200	103	70-130	
cis-1,2-Dichloroethene	204	4.0	"	200	102	70-130	
cis-1,3-Dichloropropene	199	4.0	"	200	99.3	70-130	
Dibromochloromethane	223	4.0	"	200	112	70-130	
Dibromomethane	209	4.0	"	200	105	70-130	
Ethylbenzene	182	4.0	"	200	91.1	70-130	
Hexachlorobutadiene	197	10.0	"	200	98.5	70-130	
lodomethane	860	30.0	"	1000	86.0	70-130	
Isopropylbenzene	199	4.0	"	200	99.3	70-130	
m,p-Xylene	365	8.0	II .	400	91.3	70-130	
Methyl tert-Butyl Ether	208	4.0	II .	200	104	70-130	
Methylene Chloride	212	20.0	II .	200	106	70-130	
Naphthalene	210	20.0	"	200	105	70-130	

Origins Laboratory, Inc.



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Project Number: 11337801

Project: 33rd St Outfall

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes	
7 thany to	rtoodit		Ornito	Level	Result	%KEU	LIIIIIIS	KPD	LITTIIL	notes	ĺ

Batch 4A30006 - EPA 5030 (soil)

LCS (4A30006-BS1)				F	Prepared: 01/30/201	4 Analyzed: 01/30/2014	
n-Butylbenzene	195	4.0	ug/kg	200	97.6	70-130	
n-Propylbenzene	205	4.0	II .	200	102	70-130	
o-Xylene	200	4.0	II .	200	100	70-130	
sec-Butylbenzene	203	4.0	II .	200	102	70-130	
Styrene	207	4.0	II .	200	104	70-130	
tert-Butylbenzene	210	4.0	II .	200	105	70-130	
Tetrachloroethene	196	4.0	II .	200	98.0	70-130	
Toluene	199	4.0	"	200	99.7	70-130	
trans-1,2-Dichloroethene	200	4.0	"	200	99.9	70-130	
trans-1,3-Dichloropropene	199	4.0	"	200	99.3	70-130	
Trichloroethene	201	4.0	"	200	101	70-130	
Trichlorofluoromethane	203	4.0	"	200	101	70-130	
Vinyl chloride	209	4.0	"	200	105	70-130	
Surrogate: 1,2-Dichloroethane-d4	64		ug/L	62.5	102	70-130	
Surrogate: Toluene-d8	62		"	62.5	99.8	70-130	
Surrogate: 4-Bromofluorobenzene	63		"	62.5	101	70-130	

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Project Number: 11337801

Project: 33rd St Outfall

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike	Source	%REC	%REC Limits	RPD	RPD Limit	Notes
Analyte	Nesuit	LIIIII	Office	Level	Result	%REC	Limits	RPD	Limit	Notes

Batch 4A30006 - EPA 5030 (soil)

Matrix Spike (4A30006-MS1)		Source: X4	401273-01		Prepare	d: 01/30/201	4 Analyzed: 01/30/2014	
1,1,1,2-Tetrachloroethane	163	4.0	ug/kg	200	ND	81.4	70-130	
1,1,1-Trichloroethane	194	4.0	"	200	ND	97.1	70-130	
1,1,2,2-Tetrachloroethane	198	4.0	"	200	ND	99.0	70-130	
1,1,2-Trichloroethane	199	4.0	"	200	ND	99.4	70-130	
1,1-Dichloroethane	191	4.0	"	200	ND	95.7	70-130	
1,1-Dichloroethene	189	4.0	"	200	ND	94.4	70-130	
1,1-Dichloropropene	183	4.0	"	200	ND	91.4	70-130	
1,2,3-Trichlorobenzene	185	10.0	"	200	ND	92.3	70-130	
1,2,3-Trichloropropane	187	10.0	"	200	ND	93.4	70-130	
1,2,4-Trichlorobenzene	181	10.0	"	200	ND	90.6	70-130	
1,2,4-Trimethylbenzene	185	4.0	"	200	ND	92.7	70-130	
1,2-Dibromo-3-chloropropane	207	20.0	"	200	ND	104	70-130	
1,2-Dibromoethane (EDB)	201	4.0	"	200	ND	101	70-130	
1,2-Dichlorobenzene	183	4.0	"	200	ND	91.5	70-130	
1,2-Dichloroethane	204	4.0	"	200	ND	102	70-130	
1,2-Dichloropropane	197	4.0	"	200	ND	98.6	70-130	
1,3,5-Trimethylbenzene	192	4.0	"	200	ND	95.9	70-130	
1,3-Dichlorobenzene	182	4.0	"	200	ND	90.8	70-130	
1,3-Dichloropropane	191	4.0	"	200	ND	95.3	70-130	
1,4-Dichlorobenzene	179	4.0	"	200	ND	89.5	70-130	
2,2-Dichloropropane	183	4.0	"	200	ND	91.7	70-130	
2-Butanone	1040	20.0	"	1000	ND	104	70-130	
2-Chlorotoluene	162	4.0	"	200	ND	81.2	70-130	
2-Hexanone	990	20.0	"	250	ND	396	70-130	J-0
4-Chlorotoluene	179	4.0	"	200	ND	89.4	70-130	
4-Isopropyltoluene	183	4.0	"	200	ND	91.6	70-130	

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Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike	Source	%REC	%REC Limits	RPD	RPD Limit	Notes
Analyte	Nesuit	LIIIII	Office	Level	Result	%REC	Limits	RPD	Limit	Notes

Batch 4A30006 - EPA 5030 (soil)

Matrix Spike (4A30006-MS1) 4-Methyl-2-pentanone		Source: X4	101273-01		Prepare	d: 01/30/201	4 Analyzed: 01/30/2014	
4-Methyl-2-pentanone	1040	20.0	ug/kg	1000	8.3	103	70-130	
Acetone	1020	32.0	"	250	8.2	405	70-130	J-02
Benzene	186	4.0	"	200	ND	93.0	70-130	
Bromobenzene	176	4.0	"	200	ND	88.2	70-130	
Bromochloromethane	198	4.0	"	200	ND	98.8	70-130	
Bromodichloromethane	196	4.0	"	200	ND	98.1	70-130	
Bromoform	214	4.0	"	200	ND	107	70-130	
Bromomethane	198	4.0	"	200	ND	98.8	70-130	
Carbon disulfide	921	10.0	"	1000	ND	92.1	70-130	
Carbon tetrachloride	188	4.0	"	200	ND	93.9	70-130	
Chlorobenzene	186	4.0	"	200	ND	92.8	70-130	
Chloroethane	199	10.0	"	200	ND	99.3	70-130	
Chloroform	177	4.0	"	200	ND	88.7	70-130	
Chloromethane	195	4.0	"	200	ND	97.3	70-130	
cis-1,2-Dichloroethene	195	4.0	"	200	ND	97.6	70-130	
cis-1,3-Dichloropropene	189	4.0	"	200	ND	94.5	70-130	
Dibromochloromethane	215	4.0	"	200	ND	107	70-130	
Dibromomethane	199	4.0	"	200	ND	99.7	70-130	
Ethylbenzene	171	4.0	"	200	ND	85.6	70-130	
Hexachlorobutadiene	168	10.0	"	200	ND	84.0	70-130	
lodomethane	813	30.0	"	1000	ND	81.3	70-130	
Isopropylbenzene	186	4.0	u .	200	ND	92.8	70-130	
m,p-Xylene	346	8.0	u u	400	ND	86.5	70-130	
Methyl tert-Butyl Ether	200	4.0	u .	200	ND	99.9	70-130	
Methylene Chloride	204	20.0	u .	200	9.0	97.5	70-130	
Naphthalene	201	20.0	"	200	ND	100	70-130	

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Project: 33rd St Outfall

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike	Source	%REC	%REC Limits	RPD	RPD Limit	Notes
Analyte	Nesuit	LIIIII	Ullits	Level	Result	%REC	Limits	RPD	Limit	Notes

Batch 4A30006 - EPA 5030 (soil)

Matrix Spike (4A30006-MS1)		Source: X	401273-01		Prepare	ed: 01/30/201	14 Analyzed: 01/30/2014
n-Butylbenzene	181	4.0	ug/kg	200	ND	90.6	70-130
n-Propylbenzene	187	4.0	"	200	ND	93.3	70-130
o-Xylene	186	4.0	"	200	ND	92.8	70-130
sec-Butylbenzene	185	4.0	"	200	ND	92.7	70-130
Styrene	194	4.0	"	200	ND	96.8	70-130
tert-Butylbenzene	194	4.0	II .	200	ND	97.2	70-130
Tetrachloroethene	184	4.0	"	200	ND	92.2	70-130
Toluene	185	4.0	"	200	ND	92.6	70-130
trans-1,2-Dichloroethene	189	4.0	"	200	ND	94.4	70-130
trans-1,3-Dichloropropene	189	4.0	"	200	ND	94.5	70-130
Trichloroethene	192	4.0	"	200	ND	95.8	70-130
Trichlorofluoromethane	194	4.0	"	200	ND	97.1	70-130
Vinyl chloride	196	4.0	"	200	ND	97.8	70-130
Surrogate: 1,2-Dichloroethane-d4	64		ug/L	62.5		103	70-130
Surrogate: Toluene-d8	61		II .	62.5		98.1	70-130
Surrogate: 4-Bromofluorobenzene	63		"	62.5		101	70-130

Origins Laboratory, Inc.



9100 West Jewell Avenue, Suite 200

Lakewood

CO 80232

Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike	Source	%REC	%REC Limits	RPD	RPD Limit	Notes
Analyte	Nesuit	LIIIII	Ullits	Level	Result	%REC	Limits	RPD	Limit	Notes

Batch 4A30006 - EPA 5030 (soil)

1,1,1,2-Tetrachloroethane1631,1,1-Trichloroethane1941,1,2,2-Tetrachloroethane1981,1,2-Trichloroethane1991,1-Dichloroethane1911,1-Dichloroethene1891,1-Dichloropropene1831,2,3-Trichlorobenzene185	4.0 4.0 4.0 4.0 4.0 4.0 10.0	ug/kg " " " "	200 200 200 200 200 200 200 200 200	ND ND ND ND ND ND	81.4 97.1 99.0 99.4 95.7 94.4 91.4	70-130 70-130 70-130 70-130 70-130 70-130 70-130	0.00 0.00 0.00 0.00 0.00 0.00	20 20 20 20 20 20 20 20	
1,1,2,2-Tetrachloroethane1981,1,2-Trichloroethane1991,1-Dichloroethane1911,1-Dichloroethene1891,1-Dichloropropene183	4.0 4.0 4.0 4.0 4.0 10.0	" " " "	200 200 200 200 200 200	ND ND ND ND	99.0 99.4 95.7 94.4	70-130 70-130 70-130 70-130	0.00 0.00 0.00 0.00	20 20 20 20	
1,1,2-Trichloroethane1991,1-Dichloroethane1911,1-Dichloroethene1891,1-Dichloropropene183	4.0 4.0 4.0 4.0 10.0	" " " "	200 200 200 200	ND ND ND ND	99.4 95.7 94.4	70-130 70-130 70-130	0.00 0.00 0.00	20 20 20	
1,1-Dichloroethane1911,1-Dichloroethene1891,1-Dichloropropene183	4.0 4.0 4.0 10.0	" " "	200 200 200	ND ND ND	95.7 94.4	70-130 70-130	0.00	20 20	
1,1-Dichloroethene 189 1,1-Dichloropropene 183	4.0 4.0 10.0 10.0	" "	200 200	ND ND	94.4	70-130	0.00	20	
1,1-Dichloropropene 183	4.0 10.0 10.0	"	200	ND					
• •	10.0 10.0	"			91.4	70-130	0.00	20	
1.2.3 Trichlorohonzono 195	10.0		200	ND			0.00	20	
1,2,3-1110110100001120110		"		ND	92.3	70-130	0.00	20	
1,2,3-Trichloropropane 187	10.0		200	ND	93.4	70-130	0.00	20	
1,2,4-Trichlorobenzene 181	10.0	"	200	ND	90.6	70-130	0.00	20	
1,2,4-Trimethylbenzene 185	4.0	"	200	ND	92.7	70-130	0.00	20	
1,2-Dibromo-3-chloropropane 207	20.0	"	200	ND	104	70-130	0.00	20	
1,2-Dibromoethane (EDB) 201	4.0	"	200	ND	101	70-130	0.00	20	
1,2-Dichlorobenzene 183	4.0	"	200	ND	91.5	70-130	0.00	20	
1,2-Dichloroethane 204	4.0	"	200	ND	102	70-130	0.00	20	
1,2-Dichloropropane 197	4.0	"	200	ND	98.6	70-130	0.00	20	
1,3,5-Trimethylbenzene 192	4.0	"	200	ND	95.9	70-130	0.00	20	
1,3-Dichlorobenzene 182	4.0	"	200	ND	90.8	70-130	0.00	20	
1,3-Dichloropropane 191	4.0	"	200	ND	95.3	70-130	0.00	20	
1,4-Dichlorobenzene 179	4.0	"	200	ND	89.5	70-130	0.00	20	
2,2-Dichloropropane 183	4.0	"	200	ND	91.7	70-130	0.00	20	
2-Butanone 1040	20.0	"	1000	ND	104	70-130	0.00	20	
2-Chlorotoluene 162	4.0	"	200	ND	81.2	70-130	0.00	20	
2-Hexanone 990	20.0	"	250	ND	396	70-130	0.00	20	J-0
4-Chlorotoluene 179	4.0	"	200	ND	89.4	70-130	0.00	20	
4-Isopropyltoluene 183	4.0	"	200	ND	91.6	70-130	0.00	20	

Origins Laboratory, Inc.



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Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike	Source	%REC	%REC Limits	RPD	RPD Limit	Notes
Analyte	Nesuit	LIIIII	Office	Level	Result	%REC	Limits	RPD	Limit	Notes

Batch 4A30006 - EPA 5030 (soil)

Matrix Spike Dup (4A30006-MSD1)		Source: X4	401273-01		Prepare	d: 01/30/201	4 Analyzed: 01	/30/2014		
4-Methyl-2-pentanone	1040	20.0	ug/kg	1000	8.3	103	70-130	0.00	20	
Acetone	1020	32.0	"	250	8.2	405	70-130	0.00	20	J-02
Benzene	186	4.0	"	200	ND	93.0	70-130	0.00	20	
Bromobenzene	176	4.0	"	200	ND	88.2	70-130	0.00	20	
Bromochloromethane	198	4.0	"	200	ND	98.8	70-130	0.00	20	
Bromodichloromethane	196	4.0	"	200	ND	98.1	70-130	0.00	20	
Bromoform	214	4.0	"	200	ND	107	70-130	0.00	20	
Bromomethane	198	4.0	"	200	ND	98.8	70-130	0.00	20	
Carbon disulfide	921	10.0	"	1000	ND	92.1	70-130	0.00	20	
Carbon tetrachloride	188	4.0	"	200	ND	93.9	70-130	0.00	20	
Chlorobenzene	186	4.0	"	200	ND	92.8	70-130	0.00	20	
Chloroethane	199	10.0	"	200	ND	99.3	70-130	0.00	20	
Chloroform	177	4.0	"	200	ND	88.7	70-130	0.00	20	
Chloromethane	195	4.0	"	200	ND	97.3	70-130	0.00	20	
cis-1,2-Dichloroethene	195	4.0	"	200	ND	97.6	70-130	0.00	20	
cis-1,3-Dichloropropene	189	4.0	"	200	ND	94.5	70-130	0.00	20	
Dibromochloromethane	215	4.0	"	200	ND	107	70-130	0.00	20	
Dibromomethane	199	4.0	"	200	ND	99.7	70-130	0.00	20	
Ethylbenzene	171	4.0	"	200	ND	85.6	70-130	0.00	20	
Hexachlorobutadiene	168	10.0	"	200	ND	84.0	70-130	0.00	20	
lodomethane	813	30.0	"	1000	ND	81.3	70-130	0.00	20	
Isopropylbenzene	186	4.0	"	200	ND	92.8	70-130	0.00	20	
m,p-Xylene	346	8.0	"	400	ND	86.5	70-130	0.00	20	
Methyl tert-Butyl Ether	200	4.0	u u	200	ND	99.9	70-130	0.00	20	
Methylene Chloride	204	20.0	u u	200	9.0	97.5	70-130	0.00	20	
Naphthalene	201	20.0	u u	200	ND	100	70-130	0.00	20	

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Project: 33rd St Outfall

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike	Source Result	%RFC	%REC	RPD	RPD Limit	Notes	
Analyte	Result	LIIIII	Ullits	Level	Result	%REC	Limits	RPD	Limit	Notes	ĺ

Batch 4A30006 - EPA 5030 (soil)

Matrix Spike Dup (4A30006-MSD1)		Source: X4	401273-01		Prepare	d: 01/30/201	4 Analyzed: 01	/30/2014	
n-Butylbenzene	181	4.0	ug/kg	200	ND	90.6	70-130	0.00	20
n-Propylbenzene	187	4.0	"	200	ND	93.3	70-130	0.00	20
o-Xylene	186	4.0	"	200	ND	92.8	70-130	0.00	20
sec-Butylbenzene	185	4.0	"	200	ND	92.7	70-130	0.00	20
Styrene	194	4.0	"	200	ND	96.8	70-130	0.00	20
tert-Butylbenzene	194	4.0	"	200	ND	97.2	70-130	0.00	20
Tetrachloroethene	184	4.0	"	200	ND	92.2	70-130	0.00	20
Toluene	185	4.0	"	200	ND	92.6	70-130	0.00	20
trans-1,2-Dichloroethene	189	4.0	"	200	ND	94.4	70-130	0.00	20
trans-1,3-Dichloropropene	189	4.0	"	200	ND	94.5	70-130	0.00	20
Trichloroethene	192	4.0	"	200	ND	95.8	70-130	0.00	20
Trichlorofluoromethane	194	4.0	"	200	ND	97.1	70-130	0.00	20
Vinyl chloride	196	4.0	"	200	ND	97.8	70-130	0.00	20
Surrogate: 1,2-Dichloroethane-d4	64		ug/L	62.5		103	70-130		
Surrogate: Toluene-d8	61		II .	62.5		98.1	70-130		
Surrogate: 4-Bromofluorobenzene	63		11	62.5		101	70-130		

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Project Number: 11337801

Project: 33rd St Outfall

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike	Source	%REC	%REC	RPD	RPD Limit	Notes	1
Allalyte	resuit	LIIIII	Office	Level	Result	%REC	Limits	RPD	Limit	Notes	

Extractable Petroleum Hydrocarbons by 8015M - Quality Control Origins Laboratory, Inc.

		Reporting		Spike	Course		0/ DEC		DDD	
		reporting		Spike	Source		%REC		RPD	
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes

Batch 4A28013 - EPA 3580

Blank (4A28013-BLK1)					Prepare	d: 01/28/201	4 Analyzed: 01	/28/2014	
Gasoline (C6-C10)	ND	50.0	mg/kg						
Diesel (C10-C28)	ND	50.0	"						
Residual Range Organics (C28-C36)	ND	100	"						
TPH - Carbon Chain Total	ND	50.0	II .						
Surrogate: o-Terphenyl	39.4		g	50.0		78.9	59-131		
LCS (4A28013-BS1)					Prepare	d: 01/28/201	4 Analyzed: 01	/28/2014	
Gasoline (C6-C10)	847	50.0	mg/kg	1000		84.7	59-133		
Diesel (C10-C28)	916	50.0	"	1000		91.6	64-121		
Residual Range Organics (C28-C36)	990	100	"	1000		99.0	58-124		
Surrogate: o-Terphenyl	45.5		g	50.0		91.0	59-131		
Matrix Spike (4A28013-MS1)		Source: X	401270-03		Prepare	d: 01/28/201	4 Analyzed: 01/28/2014		
Gasoline (C6-C10)	871	50.0	mg/kg	1000	ND	87.1	57-139		
Diesel (C10-C28)	913	50.0	II .	1000	ND	91.3	53-125		
Residual Range Organics (C28-C36)	1000	100	"	1000	ND	100	47-133		
Surrogate: o-Terphenyl	45.1		g	50.0		90.3	59-131		
Matrix Spike Dup (4A28013-MSD1)		Source: X	401270-03		Prepare	d: 01/28/201	4 Analyzed: 01	/28/2014	
Gasoline (C6-C10)	859	50.0	mg/kg	1000	ND	85.9	57-139	1.33	20
Diesel (C10-C28)	898	50.0	"	1000	ND	89.8	53-125	1.74	20
Residual Range Organics (C28-C36)	1010	100	"	1000	ND	101	47-133	0.531	20

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Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

Extractable Petroleum Hydrocarbons by 8015M - Quality Control Origins Laboratory, Inc.

Analyte Result Limit Units Level Result %REC Limits RPD Limit N		Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 4A28013 - EPA 3580

Matrix Spike Dup (4A28013-MSD1)		Source: X401270-03	Prepared: 01/28/2014 Analyzed: 01/28/2014					
Surrogate: o-Terphenyl	45.6	g	50.0	91.2	59-131			

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Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

Metals by SW846 3050B/6010C - Quality Control **GEL Laboratories, LLC**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1363143 - SW846 3050B										
BLANK (1203026923-BLK)					Prepared	d: 01/30/2014	Analyzed: 01	/31/2014		
Selenium	0.523	2.96	mg/kg		0		-			J
Silver	ND	0.493	"		0		-			U
Lead	ND	0.986	II .		0		-			U
Chromium	ND	0.493	"		0		-			U
Cadmium	ND	0.493	"		0		-			U
Barium	ND	0.493	"		0		-			U
Arsenic	ND	2.96	"		0		-			U
LCS (1203026924-BKS)					Prepared	d: 01/30/2014	Analyzed: 01	/31/2014		
Silver	45.3	0.479	mg/kg	47.9	0	94.6	80-120			
Selenium	47.1	2.87	"	47.9	0	98.4	80-120			
Lead	45.5	0.958	II .	47.9	0	95.1	80-120			
Chromium	45.7	0.479	"	47.9	0	95.4	80-120			
Cadmium	46.4	0.479	m .	47.9	0	96.8	80-120			
Barium	47.7	0.479	"	47.9	0	99.6	80-120			
Arsenic	46.3	2.87	"	47.9	0	96.8	80-120			
DUP (1203026925 D)		Source: X40	1273-01		Prepared	d: 01/3 <mark>0/2014</mark>	Analyzed: 01	/31/2014		
Arsenic	3.00	3.19	mg/kg dry		3.86		0-20	24.9	20	J
Barium	98.9	0.532	"		104		0-20	4.77	20	
Chromium	6.73	0.532	"		7.21		0-20	6.83	20	
Lead	6.88	1.06	"		8.11		0-20	16.4	20	
Selenium	1.63	3.19	"		1.40		0-20	14.9	20	J
Silver	0.211	0.532	"		0.251		0-20	17.0	20	J
Cadmium	0.152	0.532	"		0.132		0-20	14.1	20	J
MS (1203026926 S)		Source: X40	1273-01		Prepared	d: 01/30/2014	Analyzed: 01	/31/2014		

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Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

Metals by SW846 3050B/6010C - Quality Control GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike	Source	%REC	%REC Limits	RPD	RPD Limit	Notes
Analyte	Nesuit	LIIIII	Ullits	Level	Result	%REC	Limits	RPD	Limit	Notes

Batch 1363143 - SW846 3050B

MS (1203026926 S)		Source: X401273-01				Prepared: 01/30/2014 Analyzed: 01/31/2014				
Cadmium	48.0	0.537	mg/kg dry	53.7	0.132	89	75-125			
Barium	178	0.537	"	53.7	104	138	75-125			
Chromium	57.4	0.537	"	53.7	7.21	93.4	75-125			
Lead	56.6	1.07	"	53.7	8.11	90.2	75-125			
Selenium	50.7	3.22	"	53.7	1.40	91.8	75-125			
Silver	49.3	0.537	"	53.7	0.251	91.4	75-125			
Arsenic	51.5	3.22	"	53.7	3.86	88.7	75-125			
PS (1203029329 S)		Source: X	401273-01		Prepare	d: 01/30/20 ²	14 Analyzed: 02/03/2014			
Barium	1.73	0.00556	mg/kg dry	500	104	118	80-120			

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Project Number: 11337801

Project: 33rd St Outfall

Metals by SW846 7471A - Quality Control GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1363210 - SW846 7471A Pre	ep									
BLANK (1203027083-BLK)					Prepared	I: 01/31/2014	Analyzed: 02	/03/2014		
Mercury	ND	0.0115	mg/kg		0		-			U
LCS (1203027084-BKS)					Prepared	I: 01/31/2014	Analyzed: 02	/03/2014		
Mercury	0.114	0.0119	mg/kg	0.119	0	95.7	80-120			
DUP (1203027085 D)		Source: X4	01273-01		Prepared	I: 01/31/2014	Analyzed: 02	/03/2014		
Mercury	0.0163	0.0127	mg/kg dry		0.0138		0-20	16.8	20	
MS (1203027086 S)		Source: X4	01273-01		Prepared	I: 01/31/2014	Analyzed: 02	/03/2014		
Mercury	0.139	0.0131	mg/kg dry	0.131	0.0138	95.7	80-120			

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Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

Notes and Definitions

U Result not detected above the detection limit

J-02 Reported value failed to meet established quality control criteria for the precision accuracy.

J Greater than the detection limit but less than the reporting limit

ND Analyte NOT DETECTED at or above the reporting limit

RPD Relative Percent Difference

Origins Laboratory, Inc.



May 09, 2013

Pinyon

Stan Spencer

9100 West Jewell Avenue, Suite 200

Lakewood

CO 80232

Project Name - 33rd St Outfall

Project Number - [none]

Attached are you analytical results for 33rd St Outfall received by Origins Laboratory, Inc. May 02, 2013. This project is associated with Origins project number X305007-01.

The analytical results in the following report were analyzed under the guidelines of EPA Methods. These methods are identified as follows; "SW" are defined in SW-846, "EPA" are defined in 40CFR part 136 and "SM" are defined in the most current revision of Standard Methods For the Examination of Water and Wastewater.

The analytical results apply specifically to the samples and analyses specified per the attached Chain of Custody. As such, this report shall not be reproduced except in full, without the written approval of Origin's laboratory.

Unless otherwise noted, the analytical results for all soil samples are reported on a wet weight basis. All analytical analyses were performed under NELAP guidelines unless noted by a data qualifier.

Any holding time exceedances, deviations from the method specifications or deviations from Origins Laboratory's Standard Operating Procedures are outlined in the case narrative.

Thank you for selecting Origins for your analytical needs. Please contact us with any questions concerning this report, or if we can help with anything at all.

Origins Laboratory, Inc. 303.433.1322 o-squad@oelabinc.com





1725 Elk Place, Denver, CO 80211 | Phone: 303.433.1322 | Fax: 303.265.9645



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Stan Spencer

Project Number: [none]

Project: 33rd St Outfall

CROSS REFERENCE REPORT

	ONOGO NEI ENEMOE NEI ONT									
Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received						
B-14 @ 1'	X305007-01	Soil	May 2, 2013 9:48	05/02/2013 16:22						
B-15 @ 4'	X305007-02	Soil	May 2, 2013 9:48	05/02/2013 16:22						

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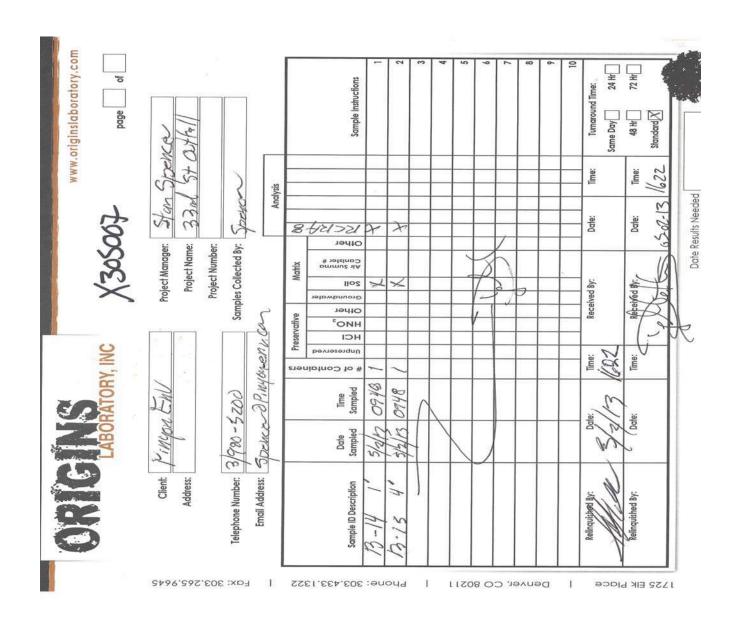
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Stan Spencer

Project Number: [none]

Project: 33rd St Outfall



Origins Laboratory, Inc.



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Stan Spencer

Project Number: [none]

Project: 33rd St Outfall

Sample Rece	ipt Che	cklist		Effective Date: 01/09/1
TREET OF THE TREET				
rigins Work Order: X305007	Clie	nt:	nyon	and St OntGall
	Clie	nt Projec	1D: 33	ird St OutGall
hecklist Completed by: DERE Smith	Ship	ped Via:	HIP	and Delivered, Pick-up, etc.)
ate/time completed: 5/2/13 16:25	Airb	ill #: _\\\	redex, Fi	and Delivered, Fick-up, etc.)
latrix(s) Received: (Check all that apply):Soil/Soli				CCC on an annual burney h
ooler Number/Temperature:/27.3 ° c		*c		° C/*
hermometer ID:				
Requirement Description	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature between 0°C to ≤ 6°C ⁽¹⁾ ?		ν		Bempled Sameday
Is there ice present (document if blue ice is used)		V		,
Are custody seals present on cooler? (if so, document in comments if they are signed and dated, broken or intact)		ν		
Are custody seals present on each sample container? (if so, document in comments if they are signed and dated, broken or intact)		V		
Were all samples received intact ⁽¹⁾ ?	V			
Vvas adequate sample volume provided ⁽¹⁾ ?	V			
Are short holding time analytes or samples with HTs due within 48 hours present ⁽¹⁾ ?		~		
Is a chain-of-custody (COC) present and filled out completely(1)?	V			
Does the COC agree with the number and type of sample bottles received (1)?	V			
Do the sample IDs on the bottle labels match the COC ⁽¹⁾ ?	V			
Is the COC properly relinquished by the client with date and time recorded (1)?	V			
For volatiles in water – is there headspace (> ½ inch bubble) present? If yes, contact client and note in			1/	Sel/
narrative. Are samples preserved that require preservation and was it checked (11) / (note ID of confirmation instrument used in comments) / (preservation is not confirmed for subcontracted analyses in order to insure sample integrity)/(pH <2 for samples preserved with HNO3, HCL, H2SO4) / (pH >10 for samples preserved with NaAsO2+NaOH, ZnAc+NaOH).			2	5011
Additional Comments (if any):				

Origins Laboratory, Inc.



9100 West Jewell Avenue, Suite 200

Lakewood

CO

80232

Stan Spencer

Project Number: [none]

Project: 33rd St Outfall

B-14 @ 1'

5/2/201	3 9:4	8:0	0AM

		Reporting						
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

GEL Laboratories, LLC X305007-01 (Soil)

Metals by 7471

Mercury	0.0232	0.00427	mg/kg dry	1	1299731	05/06/2013	05/07/2013	
Metals by SW846 3050B/6010C								
Arsenic	2.32	0.550	mg/kg dry	1	1299886	05/07/2013	05/07/2013	J
Barium	60.6	0.110	"	"	II .	n .	n .	
Cadmium	0.432	0.110	"	"	"	n .	n .	J
Chromium	7.40	0.165	"	"	"	n .	n .	
Lead	15.8	1.82	"	5	"	"	"	
Selenium	ND	2.75	"	"	"	"	"	U
Silver	ND	0.110	"	1	"	"	"	U

Origins Laboratory, Inc.



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Stan Spencer

Project Number: [none]

Project: 33rd St Outfall

B-15 @ 4' 5/2/2013 9:48:00AM

		Reporting						
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

GEL Laboratories, LLC X305007-02 (Soil)

Metals by 7471

Mercury	ND	0.00373	mg/kg dry	1	1299731	05/06/2013	05/07/2013	U
Metals by SW846 3050B/6010C								
Arsenic	2.74	0.498	mg/kg dry	1	1299886	05/07/2013	05/07/2013	J
Barium	71.6	0.0996	n .	"	II .	II .	"	
Cadmium	0.259	0.0996	"	"	"	"	"	J
Chromium	7.93	0.149	"	"	"	"	"	
Lead	6.26	0.329	"	"	"	"	"	
Selenium	ND	0.498	"	"	"	II .	II .	U
Silver	ND	0.0996	"	"	"	"	n	U

Origins Laboratory, Inc.



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Stan Spencer

Project Number: [none]
Project: 33rd St Outfall

Metals by SW846 3050B/6010C - Quality Control GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1299886 - SW846 3050B										
BLANK (1202871087-BLK)					Prepared	: 05/07/2013	Analyzed: 05	/07/2013		
Barium	ND	0.100	mg/kg		0		-			U
Cadmium	ND	0.100	II .		0		-			U
Chromium	ND	0.150	II .		0		-			U
Lead	ND	0.330	"		0		-			U
Selenium	ND	0.500	"		0		-			U
Silver	ND	0.100	"		0		-			U
Arsenic	ND	0.500	"		0		-			U
LCS (1202871088-BKS)					Prepared	: 05/07/2013	Analyzed: 05	/07/2013		
Silver	50.6	0.098	mg/kg	49.0	0	103	80-120			
Arsenic	50.7	0.490	"	49.0	0	103	80-120			
Barium	50.3	0.098	II .	49.0	0	103	80-120			
Cadmium	52.1	0.098	II .	49.0	0	106	80-120			
Chromium	51.0	0.147	II .	49.0	0	104	80-120			
Lead	50.5	0.324	II .	49.0	0	103	80-120			
Selenium	53.8	0.490	"	49.0	0	110	80-120			
DUP (1202871089 D)		Source: X30	5007-01		Prepared	: 05/07/2013	Analyzed: 05	/07/2013		
Barium	85.3	0.109	mg/kg dry		60.6		0-20	33.9	20	
Cadmium	0.399	0.109	"		0.432		0-20	7.87	20	J
Chromium	6.05	0.163	"		7.40		0-20	20.1	20	
Lead	38.4	1.80	"		15.8		0-20	83.3	20	
Selenium	ND	2.72	"		<2.72		0-20	60.5	20	U
Silver	ND	0.109	II .		<0.109		0-20	NR	20	U
Arsenic	4.51	0.544	II .		2.32		0-20	64.0	20	
MS (1202871090 S)		Source: X30	5007-01		Prepared	: 05/07/2013	Analyzed: 05	/07/2013		

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Stan Spencer

Project Number: [none]
Project: 33rd St Outfall

Metals by SW846 3050B/6010C - Quality Control GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike	Source	%REC	%REC Limits	RPD	RPD Limit	Notes
Analyte	Nesuit	LIIIII	Ullits	Level	Result	%REC	Limits	RPD	Limit	Notes

Batch 1299886 - SW846 3050B

MS (1202871090 S)		Source: X	305007-01		Prepared	d: 05/07/201	3 Analyzed: 05/07/2013
Silver	53.3	0.109	mg/kg dry	54.6	<0.109	97.5	75-125
Arsenic	54.4	0.546	"	54.6	2.32	95.3	75-125
Barium	109	0.109	"	54.6	60.6	89	75-125
Cadmium	49.1	0.109	"	54.6	0.432	89.2	75-125
Chromium	56.5	0.164	"	54.6	7.40	90	75-125
Lead	67.7	1.80	"	54.6	15.8	95	75-125
Selenium	66.1	2.73	"	54.6	<2.73	121	75-125

Origins Laboratory, Inc.



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Stan Spencer

Project Number: [none]
Project: 33rd St Outfall

Notes and Definitions

U Not detected above the detection limit

J Greater than the detection limit but less than the reporting limit

ND Analyte NOT DETECTED at or above the reporting limit

RPD Relative Percent Difference

Origins Laboratory, Inc.



August 02, 2013

Pinyon

Brian Partington

9100 West Jewell Avenue, Suite 200

Lakewood

CO 80232

Project Name - 33rd St Outfall

Project Number - 11337801

Attached are you analytical results for 33rd St Outfall received by Origins Laboratory, Inc. July 26, 2013. This project is associated with Origins project number X307129-01.

The analytical results in the following report were analyzed under the guidelines of EPA Methods specified in SW-846. The analytical results apply specifically to the samples and analyses specified per the attached Chain of Custody.

Thank you for selecting Origins for your analytical needs. Please contact us with any questions concerning this report, or if we can help with anything at all.

Origins Laboratory, Inc. 303.433.1322 o-squad@oelabinc.com





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Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

CROSS REFERENCE REPORT

CROSS REI ERENGE REFORT										
	Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received					
•	ENV-1	X307129-01	Soil	July 26, 2013 8:45	07/26/2013 10:29					
	ENV-2	X307129-02	Soil	July 26, 2013 9:06	07/26/2013 10:29					
	ENV-3	X307129-03	Soil	July 26, 2013 9:35	07/26/2013 10:29					

Origins Laboratory, Inc.



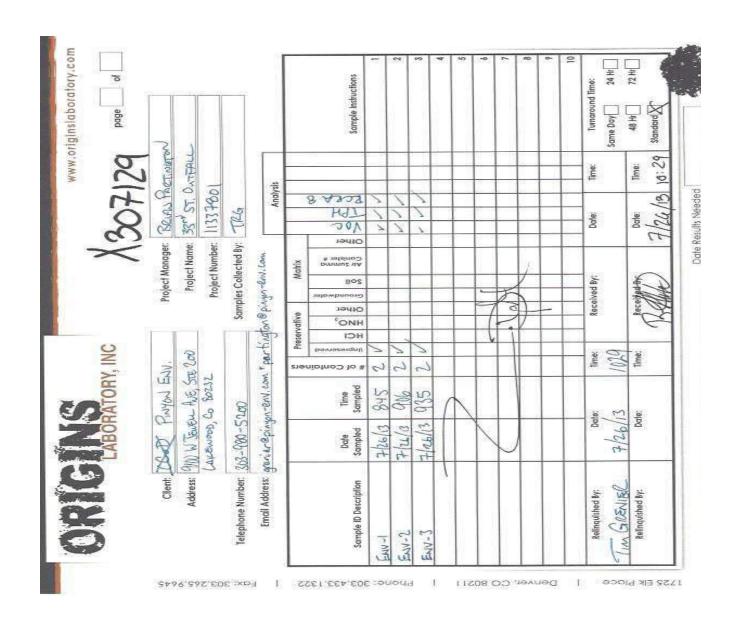
9100 West Jewell Avenue, Suite 200

Lakewood CO 80232

Brian Partington

Project Number: 11337801

Project: 33rd St Outfall



Origins Laboratory, Inc.



9100 West Jewell Avenue, Suite 200

Lakewood CO 80232

Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

Sample Recei	pt Chec			
rigins Work Order: X3071Z9	Clien		OYAU	POST GLITPYLL
(2-H)		it Project	11 /T	V 05 112 1
hecklist Completed by:			FedExa Han	d Delivered, Pick up. etc.)
ate/time completed: 7/26/13 14:20	Airbi	II #	201	M
latrix(s) Received. (Check all that apply)X_Soit/Solic	1	Water _	Othe	(Describe)
ooler Number/Temperature\ / 120-c	- 53	. c	- 1	- c _ / c
hermometer ID 1 602				
Requirement Description	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature between 0°C to 5 6°C 107	- 63	X		SAMPLED SAMED
is there we present (document if blue ice is used)	X			
Are custody seals present on copier? (if so, document in comments if they are signed and dated, broken or		X		
intact). Are oustody seals present on each sample container? (if so, document in comments if they are signed and dated, broken or intact).		X		
Were all samples received intact 111-7	X			
Was adequate sample volume provided 11-7	X		/	
Are short holding time analytes or samples with HTs due within 48 hours present 11-2		1		
is a chain-of-custody (COC) present and filled out completely 11?	X			
Diges the COC agree with the number and type of sample bottles received 10.7	X			
Do the sample IDs on the bottle labels match the	X			
Is the COC properly relinquished by the client with date and time recorded 12	X			
For volatiles in water - is there headepace (- % inch bubble) present? If yes, contact client and note in prinative.			X	Soil
Are samples preserved that require preservation and was it checked ¹¹⁷ ? (note IC) of confirmation instrument used in comments! / greateration in not confirmation of the confirmation of the subcontracted analyses in order to thate imagine integrably (pil > 2 for camples preserved with HNOT, HCL, 1/25/C4/ / (pil > 10 for samples preserved with MMASC2 > NoC4 2 Arbot + MICHEL.)			X	Sou
Additional Comments (if any)				
If NO, then contact the overt before proceeding with analysis sectors for in the solutions form	as yext net efects (ab	ore and in	and person e case nimi	contacted as well as the corrective
~ \$	5	1	one britania di San	28-13 14 N

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Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

ENV-1 7/26/2013 8:45:00AM

		Reporting						
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

GEL Laboratories, LLC X307129-01 (Soil)

90.9

ND

90.9

97.6 %

114 DV 141	Ha	bv	7471
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Mercury	0.446	0.014	mg/kg dry	1	1318166	07/29/2013	07/30/2013	
Metals by SW846 3050B/6	010C							
Arsenic	5.21	3.51	mg/kg dry	1	1318114	07/30/2013	07/31/2013	
Barium	179	0.585	II.	"	"	"	"	
Cadmium	0.987	0.585	"	"	"	II .	"	
Chromium	11.9	0.585	"	"	"	"	"	
Lead	201	1.17	II .	"	"	"	II .	
Selenium	ND	3.51	"	"	II .	"	08/01/2013	U
Silver	1.55	0.585	"	"	"	u	07/31/2013	
TPH-Carbon Chain by EP	A Method 8015C							
Gasoline (C6-C10)	ND	50.0	mg/kg	1	3G29003	07/29/2013	08/01/2013	

VOC by EPA 8260C

TPH - Carbon Chain Total

Residual Range Organics (C28-C36)

Diesel (C10-C28)

Surrogate: o-Terphenyl

ND 4.0 ug/kg 07/30/2013 07/30/2013 1,1,1,2-Tetrachloroethane 3G30004

50.0

200

50.0

59-131

Origins Laboratory, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



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Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

ENV-1 7/26/2013 8:45:00AM

		Reporting						
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

Origins Laboratory, Inc. X307129-01 (Soil)

VOC by EPA 8260C

1,1,1-Trichloroethane	ND	4.0	ug/kg	1	3G30004	07/30/2013	07/30/2013
	ND	4.0	"	"	"	"	"
1,1,2,2-Tetrachloroethane				,,	_	"	"
1,1,2-Trichloroethane	ND	4.0	"	"	"	"	"
1,1-Dichloroethane	ND	4.0	"	"	"	II .	"
1,1-Dichloroethene	ND	4.0	"	"	"	"	"
1,1-Dichloropropene	ND	4.0	"	"	"	"	"
1,2,3-Trichlorobenzene	ND	10.0	II	"	"	II .	"
1,2,3-Trichloropropane	ND	10.0	II	"	"	II .	11
1,2,4-Trichlorobenzene	ND	4.0	"	"	"	II	II .
1,2,4-Trimethylbenzene	ND	4.0	"	"	"	II	II .
1,2-Dibromo-3-chloropropane	ND	20.0	"	"	"	II	II .
1,2-Dibromoethane (EDB)	ND	4.0	"	"	"	II	II .
1,2-Dichlorobenzene	ND	4.0	"	"	"	II	II .
1,2-Dichloroethane	ND	4.0	II	"	"	II	II .
1,2-Dichloropropane	ND	4.0	II	"	"	II	II .
1,3,5-Trimethylbenzene	ND	4.0	II	"	"	II	II .
1,3-Dichlorobenzene	ND	4.0	II	"	"	II	II .
1,3-Dichloropropane	ND	4.0	"	"	"	11	II .
1,4-Dichlorobenzene	ND	4.0	II	"	"	II	II .

Origins Laboratory, Inc.



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Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

ENV-1

7/26/2013	8:45:00AM
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		Reporting						
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

Origins Laboratory, Inc. X307129-01 (Soil)

VOC by EPA 8260C

2,2-Dichloropropane	ND	4.0	ug/kg	1	3G30004	07/30/2013	07/30/2013
2-Butanone	ND	20.0	"	"	"	"	II .
2-Chlorotoluene	ND	4.0	"	"	"	"	II
2-Hexanone	ND	20.0	"	"	"	"	II
4-Chlorotoluene	ND	4.0	"	"	"	"	II .
4-Isopropyltoluene	ND	4.0	"	"	"	"	II .
4-Methyl-2-pentanone	ND	20.0	"	"	"	"	II .
Acetone	ND	32.0	"	"	"	"	II
Benzene	ND	4.0	"	"	"	"	u
Bromobenzene	ND	4.0	"	"	"	"	II .
Bromochloromethane	ND	4.0	"	"	"	"	II .
Bromodichloromethane	ND	4.0	"	"	"	"	II .
Bromoform	ND	4.0	"	"	"	"	II .
Bromomethane	ND	4.0	"	"	"	"	II .
Carbon disulfide	ND	10.0	"	"	"	II .	II
Carbon tetrachloride	ND	4.0	"	"	"	"	II
Chlorobenzene	ND	4.0	"	"	"	"	II
Chloroethane	ND	4.0	"	"	"	"	п
Chloroform	ND	4.0	ıı	"	II	"	"

Origins Laboratory, Inc.



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9100 West Jewell Avenue, Suite 200

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Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

ENV-1

7/26/2013	8:45:00AM
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		Reporting						
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

Origins Laboratory, Inc. X307129-01 (Soil)

VOC by EPA 8260C

Chloromethane	ND	4.0	ug/kg	1	3G30004	07/30/2013	07/30/2013
cis-1,2-Dichloroethene	ND	4.0	"	"	"	"	"
cis-1,3-Dichloropropene	ND	4.0	"	"	"	"	"
Dibromochloromethane	ND	4.0	"	"	"	u	"
Dibromomethane	ND	4.0	"	"	"	II .	"
Ethylbenzene	ND	4.0	"	"	"	II .	"
Hexachlorobutadiene	ND	5.0	"	"	"	II .	n .
lodomethane	ND	10.0	"	"	"	II .	n .
Isopropylbenzene	ND	4.0	"	"	"	II .	"
m,p-Xylene	ND	4.0	"	"	"	II .	"
Methyl tert-Butyl Ether	ND	4.0	"	"	"	II	"
Methylene Chloride	ND	20.0	"	"	"	II	"
Naphthalene	ND	20.0	"	"	"	II .	"
n-Butylbenzene	ND	4.0	"	"	"	II .	"
n-Propylbenzene	ND	4.0	"	"	"	II	II
o-Xylene	ND	4.0	"	"	"	II	II
sec-Butylbenzene	ND	4.0	"	"	"	II	II
Styrene	ND	4.0	"	"	"	II .	"
tert-Butylbenzene	ND	4.0	W .	"	"	"	"

Origins Laboratory, Inc.



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Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

ENV-1

7/26/2013 8:45:00AM

		Reporting						
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

Origins Laboratory, Inc. X307129-01 (Soil)

VOC by EPA 8260C

Tetrachloroethene	ND	4.0	ug/kg	1	3G30004	07/30/2013	07/30/2013	
Toluene	ND	4.0	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	4.0	"	"	II .	"	"	
trans-1,3-Dichloropropene	ND	4.0	"	"	"	II .	н	
Trichloroethene	ND	4.0	"	"	"	n .	н	
Trichlorofluoromethane	ND	4.0	"	"	"	n .	н	
Vinyl chloride	ND	4.0	"	"	"	n .	н	
Xylenes, total	ND	4.0	"	"	"	п	п	
Surrogate: 1,2-Dichloroethane-d4	106 %	70-130			"	"	"	
Surrogate: Toluene-d8	102 %	70-130			"	"	"	
Surrogate: 4-Bromofluorobenzene	98.4 %	70-130			"	"	"	

Origins Laboratory, Inc.

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Noelle E Doyle, President



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Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

1318166

07/29/2013

07/30/2013

ENV-2 7/26/2013 9:06:00AM

		Reporting						
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

mg/kg dry

GEL Laboratories, LLC X307129-02 (Soil)

0.0114

0.109

IIM DV ITI	Н	a	bv	747
------------	---	---	----	-----

Mercury

,			0 0 ,					
Metals by SW846 3050B/60	10C							
Arsenic	1.40	3.08	mg/kg dry	1	1318114	07/30/2013	07/31/2013	J
Barium	58.8	0.513	"	"	II .	II .	u u	
Cadmium	0.916	0.513	"	"	"	II .	u u	
Chromium	6.16	0.513	"	"	"	II .	u u	
Lead	43.8	1.03	"	"	"	"	"	
Selenium	ND	3.08	"	"	"	"	08/01/2013	U
Silver	1.41	0.513	"	"	"	"	07/31/2013	
TDU Carbon Chain by EDA	Method 8015C							

TPH-Carbon Chain by EPA Method 8015C

Gasoline (C6-C10)	ND	50.0	mg/kg	1	3G29003	07/29/2013	08/01/2013	
Diesel (C10-C28)	ND	50.0	"	"	"	II .	II .	
Residual Range Organics (C28-C36)	ND	200	"	"	"	II	II .	
TPH - Carbon Chain Total	ND	50.0	"	"	II .	II .	II .	
Surrogate: o-Terphenyl	98.9 %	59-131			11	II .	n	

VOC by EPA 8260C

1,1,1,2-Tetrachloroethane ND 4.0 ug/kg 1 3G30004 07/30/2013 07/30/2013

Origins Laboratory, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Noelle E Doyle, President



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Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

ENV-2 7/26/2013 9:06:00AM

		Reporting						
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

Origins Laboratory, Inc. X307129-02 (Soil)

VOC by EPA 8260C

1,1,1-Trichloroethane	ND	4.0	ug/kg	1	3G30004	07/30/2013	07/30/2013
1,1,2,2-Tetrachloroethane	ND	4.0	II.	"	"	"	"
1,1,2-Trichloroethane	ND	4.0	"	"	"	II .	II .
1,1-Dichloroethane	ND	4.0	"	"	"	II .	II .
1,1-Dichloroethene	ND	4.0	"	"	"	II.	W .
1,1-Dichloropropene	ND	4.0	"	"	"	II .	II .
1,2,3-Trichlorobenzene	ND	10.0	"	"	"	II	п
1,2,3-Trichloropropane	ND	10.0	"	"	"	II.	W .
1,2,4-Trichlorobenzene	ND	4.0	"	"	"	II	п
1,2,4-Trimethylbenzene	ND	4.0	"	"	"	II.	II .
1,2-Dibromo-3-chloropropane	ND	20.0	"	"	"	II.	II .
1,2-Dibromoethane (EDB)	ND	4.0	"	"	"	II.	II .
1,2-Dichlorobenzene	ND	4.0	"	"	"	II.	II .
1,2-Dichloroethane	ND	4.0	II .	"	"	II.	II .
1,2-Dichloropropane	ND	4.0	II .	"	"	II.	II .
1,3,5-Trimethylbenzene	ND	4.0	II .	"	"	II.	II .
1,3-Dichlorobenzene	ND	4.0	II .	"	"	II.	II .
1,3-Dichloropropane	ND	4.0	II .	"	"	u	"
1,4-Dichlorobenzene	ND	4.0	"	"	II .	"	"

Origins Laboratory, Inc.



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Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

ENV-2 7/26/2013 9:06:00AM

		Reporting						
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

Origins Laboratory, Inc. X307129-02 (Soil)

VOC by EPA 8260C

2,2-Dichloropropane	ND	4.0	ug/kg	1	3G30004	07/30/2013	07/30/2013
2-Butanone	ND	20.0	"	"	"	"	"
2-Chlorotoluene	ND	4.0	"	"	"	"	"
2-Hexanone	ND	20.0	"	"	"	"	"
4-Chlorotoluene	ND	4.0	"	"	"	"	"
4-Isopropyltoluene	ND	4.0	"	"	"	"	"
4-Methyl-2-pentanone	ND	20.0	"	"	"	"	"
Acetone	ND	32.0	"	"	"	"	"
Benzene	ND	4.0	"	"	"	"	u.
Bromobenzene	ND	4.0	"	"	"	"	u
Bromochloromethane	ND	4.0	"	"	"	"	"
Bromodichloromethane	ND	4.0	"	"	"	"	"
Bromoform	ND	4.0	"	"	"	"	"
Bromomethane	ND	4.0	"	"	"	"	"
Carbon disulfide	ND	10.0	"	"	"	"	n
Carbon tetrachloride	ND	4.0	"	"	"	"	"
Chlorobenzene	ND	4.0	"	"	"	"	n
Chloroethane	ND	4.0	"	"	"	"	u
Chloroform	ND	4.0	"	"	"	"	"

Origins Laboratory, Inc.



9100 West Jewell Avenue, Suite 200

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Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

ENV-2 7/26/2013 9:06:00AM

		Reporting						
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

Origins Laboratory, Inc. X307129-02 (Soil)

VOC by EPA 8260C

Chloromethane	ND	4.0	ug/kg	1	3G30004	07/30/2013	07/30/2013
cis-1,2-Dichloroethene	ND	4.0	II	"	"	11	II .
cis-1,3-Dichloropropene	ND	4.0	"	"	"	II .	"
Dibromochloromethane	ND	4.0	"	"	"	II .	"
Dibromomethane	ND	4.0	"	"	"	II .	"
Ethylbenzene	ND	4.0	"	"	"	II .	"
Hexachlorobutadiene	ND	5.0	"	"	"	II .	"
lodomethane	ND	10.0	"	"	"	II .	"
Isopropylbenzene	ND	4.0	"	"	"	II .	"
m,p-Xylene	ND	4.0	"	"	"	II	"
Methyl tert-Butyl Ether	ND	4.0	"	"	"	II .	"
Methylene Chloride	ND	20.0	"	"	"	II .	"
Naphthalene	ND	20.0	"	"	"	II .	"
n-Butylbenzene	ND	4.0	"	"	"	II .	"
n-Propylbenzene	ND	4.0	"	"	"	II .	"
o-Xylene	ND	4.0	"	"	"	II .	"
sec-Butylbenzene	ND	4.0	"	"	"	II .	"
Styrene	ND	4.0	"	"	"	II	"
tert-Butylbenzene	ND	4.0	"	"	"	II .	"

Origins Laboratory, Inc.



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Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

ENV-2

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		Reporting						
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

Origins Laboratory, Inc. X307129-02 (Soil)

VOC by EPA 8260C

Tetrachloroethene	ND	4.0	ug/kg	1	3G30004	07/30/2013	07/30/2013	
Toluene	ND	4.0	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	4.0	"	"	II .	"	"	
trans-1,3-Dichloropropene	ND	4.0	"	"	"	II .	н	
Trichloroethene	ND	4.0	"	"	"	n .	н	
Trichlorofluoromethane	ND	4.0	"	"	"	n .	н	
Vinyl chloride	ND	4.0	"	"	"	n .	u .	
Xylenes, total	ND	4.0	"	"	n	п	п	
Surrogate: 1,2-Dichloroethane-d4	102 %	70-130			"	"	"	
Surrogate: Toluene-d8	109 %	70-130			"	"	"	
Surrogate: 4-Bromofluorobenzene	87.6 %	70-130			"	"	"	

Origins Laboratory, Inc.

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Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

1318166

07/29/2013

07/30/2013

ENV-3 7/26/2013 9:35:00AM

		Reporting						
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

mg/kg dry

GEL Laboratories, LLC X307129-03 (Soil)

0.0131

0.00572

IIM DV ITI	Н	a	bv	747
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Mercury

Arsenic	1.31	3.27	mg/kg dry	1	1318114	07/30/2013	07/31/2013	J
Barium	134	0.545	II .	"	"	n .	n .	
Cadmium	ND	0.545	"	"	"	"	"	U
Chromium	15.1	0.545	II .	"	"	n .	n .	
Lead	13.5	1.09	II.	"	"	II .	n .	
Selenium	ND	3.27	"	"	"	"	08/01/2013	U
Silver	1.42	0.545	"	"	"	"	07/31/2013	

1PH-Carbon Chain by EPA Method 8015C

Gasoline (C6-C10)	ND	50.0	mg/kg	1	3G29003	07/29/2013	08/01/2013	
Diesel (C10-C28)	ND	50.0	"	"	"	"	п	
Residual Range Organics (C28-C36)	ND	200	"	"	"	II .	H .	
TPH - Carbon Chain Total	ND	50.0	"	"	"	II .	n	
Surrogate: o-Terphenyl	98.6 %	59-131			"	n.	"	

VOC by EPA 8260C

4.0 ND 07/30/2013 1,1,1,2-Tetrachloroethane ug/kg 3G30004 07/30/2013

Origins Laboratory, Inc.



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Project Number: 11337801

Project: 33rd St Outfall

ENV-3 7/26/2013 9:35:00AM

		Reporting						
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

Origins Laboratory, Inc. X307129-03 (Soil)

VOC by EPA 8260C

1,1,1-Trichloroethane	ND	4.0	ug/kg	1	3G30004	07/30/2013	07/30/2013
1,1,2,2-Tetrachloroethane	ND	4.0	"	"	"	"	"
1,1,2-Trichloroethane	ND	4.0	"	"	"	II .	"
1,1-Dichloroethane	ND	4.0	"	"	"	II .	"
1,1-Dichloroethene	ND	4.0	"	"	"	II .	"
1,1-Dichloropropene	ND	4.0	"	"	"	II	"
1,2,3-Trichlorobenzene	ND	10.0	"	"	"	II	"
1,2,3-Trichloropropane	ND	10.0	"	"	"	II	"
1,2,4-Trichlorobenzene	ND	4.0	"	"	"	II	II .
1,2,4-Trimethylbenzene	ND	4.0	"	"	"	II.	II .
1,2-Dibromo-3-chloropropane	ND	20.0	"	"	"	II .	II .
1,2-Dibromoethane (EDB)	ND	4.0	"	"	"	II	II .
1,2-Dichlorobenzene	ND	4.0	"	"	"	II	"
1,2-Dichloroethane	ND	4.0	"	"	"	II	II .
1,2-Dichloropropane	ND	4.0	II	"	"	II.	II .
1,3,5-Trimethylbenzene	ND	4.0	II	"	"	II.	II .
1,3-Dichlorobenzene	ND	4.0	II	"	"	II.	II .
1,3-Dichloropropane	ND	4.0	II	"	"	"	"
1,4-Dichlorobenzene	ND	4.0	"	"	"	II .	II .

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Project Number: 11337801

Project: 33rd St Outfall

ENV-3 7/26/2013 9:35:00AM

		Reporting						
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

Origins Laboratory, Inc. X307129-03 (Soil)

VOC by EPA 8260C

2,2-Dichloropropane	ND	4.0	ug/kg	1	3G30004	07/30/2013	07/30/2013
2-Butanone	ND	20.0	"	"	"	u.	II .
2-Chlorotoluene	ND	4.0	"	"	"	u.	II .
2-Hexanone	ND	20.0	II	"	"	II .	"
4-Chlorotoluene	ND	4.0	"	"	"	"	II .
4-Isopropyltoluene	ND	4.0	"	"	"	"	II .
4-Methyl-2-pentanone	ND	20.0	"	"	"	"	II .
Acetone	ND	32.0	"	"	"	II .	"
Benzene	ND	4.0	"	"	"	II .	II .
Bromobenzene	ND	4.0	II	"	"	II	II .
Bromochloromethane	ND	4.0	"	"	"	"	II .
Bromodichloromethane	ND	4.0	"	"	"	"	II .
Bromoform	ND	4.0	"	"	"	"	II .
Bromomethane	ND	4.0	II	"	"	"	II .
Carbon disulfide	ND	10.0	II	"	"	"	II .
Carbon tetrachloride	ND	4.0	II	"	"	"	II .
Chlorobenzene	ND	4.0	II	"	"	"	II .
Chloroethane	ND	4.0	"	"	"	"	"
Chloroform	ND	4.0	"	"	"	"	"

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Project Number: 11337801

Project: 33rd St Outfall

ENV-3 7/26/2013 9:35:00AM

		Reporting						
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

Origins Laboratory, Inc. X307129-03 (Soil)

VOC by EPA 8260C

Chloromethane	ND	4.0	ug/kg	1	3G30004	07/30/2013	07/30/2013
cis-1,2-Dichloroethene	ND	4.0	"	"	"	"	"
cis-1,3-Dichloropropene	ND	4.0	"	"	"	"	"
Dibromochloromethane	ND	4.0	"	"	"	"	"
Dibromomethane	ND	4.0	"	"	"	"	"
Ethylbenzene	ND	4.0	"	"	"	"	u.
Hexachlorobutadiene	ND	5.0	"	"	"	"	u.
Iodomethane	ND	10.0	"	"	"	"	II.
Isopropylbenzene	ND	4.0	"	"	"	11	II .
m,p-Xylene	ND	4.0	"	"	"	"	II.
Methyl tert-Butyl Ether	ND	4.0	"	"	"	"	II.
Methylene Chloride	ND	20.0	"	"	"	"	II.
Naphthalene	ND	20.0	"	"	"	"	II.
n-Butylbenzene	ND	4.0	"	"	"	"	II.
n-Propylbenzene	ND	4.0	"	"	"	"	II.
o-Xylene	ND	4.0	"	"	"	"	II.
sec-Butylbenzene	ND	4.0	"	"	"	"	"
Styrene	ND	4.0	W .	"	"	"	"
tert-Butylbenzene	ND	4.0	"	"	"	"	"

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Project Number: 11337801

Project: 33rd St Outfall

ENV-3 7/26/2013 9:35:00AM

		Reporting						
Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes

Origins Laboratory, Inc. X307129-03 (Soil)

VOC by EPA 8260C

Tetrachloroethene	ND	4.0	ug/kg	1	3G30004	07/30/2013	07/30/2013	
Toluene	ND	4.0	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	4.0	"	"	II .	"	"	
trans-1,3-Dichloropropene	ND	4.0	"	"	"	n .	н	
Trichloroethene	ND	4.0	"	"	"	n	н	
Trichlorofluoromethane	ND	4.0	"	"	"	n	н	
Vinyl chloride	ND	4.0	"	"	"	"	u .	
Xylenes, total	ND	4.0	"	"	"	II .	п	
Surrogate: 1,2-Dichloroethane-d4	108 %	70-130			"	"	"	
Surrogate: Toluene-d8	103 %	70-130			"	"	"	
Surrogate: 4-Bromofluorobenzene	99.2 %	70-130			"	"	"	

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Project Number: 11337801

Project: 33rd St Outfall

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control Origins Laboratory, Inc.

Analista	Decell	Reporting	11	Spike	Source		%REC		RPD	
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes

Batch 3G30004 - EPA 5030 (soil)

Blank (3G30004-BLK1)				Prepared: 07/30/2013 Analyzed: 07/30/2013
1,1,1,2-Tetrachloroethane	ND	4.0	ug/kg	
1,1,1-Trichloroethane	ND	4.0	"	
1,1,2,2-Tetrachloroethane	ND	4.0	"	
1,1,2-Trichloroethane	ND	4.0	"	
1,1-Dichloroethane	ND	4.0	"	
1,1-Dichloroethene	ND	4.0	"	
1,1-Dichloropropene	ND	4.0	"	
1,2,3-Trichlorobenzene	ND	10.0	u.	
1,2,3-Trichloropropane	ND	10.0	u.	
1,2,4-Trichlorobenzene	ND	4.0	u.	
1,2,4-Trimethylbenzene	ND	4.0	u.	
1,2-Dibromo-3-chloropropane	ND	20.0	u.	
1,2-Dibromoethane (EDB)	ND	4.0	"	
1,2-Dichlorobenzene	ND	4.0	"	
1,2-Dichloroethane	ND	4.0	"	
1,2-Dichloropropane	ND	4.0	"	
1,3,5-Trimethylbenzene	ND	4.0	"	
1,3-Dichlorobenzene	ND	4.0		
1,3-Dichloropropane	ND	4.0		
1,4-Dichlorobenzene	ND	4.0	u.	
2,2-Dichloropropane	ND	4.0	u.	
2-Butanone	ND	20.0	II .	
2-Chlorotoluene	ND	4.0	II .	
2-Hexanone	ND	20.0	"	
4-Chlorotoluene	ND	4.0	"	
4-Isopropyltoluene	ND	4.0	"	

Origins Laboratory, Inc.



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Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control Origins Laboratory, Inc.

Analista	Decell	Reporting	11	Spike	Source		%REC		RPD	
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes

Batch 3G30004 - EPA 5030 (soil)

Blank (3G30004-BLK1)				Prepared: 07/30/2013 Analyzed: 07/30/2013
4-Methyl-2-pentanone	ND	20.0	ug/kg	
Acetone	ND	32.0	u u	
Benzene	ND	4.0	"	
Bromobenzene	ND	4.0	"	
Bromochloromethane	ND	4.0	"	
Bromodichloromethane	ND	4.0	II .	
Bromoform	ND	4.0	II .	
Bromomethane	ND	4.0	II .	
Carbon disulfide	ND	10.0	II .	
Carbon tetrachloride	ND	4.0	II .	
Chlorobenzene	ND	4.0	II .	
Chloroethane	ND	4.0	II .	
Chloroform	ND	4.0	II .	
Chloromethane	ND	4.0	II .	
cis-1,2-Dichloroethene	ND	4.0	II .	
cis-1,3-Dichloropropene	ND	4.0	II .	
Dibromochloromethane	ND	4.0	II .	
Dibromomethane	ND	4.0	II .	
Ethylbenzene	ND	4.0	II .	
Hexachlorobutadiene	ND	5.0	"	
lodomethane	ND	10.0	II .	
Isopropylbenzene	ND	4.0	II .	
m,p-Xylene	ND	4.0	"	
Methyl tert-Butyl Ether	ND	4.0	"	
Methylene Chloride	ND	20.0	"	
Naphthalene	ND	20.0	"	

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Project Number: 11337801

Project: 33rd St Outfall

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control Origins Laboratory, Inc.

	_								
	Repor	ting	Spike	Source		%REC		RPD	
Analyte Re	sult Limi	t Units	Level	Result	%REC	Limits	RPD	Limit	Notes
, ,			LCVCI	rtoouit	/01 (LO	Liiiilo	INID	Lilling	140103

Batch 3G30004 - EPA 5030 (soil)

Blank (3G30004-BLK1)				Pr	epared: 07/30/201	3 Analyzed: 07/30/2013	
n-Butylbenzene	ND	4.0	ug/kg				
n-Propylbenzene	ND	4.0	"				
o-Xylene	ND	4.0	"				
sec-Butylbenzene	ND	4.0	"				
Styrene	ND	4.0	"				
tert-Butylbenzene	ND	4.0	"				
Tetrachloroethene	ND	4.0	"				
Toluene	ND	4.0	"				
trans-1,2-Dichloroethene	ND	4.0	"				
trans-1,3-Dichloropropene	ND	4.0	"				
Trichloroethene	ND	4.0	"				
Trichlorofluoromethane	ND	4.0	"				
Vinyl chloride	ND	4.0	"				
Xylenes, total	ND	4.0	"				
Surrogate: 1,2-Dichloroethane-d4	67		ug/L	62.5	107	70-130	
Surrogate: Toluene-d8	65		"	62.5	104	70-130	
Surrogate: 4-Bromofluorobenzene	60		"	62.5	96.4	70-130	

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Project Number: 11337801

Project: 33rd St Outfall

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control Origins Laboratory, Inc.

Analista	Decell	Reporting	11	Spike	Source		%REC		RPD	
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes

Batch 3G30004 - EPA 5030 (soil)

LCS (3G30004-BS1)				P	Prepared: 07/30/201	3 Analyzed: 07/30/2013	
1,1,1,2-Tetrachloroethane	202	4.0	ug/kg	200	101	70-130	
1,1,1-Trichloroethane	212	4.0	"	200	106	70-130	
1,1,2,2-Tetrachloroethane	216	4.0	"	200	108	70-130	
1,1,2-Trichloroethane	212	4.0	"	200	106	70-130	
1,1-Dichloroethane	208	4.0	"	200	104	70-130	
1,1-Dichloroethene	213	4.0	"	200	106	70-130	
1,1-Dichloropropene	207	4.0	"	200	104	70-130	
1,2,3-Trichlorobenzene	210	10.0	"	200	105	70-130	
1,2,3-Trichloropropane	207	10.0	"	200	103	70-130	
1,2,4-Trichlorobenzene	209	4.0	"	200	104	70-130	
1,2,4-Trimethylbenzene	202	4.0	"	200	101	70-130	
1,2-Dibromo-3-chloropropane	216	20.0	"	200	108	70-130	
1,2-Dibromoethane (EDB)	208	4.0	"	200	104	70-130	
1,2-Dichlorobenzene	212	4.0	"	200	106	70-130	
1,2-Dichloroethane	207	4.0	"	200	103	70-130	
1,2-Dichloropropane	205	4.0	"	200	103	70-130	
1,3,5-Trimethylbenzene	205	4.0	"	200	103	70-130	
1,3-Dichlorobenzene	207	4.0	II	200	103	70-130	
1,3-Dichloropropane	211	4.0	"	200	105	70-130	
1,4-Dichlorobenzene	212	4.0	"	200	106	70-130	
2,2-Dichloropropane	200	4.0	"	200	100	70-130	
2-Butanone	1080	20.0	"	1000	108	70-130	
2-Chlorotoluene	205	4.0	"	200	103	70-130	
2-Hexanone	1020	20.0	"	1000	102	70-130	
4-Chlorotoluene	204	4.0	"	200	102	70-130	
4-Isopropyltoluene	205	4.0	"	200	102	70-130	

Origins Laboratory, Inc.



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Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control Origins Laboratory, Inc.

Analista	Decell	Reporting	11	Spike	Source		%REC		RPD	
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes

Batch 3G30004 - EPA 5030 (soil)

LCS (3G30004-BS1)	Prepared: 07/30/2013 Analyzed: 07/30/2013						
4-Methyl-2-pentanone	1070	20.0	ug/kg	1000	107	70-130	
Acetone	986	32.0	"	1000	98.6	70-130	
Benzene	208	4.0	"	200	104	70-130	
Bromobenzene	214	4.0	"	200	107	70-130	
Bromochloromethane	213	4.0	"	200	107	70-130	
Bromodichloromethane	217	4.0	"	200	108	70-130	
Bromoform	201	4.0	"	200	101	70-130	
Bromomethane	229	4.0	"	200	114	70-130	
Carbon disulfide	954	10.0	"	1000	95.4	70-130	
Carbon tetrachloride	213	4.0	"	200	106	70-130	
Chlorobenzene	201	4.0	"	200	101	70-130	
Chloroethane	225	4.0	"	200	112	70-130	
Chloroform	202	4.0	"	200	101	70-130	
Chloromethane	182	4.0	"	200	91.1	70-130	
cis-1,2-Dichloroethene	214	4.0	"	200	107	70-130	
cis-1,3-Dichloropropene	211	4.0	"	200	106	70-130	
Dibromochloromethane	218	4.0	"	200	109	70-130	
Dibromomethane	207	4.0	"	200	104	70-130	
Ethylbenzene	193	4.0	"	200	96.5	70-130	
Hexachlorobutadiene	208	5.0	"	200	104	70-130	
lodomethane	998	10.0	"	1000	99.8	70-130	
Isopropylbenzene	199	4.0	"	200	99.4	70-130	
m,p-Xylene	384	4.0	"	400	96.1	70-130	
Methyl tert-Butyl Ether	202	4.0	"	200	101	70-130	
Methylene Chloride	200	20.0	"	200	99.9	70-130	
Naphthalene	209	20.0	II .	200	105	70-130	

Origins Laboratory, Inc.



9100 West Jewell Avenue, Suite 200

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Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control Origins Laboratory, Inc.

Analyte	Result	Reporting	Units	Spike	Source	0/ DEC	%REC	DDD	RPD Limit	Natas
Analyte	Result	Limit	UTIILS	Level	Result	%REC	Limits	RPD	Limit	Notes

Batch 3G30004 - EPA 5030 (soil)

LCS (3G30004-BS1) Prepared: 07/30/2013 Analyzed: 07/30/2013							
n-Butylbenzene	200	4.0	ug/kg	200	100	70-130	
n-Propylbenzene	199	4.0	m .	200	99.6	70-130	
o-Xylene	195	4.0	m .	200	97.4	70-130	
sec-Butylbenzene	199	4.0	"	200	99.4	70-130	
Styrene	194	4.0	"	200	96.9	70-130	
tert-Butylbenzene	205	4.0	"	200	102	70-130	
Tetrachloroethene	205	4.0	"	200	102	70-130	
Toluene	201	4.0	"	200	101	70-130	
trans-1,2-Dichloroethene	211	4.0	"	200	105	70-130	
trans-1,3-Dichloropropene	217	4.0	"	200	108	70-130	
Trichloroethene	208	4.0	m .	200	104	70-130	
Trichlorofluoromethane	233	4.0	"	200	116	70-130	
Vinyl chloride	173	4.0	"	200	86.3	70-130	
Surrogate: 1,2-Dichloroethane-d4	65		ug/L	62.5	104	70-130	
Surrogate: Toluene-d8	64		"	62.5	102	70-130	
Surrogate: 4-Bromofluorobenzene	60		"	62.5	95.6	70-130	

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Project: 33rd St Outfall

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control Origins Laboratory, Inc.

	_								
	Repor	ting	Spike	Source		%REC		RPD	
Analyte Re	sult Limi	t Units	Level	Result	%REC	Limits	RPD	Limit	Notes
, ,			LCVCI	rtoouit	/01 (LO	Liiiilo	INID	Lilling	140103

Batch 3G30004 - EPA 5030 (soil)

Matrix Spike (3G30004-MS1)		Source: X3	307126-01	Prepared: 07/30/2013 Analyzed: 07/30/2013				
1,1,1,2-Tetrachloroethane	192	4.0	ug/kg	200	ND	96.2	70-130	
1,1,1-Trichloroethane	205	4.0	"	200	ND	103	70-130	
1,1,2,2-Tetrachloroethane	199	4.0	"	200	ND	99.4	70-130	
1,1,2-Trichloroethane	198	4.0	"	200	ND	99.2	70-130	
1,1-Dichloroethane	198	4.0	"	200	ND	99.2	70-130	
1,1-Dichloroethene	203	4.0	"	200	ND	101	70-130	
1,1-Dichloropropene	196	4.0	"	200	ND	97.8	70-130	
1,2,3-Trichlorobenzene	189	10.0	"	200	ND	94.3	70-130	
1,2,3-Trichloropropane	193	10.0	"	200	ND	96.3	70-130	
1,2,4-Trichlorobenzene	187	4.0	"	200	ND	93.7	70-130	
1,2,4-Trimethylbenzene	192	4.0	"	200	ND	96.0	70-130	
1,2-Dibromo-3-chloropropane	199	20.0	"	200	ND	99.3	70-130	
1,2-Dibromoethane (EDB)	189	4.0	"	200	ND	94.7	70-130	
1,2-Dichlorobenzene	199	4.0	"	200	ND	99.7	70-130	
1,2-Dichloroethane	193	4.0	"	200	ND	96.5	70-130	
1,2-Dichloropropane	195	4.0	"	200	ND	97.3	70-130	
1,3,5-Trimethylbenzene	192	4.0	"	200	ND	96.2	70-130	
1,3-Dichlorobenzene	193	4.0	"	200	ND	96.3	70-130	
1,3-Dichloropropane	192	4.0	"	200	ND	96.0	70-130	
1,4-Dichlorobenzene	197	4.0	"	200	ND	98.6	70-130	
2,2-Dichloropropane	198	4.0	"	200	ND	99.2	70-130	
2-Butanone	1000	20.0	"	1000	ND	100	70-130	
2-Chlorotoluene	192	4.0	"	200	ND	96.1	70-130	
2-Hexanone	936	20.0	"	1000	ND	93.6	70-130	
4-Chlorotoluene	193	4.0	"	200	ND	96.3	70-130	
4-Isopropyltoluene	192	4.0	"	200	ND	96.0	70-130	

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Project Number: 11337801

Project: 33rd St Outfall

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control Origins Laboratory, Inc.

	_								
	Repor	ting	Spike	Source		%REC		RPD	
Analyte Re	sult Limi	t Units	Level	Result	%REC	Limits	RPD	Limit	Notes
, ,			LCVCI	rtoouit	/01 (LO	Liiiilo	INID	Lilling	140103

Batch 3G30004 - EPA 5030 (soil)

Matrix Spike (3G30004-MS1)		Source: X3	807126-01	Prepared: 07/30/2013 Analyzed: 07/30/2013				
4-Methyl-2-pentanone	999	20.0	ug/kg	1000	ND	99.9	70-130	
Acetone	924	32.0	"	1000	7.5	91.7	70-130	
Benzene	197	4.0	"	200	ND	98.7	70-130	
Bromobenzene	196	4.0	"	200	ND	98.0	70-130	
Bromochloromethane	202	4.0	"	200	ND	101	70-130	
Bromodichloromethane	202	4.0	"	200	ND	101	70-130	
Bromoform	187	4.0	"	200	ND	93.3	70-130	
Bromomethane	224	4.0	"	200	ND	112	70-130	
Carbon disulfide	908	10.0	"	1000	ND	90.8	70-130	
Carbon tetrachloride	204	4.0	"	200	ND	102	70-130	
Chlorobenzene	193	4.0	"	200	ND	96.4	70-130	
Chloroethane	216	4.0	"	200	ND	108	70-130	
Chloroform	192	4.0	"	200	1.0	95.3	70-130	
Chloromethane	209	4.0	"	200	ND	104	70-130	
cis-1,2-Dichloroethene	199	4.0	"	200	ND	99.7	70-130	
cis-1,3-Dichloropropene	196	4.0	"	200	ND	98.0	70-130	
Dibromochloromethane	204	4.0	"	200	ND	102	70-130	
Dibromomethane	195	4.0	"	200	ND	97.3	70-130	
Ethylbenzene	185	4.0	"	200	ND	92.4	70-130	
Hexachlorobutadiene	175	5.0	"	200	ND	87.4	70-130	
Iodomethane	959	10.0	"	1000	ND	95.9	70-130	
Isopropylbenzene	185	4.0	II .	200	ND	92.7	70-130	
m,p-Xylene	360	4.0	II .	400	ND	90.1	70-130	
Methyl tert-Butyl Ether	197	4.0	II .	200	ND	98.5	70-130	
Methylene Chloride	185	20.0	"	200	ND	92.7	70-130	
Naphthalene	194	20.0	"	200	ND	97.2	70-130	

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Project Number: 11337801

Project: 33rd St Outfall

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control Origins Laboratory, Inc.

	5 "								
	Reporting		Spike	Source		%REC		RPD	
Analyte Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes
,			LOVOI	rtoourt	/01 NEO	Lillito	111 0	Liiiii	140101

Batch 3G30004 - EPA 5030 (soil)

Matrix Spike (3G30004-MS1)		Source: X	307126-01		Prepared: 07/30/2013 Analyzed: 07/30/2013				
n-Butylbenzene	185	4.0	ug/kg	200	ND	92.4	70-130		
n-Propylbenzene	189	4.0	"	200	ND	94.6	70-130		
o-Xylene	183	4.0	"	200	ND	91.6	70-130		
sec-Butylbenzene	187	4.0	"	200	ND	93.7	70-130		
Styrene	180	4.0	"	200	ND	90.2	70-130		
tert-Butylbenzene	192	4.0	"	200	ND	96.0	70-130		
Tetrachloroethene	192	4.0	"	200	ND	96.0	70-130		
Toluene	190	4.0	"	200	ND	95.1	70-130		
trans-1,2-Dichloroethene	203	4.0	"	200	ND	101	70-130		
trans-1,3-Dichloropropene	195	4.0	"	200	ND	97.7	70-130		
Trichloroethene	200	4.0	"	200	ND	100	70-130		
Trichlorofluoromethane	232	4.0	"	200	ND	116	70-130		
Vinyl chloride	185	4.0	"	200	ND	92.6	70-130		
Surrogate: 1,2-Dichloroethane-d4	64		ug/L	62.5		103	70-130		
Surrogate: Toluene-d8	65		"	62.5		103	70-130		
Surrogate: 4-Bromofluorobenzene	60		"	62.5		95.5	70-130		

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Project Number: 11337801

Project: 33rd St Outfall

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control Origins Laboratory, Inc.

		Donartina			_					
	-	Reporting		Spike	Source		%REC		RPD	
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes

Batch 3G30004 - EPA 5030 (soil)

Matrix Spike Dup (3G30004-MSD1)		Source: X3	307126-01	Prepared: 07/30/2013 Analyzed: 07/30/2013						
1,1,1,2-Tetrachloroethane	189	4.0	ug/kg	200	ND	94.7	70-130	1.51	20	
1,1,1-Trichloroethane	202	4.0	"	200	ND	101	70-130	1.47	20	
1,1,2,2-Tetrachloroethane	195	4.0	"	200	ND	97.4	70-130	2.07	20	
1,1,2-Trichloroethane	199	4.0	"	200	ND	99.5	70-130	0.322	20	
1,1-Dichloroethane	195	4.0	"	200	ND	97.3	70-130	1.91	20	
1,1-Dichloroethene	200	4.0	"	200	ND	100	70-130	1.13	20	
1,1-Dichloropropene	190	4.0	"	200	ND	95.1	70-130	2.74	20	
1,2,3-Trichlorobenzene	178	10.0	"	200	ND	88.9	70-130	5.83	20	
1,2,3-Trichloropropane	187	10.0	"	200	ND	93.6	70-130	2.89	20	
1,2,4-Trichlorobenzene	181	4.0	"	200	ND	90.7	70-130	3.32	20	
1,2,4-Trimethylbenzene	189	4.0	"	200	ND	94.7	70-130	1.36	20	
1,2-Dibromo-3-chloropropane	186	20.0	"	200	ND	93.1	70-130	6.42	20	
1,2-Dibromoethane (EDB)	193	4.0	"	200	ND	96.6	70-130	1.94	20	
1,2-Dichlorobenzene	196	4.0	"	200	ND	97.8	70-130	1.92	20	
1,2-Dichloroethane	191	4.0	"	200	ND	95.5	70-130	1.06	20	
1,2-Dichloropropane	193	4.0	"	200	ND	96.4	70-130	0.908	20	
1,3,5-Trimethylbenzene	189	4.0	"	200	ND	94.4	70-130	1.80	20	
1,3-Dichlorobenzene	187	4.0	"	200	ND	93.3	70-130	3.16	20	
1,3-Dichloropropane	193	4.0	"	200	ND	96.5	70-130	0.540	20	
1,4-Dichlorobenzene	194	4.0	"	200	ND	97.0	70-130	1.66	20	
2,2-Dichloropropane	193	4.0	"	200	ND	96.7	70-130	2.51	20	
2-Butanone	1000	20.0	"	1000	ND	100	70-130	0.228	20	
2-Chlorotoluene	190	4.0	"	200	ND	95.2	70-130	0.899	20	
2-Hexanone	945	20.0	"	1000	ND	94.5	70-130	0.936	20	
4-Chlorotoluene	190	4.0	"	200	ND	95.1	70-130	1.27	20	
4-Isopropyltoluene	192	4.0	"	200	ND	96.2	70-130	0.250	20	

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Project Number: 11337801

Project: 33rd St Outfall

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control Origins Laboratory, Inc.

		Reporting		Spike	Source		%REC		RPD		l
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes	l

Batch 3G30004 - EPA 5030 (soil)

Matrix Spike Dup (3G30004-MSD1)		Source: X3	807126-01	Prepared: 07/30/2013 Analyzed: 07/30/2013						
4-Methyl-2-pentanone	981	20.0	ug/kg	1000	ND	98.1	70-130	1.83	20	
Acetone	927	32.0	"	1000	7.5	91.9	70-130	0.264	20	
Benzene	194	4.0	"	200	ND	97.2	70-130	1.49	20	
Bromobenzene	192	4.0	"	200	ND	95.8	70-130	2.23	20	
Bromochloromethane	199	4.0	"	200	ND	99.5	70-130	1.56	20	
Bromodichloromethane	197	4.0	"	200	ND	98.6	70-130	2.27	20	
Bromoform	189	4.0	"	200	ND	94.5	70-130	1.28	20	
Bromomethane	222	4.0	"	200	ND	111	70-130	1.06	20	
Carbon disulfide	894	10.0	"	1000	ND	89.4	70-130	1.55	20	
Carbon tetrachloride	200	4.0	"	200	ND	100	70-130	1.90	20	
Chlorobenzene	191	4.0	"	200	ND	95.5	70-130	0.938	20	
Chloroethane	215	4.0	"	200	ND	107	70-130	0.390	20	
Chloroform	189	4.0	"	200	1.0	94.0	70-130	1.39	20	
Chloromethane	204	4.0	"	200	ND	102	70-130	2.31	20	
cis-1,2-Dichloroethene	196	4.0	"	200	ND	98.1	70-130	1.62	20	
cis-1,3-Dichloropropene	193	4.0	"	200	ND	96.4	70-130	1.61	20	
Dibromochloromethane	197	4.0	"	200	ND	98.4	70-130	3.48	20	
Dibromomethane	191	4.0	"	200	ND	95.5	70-130	1.91	20	
Ethylbenzene	182	4.0	"	200	ND	91.1	70-130	1.46	20	
Hexachlorobutadiene	173	5.0	"	200	ND	86.3	70-130	1.29	20	
lodomethane	944	10.0	"	1000	ND	94.4	70-130	1.63	20	
Isopropylbenzene	186	4.0	"	200	ND	93.2	70-130	0.538	20	
m,p-Xylene	361	4.0	"	400	ND	90.4	70-130	0.310	20	
Methyl tert-Butyl Ether	195	4.0	"	200	ND	97.3	70-130	1.16	20	
Methylene Chloride	180	20.0	"	200	ND	90.0	70-130	2.89	20	
Naphthalene	186	20.0	"	200	ND	93.0	70-130	4.40	20	

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Project: 33rd St Outfall

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control Origins Laboratory, Inc.

	5 "								
	Reporting		Spike	Source		%REC		RPD	
Analyte Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes
,			LOVOI	rtoourt	/01 NEO	Lillito	111 0	Liiiii	140101

Batch 3G30004 - EPA 5030 (soil)

Matrix Spike Dup (3G30004-MSD1)		Source: X	307126-01	Prepared: 07/30/2013 Analyzed: 07/30/2013						
n-Butylbenzene	183	4.0	ug/kg	200	ND	91.7	70-130	0.760	20	
n-Propylbenzene	187	4.0	"	200	ND	93.6	70-130	1.08	20	
o-Xylene	184	4.0	"	200	ND	91.8	70-130	0.218	20	
sec-Butylbenzene	183	4.0	"	200	ND	91.5	70-130	2.40	20	
Styrene	180	4.0	"	200	ND	90.0	70-130	0.200	20	
tert-Butylbenzene	192	4.0	u.	200	ND	96.2	70-130	0.250	20	
Tetrachloroethene	193	4.0	u.	200	ND	96.6	70-130	0.602	20	
Toluene	188	4.0	"	200	ND	94.1	70-130	0.994	20	
trans-1,2-Dichloroethene	200	4.0	"	200	ND	99.8	70-130	1.45	20	
trans-1,3-Dichloropropene	196	4.0	"	200	ND	97.9	70-130	0.204	20	
Trichloroethene	199	4.0	"	200	ND	99.5	70-130	0.641	20	
Trichlorofluoromethane	226	4.0	u.	200	ND	113	70-130	2.64	20	
Vinyl chloride	184	4.0	"	200	ND	91.9	70-130	0.824	20	
Surrogate: 1,2-Dichloroethane-d4	65		ug/L	62.5		105	70-130			
Surrogate: Toluene-d8	64		"	62.5		102	70-130			
Surrogate: 4-Bromofluorobenzene	60		"	62.5		95.8	70-130			

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Project Number: 11337801

Project: 33rd St Outfall

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control Origins Laboratory, Inc.

		Reporting		0 "	0		0/ DEO		DDD	
				Spike	Source		%REC		RPD	
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes

Extractable Petroleum Hydrocarbons by 8015M - Quality Control Origins Laboratory, Inc.

		Reporting		Spike	Source		%REC		RPD	
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes

Batch 3G29003 - EPA 3580

Blank (3G29003-BLK1)					Prepare	d: 07/29/201	3 Analyzed: 07	/29/2013	
Gasoline (C6-C10)	ND	50.0	mg/kg						
Diesel (C10-C28)	ND	50.0	II .						
Residual Range Organics (C28-C36)	ND	200	"						
TPH - Carbon Chain Total	ND	50.0	"						
Surrogate: o-Terphenyl	49		g	50.0		97.3	59-131		
LCS (3G29003-BS1)					Prepare	d: 07/29/201	3 Analyzed: 07	/29/2013	
Gasoline (C6-C10)	1010	50.0	mg/kg				59-133		
Diesel (C10-C28)	963	50.0	II .	1000		96.3	64-121		
Residual Range Organics (C28-C36)	833	200	"	1000		83.3	58-124		
Surrogate: o-Terphenyl	44		g	50.0		87.1	59-131		
Matrix Spike (3G29003-MS1)		Source: X	307130-07		Prepare	d: 07/29/201	3 Analyzed: 07	/29/2013	
Gasoline (C6-C10)	1130	50.0	mg/kg		67.1		57-139		
Diesel (C10-C28)	985	50.0	"	1000	ND	98.5	53-125		
Residual Range Organics (C28-C36)	902	200	"	1000	32.6	86.9	47-133		
Surrogate: o-Terphenyl	61		g	50.0		122	59-131		
Matrix Spike Dup (3G29003-MSD1)		Source: X	307130-07		Prepare	d: 07/29/201	3 Analyzed: 07	/29/2013	
Gasoline (C6-C10)	1070	50.0	mg/kg		67.1		57-139	4.98	20
Diesel (C10-C28)	1060	50.0	"	1000	ND	106	53-125	7.71	20
Residual Range Organics (C28-C36)	974	200	II .	1000	32.6	94.1	47-133	7.71	20

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Project Number: 11337801

Project: 33rd St Outfall

Extractable Petroleum Hydrocarbons by 8015M - Quality Control Origins Laboratory, Inc.

		Reporting		Spike	Source		%REC		RPD	
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes

Batch 3G29003 - EPA 3580

Matrix Spike Dup (3G29003-MSD1)	Source: X307130-07		Prepared: 07/29/2013 Analyzed: 07/29/2013				
Surrogate: o-Terphenyl	72	g	50.0	144	59-131	S-GC	

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Project Number: 11337801

Project: 33rd St Outfall

Hg by 7471 - Quality Control GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1318166 - SW846 7471A Prep										
BLANK (1202916893-BLK)					Prepared	: 07/29/2013	3 Analyzed: 07	/30/2013		
Mercury	ND	0.00394	mg/kg		0		-			U
LCS (1202916894-BKS)					Prepared	: 07/29/2013	3 Analyzed: 07	/30/2013		
Mercury	0.123	0.00396	mg/kg	0.118	0	104	80-120			

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Project Number: 11337801

Project: 33rd St Outfall

Metals by SW846 3050B/6010C - Quality Control GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Note
Batch 1318114 - SW846 3050B										
BLANK (1202916752-BLK)					Prepared	I: 07/30/2013	Analyzed: 07	/31/2013		
Cadmium	ND	0.0965	mg/kg		0		-			U
Selenium	ND	0.483	11		0		-			U
Chromium	ND	0.145	II .		0		-			U
Barium	ND	0.0965	"		0		-			U
Arsenic	ND	0.483	"		0		-			U
Silver	ND	0.0965	"		0		-			U
Lead	ND	0.319	"		0		-			U
LCS (1202916753-BKS)					Prepared	I: 07/30/2013	Analyzed: 07	//31/2013		
Arsenic	50.4	0.499	mg/kg	49.9	0	101	80-120			
Cadmium	53.2	0.0998	II .	49.9	0	107	80-120			
Chromium	50.6	0.150	II .	49.9	0	101	80-120			
Lead	52.4	0.329	II .	49.9	0	105	80-120			
Selenium	53.6	0.499	II .	49.9	0	107	80-120			
Silver	50.2	0.0998	"	49.9	0	101	80-120			
Barium	50.7	0.0998	"	49.9	0	102	80-120			
DUP (1202916754 D)		Source: X30	07129-01		Prepared	I: 07/3 <mark>0/2013</mark>	Analyzed: 07	/31/2013		
Lead	267	0.372	mg/kg dry		201		0-20	28.2	20	
Arsenic	6.00	0.564	"		5.21		0-20	14.0	20	
Barium	311	0.113	II .		179		0-20	54.0	20	
Chromium	13.1	0.169	"		11.9		0-20	9.17	20	
Selenium	ND	0.564	II .		<0.564		0-20	46.5	20	U
Silver	1.84	0.113	"		1.55		0-20	17.5	20	
Cadmium	1.07	0.113	"		0.987		0-20	7.61	20	
MS (1202916755 S)		Source: X30	07129-01		Prepared	I: 07/30/2013	Analyzed: 07	/31/2013		

Origins Laboratory, Inc.



9100 West Jewell Avenue, Suite 200

Lakewood

CO

80232

Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

Metals by SW846 3050B/6010C - Quality Control GEL Laboratories, LLC

		Donartina		.	_					
		Reporting		Spike	Source		%REC		RPD	
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes

Batch 1318114 - SW846 3050B

MS (1202916755 S)		Source: X	307129-01		Prepared: 07/30/2013 Analyzed: 07/31/2013					
Lead	272	0.371	mg/kg dry	56.2	201	127	75-125			
Arsenic	58.8	0.562	"	56.2	5.21	95.5	75-125			
Barium	310	0.112	"	56.2	179	233	75-125			
Cadmium	56.2	0.112	"	56.2	0.987	98.3	75-125			
Chromium	70.8	0.168	"	56.2	11.9	105	75-125			
Silver	56.1	0.112	"	56.2	1.55	97.1	75-125			
Selenium	49.4	0.562	"	56.2	< 0.562	88	75-125			
PS (1202919305 S)		Source: X307129-01			Prepared	l: Analyzed	d: 07/31/2013			
Barium	2.44	0.00118	mg/kg dry	500	179	108	80-120			
Lead	2.70	0.00389	"	500	201	115	80-120			

Origins Laboratory, Inc.



9100 West Jewell Avenue, Suite 200

Lakewood

CO

80232

Brian Partington

Project Number: 11337801

Project: 33rd St Outfall

Notes and Definitions

U Result not detected above the detection limit

S-GC Surrogate recovery outside of control limits. The data was accepted based on valid recovery of the remaining

surrogate.

J Greater than the detection limit but less than the reporting limit

ND Analyte NOT DETECTED at or above the reporting limit

RPD Relative Percent Difference

Origins Laboratory, Inc.



Appendix D DEH Guidance for Third Party Reuse of Excess Soil from City Projects





Division of Environmental Quality 200 W 14th Ave, Suite 310 Denver, CO 80204 p: 720-913-1311 f: 720-865-5534

www.denvergov.org/deh

INTEROFFICE MEMORANDUM

TO: City and County of Denver Department Executive Directors

FROM: Doug Linkhart, Executive Director

DATE: April 29, 2015

SUBJECT: Guidance for Third Party Reuse of Excess Soil from City Projects

There is increasing demand in and around the City and County of Denver (City) for soil available for reuse. City projects sometimes generate excess soil that potentially could be reused. Such reuse offers several benefits to the City including reduced hauling costs, disposal fees, and vehicle emissions. The soil must be adequately characterized based on the intended reuse in order to protect public health and the environment. If contaminated, the soil must be disposed at the City-owned Denver Arapahoe Disposal Site (DADS) in accordance with Executive Order 115. If the soil meets the Colorado Department of Public Health and Environment (CDPHE) regulatory standards and guidance, the Department of Environmental Health (DEH) encourages its reuse.

This guidance provides procedures and criteria by which contractors and third parties may, or may not, reuse excess soil from City projects at non-City sites.

As such, to promote safe and sustainable reuse, it is within DEH's purview to implement the following requirements for City excess soils to be reused:

- 1. City personnel are responsible for contacting the City's Department of Environmental Health (DEH)¹ when they receive a contractor or third party request to reuse soil. DEH is responsible for promptly informing the contractor or third party of City sampling and analysis requirements, which are designed to promote safe and sustainable reuse.
- 2. Soil must be adequately characterized by sampling utilizing a sampling plan and methodology sufficient to evaluate the equivalent of at least every 500 cubic yards to be excavated.
- 3. Analyze those soil samples for, at a minimum:
 - a. Volatile organic constituents

¹ Diane DeLillio, 720-865-5448, diane.delillio@denvergov.org





Department of Environmental Health

Division of Environmental Quality 200 W 14th Ave, Suite 310 Denver, CO 80204 p: 720-913-1311 f: 720-865-5534 www.denvergov.org/deh

- b. Semi-volatile organic constituents
- c. Total petroleum hydrocarbons
- d. Pesticides
- e. Herbicides
- f. PCBs
- g. Arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver
- h. Asbestos.
- 4. The sampling and analysis must be conducted by environmental professionals approved by DEH.
- 5. The party requesting the excess soil shall pay all costs associated with the sampling and analysis of the soil.
- 6. Before the City will release the soil for reuse, the party requesting the excess soil must demonstrate to DEH's satisfaction that the soil meets either CDPHE's most restrictive criteria for residential soil or applicable CDPHE criteria based on the designated land use of the receiving site.
- 7. DEH maintains the documentation for sample collection, analytical results, and the environmental consultant's field notes and evaluation.
- 8. The party will be required to sign a release to accept the soil from the City and to release the City from liability.

CC: Jessica Brody, CAO Zach Clayton, DEH Gregg Thomas, DEH





Appendix E EPA Toxicity Characteristic Maximum Concentration of Contaminants

Toxicity Characteristic - Maximum Concentration of Contaminants (Determine Levels using TCLP, Test Method 1311, EPA S -846) 40CFR 261.24

USEPA Hazardous aste Number	Constituent	CAS Number	Regulatory Level (mg I)
D004	Arsenic	7440-38-2	5.0
D005	arium	7440-39-3	100.0
D018 vol	Benzene	71-43-2	0.5
D006	Cadmium	7440-43-9	1.0
D019 vol	Carbon Tetrachloride	56-23-5	0.5
D020 pest	Chlordane	57-74-9	0.03
D021 vol	Chlorobenzene	108-90-7	100.0
D022 vol	Chloroform	67-66-3	6.0
D007	Chromium	7440-47-3	5.0
D023 semivol	o-Cresol	95-48-7	200.0*
D024 semivol	m-Cresol	108-39-4	200.0*
D025 semivol	p-Cresol	106-44-5	200.0*
D026 semivol	Cresol		200.0*
D016 herbicide	2,4-D	94-75-7	10.0
D027 vol	1,4-Dichlorobenzene	106-46-7	7.5
D028 vol	1,2-Dichloroethane	107-06-2	0.5
D029 vol	1,1-Dichloroethylene	75-35-4	0.7
D030 semivol	2,4-Dinitrotoluene	121-14-2	0.13
D012 pest	Endrin	72-20-8	0.02
D031 pest	Heptachlor, and its epoxide	76-44-8	0.008
D032 semivol	Hexachlorobenzene	118-74-1	0.13
D033 semivol	Hexachloro-1,3-butadiene	87-68-3	0.5
D034 semivol	Hexachloroethane	67-72-1	3.0
D008	Lead	7439-92-1	5.0
D013 pest	Lindane	58-89-9	0.4
D009	Mercury	7439-97-6	0.2
D014 pest	Methoxychlor	72-43-5	10.0
D035 vol	Methyl Ethyl Ketone (MEK) (2- Butanone)	78-93-3	200.0
D036 semivol	Nitrobenzene	98-95-3	2.0
D037 semivol	Pentachlorophenol	87-86-5	100.0
D038 semivol	Pyridine	110-86-1	5.0
D010	Selenium	7782-49-2	1.0
D011	Silver	7440-22-4	5.0
D039 vol	Tetrachloroethylene	127-18-4	0.7
D015 pest	Toxaphene	8001-35-2	0.5
D040 vol	Trichloroethylene	79-01-6	0.5
D041 semivol	2,4,5-Trichlorophenol	95-95-4	400.
D042 semivol	2,4,6-Trichlorophenol	88-06-2	2.0
D017 herbicide	2,4,5-TP (Silvex)	93-72-1	1.0
D043 vol	Vinyl Chloride	75-01-4	0.2

^{*} If the o-, m-, and /or p-Cresol concentrations cannot be differentiated, then the total cresol (D026) concentration (200 ppm) is used.

Compounds presented in **blue** are the RCRA eight priority metals

Vol – Volatile organic compound Semivol – Semi volatile organic compound

Pest - Pesticide



Appendix F City and County of Denver - Asbestos-Contaminated Soil Management Standard Operating Procedure

ASBESTOS-CONTAMINATED SOIL MANAGEMENT STANDARD OPERATING PROCEDURE For City and County of Denver

December 3, 2010



City and County of Denver
Department of Environmental Health
Division of Environmental Quality
200 West 14th Avenue, Department 310
Denver, Colorado 80204
311

*

ASBESTOS-CONTAMINATED SOIL MANAGEMENT STANDARD OPERATING PROCEDURE For City and County of Denver

December 3, 2010

Prepared by:	Steve P Jon Jules
	Steve Gonzales
	State of Colorado Certified Project Designer
Reviewed by:	Dand Civilian
	Dave Erickson
	State of Colorado Certified Building Inspector

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APPENDIX A

CDPHE Notification Forms

APPENDIX B

CDPHE Approval letter and City's Responses to CDPHE Comments

ACRONYMS AND DEFINITIONS

Acronyms

ABI Asbestos building inspector
ACM Asbestos-containing materials
ACS Asbestos-contaminated soil

AMS Asbestos Air Monitoring Specialist, CDPHE Certified

APCD Air Pollution Control Division
AQCC Air Quality Control Commission
CCOD City and County of Denver

CDPHE Colorado Department of Public Health and Environment

City City and County of Denver
DADS Denver Arapahoe Disposal Site
DOT Department of Transportation

EPA United States Environmental Protection Agency

ESA Environmental Site Assessment
GIS Geographic information system
GPS Global positioning system
HASP Health and Safety Plan
HEPA High efficiency particulate air

HMWMD Hazardous Materials Waste Management Division

MMP Materials Management Plan

MPH Miles per hour

NESHAP National Emissions Standards for Hazardous Air Pollutants

NIOSH
National Institute of Occupational Safety and Health
NVLAP
National voluntary Laboratory Accreditation Program

OSHA Occupational Safety and Health Administration

PCM Phase Contract Microscopy
PEL Permissible Exposure Limit
PLM Polarized Light Microscopy

POLY Polyethylene

PPE Personal Protective Equipment

SCMP Soil Characterization and Management

SOP Standard operating procedure
TEM Transmission electron microscope
TSCA Toxic Substances Control Act

Definitions

- "Air Monitoring Specialist" means a person who performs air monitoring referred to in this guidance and who is certified to perform air monitoring in accordance with Air Regulation No. 8, Part B.
- "Asbestos Supervisor" means a person who has been certified as an asbestos Supervisor in accordance with Air Regulation No. 8, Part B.
- "Asbestos Project Designer" or "Project Designer" means a person who has been certified as an asbestos Project Designer in accordance with Air Regulation No. 8, Part B.
- "Adequately wet" means sufficiently mix or penetrate with liquid to completely prevent the release of particulate material and fibers into the ambient air. If visible emissions are observed coming from asbestos-contaminated soil or asbestos-containing material, then the material has not been adequately wetted. However, the absence of visible emissions is not sufficient evidence of being adequately wet. Guidance on determining when a material is adequately wet can be found in EPA's Asbestos NESHAP Adequately Wet Guidance, EPA 340/1-90-019 (December 1990).
- "Asbestos" means the asbestiform varieties of serpentine (chrysotile), riebeckite (crocidolite), amosite (cummingtonite-grunerite), anthophyllite, and actinolite-tremolite.
- "Asbestos contaminated soil" means soil containing any amount of asbestos.
- "Asbestos waste" means any asbestos-containing material whether it contains friable or non-friable asbestos, that is not intended for further use. This term includes but is not limited to asbestos mill tailings, asbestos from pollution control devices, and containers that contain asbestos.
- "Asbestos containing material" means any material that contains more than one percent (1%) asbestos by weight, area or volume.
- "Certified Asbestos Building Inspector" (ABI) means a person certified in accordance with Air Regulation No. 8, Part B, to perform asbestos inspection and sampling, and who has a minimum of six (6) months experience in asbestos-contaminated soil inspections.
- "Consultant" means entity contracted to perform training, inspections, and air monitoring related to soil disturbing activities in accordance with the SCMP.
- "Contractor" means entity contracted to perform soil disturbing activities in accordance with the SOP.
- "Facility Component" means any component associated with a structure, installation, or building and includes buried utilities, tanks, structures or other installations.
- "Friable" means that the material, when dry, may be crumbled, pulverized, or reduced to powder by hand pressure, and includes previously non-friable material after such previously non-friable material becomes damaged to the extent that when dry it may be crumbled, pulverized, or reduced to powder by hand pressure.
- "Leak tight" means that solids, liquids, or gases cannot escape or spill out. It also means dust tight.
- "Mechanical" means operated or produced by mechanism or machine. This may include, but shall not be limited to, an excavator, backhoe, grader, tiller, auger, or hand shovel.
- "Non-friable" means material which, when dry, may not be crumbled, pulverized, or reduced to powder by hand pressure.

"Site" or "solid waste disposal site" means the location for a facility chosen based upon geologic, hydrogeologic and operational considerations. For the purpose of Section 5.5 of the Solid Waste Regulations "site" means the area or areas where soil-disturbing activities are occurring or will occur.

"Soil-disturbing activities" means excavation, grading, tilling, or any other mechanical activity used to disturb the soil.

"Visible emissions" means any emissions which are visually detectable without the aid of instruments, coming from material containing asbestos, asbestos waste, asbestos-contaminated soil, or from handling and disposal of asbestos waste, material containing asbestos or asbestos-contaminated soil.

"Work Area" means the area where soil disturbing activities are occurring. For asbestos contaminated soil disturbance, Work Area also means the regulated/controlled area boundary. Purpose and Scope

1 Introduction

This Standard Operating Procedure (SOP) provides written procedures that are the minimum requirements for the proper training, handling, packaging and disposal of asbestos-contaminated soil (ACS) or asbestos containing material (ACM) during soil disturbing activities for City and County of Denver (City) properties or property owned by others where the City is performing work. This SOP shall be followed whenever soil excavation or disturbance will occur in areas where ACS or ACM is known or suspected to exist. This SOP satisfies the Section 5.5.3(C) and 5.5.4(B): Soil Characterization and Management Plan Requirements of the Colorado Solid Waste Regulations (6CCR 1007-2, Part 1).

When using this SOP for a specific project, appropriate notification shall be provided to the Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division (CDPHE) using the CDPHE notification forms attached to this SOP (Appendix A). Note that for existing projects, where project information has already been provided to CDPHE, notification shall be provided to the established CDPHE contact, and use of the forms in Appendix A may not be necessary.

This SOP should be used as a guideline for implementing appropriate management and disposal practices, and may be supplemented with additional site-specific addendums which describe current site conditions and past characterization efforts. In addition, site-specific management plans, Material Management Plans (MMPs) for other regulated material, and/or Health and Safety Plans (HASPs) for site-specific safe work practices will be appended to this SOP when appropriate. Such addendums and management plans will be submitted to the CDPHE using the same CDPHE notification requirements noted above.

CDPHE has reviewed, commented on earlier version and has approved this SOP. The CDPHE Letter approving this SOP is included in Appendix B. Appendix B also includes the City's responses to CDPHE comments on an earlier draft version of this SOP.

2 Site Information, Conditions and Planned Soil Disturbing Activities

2.1 Site Information Background

Knowledge of potential or known asbestos in soil occurrence is gained through a review of environmental and historical conditions of a site, or prior site characterizations, investigations or assessments. Results of the environmental and historical review will be used to classify the site according to the potential for asbestos to be present in soil, and the appropriate level of response, characterization and management activities, if any, for a site.

2.2 Review of Environmental and Historical Conditions

A review of environmental and historical conditions may consist of a Phase I Environmental Site Assessment (ESA), or a less formal environmental screen. The review may include, as necessary:

- Historical aerial photographs;
- Sanborn Fire Insurance maps;
- Historical city directories;
- City and County of Denver historical landfill map and database;
- Standard environmental record sources;
- Site visit:
- Utility plans and maps;
- Previous environmental studies;
- Building department records;
- County assessor's office records;
- Geologic maps;
- Investigation of other historical site conditions and uses;
- Interviews with site owners, operators, and government officials.

2.3 ACS Potential Classification

Results of the environmental and historical review are used to classify the site according to the potential for asbestos to be present in soil. The classification is used to determine the appropriate level of response, characterization and management activities, if any, for a site. Figure 1 depicts the site classification system and the response actions that flow from each classification.

2.3.1 Known ACS

A site that is classified as having known ACS is one where confirmed asbestos material in the soil was identified from subsurface soil investigation or from visual observations of the surface, sidewalls, embankments, etc. Soil disturbance activities on sites with known ACS will follow the management practices outlined in Section 7.0 of this SOP. Additional site characterization, if appropriate, will be conducted according to the procedures outlined in Section 6.0 of this SOP.

2.3.2 Reason to Believe

A site that is classified as Reason to Believe is one where evidence from environmental and historical reviews indicates that ACM could be encountered. Such evidence could include the presence of buried building debris or landfills in which construction debris or ACM is believed to have been deposited. Soil disturbing activities on sites classified as Reason to Believe will follow management practices of Section 7 of this SOP.

The presence of the following materials alone would not justify classifying a site as Reason to Believe:

- Wood
- Glass
- Metal
- Gravel
- Unfinished (no surface coating) concrete slab¹
- Brick other than fire brick²

Brick and concrete typically are considered to be free of asbestos and rarely or only occasionally will contain asbestos. If ACM is identified in these or other materials the appropriate management practices outlined in Section 7.0 of this SOP will be implemented during soil disturbing activities. Additional site characterization, if appropriate, will be conducted according to the procedures outlined in Section 6.0 of this SOP.

2.3.3 No Reason to Know or Believe

A site that is classified as having No Reason to Know or Believe is one where environmental and historical reviews do not identify the potential for asbestos containing materials to be on site even though waste material identified above and not typically associated with asbestos may be present.

Procedures in Section 7.0 of this SOP would not be implemented at a site classified as No Reason to Know or Believe.

Addition of asbestos to concrete slab was not a common use of asbestos. However, manufactured asbestos and Portland cement products were common including water pipes, simulated ceramic bathroom tiles, facings of acoustical materials, electrical switchboard panels, laboratory tabletops, electrical conduits, and even smaller diameter pipes were used for purlins and trusses in wartime construction to conserve steel and lumber.

² Asbestos was historically used in the fabrication of fire brick. Asbestos containing fire brick was used around boilers and furnaces and was cemented in place with asbestos furnace cement. Today, fire brick is manufactured without asbestos and much of the older asbestos fire brick has been removed and replaced with non-asbestos fire brick. Discussion of fire brick will be included in City-provided asbestos awareness training.

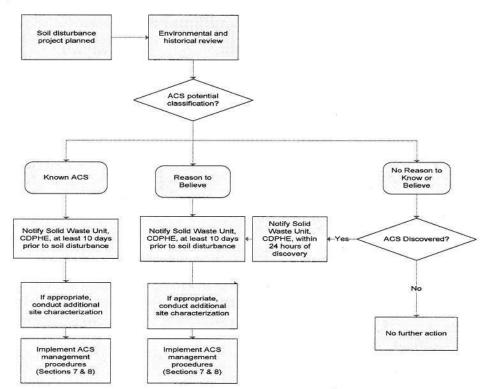


Figure 1. Site Review and ACS Potential Classification Flowchart

3 Primary Contacts, Roles and Responsibilities

For projects where asbestos in soil will be disturbed, personnel from the following departments and agencies will be identified for each site.

Organization	Role/Responsibility	Contact Information
City and County of Denver Specific Division	Project Management	To be determined
City and County of Denver Department of Environmental Health	Environmental Compliance	Steve Gonzales Phone: 720.865.5447 Email: steve.gonzales@denvergov.org
CDPHE Hazardous Materials and Waste Management Division (HMWMD)	Regulatory Agency	CDPHE Project Manager Solid Waste Unit Phone: Email:
Excavation Contractor	Site excavation and as needed management of ACS in accordance with this SOP	To be determined
ACS Consultant	ACS Consulting (soil characterization, remediation oversight, soil observation, ACM identification and air monitoring)	To be determined

Additionally, an asbestos building inspector certified in accordance with Air Regulation No. 8, Part B with at least six months of asbestos in soil experience (ABI) will be selected and independently retained by the excavation contractor. Requirements and responsibilities of the ABI, excavation contractor (contractor) and ACS consultant are discussed in the following subsections.

3.1 Asbestos Building Inspector Requirements

At sites classified as "Known ACS" or "Reason to Believe" where one could reasonably expect to encounter ACM an ABI will be on-site during soil disturbing activities to observe and identify potential ACM which may be encountered.

The ABI will be responsible for the following:

- Be on-site during soil disturbing and soil loading operations;
- Identify suspect ACM as soil is being excavated;
- Complete necessary sampling of suspect ACM in accordance with Section 6.1 of this SOP;
- Complete daily logs detailing site activities;
- Maintain pertinent documentation related to adherence of the SOP, including sampling results, air monitoring data, waste manifests, photographs, etc., and
- Verify implementation and adherence of the SOP in the event that ACM is identified during excavation of soil at the site.

3.2 Contractor Requirements

Contractors performing ACM or ACS removal activities will be responsible for the following:

- Providing the ABI and the City with documentation that all individuals performing ACM or ACS disturbing activities have completed asbestos contaminated soil awareness training that provides information necessary to perform their duties in a way that ensures compliance with the requirements of Section 5.5 of the Solid Waste Regulations, Section 5.0 of this SOP, and asbestos awareness training per Occupational Safety and Health Administration (OSHA) standards set forth at 29 CFR 1926.1101 (k) (9) (vii). All records that document the training, experience or certification requirements required in Section 5.5 of the Solid Waste Regulations shall be available for Division review throughout the duration of ACM or ACS disturbing activities;
- Preparing and implementing a HASP in accordance with all applicable regulations, including OSHA. The contractor will be responsible for the health and safety of its employees, sub-contractors, consultants, etc., as well as providing all necessary training and personal protective equipment (PPE) for completion of work at the site;
- Maintenance of all necessary site control to prevent unauthorized entry into any regulated work area;
- Verifying that ACM or ACS disturbance-related waste material is not disposed on the site, disposed into storm drains, sanitary sewers, streams, irrigation facilities or waterways;
- Removing non-salvageable, non-hazardous materials and equipment from the site and disposing at DADS in accordance with local, state and federal laws;
- Ensuring that all special personnel and required equipment are provided to haul construction debris to DADS;
- Ensuring that any special handling charges imposed by Waste Management at DADS are paid; and
- The contractor will be responsible for adherence to this plan at the direction of the ABI.

4 Regulatory Summary and Regulatory References

4.1 CDPHE Hazardous Materials Waste Management Division (HMWMD) –

"Asbestos-Contaminated Soils" not associated with the "Built Environment"

To address asbestos in soil, the CDPHE HMWMD has established specific management requirements for asbestos in soil under Section 5.5 of the Regulations Pertaining to Solid Waste Disposal Sites and Facilities (6 CCR 1007-2). Disposal of ACM, and work done in ACS, must comply with this regulation. The requirements of Section 5.5 of the Solid Waste Regulations apply to the owner or operator of any property with ACS at which soil-disturbing activities are occurring or planned for any area containing ACS. The requirements of Section 5.5 are triggered when the owner or operator knows of or believes ACS is present at a site, (through confirmation by analysis of observed material that is suspected of containing asbestos), or has reason to know or believe that visible asbestos will be encountered. An owner or operator who has no reason to know of or suspect ACS at a site does not have a duty to sample or otherwise investigate for ACS prior to commencing excavation, or other soil disturbing activities, at the site. It is important to understand that there is no language in the Solid Waste Regulations that requires an owner or operator to perform soil-disturbing activities, or to remediate ACS. The regulations include specific requirements that apply if ACS is disturbed or will be disturbed.

To supplement the regulation, CDPHE developed a guidance document intended to provide direction to contractors, consultants and property owners who are involved in soil disturbing activities in areas with known or suspected ACS, or where ACS is discovered. The guidance is meant to assist in compliance with the Solid Waste Regulations, and where applicable, Air Ouality Control Commission Regulation No. 8, Part B (5 CCR 1001-10, Part B - Asbestos).

In accordance with Section 5.5.2 of the Solid Waste Regulations, the following projects are exempt from the requirements of Section 5.5 of the Solid Waste Regulations, but may be subject to other sections of the Solid Waste Regulations or other regulatory programs:

- 1. In situations where the soil contains solely non-friable ACM, that has not been rendered friable, the non-friable material can be removed from the soil and properly disposed in accordance with Section 5.2 of the Solid Waste Regulations. The surrounding soil would not be considered to be ACS, and therefore would not be subject to the requirements of Section 5.5 of the Solid Waste Regulations. The determination that a material is non-friable must be made by an ABI who has been certified in accordance with AQCC Regulation No. 8, Part B, and who has a minimum of six (6) months experience in ACS inspections (see Section 5.4 Worker Training).
- 2. The requirements of Section 5.5 of the Solid Waste Regulations do not apply to asbestos abatement of facility components (including pipes, ducts and boilers) conducted in accordance with AQCC Regulation No. 8, Part B, unless the total quantity of asbestos-containing material to be removed from a facility component that is on or in soil that will-be disturbed falls below Regulation No. 8 trigger levels. Disposal of asbestos must comply with Sections 5.1 through 5.4 of the Solid Waste Regulations.

- 3. The requirements of Section 5.5 of the Solid Waste Regulations do not apply to spill response activities that are subject to the requirements of AQCC Regulation No. 8, Part B. As above, disposal of asbestos must still comply with Sections 5.1 through 5.4 of the Solid Waste Regulations.
- 4. Ambient occurrences of asbestos that are not due to site-specific activities. Ambient occurrences of asbestos may include, but are not limited to, naturally occurring asbestos or the distribution of asbestos from normal wear of automotive products.
- 5. Projects involving excavations with a total volume of less than 1 cubic yard of soil using low-emission excavation methods such as hand held tools or light equipment.
- 6. Projects conducted directly by a homeowner at their primary residence, including residential landscaping projects and other private residential soil-disturbing projects conducted after the primary dwelling is built, (e.g., planting trees, digging holes for fence posts, installing sign posts, gardening, or other projects done by private individuals at their primary residence.

The exemption for asbestos abatement projects conducted under AQCC Regulation No. 8, Part B includes asbestos debris that may come into contact with soil during demolition of structures with ACM and materials containing trace amounts of asbestos (including trace soil in crawlspaces, loose fill vermiculite, etc) that can legally remain during demolition and be disposed of as normal demolition debris. Any asbestos debris left behind after the completion of a demolition project and associated site cleanup would be subject to the requirements of Section 5.5 of the Solid Waste Regulations if disturbed in the future.

4.2 Federal and State Agencies

The EPA National Emissions Standards for Hazardous Air Pollutants (NESHAPs)/CDPHE Air Pollution Control Division (APCD) regulations primary consideration under this SOP is adherence to CDPHE Regulation 8 requirements for the discovery of ACM on buried facility components such as piping, boilers, etc and the proper removal in accordance with the EPA NESHAPs and CDPHE Regulation 8. Under CDPHE Regulation 8, secondary consideration under this SOP is the proper removal of all construction debris including non-friable materials allowed to remain during demolition, asbestos containing joint compound (where composite result reported less than 1%) and trace-1% asbestos materials. Where demolition debris is allowed to remain after demolition activities have been completed, any presence of asbestos in the soil would then be subject to the CDPHE HMWMD ACS regulations outlined in 6 CCR 1007-2 Section 5.5.

All work on ACM or ACS must comply with the applicable requirements of EPA, OSHA, DOT and CDPHE Regulation 8.

4.3 Facility Components

Removal of ACM on a facility component with asbestos quantities above the following trigger levels is subject to the notification, permit, and abatement requirements of AQCC Regulation No. 8, and shall not be conducted under this SOP:

i. 260 linear feet on pipes;

- ii. 160 square feet on other surfaces, or;
- iii. The volume equivalent of a 55-gallon drum.

However, removal of asbestos-containing material on a facility component, that is below the AQCC Regulation No. 8 trigger levels, and that is located on or in soil that will be disturbed, shall be conducted under this SOP in accordance with work practices in AQCC Regulation No. 8, Part B, Section III.O. This removal is not subject to the notification or permit requirements of Air Regulation No. 8; and OSHA Asbestos Standard for the construction Industry, 1926. 1101.

If there is asbestos-contaminated soil associated with the facility component, and less than one cubic yard of ACS will be disturbed, no notification will be made to CDPHE HMWMD. The subject ACS will be managed and removed utilizing wet methods and low-emission excavation techniques (hand tools). The CABI will ensure proper disposal of this ACS in accordance with Section 7.4.9 of this SOP.

If there is asbestos-contaminated soil associated with the facility component, and greater than one cubic yard of ACS will be disturbed, CDPHE HMWMD will be notified and the requirements in this SOP will be fully implemented.

5 Training Requirements

5.1 SOP circulation

Entities/persons involved with soil disturbing activities shall be provided a copy of this SOP prior to performing work.

5.2 Awareness Training

On-the-job asbestos soils awareness training as defined in Section 5.5.6 of the Solid Waste Regulations will be provided to all workers directly involved in soil disturbing activities on soil disturbing projects, including heavy equipment operators where there is known ACS or a reason to believe ACS may be encountered. The City's Department of Environmental Health, Environmental Quality Division (EQ) is available to any City department and/or City contractor as an ABI resource to provide the awareness training as follows:

"On-the-job" asbestos soils awareness training as defined in Section 5.5.6 of the Solid Waste Regulations will be provided to workers directly involved in soil-disturbing activities on sites where there is known ACS or a "reason to believe" ACS may be encountered. The training will address such topics as history and background of asbestos, identifying types of asbestos, health effects, engineering controls, and actions to take when suspect asbestos materials are encountered. The training will be conducted with oversight and curriculum development by a currently certified asbestos building inspector, asbestos supervisor or project designer.

The awareness training will provide information necessary for the individuals to perform their duties in a way that ensures compliance with the requirements of Section 5.5 of the Solid Waste Regulations. The training will be conducted by an Asbestos Supervisor, ABI or Project Designer, certified in accordance with AQCC Regulation No. 8, Part B, and who has a minimum of six (6) months experience in asbestos-contaminated soil management.

5.3 ACS Soil Disturbance Training

Personnel overseeing, directing and/or handling ACM or ACS during soil excavation activities shall have the following minimum training:

Asbestos-contaminated soil training that provides information necessary to perform their duties in a way that ensures compliance with the requirements of Section 5.5 of the Solid Waste Regulations, including on-the-job ACS awareness training as discussed in Section 5.2 above. This training will be conducted by an Asbestos Supervisor, ABI or Project Designer, certified in accordance with AQCC Regulation No. 8, part B, and who has a minimum of six months experience in asbestos-contaminated soil management.

Training in accordance with OSHA standard 1926.1101(k)(9)(vii) is also required for those performing soil disturbing activities in an area with ACM or ACS.

This training requirement applies to equipment operators but is not required for drivers of trucks carrying contaminated material for disposal to approved landfills.

5.4 ACS Inspection, SOP Preparation, and Air Monitoring Training

Individuals performing soil inspection (for purposes of identifying suspect ACM) must have a current ABI certification in accordance with AQCC Regulation No. 8, Part B, and must have a minimum of six months experience conducting ACS inspections. When a team of ABIs are used for inspection and sampling, the team-lead inspector must have a minimum six months experience (oversight inspectors are allowed to collect bulk samples, etc without the minimum six months experience).

Individuals preparing and signing Soil Characterization and Management Plans (SCMPs) must have a current Asbestos Project Designer certification in accordance with AQCC Regulation No. 8, Part B.

Individuals performing asbestos air monitoring (alone) associated with ACS disturbing activities must have a current Air Monitoring Specialist (AMS) certification in accordance with AQCC Regulation No. 8, Part B. Air monitoring oversight can be provided by non-AMS certified staff including sample analysis, mobilization of equipment, etc.

5.5 Additional Considerations

It is the contractor's responsibility to provide training to all employees who have the potential for exposure to asbestos in the proper use of PPE and have a current annual physical with a medical release/respirator use form in accordance with the employer's medical surveillance program. Personal exposure air monitoring will be conducted in accordance with the employer's exposure assessment program.

6 Immediate and Interim Actions upon Discovery of Suspected ACM

This section describes the immediate and interim actions that will be implemented when suspected ACM or ACS is discovered. When suspected ACM or ACS is discovered during excavation activities at the project, the critical requirement is to avoid generating airborne soil or being in direct contact with contaminated soil, thereby limiting potential exposure to asbestos fibers. Field personnel shall take actions necessary to assure that the suspect material is not disturbed while waiting for appropriately trained personnel to arrive on site. DEH is available to any City department and/or City contractor as an ABI resource to implement this SOP as required.

6.1 Immediate Actions upon Discovery of Suspected ACM

The CDPHE will be notified at least 10 days prior to any planned soil disturbing activity in areas of known or suspected ACS or ACM. In the event that visible ACS or ACM in soil is discovered the Division will be notified of this discovery no later than 24 hours after discovery. The CDPHE can be notified by using the Notification Form in Appendix A of this plan and faxed to 303-759-5355 or emailed to comments.hmwmd@state.co.us. For emergency repair projects to utilities, etc., notification will be provided to CDPHE by the next business day. Note that for existing projects, where project information has already been provided to CDPHE, notification shall be provided to the established CDPHE contact and use of the form in Appendix A may not be necessary. Notification information for DEH is provided in Section 3.0 of this SOP. Figure 2 depicts the general procedure for Immediate and Interim Action upon Discovery of Suspected ACM.

This SOP has been prepared to minimize potential delays, and to develop approved standard procedures that the contractor or City personnel will implement as needed for applicable soil disturbing activities. These standard procedures once approved by the CDPHE, will satisfy the requirements for a SCMP.

The following outlines procedures to be followed to minimize the potential for release of airborne asbestos fibers when suspect ACM or ACS is discovered.

- Stop work immediately upon encountering material that is suspected of containing asbestos.
- Adequately wet area with water before performing sampling activities that will disturb the material (note: visual inspection does not require wetting). Maintain wet conditions throughout sampling activities. If leaving the site unattended, cover the disturbed soil with a layer of 6-mil polyethylene (poly) sheeting, or spray with magnesium chloride solution in sufficient amounts to wet the soil to prevent drying and dust generation.

- Demarcate area suspected of containing asbestos with barrier tape, or other means, and provide site access control. Access can be prevented by means of fencing or security personnel.
- Disturb soil as little as possible to perform sampling activities as described in Section 6.2.
- A layer of 6-mil poly may be used to prevent cross contamination onto clean soils during
 initial characterization activities by placing the poly on the ground an then placing the
 potentially contaminated soil directly on the poly.
- Generate no visible emissions (dust) during characterization activities.

The ABI will collect samples of the suspect asbestos materials according to procedures provided in Section 6.2. The samples will be analyzed using polarized light microscopy (PLM) to identify the presence of asbestos fibers.

Clothing and equipment that has come in contact with suspect asbestos will be considered potentially contaminated until/unless analytical results indicate the material does not contain any asbestos. Workers and equipment will be decontaminated on site; dirt and debris should not leave the immediate work area. Heavy equipment will be left on site until analytical results are received unless the equipment has been decontaminated. The following procedures can be modified by the ABI based on the project scale and the potential level of exposure:

- Decontaminate workers by removing visible soil and dust with water or damp wipes or rags. Place wipes and rags in a plastic bag and label as "investigation-derived waste", "date" and "company name". If additional clothing is available, clothes should be changed and potentially contaminated clothing should be bagged separately from wipes and rags.
- Decontaminate equipment by removing gross soils and dust, then washing the equipment. Decontamination of equipment should be conducted by a certified asbestos worker wearing proper PPE. Materials used for decontamination should be bagged and labeled as above. Decontamination rinse water should be collected and filtered to five microns prior to disposal, or filtered water can be reused for wetting of asbestos-contaminated areas that will be removed. If areas where filtered decontamination water has been applied are not going to be excavated prior to drying, the surface must be covered or stabilized until excavation occurs to prevent the emissions of any asbestos fibers that were not removed during filtration. If disposal of decontamination water to the sanitary sewer is anticipated, rinse water should be filtered to five microns. Please see Section 7.4.11 of the SOP for more information regarding equipment decontamination.
- Based on analytical results of suspect materials, if asbestos is present, dispose of bags by
 double bagging and disposing as asbestos waste at DADS, or with ACM removed in
 accordance with this plan. If analytical results indicate that no asbestos is present, bags
 can be disposed as non-asbestos solid waste.

After confirmation of ACM or ACS by the ABI, the ABI will direct the contractor on full implementation of this SOP.

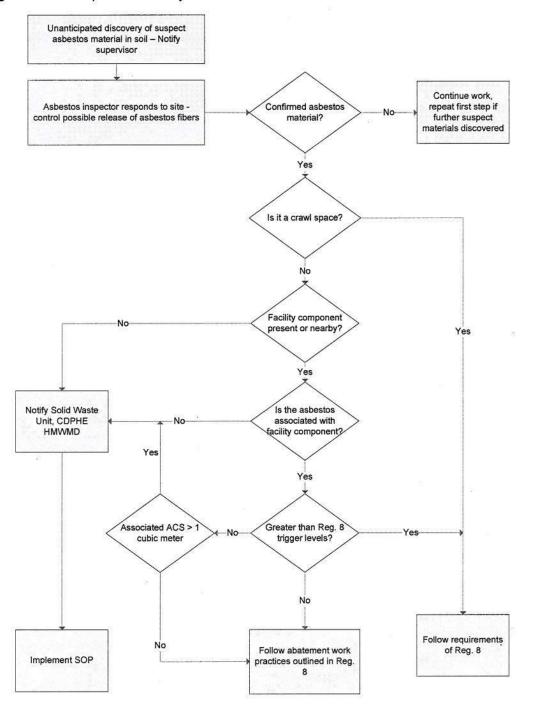


Figure 2. Unanticipated discovery of asbestos in soil flowchart

6.2 Interim Actions upon Discovery of Suspected ACM

Site characterization to identify the extent of ACM may be required to help develop the scope of work required to manage ACM disturbed in soil. Site characterization activities are described below.

6.2.1 Site Characterization

In the event that suspect ACM is visually identified by the ABI, steps outlined in Section 7.0 will be implemented. The following steps will be applied to sample and analyze suspect ACM identified by the ABI:

- Samples of suspect ACM shall be placed in appropriate sample containers such as sample bags or jars;
- Care should be taken to ensure that suspect ACM is adequately wetted to prevent visible emissions during the sampling process;
- The ABI will classify the suspect ACM as friable or non-friable;
- A field sampling form or log book entry will be maintained for each sample obtained.
 The form or log book entry will include the location using a hand-held GPS instrument,
 date and time of each sample, description of the type of material, assessment of friability
 of the material and other made.
- Proper chain-of-custody procedures will be followed for all samples collected.

The following analytical procedures will be followed for analysis of suspect asbestos materials:

Samples of suspect ACM will be analyzed by a National Voluntary Laboratory
Accreditation Program (NVLAP)-accredited laboratory by PLM methodology to
determine if any asbestos fibers are present. Alternatively, suspect ACM can be assumed
to contain asbestos rather than sample and await analytical results.

If assumed ACM is present in soil or ACM is confirmed in soil by the ABI, the ABI will direct the contractor on full implementation of this SOP.

7 Removal of Asbestos-Contaminated Soil

7.1 ACS Management Procedures

The following sections provide general ACS management procedures to be utilized when disturbing ACS. Section 7.2 describes notification procedures, Section 7.3 describes management of limited quantities of ACM and the remaining sections describe management of significant quantities of ACM (note notification to CDPHE, worker protection and proper disposal will apply to both types of discoveries). Minimum engineering controls and air monitoring will be implemented any time excavation activities are occurring in an area of Known ACS, or at a site that is classified as Reason to Believe.

7.1.1 Minimum Engineering Controls for Known or Reason to Believe Sites

Minimum engineering controls should include, but not be limited to:

- If multiple excavations are occurring simultaneously where ACM is potentially present, then multiple ABIs must be available to observe each active excavation.
- The ABI must be located or positioned to positively identify the presence or absence of suspect ACM. The ABI and equipment operator should have a means of continuously communicating with each other.
- A misting system, spray bar, or equivalent spray device should be mounted on each bucket or excavator that is disturbing debris and/or ACS to ensure that there are no emissions.
- A person with a fire hose on low pressure and equipped with a ball valve (or equivalent)
 will be present at the point of excavation to prevent and not cause fugitive dust emissions
 and potential asbestos fiber emissions to comply with the regulations.

7.2 Notifications for Planned ACS or ACM Disturbance

The CDPHE will be notified at least 10 days prior to any planned soil disturbing activity in areas of known ACM or ACS. The CDPHE can be notified by using the Notification Form provided in Appendix A, and faxed to 303-759-5355, or emailed to comments.hmwmd@state.co.us. For emergency repair projects to utilities etc., notification will be provided to CDPHE by the next business day. Note that for existing projects, where project information has already been provided to CDPHE, notification shall be provided to the established CDPHE contact, and use of the forms in Appendix A may not be necessary.

7.3 Removal by Hand - Limited Quantity ACM Discovery Management and Disposal "Pick and Go"

If ACM or suspect ACM is encountered in soil and consists of less than 25 separate pieces of ACM in a single location that is less than 10 cubic feet (with multiple pieces of ACM within a few inches of each other to be treated as one piece of ACM), the ABI may direct the removal of these pieces of ACM using the procedures listed below:

- 1. Use water to adequately wet the material and surrounding soil;
- 2. For non-friable ACM, gather and place the ACM and several inches of surrounding soil in six- millimeter bags (double bags);
- For friable ACM gather and place ACM and three cubic feet of surrounding soil in sixmillimeter bags (double bags). Continue work with extra attention to possible additional ACM in that vicinity;
- Stage waste bags in a lined drum or roll-off container. Identify drums or containers as solid waste that contains asbestos for disposal at DADS in accordance with CDPHE regulations and this SOP; and
- Conduct a follow-up visual inspection of the area and repeat procedures 1 through 4 above as necessary.

All personnel involved in the removal of Limited Quantity ACM will wear at a minimum a half-face air purifying respirator with HEPA filtration, disposable protective suit, over booties and gloves. Decontamination of all tools and equipment involved in the removal of ACM is required prior to leaving the designated work area. Refer to Sections 7.4.10 and 7.4.11 of this plan for equipment and worker decontamination procedures.

7.4 Excavation and Earthmoving, Known ACS or ACM

The following subsections apply to excavation or earthmoving work in areas where ACM or ACS has been identified.

7.4.1 Site Control, Demarcation, Fencing and Wind Screening

The designated work area consists of the immediate area where ACM or ACS has been observed. The designated work area can be demarcated on all four sides using a movable/portable wind barrier to prevent wind dispersal of soil during excavation activities. Moveable/portable wind barriers can be placed on all four sides and immediately adjacent to the point of excavation, and should be of adequate height and configuration (size) to minimize wind soil dispersal at the point of excavation. For large projects with widespread removal of ACS, the requirement for the use of windbreak barriers may be modified or waived For smaller areas or highly mobile removal activities, moveable "directional" mobile wind fencing can be used, and should be positioned upwind and adjacent to soil removal activities at all times. Where only directional wind fencing is used, asbestos barrier tape should be installed to identify the remaining boundary of the Work Area (where wind fence is not positioned)

7.4.2 Protection of Adjacent Structures

When the designated work area is close (i.e. 50 feet) to occupied structures, external barriers may need to be constructed. Exposed openings in the structure, including windows, doorways, vents or other openings should be sealed with 6-mil poly.

7.4.3 Soil Wetting and Stabilization

Soil within the designated work area will be adequately wetted to prevent any fugitive dust emissions that may be generated during initial setup and mobilization into the area. The contractor shall use water hoses from a tank truck or directly from a fire hydrant or other water source. Water will be applied at low pressure so as to not generate dust or splattering. During all soil disturbing activities, wetting of soil will be sufficient to ensure soils are adequately wet (no visibly dry soil and no visible emissions) throughout the soil disturbing activities.

7.4.4 Dust and Emissions Control

General dust control will be achieved by use of water trucks that will regularly spread water on all access roads throughout the project site to ensure no visible dust generation by vehicle traffic during soil disturbing activities.

Water will be applied for dust control within all disturbed areas. The contractor will maintain the dust control process throughout the course of the project during soil disturbing activities. Removal of soil and debris from the designated work area will be performed with heavy equipment which has been adapted to have a water misting system installed to minimize dust emissions at the point of removal. Water will be applied in a manner that does not cause run-off or splattering. In addition, a water misting system will be constructed to wet the material at the point of loading into the dumpster prior to final packaging. Additional hand wetting using a water hose equipped with a ball valve for misting will be used to eliminate fugitive emissions, but avoid splatter or drift from spraying.

Whenever ACM or ACS is disturbed, the contractor will ensure that no emissions are generated. The City's consultant will be on site to monitor the moisture of the soil being excavated to ensure that it is adequately wet (and to observe for any visible emissions). An ABI will conduct these visual inspections.

If emissions are observed during the removal process, soil disturbing activities will immediately cease and work practices will be reviewed and modified by the contractor. The consultant will log all instances where visible dust emissions occurred and immediately notify the City and CDPHE by phone and in writing, of all occurrences, and will obtain any direction from the City and CDPHE.

7.4.5 Personal Protective Equipment

During soil disturbing activities, all persons within the designated work area shall utilize appropriate PPE, as identified in OSHA's general requirements for asbestos workers (29 CFR 1910.1001). PPE shall include appropriate respiratory protection with a minimum half face respirator with HEPA filtration required anytime active soil disturbance is occurring, protective full body Tyvek[®] suit with attached hood and booties, gloves, rubber boots, and other protective wear as appropriate based on conditions (cold stress, heat stress, insects, etc).

7.4.6 Removal/Excavation

Utilizing an excavator, mini excavator or backhoe with a bucket mounted spray bar system; the soil excavation will proceed within the designated work area. The spray bar system will consist of nozzles inside the back top edge of the bucket and two outside the bucket with nozzle's spray

pattern overlapping that will eliminate fugitive dust during loading, but avoid splatter or drift from spraying. Additional hand wetting will be conducted at the point of excavation using a water hose equipped with a ball valve and nozzle for misting. The low pressure ball valve and nozzle should allow water application in an outward fan of fine spray or mist that will knock down potential fiber emissions while also preventing splattering or runoff.

Excavation of ACS will not overreach the bounds of wetting. For projects involving relatively shallow ACS occurrence, excavation will be conducted in 6-inch and 1-foot lifts to ensure that disturbed soil remains adequately wet. For projects involving ACS at depth, such as a landfill, excavation in lifts may not be practical. In these instances, wetting may take place as the excavation proceeds, with wetting being conducted using hand held low pressure hoses. The soil may be mixed within the excavation, using the excavator bucket, until it is adequately wet. The soil may then be moved from the excavation into the lined trailer. If ACM is present in the excavation side-walls or floor, the material will be wetted and stabilized with magnesium chloride if left overnight, or covered with poly sheeting if ACM in the excavation side-wall or floor will remain exposed for a longer period of time. At no time shall soil that is not adequately wet be removed from the excavation. During the removal process, all areas of impact will be kept adequately wet. Water will be applied at low pressure so as not to generate dust or splattering and will be applied at the point of contact. The excavator will handle the material wet and direct load the soil into a tractor trailer or end dump.

Poly sheeting will be placed over uncontaminated soils in the swing radius of the excavator and along the transport route of loading equipment to prevent cross-contamination. Care will be taken to avoid contamination of the excavating equipment. This will be accomplished by driving and keeping excavating equipment on non-contaminated soil.

If the excavating equipment has to be placed on contaminated soil, the soil will be covered with 6-mil poly to avoid contamination of the rig. If the rig is driven over contaminated soil, the soil will be adequately wetted to avoid air emissions. Equipment that comes in contact with contaminated soil, or that was within the designated work area will be decontaminated. Conduct work with appropriate phasing/sequencing that will minimize cross-contamination potential.

7.4.7 Soil Stockpiling

Stockpiling of ACS will only occur under CDPHE and City approval, as removal of ACS should be under a direct load approach whenever possible. When soil movement and stockpiling is necessary, stockpiled ACS must be stabilized and covered when not in use and must not be allowed to remain on site longer than 5 working days.

7.4.8 Truck/Container Staging/Lining and Waste Loading

All truck drivers will be instructed to close all windows and shut off air delivery systems (fans on air-conditioning and heating systems) when entering the loading area. All travel and positioning of waste transport truck/trailers should be on visually verified clean soil to minimize the need for decontamination procedures. At the loading location, a 10-mil poly sheeting or thicker "lay-down pad" will be placed on the ground under dumpsters/trucks to catch any spilled material. Spilled ACM or ACS will be cleaned up immediately and not allowed to dry out or accumulate. Additional poly can be draped over trailer tires/fenders to minimize the need for

decontamination after loading. After the load has been secured and load cover tarp is installed, the poly sheeting lay down loading pad will be properly decontaminated prior to the truck moving forward, using wet methods such as hoses and brooms and squeegees.

7.4.9 Waste Transportation and Disposal

Containers of non-friable ACM, soil with visible non-friable asbestos or ACS with no visible asbestos will be managed in accordance with the requirements of Section 5.5.7 (B) and 5.2 of the Solid Waste Regulations. In accordance with the disposal requirements for non-friable ACM at least one 6-mil poly liner will be in trucks used for transport of soil that contains visible non-friable ACM. Poly liners should be designed and sized for the container to be used and should be folded over sides of trailers and containers to protect against contamination during loading and to facilitate decontamination. After loading, the liners will be sealed so that it remains leaktight during transportation and disposal operations. Containers of non-friable ACM and soil shall be labeled with "asbestos, danger", the name of the generator, and placed on top of sealed liner.

Containers of friable ACM, or soil with visible friable asbestos, shall be labeled, in accordance with the requirements of Section 5.3 of the Solid Waste Regulations. The disposal requirements for friable asbestos waste (Section 5.3.5(A) of the Solid Waste Regulations) require that at least two 6-mil poly liners be used to encapsulate soil that contains visible friable asbestos. Poly liners should be designed and sized for the container to be used and should be folded over sides of trailers and containers to protect against contamination during loading and to facilitate decontamination. After loading, both liners should be sealed separately. The liners shall be sealed so that they remain leak-tight during transportation and disposal operations and labeled in accordance with Section 5.3.5(B) of the Solid Waste Regulations.

In addition, DOT asbestos placards shall be placed on all four vertical sides of the container or vehicle being used for transport of ACM and ACS. The contractor should direct the schedule of transportation of asbestos-contaminated soil. When loaded, each truck will be assigned a manifest to serve as the shipping document for that particular load.

ACM or ACS shall be transported and disposed in a leak-tight container in accordance with the CDPHE disposal requirements. Documentation stating that the ACM or ACS originating from the site will not be used as daily cover or sold as clean fill shall accompany each load of ACM or ACS removed from the site.

Disposal of ACM or ACS will be conducted as follows in accordance with Section 5.5.7 of the Solid Waste Regulations:

- ACS containing visible friable asbestos will be disposed in a leak tight container as
 friable asbestos waste in accordance with the requirements of Section 5.3 of the Solid
 Waste Regulations.
- ACS containing only visible non-friable asbestos, that has not been rendered friable, will be disposed of as non-friable asbestos in accordance with Section 5.2 of the Solid Waste Regulations.
- 3. ACS containing no visible asbestos will be disposed in a manner similar to non-friable asbestos waste, as described in Section 5.2 of the Solid Waste Regulations.

7.4.10 Personnel Decontamination

At the beginning of each work day workers who will be in the area of active ACS disturbance will don disposable protective suits (Tyvek), disposable gloves and disposable boot covers (excluding truck drivers). For most projects, worker decontamination will consist of removal of the Tyvek suit, gloves, and boot covers, which should then be containerized and disposed as asbestos waste. Any non-disposable personnel items must be decontaminated with water or wet wiping.

During all soil-disturbing activities in areas with friable asbestos, a fully functioning decontamination unit or trailer can be available onsite for worker decontamination as specified by the contractor's HASP. The decontamination unit will be centrally located among investigation areas and will consist of three chambers with operational hot and cold running water for the shower. The decontamination unit may be utilized by the workers each time they exit the work area. All contaminated disposable personnel protective equipment shall be containerized and disposed as asbestos waste. Water from the decontamination unit will be filtered to 5 micron and disposed of in the sanitary sewer.

7.4.11 Equipment Decontamination

All equipment and tools that come into contact with, or are used for removal of ACM or ACS will be decontaminated (free of all visible dust and debris) using wet cleaning methods, prior to leaving the work zone. Equipment decontamination can occur in areas of asbestos-contaminated soil or within a decontamination station. If decontamination occurs over asbestos contaminated soil the area will be kept wet or stabilized and soil in the area will subsequently removed for disposal. Alternatively, equipment decontamination will be conducted within a decontamination station constructed adjacent to the work zone. The decontamination station will be constructed of 10-mil poly sheeting (and other materials as necessary, such as ethylene propylene diene monomer [EPDM] rubber roofing, etc) in such a way as to capture all contaminated material and wastewater from the decontamination process. All wastewater from the decontamination station will be filtered to a minimum of 5-microns prior to use as wetting water for an area of ACS that subsequently will be removed or discharge to a sanitary sewer.

7.5 Wind and Work Stoppage Conditions

ACS disturbance operations will not be conducted if winds produce visible emissions of dust or create dust when moving equipment or soil. All wind speed measurements will be taken at locations in close proximity to, and representative of, the designated work area in which the ACS is being handled. Wind speed measurements will be recorded at least every 30 minutes and during wind gusts by an AMS. This frequency will be increased at the AMS's discretion when it has been determined that wind conditions may be approaching threshold limits. It will be the responsibility of the AMS to take and record all wind speed measurements onto the daily logs.

Shutdown conditions: ACS removal/disturbance operations will immediately and temporarily cease when one or more of the following conditions have been met:

1. Any wind gust reaching or exceeding 20 mph as determined by hand-held instruments;

- 2. Sustained wind speeds reaching or exceeding 12 mph averaged over a period of 10 minutes;
- 3. Winds are producing visible emissions or creating movement of dust or debris in or near the removal/disturbance area; or
- 4. Winds are impacting the ability of engineering controls to work as designed.

During wind-related work shutdowns, other work activities not involving soil removal or disturbance (e.g., lining dumpsters) may continue.

Resume Conditions: ACS disturbance activities may resume after <u>all</u> of the following conditions have been met:

- 1. All wind gust readings for a period of 20 minutes drop below 20 mph as determined by hand-held instruments;
- 2. Sustained wind speeds are below 12 mph averaged over a period of 20 minutes;
- Winds are no longer producing visible emissions or creating movement of dust in or around the removal/disturbance area; and
- 4. Winds are not impacting on the ability of engineering controls to work as designed.

7.6 Air Monitoring Requirements Associated with Engineering Controls

During soil disturbing activities in areas of known ACS or where there is reason to believe ACM or ACS may be encountered, the AMS will collect air samples to assist in determining the adequacy of the engineering and environmental controls employed at the site. The daily air monitoring sampling scheme, monitoring type, sample frequency, duration and analysis are listed in Table 1. Progressive air monitoring will be implemented when excavation activities are occurring in a fill area in which one can expect to encounter ACM or ACS even prior to identification of ACM and when suspect ACM has been observed. All air samples will be collected by an AMS. Depending on the size of the work area and the type of soil being removed, air monitoring may include personnel air monitoring only, or personnel monitoring and perimeter air monitoring for large open areas. In general, personnel air monitoring only (i.e., no perimeter monitoring) shall be used when disturbing no more than a 100 x 100 foot area at a time. Where only personnel air monitoring being performed, personnel air monitoring must be in an area representative of the designated work area. However, if the work area is proximate to occupied buildings residential homes, or areas of public access perimeter air monitoring may be necessary even if the work area is smaller than 100 x 100 feet, in order to demonstrate that no asbestos fibers have left the work area.

7.6.1 Personal Air Monitoring Associated with OSHA

It is the contractor's responsibility to ensure that personal air monitoring shall be performed in accordance with all OSHA requirements and the site Health and Safety Plan during disturbance of known and suspect asbestos in soil. In addition to OSHA requirements, for all ACS excavation activities, at least two different workers or 25 percent of the workers, whichever is greater, and who are expected to have the worst-case exposure to asbestos during excavation shall be monitored to assist in determining the adequacy of engineering and environmental controls employed at the site.

7.6.2 Perimeter Air Monitoring

Generally, perimeter air monitoring will be performed during excavation of greater than 100 x 100 feet of disturbances of ACS. Perimeter air monitoring may be required in smaller excavations where friable ACM exists and soil disturbance occurs immediately adjacent to sensitive receptors such as occupied buildings, residential homes or areas of public access or if personnel monitoring is not representative of the work area.

7.6.3 Air Sample Analysis

Air samples shall be submitted for total fiber analysis using phase contrast microscopy (PCM) by an asbestos accredited laboratory at the end of each work day. The two samples with the highest fiber concentrations by PCM will be analyzed by transmission electron microscopy (TEM) for asbestos fibers. Table 1 summarizes the number and location of personnel and perimeter air samples and sample analysis requirements including when TEM analysis is required. Air monitoring sampling protocols are described below.

7.6.3.1 Sampling Media

Air samples will be collected by drawing air through a 25-millimeter mixed cellulose ester filter, 0.8-micron pore size, with an open-faced, long cowl using low-flow personal sampling pumps at approximately two liters per minute (or flow rate to provide a sufficient limit of quantitation/limit of detection [LOQ/LOD]). Each low-volume pump will be fitted with a computer microchip, which electronically regulates airflow and allows a fixed flow rate of air to pass over the face of the filter. The flow rate and the volume of air passed through the filter will be determined based on the National Institute for Occupational Safety and Health (NIOSH) 7400 analytical method. Each pump will be calibrated before and after the collection of each sample using a primary standard.

7.6.3.2 Sample Analysis

Sample analyses will be performed by an analyst using PCM according to the NIOSH 7400 Method. The analyst will be an AMS and a participant in the NIOSH Proficiency Analytical Testing Program and have been deemed proficient. Analyses of TEM air samples will be submitted to an accredited laboratory using TEM according to the Asbestos Hazard Emergency Response Act protocol.

7.6.3.3 Reporting

PCM verbal results will be made available by the start of the next business day or as soon as practical after the start of the next business day. TEM verbal results will be made available within 24-hours of receipt of samples by the laboratory, and written results will be made available within 24 hours from the time the verbal result is received. CDPHE will be immediately notified if any sample results show any concentration of airborne asbestos fibers. If any asbestos fibers are detected by TEM, all soil disturbance activities will be stopped and engineering controls will be evaluated by contractor and consultant, and will be discussed with City and CDPHE to determine if changes in engineering controls or additional PPE are required.

7.7 Final Inspection Procedures

As the project progresses, visual inspection will be performed to ensure that all observable ACM has been removed from the soil surface. The soil will be removed in a manner that will provide a flat, even surface (with no spoil piles) for visual inspection. The inspections will be performed for the surface area removed that day, as a preliminary inspection. Due to the wet nature of the removal and the soil, adequate drying time is required before a final visual inspection can be conducted.

The removal of soil in the debris field area will be considered complete when sufficient soil has been excavated based on construction plans.

7.8 Managing ACS left in place

Where ACM is observed at the depth and extent of excavation the area shall be covered with a geotech membrane and labeled as asbestos-contaminated soil. The geotech membrane should be covered with clean soil to protect and maintain the geotech membrane in place. Prior to covering with clean soil, photographs will be taken from each compass point of the boundary, and the corner points of the boundary shall be obtained using a GPS with sub-foot accuracy. This information will be maintained by DEH and other City departments as appropriate.

7.9 Spill Control

Where ACM or ACS is spilled during loading or transport, the contractor shall ensure the spilled ACM or ACS is immediately collected in accordance with wetting and emission control provisions of this SOP.

7.10 Erosion Control

To control wind erosion of ACM or ACS, use of silt fencing or wind fencing may be used, where appropriate. Stabilize friable ACS by covering with magnesium chloride (or equivalent soil stabilizer) or 6-mil poly until removal can occur. Securely fasten poly sheeting to prevent removal by the wind.

To control water erosion, the use of silt fencing, erosion control mats, straw waddles or equivalent erosion control methods shall be used in areas where run-off is likely. Where ACM or ACS will remain follow the procedure described above in Section 7.8.

8 Special Considerations

8.1 Importing and Exporting Soil

The contractor shall notify and receive approval from the City project manager prior to any soil being exported or imported to the site. The contractor shall coordinate any inspections, observation, or testing requested by the City project manager for any exported or imported soils to the site.

8.2 Soil Stockpiling Management Procedures

Stockpiling of ACS will only occur for waste segregation and loading, as provided in this plan. Stockpiled ACS must be stabilized and covered when not in use, and must not be allowed to remain on site longer than 5 working days.

8.3 Emergency Buried Utility Repair Projects

Specific provisions of this SOP require some planning and response time that may not be appropriate in an emergency response situation to repair a buried utility. This section identifies the minimum requirements under this SOP for the first 24 hours of excavation and repair, to ensure that necessary repairs can be made to buried utilities promptly in an emergency situation where the utility must be repaired immediately (which may include evening and weekend work). Where suspect ACM is encountered during the emergency response, only worker protection, adequate wetting and no visible emission provisions of this SOP will apply within the first 24 hours. The remaining provisions including notification to CDPHE HMWMD, material characterization, asbestos awareness training, air monitoring, disposal etc. will take effect after the first 24 hours of the excavation and repair event. Ensuring adequate wetting and no visible emissions during the first 24-hours of the emergency excavation will allow necessary work to continue and will provide a window for implementing remaining provisions of this SOP including testing of suspect materials, and where suspect ACM is identified, implementing management actions under this SOP. Suspect ACS that has been excavated during the emergency repair shall not be placed back into the hole/pit until characterization can be conducted by an ABI. Appropriate worker protection (respirator, disposable suit, gloves, etc.) shall be utilized when any suspect ACM is encountered.

9 References

- CDPHE. 2006. Asbestos-Contaminated Soil Guidance Document. Prepared in draft form April 2006 by the Hazardous Materials and Waste Management Division.
- CDPHE. 2006. Asbestos-Contaminated Soil Regulations. Section 5.5 of the Hazardous Materials and Waste Management Division's Regulations Pertaining to Solid Waste Disposal Sites and Facilities
- CDPHE. 2008, Air Quality Control Commission Regulation No. 8, Part B (5 CCR 1001-10, Part B Asbestos).
- OSHA. Construction Industry Standards for Asbestos. 29 CFR 1926.110

Table 1: Air Monitoring Requirements

Transported Type	Samulino Frequency Duration	Duration	Anolycic
	and the state of t	Daramon	Alianysis
Personal Air C Monitoring to	One sample per shift for each of two workers closest to disturbance activity but not inside heavy equipment	Ongoing	PCM analysis to support project air monitoring requirements. Any sample with PCM results exceeding 0.01 fibers/cc must be analyzed by TEM.
	NONE	N/A	N/A
reminerer Sampining			
	Removal by Hand or Hand-Held Equipment of Limited Quantity ACM	of Limited (uantity ACM
Monitoring Type S	Sampling Frequency	Duration	Analysis
-	One sample per shift for each of two workers closest	Ongoing	PCM on two workers – if analysis yields
m gillionillom	to disturbance activity but not inside neavy equipment		results with detectable fiber levels (based on
			for subsequent three non friable and friable
			asbestos discovery events. If no asbestos
			fibers identified, PCM for subsequent
			events. Any sample with PCM results
	110		by TEM. In the event that ACS disturbance
25	*		is ongoing for multiple weeks, TEM analysis will be performed for two consecutive days
			every other week.
Area of Disturbance	NONE	N/A	N/A
Perimeter Sampling			
Removal by mec	Removal by mechanical means (heavy equipment bucket, excavator, backhoe, etc) of Non-Friable ACM that has not been rendered friable	, backhoe, et	c) of Non-Friable ACM that has not been
Monitoring Type	Sampling Frequency	Duration	Analysis
Personal Air	One sample per shift for each of two workers	Ongoing	Submit personnel and perimeter samples (5
Monitoring	closest to disturbance activity but not inside heavy	The Art of Control	samples) for PCM analysis. If analysis
	equipment		vields results with detectable fiber levels

Table 1: Air Monitoring Requirements

Ongoing

Area of Disturbance Perimeter Sampling

Two downwind perimeter samples and one upwind perimeter sample from immediate Area of Disturbance

approximately 1 acre in size. One additional analysis on two (2) highest PCM samples to total number of samples collected, based on evaluate engineering controls. Any sample l acre, additional samples shall be analyzed active area of soil disturbance is larger than must be analyzed by TEM. For large areas active areas of soil disturbance greater than with PCM results exceeding 0.01 fibers/cc monitoring point should be added for each by TEM at a minimum rate of 25% of the analysis is not required if PCM results are (approximately 1 sample per additional 1/4 place downwind floating samplers at least (based on fiber count) then conduct TEM 50 feet from any other sample point. For acre increase in area). The AMS should monitoring points shall be added if the additional 200 linear feet of perimeter highest PCM results. However, TEM of disturbance, additional perimeter non-detect (based on fiber count).

Reme	Removal of Friable ACM by mechanical means (heavy equipment bucket, excavator, backhoe, etc)	quipment buc	ket, excavator, backhoe, etc)
Monitoring Type	Monitoring Type Sampling Frequency	Duration Analysis	Analysis
Personal Air Monitoring	each of 2 workers closest to at not inside heavy equipment	Ongoing	Submit personnel and perimeter samples (8 samples) for PCM analysis. If analysis
Area of Disturbance Perimeter Sampling	Area of Disturbance 6 perimeter samples from immediate Area of Perimeter Sampling Disturbance per day; including 4 points of compass and 2 downwind floaters	Ongoing	yields results with detectable fiber levels (based on fiber count) then conduct TEM analysis on two (2) highest PCM samples to evaluate engineering controls. Any sample with PCM results exceeding 0.01 fibers/cc must be analyzed by TEM. For large areas of disturbance, additional perimeter

City SOP

monitoring points shall be added if the

Table 1: Air Monitoring Requirements

active area of soil disturbance is larger than approximately 1 acre in size. One additional monitoring point should be added for each additional 200 linear feet of perimeter (approximately 1 sample per additional ¼ acre increase in area). The AMS should place downwind floating samplers at least 50 feet from any other sample point. For active areas of soil disturbance greater than 1 acre, additional samples shall be analyzed by TEM at a minimum rate of 25% of the total number of samples collected, based on highest PCM results. However, TEM analysis is not required if PCM results are non-detect (based on fiber count).

If engineering controls are deemed to be adequate by the ABI and air monitoring specialist (AMS); and ongoing project air monitoring data supports this conclusion, the number and frequency of TEM and PCM analyses may be reduced following HMWM Division approval.

City SOP

Appendix A
CDPHE Notification Forms

(9)

Colorado Department of Public Health and Environment Hazardous Materials and Waste Management Division Asbestos Contaminated Soil Notification Form

24 HOUR NOTIFICATION OF UNPLANNED ASBESTOS DISCOVERY

For 24-hour notification of the unplanned discovery of asbestos-contaminated soil, a completed a copy of this form should be faxed to 303-759-5355 Attn: Solid Waste Unit Leader, or emailed to comments.hmwmd@state.co.us. If the Hazardous Materials and Waste Management Division has not pre-approved standard operating procedures that will be implemented, you must then submit a Soil Characterization and Management Plan to the Division for approval. If the Division has pre-approved standard operating procedures that will be implemented, you only need to submit a completed copy of this form.

The Soil Characterization and Management Plan should be mailed to: Colorado Department of Public Health and Environment, Division-B2 Attn: Solid Waste Unit Leader, 4300 Cherry Creek Drive South, Denver CO 80246-1530 or emailed to: comments.hmwmd@state.co.us.

Date and time reported:	***************************************					
Contact person for entity pe	erforming	soil-disturbing ac	ivity:		Phone:	Ext:
Organization, company or a	agency:			z sązowa i do		
Address:						
City:			s	tate:		Zip:
Name of property owner/op	erator or p	property represen	tative:			
Owner/operator contact (if	different):		maning anjegografia		Phone:	Ext:
Address:]	Fax:	
City:		y commonwhile	s	tate:		Zip:
Discovery date:		Discovery time	(include	AM or P	M):	
Location of property: (Street address or other location description – e.g.	Street A	Address:		9		
highway mile marker)	County	*	C	ity:		Zip:
Activity resulting in discovery:				***************************************	8	
Description of material encountered:						
Description of access or emissions controls implemented:				0 25	3	
Has the Division pre-approv If "no," implement interim a review and approval.					#20.03 Conse	□ no t Plan for Division

Colorado Department of Public Health and Environment Hazardous Materials and Waste Management Division Asbestos Contaminated Soil Notification Form

10 DAY NOTIFICATION OF PLANNED ASBESTOS MANAGEMENT

For notification of planned management of asbestos-contaminated soil, a completed copy of this form should be submitted to the Hazardous Materials and Waste Management Division at least 10 working days prior to any planned soil-disturbing activity. If the Division has not pre-approved standard operating procedures that will be implemented, you must also submit a **Soil Characterization and Management Plan** to the Division for approval. If the Division has pre-approved standard operating procedures that will be implemented, then you only need to submit a completed copy of this form.

The form and plan can be mailed to: Colorado Department of Public Health and Environment, Division-B2 Attn: Solid Waste Unit Leader, 4300 Cherry Creek Drive South, Denver CO 80246-1530 or emailed to: <a href="mailed-emailed-colorable-co

Contact person for entity per	rforming soil-disturbin	g activity:	Phone:	Ext:	
Organization, company or a	gency:				
Address:					
City:		State:		Zip:	
Name of property owner/ope	rator or property repr	esentative:			
Owner/operator contact (if d	ifferent):		Phone:	Ext:	
Address:		Fax:			
City:		State:		Zip:	
Location of property: (Street address or other location description – e.g.	Street Address:	2 2	E	8	
highway mile marker)	County:	City:	3	Zip:	
General Site Description:			N.		
Description of planned soil- disturbing activities:				×	
Description of material that					

Appendix B

CDPHE Approval Letter and City's Responses to CDPHE Comments

e e e

STATE OF COLORADO

Bill Ritter, Jr., Governor

Martha E. Rudolph, Executive Director

Dedicated to protecting and improving the health and environment of the people of Colorado

4300 Cherry Creek Dr. S. Denver, Colorado 80246-1530 Phone (303) 692-2000 TDD Line (303) 691-7700 Located in Glendale, Colorado Laboratory Services Division 8100 Lowry Blvd. Denver, Colorado 80230-6928 (303) 692-3090

http://www.cdphe.state.co.us



December 7, 2010

Mr. Dave Erickson CCOD, Department of Environmental Health 200 W. 14th Avenue, Department 310 Denver, CO 80204

RE:

Final Agency Action: Approval of Asbestos-Contaminated Soil Management Standard Operating Procedure for City and County of Denver, dated December 3, 2010

Dear Mr. Erickson:

On December 6, 2010, the Hazardous Materials and Waste Management Division of the Colorado Department of Public Health and Environment ("the Division") received the revised Asbestos-Contaminated Soil Management Standard Operating Procedure (SOP) for City and County of Denver, dated December 3, 2010. The Division has completed its review and is pleased to approve this standard operating procedure for asbestos-contaminated soil management projects in the City and County of Denver.

The Division is authorized to bill for its review of technical submittals, pursuant to 6 CCR 1007-2, Part 1, Section 1.7. An invoice for the Division's review of the subject document will be transmitted to you under separate cover. Should you have any questions regarding this correspondence, please call Cindy Smith at (303) 692-3409.

Sincerely,

Cindy M. Smith

Environmental Protection Specialist

Solid Waste and Material Management Unit

Solid and Hazardous Waste Program

cc:

Charles Johnson, CDPHE

Alice Luhan, CCOD Department of Environmental Health, 200 W. 14th Avenue, Dept. 310, Denver, CO 80204 Steve Gonzales, CCOD Department of Environmental Health, 200 W. 14th Avenue, Dept. 310, Denver, CO 80204

File:

SW/DNV/SOP 3.10

20 E

Department of Environmental Health, Environmental Quality
Responses to June 16, 2010 CDPHE comments on City and County of Denver
Asbestos-Contaminated Soil Management Standard Operating Procedure (SOP)
July 23, 2010 – Revised November 19, 2010

Comment 1: Page 3, Section 2.3.2, High Potential ACS, change this section heading to "High Potential ACS – Reason to Know or Believe".

Response: The heading for Section 2.3.2 was changed to "Reason to Believe".

Comment 2: Page 3, Section 2.3.3, Elevated Potential ACS, change this section heading to "Elevated Potential ACS – Reason to Believe."

Response: Consistent with 6 CCR 1007-2 Regulations Pertaining to Solid Waste Sites and Facilities and in accordance with discussion among CDPHE and CCOD personnel on August 12, 2010, reference to Elevated Potential ACS (Section 2.3.3) has been eliminated from the SOP. Instead, subsections under Section 2.3 ACS Potential Classification are limited to "Known ACS", "Reason to Believe", and "No Reason to Know or Believe".

Comment 3: Page 3, Section 2.3.3, Elevated Potential ACS, third sentence, replace the work "moderate" with "elevated" to use consistent terminology.

Response: As noted in response to Comment 2, reference to "Elevated Potential ACS" has been eliminated and the requested change cannot be made.

Comment 4: Page 3, Section 2.3.3, Elevated Potential ACS, modify the fourth sentence such that it states" Where a site has been classified as having an elevated potential to encounter ACS, an ABI will be present during soil-disturbing activities because it has been established that there is reason to believe ACS may be encountered.

Response: The City has modified Section 2.3 (and Section 2.3.3) to read as follows:

2.3 ACS Potential Classification

Results of the environmental and historical review are used to classify the site according to the potential for asbestos to be present in soil. The classification is used to determine the appropriate level of response, characterization and management activities, if any, for a site. Figure 1 depicts the site classification system and the response actions that flow from each classification.

2.3.1 Known ACS

A site that is classified as having known ACS is one where confirmed asbestos material in the soil was identified from subsurface soil investigation or from visual observations of the surface, sidewalls, embankments, etc. Soil disturbance activities on sites with known ACS will follow the management practices outlined in Section 7.0 of this SOP. Additional site characterization, if appropriate, will be conducted according to the procedures outlined in Section 6.0 of this SOP.

2.3.2 Reason to Believe

A site that is classified as Reason to Believe is one where evidence from environmental and historical reviews indicates that ACM could be encountered. Such evidence could include the presence of buried building debris or landfills in which construction debris or ACM is believed to have been deposited.

The presence of the following materials alone would not justify classifying a site as Reason to Believe:

- · Wood
- Glass
- Metal
- Gravel
- Unfinished (no surface coating) concrete slab ¹
- Brick other than fire brick²

Brick and concrete typically are considered to be free of asbestos and rarely or only occasionally will contain asbestos. If ACM is identified in these or other materials the appropriate management practices outlined in Section 7.0 of this SOP will be implemented during soil disturbing activities. Additional site characterization, if appropriate, will be conducted according to the procedures outlined in Section 6.0 of this SOP.

2.3.3 No Reason to Know or Believe

A site that is classified as having No Reason to Know or Believe is one where environmental and historical reviews do not identify the potential for asbestos containing materials to be on site even though waste material identified above and not typically associated with asbestos may be present.

Procedures in Section 7.0 of this SOP would not be implemented at a site classified as No Reason to Know or Believe.

Comment 5: Page 3, Section 2.3.3. Elevated Potential ACS, delete the last sentence of the paragraph.

Addition of asbestos to concrete slab was not a common use of asbestos. However, manufactured asbestos and Portland cement products were common including water pipes, simulated ceramic bathroom tiles, facings of acoustical materials, electrical switchboard panels, laboratory tabletops, electrical conduits, and even smaller diameter pipes were used for purlins and trusses in wartime construction to conserve steel and lumber.

² Asbestos was historically used in the fabrication of fire brick. Asbestos containing fire brick was used around boilers and furnaces and was cemented in place with asbestos furnace cement. Today, fire brick is manufactured without asbestos and much of the older asbestos fire brick has been removed and replaced with non-asbestos fire brick. Discussion of fire brick will be included in City-provided asbestos awareness training

Response: Please see response to comment 4.

Comment 6: Page 3, Section 2.3.4: Low Potential ACS, change this section heading to Low Potential ACS – No Reason to Know or Believe."

Response: The requested change has been made.

Comment 7: Page 4, Figure 1, last box under Low Potential, change Section "4" to Section "6".

Response: Figure 1 was revised to reflect changes in the text as noted in response to Comment 4.

Comment 8: Page 4, Figure 1, last box under High Potential, delete current language and state that "An ABI will be present during soil-disturbing activities."

Response: Figure 1 has been revised to reflect the response to Comment 4.

Comment 9: Page 4, Figure 1, under High Potential, add last box that contains language "If ACM is observed, implement ACS management procedures of Section 7 and Section 8."

Response: Please see response to Comment 8.

Comment 10: Page 4, Figure 1, the boxes under "Elevated Potential" should reflect same approach and language as boxes under "High Potential" because you've already established a "reason to believe" that asbestos may be encountered on these sites.

Response: Please see response to Comment 8.

Comment 11: Page 6, Section 4.1, first sentence; delete "ACM" and insert 'asbestos'.

Response: The requested change has been made.

Comment 12: Page 6, Section 4.1, delete third, fourth and fifth paragraphs. This is extraneous information that doesn't belong in the SOP, and may confuse the reader trying to implement this procedure.

Response: The requested change has been made.

Comment 13: Page 7, Section 4.1 delete first paragraph.

Response: The requested change has been made.

Comment 14: Page 7, Section 4.1 item 2, add language to this paragraph to clarify that the subject exemption from Section 5.5 applies, unless the total quantity of asbestos-

containing material to be removed from a facility component falls below Regulation No. 8 trigger levels and the facility component is located on or in soil that will be disturbed.

Response: As requested in Comment 16 below, text from Section 4.2 in which trigger levels are discussed, has been inserted in Section 4.1.

Comment 15: Pages 7 and 8, Section 4.2, delete first, second, third, fourth, and fifth paragraphs. This is extraneous information that doesn't belong in the SOP and may confuse the reader trying to implement this procedure.

Response: Response: The requested change has been made.

Comment 16: Pages 8 and 9, Section 4.2, extract items 1, 2 and 3 from this section and insert this discussion on Page 6, Section 4.1 just below the existing first paragraph.

Response: Response: The requested change has been made.

Comment 17: Page 9, Section 4.2, delete second paragraph beginning with "Under EPA NESHAPS/CDPHE APCD regulations..." This is good information regarding Regulation No. 8 but does not belong in this which was written to address activities under Solid Waste oversight

Response: This paragraph has been retained to provide the reader with information regarding facility components that may be buried on a site.

Comment 18: Page 10, Section 5.2, modify first sentence such that it begins "On-the-job asbestos-contaminated soil awareness training..."

Response: The requested change has been made.

Comment 19: Page 10, Section 5.2, there appears to be a conflict between the first sentence in first paragraph which states that "on-the-job asbestos-contaminated soil awareness training will be provided to all workers directly involved in soil disturbing activities on soil disturbing projects, including heavy equipment operators", and the first sentence in the second paragraph which states that "on-the-job asbestos soils awareness training as defined in Section 5.5.6 of the Solid Waste Regulations will be provided to workers directly involved in soil-disturbing activities on sites where there is known ACS or a "reason to believe ACS may be encountered." Please provide clarifying language that differentiates the training discussed in these two paragraphs.

Response: The first paragraph of Section 5.2 has been revised to read as follows:

On-the-job asbestos contaminated soil awareness (ACS) training as defined in Section 5.5.6 of the Solid Waste Regulations will be provided to all workers directly involved in soil disturbing activities on soil disturbing projects, including heavy equipment operators where these is known ACS or a reason to believe ACS may be encountered. EQ is

available to any City department and/or City contractor as an ABI resource to provide the awareness training as follows:

Comment 20: Page 10, Section 5.2, third paragraph, first two sentences, replace the word "must" with "will".

Response: The requested change has been made.

Comment 21: page 10, Section 5.3, delete item 1 and item 3 from the section, as these are not training requirements. This language can be incorporated in other relevant sections of the SOP.

Response: The requested change has been made.

Comment 22: Page 10, Section 5.3, item 2, insert "as discussed in Section 5.2 above" after "on-the-job ACS awareness training" to clarify that this is the same ACS awareness training required for soil disturbance in areas with a potential for asbestos.

Response: The requested change has been made for sites classified as "Reason to Believe".

Comment 23: Page 11, Section 5.5, modify first sentence to state "CCOD will require individuals with the potential for exposure to asbestos fibers to be trained in the proper..."

Response: The City relies on its contractors to provide proper training to their employees. Accordingly, the first sentence of Section 5.5 was modified to read as follows: "It is the contractor's responsibility to provide training to all employees who have the potential for exposure to asbestos fibers in the proper usage of personal protective equipment and ensure that they have a current annual physical with a medical release/respirator usage form in accordance with the employer's medical surveillance program."

Comment 24: Page 11, Section 5.5, second sentence, replace the word "should" with "will".

Response: The requested change has been made.

Comment 25: Page 12, Section 6, delete first sentence of second paragraph and re-write to indicate that CDPHE will be notified at least 10 working days prior r to any soil disturbing activities in areas of known or high potential ACS. The approved SOP does not renounce the need to notify the Department of soil disturbing projects.

Response: The first sentence was replaced with the following sentence: "The CDPHE will be notified at least 10 days prior to any planned soil disturbing activity in areas of known or suspected ACS or ACM."

Comment 26: Page 13, Figure 2, make separate boxes for the current "facility component" diamond to outline options for above trigger level and below trigger level scenarios. You may refer to the flow chart in the current CDPHE guidance document.

Response: The requested change has been made.

Comment 27: page 14, fourth paragraph, modify first sentence to state "Clothing and equipment that has come into contact with suspect asbestos will be considered potentially contaminated until/unless analytical results indicate the material does not contain any asbestos."

Response: The requested change has been made.

Comment 28: page 14, fourth paragraph, modify third sentence to state "Heavy equipment will be left on site until analytical results are received, unless the equipment has been decontaminated."

Response: The requested change has been made.

Comment 29: Page 14, third bullet, modify first sentence to state "Decontaminate workers by removing visible soil and dust with water or damp wipes or rags."

Response: The requested change has been made.

Comment 30: Page 14, fourth bullet, refer to Section 7.4.11 of the SOP for equipment decontamination.

Response: The requested change has been made.

Comment 31: Page 14, fifth bullet, delete specific reference to DADS landfill

Response: Reference to DADS landfill has been retained; asbestos contaminated soil from City-funded projects must be transported and disposed of at DADS landfill.

Comment 32: Page 14, last sentence, add language acknowledging option to assume ACM and follow Section 7 of the SOP (rather than sample and await analytical results).

Response: The last sentence was revised to read as follows: "If assumed ACM is present in soil or ACM is confirmed in soil by the ABI, the ABI will direct the contractor on full implementation of this SOP."

Comment 33:: Page 15, Section 6.1 second sentence, replace the word "site" with "soil".

Response: The requested change has been made.

Comment 34: Page 15, Section 6.1, first paragraph, the first and second sentence appear to contradict each other. If the point is to look for ACM the ABI should be there all the time. Please clarify and re-write.

Response: The first paragraph of Section 6.1 (now 6.2) has been revised to read as follows:

"6.2 Interim Actions upon Discovery of Suspected ACM Site characterization to identify the extent of ACM may be required to help develop the scope of work required to manage ACM disturbed in soil. Site characterization activities are described below.

6.2.1 Site Characterization

In the event that suspect ACM is visually identified by the ABI, steps outlined in Section 7.0 will be implemented. The following steps will be applied to sample and analyze suspect ACM identified by the ABI:"

Comment 35: Page 15, Section 6.1, immediately following second sentence, insert language stating "per Section 5.2 of this SOP, all workers will have asbestos awareness training and if debris is identified, the ABI will be called."

Response: Section 6.1 has been revised and is now Section 6.2. Also, please see response to Comment 34.

Comment 36: Page 15, Section 6.1, first paragraph, third sentence, delete specific reference to DADS and replace with "an approved disposal facility".

Response: Please see response to Comment 31.

Comment 37: Page 16, Section 7.1, first paragraph, last sentence, include "Elevated Potential."

Response: The last sentence was modified to read: "Minimum engineering controls and air monitoring will be implemented any time excavation activities are occurring in an area of Known ACS, at a site that is classified as Reason to Believe."

Comment 38: Page 16, Section 7.1.1, modify fourth bullet to state "A person with a fire hose on low pressure and equipped with a ball valve (or equivalent) will be present at the point of excavation to prevent and not cause fugitive dust emissions and potential asbestos fiber emissions..."

Response: The requested change has been made.

Comment 39: Page 16, Section 7.2, modify this section to provide for a 10-day notice to the Department, as discussed in comment #25 above, or delete. Notification is discussed in Section 7.4; therefore, Section 7.2 is unnecessary.

Response: Text in Section 7.4 regarding notification was moved to Section 7.2. The first sentence of Section 7.2 reads as follows: "The CDPHE will be notified at least 10 days prior to any planned soil disturbing activity in areas of known ACM or ACS".

Comment 40: Page 17, Section 7.4.1, add language to this section explaining that, for large projects with widespread removal of ACS, the requirement for the use of windbreak barriers may be modified or waived

Response: The following sentence was added to Section 7.4.1: "For large projects with widespread removal of ACS, the requirement for the use of windbreak barriers may be modified or waived."

Comment 41: Page 18, Section 7.4.4, third paragraph, second sentence, please clarify that an asbestos soil inspector will perform this function.

Response: In Section 7.4.4, third paragraph, second sentence, the words "The Consultant" were replaced with "An ABI".

Comment 42: Page 18, Section 7.4.6, first paragraph, second sentence, delete the words "provide adequate wetting to".

Response: The requested change has been made.

Comment 43: Page 18, Section 7.4.6 first paragraph, second sentence, add the words "during loading" immediately following eliminate fugitive dust.

Response: The requested change has been made.

Comment 44: Page 19, Section 7.4.6, regarding second paragraph, first sentence, it has been the Division's observation that it is not always practical to remove soil in lifts during deep excavation projects. Add a paragraph to Section 7.4.6 that addresses wetting for deeper excavations. You may choose to borrow language from the following excerpt:

Excavation equipment will be fitted with a spray bar to contain any emissions inadvertently generated during the removal process, as well as a hand held misting system/water spray at the excavation point to ensure adequate soil wetting. Excavation of asbestos-contaminated soil will not overreach the bounds of wetting. For projects involving relatively shallow ACS occurrence, excavation will be conducted in 6-inch and 1-foot lifts to ensure that disturbed soil remains adequately wet. For projects involving ACS at depth, such as a landfill, excavation in lifts may not be practical. In these instances, wetting may take place as the excavation proceeds, with wetting being conducted using hand held low pressure hoses. The soil may be mixed within the excavation, using the excavator bucket, until it is adequately wet. The soil may then be moved from the excavation into the lined trailer. At no time shall soil that is not adequately wet

be removed from the excavation. During the removal process, all areas of impact will be kept adequately wet with amended water. Amended water will be applied at low pressure so as not to generate dust or splattering and will be applied at the point of contact. The excavator will handle the material wet and direct load the soil into a tractor trailer or end dump.

Response: Portions of the second paragraph of Section 7.4.6 were replaced with the excerpted language provided in Comment 44.

Comment 45: Page 19, Section 7.4.8, modify third sentence to state "At the loading location, a ten-mil polyethylene sheeting or thicker lay-down pad will be installed on the ground under dumpsters/trucks to catch any spilled material."

Response: The requested change has been made.

Comment 46: Page 19, Section 7.4.8, modify sixth sentence to state "After the load has been secured and load cover tarp is installed, the poly sheeting lay down loading pad will be properly decontaminated prior to the truck moving forward, using wet methods such as hoses and brooms and squeegees."

Response: The requested change has been made.

Comment 47: Page 19, Section 7.4.9, modify first sentence to state "Containers of non-friable ACM, or soil with visible non-friable asbestos, will be labeled in accordance with the requirements of Section 5.5.7 (B) and 5.2 of the Solid Waste Regulations.

Response: The requested change has been made.

Comment 48: Page 20, Section 7.4.9, second paragraph last sentence, add language "and labeled in accordance with Section 5.3.5(B) of the Solid Waste Regulations."

Response: The requested change has been made.

Comment 49: Page 20, Section 7.4.10 Personnel Decontamination, the proposed approach to personnel decontamination may be more costly and laborious than necessary. Specifically, workers are not required to wear double suits and CDPHE Regulation No. 8 requirements don't apply to outdoor asbestos-contaminated soil projects. You may choose to borrow worker decontamination language from 9.2 of the RTD SOP:

During all soil-disturbing activities in areas with friable asbestos, a fully functioning decontamination unit or trailer shall be available onsite for worker decontamination. The decontamination unit will be centrally located between the investigation areas. The decontamination unit will consist of three (3) chambers and has fully operational hot and cold running water for the shower. At the beginning of each day workers that will be in the area of active ACS disturbance will don disposable protective suits (Tyvek), disposable gloves and

disposable boot covers (excluding truck drivers). For most projects, worker decontamination may consist of removal of Tyvek suit, gloves, and boot covers, which should then be containerized and disposed as asbestos waste. Any non-disposable personnel items must be decontaminated with water or wet wiping. The decontamination unit, as indicated in the Contractors Health and Safety Plan, may be utilized by the workers each time they exist the work area. All contaminated disposable personnel protective equipment shall be containerized and disposed as asbestos waste. Water from the decontamination unit will be filtered to 5 micron and disposed of in the sanitary sewer.

Response: The first paragraph in Section 7.4.10 was replaced with the suggested worker decontamination language from 9.2 of the RTD SOP.

Comment 50: Page 21, Section 7.4.11, Equipment Decontamination, you may want to delete the reference to HEPA vacuuming methods and just cite decontamination via wet methods using hoses, brooms and squeegees. Generally, it is not practical to use a high efficiency particulate air (HEPA) filter equipped vacuum to decontaminate heavy equipment used for excavation purposes in the outdoor environment.

Response: Reference to HEPA vacuuming methods was removed from Section 7.4.11.

Comment 51: Page 21, Section 7.4.11, Equipment Decontamination, while full utilization of a decontamination station will often be necessary, you might add language that contemplates instances where decontamination can occur over areas of asbestoscontaminated soil, as long as the area will be kept wet, or stabilized, and the area is identified for subsequent removal.

Response: The following text was inserted to Section 7.4.11 immediately following the first sentence: "Equipment decontamination can occur in areas of asbestos-contaminated soil or within a decontamination station. If decontamination occurs over asbestos contaminated soil the area will be kept wet or stabilized and soil in the area will subsequently removed for disposal. Alternatively..."

Comment 52: Page 21, Section 7.5, first paragraph, modify third sentence to indicate that wind speed measurements will be recorded every 30 minutes and during gusts.

Response: The requested change has been made.

Comment 53: Section 7.6, Air Monitoring, add clarifying language to the sixth or seventh sentence stating that "in instances where personnel-only air monitoring is being performed (no perimeter monitoring), personnel monitoring must be representative of the work area."

Response: The requested change has been made.

Comment 54: Page 22, Section 7.6.2, add a sentence that contemplates the fact that perimeter monitoring may be necessary for soil-disturbing projects with areas-of-disturbance even smaller than 100 x 100 feet. For example, in smaller areas where known friable ACM exists and soil disturbance is occurring immediately adjacent to sensitive receptors such as occupied buildings, residential homes, or areas of public access.

Response: Section 7.6.2 was revised to the following: "Generally, perimeter air monitoring will be performed during excavation of greater than 100 x 100 feet of disturbances of ACS. Perimeter air monitoring may be required in smaller excavations where friable ACM exists and soil disturbance occurs immediately adjacent to sensitive receptors such as occupied building, residential homes or areas of public access."

Comment 55: Page T-1, Table 1: Air Monitoring Requirements, modify the first table heading such that it reads "Excavation by Mechanical Means in Areas where there is Reason to Know or Believe that ACM will be encountered".

Response: The requested change has been made.

Comment 56: Page T-2, Table 1: Air Monitoring Requirements, under heading Removal of Friable ACM by mechanical means (heavy equipment bucket, excavator, backhoe, etc.), please re-format columns to make table more readable.

Response: The requested change has been made.

Comment 57: Page T-3, last sentence, delete the language "SOPs may contain language specifying that "and "based on methodology describe in the approved SOP."

Response: The requested change has been made.



DEPARTMENT OF PUBLIC WORKS

Drawings

Contract No. 201631819

33RD STREET OUTFALL (31ST AND 36TH STREET OUTFALL PROJECT) SEGMENT - BLAKE ST. TO ARAPAHOE ST.

DECEMBER 2, 2016

CITY AND COUNTY OF DENVER

DEPARTMENT OF PUBLIC WORKS - ENGINEERING DIVISION

33RD STREET OUTFALL

(31ST AND 36TH STREET OUTFALL PROJECT)

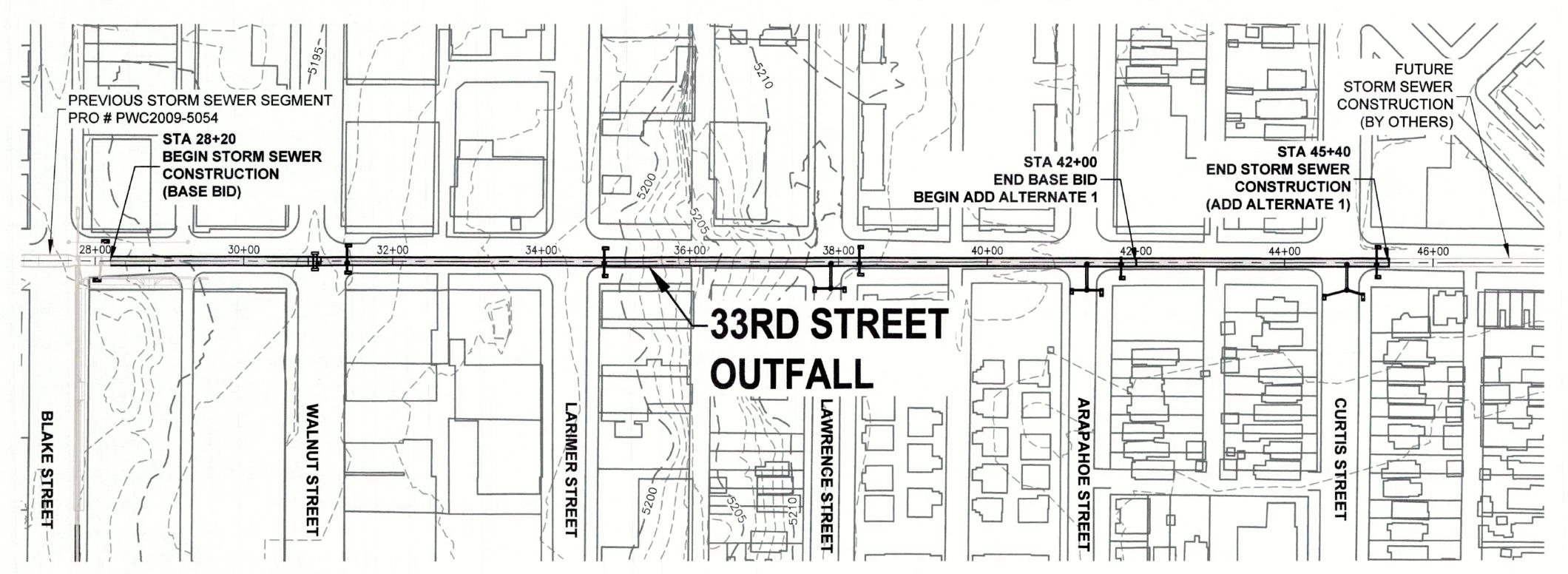
SEGMENT - BLAKE ST. TO ARAPAHOE ST. (BASE BID)

ADD ALTERNATE 1 - ARAPAHOE ST. TO CURTIS ST.

CCD CONTRACT NO:

PRO CONTROL NO: PWC2009-5054 PROJECT MASTER NO: 2012-PROJMSTR-0000214

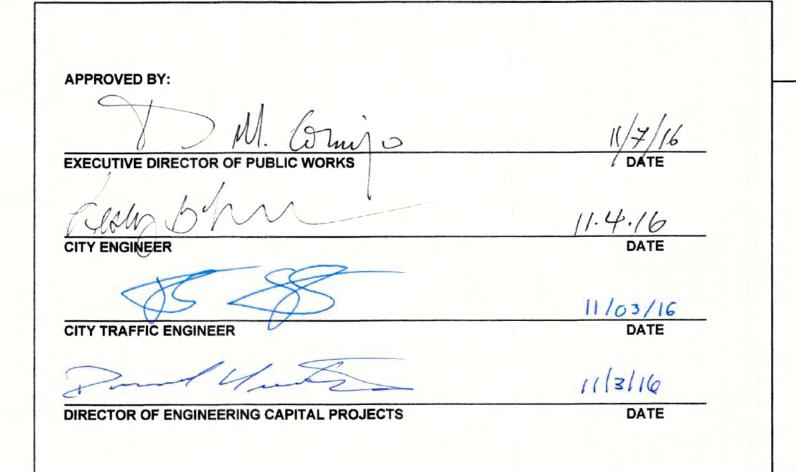
OCTOBER 2016



OVERALL SHEET#	SUBSET SHEET#	SUBSET TITLE		
1-2	GEN1-1 to GEN1-2	COVER SHEET AND GENERAL NOTES		
3	DMO1-1	DEMOLITION PLAN		
4-10	UTL1-1 to UTL1-7	UTILITY SHEETS		
11	STM1-1	STORM SEWER GEOMETRIC PLAN		
12-13	STM2-1 to STM2-2	STORM SEWER MAINLINE PLAN & PROFILE		
14-17	STM3-1 to STM3-4	STORM SEWER LATERALS PLAN & PROFILE		
18-20	STM4-1 to STM4-3	STORM SEWER DETAILS		
21	LSP1-1	TREE LAWN PROTECTION PLAN		
22	PAV1-1	PAVING TYPICAL SECTIONS		
23-25	PAV2-1 to PAV2-3	PAVING PLAN AND DETAILS		
26-28	PAV3-1 to PAV3-3	ROADWAY GRADING PLANS		
29-30	SS1-1 to SS-2	SIGNING AND STRIPING PLANS		
31	TCP1-1	TRAFFIC CONTROL PLAN		
32-36	ECP1-1 to ECP1-6	EROSION CONTROL PLAN		
37-41	WTR1-1 to WTR1-14	WATER RELOCATION PLANS		
42-48	STR1-1 to STR1-6	STRUCTURAL DETAILS		
49-58	SRV1-1 to SRV1-10	SURVEY CONTROL		
59-61	SRV2-1 to SRV2-3	OWNERSHIP MAP		

0 40' 80 SCALE: 1" = 40'

PROJECT LOCATION:
THE PROJECT IS LOCATED IN SECTIONS 26 AND 27, TOWNSHIP 3 SOUTH,
RANGE 68 WEST OF THE 6TH PRINCIPAL MERIDIAN, CITY AND COUNTY
OF DENVER, STATE OF COLORADO.







JEFFREY C. HOLSTE, COLORADO PE # 44317

NO. DESCRIPTION OF REVISIONS DATE BY

WO WORKING DAY,
BEFORE YOU DIG
1-800-922-1987



CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION
CAPITAL PROJECTS MANAGEMENT
2000 W. 3RD AVE. DENVER, CO 80223
TEL.: (303) 446-3617 FAX: (303) 446-364

33RD STREET OUTFALL
- BLAKE ST. TO ARAPAHOE ST.
PRO CONTROL NO: PWC2009-5054
PILAR REVIEW NO: 2012-0214-03
COVER SHEET

DRAWN BY:

KIS, JCH

DESIGNED BY:

JCH

APPROVED BY:

JCH

DRAWING NAME:

BLKtoARAP-COVER SHEET.dwg

OCTOBER 2016
SHEET NO.:

GEN1-1 1 of 61

VERIFIED BY THE CONTRACTOR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ASPECTS OF SAFETY INCLUDING, BUT NOT LIMITED TO

EXCAVATION, TRENCHING, SHORING, TRAFFIC CONTROL, AND

- THE CONTRACTOR SHOULD REMOVE MATERIALS AND EQUIPMENT FROM THE ROADWAY ROW AT THE CLOSE OF DAILY OPERATIONS. THE TRAFFIC CONTROL PLAN (TCP) MUST INCLUDE PROTECTIVE MEASURES WHERE MATÈRIALS AND EQUIPMENT MAY BE STORED IN THE ROW. BUT ENSURE FIVE FEET OF PEDESTRIAN CLEARANCE ON SIDEWALKS. THE CONTRACTOR SHALL NOT STOCKPILE MATERIAL IN THE CLEAR ZONE OF THE TRAVELED WAY.
- THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL PROJECT PERMITS ASSOCIATED WITH CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR BEING AWARE OF, NOTIFYING, COORDINATING AND SCHEDULING ALL INSPECTIONS REQUIRED FOR FINAL APPROVALS AND PROJECT ACCEPTANCE. ALL WORK, INCLUDING CORRECTION WORK, IS SUBJECT TO NOTIFICATION AND INSPECTION REQUIREMENTS.
- 5. IF ANY OF THE CONTRACTOR'S OPERATIONS DESTROY OR DAMAGE ANY PROPERTY, PUBLIC OR PRIVATE, THE CONTRACTOR SHALL PROMPTLY REPAIR OR REPLACE SUCH PROPERTY. TO THE SATISFACTION OF THE PROJECT MANAGER, BEFORE THE CITY WILL ACCEPT OR PAY FOR THE WORK PERFORMED UNDER THE CONTRACT. IF THE CONTRACTOR FAILS TO REPAIR OR REPLACE SUCH PROPERTY, THE CITY, AT THE SOLE DISCRETION OF THE MANAGER, MAY UNDERTAKE SUCH REPAIR OR REPLACEMENT AND DEDUCT THE COST OF THE SAME FROM AMOUNTS PAYABLE TO THE CONTRACTOR UNDER THE CONTRACT.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR RECORDING AS-BUILT INFORMATION ON A SET OF RECORD DRAWINGS KEPT ON THE CONSTRUCTION SITE, AND AVAILABLE TO THE CITY INSPECTOR AT ALL TIMES. UPON COMPLETION OF THE WORK, THE CONTRACTOR SHALL SUBMIT RECORD DRAWINGS, IN AN AUTOCAD COMPATIBLE FORMAT, TO THE CITY. THE PRODUCTION OF THESE DOCUMENTS WILL NOT BE PAID FOR SEPARATELY, BUT SHALL BE INCLUDED IN THE COST OF THE WORK.
- ALL WORK SHALL CONFORM TO CURRENT CITY AND COUNTY OF DENVER STANDARDS AND SPECIFICATIONS. THE CITY RESERVES THE RIGHT TO ACCEPT OR REJECT ANY MATERIALS AND WORKMANSHIP THAT DOES NOT CONFORM TO THE LATEST EDITION OF THE CITY STANDARDS AND SPECIFICATIONS, OR HALT CONSTRUCTION UNTIL THE CONFLICT IS RESOLVED.
- PRIOR TO THE COMMENCEMENT OF CONSTRUCTION, ALL STORM DRAIN INLETS, LATERALS, MAINS AND OTHER STORM RUNOFF APPURTENANCES WITHIN THE PROJECT LIMITS SHALL BE CLEARED OF SEDIMENT AND DEBRIS IN ACCORDANCE WITH DENVER WASTEWATER MANAGEMENT DEPARTMENT STANDARDS. AFTER CONSTRUCTION, THE CONTRACTOR SHALL REMOVE ANY SEDIMENT OR DEBRIS FROM THE STORM SEWER SYSTEM AT NO COST TO THE
- PRIOR TO FINAL ACCEPTANCE, ALL DISTURBED PORTIONS OF ROADWAY ROW SHALL BE CLEANED UP AND RESTORED TO THEIR ORIGINAL CONDITION, SUBJECT TO CITY APPROVAL.
- 10. NO WORK SHALL BE PERMITTED ON WEEKENDS OR HOLIDAYS WITHOUT PRIOR AUTHORIZATION OR UNLESS OTHERWISE SPECIFIED. THE CITY MAY RESTRICT WORK IN THE ROW DURING ADVERSE WEATHER CONDITIONS OR DURING PERIODS OF HIGH TRAFFIC VOLUME.
- 11. NO CLEATED OR TRACKED EQUIPMENT MAY WORK IN OR MOVE OVER PAVED SURFACES WITHOUT MATS.
- 12. WHERE ROW FENCES MUST BE REMOVED OR CUT TO FACILITATE CONSTRUCTION, APPROVAL MUST FIRST BE GIVEN BY THE CITY. EXISTING ROW/FENCE LINE MUST BE ESTABLISHED BY GOOD SURVEY PRACTICES. FENCES WILL BE REPLACED IN KIND ACCORDING TO CITY FENCING STANDARDS.
- PROTECTION AND REPLACEMENT OF STREET IMPROVEMENTS ARE THE RESPONSIBILITY OF THE CONTRACTOR UNTIL THESE IMPROVEMENTS ARE FULLY COMPLETED AND ACCEPTED BY THE CITY.
- 14. THE CONTRACTOR SHALL PROVIDE SHOP DRAWINGS AT THE PRE-CONSTRUCTION MEETING.
- 15. THE CONTRACTOR SHALL REFER TO AND IMPLEMENT THE PROJECT MATERIALS MANAGEMENT PLAN (MMP).
- 16. IF UNKNOWN/UNIDENTIFIED UNDERGROUND STORAGE TANKS, DRUMS, ODOROUS SOIL, STAINED SOIL, ASBESTOS-CEMENT PIPE, TRANSITE, BUILDING DEBRIS OR WASTE MATERIALS ARE ENCOUNTERED DURING THE PROJECT, CONTRACTOR SHALL IMMEDIATELY STOP WORK IN THE AREA OF THE DISCOVERY UNTIL DENVER ENVIRONMENTAL HEALTH (DEH) MAKES A DETERMINATION OF HOW TO PROCEED. CONTRACTOR SHALL IMMEDIATELY NOTIFY DEH OF THE DISCOVERY VIA THE PHONE NUMBER 720-460-1706.
- EXISTING SURFACE CONTOURS WITHIN CITY AND COUNTY OF DENVER ROW ARE BASED ON FIELD SURVEY DATA FOR THIS PROJECT. EXISTING SURFACE CONTOURS DISPLAYED OUTSIDE OF THE CCD ROW ARE BASED ON A SURFACE CREATED FROM CCD GIS 2' CONTOUR DATA AND ARE APPROXIMATE.
- THE CONTRACTOR SHALL DIRECT NON-RECYCLABLE NON-HAZARDOUS WASTES FROM CCD-OWNED OR CONTROLLED PROPERTY OR FACILITIES TO THE DENVER ARAPAHOE DISPOSAL SITE (DADS) LANDFILL FOR DISPOSAL FOLLOWING THE REQUIREMENT AND PROCEDURAL GUIDANCE OUTLINED IN CCD'S EXECUTIVE ORDER 115.
- NOISE CONTROL- EXEMPT HOURS FOR CONSTRUCTION IN THE CITY AND COUNTY OF DENVER ARE FROM 7 A.M. TO 9 P.M. MONDAY THROUGH FRIDAY AND 8 A.M. TO 5 P.M. ON SATURDAYS AND SUNDAYS PER SECTIONS 36-6. (B)(7) AND 36-7.(5)A., B. AND C. OF DENVER'S NOISE ORDINANCE, CHAPTER 36 "NOISE CONTROL", DENVER REVISED MUNICIPAL CODE (DRMC). IF THERE IS AN ANTICIPATED NEED TO WORK OUTSIDE OF THE EXEMPTED HOURS FOR CONSTRUCTION: 1) THE CONTRACTOR WILL NEED TO MAKE A REQUEST FOR A NIGHTTIME NOISE VARIANCE AS ALLOWED FOR IN SECTION 36-7.(5)C. OF THE DRMC. THE VARIANCE PROCESS NEEDS TO BE STARTED A MINIMUM OF TWO TO THREE MONTHS PRIOR TO THE DESIRED START DATE OF ANY WORK NEEDING TO OCCUR OUTSIDE OF EXEMPTED HOURS. 2) ANY NOISE VARIANCE QUESTIONS SHOULD BE DIRECTED TO PAUL RIEDESEL, DEPARTMENT OF ENVIRONMENTAL HEALTH, DENVER COMMUNITY NOISE PROGRAM, (PHONE 720-865-5410; FAX 720-865-5532) A MINIMUM OF THREE MONTHS PRIOR TO THE START OF THE PROJECT.

- 20. CONTRACTOR SHALL TAKE REASONABLE MEASURES TO PREVENT PARTICULATE MATTER FROM BECOMING AIRBORNE AND TO PREVENT THE VISIBLE DISCHARGE OF FUGITIVE PARTICULATE EMISSIONS BEYOND THE PROPERTY ON WHICH THE EMISSIONS ORIGINATE. THE MEASURES TAKEN MUST BE EFFECTIVE IN THE CONTROL OF FUGITIVE PARTICULATE EMISSIONS AT ALL TIMES ON THE SITE, INCLUDING PERIODS OF INACTIVITY SUCH AS EVENINGS, WEEKENDS, AND HOLIDAYS AS WELL AS ANY OTHER PERIOD OF INACTIVITY.
- 21. ANY FILL MATERIAL OR SOILS TO BE MOVED TO AND PLACED ON CCD-OWNED PROPERTY OR PLACED ON REAL PROPERTY TO BE TRANSFERRED TO THE CCD MUST BE FREE OF KNOWN CONTAMINATION (OBSERVED OR PREVIOUSLY DOCUMENTED) AND BE ACCEPTABLE FOR UNRESTRICTED RESIDENTIAL USE. CONTACT DAVE ERICKSON, DENVER ENVIRONMENTAL HEALTH (720-865-5433) FOR CLARIFICATION, IF NEEDED, REGARDING THIS CCD REQUIREMENT.

PROJECT PLANS, SPECIFICATIONS, PERMITS

STANDARDS)

- ALL MATERIAL, EQUIPMENT, INSTALLATION AND CONSTRUCTION FOR THIS PROJECT SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE FOLLOWING STANDARD REFERENCES AS APPLICABLE:
- a. CITY AND COUNTY OF DENVER, STANDARDS AND DETAILS FOR ENGINEERING DIVISION
- b. STORM DRAINAGE AND SANITARY SEWER CONSTRUCTION DETAIL AND TECHNICAL SPECIFICATIONS
- c. DEPARTMENT OF PUBLIC WORKS STANDARD SPECIFICATIONS FOR CONSTRUCTION GENERAL CONTRACT CONDITIONS
- d. WASTEWATER MANAGEMENT DIVISION STANDARD DETAILS e. TRAFFIC STANDARD DRAWINGS AND TRAFFIC
- ENGINEERING SERVICES PROJECT SPECIALS COLORADO DEPARTMENT OF TRANSPORTATION (CDOT) STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION AND STANDARD PLANS, (M&S
- g. FEDERAL HIGHWAY ADMINISTRATION (FHWA), MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) FOR STREETS AND HIGHWAYS AND THE COLORADO SUPPLEMENT THERETO
- h. AMERICAN ASSOCIATION OF STATE AND HIGHWAY TRANSPORTATION OFFICIALS (AASHTO) ROADSIDE DESIGN GUIDE
- 2. THE CONTRACTOR SHALL HAVE ONSITE AT ALL TIMES, ONE COPY OF THE APPROVED PLANS, ONE COPY OF THE APPROPRIATE STANDARDS AND SPECIFICATIONS, AND COPIES OF ANY PERMITS AND EXTENSION AGREEMENTS NEEDED FOR THE JOB.
- 3. IF DURING THE CONSTRUCTION PROCESS, CONDITIONS ARE ENCOUNTERED WHICH COULD INDICATE A SITUATION THAT IS NOT IDENTIFIED ON THE PLANS OR SPECIFICATIONS, THE CONTRACTOR SHALL CONTACT THE PROJECT MANAGER IMMEDIATELY.
- 4. ALL DESIGN DRAWINGS PROVIDED AS PART OF THIS CONTRACT ARE FORMATTED FOR PRINTING FULL SIZE, ON STANDARD 22 X 34 INCH (ANSI D) PAPER SIZE. IF HALF-SIZE SHEETS ARE PRINTED ON STANDARD 11 X 17 PAPER SIZE, THEN THE USER SHALL SCALE WHERE APPROPRIATE. IT IS THE USER'S RESPONSIBILITY TO ENSURE THAT HARD COPIES OF PLANS UTILIZED FOR BIDDING OR CONSTRUCTION ARE PRINTED ON THE PROPER MEDIA SIZE AND THAT SCALES PROVIDED WITHIN THE DRAWINGS ARE CORRECTLY INTERPRETED.
- 5. THE CONTRACTOR SHALL NOTIFY THE PROJECT CONSTRUCTION ENGINEER IMMEDIATELY OF ANY DISCREPANCIES OR VARIATIONS IN THE DRAWINGS & SPECIFICATIONS THAT EFFECT PRICING OR THAT COULD REQUIRE MODIFICATION TO THE DESIGN.

- 1. THE TYPE, SIZE, LOCATION AND NUMBER OF ALL KNOWN UNDERGROUND UTILITIES ARE APPROXIMATE WHEN SHOWN ON THE DRAWINGS, UNLESS OTHERWISE NOTED. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE EXISTENCE AND LOCATION OF ALL UNDERGROUND UTILITIES ALONG THE ROUTE OF THE WORK BEFORE COMMENCING NEW CONSTRUCTION. RESPONSIBILITIES FOR THE RELOCATION OF UTILITY LINES ARE AS NOTED IN THE PROJECT SPECIAL PROVISIONS. THE CONTRACTOR SHALL COOPERATE WITH COMPANIES TRYING TO COORDINATE THE RELOCATION EFFORT. LINES NOT RELOCATED SHALL BE PROTECTED BY THE CONTRACTOR IN PLACE. THE CONTRACTOR SHALL CONTACT THE UTILITY NOTIFICATION CENTER OF COLORADO (UNCC) AT 1-800-922-1987, AT LEAST 2 WORKING DAYS PRIOR TO BEGINNING EXCAVATION OR GRADING.
- 2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING UTILITIES DURING CONSTRUCTION AND SHALL HOLD THE CITY AND ITS ENGINEERS HARMLESS FOR DAMAGES ARISING FROM THE CONTRACTOR'S FAILURE TO ADEQUATELY PROTECT EXISTING UTILITIES. DAMAGED UTILITIES SHALL BE REPAIRED BY AND AT THE EXPENSE OF THE CONTRACTOR.
- THE CONTRACTOR IS REQUIRED TO RESET, ADJUST OR REPLACE ANY UTILITIES THAT ARE IMPACTED BY CONSTRUCTION AND ARE DESIGNED TO REMAIN WITHIN THE PROJECT LIMITS.
- LOCATIONS FOR POTHOLING SHALL BE AS APPROVED BY THE PROJECT MANAGER. CONTRACTOR TO SUPPORT ALL EXISTING UTILITIES DURING CONSTRUCTION AND COORDINATE WITH UTILITY OWNERS FOR REMOVAL OF CONCRETE ENCASEMENTS.
- THE CONTRACTOR SHALL LOCATE AND VERIFY ALL LIVE SANITARY SEWER SERVICES (TAPS) AND ENSURE THAT ALL ACTIVE TAPS AFFECTED BY THE CONSTRUCTION OPERATIONS ARE PROPERLY RECONNECTED. IN THE EVENT OF A SANITARY SEWER BACKUP, WITHIN THE CONSTRUCTION LIMITS, THE CONTRACTOR ASSUMES ALL RESPONSIBILITY FOR ENSURING BUSINESSES AND RESIDENCES AFFECTED ARE IMMEDIATELY ADDRESSED AND PLACED BACK INTO SERVICE.

REMOVALS, EXISTING ITEMS, SAW CUTTING

- ALL ITEMS TO BE REMOVED AND NOT RESET SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED FROM THE SITE AND DISPOSED OF PROPERLY.
- 2. SIGNS AND / OR SIGNAL EQUIPMENT DESIGNATED AS REMOVAL ITEMS SHALL BE CAREFULLY REMOVED AND DELIVERED BY THE CONTRACTOR TO THE CITY YARD AT 5440 ROSLYN STREET, BUILDING E. ANY MATERIAL DESIGNATED FOR SALVAGE THAT IS DAMAGED AFTER REMOVAL SHALL BE REPAIRED OR REPLACED BY THE CONTRACTOR TO THE SATISFACTION OF THE ENGINEER. NO

- SEPARATE PAYMENT SHALL BE MADE FOR LOADING, HAULING, UNLOADING, OR PLACING SALVAGED MATERIALS IN THE CITY YARD.
- 3. WHERE IT IS REQUIRED TO REMOVE EXISTING CONCRETE OR ASPHALT, CUTTING SHALL BE DONE TO A NEAT WORK LINE TO FULL DEPTH USING A SAW, CUTTING WHEEL, OR OTHER METHOD APPROVED BY THE PROJECT MANAGER. THIS WILL NOT BE PAID SEPARATELY, BUT SHALL BE INCLUDED IN THE WORK.
- 4. REMOVAL OF EXISTING CURB AND GUTTER, SIDEWALK, DRIVEWAYS, CURB CUTS, AND OTHER CONCRETE ITEMS THAT ARE ATTACHED OR ADJACENT TO OTHER CONCRETE ITEMS SHALL BE REMOVED TO THE NEAREST JOINT, AS NEEDED TO AVOID DAMAGING THE REMAINING CONCRETE ITEMS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DAMAGE TO ADJACENT SIDEWALK DURING CURB AND GUTTER REMOVAL AND SHALL REPLACE DAMAGED SECTIONS AT NO ADDITIONAL COST TO THE PROJECT.
- 5. THE CONTRACTOR IS REQUIRED TO RESET, ADJUST, OR REPLACE ANY UTILITIES, LANDSCAPING, SPRINKLER SYSTEMS, SIGNS, SIDEWALKS, ETC. THAT ARE IMPACTED BY CONSTRUCTION AND ARE NOT DESIGNATED TO BE REMOVED.
- THE CONTRACTOR SHALL USE AGGREGATE BASE COURSE OR ASPHALT MILLINGS TO FILL AREA LEFT BY REMOVAL OF DRIVEWAY OR CURB RAMP PRIOR TO PLACEMENT OF NEW SIDEWALK, DRIVEWAY OR CURB RAMP.
- 7. EXACT LOCATION OF ALL SAW CUTS SHALL BE DETERMINED IN THE FIELD BY THE PROJECT CONSTRUCTION ENGINEER.

<u>PAVEMENT</u>

- 1. A TACK COAT IS REQUIRED PRIOR TO THE PLACEMENT OF SUBSEQUENT LIFTS OF HMA.
- WHERE NEW CONSTRUCTION IS TO ABUT EXISTING PAVEMENT, THE EXISTING PAVEMENT SHALL BE REMOVED TO A NEAT VERTICAL LINE TO CREATE A CLEAN CONSTRUCTION
- 3. PATCH ASPHALT PAVEMENT AS NECESSARY TO JOIN NEW GUTTERS WITH EXISTING PAVEMENT.
- 4. WHEN AN EXISTING ASPHALT STREET IS CUT, THE STREET MUST BE RESTORED TO A CONDITION EQUAL TO OR BETTER THAN ITS ORIGINAL CONDITION. THE EXISTING STREET CONDITION SHALL BE DOCUMENTED BEFORE ANY CUTS ARE MADE. PATCHING SHALL BE DONE IN CONFORMANCE WITH THE PROJECT STANDARDS. THE FINISHED PATCH SHALL BLEND SMOOTHLY INTO THE EXISTING SURFACE. ALL LARGE PATCHES SHALL BE PAVED WITH AN ASPHALT LAY-DOWN MACHINE.

EARTHWORK AND EXCAVATIONS

- 1. THE CONTRACTOR SHALL LIMIT CONSTRUCTION ACTIVITIES TO THOSE AREAS WITHIN THE LIMITS OF DISTURBANCE AND TOES OF SLOPE AS SHOWN ON THE PLANS AND CROSS SECTION. ANY DISTURBANCE BEYOND THESE LIMITS SHALL BE RESTORED TO ORIGINAL CONDITIONS AT THE EXPENSE OF THE CONTRACTOR.
- 2. WATER SHALL BE USED AS A DUST PALLIATIVE WHERE REQUIRED. COST FOR DUST PALLATIVE SHALL NOT BE MEASURED AND PAID FOR SEPARATELY, BUT SHALL BE CONSIDERED INCIDENTAL TO THE WORK.
- 3. THE DEPTH OF RECONDITIONING AND FOR THE BASES OF CUTS AND FILLS SHALL BE 6 INCHES. THE PROJECT SPECIFIED MOISTURE DENSITY CONTROL SHALL BE APPLIED FOR THE SPECIFIED DEPTH. THE EXCAVATION REQUIRED FOR COMPACTION OF BASES OF CUTS AND FILLS WILL BE CONSIDERED SUBSIDIARY TO THAT OPERATION AND WILL NOT BE PAID FOR SEPARATELY.
- 4. MOISTURE DENSITY CONTROL SHALL BE APPLIED FULL DEPTH FOR ALL EMBANKMENTS.
- 5. DURING EACH PHASE OF CONSTRUCTION, THE CONTRACTOR SHALL SHAPE TO DRAIN AND COMPACT THE WORK AREA TO A UNIFORM CROSS-SECTION. ELIMINATE ALL RUTS AND LOW SPOTS THAT COULD HOLD WATER. AREAS AND FACILITIES SUBJECTED TO FLOODING, REGARDLESS OF THE SOURCE OF WATER, SHALL BE PROMPTLY DEWATERED AND RESTORED AT NO ADDITIONAL COST TO THE CITY.
- ALL WORK SHALL BE PROPERLY BACKFILLED PRIOR TO THE END OF THE WORKDAY. NO OPEN HOLES ARE ALLOWED
- 7. WHERE CONSISTENT WITH SAFETY AND SPACE CONSIDERATIONS, EXCAVATED MATERIAL IS TO BE PLACED ON THE UPHILL SIDE OF TRENCHES. 8. MATERIAL REMOVED FROM ANY PORTION OF THE ROADWAY
- PRISM MUST BE REPLACED IN LIKE KIND WITH EQUAL OR BETTER COMPACTION. NO SEGREGATION OF MATERIALS WILL BE PERMITTED.

- 1. IF CONCRETE REPLACEMENT IS NECESSARY, THE ENTIRE AFFECTED SLAB OR PANEL MUST REPLACED.
- 2. THE CONTRACTOR SHALL SELECT AND USE A BOXOUT AT CATCH BASINS, MANHOLES, AND OTHER ROADWAY APPURTENANCES OF SIMILAR AND LARGER SIZE. SEE CCD STD DWG NO. 11.5.
- SIDEWALK SHALL BE CLASS P CONCRETE. THE USE OF 3/4 IN (#67) TOP SIZE AGGREGATE IS ALLOWED. 4. BENDER BOARDS (TWO INCH MINIMUM THICKNESS) SHALL
- BE USED ON ALL CURVES OF LESS THAN 75 FOOT RADIUS. 5. CURB AND GUTTER ANGLE BREAKS SHALL BE SMOOTHED WITH A 2 FT RADIUS UNLESS OTHERWISE SHOWN ON THE
- 6. PROVIDE A 2 FT CURB AND GUTTER TRANSITION AT EACH END OF INLETS.
- 7. THE CONTRACTOR SHALL INSTALL 1/2 IN EXPANSION JOINT MATERIAL BETWEEN THE CURB, CURB AND GUTTER AND THE SIDEWALK, AND AROUND INLET STRUCTURES OR BLOCKOUTS OR AS DIRECTED BY THE PROJECT MANAGER.
- 8. CURB RAMPS SHALL BE CONSTRUCTED USING TRUNCATED DOMES AS SHOWN IN THE CITY AND COUNTY OF DENVER STANDARD DETAILS. TRUNCATED DOMES AND GROOVES SHALL NOT BE PAID SEPARATELY, BUT INCLUDED IN THE COST OF THE CONCRETE CURB RAMP.
- 9. DOWELS, PIPES, WATER STOPS, GASKETS, AND OTHER INSTALLED MATERIALS AND ACCESSORIES SHALL BE HELD SECURELY IN POSITION WHILE CONCRETE OR GROUT IS BEING PLACED.
- 10. FOR STRUCTURAL CONCRETE SEE STRUCTURAL DESIGN SHEETS.

1. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING AND MAINTAINING ADEQUATE TRAFFIC CONTROL THROUGHOUT THE

- PROJECT, INCLUDING PROPER TRAFFIC CONTROL DEVICES AND PERSONNEL. A TRAFFIC CONTROL PLAN (TCP) IS SUBJECT TO CITY APPROVAL PRIOR TO COMMENCING WORK ON ROADWAY ROW. A COPY OF APPROVED TCPS MUST BE AVAILABLE ON SITE DURING WORK. TRAFFIC CONTROL IS TO BE IN ACCORDANCE WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).
- ALL PAVEMENT MARKINGS MUST BE INSTALLED ACCORDING TO MANUFACTURER'S SPECIFICATIONS.
- COORDINATE ALL TRAFFIC SIGNAL EQUIPMENT RELOCATIONS WITH PUBLIC WORKS TRAFFIC ENGINEERING SERVICES (TES).

LANDSCAPING

- 1. THE CONTRACTOR SHALL NOT SPRAY, CUT OR TRIM TREES OR OTHER LANDSCAPING WITHIN THE ROW UNLESS SUCH WORK IS OTHERWISE SPECIFIED IN THIS PERMIT OR CLEARLY INDICATED ON THE APPROVED PLANS.
- SEEDING, SODDING AND PLANTING IN THE ROW SHALL BE AS SPECIFIED OR OTHERWISE APPROVED BY THE CITY. CONSTRUCTION, MAINTENANCE AND WATERING REQUIREMENTS SHALL CONFORM TO CITY STANDARD SPECIFICATIONS.
- UNLESS STREETSCAPE HAS BEEN APPROVED, THE CONTRACTOR SHALL LANDSCAPE ALL ROW WITH SOD AND TREES. ALL LANDSCAPING WITHIN THE ROW SHALL BE IN CONFORMANCE WITH THE LATEST STREETSCAPE DESIGN MANUAL. NO LOOSE MATERIAL (I.E. ROCK, BARK, GRAVEL ETC.) SHALL BE ALLOWED. DECORATIVE CONCRETE OR LOW GROWING PLANT MATERIAL MAY BE ALLOWED ONLY WITH THE SPECIFIC APPROVAL OF THE CITY. TREES SHALL BE PRE-APPROVED BY THE DEPARTMENT OF PARKS AND RECREATION, FORESTRY OFFICE, AND SHALL BE A MINIMUM OF 20-FEET FROM PROPERTY CORNERS AT INTERSECTIONS, 25-FEET FROM STREET LIGHTS AND 10-FEET FROM EDGE OF DRIVEWAYS.
- THE CONTRACTOR SHALL BACKFILL AND FINE GRADE ALL CUT OR FILL SLOPES TO MATCH EXISTING CONDITIONS TO THE SATISFACTION OF THE PROJECT CONSTRUCTION ENGINEER. WHERE EXISTING LAWNS ARE DAMAGED BY THE CONTRACTOR'S OPERATIONS THE CONTRACTOR SHALL RE-SEED AND/OR SOD THE AFFECTED AREA TO A CONDITION EQUAL TO, OR BETTER THAN THAT WHICH EXISTED PRIOR THE CONSTRUCTION. ALL COSTS ARE INCLUDED WITHIN APPURTENANT BID ITEMS.

<u>DRAINAGE</u>

- 1. ALL SEWER PIPES SHALL BE INSTALLED WITH CLASS B BEDDING AS A MINIMUM.
- SANITARY SEWER PIPES SHALL BE PVC AND CONFORM TO: ASTMD3034 SDR 35 FOR SIZES 8 INCHES TO 15 INCHES IN DIAMETER (SOLID WALL), ASTM F789 FOR 18 INCHES (SOLID WALL), ASTM F679 FOR SIZES 18 TO 36 INCHES (SOLID WALL), ASTM F949 FOR SIZES 8 TO 36 INCHES (PVC PROFILE WALL), ASTM F794 FOR SIZES 8 TO 48 INCHES (PROFILE WALL), OR ASTM F1803 FOR SIZES 18 TO 60 INCHES (CLOSED PROFILE GRAVITY PIPE).
- THE CONTRACTOR PERFORMING WORK ON ANY PUBLIC OR PRIVATE STORM SEWER FACILITY OR APPURTENANCE MUST BE PROPERLY TRADE LICENSED AS A COMPANY AND HAVE A LICENSED PLUMBER OR CERTIFIED JOURNEYMAN DRAINLAYER ON SITE DURING THE WORK.
- ACCESS MUST BE MAINTAINED FOR ALL SEWER MANHOLES DURING CONSTRUCTION. MINIMUM ACCESS TO EACH MANHOLE IS A 20 FOOT WIDE LANE FROM THE NEAREST PUBLIC RIGHT OF WAY, CENTERED AT THE MANHOLE INCLUDING A 10 FOOT RADIUS AROUND THE MANHOLE AND 22.0 FEET OF VERTICAL CLEARANCE.
- 5. ALL DROP STRUCTURES SHALL BE INSPECTED BY CCD MAINLINE INSPECTIONS. THE CONTRACTOR MUST CALL MAINLINE INSPECTIONS @ (303)446-3722, A MINIMUM OF 24 HOURS PRIOR TO THE PRECONSTRUCTION MEETING AND PRIOR TO STARTING ANY WORK
- LOCATION OF INLET CONNECTORS MAY BE ADJUSTED IN THE FIELD AT THE DIRECTION OF THE PROJECT CONSTRUCTION ENGINEER IN CONJUNCTION WITH DESIGN INTENTION. ALL INLET CONNECTIONS SHOWN IN PLAN AND PROFILE ARE APPROXIMATE LOCATIONS AND DEPTHS.

- PRIOR TO BEGINNING WORK ON THE PROJECT. THE CONTRACTOR'S SURVEYOR SHALL PERFORM A SURVEY TO VERIFY ALL SURVEY CONTROL POINTS, CITY OF DENVER RANGE POINTS, SECTION CORNERS, AND BENCHMARKS AS SHOWN ON THE SURVEY CONTROL DIAGRAM. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPLACING ALL LAND SURVEY MONUMENTS DISRUPTED BY CONSTRUCTION ACTIVITIES OR BY NEGLIGENCE ON THE PART OF THE CONTRACTOR. THE CONTRACTOR IS REQUIRED TO FOLLOW COLORADO STATE LAW REGARDING SURVEY MONUMENTS. THIS WILL NOT BE PAID SEPARATELY, BUT SHALL BE INCLUDED IN THE WORK UNLESS SPECIFIED OTHERWISE IN SECTION 629. FOR FURTHER INFORMATION CONTACT:
 - PUBLIC WORKS SURVEY DEPARTMENT ATTENTION: CITY SURVEYOR
 - 201 W. COLFAX AVE. DENVER, CO 80202 720-865-3121
- AFTER COMPLETION OF THE PAVING OPERATIONS, THE CONTRACTOR SHALL UPGRADE TEMPORARY RANGE POINTS WITH PERMANENT RANGE POINT MONUMENTS AT THE LOCATION AS INDICATED ON THE SURVEY CONTROL DIAGRAM. MONUMENTS SHALL MEET CURRENT CITY AND COUNTY OF DENVER STANDARDS. SEE SECTION 629 OF THE THE SPECIAL PROVISIONS FOR MORE INFORMATION.
- A SURVEY SHALL BE DEPOSITED WITH THE CITY AND COUNTY OF DENVER PER STATE STATUTE. CITY MONUMENT RECORDS SHALL BE PREPARED FOR ALL RANGE POINTS WITHIN THE PROJECT AND DEPOSITED WITH THE CITY SURVEYOR.
- ANY PERSON WHO KNOWINGLY REMOVES, ALTERS, OR DEFACES ANY PUBLIC LAND SURVEY MONUMNET AND/OR BOUNDARY MONUMENT OR ACCESSORY, COMMITS A CLASS TWO (2) MISDEMEANOR PURSUANT TO STATE STATUTE C.R.S. SECTION 18-4-508.
- ALL STATIONS ARE OFFSETS SHOWN ON THE PLANS ARE TO THE CONTROL LINES UNLESS OTHERWISE NOTED. THE USE OF CONTROL MONUMENTS FOR CONSTRUCTION STAKING OTHER THAN THOSE SHOWN ON THE PLANS OR APPROVED BY THE PW DEPT IS PROHIBITED, AND USE OF SUCH MONUMENTS IS AT THE CONTRACTOR'S SOLE RISK.
- PROPOSED FINISHED GROUND ELEVATIONS FOR ITEMS TO BE ADJUSTED, RESET OR MODIFIED SHALL BE FIELD VERIFIED BY THE CONTRACTOR.

GEOTECHNICAL BORING LOG LEGEND

BORE HOLE/TEST HOLE

grained sand, trace gravel.

₹ TOPSOIL

SPHALT, thickness in inches shown to the left of the log.

 74 mm CONCRETE PAVEMENT, thickness in inches shown to left of log.

AGGREGATE BASE COURSE, sand with silt, moist, brown, fine to coarse grained sand. Thickness in inches shown to the left of the log. 📈 FILL, silty to clayey sand with gravel to clay with sand, very loose to medium debris such

as concrete, brick and building materials encountered periodically, moist, light to dark brown to black, fine to coarse grained sand, no to low plasticity, small to large gravel. CLAY, sand and silt, trace gravel, soft to very stiff, moist, low to high plasticity, brown

SAND and GRAVEL, dense to very hard, moist, light brown to brown, fine to coarse grained sand, small to large gravel.

SAND, loose to very dense, moist to wet, light brown to brown, fine to coarse grained 🔛 sand, small to medium gravel.

SAND with CLAY, to clayey sand, silt, trace gravel, very dense, moist, low plasticity, brown,

🛂 fine to coarse grained sand, small gravel. SAND with SILT, very loose to dense, moist, light brown to brown, very fine to coarse

CLAYSTONE BEDROCK, hard to very hard, moist, low to high plasticity, brownish grey to blue—gray, contains variable amounts of fine to medium grained sand, trace coal seams.

SANDSTONE BEDROCK, hard, moist, blue-gray, fine to medium grained, clayey.

Drive sample blow count, Indicates that 3 blows from a 140 pound hammer falling 30 inches were required to drive the California or Split Spoon sampler 12 inches.

Indicates drive sample, Standard Penetration Test, 1g inch I.D. split spoon sample.

Indicates depth to water level and number of days after drilling measurement was made.

LEGEND

— — — W— — EXISTING WATER LINE

— — — FO— — EXISTING FIBER OPTIC LINE

——— SAN ——— EXISTING SANITARY SEWER

— — — E — — EXISTING UNDERGROUND ELECTRIC LINE

--- STM --- EXISTING STORM SEWER

— — — G — — EXISTING GAS LINE

Indicates depth at which caved material accumulated.

Indicates 2 inch I.D. California liner drive sample

Indicates disturbed bulk sample.

ABBREVIATIONS

DWMD

EOP

FΟ

PCBC

RCP

RTD

UP

RPMP

CAST IN PLACE

EAST/EASTING

EDGE OF ASPHALT

FINISHED GRADE

NORTH/NORTHING

OVERHEAD ELECTRIC

OVERHEAD TELEPHONE

POLY VINYL CHLORIDE

PRECAST CONCRETE BOX CULVERT

REINFORCED CONCRETE PIPE

REINFORCED CONCRETE BOX CULVERT

REINFORCED POLYMER MORTAR PIPE

REGIONAL TRANSPORTATION DISTRICT

FIBER OPTIC

INVERT

MANHOLE

OVERHEAD

LEFT

RIGHT

RIGHT OF WAY

SANITARY

STANDARD

TEST HOLE

STATION

STORM

WATER

WITH

RETAINING WALL

TOP BACK OF CURB

TOP OF BOULDERS

UNION PACIFIC

EDGE OF PAVEMENT

HYDRAULIC GRADE LINE

DUCTILE IRON PIPE

DENVER WASTEWATER MANAGEMENT DIVISION

DIAMETER

DRAWING

Test Hole #

Bore Hole

ING OU

VO BE

NAGEMENT ER, CO 80223 (303) 446-3647

PITAL) W. 3RJ (303) 4

AP. OUTE REE

— — — OHE — — EXISTING OVERHEAD ELECTRIC LINE PROPOSED WATER LINE PROPOSED SANITARY SEWER — — — EXISTING INDEX CONTOURS (5') EXISTING NOMINAL CONTOURS (1') PROPOSED STORM SEWER PIPE (PLAN)

PROPOSED STORM SEWER PIPE (PROFILE)

EXISTING WATER VALVE WILSON



DRAWN BY: &COMPANY DESIGNED BY: APPROVED BY: DRAWING NAME:

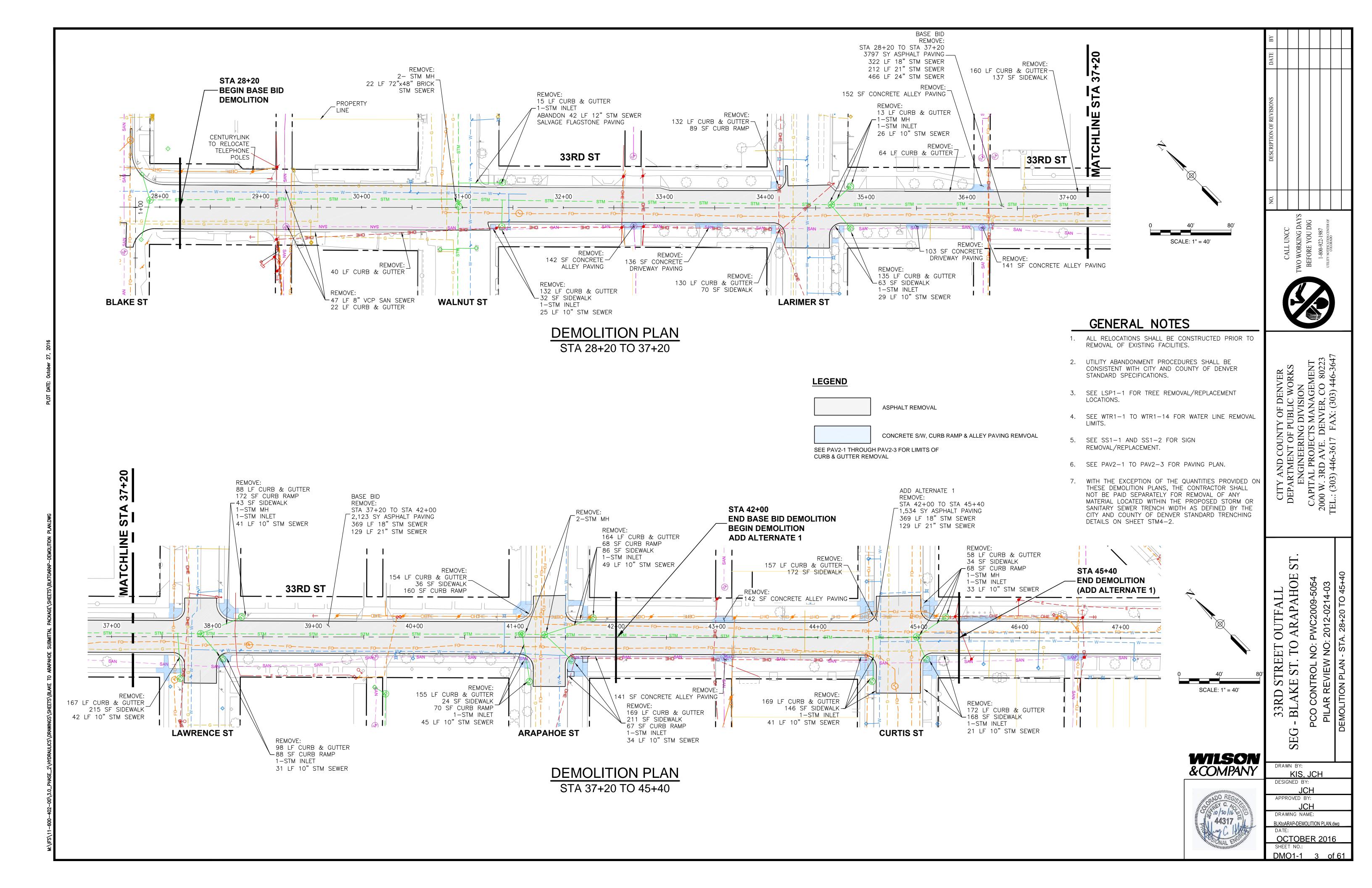
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KtoARAP-GENERAL NOTES AND LEGEND. OCTOBER 2016 SHEET NO.:

GEN1-2

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UTILITY	CONTACT NAME	ADDRESS	TELEPHONE	EMAIL
CENTURYLINK COMMUNICATIONS	LISA HAUSWIRTH	5325 ZUNI ST., DENVER, CO 80221	720-578-3715	LISA.HAUSWIRTH@CENTURYLINK.COM
COMCAST	KIP WEST	8000 E. ILIFF AVE., DENVER, CO 80231	303-603-2832	KIP_WEST@CABLE.COMCAST.COM
DENVER WASTEWATER	STEVE CHOI	2000 W. 3RD AVE., DENVER, CO 80223	303-446-3648	STEVE.CHOI@DENVERGOV.ORG
DENVER WATER	RAY BATTS	1600 W. 12TH AVE. DENVER, CO 80204	720-345-1069	RAPHEAL.BATTS@DENVERWATER.ORG
LEVEL 3 COMMUNICATIONS	GUIDO AGUILLARD	14200 E. JEWELL AVE., AURORA, CO 80012	303-566-6045	GUIDO.AGUILLARD@LEVEL3.COM
MCI/VERIZON	DAVID MCALLISTER	24055 E. 6TH AVE., AURORA, CO 80018	801-301-0937	DAVID.MCALLISTER@VERIZON.COM
XCEL ENERGY	DANIEL NIVAL	1123 W. 3RD AVE., DENVER, CO 80223	303-571-3659	DANIEL.NIVAL@XCELENERGY.COM
ZAYO	JAMES BLACK	400 CENTENNIAL PARKWAY, SUITE 200, LOUISVILLE, CO 80027	719-216-8508	JAMESR.BLACK@ZAYO.COM

UTILITY GENERAL NOTES

1. CAUTION: LOCATION OF EXISTING UTILITIES IS SHOWN ACCORDING TO THE BEST INFORMATION AVAILABLE AS SUPPLIED BY THE UTILITY PROVIDERS INCLUDING TYPE, SIZE, LOCATION, AND NUMBER OF UTILITIES. PRIOR TO DATE OF CONSTRUCTION CONTRACTOR SHALL VERIFY EXISTING UTILITIES WITH THE UTILITY NOTIFICATION CENTER OF COLORADO (UNCC) AND/OR UTILITY COMPANIES. FOR ADDITIONAL INFORMATION CONTACT: UNCC 1-800-922-1987. THE CONTRACTOR SHALL VERIFY EXISTENCE, SIZE, AND LOCATION OF EXISTING UTILITIES AND FACILITIES PRIOR TO CONSTRUCTION AND SHALL NOTIFY THE ENGINEER OF ANY DISCREPANCIES.

2. PRIOR TO COMMENCEMENT OF CONSTRUCTION, THE CONTRACTOR SHALL CONTACT ALL UTILITIES TO COORDINATE SCHEDULING. SHOULD ANY CONFLICTS, RECONSTRUCTION, OR OTHER INTERRUPTIONS IN SERVICE BE REQUIRED, CONTRACTOR SHALL COORDINATE UTILITY SCHEDULING.

3. THE CONTRACTOR SHALL CORRECTLY SHOW ON SUBMITTED DRAWINGS THE LOCATIONS OF ALL UTILITIES IN THE VICINITY WHERE THE CONTRACTOR MAY BORE, TRENCH, EXCAVATE, AND INSTALL CONDUIT, FIBER, FIBER ENCLOSURES, VAULTS, AND HANDHOLDS. IN THE EVENT THAT THE CONDUIT RUN, FIBER ENCLOSURES, VAULTS, OR HANDHOLDS ARE LOCATED WITHIN THE VICINITY OF ANY UTILITY, THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN AND INSTALLATION THAT WILL PREVENT DAMAGE TO THE INSTALLATION UNDER NORMAL UTILITY OPERATING CONDITIONS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO OBTAIN INFORMATION ON EACH OF THE UTILITIES AS APPLICABLE SUCH AS GAS PRESSURE, STEAM AND WATER PRESSURES, TEMPERATURES, ETC.

4. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO EXAMINE THE SITE FOR EVIDENCE OF FAILURES OF OR DEFICIENCIES IN UTILITY COMPANY FACILITIES (I.E. XCEL, DENVER WATER, DENVER PUBLIC WORKS, WMD, ETC.) AND TO IMMEDIATELY CALL ANY SUCH EVIDENCE OF PRE-EXISTING DAMAGE TO THE ATTENTION OF THE UTILITY COMPANY ALONG WITH PROPER DOCUMENTATION. THE CONTRACTOR HEREBY AGREES THAT THE REPAIR OF ANY AND ALL DAMAGES (DIRECT OR INDIRECT), THAT MAY BE SUBSEQUENTLY DISCOVERED AND PROVEN TO HAVE BEEN CAUSED BY THE CONSTRUCTION ACTIVITIES, IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR WITHOUT SUCH EVIDENCE OF PRE-EXISTING DAMAGE. THE CONTRACTOR HEREBY AGREES THAT ANY AND ALL DAMAGES (DIRECT OR INDIRECT) TO UTILITY COMPANY FACILITIES, WHICH MAY BE SUBSEQUENTLY DISCOVERED WITHIN THOSE AREAS WHERE CONSTRUCTION OCCURRED WITHIN SIX FEET OF UTILITY COMPANY FACILITIES (DIRECT OR INDIRECT), AND WITHIN A PERIOD OF THREE YEARS FROM THE DATE OF CONSTRUCTION, WERE CAUSED BY THE CONSTRUCTION ACTIVITIES. FURTHERMORE, THE REPAIR IS AGREED TO BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PROTECT ALL UTILITY COMPANY FACILITIES WITHIN THE AREA OF CONSTRUCTION. THIS INCLUDES ALL STEPS NECESSARY TO PREVENT SUBSIDENCE OF THE SOIL ADJACENT TO OR NEAR UTILITY COMPANY FACILITIES.

5. ANY CASING OR SLEEVE SO INSTALLED UNDER THE ROADWAY SHALL BE THE SAME DIAMETER AS THE BORE SO AS TO ELIMINATE A VOID AROUND THE CASING. IN THE EVENT JACKING OPERATIONS RESULT IN VOIDS, THE RESULTANT VOIDS SHALL BE GROUTED OR OTHERWISE BACKFILLED, SUBJECT TO CITY APPROVAL. ENDS OF BORED SECTIONS SHALL NOT BE COVERED BEFORE BEING INSPECTED.

6. THE CONTRACTOR SHALL MAINTAIN AT LEAST A 10 FOOT CLEAR ZONE TO UTILITIES AT ALL TIMES IN ACCORDANCE WITH CITY STANDARDS. THE CONTRACTOR SHALL CLEARLY IDENTIFY OWNER NAME AND CONTACT INFORMATION ON ALL MANHOLE COVERS.

7. FOR ALL MANHOLES IN ASPHALT STREETS, ADD A 2-INCH RISER RING DIRECTLY UNDER THE COVER TO FACILITATE FUTURE ROTOMILL/OVERLAY OPERATIONS.

8. THE CONTRACTOR SHALL FILL SPACE BETWEEN WATER LINE AND NEW SANITARY OR STORM SEWER LINE WITH FLOWABLE FILL WHEN SEPARATION IS LESS THAN ONE FOOT, PER DWD REQUIREMENTS.

9. THE CONTRACTOR SHALL COORDINATE WITH XCEL ENERGY PRIOR TO WORKING UNDER OVERHEAD UTILITIES.

10. THE CONTRACTOR SHALL KEEP REQUIRED MINIMUM CLEARANCE FROM ALL OVERHEAD UTILITIES DURING CONSTRUCTION ACTIVITIES.

11. A REPRESENTATIVE OF DENVER WATER SHALL BE PRESENT FOR ALL WATER LINE LOWERINGS AND CONSTRUCTION.

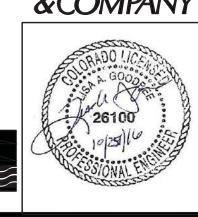
UTILITY LEGEND

·EEE	EXISTING ELECTRIC	0	EXISTING STORM INLET
·F0F0	EXISTING FIBER OPTIC	ST	EXISTING STORM MANHOLE
. ———Т ———Т	EXISTING TELEPHONE	SA	EXISTING SANITARY MANHOLE
·TVTV	EXISTING CABLE TV	T	EXISTING TELEPHONE/FIBER MANHOLE
·	EXISTING GAS	W	EXISTING WATER MANHOLE
·	EXISTING WATER		EXISTING WATER VALVE
SAN	EXISTING SANITARY SEWER		EXISTING FIRE HYDRANT
· — — — — —	EXISTING STORM SEWER		EXISTING GAS VALVE
OHEOHEOH	EXISTING OVERHEAD ELECTRIC	0()	EXISTING LIGHT POLE
	PROPOSED STORM SEWER	E	EXISTING ELECTRIC MANHOLE
- G	PROPOSED GAS	PBE	EXISTING LIGHTING PULL BOX
· ——W——W	PROPOSED WATER	E	EXISTING ELECTRIC PULL BOX
· ——E——E——E	· PROPOSED ELECTRIC		EXISTING TELEPHONE PEDESTAL
F0F0F0			PROPOSED SANITARY MANHOLE
	 PROPOSED SANITARY SEWER 	•	UTILITY POTHOLE
\cdot \times \cdot \times \cdot \times \cdot \times	REMOVAL/ABND EXISTING		

ST. ARAPAHOE

WILSON &COMPANY

GOODBEE



CALL UNCC WO WORKING DA BEFORE YOU DIV 1-800-922-1987

33RD STREET OUTFALL BLAKE

SEG DESIGNED BY: APPROVED BY: ETR DRAWING NAME: UTILITYCOVER-SEG3.DWG

OCTOBER 2016 SHEET NO .:

UTL1-1 4 of 61

POTHOLE LOG (LISTED IN ORDER OF STATIONING)

Pothole Number	Description	Apx Sta	Location	Notes	Ground Elev	Size/Material	Depth to TOP (in)	TOP Elev	Depth to BOP (in)	BOP Elev	Date Potholed	Northing	Easting
115	Gas Main - 3" Xcel	28+35	west of Blake/Walnut Alley	north of PH-116	5194.65	3" steel	32	5192.0	35	5191.7	05/30/13	450989.70	647563.14
116	Gas Main - 2" Xcel	28+35	west of Blake/Walnut Alley	south of PH-115	5194.62	2" steel	35	5191.7	37	5191.5	05/30/13	450987.48	647561.29
117	Fiber Optic- Level 3	29+30	Blake/Walnut Alley	2-1.5" HDPE (orange, blue) and 1 or 2- 1.25" HDPE (black)	5195.27	4" steel	41	5191.9	45	5191.5	05/31/13	450949.42	647615.05
118	Fiber Optic- Level 3	30+80	Walnut	at bend in fiber run. Potholer recorded 6x1.5" conduits	5196.30	8x1.25" plastic	38	5193.1	48	5192.3	05/31/13	450839.37	647717.86
119	Gas Main- 8" Xcel	30+90	Walnut		5196.57	8" steel	35	5193.7	43	5193.0	05/31/13	450843.32	647736.08
120A	Water Main- 6" Denver Water	31+05	Walnut	where waterlines in 33rd and Walnut connect.	5196.34	6" PVC	79	5189.8	85	5189.3	5/31/2013	450833.97	647750.98
120B	Water Main- 6" Denver Water	31+05	33rd at Walnut	where waterlines in 33rd and Walnut connect.	5196.34	6" steel	79	5189.8	85	5189.3	5/31/2013	450833.97	647750.98
121	Gas Main- 2" Xcel	31+10	Walnut		5196.27	2" steel	60	5191.3	62	5191.1	05/31/13	450830.47	647751.57
122A	Gas Main- 4" Xcel	34+25	Larimer	where gas in Larimer and Level 3 in 33rd cross	5199.29	4" steel	26	5197.1	32	5196.6	6/3/2013	450592.43	647962.01
122B	Fiber Optic- Level 3	34+25	33rd at Larimer	where gas in Larimer and Level 3 in 33rd cross	5199.29	8x1.5" plastic	114	5189.8	122	5189.1	6/3/2013	450592.43	647962.01
123	Water Main- 12" Denver Water	34+40	Larimer		5199.48	12" steel	44	5195.8	56	5194.8	06/03/13	450590.67	647980.45
124	Fiber Optic- Level 3	36+20	Larimer/Lawrence Alley	locator thought it was 20' deep.	5204.85	DNF at 14 ft	DNF at 14 ft	DNF	DNF at 14 ft	DNF	06/03/13	450464.40	648105.92
232A	Fiber Optic- Level 3	36+20	Crossing 33rd at alley between Larimer and Lawrence	Offset pothole from PH-124	5204.84	4x1.25" plastic	62	5199.7	68	5199.2	02/20/14	450464.27	648108.77
232B	Storm - 18" DWM	36+20	in WB 33rd at alley between Larimer and Lawrence		5204.84	18" clay	80	5198.2	95	5196.9	02/20/14	450464.27	648108.77
125A	Fiber Optic- Level 3	37+60	Lawrence	where fiber runs in Lawrence and 33rd cross	5210.41	10x1.5" plastic	66	5204.9	78	5203.9	6/3/2013	450359.50	648201.60
125B	Fiber Optic- Level 3	37+60	33rd at Lawrence	where fiber runs in Lawrence and 33rd cross	5210.41	8x1.5" plastic	142	5198.6	154	5197.6	6/3/2013	450359.50	648201.60
125C	Unknown/unexpected	37+60	33rd at Lawrence east of Level 3 fiber in Lawrence.	may be abandoned waterline	5210.41	20" DIP	55	5205.8	75	5204.2	6/3/2013	450359.50	648201.60
126	Gas Main- 4" Xcel	37+75	Lawrence		5210.78	4" plastic	33	5208.0	37	5207.7	06/03/13	450358.24	648219.99
127	Water Main- 6" Denver Water	37+80	Lawrence		5210.92	6" steel	56	5206.3	62	5205.8	06/03/13	450355.30	648222.02
128	Electric- Xcel	38+20	East of Lawrence		5210.48	2" plastic	61	5205.4	63	5205.2	06/03/13	450324.62	648252.11
233	Water main - 8" Denver Water	38+30	SE 33rd/Lawrence	crosses lateral. Potholer estimated pipe size of 12"	5210.04	8" plastic	55	5205.5	63	5204.8	02/18/14	450305.34	648244.59





33RD STREET OUTFALL SEG - BLAKE ST. TO ARAPAHOE ST. PCO CONTROL NO: PWC2009-5054
PILAR REVIEW NO: 2012-0214-03
UTILITY POTHOLE LOG

UTILITYCOVER-SEG3.DWG

DATE:

OCTOBER 2016

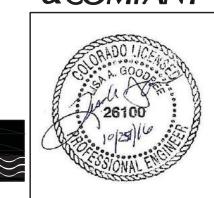
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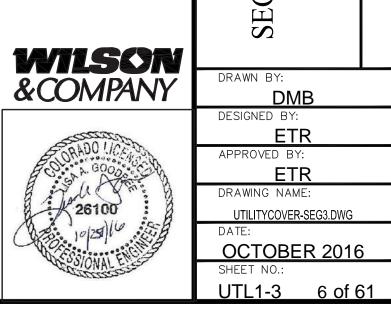
UTL1-2 5 of 61

POTHOLE LOG (LISTED IN ORDER OF STATIONING)

Pothole Number	Description	Apx Sta	Location	Notes	Ground Elev	Size/Material	Depth to TOP (in)	TOP Elev	Depth to BOP (in)	BOP Elev	Date Potholed	Northing	Easting
129	Telephone- Centurylink	39+80	east of alley between Lawrence and Arapahoe	400 pr cable no fiber	5211.44	4" plastic	29	5209.0	33	5208.7	5/31/2013	450213.20	648362.50
130B	Fiber Optic- Level 3	41+15	33rd at Arapahoe	where gas in Arapahoe and Level 3 in 33rd cross. Potholer recorded 12 conduits.	5212.55	8x1.5" plastic	112	5203.2	123	5202.3	5/31/2013	450106.29	648450.77
130A	Gas- 4" Xcel	41+20	Arapahoe	where gas in Arapahoe and Level 3 in 33rd cross	5212.64	4" steel and 2x1" steel control lines	29	5210.2	36	5209.6	5/31/2013	450103.60	648452.42
131	Fiber Optic- Zayo	41+25	Arapahoe		5212.76	4x4" plastic	44	5209.1	54	5208.3	5/31/2013	450112.45	648468.97
132	Water Main- 6" Denver Water	41+50	Arapahoe		5212.72	6" steel	70	5206.9	76	5206.4	5/31/2013	450095.84	648486.66
234	Fiber Optic - Zayo	41+80	NE 33rd/Arapahoe	crosses lateral	5211.93	2x2" plastic	33	5209.2	35	5209.0	02/18/14	450078.76	648508.52
235	Fiber Optic- Level 3	41+80	SE 33rd/Arapahoe	crosses lateral. Potholer recorded 10x2" conduits.	5212.36	8x1.5" plastic	48	5208.4	60	5207.4	02/18/14	450063.60	648493.12
135	Fiber Optic- Level 3	44+50	Curtis	located west of waterline	5212.78	4" steel	154	5199.9	158	5199.6	5/30/2013	449881.36	648697.27
133	Water Main- 6" Denver Water	44+60	Curtis		5213.12	6" steel	70	5207.3	76	5206.8	5/30/2013	449873.31	648705.75
134	Gas Main- 4" Xcel	44+70	Curtis		5213.25	4" steel	27	5211.0	31	5210.7	5/30/2013	449867.36	648711.25
236	Fiber Optic- Level 3	44+75	Curtis south of 33rd	crosses lateral.	5213.33	8x1.5" plastic	53	5208.9	59	5208.4	02/18/14	449830.67	648684.41
136	Fiber Optic- MCI	44+90	Curtis		5213.15	concrete enc	10	5212.3	37	5210.1	5/30/2013	449853.68	648729.98
137	Fiber Optic/UGT- Centurylink	45+00	Curtis		5212.92	concrete enc	30	5210.4	55	5208.3	5/30/2013	449846.69	648736.45
237	Fiber Optic - Zayo	45+25	NE 33rd/Curtis	crosses lateral	5212.69	2x2" plastic	70	5206.9	72	5206.7	02/18/14	449830.53	648752.87
238	Gas main - 2" Xcel	45+25	SE 33rd/Curtis	crosses lateral	5212.20	2" steel	36	5209.2	38	5209.0	02/18/14	449816.39	648738.51
138	Fiber Optic- Centurylink	46+60	Curtis/Champa Alley		5213.08	concrete enc	37	5210.0	56	5208.4	5/30/2013	449734.16	648844.50
139A	Fiber Optic - CCD Traffic	48+05	Downing at Champa	where CCD traffic on west side of Downing crosses Century Link in Champa	5213.10	2" steel	31	5210.5	33	5210.4	5/30/2013	449630.41	648953.11
139B	Fiber Optic - CenturyLink	48+05	Champa at Downing	where CCD traffic on west side of Downing crosses Century Link in Champa	5213.10	concrete enc	42	5209.6	95	5205.2	5/30/2013	449630.41	648953.11
139C	Abandoned 8" water main - Denver Water	48+05	33rd at Champa	may be DWD waterline if water locate was off or abandoned utility.	5213.10	8" steel	60	5208.1	68	5207.4	5/30/2013	449630.41	648953.11
239	Fiber Optic - Zayo	48+15	33rd/Champa	crosses main	5213.13	2x2" plastic	24	5211.1	26	5211.0	02/18/14	449630.64	648956.51
140	Storm Main- 60" Brick	48+60	Champa south of 33rd	crest of pipe located under curb/gutter	5213.65	60" brick	145	5201.6	205 est	5196.6	5/30/2013	449581.72	648935.49
141	Water Main- 6" Denver Water	48+65	Champa south of 33rd		5214.01	6" steel	54	5209.5	60	5209.0	5/30/2013	449575.95	648936.53







33RD STREET OUTFALL SEG - BLAKE ST. TO ARAPAHOE ST.

PCO CONTROL NO: PWC2009-5054
PILAR REVIEW NO: 2012-0214-03
UTILITY POTHOLE LOG

DRY UTILITY SUMMARY

Utility Owner	Туре	Size	Material	Apx Sta Begin	Apx Sta End	Location	Comments	Resolution
CENTURYLINK								
CenturyLink	ОНТ			28+25	29+95	On north side of 33rd St. between Blake St. and alley between Blake and Walnut St.	Poles relocated in 2016 for this project.	Protect in place.
CenturyLink	ОНТ	Unk	Unk	29+15		Across 33rd St. on west side of alley between Blake St. and Walnut St.	On Xcel poles with electric	CenturyLink to temporarily lay on ground.
CenturyLink	ОНТ	Unk	Unk	32+60		Across 33rd St. on west side of alley between Walnut St. and Larimer St.	On Xcel poles with electric.	CenturyLink to temporarily lay on ground.
CenturyLink	ОНТ	Unk	Unk	36+20		Across 33rd St. on east side of alley between Larimer St. and Lawrence St.	On Xcel poles with electric	CenturyLink to temporarily lay on ground.
CenturyLink	UGT/UGFO	4"	Plastic	39+80		Across 33rd St. between Lawrence and Arapahoe.	Top of conduit at 5209.0. Top of storm box at 5194.5.	Support in place by CenturyLink.
CenturyLink	OHT	Unk	Unk	41+80		Northeast corner of 33rd/Arapahoe	Pole near inlet on northeast corner.	Protect in place by CenturyLink.
CenturyLink	ОНТ	Unk	Unk	43+20		On east side of alley crossing 33rd St. between Arapahoe and Curtis.	Crosses storm box. Apx 15 feet to nearest poles. CenturyLink poles.	CenturyLink to temporarily lay on ground.
CenturyLink	UGFO	Unk	Unk	45+00		In NB Curtis across 33rd St.	Concrete encasement 5210.4-5208.3. Top of storm box 5196.	Remove encasement and support conduits in place by CenturyLink.
CenturyLink	UGFO	Unk	Unk	45+00		In NB Curtis south of 33rd St.	Est. bottom of concrete encasement at 5208.3. Top of 15" storm at 5208.	Remove encasement and support conduits in place by CenturyLink.
CenturyLink	ОНТ	Unk	Unk	45+20		North of 33rd St east of Curtis St.	Crosses over proposed inlet. Pole near inlet on northeast corner.	Protect in place by CenturyLink.
COMCAST	5113 2					·		
Comcast	OHTV	Unk	Unk	29+15		Across 33rd St. on west side of alley between Blake St. and Walnut St.	On Xcel poles with electric	Comcast to temporarily lay on ground.
Comcast	OHTV	Unk	Unk	32+60		Across 33rd St. on west side of alley between Walnut St. and Larimer St.	On Xcel poles with electric	Comcast to temporarily lay on ground.
Comcast	OHTV	Unk	Unk	36+20		Across 33rd St. on east side of alley between Larimer St. and Lawrence St.	On Xcel poles with electric	Comcast to temporarily lay on ground.
Comcast	OHTV	Unk	Unk	43+00		On west side of alley crossing 33rd St. between Arapahoe and Curtis	On Xcel poles with electric	Bury by Comcast
LEVEL3								
Level 3	UGFO	4"	Steel	29+30		Across 33rd St. on east side of alley between Blake and Walnut.	Top of fiber at 5191.9. Top of storm box at 5188	Support in place.
Level 3	UGFO	8x1.5"	plastic	30+80	44+75	Across 33rd St. at Walnut and on south side of 33rd St. between Walnut St. and Curtis St. to manhole in SB Curtis St. south of 33rd St.	Along south edge of storm box.	Abandon manholes/conduits and relocate fiber by Level 3.
Level 3	UGFO	4x1.25"	plastic	36+20		Across 33rd St. on east side of alley between Lawrence St. and Larimer St.	Bottom of conduit 5199.2. Top of storm box at 5194.	Support in place.
Level 3	UGFO	10x1.5"	Plastic	37+60		Across 33rd St. under sidewalk on west side of Lawrence St.	Top of fiber at 5204.9. Bottom of fiber at 5203.9. Top of storm box at 5194. Contains conduit leased to MCI.	Support in place.
Level 3	UGFO	4"	Steel	44+50		Under sidewalk on west side of Curtis across 33rd St.	Bottom of fiber at 5199.6. Top of storm box at 5196	Support in place.
Level 3	UGFO	unk	unk	44+50		Under sidewalk on west side of Curtis south of 33rd St.	Behind existing and new storm inlet.	Protect in place.
Level 3	UGFO	manhole		44+80		In SB Curtis St. south of 33rd St.	East end of Level 3 fiber relocation.	Protect manhole in place.
Level 3	UGFO	manhole				In sidewalk west of Lawrence St. south of 33rd St.	Manhole behind existing and new inlet.	Protect in place.
MCI/VERIZON			I					
MCI/Verizon	UGFO	Unk	Unk	44+90		Across 33rd St. in NB Curtis St.	Concrete encased 5212.3-5210.1. Top of storm box 5196.	Remove encasement and support conduits in place by MCI
MCI/Verizon	UGFO	Unk	Unk	44+90		In NB Curtis south of 33rd St.	Est. bottom of concrete encasement at 5210.1. Top of 15" storm at 5207.	Remove encasement and support conduits in place by MCI
ZAYO		LEGICA CASSIFICATION	26.5		pripries and the second			
Zayo	UGFO	2x2"	plastic	41+80	47+40	In WB 33rd St. between Arapahoe St. and Champa St.	Near north side of storm box.	Relocate by Zayo.
Zayo/MCI	UGFO	4x4"	plastic	41+25		Across 33rd St. in SB Arapahoe St.	MCI lease fiber from Zayo. Bottom of conduits at 5208.3. Top of storm box 5195.	Support in place by Zayo.
Zayo/MCI	UGFO	4x4"	plastic	41+25		In Arapahoe St. south of 33rd St.	MCI lease fiber from Zayo. Est. bottom of conduits at 5208.3. Top of 15" storm at 5207.	Support in place by Zayo.

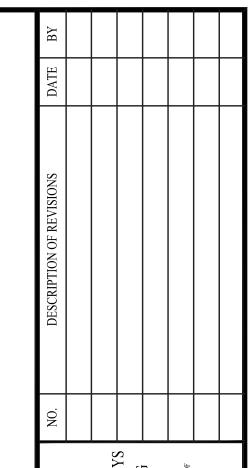
Abbreviations

OHE - overhead electric OHE/OHF - overhead electric/fiber OHT - overhead telephone OHTV - overhead cable TV UGE - buried electric

FB - fusion bond IP - intermediate pressure LP - low pressure MW - mill wrapped PED - plastic UGT - buried telephone

GOODBEE & ASSOCIATES, INC.







33RD STREET OUTFALL - BLAKE ST. TO ARAPAHOE ST.

SEG ETR
APPROVED BY: ETR
DRAWING NAME: UTILITYCOVER-SEG3.DWG DATE:

OCTOBER 2016

SHEET NO.:

UTL1-4 7 of 61

UGFO - buried fiber

DRY UTILITY SUMMARY

Utility Owner	Туре	Size	Material	Apx Sta Begin	Apx Sta End	Location	Comments	Resolution
XCEL ENERGY - ELECTRIC			70-					
Xcel Energy	OHE/OHF	Unk	Unk	29+15		Across 33rd St. on west side of alley between Blake St. and Walnut St	Crosses storm box. Comcast and CenturyLink on poles.	Xcel to temporarily de-energize
Xcel Energy	OHE	Unk	Unk	31+40		Southeast corner of 33rd St./Walnut St.	South of storm box. Pole near proposed inlet.	Protect in place.
Xcel Energy	OHE	Unk	Unk	32+60		Across 33rd St. on west side of alley between Walnut St. and Larimer St.	Crosses storm box. Comcast and CenturyLink on poles.	Xcel to temporarily de-energize
Xcel Energy	OHE	Unk	Unk	32+80		Across 33rd St. on east side of alley between Walnut St. and Larimer St.	Street light feed. Crosses storm box.	Xcel to temporarily disconnect. Coordinate with owner to schedule outage.
Xcel Energy	OHE	Unk	Unk	34+10		Across 33rd St. on west side of Larimer St.	Street light feed to street light on southwest corner. Crosses storm box.	Xcel to temporarily disconnect. Coordinate with owner to schedule outage.
Xcel Energy	OHE	Unk	Unk	34+40		Across 33rd St. at Larimer St. from northeast to southwest corner	Street light feed between poles on northeast and southwest corners. Crosses storm box.	Xcel to temporarily disconnect. Coordinate with owner to schedule outage.
Xcel Energy	OHE	Unk	Unk	36+20		Across 33rd St. on east side of alley between Larimer St. and Lawrence St.	Crosses storm box. Comcast and CenturyLink on poles.	Xcel to temporarily de-energize
Xcel Energy	OHE	Unk	Unk	37+75		Across 33rd St. on west side of Lawrence St.	Street light feed.	Xcel to temporarily disconnect. Coordinate with owner to schedule outage.
Xcel Energy	UGE	2"	Plastic	38+20		Across 33rd St. on east side of Lawrence St.	Residential service. Top of conduit 5205.4. Top of storm box 5194. Near storm manhole and inlet.	Adjust as needed by Xcel.
Xcel Energy	OHE	Unk	Unk	41+60		Runs southwest from pole on southeast corner of 33rd/Arapahoe	Street light feed. Crosses over proposed inlet south of southeast corner 33rd/Arapahoe.	Xcel to temporarily disconnect. Coordinate with owner to schedule outage.
Xcel Energy	OHE	Unk	Unk	41+80		On south side of 33rd St. east of Arapahoe St.	Street light feed. Crosses over proposed inlet east of southeast corner 33rd/Arapahoe.	Protect in place by Xcel.
Xcel Energy	OHE	Unk	Unk	43+00		On west side of alley crossing 33rd St. between Arapahoe and Curtis	With Comcast. Crosses storm box. Apx 15 feet to nearest pole on south side of street	Bury by Xcel
Xcel Energy	OHE	Unk	Unk	45+40		On north side of 33rd St. east of Curtis St.	Pole near inlet on northeast corner.	Protect in place by Xcel.
Xcel Energy	OHE	unk	unk	45+50		Across 33rd St. east of Curtis St.		Bury by Xcel.
XCEL ENERGY - GAS			3				1	1
Xcel Energy	gas	service	unk	29+35		Across 33rd St. east of alley between Blake St. and Walnut St. from 3" gas main on south side of 33rd St.	Relocated in 2015. Estimated depth 3-4 ft.	Support in place.
Xcel Energy	gas	2"	Steel	29+55		Across 33rd St. east of alley between Blake St. and Walnut St. from 3" gas main on south side of 33rd St.	Service to 3270 Blake St. Est. bottom of gas service at 5192. Top of storm box at 5188.	Support in place.
Xcel Energy	gas	8" LP	FB	30+85		Across 33rd St. in Walnut St.	Relocated in 2015. Estimated depth 3-4 ft.	Support in place as needed.
Xcel Energy	gas	4"	steel	34+30		Across 33rd St. in Larimer St.	Top of gas line at 5197.1. Top of storm box 5193.	Support in place as needed.
Xcel Energy	gas	2"	PED/MW	35+60	37+60	On south side of 33rd St. west from 4" gas in Lawrence St.	About 5 feet south of south end of storm box. Not potholed. Connects to service to 3301 Lawrence St. and 3264 Larimer St.	Relocate by Xcel.
Xcel Energy	gas	service	unk	36+60		Across 33rd St. east of alley between Lawrence and Larimer St.	Service to 3301 Lawrence	Relocate by Xcel.
Xcel Energy	gas	4"	PED	37+75		Across 33rd St. on west side of Lawrence St.	Bottom of gas line at 5207.7. Top of storm box 5194.	Support in place as needed.
Xcel Energy	gas	4"	PED	37+75		On west side of Lawrence St. south of 33rd St.	Est. bottom of gas line at 5207.5. Top of 15" storm at 5204.5	Support in place as needed.
Xcel Energy	gas	1"/4"	MW	41+20		In Arapahoe St. across 33rd St.	4" steel and 2x1" steel control lines found in pothole. Bottom of gas line at 5209.6. Top of storm box at 5195.	Support in place by Xcel.
Xcel Energy	gas	1"/4"	MW	41+20		In Arapahoe St. south of 33rd St.	4" steel and 2x1" steel control lines found in pothole. Est. bottom of gas line at 5209.6. Top of 15" storm at 5207.5.	Support in place by Xcel.
Xcel Energy	gas	service		43+85		Across 33rd St. west of Curtis St.	Est. bottom of gas service 5210. Top of storm box 5196.	TBD
Xcel Energy	gas	4"	MW	44+70		West side of Curtis St. south of 33rd St.	Bottom of gas line at 5210.7. Top of 15" storm at 5209	Support in place by Xcel.
Xcel Energy	gas	4"	MW	44+70		On west side of Curtis St. across 33rd St.	Top of gas line at 5211.0. Top of storm box 5196.	Support in place by Xcel.
Xcel Energy	gas	2"	MW	44+80		South side of 33rd St. in Curtis	Est. bottom of gas at 5209.0. Top of 24" storm at 5205.	TBD
Xcel Energy	gas	2"	MW	45+25		On south side of 33rd St. east of Curtis St.	Est. bottom of gas line at 5209.0. Top of 15" storm at 5206.5.	TBD

Abbreviations

OHE - overhead electric OHE/OHF - overhead electric/fiber OHT - overhead telephone

OHTV - overhead cable TV UGE - buried electric UGFO - buried fiber

FB - fusion bond

IP - intermediate pressure

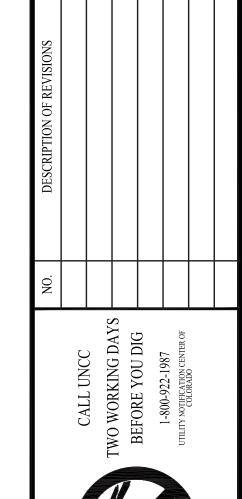
LP - low pressure

MW - mill wrapped

PED - plastic

UGT - buried telephone







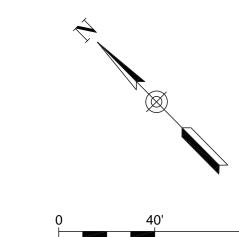
33RD STREET OUTFALL - BLAKE ST. TO ARAPAHOE ST.

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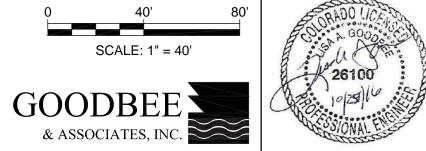
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SCALE: 1" = 40'



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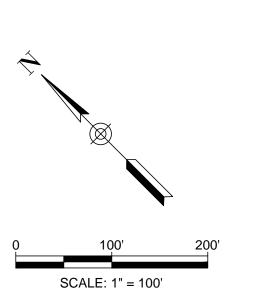
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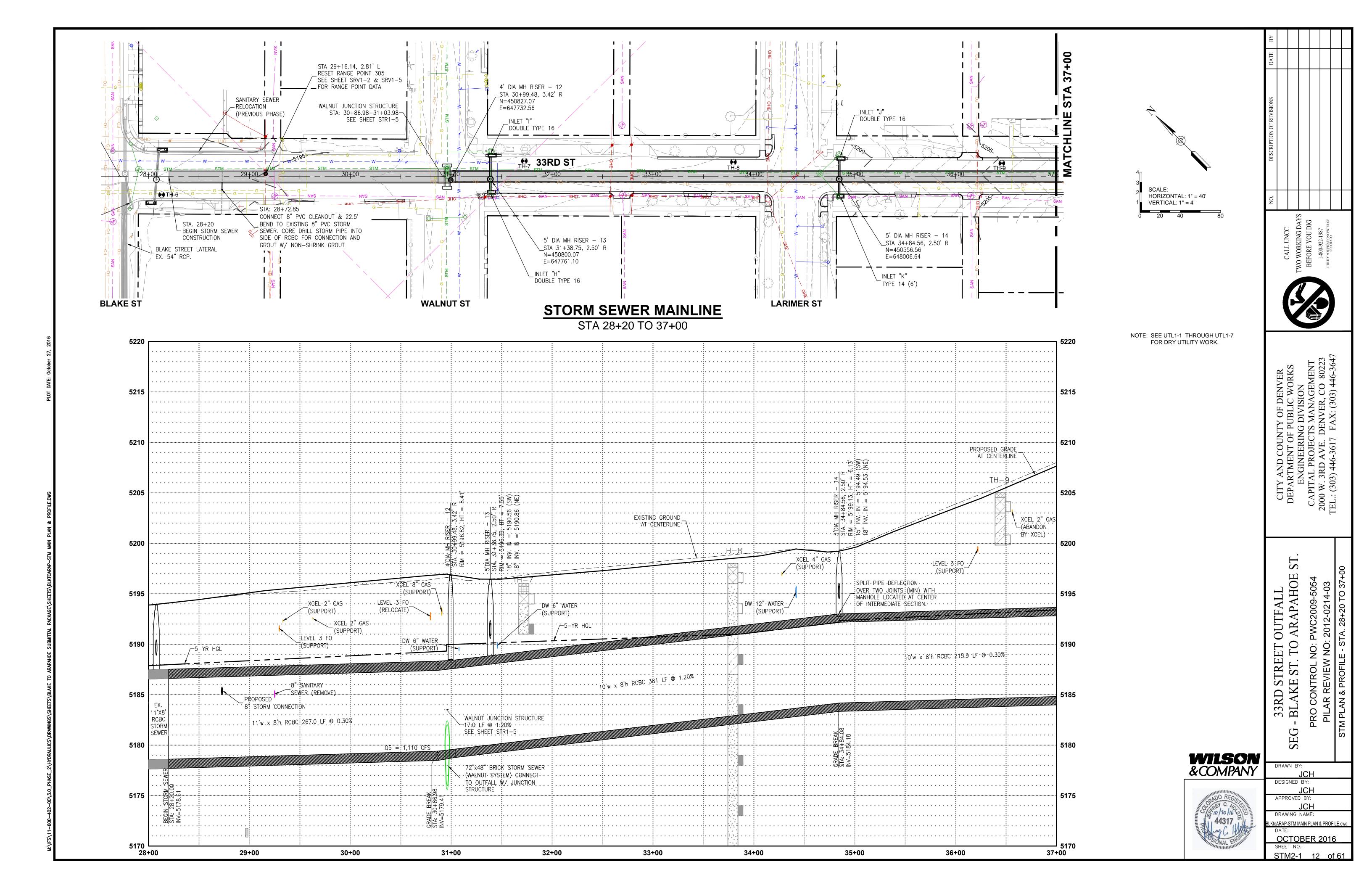
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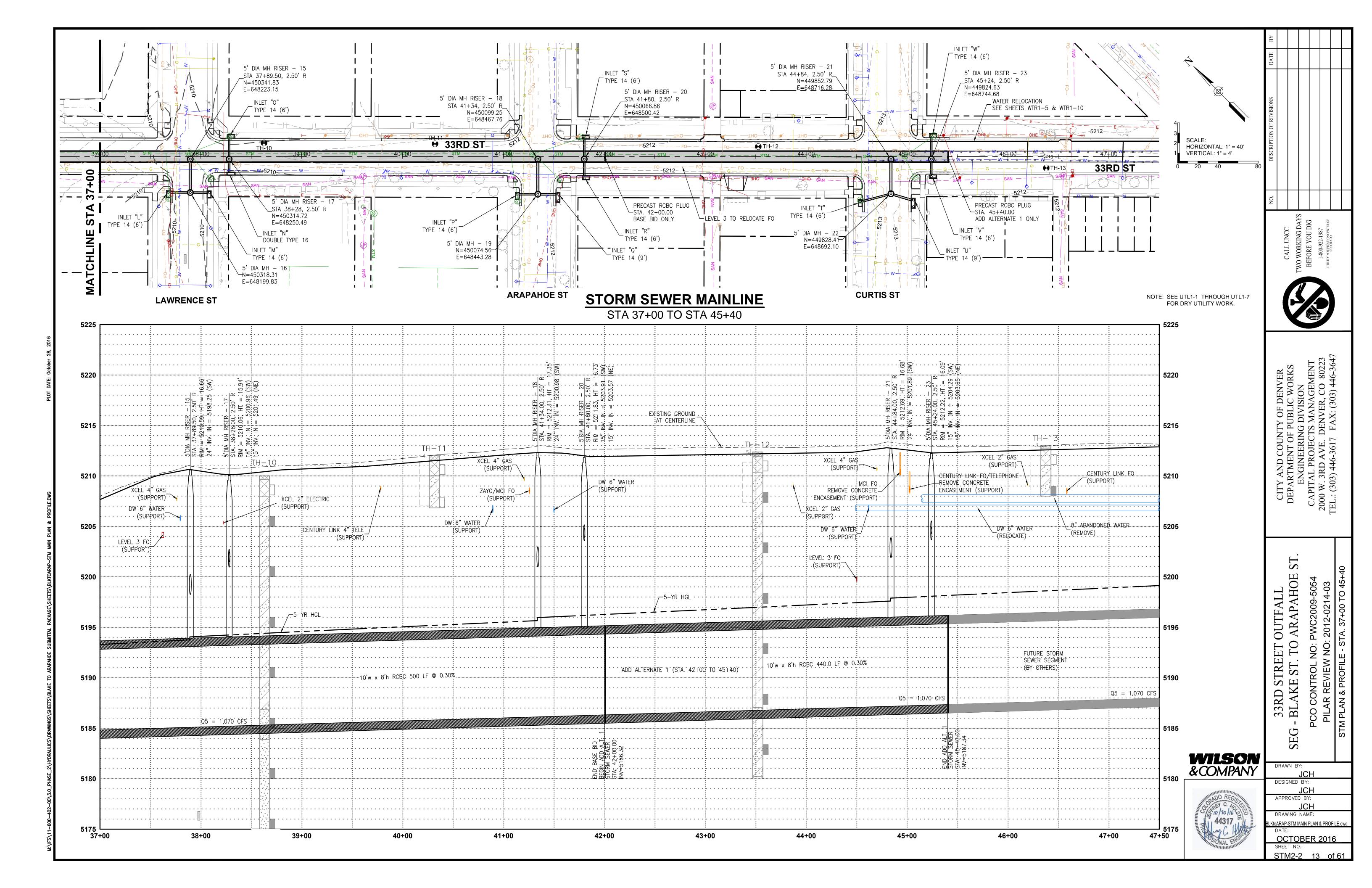
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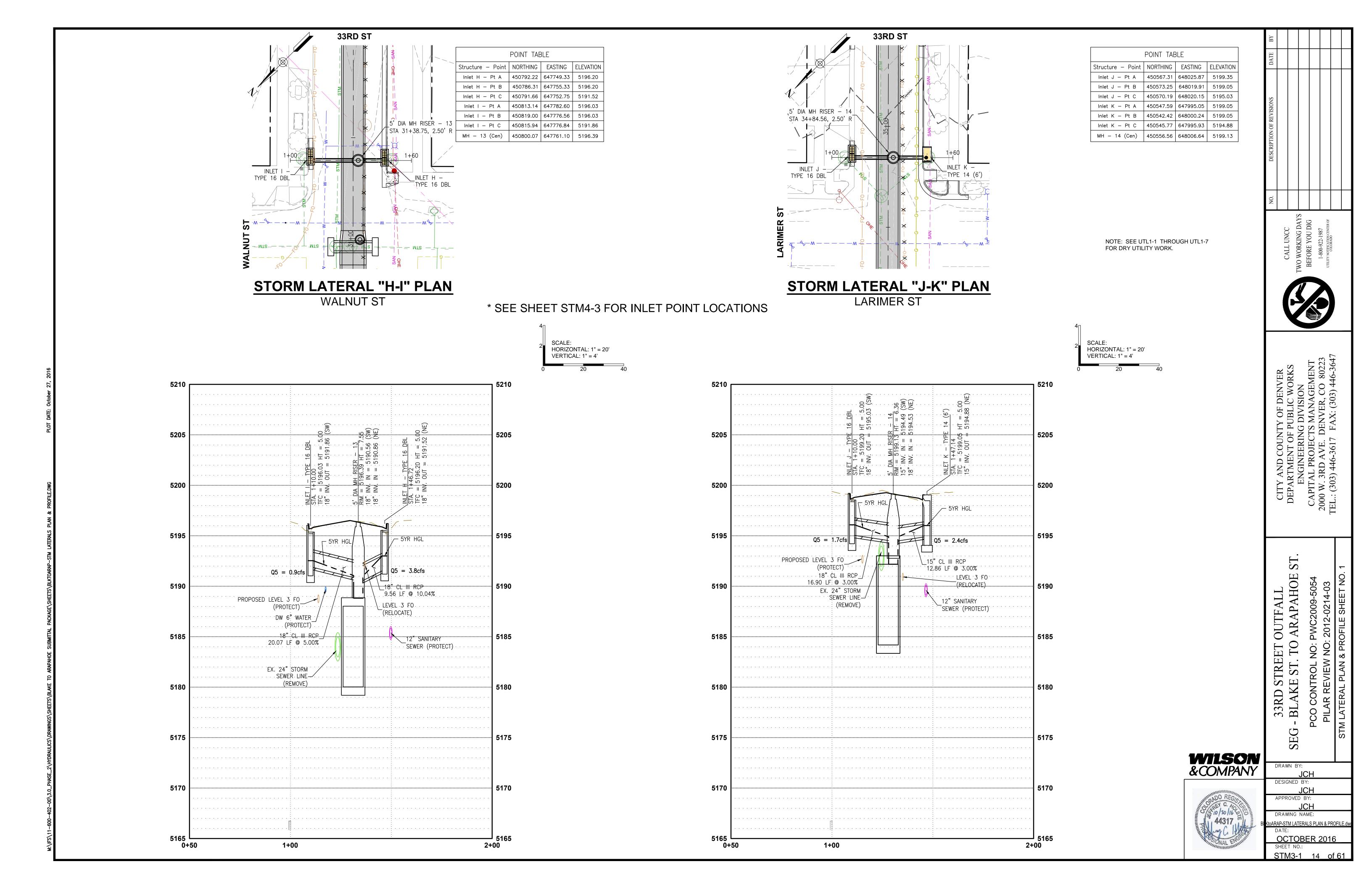


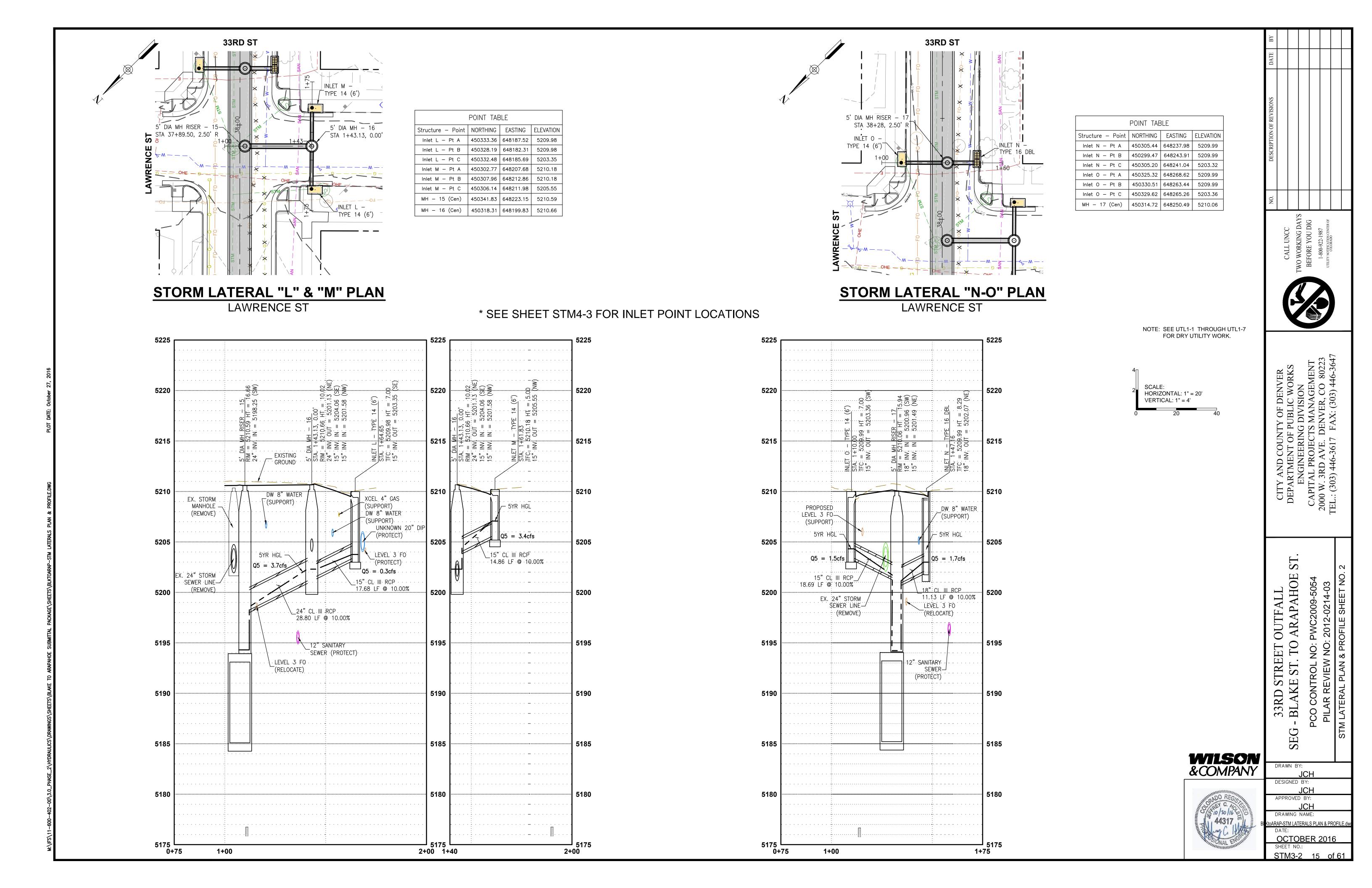
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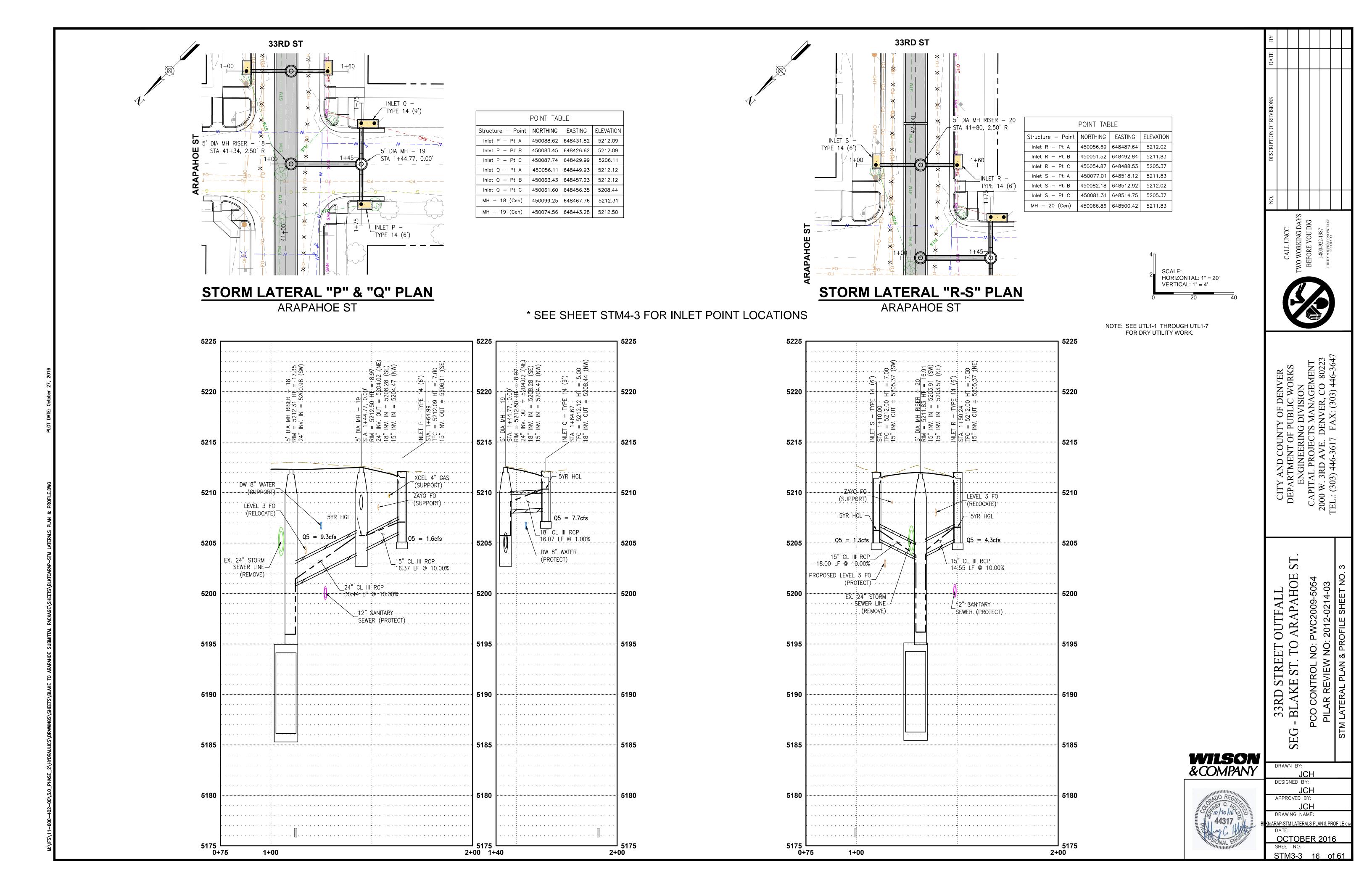
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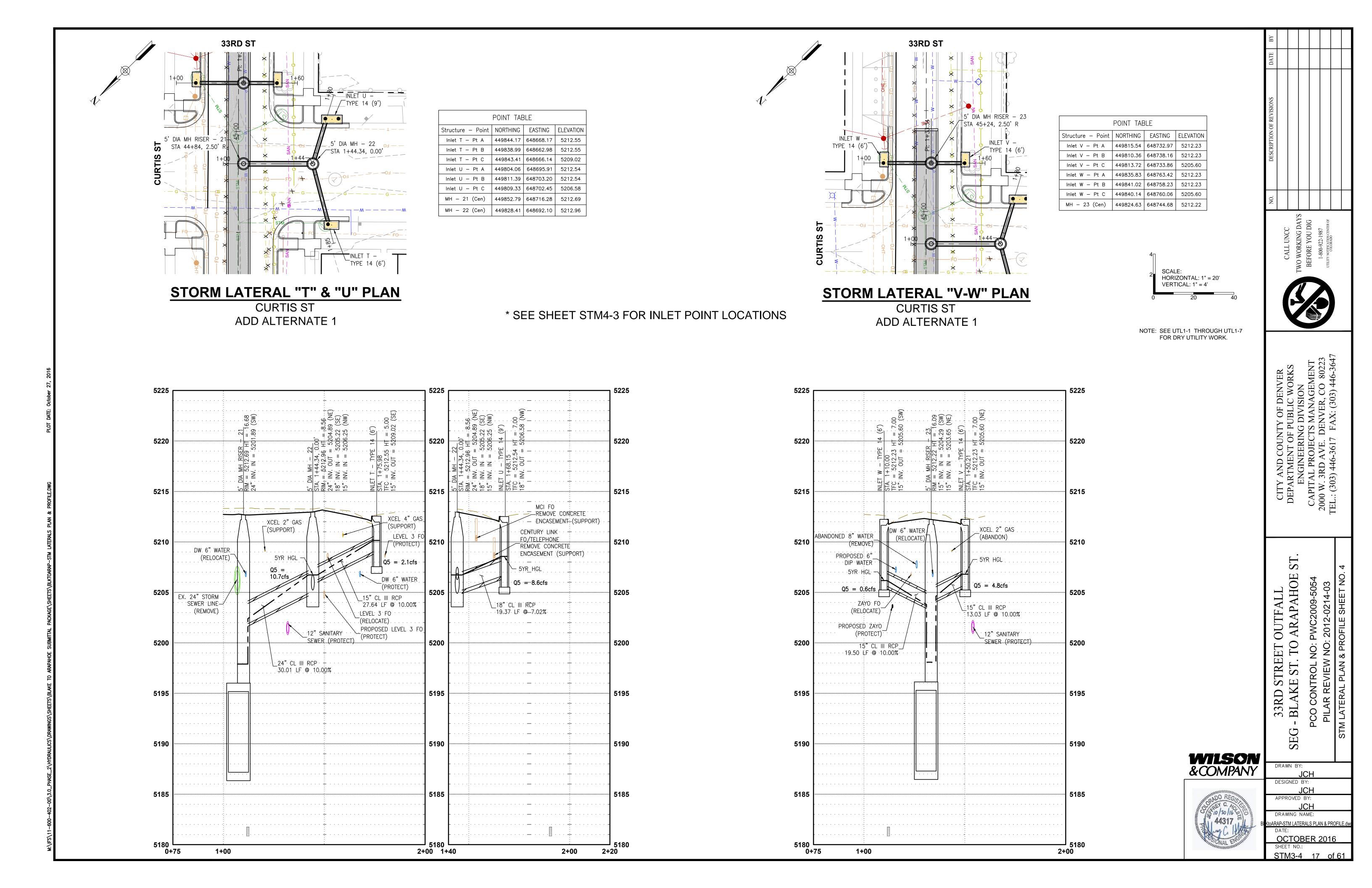


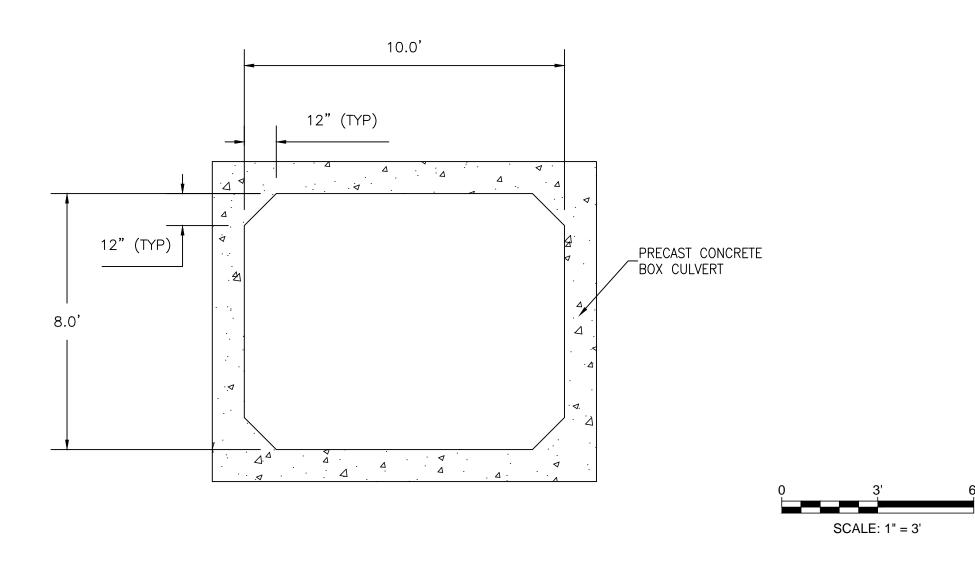












TYPICAL 11'w x 8'h PRECAST BOX CULVERT SECTION

STA 28+20 TO 30+86.98

TYPICAL 10'w x 8'h PRECAST BOX CULVERT SECTION

STA 31+03.98 TO 45+40.00

NOTES:

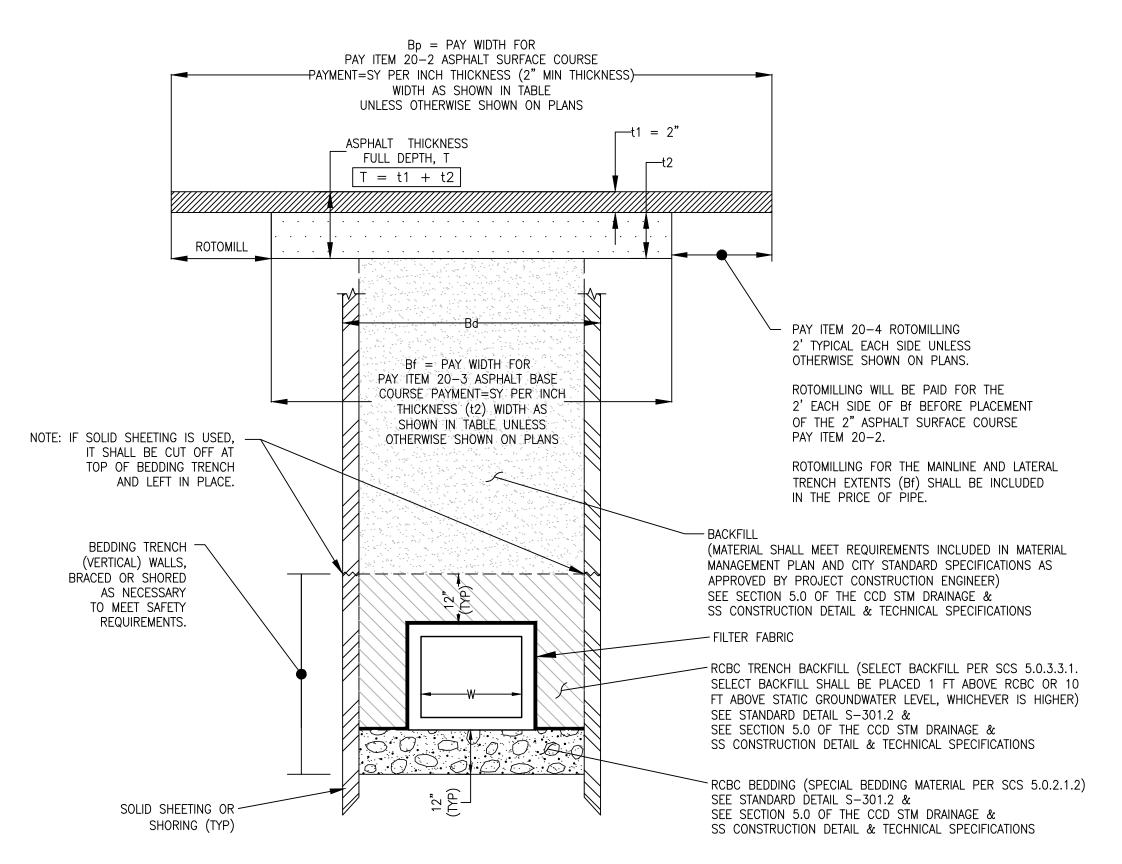
- RCBC SECTIONS SHOWN TO ILLUSTRATE ASSUMED CONVEYANCE AREA FOR DESIGN AND IS FOR INFORMATION ONLY; DESIGN OF ALL RCBC SECTIONS SHALL CONFORM TO ASTM C1433. PRECAST BOX CULVERT SECTIONS SHALL BE USED AT MANHOLE ACCESS LOCATIONS ALONG WITH PRECAST MANHOLE RISER SECTIONS UNLESS OTHERWISE SHOWN ON PLANS.
- CAST IN PLACE STRUCTURES ARE TO BE PROVIDED AT GAPS IN PRECAST STATIONING. SEE STRUCTURAL DESIGN SHEETS STR1-1 TO STR 1-7.
- REINFORCEMENT NOT SHOWN.
- RCBC PIPE JOINTS SHALL MEET CCD STANDARD SPECIFICATIONS FOR JOINT GAP AND DEFLECTION. THE CONTRACTOR SHALL INSTALL A CONCRETE COLLAR AT THE DIRECTION OF THE PROJECT CONSTRUCTION ENGINEER FOR ALL JOINTS THAT DO NOT MEET CCD STANDARD SPECIFICATIONS. SEE STR1-4 FOR COLLAR DETAIL.

WILSON &COMPANY

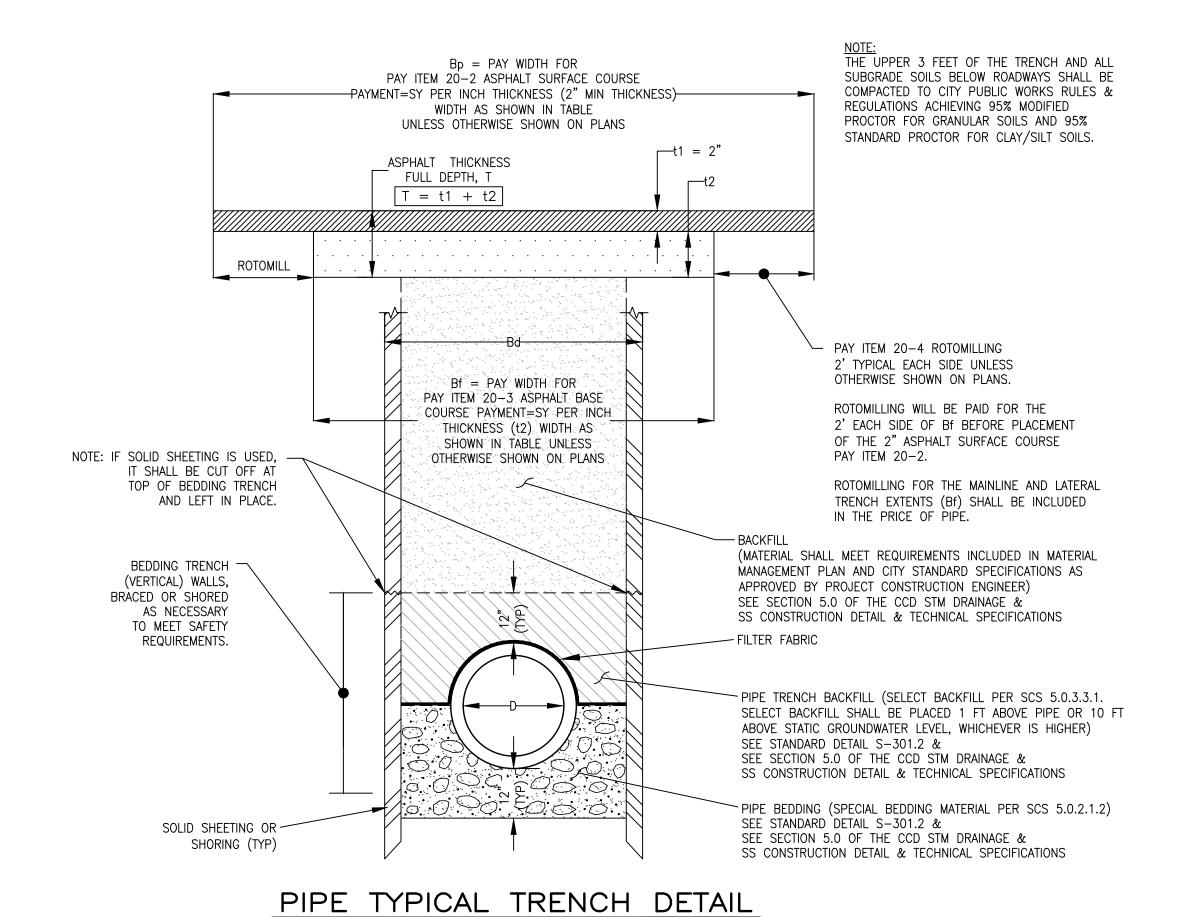


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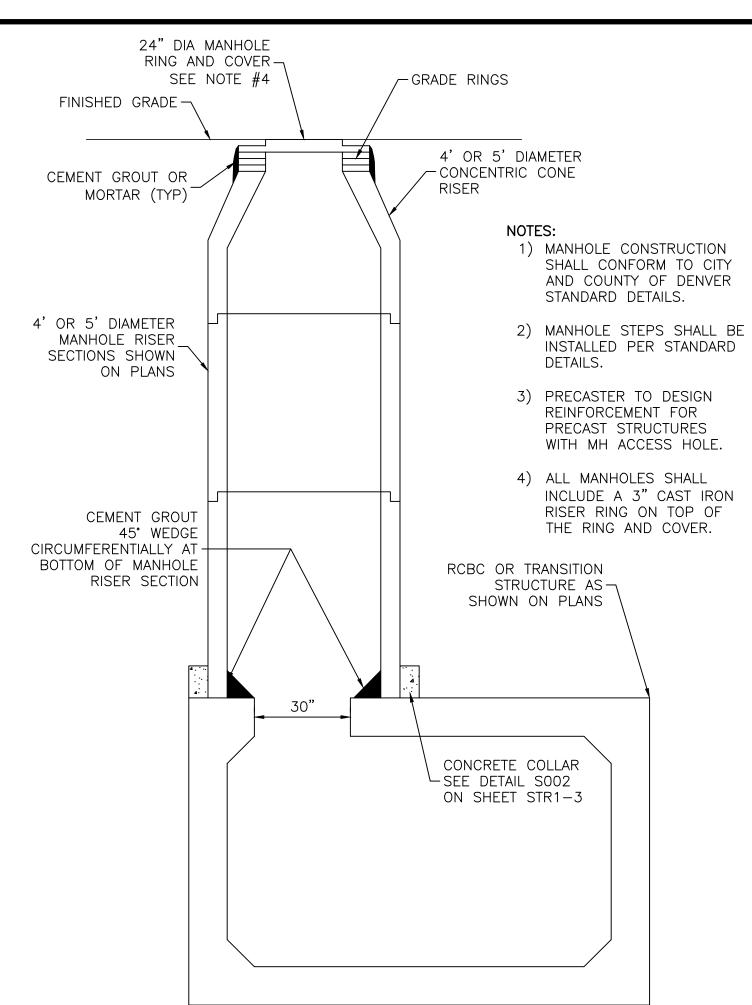
33RD STREET OUTFALL - BLAKE ST. TO ARAPAHOE



BOX CULVERT TYPICAL TRENCH DETAIL N.T.S.



N.T.S.



MANHOLE RISER DETAIL

	Bd, Bf, E	3p Values	
W D	Bd	Bf	Вр
W or D	(ft)	(ft)	(ft)
4"-6"	3.5	8.0	12.0
8"-10"	4.0	8.0	12.0
12"-15"	4.5	8.0	12.0
18"-21"	5.0	8.0	12.0
24"	5.5	8.0	12.0
27"-30"	6.0	8.0	12.0
33"	6.5	8.0	12.0
36"-42"	9.0	11.0	15.0
48"	10.0	12.0	16.0
54"	10.5	12.5	16.5
60"	11.0	13.0	17.0
66"	11.5	13.5	17.5
72"-78"	12.5	14.5	18.5
84"	13.5	15.5	19.5
90"	14.0	16.0	20.0
96"	14.5	16.5	20.5
102"	15.0	17.0	21.0
108"	16.0	18.0	22.0
120"	18.0	20.0	24.0
132"	19.0	21.0	25.0
144"	20.0	22.0	26.0
14'	23.0	25.0	29.0

Bd= SPECIFIED TRENCH WIDTH AS SHOWN IN TABLE ABOVE t1= DEPTH OF ASPHALT SURFACE COURSE

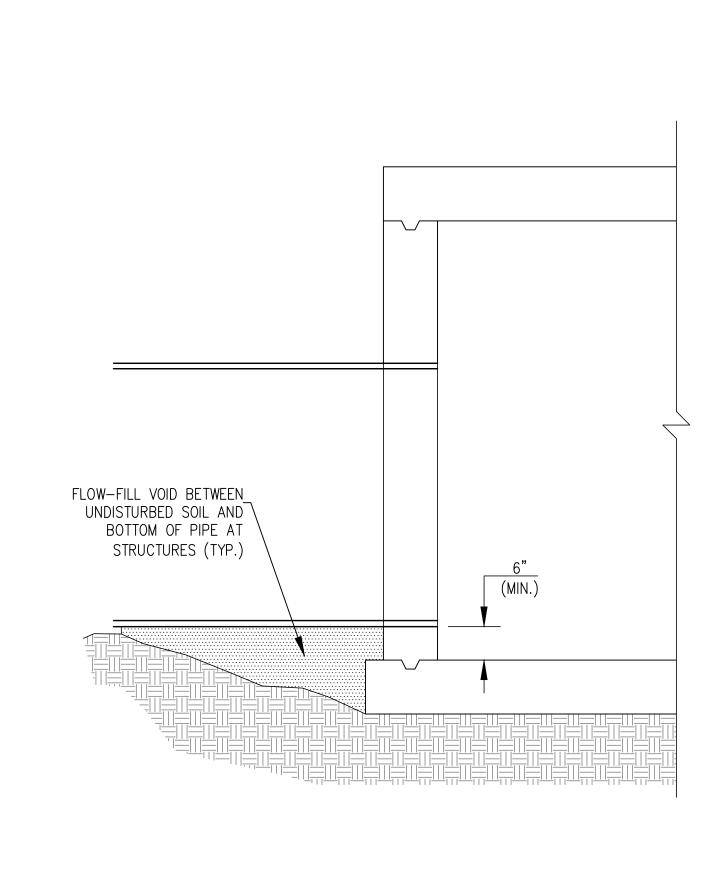
t2= DEPTH FOR ASPHALT BASE COURSE W= INSIDE WIDTH OF THE SPECIFIED RCBC

D= INSIDE DIAMETER OF THE SPECIFIED PIPE

NOTE:

1. RCBC AND PIPE TRENCHING, SHORING AND SOLID SHEETING TO BE IN ACCORDANCE WITH O.S.H.A. REGULATIONS.

NOTE: WHEREVER CLAYSTONE BEDROCK IS ENCOUNTERED, BEDROCK MUST BE OVER **EXCAVATED TO 3 FT BELOW THE BOTTOM OF THE RCBC OR PIPE AND REPLACED** WITH SPECIAL BEDDING MATERIAL.



FLOW-FILL (CLSM) DETAIL

(FOR PIPE SUPPORT AT ALL STRUCTURES, TYP.) NTS

> STREET 33RD SE

44317

DRAWN BY: DESIGNED BY: APPROVED BY: DRAWING NAME: KtoARAP-STORM SEWER DETAILS 3.dw

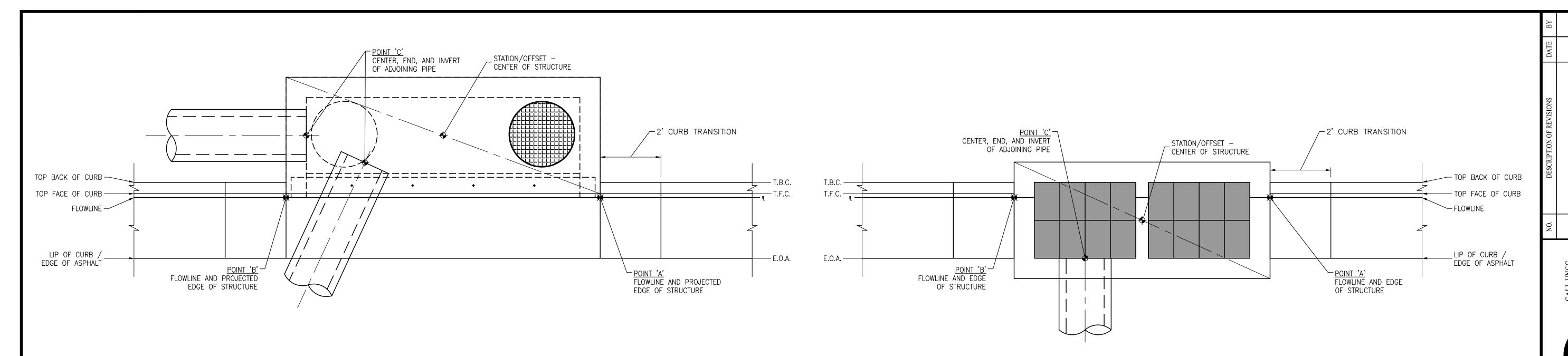
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OUTFALL O ARAPAHOE

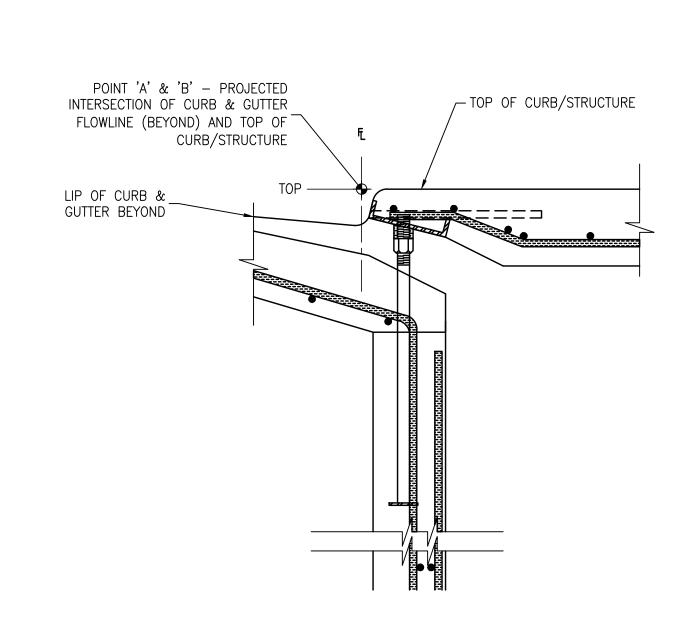
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OCTOBER 2016 SHEET NO.: STM4-2 19 of 61

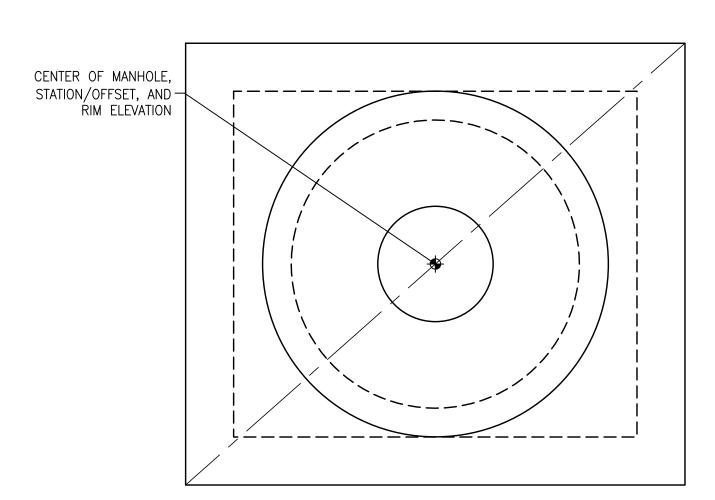


TYPE 14 INLET POINT LOCATION

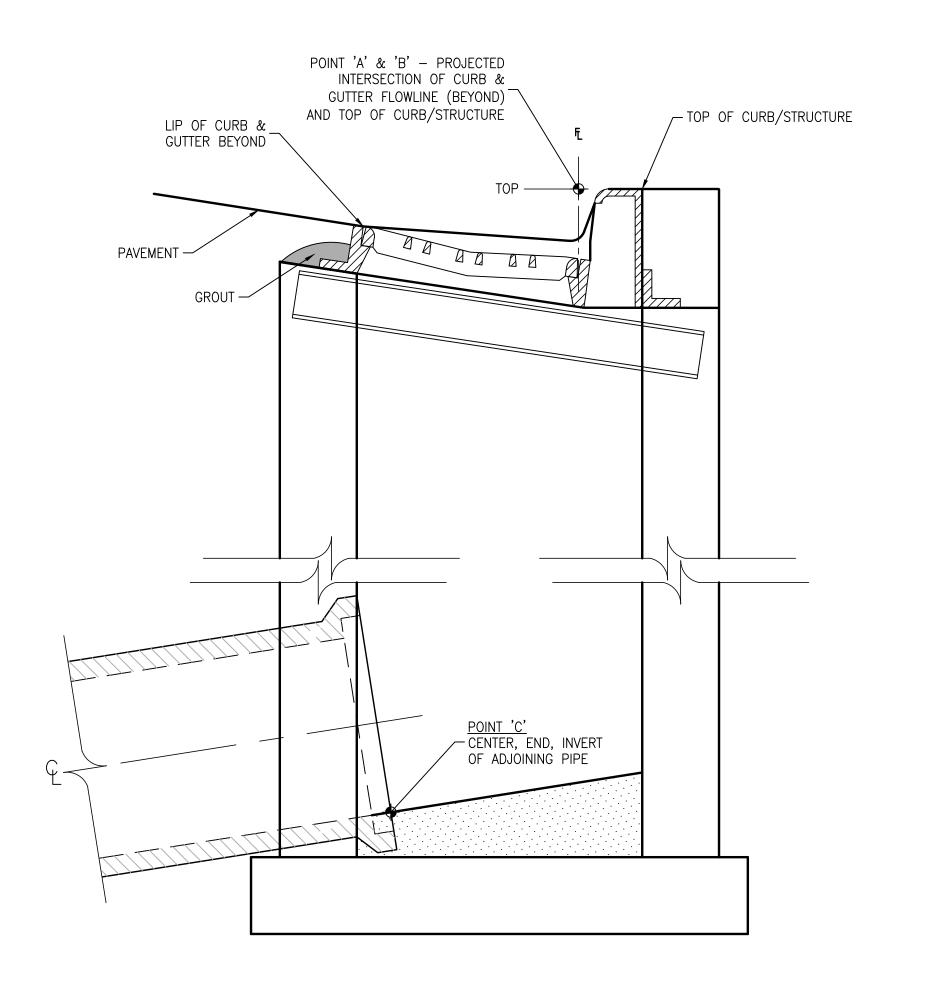
TYPE 16 COMBINATION INLET POINT LOCATION



TYPE 14 INLET POINT LOCATION N.T.S.



TYPE 'B' MANHOLE POINT LOCATION N.T.S.

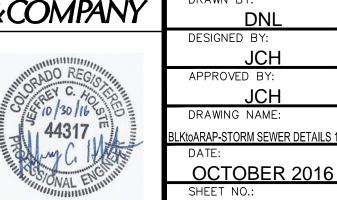


NOTES:

- CONTRACTOR TO MITER PIPE ENDS TO MATCH FLUSH TO THE INSIDE WALL OF INLETS AND MANHOLES.
- INLET DETAILS ARE FOR REPRESENTATION OF KEY POINTS NEEDED FOR INLET LAYOUT. CCD STANDARDS TO BE USED FOR INLET CONSTRUCTION.

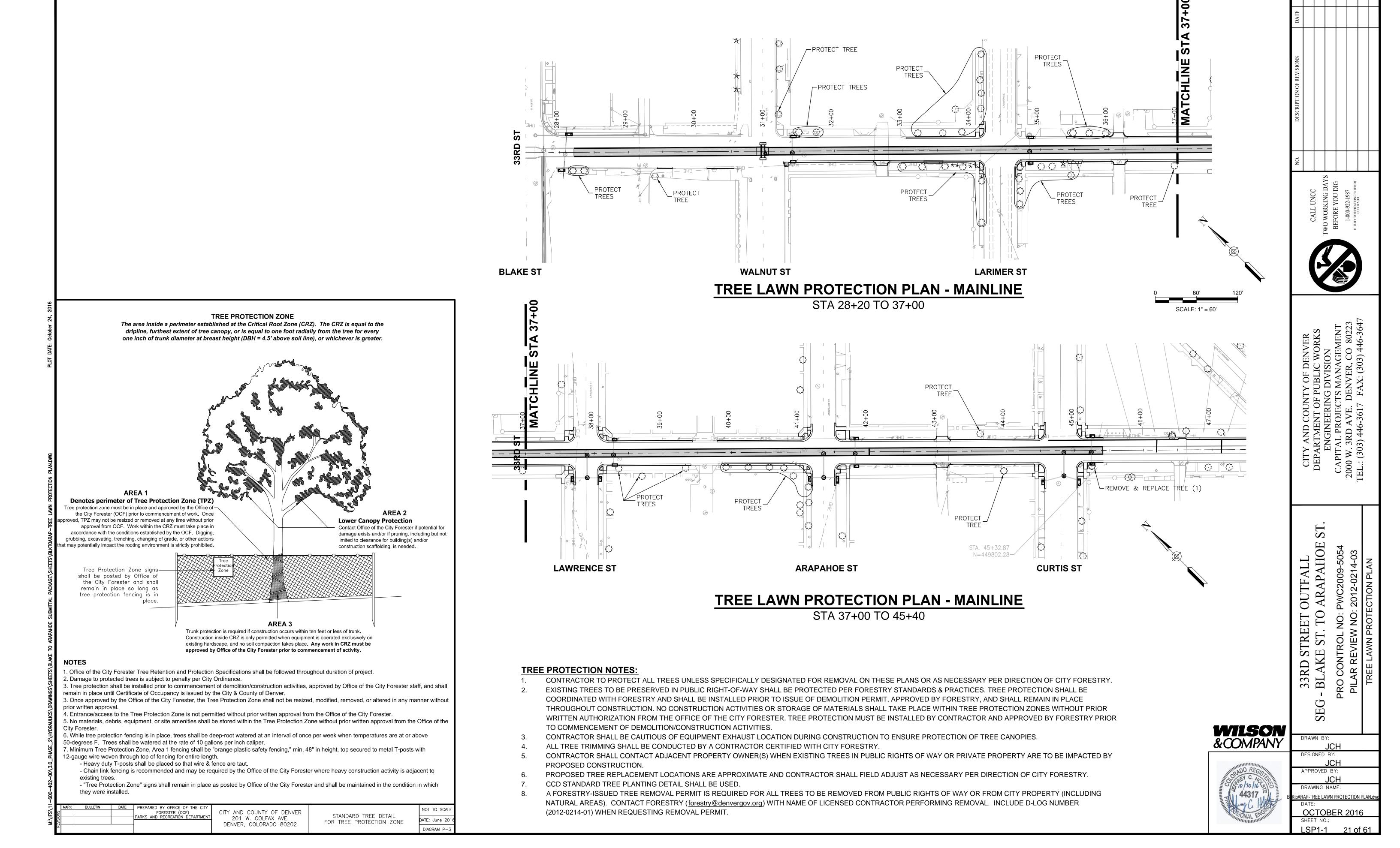
TYPE 16 COMBINATION INLET POINT LOCATION N.T.S.

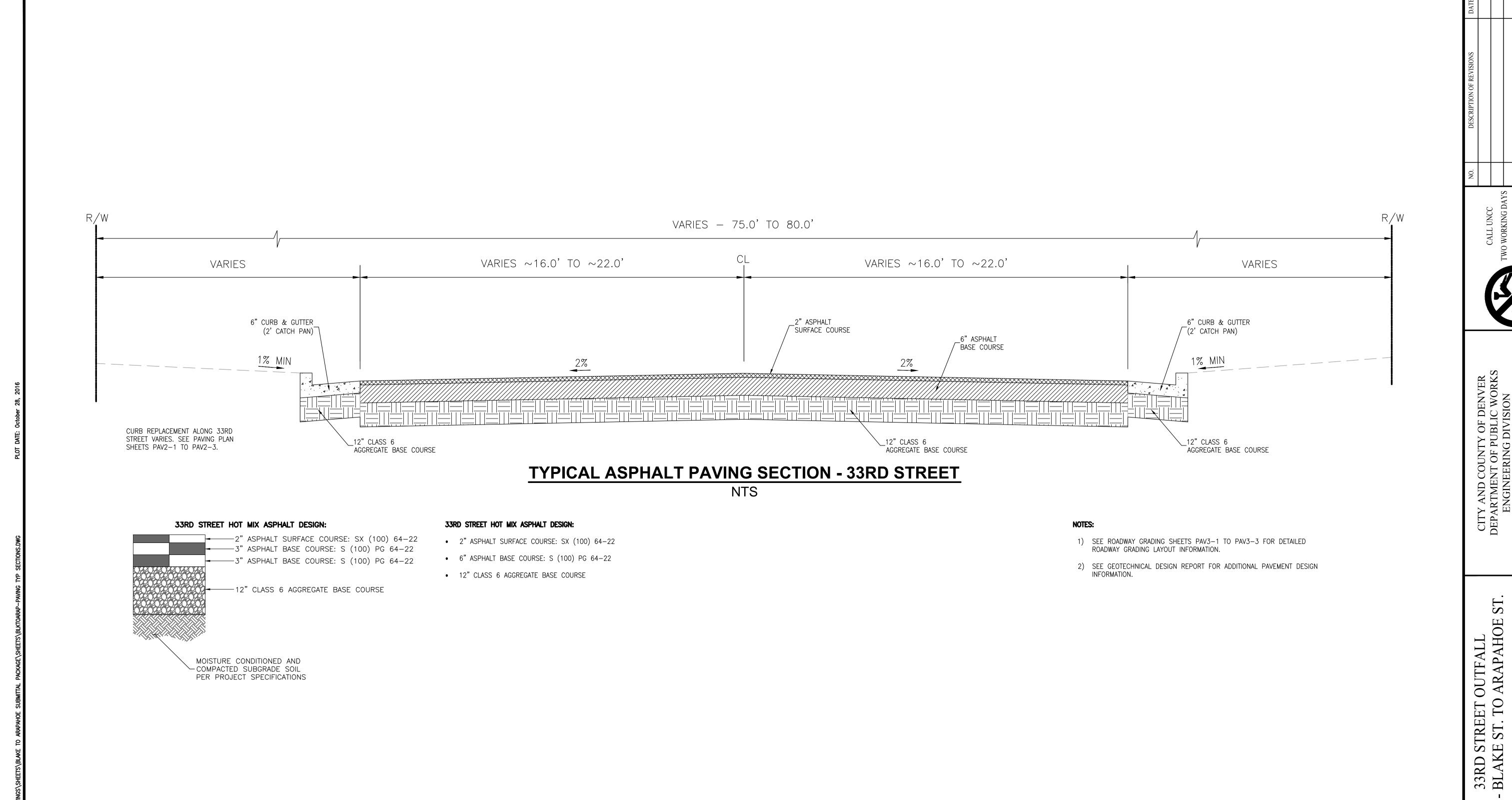
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33RD STREET OUTFALL BLAKE ST. TO ARAPAHOE





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JCH

DESIGNED BY:

JCH

APPROVED BY:

JCH

DRAWING NAME:

BLKtoARAP-PAVING TYP SECTIONS.dwg

DATE:

OCTOBER 2016

SHEET NO.:

PAV1-1 22 of 61

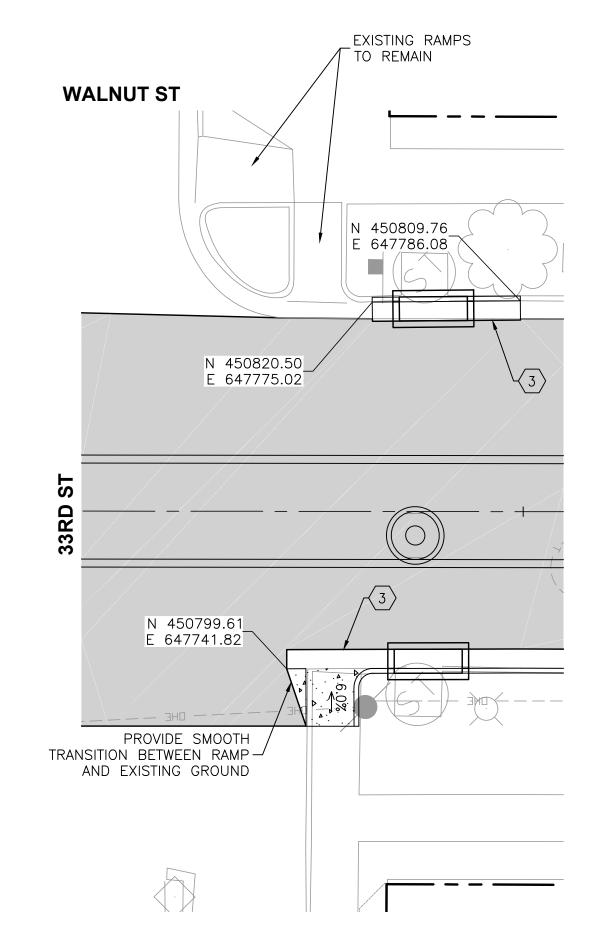
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M-\IFS\11-600-402-00\3 0 PHASF 2\HYDRAIIIICS\DRAWINGS\SHFFTS\F

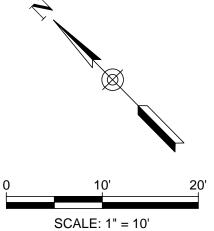
LIMITS OF HMA

SCALE: 1" = 40'

STA 28+20 TO 32+50



INTERSECTION DETAIL



33RD ST & WALNUT ST

GENERAL NOTES

1. ALL UTILITY SURFACE FEATURES, INCLUDING BUT NO LIMITED TO, VALVES, METERS, AND MANHOLES, SHALL BE PROTECTED DURING CONSTRUCTION AND ADJUSTED TO FINAL

2. CURB RETURN ALIGNMENTS ARE LOCATED ALONG FLOWLINE AND ARE STATIONED IN A CLOCK-WISE MANNER.

3. ALL CURB RAMPS ARE TYPE 1 PER STD DWG 7.1 UNLESS INDICATED OTHERWISE ON INTERSECTION DETAILS.

4. ALL RAMP TO FACE OF CURB RADII ARE 2' UNLESS INDICATED OTHERWISE IN THE PLAN VIEW.

5. ALL PROPOSED SIDEWALKS AND RAMPS ARE 5' WIDE UNLESS INDICATED OTHERWISE IN THE INTERSECTION DETAILS. MATCH EXISTING GRADE AT EDGE OF PROPOSED RAMP/SIDEWALK. LANDING, RAMP & SIDEWALK CROSS SLOPE SHALL NOT EXCEED 2%.

(FL) UNLESS NOTED OTHERWISE.

7. SEE ROADWAY GRADING PLANS FOR DETAILED ROADWAY DESIGN INFORMATION.

8. TRUNCATED DOMES SHALL BE CONSTRUCTED WITH ALL CURB RAMPS. SEE STD DWG 7.0B.

6. ALL N & E, AND RADII CALLOUTS REFERENCE FLOWLINE

9. RAMP LANDING AREAS SHALL NOT EXCEED 2% IN ANY DIRECTION. RAMP CROSS-SLOPE SHALL NOT EXCEED 2%. RAMP LONGITUDINAL SLOPE SHALL NOT EXCEED 8.3%. SEE STD DWG 7.0A & 7.0B. RAMP SLOPES SHOWN ON THIS SHEET ARE BASED ON FIELD SURVEY & MAY BE ADJUSTED WITH APPROVAL FROM PROJECT MANAGER.

KEYED NOTES

- 1 PROTECT EXISTING CURB & GUTTER. PROPOSED ASPHALT TO MATCH EXISTING LIP OF CURB.
- 2 ROTOMILL 2" EXISTING ASPHALT IN ROADWAY AND EXTEND NEW ASPHALT SURFACE COURSE 2' MINIMUM BEYOND HMA. HMA QUANTITIES SHOWN ON THIS SHEET DO NOT INCLUDE ROTOMILL AREAS.
- (3) INSTALL 6" CURB & GUTTER-2' CATCH PAN. CURB & GUTTER LINEAL FOOTAGE: 1) LENGTH OF RETURN ALIGNMENT; 2) LENGTH PROVIDED WITH KEYED NOTE
- $\langle 4 \rangle$ INSTALL 8" DRIVEWAY OR ALLEY CONC PAVING.
- $\langle 5 \rangle$ INSTALL ALLEY CUT PER STD DWG 10.1.
- 6 INSTALL ALLEY CUT PER STD DWG 10.2A.
- $\binom{7}{7}$ INSTALL ALLEY CUT PER STD DWG 10.2B.



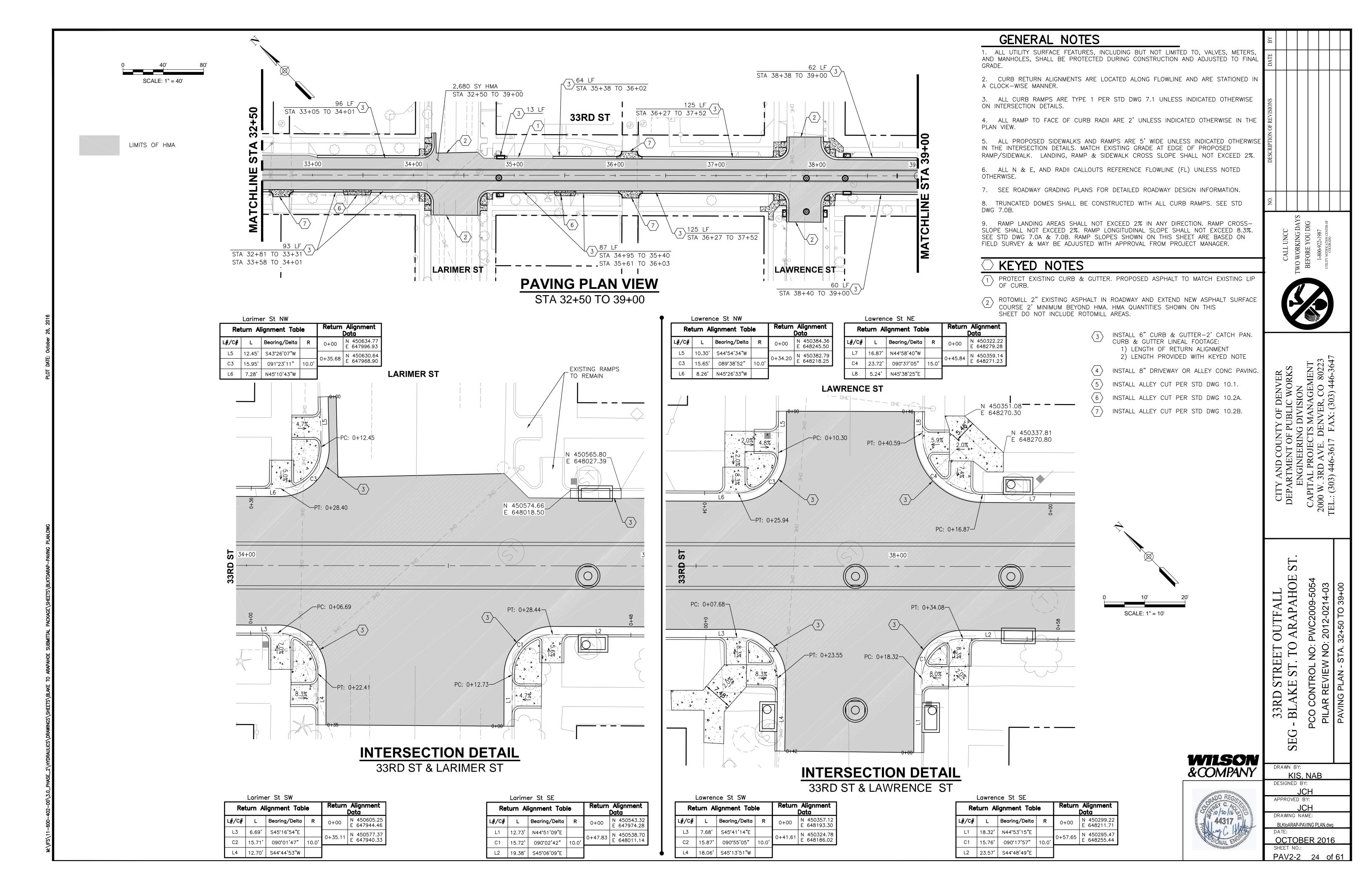
33RD STREET OUTFALL BLAKE ST. TO ARAPAHOE

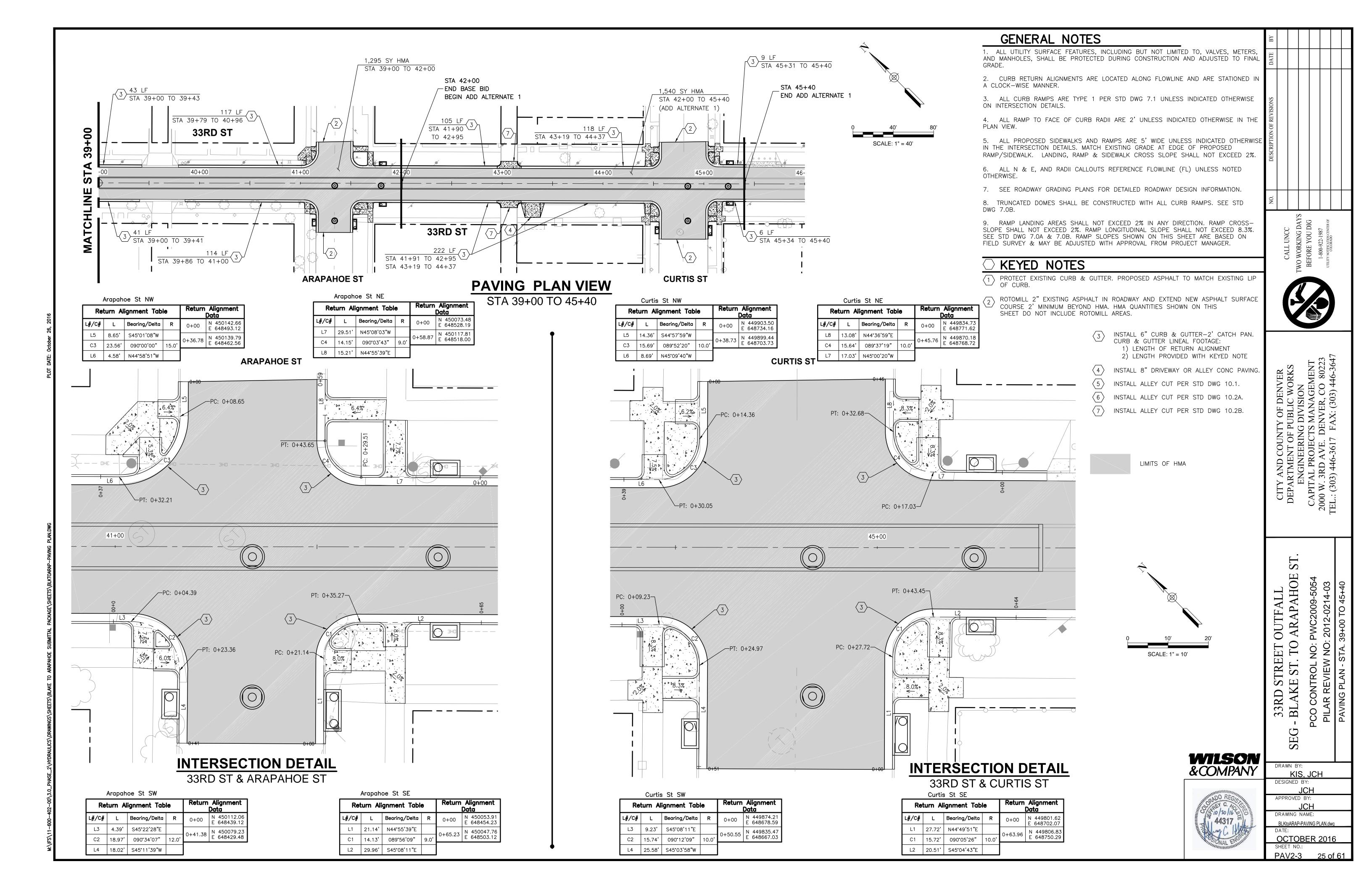
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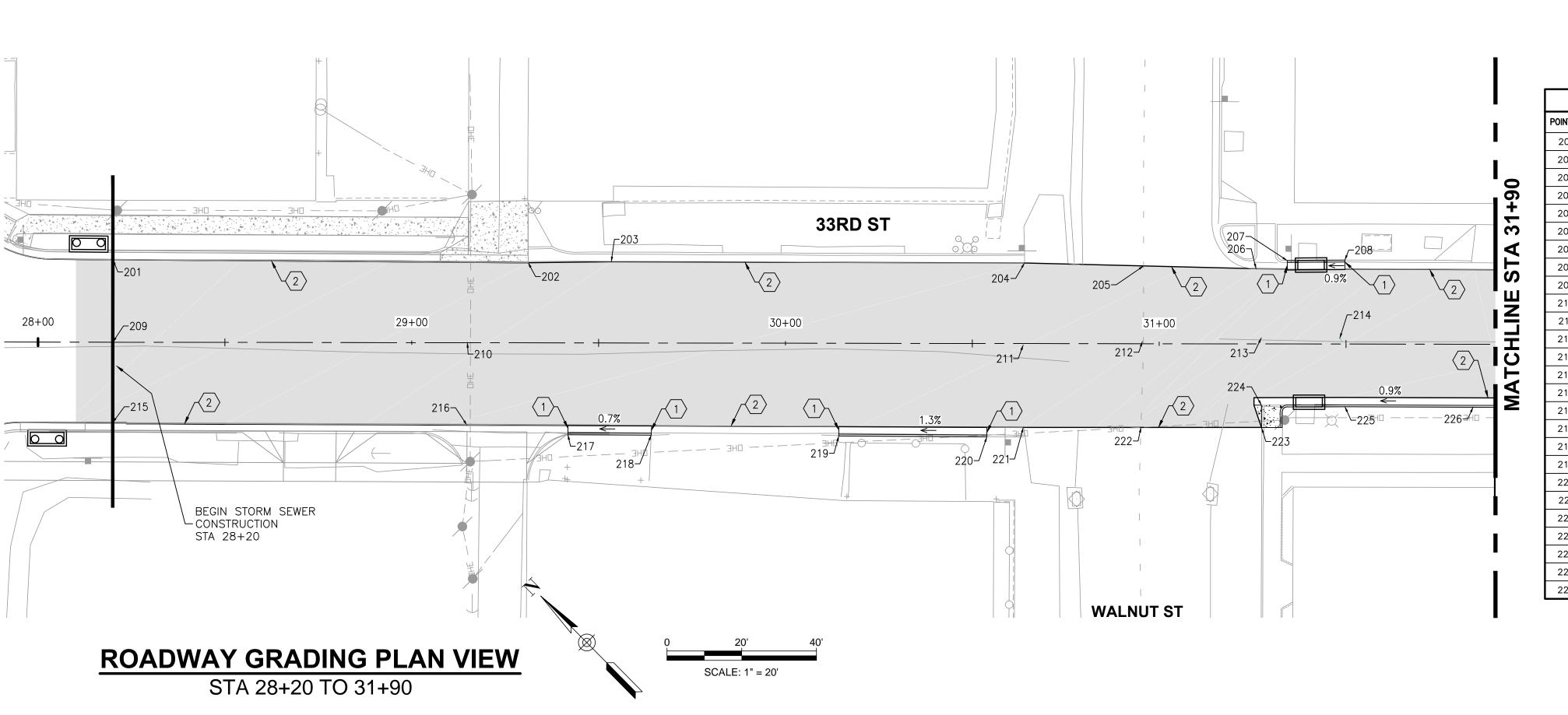
KIS, NAB DESIGNED BY:

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OCTOBER 2016
SHEET NO.: PAV2-1 23 of 61







	POINT TABLE										
POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION							
201	451041.9829	647552.0893	5193.76	EOA							
202	450963.2700	647630.5341	5194.88	EOA							
203	450947.8302	647646.5520	5194.95	EOA							
204	450869.8500	647724.9300	5196.18	EOA							
205	450846.8811	647747.0286	5196.52	EOA							
206	450825.1920	647767.8960	5195.94	EOA							
207	450820.8606	647775.3655	5196.18	TBC							
208	450810.1168	647786.4266	5196.16	TBC							
209	451026.2956	647536.5318	5194.09	CROWN							
210	450959.5002	647603.9193	5195.30	CROWN							
211	450854.4743	647709.1998	5196.70	CROWN							
212	450832.7150	647732.5769	5196.96	CROWN							
213	450811.0313	647755.8728	5196.52	CROWN							
214	450796.2144	647770.7632	5196.50	CROWN							
215	451011.0082	647521.3710	5193.55	EOA							
216	450943.8727	647588.3239	5194.76	EOA							
217	450923.0508	647605.7122	5195.40	TBC							
218	450907.2967	647621.4889	5195.56	TBC							
219	450871.8613	647657.0082	5196.00	TBC							
220	450843.8200	647685.0155	5196.52	TBC							
221	450838.7720	647693.7480	5196.23	EOA							
222	450816.6117	647716.1291	5196.59	EOA							
223	450793.9424	647739.0242	5196.11	EOA							
224	450798.2045	647743.2473	5195.85	FL							
225	450782.1748	647758.8198	5196.24	TBC							
226	450758.0020	647783.1058	5196.54	TBC							

LIMITS OF HMA

GENERAL NOTES

2. SEE PAV2-1 - PAV2-3 (PAVING PLAN SHEETS) FOR ADDITIONAL INFORMATION RELATED TO ROADWAY LAYOUT.

KEYED NOTES

- MATCH EXISTING LIP OF CURB, FLOWLINE & TOP BACK OF CURB ELEVATIONS. TRANSITION THE TOP BACK OF CURB LINEARLY BETWEEN EXISTING CURB HEIGHT TO TYPICAL 6 INCH CURB HEIGHT WITHIN A 2 FT SPAN.
- EDGE OF PROPOSED PAVING. MATCH EXISTING PAVEMENT OR EXISTING LIP OF CURB ELEVATION.

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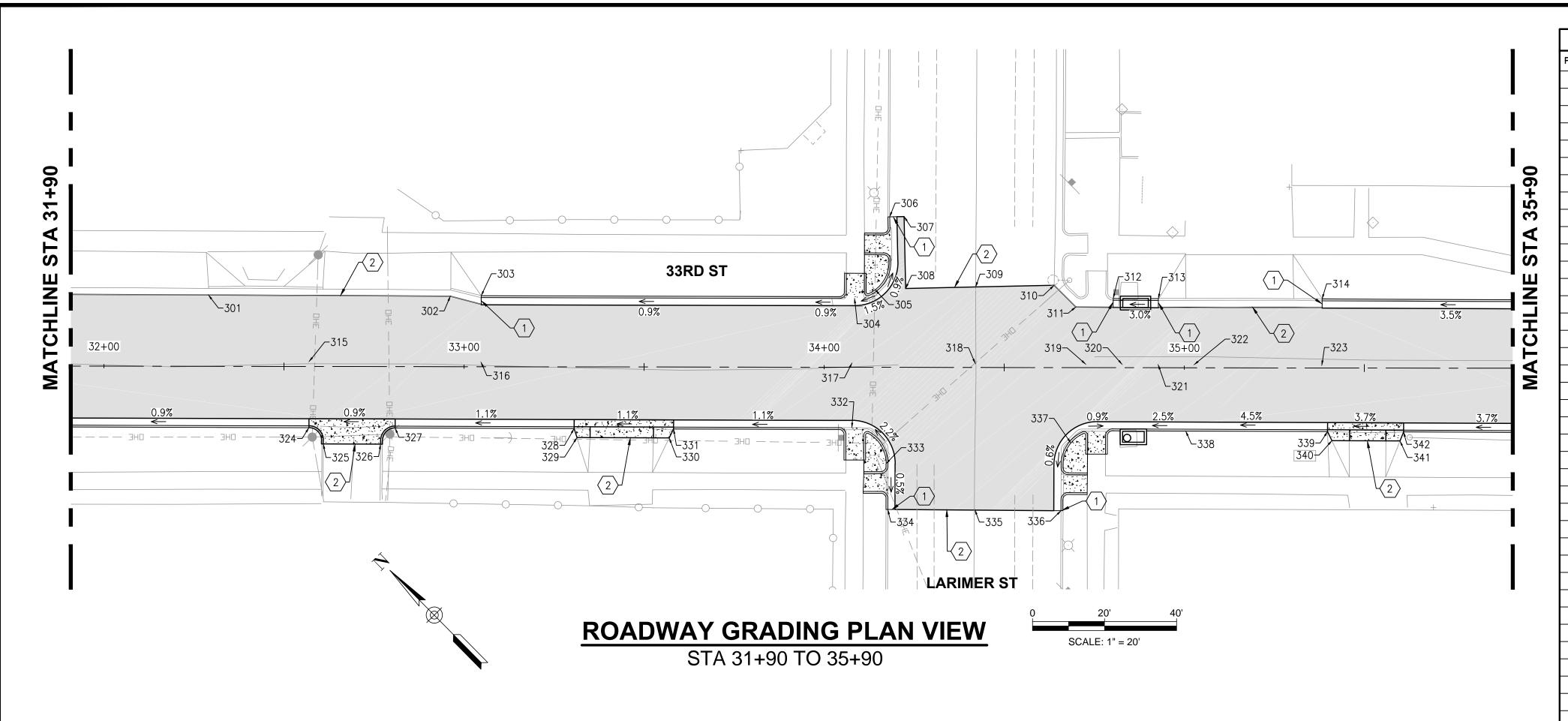


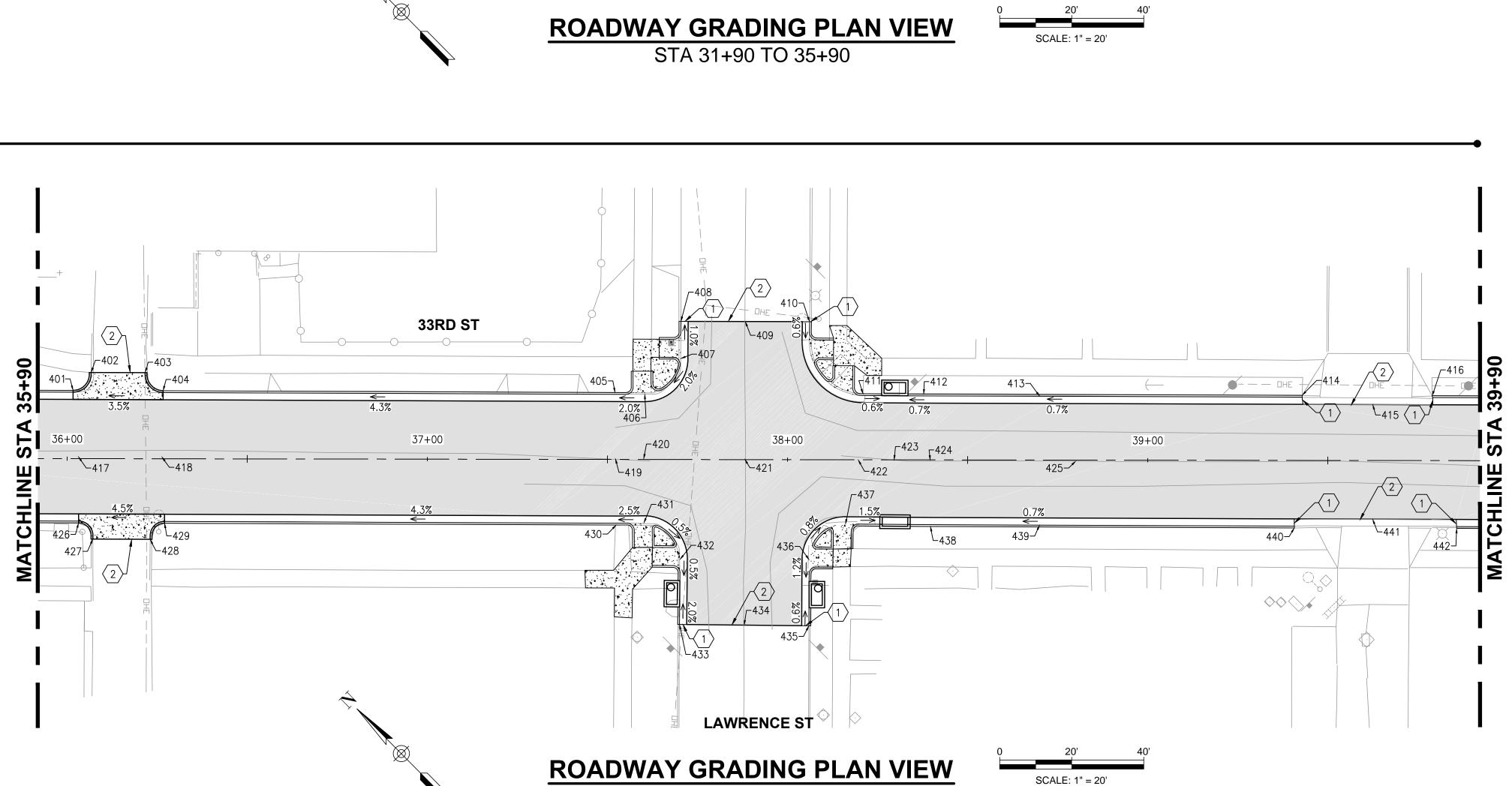
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SHEET NO.:

PAV3-1 26 of 61

ST.

33RD STREET OUTFALL - BLAKE ST. TO ARAPAHOE





STA 35+90 TO 39+90

POINT TABLE Point # | Northing | 301 | 450752.3586 | 647840.8966 | 5196.64 | 302 | 450704.8900 | 647888.4200 | 5197.38 303 | 450698.9449 | 647894.5972 | 5197.89 | 305 | 450623.1885 | 647973.5499 | 5198.90 | 306 | 450634.7658 | 647990.6528 | 5198.20 307 | 450632.0157 | 647993.5574 | 5198.52 | 308 | 450617.5112 | 647979.8244 | 5198.90 | 309 | 450604.1436 | 647993.9411 | 5199.41 | EOA 310 | 450589.1640 | 648009.7660 | 5198.88 | EOA 311 | 450580.6320 | 648009.8360 | 5198.76 312 | 450575.0172 | 648018.8479 | 5199.07 313 | 450566.1552 | 648027.7429 | 5199.43 314 | 450534.1141 | 648059.9890 | 5201.31 | TBC 315 | 450719.5709 | 647847.7866 | 5197.40 | 316 | 450685.9053 | 647881.6190 | 5197.88 | 317 | 450613.2634 | 647954.6703 | 5198.80 | 318 | 450589.0591 | 647978.9132 | 5199.45 | CROWN 319 | 450567.4028 | 648000.6041 | 5199.16 | CROWN 321 | 450553.2005 | 648014.8290 | 5199.45 | 322 | 450546.1352 | 648021.9057 | 5199.70 | 323 | 450521.0818 | 648046.9988 | 5201.16 | 324 | 450706.5347 | 647834.8142 | 5197.17 | 325 | 450700.5235 | 647834.4747 | 5196.88 | 326 | 450689.2799 | 647845.7709 | 5197.23 | EOD 327 | 450689.6475 | 647851.7805 | 5197.38 | 328 | 450654.5798 | 647887.0125 | 5197.94 | 329 | 450652.2388 | 647885.8206 | 5198.12 330 | 450634.1705 | 647903.9735 | 5198.39 | 331 | 450635.0993 | 647906.5843 | 5198.25 | 332 | 450600.5428 | 647942.0359 | 5198.29 | 333 | 450586.7494 | 647941.7469 | 5199.13 | 334 | 450577.3744 | 647933.1581 | 5198.57 | EOA 335 | 450560.3250 | 647950.3006 | 5199.49 | 336 | 450543.3188 | 647967.1257 | 5198.58 | 337 | 450554.7457 | 647982.2865 | 5199.20 | 338 | 450534.6823 | 648007.2940 | 5199.31 339 | 450506.8850 | 648035.1808 | 5201.09 | 340 | 450504.2571 | 648034.2759 | 5201.13 341 | 450490.8985 | 648047.6776 | 5201.91 342 | 450491.9773 | 648050.1365 | 5201.85 |

LIMITS OF HMA

GENERAL NOTES

SEE STM3-1 - STM3-4 (STORM LATERAL PLAN & PROFILE SHEETS) FOR INLET ELEVATIONS.

2. SEE PAV2-1 - PAV2-3 (PAVING PLAN SHEETS) FOR ADDITIONAL INFORMATION RELATED TO ROADWAY LAYOUT.

KEYED NOTES

- MATCH EXISTING LIP OF CURB, FLOWLINE & TOP BACK OF CURB ELEVATIONS. TRANSITION THE TOP BACK OF CURB LINEARLY BETWEEN EXISTING CURB HEIGHT TO TYPICAL 6 INCH CURB HEIGHT WITHIN A 2 FT SPAN.
- EDGE OF PROPOSED PAVING. MATCH

 EXISTING PAVEMENT OR EXISTING LIP OF CURB ELEVATION.

POINT TABLE					
POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION	
401	450489.3785	648104.8688	5203.58	TBC	
402	450489.3840	648111.9340	5203.80	EOD	
403	450478.7945	648122.5577	5204.37	EOD	
404	450471.7293	648122.5749	5204.45	TBC	
405	450383.1514	648211.4385	5209.82	TBC	
406	450377.0008	648216.9723	5209.49	FL	
407	450377.0307	648231.0352	5209.81	FL	
408	450384.3585	648238.3399	5209.71	FL	
409	450371.7615	648251.0126	5210.55	EOA	
410	450359.1466	648263.6672	5209.70	FL	
411	450334.5065	648260.1481	5210.02	TBC	
412	450322.5764	648272.0691	5210.02	TBC	
413	450299.5003	648294.5440	5209.76	FL	
414	450248.4612	648346.5298	5210.81	TBC	
415	450232.8570	648358.6560	5210.63	EOA	
416	450222.9949	648372.1149	5211.05	TBC	
417	450475.2626	648092.9752	5203.65	CROWN	
418	450458.8936	648109.4003	5204.52	CROWN	
419	450370.0039	648198.5949	5209.89	CROWN	
420	450364.4604	648204.1575	5210.12	CROWN	
421	450344.6593	648224.0264	5210.65	CROWN	
422	450322.3963	648246.2963	5210.18	CROWN	
423	450315.3347	648253.3768	5210.13	CROWN	
424	450308.2731	648260.4574	5210.18	CROWN	
425	450279.6688	648288.9603	5210.60	CROWN	
426	450462.1321	648080.0779	5203.42	TBC	
427	450456.1217	648079.7334	5203.50	EOD	
428	450444.9116	648090.9797	5204.27	EOD	
429	450445.2748	648096.9895	5204.50	TBC	
430	450356.7594	648185.7902	5209.91	TBC	

POINT TABLE				POINT TABLE				
EASTING	ELEVATION	DESCRIPTION	Г	POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
648104.8688	5203.58	TBC		431	450351.7538	648191.6330	5209.60	FL
648111.9340	5203.80	EOD		432	450337.4989	648191.6898	5209.51	FL
648122.5577	5204.37	EOD		433	450324.7769	648178.8648	5209.58	FL
648122.5749	5204.45	TBC		434	450312.0078	648191.5056	5210.75	EOA
648211.4385	5209.82	TBC		435	450299.2280	648204.1537	5209.71	FL
648216.9723	5209.49	FL		436	450312.2092	648217.0839	5209.75	FL
648231.0352	5209.81	FL		437	450312.2000	648231.2629	5209.63	FL
648238.3399	5209.71	FL		438	450295.1273	648247.5241	5210.03	TBC
648251.0126	5210.55	EOA		439	450274.0915	648269.3454	5209.76	FL
648263.6672	5209.70	FL		440	450223.8226	648319.0995	5210.80	TBC
648260.1481	5210.02	TBC		441	450210.2491	648336.2677	5210.55	EOA
648272.0691	5210.02	TBC		442	450192.0144	648351.0303	5211.16	TBC
648294.5440	5209.76	FL						
649346 5209	5210.91	TDC						

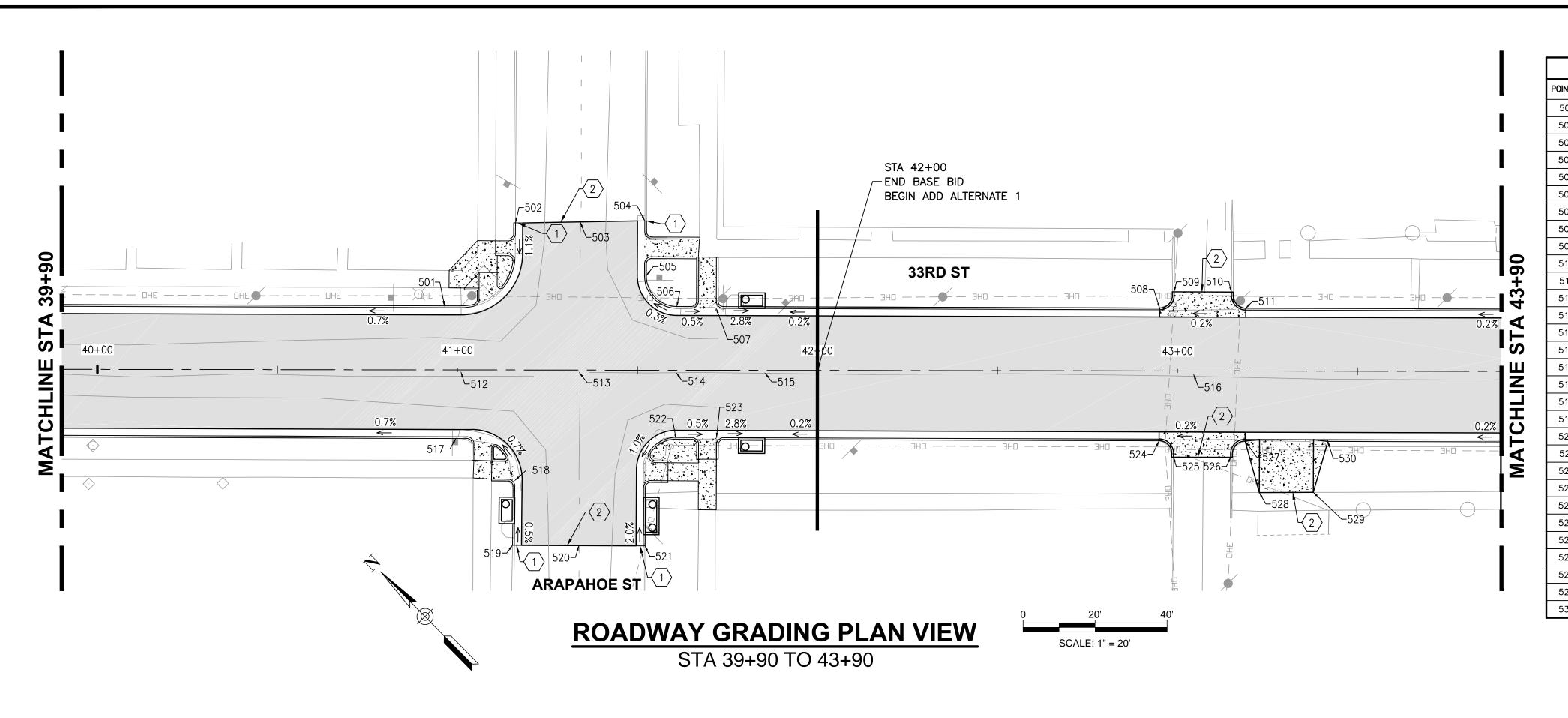


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WILSON &COMPANY

33RD STREET OUTFALL

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POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
501	450140.1482	648455.3481	5211.90	TBC
502	450142.6612	648485.5582	5211.79	FL
503	450130.2326	648498.5130	5212.56	EOA
504	450117.8062	648511.4701	5211.66	FL
505	450106.6820	648501.0802	5212.20	TBC
506	450094.6547	648501.1019	5212.24	TBC
507	450086.5742	648508.5117	5211.69	FL
508	450000.0516	648596.1494	5212.05	TBC
509	450000.4194	648602.1591	5211.85	EOD
510	449989.1868	648613.4507	5212.06	EOD
511	449983.1755	648613.1140	5212.09	TBC
512	450123.8014	648445.6359	5212.09	CROWN
513	450100.6324	648468.9280	5212.31	CROWN
514	450081.6184	648488.0431	5212.25	CROWN
515	450064.2553	648505.4925	5211.93	CROWN
516	449980.2820	648589.8832	5212.09	CROWN
517	450111.7059	648431.6483	5211.90	TBC
518	450091.9180	648435.1471	5211.56	FL
519	450079.5758	648422.0114	5212.12	TBC
520	450066.5599	648435.0439	5212.59	EOA
521	450053.5521	648448.0845	5212.24	TBC
522	450068.5400	648475.0268	5212.26	TBC
523	450060.9927	648483.3189	5211.70	FL
524	449973.9147	648570.1040	5212.05	TBC
525	449967.9070	648569.7612	5211.95	EOD
526	449956.6976	648581.0242	5212.07	EOD
527	449957.0654	648587.0337	5212.10	TBC
528	449944.1391	648579.8126	5212.65	EOD
529	449933.6326	648590.5185	5212.62	EOD
530	449940.8407	648603.3358	5212.12	TBC

LIMITS OF HMA

GENERAL NOTES

1. SEE STM3-1 - STM3-4 (STORM LATERAL PLAN & PROFILE SHEETS) FOR INLET ELEVATIONS.

2. SEE PAV2-1 - PAV2-3 (PAVING PLAN SHEETS) FOR ADDITIONAL INFORMATION RELATED TO ROADWAY LAYOUT.

KEYED NOTES

- MATCH EXISTING LIP OF CURB, FLOWLINE & TOP BACK OF CURB ELEVATIONS. TRANSITION THE TOP BACK OF CURB LINEARLY BETWEEN EXISTING CURB HEIGHT TO TYPICAL 6 INCH CURB HEIGHT WITHIN A 2 FT SPAN.
- EDGE OF PROPOSED PAVING. MATCH EXISTING PAVEMENT OR EXISTING LIP OF CURB ELEVATION.

		POINT TABLE		
POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
601	449899.7966	648696.9635	5212.33	TBC
602	449893.6950	648716.5425	5212.39	TBC
603	449903.5024	648727.0450	5212.05	FL
604	449886.7556	648744.4105	5213.05	EOA
605	449870.1862	648761.6089	5212.10	FL
606	449860.5240	648752.7777	5212.63	TBC
620	449880.5685	648690.0923	5212.37	CROWN
621	449857.3680	648714.8284	5212.80	CROWN
622	449825.7887	648748.4979	5212.30	CROWN
625	449867.6955	648677.5393	5211.85	FL
626	449835.8150	648659.0857	5212.72	TBC
627	449818.8702	648676.0760	5213.33	EOA
628	449801.6178	648693.4855	5212.20	FL
NO	TF·			

ADDITIONAL POINTS SHOWN IN PLAN VIEW WILL BE DETAILED IN FUTURE SEGMENT POINT TABLE.

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SEC	ROA
DRAWN BY:	
NAB	
DESIGNED BY:	
NAB	
APPROVED BY:	
JCH	
DRAWING NAME:	
BLKtoarap-roadway Grading PLA	N.dwg
DATE:	
OCTOBER 2016)
SHEET NO.:	
DAV/2 2 00 of	C4

FUTURE SEGMENT (BY OTHERS) STA 45+40 END ADD ALTERNATE 1-33RD ST 43+90 STA_ 47+00 45+00 MATCHLINE 622 CHAMPA ST **ROADWAY GRADING PLAN VIEW**

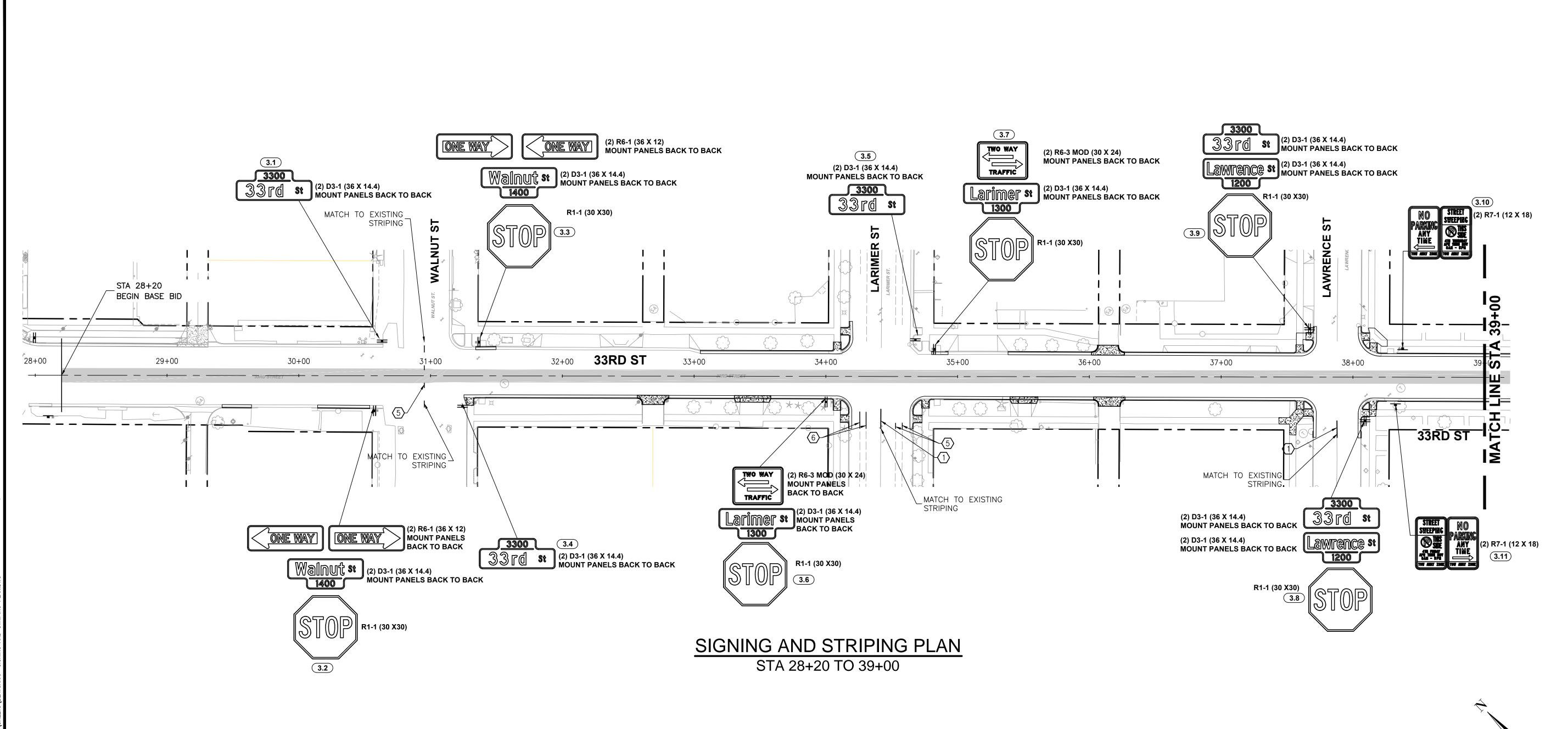
STA 43+90 TO 45+40

SCALE: 1" = 20'

33RD STREET OUTFALL G - BLAKE ST. TO ARAPAHOE

ST.

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PAVEMENT MARKING LEGEND AND NOTES

A. TRAFFIC LANE PAVEMENT MARKINGS

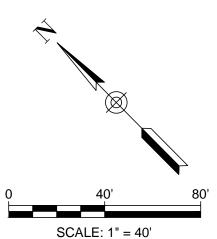
EPOXY PAVEMENT MARKING MATERIAL SHALL BE USED UNLESS OTHERWISE APPROVED BY T.E.S

ASPHALT ROADWAY SURFACE:
INLAID PREFORMED PLASTIC TAPE SHALL BE USED FOR (5) (9) (20) UNLESS OTHERWISE APPROVED BY T.E.S

CONCRETE ROADWAY SURFACE: INLAID PREFORMED PLASTIC TAPE (CONTRAST) PAVEMENT MARKING MATERIAL SHALL BE USED FOR (5) (9) (20) UNLESS OTHERWISE APPROVED BY T.E.S

- (1) 4" DOUBLE YELLOW CENTERLINE WITH 4" SEPARATION
- (2) 4" SKIP YELLOW CENTERLINE, 10' LINE, 30' GAP
- (3) 4" SOLID YELLOW TWO WAY LEFT EDGE LINE
- (4) 4" SOLID YELLOW WITH 4" SKIP YELLOW, 10' LINE, 30' GAP, AND 4" SEPERATION
- (5) 4" SKIP WHITE LANE LINE, 10' LINE, 30' GAP
- (6) 4" SOLID WHITE RIGHT EDGE LINE OR TURN LANE LINE
- (7) 4" SOLID WHITE 45 DEGREE DIAGONAL CROSSHATCH AT 15' SPACING
- (8) 8" SOLID WHITE RIGHT EDGE LINE OR TURN LANE LINE (9) 8" DASHED WHITE LINE, 2' DASH WITH 4' GAP
- DASHES THRU INTERSECTION WHEN SHOWN ON PLANS ARE 2' LONG LINES WITH 6' GAPS CENTERED IN EACH CROSS STREET TRAFFIC LANE

- B. CROSSWALK MARKINGS MATERIAL SHALL BE REFLECTORIZED PREFORMED THERMO-PLASTIC (MIN. 90 MIL THICKNESS) HULL WIDTH WITHOUT SEAMS UNLESS OTHERWISE SPECIFIED
- (15) 18" WHITE TRAVERSE CROSSWALK LINE
- (16) 18" X 10' WHITE CROSSWALK BAR
- (17) 24" X 10' WHITE CROSSWALK BAR
- (18) 24"WHITE STOP LINE, ONLY WHEN SHOWN ON PLANS
- (19) PAVEMENT MESSAGES ONLY WHEN SHOWN ON PLANS
- C. ANY FINAL PAVEMENT MARKING QUANTITIES SHALL INCLUDE REMOVAL OF ANY AND CONFLICTING, PREVIOUS OR DETOUR MARKINGS AS NECESSARY.
- D. ALL OTHER PROVISIONS OF "CITY AND COUNTY OF DENVER STANDARDS AND SPECIFICATIONS: AND "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION", STATE DEPARTMENT OF HIGHWAYS, STATE OF COLORADO, CURRENT EDITION SHALL APPLY.
- E. REMOVALS SHALL BE BY GRINDING, SANDBLASTING, OR WATER BLASTING METHODS PROVIDED THAT THE PAVEMENT SURFACE SHALL NOT BE MATERIALLY DAMAGED. THE PAVEMENT MARKINGS SHALL BE REMOVED TO THE EXTENT THAT THEY SHALL NOT BE VISIBLE UNDER DAY OR NIGHT CONDITIONS.



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OUTFALL

STREET

33RD

SE

PAVEMENT MARKING LEGEND AND NOTES

A. TRAFFIC LANE PAVEMENT MARKINGS

EPOXY PAVEMENT MARKING MATERIAL SHALL BE USED UNLESS OTHERWISE APPROVED BY T.E.S

ASPHALT ROADWAY SURFACE:

INLAID PREFORMED PLASTIC TAPE SHALL BE USED FOR (5) (9) (20) UNLESS OTHERWISE APPROVED BY T.E.S

CONCRETE ROADWAY SURFACE:

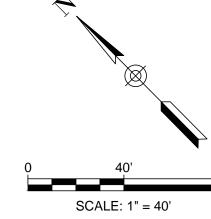
INLAID PREFORMED PLASTIC TAPE (CONTRAST)
PAVEMENT MARKING MATERIAL SHALL BE USED FOR (5) (9) (20)
UNLESS OTHERWISE APPROVED BY T.E.S

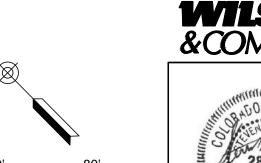
- (1) 4" DOUBLE YELLOW CENTERLINE WITH 4" SEPARATION
- (2) 4" SKIP YELLOW CENTERLINE, 10' LINE, 30' GAP
- (3) 4" SOLID YELLOW TWO WAY LEFT EDGE LINE
- (4) 4" SOLID YELLOW WITH 4" SKIP YELLOW, 10' LINE, 30' GAP, AND 4" SEPERATION
- (5) 4" SKIP WHITE LANE LINE, 10' LINE, 30' GAP
- (6) 4" SOLID WHITE RIGHT EDGE LINE OR TURN LANE LINE
- (7) 4" SOLID WHITE 45 DEGREE DIAGONAL CROSSHATCH AT 15' SPACING
- (8) 8" SOLID WHITE RIGHT EDGE LINE OR TURN LANE LINE
- 9 8" DASHED WHITE LINE, 2' DASH WITH 4' GAP
- DASHES THRU INTERSECTION WHEN SHOWN ON PLANS ARE 2' LONG LINES WITH 6' GAPS CENTERED IN EACH CROSS STREET TRAFFIC LANE

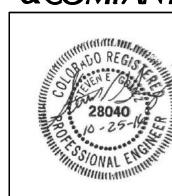
B. CROSSWALK MARKINGS - MATERIAL SHALL BE REFLECTORIZED PREFORMED THERMO-PLASTIC (MIN. 90 MIL THICKNESS) HULL WIDTH WITHOUT SEAMS UNLESS OTHERWISE SPECIFIED

STA 39+00 TO 45+40

- (15) 18" WHITE TRAVERSE CROSSWALK LINE
- (16) 18" X 10' WHITE CROSSWALK BAR
- (17) 24" X 10' WHITE CROSSWALK BAR
- (18) 24"WHITE STOP LINE, ONLY WHEN SHOWN ON PLANS
- (19) PAVEMENT MESSAGES ONLY WHEN SHOWN ON PLANS
- C. ANY FINAL PAVEMENT MARKING QUANTITIES SHALL INCLUDE REMOVAL OF ANY AND CONFLICTING, PREVIOUS OR DETOUR MARKINGS AS NECESSARY.
- D. ALL OTHER PROVISIONS OF "CITY AND COUNTY OF DENVER STANDARDS AND SPECIFICATIONS: AND "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION", STATE DEPARTMENT OF HIGHWAYS, STATE OF COLORADO, CURRENT EDITION SHALL APPLY.
- E. REMOVALS SHALL BE BY GRINDING, SANDBLASTING, OR WATER BLASTING METHODS PROVIDED THAT THE PAVEMENT SURFACE SHALL NOT BE MATERIALLY DAMAGED. THE PAVEMENT MARKINGS SHALL BE REMOVED TO THE EXTENT THAT THEY SHALL NOT BE VISIBLE UNDER DAY OR NIGHT







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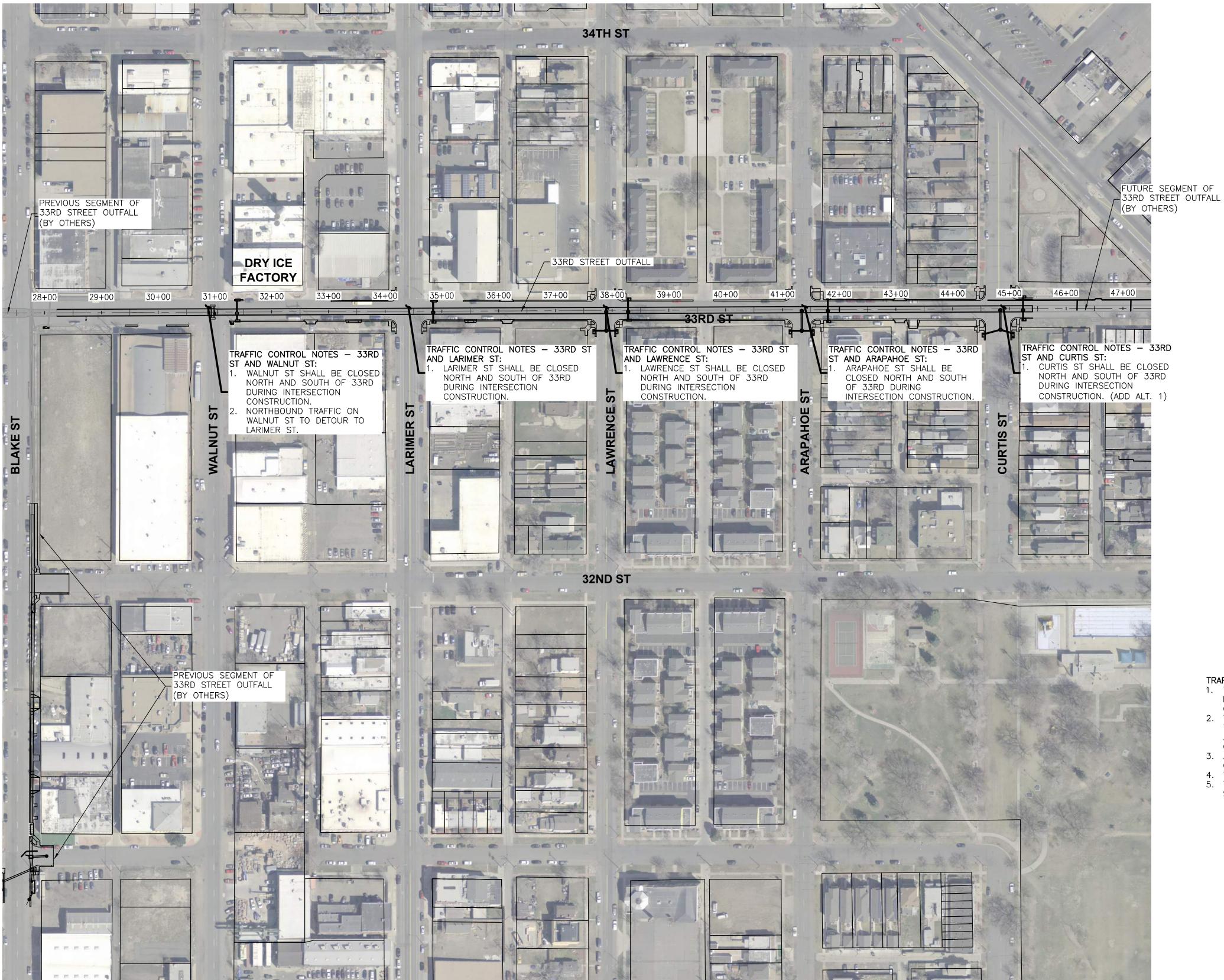
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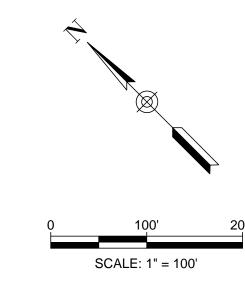
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ST. STREET OUTFALL E ST. TO ARAPAHOE







- TRAFFIC CONTROL GENERAL NOTES:

 1. THE CONTRACTOR SHALL PROVIDE ACCESS TO ALL BUSINESSES AND RESIDENCES LOCATED ALONG THE PROJECT CORRIDOR DURING



WILSON &COMPANY

CALL UNCC TWO WORKING DAY! BEFORE YOU DIG

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33RD STREET OUTFALL - BLAKE ST. TO ARAPAH(

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TRAFFIC CONTROL PLAN BLAKE ST TO CURTIS ST

CONSTRUCTION.

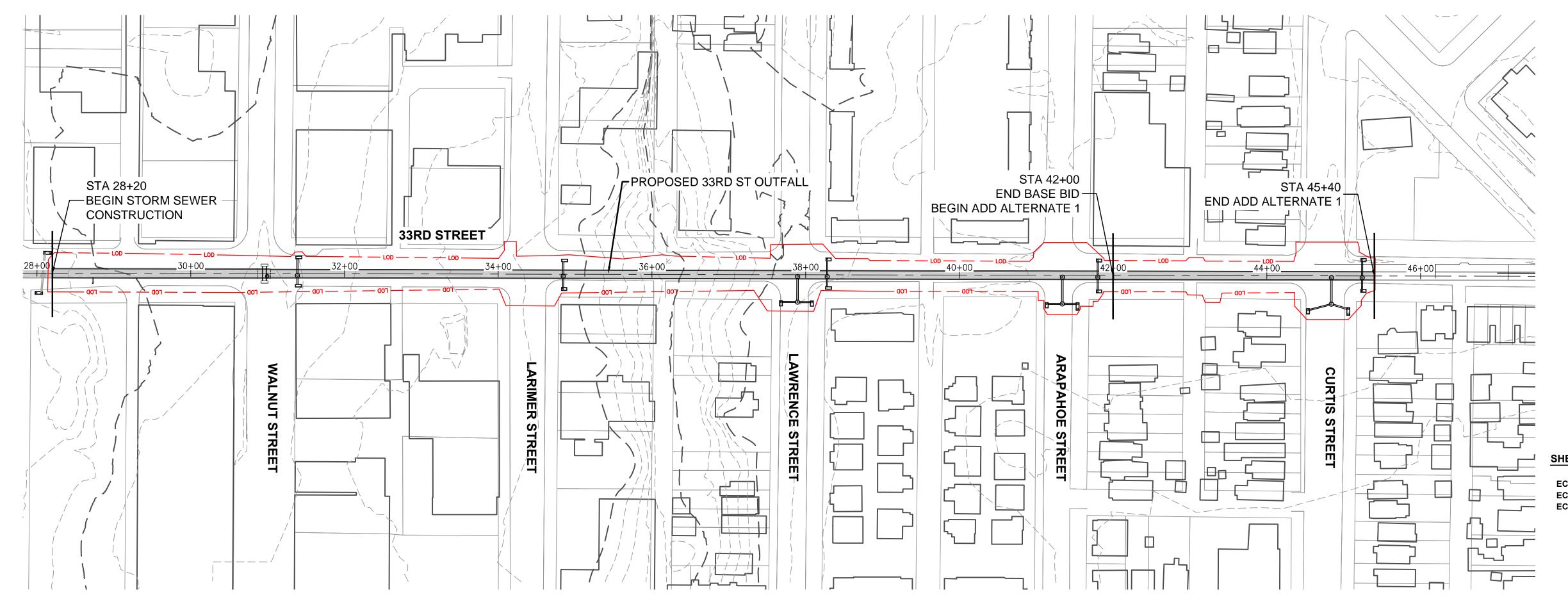
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PREPARING DETAILED TRAFFIC CONTROL PLANS TO SUBMIT TO THE CITY FOR REVIEW AND APPROVAL BY TRAFFIC ENGINEERING SERVICES PRIOR TO

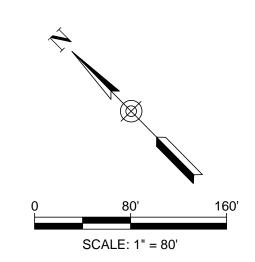
CONSTRUCTION.

3. ALL TRAFFIC CONTROL AND TEMPORARY CLOSURES SHALL BE COORDINATED WITH THE DENVER FIRE DEPARTMENT.

4. THE CONTRACTOR SHALL MAINTAIN SIDEWALK ACCESS AT ALL TIMES.
5. THIS TRAFFIC CONTROL PLAN IS FOR INFORMATION ONLY AND IS SUBJECT TO CHANGE.

(31ST AND 36TH STREET OUTFALL PROJECT) SEGMENT - BLAKE ST. TO ARAPAHOE ST. (BASE BID) ADD ALTERNATE 1 - ARAPAHOE ST. TO CURTIS ST. EROSION CONTROL PLANS





SHEET INDEX

SHEET # TITLE

ECP1-3 TO ECP1-5

COVER **EROSION CONTROL PLAN EROSION CONTROL DETAILS**

EROSION CONTROL NOTES

THE PERMITTEE MUST IMPLEMENT AND COMPLY WITH THE APPROVED CASDP AND ASSOCIATED DOCUMENTS FOR THIS PROJECT.

THE CONTRACTOR SHALL PREVENT SEDIMENT, DEBRIS AND ALL OTHER POLLUTANTS FROM ENTERING THE STORM SEWER SYSTEM DURING ALL DEMOLITION, EXCAVATION, TRENCHING, BORING, GRADING, OR OTHER CONSTRUCTION OPERATIONS THAT ARE PART OF THIS PROJECT. THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR REMEDIATION OF ANY ADVERSE IMPACTS TO THE MUNICIPAL SEPARATE STORM SEWER SYSTEM, RECEIVING WATERS, WATERWAYS, WETLANDS, AND OR OTHER PUBLIC OR PRIVATE PROPERTIES, RESULTING FROM WORK DONE AS PART OF THIS PROJECT.

3. THE PERMITTEE AND/OR CONTRACTOR SHALL REMOVE ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO OR, ACCUMULATE IN, THE FLOWLINES, STORM DRAINAGE APPURTENANCES, AND PUBLIC RIGHTS OF WAYS OF THE CITY AND COUNTY OF DENVER AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPMENT OR CONSTRUCTION PROJECT. SAID REMOVAL SHALL BE CONDUCTED IN A TIMELY MANNER.

4. SOIL STABILIZATION MEASURES SHALL BE IMPLEMENTED WITHIN FOURTEEN (14) DAYS FOLLOWING COMPLETION OF

GRADING ACTIVITIES. STABILIZATION OF DISTURBED AREAS ADJACENT TO RECEIVING WATERS OR WITH SLOPES 3 TO 1 OR GREATER SHALL BE COMPLETED WITHIN SEVEN (7) DAYS FOLLOWING COMPLETION OF GRADING ACTIVITIES.

NOTE: FEDERAL AND STATE REGULATIONS MAY SOON REQUIRE STABILIZATION WITHIN SEVEN (7) DAYS OF COMPLETION OF GRADING ACTIVITIES. IN SUCH CASES, THE SHORTER TIMEFRAME SHALL APPLY TO PROJECTS WITHIN DENVER AS WELL.

5. THE DEVELOPER, GENERAL CONTRACTOR, GRADING CONTRACTOR AND/OR THEIR AUTHORIZED AGENTS SHALL INSURE THAT ALL LOADS OF CUT AND FILL MATERIAL IMPORTED TO OR EXPORTED FROM THIS SITE SHALL BE PROPERLY COVERED TO PREVENT LOSS OF THE MATERIAL DURING TRANSPORT ON PUBLIC RIGHTS OF WAY.

6. THE USE OF REBAR TO ANCHOR BEST MANAGEMENT PRACTICES IS PROHIBITED. STEEL FENCE POSTS MAY BE USED ON A CASE BY CASE BASIS AND REQUIRES APPROVAL FROM THE CITY AND COUNTY OF DENVER SWMP REVIEWER OR THE STORMWATER ENFORCEMENT INVESTIGATOR PRIOR TO INSTALLATION.

7. SOILS THAT WILL BE STOCKPILED FOR MORE THAN THIRTY (30) DAYS SHALL BE PROTECTED FROM WIND AND WATER EROSION WITHIN FOURTEEN (14) DAYS OF STOCKPILE CONSTRUCTION. STABILIZATION OF STOCKPILES LOCATED WITHIN 100 FEET OF

RECEIVING WATERS, OR WITH SLOPES 3 TO 1 OR GREATER SHALL BE COMPLETED WITHIN SEVEN (7) DAYS FOLLOWING STOCKPILE CONSTRUCTION. STABILIZATION AND PROTECTION OF THE STOCKPILE MAY BE ACCOMPLISHED BY ANY OF THE FOLLOWING: MULCHING, TEMPORARY/PERMANENT REVEGETATION OPERATIONS, CHEMICAL SOIL STABILIZER APPLICATION (REQUIRES DENVER PUBLIC WORKS APPROVAL), OR EROSION CONTROL MATTING/GEOTEXTILES. IF STOCKPILES ARE LOCATED WITHIN 100 FEET OF RECEIVING WATERS, A DRAINAGEWAY OR THE SITE PERIMETER, ADDITIONAL SEDIMENT CONTROLS SUCH SHALL BE

8. APPROVED EROSION AND SEDIMENT CONTROL 'BEST MANAGEMENT PRACTICES' SHALL BE MAINTAINED AND KEPT IN GOOD REPAIR FOR THE DURATION OF THIS PROJECT. AT A MINIMUM, THE PERMITTEE OR CONTRACTOR SHALL PRODUCE AND RETAIN WEEKLY WRITTEN INSPECTION RECORDS FOR ALL BMPS AND AFTER SIGNIFICANT PRECIPITATION EVENTS. ALL NECESSARY MAINTENANCE AND REPAIR SHALL BE COMPLETED IMMEDIATELY. ADDITIONALLY, STREET SWEEPING IS TO BE COMPLETED BY THE CLOSE OF THE BUSINESS DAY OR (AND) ON AN AS NEEDED BASIS THROUGHOUT THE DAY.

9. WATER USED IN THE CLEANING OF CEMENT TRUCK DELIVERY CHUTES SHALL BE DISCHARGED INTO A PREDEFINED, CONCRETE WASHOUT AREA ON THE JOB SITE. BERMED CONTAINMENT OR COMMERCIALLY AVAILABLE CONCRETE WASHOUT DEVICES THAT

FULLY CONTAIN ALL WASH WATER ARE ACCEPTABLE. WASH WATER DISCHARGED INTO THE CONTAINMENT AREA OR DEVICE SHALL BE ALLOWED TO INFILTRATE, EVAPORATE, AND OR BE DISPOSED OF IN ACCORDANCE WITH ALL APPLICABLE REGULATIONS. DRIED CEMENT WASTE IS TO BE REMOVED FROM THE CONTAINMENT AREA AND PROPERLY DISPOSED.

SHOULD THE USE OF A PREDEFINED BERMED CONTAINMENT AREA OR APPROVED WASHOUT DEVICE BE TECHNICALLY INFEASIBLE DUE TO THE PROJECT SIZE, OR LACK OF AN AREA WITH A SUITABLE GROUND SURFACE FOR ESTABLISHING CONTAINMENT, PROPER DISPOSAL OF CONCRETE WASHOUT AND WASH WATER AT THE JOB SITE SHALL CONFORM TO THE APPROVED TECHNIQUES AND PRACTICES IDENTIFIED IN THE COLORADO DEPARTMENT OF PUBLIC HEALTH & ENVIRONMENT'S TRAINING VIDEO ENTITLED 'BUILDING FOR A CLEANER ENVIRONMENT, READY MIX WASHOUT TRAINING AND ITS ACCOMPANYING MANUAL ENTITLED, 'READY MIX WASHOUT GUIDEBOOK, VEHICLE AND EQUIPMENT WASHOUT AT CONSTRUCTION SITES.'

THE DIRECT OR INDIRECT DISCHARGE OF WATER CONTAINING WASTE CEMENT TO THE STORM SEWER SYSTEM IS PROHIBITED. (SEC.56-102A, C; REVISED MUNICIPAL CODE, CITY AND COUNTY OF DENVER).

10. THE CONTRACTOR SHALL PROTECT ALL STORM SEWER FACILITIES ADJACENT TO ANY LOCATION WHERE PAVEMENT

CUTTING OPERATIONS INVOLVING WHEEL CUTTING, SAW CUTTING, OR ABRASIVE WATER JET CUTTING ARE TO TAKE PLACE.

THE CONTRACTOR SHALL REMOVE AND PROPERLY DISPOSE OF ALL WASTE PRODUCTS GENERATED BY SAID CUTTING OPERATIONS ON A DAILY BASIS OR AS NEEDED THROUGHOUT THE WORK DAY.

THE DISCHARGE OF ANY WATER CONTAMINATED BY WASTE PRODUCTS FROM CUTTING OPERATIONS TO THE STORM SEWER SYSTEM IS PROHIBITED. (SEC.56-102A, C; REVISED MUNICIPAL CODE, CITY AND COUNTY OF DENVER)

11. PAVED AND IMPERVIOUS SURFACES WHICH ARE ADJACENT TO CONSTRUCTION SITES MUST BE SWEPT ON A DAILY BASIS AND AS NEEDED DURING THE DAY WHEN SEDIMENT AND OTHER MATERIALS ARE TRACKED OR DISCHARGED ONTO THEM. EITHER SWEEPING BY HAND OR USE OF STREET SWEEPERS IS ACCEPTABLE. STREET SWEEPERS USING WATER WHILE SWEEPING IS PREFERRED IN ORDER TO MINIMIZE DUST. FLUSHING OFF PAVED SURFACES WITH WATER IS PROHIBITED.



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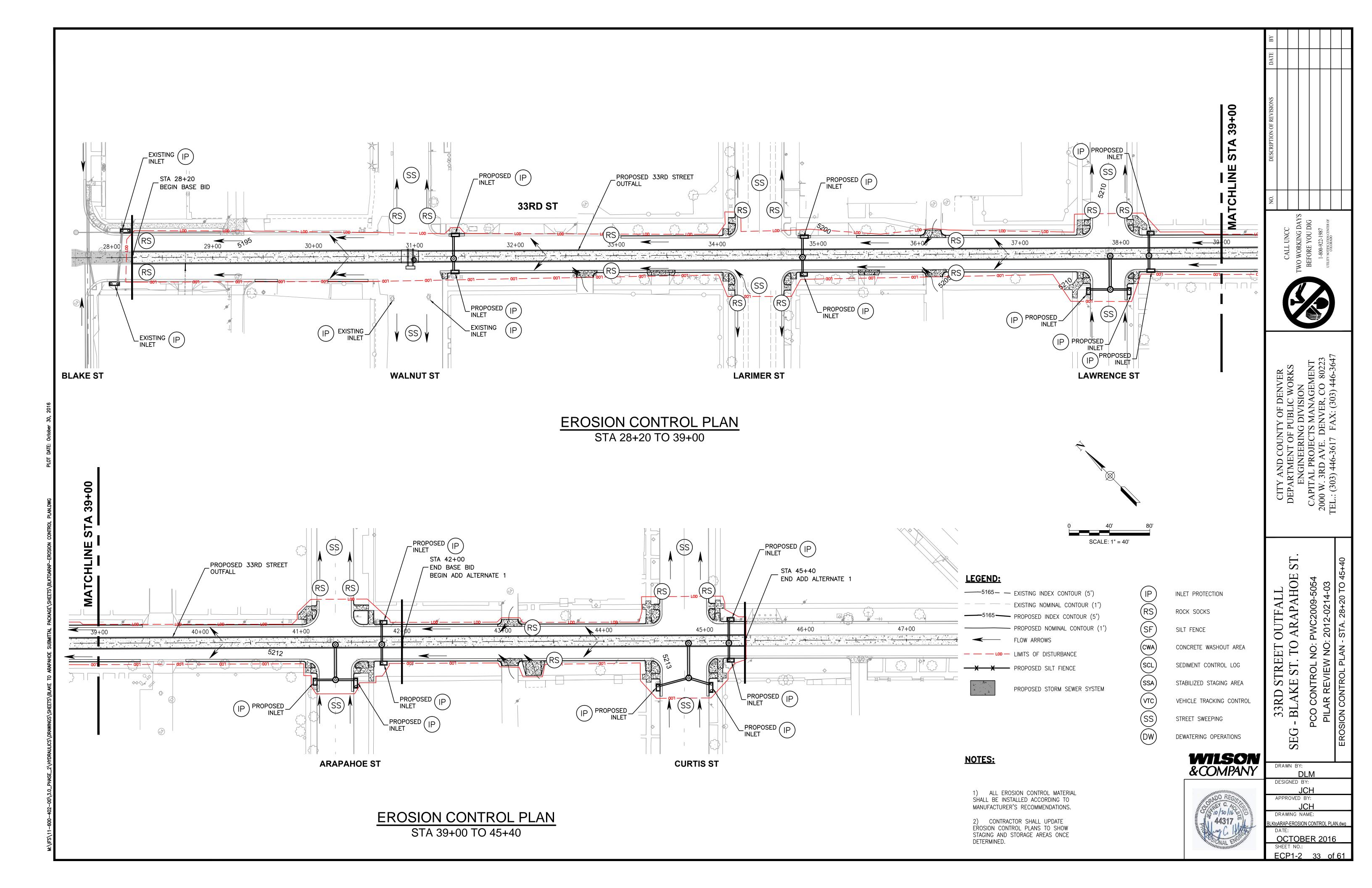
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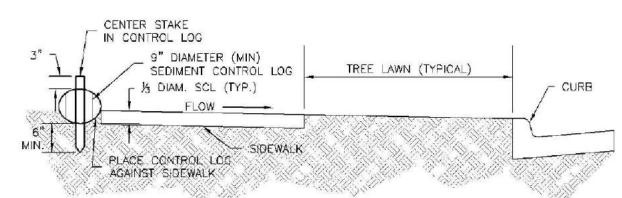
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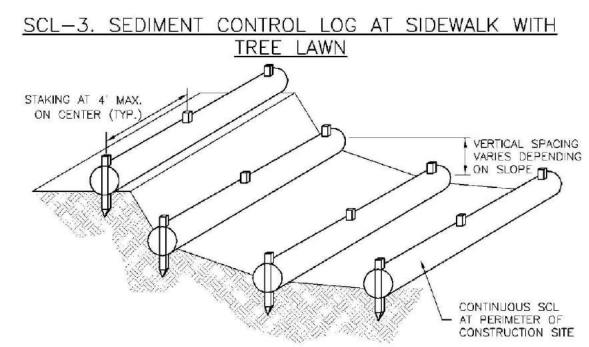
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SC-2

SC-2



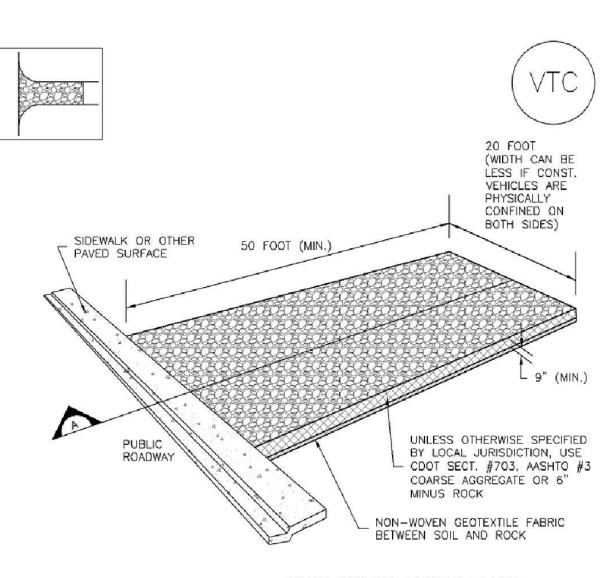


SCL-4. SEDIMENT CONTROL LOGS TO CONTROL SLOPE LENGTH

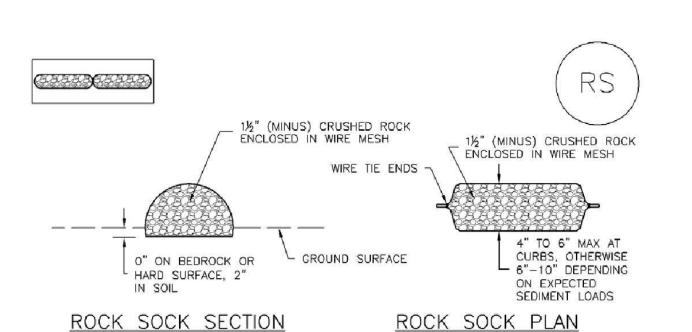
Vehicle Tracking Control (VTC)

SM-4

WO WORK BEFORE



VTC-1. AGGREGATE VEHICLE TRACKING CONTROL



ANY GAP AT JOINT SHALL BE FILLED WITH AN ADEQUATE AMOUNT OF 1½" (MINUS) CRUSHED ROCK AND WRAPPED WITH ADDITIONAL WIRE MESH SECURED TO ENDS OF ROCK ROCK SOCK, REINFORCED SOCK. AS AN ALTERNATIVE TO FILLING JOINTS

ADDITIONAL WIRE WRAPPING, ROCK SOCKS CAN BE OVERLAPPED (TYPICALLY 12-INCH OVERLAP) TO AVOID GAPS ROCK SOCK JOINTING

ROCK SOCK INSTALLATION NOTES

-LOCATION(S) OF ROCK SOCKS.

1. SEE PLAN VIEW FOR:

GRADATION TABLE SIEVE SIZE MASS PERCENT PASSING SQUARE MESH SIEVES COARSE AGGREGATE FOR CONCRETE PER AASHTO M43. ALL ROCK SHALL BI FRACTURED FACE, ALL SIDES.

BETWEEN ADJOINING ROCK SOCKS WITH CRUSHED ROCK AND

2. CRUSHED ROCK SHALL BE 11/2" (MINUS) IN SIZE WITH A FRACTURED FACE (ALL SIDES) AND SHALL COMPLY WITH GRADATION SHOWN ON THIS SHEET (11/2" MINUS).

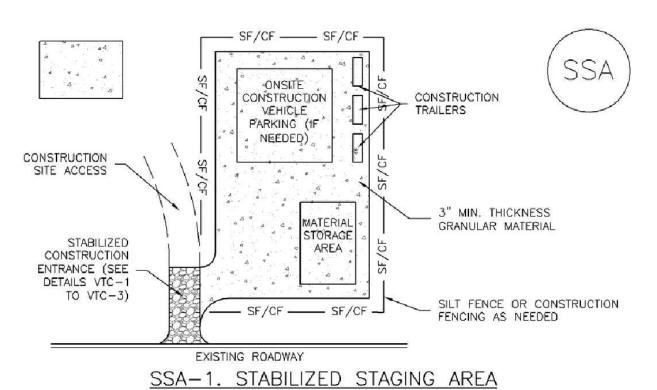
3. WIRE MESH SHALL BE FABRICATED OF 10 GAGE POULTRY MESH, OR EQUIVALENT, WITH A MAXIMUM OPENING OF 1/2", RECOMMENDED MINIMUM ROLL WIDTH OF 48"

4. WIRE MESH SHALL BE SECURED USING "HOG RINGS" OR WIRE TIES AT 6" CENTERS ALONG ALL JOINTS AND AT 2" CENTERS ON ENDS OF SOCKS.

5. SOME MUNICIPALITIES MAY ALLOW THE USE OF FILTER FABRIC AS AN ALTERNATIVE TO WIRE RS-1. ROCK SOCK PERIMETER CONTROL

Stabilized Staging Area (SSA)

SM-6



STABILIZED STAGING AREA INSTALLATION NOTES

1. SEE PLAN VIEW FOR

-LOCATION OF STAGING AREA(S) -CONTRACTOR MAY ADJUST LOCATION AND SIZE OF STAGING AREA WITH APPROVAL FROM THE LOCAL JURISDICTION.

2. STABILIZED STAGING AREA SHOULD BE APPROPRIATE FOR THE NEEDS OF THE SITE. OVERSIZING RESULTS IN A LARGER AREA TO STABILIZE FOLLOWING CONSTRUCTION.

3. STAGING AREA SHALL BE STABILIZED PRIOR TO OTHER OPERATIONS ON THE SITE.

4. THE STABILIZED STAGING AREA SHALL CONSIST OF A MINIMUM 3" THICK GRANULAR

SECT. #703, AASHTO #3 COARSE AGGREGATE OR 6" (MINUS) ROCK. 6. ADDITIONAL PERIMETER BMPs MAY BE REQUIRED INCLUDING BUT NOT LIMITED TO SILT

5. UNLESS OTHERWISE SPECIFIED BY LOCAL JURISDICTION, ROCK SHALL CONSIST OF DOT

FENCE AND CONSTRUCTION FENCING. STABILIZED STAGING AREA MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

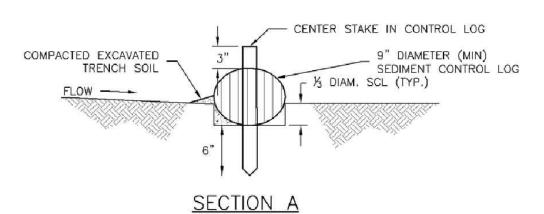
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE

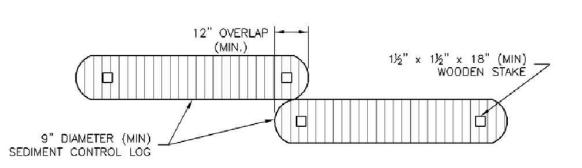
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

4. ROCK SHALL BE REAPPLIED OR REGRADED AS NECESSARY IF RUTTING OCCURS OR UNDERLYING SUBGRADE BECOMES EXPOSED.

1½" x 1½" x 18" (MIN) WOODEN STAKE 9" DIAMETER (MIN) SEDIMENT CONTROL LOG 4 MAX. CENTER (TYP DIAMETER SEDIMENT NEED TO BE EMBEDDED DEEPER.

SEDIMENT CONTROL LOG





SEDIMENT CONTROL LOG JOINTS

SCL-1. SEDIMENT CONTROL LOG

SM-6 Stabilized Staging Area (SSA)

STABILIZED STAGING AREA MAINTENANCE NOTES

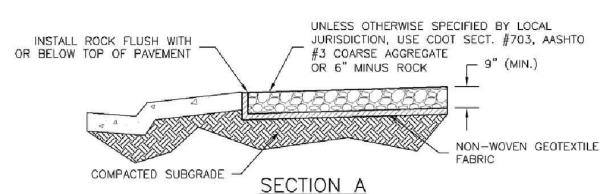
5. STABILIZED STAGING AREA SHALL BE ENLARGED IF NECESSARY TO CONTAIN PARKING, STORAGE, AND UNLOADING/LOADING OPERATIONS.

6. THE STABILIZED STAGING AREA SHALL BE REMOVED AT THE END OF CONSTRUCTION. THE GRANULAR MATERIAL SHALL BE REMOVED OR, IF APPROVED BY THE LOCAL JURISDICTION, USED ON SITE, AND THE AREA COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY LOCAL JURISDICTION.

NOTE: MANY MUNICIPALITIES PROHIBIT THE USE OF RECYCLED CONCRETE AS GRANULAR MATERIAL FOR STABILIZED STAGING AREAS DUE TO DIFFICULTIES WITH RE-ESTABLISHMENT OF VEGETATION IN AREAS WHERE RECYCLED CONCRETE WAS PLACED.

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN

(DETAILS ADAPTED FROM DOUGLAS COUNTY, COLORADO, NOT AVAILABLE IN AUTOCAD)





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to ARAP-EROSION CONTROL DETAILS.du

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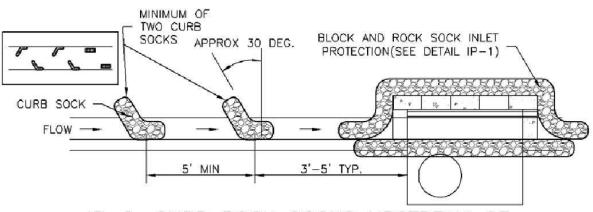
IP-1. BLOCK AND ROCK SOCK SUMP OR ON GRADE INLET PROTECTION

BLOCK AND CURB SOCK INLET PROTECTION INSTALLATION NOTES

1. SEE ROCK SOCK DESIGN DETAIL FOR INSTALLATION REQUIREMENTS.

2. CONCRETE "CINDER" BLOCKS SHALL BE LAID ON THEIR SIDES AROUND THE INLET IN A SINGLE ROW, ABUTTING ONE ANOTHER WITH THE OPEN END FACING AWAY FROM THE CURB.

3. GRAVEL BAGS SHALL BE PLACED AROUND CONCRETE BLOCKS, CLOSELY ABUTTING ONE ANOTHER AND JOINTED TOGETHER IN ACCORDANCE WITH ROCK SOCK DESIGN DETAIL.



IP-2. CURB ROCK SOCKS UPSTREAM OF INLET PROTECTION

CURB ROCK SOCK INLET PROTECTION INSTALLATION NOTES

Dewatering Operations (DW)

PUMP SUCTION LINE

CENTERED IN BUCKET

OR SUBMERSIBLE PUMP

- 1. SEE ROCK SOCK DESIGN DETAIL INSTALLATION REQUIREMENTS.
- 2. PLACEMENT OF THE SOCK SHALL BE APPROXIMATELY 30 DEGREES FROM PERPENDICULAR IN THE OPPOSITE DIRECTION OF FLOW.
- 3. SOCKS ARE TO BE FLUSH WITH THE CURB AND SPACED A MINIMUM OF 5 FEET APART.
- 4. AT LEAST TWO CURB SOCKS IN SERIES ARE REQUIRED UPSTREAM OF ON-GRADE INLETS.

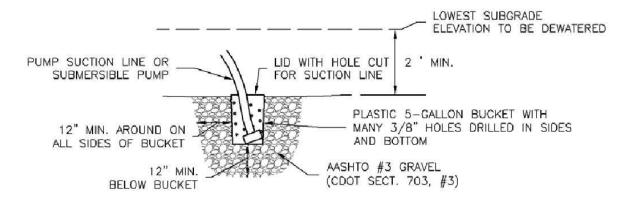
SM-9

PLASTIC 5-GALLON BUCKET WITH - MANY 3/8" HOLES DRILLED IN SIDES BUCKET FILLED WITH AASHTO #3 GRAVEL (CDOT SECT. 703, #3)

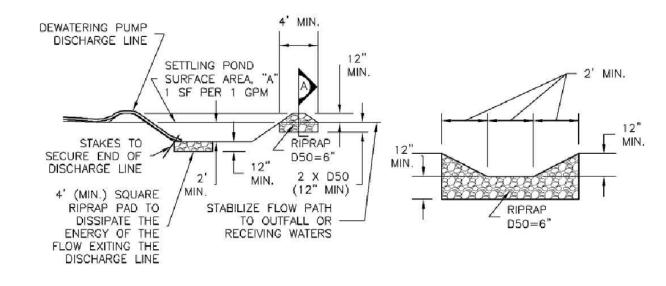
SM-9

DW-1. DEWATERING POND ALREADY FILLED WITH WATER

FOR SUCTION LINE

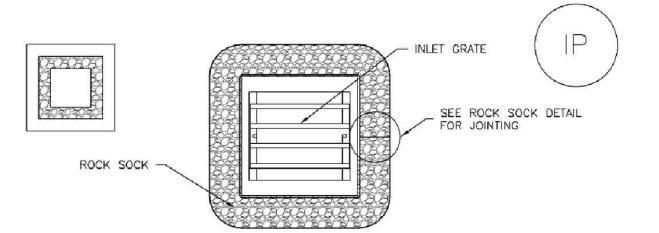


DW-2. DEWATERING SUMP FOR SUBMERSED PUMP



DW-3. SUMP DISCHARGE SETTLING BASIN

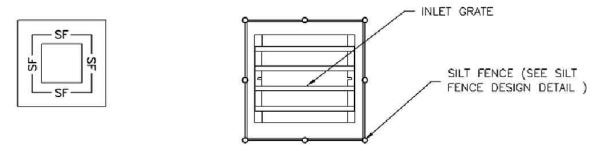
SETTLING BASIN SECTION A



IP-3. ROCK SOCK SUMP/AREA INLET PROTECTION

ROCK SOCK SUMP/AREA INLET PROTECTION INSTALLATION NOTES 1. SEE ROCK SOCK DESIGN DETAIL FOR INSTALLATION REQUIREMENTS

2. STRAW WATTLES/SEDIMENT CONTROL LOGS MAY BE USED IN PLACE OF ROCK SOCKS FOR INLETS IN PERVIOUS AREAS. INSTALL PER SEDIMENT CONTROL LOG DETAIL.

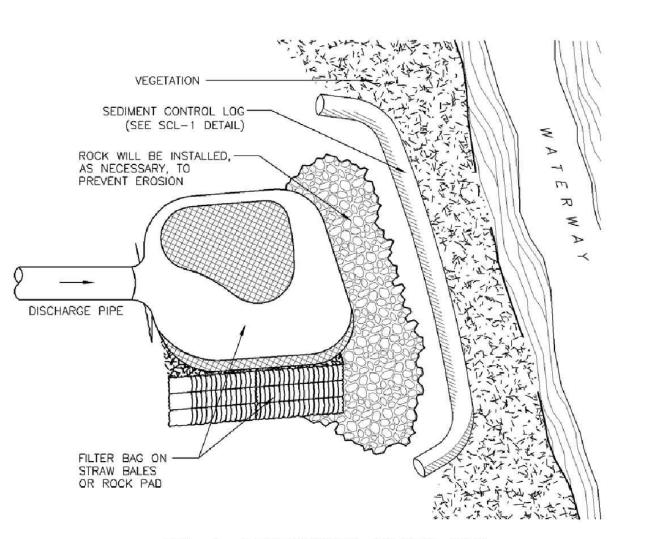


IP-4. SILT FENCE FOR SUMP INLET PROTECTION

SILT FENCE INLET PROTECTION INSTALLATION NOTES

- 1. SEE SILT FENCE DESIGN DETAIL FOR INSTALLATION REQUIREMENTS.
- 2. POSTS SHALL BE PLACED AT EACH CORNER OF THE INLET AND AROUND THE EDGES AT A MAXIMUM SPACING OF 3 FEET.
- 3. STRAW WATTLES/SEDIMENT CONTROL LOGS MAY BE USED IN PLACE OF SILT FENCE FOR INLETS IN PERVIOUS AREAS. INSTALL PER SEDIMENT CONTROL LOG DETAIL.

Dewatering Operations (DW)



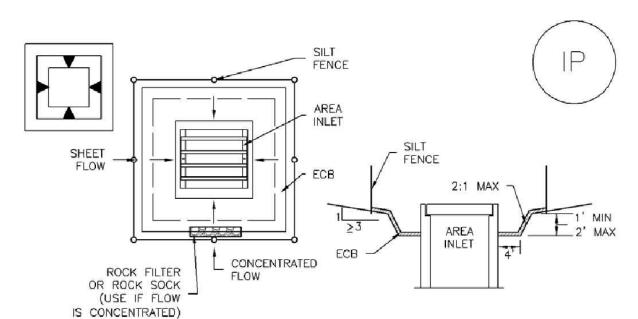
DW-4. DEWATERING FILTER BAG

DEWATERING INSTALLATION NOTES

1. SEE PLAN VIEW FOR; -LOCATION OF DEWATERING EQUIPMENT. -TYPE OF DEWATERING OPERATION (DW-1 TO DW-4).

2. THE OWNER OR CONTRACTOR SHALL OBTAIN A CONSTRUCTION DISCHARGE (DEWATERING) PERMIT FROM THE STATE PRIOR TO ANY DEWATERING OPERATIONS DISCHARGING FROM THE SITE. ALL DEWATERING SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE PERMIT.

 THE OWNER OR OPERATOR SHALL PROVIDE, OPERATE, AND MAINTAIN DEWATERING SYSTEMS OF SUFFICIENT SIZE AND CAPACITY TO PERMIT EXCAVATION AND SUBSEQUENT CONSTRUCTION IN DRY CONDITIONS AND TO LOWER AND MAINTAIN THE GROUNDWATER LEVEL A MINIMUM OF 2-FEET BELOW THE LOWEST POINT OF EXCAVATION AND CONTINUOUSLY MAINTAIN EXCAVATIONS FREE OF WATER UNTIL BACK-FILLED TO FINAL GRADE.



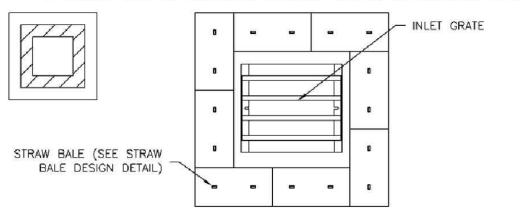
IP-5. OVEREXCAVATION INLET PROTECTION

OVEREXCAVATION INLET PROTECTION INSTALLATION NOTES

1. THIS FORM OF INLET PROTECTION IS PRIMARILY APPLICABLE FOR SITES THAT HAVE NOT YET REACHED FINAL GRADE AND SHOULD BE USED ONLY FOR INLETS WITH A RELATIVELY SMALL CONTRIBUTING DRAINAGE AREA.

2. WHEN USING FOR CONCENTRATED FLOWS, SHAPE BASIN IN 2:1 RATIO WITH LENGTH ORIENTED TOWARDS DIRECTION OF FLOW.

3. SEDIMENT MUST BE PERIODICALLY REMOVED FROM THE OVEREXCAVATED AREA.



IP-6. STRAW BALE FOR SUMP INLET PROTECTION

STRAW BALE BARRIER INLET PROTECTION INSTALLATION NOTES

1. SEE STRAW BALE DESIGN DETAIL FOR INSTALLATION REQUIREMENTS.

2. BALES SHALL BE PLACED IN A SINGLE ROW AROUND THE INLET WITH ENDS OF BALES TIGHTLY ABUTTING ONE ANOTHER.

Dewatering Operations (DW)

SM-9

DEWATERING INSTALLATION NOTES

4. DEWATERING OPERATIONS SHALL USE ONE OR MORE OF THE DEWATERING SUMPS SHOWN ABOVE, WELL POINTS, OR OTHER MEANS APPROVED BY THE LOCAL JURISDICTION TO REDUCE THE PUMPING OF SEDIMENT, AND SHALL PROVIDE A TEMPORARY SEDIMENT BASIN OR FILTRATION BMP TO REDUCE SEDIMENT TO ALLOWABLE LEVELS PRIOR TO RELEASE OFF SITE OR TO A RECEIVING WATER. A SEDIMENT BASIN MAY BE USED IN LIEU OF SUMP DISCHARGE SETTLING BASIN SHOWN ABOVE IF A 4-FOOT-SQUARE RIPRAP PAD IS PLACED AT THE DISCHARGE POINT AND THE DISCHARGE END OF THE LINE IS STAKED IN PLACE TO PREVENT MOVEMENT OF THE LINE.

DEWATERING MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

4. DEWATERING BMPs ARE REQUIRED IN ADDITION TO ALL OTHER PERMIT REQUIREMENTS.

5. TEMPORARY SETTLING BASINS SHALL BE REMOVED WHEN NO LONGER NEEDED FOR DEWATERING OPERATIONS. ANY DISTURBED AREA SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE LOCAL

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

(DETAILS ADAPTED FROM DOUGLAS COUNTY, COLORADO, NOT AVAILABLE IN AUTOCAD)

WO WORK BEFORE



S

OUTFALL STREET 33RD RO PI SE

WILSON

&COMPANY

APPROVED BY: DRAWING NAME: to ARAP-FROSION CONTROL DETAILS.du

DRAWN BY:

DESIGNED BY:

OCTOBER 2016 SHEET NO.: ECP1-4

VEHICLE TRACKING

CONTROL (SEE

VTC DETAIL) OR OTHER STABLE SURFACE

_2% SLOPE

VEHICLE TRACKING

CONTROL (SEE VTC

Appropriate Uses

Use this practice at construction sites where vehicles may track sediment offsite onto paved roadways.

Design and Installation

Street sweeping or vacuuming should be

conducted when there is noticeable sediment accumulation on roadways adjacent to the construction site. Typically, this will be concentrated at the entrance/exit to the construction site. Well-maintained stabilized construction entrances, vehicle

On smaller construction sites, street sweeping can be conducted manually using a shovel and broom.

- Inspect paved roads around the perimeter of the construction site on a daily basis and more
- Following street sweeping, check inlet protection that may have been displaced during street
- Inspect area to be swept for materials that may be hazardous prior to beginning sweeping operations.

Street Sweeping/Vacuur	ning
Functions	
Erosion Control	No
Sediment Control	Yes
Site/Material Management	Yes

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Photograph SS-1. A street sweeper removes sediment and potential pollutants along the curb line at a construction site. Photo courtesy of

tracking controls and tire wash facilities can help reduce the necessary frequency of street sweeping and

Never wash accumulated sediment on roadways into storm drains.

Maintenance and Removal

- frequently, as needed. Remove accumulated sediment, as needed.

Street Sweeping/ Vacu	uming
unctions	
osion Control	No
ediment Control	Yes
te/Material Management	Yes

1. SEE PLAN VIEW FOR: -CWA INSTALLATION LOCATION.

COMPACTED BERM AROUND

Concrete Washout Area (CWA)

8 X 8 MIN.

UNDISTURBED OR

COMPACTED SOIL

CWA INSTALLATION NOTES

2. DO NOT LOCATE AN UNLINED CWA WITHIN 400' OF ANY NATURAL DRAINAGE PATHWAY OR WATERBODY. DO NOT LOCATE WITHIN 1,000' OF ANY WELLS OR DRINKING WATER SOURCES. IF SITE CONSTRAINTS MAKE THIS INFEASIBLE, OR IF HIGHLY PERMEABLE SOILS EXIST ON SITE, THE CWA MUST BE INSTALLED WITH AN IMPERMEABLE LINER (16 MIL MIN. THICKNESS) OR SURFACE STORAGE ALTERNATIVES USING PREFABRICATED CONCRETE WASHOUT DEVICES OR A LINED ABOVE GROUND STORAGE ARE SHOULD BE USED.

CONCRETE WASHOUT AREA PLAN

8 X 8 MIN.

SECTION A

CWA-1. CONCRETE WASHOUT AREA

3' MIN.

CONCRETE WASHOUT

3. THE CWA SHALL BE INSTALLED PRIOR TO CONCRETE PLACEMENT ON SITE.

4. CWA SHALL INCLUDE A FLAT SUBSURFACE PIT THAT IS AT LEAST 8' BY 8' SLOPES LEADING OUT OF THE SUBSURFACE PIT SHALL BE 3:1 OR FLATTER. THE PIT SHALL BE AT

5. BERM SURROUNDING SIDES AND BACK OF THE CWA SHALL HAVE MINIMUM HEIGHT OF 1'.

6. VEHICLE TRACKING PAD SHALL BE SLOPED 2% TOWARDS THE CWA.

7. SIGNS SHALL BE PLACED AT THE CONSTRUCTION ENTRANCE, AT THE CWA, AND ELSEWHERE AS NECESSARY TO CLEARLY INDICATE THE LOCATION OF THE CWA TO OPERATORS OF CONCRETE TRUCKS AND PUMP RIGS.

8. USE EXCAVATED MATERIAL FOR PERIMETER BERM CONSTRUCTION.

November 2010

CWA MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON

4. THE CWA SHALL BE REPAIRED, CLEANED, OR ENLARGED AS NECESSARY TO MAINTAIN CAPACITY FOR CONCRETE WASTE. CONCRETE MATERIALS, ACCUMULATED IN PIT, SHALL BE REMOVED ONCE THE MATERIALS HAVE REACHED A DEPTH OF 2'.

5. CONCRETE WASHOUT WATER, WASTED PIECES OF CONCRETE AND ALL OTHER DEBRIS IN THE SUBSURFACE PIT SHALL BE TRANSPORTED FROM THE JOB SITE IN A WATER-TIGHT CONTAINER AND DISPOSED OF PROPERLY.

6. THE CWA SHALL REMAIN IN PLACE UNTIL ALL CONCRETE FOR THE PROJECT IS PLACED.

7. WHEN THE CWA IS REMOVED, COVER THE DISTURBED AREA WITH TOP SOIL, SEED AND MULCH OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE LOCAL JURISDICTION.

(DETAIL ADAPTED FROM DOUGLAS COUNTY, COLORADO AND THE CITY OF PARKER, COLORADO, NOT AVAILABLE IN AUTOCAD). NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

CALL UNCC WO WORKING DA BEFORE YOU DI



ARAPAHOE 33RD STREET OUTFALL - BLAKE ST. TO ARAPAH(

WILSON &COMPANY

toARAP-EROSION CONTROL DETAILS.c OCTOBER 2016
SHEET NO.:
ECP1-5 36 of 6

Urban Drainage and Flood Control District

Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3

CWA-3

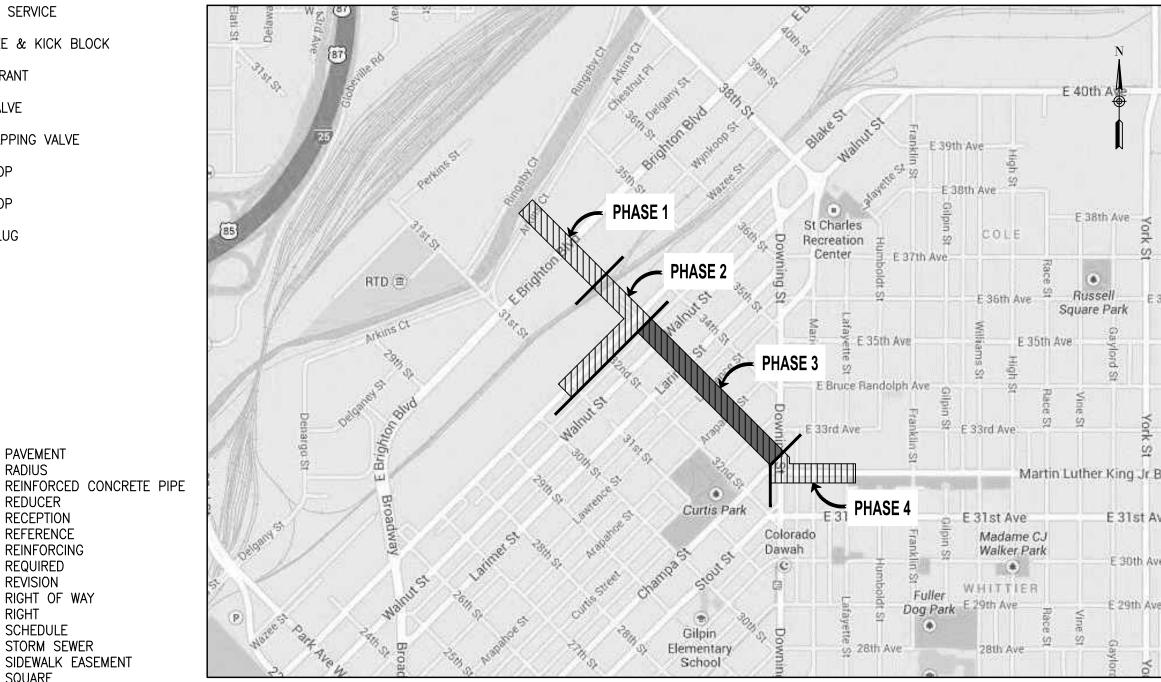
CWA-4

Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 November 2010

(31ST AND 36TH STREET OUTFALL PROJECT) **WATER RELOCATION PLANS** PROPOSED SANITARY SEWER

A PORTION OF THE SOUTHEASTERN QUARTER OF SECTION 22, A PORTION OF THE WESTERN HALF OF SECTION 26, & A PORTION OF THE NORTHEASTERN QUARTER OF SECTION 27; TOWNSHIP 3 SOUTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN CITY AND COUNTY OF DENVER, STATE OF COLORADO

* SOUTH PLATTE RIVER TO LAFAYETTE STREET



SCALE: 1" = 1000'

PHASE 3 - INDEX OF SHEETS

DRAWING	DRAWING	SHEET
NO.	DESCRIPTION	<u>NO.</u>
WTR1-1	WATER IMPROVEMENTS COVER SHEET	1
WTR1-2	WATER IMPROVEMENTS GENERAL NOTES SHEET	2
PHASE 2 	WATER IMPROVEMENTS WATER ONLY PLAN 1 OF 5	3
PHASE 2 WTR1 4	WATER IMPROVEMENTS WATER ONLY PLAN 2 OF 5	4
WTR1-5	WATER IMPROVEMENTS WATER ONLY PLAN 3 OF 5	5
PHASE 4 	WATER IMPROVEMENTS WATER ONLY PLAN 4 OF 5	6
PHASE 4 	WATER IMPROVEMENTS WATER ONLY PLAN 5 OF 5	
PHASE 2 	WATER IMPROVEMENTS OVERALL UTILITY PLAN 1 OF 5	8
PHASE 2 WTR1 9	WATER IMPROVEMENTS OVERALL UTILITY PLAN 2 OF 5	9
WTR1-10	WATER IMPROVEMENTS OVERALL UTILITY PLAN 3 OF 5	10
PHASE 4 	WATER IMPROVEMENTS OVERALL UTILITY PLAN 4 OF 5	11
PHASE 4 	WATER IMPROVEMENTS OVERALL UTILITY PLAN 5 OF 5	12
PHASE 2 WTR1 13	WATER IMPROVEMENTS CROSSING SHEET 1 OF 1	13
WTR1-14	WATER IMPROVEMENTS TEMPORARY CONNECTION SHEET 1 OF	1 14

COORDINATE DATUM

LEGEND

 $\cdot \quad \mathsf{X} \cdot \mathsf{X} \cdot \mathsf{X} \cdot \mathsf{X}$

ABBREVIATIONS

BASELINE

BOULEVARD

CAST IRON

CENTERLINE

CONCRETE

DIAMETER

ELEVATION

EACH WAY

FINISHED

FLOWLINE

FLANGE

GALLON

• 6" 45° HORIZONTAL BEND W/ KB 6"x6" TAPPING SLEEVE W/ KB

• 12"x6" TAPPING SLEEVE W/ KB • 6" DUCTILE IRON PIPE (DIP)

• 3/4" TYPE 'K' COPPER PIPE

REMOVE 6" GATE VALVE

RELOCATE EXISTING 3/4" DOMESTIC TAP

REMOVE/REPLACE EXISTING FIRE HYDRANT

REMOVE 6"x6" TEE AT EXISTING FIRE HYDRANT

REMOVE 6" DUCTILE IRON PIPE (DIP)

6" TAPPING VALVE

6" GATE VALVE

• 6" MJ PLUG

FIRE HYDRANI

FIBERGLASS REINFORCED PIPE

PHASE 3 - QUANTITIES LIST

6"x6" STAINLESS STEEL TAPPING SLEEVE W/ KB 1

EXISTING

ELBOW

DOWN

CONSTRUCTION

DUCTILE IRON PIPE

CONTINUOUS

CENTER

ASTM

BLVD

CEN

CLR

CMP

CONC

CONST

CONT

DWMD

EW

FIN

FT

EXIST

FL OR F/L

DI OR DIP

ELEV OR EL

CL OR C/I

APPROX

EXISTING SANITARY SEWER

EXISTING STORM SEWER

EXISTING 6" WATER LINE

EXISTING 10" WATER LINE

EXISTING 12" WATER LINE

EXISTING WATER VALVE

EXISTING FIRE HYDRANT

EXISTING LIGHT POLE

EXISTING POWER POLE

EXISTING FIBER OPTICS LINE

EXISTING GAS LINE

AMERICAN SOCIETY OF TESTING AND MATERIALS

DENVER WASTEWATER MANAGEMENT DISTRICT

APPROXIMATE OR APPROXIMATELY

CORRUGATED METAL PIPE

EXISTING ELECTRICAL LINE

EXISTING OVERHEAD ELECTRICAL LINE

EXISTING DOMESTIC SERVICE

EXISTING SANITARY SEWER MANHOLE

EXISTING STORM SEWER MANHOLE

EXISTING WATER LINE TO BE ABANDONED

EXISTING SMALL WATER METER (IN MANHOLE)

EXISTING STORM SEWER INLET

PROJECT COORDINATES ARE MODIFIED UTM ZONE 13 NORTH NAD 83 (1992) COORDINATES IN US SURVEY FEET. THE COMBINED ELEVATION/SCALE FACTOR USED TO MODIFY THE COORDINATES FROM UTM SFT. TO PROJECT COORDINATES IS 1.000650402. THE RESULTING COORDINATES ARE DECREASED BY 14,000,000 SFT. IN THE NORTHING AND 1,000,000 SFT. IN THE EASTING AFTER MULTIPLYING THE UTM SFT. COORDINATES BY THE COMBINED ELEVATION/SCALE FACTOR.

370.4

374.0

PROJECT COORDINATES NORTHING US SURVEY FEET = (UTM NORTH ZONE 13 COORDINATE NORTHING * 1.000650402 - 14,000,000); PROJECT COORDINATES EASTING US SURVEY FEET

= (UTM NORTH ZONE 13 COORDINATE EASTING * 1.000650402 - 1,000,000).

BASIS OF BEARINGS

PROPOSED SANITARY SEWER CLEANOUT

PROPOSED SANITARY SEWER PLUG

PROPOSED STORM SEWER MANHOLE

PROPOSED STORM SEWER INLET

PROPOSED DOMESTIC SERVICE

PROPOSED WATER TEE & KICK BLOCK

PROPOSED STORM SEWER

PROPOSED 6" WATER LINE

PROPOSED FIRE HYDRANT

PROPOSED WATER VALVE

PROPOSED CORP STOP

PROPOSED CURB STOP

PROPOSED WATER PLUG

PROPOSED 45° BEND

PVMT OR PVT

SS

GALVANIZED

GATE VALVE

HIGH POINT

HORIZONTAL

KICK BLOCK

LINEAR FEET

LOW POINT

MANUFACTURER

MIDDLE OR MIDPOINT

MECHANICAL JOINT

NOT IN CONTRACT

MEAN SEA LEVEL

NOT TO SCALE

ON CENTER

PROPOSED

PLAIN END

PROPERTY LINE

PROFILE GRADE LINE

POLYVINYL CHLORIDE

MAXIMUM

MANHOLE

MINIMUM

NUMBER

NOMINAL

NTS

P OR PROP

PL OR P/L

INVERT

POUNDS

LEFT

GROUNDWATER

GAUGE (MATERIAL)

HORIZONTAL CONTROL LINE

PROPOSED WATER TAPPING VALVE

PAVEMENT

REDUCER

RECEPTION

REFERENCE

REINFORCING

RIGHT OF WAY

STORM SEWER

SIDEWALK EASEMENT

REQUIRED

SCHEDULE

SQUARE

STREET

STATION

STANDARD

SANITARY SEWER

THRUST BLOCK

TOP OF SEWER

UTILITY EASEMENT

UNDERGROUND

THREADED

THICKNESS

TYPICAL

VERTICAL

WIDTH

WATER

WITH

REVISION

RIGHT

RADIUS

ALL BEARINGS ARE BASED ON THE LINE CONNECTING PROJECT "CONTROL POINT NO. 1" TO PROJECT "CONTROL POINT NO. 2", BEING A GRID BEARING OF N31°08'41"E AS OBTAINED FROM A GLOBAL POSITIONING SYSTEM (GPS) SURVEY BASED ON THE COLORADO HIGH ACCURACY REFERENCE NETWORK (CHARN). SAID GRID BEARING IS NAD 83 (1992) UTM ZONE 13 NORTH.

CONTROL POINTS "1 & 2" ARE MONUMENTED WITH A 2" DIAMETER ALUMINUM CAP SET ON #5 REBAR, CAP STAMPED "L.P.I. (PT. #) SURVEY CONTROL POINT".

BENCHMARK

PROJECT ELEVATIONS ARE BASED ON THE CITY AND COUNTY OF DENVER BENCHMARK NO. BM-377, HAVING A PUBLISHED NAVD 88 ELEVATION OF 5,196.44 FEET.

DIFFERENTIAL LEVELS WERE RUN THROUGH THE SET AND FOUND PROJECT CONTROL POINTS AS SHOWN IN THE SURVEY CONTROL DOCUMENTS TO ESTABLISH VERTICAL CONTROL WITHIN THE PROJECT LIMITS.

ALL CITY AND COUNTY OF DENVER BENCHMARKS ARE NAVD 88 DATUM. PUBLISHED ELEVATIONS UPDATED MAY, 2001.

CIVIL ENGINEER

WILSON & COMPANY 1675 BROADWAY, SUITE 200 DENVER, COLORADO 80202 PH: 303-297-2976 FAX: 303-297-2693 KYLE GODWIN, PE KYLE.GODWIN@WILSONCO.COM

LEGAL DESCRIPTION

LYING IN SECTIONS 22, 26, 27, & 35 TOWNSHIP 3 SOUTH, RANGE, 68 WEST OF THE 6TH PRINCIPLE MERIDIAN CITY AND COUNTY OF DENVER, COLORADO

FIRE FLOW DATA

ſ	
	FIRE FLOW REQUIREMENTS ARE1,500 GPM.
	THIS BUILDING REQUIRES 1 FIRE HYDRANTS TO MEET
	FIRE-FLOW REQUIREMENTS.
	EACH FIRE HYDRANT MUST SUPPLY 1,500 GPM MINIMUM
	@ 20 PSI RESIDUAL PRESSURE.
	CODE USED FOR ANALYSIS: N/A
	OCCUPANCY GROUP: N/A
	CONSTRUCTION TYPE: N/A
	FIRE AREA: N/A
	THIS BUILDING IS NOT FULLY SPRINKLERED.

Fire hydrants shall be installed according to Denver Water Standards. The number and location(s) of fire hydrants(s) and fire flow as shown on this water main installation is correct as specified by the _____ Fire Department Signatrure of Fire Chief or Designated Representative Date Signed

To be completed by Denver Water Denver Water's review of these plans relates

only to Denver Water requirements, and does not include a full analysis of: soil conditions, support or load factors, or any other matters. Any modification of these plans must be resubmitted to Denver Water for review prior to construction. The Professional Engineer, Contractors, and Owners designing and constructing this proposed water distribution system shall be solely responsible for the adequacy of the design, installation, and materials utilized in this water distribution system for any specific site

Date Contract No.

☐ Approved for Construction Approval Valid for 1 year

DENVER WATER

|Sales Administrator



WATER SHEETS UNDER SEPERATE FINAL REVIEW BY DENVER WATER. FINAL STAMPED WATER SHEETS WILL BE ISSUED AS ADDENDUM TO THE BID SET.

KYLE MATHEW GODWIN COLORADO PE# 47646

OUTFALL

STREET 33RD SE

DRAWN BY: DESIGNED BY: APPROVED BY: KMG DRAWING NAME:

WTR 1&2 COVER&NOTES.dwg

SEPTEMBER 2016 SHEET NO.: WTR1-1 37 of 61 2. CONTRACTORS SHALL MAINTAIN A COPY OF THE CURRENT ENGINEERING STANDARDS ON-SITE AT ALL TIMES DURING CONSTRUCTION. SEE THE CHART BELOW FOR A QUICK REFERENCE TO THE FREQUENTLY USED MATERIAL SPECIFICATIONS.

MATERIAL SPECIFICATION QUICK REFERENCES

MATERIAL SPECIFICATION	DESCRIPTION
MS 01	DI PIPE
MS 02	PVC PIPE
MS 03	FITTINGS
MS 04, MS 05	VALVES
MS 08	TAPPING VALVES
MS 09	TAPPING SLEEVES
MS 12	VALVE BOXES (RECYCLED WATER SYSTEM VALVE BOXES SHALL BE FITTED WITH TRIANGULAR COVERS CAST WITH THE WORDS "DENVER WATER RECYCLES" AND SHALL BE COATED WITH A FUSION BONDED EPOXY COATING, PANTONE 2577U IN COLOR.)
MS 13	DRY BARREL FIRE HYDRANTS
MS 23	BRASS AND BRONZE GOODS
MS 29	RESTRAINT DEVICE

- 3. TRACER WIRE, 12 GAUGE, SHALL BE INSTALLED ON ALL NON-METALLIC WATER MAINS.
- 4. FOR ALL PIPE INSTALLATIONS, THE DEPTH OF COVER OVER THE PIPE, MEASURED FROM OFFICIAL STREET GRADE TO THE TOP OF THE PIPE, SHALL BE A MINIMUM OF 4.5 FEET AND SHALL BE KNOWN AS THE COVER OVER THE PIPE. IF DIFFICULTIES ARISE WHEN CROSSING INTERFERENCE, AND WHERE SPECIFICALLY APPROVED BY DENVER WATER, DEVIATIONS FROM 4.5 FEET OF COVER WILL BE PERMITTED. THE COVER OVER THE PIPE SHALL BE A MINIMUM OF 4.5 FEET AND A MAXIMUM OF 10 FEET. REFER TO STANDARD DRAWING SHEET 16.
- 5. ANY CHANGES IN ALIGNMENT AND GRADE SHALL BE AUTHORIZED BY DENVER WATER AND SHALL BE ACCOMPLISHED BY THE INSTALLATION OF ADDITIONAL FITTINGS. THE DEFLECTION OF JOINTS IS PERMITTED ONLY WHEN INSTALLING PIPE ON HORIZONTAL OR VERTICAL CURVES.
- 6. THE CONTRACTOR SHALL ADJUST ALL VALVE BOXES AND FIRE HYDRANTS TO THE FINAL FINISHED GRADE. 7. ALL BENDS, TEES, FIRE HYDRANTS, BLOW-OFFS, AND PLUGS AT DEAD-END MAINS SHALL BE PROTECTED
- FROM THRUST WITH MECHANICAL RESTRAINT AND CONCRETE THRUST BLOCKS IN ACCORDANCE WITH DENVER WATER'S ENGINEERING STANDARD DRAWINGS SHEET 28 AND 32. 8. ALL VALVES ARE TO BE LOCATED ON PROPERTY LINE EXTENSIONS, EXCEPT FOR TAPPING TEES WHERE AN
- ADDITIONAL VALVE SHALL BE PLACED ON THE TAPPING TEE. OTHER VALVE LOCATIONS MAY BE REQUIRED AS SHOWN ON THE PLANS. 9. WHEN IT IS NECESSARY TO LOWER OR RAISE WATER LINES AT STORM DRAINS AND OTHER UTILITY
- CROSSINGS, A MINIMUM CLEARANCE OF 1.5 FEET SHALL BE MAINTAINED BETWEEN THE OUTSIDE OF THE
- 10. THE CONTRACTOR SHALL HAVE ONE SIGNED COPY OF THE APPROVED WATER PLANS IN HIS/HER POSSESSION AT ALL TIMES.
- 11. ONLY ONE POINT OF CONNECTION WILL BE ALLOWED UNTIL THE TESTING OF THE NEW INSTALLATIONS IS
- 12. NEWLY INSTALLED WATER MAINS AND FIRELINES SHALL BE HYDROSTATICALLY TESTED IN ACCORDANCE WITH DENVER WATER ENGINEERING STANDARDS, SECTION 8.25.
- 13. PRIOR TO THE INSTALLATION OF WATER MAINS, ROAD CONSTRUCTION MUST HAVE PROGRESSED TO AT LEAST THE SUB-GRADE STATE. SUB-GRADE IS DEFINED AS AN ELEVATION OF NO MORE THAN 7 INCHES BELOW THE FINISHED STREET GRADE.
- 14. THE CONTRACTOR IS RESPONSIBLE FOR:
 - A. NOTIFYING CUSTOMERS WHO MAY BE AFFECTED BY A WATER OUTAGE DURING CONSTRUCTION. OBTAINING, AT THE CONTRACTOR'S EXPENSE, APPLICABLE LICENSES, PERMITS, BONDS, ETC. THAT ARE
 - REQUIRED FOR THE MAIN INSTALLATION/SYSTEM MODIFICATION. C. CONTACT DENVER WATER'S CONSTRUCTION ENGINEERING PERSONNEL FOR THE PRE-CONSTRUCTION MEETING AND INSPECTION, 303-628-6038, AT LEAST 48 HOURS PRIOR TO BEGINNING CONSTRUCTION IN THE EVENT OF AN EMERGENCY IN DENVER OR IN A TOTAL SERVICE AREA AFTER WORKING HOURS, CALL DENVER WATER'S WESTSIDE DISPATCHER: 303-628-6390. IN A MASTER METER DISTRICT, PLEASE
 - CONTACT THE REPRESENTATIVE OF THE DISTRICT IN WHICH THE PROJECT IS TAKING PLACE. D. PAYING ALL ADDITIONAL CHARGES FOR INSPECTION OUTSIDE NORMAL WORK HOURS.

NOTE: BE ADVISED THAT ON OCCASION VALVES IN OUR SYSTEM MAY BE INOPERABLE. ON SUCH OCCASIONS. IT MAY BECOME NECESSARY TO BACK UP AN ADDITIONAL BLOCK FOR THE SHUT OUT. IF THAT OCCURS, MAKE ADDITIONAL NOTIFICATIONS TO CUSTOMERS WITH THE MANDATORY 24 HOURS ADVANCE NOTICE. WHEN VALVE MAINTENANCE IS REQUIRED, A DELAY OF SEVERAL DAYS SHOULD BE EXPECTED.

TAP AND METER NOTES: (for denver, total service, and read and bill areas only. in MASTER METER DISTRICTS, PLEASE REFER TO THE SPECIFICATION FOR THAT DISTRICT)

- 1. BEFORE ANY TAPS ARE MADE FROM MAINS, APPLICATION(S) FOR THE TAPS MUST BE RECEIVED AND
- APPROVED BY THE DISTRIBUTOR AND BY DENVER WATER. 2. DENVER WATER WILL MAKE ALL TAPS THAT ARE 2 INCHES AND SMALLER.
- 3. INDIVIDUAL SERVICE LINE PRESSURE REDUCING VALVES (PRV) ARE REQUIRED WHEN AREA PRESSURE EXCEEDS
- 4. SERVICES AND METERS:
- A. THE CONTRACTOR SHALL HOLD AN ON-SITE PRE-CONSTRUCTION CONFERENCE WITH THE METER INSPECTOR FOR ALL TAPS, SERVICE LINES, AND METERS LARGER THAN 1 INCH, AND FOR PROJECTS INVOLVING MORE THAN ONE TAP AND SERVICE. TO SCHEDULE A PRE-CONSTRUCTION CONFERENCE CALL 303-628-6145.
- B. A COPY OF THESE PLANS WITH DENVER WATER'S APPROVAL STICKER MUST BE PRESENT ON-SITE AT
- THE TIME THE TAP IS MADE AND AT THE TIME THE METER IS INSPECTED OR INSTALLED. C. PRIOR TO THE TAP BEING MADE, THE SERVICE ADDRESS SHALL BE POSTED, ALONG WITH THE CURB VALVE, METER YOKE, AND METER PIT/VAULT INSTALLED. UPON TAP INSTALLATION, THE CONTRACTOR MAY REQUEST THE METER INSPECTION AFTER THE FIRST POUR OF CONCRETE HAS OCCURRED. THE SERVICE ADDRESS SHALL REMAIN POSTED UNTIL THE METER SETTING PASSES INSPECTION.
- D. A SOIL AMENDMENT INSPECTION WILL BE REQUIRED PRIOR TO THE COMPLETION OF THE CERTIFICATE OF OCCUPANCY. CONTACT CONSERVATION AT 303-628-6670 FOR INFORMATION AND TO SCHEDULE A SOIL AMENDMENT INSPECTION.
- E. METERS CANNOT BE SET OR INSPECTED, OR SERVICES ACTIVATED, UNTIL THE REQUIREMENTS FOR BACKFLOW PREVENTION HAVE BEEN COMPLETED. CONTACT THE BACKFLOW PREVENTION PROGRAM
- PERSONNEL AT 303-628-5940 FOR FURTHER INFORMATION. F. ALLOW AT LEAST THREE WORKING DAYS ADVANCE NOTICE WHEN SCHEDULING TAPS. TO SCHEDULE A TAP CALL 303-628-6701; FOR QUESTIONS RELATED TO A METER INSPECTION CALL 303-628-6145. SERVICE ACTIVATION WILL TAKE PLACE WHEN THE SERVICE AND METER SETTING PASS INSPECTION.
- G. ALL METER AND AUTOMATIC METER READING DEVICE LOCATIONS SHALL BE APPROVED BY A DENVER WATER METER INSPECTOR, EXCEPT IN MASTER METER DISTRIBUTOR DISTRICTS.

- H. METER PITS AND VAULTS MUST BE SET FLUSH WITH THE FINAL GRADE OF THE LANDSCAPE, INCLUDING PROPER DEPTH OF SOIL AMENDMENT. IF FINAL GRADING HAS NOT BEEN COMPLETED AT THE TIME OF METER INSPECTION, THE OWNER WILL BE REQUIRED TO RAISE OR LOWER THE METER PIT/VAULT WHEN FINAL GRADE IS ESTABLISHED. ADJUSTMENT OF THE PIT MAY REQUIRE ADJUSTMENT OF THE METER SETTING WITHIN THE PIT.
- I. METER SETTING, VALVES, AND SERVICE LINES FROM THE MAIN TO THE BACKFLOW PREVENTER ASSEMBLY, IF PRESENT, OR TO 5 FEET AFTER THE METER VAULT, MUST MEET ALL APPLICABLE ENGINEERING STANDARDS IN EFFECT AT THE TIME OF ACTIVATION. IF NECESSARY TO COMPLY WITH CURRENT STANDARDS, MODIFICATIONS MAY BE REQUIRED FROM THE DETAILS ON THESE PLANS.
- J. NO PRESENT OR FUTURE FENCES OR WALLS ARE PERMITTED BETWEEN THE RIGHT-OF-WAY (ROW) OR EASEMENT AND THE METER SETTING. THERE SHALL BE NO PERMANENT OBSTRUCTIONS WITHIN 5 FEET OF THE OUTSIDE WALL OF THE METER PIT OR VAULT.
- K. TAP RELOCATION (FROM WHAT IS SHOWN ON THE PLANS) MAY BE NECESSARY TO AVOID PAVED AREAS OR OTHER OBSTRUCTIONS THAT ARE NOT SHOWN ON THE PLANS. DEVIATIONS FROM THESE PLANS AND STANDARDS MUST BE APPROVED PRIOR TO CONSTRUCTION.
- L. INSIDE THE CITY OF DENVER AND IN TOTAL SERVICE AND READ & BILL DISTRIBUTOR DISTRICTS, METERS MUST BE FURNISHED WITH AUTOMATIC METER READING (AMR) DEVICES AS SPECIFIED BY DENVER WATER. THE AMR DEVICES WILL BE INSTALLED BY DENVER WATER AT THE TIME OF SERVICE ACTIVATION.
- M. METER PITS AND VAULTS SHALL HAVE APPROPRIATE LIDS BASED ON THE LOCATION AND THE APPLICATION. CONTACT METER INSPECTION AT 303-628-6145 TO DETERMINE THE CORRECT LID
- N. THE CONTRACTOR SHALL PROVIDE A REMOTE AMR DEVICE MOUNTING BOX WHEN REQUIRED. INSTALL A DOUBLE-GANG 4x4 ELECTRICAL JUNCTION BOX; MOUNT AS DIRECTED 7 FEET ABOVE GRADE. INSTALL BELDEN #9451 CABLE IN 0.75 INCH OR LARGER CONDUIT FROM THE METER TO THE MOUNTING BOX. TWO BOXES AND TWO CABLES ARE REQUIRED FOR COMPOUND METERS.
- O. INSIDE THE CITY OF DENVER, ALL MULTI-FAMILY DWELLINGS WITH A SINGLE TAP, SERVICE LINE, AND METER ARE REQUIRED TO SUB-METER EACH INDIVIDUAL UNIT (SEC 401.3.2 OF DENVER MODIFICATIONS TO THE INTERNATIONAL PLUMBING CODE, ORDINANCE NUMBER 576, SERIES 2004), CALL THE CITY AND COUNTY OF DENVER PLUMBING INSPECTOR FOR INFORMATION AT 720-865-2625.
- P. INSIDE THE CITY OF DENVER, ALL SERVICE LINES MUST BE INSTALLED TO AVOID EXISTING OR PROPOSED STREET TREES. CONTACT THE CITY AND COUNTY OF DENVER'S FORESTER AT 720-913-0647 FOR
- Q. EXISTING SERVICES MUST BE METERED AT ALL TIMES UNTIL THE TAP HAS BEEN CUT AT THE MAIN AND WITNESSED BY DENVER WATER.

CROSS-CONNECTION CONTROL REQUIREMENTS:

THE LICENSEES LISTED BELOW SHALL BE IN CONFORMANCE WITH DENVER WATER'S ENGINEERING STANDARDS, CHAPTER 5.05, CROSS-CONNECTION CONTROL AND BACKFLOW PREVENTION. BACKFLOW PREVENTION ASSEMBLIES ARE REQUIRED TO BE INSTALLED ON THE FOLLOWING WATER SERVICE LINES:

- 1. COMMERCIAL PROPERTIES: REAL ESTATE ZONED FOR BUSINESSES AND/OR INDUSTRIAL USE THAT CONSIST OF SIX OR MORE UNITS WITH A DOMESTIC, FIRELINE, OR DEDICATED WATER IRRIGATION SERVICE TAP (DEFINED AS SUCH FOR CROSS-CONNECTION PURPOSES).
- DOMESTIC, DEDICATED IRRIGATION, FIRELINE AND/OR RECYCLED WATER SERVICE LINES. 2. MULTI-FAMILY RESIDENTIAL: A DWELLING WITH TWO TO FIVE UNITS WITH A DOMESTIC, FIRELINE, AND/OR
- DEDICATED WATER SERVICE TAP (DEFINED AS SUCH FOR CROSS-CONNECTION PURPOSES) • PREMISES OVER THREE STORIES/GREATER THAN 30 FEET, FIRE PROTECTION SYSTEM, COMMON BOILER, AUXILIARY WATER, SWIMMING POOL AND IRRIGATION SYSTEMS.
- 3. SINGLE FAMILY RESIDENTS: A SINGLE UNIT DWELLING (DEFINED AS SUCH FOR CROSS—CONNECTION PURPOSES).
- DUAL WATER SUPPLY AGREEMENT.
- A. ALL BACKFLOW PREVENTION ASSEMBLIES SHALL BE A MODEL MANUFACTURED IN COMPLIANCE WITH AWWA C510 AND C511 AND SHALL HAVE MET THE SPECIFICATIONS BY THE UNIVERSITY OF CALIFORNIA FOUNDATION FOR CROSS—CONNECTION CONTROL AND HYDRAULIC RESEARCH:
 - FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH SCHOOL OF ENGINEERING MC-2531
 - UNIVERSITY OF SOUTHERN CALIFORNIA P.O. BOX 77902
 - LOS ANGELES, CALIFORNIA 90007 FOUNDATION OFFICE: 886-545-6340
- http://www.usc.edu/dept/fccchr/ B. THE LICENSEE IS REQUIRED TO HAVE A CERTIFIED AMERICAN BACKFLOW PREVENTION ASSOCIATION (ABPA) OR AMERICAN SOCIETY OF SANITARY ENGINEERING (ASSE) TESTER INSPECT AND TEST THE EXISTING AND/OR NEWLY INSTALLED CONTAINMENT BACKFLOW PREVENTION ASSEMBLIES ON THE DEDICATED WATER SERVICE LINES (DOMESTIC, DEDICATED IRRIGATION, FIRELINE, AND RECYCLED) UPON
- INSTALLATION AND ANNUALLY THEREAFTER. C. THE ABPA OR ASSE CERTIFIED BACKFLOW TESTER IS RESPONSIBLE TO MEET THE REQUIREMENTS LISTED IN THE ENGINEERING STANDARDS, CHAPTER 5.05.
 - •• IF THE ABPA OR ASSE CERTIFIED BACKFLOW TESTER IS TESTING A BACKFLOW PREVENTION ASSEMBLY INSTALLED ON A RECYCLED WATER SERVICE LINE, THE TESTER IS REQUIRED TO HAVE A DEDICATED RECYCLED WATER TEST GAUGE.
- D. WITHIN 48 HOURS OF DENVER WATER SETTING THE METER AND TURNING ON THE WATER SERVICE, THE ABPA OR ASSE CERTIFIED BACKFLOW TESTER IS REQUIRED TO SUBMIT THE CONTAINMENT BACKFLOW ASSEMBLY TEST REPORT(S) TO THE CROSS-CONNECTION CONTROL OFFICE:
 - PHONE: 303-628-5969 FAX: 303-794-8325 EMAIL: <u>CrossConnectionControl@denverwater.org</u> MAILING ADDRESS: DENVER WATER
 - ATTN: CROSS-CONNECTION CONTROL 6100 W. QUINCY AVENUE

DENVER, COLORADO 80235

- E. THERE SHALL BE NO UNPROTECTED TAKEOFFS FROM THE SERVICE LINE AHEAD OF ANY METER OR AHEAD OF ANY BACKFLOW PREVENTION ASSEMBLY LOCATED AT THE POINT OF DELIVERY TO THE CUSTOMER'S WATER SYSTEM.
- F. NO BRANCH LINES OR TAPS ARE ALLOWED ON DEDICATED COMMERCIAL IRRIGATION WATER SERVICE LINES OR RECYCLED WATER SERVICE LINE FOR DOMESTIC (POTABLE) USE (E.G. DRINKING FOUNTAINS, WATER PLAY FEATURES, SWIMMING POOL, RESTROOM FACILITIES, ETC.):
- 1.1. BETWEEN THE IRRIGATION TAP AND METER. 1.2. BETWEEN THE METER AND THE BACKFLOW PREVENTION ASSEMBLY. 1.3. DOWNSTREAM FROM THE BACKFLOW PREVENTION ASSEMBLY.
- 4. COMMERCIAL IRRIGATION WATER SERVICE LINE TAPS:
- COMPLY WITH THE CROSS-CONNECTION CONTROL REQUIREMENTS LISTED ABOVE (A-F).
- REQUIRE AN APPROVED USC FCCCHR REDUCED PRESSURE PRINCIPLE (RP) BACKFLOW PREVENTION ASSEMBLY TO BE INSTALLED 5 FEET DOWNSTREAM FROM THE METER PIT AS AN ABOVE GROUND INSTALLATION BEFORE ANY CONNECTIONS. REFER TO THE MANUFACTURER'S INSTALLATION INSTRUCTIONS FOR HEIGHT AND ORIENTATION REQUIREMENTS.
- •• IF THE BACKFLOW PREVENTION ASSEMBLY CANNOT BE INSTALLED 5 FEET DOWNSTREAM FROM THE METER PIT, INCLUDE A VARIANCE LETTER JUSTIFYING THE NEED FOR RELOCATION. 5. RECYCLED WATER SERVICE LINE TAPS:
- BACKFLOW PREVENTION ASSEMBLIES ARE REQUIRED TO BE INSTALLED ON COMMERCIAL RECYCLED WATER SERVICE LINE TAPS:
- IF CHEMICAL INJECTION IS USED DOWNSTREAM FROM THE METER.
- IF PUMPS ARE USED DOWNSTREAM FROM THE METER.
- IF THE EXISTING OR PROPOSED SYSTEM POSES A RISK TO THE INTEGRITY OF THE RECYCLED WATER SYSTEM.
 - •• COMPLY WITH THE CROSS-CONNECTION CONTROL REQUIREMENTS LISTED ABOVE (A-F) •• REQUIRE AN APPROVED USC FCCCHR REDUCED PRESSURE PRINCIPLE (RP) BACKFLOW PREVENTION ASSEMBLY TO BE INSTALLED 5 FEET DOWNSTREAM FROM THE METER PIT AS AN ABOVE GROUND INSTALLATION BEFORE ANY CONNECTIONS. REFER TO THE MANUFACTURER'S INSTALLATION

- INSTRUCTIONS FOR HEIGHT AND ORIENTATION REQUIREMENTS.
- ••• IF THE BACKFLOW PREVENTION ASSEMBLY CANNOT BE INSTALLED 5 FEET DOWNSTREAM FROM THE METER PIT, INCLUDE A VARIANCE LETTER JUSTIFYING THE NEED FOR RELOCATION.
- •• BACKFLOW PREVENTION ASSEMBLIES INSTALLED ON RECYCLED WATER SERVICE LINE SHALL BE IDENTIFIED AS "RECYCLED WATER".
- 6. RECYCLED OR RAW WATER (DITCH WATER, POND, WELL, ETC.) USED FOR IRRIGATION ON THE PREMISES:
 - COMPLY WITH THE CROSS-CONNECTION CONTROL REQUIREMENTS LISTED ABOVE (A-F). REQUIRES AN APPROVED USC FCCCHR BACKFLOW PREVENTION ASSEMBLY (CONTAINMENT) TO BE
 - INSTALLED 5 FEET DOWNSTREAM FROM THE METER PIT ON ANY POTABLE WATER SERVICE LINE.
 - •• THE BACKFLOW ASSEMBLY TYPE IS DETERMINED BY THE 'DEGREE OF HAZARD' DOWNSTREAM FROM THE METER; REFER TO DENVER WATER'S ENGINEERING STANDARDS, 1.06, DEGREE OF HAZARD, OR CONTACT CROSS-CONNECTION CONTROL AT 303-628-5940.
- 7. IT IS AT THE SOLE DISCRETION OF DENVER WATER'S CROSS—CONNECTION CONTROL SECTION TO APPROVE VARIANCE REQUESTS RELATED TO PROPOSED BACKFLOW PREVENTION ASSEMBLY INSTALLATION.

HEALTH NOTES/WATER QUALITY:

- 1. THE COLORADO DEPARTMENT OF PUBLIC HEALTH & ENVIRONMENT (CDPHE) REGULATES ASBESTOS ACTIVITIES THROUGH THE AIR POLLUTION CONTROL DIVISION (APCD) AND THE SOLID WASTE AND MATERIALS MANAGEMENT DIVISION (SWMMD) WHEN SOIL CONTAMINATION IS INVOLVED. DENVER WATER WILL REQUIRE CONTRACTORS AND DEVELOPERS TO FOLLOW THE PROCEDURES BELOW WHEN CEMENT ASBESTOS PIPE IS
 - THE PIPE MUST BE REMOVED FROM THE EXCAVATION FOR PROPER DISPOSAL
 - THE CONTRACTOR/DEVELOPER WILL MANAGE THE PIPE IN ACCORDANCE WITH THE FOLLOWING
 - •• COLORADO AIR REGULATIONS NO 8 CONTROL OF HAZARDOUS AIR POLLUTANTS.
 - •• OSHA 29 CFR 1910.1001 GENERAL INDUSTRY STANDARDS ASBESTOS •• OSHA 29 CFR 1926.1101 - CONSTRUCTION STANDARDS - ASBESTOS
 - IF LARGE AMOUNTS OF CEMENT ASBESTOS PIPE ARE ANTICIPATED TO BE REMOVED, THE MATERIAL MUST BE MANAGE BY AN APPROPRIATE ASBESTOS ABATEMENT CONTRACTOR (160 SQUARE FEET OR 260 LINEAR FEET WILL REQUIRE A PERMIT).

NOTE: CEMENT ASBESTOS PIPE IS CONSIDERED A NON-FRIABLE ASBESTOS MATERIAL, DEFINED AS CONTAINING MORE THAN 1% ASBESTOS BY WEIGHT, AND CANNOT BE CRUMBLED, PULVERIZED, OR REDUCED TO POWDER BY HAND PRESSURE. THEREFORE, A RELEASE OF ASBESTOS FIBERS IS NOT LIKELY DURING NORMAL USE AND HANDLING OF THIS MATERIAL.

- 2. DENVER WATER PERSONNEL ARE NOT RESPONSIBLE FOR WORK SITE SAFETY OR THE COMPLIANCE/ENFORCEMENT OF SAFETY REGULATIONS AND STANDARDS ESTABLISHED BY OTHER AGENCIES. ALL SAFETY COMPLIANCE/ENFORECEMENT AT THE WORK SITE SHALL BE THE CONTRACTOR'S SOLE
- 3. THE WATER QUALITY CONTROL DIVISION OF THE COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT (CDPHE) REQUIRES ALL WATER LINE CONTRACTORS TO POSSESS A CURRENT DISCHARGE PERMIT FOR DISCHARGES OF CHLORINATED AND PROCESS WATERS ASSOCIATED WITH THE INSTALLATION OF NEW MAINS OR CONDUITS. CONTACT CDPHE WATER QUALITY CONTROL DIVISION AT 303-692-3539 FOR INFORMATION ON OBTAINING THE REQUIRED PERMIT.
- 4. CHLORINATION AND FLUSHING: ALL WATER MAINS SHALL BE INSTALLED AND CHLORINATED IN ACCORDANCE WITH DENVER WATER'S ENGINEERING STANDARDS, SECTION 8.24. THE LINES SHALL BE CHLORINATED IN ACCORDANCE WITH AWWA C-651, "DISINFECTING WATER MAINS". THE PREFERRED METHOD IS TO USE SUFFICIENT CHLORINE TABLETS TO PRODUCE A 25 MG/L SOLUTION. TABLETS SHOULD BE ATTACHED TO THE TOP OF THE PIPE WITH AN APPROVED ADHESIVE CERTIFIED TO NSF STANDARD 61, PRIOR TO PIPE INSTALLATION IN THE TRENCH. CHLORINATION OF 16 INCH AND LARGER PIPE REQUIRES A CHLORINE SLURRY. THE CHLORINATION OF ANY FINISHED PIPELINE SHALL BE COMPLETED PRIOR TO HYDROSTATIC TESTING.

IRRIGATION NOTES:

- 1. IRRIGATION OF MEDIANS AND OTHER PUBLIC LANDSCAPED AREAS LESS THAN 25 FEET IN WIDTH MUST BE DONE IN ACCORDANCE WITH DENVER WATER OPERATING RULE 14.02.3 (CALL DENVER WATER CONSERVATION
- SECTION AT 303-628-6343 FOR INFORMATION REGARDING IRRIGATION SYSTEMS). FOR STRIPS OF LAND LESS THAN 6 FEET IN WIDTH — SPRAY IRRIGATION SHALL BE PROHIBITED.
- LOW-FLOW IRRIGATION SYSTEMS ARE REQUIRED. • FOR STRIPS OF LAND BETWEEN 6 FEET AND 15 FEET IN WIDTH - ONLY LOW-FLOW IRRIGATION, OR SPRAY IRRIGATION USING LOW-ANGLE SPRAY NOZZLES DESIGNED FOR THE SPECIFIC WIDTH TO BE IRRIGATED SHALL BE PERMITTED. ALL SPRAY HEADS MUST BE PRESSURE REDUCING AND DESIGNED TO
- PREVENT LOW HEAD DRAINAGE. • FOR STRIPS OF LAND MORE THAN 15 FEET IN WIDTH - ONLY GEAR-DRIVEN ROTORS WITH LOW-ANGLE NOZZLES MAY BE USED TO IRRIGATE TURF AREAS. PLANTING BEDS MAY BE IRRIGATED WITH LOW-FLOW SPRAY IRRIGATION. ALL SPRAY HEADS MUST BE PRESSURE REDUCING AND DESIGN TO PREVENT LOW HEAD DRAINAGE.
- 2. IRRIGATION SERVICE LINES REQUIRE AN APPROVED UNIVERSITY OF SOUTHERN CALIFORNIA (USC) REDUCED PRESSURE PRINCIPLE (RP) BACKFLOW PREVENTION ASSEMBLY (CONTAINMENT) TO BE INSTALLED 5 FEET DOWNSTREAM FROM THE METER PIT AS AN ABOVE GROUND INSTALLATION BEFORE ANY CONNECTIONS. REFER TO THE MANUFACTURER'S INSTALLATION INSTRUCTIONS FOR HEIGHT AND ORIENTATION REQUIREMENTS.
- 3. IF RECYCLED OR RAW WATER (DITCH WATER, POND, WELL, ETC.) IS USED FOR IRRIGATION ON THE PREMISES, AN APPROVED UNIVERSITY OF CALIFORNIA (USC) BACKFLOW PREVENTION ASSEMBLY (CONTAINMENT) SHALL BE INSTALLED 5 FEET DOWNSTREAM FROM THE METER PIT ON ANY POTABLE WATER SERVICE LINE. THE BACKFLOW ASSEMBLY TYPE IS DETERMINED BY THE DEGREE OF HAZARD DOWNSTREAM FROM THE METER (RP - HIGH HAZARD INSTALLED ABOVE GROUND OR DC - LOW HAZARD INSTALLED BELOW GROUND - 60 INCH DIAMETER MANHOLE). FOR ADDITIONAL INFORMATION, PLEASE REFERENCE DENVER WATER'S ENGINEERING STANDARDS, 6.11, OR CONTACT CROSS-CONNECTION CONTROL AT 303-628-5940.
- 4. A SOIL AMENDMENT WILL BE REQUIRED ON EVERY PROPERTY REQUIRING NEW WATER SERVICE.

DISCLAIMER

DENVER WATER STANDARD OPERATING PROCEDURES REPRESENT RECOMMENDED PRACTICES THAT SHOULD BE APPLICABLE TO MOST SITUATIONS ENCOUNTERED. THESE PROCEDURES SHOULD BE FOLLOWED TO THE EXTENT APPLICABLE; HOWEVER, THEY BY NO MEANS REPRESENT THE ONLY METHOD TO PERFORM THE TASKS THEY DESCRIBE. IT IS UNDERSTOOD THAT FIELD CONDITIONS, EMERGENCIES, AND OTHER CIRCUMSTANCES MAY REQUIRE DEVIATION FROM STANDARD OPERATING PROCEDURES.

> To be completed by Denver Wate Denver Water's review of these plans relates only to Denver Water requirements, and does not include a full analysis of: soil conditions support or load factors, or any other matters. Any modification of these plans must be resubmitted to Denver Water for review prior to construction. The Professional Engineer, Contractors, and Owners designing and constructing this proposed water distribution system shall be solely responsible for the adequacy of the design, installation, and materials utilized in this water distribution system for any specific site I.D. No. Contract No.

☐ Approved for Construction Approval Valid for 1 year DENVER WATER

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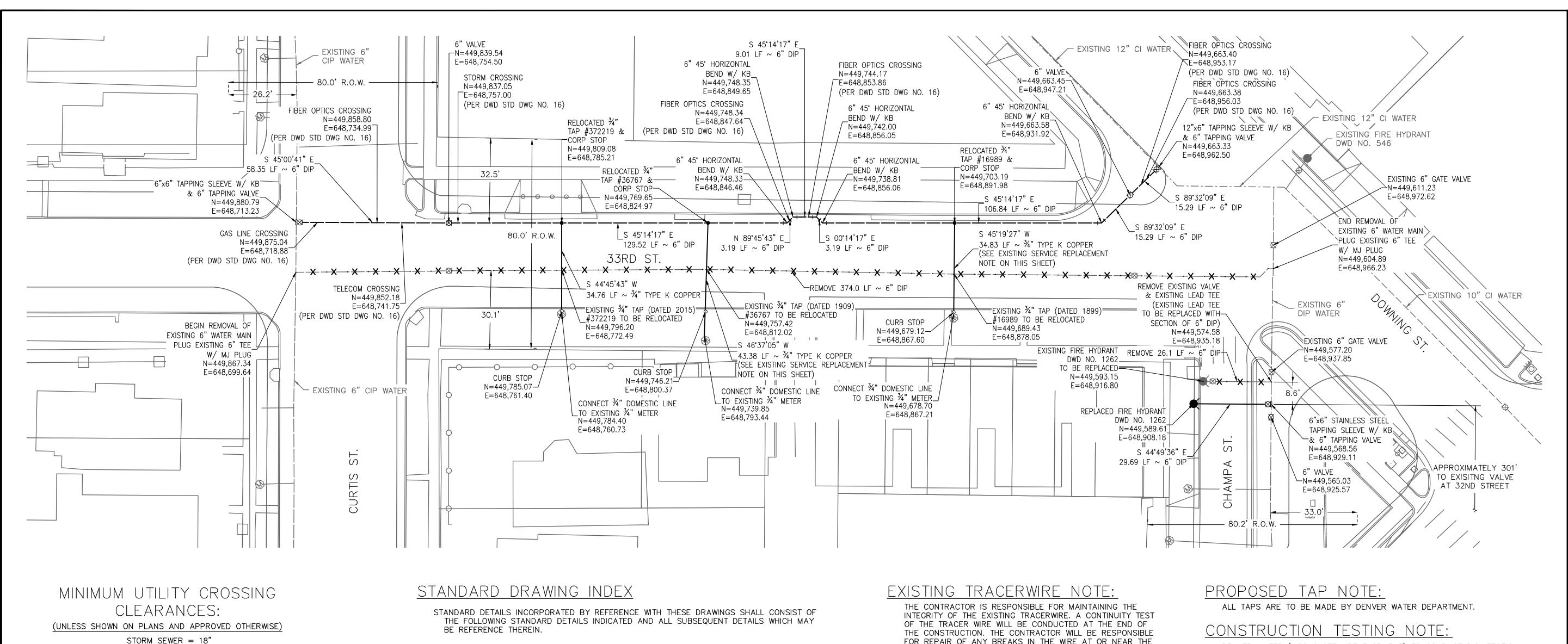
WILSON &COMPANY

DRAWN BY: KMG DESIGNED BY: APPROVED BY: KMG DRAWING NAME: WTR 1&2 COVER&NOTES.dwg SEPTEMBER 2016

WTR1-2 38 of 61

SHEET NO.:

NOTES FROM NOVEMBER 14, 2014 REVISION



SANITARY SEWER = 18"

ELECTRICAL LINE = 6" (PREFER 12")

GAS LINE = 6" (PREFER 12")

FIBER OPTICS = 6" (PREFER 12")

NOTES TO CONTRACTOR:

- 1. CONTRACTOR TO VERIFY LOCATION AND DEPTH OF EXISTING UTILITIES PRIOR TO CONSTRUCTION.
- 2. CONTRACTOR TO ADJUST FITTINGS FOR CONNECTION TO PIPE BENS USING MAXIMUM JOINT DEFLECTION SPECIFIED BY MANUFACTURER.
- 3. ALL PIPE CONNECTIONS SHALL BE WATERTIGHT.

SHEET 1 - WATER DISTRIBUTION SYSTEM TYPICAL PLAN SHEET 2 - WATER DISTRIBUTION SYSTEM TYPICAL PLAN FOR CURVED STREETS

SHEET 4 - TYPICAL STREET CROSS SECTION & STREET CENTERLINE PROFILE

SHEET 5 - TYPICAL PRIVATE STREET CROSS SECTION SHEET 8 - PLAN, PROFILE, & LOCATION FOR FIRE HYDRANTS, MAINS, & VALVES

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SHEET 15 - STORM & SANITARY SEWER CROSSING

SHEET 16 - OPEN CUT CROSSING OVER OR UNDER CONDUIT OR CONFLICTING UTILITY

SHEET 19 - VALVE OPERATION SHEET 21 - VALVE BOX SUPPORT PLATE

SHEET 23 - VALVE OPERATOR GUIDE SHEET 24 - STANDARD ADJUSTABLE SUPPORT

SHEET 25 - HEAVY DUTY ADJUSTABLE SUPPORT SHEET 28 - CONCRETE KICKBLOCKS BEARING SURFACES & INSTALLATION

SHEET 29 - CONCRETE KICKBLOCK REQUIREMENTS FOR WATER MAIN & TAP SIZE COMBOS SHEET 30 - STUD NUT TIGHTENING SEQUENCE

SHEET 31 - FLANGE LUG DETAIL SHEET 32 - LENGTH OF RESTRAINED PIPE

SHEET 33 - POLYETHYLENE WRAP ON PIPE & AT TAP INSTALLATION

SHEET 34 - INSULATED JOINTS, RODS, & BOLTED SLEEVE TYPE COUPLINGS

SHEET 35 - DUCTILE IRON PIPE JOINT BONDING SHEET 36 - CADWELD PROTECTION

SHEET 37 — TRACER WIRE INSTALLATION FOR PVC WATER MAIN

SHEET 46 - TEMPORARY BLOWOFF INSTALLATION FOR 12" & SMALLER PIPE SHEET 53 - GENERAL METER & SERVICE NOTES

SHEET 54 - 2" & SMALLER SERVICE LINE, STOP BOX, & OUTSIDE METER INSTALLATION

SHEET 55 - OUTSIDE SETTING FOR 34" AND 1" METERS

FOR REPAIR OF ANY BREAKS IN THE WIRE AT OR NEAR THE PROPOSED EXCAVATIONS.

EXISTING FIRE HYDRANT NOTE:

THE EXISTING FIRE HYDRANT TO BE RELOCATED MUST BE INSPECTED BY DWD TO VERIFY THE INTEGRITY OF THE HYDRANT PRIOR TO REUSE.

EXISTING WATER MAIN NOTE:

THE EXISTING MAIN TO BE TAPPED IS OVER 100 YEARS OLD, AND SHOULD THE CONDITION OF THE PIPE NOT ALLOW FOR A SECURE TAP, AN APPROPRIATE SIZED TEE WILL NEED TO BE INSTALLED IN PLACE OF THE TAPPING SLEEVE AND TAPPING VALVE. THIS DECISION WILL BE MADE IN THE FIELD BY THE DENVER WATER INSPECTOR. SHOULD THE NEED FOR A TEE ARISE, THE CONTRACTOR IS TO BE AWARE OF THE FOLLOWING: THE PIPE IS CAST IRON WITH "LEAD JOINTS" AND ANY DISTURBANCE OF A LEAD JOINT WILL CAUSE THE PACKING OF LEAD TO LOOSED WHICH MAY CAUSE LEAKAGE. THE CONTRACTOR SHOULD EXERCISE CAUTION WHEN CUTTING OLD PIPE, AND IT IS ADVISABLE TO "BLOCK" THE PIPE FOR SUPPORT PRIOR TO CUTTING, WHICH WILL REDUCE THE MOVEMENT OF THE PIPE PROTRUDING OUT OF THE LEAD JOINT NEARBY. THE CONTRACTOR WILL BE HELD RESPONSIBLE FOR ANY LEAK AT OR NEAR THE EXCAVATION.

DENVER WATER (WQO SYSTEM DEVELOPMENT) TO CONDUCT DISINFECTION AND HYDROSTATIC PRESSURE TESTING OF THE WATER MAIN AND ASSOCIATED BRANCHES. PLEASE CONTACT SYSTEM DEVELOPMENT AT 303-634-3470 PRIOR TO CONSTRUCTION FOR TESTING REQUIREMENTS.

EXISTING SERVICE REPLACEMENT NOTE:

IF THE DATE OF THE ORIGINAL TAP INSTALLATION INDICATES THAT THE SERVICE LINE MIGHT CONTAIN LEAD, A WATER QUALITY TEST MUST BE CONDUCTED WITH EQUIPMENT SUPPLIED BY DENVER WATER. IF LEAD IS DETECTED BY THE TEST, ALL NON-COPPER COMPONENTS OF THE SERVICE LINE MUST BE REPLACED FROM THE MAIN TO THE FIRST COPPER OR BRASS FITTING WITHIN THE STRUCTURE. SEE DENVER WATER OPERATING RULE 9.04 FOR ADDITIONAL INFORMATION.

SCALE: 1" = 20'

Denver Water's review of these plans relates only to Denver Water requirements, and does not include a full analysis of: soil conditions support or load factors, or any other matters. Any modification of these plans must be resubmitted to Denver Water for review prior to construction. The Professional Engineer, Contractors, and Owners designing and constructing this proposed water distribution system shall be solely responsible for the adequacy of the design, installation,

and materials utilized in this water

distribution system for any specific site

To be completed by Denver Water

location. Contract No.

Sales Administrator

☐ Approved for Construction Approval Valid for 1 year

DENVER WATER

WILSON &COMPANY

KMG DESIGNED BY: KMG APPROVED BY: KMG DRAWING NAME: WTR 3-7 WATER ONLY PLANS.dwg SEPTEMBER 2016

WTR1-5 39 of 61

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O CONTROL LAR REVIEW WATER ONLY

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WO WORF BEFORE 1-800-92

COORDINATE DATUM

PROJECT COORDINATES ARE MODIFIED UTM ZONE 13 NORTH NAD 83 (1992) COORDINATES IN US SURVEY FEET. THE COMBINED ELEVATION/SCALE FACTOR USED TO MODIFY THE COORDINATES FROM UTM SFT. TO PROJECT COORDINATES IS 1.000650402. THE RESULTING COORDINATES ARE DECREASED BY 14,000,000 SFT. IN THE NORTHING AND 1,000,000 SFT. IN THE EASTING AFTER MULTIPLYING THE UTM SFT. COORDINATES BY THE COMBINED ELEVATION/SCALE FACTOR.

PROJECT COORDINATES NORTHING US SURVEY FEET

= (UTM NORTH ZONE 13 COORDINATE NORTHING * 1.000650402 - 14.000.000): PROJECT COORDINATES EASTING US SURVEY FEET = (UTM NORTH ZONE 13 COORDINATE EASTING * 1.000650402 - 1,000,000).

BASIS OF BEARINGS

ALL BEARINGS ARE BASED ON THE LINE CONNECTING PROJECT "CONTROL POINT NO. 1" TO PROJECT "CONTROL POINT NO. 2", BEING A GRID BEARING OF N31°08'41"E AS OBTAINED FROM A GLOBAL POSITIONING SYSTEM (GPS) SURVEY BASED ON THE COLORADO HIGH ACCURACY REFERENCE NETWORK (CHARN). SAID GRID BEARING IS NAD 83 (1992) UTM ZONE 13 NORTH.

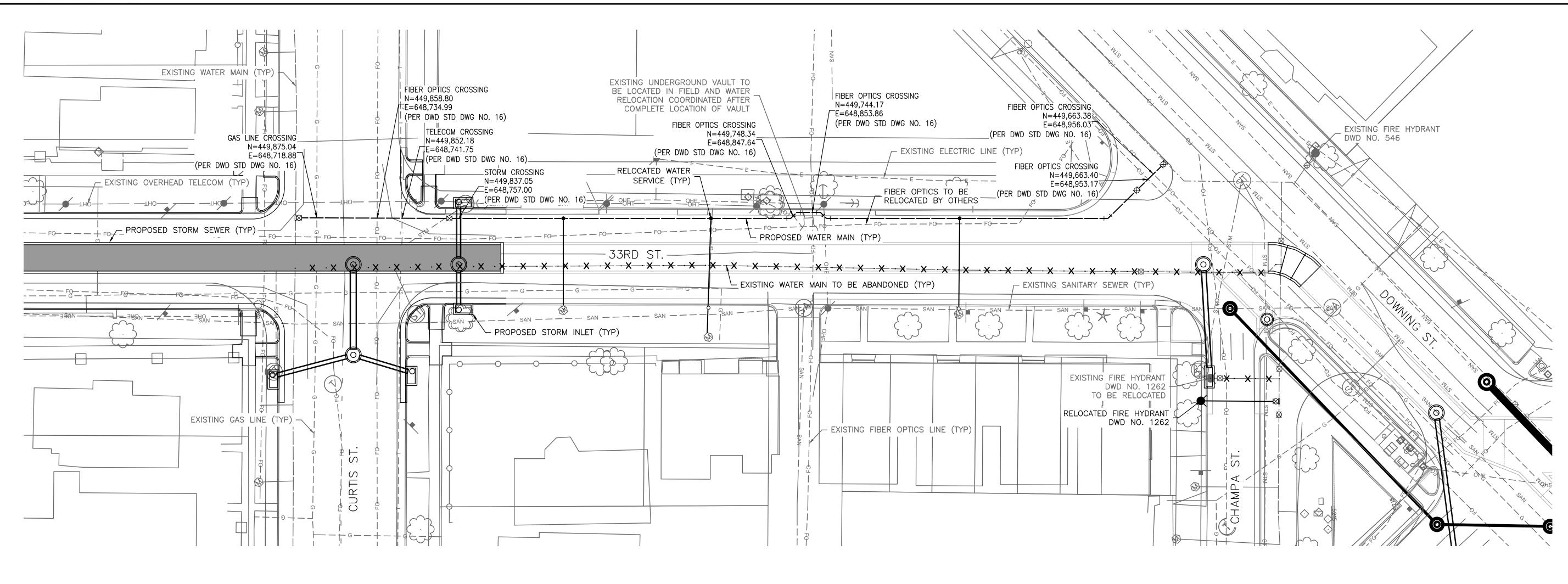
CONTROL POINTS "1 & 2" ARE MONUMENTED WITH A 2" DIAMETER ALUMINUM CAP SET ON #5 REBAR, CAP STAMPED "L.P.I. (PT. #) SURVEY CONTROL POINT".

BENCHMARK

PROJECT ELEVATIONS ARE BASED ON THE CITY AND COUNTY OF DENVER BENCHMARK NO. BM-377, HAVING A PUBLISHED NAVD 88 ELEVATION OF 5,196.44 FEET.

DIFFERENTIAL LEVELS WERE RUN THROUGH THE SET AND FOUND PROJECT CONTROL POINTS AS SHOWN IN THE SURVEY CONTROL DOCUMENTS TO ESTABLISH VERTICAL CONTROL WITHIN THE PROJECT LIMITS.

ALL CITY AND COUNTY OF DENVER BENCHMARKS ARE NAVD 88 DATUM. PUBLISHED ELEVATIONS UPDATED MAY, 2001.



MINIMUM UTILITY CROSSING CLEARANCES:

(UNLESS SHOWN ON PLANS AND APPROVED OTHERWISE)

STORM SEWER = 18"

SANITARY SEWER = 18"

GAS LINE = 6" (PREFER 12") ELECTRICAL LINE = 6" (PREFER 12")

FIBER OPTICS = 6" (PREFER 12")

NOTES TO CONTRACTOR:

- 1. CONTRACTOR TO VERIFY LOCATION AND DEPTH OF EXISTING UTILITIES PRIOR TO CONSTRUCTION.
- 2. CONTRACTOR TO ADJUST FITTINGS FOR CONNECTION TO PIPE BENS USING MAXIMUM JOINT DEFLECTION SPECIFIED BY MANUFACTURER.
- 3. ALL PIPE CONNECTIONS SHALL BE WATERTIGHT.

STANDARD DRAWING INDEX

STANDARD DETAILS INCORPORATED BY REFERENCE WITH THESE DRAWINGS SHALL CONSIST OF THE FOLLOWING STANDARD DETAILS INDICATED AND ALL SUBSEQUENT DETAILS WHICH MAY BE REFERENCE THEREIN.

SHEET 1 - WATER DISTRIBUTION SYSTEM TYPICAL PLAN SHEET 2 - WATER DISTRIBUTION SYSTEM TYPICAL PLAN FOR CURVED STREETS

SHEET 4 - TYPICAL STREET CROSS SECTION & STREET CENTERLINE PROFILE

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SHEET 36 - CADWELD PROTECTION

SHEET 37 - TRACER WIRE INSTALLATION FOR PVC WATER MAIN SHEET 46 - TEMPORARY BLOWOFF INSTALLATION FOR 12" & SMALLER PIPE

SHEET 53 - GENERAL METER & SERVICE NOTES

SHEET 54 - 2" & SMALLER SERVICE LINE, STOP BOX, & OUTSIDE METER INSTALLATION

SHEET 55 - OUTSIDE SETTING FOR 34" AND 1" METERS

EXISTING TRACERWIRE NOTE:

THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING THE INTEGRITY OF THE EXISTING TRACERWIRE. A CONTINUITY TEST THE CONSTRUCTION. THE CONTRACTOR WILL BE RESPONSIBLE FOR REPAIR OF ANY BREAKS IN THE WIRE AT OR NEAR THE PROPOSED EXCAVATIONS.

EXISTING FIRE HYDRANT NOTE:

THE EXISTING FIRE HYDRANT TO BE RELOCATED MUST BE INSPECTED BY DWD TO VERIFY THE INTEGRITY OF THE HYDRANT PRIOR TO REUSE.

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PROPOSED TAP NOTE:

ALL TAPS ARE TO BE MADE BY DENVER WATER DEPARTMENT.

CONSTRUCTION TESTING NOTE

DENVER WATER (WQO SYSTEM DEVELOPMENT) TO CONDUCT DISINFECTION AND HYDROSTATIC PRESSURE TESTING OF THE WATER MAIN AND ASSOCIATED BRANCHES. PLEASE CONTACT SYSTEM DEVELOPMENT AT 303-634-3470 PRIOR TO CONSTRUCTION FOR TESTING REQUIREMENTS.

EXISTING SERVICE REPLACEMENT NOTE:

IF THE DATE OF THE ORIGINAL TAP INSTALLATION INDICATES THAT THE SERVICE LINE MIGHT CONTAIN LEAD, A WATER QUALITY TEST MUST BE CONDUCTED WITH EQUIPMENT SUPPLIED BY DENVER WATER. IF LEAD IS DETECTED BY THE TEST. ALL NON-COPPER COMPONENTS OF THE SERVICE LINE MUST BE REPLACED FROM THE MAIN TO THE FIRST COPPER OR BRASS FITTING WITHIN THE STRUCTURE. SEE DENVER WATER OPERATING RULE 9.04 FOR ADDITIONAL INFORMATION.

COORDINATE DATUM

PROJECT COORDINATES ARE MODIFIED UTM ZONE 13 NORTH NAD 83 (1992) COORDINATES IN US SURVEY FEET. THE COMBINED ELEVATION/SCALE FACTOR USED TO MODIFY THE COORDINATES FROM UTM SFT. TO PROJECT COORDINATES IS 1.000650402. THE RESULTING COORDINATES ARE DECREASED BY 14,000,000 SFT. IN THE NORTHING AND 1,000,000 SFT. IN THE EASTING AFTER MULTIPLYING THE UTM SFT. COORDINATES BY THE COMBINED ELEVATION/SCALE FACTOR.

PROJECT COORDINATES NORTHING US SURVEY FEET

= (UTM NORTH ZONE 13 COORDINATE NORTHING * 1.000650402 - 14,000,000); PROJECT COORDINATES EASTING US SURVEY FEET

= (UTM NORTH ZONE 13 COORDINATE EASTING * 1.000650402 - 1,000,000).

BASIS OF BEARINGS

ALL BEARINGS ARE BASED ON THE LINE CONNECTING PROJECT "CONTROL POINT NO. 1" TO PROJECT "CONTROL POINT NO. 2", BEING A GRID BEARING OF N31°08'41"E AS OBTAINED FROM A GLOBAL POSITIONING SYSTEM (GPS) SURVEY BASED ON THE COLORADO HIGH ACCURACY REFERENCE NETWORK (CHARN). SAID GRID BEARING IS NAD 83 (1992) UTM ZONE 13 NORTH.

CONTROL POINTS "1 & 2" ARE MONUMENTED WITH A 2" DIAMETER ALUMINUM CAP SET ON #5 REBAR, CAP STAMPED "L.P.I. (PT. #) SURVEY CONTROL POINT".

BENCHMARK

PROJECT ELEVATIONS ARE BASED ON THE CITY AND COUNTY OF DENVER BENCHMARK NO. BM-377, HAVING A PUBLISHED NAVD 88 ELEVATION OF 5,196.44 FEET.

DIFFERENTIAL LEVELS WERE RUN THROUGH THE SET AND FOUND PROJECT CONTROL POINTS AS SHOWN IN THE SURVEY CONTROL DOCUMENTS TO ESTABLISH VERTICAL CONTROL WITHIN THE PROJECT LIMITS.

ALL CITY AND COUNTY OF DENVER BENCHMARKS ARE NAVD 88 DATUM. PUBLISHED ELEVATIONS UPDATED MAY, 2001.

only to Denver Water requirements, and does not include a full analysis of: soil conditions, support or load factors, or any other matters. Any modification of these plans must be resubmitted to Denver Water for review prior to construction. The Professional Engineer, Contractors, and Owners designing and constructing this proposed water distribution system shall be solely responsible for the adequacy of the design, installation, and materials utilized in this water distribution system for any specific site

To be completed by Denver Water

Denver Water's review of these plans relates

Date	I.D. No.								
Contract No.	Map No.								
☐ Approved for Construction Approval Valid for 1 year									
DENVE	R WATER								

Sales Administrator

WILSON &COMPANY

DRAWN BY: **KMG** DESIGNED BY: KMG APPROVED BY: KMG DRAWING NAME:

ST

ARAPAHOE

0I

BLAKE

SE

PRO CONTROL PILAR REVIEW DW OVERALL UTII

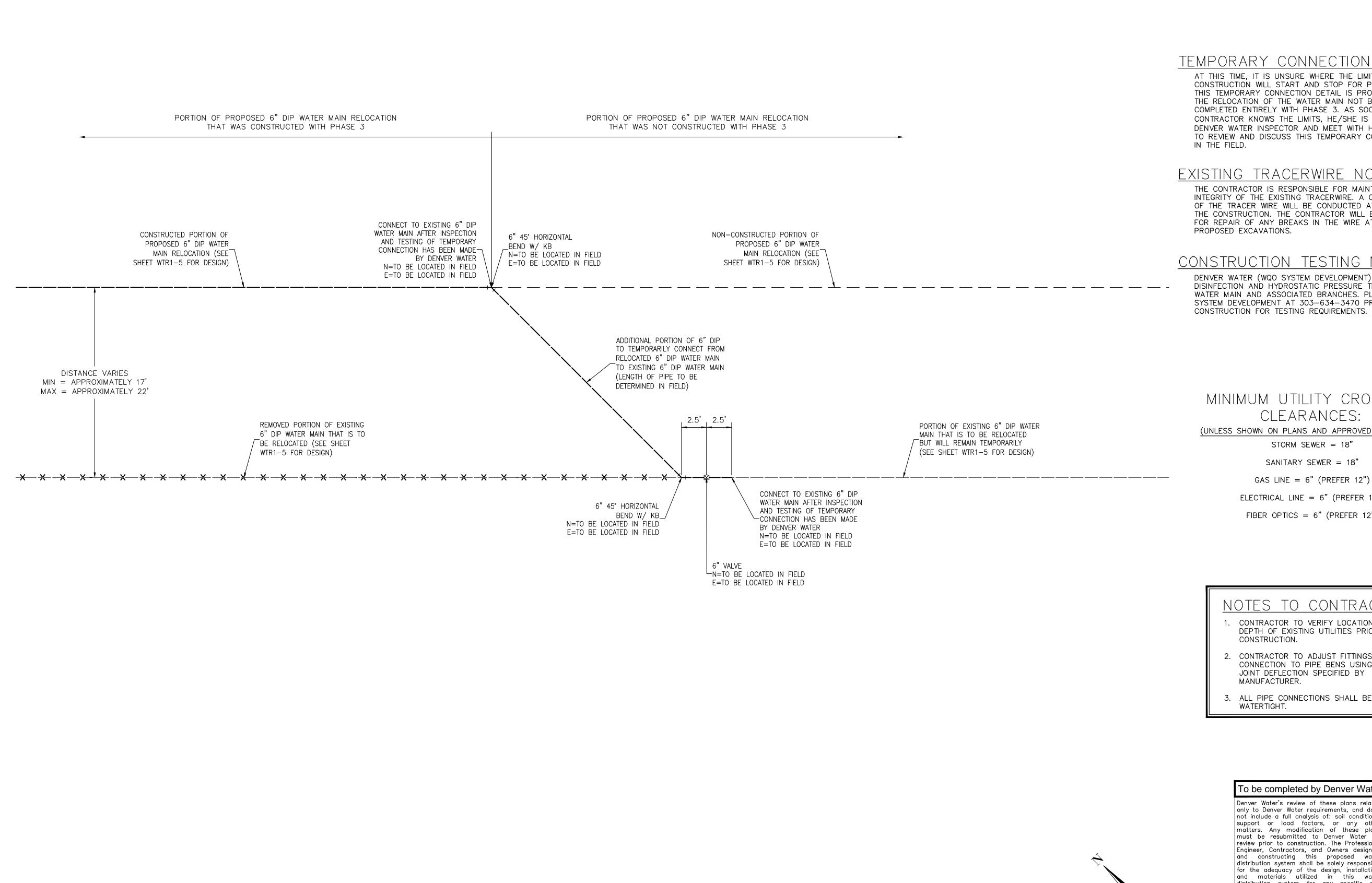
OUTFALL

STREET

33RD

WTR 8-12 OVERALL UTILITY PLANS.dwg SEPTEMBER 2016 SHEET NO .:

WTR1-10 40 of 61



TEMPORARY CONNECTION NOTE

AT THIS TIME, IT IS UNSURE WHERE THE LIMITS OF CONSTRUCTION WILL START AND STOP FOR PHASE 3, AND THIS TEMPORARY CONNECTION DETAIL IS PROVIDED SHOULD THE RELOCATION OF THE WATER MAIN NOT BE ABLE TO BE COMPLETED ENTIRELY WITH PHASE 3. AS SOON AS THE CONTRACTOR KNOWS THE LIMITS, HE/SHE IS TO INFORM THE DENVER WATER INSPECTOR AND MEET WITH HIM/HER ON SITE TO REVIEW AND DISCUSS THIS TEMPORARY CONNECTION DETAIL

EXISTING TRACERWIRE NOTE:

THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING THE INTEGRITY OF THE EXISTING TRACERWIRE. A CONTINUITY TEST OF THE TRACER WIRE WILL BE CONDUCTED AT THE END OF THE CONSTRUCTION. THE CONTRACTOR WILL BE RESPONSIBLE FOR REPAIR OF ANY BREAKS IN THE WIRE AT OR NEAR THE PROPOSED EXCAVATIONS.

CONSTRUCTION TESTING NOTE:

DENVER WATER (WQO SYSTEM DEVELOPMENT) TO CONDUCT DISINFECTION AND HYDROSTATIC PRESSURE TESTING OF THE WATER MAIN AND ASSOCIATED BRANCHES. PLEASE CONTACT SYSTEM DEVELOPMENT AT 303-634-3470 PRIOR TO CONSTRUCTION FOR TESTING REQUIREMENTS.

MINIMUM UTILITY CROSSING CLEARANCES:

(UNLESS SHOWN ON PLANS AND APPROVED OTHERWISE)

STORM SEWER = 18"

SANITARY SEWER = 18"

ELECTRICAL LINE = 6" (PREFER 12")

FIBER OPTICS = 6" (PREFER 12")

NOTES TO CONTRACTOR:

- 1. CONTRACTOR TO VERIFY LOCATION AND DEPTH OF EXISTING UTILITIES PRIOR TO CONSTRUCTION.
- 2. CONTRACTOR TO ADJUST FITTINGS FOR CONNECTION TO PIPE BENS USING MAXIMUM JOINT DEFLECTION SPECIFIED BY MANUFACTURER.
- 3. ALL PIPE CONNECTIONS SHALL BE

To be completed by Denver Water

Denver Water's review of these plans relates only to Denver Water requirements, and does not include a full analysis of: soil conditions, support or load factors, or any other matters. Any modification of these plans must be resubmitted to Denver Water for review prior to construction. The Professional Engineer, Contractors, and Owners designing and constructing this proposed water distribution system shall be solely responsible for the adequacy of the design, installation, and materials utilized in this water distribution system for any specific site

Toda (Total	
Date	I.D. No.
Contract No.	Map No.

☐ Approved for Construction Approval Valid for 1 year

DENVER WATER

Sales Administrator

SCALE: 1" = 5'

&COMPANY

KMG DRAWING NAME:

ST.

OUTFALL ARAPAHOE

100

PRO CONTROL PILAR REVIEW

STREET

33RD

CALL UNCC WO WORKING DA BEFORE YOU DIO 1-800-922-1987

SEPTEMBER 2016 SHEET NO.: WTR1-14 41 of 61

WILSON

SE DRAWN BY: KMG DESIGNED BY: APPROVED BY: WTR 14 TEMP CONNECTION DETAIL.dwg

BASIS OF BEARINGS

COORDINATE DATUM

PROJECT COORDINATES NORTHING US SURVEY FEET

PROJECT COORDINATES EASTING US SURVEY FEET

PROJECT COORDINATES ARE MODIFIED UTM ZONE 13 NORTH NAD 83 (1992) COORDINATES IN US SURVEY FEET. THE

COMBINED ELEVATION/SCALE FACTOR USED TO MODIFY THE COORDINATES FROM UTM SFT. TO PROJECT COORDINATES

IS 1.000650402. THE RESULTING COORDINATES ARE DECREASED BY 14,000,000 SFT. IN THE NORTHING AND 1,000,000

SFT. IN THE EASTING AFTER MULTIPLYING THE UTM SFT. COORDINATES BY THE COMBINED ELEVATION/SCALE FACTOR.

= (UTM NORTH ZONE 13 COORDINATE NORTHING * 1.000650402 - 14,000,000);

= (UTM NORTH ZONE 13 COORDINATE EASTING * 1.000650402 - 1,000,000).

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DIFFERENTIAL LEVELS WERE RUN THROUGH THE SET AND FOUND PROJECT CONTROL POINTS AS SHOWN IN THE SURVEY CONTROL DOCUMENTS TO ESTABLISH VERTICAL CONTROL WITHIN THE PROJECT LIMITS.

ALL CITY AND COUNTY OF DENVER BENCHMARKS ARE NAVD 88 DATUM. PUBLISHED ELEVATIONS UPDATED MAY, 2001.

GENERAL NOTES

ALL CONSTRUCTION SHALL BE IN CONFORMANCE WITH THE CITY AND COUNTY OF DENVER STANDARD SPECIFICATIONS FOR CONSTRUCTION AND THE WASTEWATER MANAGEMENT CAPITAL PROJECTS MANAGEMENT STANDARD CONSTRUCTION SPECIFICATIONS DATED MARCH 15, 2016 (WWCPMSCS), AND THE STORM DRAINAGE DESIGN AND TECHNICAL CRITERIA, REVISED NOVEMBER 2013, AS MODIFIED BY THE PROJECT SPECIAL PROVISIONS, SUPPLEMENTAL SPECIFICATIONS, AND THESE DRAWINGS. ALL CONCRETE AND REINFORCING FOR STRUCTURES SHALL CONFORM TO REQUIREMENTS SET FORTH IN THE MOST RECENT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION BY THE COLORADO DEPARTMENT OF TRANSPORTATION.

STRUCTURE EXCAVATION AND BACKFILL SHALL BE AS SHOWN ON CDOT STANDARD PLAN NO. M-206-1. BACKFILL SHALL BE "STRUCTURAL FILL" AS NOTED IN WWCPMSCS SECTION 5.0.3.3 (THIS IS THE SAME AS CDOT STRUCTURE BACKFILL CLASS 1) IN ADDITION, STRUCTURAL FILL SHALL HAVE A LIQUID LIMIT NOT EXCEEDING 35 AND A PLASTICITY INDEX OF NOT OVER SIX WHEN DETERMINED IN CONFORMITY WITH AASHTO T-89 AND T-90 RESPECTIVELY. STRUCTURAL EXCAVATION AND BACKFILL WILL NOT BE MEASURED SEPARATELY, BUT SHALL BE INDLUDED IN THE

VERTICAL SHORING IS REQUIRED FOR EXCAVATION SUPPORT ADJACENT TO THE EXISTING BUILDINGS AND WHERE DETERMINED BY THE CONTRACTOR. VERTICAL SHORING WILL NOT BE MEASURED AND PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE WORK.

EXPANSION JOINT MATERIAL SHALL MEET AASHTO SPECIFICATION M213.

ALL REINFORCING STEEL SHALL BE NON-EPOXY COATED UNLESS OTHERWISE NOTED.

(E) DENOTES EPOXY COATED REINFORCING STEEL.

STRUCTURAL CONCRETE EXPOSED TO SOIL SHALL CONFORM TO CLASS 2 CEMENTITIOUS MATERIAL REQUIREMENTS FOR A CLASS 2 SULFATE EXPOSURE.

THE FOLLOWING TABLE GIVES THE MINIMUM CLASS B LAP SPLICE LENGTH FOR BLACK REINFORCING BARS PLACED IN ACCORDANCE WITH SUBSECTION 602.06. THESE SPLICE LENGTHS SHALL BE INCREASED BY 25% FOR BARS SPACED AT LESS THAN 6" ON CENTER AND INCREASED BY 30% IF MORE THAN 50% OF THE REINFORCEMENT ARE SPLICED WITHIN THE REQUIRED LAP LENGTH.

BAR SIZE

SPLICE LENGTH FOR CLASS D CONCRETE

#4	# 5	#6	# 7	#8	#9	#10	#11	
1'-1"	1'-4"	1'-7"	1'-11"	2'-6"	3'-1"	3'–11"	4'-10"	

THE FOLLOWING TABLE GIVES THE MINIMUM CLASS B LAP SPLICE LENGTH FOR EPOXY COATED REINFORCING BARS PLACED IN ACCORDANCE WITH SUBSECTION 602.06. THESE SPLICE LENGTHS SHALL BE INCREASED BY 25% FOR BARS SPACED AT LESS THEN 6" ON CENTER AND INCREASED BY 30% IF MORE THAN 50% OF THE REINFORCEMENT ARE SPLICED WITHIN THE REQUIRED LAP LENGTH.

BAR SIZE

SPLICE LENGTH FOR CLASS D CONCRETE

#4	# 5	#6	#7	#8	#9	#10	#11
1'-3"	1'-7"	2'-5"	2'-10"	3'-8"	4'-8"	5'-11"	7'-3"

WHEN THE CONTRACTOR ELECTS TO SUBSTITUTE EPOXY COATED REINFORCEMENT FOR BLACK REINFORCING BARS, THE MINIMUM LAP SPLICE

THE ABOVE SPLICE LENGTHS SHALL BE INCREASED BY 20 PERCENT FOR 3 BAR BUNDLES AND 33 PERCENT FOR 4 BAR BUNDLES. THE ABOVE SPLICE LENGTHS MAY BE REDUCED BY 20 PERCENT WHEN 3" OF CLEAR COVER EXISTS AND BAR SPACING IS 6" OR GREATER ON CENTER.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE STABILITY OF THE STRUCTURE DURING CONSTRUCTION.

E.F. = EACH FACE, F.F. = FAR FACE, N.F. = NEAR FACE, B.F. = BACK FACE

ALL STRUCTURAL CONCRETE ELEMENTS ON THE FOLLOWING STRUCTURAL SHEETS ARE CAST-IN-PLACE REINFORCED CONCRETE STRUCTURES UNLESS OTHERWISE NOTED.

STATIONS, ELEVATIONS, AND DIMENSIONS CONTAINED IN THESE PLANS ARE BASED ON DRAWINGS FROM WILSON AND COMPANY, THE CONTRACTOR SHALL VERIFY ALL DEPENDENT DIMENSIONS IN THE FIELD BEFORE ORDERING OR FABRICATING ANY MATERIAL.

THE INFORMATION SHOWN ON THESE PLANS CONCERNING THE TYPE AND LOCATION OF UNDERGROUND UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. THE CONTRACTOR IS RESPONSIBLE FOR MAKING HIS OWN DETERMINATION AS TO THE TYPE AND LOCATION OF UNDERGROUND UTILITIES AS MAY BE NECESSARY TO AVOID DAMAGE THERETO. THE CONTRACTOR SHALL CONTACT THE UTILITY NOTIFICATION CENTER OF COLORADO AT 1-800-922-1987 OR 811 AT LEAST 2 DAYS (NOT INCLUDING THE DAY OF NOTIFICATION) PRIOR TO ANY EXCAVATION OR OTHER EARTHWORK.

FLOW CHANNELS AND INVERTS MAY BE FORMED BY SHAPING WITH LEAN CONCRETE.

LEAN CONCRETE FILL SHALL HAVE A 28-DAY STRENGTH OF 2,000 PSI (TYPE II CEMENT).



DESIGN DATA - CULVERTS/BURIED STRUCTURES

DESIGN METHOD: LOAD FACTOR DESIGN

SOIL DATA PER GEOCAL DATA AND DESIGN REPORT FOR 33RD STREET OUTFALL, REPORT NO. G11.1411.001, AND SUBSEQUENT TECHNICAL MEMORANDUMS.

UNIT WEIGHT: 135 PCF ACTIVE EARTH PRESSURE: 38 PSF/FT AT-REST EARTH PRESSURE: 54 PSF/FT PASSIVE EARTH PRESSURE: 473 PSF/FT FRICTION ANGLE: 34 DEGREES

LIVE LOAD: HS-20 EXCEPT AS NOTED.

REINFORCED CONCRETE:

CLASS D CONCRETE: f'c = 4,500 PSIfy = 60,000 PSIREINFORCING STEEL:

PRECAST CONCRETE:

CLASS PS CONCRETE: f'c = (SEE PRECASTER'S PLANS)

PRECAST CONCRETE BOX CULVERTS

PRECAST CONCRETE BOX CULVERT (PCBC) SHALL CONFORM TO THE REQUIREMENTS OF THE CITY AND COUNTY OF DENVER WASTEWATER CAPITAL PROJECTS MANAGEMENT STANDARD CONSTRUCTION SPECIFICATIONS 10.3, PRECAST REINFORCED BOX—CONDUITS.

THE END OF THE PCBC THAT IS ADJACENT (BUTT JOINT) TO A CAST—IN—PLACE REINFORCED CONCRETE BOX CULVERT (RCBC) OR CONCRETE STRUCTURE SHALL NOT HAVE A TONGUE AND GROOVE END BUT SHALL BE FLUSH TO FORM A TIGHT BUTT JOINT WITH THE RCBC.

PCBC SHALL HAVE MECHANICAL ANCHORS FOR REBAR TO BE EXTENDED INTO THE RCBC AS SHOWN ON THE PLANS.

REINFORCED CONCRETE BOX CULVERT

THE ENDS OF THE REINFORCED CONCRETE BOX CULVERT (RCBC) THAT IS TO BE ADJACENT (BUTT JOINT) TO A PRECAST CONCRETE BOX CULVERT (PCBC) SHALL BE FORMED TO PROVIDE A FLUSH JOINT WITH THE PCBC.

KING DAY! YOU DIG



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33RD STREET OUTFALL

G - BLAKE ST. TO ARAPAHOE S'
PRO CONTROL NO: PWC2009-5054
PILAR REVIEW NO: 2012-0214-03 SEG

ST

&COMPANY KDG Engineering LLC

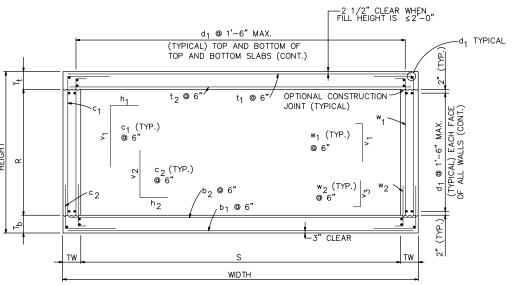
WILSON

SMY SHK SHK 42 General Notes

STR1-1

OCTOBER 2016

STRUCTURE	APPROXIMATE BEGIN STATION LOCATION	SECTION	SHEET NO.		вох	SIZE		DESIGN FILL HEIGHT		SLAB AND WALL THICKNESS								DIMENSIONS					
				S	R	HEIGHT	WIDTH	HEIGH	T _t	T _b	TW	t ₁ & b ₁	t ₂	b ₂	w ₁ & w ₂	C ₁	c ₂	d ₁	h ₁	h ₂	v ₁	v ₂	V ₃
				FTIN.	FTIN.	FTIN.	FTIN.	FTIN.	IN.	IN.	IN.	#	#	#	#	#	#	#	FTIN.	FTIN.	FTIN.	FTIN.	FTIN.
	·																						-
WALNUT JUNCTION STRUCTURE - OUTLET	30+86.98	D-D	STR1-5	11 - 0	8 - 0	10 - 2	12 - 10	10 - 0	13.0	13.0	11.0	6	8	8	5	7	7	4	3 - 4	3 - 4	8 - 11	3 - 7	2 - 11
WALNUT JUNCTION STRUCTURE -																							
INLET	31+03.98	E-E	STR1-5	10 - 0	8 - 0	10 - 2	11 - 8	15 - 6	13.0	13.0	10.0	6	8	8	5	7	7	4	3 - 4	3 - 4	8 - 11	3 - 7	2 - 11
					_																•		





33RD STREET OUTFALL
SEG - BLAKE ST. TO ARAPAHOE ST.
PRO CONTROL NO: PWC2009-5054
PILAR REVIEW NO: 2012-0214-03
CIP CONCRETE BOX CULVERT DETAILS DESIGNED BY:

JCL

APPROVED BY:

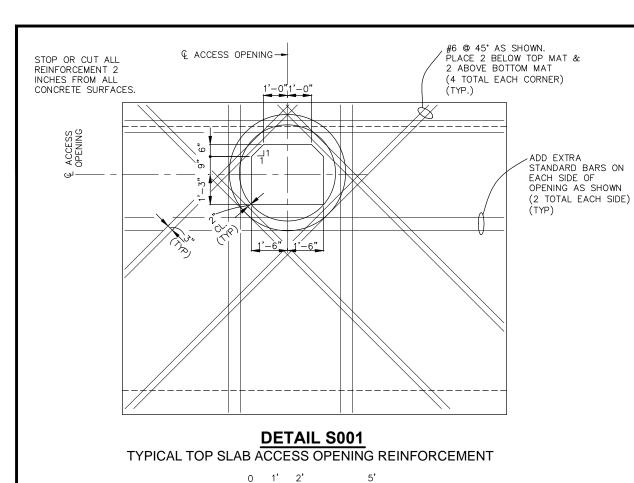
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DRAWING NAME:

A3 CIP CBC DETAILS.dwg
DATE:
OCTOBER 2016
SHEET NO.:
STR1-2 43 of 6

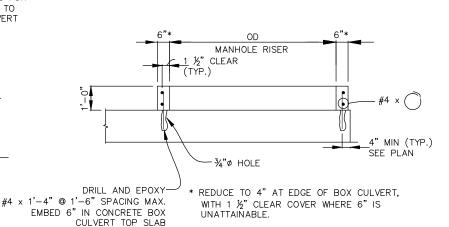
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PLACE INSERTS FOR MANHOLE RISER 4" MIN CLEAR TO EDGE OF CULVERT CAST IN PLACE OR PRECAST CONCRETE CONCRETE COLLAR BOX CULVERT Α

PLAN



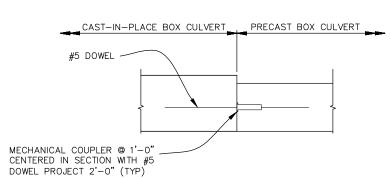
SECTION A-A

DETAIL S002

COLLARS AT MANHOLE RISERS

ALL LOCATIONS WHERE RISER SECTIONS CONNECT TO PRECAST AND CAST IN PLACE BOX CULVERTS.

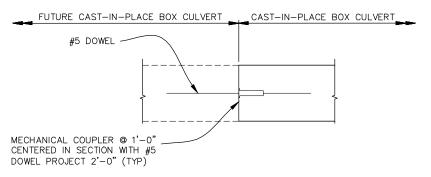
0 1' 2' SCALE: 1/2"=1'



DETAIL S003

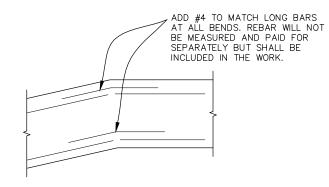
SCALE: 1/2"=1"

TYPICAL MECHANICAL COUPLER DETAIL CAST-IN-PLACE TO PRECAST N.T.S.



DETAIL S004

TYPICAL MECHANICAL COUPLER DETAIL CAST-IN-PLACE TO CAST-IN-PLACE N.T.S.



OPTIONAL DETAIL

AT BEND IN CIP CBC WALLS AND SLABS N.T.S.

NOTE: MECHANICAL COUPLERS FOR REINFORCING SHALL DEVELOP 125% OF THE TENSILE STRENGTH OF THE SPECIFIED REBAR. MECHANICAL COUPLERS SHALL INCLUDE THE ACTUAL COUPLING DEVICE AND THE REBAR OR ANCHOR ROD ON BOTH SIDES OF THE COUPLER. MECHANICAL COUPLERS SHALL BE INCLUDED IN THE WORK AND WILL NOT BE MEASURED OR PAID FOR SEPARATELY.



KDG Engineering LLC



SMY SHK 44 Typical Reinforcement Details 1.dv OCTOBER 2016

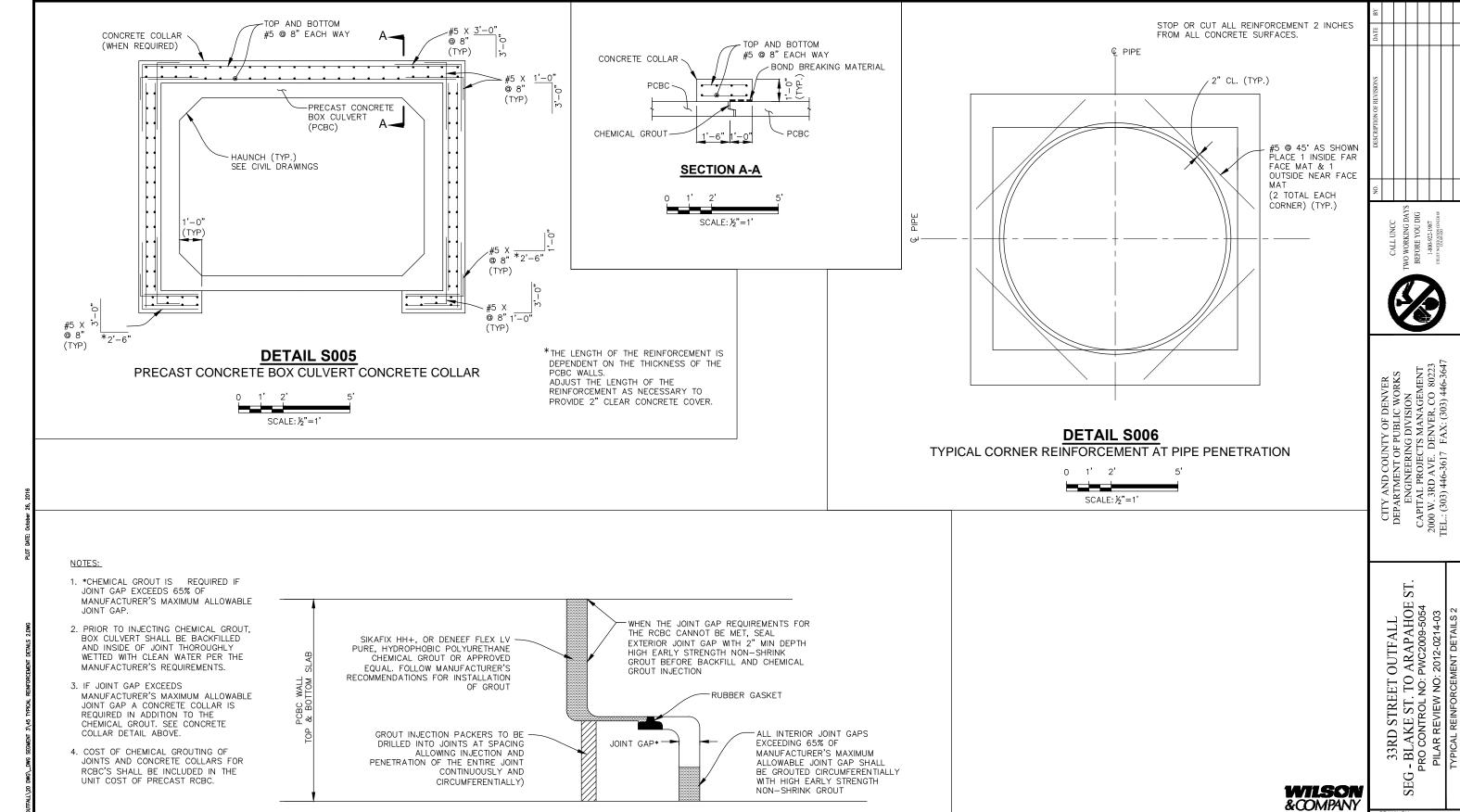
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ST.

33RD STREET OUTFALL
G-BLAKE ST. TO ARAPAHOE S'
PRO CONTROL NO: PWC2009-5054
PILAR REVIEW NO: 2012-0214-03
TYPICAL REINFORCEMENT DETAILS 1



DETAIL S007
PRECAST CONCRETE BOX CULVERT CHEMICAL GROUT JOINT

N.T.S.

KDG Engineering LLC

Scranbo Licetus

19188

20/27/2012

10/20/27/2013

DRAWN BY:

SMY

DESIGNED BY:

JCL

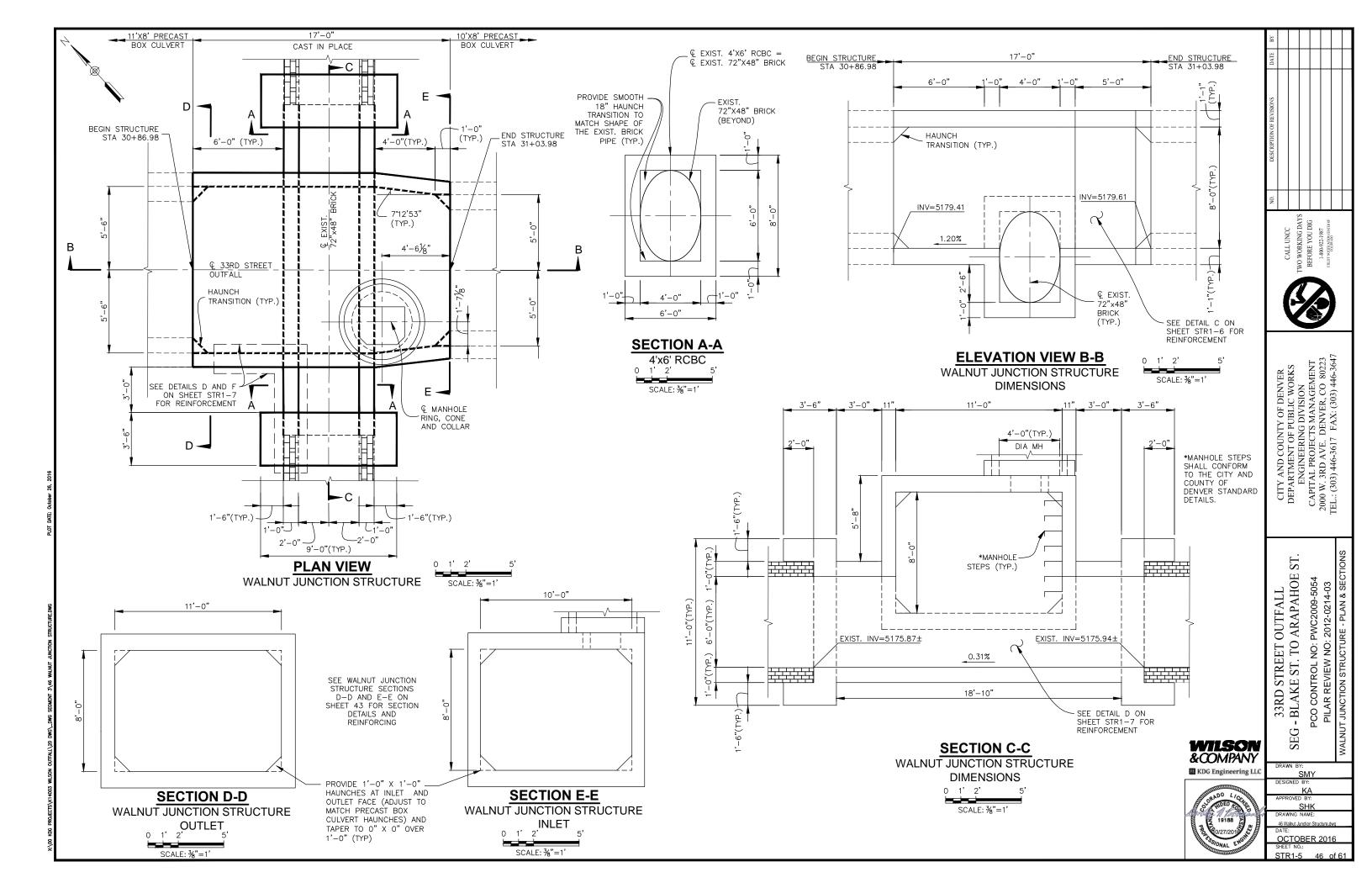
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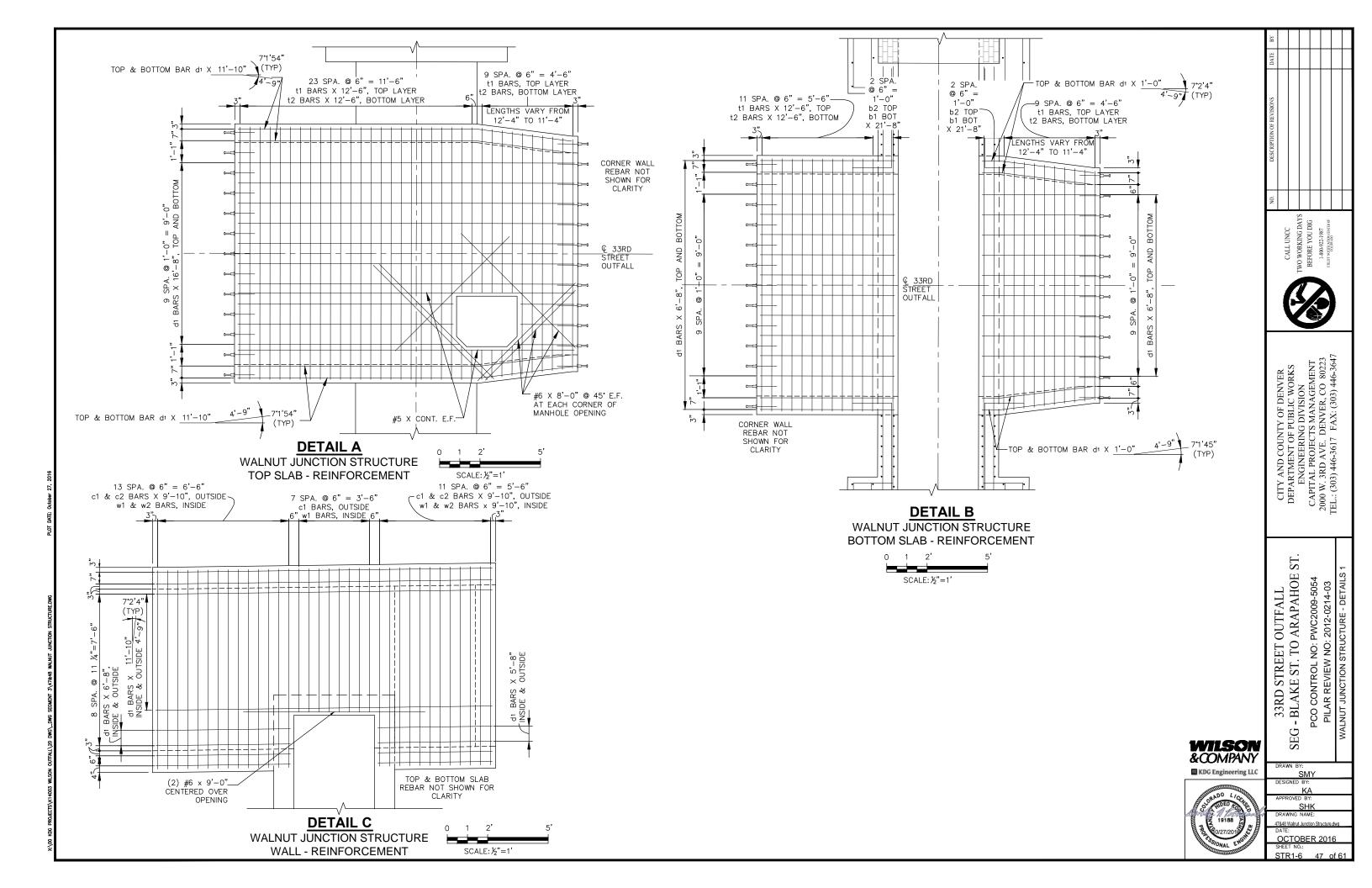
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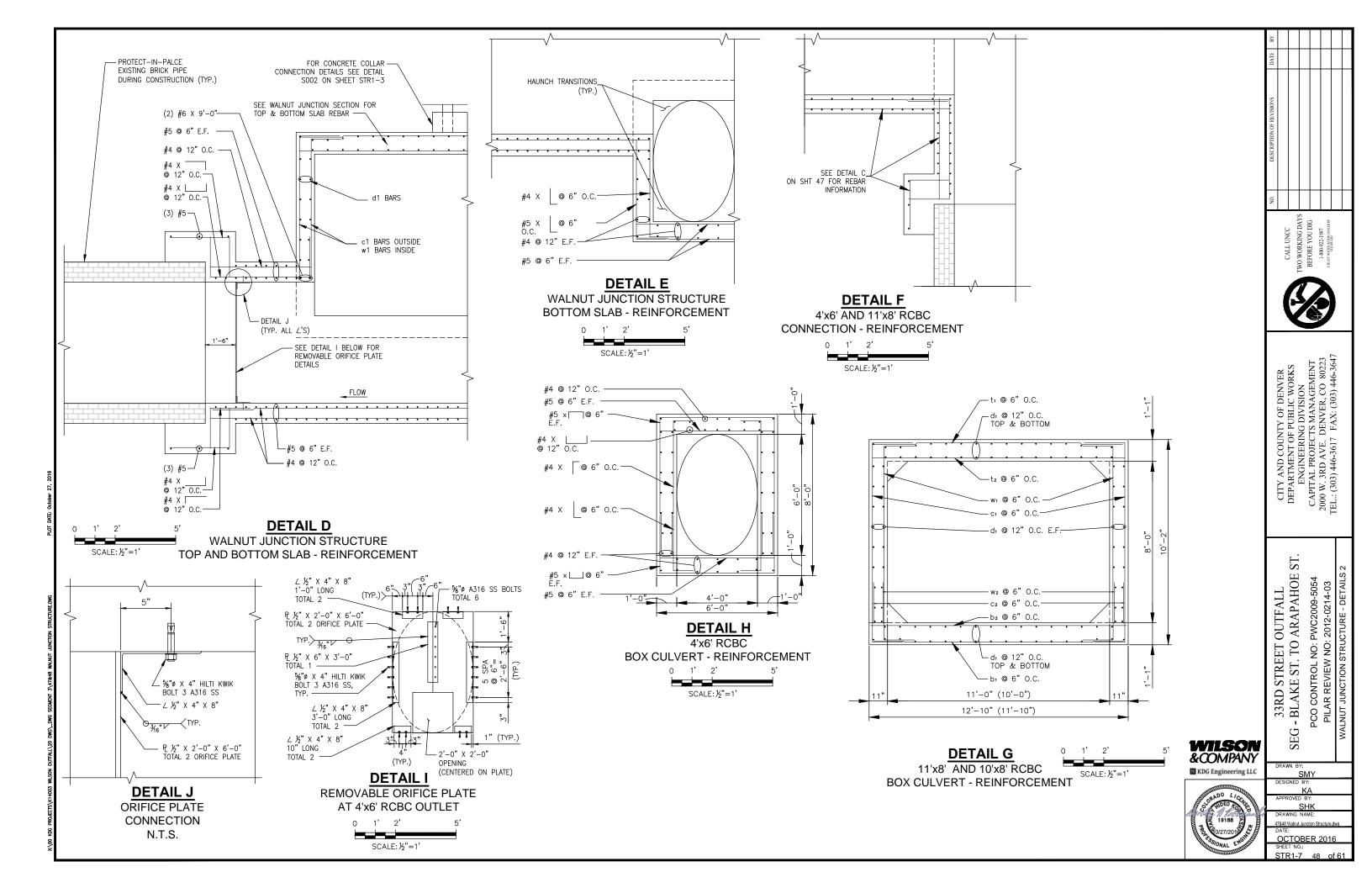
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STR1-4

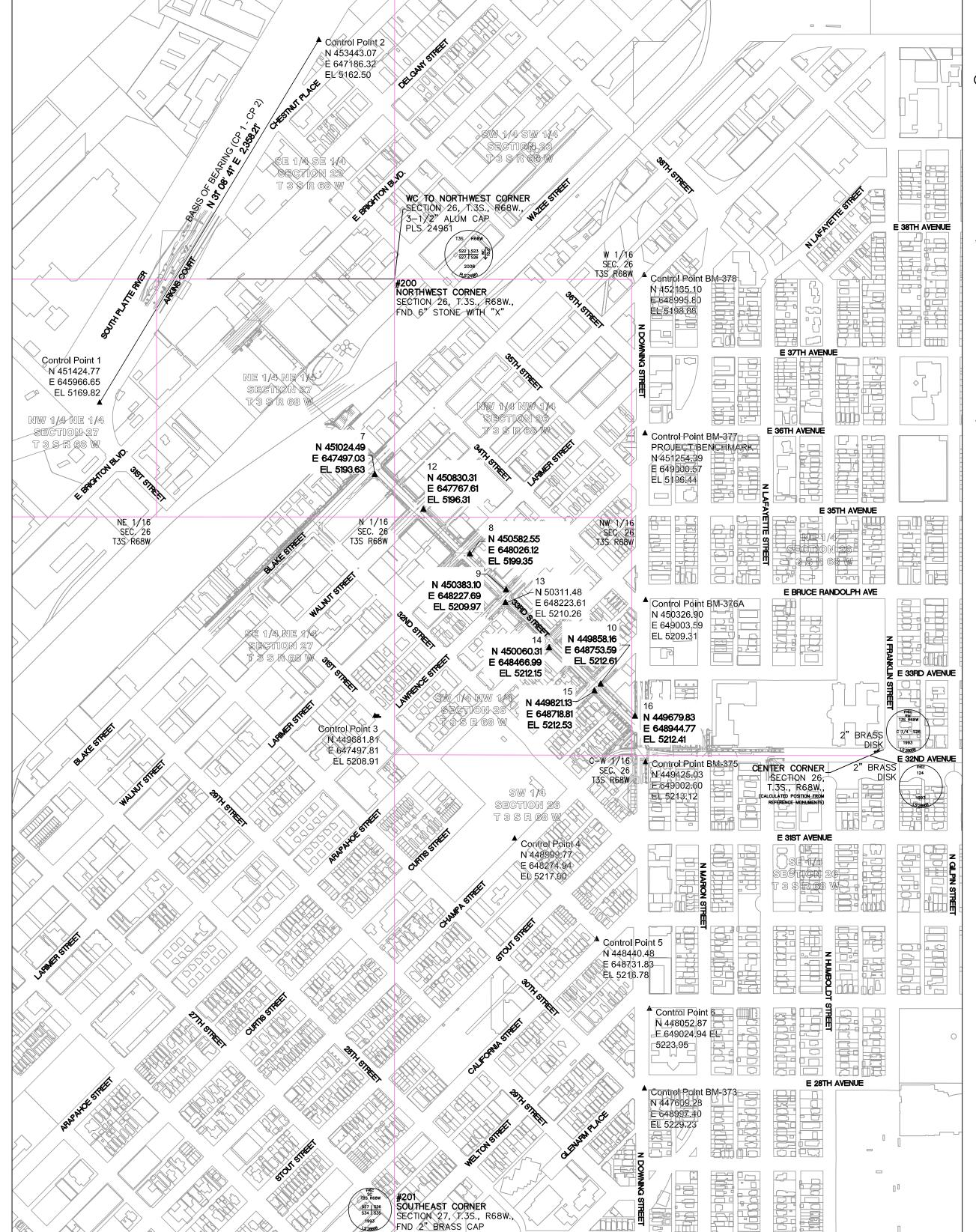
JCL
APPROVED BY:
SHK
DRAWING NAME:
45 Typical Reinforcement Details 2.dwg
DATE:
OCTOBER 2016







SURVEY CONTROL INFORMATION



GEODETIC COORDINATE SUMMARY TABLE OF FOUND NATIONAL GEODETIC SURVEY (NGS) CONTROL POINTS (HELD FIXED U.S. FEET)

	GEODETIC COORDIN	NATES - NAD 83 (1992)	ELLIPSOID		UTM NORTH ZONE 13		UTM NORTH ZONE 13		PROJECT COORDINATES		PROJECT COORDINATES		PROJECT COORDINATES		NAVD 88	
POINT NO.	LATITUDE	LONGITUDE	HEIGHT	MAPPING ANGLE	NORTHING	EASTING	POINT NO.	NORTHING	EASTING	ELEVATION	DESCRIPTION					
ALAMEDA *	39°42'39.39630"N	105°03'57.01077"W	5403.03	-0°02'31.4"	14421485.72	1621901.63	ALAMEDA	430865.48	622956.52	5457.68	FOUND 3 1/4" BRASS CAP IN CONCRETE STAMPED "ALAMEDA 1977" (KK1393)					
ARGO *	39°47'04.34115"N	104°58'53.46470"W	5090.04	0°00'42.6"	14448277.49	1645608.81	ARGO	457674.68	646679.11	5146.35	FOUND STAINLESS STEEL ROD IN RANGE BOX STAMPED "ARGO 1995 " (AE5245)					
B-394 *	39°46'47.04085"N	104°56'26.22144"W	5205.00	0°02'16.8"	14446532.63	1657100.23	B-394	455928.68	658178.01	5261.82	FOUND 3 1/4" BRASS CAP IN CONCRETE STAMPED "B 394 1983" (KK1294)					
CITY PARK *	39°44'52.71761"N	104°56'27.43654"W	5247.57	0°02'15.9"	14434969.23	1657013.02	CITY PARK	444357.76	658090.74	5304.27	FOUND 3 1/4" ALUMINUM CAP IN RANGE BOX STAMPED "CDOT 1994 FW" (AE5249)					
HARD *	39°42'46.27782"N	105°07'34.80803"W	5606.65	-0°04'50.6"	14422199.98	1604888.52	HARD	431580.21	605932.34	5659.97	FOUND STAINLESS STEEL ROD IN RANGE BOX STAMPED "HARD " (DE7958)					
MOE *	39°44'25.77651"N	105°02'52.81292"W	5285.48	-0°01'50.5"	14432242.40	1626922.46	MOE	441629.16	627980.62	5340.57	FOUND 3 1/4" BRASS CAP IN CONCRETE STAMPED "MOE 1994" (AA7132)					

^{*} DENOTES MONUMENT NOT SHOWN ON THIS CONTROL DIAGRAM - OUTSIDE PROJECT AREA

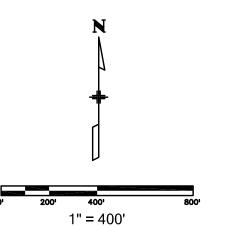
GEODETIC COORDINATE SUMMARY TABLE OF FOUND SECONDARY SURVEY CONTROL POINTS (ADJUSTED FIELD DATA U.S. FEET):

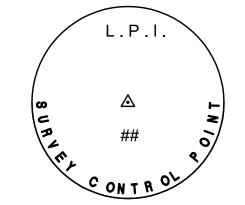
	GEODETIC COORDIN	NATES - NAD 83 (1992)	ELLIPSOID		UTM NORTH ZONE 13		UTM NORTH ZONE 13			PROJECT COORDINATES		PROJECT COORDINATES		PROJECT COORDINATES		NAVD 88	
POINT NO.	LATITUDE	LONGITUDE	HEIGHT	MAPPING ANGLE	NORTHING	EASTING	POINT NO.	NORTHING	EASTING	ELEVATION	DESCRIPTION						
BM-371	39°45'06.74048"N	104°58'23.86103"W	5195.78	0°01'01.5"	14436383.23	1647922.50	BM-371	445772.68	648994.31	5252.09	FOUND 2" CCD BRASS BENCHMARK CAP IN CONCRETE CURB STAMPED "BM 371"						
BM-373	39°45'24.88662"N	104°58'23.81448"W	5172.90	0°01'01.5"	14438218.64	1647925.59	BM-373	447609.28	648997.40	5229.23	FOUND 2" CCD BRASS BENCHMARK CAP IN FLAGSTONE INLET STAMPED "BM 373"						
BM-375	39°45'42.82674"N	104°58'23.74098"W	5156.78	0°01'01.6"	14440033.21	1647930.79	BM-375	449425.04	649002.60	5213.12	FOUND 2" CCD BRASS BENCHMARK CAP IN CONCRETE CURB STAMPED "BM 375"						
BM-376A	39°45'51.73744"N	104°58'23.72488"W	5152.96	0°01'01.6"	14440934.49	1647931.77	BM-376A	450326.90	649003.59	5209.31	FOUND 2" CCD BRASS BENCHMARK CAP IN CONCRETE CURB STAMPED "BM 376A"						
BM-377	39°46'00.90128"N	104°58'23.76003"W	5140.08	0°01'01.6"	14441861.38	1647928.75	BM-377	451254.39	649000.57	5196.44	FOUND 2" CCD BRASS BENCHMARK CAP IN FLAGSTONE INLET STAMPED "BM 377"						
BM-378	39°46'09.60291"N	104°58'23.81772"W	5142.51	0°01'01.5"	14442741.51	1647923.99	BM-378	452135.10	648995.80	5198.88	FOUND 2" CCD BRASS BENCHMARK CAP IN FLAGSTONE INLET STAMPED "BM 378"						
FEDERAL*	39°43'30.26885"N	105°01'24.50062"W	5196.92	-0°00'54.0"	14426625.30	1633816.91	FEDERAL	436008.41	634879.55	5252.40	FOUND 3 1/4" ALUMINUM CAP IN RANGE BOX STAMPED "CDOT CONTROL POINT"						

^{*} DENOTES MONUMENT NOT SHOWN ON THIS CONTROL DIAGRAM - OUTSIDE PROJECT AREA

COORDINATE SUMMARY TABLE OF SET PROJECT CONTROL POINTS (ADJUSTED FIELD DATA U.S. FEET):

	PROJECT CO	OORDINATES	NAVD 88	
POINT NO.	NORTHING	EASTING	ELEVATION	DESCRIPTION
1	451424.77	645966.65	5169.82	SET LUND PARTNERSHIP CONTROL MONUMENT
2	453443.07	647186.32	5162.50	SET LUND PARTNERSHIP CONTROL MONUMENT
3	449681.81	647497.81	5208.91	SET LUND PARTNERSHIP CONTROL MONUMENT
4	448999.77	648274.94	5217.00	SET LUND PARTNERSHIP CONTROL MONUMENT
5	448440.48	648731.83	5216.78	SET LUND PARTNERSHIP CONTROL MONUMENT
6	448052.87	649024.94	5223.95	SET LUND PARTNERSHIP CONTROL MONUMENT
7	451024.49	647497.03	5193.63	SET LUND PARTNERSHIP CONTROL MONUMENT
8	450582.55	648026.12	5199.35	SET LUND PARTNERSHIP CONTROL MONUMENT
9	450383.10	648227.69	5209.97	SET LUND PARTNERSHIP CONTROL MONUMENT
10	449858.16	648753.59	5212.61	SET LUND PARTNERSHIP CONTROL MONUMENT
12	450830.31	647767.61	5196.31	SET LUND PARTNERSHIP CONTROL MONUMENT
13	450311.48	648223.62	5210.26	SET LUND PARTNERSHIP CONTROL MONUMENT
14	450060.31	648466.99	5212.15	SET LUND PARTNERSHIP CONTROL MONUMENT
15	449821.13	648718.81	5212.53	SET LUND PARTNERSHIP CONTROL MONUMENT
16	449679.83	648944.77	5212.41	SET LUND PARTNERSHIP CONTROL MONUMENT





TYPICAL LUND PARTNERSHIP CONTROL MONUMENT (2" DIAMETER ALUMINUM CAP)

31st Street and 36th Street Outfall Study and Design Lying in Sections 22, 27, 26, & 35 All In Township 3 South, Range 68 West of the 6th Principal Meridian City and County of Denver, Colorado



BASIS OF BEARINGS: All bearings are based on the line connecting project "Control Point No. 1" to project "Control Point No. 2", being a GRID bearing of N 31°08'41" E as obtained from a global positioning system (GPS) survey based on the Colorado High Accuracy Reference Network (CHARN). Said Grid bearing is NAD 83 (1992) UTM Zone 13 North. Control Points "1 & 2" are monumented with a 2" diameter aluminum cap set on # 5 rebar, cap stamped "L.P.I. (Pt. #) Survey Control Point".

BASIS OF ELEVATIONS: Project elevations are based on the City and County of Denver benchmark No. BM-377, having a published NAVD 88 elevation of 5,196.44 sft. Differential levels were run through the set and found project control points as shown hereon

All City and County of Denver benchmarks are NAVD88 datum, published elevations updated May, 2001.

COORDINATE DATUM: Project coordinates are modified UTM Zone 13 North NAD '83 (1992) coordinates in US Survey feet. The combined elevation/scale factor used to modify the coordinates from UTM sft. to project coordinates is 1.000650402. The resulting coordinates are decreased by 14,000,000 sft. in the Northing and 1,000,000 sft. in the Easting after multiplying the UTM sft. coordinates by the combined elevation/scale factor.

Project Coordinates Northing US Survey Feet = (UTM North Zone 13 Coordinate Northing * 1.000650402 - 14,000,000) Project Coordinates Easting US Survey Feet = (UTM North Zone 13 Coordinate Easting * 1.000650402 - 1,000,000).

General Notes:

This Survey Control Diagram is not a boundary survey of the adjoining property, and is prepared for City and County of Denver purposes only

to establish vertical control within the project limits.

Title policy, title commitment, and title research are not part of this survey, therefore easements, rights, and restrictions of record were not researched and are not shown on this diagram. The verification of the physical evidence with relation to easements, rights of ways, property boundaries, and restrictions, as described in the instruments of record, were not included in this control survey.

This control diagram is subject to change and may not be the most current set. It is the user's responsibility to verify with the City and County of Denver that this set is the most current. The information contained on the attached drawing is not valid unless this copy bears an original signature of the Professional Land Surveyor hereon named.

The field survey for this Survey Control Diagram was performed between March 2013 and

NOTICE: According to Colorado law you must commence any legal action based upon any defect in this survey within three years after you first discover such defect. In no event may any action based upon any defect in this survey be commenced more than ten years from the date of the certification shown hereon.

SURVEYOR STATEMENT (SURVEY CONTROL DIAGRAM)

Geoffrey F. Stephenson, PLS No. 23521

I, Geoffrey F. Stephenson, a professional land surveyor licensed in the State of Colorado, do hereby state to the City and County of Denver that this Survey Control Diagram was prepared and the field survey it represents was performed under my responsible charge, and based upon my knowledge, information and belief is in accordance with applicable standards of practice defined by City and County of Denver publications. This statement is not a guaranty or warranty, either expressed or implied.



APPROVED BY: GFS DRAWING NAME: 57001-SurvControl.dwa

DRAWN BY:

DESIGNED BY:

33RD STREET OUTFALL SEG - BLAKE ST. TO ARAPAHOE ST.

PWC2009-5: 2012-0214

O CONTROL N AR REVIEW I

OCTOBER 2016 SHEET NO .:

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COORDINATE SUMMARY TABLE OF ALIQUOT POINTS (ADJUSTED FIELD DATA U.S. FEET):

	PROJECT CO	ORDINATES		
POINT	NORTHING (FT)	EASTING (FT)	LOCATION	DESCRIPTION
200	452113.69	647606.60	NORTHEAST CORNER SECTION 27, TOWNSHIP 3 SOUTH, RANGE 68 WEST, 6TH P.M.	FOUND 6" BY 6" STONE WITH CHISELED CROSS IN CENTER, 1.3' BELOW GRADE
201	446819.89	647606.75	SOUTHEAST CORNER SECTION 27, TOWNSHIP 3 SOUTH, RANGE 68 WEST, 6TH P.M.	FOUND 2" BRASS CAP STAMPED "LS 28668", FLUSH WITH TOP OF TYPE R INLET
*202	452112.59	644960.96	NORTH QUARTER SECTION 27, TOWNSHIP 3 SOUTH, RANGE 68 WEST, 6TH P.M.	FOUND 3 1/4" ALUMINUM CAP STAMPED "PLS 33204", FLUSH WITH ASPHALT PARKING LOT
*203	449470.11	642314.46	WEST QUARTER SECTION 27, TOWNSHIP 3 SOUTH, RANGE 68 WEST, 6TH P.M.	FOUND 3 1/4" ALUMINUM CAP STAMPED "PLS 24949", 0.5' ABOVE GRADE
*204	450791.25	643638.37	NORTHWEST SIXTEENTH SECTION 27, TOWNSHIP 3 SOUTH, RANGE 68 WEST, 6TH P.M.	FOUND DAMAGED 3 1/4" ALUMINUM CAP STAMPED "PLS 13155", 0.2' BELOW GRADE
*205	449469.19	643637.25	CENTER WEST SIXTEENTH SECTION 27, TOWNSHIP 3 SOUTH, RANGE 68 WEST, 6TH P.M.	FOUND VERTICAL RAILROAD RAIL WITH CENTER PUNCH IN RANGE BOX, 0.8' BELOW RANGE BOX LID
*206	449358.50	644960.40	WITNESS CORNER, CENTER QUARTER SECTION 27, TOWNSHIP 3 SOUTH, RANGE 68 WEST, 6TH P.M.	FOUND 3 1/4" ALUMINUM CAP STAMPED "110.0 WC PLS 33204", FLUSH WITH CONCRETE SIDEWALK
*207	449468 33	645140 56	WITNESS CORNER CENTER OLIARTER SECTION 27 TOWNSHIP 3 SOUTH RANGE 68 WEST 6TH P.M.	FOUND SCARRED 3 1/4" ALLIMINUM CAP STAMPED "PLS 33204" FULSH WITH CONCRETE SIDEWALK

* DENOTES MONUMENT NOT SHOWN ON THIS CONTROL DIAGRAM - OUTSIDE PROJECT AREA

COORDINATE SUMMARY TABLE OF RANGE POINTS (ADJUSTED FIELD DATA U.S. FEET):

	PROJECT COORDINATES		
POINT	NORTHING (FT)	EASTING (FT)	DESCRIPTION
300	451078.25	647461.12	FOUND 1" DIAMETER IRON BAR IN RANGE BOX
305	450960.59	647606.77	FOUND 1" DIAMETER IRON BAR IN RANGE BOX
342	449585.68	648958.95	FOUND 1" SQUARE DRAG TOOTH IN RANGE BOX
361	450005.14	647857.29	FOUND 1" SQUARE DRAG TOOTH IN RANGE BOX
*371	450249.40	647612.16	FOUND 1" DIAMETER IRON BAR IN RANGE BOX
410	450263.24	648959.24	FOUND 1" SQUARE DRAG TOOTH IN RANGE BOX
*411	449516.92	648347.37	FOUND 1" SQUARE DRAG TOOTH IN RANGE BOX
*412	449149.79	648958.63	FOUND STONE IN RANGE BOX
413	449482.96	649305.04	FOUND 2 1/2" ALUMINUM CAP IN RANGE BOX STAMPED "RANGE POINT PLS 34183"
*414	449026.99	649304.61	FOUND STONE IN RANGE BOX
*415	449026.95	649650.49	FOUND 1" SQUARE DRAG TOOTH IN RANGE BOX
*416	449027.21	648958.37	FOUND 2 1/2" ALUMINUM CAP IN RANGE BOX STAMPED "RANGE POINT PLS 34183"

* DENOTES POINT NOT SHOWN GRAPHICALLY

COORDINATE SUMMARY TABLE OF PROPERTY EVIDENCE (ADJUSTED FIELD DATA U.S. FEET):

	PROJECT CO		
POINT	NORTHING (FT)	EASTING (FT)	DESCRIPTION
301	451075.19	647541.47	FOUND CHISELED CROSS IN WALK
302	451123.40	647484.77	FOUND CHISELED CROSS ON TOP OF CURB
303	451082.21	647443.82	FOUND CHISELED CROSS ON TOP OF CURB
304	451028.88	647485.46	FOUND CHISELED CROSS ON TOP OF CURB
306	450793.38	647747.61	FOUND CHISELED MALTESE CROSS ON TOP OF CURB
308	450581.30	647936.93	FOUND CHISELED MALTESE CROSS ON TOP OF CURB
309	450579.20	647934.80	FOUND CHISELED MALTESE CROSS ON TOP OF CURB
310	450634.36	647989.91	FOUND CHISELED MALTESE CROSS ON TOP OF CURB
311	450632.92	647988.53	FOUND CHISELED MALTESE CROSS ON TOP OF CURB
312	450547.08	647971.30	FOUND CHISELED MALTESE CROSS ON TOP OF CURB
313	450543.48	647967.58	FOUND CHISELED MALTESE CROSS ON TOP OF CURB
314	450385.88	648239.38	FOUND CHISELED CROSS ON TOP OF CURB
318		648271.06	
	450335.21		FOUND PK NAIL & 1 1/2" DISK IN CONC WALK STAMPED "PLS 16109 GMS
319	450355.01	648271.03	FOUND PK NAIL & 1 1/2" DISK IN CONC WALK STAMPED "PLS 16109 GMS
320	450044.10	648469.39	FOUND BENT #5 REBAR, 0.4' ABOVE GROUND
323	450147.58	648479.26	FOUND PK NAIL & 1 1/2" DISK IN CONC WALK
*324	450006.34	648400.98	FOUND CHISELED CROSS ON TOP OF CURB
325	449955.94	648557.86	FOUND 1 1/4" YELLOW PLASTIC CAP MARKED "VLC LS 20699"
326	450009.06	648610.85	FOUND PK NAIL & 1 1/4" TAG
327	449902.82	648504.90	FOUND 1 1/4" YELLOW PLASTIC CAP MARKED "VLC LS 20699"
330	449955.07	648778.20	FOUND NAIL & 1" BRASS TAG STAMPED "15321 R.E. PORT"
332	449559.84	648881.71	FOUND NAIL & ILLEGIBLE 1" DISK
333	449560.08	648881.94	FOUND CHISELED CROSS ON TOP OF CURB
334	449509.08	648831.23	FOUND CHISELED CROSS ON TOP OF CORB FOUND NAIL & 1 1/2" DISK ON TOP OF CURB STAMPED "AEGIS LS 9655
*335	449341.21	648715.06	FOUND CHISELED CROSS ON TOP OF CURB
340	449902.86	648504.84	FOUND 1 1/4" YELLOW PLASTIC CAP MARKED "VLC LS 20699"
341	449491.29	648813.40	FOUND NAIL & 1 1/2" DISK ON TOP OF CURB STAMPED "AEGIS LS 9655
*343	449234.18	648608.49	FOUND CHISELED CROSS ON TOP OF CURB
*344	449234.21	648633.61	FOUND CHISELED CROSS ON TOP OF CURB
*345	449260.02	648659.11	FOUND CHISELED CROSS ON TOP OF CURB
*346	449310.45	648633.17	FOUND CHISELED CROSS ON TOP OF CURB
*347	449310.40	648607.95	FOUND CHISELED CROSS ON TOP OF CURB
*348	449557.65	648359.88	FOUND CHISELED CROSS ON TOP OF CURB
349	449634.55	648527.19	FOUND CHISELED CROSS ON TOP OF CURB
350	449687.97	648580.42	FOUND CHISELED CROSS ON TOP OF CURB
351		648598.19	FOUND CHISELED CROSS ON TOP OF CURB
	449705.75		
*352	449801.83	648145.60	FOUND CHISELED CROSS ON TOP OF CURB
*353	449747.92	648092.01	FOUND CHISELED CROSS ON TOP OF CURB
*354	449745.12	648089.17	FOUND CHISELED CROSS ON TOP OF CURB
*355	449776.12	648171.43	FOUND CHISELED CROSS ON TOP OF CURB
*356	449820.43	648215.55	FOUND CHISELED CROSS ON TOP OF CURB
357	449864.72	648259.66	FOUND CHISELED CROSS ON TOP OF CURB
359	450035.14	647889.06	FOUND CHISELED "X" ON TOP OF CURB
360	449992.18	647846.95	FOUND CHISELED CROSS ON TOP OF CURB
362	449963.69	647869.92	FOUND CHISELED CROSS ON TOP OF CURB
363	449966.50	647872.72	FOUND CHISELED CROSS ON TOP OF CURB
364	450020.19	647926.28	FOUND CHISELED CROSS ON TOP OF CURB
*370	450209.62	647651.99	FOUND CHISELED "X" ON TOP OF CURB
*372	450239.28	647595.96	FOUND CHISELED X ON TOP OF CURB
*373	450240.78	647597.48	FOUND CHISELED CROSS ON TOP OF CURB
*374	450291.68	647648.33	FOUND CHISELED CROSS ON TOP OF CURB
375	450382.99	647739.33	FOUND CHISELED CROSS ON TOP OF CURB
376	450400.71	647756.97	FOUND CHISELED CROSS ON TOP OF CURB
377	450506.88	647862.91	FOUND CHISELED CROSS ON TOP OF CURB
378	450454.92	647879.54	FOUND CHISELED CROSS ON TOP OF CURB
379	450419.54	647844.28	FOUND NAIL & 1" BRASS TAG STAMPED "LS 31929"
380	450366.42	647791.32	FOUND NAIL & ILLEGIBLE 3/4" TAG IN CHISELED CROSS ON TOP OF CUI
381	450365.91	647790.82	FOUND CHISELED "X" ON TOP OF CURB
*382	450295.13	647720.21	FOUND CHISELED CROSS ON TOP OF CURB
383	450445.33	647392.09	FOUND CHISELED CROSS ON TOP OF CURB
384	450499.20	647445.67	FOUND NAIL & 3/4" DISK STAMPED "PLS 7135" ON TOP OF CURB
385	450569.98	647516.21	FOUND NAIL & ILLEGIBLE 3/4" DISK ON TOP OF CURB
386	450605.57	647551.42	FOUND CHISELED CROSS ON TOP OF CURB
387	450658.70	647604.31	FOUND CHISELED CROSS ON TOP OF CURB
388	450676.33	647622.07	FOUND CHISELED CROSS ON TOP OF CURB
389	450711.79	647657.23	FOUND CHISELED CROSS ON TOP OF CURB
390	451021.34	647489.00	FOUND 1 1/4" RED PLASTIC CAP MARKED "HKS LS 16062"
391	450738.14	647206.38	FOUND 1 1/4" RED PLASTIC CAP MARKED "HKS LS 16062"
392	450681.54	647150.13	FOUND ILLEGIBLE 1 1/2" ALUMINUM CAP
*393	450738.19	647121.74	FOUND PK NAIL IN ASPHALT
*394	451163.59	647629.71	FOUND PK NAIL IN ASPHALT FOUND ILLEGIBLE 1 1/4" YELLOW PLASTIC CAP
403	451262.01	647361.98	FOUND 1" DISK TAG MARKED "PLS 38015"
404	451134.88	647489.28	FOUND 2" ALUMINUM CAP STAMPED "TRUE MERIDIAN GEOMATICS PLS 3
404 *409	451170.02	648013.25	FOUND NAIL & 3/4" BRASS TAG STAMPED "LS 18475"

* DENOTES MONUMENT NOT SHOWN ON THIS CONTROL DIAGRAM - OUTSIDE PROJECT AREA

	PROJECT CC	ORDINATES	
POINT	NORTHING (FT)	EASTING (FT)	DESCRIPTION
419	451258.44	647924.61	FOUND 1" YELLOW PLASTIC CAP MARKED "SCHEAR LS 18475"
*420	451326.13	647969.71	FOUND 1 1/4" YELLOW PLASTIC CAP MARKED "COSTIN LS 11338"
421 422	450933.06	647577.57	FOUND 1 1/2" ALUMINUM CAP STAMPED "LS 30830"
*424	450921.85 450649.88	647588.93 647295.01	FOUND BENT #3 REBAR FOUND 1 1/4" RED PLASTIC CAP MARKED "HKS PLS 36062"
425	450782.55	647727.97	FOUND CHISELED MALTESE CROSS IN WALK
*426	450914.67	648269.45	FOUND CHISELED MALTESE CROSS ON TOP OF INLET
*427	450880.53	648303.75	FOUND CHISELED MALTESE CROSS ON TOP OF CURB
*428	450887.28	648310.47	FOUND CHISELED MALTESE CROSS ON TOP OF CURB
429	450705.24	648060.52	FOUND CHISELED MALTESE CROSS ON TOP OF CURB
*430	450260.13	647685.59	FOUND NAIL & ILLEGIBLE 3/4" BRASS TAG
*431 432	450159.38 450500.89	647786.59 648123.87	FOUND NAIL & 3/4" BRASS TAG STAMPED "LS 24?56" FOUND NAIL & ILLEGIBLE 3/4" BRASS TAG
433	450672.94	648525.56	FOUND CHISELED CROSS IN HANDICAP RAMP
*434	450643.80	648548.01	FOUND CHISELED CROSS ON TOP OF CURB
*435	450628.46	648563.28	FOUND 1 1/4" ORANGE PLASTIC CAP MARKED "16109"
*436	450440.93	648751.64	FOUND 1 1/4" ORANGE PLASTIC CAP MARKED "16109"
437	450009.47	648434.69	FOUND 1" ORANGE PLASTIC CAP MARKED "PLS 30098"
*438	449048.24	649284.58	FOUND 1 1/4" YELLOW PLASTIC CAP MARKED "CR MOORE PLS 10046"
*439 *440	449174.10 449199.23	649157.55 649157.55	FOUND NAIL & 1" BRASS TAG STAMPED "PLS 25946" FOUND NAIL & 1" BRASS TAG STAMPED "PLS 25946"
*441	449312.15	649145.76	FOUND NAIL & 1" BRASS TAG STAMPED "LS 25946" FOUND NAIL & 1" BRASS TAG STAMPED "LS 34183"
442	449425.08	649491.84	FOUND NAIL & 1" BRASS TAG STAMPED 125 34 163 FOUND NAIL & 1" BRASS TAG STAMPED "RE PORT LS 15321"
443	449425.06	649505.80	FOUND #4 REBAR
*444	449081.94	648863.13	FOUND CHISELED CROSS IN WALK
*445	449079.15	648865.91	FOUND CHISELED CROSS IN WALK
*446	449082.05	648868.79	FOUND CHISELED CROSS IN WALK
*447	449135.12	648921.72	FOUND CHISELED CROSS ON TOP OF CURB
*448	449195.76	648954.49	FOUND CHISELED CROSS ON TOP OF CURB
*449 *450	449335.09 449324.40	648938.94 648908.90	FOUND 1" BRASS DISK STAMPED "LS 30650" FOUND 1 1/4" BRASS TAG STAMPED "LS 10717"
*451	449324.40	648853.25	FOUND 1/4 BRASS TAG STAMPED LS 10/1/ FOUND 3/4" SMOOTH BAR
*452	449250.02	648877.25	FOUND 3/4" PIPE IN CONCRETE
*453	449170.44	648774.84	FOUND CUT ARROW ON TOP OF CURB
*454	449204.31	648715.25	FOUND CHISELED CROSS ON TOP OF CURB
455	449416.84	648816.14	FOUND CHISELED CROSS IN WALK
456	449865.24	648770.08	FOUND CHISELED CROSS IN WALK
*457	454188.89	647713.69	FOUND NAIL IN 1 1/4" YELLOW PLASTIC CAP MARKED "BURDICK PLS 9010"
458 *480	449505.01 449970.32	649364.89 646617.95	FOUND 3" BRASS CAP STAMPED "D.P.S. 36.95" FOUND 1 1/4" YELLOW PLASTIC CAP STAMPED "LS 37929"
*481	450058.63	646529.43	FOUND 11/4" YELLOW PLASTIC CAP STAMPED "LS 37929"
482	450343.31	646810.28	FOUND 2" ALUMINUM CAP STAMPED "2' W.C. PLS 37929"
483	450398.98	646866.31	FOUND #4 REBAR
*485	450210.72	646658.67	FOUND CHISELED CROSS ON TOP OF CURB
*486	450018.06	646384.35	FOUND 3/4" BRASS TAG STAMPED "CALIBRE LS (ILLEGIBLE)"
*487	449768.97	646137.68	FOUND 3/4" BRASS TAG ILLEGIBLE
*488	449672.02	646121.68	FOUND CHISELED CROSS ON TOP OF CURB
*489 *490	449530.06 449494.57	645980.28 645944.89	FOUND CHISELED CROSS ON TOP OF CURB FOUND CHISELED CROSS ON TOP OF CURB
*491	449388.09	645838.78	FOUND CHISELED CROSS ON TOP OF CURB
*500	449701.65	648815.81	FOUND ILLEGIBLE 1" BLUE PLASTIC CAP UNDER CORNER OF BUILDING
501	449917.73	648542.50	FOUND #4 REBAR
502	451894.83	646780.95	FOUND 1 1/4" YELLOW PLASTIC CAP MARKED "PORT & ASSOC. LS 15321"
503	451971.93	646856.99	FOUND 1 1/4" GREEN PLASTIC CAP MARKED 39 NORTH PLS 38284"
504	452113.66	646998.16	FOUND 1 1/4" GREEN PLASTIC CAP MARKED 39 NORTH PLS 38284"
505	452107.33	646720.80	FOUND 1 1/4" YELLOW PLASTIC CAP MARKED "J. JONES LS 19606"
506 *507	452112.41 451612.35	646715.66 646498.93	FOUND 1 1/4" YELLOW PLASTIC CAP MARKED "J. JONES LS 19606" FOUND #4 REBAR
508	451612.35	646271.95	FOUND #4 REBAR FOUND #4 REBAR
509	452031.45	646644.92	FOUND 1 1/4" YELLOW PLASTIC CAP MARKED "J. JONES LS 19606"
510	452318.33	646790.10	FOUND #4 REBAR WITH BROKEN RED PLASTIC CAP ILLEGIBLE
*511	452455.51	646650.57	FOUND #4 REBAR
17446	451758.28	647251.36	FOUND 1 1/2" ALUMINUM CAP STAMPED "FRONTIER SURV PLS 30830 4' WC"
17607	451532.06	647020.34	FOUND 1 1/4" YELLOW PLASTIC CAP MARKED "PLS 19003"
17608	451617.54	647106.78	FOUND PURPLE PLASTIC CAP MARKED "MG LLC LS 37890"
17609 *17873	451862.49 451765.81	646861.01	FOUND NAIL & ILLEGIBLE 3/4" BRASS TAG IN CONCRETE
1/0/3	401/00.61	646785.94	FOUND 1 1/4" BRASS TAG STAMPED "LS 19003"

* DENOTES MONUMENT NOT SHOWN ON THIS CONTROL DIAGRAM - OUTSIDE PROJECT AREA

LEGEND

FOUND PROPERTY EVIDENCE

▲ PROJECT CONTROL POINT

NGS CONTROL POINT

----- EXISTING R.O.W. LINE

----- ALIQUOT LINE

SURVEYING

1. PRIOR TO BEGINNING WORK ON THE PROJECT, THE CONTRACTOR'S SURVEYOR SHALL PERFORM A SURVEY TO VERIFY ALL SURVEY CONTROL POINTS, CITY OF DENVER RANGE POINTS, SECTION CORNERS, AND BENCHMARKS AS SHOWN ON THE SURVEY CONTROL DIAGRAM. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPLACING ALL LAND SURVEY MONUMENTS DISRUPTED BY CONSTRUCTION ACTIVITIES OR BY NEGLIGENCE ON THE PART OF THE CONTRACTOR. THE CONTRACTOR IS REQUIRED TO FOLLOW COLORADO STATE LAW REGARDING SURVEY MONUMENTS. THE CONTRACTOR SHALL RETAIN A COLORADO LICENSED PROFESSIONAL LAND SURVEYOR TO RESET ANY AFFECTED SURVEY MONUMENTS. THIS WILL NOT BE PAID SEPARATELY, BUT SHALL BE INCLUDED IN THE WORK UNLESS SPECIFIED OTHERWISE IN SECTION 629. FOR FURTHER INFORMATION CONTACT:

PUBLIC WORKS - SURVEY DEPARTMENT ATTN: CITY SURVEYOR 201 W. COLFAX AVE. DENVER, CO 80202 720-865-3121

- 2. AFTER COMPLETION OF THE PAVING OPERATIONS, THE CONTRACTOR SHALL UPGRADE TEMPORARY RANGE POINTS WITH PERMANENT RANGE POINT MONUMENTS AT THE LOCATIONS AS INDICATED ON THE LAND SURVEY CONTROL DIAGRAM. MONUMENTS SHALL MEET CURRENT CITY AND COUNTY OF DENVER STANDARDS. SEE SECTION 629 OF THE SPECIAL PROVISIONS FOR MORE INFORMATION.
- 3. A SURVEY SHALL BE DEPOSITED WITH THE CITY AND COUNTY OF DENVER PER STATE STATUTE. CITY MONUMENT RECORDS SHALL BE PREPARED FOR ALL RANGE POINTS WITHIN THE PROJECT AND DEPOSITED WITH THE CITY
- 4. ANY PERSON WHO KNOWINGLY REMOVES, ALTERS, OR DEFACES ANY PUBLIC LAND SURVEY MONUMENT AND/OR BOUNDARY MONUMENT OR ACCESSORY, COMMITS A CLASS TWO (2) MISDEMEANOR PURSUANT TO STATE STATUTE C.R.S. SECTION 18-4-508.
- 5. ALL STATIONS AND OFFSETS SHOWN ON THE PLANS ARE TO THE CONTROL LINES UNLESS OTHERWISE NOTED. THE USE OF CONTROL MONUMENTS FOR CONSTRUCTION STAKING OTHER THAN THOSE SHOWN ON THE PLANS OR APPROVED BY THE PW DEPT IS PROHIBITED, AND USE OF SUCH MONUMENTS IS AT THE CONTRACTOR'S SOLE RISK.
- 6. PROPOSED FINISHED GROUND ELEVATIONS FOR ITEMS TO BE ADJUSTED, RESET OR MODIFIED SHALL BE FIELD VERIFIED BY THE CONTRACTOR.

LUND

12265 W. Bayaud Avenue, Suite 130 Lakewood, Colorado 80228 P:303.989.1461 F: 303.989.4094

CIVIL ENGINEERING & SURVEYING

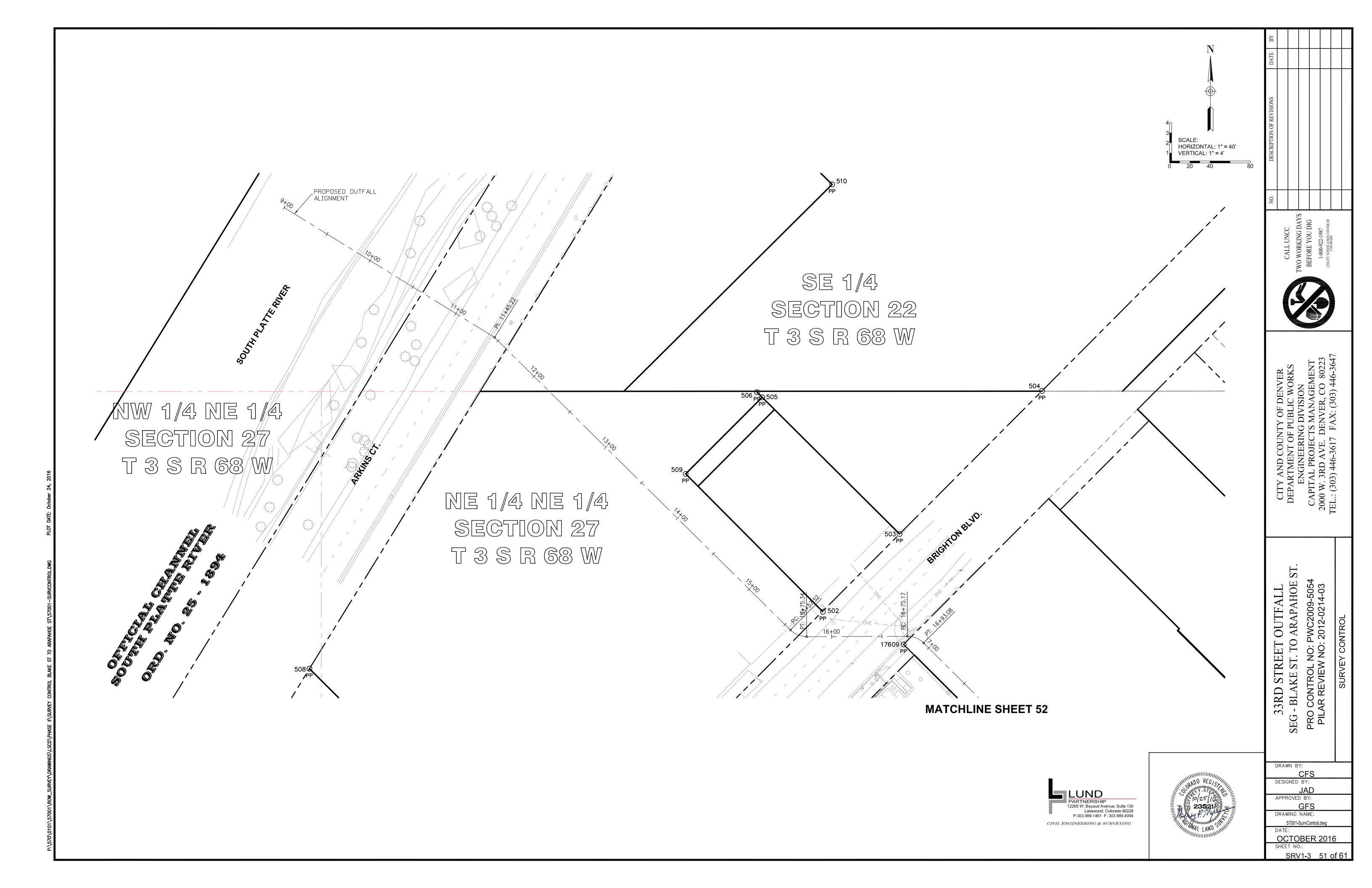


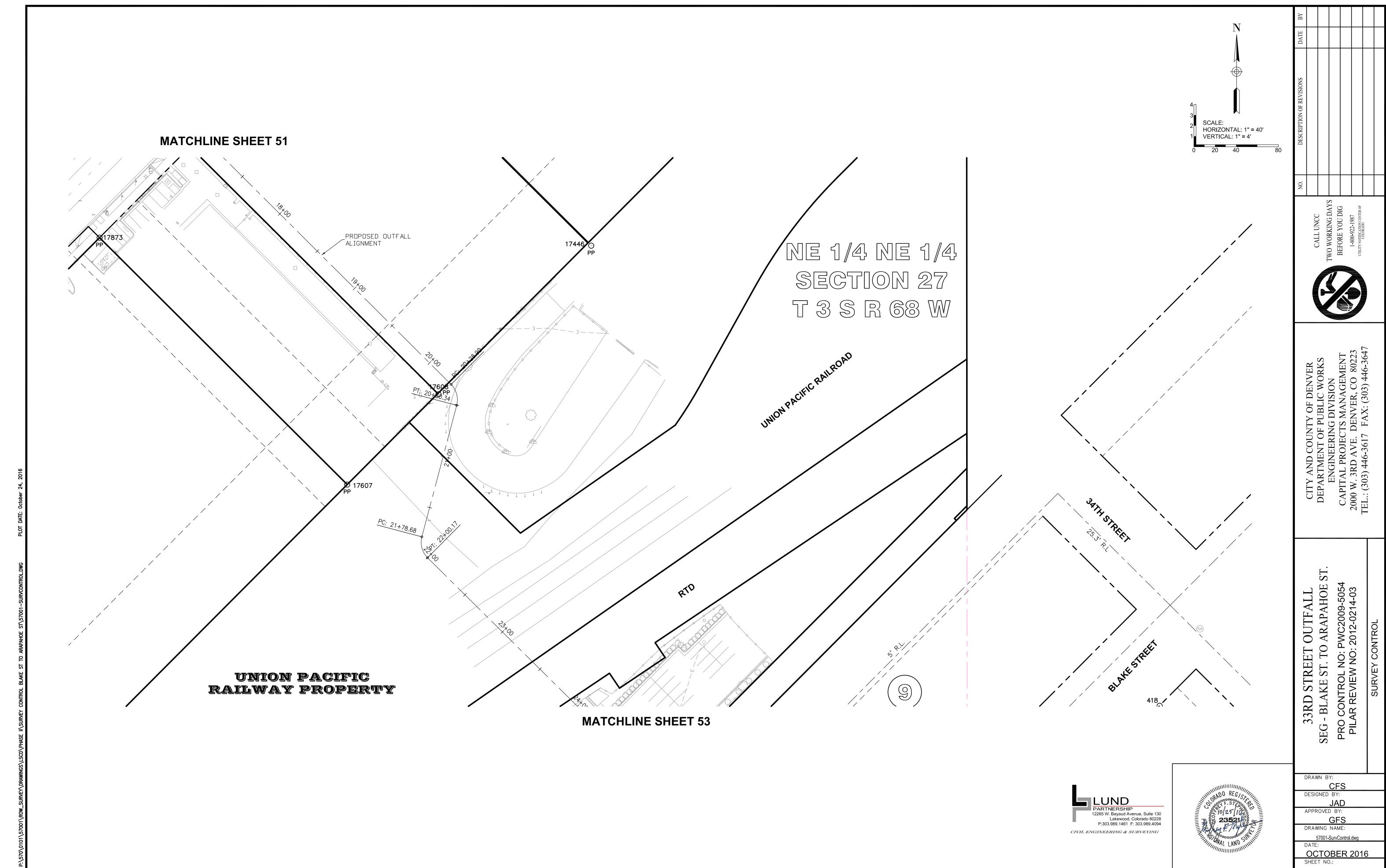
33RD STREET OUTFALL SEG - BLAKE ST. TO ARAPAHOE ST. PRO CONTROL NO: PWC2009-5054 PILAR REVIEW NO: 2012-0214-03



APPROVED BY: DRAWING NAME: 57001-SurvControl.dwg OCTOBER 2016

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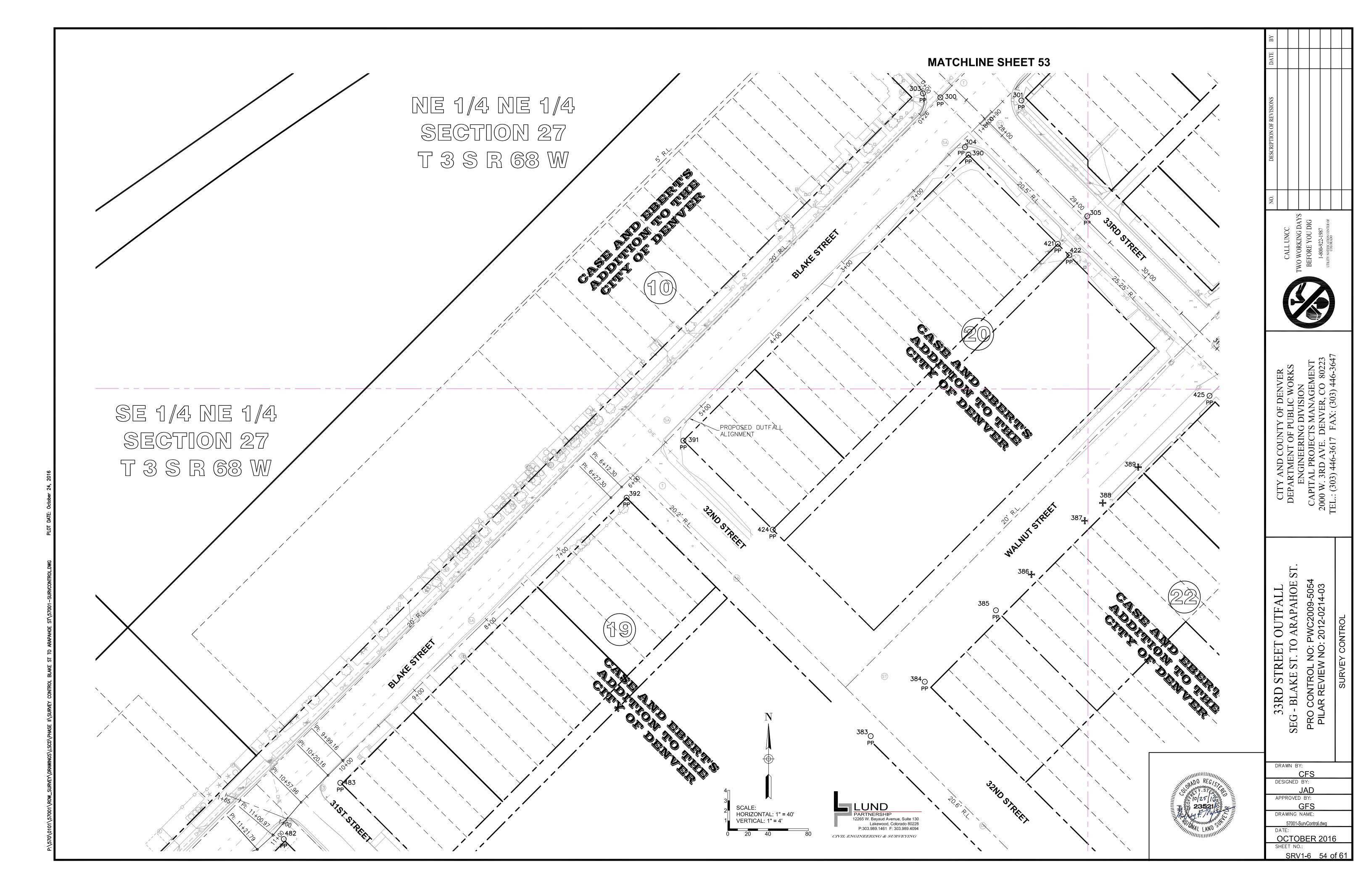


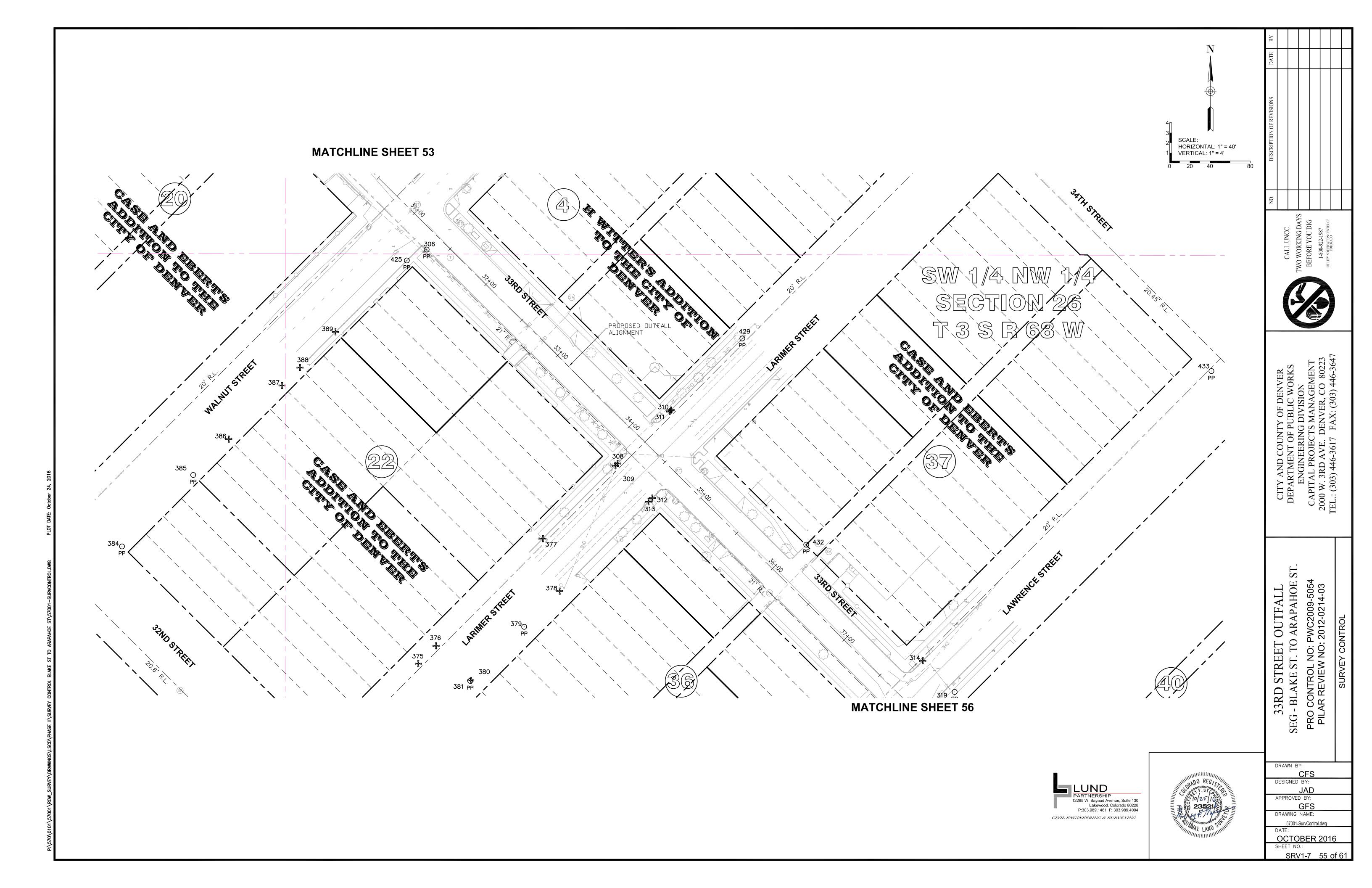


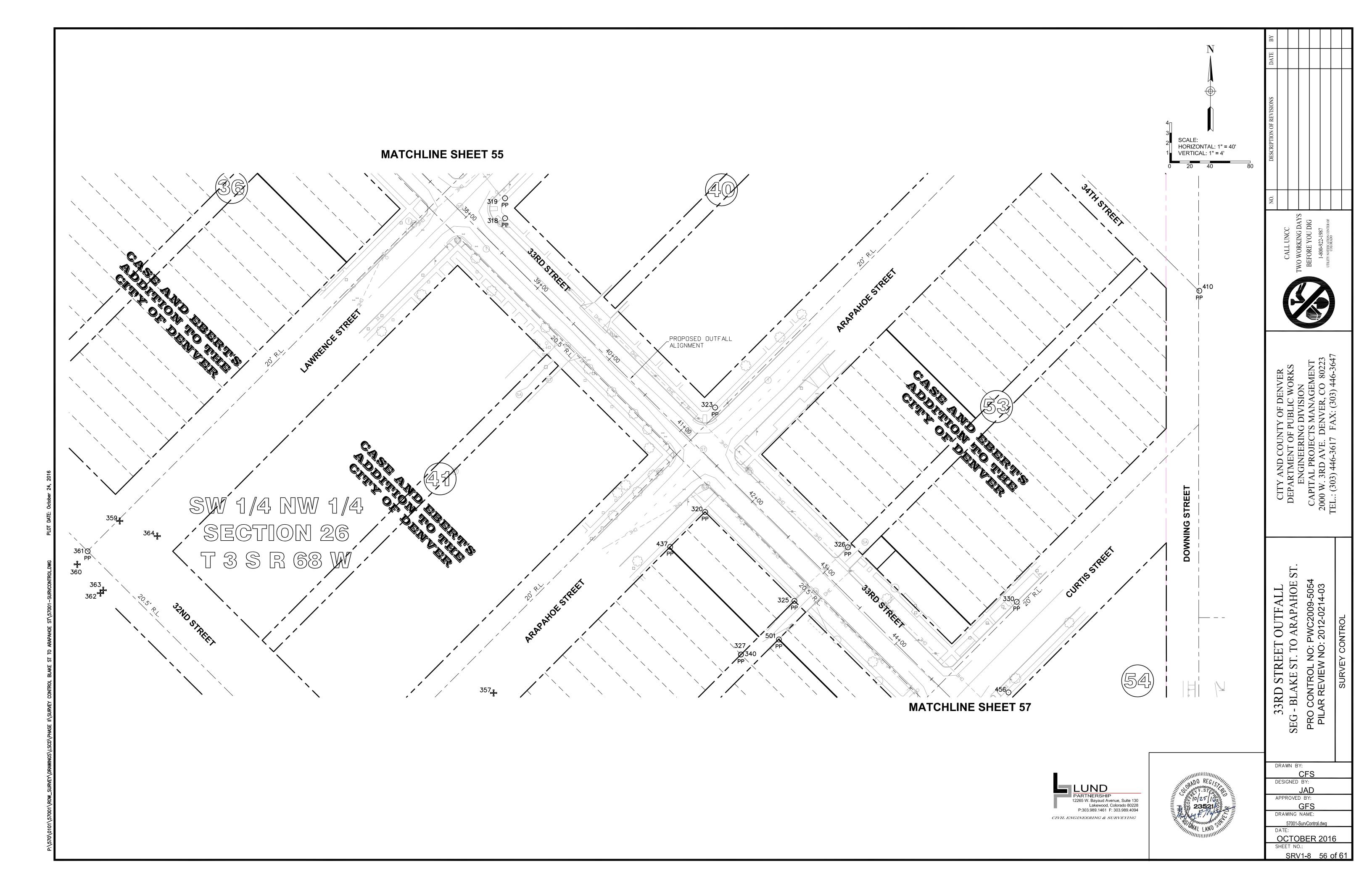
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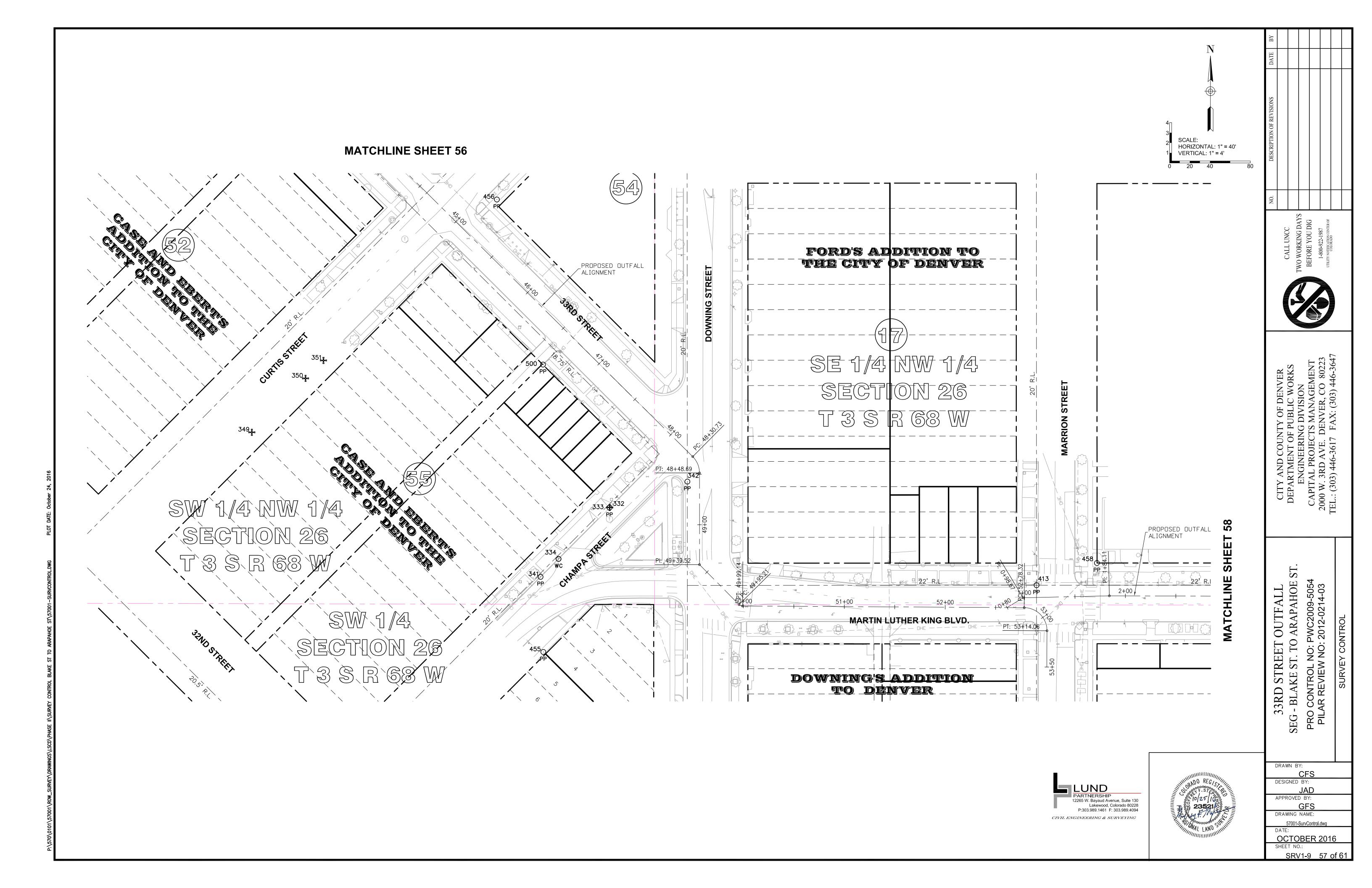
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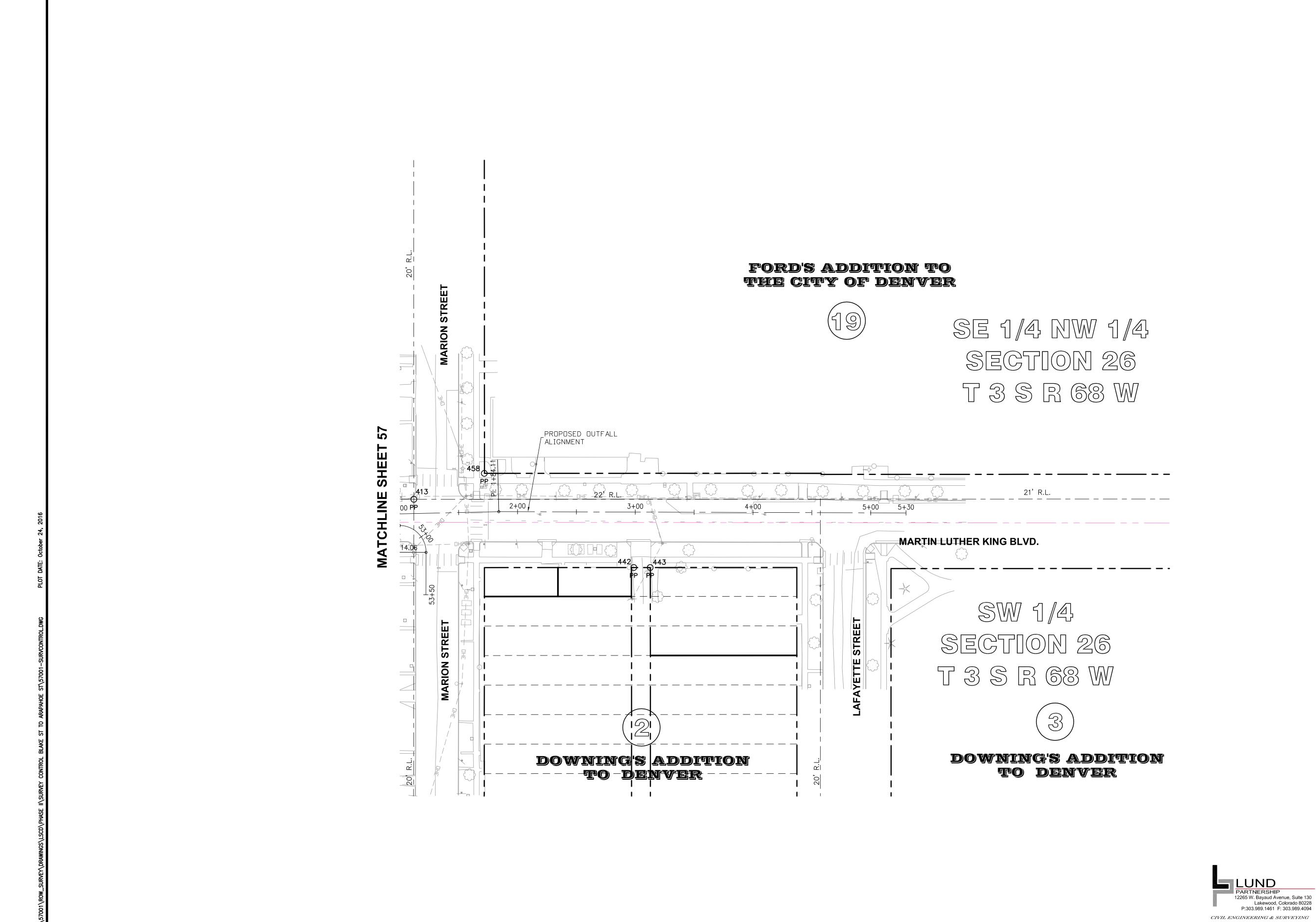
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33RD STREET OUTFALL
SEG - BLAKE ST. TO ARAPAHOE ST.
PRO CONTROL NO: PWC2009-5054
PILAR REVIEW NO: 2012-0214-03

CFS
DESIGNED BY:

JAD
APPROVED BY:

DRAWING NAME: 57001-SurvControl.dwg

OCTOBER 2016
SHEET NO.: SRV1-10 58 of 61

SCALE: HORIZONTAL: 1" = 40' VERTICAL: 1" = 4'

