Renaissance Infrastructure Consulting

1815 McGee Street Suite 200
Kansas City, MO 64108
P: 816.800.0950
ric-consult.com

January 15, 2019

Mike Weisenborn
Project Manager, Development Center
City of Lee's Summit
220 SE Green Street
Lee's Summit, MO 64063

Re: **18-0251 Burton Townhomes Sanitary Sewer Impact Statement**

Mr. Weisenborn:
Per the requirements provided by the City of Lee's Summit's planning code regarding the preliminary development plan submittal for the proposed Burton Townhomes, a sanitary sewer impact analysis has been conducted. The following is a report of the analysis.

PROJECT DESCRIPTION

The proposed Burton Townhomes development is in the City of Lee's Summit, Jackson County, MO. The project is located on the southwest corner of NW Olive St and NW Orchard Dr and is 3.52 acres in size. A site location map has been provided as Exhibit A. The complex generally consists of nine primary townhomes and associated infrastructure. The entire site is located within the Cedar Creek Watershed. Refer to Exhibit B for a layout of the proposed complex.

METHODOLOGY

Based on the provisions outlined in the Lee's Summit Design and Construction Manual (LS DCM) 6500 for Sanitary Sewers, the peak sanitary sewer flow has been determined. Using as-builts and survey information on the existing sanitary sewer infrastructure, the existing sanitary sewer system has been analyzed to determine if the proposed flows will require any modifications to the existing system.

EXISTING PEAK FLOW

The existing sanitary sewer system services residential housing, a commercial lumber yard, a church, and a veterinarian complex. The existing residential area and surrounding non-residential developments were analyzed to determine the existing peak flowrate conditions. The LS DCM 6501.C was used to calculate existing residential and equivalent non-residential development peak flowrates for the existing system. The Jackson County Incentive Viewer was used to determine lot acreage. An existing sanitary sewer layout was provided by the City of Lee's Summit. Refer to Exhibit C (Existing Site) for a layout of the existing sanitary sewer and lot lines used to determine existing peak flowrates. A summary of the flows calculated for the existing use has been provided in Table 1.

Renaissance Infrastructure Consulting

1815 McGee Street Suite 200
Kansas City, MO 64108
P: 816.800.0950
ric-consult.com

Table 1. Summary of Existing Sanitary Sewer Peak Flows

	Area (Ac.)	EDU	Peak Base Flow (gpd)	Peak Infiltration	Peak Inflow				Peak Flow (gpd)	Peak Flow Rate (cfs)
					Time of Concentration, T_c (min)	Intensity, i (iph)	Peak Inflow, Q (cfs)	Peak Inflow (gpd)		
Ex Residential South	1.33	-	2,000	667	19.69	6.27	0.025	16,209	**18,875**	**0.029**
Lumber Yard	0.58	0.1	761	291	16.19	6.98	0.024	15,752	**16,804**	**0.026**
Ex Residential North	1.68	-	2523	841	21.16	6.12	0.031	19,957	**23,321**	**0.036**
Office Building	0.07	0.3	257	33	9.33	8.13	0.003	2,069	**2,359**	**0.004**
Church	0.10	0.5	675	52	10.47	7.84	0.005	3,141	**3,867**	**0.006**
Animal Hospital	0.21	0.4	1,093	105	12.50	7.58	0.010	6,147	**7,345**	**0.011**
Total	4.0		7,309	1988			0.098	66,889	**72,571**	**0.112**

PROPOSED PEAK FLOW

The proposed sanitary sewer system will service a 3.52 acre of multi-family townhomes along NW Olive St. This residential development was analyzed to determine the proposed peak flowrate conditions. The LS DCM 6501.C was used to calculate the peak sanitary sewer flow for the proposed multi-family townhomes. The peak sanitary sewer flow is the summation of the peak base flow, the peak infiltration, and the peak inflow of the proposed townhomes as well as existing residential and non-residential developments. A summary of the flows calculated for proposed use and existing use has been provided in Table 2. Refer to Exhibit D (Proposed Site) for details regarding the proposed peak flow calculations.

Table 2. Summary of Proposed Sanitary Sewer Peak Flows

	Area (Ac.)	EDU	Peak Base Flow (gpd)	Peak Infiltration	Peak Inflow				Peak Flow (gpd)	Peak Flow Rate (cfs)
					Time of Concentration, T_c (min)	Intensity, i (iph)	Peak Inflow, Q (cfs)	Peak Inflow (gpd)		
Prop Townhomes	3.52	-	5,280	1,760	25.05	5.56	0.059	37,948	**44,988**	**0.070**
Ex Residential South	1.33	-	2,000	667	19.96	6.27	0.025	16,209	**18,875**	**0.029**
Lumber Yard	0.58	0.1	761	291	16.19	6.98	0.024	15,752	**16,804**	**0.026**
Ex Residential North	1.68	-	2,523	841	21.16	6.12	0.031	19,957	**23,321**	**0.036**
Office Building	0.07	0.3	257	33	9.33	8.13	0.003	2,069	**2,359**	**0.004**
Church	0.10	0.5	675	52	10.47	7.84	0.005	3,141	**3,867**	**0.006**
Animal Hospital	0.21	0.4	1,093	105	12.50	7.58	0.010	6,147	**7,345**	**0.011**
Total	7.5		12,589	3,748			0.157	101,222	**117,558**	**0.182**

1815 McGee Street Suite 200
Kansas City, MO 64108
P: 816.800.0950
ric-consult.com

SANITARY IMPACT ANALYSIS

The capacities of the existing sanitary sewer infrastructure have been modeled to verify that the existing infrastructure is adequate to support the estimated peak sanitary sewer flows from the proposed sites. Sanitary flows are conveyed to an existing 4' concrete sanitary sewer manhole north of the site. Table 3 provides a summary of the existing pipes as well as pipe flow capacity in the system based on survey and provided as-built information. Flow capacities were calculated using Manning's Equation. The information for pipe 30-051 was provided via survey. Flowlines and length for pipes 30-031 through 30-009 were not provided by survey nor are reflected in the provided as-built information. Slopes for pipes 30-031 through 30-009 were assumed based on minimum requirements per LS DCM 6500 D.2.d. Pipe size was assumed to be 8" for pipes 30-031 through 30-010, and 10" for pipe 30-009. See Exhibit E for provided as-built information.

Table 3. Summary of Existing Sanitary System & Flow Capacities

Pipe ID (As-Built)	Pipe Length (ft)	US Flowline (ft)	DS Flowline (ft)	Pipe Slope (ft/ft)	Manning's n	Pipe Size (in)	Pipe Area (sf)	Pipe Flow Capacity (cfs)
30-051	323.77	1007.25	1005.95	0.004	0.015	8	0.35	0.664
30-031	N/A	N/A	N/A	0.006	0.015	8	0.35	0.813
30-014	N/A	N/A	N/A	0.006	0.015	8	0.35	0.813
30-013	N/A	N/A	N/A	0.006	0.015	8	0.35	0.813
30-010	N/A	N/A	N/A	0.006	0.015	8	0.35	0.813
30-009	N/A	N/A	N/A	0.006	0.015	10	0.55	1.475

Table 4 provides a summary of the proposed system as well as pipe flow capacity in the proposed system based on Manning's Equation.

Table 4. Summary of Proposed Sanitary System & Flow Capacities

Pipe ID	Pipe Length (ft)	US Flowline (ft)	DS Flowline (ft)	Pipe Slope (ft/ft)	Manning's n	Pipe Size (in)	Pipe Area (sf)	Pipe Flow Capacity (cfs)
Prop. Pipe	N/A	N/A	N/A	0.006	0.015	8	0.35	0.813

The existing peak flow rate was modeled in the existing system to determine current capacity and service conditions. The location of contributing laterals from residential and non-residential developments were assumed based on the existing sanitary sewer layout. Table 5 gives a summary of the existing sanitary sewer impact under existing conditions. Exhibit C shows details regarding the performance of the existing sanitary pipes under existing conditions.

1815 McGee Street Suite 200
Kansas City, MO 64108
P: 816.800.0950
ric-consult.com

Table 5. Summary of Existing Sanitary Impact Under Existing Conditions

Contributing Residential and Non-Res. Developments	Pipe ID (As-Built)	Pipe Slope (ft/ft)	Pipe Size (in)	Existing Flow Rate (cfs)	Depth (ft)	Accumulative Flow Rate (cfs)	Accumulative Depth (ft)	Pipe Velocity (ft/s)
Ex Residential South + Lumber	30-051	0.004	8	0.055	0.13	0.055	0.13	1.14
Ex Residential North	30-031	0.006	8	0.036	0.10	0.091	0.15	1.53
Office + Church + Animal Hospital	30-014	0.006	8	0.021	0.08	0.112	0.17	1.58
N/A	30-013	0.006	8	0.021	0.08	0.112	0.17	1.58
N/A	30-010	0.006	8	0.021	0.08	0.112	0.17	1.58
N/A	30-009	0.006	10	0.021	0.07	0.112	0.16	1.50

The proposed peak flow rate (along with the existing peak flowrate) was modeled in the existing system to determine if it is adequate to receive and convey the flows from the proposed development. Table 6 gives a summary of the existing sanitary sewer impact under proposed conditions. Exhibit D shows details regarding the performance of the existing sanitary pipes under proposed conditions.

Table 6. Summary of Existing Sanitary Impact Under Proposed Conditions

Contributing Residential and Non-Res. Developments	Pipe ID	Pipe Slope (ft/ft)	Pipe Size (in)	Existing Flow Rate (cfs)	Depth (ft)	Accumulative Flow Rate (cfs)	Accumulative Depth (ft)	Pipe Velocity (ft/s)
Prop Townhomes	Prop. Pipe	0.006	8	0.070	0.14	0.070	0.14	1.31
Ex Residential South + Lumber	30-051	0.004	8	0.055	0.13	0.125	0.20	1.40
Ex Residential North	30-031	0.006	8	0.036	0.1	0.161	0.20	1.81
Office + Church + Animal Hospital	30-014	0.006	8	0.021	0.08	0.182	0.22	1.79
N/A	30-013	0.006	8	0.021	0.08	0.182	0.22	1.79
N/A	30-010	0.006	8	0.021	0.08	0.182	0.22	1.79
N/A	30-009	0.006	10	0.021	0.07	0.182	0.20	1.78

SUMMARY

The proposed use identified herein results in an increase in the expected sanitary sewer flows as compared to the existing conditions. The existing infrastructure, however, is still adequate to receive and convey the flows from the proposed townhome development. Table 7 provides a summary comparing the proposed system flow rates to the existing sanitary sewer pipe capacities.

Renaissance Infrastructure Consulting

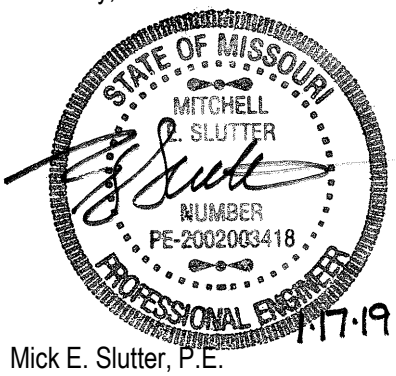
1815 McGee Street Suite 200
Kansas City, MO 64108
P: 816.800.0950
ric-consult.com

Table 7. Summary of Flow Rates vs. Pipe Flow Capacities

Contributing Residential and Non-Res. Developments	Pipe ID	Pipe Size (in)	Existing Flow Rate (cfs)	Accumulative Flow Rate (cfs)	Pipe Flow Capacity (cfs)
Prop Townhomes	Prop. Pipe	8	0.070	0.070	0.813
Ex Residential South + Lumber	30-051	8	0.055	0.125	0.664
Ex Residential North	30-031	8	0.036	0.161	0.813
Office + Church + Animal Hospital	30-014	8	0.021	0.182	0.813
N/A	30-013	8	0.021	0.182	0.813
N/A	30-010	8	0.021	0.182	0.813
N/A	30-009	10	0.021	0.182	1.475

It is our opinion that no modifications to the existing public sanitary sewer infrastructure will be required to accommodate the flows from the proposed development. If you have any questions or need additional clarification, please do not hesitate to contact us.

Sincerely,



Mick E. Slutter, P.E.
mslutter@ric-consult.com

E. Danielle Sandman, E.I.
dsandman@ric-consult.com

RENAISSANCE INFRASTRUCTURE CONSULTING

Exhibit A

Site Location Maps

Exhibit A: Burton Townhomes Project Location Map

NORTH

1"=1000'

0 500' 1000'

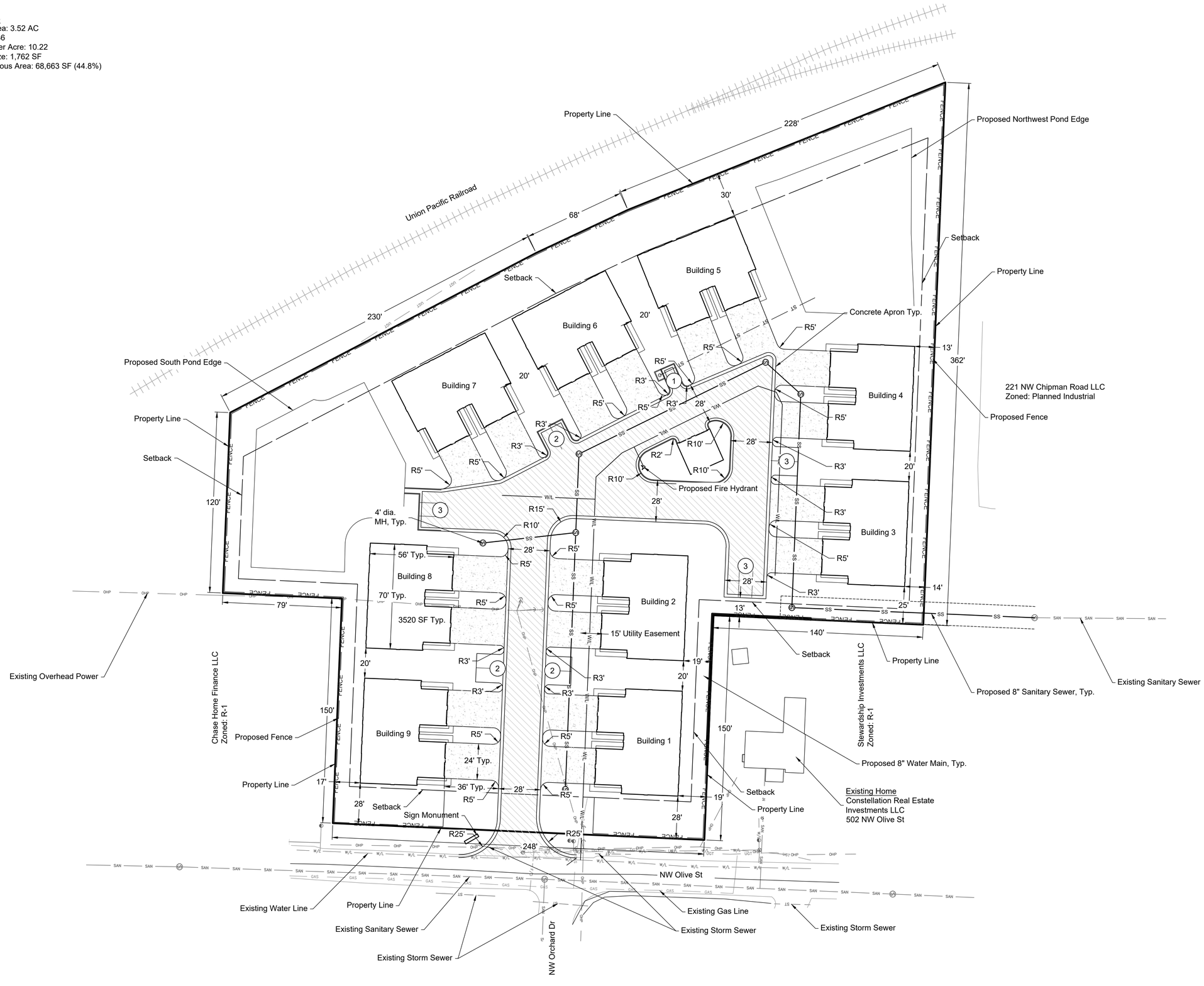
Exhibit A
18-0251
Prepared: 12/11/18

Renaissance Infrastructure Consulting
1815 McGee Street, Suite. 200
Kansas City, Missouri 64108
816.800.0950
www.ric-consult.com

Exhibit B

Proposed General Layout

Lot Info
Lot Area: 3.52 AC
Units: 36
Units per Acre: 10.22
Unit Size: 1,762 SF
Impervious Area: 68,663 SF (44.8%)



Sheet
C2

Preliminary Development Plans
18-0251
Burton Townhomes
Lee's Summit, Jackson County, Missouri

General Layout

NO.	BY	DATE	REVISION
1.	MES	QD	ORIGINAL SUBMITTAL

Renaissance Infrastructure Consulting
185 McGee Street, Suite 200
Kansas City, Missouri 64108
816.800.0950
www.RIC-consult.com
MO Certificate of Authority: E-2010033630

STATE OF MISSOURI
MITCHELL E. SLUTTER
NUMBER PE-2002003418
PROFESSIONAL ENGINEER
MITCHELL E. SLUTTER PE-2002003418

Jan 15, 2019-12:39pm
Z:\RIC Design\2018\18-0251 Burton Townhomes Lees Summit\Dwg\PDP's\General Layout.dwg

Exhibit C

Existing Sanitary Sewer

Office + Church + Animal Hospital
Area: 0.38 Ac
EDU: 0.4 - 0.5

Ex. Residential North
Area: 1.68 Ac

Ex. Residential South
Area: 1.33 Ac

NW Olive St

Held for Line

417.50'

S27°33'40"E 230.08'

Pipe 30-031

Pipe 30-051

Pipe 30-014

Pipe 30-013

Pipe 30-010

Prop. Townhomes
Area: 3.52 Ac

Union Pacific Railroad

Lumber Yard
Building Area: 0.58 Ac
EDU: 0.1

Existing 8" VCP

NORTH

1"=150'

0 75' 150'

Exhibit C

Existing Sanitary Sewer Layout

18-0251 Burton Townhomes
Lee's Summit, Jackson Co., Missouri

NO.	BY	XXX	XXX	X/XX/XX
			QD	DATE
REVISION				

ORIGINAL SUBMITTAL

Renaissance Infrastructure Consulting
132 Abbie Avenue
Kansas City, Kansas 64108
913.317.9500
www.ric-consult.com

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, Jan 14 2019

Pipe 30-051 Existing Conditions

Circular

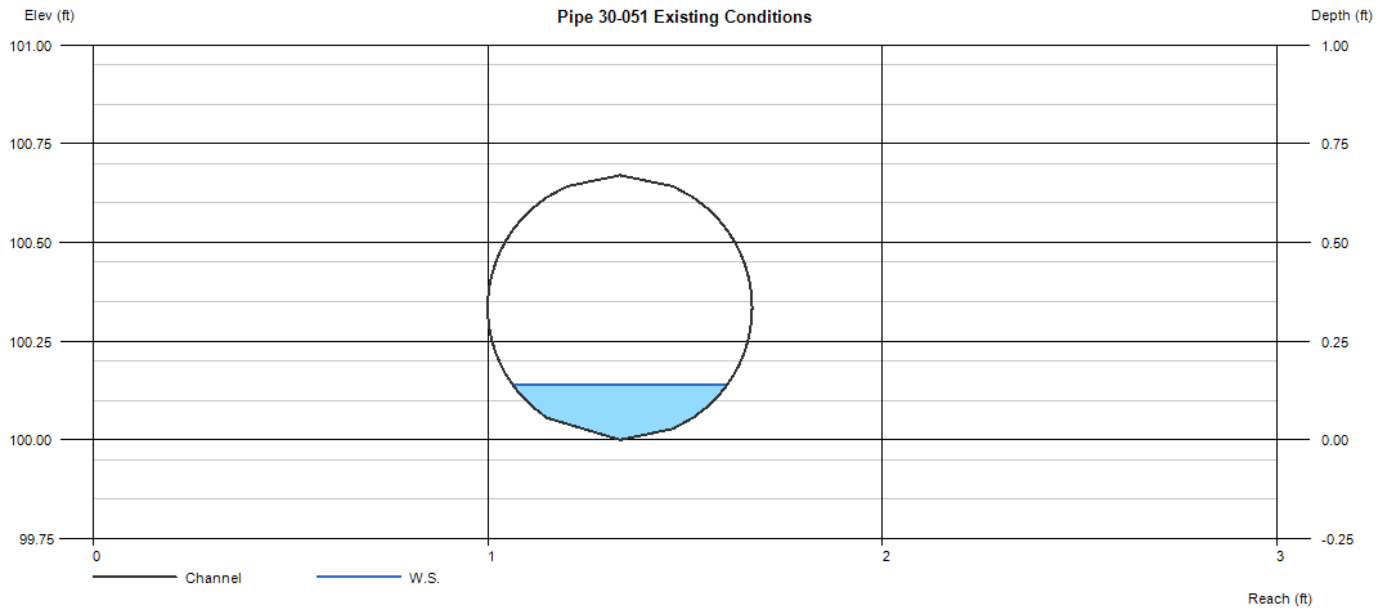
Diameter (ft)	= 0.67
Invert Elev (ft)	= 100.00
Slope (%)	= 0.40
N-Value	= 0.015

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.06

Highlighted

Depth (ft)	= 0.14
Q (cfs)	= 0.060
Area (sqft)	= 0.05
Velocity (ft/s)	= 1.12
Wetted Perim (ft)	= 0.64
Crit Depth, Yc (ft)	= 0.12
Top Width (ft)	= 0.54
EGL (ft)	= 0.16



Channel Report

Pipe 30-031 Existing Conditions

Circular

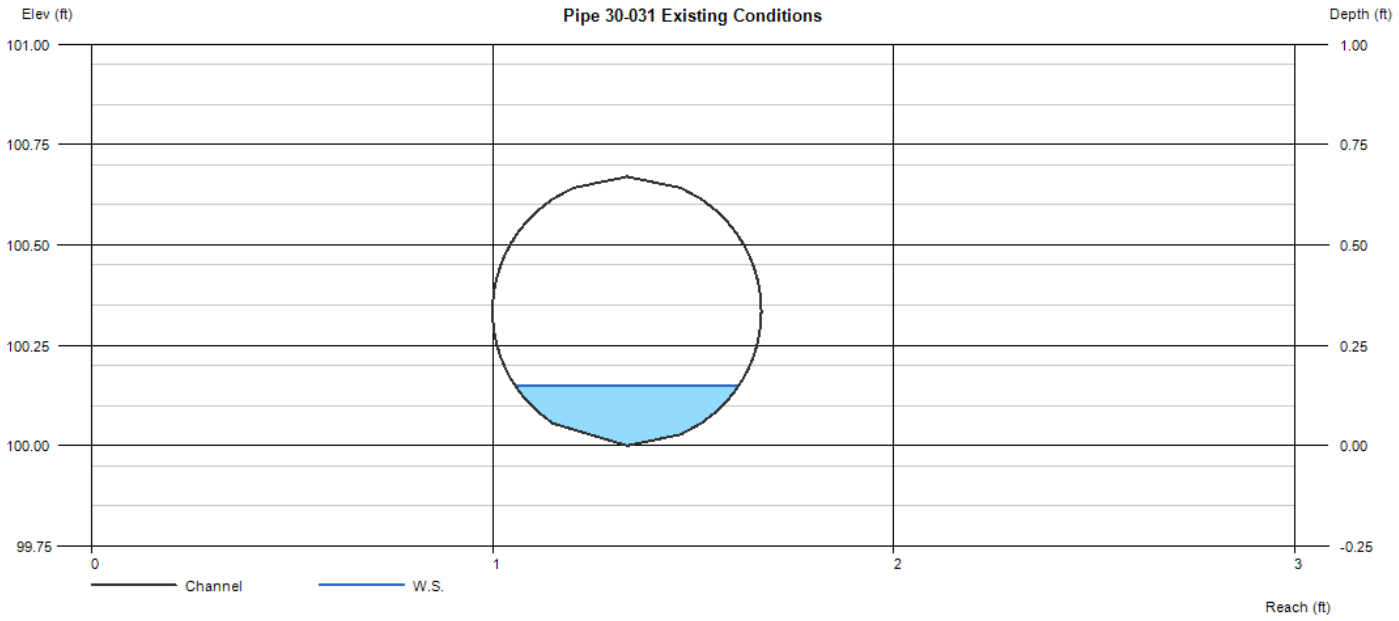
Diameter (ft)	= 0.67
Invert Elev (ft)	= 100.00
Slope (%)	= 0.60
N-Value	= 0.015

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.09

Highlighted

Depth (ft)	= 0.15
Q (cfs)	= 0.090
Area (sqft)	= 0.06
Velocity (ft/s)	= 1.51
Wetted Perim (ft)	= 0.66
Crit Depth, Yc (ft)	= 0.14
Top Width (ft)	= 0.56
EGL (ft)	= 0.19



Channel Report

Pipe 30-014 Existing Conditions

Circular

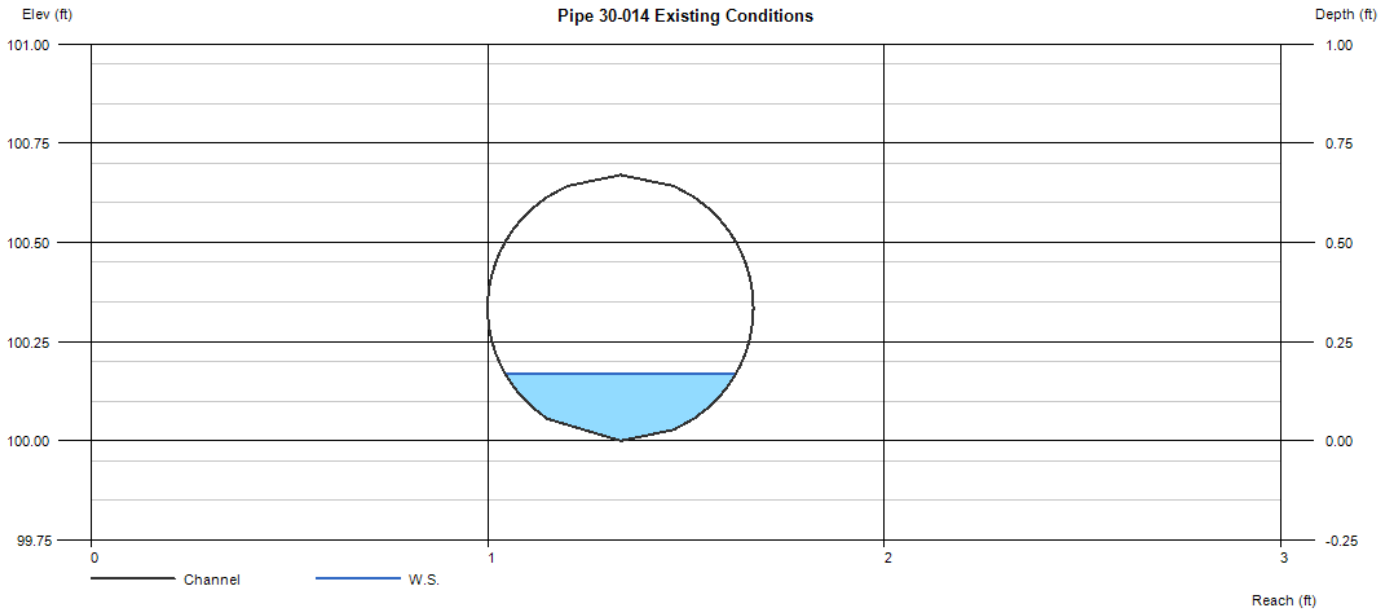
Diameter (ft)	= 0.67
Invert Elev (ft)	= 100.00
Slope (%)	= 0.60
N-Value	= 0.015

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.11

Highlighted

Depth (ft)	= 0.17
Q (cfs)	= 0.112
Area (sqft)	= 0.07
Velocity (ft/s)	= 1.58
Wetted Perim (ft)	= 0.71
Crit Depth, Yc (ft)	= 0.16
Top Width (ft)	= 0.58
EGL (ft)	= 0.21



Channel Report

Pipe 30-009 Existing Conditions

Circular

Diameter (ft)	= 0.83
Invert Elev (ft)	= 100.00
Slope (%)	= 0.60
N-Value	= 0.015

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.11

Highlighted

Depth (ft)	= 0.16
Q (cfs)	= 0.110
Area (sqft)	= 0.07
Velocity (ft/s)	= 1.50
Wetted Perim (ft)	= 0.76
Crit Depth, Yc (ft)	= 0.15
Top Width (ft)	= 0.66
EGL (ft)	= 0.20

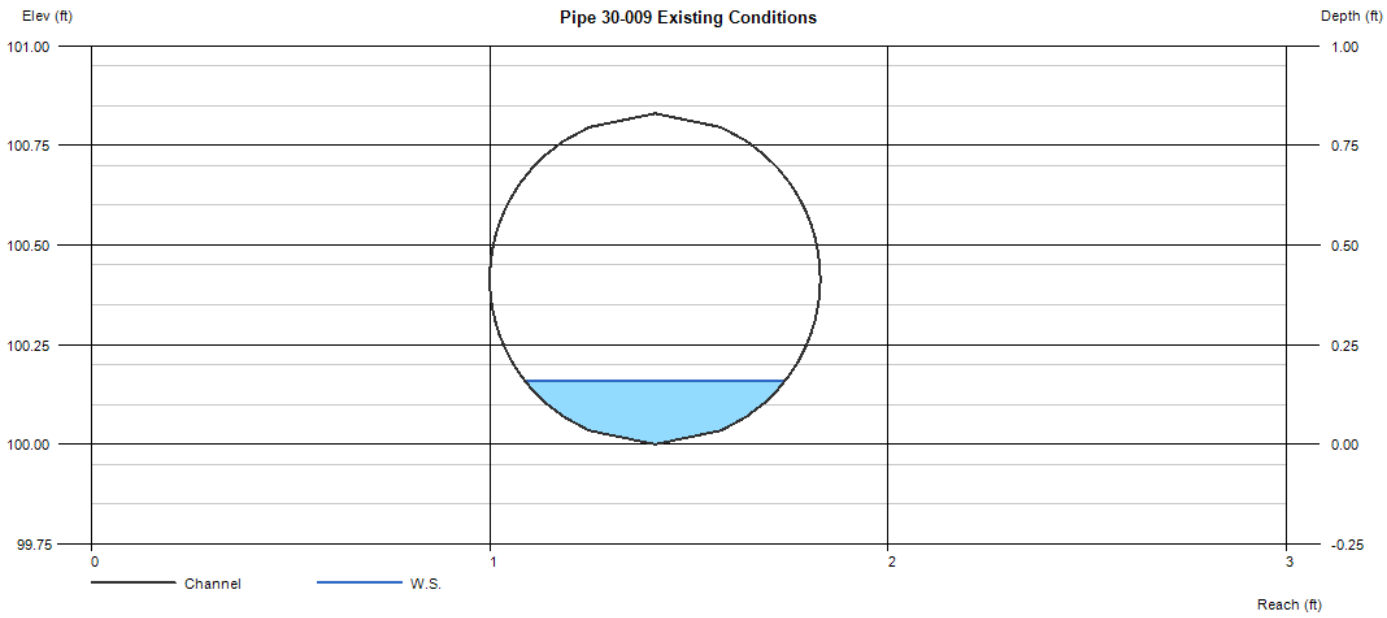
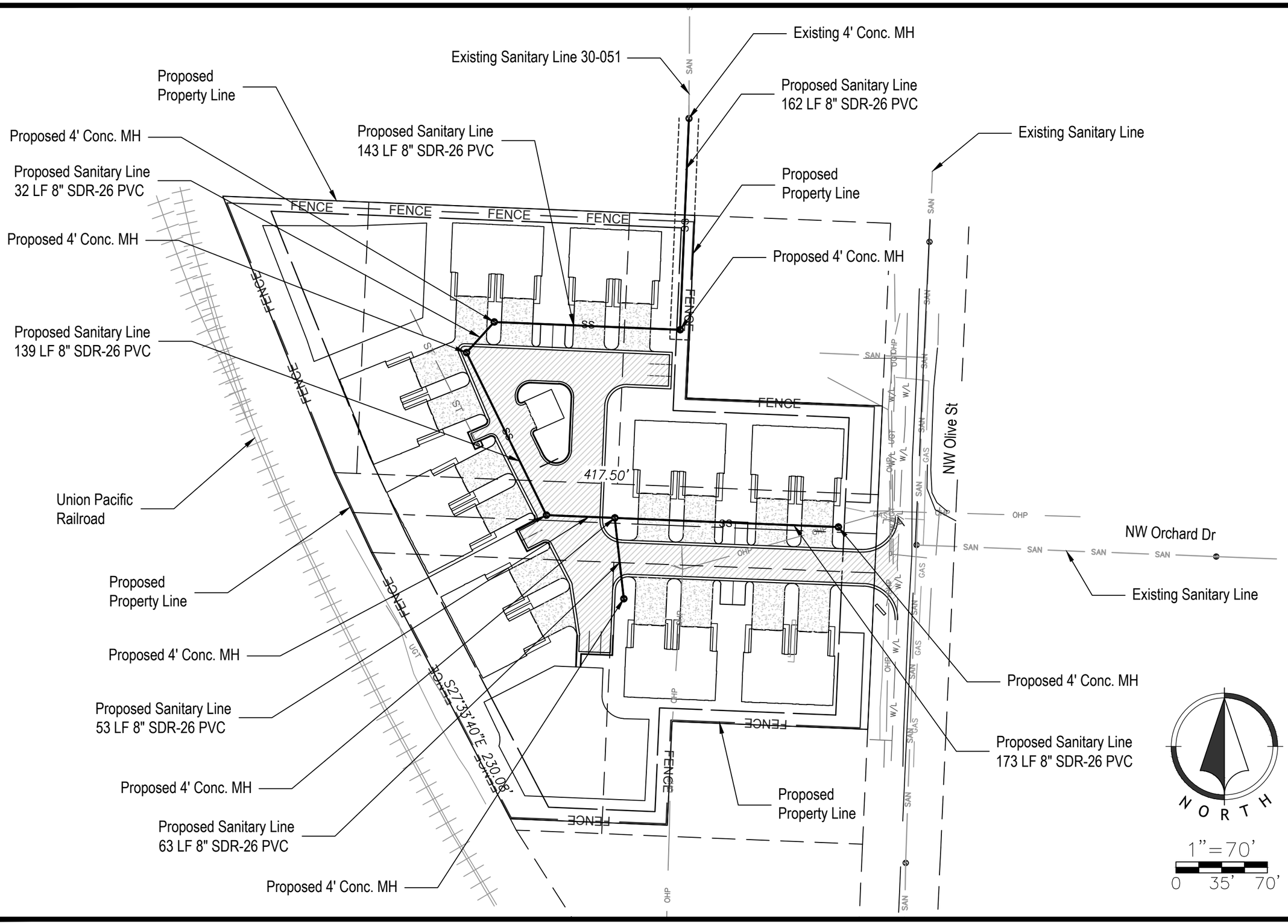


Exhibit D

Proposed Sanitary Sewer



NORTH

1"=70'

0 35' 70'

Exhibit D

Proposed Sanitary Sewer Layout

18-0251 Burton Townhomes

Lee's Summit, Jackson Co., Missouri

NO.	BY	QD	DATE	REVISION
XXX	XXX	X/XX/XX		ORIGINAL SUBMITTAL

Renaissance Infrastructure Consulting

132 Abbie Avenue
Kansas City, Kansas 64108

913.317.9500
www.ric-consult.com

Channel Report

Prop. Pipe Proposed Conditions

Circular

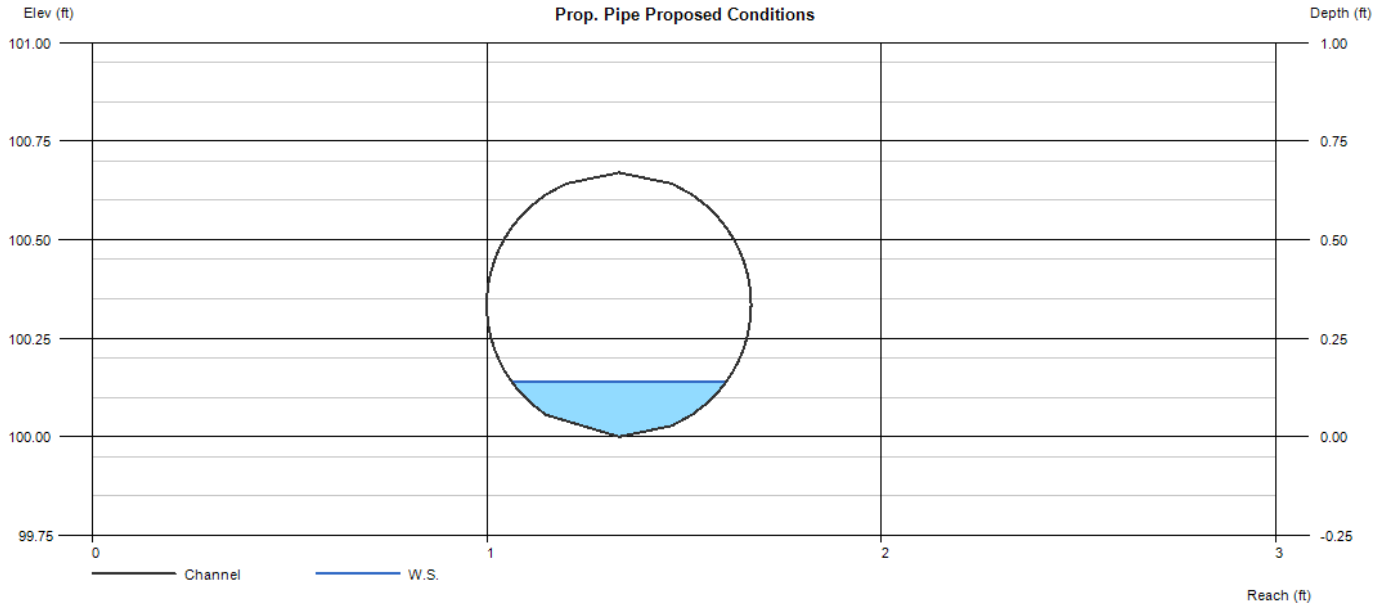
Diameter (ft)	= 0.67
Invert Elev (ft)	= 100.00
Slope (%)	= 0.60
N-Value	= 0.015

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.07

Highlighted

Depth (ft)	= 0.14
Q (cfs)	= 0.070
Area (sqft)	= 0.05
Velocity (ft/s)	= 1.31
Wetted Perim (ft)	= 0.64
Crit Depth, Yc (ft)	= 0.12
Top Width (ft)	= 0.54
EGL (ft)	= 0.17



Channel Report

Pipe 30-051 Proposed Conditions

Circular

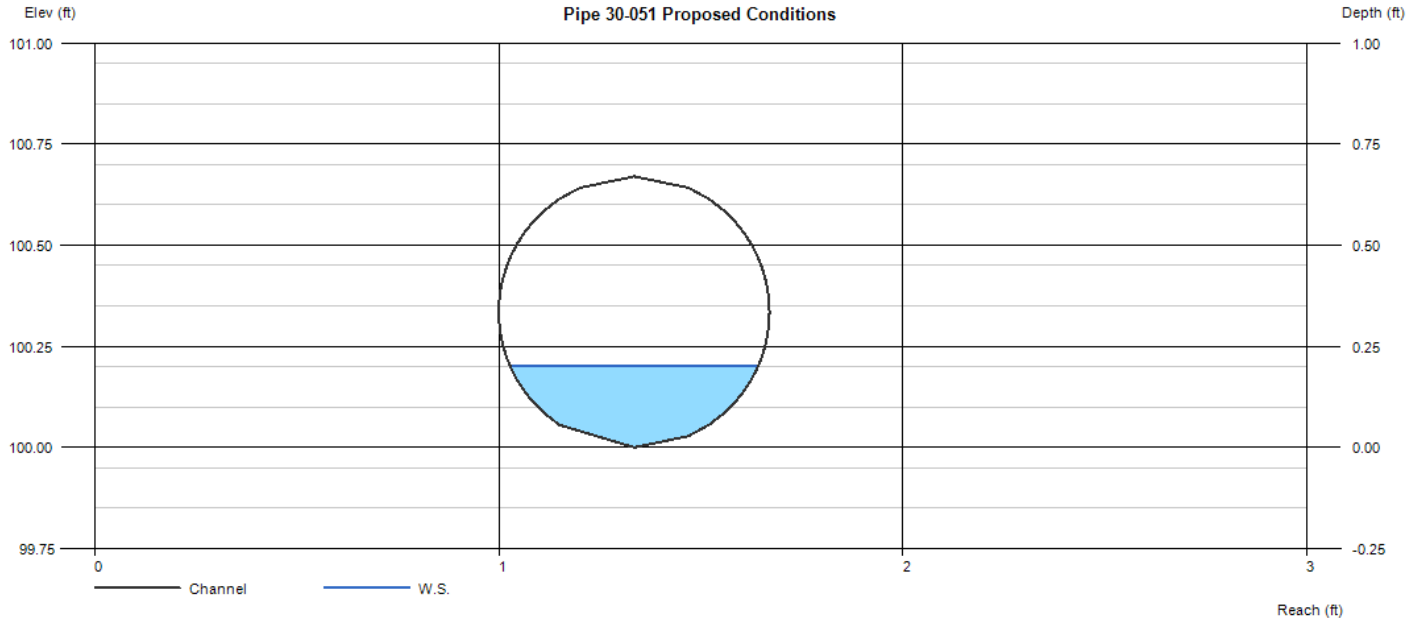
Diameter (ft)	= 0.67
Invert Elev (ft)	= 100.00
Slope (%)	= 0.40
N-Value	= 0.015

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.13

Highlighted

Depth (ft)	= 0.20
Q (cfs)	= 0.125
Area (sqft)	= 0.09
Velocity (ft/s)	= 1.40
Wetted Perim (ft)	= 0.78
Crit Depth, Yc (ft)	= 0.17
Top Width (ft)	= 0.61
EGL (ft)	= 0.23



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, Jan 14 2019

Pipe 30-031 Proposed Conditions

Circular

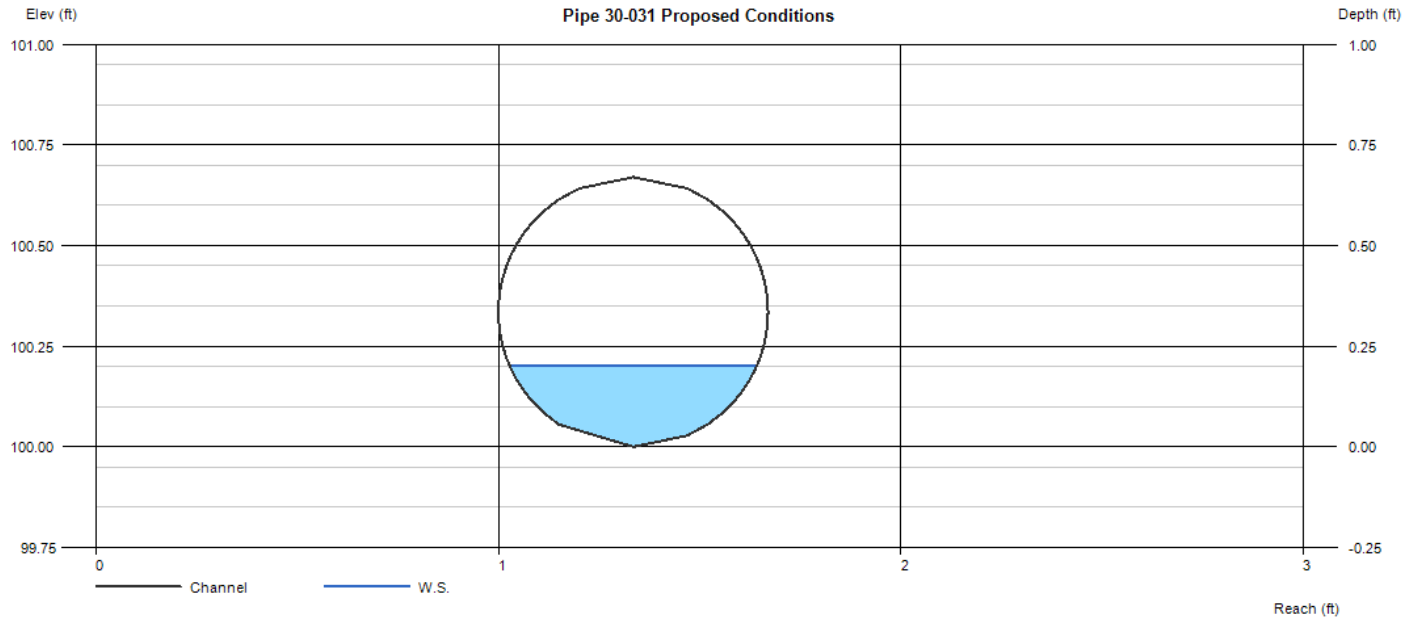
Diameter (ft)	= 0.67
Invert Elev (ft)	= 100.00
Slope (%)	= 0.60
N-Value	= 0.015

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.16

Highlighted

Depth (ft)	= 0.20
Q (cfs)	= 0.161
Area (sqft)	= 0.09
Velocity (ft/s)	= 1.81
Wetted Perim (ft)	= 0.78
Crit Depth, Yc (ft)	= 0.19
Top Width (ft)	= 0.61
EGL (ft)	= 0.25



Channel Report

Pipe 30-014 Proposed Conditions

Circular

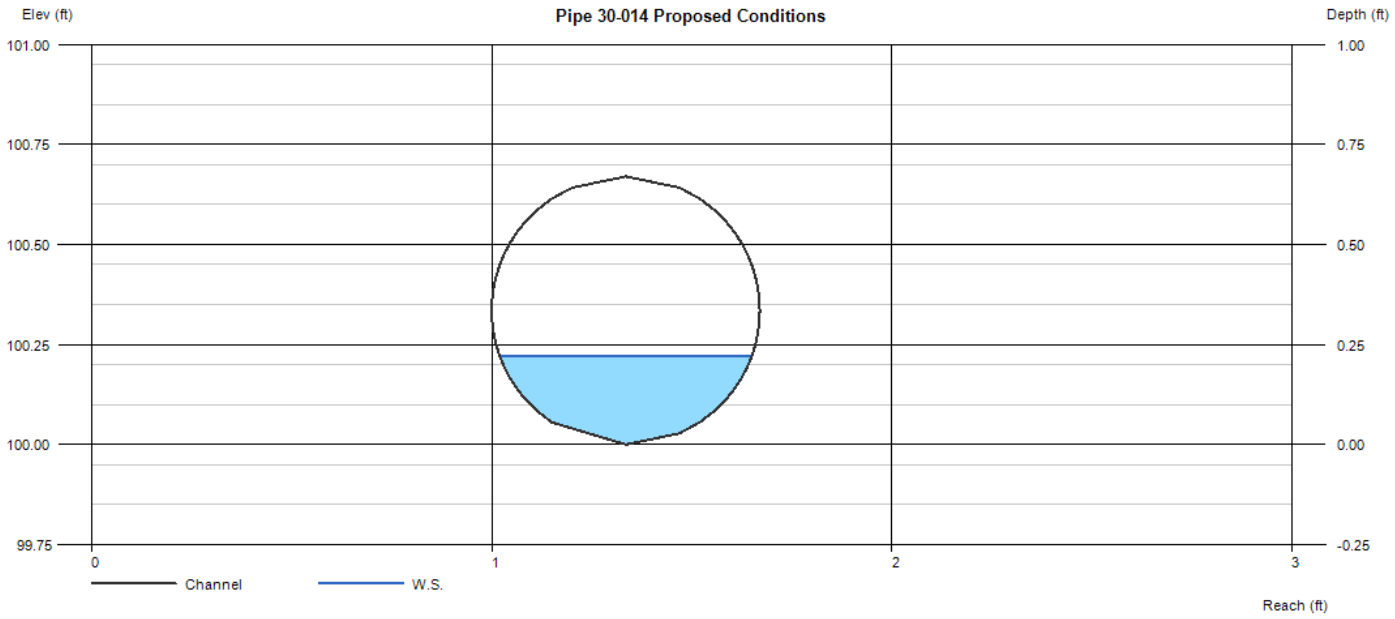
Diameter (ft)	= 0.67
Invert Elev (ft)	= 100.00
Slope (%)	= 0.60
N-Value	= 0.015

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.18

Highlighted

Depth (ft)	= 0.22
Q (cfs)	= 0.182
Area (sqft)	= 0.10
Velocity (ft/s)	= 1.79
Wetted Perim (ft)	= 0.82
Crit Depth, Yc (ft)	= 0.20
Top Width (ft)	= 0.63
EGL (ft)	= 0.27



Channel Report

Pipe 30-009 Proposed Conditions

Circular

Diameter (ft)	= 0.83
Invert Elev (ft)	= 100.00
Slope (%)	= 0.60
N-Value	= 0.015

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.18

Highlighted

Depth (ft)	= 0.20
Q (cfs)	= 0.182
Area (sqft)	= 0.10
Velocity (ft/s)	= 1.80
Wetted Perim (ft)	= 0.85
Crit Depth, Yc (ft)	= 0.19
Top Width (ft)	= 0.71
EGL (ft)	= 0.25

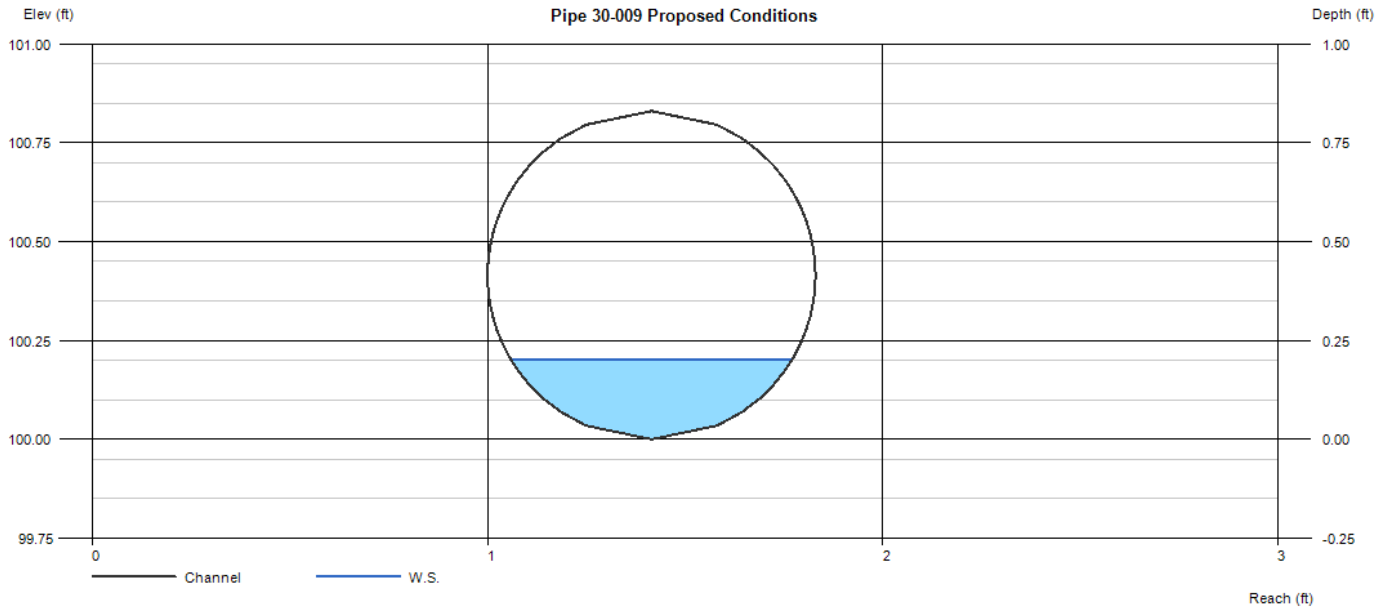


Exhibit E

City of Lee's Summit As-Builts

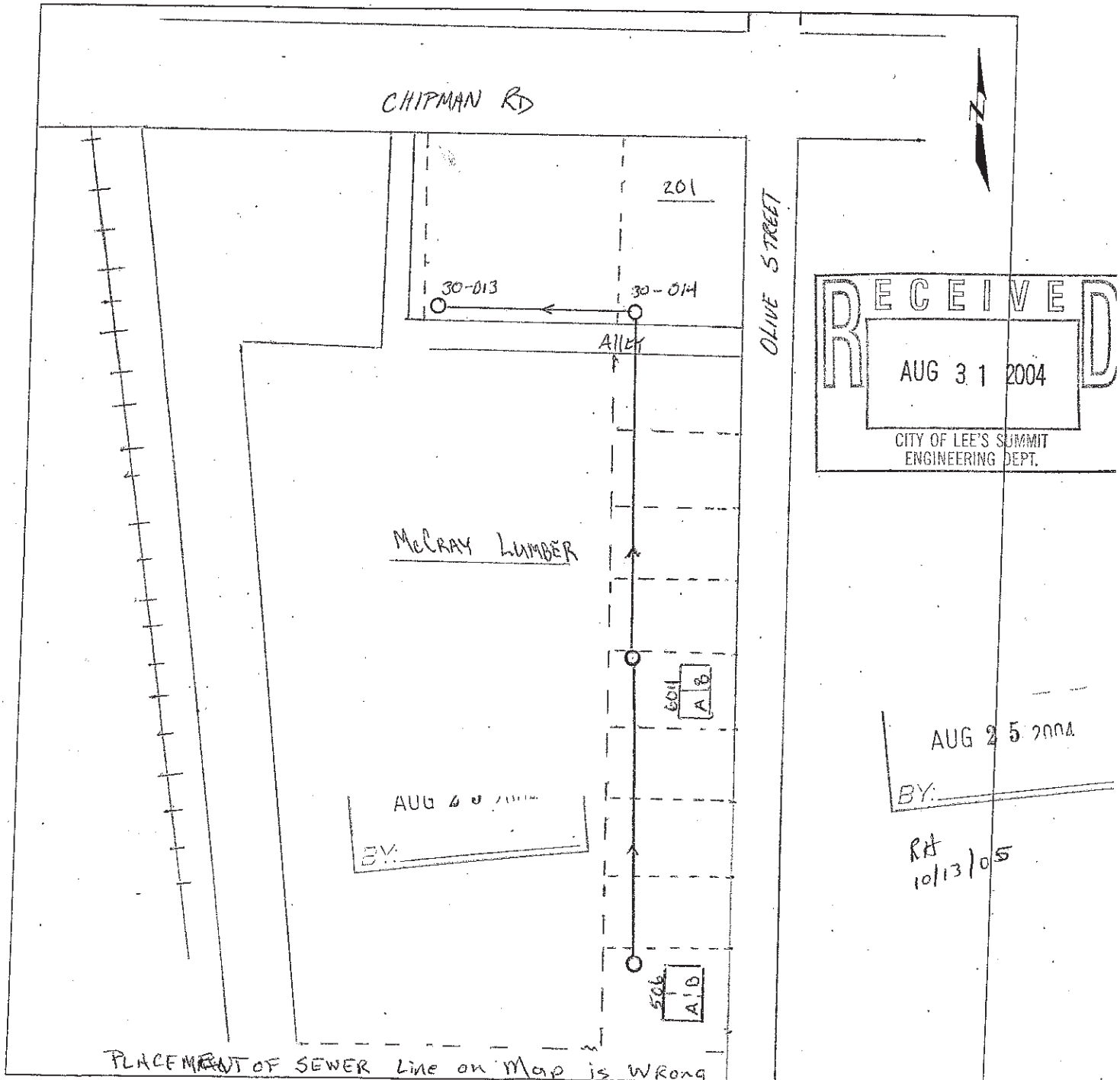
CORRECTION TO BASE MAP

Date: 8-25-04 Map Number: 55-30 Reporter: T. REYNOLDS

Date found: 8-25-04 Date correction was submitted to PW: 8/31/04 (MS)

Date correction was made on the computer & notification sent to WU: 10/13/05, Sent 10/17/05

In the area below, sketch the way the infrastructure should be shown on the base map. Include dimensions to assist in locating the item relative to the back-of-curb and other readily-visible features. If items are shown on the base map, but do not exist in the field, attach a marked up copy of the relevant portion of the base map indicating items to be deleted.




MCNARY CT
COMMERCE DR
OLIVE ST
MAIN ST
FRANCES RD
CARROLL RD
DONOVAN RD
DUNLAP DR
REDWING DR
GIBSON RD
HILLCREST LN
OXFORD LN
30-031
30-051
SS30