



UNDERGROUND CONSTRUCTION TECHNOLOGY

The Underground Utilities Event | July 13-15, 2021 | Music City Center | Nashville, TN



SewerAI



Case Studies in Condition Assessment Using Computer Vision Artificial Intelligence in Wastewater Collection Systems

Billy Gilmartin IV, CRO, SewerAI,
bgilmartin@sewerai.com

Eric Sullivan, NASSCO PACP Trainer, SewerAI,
Director of BD,
esullivan@sewerai.com

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Case Studies in Condition Assessment Using Computer Vision Artificial Intelligence in Wastewater Collection Systems

- Company Overview
- What is AutoCode™?
- Problems w/ Traditional (Manual) Inspection Workflows
- Problems with Pipe Data Management
- Cloud Computing Basics
- Integrations
- Case Studies:
 - CCTV Operator Productivity
 - SFPUC
 - EBMUD
- Conclusions, Use-Cases & Q&A





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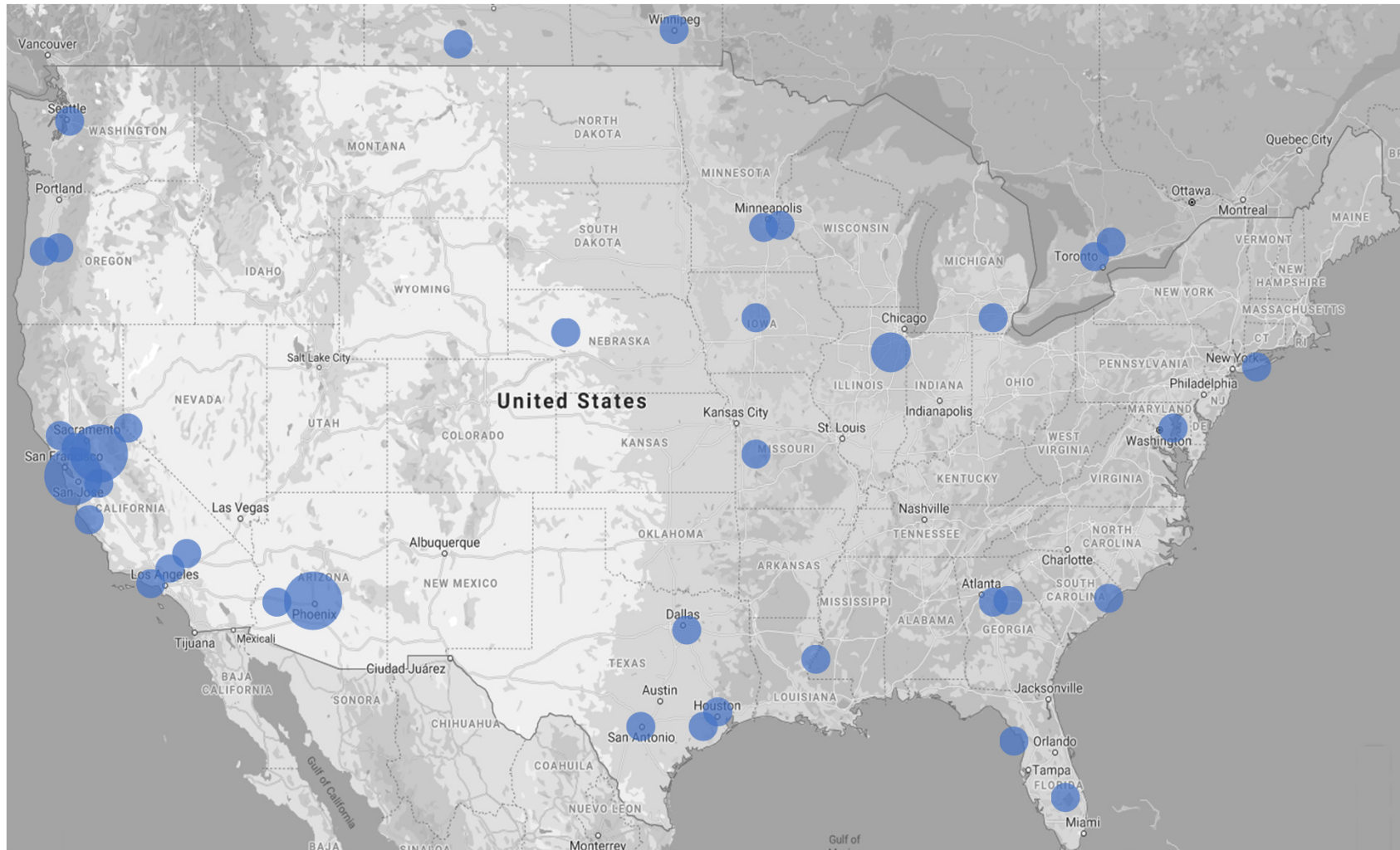
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SewerAI

Overview

- Founded in Q1 2019
- Located in Walnut Creek, CA
- Projects throughout North America





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- Projects throughout North America
- Working with Utilities, Contractors, and Engineering firms





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Total Pipe
Assessed



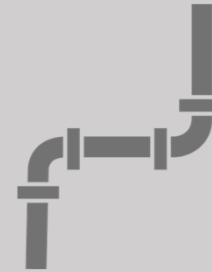
1,200+ mi
~2,000km

Engineering
Hours Saved



45,000+

Lineal Ft/m in
Pioneer™



15,000,000+ LF
~4.5M LM



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AutoCode™ uses AI computer vision to automatically detect pipe conditions





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CCTV Inspection is Broken



SLOW, EXPENSIVE,
& INCONVENIENT



- Real-time “Capture & assess” method most common
- Camera hardware idles ~2/3s of time while in pipe
- Traffic control & jet-vac equipment idles during inspection



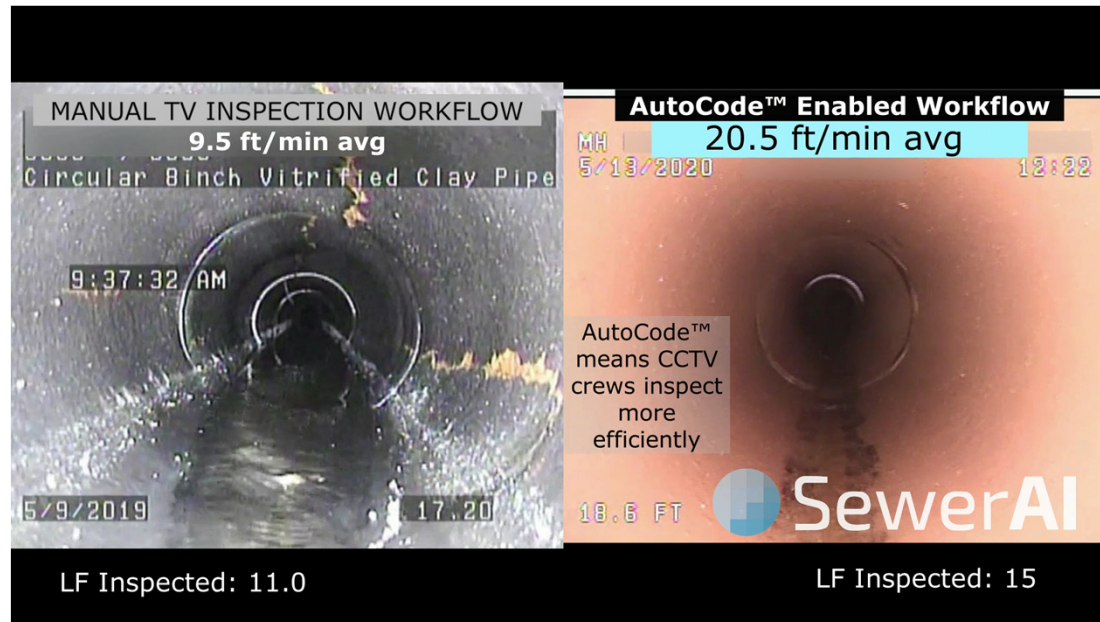
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Operational cost per LF in condition assessment is reduced as per day footage inspected increases

2X to ~3000 ft+/day

No CAPEX
Needed



Use Existing
Equipment &
Truck Software

Nicolas Caradot, Fabrice Gaudart, Francois Clemens & Frederic Cherqui (2018) Evaluation of uncertainties in sewer condition assessment, *Structure & Infrastructure Engineering*, 14:2, 264-273, DOI: 10.1080/15732479.2017.1356858



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Data Management is Broken

Data Storage & Submittal

Compiling project data, & delivering to clients can be painful & slow



Approval & Validation

Can be a slow process with difficulties collaborating





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Cloud Computing Basics

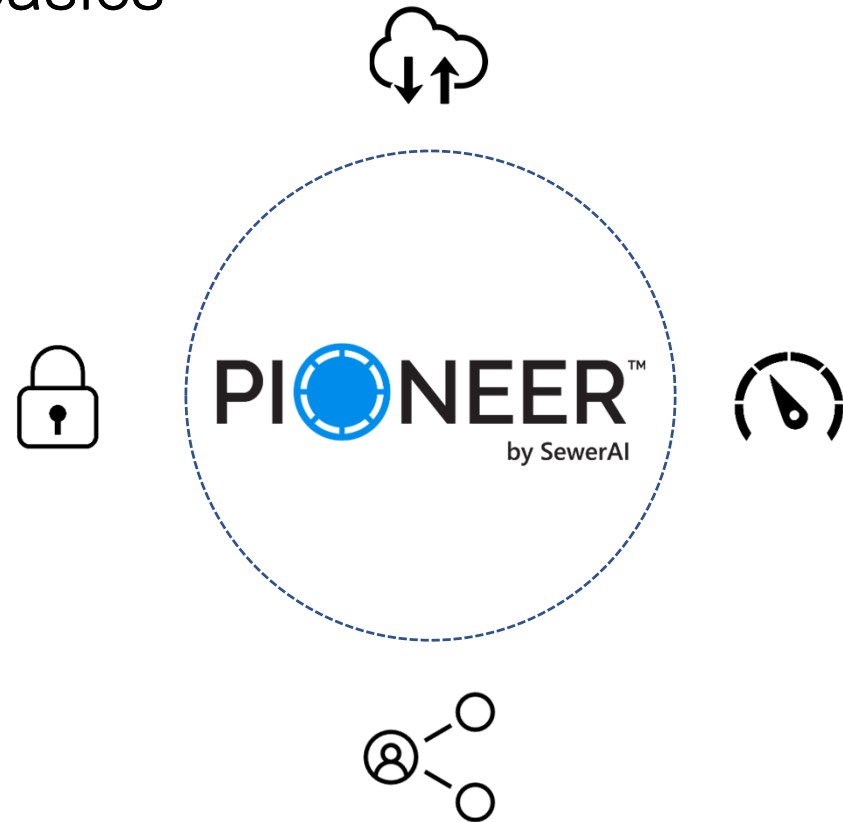
Not Tied to a HD

Scalable On Demand

Continuously Improved

Ubiquitous

...Underutilized in our Industry

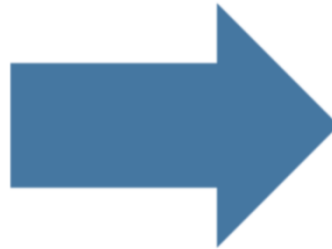




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Slow
Expensive
Difficult
Inaccurate
Fragmented



Fast
Inexpensive
Easy
Accurate
Collaborative



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How It Works

Inspection videos captured

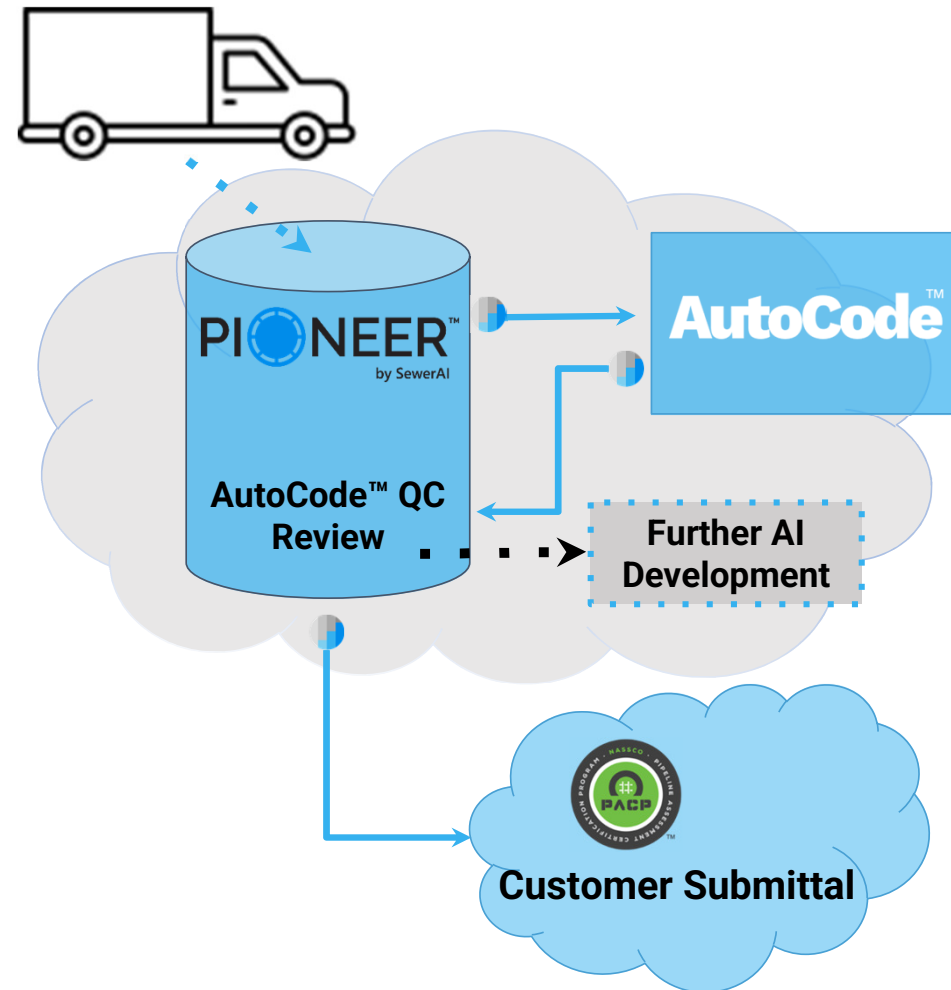
Upload data to SewerAI cloud

Data hosted for streaming in Web browser

AutoCode™ deployed

PACP technicians review all AI outputs

Customer notified when PACP deliverables are ready





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Integrations

- NASSCO PACP: Certified Software Vendor (Import / Export)
- ESRI Partner Network
- API-based system
- Planned Integrations: GIS & CMMS



esri
Partner Network



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Case Study (Operator Productivity)

Doubling Production for Contractors

- Project A – 1,352 LF/shift
- Project B – 2,691 LF/shift
- Carried out by same individuals, same trucks, & outfitted with same type of CCTV equipment systems.

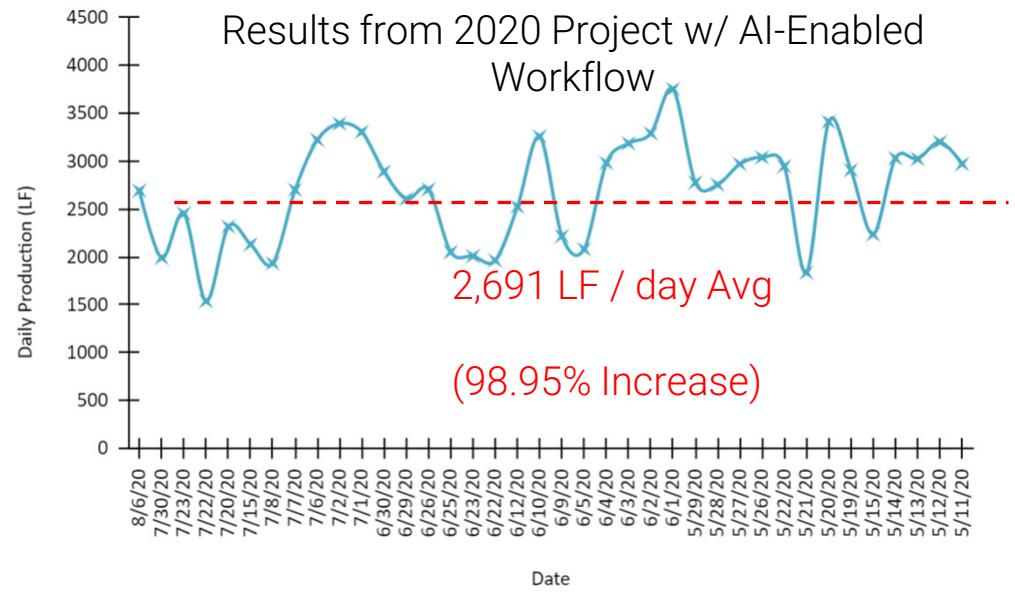
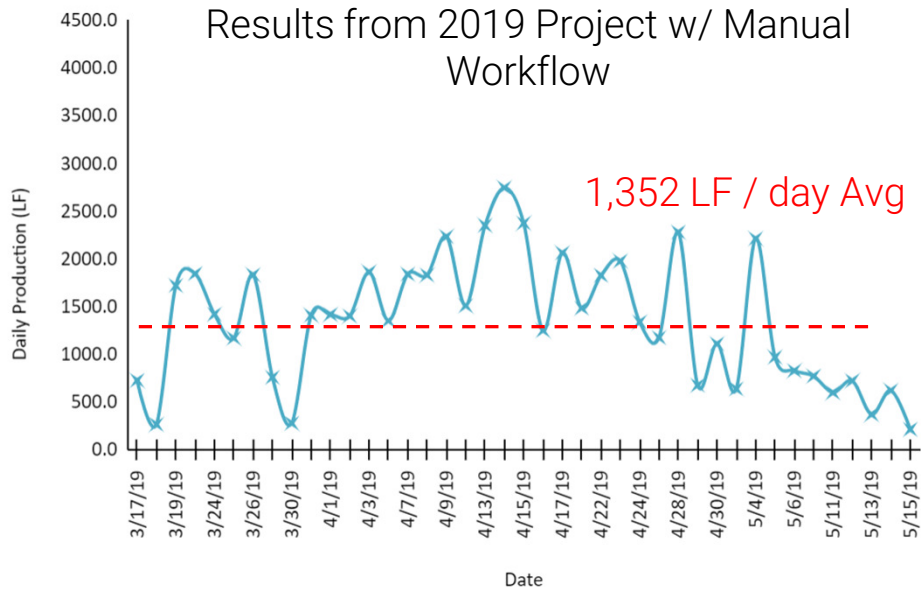




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Case Study (Operator Productivity)





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75% Cost Reduction

- SewerAI's Labeling as a Service analyzed over 1M linear feet of laterals (179 miles/~289km)
- 52,000 inspection surveys
- Would have taken Owner 8,800 hours to review manually > \$1M
- Hardware neutral (CCTV)
Hi-def data not required
- Works for CCTV mainline & lateral data

Case Study SFPUC Pilot Project Scope



San Francisco
Water Power Sewer
Services of the San Francisco Public Utilities Commission

**"SewerAI can save us millions of dollars
for our asset management program"**

Lewis Harrison, Collection System Division Manager



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Savings of >\$330K in engineering costs so far

- Identifying sources of I&I using AutoCode as mandated by Consent Decree
- 370,000 LF assessed in 18 working days Supporting a team of 3 in-house engineers
- Includes data from 7 satellite utilities
- Year 1 of a 5-year contract

Case Study East Bay Municipal Utility District



“Technologies like SewerAI are going to enable us to better manage our assets on behalf of our ratepayers”

Sophia Skoda, EBMUD CFO



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Changing the game

PANORAMO + AutoCode™

The screenshot displays the SewerAI console interface. On the left, a video feed shows a 360-degree view of a sewer pipe interior. On the right, a table lists observations with columns for Time, Distance, Code, Continuous, Dim. 1, Dim. 2, %, and Joint. The table contains 18 rows of data. At the bottom, a video player shows a timeline with a play button and a progress bar. The SewerAI logo is visible in the bottom right corner.

Time	Distance	Code	Continuous	Dim. 1	Dim. 2	%	Joint
0:16	8.22	CL					N.
0:49	24.16	TF		4			N.
0:51	25.44	SSS					Y.
1:43	50.73	SSS					Y.
1:49	53.68	FH2					Y.
1:57	57.91	FH2					Y.
2:05	61.84	SSS					Y.
2:13	65.49	TF		4			N.
2:15	66.62	FH2					Y.
2:23	70.41	SSS					Y.
2:28	73.01	FH2					Y.
2:34	75.82	MWM				50	
2:44	80.74	SSS					Y.
2:59	88.41	TF		4			Y.
3:24	100.56	H					Y.
3:25	101.06	FM					Y.



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Changing the game

Jetter cameras + AutoCode™



SewerAI

AutoCode™



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Use Cases for AutoCode™ & Pioneer™

- Database conversion
- Accelerating inspection (in field & office)
- QA / QC of CCTV submittals
- Cross bore (utility conflict) safety / audits
- Stakeholder collaboration in the cloud
- Data analytics for project execution & asset management decision support

What Use
Cases Can
You Identify?



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Questions & Answers
esullivan@sewerai.com,
bgilmartin@sewerai.com