

New Technology Trials for Pavement Management and Maintenance

VAISALA

September 2021

 CITIBOT

Overview

- Road Artificial Intelligence (AI)

Using smart phone technology with artificial intelligence software from Vaisala to perform pavement condition assessments.

- CitiBot SMS Alerts

Using an automated text messaging platform to drastically improve stakeholder communication on maintenance construction projects.

VAISALA RoadAI

Pavement Management Database/Inventory

City of Fort Worth

- Welcome, MuongKM
- Administration
- Document Link
- Service Requests
- Work Orders

Map Scale: 1:18,055

Manage Work Orders

Filter is OFF - Current list contains 1000 out of 29772 Work Orders

Form View | Table View | Filter | Reports | Assets

Close | Open | Assign | Calendar | 1 of 50

	OPS	ID	Status	Assigned To	
<input type="checkbox"/>	23	ASRD	041818049	Open	Larry Green
<input type="checkbox"/>	24	ASRD	041818048	Closed	Palmer Terrell
<input type="checkbox"/>	25	ASRD	041818047	Closed	Jerry Beall
<input type="checkbox"/>	26	ASRD	041818046	Closed	Toby Crabtree
<input type="checkbox"/>	27	ASRD	041818045	Open	Toby Crabtree
<input type="checkbox"/>	28	ASRD	041818043	Closed	Toby Crabtree
<input type="checkbox"/>	29	ASRD	041818044	Open	Jerry Beall
<input type="checkbox"/>	30	ASRD	041818042	Open	Jerry Beall
<input type="checkbox"/>	31	ASRD	041818041	Closed	Jerry Beall
<input type="checkbox"/>	32	ASRD	041818039	Closed	Toby Crabtree
<input type="checkbox"/>	33	ASRD	041818038	Open	Palmer Terrell
<input type="checkbox"/>	34	ASRD	041818040	Closed	Palmer Terrell

Columns | Save Layout | Restore Layout | Export To Excel | 1 of 20

Permitted OPS: A - Assign, S - Change Status, R - Re-open, D - Delete

* Required To Close

Layers | Legend

Street Labels

Pavement

- Failed (< 20)
- Poor (21-40)
- Fair (41-60)
- Good (61-80)
- Excellent (81-100)

Planning_Pavement

Private_Pavement

Work Orders Open

Work Orders Closed

Work Orders Hold

Service Requests Open

Service Requests Closed

Pavement Condition Rating

85



66



47



24

52



71



83

Citywide Pavement Assessment

- Services are procured
- Fleet of vans with sophisticated measurement devices are deployed to survey the network.
- In office data analysis of the photography is partially manual
- This traditional process is expensive and takes about a year.



Intermediate Condition Assessments

- Team member visually surveys the pavement segments
 - Single person decisions are more subjective, requires experience
 - Time Consuming
 - Not easily repeatable
 - PCI rating can vary by Team Member
 - May not correlate with Citywide assessment



The Webinar...



	A	B	C	D	E	F	G	H
1	Location	XSP	Start Ch	End Ch	Length	Structural	Edge	Wearing Course
98	U2204/1/20	C	420,18	440,19	20,01	0	0	0
99	U2204/1/20	C	440,19	448,19	8	0	0	0
100	U2204/1/40	C	0	20,03	20,03	2,730303	0	0
101	U2204/1/40	C	20,03	60,08	40,05	2,730303	0	0
102	U2204/1/40	C	60,08	140,2	80,12	2,730303	0	0
103	U2204/1/40	C	140,2	180,25	40,05	2,730303	79,9975	0
104	U2204/1/40	C	180,25	220,31	40,06	2,730303	0	0
105	U2204/1/40	C	220,31	240,34	20,03	2,730303	90	0
106	U2204/1/40	C	240,34	260,36	20,02	2,730303	40	60
107	U2204/1/40	C	260,36	280,39	20,03	2,730303	0	60
108	U2204/1/40	C	280,39	300,42	20,03	2,730303	0	0
109	U2204/1/40	C	300,42	340,48	40,06	2,730303	0	25
110	U2204/1/40	C	340,48	360,51	20,03	2,730303	0	0
111	U2204/1/40	C	360,51	400,56	40,05	2,730303	0	25
112	U2204/1/40	C	400,56	480,67	80,11	2,730303	0	0
113	U2204/1/40	C	480,67	500,7	20,03	2,730303	40	25
114	U2204/1/40	C	500,7	520,73	20,03	2,730303	90	0
115	U2204/1/40	C	520,73	540,76	20,03	2,730303	0	60
116	U2204/1/40	C	540,76	640,9	100,14	2,730303	0	0
117	U2204/1/40	C	640,9	660,93	20,03	2,730303	0	25

Puts Automated Data Collection in Team Members Hands

Analyzed By RoadAI Consistently Across All Team Members

Could Export Many Street Segments at a Time Into the CFW Existing Pavement Management Software Same Day for Responsiveness

Collect video through the RoadAI app

- Deploy in any existing vehicle
- User friendly
- Flexibility and control
- Cost-effective



What Assets can you Manage with RoadAI

- Roadways
- Signs
- Line Markings
- Ability to isolate almost any RoW asset
- Complete Video Library of entire road network

Pavement Conditions: Distress Type, Quantity, and Severity

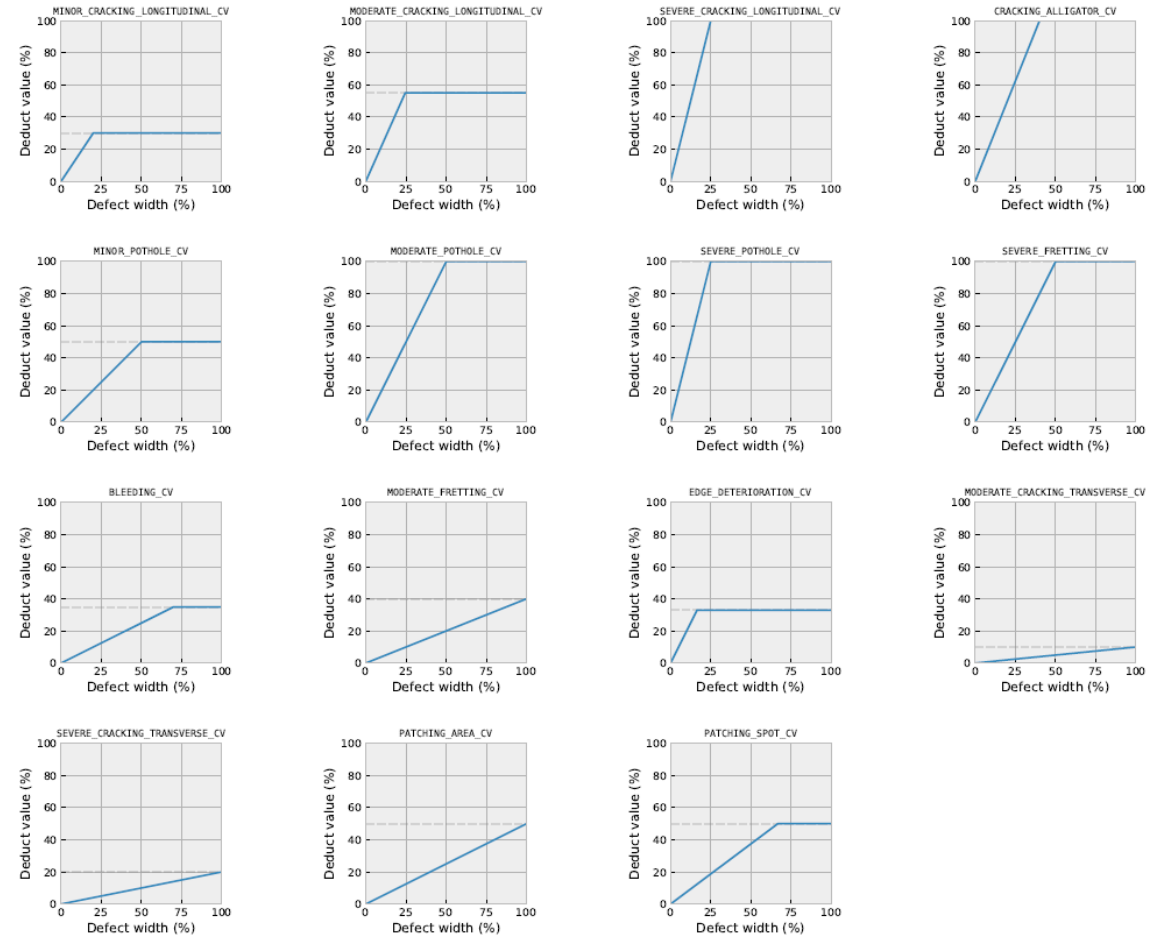
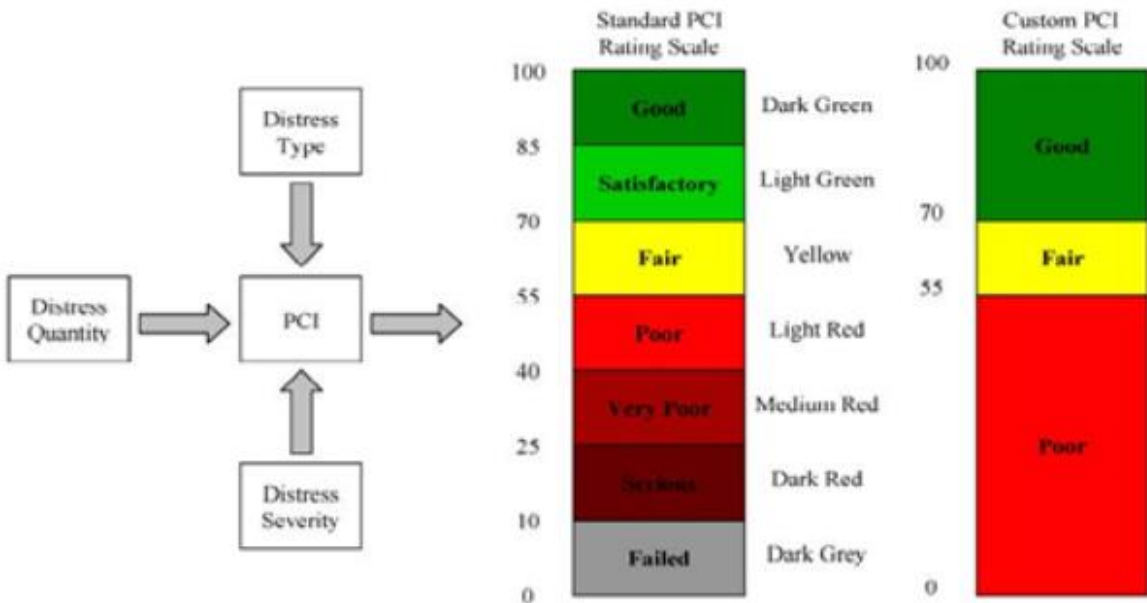
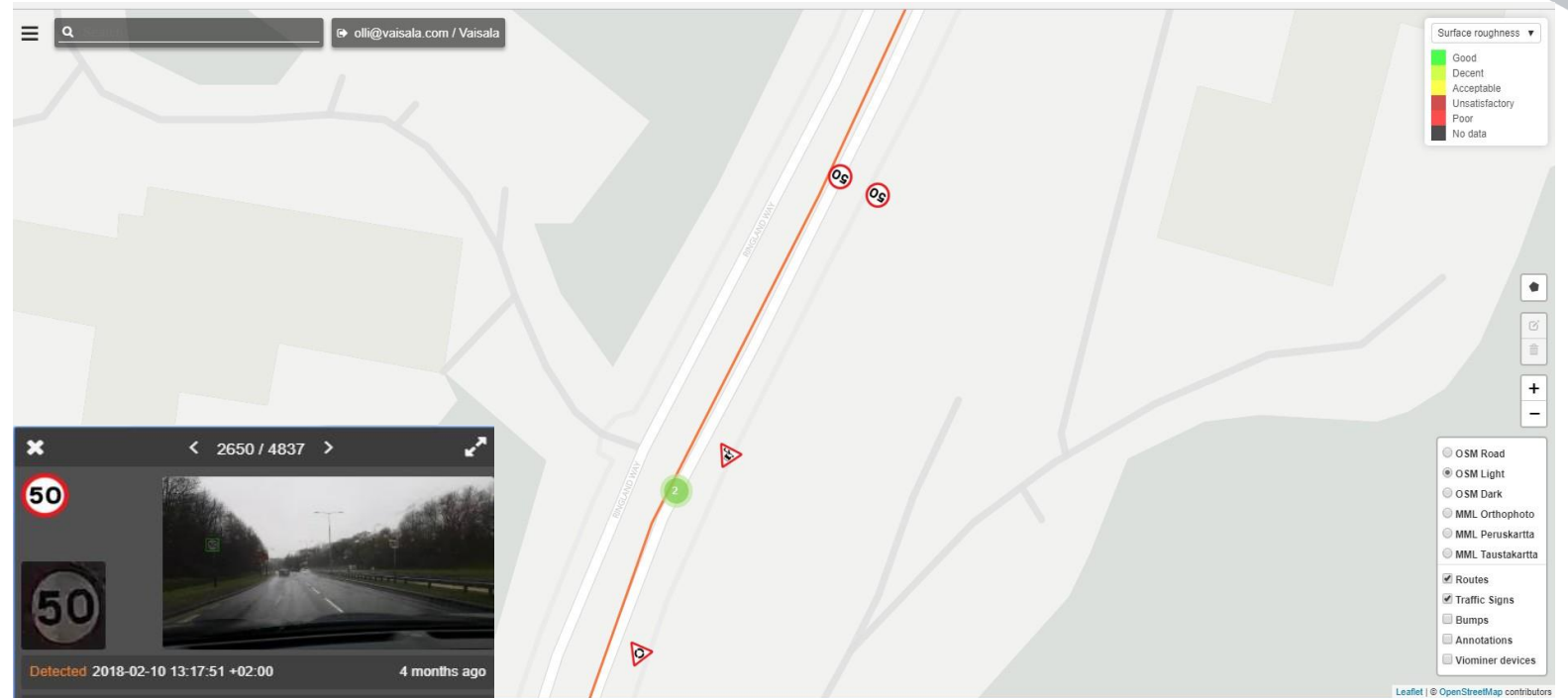


Figure 2. Defect severity to deduct value mappings for all defect types considered in the calculation of the pavement condition value.

Computer Vision - Sign Inventory

- Saved history data is used to detect missing signs
- Includes sign category and code
- Filter to display specific sign categories
- Condition rating and action tools
- Exporting options to other systems



“RoadAI brings a new perspective to improving road asset management and maintenance operations”

Pasi Leimi, Director, City of Lappeenranta

Computer Vision – Pavement Markings

- Map line markings condition
- Export condition data

100



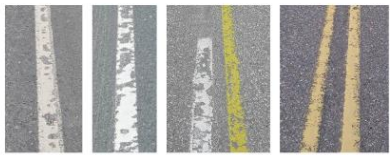
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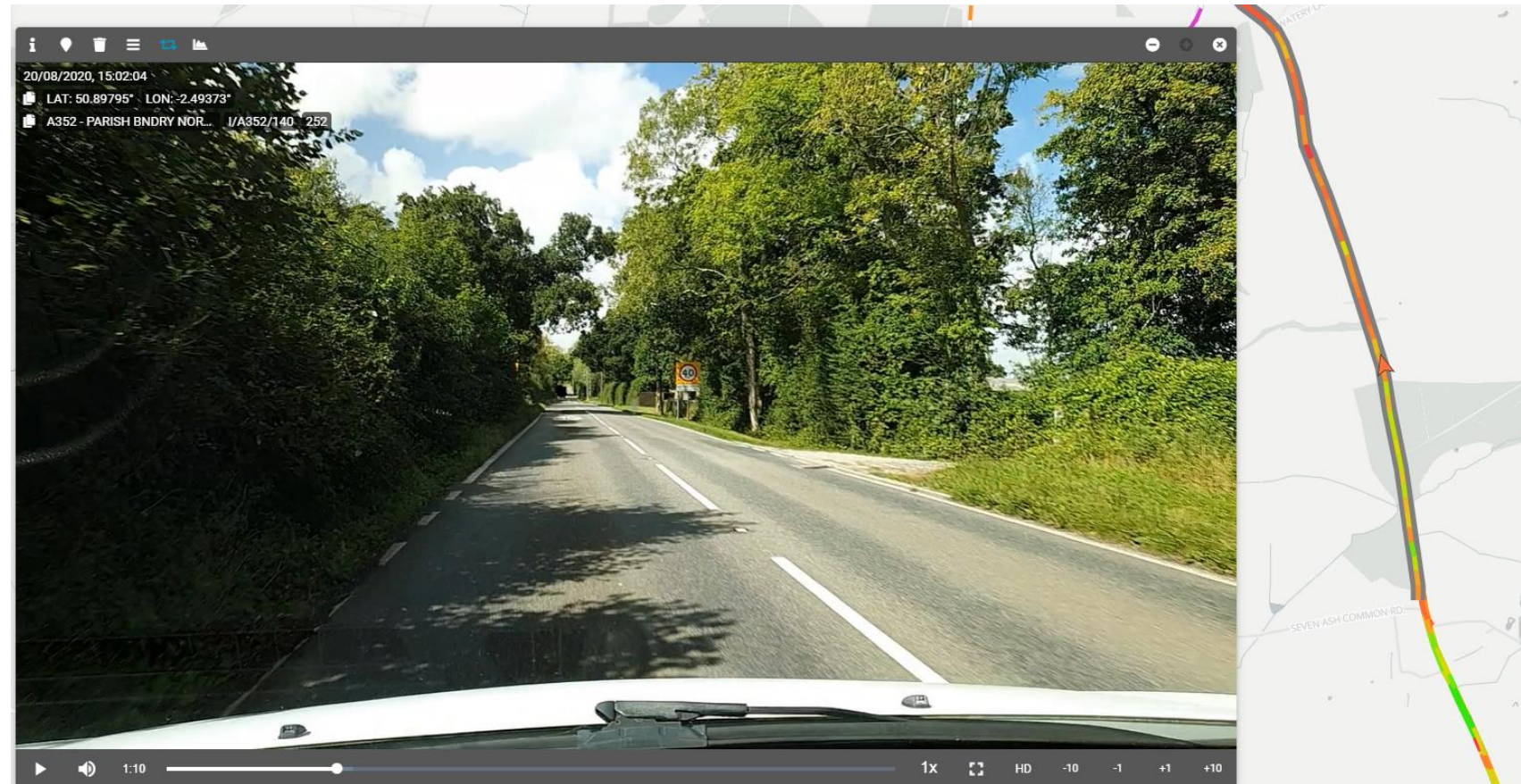
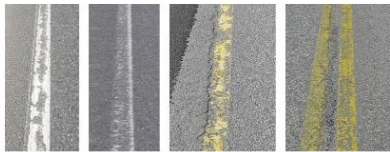
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25

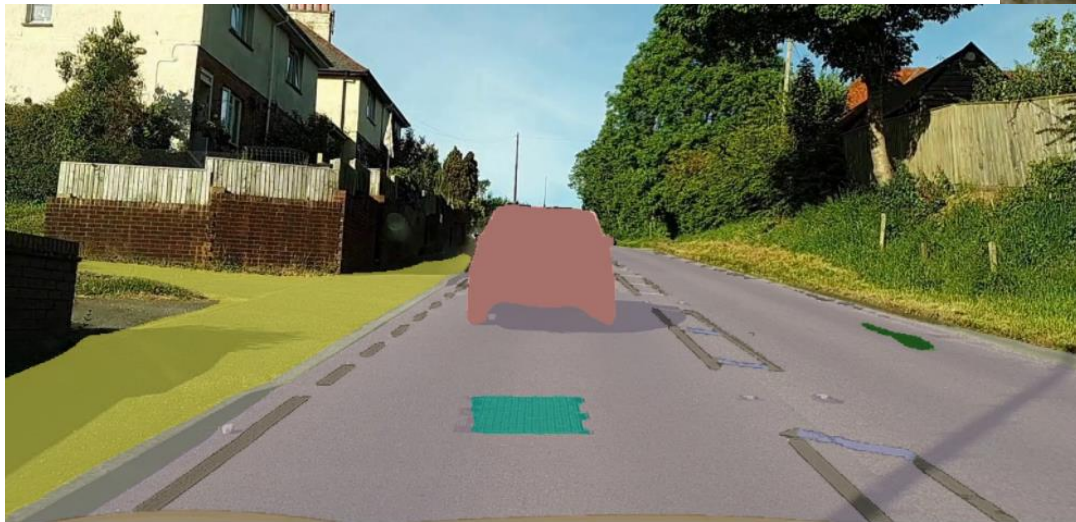


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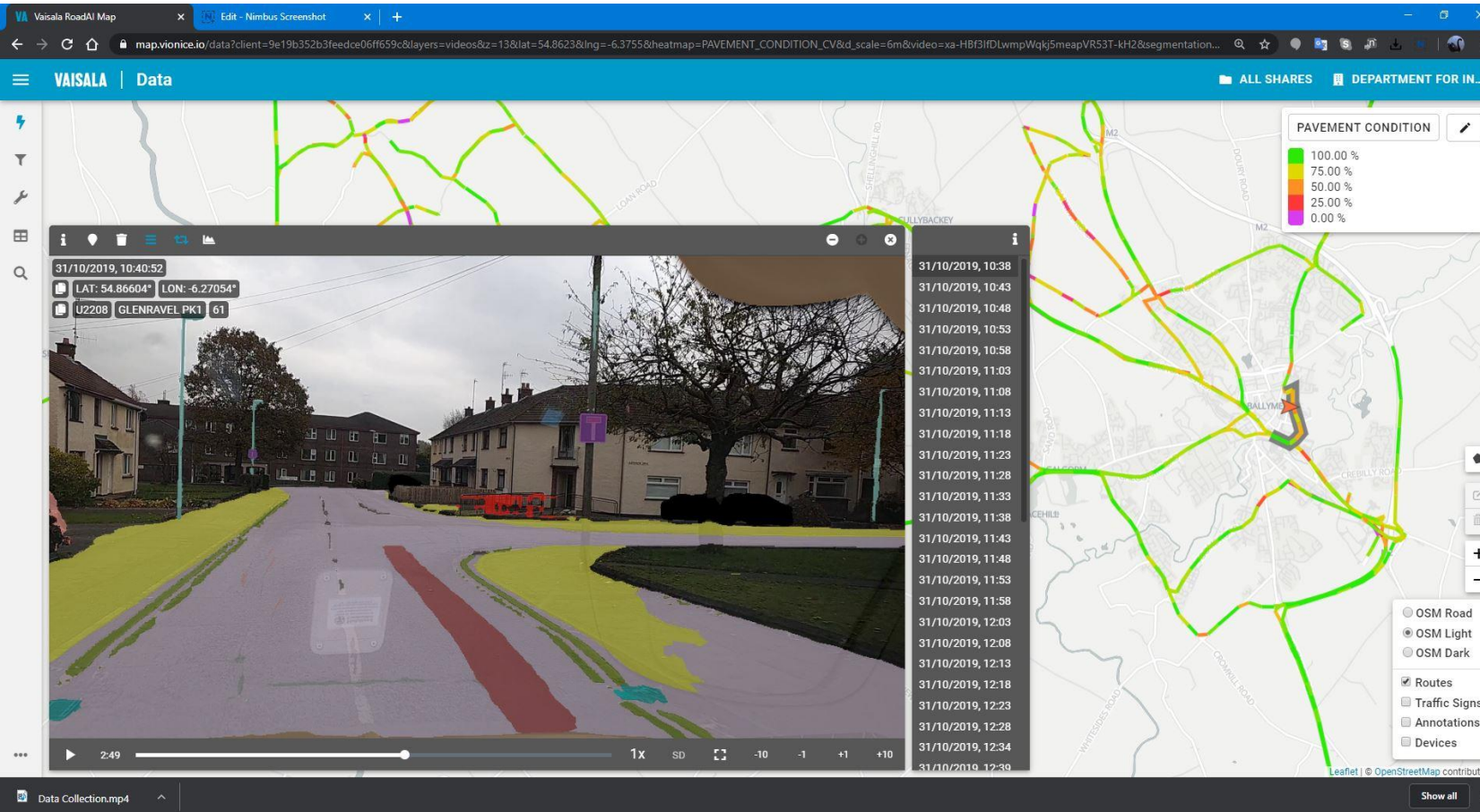


Computer Vision – Asset Detection

- Detect: catch basins, manhole covers, streetlights, guardrails, traffic lights
- Assess these assets from a desktop environment
- Tools to tag, assess condition, and create workflows



Data Collection & Processing



- Scalable data collection – Any vehicle can be equipped with a phone
- Near real time processing results: Results are available in < 4 hours

Existing process

From Survey...



...to maintenance takes 2-4 years program time



Road AI

From Computer Vision “Survey” ...



...to maintenance, could take as little as 6 months program time



Summary of Road AI Benefits

- Automated Data Collection process saves time/\$
- Cover entire Road Network
- Objective and consistent data sets
- Collect fresh condition data more often leads to better decision making
- Automated process leads to faster implementation of Pavement Management Plans
- Manage multiple Right of Way Assets
- Complete Video Library of Road Network could be used by multiple departments

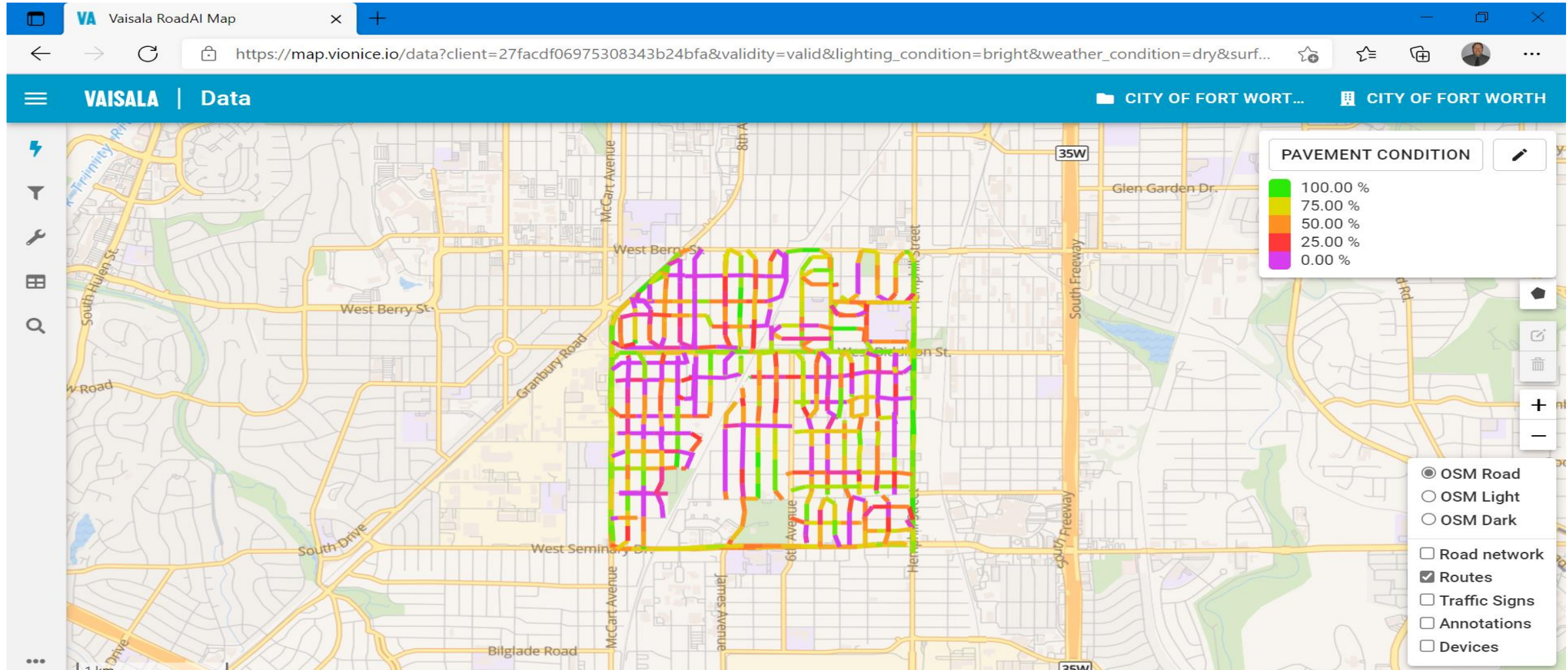
City of Fort Worth Expectations and Results

- Easy Set Up and Installation
 - Vaisala shipped the required accessories, assisted with the in-vehicle set up, and reviewed a data test run for proper phone alignment and data collection
- Efficient Data Capturing Process
 - Camera set up and driving streets at posted speed was significantly faster than alternative methods
- Consistent and Repeatable Review and Analysis Process
 - Process is evaluating streets fairly and equitably

City of Fort Worth Expectations and Results

- Fast Data Analysis
 - Easy data capture
 - Video data seamlessly transferred automatically at end of day
- Effective Data Visualization
 - Multiple data sets to view pavement defects
- Multiple Data Exporting Options
 - Data is accessible to VUEWorks, GIS, Excel/DBs

RoadAI Test Area



Actual HD Footage Next to Computer Vision



Results

- How did we validate RoadAI's data?
 - RoadAI data was compared to a current field review
- Overall test site differential was 8 points with very few outliers
- Set up, video capture, and processing are simple and seamless
- Multiple useful data displays and formatting options
- Collect data any time; scalable
- Impressive cost savings
- Customizable

 CITIBOT

SMS Alerts

Project Communication

- Existing Communication Tools
 - Door Hangers
 - Mailers/ Robocalls
 - Social Media
 - Neighborhood Meetings
- Maintenance Communication
- Disproportionate Response
- Questions During Construction



STREET MAINTENANCE

Maintenance on Your Street

Pavement maintenance is scheduled to **BEGIN TOMORROW** on this street.

Residents are asked to keep all vehicles off both sides of the street during the week from 7 a.m. to 6 p.m. If a vehicle is parked on the street, it will be relocated so work may continue.

Travel and driveway access will be limited during maintenance work.

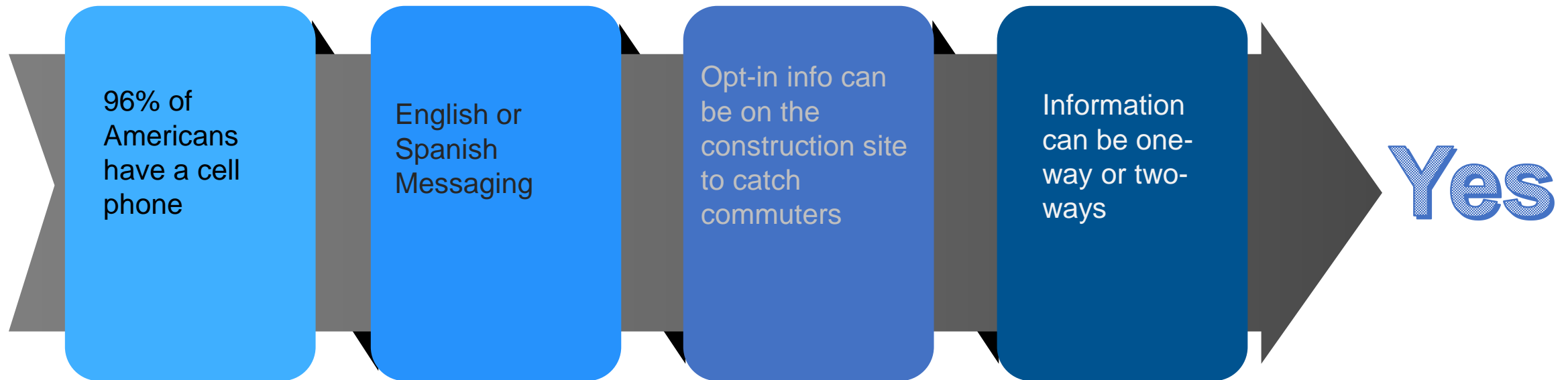
After the work is completed, the street will be open for traffic and parking.

For questions, please call 817-392-8306.



The beginning...

- Call Center Representatives





Implementation

- Set up was easy
- Pre determined messages based on schedule activities
- Sent Opt-in information through social media, neighborhood associations, portable message boards



Results

90 New Subscribers in July



NEW METHOD OF ADVERTISEMENT

The highest number of stakeholders heard of pilot project via on-site message boards as they passed through the construction

HISTORICAL NEIGHBORHOOD MEETING TURNOUTS

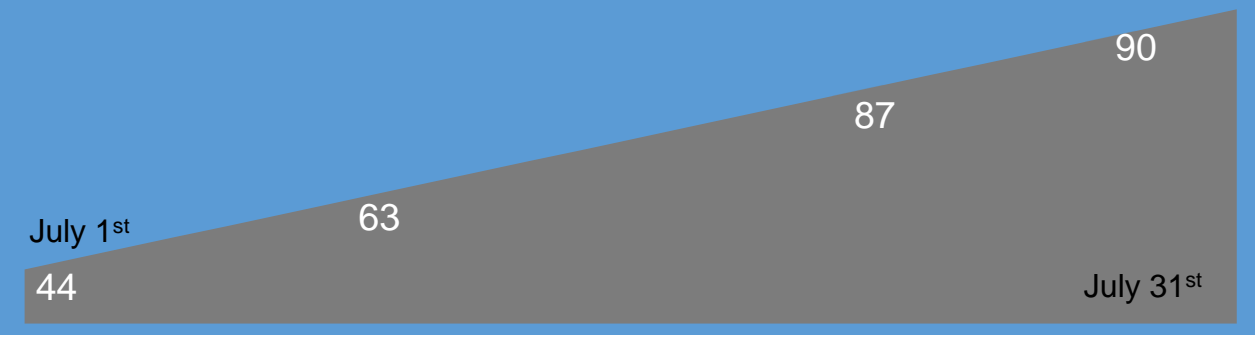
Cromwell Marine Creek	41
Kroger Dr.	24
N. Beach St. & Basswood	32

MISSED OPPORTUNITES

Started pilot trial after the Fossil Creek Blvd. project began. This feature will be more effective when

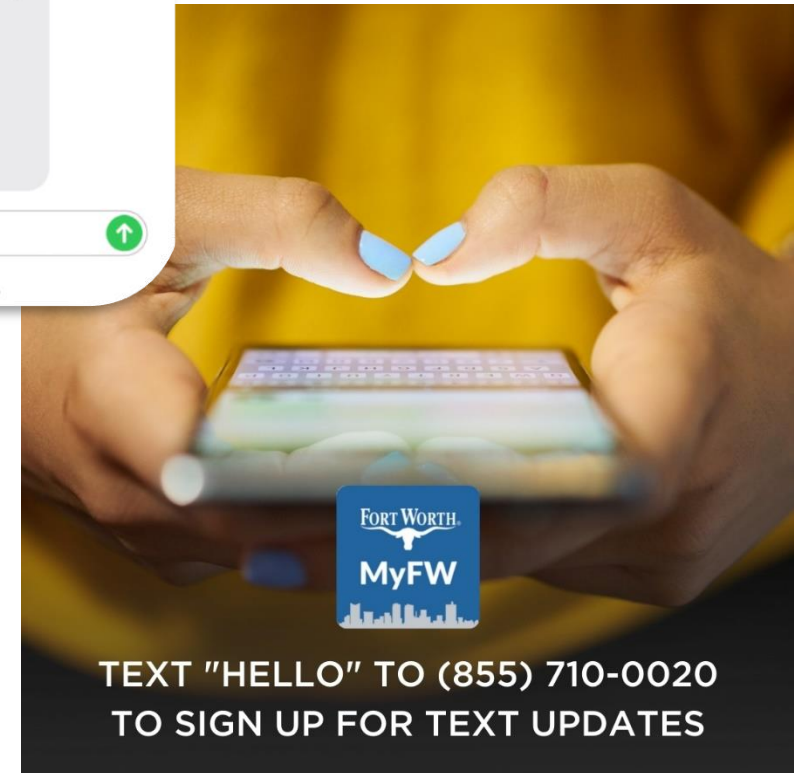
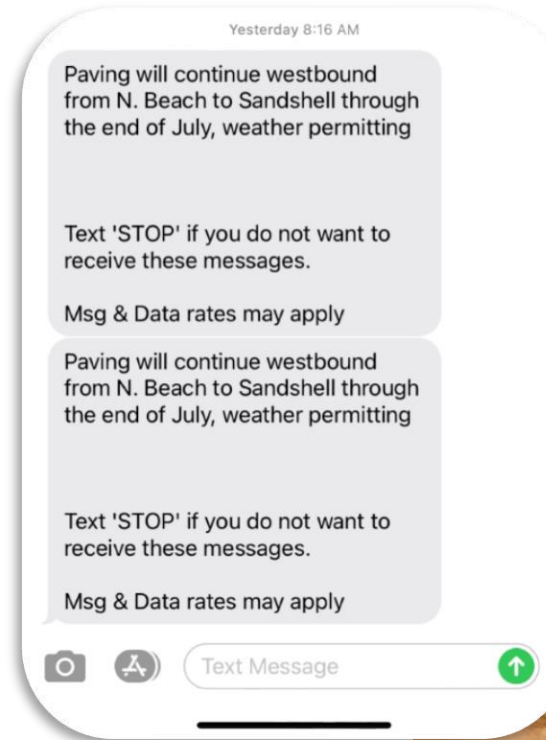
- The information is printed on door hangers, project signs and meeting handouts
- This feature can be discussed at neighborhood meetings and staff can assist people who might be intimidated by the technology
- A planned media campaign maximizes stakeholder interest; media communication was pushed inconsistently in pilot

STAKEHOLDERS OPTING-IN PILOT



Realized Benefits

- Easy for Stakeholders
- Consistent Communication
- Proactive
- Freeing up project manager time responding to stakeholders
- Reaching Commuters
- Sending links and other information

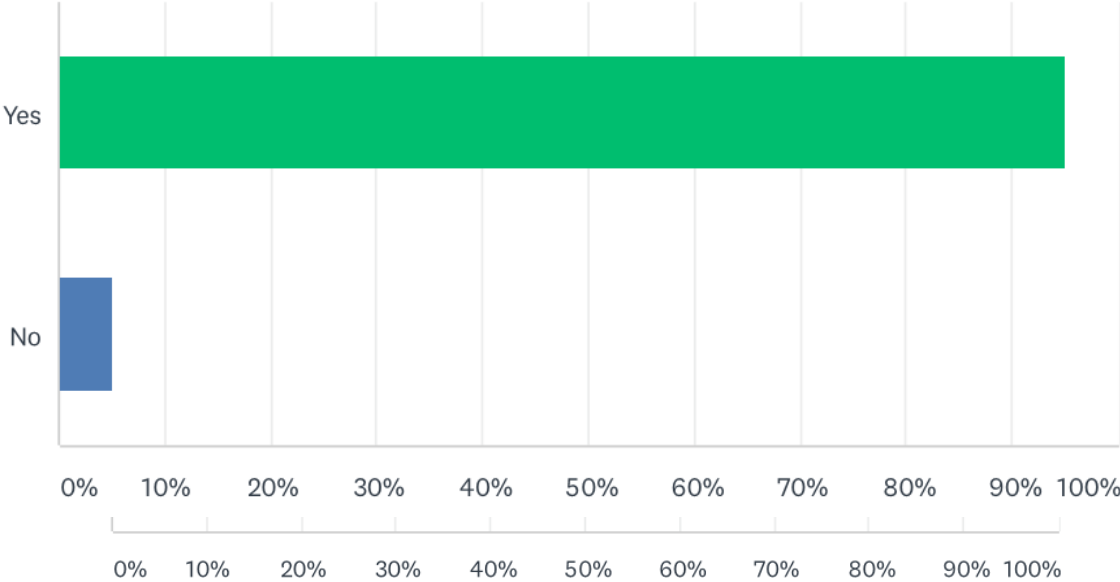


Survey Results

Q5 How did you learn about the text message pilot program for Fossil Creek Boulevard?

Q6 Would you like the City of Fort Worth to continue proving text alert updates for projects in the future?

Answered: 20 Skipped: 0



Survey Responses

Since I have to drive on Fossil Creek every day this is helpful. I follow the city's projects in my area but I like that I could easily be sent updates instead of having to go search for it or call someone

Great service!

Its about time the city moves to the technology age! Love it

Is there a list of projects I can get texts about?

What else can you send

Text alerts were fine the construction just took too long

Questions



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