



Improving Project Delivery Using Online GIS & BI

NEWEA Spring Conference 2022

Presented by Devon Jones and Kenneth Camacho

CMOM Past Practices

Why go digital?

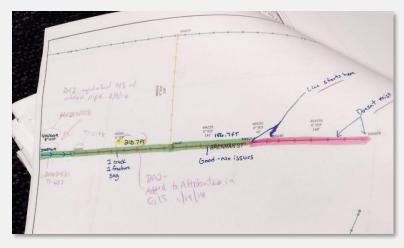
CMOM Data Collection



Hard drives for CCTV data transfer

	MACP Inspe	ection Form	The Lagran
	Header		
Seneral Information 1. Surveyed By (1.2)	2 Certificate Number (1.2)	3. Reviewed By	4. Reviewer Certificate No.
	6 Customer	7 P/O Number	8. Work Order
5. Owner			12 Time
9 Media Label	10 Project	11 Date (1,2) YYYYMMDD	
13. Sheet Number (1.2)	14. Weather	15. Pre-Cleaning (2)	16. Date Cleaned
17. Purpose of Survey (1.2)	18. Inspection Level (1,2)	19 Inspection Status (1.2)	
Location			
21. Drainage Area	22 MH/Access Point No. (1.2) 23 Street (1,2)	24. City (1,2)
25. Location Code (2)	26. Surface Type (2)	27. Inflow Potential from P	Runoff
28. Location Details			
Manhole 29 MH Use (2)	30 Access Type (1.2)	31. Year Constructed	
32 Year Renewed		33. Evidence of Surcharg	0 (2)
YYYY			
Measurements 34. Rim to Invert (2)	35. Rim to Grade (2)	36 Grade to Invert (2)	37. Rim to Grade Exposed
38 Northing*	39. Easting*	40 Elevation**	41. Coordinate System*
The state of the second second	59 Easing		AT COOLUMBIE System
42. Vertical Datum**		43. GPS Accuracy	
44 Additional Information			
44. Additional Information			
Information required if	Northing, Easting or Coordina Elevation or Vertical Datum d Red Font Fields = Mandatory	ata is recorded.	
eline Assessment Ce	d fanting Dansam		opyright © 2016, NASSCO

Paper forms for structure inspections



Paper maps for field crew assignment and hand-written markups

CMOM Project Delivery

Monthly recommendation tables

- Lengthy
- Heavy
- Disposable
- Repetitive
- Not spatial
- Not sortable or searchable

Final deliverable (Hard Drive and Hard Copy)

- Revised geodatabase
- Final recommendation table
- Summary report
- CCTV Data & Structure Inspection Reports





Digital Project Setup

Nashua CMOM Architecture

5

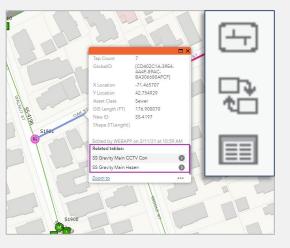
Digital Data Management

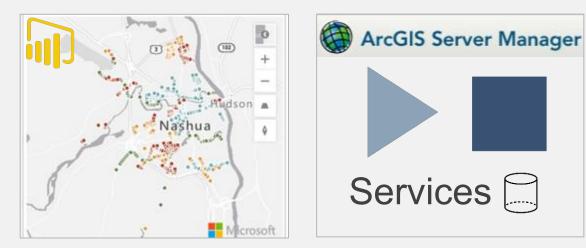
Components of a Successful Digital Solution

	Collection	Storage	Sharing
Digital	 Esri Mobile applications 	SDE geodatabase	 Esri web applications
Dig	CCTV software	ProjectWise	Power BI
	 Paper forms and maps 	Local file geodatabase	Hard drives
Previous Practices	CCTV software	• Excel	Paper deliverables
Prev Prac		 External hard drive 	

Digital Data Setup

√ Visible	Read Only	Field Name	Alias	Data Type	Allow NULL	Highlight	1
1		LOCDESC	Location Description	Text			
1		PLANLENGTH	Plan Length	Text	1		
1		LAYER	ACAD Layer	Text			
1		Material_ORIG	Material ORIG	Text	1		
1	\checkmark	created_user	created_user	Text			
1	1	created_date	created_date	Date	1		
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		CCTV_COMMENTS CCTV_TAPCOUNT GlobalID X_LOCATION Y_LOCATION ASSET_CLASS	CCTV Comments CCTV Tap Count GlobalID X Location Y Location Asset Class	Text Short Global ID Double Double Text	× 		N





- Unique Asset IDs
 - Best practices
 - Requirement for relationship classes
- Finalize schema
 - Add fields/domains
 - Inspection progress tracking
 - Revision layer schema for targeted markups
 - Related tables
 - NASSCO PACP/MACP Compliance
 - X,Y Locations for Power BI
 - Editor Tracking
 - Updates require stopping services







Digital Solution Challenges

Learning curve for Client to use Learning curve for CCTV Contractors ArcGIS Enterprise Web Apps to use Esri Mobile Apps Extra responsibility for Contractors Microsoft 365 restrictions for Power BI Duplicate Asset IDs throughout system GIS Portal downtime

Digital Workflows

In Practice

Hazen

Digital Field Data Collection

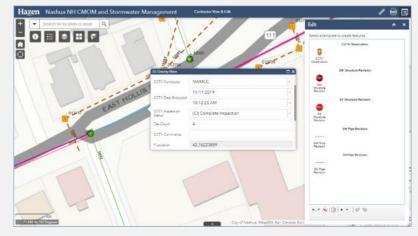
Pipes

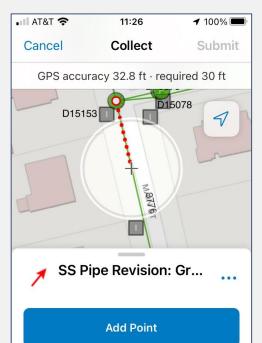
Technology

- CCTV truck, camera, PACP compliant software
- Collector application on mobile device
- Web App: office support or desktop use in truck

Process

- Markups
- Live updates





LETTERE LETTER

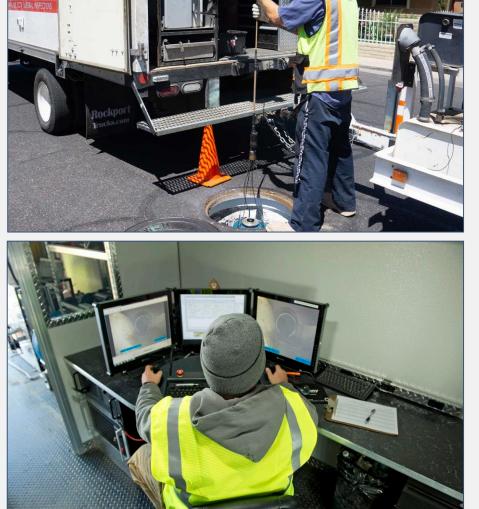
Asset Type

ANE J=

Gravity Main

Facility Identifier

ARIZONA



Digital Field Data Collection

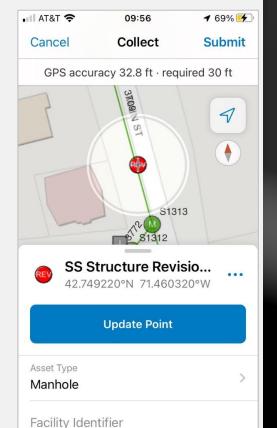
Manholes

Technology

- Survey123
- Collector
- Web App

Process

- MACP data collection
- Markups
- Updates



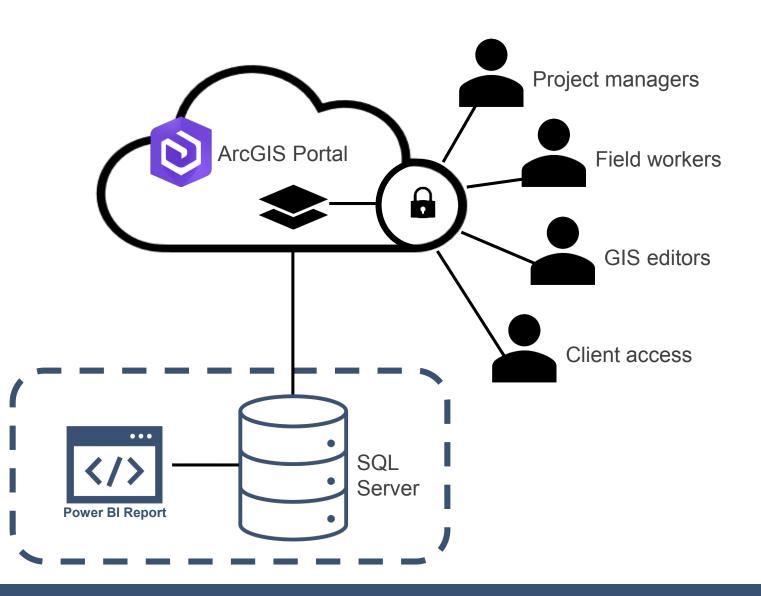
Nashua MACP Inspection Form L	.1+ હીંગ
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National Water Main Cleaning Co.	\otimes
Surveyed By	
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Certificate Number	
Project	
CMOM and Stormwater Management	\otimes
Date	
📛 Tuesday, May 17, 2022	\otimes
Time	
🕑 Time	
Weather	
	~
Purpose of Survey	
	~
Inspection Level	
level 1+	\bigotimes
	~



Nashua MACP Form L1 Overview EC i 9/17/19 - 5/19/22 🍸 Filter Report Export - Open in Map Viewer 836/836 Form view 🌔 ۲ / 🗐 ĕ¢× $\langle \rangle$ 390/ A Attachments: Esri Community Maps Contributors, City of Nashua, M... Nashua MACP Form L1 Location (Street Name City/Town Location Manhole ID generalimage-2020081. generalimage2-20200 S8171B nowell st Nashua, NH Local Rural Streets Light traffic, town and city back streets, estate streets and curbside parking areas S2418 Hoyts Ln Nashua, NH Local Rural Streets coverimage-20200819-... coverimage2-2020081 Light traffic, town and 1 of 836 selected

Data Storage and Access

- Data stored on SQL server
- Secure access via Esri apps and Power BI
- Data backed up regularly



CCTV Review



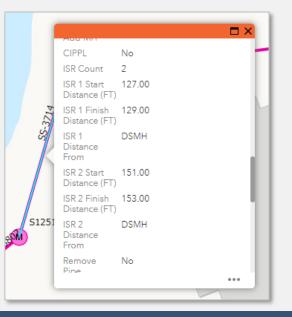
ProjectWise

- Home for CCTV data
- Reviewed by engineers

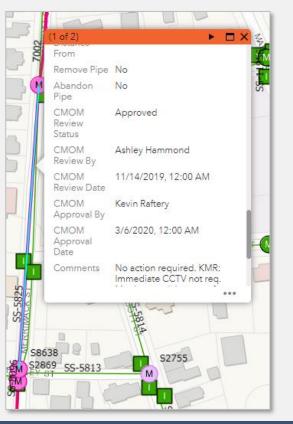
Datasource Eolder Document View Jools Window Help	~ > ;
 	cuments/NH-New Hampshire/Nashua, City of 90006-029/CCTV Dat ~
	Name Name Name

GIS Portal

- Tracked CMOM recommendations
 in GIS database related tables
- QC CMOM recommendations
- Tracked errors in collected data





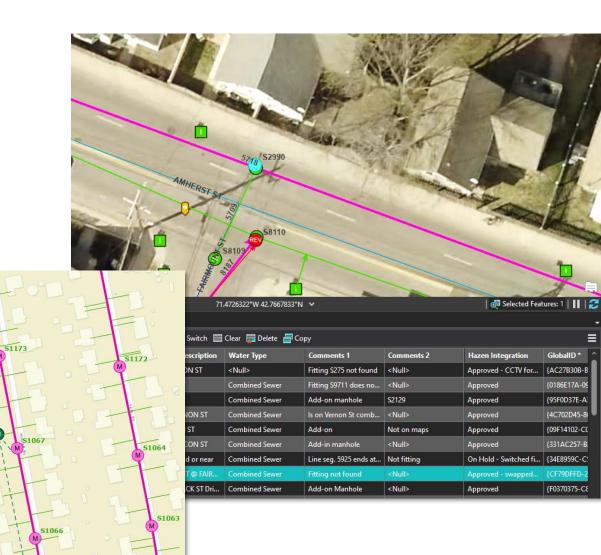


GIS Review



ArcGIS Pro Desktop

- Review live revision layers
- Update GIS layers
- QAQC GIS updates
- Data enhancements
 - Taps plotter
- Reviewed/approved recommendations
 - Done in ArcGIS Pro or Web App



ECTID	4002
et Type	Fitting
lity Identifier	S2990
ginal Identifier	S2990
v	No
V Contractor	NWMCC
ection Date cuted	10/15/2019, 5:51 PM
Access	(NF) Not Found (Incomplete)
ation Description	AMHERST ST @ FAIRMOUNT ST
ter Type	Combined Sewer
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nments 2	<null></null>
en Integration	Approved - swapped fitting for abandoned manhole
ballD	{CF79DFFD-209F-40E3-BEE3- C99AFA1D72A2}
ated_user	nwmcclteixeira
ated_date	10/15/2019, 5:55 PM
_edited_user	GISEDITOR
_edited_date	11/11/2020, 6:10 AM

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Project Delivery

Monthly and Final Deliverables

Web Applications configured for different audiences

Hazen

- Home for CCTV reviews/recommendations
- Spatial investigation
- Used during meetings for progress update and review

-

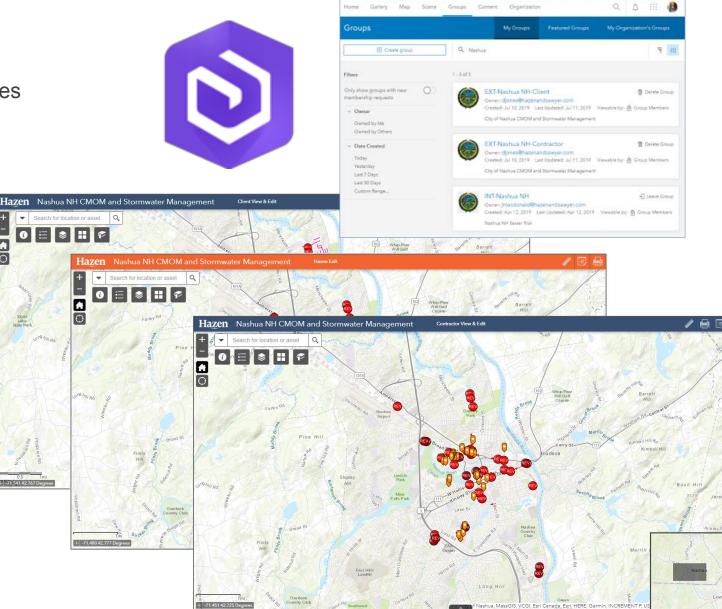
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Contractor

- Spatial edits
- Note-taking •
- Progress tracking •
- Remote support and QAQC

Client

- Map-based, paperless deliverable
- Available for review



Power Bl

- Paperless deliverable to Client
- Project Management tool
- QAQC tool for Hazen
- Shows CCTV progress
- Shows data implementation progress
- Review and Recommendation progress
- Map components and visuals to see trends
- Updates on scheduled interval



Progress Over	view				🛞 Hazen
Select all (Blank Asset Inspection Overvio			nterceptor >	Asset Inspection Progress Gravity Main Manhole Count Assets Inspected (Cumulative) 2,000 1,500	Asset Inspection Progress
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ombined	SS-5751	5751	AMHERST ST	10/15/19		Height: 36 Width: 30 i	n.			the second	
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ate Executed	D8099	1/21/202	20 12/23/2019			~								
Date Executed	D8162	1/21/202	12/23/2019											

Final Deliverables

Hard drive

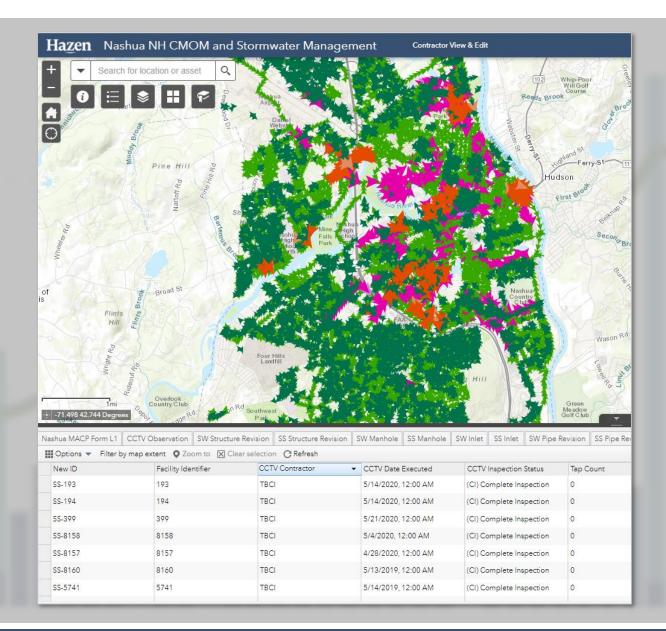
- Excel tables
- Updated GIS data
 - Feature classes
 - Related tables
- CCTV data
 - Videos
 - Images
 - Pdf reports
 - Access database

Paper reports



Benefits of Live Data Sharing

- Track project progress
- Live deliverables rather than snapshots
- Respond to data more quickly
 - Repairs
 - Inform capital improvement planning
- Simplified progress meetings
 - No printed copies required





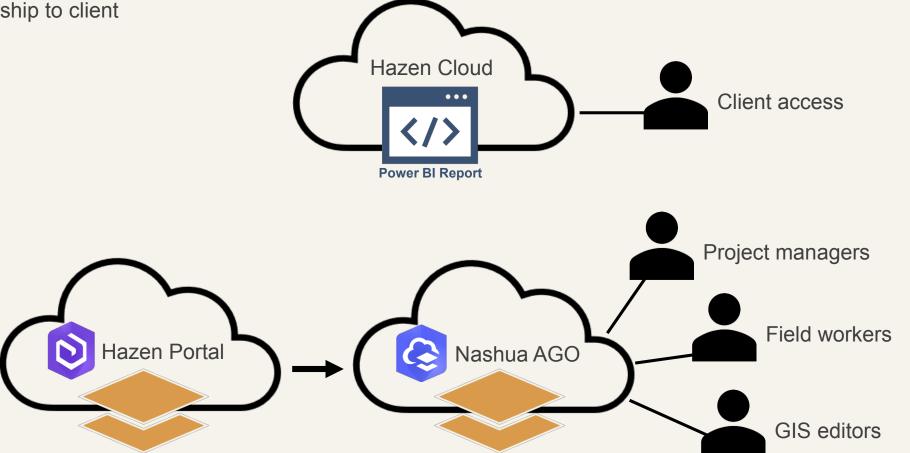
- Training with contractors
- New responsibilities for field workers
- Make data collection as simple and efficient as possible
- GIS data preparation
- GIS data improvements
- Client expectations and access





Looking Ahead

- Transitioning GIS ownership to client
- Access to Power BI
- Workflow improvements
 - Field Maps
 - Custom pop-ups
 - Auto-populate asset IDs



Questions?

Thank you!



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Kenneth Camacho Senior GIS Analyst kcamacho@hazenandsawyer.com