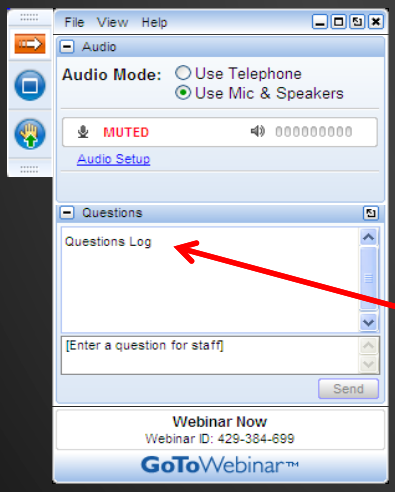
This webcast is sponsored by

National Association of Sewer Service Companies

Optimize your PACP Deliverables

April 19, 2017
1:00 – 3:00 pm Eastern

How to Participate Today



- **Audio Modes**
  - Listen using Mic & Speakers
  - Or, select "Use Telephone" and dial the conference (please remember long distance phone charges apply).
- **Submit your questions using the Questions pane.**
- **A recording will be available for replay shortly after this webcast.**

Today's Moderator

Ted DeBoda, P.E.,
Executive Director,
NASSCO, Inc.

Today's Speakers

Mike Russin
Business Manager
WinCan LLC.

Michelle D. Beason, PE
Regional Manager
National Plant Services, Inc., a Carylon Company

Keith Carpenter, PE
Collection Systems Manager
City of Lynchburg, VA

Jeff Normandin, GISP
GIS Manager
Wright-Pierce

Data Collection and Deliverables:
From a Software Vendors Perspective

Mike Russin
Business Manager
WinCan LLC.

WinCan

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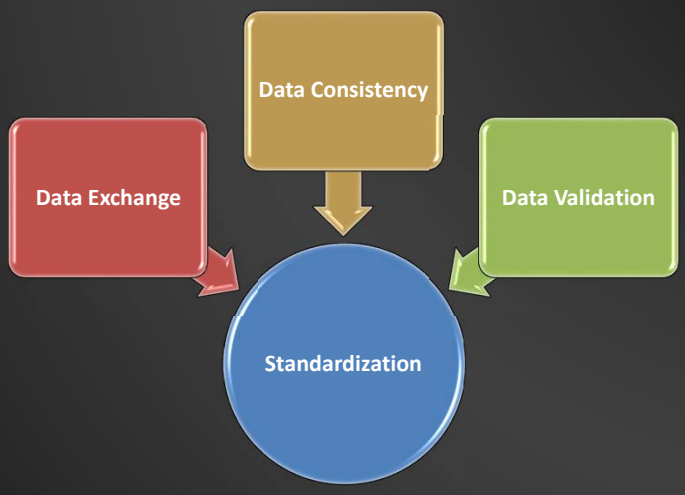
Why is Standardization Important?



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What, How, and Why: The PACP Exchange Database

What?

- What is it?
  - Microsoft Access Database
- What does it do?
  - Stores all the metadata from PACP, MACP, and LACP Inspections

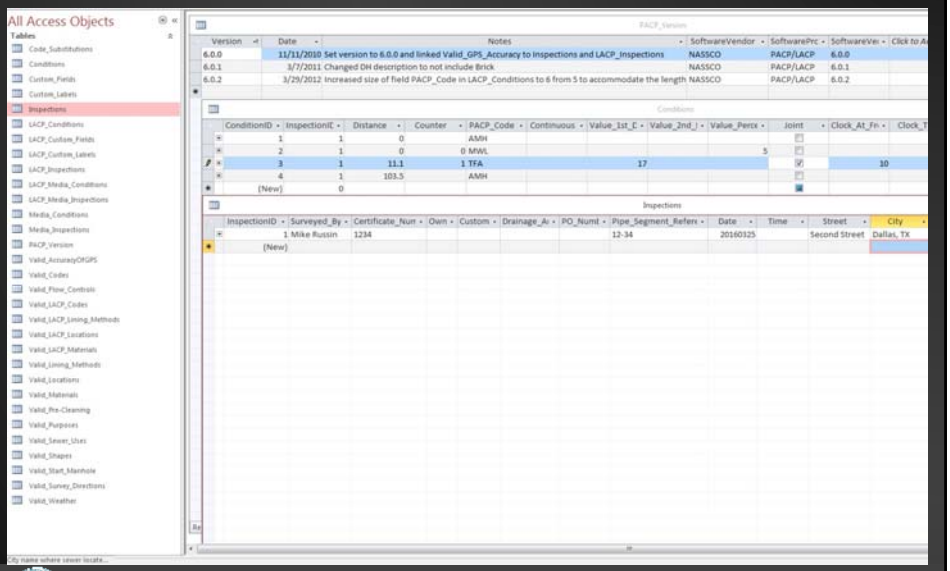
How?

- How valuable is it?
  - Extremely, as it hold all your current and historical inspection data that includes observation and overall quick score ratings that is valuable to condition assessment.(PACP, MACP, and LACP Version 7)

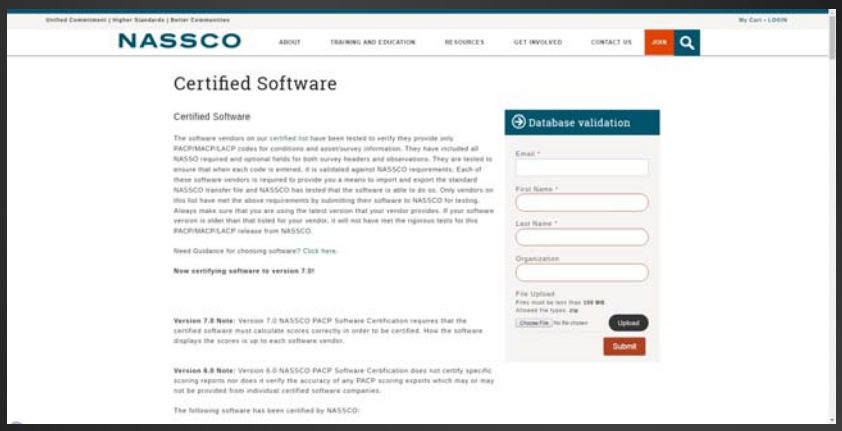
Why?

- Why do we use it?
  - Universal Format (Microsoft)
  - Compatible with all Certified PACP Software's

What, How, and Why: The PACP Exchange Database Cont.



NASSCO Certified Software



https://www.nassco.org/certified-software

Things To Consider: PACP Exchange Database

1. All PACP certified software packages will export and import to other PACP certified software packages
2. Difference between native database files and the standard PACP exchange database.
3. Make sure your version of PACP is current and matches your specifications.

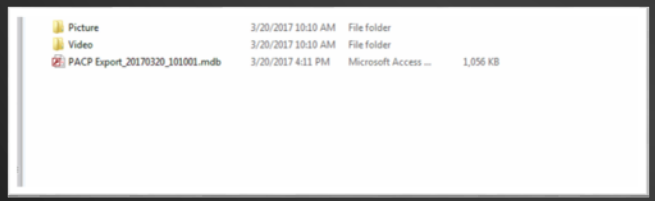
NASSCO Certified Specifications & Deliverables

1. Stronger the spec, the better the project. (**Must Enforce!!**)
2. Need to specify NASSCO PACP, MACP, and LACP format to include the PACP Exchange Database.
3. Insist that all data collection be in PACP, MACP, and LACP format according to the NASSCO Standard.

Remember, PACP allows up to 10 customer data fields in the header to accommodate any special needs you might have pertaining to the data collection.

Tips and Tools: What's Available?

- NASSCO website (CCTV specs & database validation tool)
  - General CCTV Specifications (***Under Revision***)
  - Database validation tools
  - List of available PACP Trainings
  - Current list of certified software vendors
- Talk with the industry
  - Tradeshows
  - Social Media
  - Industry publications (June Edition of Underground Construction Technology Magazine)
- Familiarize yourself with what a PACP database and deliverable.



Software issues with PACP

- Informing NASSCO (www.nassco.org)
  - Software Vendor Committee
    - Educational Group
    - Procedural Group
- Software Vendor Committee
  - Chairman, Ronnie Flannery (rguy@aquadata.com)
  - Co-Chair, Mike Russin (m.russin@wincan.com)

Data Collection and Deliverables
From a Contractors Perspective

Michelle D. Beason, PE,
Regional Manager
National Plant Services, Inc., a Carylon Company

Data Collection and Deliverables

From a Contractors Perspective

Reasons for TV Inspections

- Maintenance related
- Infiltration/inflow investigation
- Pre- and post-rehabilitation survey
- Pre-acceptance survey
- Routine assessment
- CIP assessment
- Resurvey
- Sewer system evaluation survey
- Conversion of pre-existing video
- Not known

Inspection Technologies

Common Tools

- CCTV
- Lateral Launch/Push Cameras
- Pole Camera
- Manhole Inspections

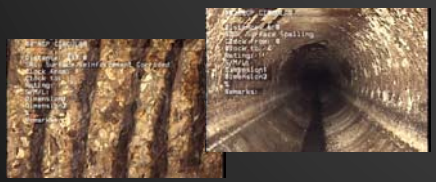
Advanced Tools

- High Definition CCTV/ 360 Degree Cameras
- Laser
- Sonar
- Acoustical Testing
- Electromagnetic Testing

The Benefits

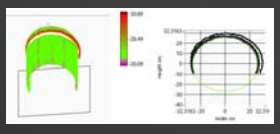
CCTV Inspections

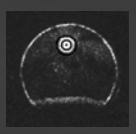
- Visually determine the pipe condition/activity.
- Using PACP can compare changes to an asset over time.
- Low relative cost and ease of use.



Advanced Tools

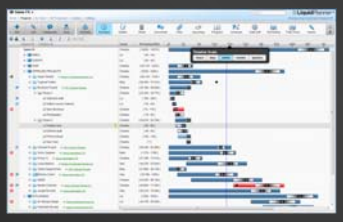
- LASER: Measure and quantify pipe shape, size, and corrosion levels.
- ELECTROMAGNETIC: Measure thickness of the pipe walls and rebar spacing; voids behind pipe
- SONAR: Measure debris levels under the water





The 3 Phases of Data Collection and Deliverables

- Project Planning
- Project Deployment
- Project Delivery



Project Planning

To begin Immediately on contract ratification

- Obtain Excel List of pipelines to be inspected.
- Obtain maps of pipelines and manholes
- Obtain GIS Shape or Geodatabase Files
- Determine permit requirements (City, County, railroad, State, etc).
- Prepare a project schedule estimating footage to inspect each day, and organize deployments

INSPECTION TECHNOLOGY	PIPE ID	US MH	DS MH	MAP LENGTH	MAPPED DIAMETER	Mapped Material
Sonar/TV	11	B03-049	B03-046	484.46	42	VCP
Sonar/TV	14	B03-053	B03-064	405.08	33	RCP
Sonar/TV	16	B03-060	B03-039	605.44	42	VCP

Project Deployment

- Follow NASSCO CCTV Inspection Protocols
  - Ensure camera is in focus
  - Camera is in center of pipe
  - No debris on the lens
  - Proceed no faster than 30 feet per minute
  - Use Optional Fields to make data more complete
- Keep to project schedule by making sure daily production goals are met.
  - Keep Client informed of progress
  - Prepare Field Log to track all inspection progress

    - Inspection Completion date, actual diameter, actual material, inspected length, comments.

Fuzzy Image?
Not acceptable!

The Field Log

DATE INSPECTED	FROM	TO	Map LENGTH	INSPECTED LENGTH (FT)	MAPPED DIAMETER	ACTUAL DIAMETER (INCH)	Mapped Material	ACTUAL MATERIAL	SENSORS USED	Notes
24-Nov	B03-049	B03-046	484.458	476.1	42	42	VCP	RCP	TV/sonar	
7-Jan	B03-053	B03-064	405.079	401.8	33	33	RCP	RCP	CCTV Only	Heavy Debris
24-Nov	B03-060	B03-039	605.441	602.8	42	42	VCP	RCP	TV/sonar	
7-Jan	B03-066	B03-065	369.11	367.1	33	33	RCP	RCP	CCTV Only	
6-Jan	B03-067	B03-040	591.917	583.6	33	33	RCP	RCP	CCTV Only	
7-Jan	B04-108	B03-066	412.758	408.8	33	33	RCP	RCP	CCTV Only	
24-Nov	B04-110	B04-108	502.129	496	33	33	RCP	RCP	TV, sonar	
19-Nov	B04-128	B04-111	320.27	311.2	33	33	RCP	RCP	TV/sonar	
6-Jan	B04-131	B04-128	450.391	443.4	33	33	RCP	RCP	CCTV Only	Hole
25-Nov	B04-132	B04-117	487.034	485.1	42	42	VCP	RCP	CCTV Only	
25-Nov	B04-136	B04-132	419.251	421.7	42	42	VCP	RCP	TV/sonar	
9-Jan	C06-027	C06-016	294.629	317.4	30	36	VCP	RCP	TV/sonar	
24-Nov	B04-111	B04-110	255.939	257	33	33	RCP	RCP	TV, sonar	
9-Jan	B04-148	B04-119	117.56	119.3	42	42	VCP	RCP	TV/sonar	
9-Jan	B04-150	B04-149	59.938	62	30	30	RCP	RCP	TV,sonar	
6-Jan	B03-061	B03-067	299.779	298.5	33	33	RCP	RCP	CCTV Only	
6-Jan	B03-063	B03-061	371.483	371.4	33	33	RCP	RCP	CCTV Only	
6-Jan	B03-064	B03-063	519.694	511	33	33	RCP	RCP	CCTV Only	
7-Jan	C06-015	C06-026	295.562	294.2	36	36	VCP	RCP	CCTV Only	

Keeping a complete field log during inspection operations will make it easier to QA/QC later!!

QA/QC and Project Delivery

1. Export PACP Project Summary Report for Project
2. Compare PACP Project Summary to the field log spreadsheet.

QA/QC the Following :

- Pipe ID Numbers
- US and DS Manhole numbers
- Pipe Size
- Pipe Material.

Project Summary Report

National Plant Services, Inc.
1461 Harbor Avenue
Long Beach, Ca. 90813
Office: 562-436-7600

The Environmental Protection Specialists

Project Summary

Main ID	Date	Address	Start MH	Finish MH	Pipe	Asset length Surveyed Length
B04-31_B04128	1/6/2015	EASEMENT	B04-128	B04-131	RCP	443.4
B03-064_B03-063	1/6/2015	EASEMENT	B03-064	B03-063	RCP	511.0
B03-063_B03-061	1/6/2015	EASEMENT	B03-063	B03-061	RCP	371.4
B03-061_B03-067	1/6/2015	EASEMENT	B03-061	B03-067	RCP	298.5
B03-067_B03-040	1/6/2015	EASEMENT	B03-067	B03-040	RCP	583.6
C06-016_C06-015	1/7/2015	EASEMENT	C06-016	C06-015	RCP	186.4
C06-015_C06-026	1/7/2015	EASEMENT	C06-015	C06-026	RCP	294.2
B03-053_B03-064	1/7/2015	EASEMENT	B03-064	B03-053	RCP	401.8
B03-065_B03-053	1/7/2015	EASEMENT	B03-053	B03-065	RCP	12.0

Make sure the information in the summary matches the Field Log Spreadsheet

National Plant Services, Inc.
1461 Harbor Avenue
Long Beach, Ca. 90813
Office: 562-436-7600

COMPARE PROJECT SUMMARY WITH FIELD LOG SPREADSHEET

The Environmental Protection Specialists

Project Summary

Main ID	Date	Address	Start MH	Finish MH	Pipe	Asset length	Surveyed Length
B04-31_B04128	1/6/2015	EASEMENT	B04-128	B04-131	RCP		443.4
B03-064_B03-063	1/6/2015	EASEMENT	B03-064	B03-063	RCP		511.0
B03-063_B03-061	1/6/2015	EASEMENT	B03-063	B03-061	RCP		371.4
B03-061_B03-067	1/6/2015	EASEMENT	B03-061	B03-067	RCP		298.5
B03-067_B03-040	1/6/2015	EASEMENT	B03-067	B03-040	RCP		583.6

DATE INSPECTED	FROM	TO	Map LENGTH	INSPECTED LENGTH (FT)	MAPPED DIAMETER	ACTUAL DIAMETER (INCH)	Mapped Material	ACTUAL MATERIAL	SENSORS USED	Notes
24-Nov	B03-049	B03-046	484.458	476.1	42	42	VCP	RCP	TV/sonar	
7-Jan	B03-053	B03-064	405.079	401.8	33	33	RCP	RCP	CCTV Only	Heavy Debris
24-Nov	B03-060	B03-039	605.441	602.8	42	42	VCP	RCP	TV/sonar	
7-Jan	B03-066	B03-065	369.11	367.1	33	33	RCP	RCP	CCTV Only	
6-Jan	B03-067	B03-040	591.917	583.6	33	33	RCP	RCP	CCTV Only	
7-Jan	B04-108	B03-066	412.758	408.8	33	33	RCP	RCP	CCTV Only	
24-Nov	B04-110	B04-108	502.129	496	33	33	RCP	RCP	TV, sonar	
19-Nov	B04-128	B04-111	320.27	311.2	33	33	RCP	RCP	TV/sonar	
6-Jan	B04-131	B04-128	450.391	443.4	33	33	RCP	RCP	CCTV Only	Hole

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QA/QC and Project Delivery (Cont.)

3. Export the PACP Scoring Report for Project.
4. Select all lines with 4 and 5 Quick Scores, or 10% of inspections with highest score, **whichever is the largest number of segments**, and QA/QC.
- Pay attention to the following:
  - Header information
  - Ensure defects are coded correctly
  - Correct errors and save record

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PACP Quick Scores Provide the Most Information about Defects

FROM	TO	INSPECTED LENGTH (FT)	ACTUAL DIAMETER (INCH)	ACTUAL MATERIAL	STRUCTURAL QUICK SCORE	O&M QUICK SCORE	OVERALL PACP PIPE RATING INDEX
B03-049	B03-046	476.1	42	RCP	3R00	4100	3.01
B03-053	B03-064	401.8	33	RCP	3L1N	1100	1.9
B03-060	B03-039	602.8	42	RCP	3U00	4100	3.1
B03-066	B03-065	367.1	33	RCP	3M00	1100	3
B03-067	B03-040	583.6	33	RCP	3G1V	3100	1.5
B04-108	B03-066	408.8	33	RCP	3O00	0000	3
B04-110	B04-108	496	33	RCP	3R00	4O00	3.5
B04-128	B04-111	311.2	33	RCP	3K00	0000	3
B04-131	B04-128	443.4	33	RCP	3W17	3N00	2.93
B04-132	B04-117	485.1	42	RCP	3R00	4100	3
B04-136	B04-132	421.7	42	RCP	3O00	0000	3
C06-027	C06-016	317.4	36	RCP	3K00	0000	3
B04-111	B04-110	257	33	RCP	3I00	0000	3
B04-148	B04-119	119.3	42	RCP	3C00	4100	3
B04-150	B04-149	62	30	RCP	3A00	4100	3.1

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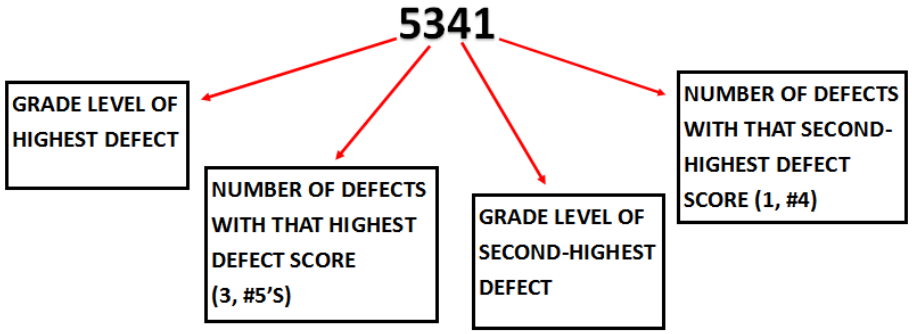
What is a PACP Quick Score?

PACP SCORE OF '5341'



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PACP Scoring Report

PACP Sewer Report

Surveyed by:	Certificate No:	Owner:	Survey Customer	Drainage area:	Sheet number:
F MORENO					

Work order:	Pipeline segment ref:	Start date/time:		Street:	City:
	NTG_967	2016/06/28	07:56	EASEMENT	

Location details:	Upstream manhole No:	Rim to invert:	Grade to invert:	Rim to grade:
	U20D1-3			

Downstream manhole No:	Rim to invert:	Grade to invert:	Rim to grade:	Sewer use:	Direction:	Flow control:	Height:
U20D1-2				SS	U	N	10

Width:	Shape:	Material:	Ln. method:	Pipe joint length:	Total length:	Length surveyed:	Year laid:	Year renewed:	Media label:
	C	VCP			256.8	256.8			1

Purpose:	Sewer category:	Pre-cleaning	Date cleaned:	Weather:	Location code:	Additional info:
F		H		1	C	

Starting access point: Easting: Northing: Elevation: Coordinate system: GPS accuracy:

Grade	Amount of Structural Defects	Structural Structural Segment Grade	Structural Pipe Rating	Structural Quick Rating	Structural Pipe Rating Index	Amount of O&M Defects	O&M Segment Grade	O&M O&M Pipe Rating	O&M Quick Rating	O&M Pipe Rating Index	Overall Pipe Overall Pipe Rating	Overall Pipe Overall Pipe Rating Index
1	0	0				0	0					
2	14	28				0	0					
3	22	66	113	5341	2.825	0	0	5	5100	5	118	2.878049
4	1	4				0	0					
5	3	15				1	5					

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PACP Scoring Report (Cont.)

Distance (Feet) (Meters)	Video Ref.	Group/ Descriptor	Modifier/ Severity	Continuous Defect	S/M/L	Value Inches (mm) 1st	2nd	%	Joint	Circumferential Location At/From	to	Image Ref.	Family	Rating	Remarks
0.0	3	AMH										DUBLIN-U20D1-3-U20D1-2 AMH at 0.0 ft (U).jpg			U20D1-2
0.0	26	MWL						10							
0.0	37	MWM						20					O&M		
23.9	116	MWLS		S01				15				DUBLIN-U20D1-3-U20D1-2 MWLS at 23.9 ft (U).jpg	S	2	
34.5	146	MWLS		F01				15				DUBLIN-U20D1-3-U20D1-2 MWLS at 34.5 ft (U).jpg	S	2	
34.8	156	MWL						5							
57.7	210	MWLS		S02				15				DUBLIN-U20D1-3-U20D1-2 MWLS at 57.7 ft (U).jpg	S	2	
107.3	313	MWLS		F02				15				DUBLIN-U20D1-3-U20D1-2 MWLS at 107.3 ft (U).jpg	S	2	
108.7	322	MWLS		S03				30				DUBLIN-U20D1-3-U20D1-2 MWLS at 108.7 ft (U).jpg	S	2	
117.7	358	MWLS		F03				30				DUBLIN-U20D1-3-U20D1-2 MWLS at 117.7 ft (U).jpg	S	2	
117.7	370	MWLS		S04				50				DUBLIN-U20D1-3-U20D1-2 MWLS at 117.7 ft (U)0.jpg	S	3	
210.8	554	FM								9	3	DUBLIN-U20D1-3-U20D1-2 FM at 210.8 ft (U).jpg	S	4	

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PACP Scoring Report (Cont.)

Surveyed by: F MORENO | Owner: | Start date/time: 2016/06/28 | Upstream manhole No: U20D1-3 | Pipeline segment ref: NTG_967 | Sheet number:

Distance (Feet) (Meters)	Video Ref.	Group/ Descriptor	Modifier/ Severity	Continuous Defect	S/M/L	Value Inches (mm) 1st	Value Inches (mm) 2nd	%	Joint	Circumferential Location At/From	Circumferential Location to	Image Ref.	Family	Rating	Remarks
229.4	617	MWLS		F04				50				DUBLIN-U20D1-3-U20D1-2 MWLS at 229.4 ft (U).jpg	S	3	
241.6	672	B							J	1	6	DUBLIN-U20D1-3-U20D1-2 B at 241.6 ft (U).jpg	S	5	
245.2	751	B		S05					J	2	6	DUBLIN-U20D1-3-U20D1-2 B at 245.2 ft (U).jpg	S	5	
245.2	785	IG								4		DUBLIN-U20D1-3-U20D1-2 IG at 245.2 ft (U).jpg	O&M	5	
247.0	814	HSV								4		DUBLIN-U20D1-3-U20D1-2 HSV at 247.0 ft (U).jpg	S	5	
248.6	871	B		F05					J	2	6	DUBLIN-U20D1-3-U20D1-2 B at 248.6 ft (U).jpg	S	5	
256.8	904	AMH										DUBLIN-U20D1-3-U20D1-2 AMH at 256.8 ft (U).jpg			U20D1-3

Remember what our PACP Scores were on this line:
Overall PACP 2.878, Structural Quick 5341, O&M Quick 5100

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QA/QC AND PROJECT DELIVERY (Cont.)

- Prepare Final Discrepancy Report for client to show differences between GIS and Actual Field Conditions

INSPECTION TECHNOLOGY	SEGMENT	FROM	TO	Map LENGTH	INSPECTED LENGTH (FT)	DATE INSPECTED	MAPPED DIAMETER	ACTUAL DIAMETER (INCH)	Mapped Material	ACTUAL MATERIAL
NPS Sonar/TV and SOLID FX MSI	11	B03-049	B03-046	484.458	476.1	24-Nov	42	42	VCP	RCP
NPS Sonar/TV	14	B03-053	B03-064	405.079	401.8	7-Jan	33	33	RCP	RCP
NPS Sonar/TV	16	B03-060	B03-039	605.441	602.8	24-Nov	42	42	VCP	RCP
NPS Sonar/TV	21	B03-066	B03-065	369.11	367.1	7-Jan	33	33	RCP	RCP
NPS Sonar/TV	22	B03-067	B03-040	591.917	583.6	6-Jan	33	33	RCP	RCP
NPS Sonar/TV	34	B04-108	B03-066	412.758	408.8	7-Jan	33	33	RCP	RCP
NPS Sonar/TV	35	B04-110	B04-108	502.129	496	24-Nov	33	33	RCP	RCP
NPS Sonar/TV	45	B04-128	B04-111	320.27	311.2	19-Nov	33	33	RCP	RCP
NPS Sonar/TV	46	B04-131	B04-128	450.391	443.4	6-Jan	33	33	RCP	RCP
NPS Sonar/TV	47	B04-132	B04-117	487.034	485.1	25-Nov	42	42	VCP	RCP
NPS Sonar/TV	49	B04-136	B04-132	419.251	421.7	25-Nov	42	42	VCP	RCP
NPS Sonar/TV	81	C06-027	C06-016	294.629	317.4	9-Jan	30	36	VCP	RCP
NPS Sonar/TV	36	B04-111	B04-110	255.939	257	24-Nov	33	33	RCP	RCP
NPS Sonar/TV	57	B04-148	B04-119	117.56	119.3	9-Jan	42	42	VCP	RCP

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Optimizing Your PACP Deliverables:
From a Municipal Perspective

Keith Carpenter, PE – PACP Trainer
City of Lynchburg, VA
Collection Systems Manager

LYNCHBURG WATER RESOURCES

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Inspection Strategies

- Understand your system and know what your inspection capabilities and needs
- Type of inspections that need to be conducted and when to do them
- Understand what needs to be inspected per the NASSCO PACP/MACP/LACP standard and what may not
- If lines are pre-cleaned, be mindful how pre-cleaning impacts your results
- Utilizing optional fields in the Header portion of each inspection
- Setting minimum experience requirements for inspection surveyors
- Requiring all digital deliverables (with exception of a sketch and invoice)
- Determining the shelf life of your PACP/MACP/LACP data
- When to require new PACP/MACP/LACP inspections
- Always specify inspections are to be done in the version of PACP/MACP/LACP

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Deliverables

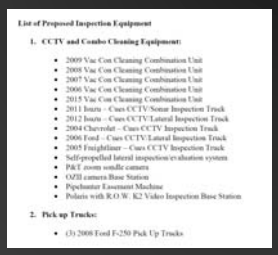
1. Preliminary Submittals
2. Intermediate Submittals
3. Final Submittals
4. Submittals to Consider

Preliminary Submittals

- PACP certifications & qualifications from surveyors
- A sample standard NASSCO PACP Standard Exchange Database exported from the Contractor's certified data collection software.
- Example media files (picture stills and video files) generated from the Contractor's certified collection software
- A list of references and past projects detailing the contractor's work history

Preliminary Submittals (Cont.)

- An equipment list detailing all of the contractor's resources



List of Proposed Inspection Equipment

1. CCTV and Combo Cleaning Equipment:
   - 2009 Vac Con Cleaning Combination Unit
   - 2008 Vac Con Cleaning Combination Unit
   - 2007 Vac Con Cleaning Combination Unit
   - 2006 Vac Con Cleaning Combination Unit
   - 2015 Vac Con Cleaning Combination Unit
   - 2011 Isuzu – Cues CCTV/Sonar Inspection Truck
   - 2012 Isuzu – Cues CCTV/Lateral Inspection Truck
   - 2004 Chevrolet – Cues CCTV Inspection Truck
   - 2006 Ford – Cues CCTV/Lateral Inspection Truck
   - 2005 Freightliner – Cues CCTV Inspection Truck
   - Self-propelled lateral inspection/evaluation system
   - P&T zoom sondle camera
   - OZII camera Base Station
   - Pipehunter Easement Machine
   - Polaris with R.O.W. K2 Video Inspection Base Station
2. Pick-up Trucks:
   - (3) 2008 Ford F-250 Pick Up Trucks

- A validation report from NASSCO attesting that the sample PACP database is a valid PACP/LACP/MACP database and fully conforms to NASSCO PACP/LACP/MACP standards and conventions.

Database Validation Results

Client: John Doe
Email:
Phone:

Vendor: XXX
Software: ZZZZ
Version: 1.0.00

Database: C:\Users\Dave\Desktop\20131212_Standard\PACP\Exchange_pacp.mdb

NASSCO DB: PACP | DB Version: 6.0.2 | Date: 1/6/2014 | Valid: PASS

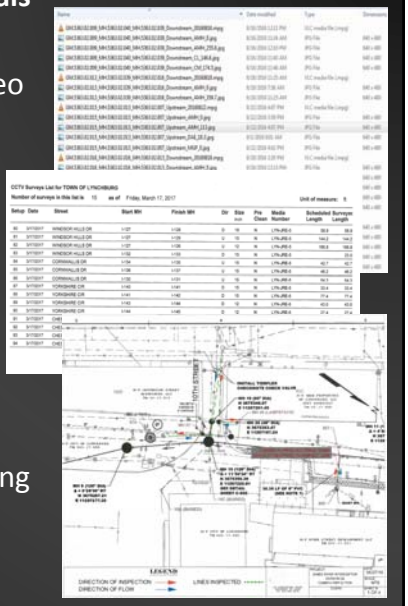
Note:

Intermediate Submittals

- A single standard PACP database generated from the Contractor's certified data collection software for all requested inspections or for a specified time period.
- Media files (picture stills and video files) for all requested inspections or for a specified time period.
- Daily activity logs: Daily activity logs shall be submitted to the owner on a weekly basis.
- Major defects: All major defects requiring immediate attention shall be reported immediately to the Owner.
- Mapping discrepancies: All mapping discrepancies shall be reported the owner the same day they are found.
- A single hard drive or a designated cloud storage utility containing all intermediate submittals

Final Submittals

- All Media files (picture stills and video files) for the entire project in that correspond to the specified naming convention.
- All Daily activity logs
- A sketch or map of all inspected line segments clearly showing and labeling all manholes, streets, and distances surveyed of each line segment



Final Submittals (Cont.)

- A single standard PACP exchange database in the latest PACP version generated for the entire project or work order
- NASSCO PACP validation report for the consolidated database
- A single hard drive or designated cloud storage utility containing all submitted data – NO DVD's or CD'S.

Submittals to Consider

- A spreadsheet which calls out the features and length televised of each line segment/inspection that corresponds to your invoice
- If cleaning was done, a report that breaks down the type of cleaning done, lengths cleaned, and the debris encountered
- A proprietary database as generated by the Contractor's data collection software.
- Free-issue software to view proprietary inspections and training on how to use it
- Pdf inspection reports generated from the Contractor's software

Quality Assurance & Quality Control

- Check make sure all the PACP header information fields, facility id's, media file names, and media formats are correct and have been utilized correctly.
- Make sure that the Contractor has coded things correctly
- Make sure that each inspection is complete
- Make sure that the catalogued defects sync up with the correct position in the video
- Make sure that video quality is satisfactory
- Keep in mind that the contractor is only obligated to meet the requirements of the specifications.

A Real-Life Application for Using Data with GIS for Risk Management

Laurie Perkins, PE
Senior Associate, PACP Trainer

Jeff Normandin, GISP
GIS Manager

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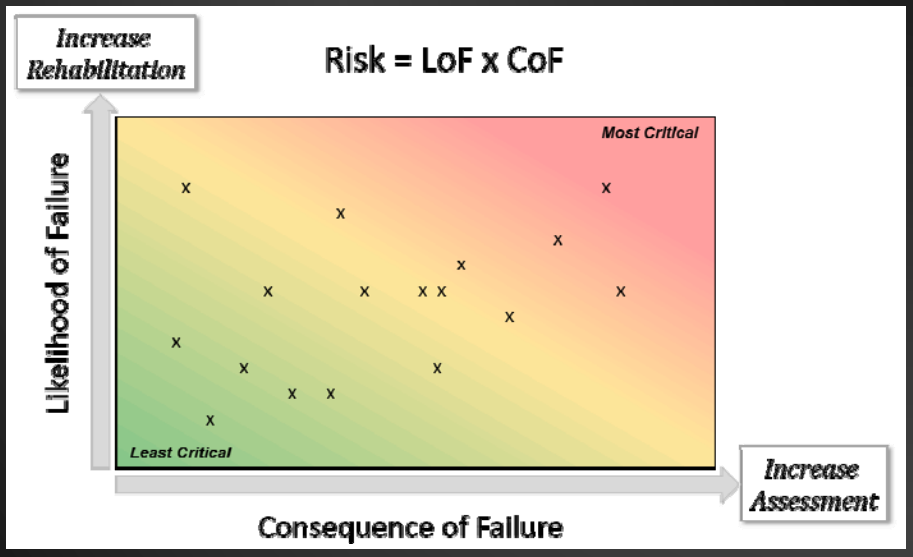
Risk in Asset Management



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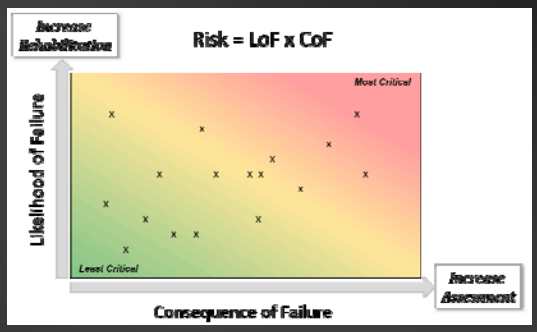
Risk in Asset Management

Likelihood of Failure (LoF)

- Based on Asset's Physical Condition
- Determined through inspections



Consequence of Failure (CoF)

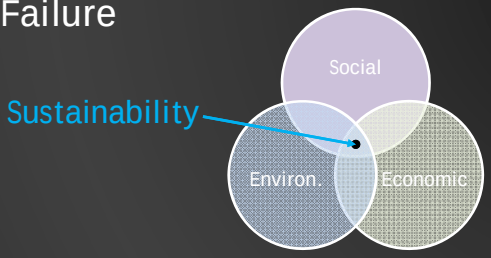
- Based on Direct & Indirect Impacts of a failure

Risk in Asset Management

Why GIS?

- Geographic analysis – Not just assets, What is NEAR your assets
- Better visual understanding
- Iterative Process
- Dynamic Results

Consequence of Failure



Social Costs
- Recreation areas
- Critical customers (hospitals, etc)

Economic Costs
- Pipe diameter
- Pipe depth
- Road classification

Environmental Costs
- Proximity to surface water, wetlands, floodplains
- Known presence of endangered species
- Significant Natural Communities

CoF Factors

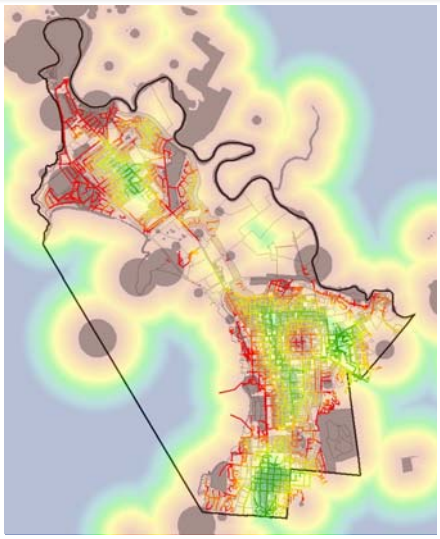
Tabular Classification

Pipe Diameter
- ≤ 6"
- 8"
- 10-12"
- 15-20"
- 21-24" (Round, Oval, and Box)
- 30-108" (Round, Oval, and Box)

CoF Factors

Geographic Calculation

- Endangered Species
- Distance Calculation
- Distances Become a Factor of Pipes



CoF Factors

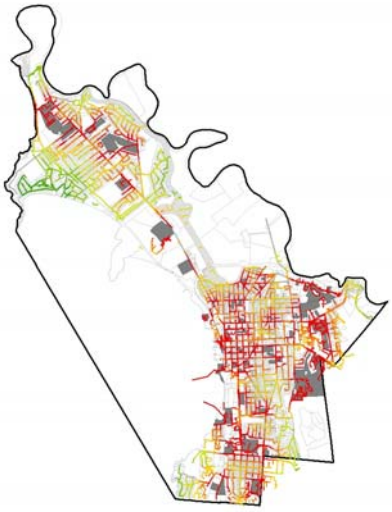
Geographic Calculation

- Water features
- Distances Applied to Pipes

CoF Factors

Geographic Calculation

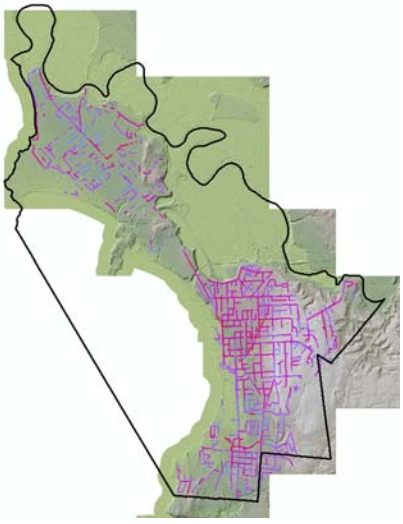
- Critical Customers
- Distances Applied to Pipes



CoF Factors

Geographic & Tabular Calculation

- Pipe Depth
- Manholes with Invert Elevs (M)
- Pipes with Invert Elevs (ft)
- Surface Elevations (LiDAR)

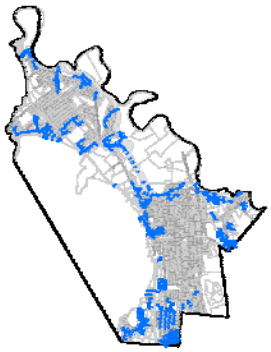


CoF Factors

Additional Consequence of Failure Considerations:

- Bike & Pedestrian Path – Treated as a Major Road

- Storm Drains and Outfalls – Treated as Streams



Weighted Prioritization

Social Costs
- Recreation areas
- Critical customers (hospitals, etc)

Economic Costs
- Pipe diameter
- Pipe depth
- Road classification

Environmental Costs
- Proximity to surface water, wetlands, floodplains
- Known presence of endangered species
- Significant Natural Communities

Overall Weights for Aggregation

Water	*28.00%*	Recreation Areas	*7.50%*
Pipe Diameter	*16.67%*	Critical Customers	*7.50%*
Pipe Depth	*16.67%*	Endangered Species	*3.50%*
Road Class	*16.67%*	Sig. Nat. Coms.	*3.50%*

Combined CoF Score

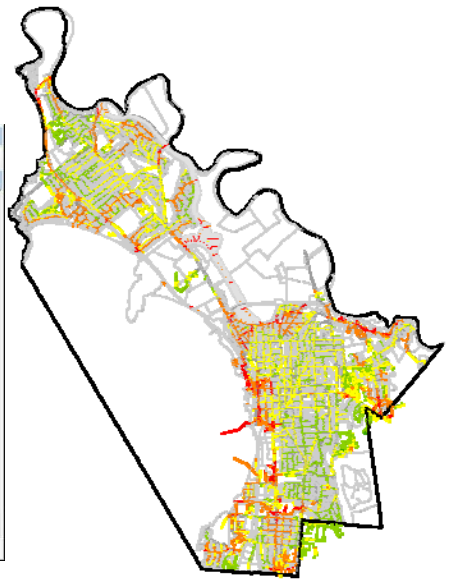
Table

Final Criticality

Score_Social	Score_Economic	Score_Environmental	Criticality
0.579356	0.555556	0.70122	2.874856
0.645428	0.388889	0.68945	2.426905
0.60283	0.555556	0.697275	2.893497
0.590455	0.555556	0.695506	2.881245
0.697369	0.444444	0.610067	2.590308
0.269283	0.888889	0.988634	5.001861
0.265989	0.722222	0.932151	4.218312
0.262962	0.722222	0.808451	3.647657
0.269544	0.555556	0.86672	3.43529
0.343282	0.388889	0.97756	3.561483
0.395649	0.555556	0.97193	4.105067
0.300536	0.388889	0.980908	3.525121
0.445459	0.777778	0.977641	4.82016
0.564182	0.611111	0.97785	4.427142
0.504537	0.611111	0.981737	4.37591
0.395649	0.444444	0.981372	3.777682
0.453617	0.555556	0.693634	2.756911
0.398176	0.555556	0.695264	2.708041
0.299094	0.666667	0.994601	4.365784
0.367569	0.666667	0.995388	4.427906

1 (0 out of 7040 Selected)

Final Criticality



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Likelihood of Failure

Consequence of Failure

Operations and Decision Making

Additional factors for prioritization:

- Break History
- Capital Improvement Projects
- Capacity Issues

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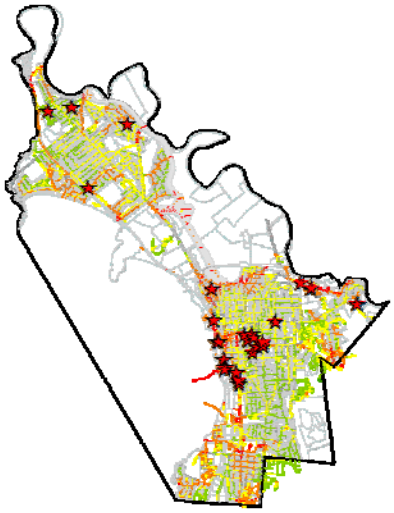
Other Considerations

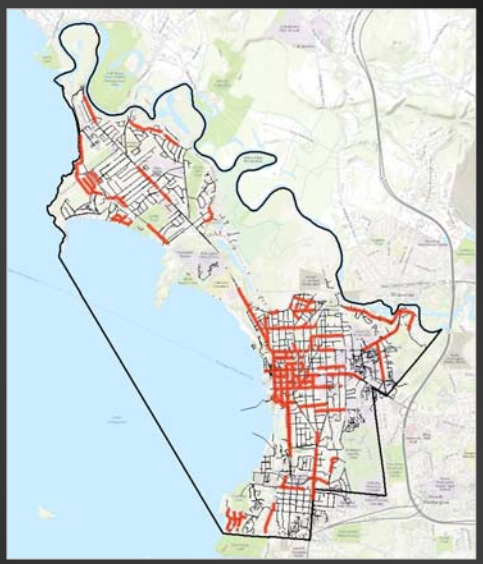
Problem Areas



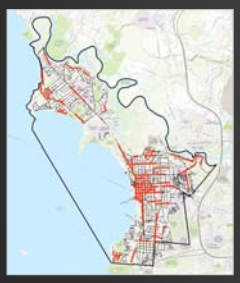
Results

Final Selection:

Pipes To Be Inspected as First Priority



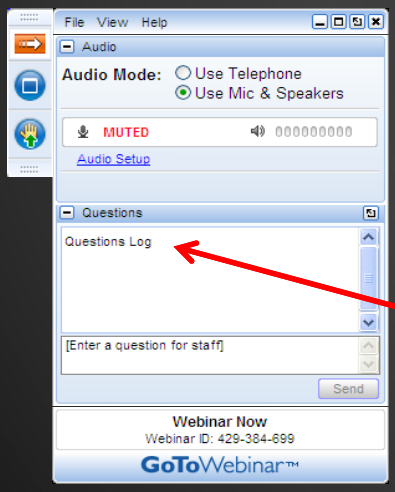
Results



Results of Analysis Guide Inspections

- Prioritization Easily Revised or Updated
- Combine with Results of PACP Inspections (LoF) For total Risk Assessment Score

Questions? How to Participate:



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- **A recording will be available for replay shortly after this webcast.**