

Man, Machine or Both!

Bringing SSES into the GIS Space for More
Efficient Sewer Rehabilitation Design

Alexis Holmdal PE, Matthew Matula PE

NEWEA CSO / WWI Conference

Tools for Change

October 30, 2018

Agenda

1 Background

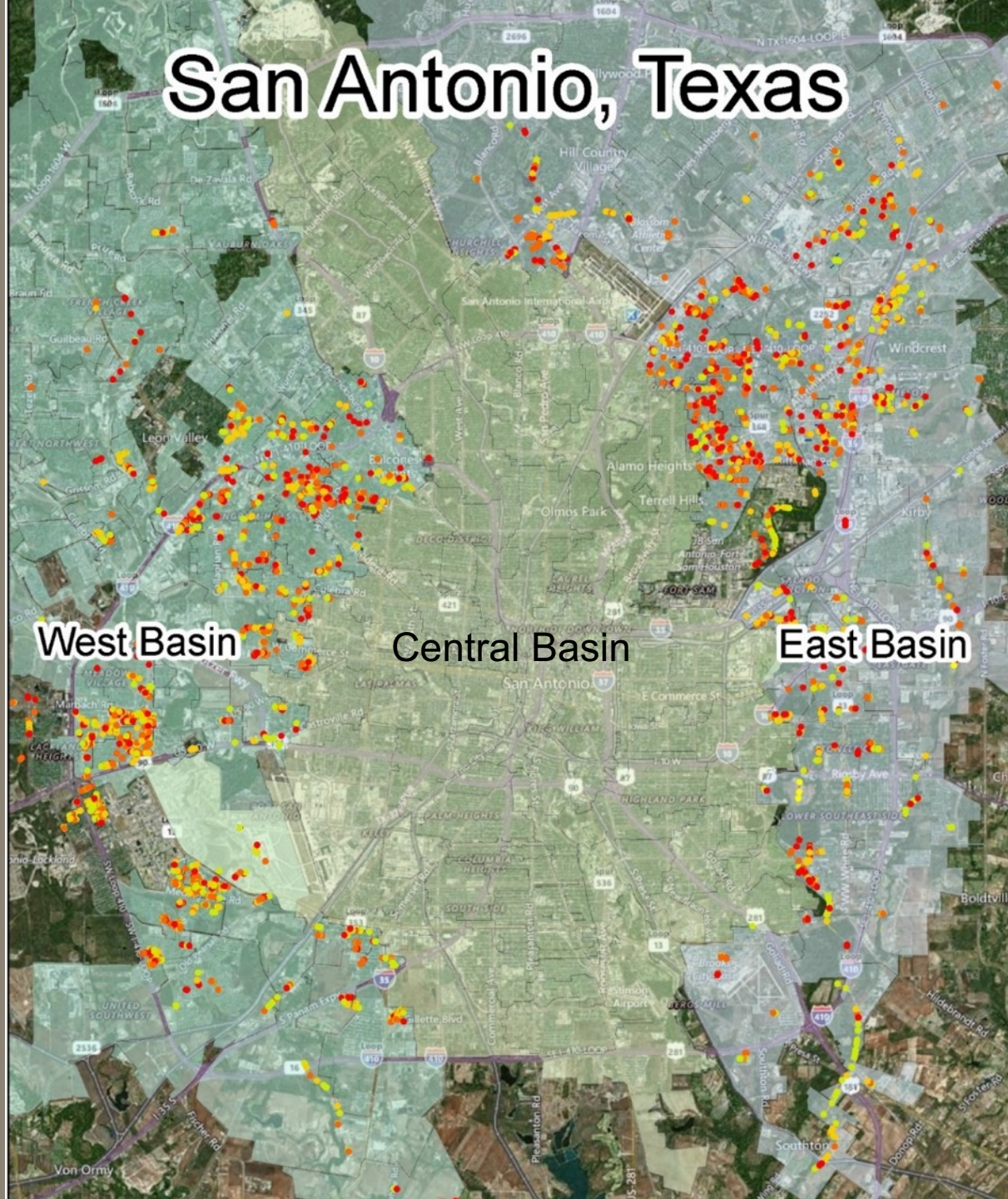
2 Data Management

3 Rehabilitation Design Criteria

4 From Idea to Design

1 Background

San Antonio, Texas



2 Data Management

The issue is rarely collecting the data, but how to manage the magnitude of data.

CCTV

PROS

- View
- View
- View

CONS

- Tedious
- Time Consuming
- Challenge to Manage Data



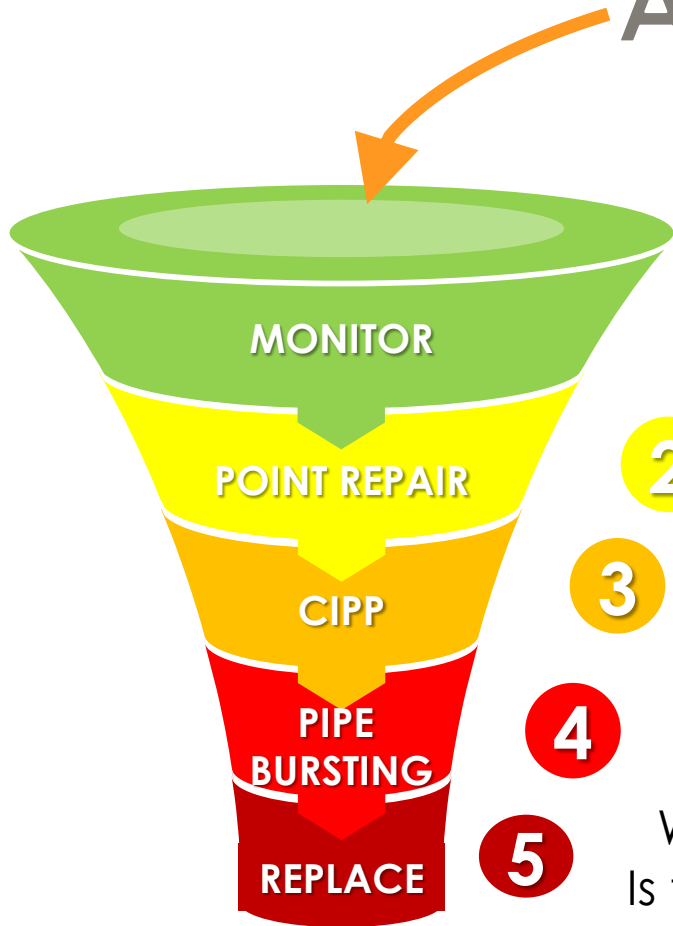


**How do you bring
manual review of assets
into the 21st century?**

3 Rehabilitation Design Criteria

The ability to change criteria in the design process allows owners to define their priorities.

Asset Machine Creation



1 What is the pavement condition?
Is the pipe >6"?

2 What is the depth of the pipe?
Was the pipe at least 75% televised?

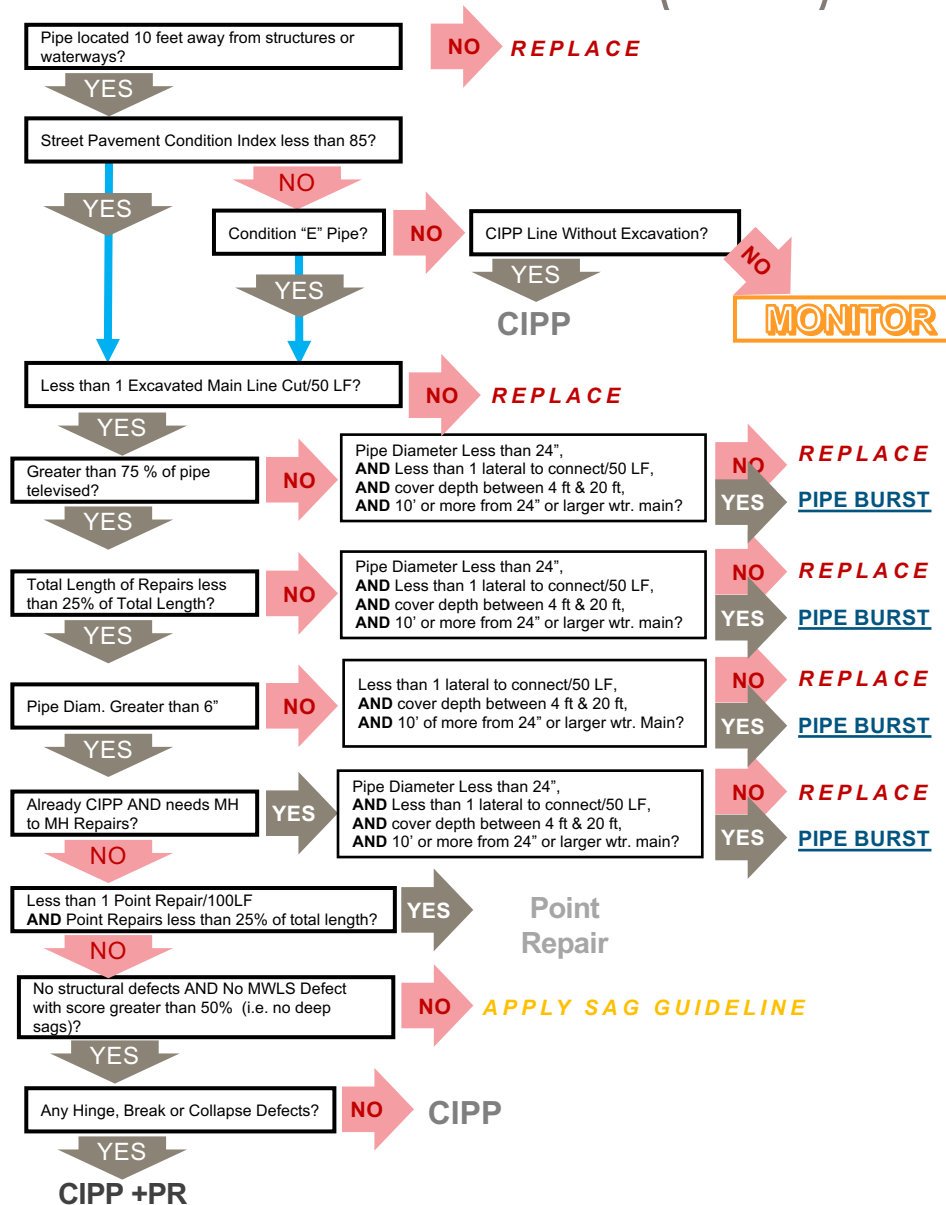
3 How many point repairs will it require to rehab?
Has the pipe already been rehabilitated?

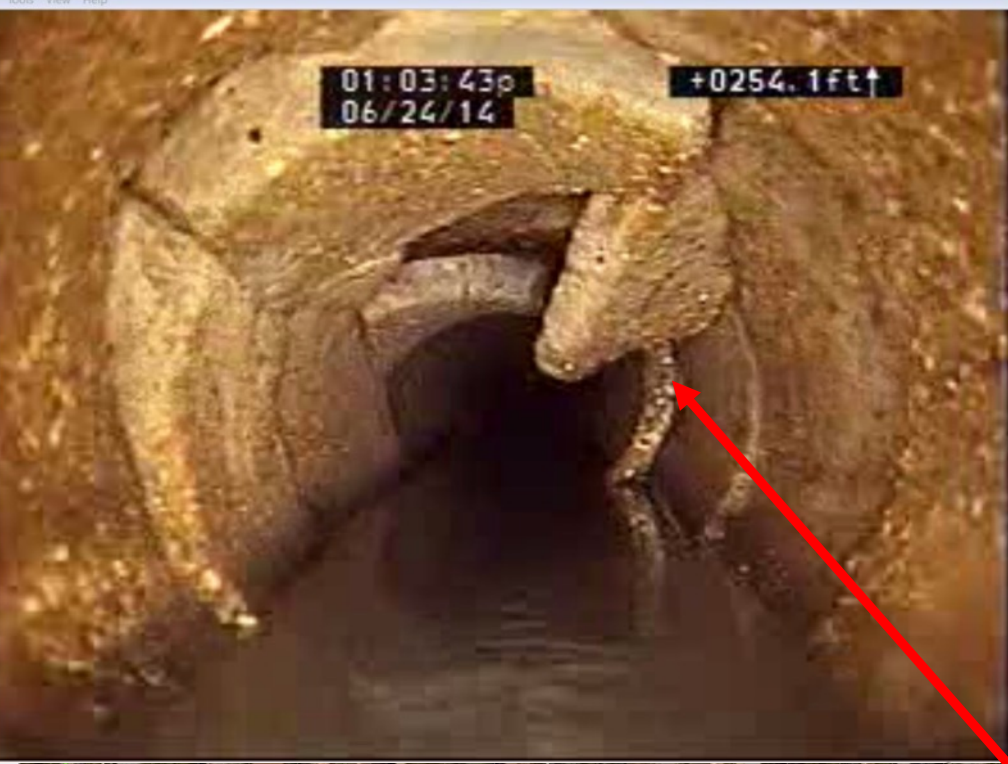
4 Is the total length of repairs > 25% of total length?
Is the pipe greater than 24"?

5 Was the pipe at least 75% televised?
Is the pipe located under any permanent structures?

Condition Remedial Measures Flowchart

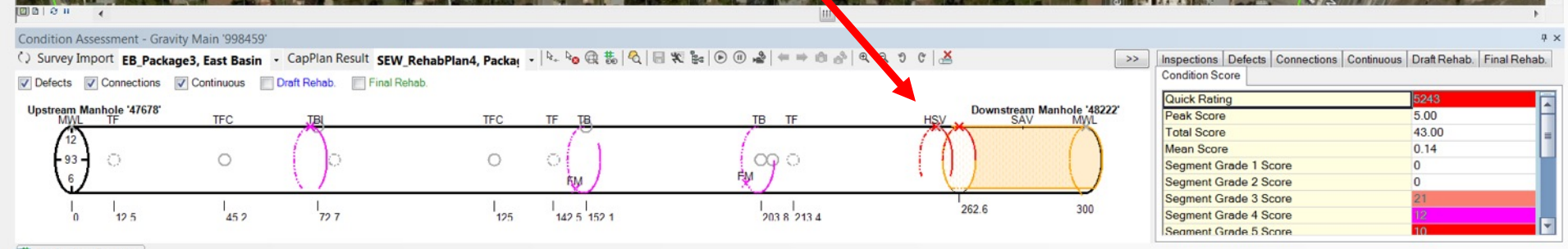
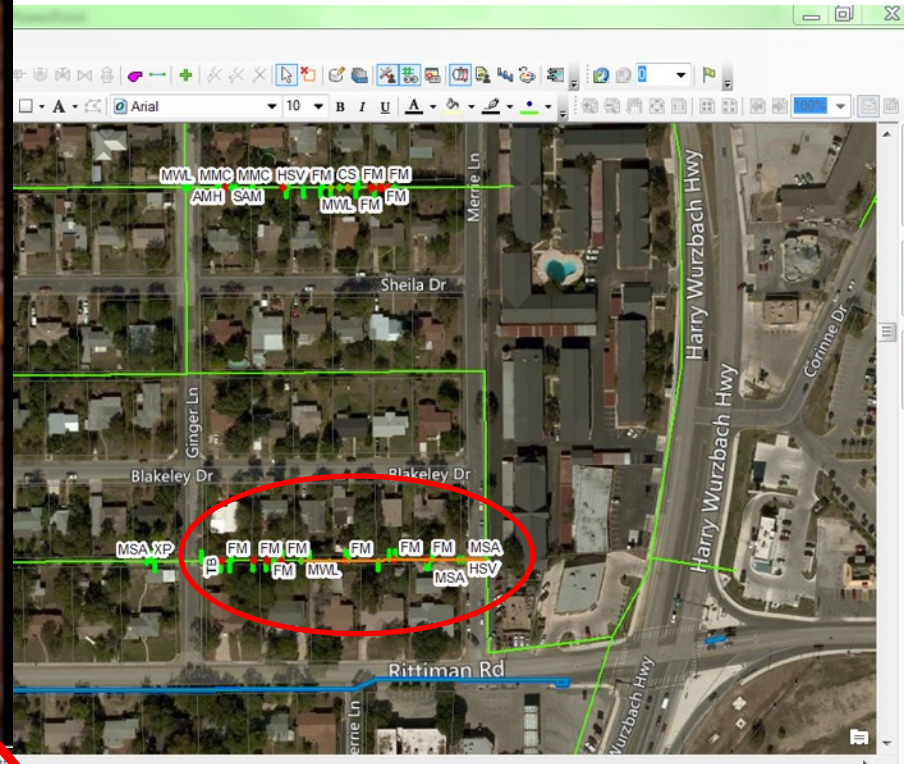
Small Diameter (<24")





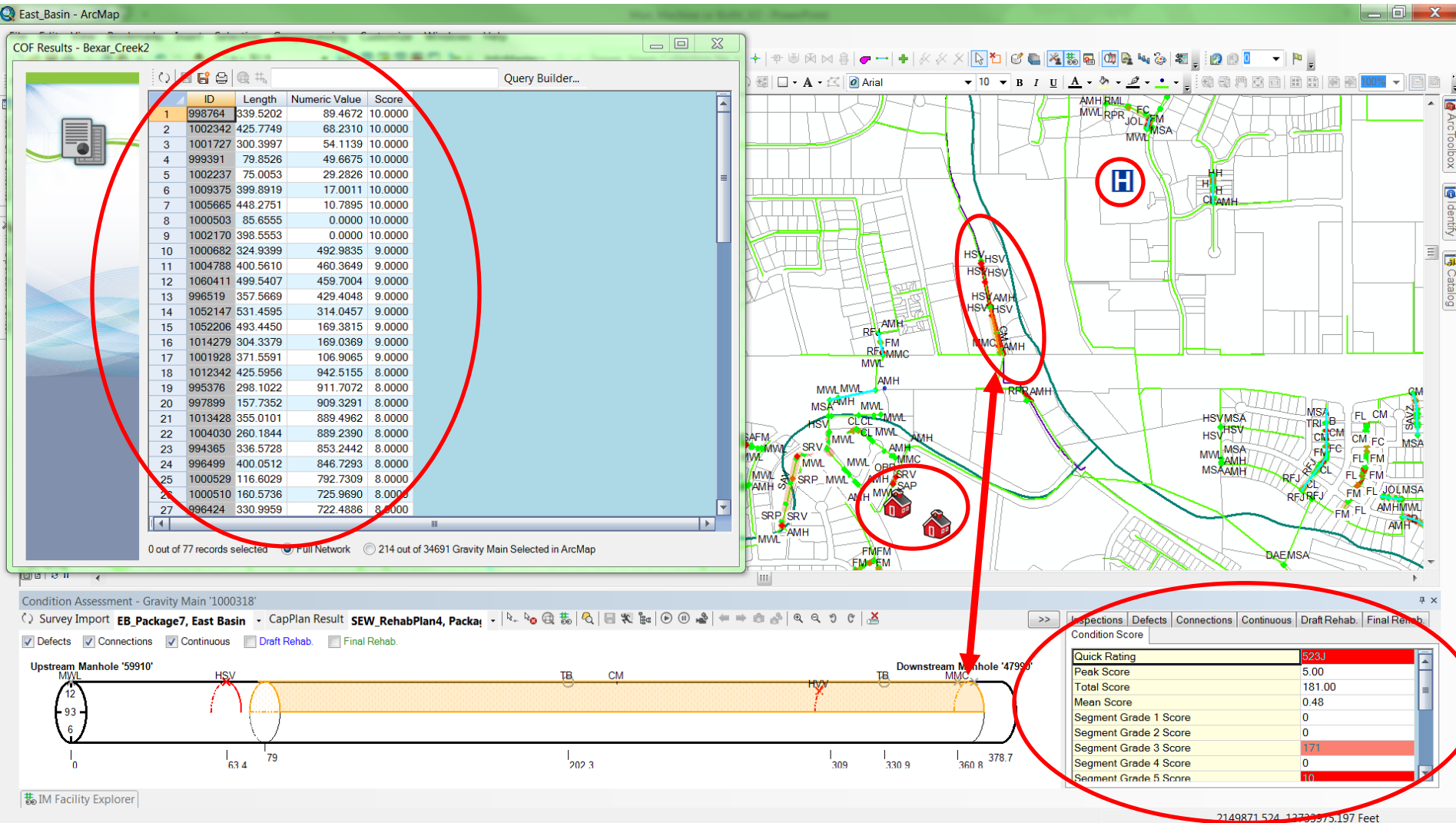
01:03:43p
06/24/14

+0254.1ft↑





The ability to geographically overlay available PACP data allows users to quickly assess system issues.



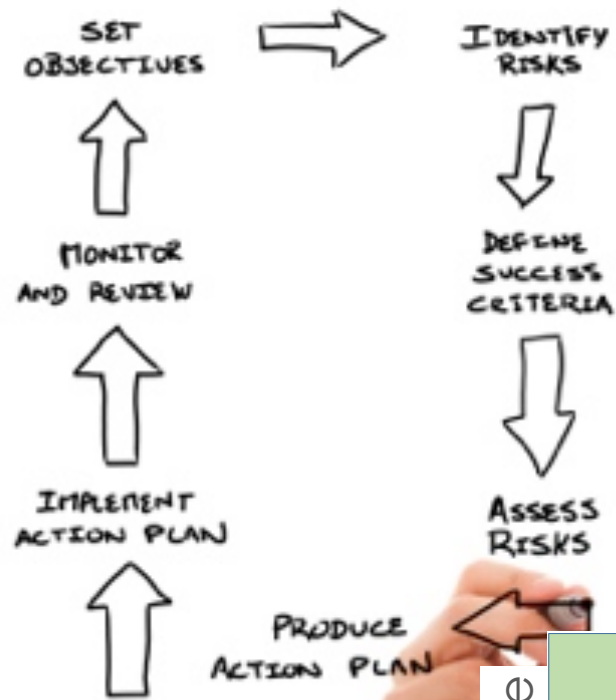
LIKELIHOOD OF FAILURE

- NASSCO Ranking/SPR
- Pipe Material
- Age
- Maintenance History

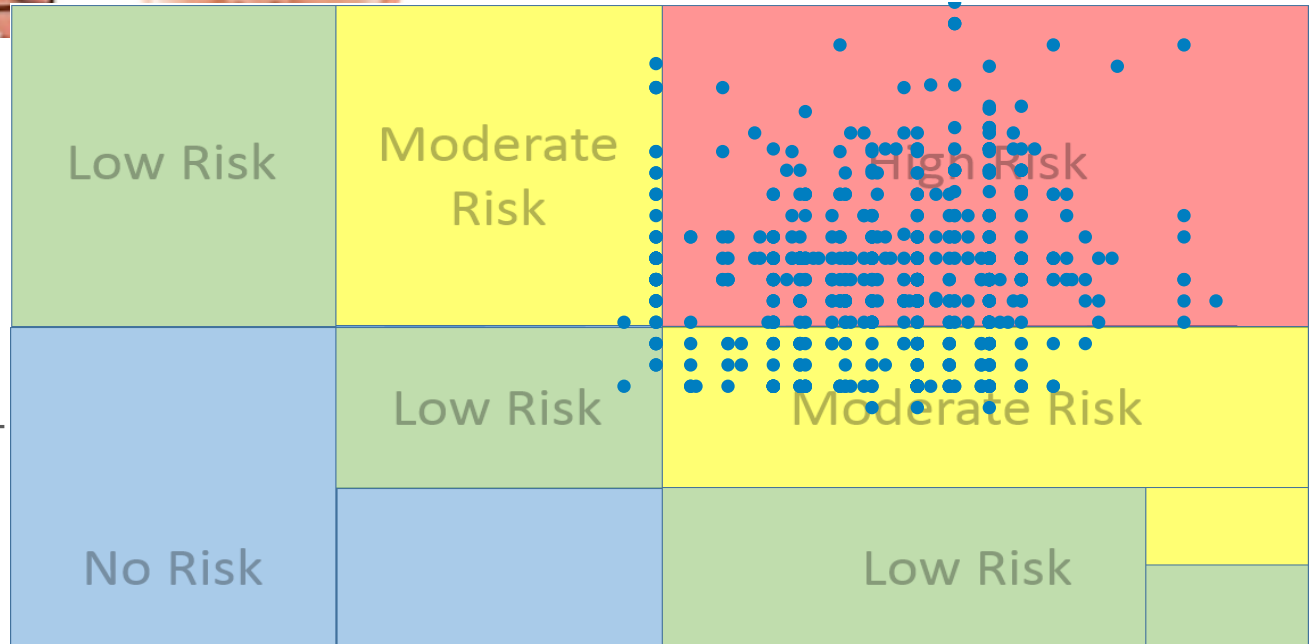
LOF x COF = RISK

CONSEQUENCE OF FAILURE

- Waterways
- Hospitals/Schools
- Sewer Size
- Major Roadways



Consequence of Failure



Likelihood of Failure

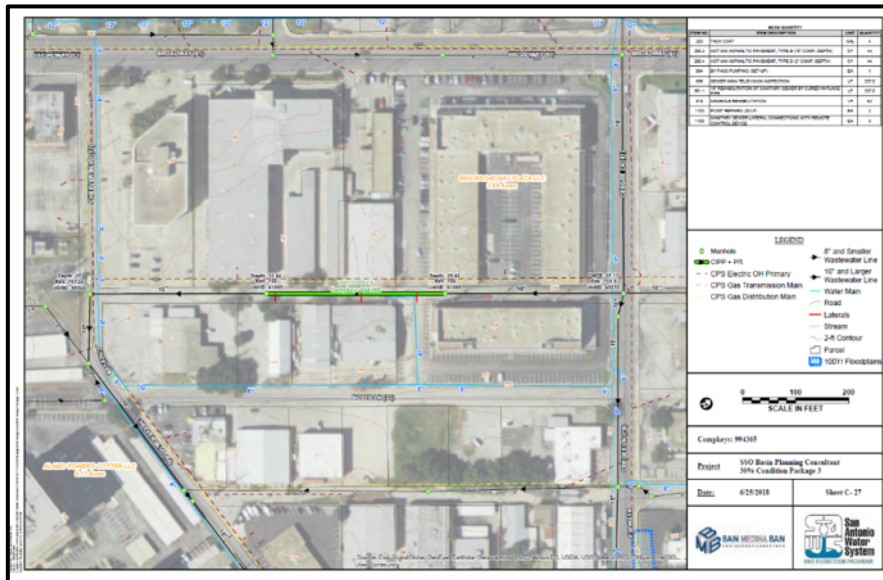
4 From Idea to Design

Developing rehabilitation plans from GIS provides efficiency in production and ease to changes.

From Idea to Design

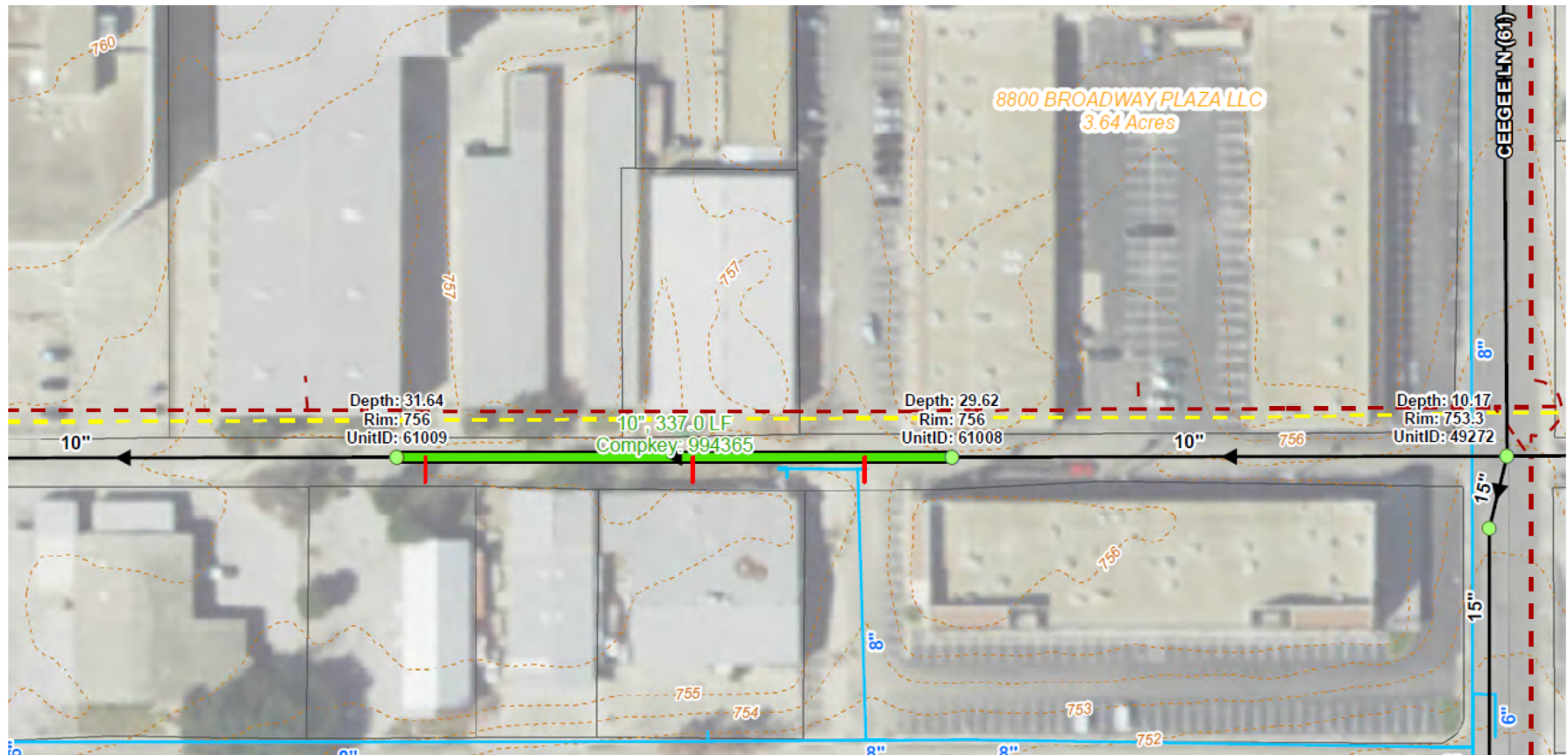
CONSTRUCTION PACKAGES

- Package 1: Pipes Under Major Road
- Package 2: Pipes >36" in Diameter
- Packages 3-6: Pipes Grouped by Location



ASSET INFORMATION	
ComKey	1014845
Final Rehab	Replace
Basin	West
Length (ft)	370
75% TxDOT	<input checked="" type="checkbox"/>
SSO Manhole	<input checked="" type="checkbox"/>
Depth of Cut	6
Boring	1N
Land Use	Single Family, Gulf Coastal, Administrative
Disturbance Manhole	47258
Depth of Cut (ft)	10
Material	SC
Verified Condition	2
No of Lateral	87
No of Point Repairs	0
By-Pass Pumping Info	
By-Pass Info	
Peak Wet Weather (Calculated for Pipes > 12" with Manning's, Assume Full Flow, mgd)	
Peak Wet Weather (from Model for Pipes > 12", mgd)	
Average Dry (from Model for Pipes > 12", mgd)	
60% Section Manhole	
60% Discharge Manhole	
By-Pass Length (ft)	
Street Repair Data	
Street Width (ft)	
Trench Repair	
Quantity of Street Repair (ft)	
Road Type	
30% Package Number	
Reason Selected for 30%	
Base or Additional	
Not Originally Assigned to SR	
Low Income Area	

From Idea to Design



From Idea to Design

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY
203	TACK COAT	GAL	4
205.2	HOT MIX ASPHALTIC PAVEMENT, TYPE B (10" COMP. DEPTH)	SY	44
205.4	HOT MIX ASPHALTIC PAVEMENT, TYPE D (2" COMP. DEPTH)	SY	44
864	BY PASS PUMPING (SET-UP)	EA	1
866	SEWER MAIN TELEVISION INSPECTION	LF	337.0
901.1	10" REHABILITATION OF SANITARY SEWER BY CURED-IN-PLACE PIPE	LF	337.0
910	MANHOLE REHABILITATION	VF	62
1103	POINT REPAIRS (20 LF)	EA	2
1109	SANITARY SEWER LATERAL CONNECTIONS WITH REMOTE CONTROL DEVICE	EA	3

From Idea to Design

CompKey	1052004	Diameter (in)	8	Depth of Cut	4	Rehab		Depth of Cut (ft)		Material	CP
Final Rehab	Replace	Length (ft)	405	Boring		Upstream Manhole	88326		0	Verified Condition	E
Basin	East	75% Televised	<input type="checkbox"/>	Land Use	Single Family, Golf Course, Administrative	Downstream Manhole	88372		0	No of Laterals	12
		SSO Manhole	<input type="checkbox"/>							No of Point Repairs	0

Constructability Information	Yes	Access to this segment is from alley entrance of Kenilworth between Harmon Dr or Chevy Chase Dr	<input type="checkbox"/> Available Grade
Operational Access	Yes	Access to this segment is from alley entrance of Kenilworth between Harmon Dr or Chevy Chase Dr	<input type="checkbox"/> Available Cover
Jurisdictional Water	N	N/A	<input checked="" type="checkbox"/> Large Trees
Endangered Species	N	N/A	<input type="checkbox"/> Site Access by Combo Truck
Karst Zones	Y	3	<input type="checkbox"/> Crosses Creek, TxDOT Rd, or Bridge
Critical Habitat	N	N/A	<input type="checkbox"/> Large WTR Mains
Environmental Factors	N	N/A	<input type="checkbox"/> Within EARZ
Hazardous Sites	N	N/A	Temporary Easement (number of parcels)
Archeological Sites	N	N/A	0
Geomorphology Issues	No	Aerial photo suggests the line is under a concrete channel	* NA (on alley)
Geotechnical Issues	No	Geology: Pecan Gap Chalk. Possible Subsoils: LEAN CLAY (CH), FAT CLAY (CH) with varying amounts of sands and gravels, CLAYEY SAND (SC) and CLAYEY GRAVEL (GC) over MARL and MARLSTONE. Moderate to Highly Expansive. Ground water can be present in perched condition at shallow depths. Due to the presence of Marl/Marlstone and Very Stiff to Hard Clay, Rock excavation equipment may be	Permanent Easement (number of parcels)
Existing Utilities	Yes	There is a 6" CI waterline approximately 11 feet from sewer line. There is a 4" gas line approximately 13 feet from sewer line	0
Permit Conditions	No	None	* NA (on alley)
Team Comments	SS main located in ally, One defect 5 at MH# 88372: HSV@3'-Repair, CM, less than 95% of pipe televised, more than 1 Lat/50LF, XP@6.2'-Repair. Need additional CCTV. Replace in place based on upstream portion of pipe.		

By-Pass Pumping Info

By-Pass Info

* Dead End Line

Peak Wet Weather (Calculated for Pipes < 12" with Mannings, Assume Full Flow, mgd)

0

Peak Wet Weather (from Model for pipes > 12", mgd)

N/A

Average Day (from Model for pipes > 12", mgd)

N/A

US Suction Manhole

*

DS Discharge Manhole

*

By-Pass Length (ft)

*

Street Repair Data

Street Width (LF)

0

Trench Repair

None

Quantity - of Street Repair (LF)

0

PCI

0

Road Type

No Impact

30% Package Number	4
Reason Selected for 30%	Concrete E
Base or Additional	Base
Not Originally Assigned to BP	<input type="checkbox"/>
Low Income Area	<input type="checkbox"/>

From Idea to Design



Questions?