Collections System

Asset Management Project

Who we are:

- Potable water for 62,000 people. 300 Miles of Pipe
- Recycled water across two counties. 60 miles of pipe
- Wastewater collection and treatment for 141,000 people.
- 200 miles Sewer Pipe

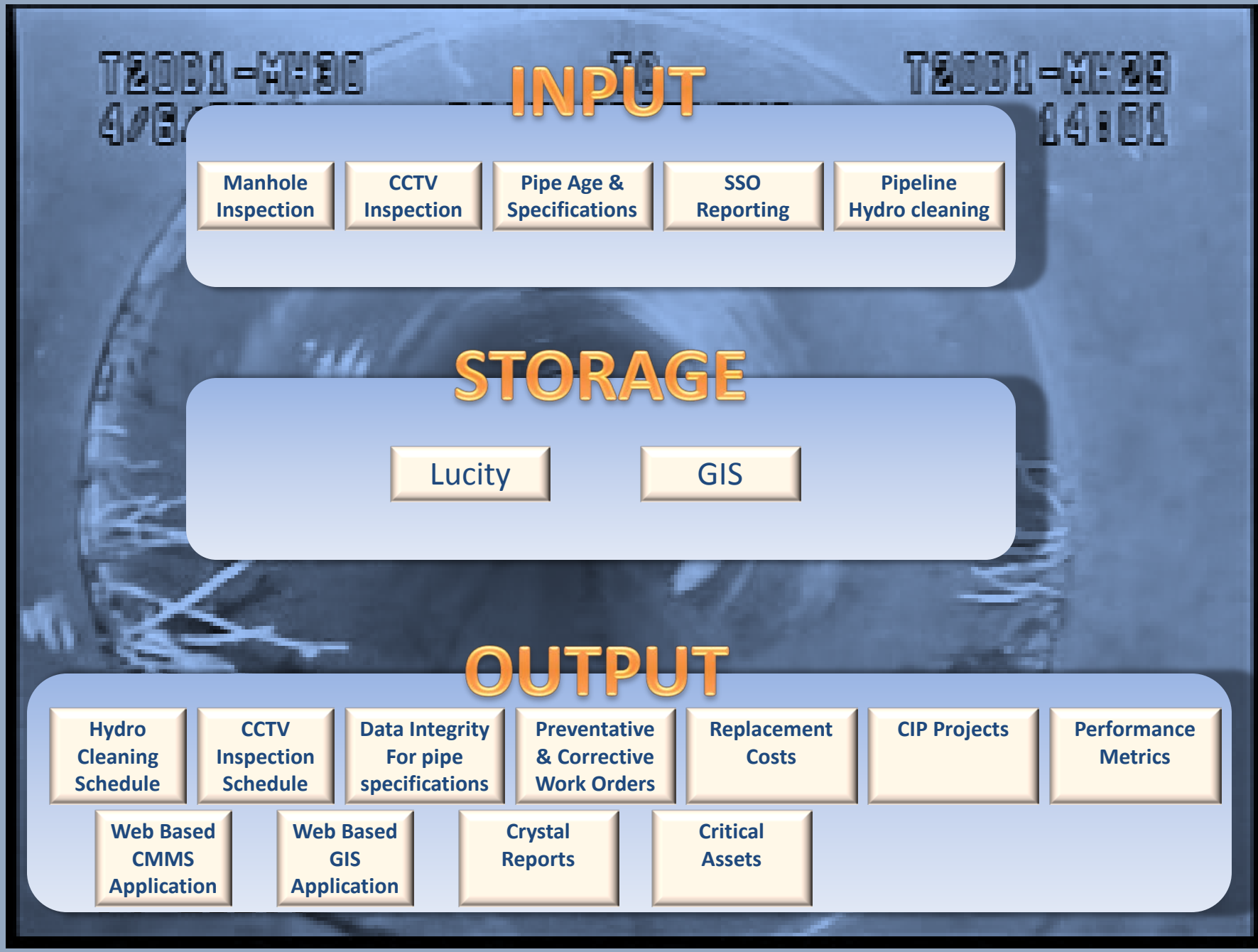
Collections System

Asset Management Project

Goal: Institutionalize

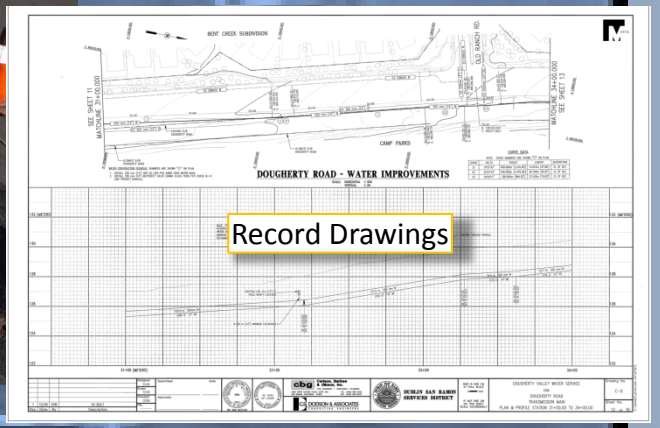
3 Functions

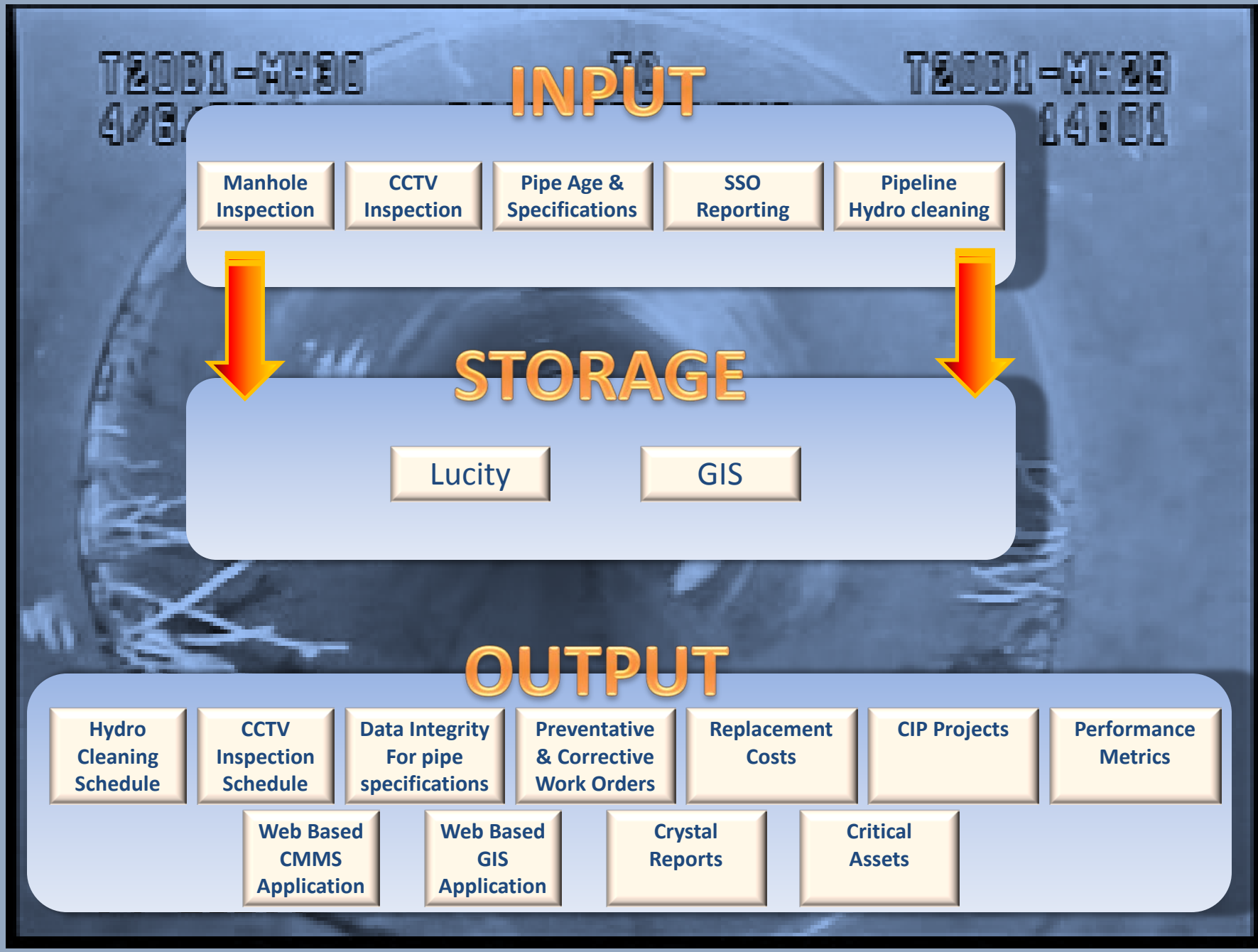
- **Provide Operations with Maintenance Management tools**
- **Provide Finance with Replacement Funding Estimates**
- **Provide Engineering with project identification**


INPUT
Manhole Inspection
CCTV Inspection
Pipe Age & Specifications
SSO Reporting
Pipeline Hydro cleaning
STORAGE
Lucity
GIS
OUTPUT
Hydro Cleaning Schedule
CCTV Inspection Schedule
Data Integrity For pipe specifications
Preventative & Corrective Work Orders
Replacement Costs
CIP Projects
Performance Metrics
Web Based CMMS Application
Web Based GIS Application
Crystal Reports
Critical Assets

INPUT

- Manhole Inspection
- CCTV Inspection
- Pipe Age & Specifications
- SSO Reporting
- Pipeline Hydro cleaning

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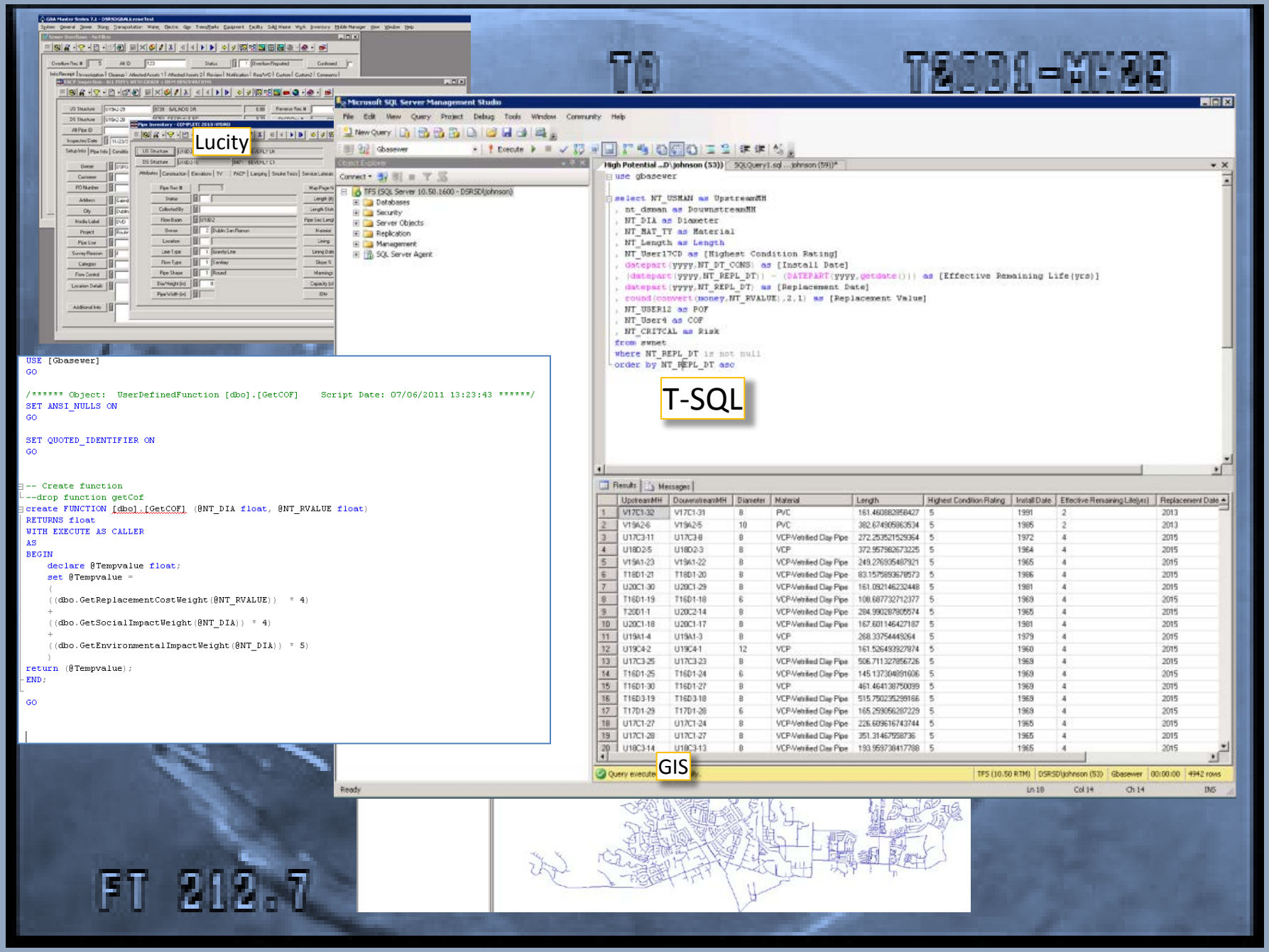
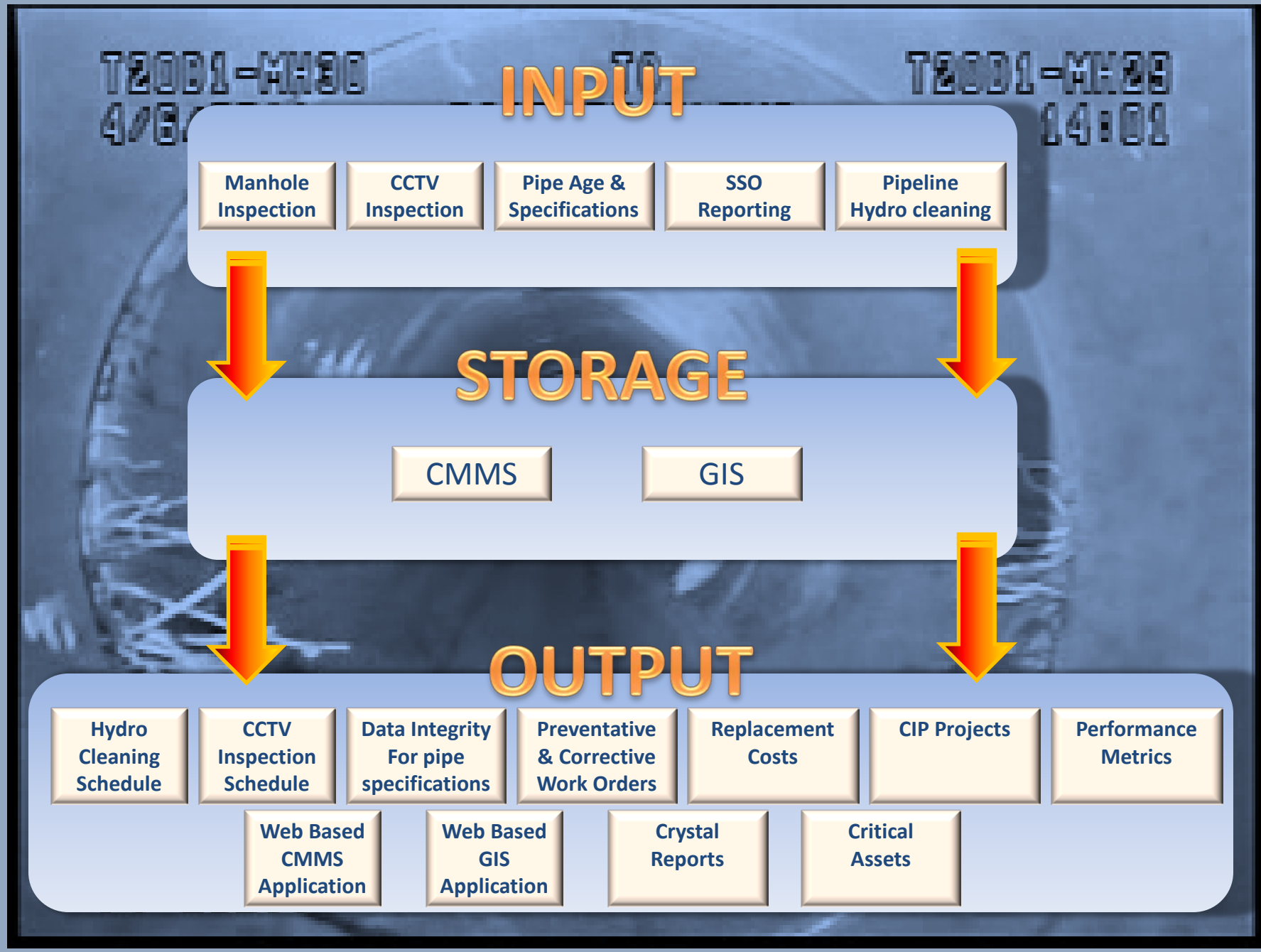



```
USE [Gbasewer]
GO

/****** Object:  UserDefinedFunction [dbo].[GetCOF]    Script Date: 07/06/2011 13:23:43 ******/
SET ANSI_NULLS ON
GO

SET QUOTED_IDENTIFIER ON
GO


-- Create function
--drop function getCof
create FUNCTION [dbo].[GetCOF] (@NT_DIA float, @NT_RVALUE float)
RETURNS float
WITH EXECUTE AS CALLER
AS
BEGIN
    declare @Tempvalue float;
    set @Tempvalue =
    (
    ((dbo.GetReplacementCostWeight(@NT_RVALUE)) * 4)
    +
    ((dbo.GetSocialImpactWeight(@NT_DIA)) * 4)
    +
    ((dbo.GetEnvironmentalImpactWeight(@NT_DIA)) * 5)
    )
return (@Tempvalue);
END;

GO
```

```
use gbasewer

select NT_USMAN as UpstreamMH
, nt_dsman as DownstreamMH
, NT_DIA as Diameter
, NT_MAT_TY as Material
, NT_Length as Length
, NT_User17CD as [Highest Condition Rating]
, datepart(yyyy,NT_DT_CONS) as [Install Date]
, (datepart(yyyy,NT_REPL_DT)) - (DATEPART(yyyy,getdate())) as [Effective Remaining Life(yrs)]
, datepart(yyyy,NT_REPL_DT) as [Replacement Date]
, round(convert(money,NT_RVALUE),2,1) as [Replacement Value]
, NT_USER12 as POF
, NT_User4 as COF
, NT_CRITCAL as Risk
from swnet
where NT_REPL_DT is not null
order by NT_REPL_DT asc
```

	UpstreamMH	DownstreamMH	Diameter	Material	Length	Highest Condition Rating	Install Date	Effective Remaining Life(yrs)	Replacement Date
1	V17C1-32	V17C1-31	8	PVC	161.460882958427	5	1991	2	2013
2	V19A2-6	V19A2-5	10	PVC	382.674905863534	5	1985	2	2013
3	U17C3-11	U17C3-8	8	VCP-Vetrified Clay Pipe	272.253521529364	5	1972	4	2015
4	U18D2-5	U18D2-3	8	VCP	372.957982673225	5	1964	4	2015
5	V19A1-23	V19A1-22	8	VCP-Vetrified Clay Pipe	249.276905487921	5	1965	4	2015
6	T18D1-21	T18D1-20	8	VCP-Vetrified Clay Pipe	83.1575893678573	5	1986	4	2015
7	U20C1-30	U20C1-29	8	VCP-Vetrified Clay Pipe	161.092146232448	5	1981	4	2015
8	T16D1-19	T16D1-18	6	VCP-Vetrified Clay Pipe	108.687732712377	5	1969	4	2015
9	T20D1-1	U20C2-14	8	VCP-Vetrified Clay Pipe	284.990287805574	5	1965	4	2015
10	U20C1-18	U20C1-17	8	VCP-Vetrified Clay Pipe	167.601146427187	5	1981	4	2015
11	U19A1-4	U19A1-3	8	VCP	268.33754449264	5	1979	4	2015
12	U19C4-2	U19C4-1	12	VCP	161.526493927874	5	1960	4	2015
13	U17C3-25	U17C3-23	8	VCP-Vetrified Clay Pipe	506.711327856726	5	1969	4	2015
14	T16D1-25	T16D1-24	6	VCP-Vetrified Clay Pipe	145.137304891696	5	1969	4	2015
15	T16D1-30	T16D1-27	8	VCP	461.464138750099	5	1969	4	2015
16	T16D3-19	T16D3-18	8	VCP-Vetrified Clay Pipe	515.750235299166	5	1969	4	2015
17	T17D1-29	T17D1-28	6	VCP-Vetrified Clay Pipe	165.259056287229	5	1969	4	2015
18	U17C1-27	U17C1-24	8	VCP-Vetrified Clay Pipe	226.609616743744	5	1965	4	2015
19	U17C1-28	U17C1-27	8	VCP-Vetrified Clay Pipe	351.31467558736	5	1965	4	2015
20	U18C3-14	U18C3-13	8	VCP-Vetrified Clay Pipe	193.959738417788	5	1965	4	2015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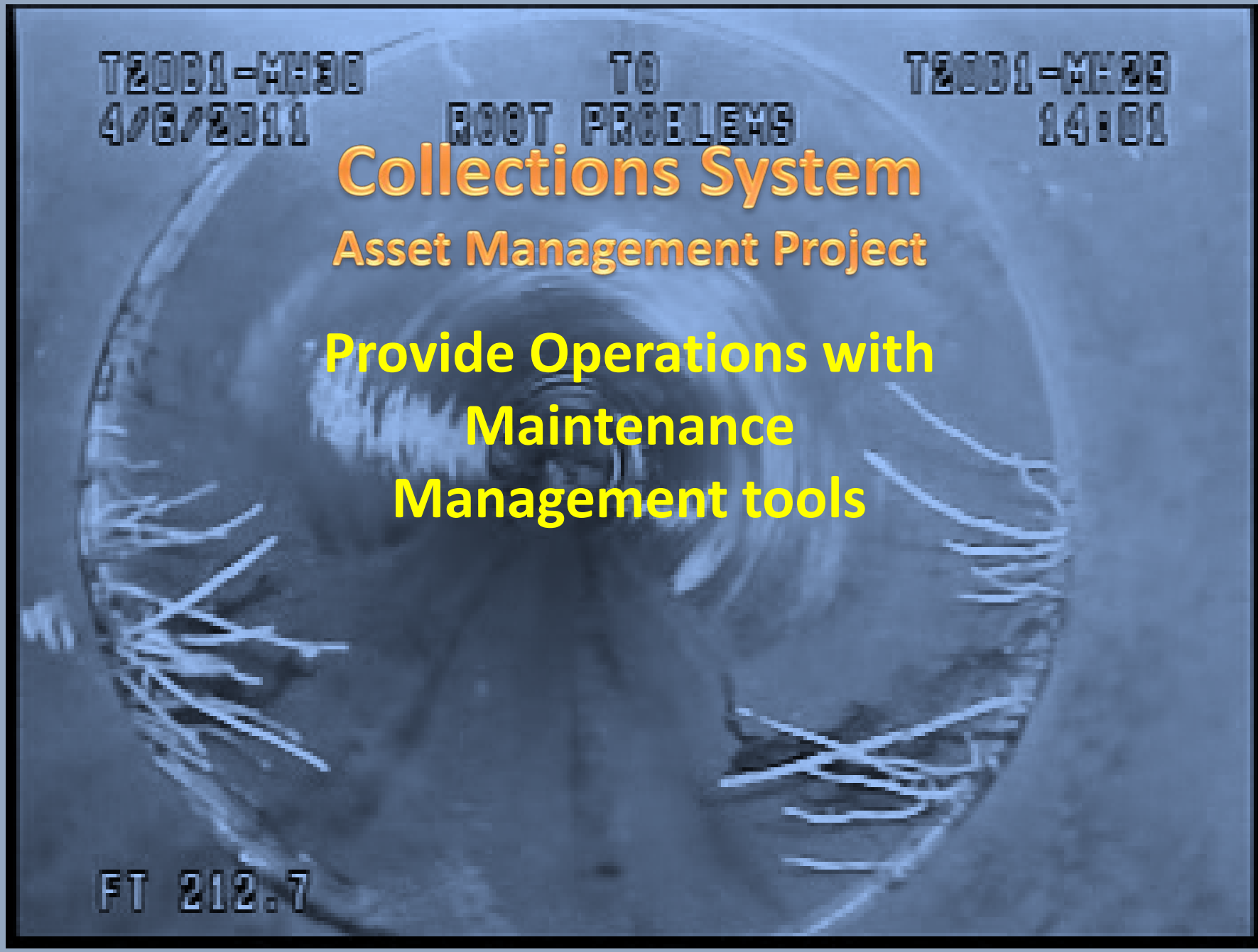
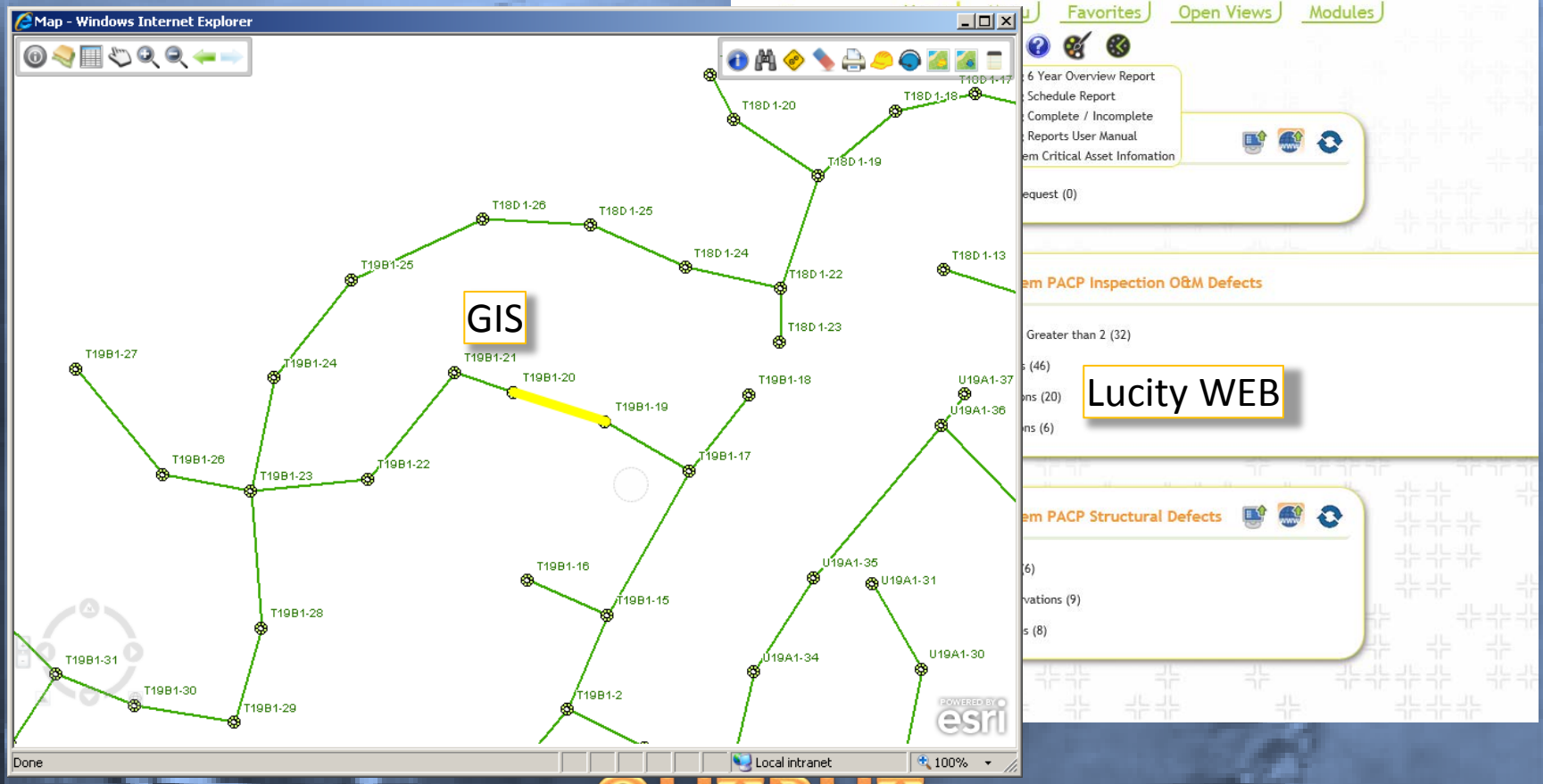


Collections System

Asset Management Project

Provide Operations with Maintenance Management tools



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Year: 2012

7/6/2011 11:08:08AM

Hydro Cleaning Schedule
Dublin San Ramon Services District

Page: 3

Hydro Freq Yrs: 2					**Tot Len:**	**188.12**						
ID:	350	BASIN:T16D3	US:	T16D3-3	DS:	T16D3-2	RISK: 9	DIA:	8	MAT:	VCP-Vetrified Clay Pipe	HYDRO YR: 2012
ID:	344	BASIN:T16D3	US:	T16D3-13	DS:	T16D3-7	RISK: 8	DIA:	8	MAT:	VCP-Vetrified Clay Pipe	HYDRO YR: 2012
ID:	1690	BASIN:T16D3	US:	T16D3-2	DS:	T16D3-1	RISK: 15	DIA:	15	MAT:	VCP-Vetrified Clay Pipe	HYDRO YR: 2012
ID:	1694	BASIN:T16D3	US:	T16D3-15	DS:	T16D3-14	RISK: 8	DIA:	8	MAT:	VCP-Vetrified Clay Pipe	HYDRO YR: 2012
ID:	2927	BASIN:T16D3	US:	T16D4-1	DS:	T16D3-9	RISK: 11	DIA:	10	MAT:	VCP-Vetrified Clay Pipe	HYDRO YR: 2012
Hydro Freq Yrs: 3					**Tot Len:**	**1,174.40**						
Basin: T16D3					**Tot Len:**	**1,878.28**						
ID:	1699	BASIN:T16D4	US:	T16D4-8								HYDRO YR: 2012
ID:	1595	BASIN:T16D4	US:	T16D4-14								HYDRO YR: 2012
Hydro Freq Yrs: 1					**Tot Len:**	**218.53**						
ID:	1701	BASIN:T16D4	US:	T16D4-15	DS:	T16D4-2	RISK: 13	DIA:	8	MAT:	VCP	HYDRO YR: 2012
ID:	1697	BASIN:T16D4	US:	T16D4-2	DS:	T16D4-1	RISK: 13	DIA:	8	MAT:	VCP-Vetrified Clay Pipe	HYDRO YR: 2012
ID:	1698	BASIN:T16D4	US:	T16D4-4	DS:	T16D4-3	RISK: 13	DIA:	8	MAT:	VCP	HYDRO YR: 2012
ID:	590	BASIN:T16D4	US:	T16D4-21	DS:	T16D4-20	RISK: 13	DIA:	8	MAT:	VCP-Vetrified Clay Pipe	HYDRO YR: 2012
Hydro Freq Yrs: 2					**Tot Len:**	**1,327.27**						
ID:	594	BASIN:T16D4	US:	T16D4-3	DS:	T16D4-2	RISK: 10	DIA:	8	MAT:	VCP	HYDRO YR: 2012
ID:	1684	BASIN:T16D4	US:	T16D1-1	DS:	T16D4-23	RISK: 8	DIA:	8	MAT:	VCP	HYDRO YR: 2012
Hydro Freq Yrs: 3					**Tot Len:**	**435.64**						
Basin: T16D4					**Tot Len:**	**1,981.43**						

Hydro Cleaning Schedule

OUTPUT

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- **Critical Assets**

Hydro Cleaning / CCTV Schedule Weighted Factors

CCTV Observations (PACP)
Grease Observations (From hydro-cleaning work)
Risk
Probability of Failure
Overflow Occurrence
Date of Last Cleaning or CCTV
Pipe Age

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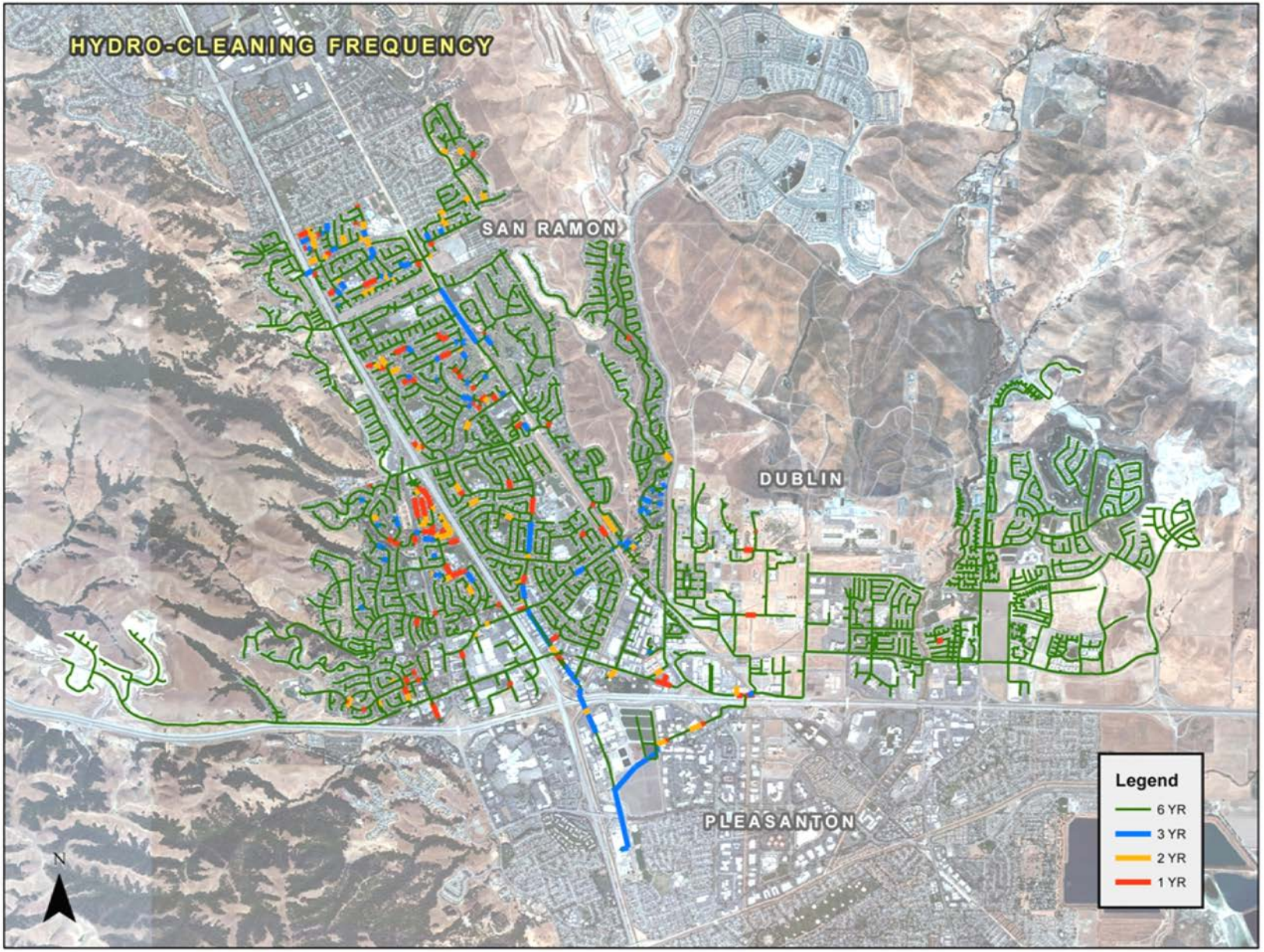
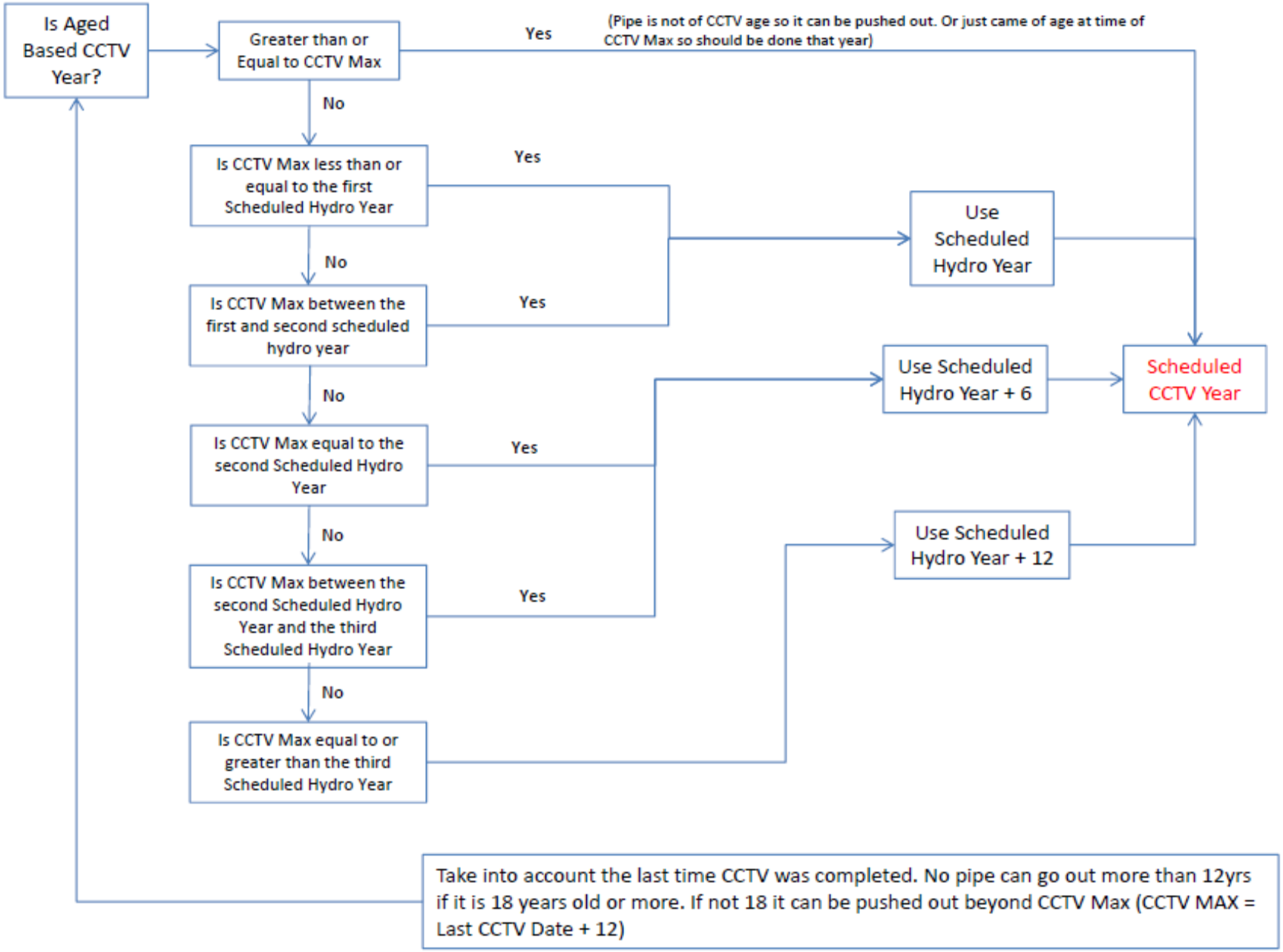
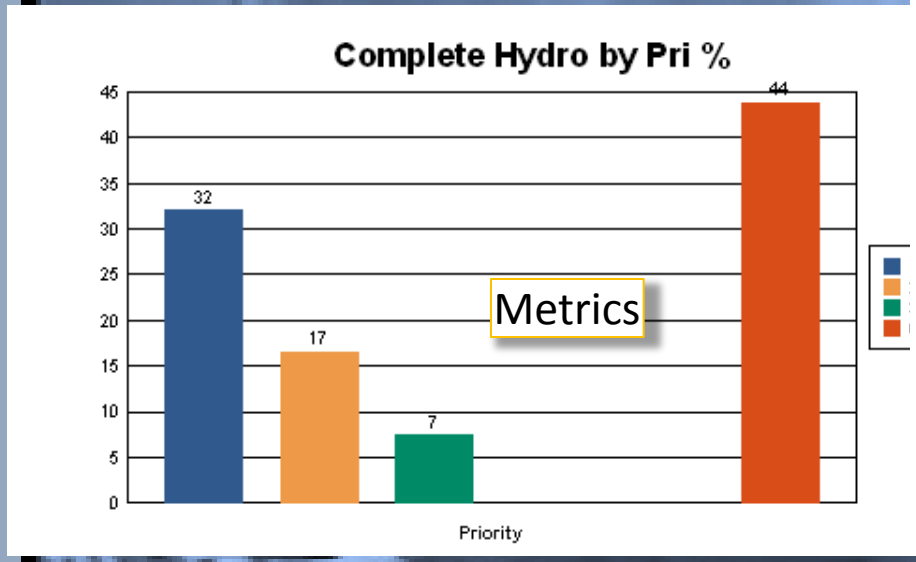

HYDRO-CLEANING FREQUENCY
SAN RAMON
DUBLIN
PLEASANTON
N
Legend
6 YR
3 YR
2 YR
1 YR

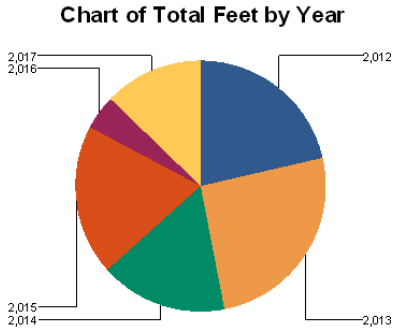

Is Aged Based CCTV Year?
Greater than or Equal to CCTV Max
Yes
(Pipe is not of CCTV age so it can be pushed out. Or just came of age at time of CCTV Max so should be done that year)
No
Is CCTV Max less than or equal to the first Scheduled Hydro Year
Yes
No
Is CCTV Max between the first and second scheduled hydro year
Yes
No
Is CCTV Max equal to the second Scheduled Hydro Year
Yes
No
Is CCTV Max between the second Scheduled Hydro Year and the third Scheduled Hydro Year
Yes
No
Is CCTV Max equal to or greater than the third Scheduled Hydro Year
Use Scheduled Hydro Year
Use Scheduled Hydro Year + 6
Use Scheduled Hydro Year + 12
Scheduled CCTV Year
Take into account the last time CCTV was completed. No pipe can go out more than 12yrs if it is 18 years old or more. If not 18 it can be pushed out beyond CCTV Max (CCTV MAX = Last CCTV Date + 12)

Hydro Cleaning 6 Year Overview
Dublin San Ramon Services District

7/6/2011 10:56:37AM Page: 1

Year Sequence	Calendar Year	Recurring Feet	Budget	Total Feet	% of Total
1	2012	0	274,831	250,321	25%
2	2013	23,739	165,365	298,570	30%
3	2014	23,739	187,313	189,104	19%
4	2015	40,973	28,742	228,286	23%
5	2016	23,739	76,955	52,481	5%
6	2017	67,770		144,725	15%





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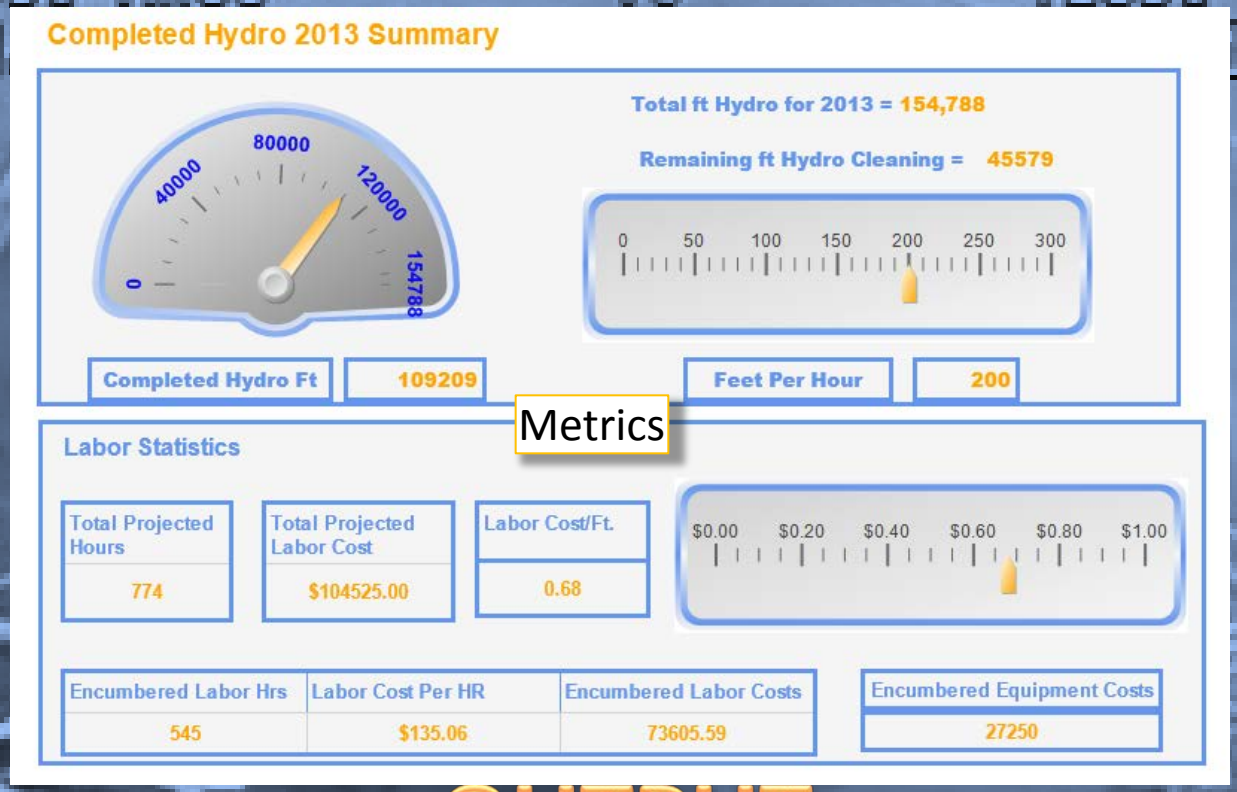

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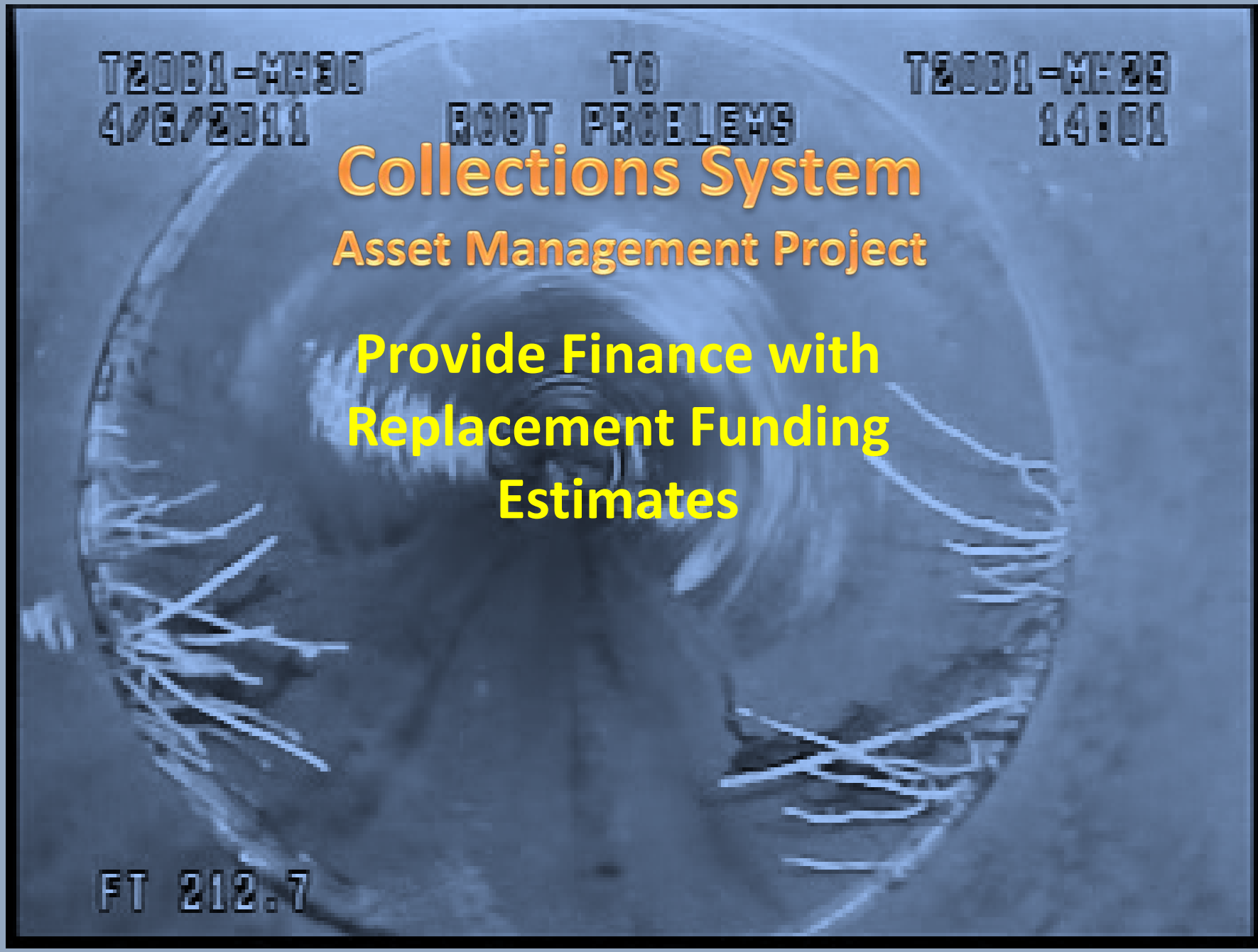
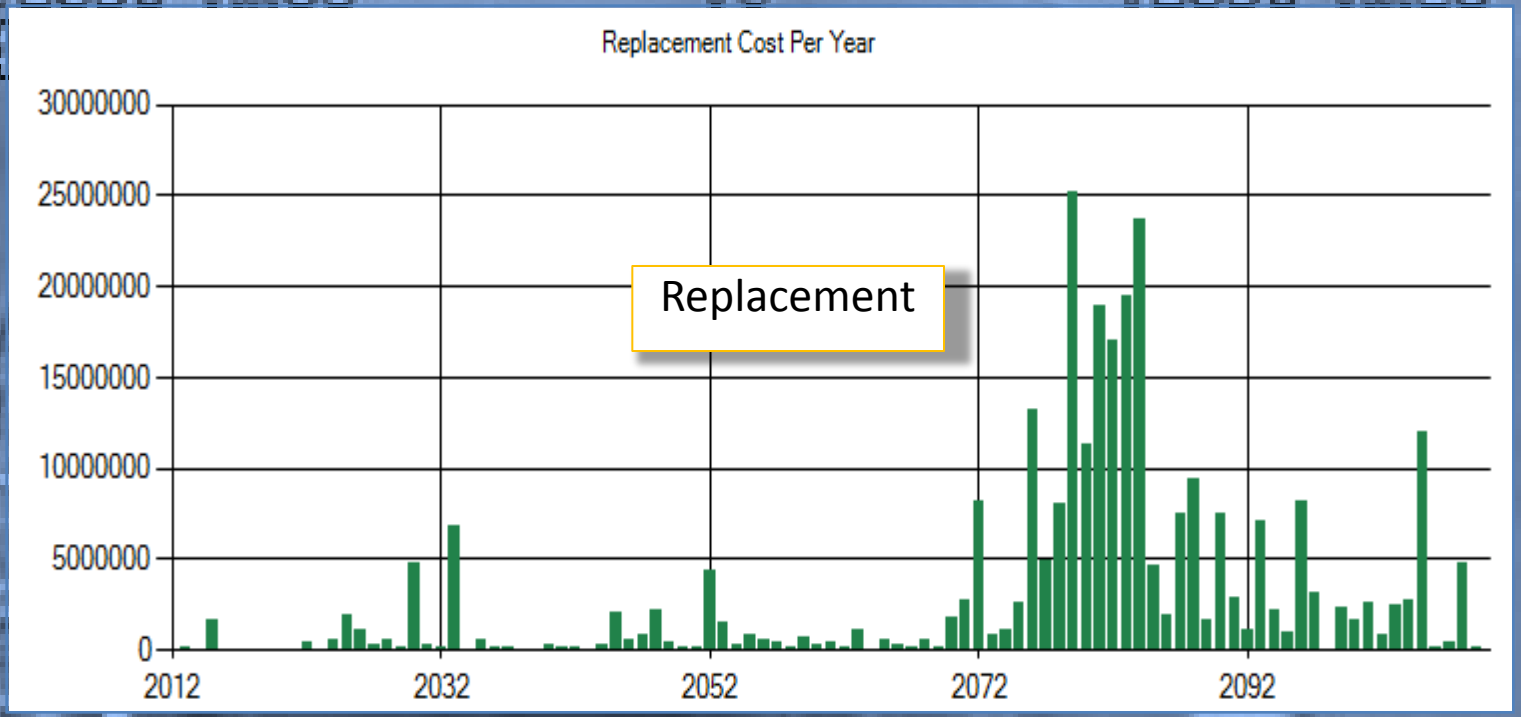
- SQL SERVER Reporting Services



Collections System

Asset Management Project

Provide Finance with Replacement Funding Estimates



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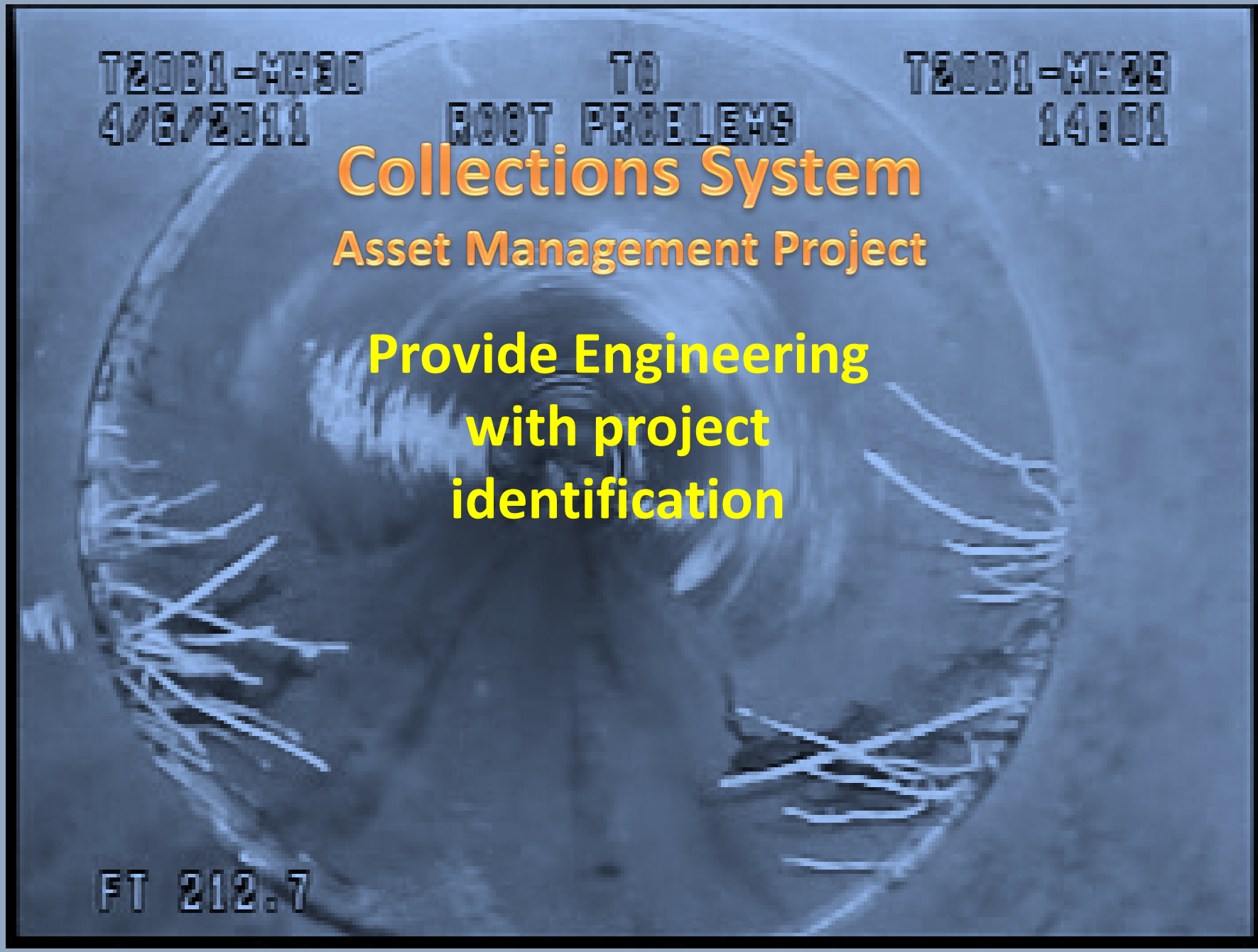
T20B1-MH3E
4/8/2011
TO
ROOT PROBLEMS
T20B1-MH2S
14:01
Collections System
Asset Management Project
Provide Engineering
with project
identification
FT 212.7

UpstreamMH	DownstreamMH	Diameter	Material	Length	Highest Condition Rating	Install Date	
V17C1-32	V17C1-31	8	PVC	161.4	5	1991	2
V19A2-6	V19A2-5	10	PVC	382.6	5	1985	2
U17C3-11	U17C3-8	8	VCP-Vetrified Clay Pipe	272.2	5	1972	4
U18D2-5	U18D2-3	8	VCP	372.9	5	1964	4
V19A1-23	V19A1-22	8	VCP-Vetrified Clay Pipe	249.2	5	1965	4
T18D1-21	T18D1-20	8	VCP-Vetrified Clay Pipe	83.1	5		
U20C1-30	U20C1-29	8	VCP-Vetrified Clay Pipe	161	5	1981	4
T16D1-19	T16D1-18	6	VCP-Vetrified Clay Pipe	108.6	5	1969	4
T20D1-1	U20C2-14	8	VCP-Vetrified Clay Pipe	284.9	5	1965	4
U20C1-18	U20C1-17	8	VCP-Vetrified	167.6	5	1981	4

Critica

Accessibility

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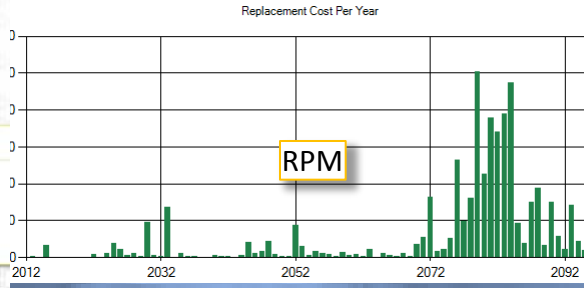

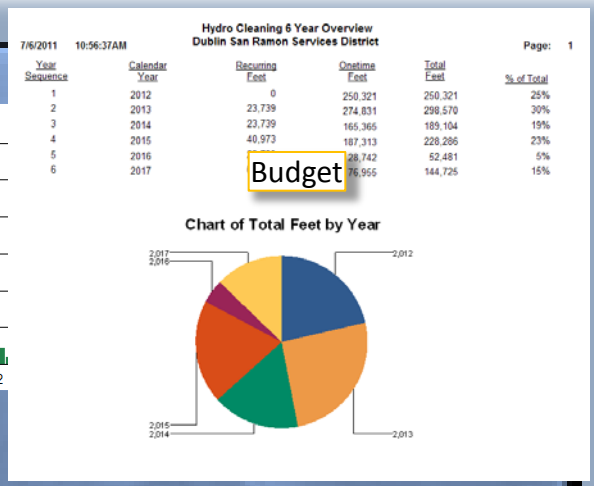

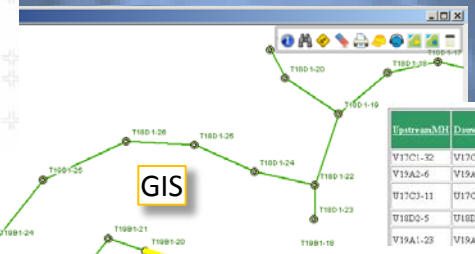

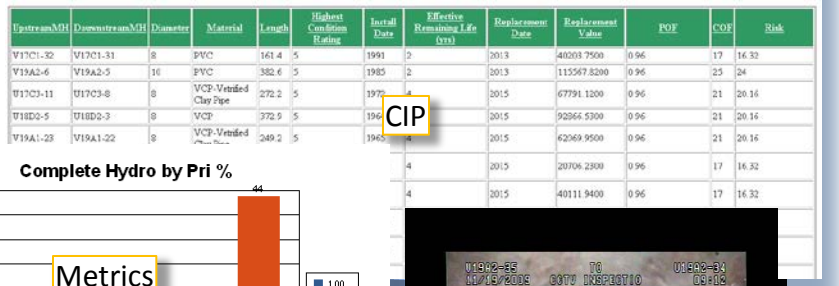

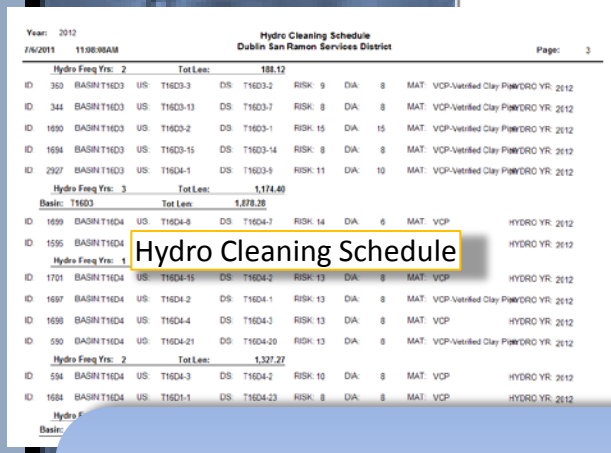

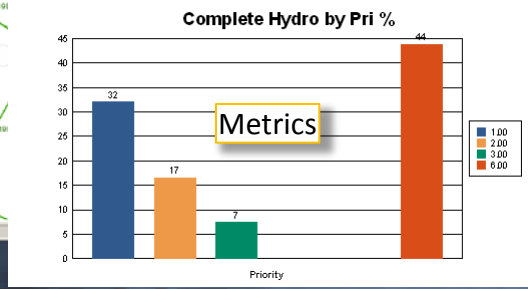

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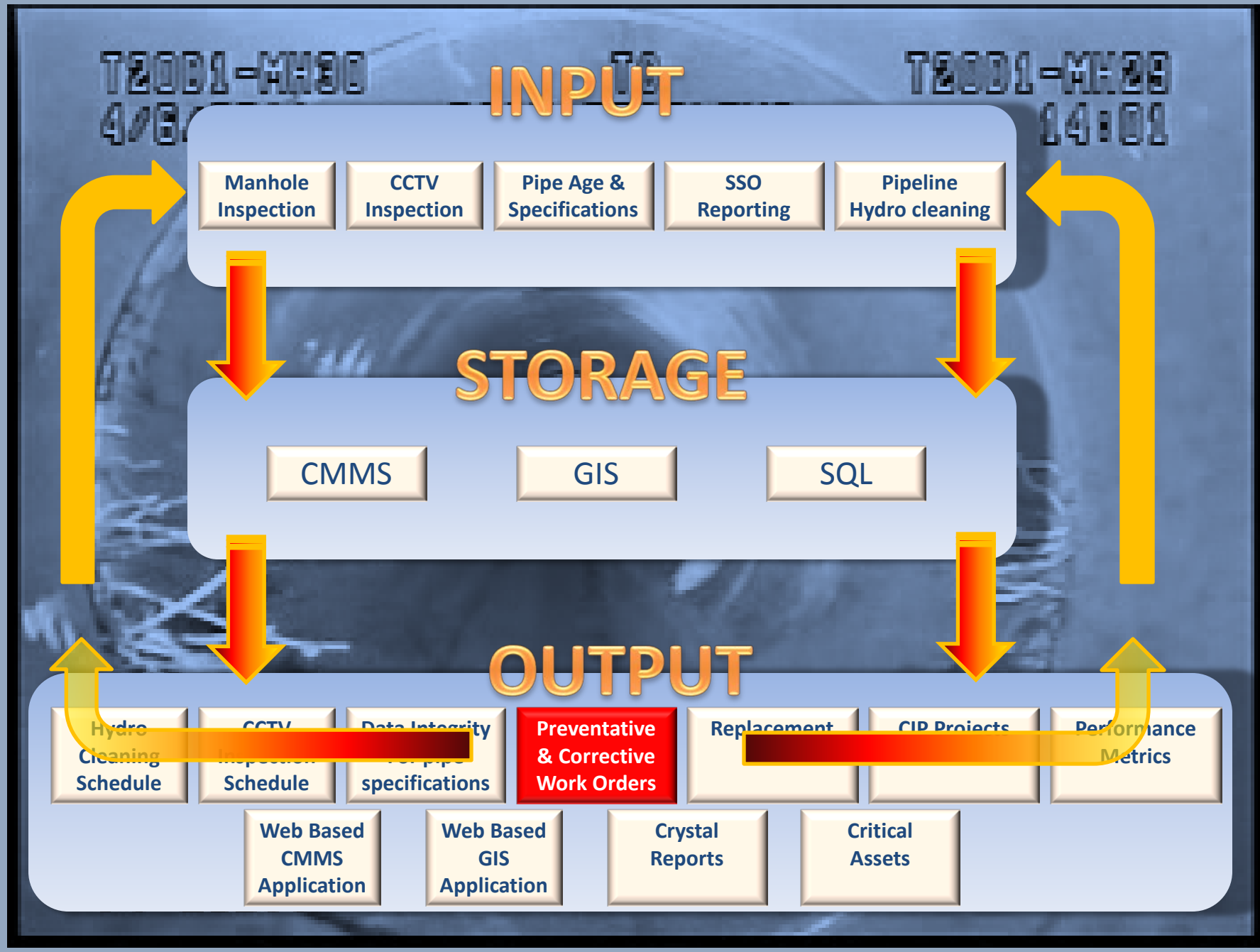
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CMMS
GIS
SQL
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CCTV Inspection Schedule
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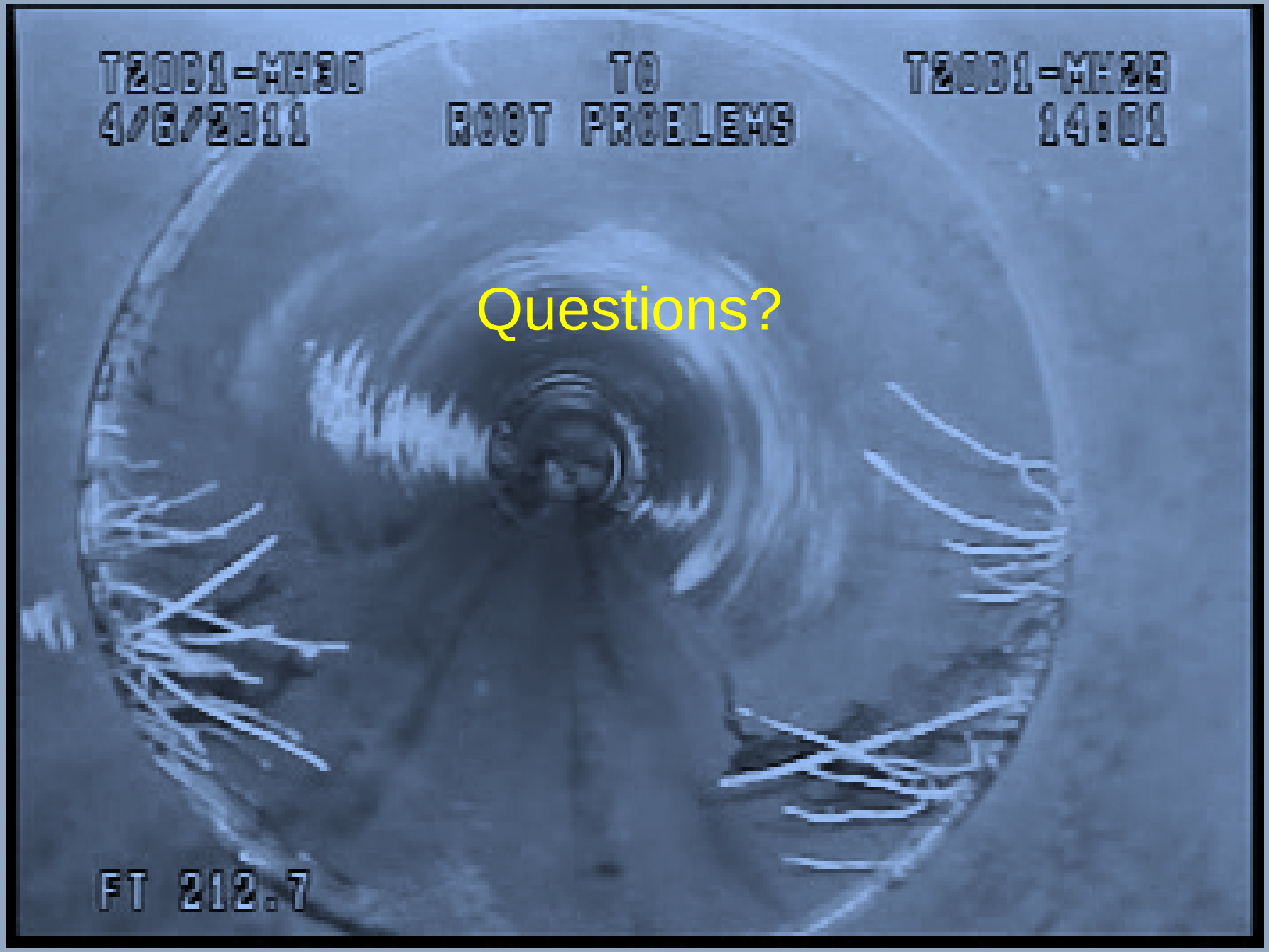
A look back

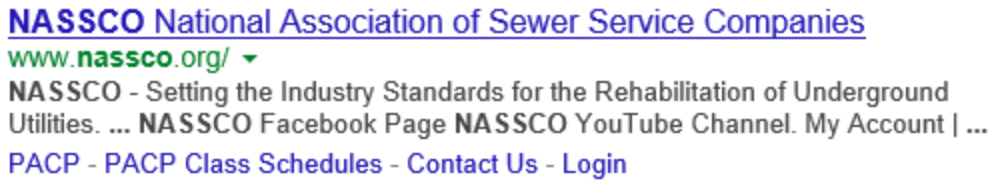
- Prevented SSO on Day Two
- Creating more corrective work orders to remove roots
- Difficult to push hardware out to field crew (Not using Lucity in the field yet)
- Finding and correcting data inaccuracy in both Lucity DB and GIS
- Work order management is critical for success
- Field Ops is generating its own work orders and using the system with little help
- Opened the door to using Lucity for other tasks



Questions?

Quiz Answers

- NASSCO



- PACP

Intro

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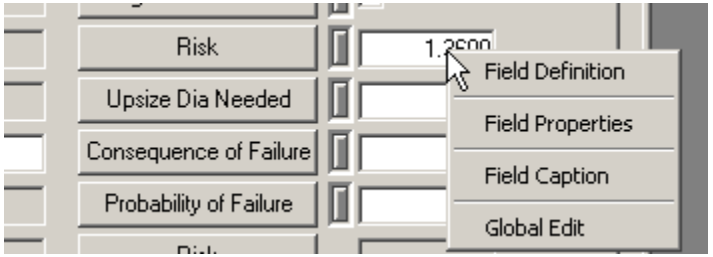
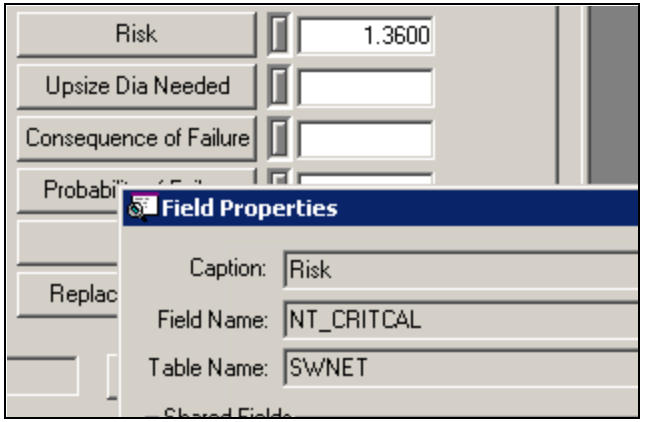
PipeDream Database Secrets

- GBASewer database tables and columns describe collection system



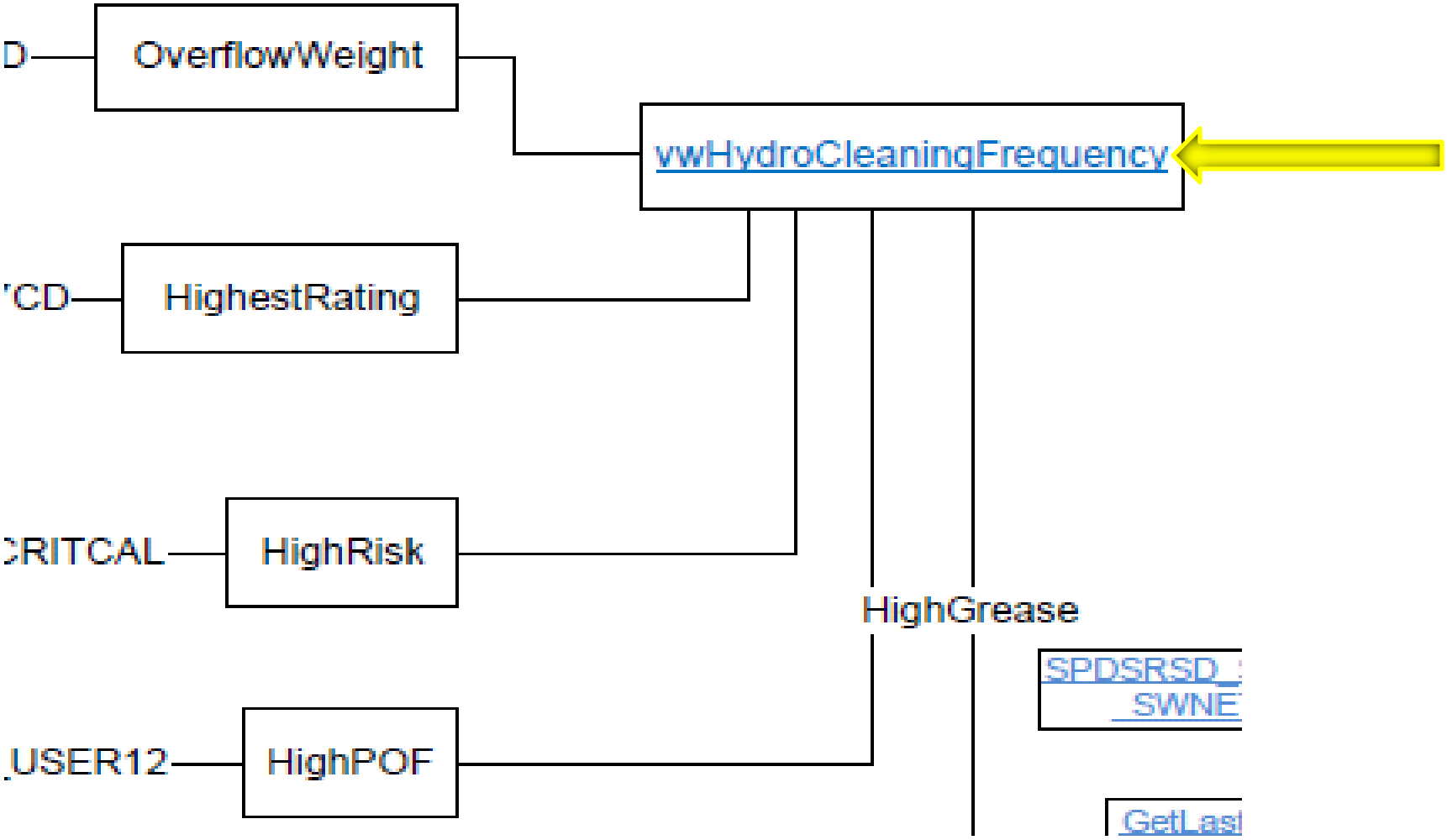


- SQL Agent recalculates all values for each pipe segment each night (5000 segments in 48 sec)

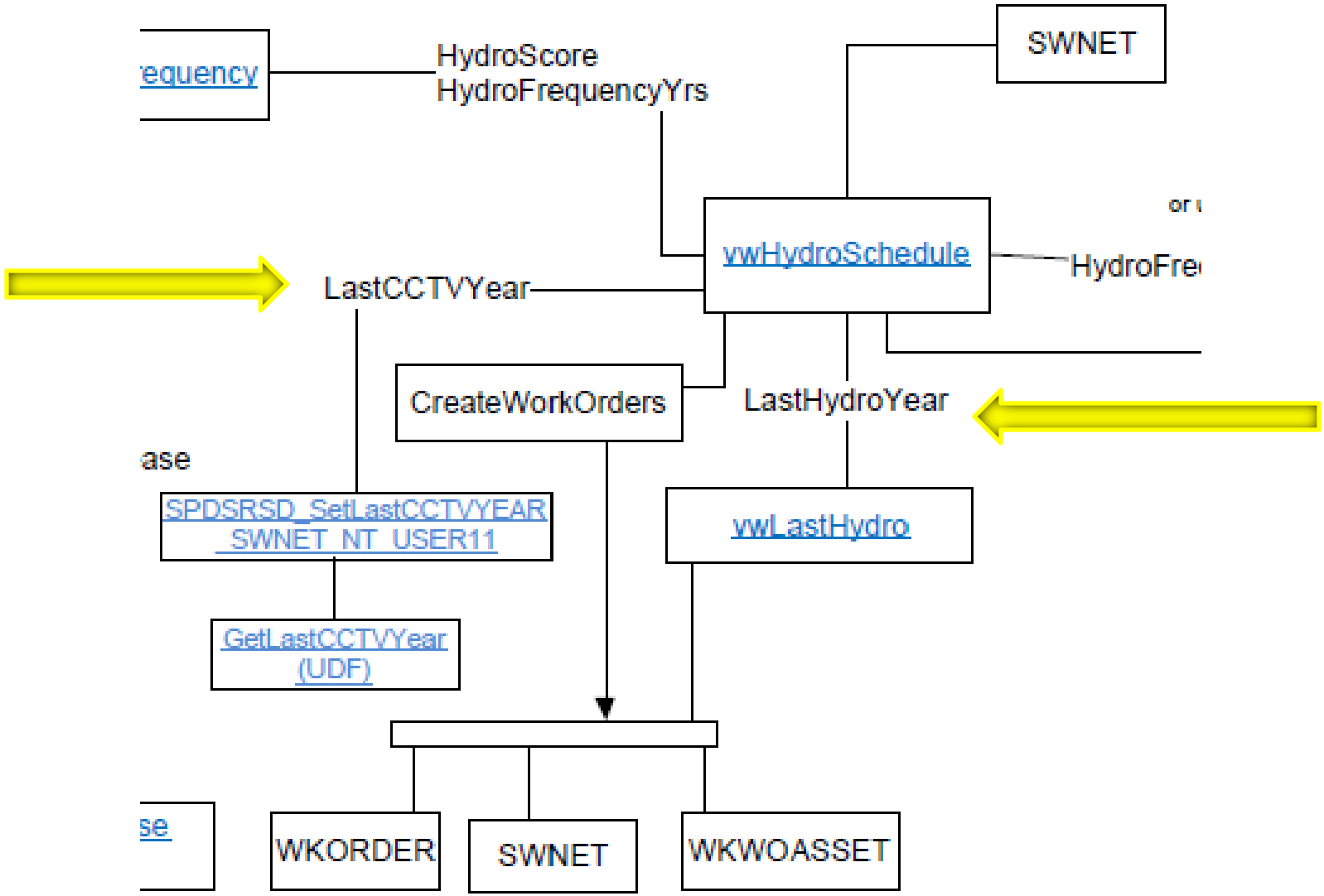
The 3 BIG Questions

- How often should I clean this pipe segment?
- When was this segment last cleaned?
- When is the next time that this pipe segment should be cleaned?

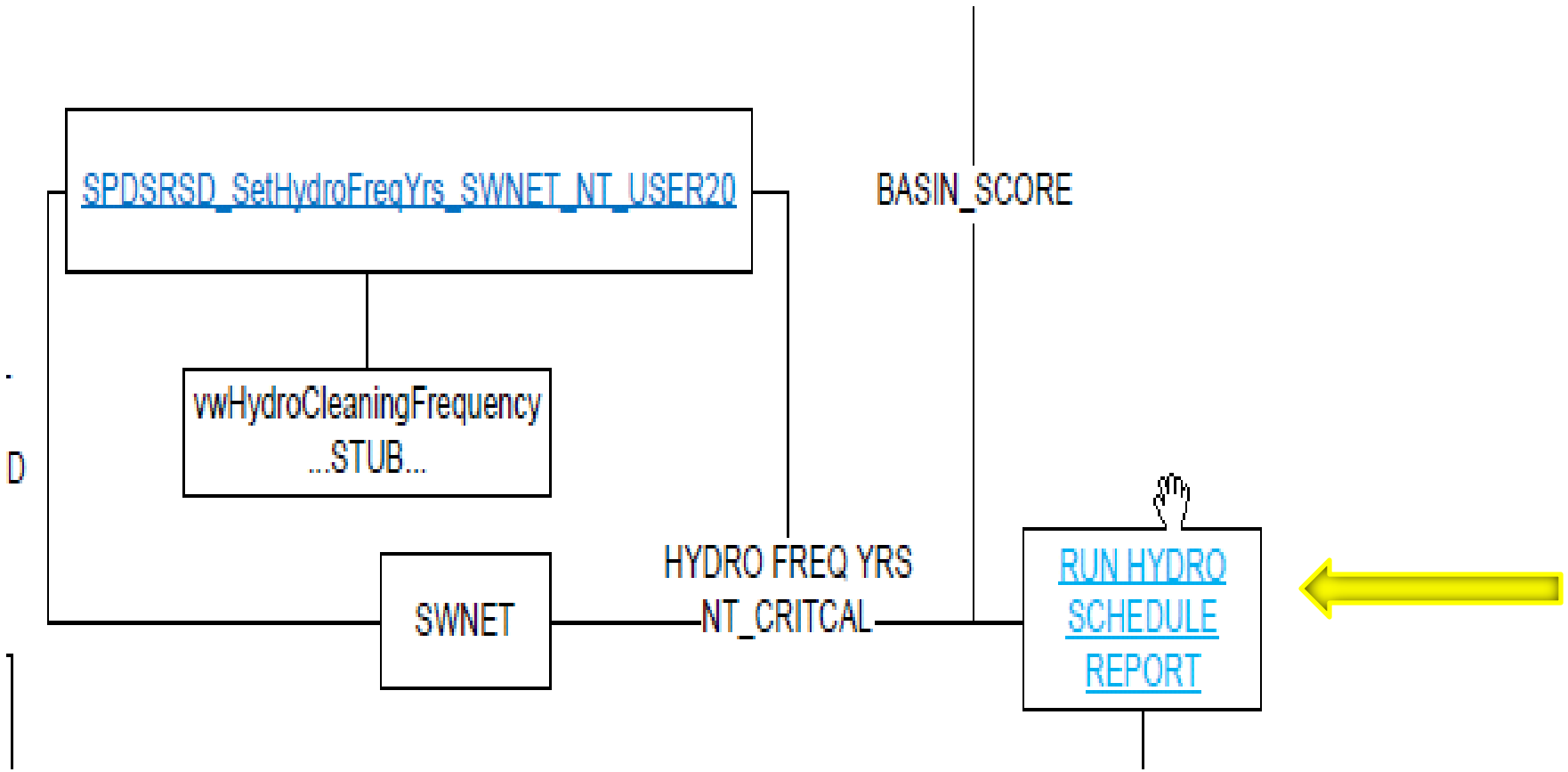
How often should I clean segment?



When was segment last touched?

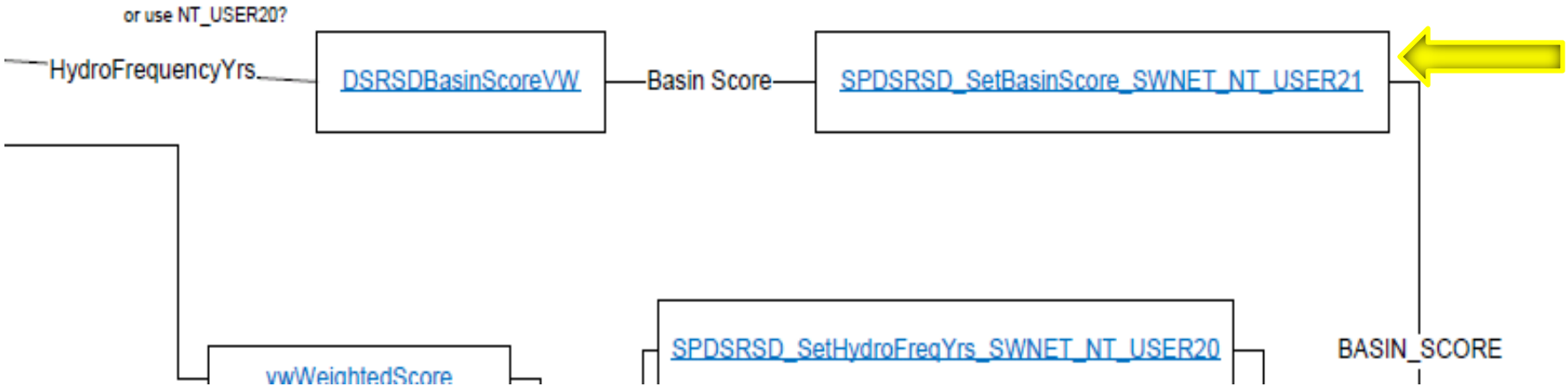


When is the next cleaning?

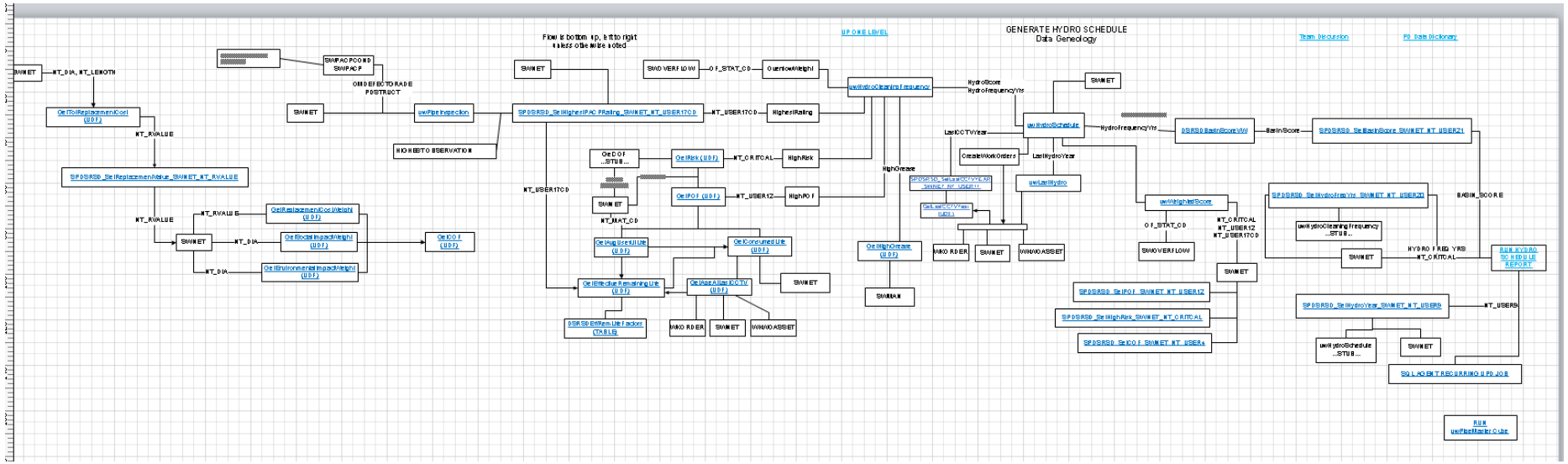


Basin Scoring

- Basin score based on worst-quality segment in the basin



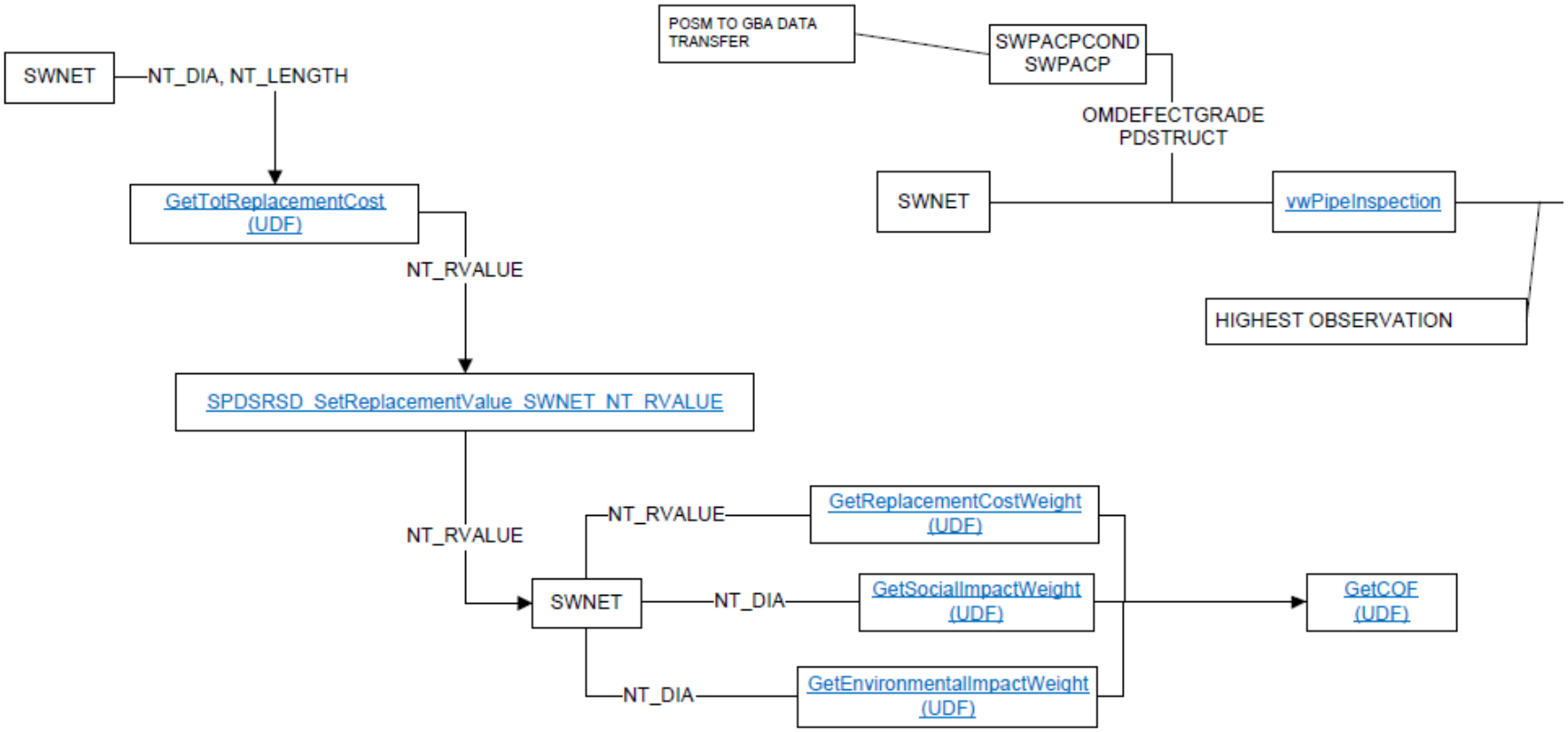
Calculation engine deconstruction


GENERATE HYDRO SCHEDULE
Data Geneology
Flow is bottom up, left to right
unless otherwise noted
SWMWAC
SWMWAC_PK
SWMWAC_PCOMID
SWMWAC_P
SWMWAC_PDESTRUCT
SWMWAC_PEFFECTIVEDATE
SWMWAC_PDESTRUCT
SWMWAC_PDESTRUCTIVEDATE
SWMWAC_PDESTRUCTIVEDATE
SWMWAC_PDESTRUCTIVEDATE

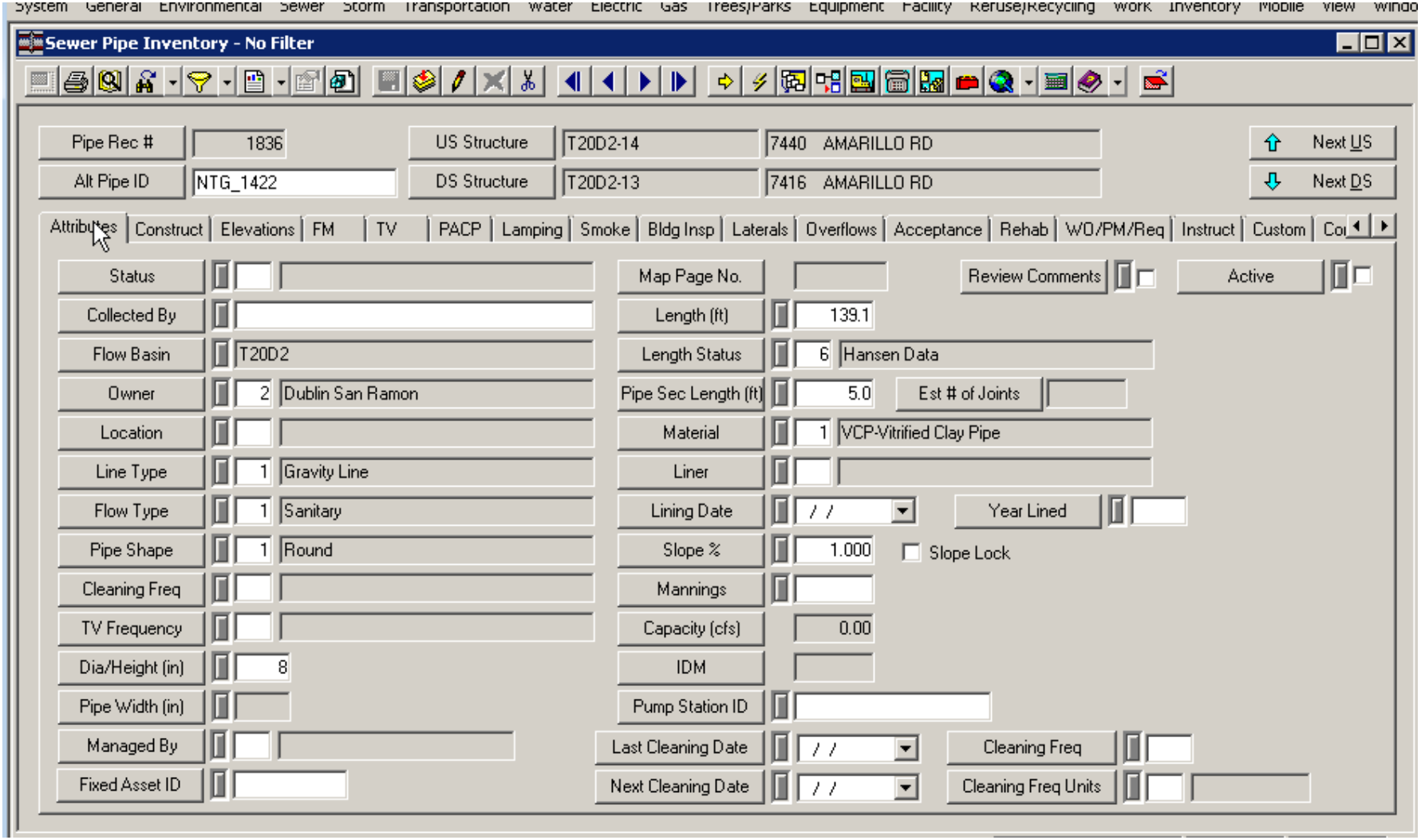
Nightly data update hierarchy

- exec SPDSRSD_CleanUpMHInspGPSData
- exec SPDSRSD_INSERTMHInspGPSSWMAN
- exec SPDSRSD_SetLastCCTVYEAR_SWNET_NT_USER11
- exec SPDSRSD_SetScheduledCCTVYear_SWNET_NT_USER10
- exec SPDSRSD_SetHighestPACPRating_SWNET_NT_USER17CD
- update swnet set NT_USER17CD = isnull (NT_USER17CD,0)
- exec SPDSRSD_SetReplacementValue_SWNET_NT_RVALUE
- exec SPDSRSD_SetPOF_SWNET_NT_USER12
- exec SPDSRSD_SetCOF_SWNET_NT_USER4
- exec SPDSRSD_SetHighRisk_SWNET_NT_CRITCAL
- exec SPDSRSD_SetHydroFreqYrs_SWNET_NT_USER20
- exec SPDSRSD_SetBasinScore_SWNET_NT_USER21
- exec SPDSRSD_SetHydroYear_SWNET_NT_USER9
- exec SPDSRSD_SetReplacementDate_SWNET_NT_REPL_DT
- Exec SPDSRSD_SetHydroScore_SWNET_NT_USER13

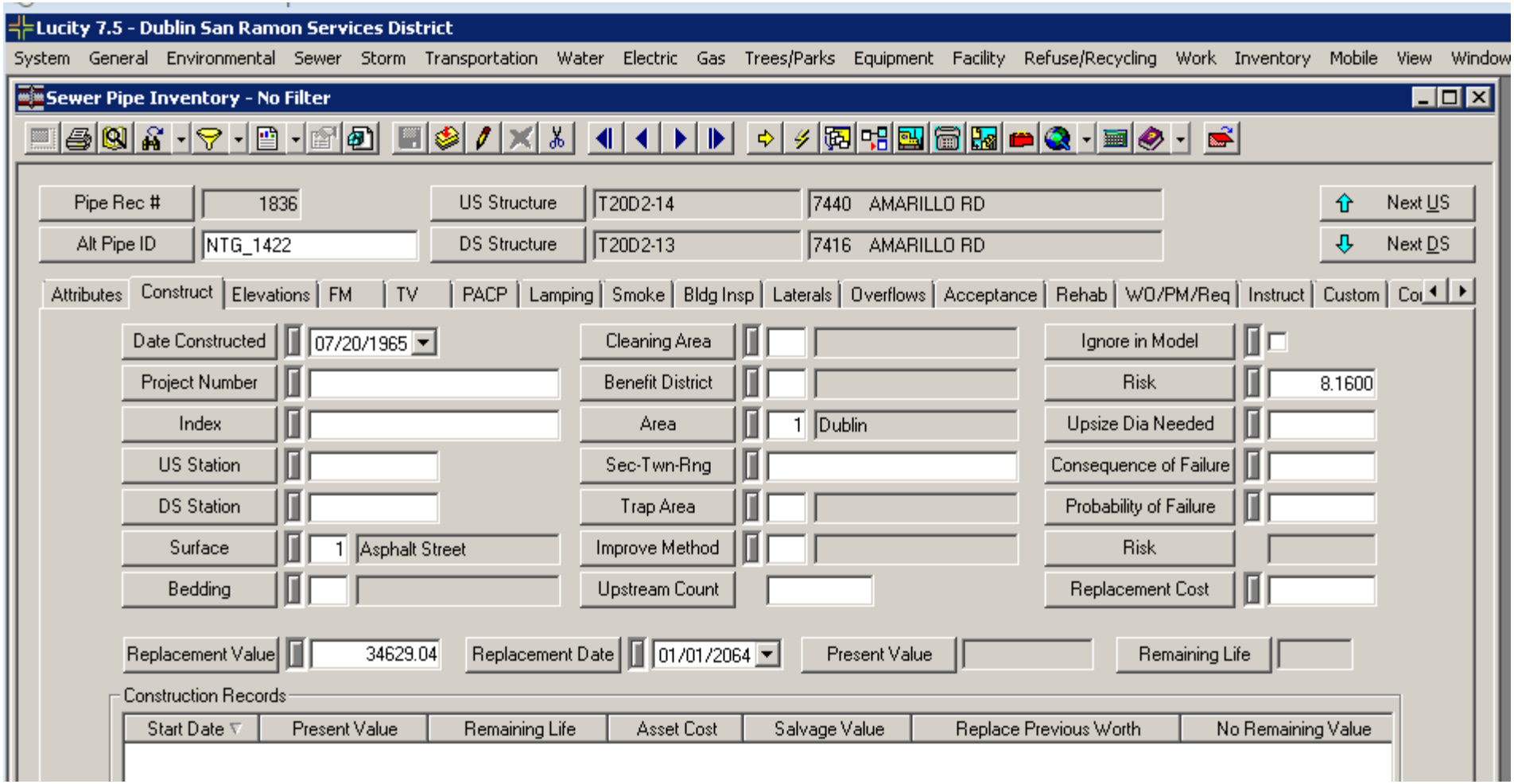
Calculation engine hierarchy



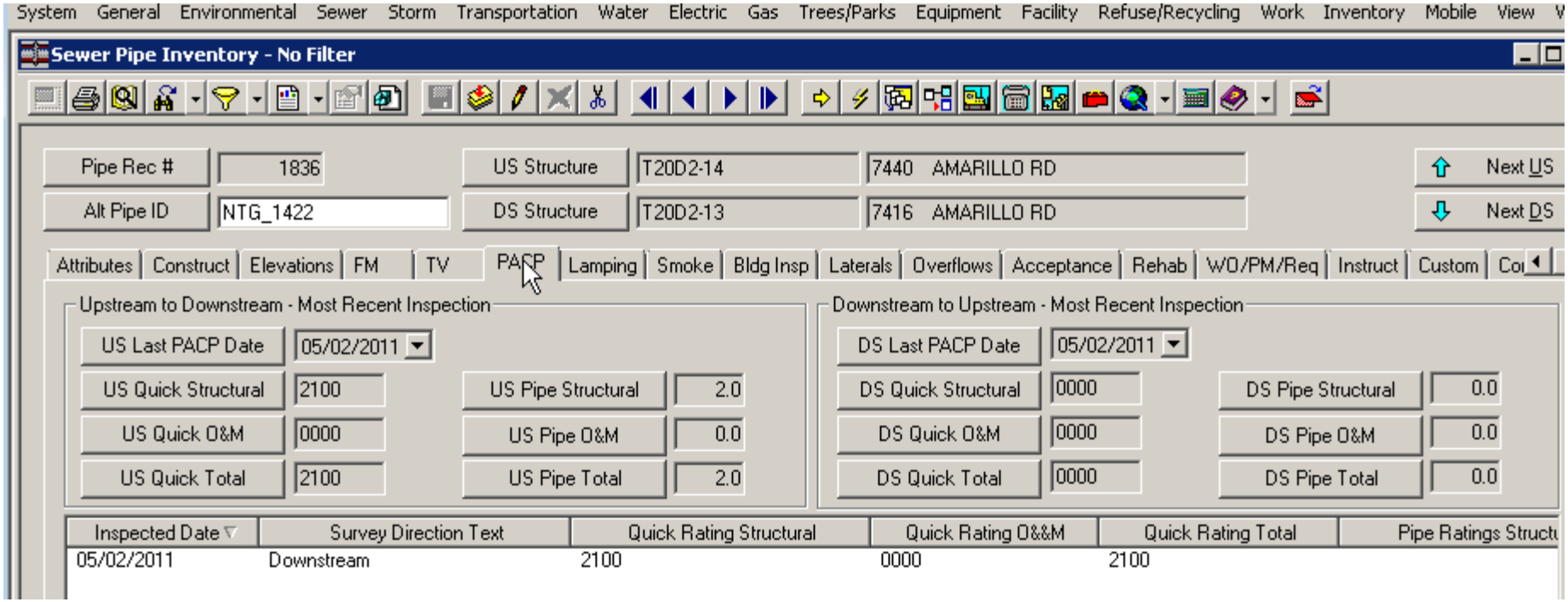
Lucity client user interface 1



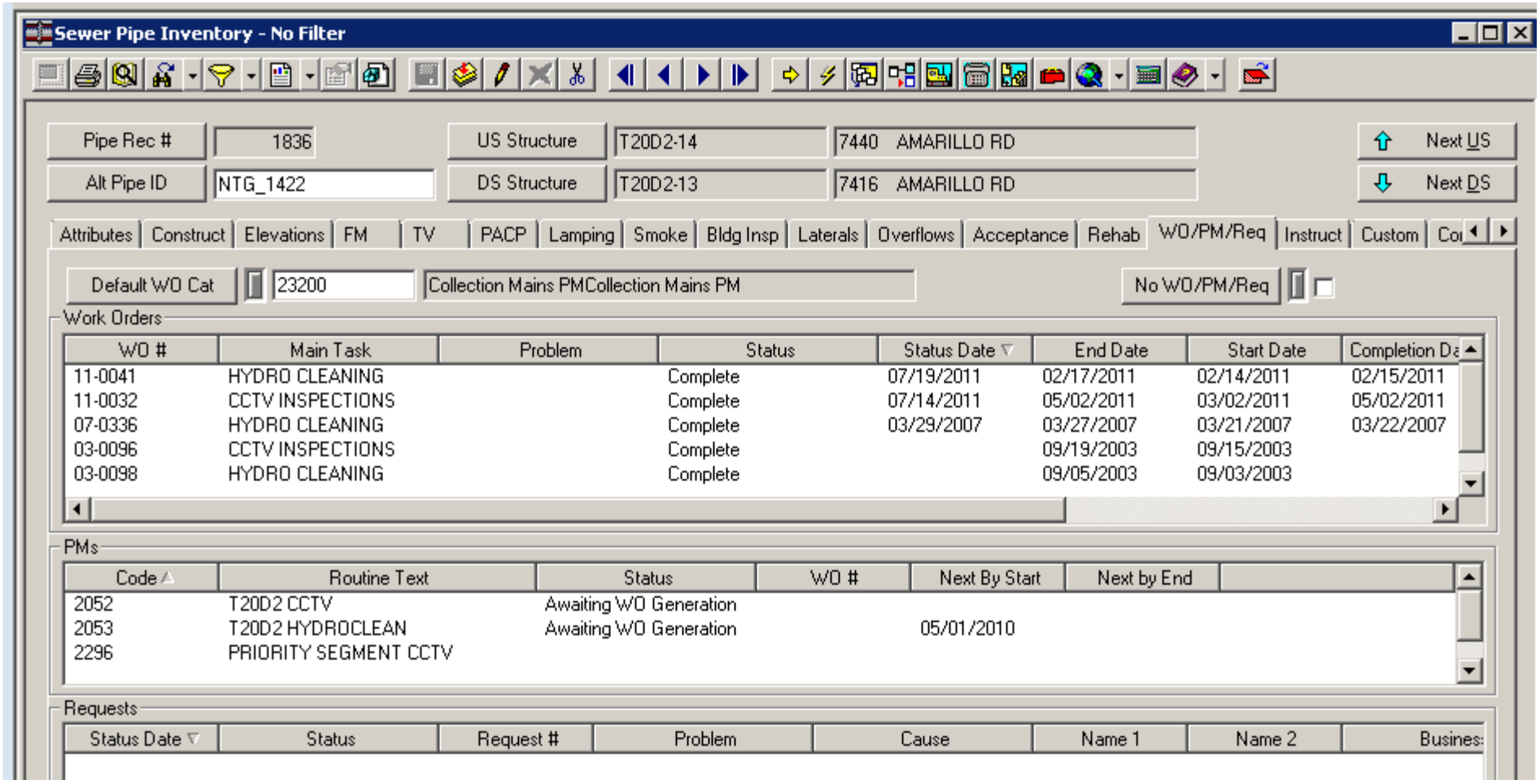
Lucity client user interface 2



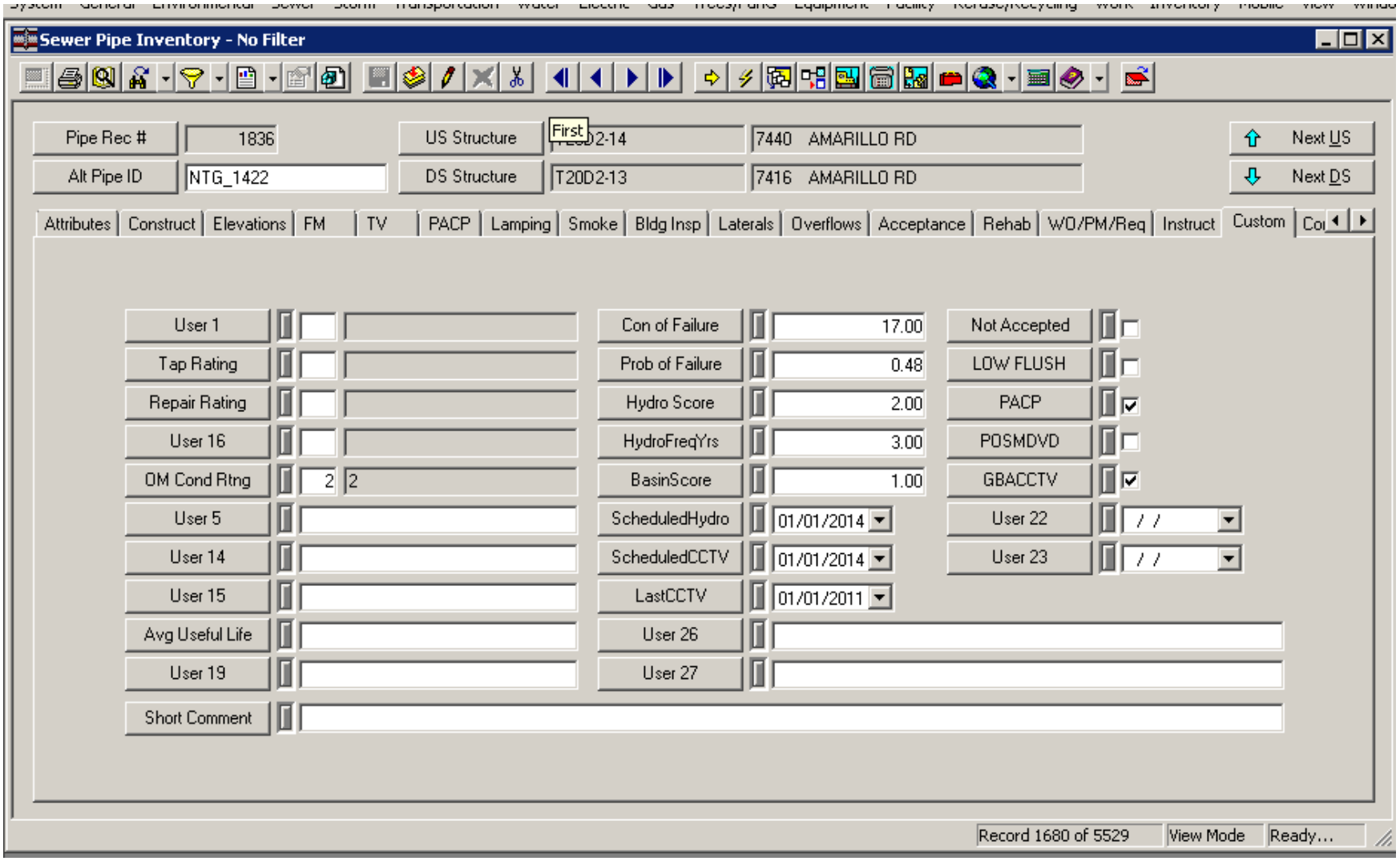
Lucity client user interface 3



Lucity client user interface 4



Lucity client user interface 5



Anyone for TSQL?

Sample function

```
CREATE FUNCTION [dbo].[GetTotReplacementCost] (@NT_Length float, @NT_Dia float)
RETURNS float
WITH EXECUTE AS CALLER
AS
BEGIN
        declare @Tempvalue float;
        Select @Tempvalue =
                case

                when @NT_dia < 7 then (@NT_length * 195)
                when @NT_dia = 8 then (@NT_length * 249)
                when @NT_dia = 10 then (@NT_length * 302)
                when @NT_dia = 12 then (@NT_length * 356)
                when @NT_dia = 15 then (@NT_length * 436)
                when @NT_dia = 18 then (@NT_length * 517)
```

Sample linked server

- CREATE PROCEDURE [dbo].[SPDSRSD_CleanUpMHInspGPSData]
- -- Add the parameters for the stored procedure here
- update a
- set a.MAG_MANHOL = REPLACE(a.MAG_MANHOL,'=','-')
- from [ENGINEERING\SQLEXPRESS].[GBAGIS].[dbo].[MANHOLE_INSP_MERGE] a;
-
- delete from [ENGINEERING\SQLEXPRESS].[GBAGIS].[dbo].[MANHOLE_INSP_MERGE]
- where MAG_MANHOL is null
- or MAG_MANHOL = '-'
- or len(MAG_MANHOL) = 0

Sample stored procedure

```
CREATE PROCEDURE [dbo].[SPDSRSD_SetLastCCTVYEAR_SWNET_NT_USER11]
 AS
BEGIN
	SET NOCOUNT ON;
	UPDATE SWNET
	SET NT_User11 =
		(SELECT CAST
			(
			CAST
				(
					dbo.GetlastCCTVYear(NT_ID) as varchar(4)
				)
			+ '-01-01'
			as DATETIME
			)
		)
END
```

Sample view

- create View [dbo].[**vwPipeInspection**] as
- select
- c.PD_ID
- ,n.NT_ID
- ,c.PD_CODE_TY AS ObservationType
- , datepart(yyyy,p.PA_INSP_DT) as InspectionYear
- , datepart(mm,p.PA_INSP_DT) as InspectionMonth
- ,p.PA_DIR_TY as SurveyDirection
- ,p.PA_ADDRESS as Street
- ,p.PA_PRIOM as PipeOMRatingIndex
- ,p.PA_PRIT as PipeTotalRatingIndex
- ,n.NT_USMAN as UpStreamMH
- ,n.NT_RVALUE as ReplacementValue
- ,n.NT_SURF_TY as Surface
- from SWPACPCOND c, SWPACP p, SWNET n
- where c.PD_PA_ID = p.PA_ID
- and n.NT_ID = p.PA_NT_ID
-

Summary

- How often should I clean this pipe segment?
- When was this segment last cleaned?
- When is the next time that this pipe segment should be cleaned?

- Questions