

A Cost Efficient Asset Management Approach Using GIS



July 2012

Public Works

Road Operations

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About Pierce County

Home of Mt Rainier in the Cascade Mountains

Home of Joint Base Lewis-McChord

Second most populous County in Washington State

800,000 people

1,700 Square miles

32 miles south of Seattle

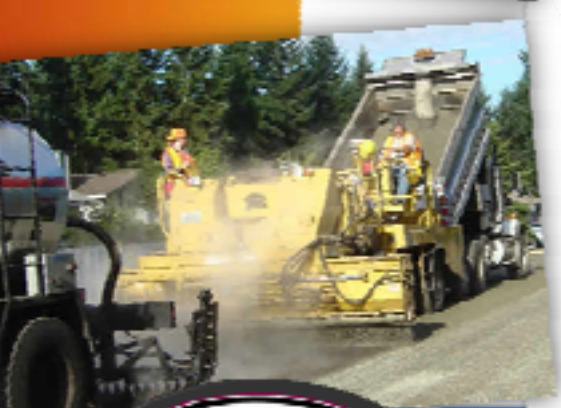
650 miles of Public Storm Storm Drainage Pipes

3,110 lane miles of County Maintained Right of Way

368 Fresh Lakes

Puget Sound

2015 U. S. Open Chambers Bay PGA Pro Golf





A Cost Efficient Asset Management Approach Using GIS

First, understanding why the effort was made!

Then how we did it!

- Federal and Local Laws are pushing us to adopt a planned approach method to Asset Management
- Required Resources/Tools Needed
- Organized Planned Approach
- Building a scalable Asset Maintenance and Condition Rating System intended for our Storm Drainage system.
- Principle design will work for a small city or large county
- Pavement, Shoulders, Roadside vegetation, including Fences, Gates, Bollards, and Sidewalks
- Planned approach works with one crew or up to as many crews as budget, available staff constraints can handle
- Today's discussion will focus on Storm Water Drainage Inventory





How we got started? In making an Asset Management System?

- ✓ Things we know and can control
 - Know What are our assets
 - Know Where are our assets
 - Know what Criteria to use to rate assets
 - Know how to rate our assets Consistently





Asset Management – in 9

- Data Acquisition Methods
- Data Collection of Feature Assets
- Data Processing
- Data Quality Control
- Developing Standards for Asset Conditions
- Assessment Feature Rating Score System
- Managing File Geodatabases – ArcGIS
- CMMS – Solutions
- Work Order Generation





Asset Management Building Blocks

Data Collection

- Industry standards
- Database Schema
- Data Dictionary
- Data Processing
- Data Conversion
- Workflow for processing new features

Assessment

- Developing Arcpad Forms
- Developing criteria for rating assets
- Uniform standards scalable to all features
- Schedule for assessment ratings
- Managing Assessment ratings
- CMMS
- Understanding the data
- Feature level cost
- Improving business decisions from rating analysis

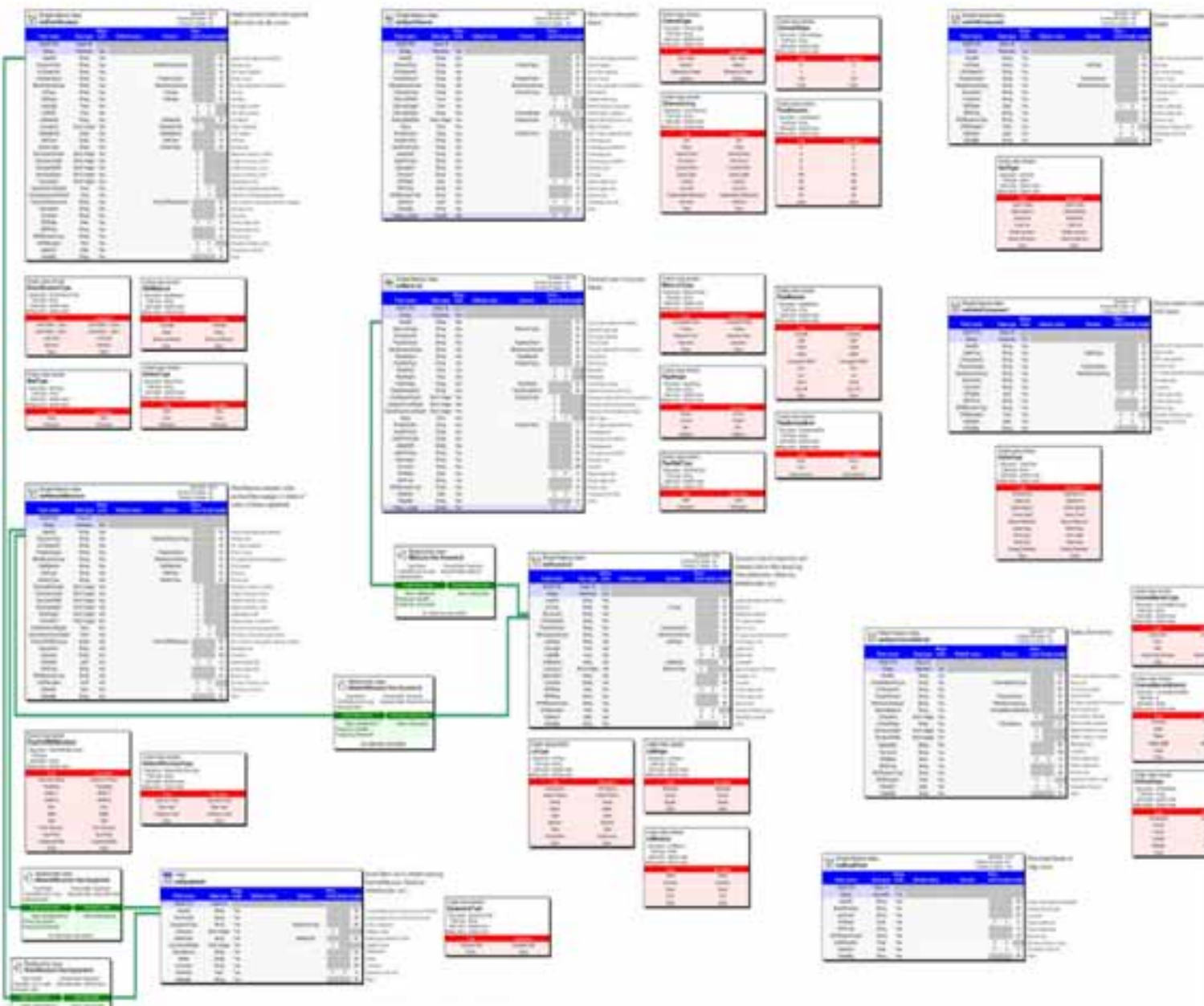
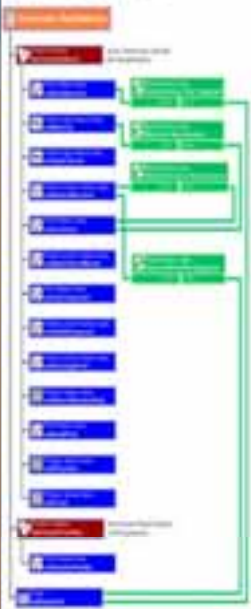


Stormwater Geodatabase Schema Diagram

May 1, 2012

Document: StormwaterGeodatabase.sde, Microsoft Access
Document: Tuesday, May 1, 2012

Geodatabase Structure



Point feature class
swDrainStructure

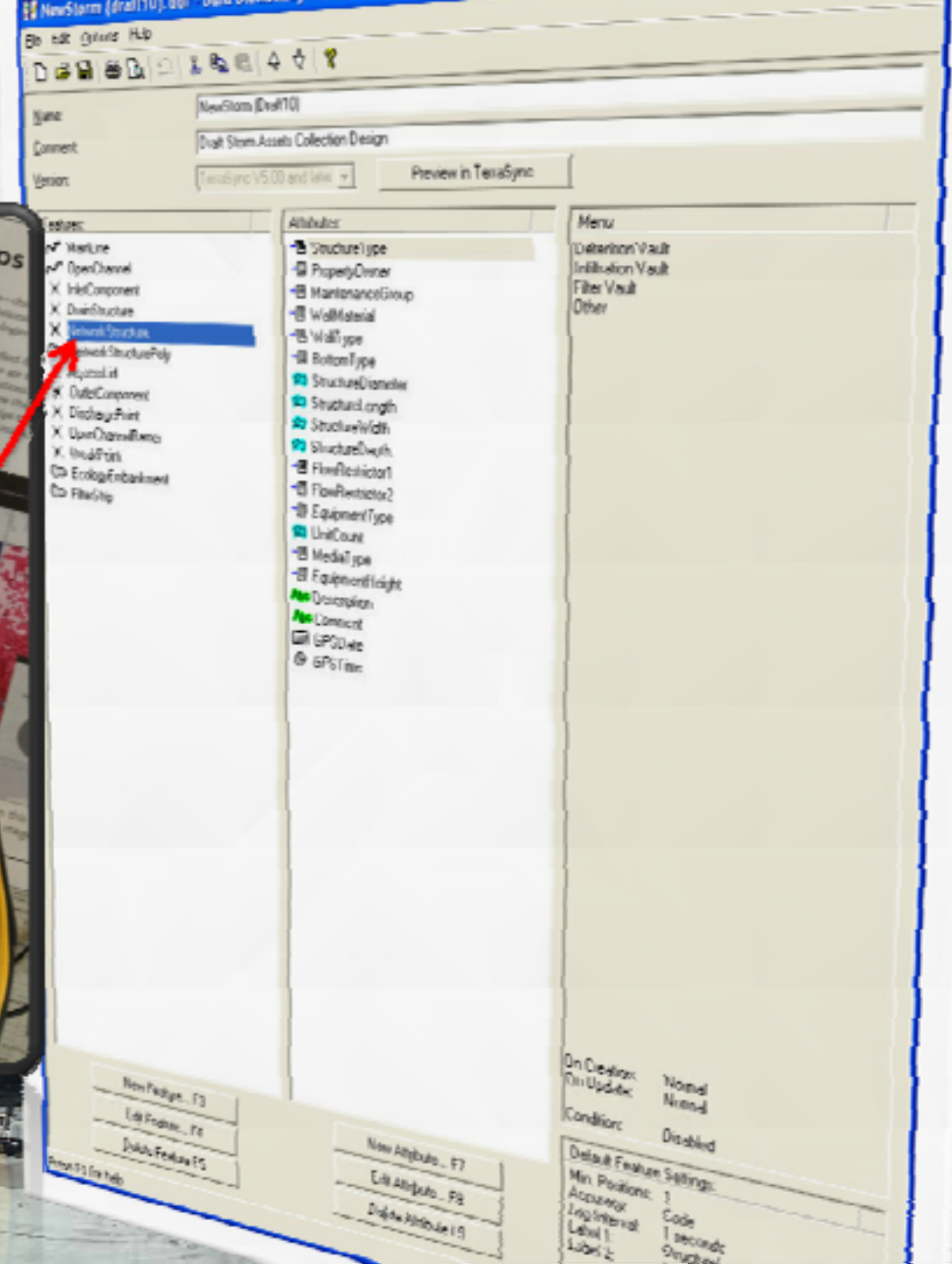
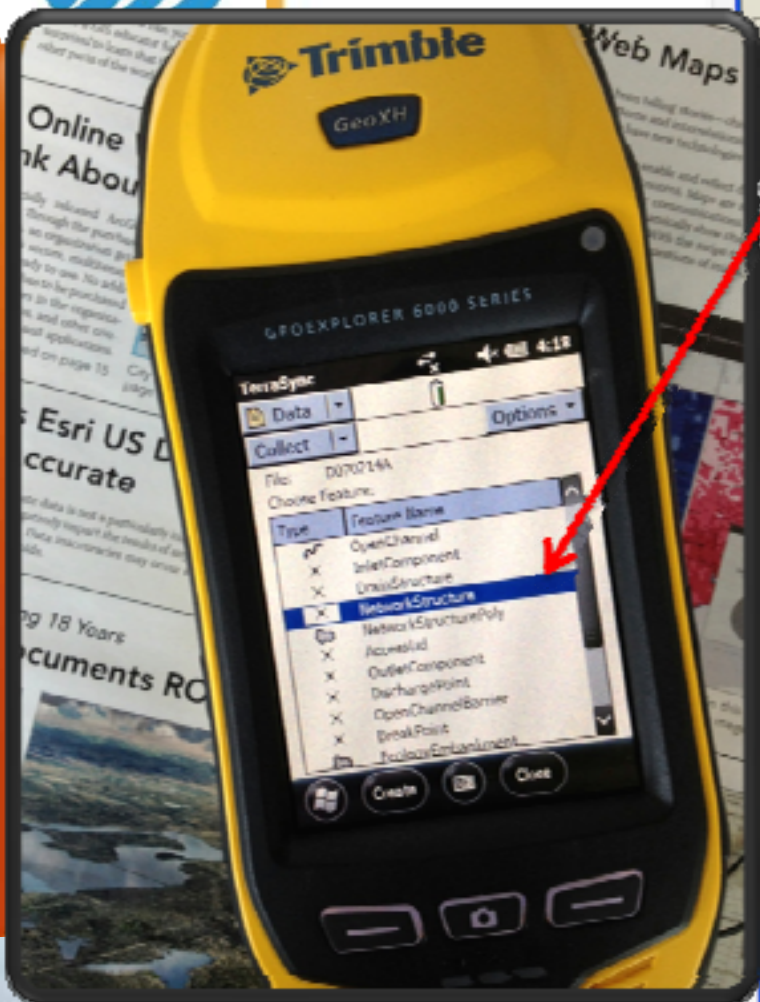


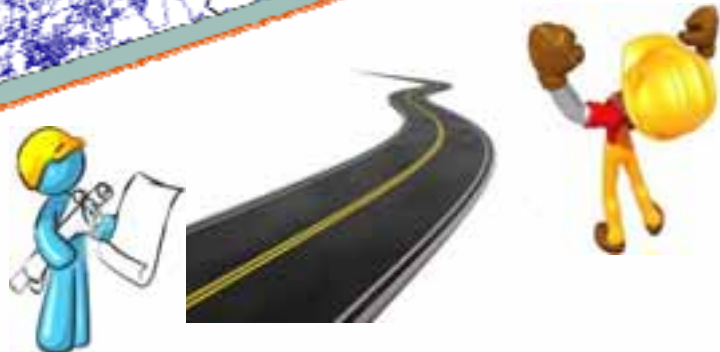
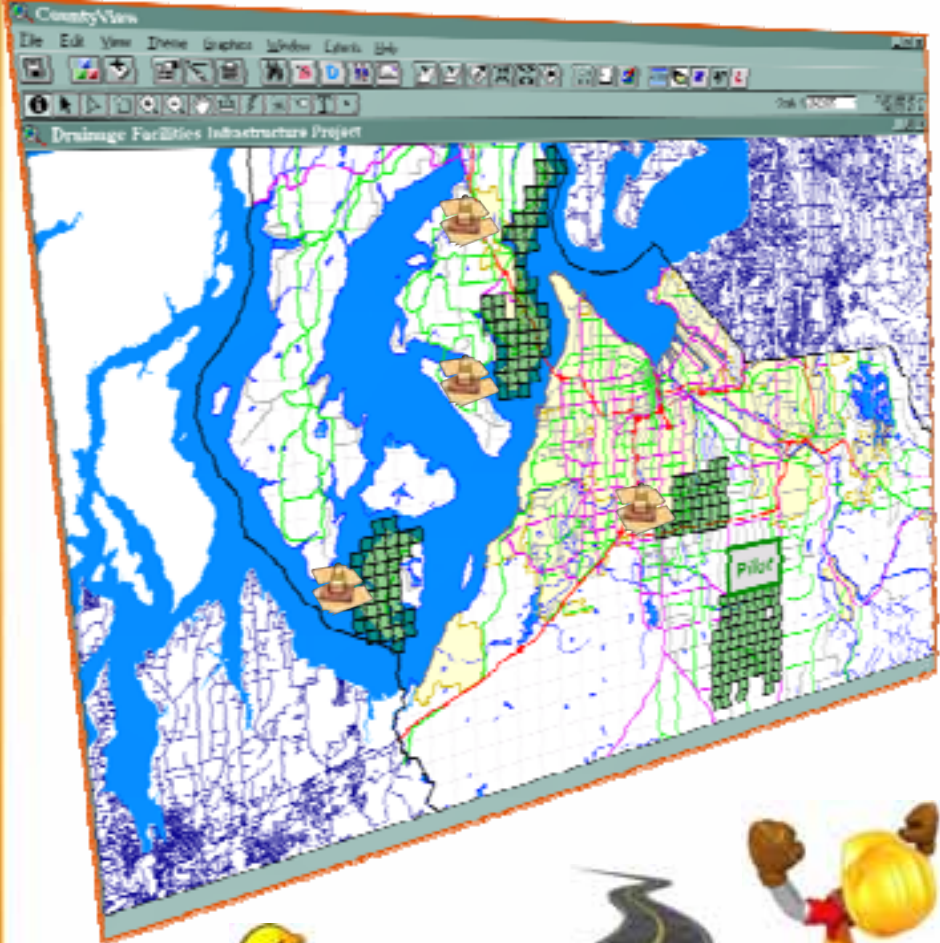
GEODATABASE

Simple feature class
swNetworkStructure

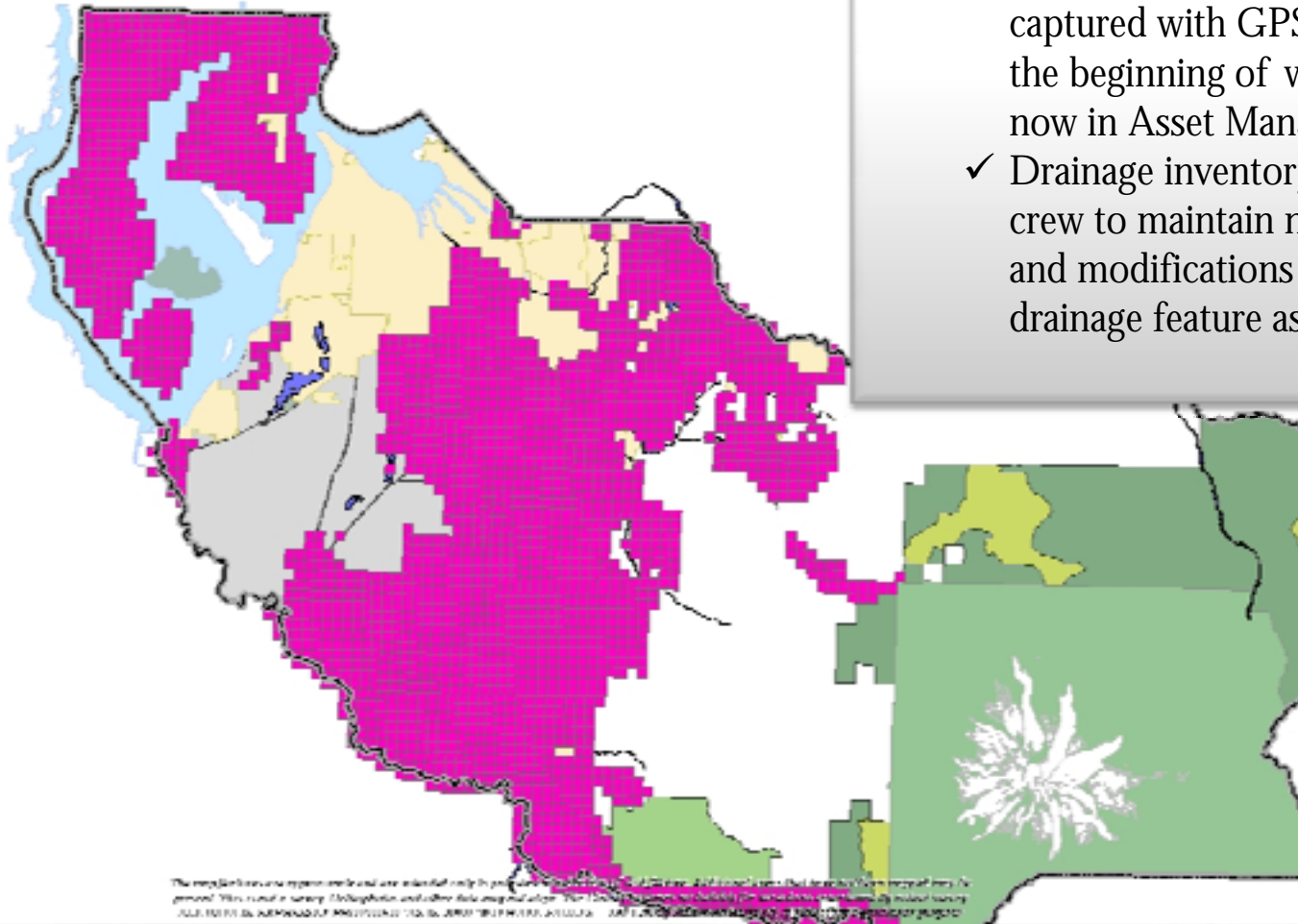
Geometry: Point
Contains M values: No
Contains Z values: No

Field name	Data type	Allow nulls	Default value	Domain	Prec- ision	Scale	Length
OBJECTID	Object ID						
Shape	Geometry	Yes					
AssetID	String	Yes					
StructureType	String	Yes		NetworkStructureType			30
UCSystemID	String	Yes					50
PropertyOwner	String	Yes		PropertyOwner			50
MaintenanceGroup	String	Yes		MaintenanceGroup			30
WallMaterial	String	Yes		WallMaterial			30
WallType	String	Yes		WallType			30
BottomType	String	Yes		BottomType			25
StructureDiameter	Short integer	Yes					
StructureLength	Short integer	Yes					
StructureWidth	Short integer	Yes					
StructureDepth	Short integer	Yes					
SampleDepth	Short integer	Yes			0		
VolumeFT3	Short integer	Yes			0		
UpstreamInletDepth	Short integer	Yes			0		
DownstreamInletDepth	Float	Yes			0		
FlowCritWQStructure	Float	Yes			0		
Description	String	Yes			0		
Comment	String	Yes			0		
GPIDate	String	Yes			0		
GPSTime	Date	Yes			0	0	
GPReviewType	String	Yes		FlowCritWQStructure	0	0	
GPSElevation	String	Yes					50
Editor	Float	Yes					50
EditorID	Date	Yes			0	0	100
EditorID	String	Yes					8
					0		15
					0	0	45
					0	0	8





Drainage Collection Complete

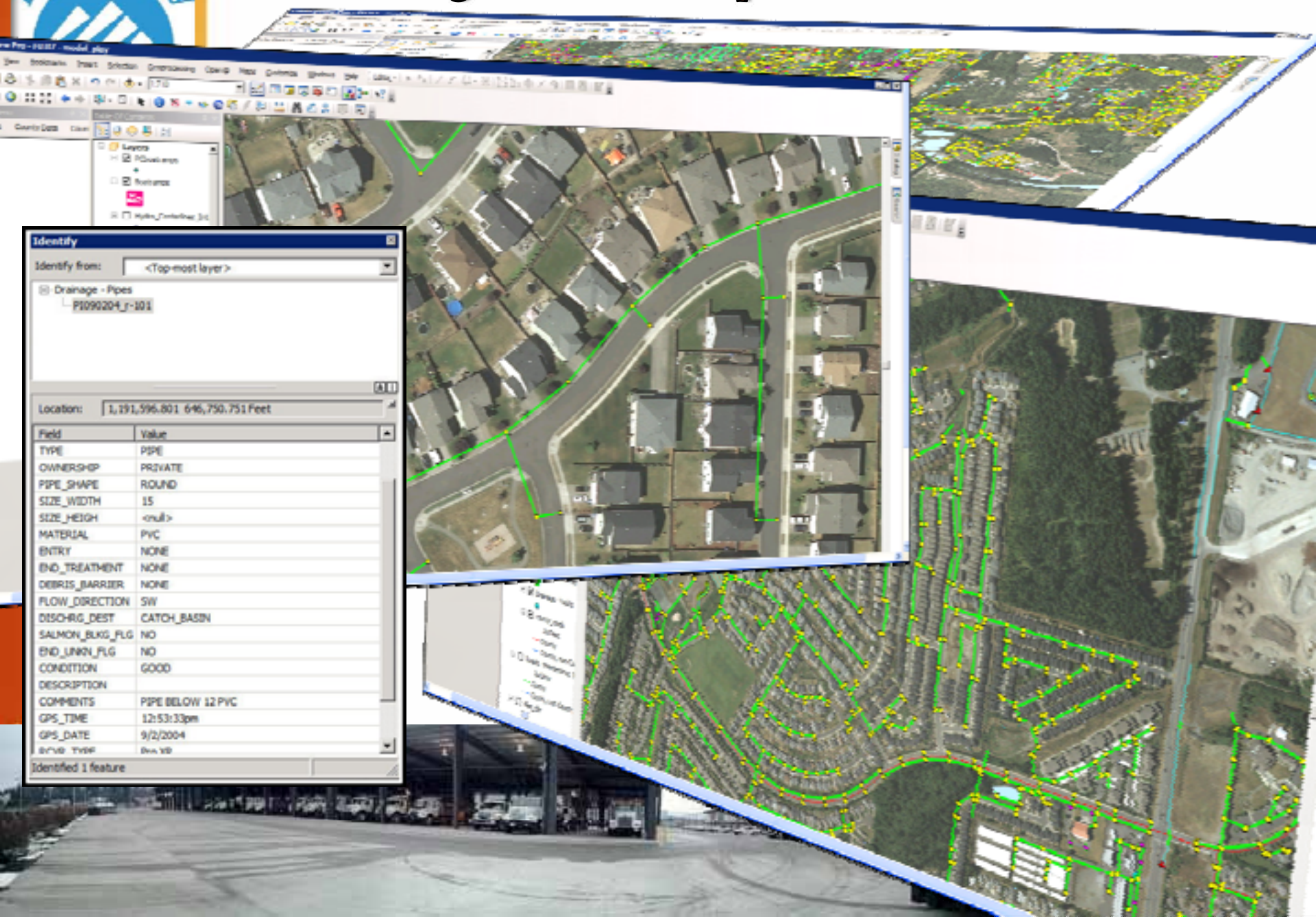


- ✓ **177,000** Drainage Features captured with GPS. This was just the beginning of what we know now in Asset Management.
- ✓ Drainage inventory reduced to one crew to maintain new construction and modifications of existing drainage feature assets



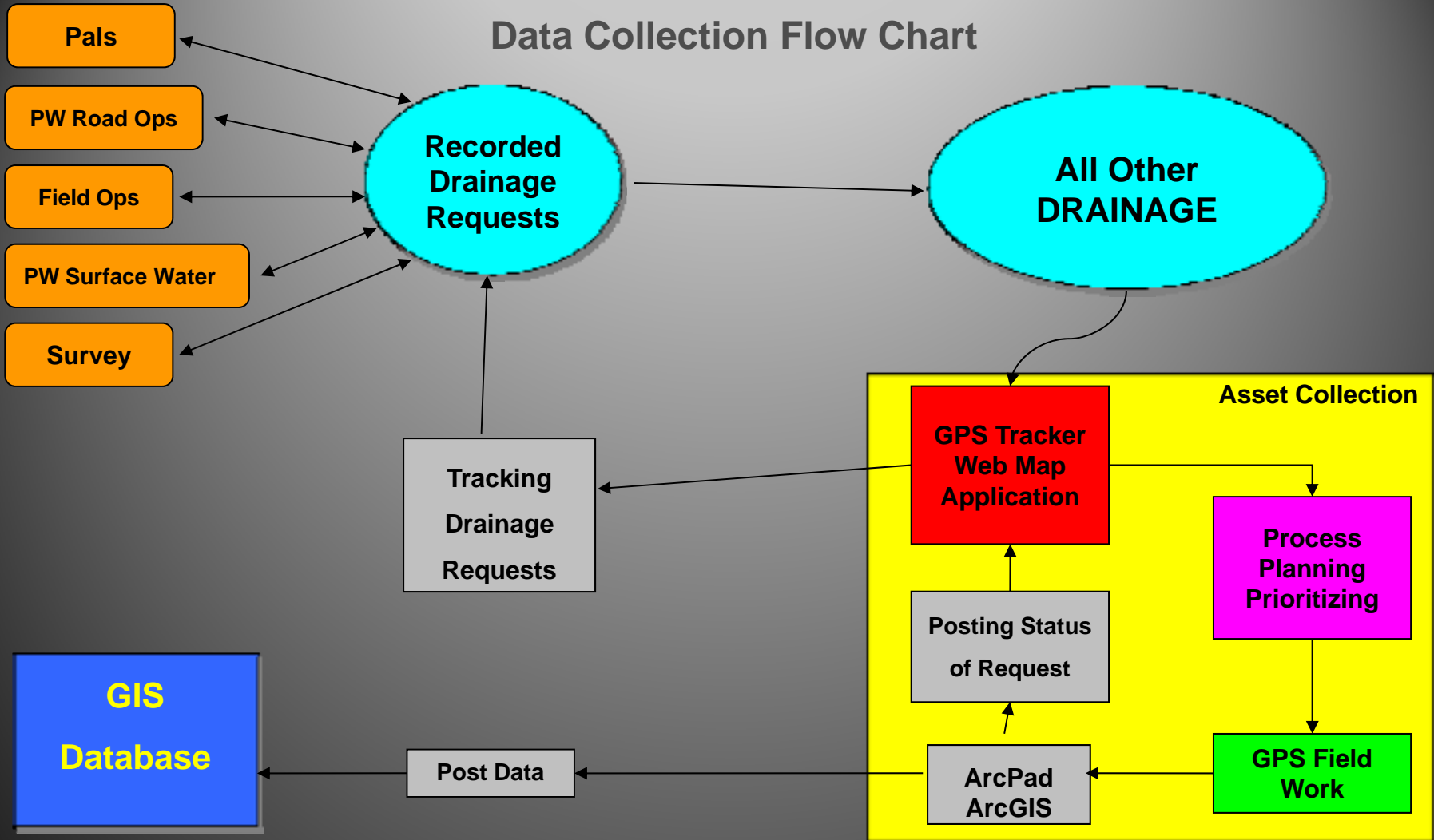


Drainage Collection Complete down to the Feature Level



Data Acquisition Methods

Data Collection Flow Chart



Timeline in Review

1998



Web map Service for
Generating Storm
Drainage Requests



Trimble Data Collector goes into the field



2012



File
Processing
in
Terrasync



Data
Processing
in ArcGIS





Drainage Inventory (What and Where)

- Road Operations, Surface Water Management and GIS have been collecting drainage data since April 1999
- Extraction of department level data by ownership for Assessment
- 20,000 number of CB/MH
- 50,000 segments of pipe for 550 miles
- 39,000 segments of channel for 1,150 miles





- Vaults
- Tanks
- Storm Filters
- Media Filter Drains
- Bio-swales
- Hydrodynamic Separators
- Channel Weirs
- CB's with
 - Frop's
 - Weirs

Storm water Treatment and Flow Control Facilities





Pierce County Drainage Assessment Manual

March 2011



Presented By

Pierce County Public Works and Utilities
Road Operations



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Pierce County Internet Site
<http://www.co.pierce.wa.us/pc/abtus/profile.htm>

Drainage Manual

Criteria and Consistency





Asset Condition Rating Scale

"No Work" Necessary At This Time	0	- No Defect	Good Condition
	1	- (A) Defect Level; Isolated	
	2	- (A) Defect Level; Several	
"Work Should" Be Completed Before The Next Assessment As Resource Capacity Allows	3	- (A) Defect Level; Predominant	Fair Condition
	4	- (B) Defect Level; Isolated	
	5	- (B) Defect Level; Several	
"Work Should" Be Completed As Soon As Practicable	6	- (B) Defect Level; Predominant	Poor Condition
	7	- (C) Defect Level; Isolated (may impact another asset)	
	8	- (C) Defect Level; Several (may impact another asset)	
	9	- (C) Defect Level; Predominant (may impact another asset)	Very Poor Condition

NOTE: "This asset condition scale is not intended to be utilized to address emergencies. If an asset is found to be in such condition as to pose an immediate threat to public safety, property or habitat, corrective action should be taken as soon as possible."



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Supplemental Features

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Data Assessment
Information
Condition

Tab 4 – Control Structure

Data Assessment
Information
Condition

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Condition Rating

Tab 2 – Condition

Catch Basin / manholes that are not maintained will not be able to filter the sediment and pollutants out of the storm water runoff as designed.

SEVERITY: Minor	Bent rungs that are still attached and functional, minor cracks in structure with no sediment entering the structure, sediment or trash greater than 1ft from IE.
Moderate	Trash immediately upstream of grate, sediment entering the structure through holes or cracks in structure, grate is low, rungs not safe, grate stuck, broken or missing, sediment is less than 1 ft from IE.
Severe	Vegetation, trash, or sediment blocking water from entering the structure, cracks that are allowing sediment into the structure, lid is not attached to the structure, broken or could not be opened, grate is raised and water is bypassing the structure sediment to the IE.

EXTENT: The extent of the catch basin / manhole defect is related to the entire defined feature. Catch basin / manholes will be measured by an extent range of (1,4,7) Minor, (2,5,8) Moderate, or (3,6,9) Severe. For example, a value of 3 equals minor severity, high extent.

ACTION: Based on the action required to repair/maintain a catch basin / manhole, a function code(s) of **(40L, 40H)** and work units will be assigned to represent the associated activity.

The feature being assessed will be rated based on severity of Minor (1-3), Moderate (4-6), and Severe (7-9) scales. The rating of 1, 4, and 7 are isolated distresses within a feature. The rating of 2, 5 and 8 are moderate distress areas within the feature. The rating of 3, 6 and 9 are distresses that exist throughout the majority of the feature. Condition values of 7, 8 and 9 are 4, 5 and 6 but with a secondary impact to another asset. The rating of Minor means that there are signs of a potential maintenance need in the future but still within the Pierce County Stormwater Manual (PCSWM) requirements. The rating of Moderate means that there are currently signs of a maintenance need per the PCSWM, but which are not affecting another asset at this time. The rating of Severe means that there are currently signs of a maintenance need per the PCSWM, and the condition is affecting another asset or has greatly affected the function of the feature. **See PCSWM for specific detailed requirements.**



Pierce County Asset Management Program

Drainage Collection Procedures and Asset Assessment Manual

Data Collection Procedures and Guidelines

This is for collection of drainage features as defined by this manual within the ROW and Public Works Facilities Maintained by Road Operations.

Items needed for data collection:

- Laptop
- ArcPad 8.0
 - County Base Map Layer
 - Road Layer
 - Drainage Layer
 - Our Feature Shapefiles and Geodatabase
- USB GPS Navigation Receiver

Supplemental items needed for data collection:

- Map of area to collect data
- Safety equipment (PPE)
- Flash Light (Million candle)
- Lid Puller
- Shovel
- Machete
- Rods (20')
- Tape Measure
- Persuader (pulling tight lids)
- T-handle locking lid key (3-4' tall)
- Mirrors
- Flat head screw driver Lg
- Dixon Yellow Chalk
- Rags
- Hand sanitizer
- Leather gloves
- Compass
- Wasp and Hornet spray
- Paper
- Pen
- Pencil
- Calculator



Equipment





Non-Structural Inspection of Assets

The following inspection procedures offer a method of determining feature attribute and condition information by observing and recording the presence of severities of defects or distresses in the feature. The elements of **Bioswale / Channel / Rain Garden, Filter Strip, Media Filter Drain, and Pond** feature information and condition rating can be assessed as follows:

- Visually identify the feature
- Identify the feature on the laptop in GIS by selecting the feature
- Verify the **Asset Info Tab** has the correct information in it (walk the length of the feature) and make changes to items that are incorrect or missing
- Select the **Condition Tab** and fill out the items for the feature.
- Select the **Comments Tab** and verify that Assessment Date is correct and that the initials of the collector are in the Assessed By.

Structural Inspection of Assets

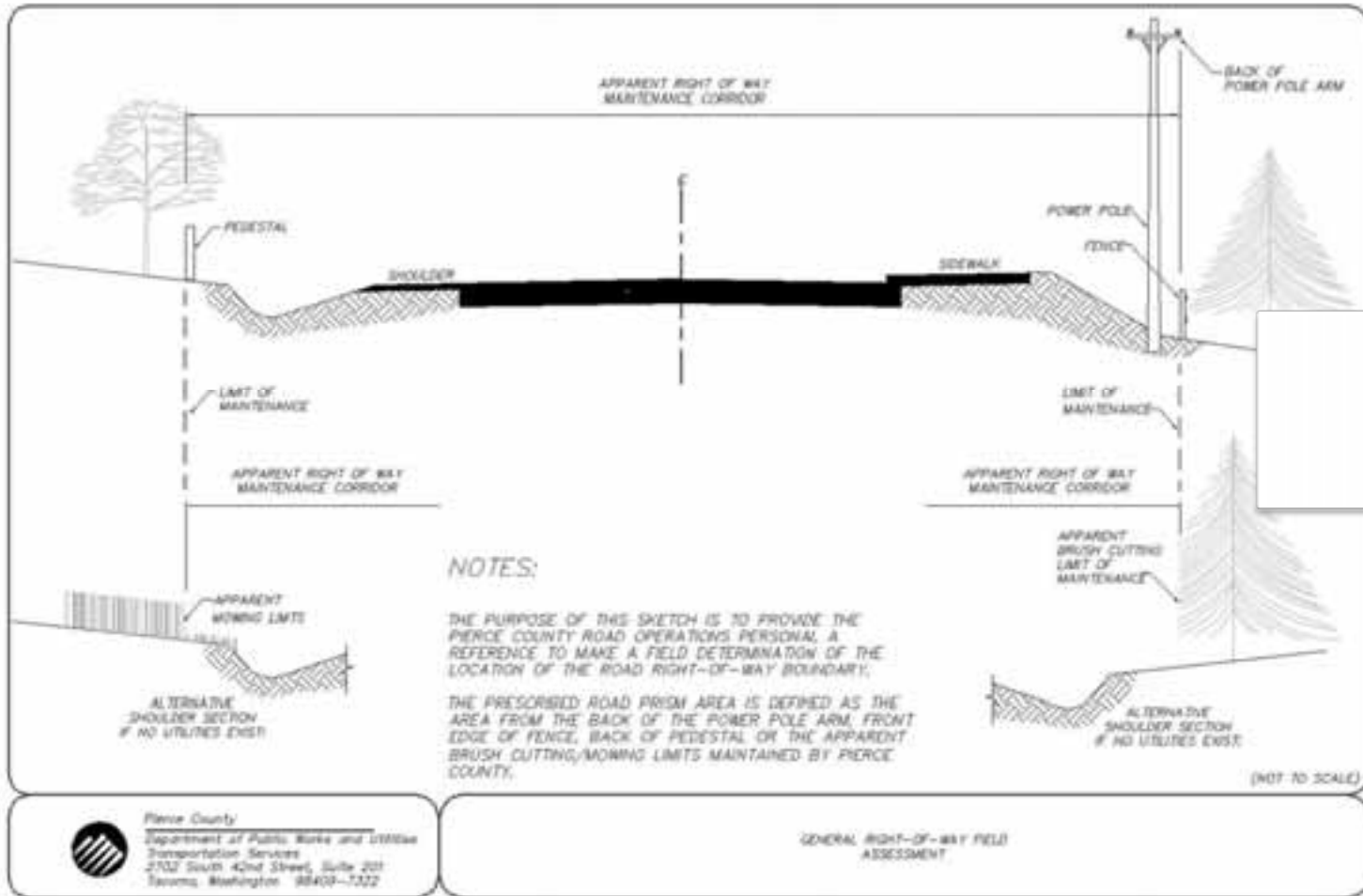
The following inspection procedures offer a method of determining feature attribute and condition information by observing and recording the presence of specific severities of defects or distresses in the feature. The elements of **Pipe / Live Stream Culvert, Tank, Catch Basin type 1 and Type 2 / Manhole, Channel Barrier, Access Lid, Vault, and Sand Filter** feature information and condition rating can be assessed as follows:

- Visually identify the feature
- Identify the feature on the laptop in GIS by selecting the feature
- Verify the **Asset Info Tab** has the correct information in it (walk the length of the feature, pull lids as needed) and make changes to items that are incorrect or missing
- Select the **Condition Tab** and fill out the items for the feature.
- If feature has a Mechanical Filter in it select the **MF Tab** and fill in the information (Optional)
- If feature has a Control Structure in it select the **CS Tab** and fill in the information (Optional)
- Select the **Comments Tab** and verify that Assessment Date is correct and that the initials of the collector are in the Assessed By.

Procedures and Guidelines



General Guidelines for ROW Limits



**ROW
Limits**



Pierce County
Department of Public Works and Utilities
Transportation Services
2102 South 42nd Street, Suite 201
Tacoma, Washington 98409-1322

GENERAL RIGHT-OF-WAY FIELD
ASSESSMENT

When cleaning a feature that goes off ROW, clean only to the apparent ROW / maintenance limits.





Catch Basin Type 1 and Type 2 / Manhole

A chamber or well, usually built at the curb line of a street, for the admission of surface water to a storm sewer or subdrain, having at its base a sediment sump designed to retain sediment and debris below the point of overflow. The difference between a Catch Basin Type 2 and a Manhole is that a Manhole does not have a sump.

Rating of Catch Basin / Manhole

<u>No Defect</u>	
MINOR (Do Nothing)	Very minor defects (Minor trash, sediment greater than 1 ft from IE)
MODERATE (Do before next Assessment)	Needs some work within 6 months (Sediment less than 1 ft from IE, crack but no sediment coming in)
SEVERE (Do within 2 months)	Need work now (Cracks allowing soil into structure, water missing structure, sediment in the pipe, major trash)



Catch Basin Type 1



Catch Basin Type 2 / Manhole

Catch Basin and Manhole





Data Assessment: Point Feature

Attributes in form to be filled out

Tab 1 – Asset Info

- **Structure Type** – Type of asset (BRICKMORTER, CB1, CB2, CURB INLET, CBMF, MH, MHMF, OTHER, PIPE)
- **Structure Material** – Material the pipe is made out of (CONCRETE, OTHER, METAL)
- **Sump Depth** – How deep is the sump, from the bottom of the pipe to the sump
- **Depth Inches** – How deep is the structure from the rim to the sump
- **Locking Lid** – Does the structure have a locking lid (YES, NO)
- **Lid Type** – Type of the lid (BEEHIVE, BI, GRATE, CMBGRATE, GRATED_OTHER, HB, OTHER, ROLLED, SLT, GRATE, SOLID, UTILITY, VANED)
- **Lid Material** – Material the lid is made of (CONCRETE, OTHER, METAL, WOOD)
- **Lid Length** – Length of the lid, in inches
- **Lid Width** – Width of the lid, in inches
- **Lid Shape** – Shape of the lid (RECTANGLE, ROUND, SQUARE, OTHER)
- **Flow Direction** – Direction of flow (E, N, NE, NW, S, SE, SW, W)
- **Discharge Destination** – What is the next feature in this system (DRAINAGE_STRUCTURE, CHANNEL, PIPE, CHANNEL_BARRIER, VAULT, FILTER_STRIP, ECOLOGY_EMBANKMENT, STORMWATER_POND, FRESH_WATER, SALT_WATER, UNKNOWN, OTHER, NONE)

Tab 2 – Condition REPAIR

- **Structure Damage** – What damage does the structure have (N/A, NONE, MINOR, MODERATE, SEVERE)
- **Lid Damage** – What kind of damage does the lid have (NONE, MINOR, SEVERE)
- **Lid Position** – Where is the lid related to the surface around it (LEVEL, LOW, HIGH)

MAINTENANCE

- **Sediment Level** – Deepest recorded sediment level in the access openings (0=No visible sediment, 3=Greater than 1ft below I.E., 6=Less than 1ft below I.E., 9=Above the I.E.)

Tab 3 – MF Info

- See page #_ for Mechanical Filters

Data Assessment for CB/MH





Tab 4 – CS Info

- See page #_ for Control Structures

Tab 5 – Comments

- **Assessment Date** – Date data was collected
- **Assessed By** – Who collected the information
- **Description** – Additional descriptions that came from GIS data coverage
- **Comments** – Additional comments needed

Required fields *italicized*

A screenshot of a software window titled "MH_CB". The window has a menu bar with "Form", "Page", "Control", and "Layout". Below the menu bar are five tabs: "Asset Info", "Condition", "MF", "CS", and "Comments". The "CS" tab is selected and highlighted. The main area of the window is titled "INFORMATION" and contains several dropdown menus: "Control/WQ Structure Type", "Cleanout Gate", "Control/WQ Functioning", "Control/WQ Damage", and "Oil Presence". Below these are three sections: "REPAIR" with "Control/WQ Functioning" and "Control/WQ Damage" dropdowns, and "MAINTENANCE" with "Oil Presence" dropdown. At the bottom of the window are "OK" and "Cancel" buttons.

Data Assessment for CB/MH





Mechanical Filter

A canister-type filter with zeolite/perlite/granular activated carbon or some other combination of media that are found in vaults, catch basins, or manholes manufactured by a proprietary system. The target pollutants for removal are total suspended solids (TSS), total and soluble phosphorous, total nitrogen, soluble metals, oil & grease and other organics.

Rating of Mechanical Filters

No Defect

MINOR

(Do Nothing)

Very minor defects

(Spotty sediment on cartridge, scum line below)

MODERATE

(Do before next Assessment)

Needs some work within 6 months

SEVERE

(Do within 2 months)

Need work now

(Top of cartridge covered with sediment, scum line above)



Mechanical Filters

**Mechanical
Filter**



Data Assessment: Polygon, Point Feature

**Mechanical
Filter Info**

Attributes in form to be filled out:

Tab 3 – Mechanical Filter

Information

- **Cap Color** – Color of the cap (BLUE, GRAY, GREEN, ORANGE, WHITE)
- **# of Cartridges** – How many cartridges are in the structure
- **Filter Height** – What is the height of the cartridges (12", 18", 27")

Condition

- **Scum Line** – Where is the scum line located (ABOVE CARTRIDGE, BELOW CARTRIDGE, NONE)
- **Top of Cartridge** – Sediment level on top of the cartridge (COVERED SEDIMENT NONE, SPOTTY SEDIMENT ,)



Locking Lid:



LOCK

**Data
Assessment
for CB/MH**

Lid Shape:



RECTANGLE



ROUND



SQUARE



Lid Type:



BEEHIVE



BISECTED GRATE



COMBINATION GRATE



GRATED OTHER



HERRING BONE



OTHER



ROLLED



SLOTTED GRATE



SOLID



UTILITY



VANED

Data Assessment for CB/MH



**Condition Type:
REPAIR**



MINOR



MODERATE



SEVERE

Structural Damage

Cracks in underground structures can allow sediment to enter the structure, or be a sign of collapse.



MINOR



MODERATE



SEVERE

Lid Damage

Damage to lids could allow trash into the structure.



LOW



HIGH

Lid Position

If the lid of a structure is low, it could cause pavement failure sooner, or cause damage to vehicles.
If the lid is high, it could allow water to bypass the structure and remain on the roadway.

MAINTENANCE



LOW



MODERATE



SEVERE

Sediment Level

Sediment level is measured from the sump to the top of the sediment.

Condition Types



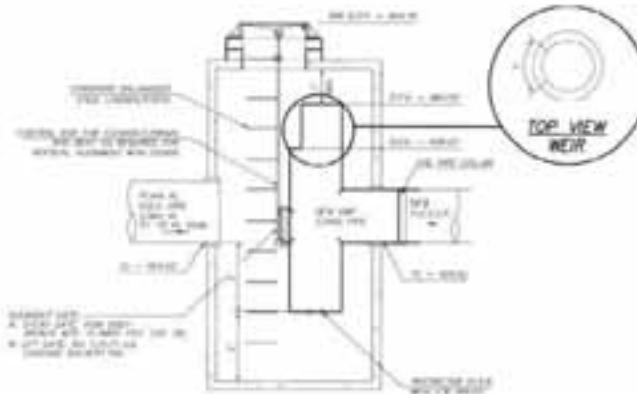


Control Structure

Control structures are located in catch basins or manholes and are restrictor devices for controlling outflow from a facility to meet the desired performance. Rise type restrictor devices ("Rise" or "FRDP-T") also provide some incidental oil/water separation to temporarily detain oil or other floatable pollutants in runoff due to accidental spill or illegal dumping. Weirs and baffles are located within catch basins, manholes, tanks or vaults. Weirs are designed to restrict flow and baffles are designed to slow down flow. The Hydrodynamic System (HDS) removes finer sediment, particles, tree oil, and debris from urban runoff. This system uses an effective combination of weir-concentration and flow-control technologies to maximize treatment. It is not allowed as a standalone system but only as a treatment train. An HDS can be located in a catch basin type 2 / manhole or a vault. Weirs can also be located in ditches but are called ditch weirs under channel barriers.

Rating of Control Structures

No Defect	
MINOR (Do Nothing)	Very minor defects) (Trace of oil)
MODERATE (Do before next Assessment)	Needs some work within 6 months (Flow restrictor damaged)
SEVERE (Do within 2 months)	Need work now (Flow restrictor not functioning, oil thick at surface)



Frap-T



Control Structure



Data Assessment: Point Feature

A screenshot of a software form titled "Silt_CB". The "Control" tab is selected. The form has sections for "INFORMATION", "REPAIR", and "MAINTENANCE". Under "INFORMATION", there is a dropdown for "Control/WQ Structure Type" and a checkbox for "Cleanout Gate". Under "REPAIR", there are checkboxes for "Control/WQ Functioning" and "Control/WQ Damage". Under "MAINTENANCE", there is a checkbox for "Oil Presence".A screenshot of a software form titled "Tanks". The "Control" tab is selected. The form has sections for "INFORMATION", "REPAIR", and "MAINTENANCE". Under "INFORMATION", there is a dropdown for "Control/WQ Type" and a checkbox for "Cleanout Gate". Under "REPAIR", there are checkboxes for "Control/WQ Functioning" and "Control/WQ Damage". Under "MAINTENANCE", there is a checkbox for "Oil Presence".A screenshot of a software form titled "Vaults". The "Control" tab is selected. The form has sections for "INFORMATION", "REPAIR", and "MAINTENANCE". Under "INFORMATION", there is a dropdown for "Control/WQ Structure Type" and a checkbox for "Clean Out Gate". Under "REPAIR", there are checkboxes for "Control/WQ Functioning" and "Control/WQ Damage". Under "MAINTENANCE", there is a checkbox for "Oil Presence".

Attributes in form to be filled out:

Tab 3/4 – Control Structure

Control Structure Info

Information

- **Control/WQ Structure Type** – Type of control structure located within the feature (BAFFLE, BAFLE/FROP-T, FROP-T, HDS, NONE, OTHER, WEIR, SAND_FILTER, COALESCING_PLATES, DOWN TURNED ELBOW, FROP-B, DROP STRUCTURE, GATE VALVE)
- **Cleanout Gate** – Is there a cleanout gate (YES, NO)

Condition

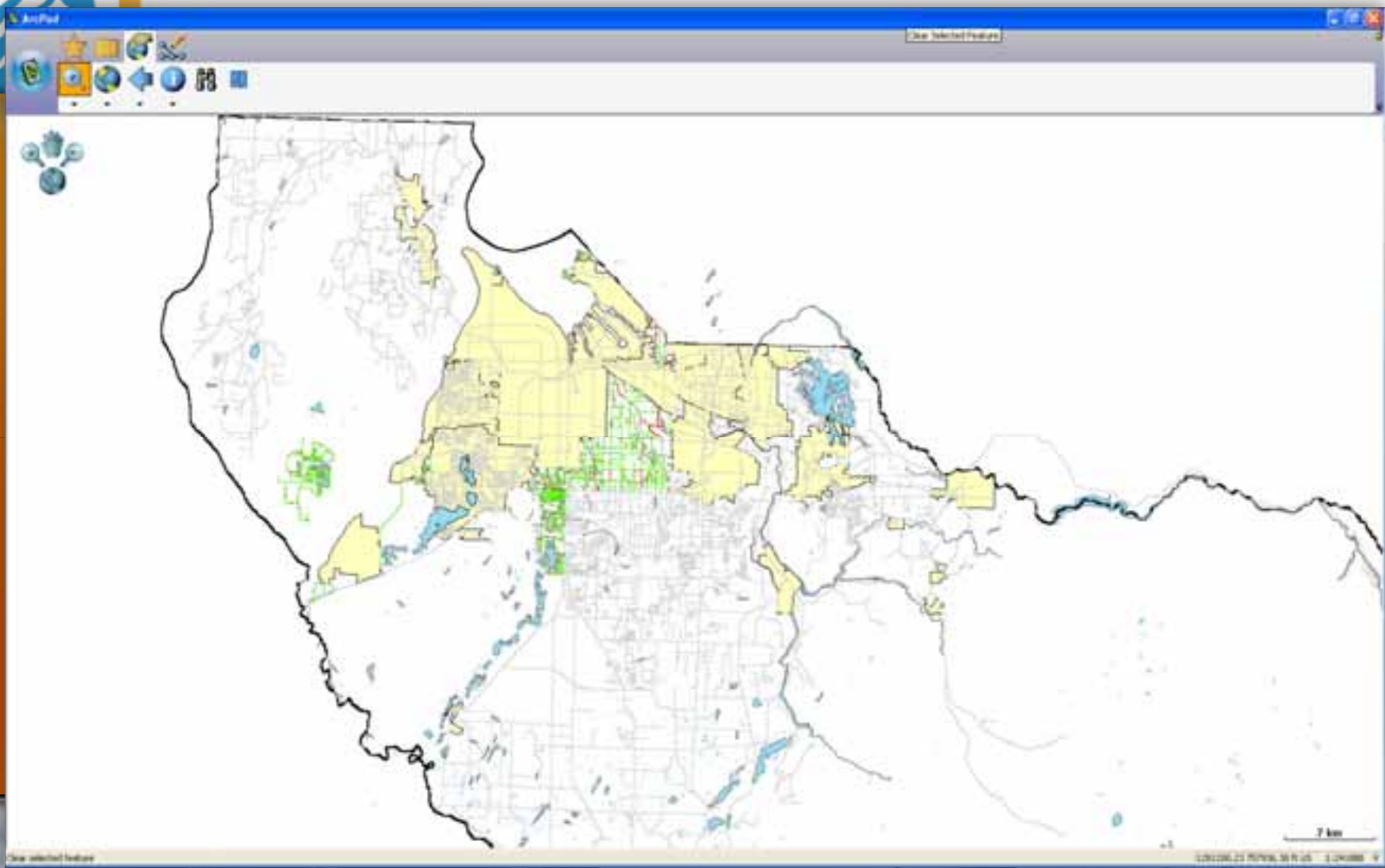
- **Control/WQ Functioning** – Is there flow restrictor functioning (N/A, YES, NO)
- **Control/WQ Damage** – Is there damage to the flow restrictor (YES, NO)
- **Oil Presence** – Is there an oil presence that completely covers the top of the water (N/A, YES, NO)

Required fields *italicized*



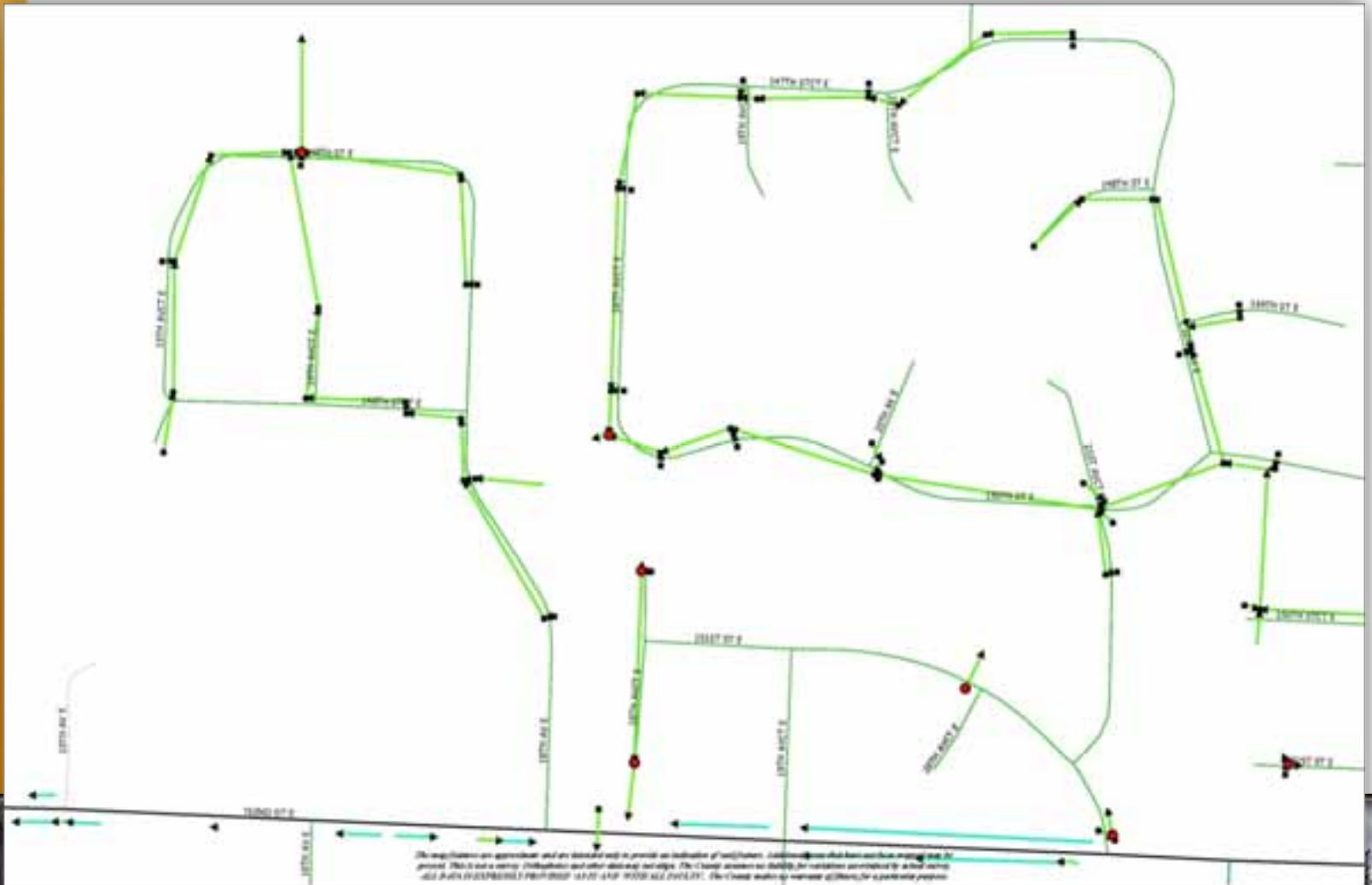


ArcPad – for Asset Inspections





Initial Inspection Example





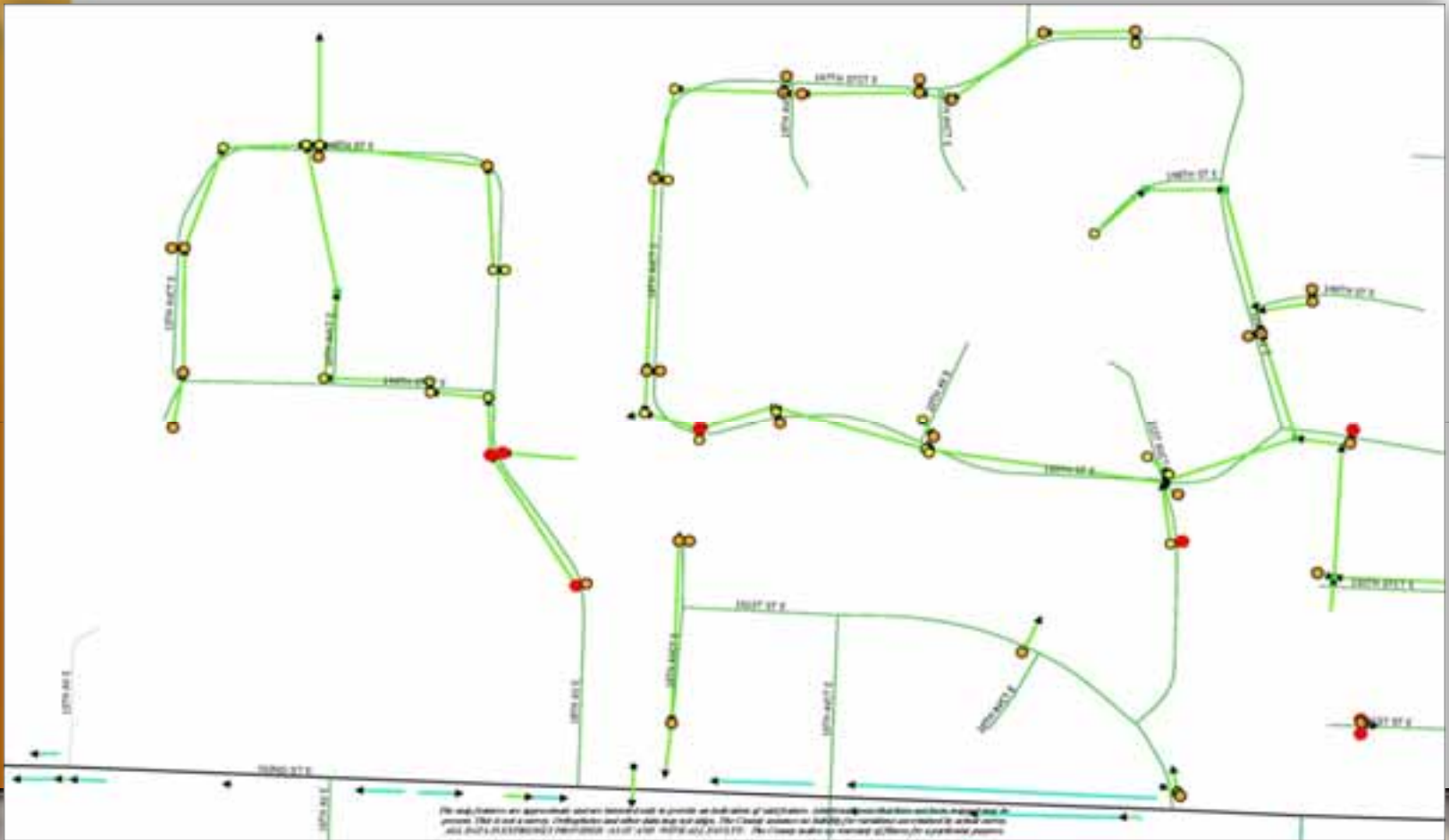
Upstream

Every time an inspection of a CB/MH occurs the inspector goes to the next 3 structures upstream from that CB/MH until you come across either 3 CB/MH's in a row that do not require cleaning (a score of 3 or less) or there are no more CB/MH's in that system.





Completed Inspection Example



CMMS



Asset Explorer

Assets Search

All

Pierce County Road Operations

- DISTRICT 1
- DISTRICT 2
- DISTRICT 3
- DISTRICT 4
- Facility
 - Bridges-Assets (Bridge-Inventory)
 - Drainage-PC
 - AMERICAN_LAKE (SWS_9)
 - BROWNS_DASH_POINT/TACOMA (SWS_1)
 - BROWN_DASH (SB_1A)
 - Drainage System (SS-8)
 - CB030408_r-13 (CB030408_r-13)**
 - SUMP_BAY (SB_1C)
 - TAYMA (SB_1B)
 - BUSWATER_CREEK (25)
 - ... BAY (2)
 - ... CREEK (3)
 - ... STEELACOON (6)

- MASHEL_RIVER (20)
- MID_NISQUALLY_RIVER (SWS_11)
- MID_PUYALLUP_RIVER (23)
- MUCK_CREEK (12)
- MUD_MOUNTAIN (13)
- OHOP_CREEK (14)
- SOUTH_PRAIRIE_CREEK (7)
- TAYMA WEST (18)

Hierarchy Structure
1.0 Watershed
1.1 Sub-Basin
1.1.1 Drainage Sub-System
1.1.1.1 Drainage Feature

CB030408_r-13 (CB030408_r-13) PK: 33092

Details GIS Related Info PMs Attach History

Specifications Materials Labor / Contacts Contracts Occupants

Specifications Add Remove

Name	Text Value	Date Value	Numeric Value	Minimum	Maximum	Optimal	WO on Failure?	Track Changes?
Condition								
Structure_Damage	0			0	3		—	✓
Control Structure								
Clean_Out_Gate							—	—
Control_Structure_Damage							—	✓
Control_Structure_Functioning							—	✓
Control_Structure_Type	NONE						—	—
Drainage Cleaning Criteria								
OIL_PRESENT							—	✓
SEDIMENT_LVL			6	0	3		—	✓
Drainage Structure								
Structure_Depth			53				—	—
Structure_Material	CONCRETE						—	—
SUMP_DEPTH			36				—	—
Lid								
Lid_Length			24				—	—
Lid_Shape	RECTANGLE						—	—
Lid_Type	HB						—	—
Lid_Width			18				—	—
Lid_Mat	METAL						—	—

Delete Generate History Print



Pierce County Asset Management Program

Drainage Maintenance Data Collection Procedures

This is for collection of maintenance information on drainage features within the ROW only

Additional items needed for maintenance data collection not associated with a vector truck:

- Laptop
- ArcPad 8.0
 - County Base Map Layer
 - Road Layer
 - Drainage Layer
 - Our Feature Shapefiles and Geodatabase
- USB GPS Navigation Receiver

Inspection Procedures and Guidelines

Guideline for Collection of Maintenance Information of Drainage Assets

The following inspection procedures offer a method of determining condition at time of maintenance by observing and recording the severities of defects or distresses in the feature:

- Visually identify the feature
- Identify the feature on the laptop in GIS by selecting the feature
- Note the items needed to fill out the form before cleaning the feature
- Fill out the form as much as you can, then clean the feature if needed
- If sediment level was scored a 5 or greater, move to the next feature upstream until you have either finished the system or have inspected 3 in a row that scored less than 5 which does not require cleaning. If the original feature had a sediment score less than 5 move on to the next assigned feature to be cleaned.

Notes:

The GIS form that is to be filled out is used for a condition assessment before maintenance is performed, but some information that is needed to be filled out might not be able to be collected before cleaning of the feature ex. Structure Condition, but should still reflect a before maintenance condition.

Rating of Catch Basin / Manhole

NONE (Do Nothing)	0 – No Defect
MINOR (Do Nothing)	3 – Very minor defects (Sediment greater than 1 foot from IE)
MODERATE (Do before next Assessment)	5,6 – Needs some work within 6 months (Sediment less than 1 foot from IE, grate low, cracks no sediment)
SEVERE (Do within 2 months)	7,9 – Need work now, affecting another asset (Grate high, cracks with sediment, grate or area around broken)

Procedures and Guidelines





Inspection & Cleaning Stats CB/MH's

- CB/MH inspected this year = 16,500 (1.1.11 Through 8.18.11 with over 15,000 from 3.7.11 to 5.24.11)
- CB/MH cleaned this year = 7,200
(1.1.11 Through 8.30.11 with over 6,100 from 3.21.11 to 8.30.11)
- Current percent of public CB/MH within the Right-of-Way inspected ~ 85%
- Estimated amount of sediment/pollutants removed this year from CB/MH Cleaned = 1,250 cu yds






Dollars Spent in 2011

- 40 Series (Actual Labor, Equipment, and Material)
 - **H (Mechanical Cleaning)** **\$599,583 EA**
 - **J (Jet Rodding of Pipe)** **\$140,854 LH**
 - **I (Inspection)** **\$272,736 LH**
 - **W (Decanting)** **\$16,423 TON**
 - Engineering (Estimated)
 - **Inspections/Program** **\$50,000**
- 2011** **\$1,079,596**





	Pierce County Public Works and Utilities Transportation Services Road Operations Division	Page 1 of 2
	<u>Maintenance Standard</u>	Effective Date 1/01/03
		Revision Date N/A

40H

Function:	Mechanically Clean Drainage Structure	Function Code:	40H
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Function Description

<p>Purpose: To prevent flooding, erosion and damage to road infrastructure and wildlife habitat. Drainage structure cleaning includes the inspection of the pipe body and/or adjacent ditch(s) to determine if further maintenance activities are required.</p>
<p>Procedure: Establish traffic control as necessary. If work is being conducted in or near a wet area, an approved Work Order and/or HPA must be on site. Install BMPs as needed or dictated by permit or work order. Remove debris from the drainage structure with a camel/vactor truck. Any generated waste materials shall be hauled to the assigned decant station. Inspect adjacent drainage features, and note any additional maintenance needs.</p>
<p>Quality: The drainage structure shall be clear of all materials to the bottom of the structure. All work shall be recorded on the appropriate Regional Road Maintenance Guideline checklist.</p>
<p>Inspection: As soon as is practicable upon completion of work, the site shall be reviewed by a Lead Worker or Supervisor. The inspection shall ensure that the scope of work completed meets service level expectations and environmental requirements.</p>

Resource Requirements

Labor		Equipment				Materials		
Job Class Code	Job Class Description	Hours / Work Unit	Equip. Code	Equip. Description	Hours per Work Unit	Material Code	Material Description	Quantity per Work Unit
9018	FS	0370	005H	Crew Cab, Pick up	0200	PY05	Vactor Solids	3.6600
9154	MT	1.1400	006K	Camel	5640	PY06	Vactor Liquids	77.0600
9151	MW	0540				7000	Water	14.4730

Note - Traffic Control For This Function Charged To: **40T**

Hand Tools	Power Tools	Consumable	Safety
Round Point Shovel Grate Hook Lid Wrench Flash Light Pole Pole Pole Tonge Potato Hook Pry Bar Sledge Hammer			PPPE Gas Monitor Rubber Boots Rain Gear Safety Glasses Hearing Protection

Planning and Control Data

Unit Cost (Operations)	Average Daily Production	Average Annual Production		Average Production per Lane Mile	% of Total Annual Budget
		Work Units	Costs		
\$67.58 per Each	40 Each (8 hour day)	3,073 Each	\$140,468.62	6685 Each per Mile	0064%





Pierce County's

