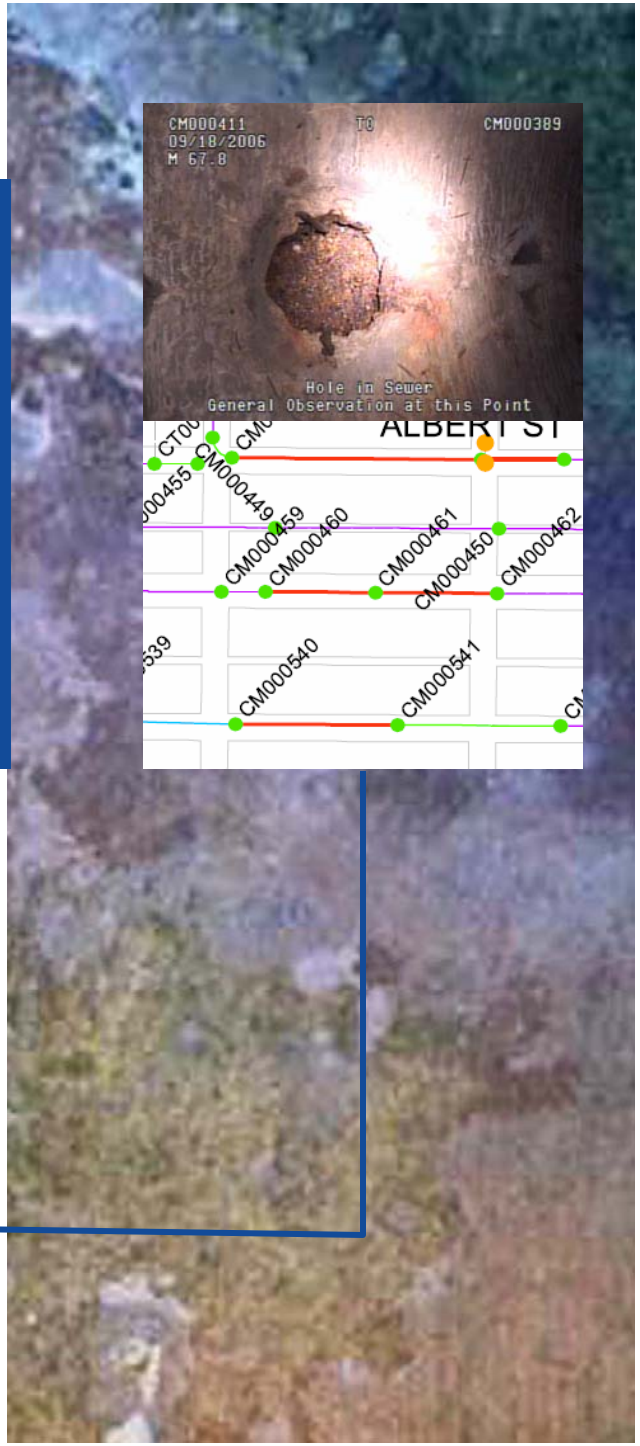
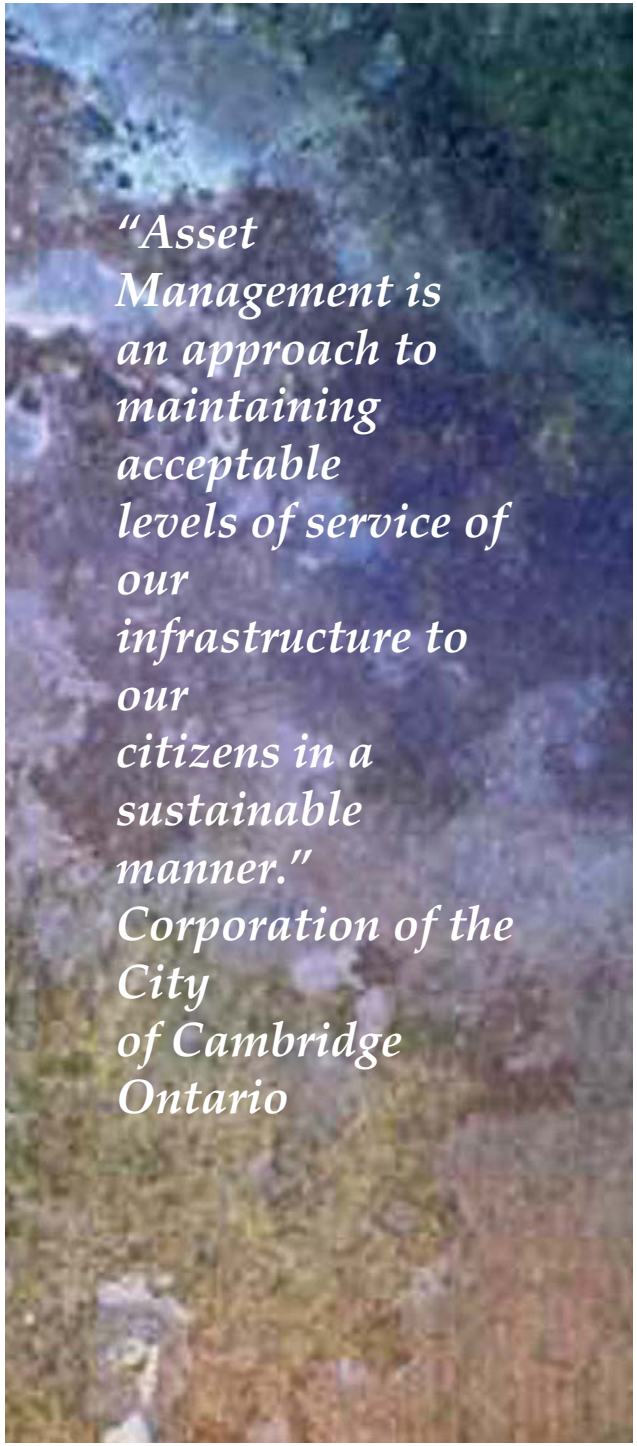
Mapping Your Assets Conditions & Concepts



AGENDA

- Asset Collection
- Asset Attributes
- Condition Assessment
- Asset Mapping
- PSAB 3150
- Lifecycle Costing Analysis

Rehabilitation/Replacement



What do you have?

The first thing your agency must do is to identify what infrastructure assets you have.

Asset Collection

What do you want to collect?

~ Do you wish to concentrate on one asset type such as sanitary sewers?

~ Would you rather do a mass data collection of all asset types?

~ How do you collect ?

~ From as-builts, GPS field collection, CCTV video pickup, air photos, ArcPad, other mobile devices…

Burnaby

~ Burnaby has used Hansen Information Technologies software for last 14 years

~ Phased approach to data collection and recording

~ Used as-built information supplemented by field survey and other paper records such as service connection cards

~ We continue to use as-built information, supplemented by GPS collection and CCTV information

~ Expect to begin using some field based mobile data collection solutions this year

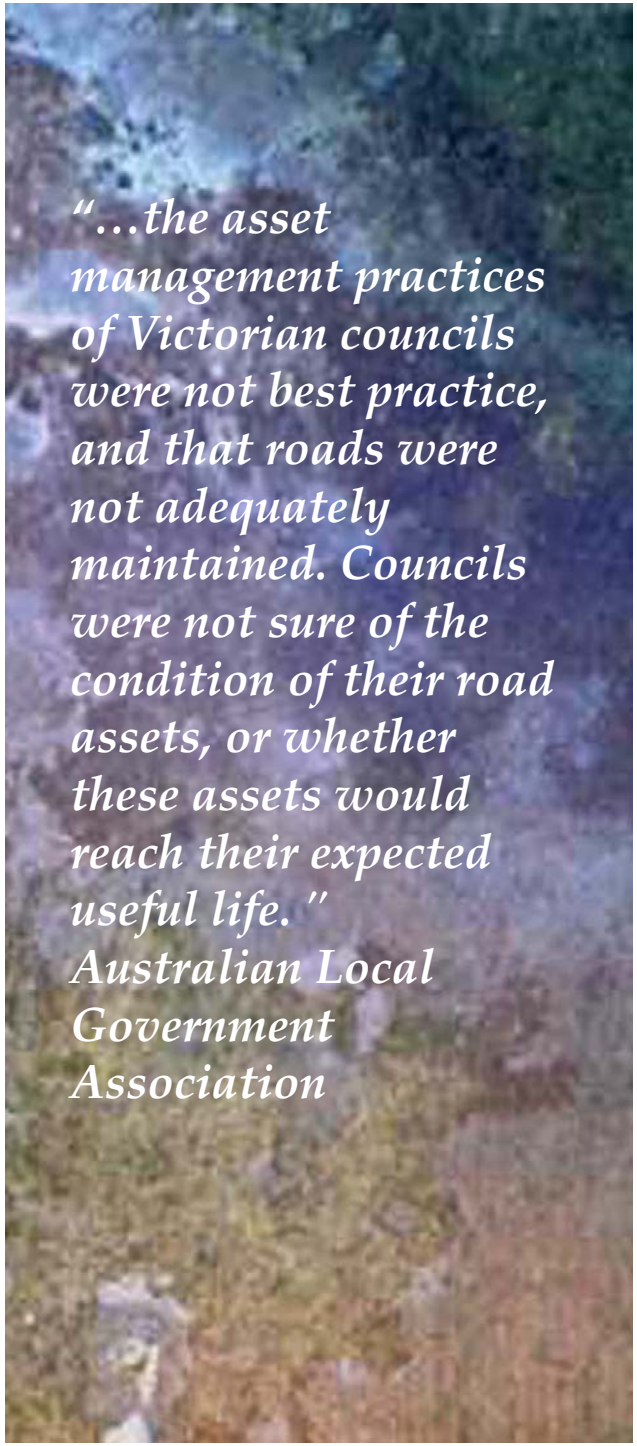
Attributes

What level of attribute detail do you want to collect ?

~ Street Light – pole height, shape, colour, curb offset, base type, luminaire type, wattage, ballast type, photocell, installation date, distribution base, service point, secondary lights, attached signs, number of wires, conduit size…

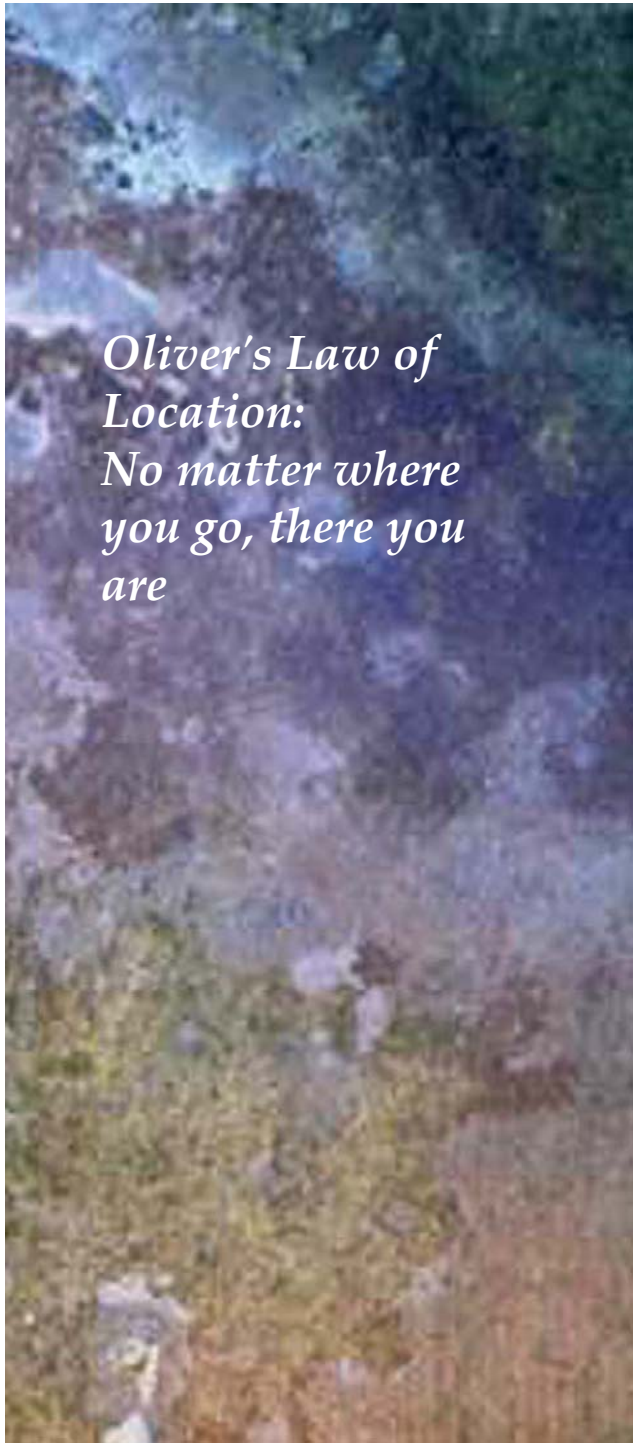
Where is it ?

Once you have determined what assets you are collecting, you must determine how to reference that asset for location purposes.



Location

- Reference by address – in front of 4949 Canada Way
- Reference asset by location – 3.0m east of the west property line
- Reference to another asset – 6.0m north of hydrant 1234
- Reference by spatial location – determined by field survey traverse, total station, GPS, etc

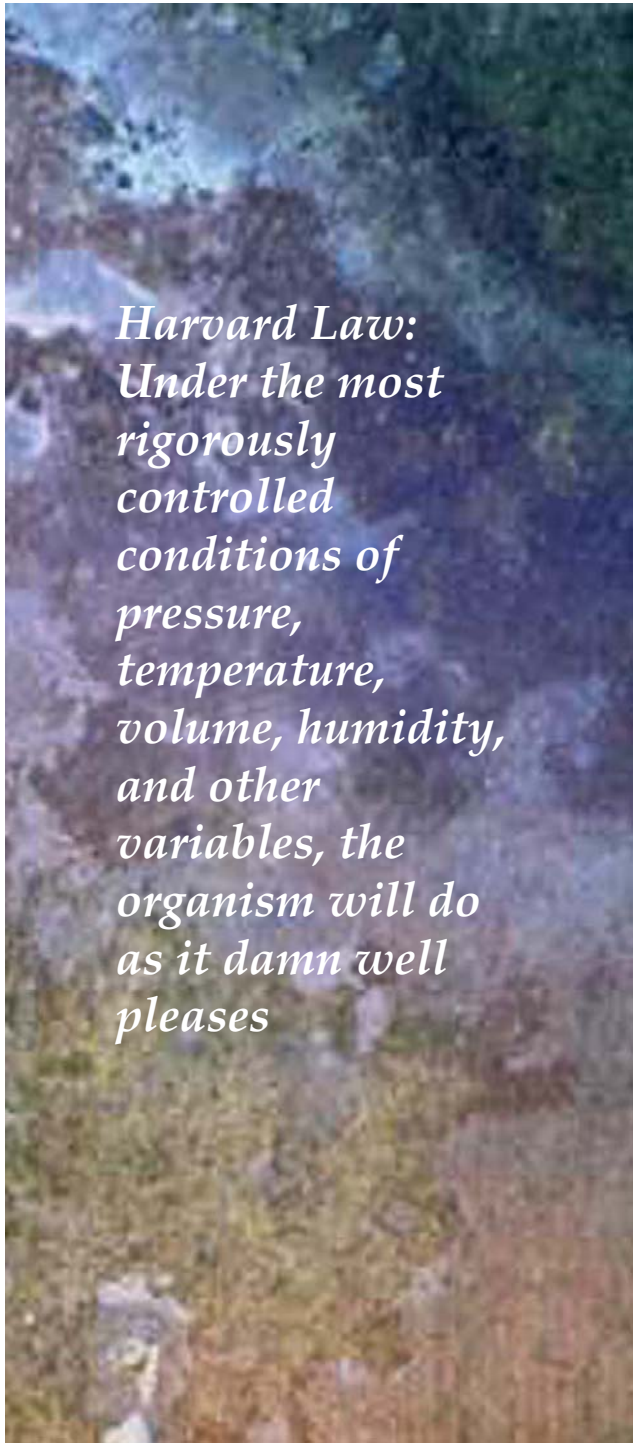


Burnaby

Water mains ~ 704 Km
Sewer mains ~ 600 Km
Storm mains ~ 600 Km
Sidewalks ~ 675 Km
Intersections ~ 370
Street lights ~ 12,200
Catch basins ~ 19,500
Vehicles ~ 680
Equipment ~ 13,300
Signs ~ 30,000
Water services ~ 36,600
Sewer services ~ 36,300
Storm services ~ 17,000
Buildings ~ 1200
Water meters ~ 3,700
Images ~ 37,000
Addresses ~ 43,500
Parcels ~ 37,300
Inspections ~ 85,000
Customer Service ~ 66,000
Work orders ~ 490,000
Total Infrastructure Assets ~ 370,000

Condition

Determine the indicators you will collect data on in order to allow you to determine the condition of the asset.

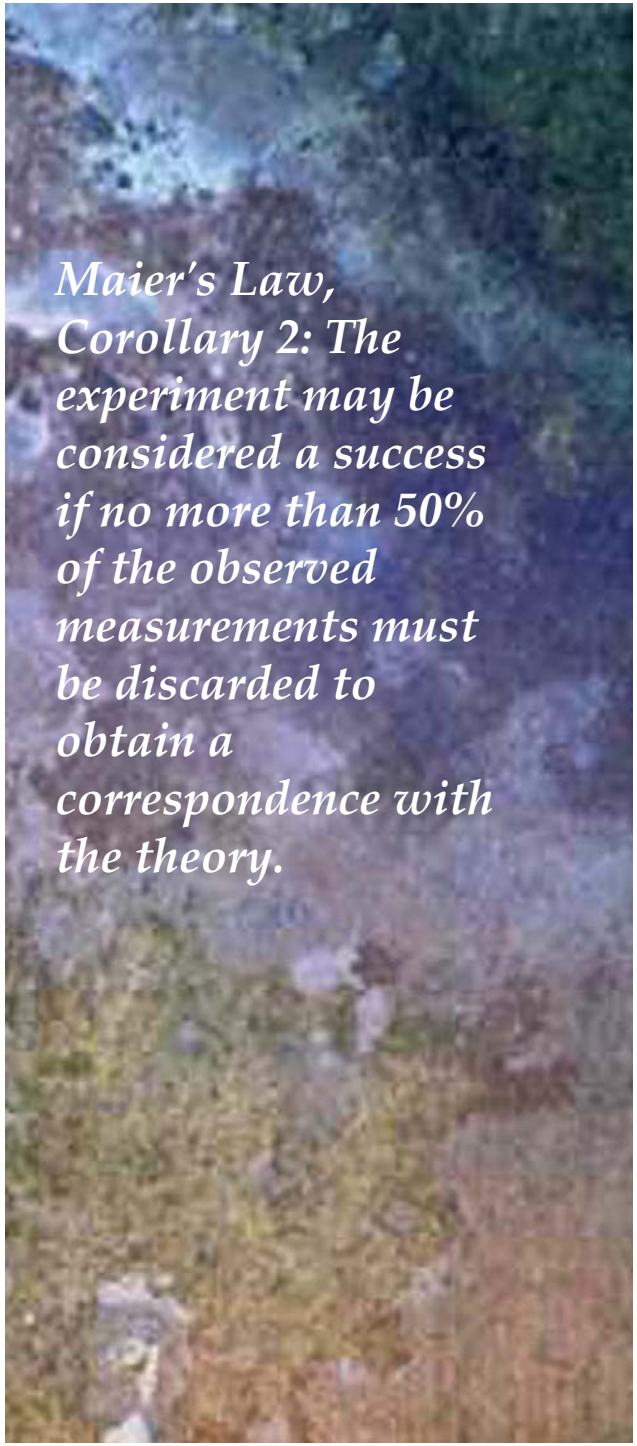


Asset Condition

- Streets – Pavement Quality index (PQI) (RCI, SAI, SDI)
- Sanitary/drainage sewers – WRc rating for structure and service
- Sidewalks – trip rating, surface
- Water/storm/sewer mains – capacity modeling

Hydrant – flow testing, annual inspections

- Water meters – AWWA testing
- etc….

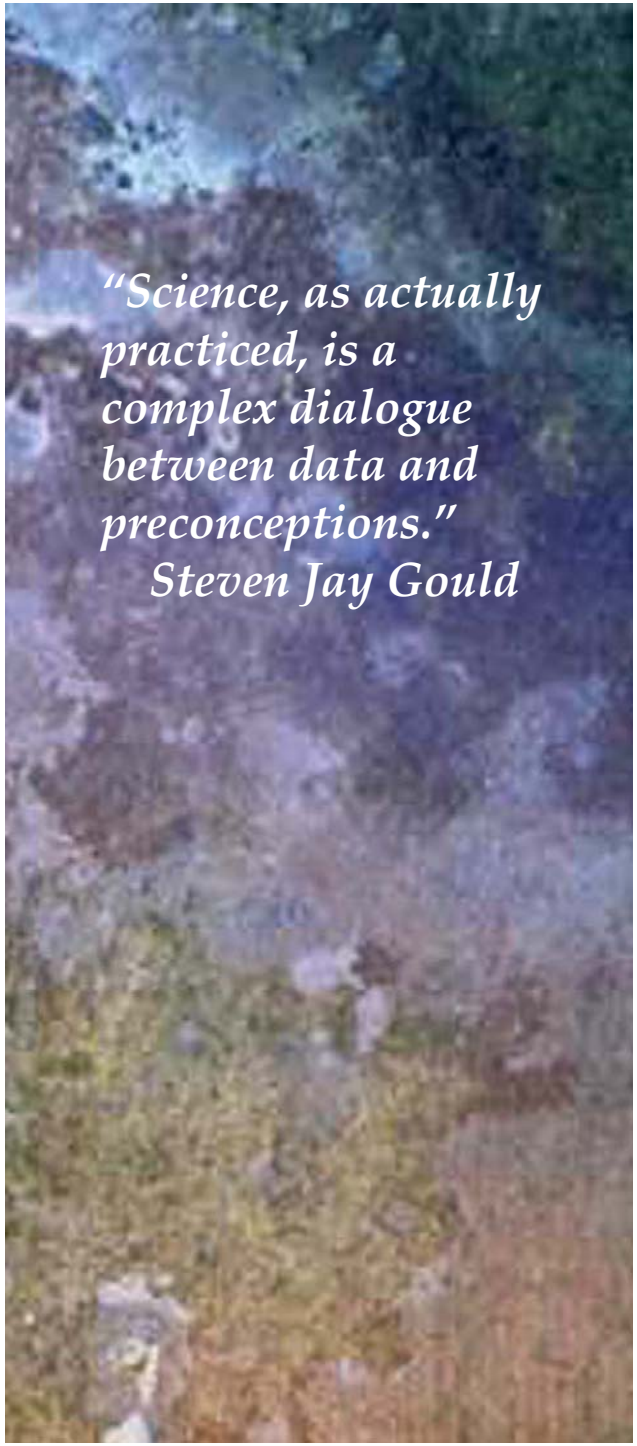


Data

~ Collecting the data to support your project will be one of your major considerations, it can be up to 80% of the project cost

~ Make allowances for analyzing the data and developing asset management plans, particularly focusing on the funding implications, both short and long term

~ Development of a set of procedures to ensure there is a mechanism for data maintenance for new assets, changes and removals



Considerations

Resources:
Ensure that sufficient staff resources are allocated to both the project and ongoing support

Processes and Practices:
Documenting these is very important for ongoing training and review

Support:
Buy-in by Department and Divisional managers and supervisors to ensure changes and procedures will be supported

Notes

Information systems:
Good communication and support for hardware acquisition and database maintenance from your IT group

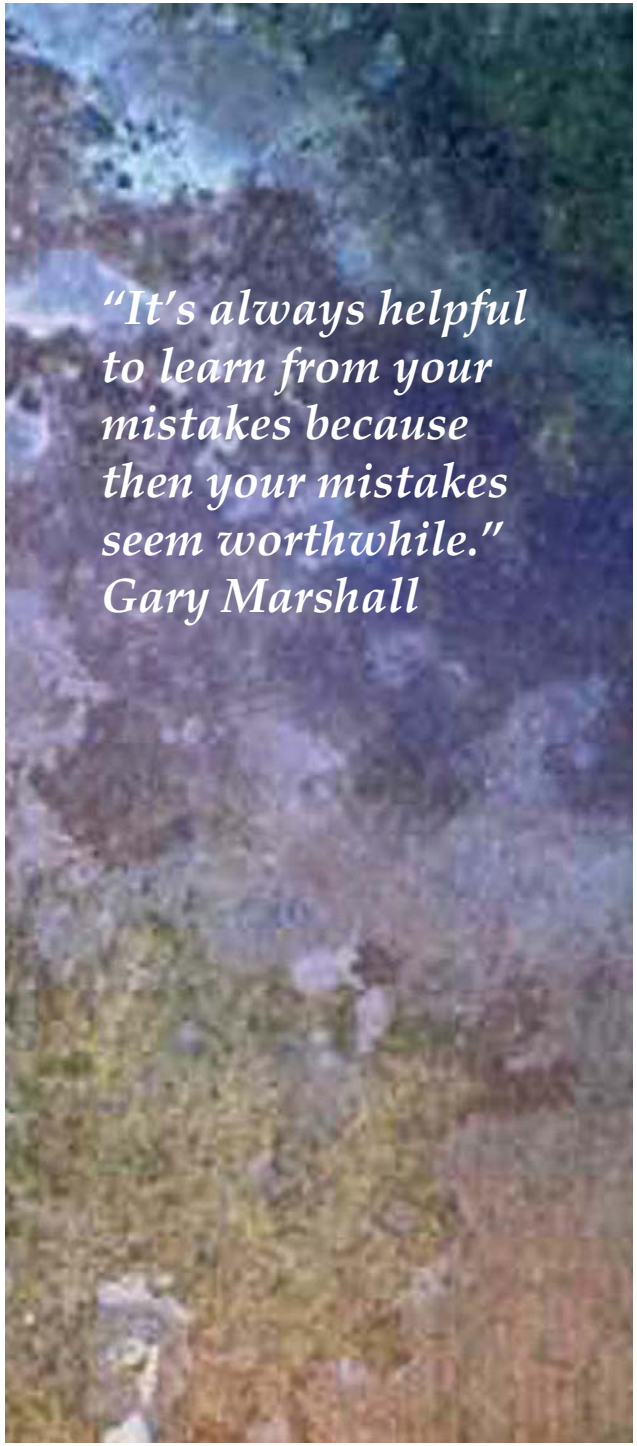
Change management:
Resistance to change of business processes and procedures – requires strong management support and persistence

Training:
On-going – provide the resources to deal with this

Communication
Sell your product, make all staff aware of what you are doing, why it is done and how it will help them in their job – get feedback from them as well

Burnaby notes

We underestimated resource requirements
~ As each phase was added support requirements grew
~ Try to separate ongoing upgrades and development from support
Reporting
~ Getting value from the data held in the system by reporting for asset inventory, conditions and costs
~ Documentation of processes and procedures was poor. It is important as it provides decision history, assists in training and is used for communicating to other groups (internal and external)



Asset Mapping

~ In Burnaby, we implemented a close-coupled linking approach to mapping asset information

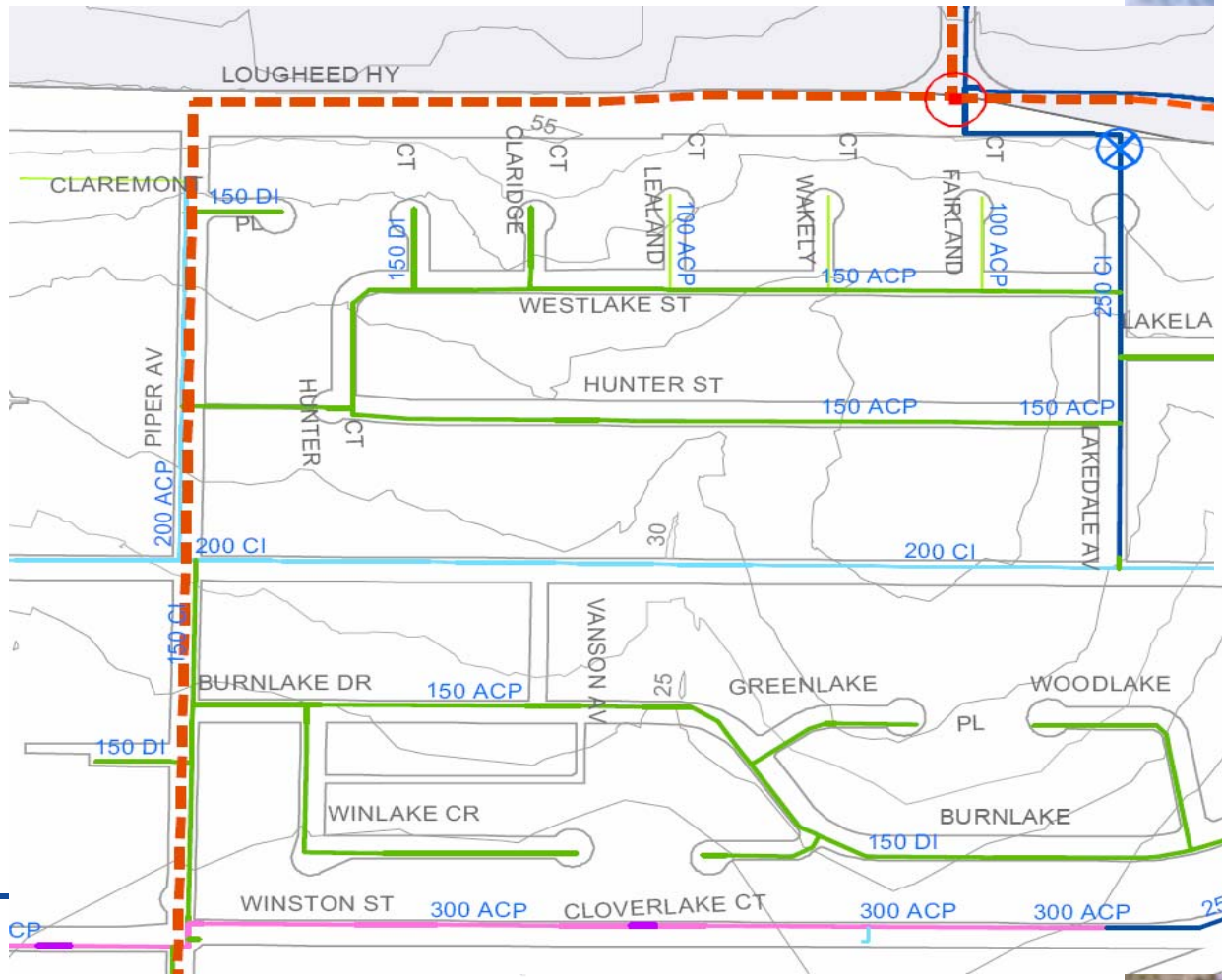
~ We use Hansen's Geo-Administrator product for data synchronization and QA/QC with ESRI's ArcGIS

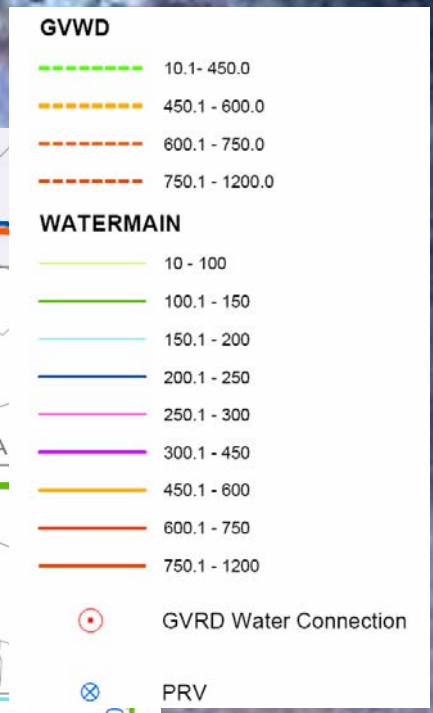
~ Basic concept that if an asset exists in the Hansen database, then it must have a equivalent point, line or polygon in the GIS

Asset Mapping

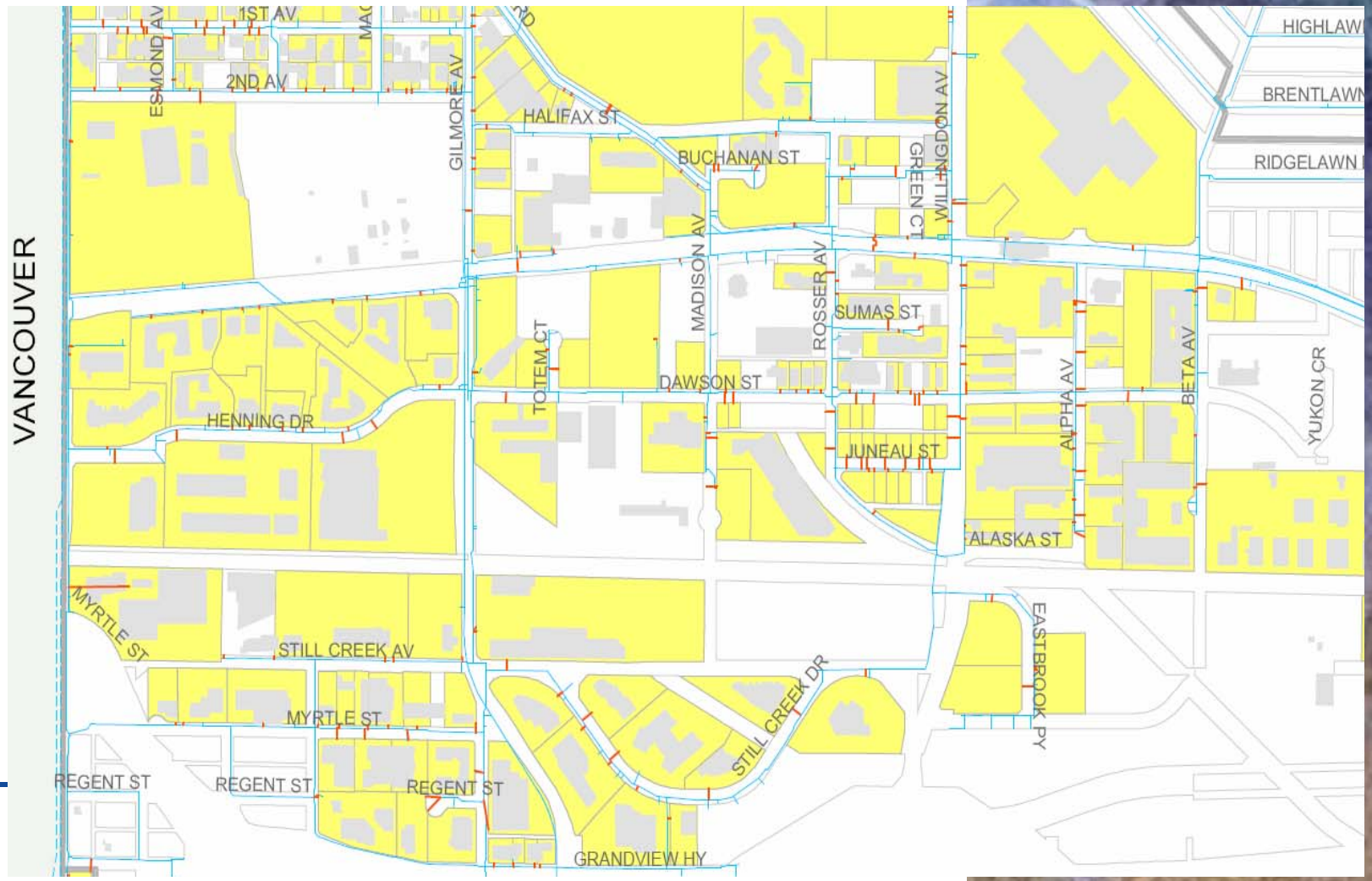
- Presentation of infrastructure asset information by attribute type selection – all 150mm AC water mains
- Presentation by condition – all sewer mains with WRc Structural grade value => 5
- Presentation by location information – all assets associated 4949 Canada Way

Water mains by size

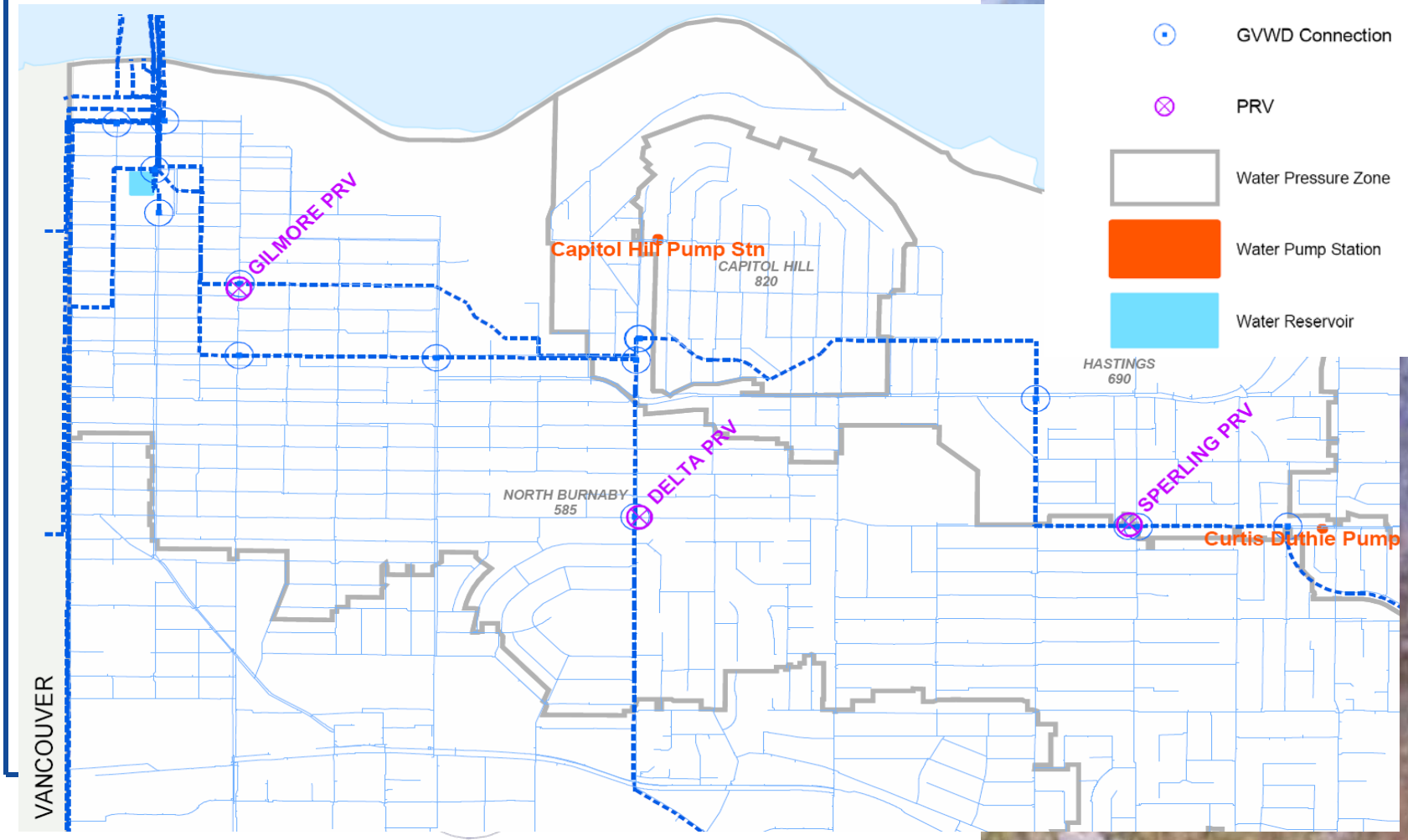




Metered properties



Water Network



Seismic Issues

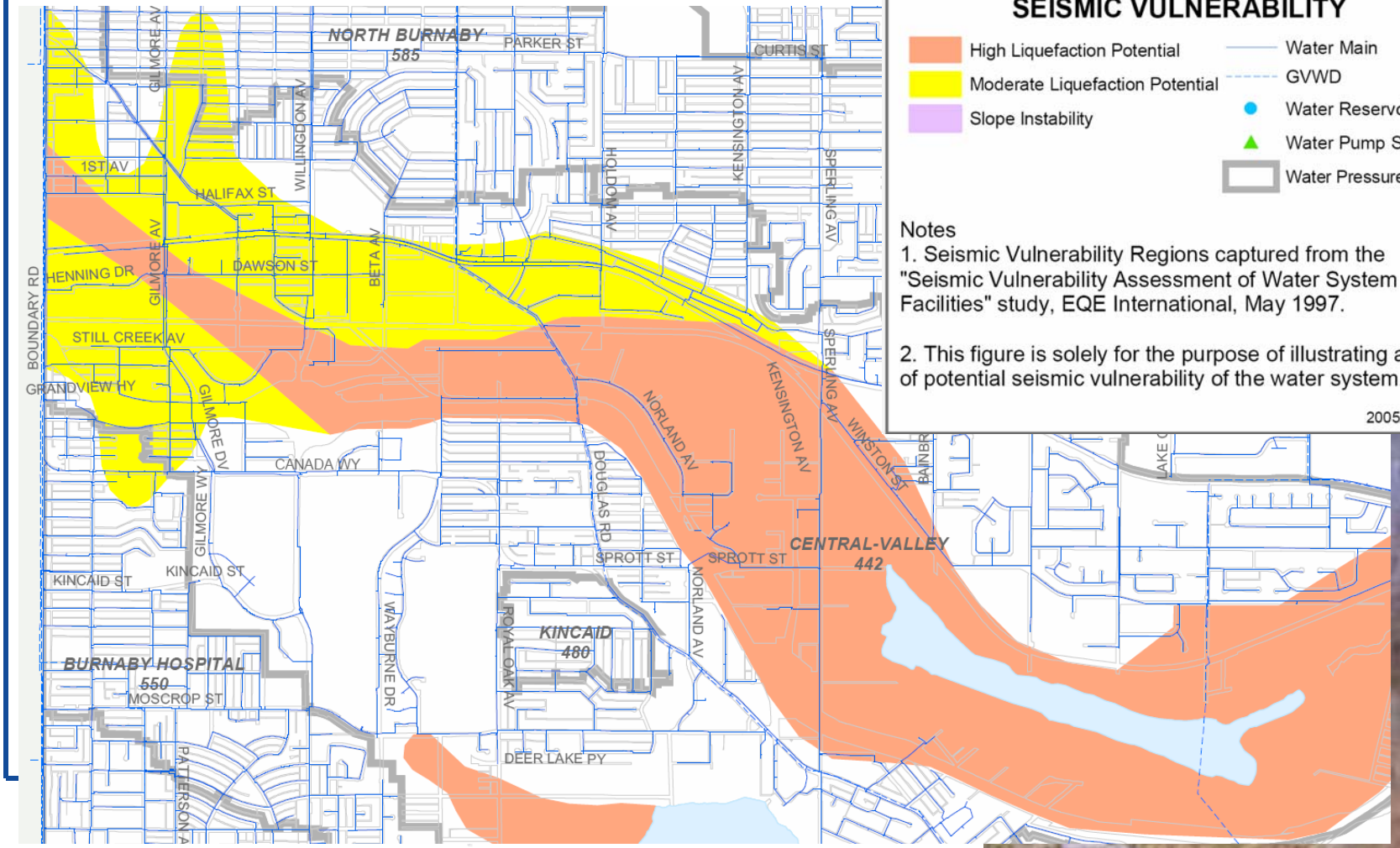


FIGURE 2.3

WATER NETWORK SEISMIC VULNERABILITY

- High Liquefaction Potential
- Moderate Liquefaction Potential
- Slope Instability
- Water Main
- GVWD
- Water Reservoir
- Water Pump Station
- Water Pressure Zone

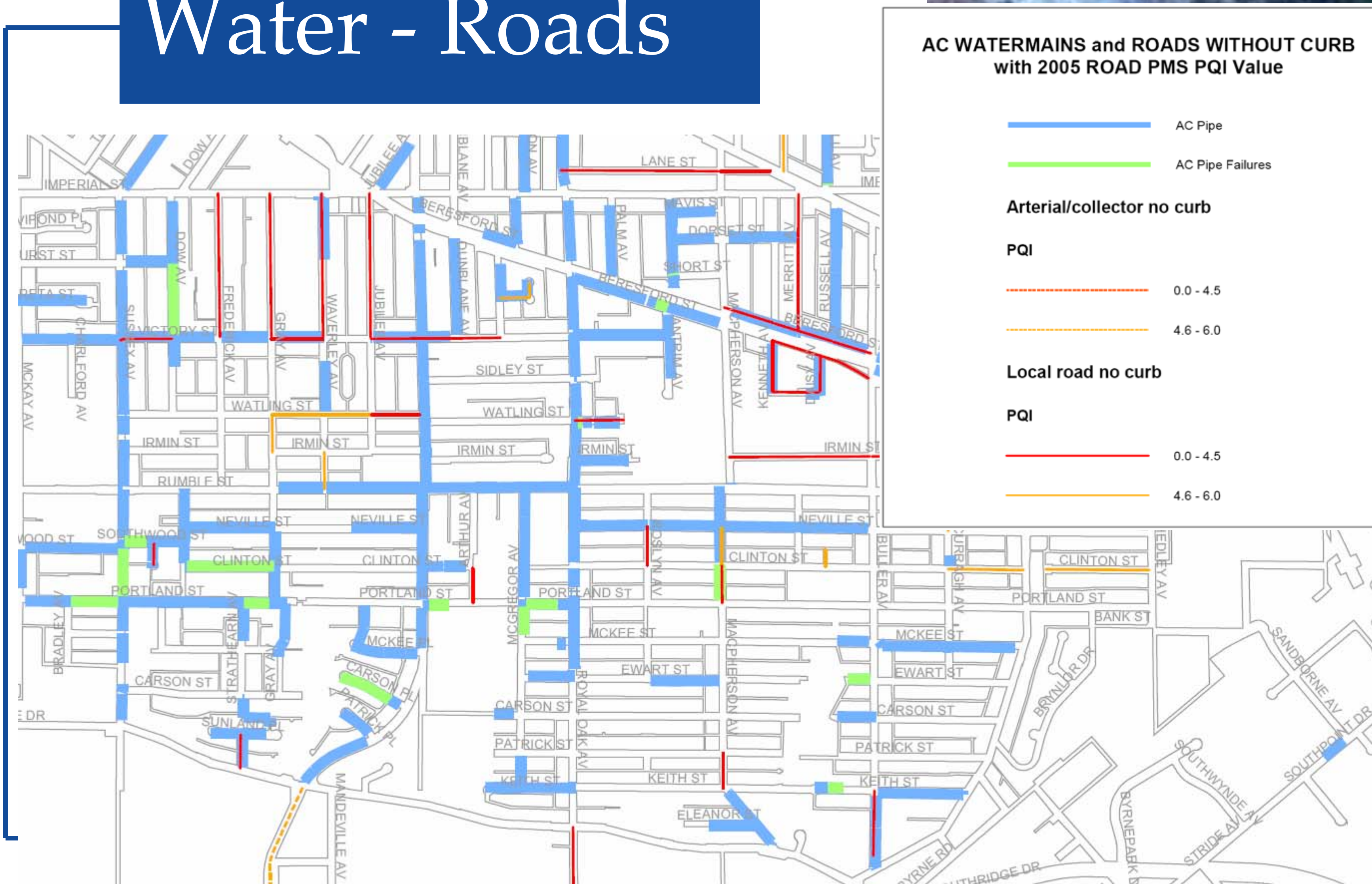
Notes

1. Seismic Vulnerability Regions captured from the "Seismic Vulnerability Assessment of Water System Facilities" study, EQE International, May 1997.

2. This figure is solely for the purpose of illustrating areas of potential seismic vulnerability of the water system.

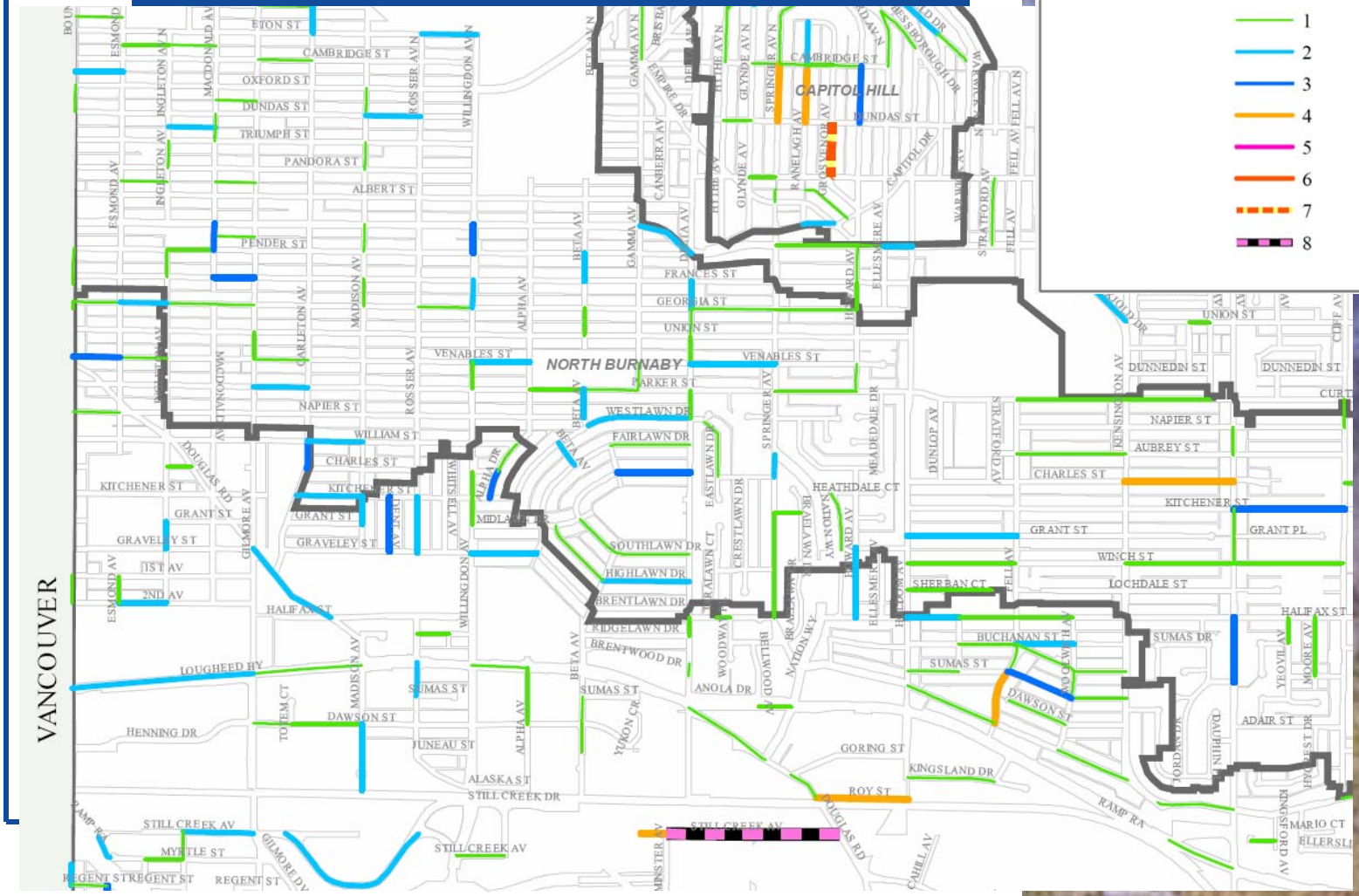
2005/10/26

Water - Roads

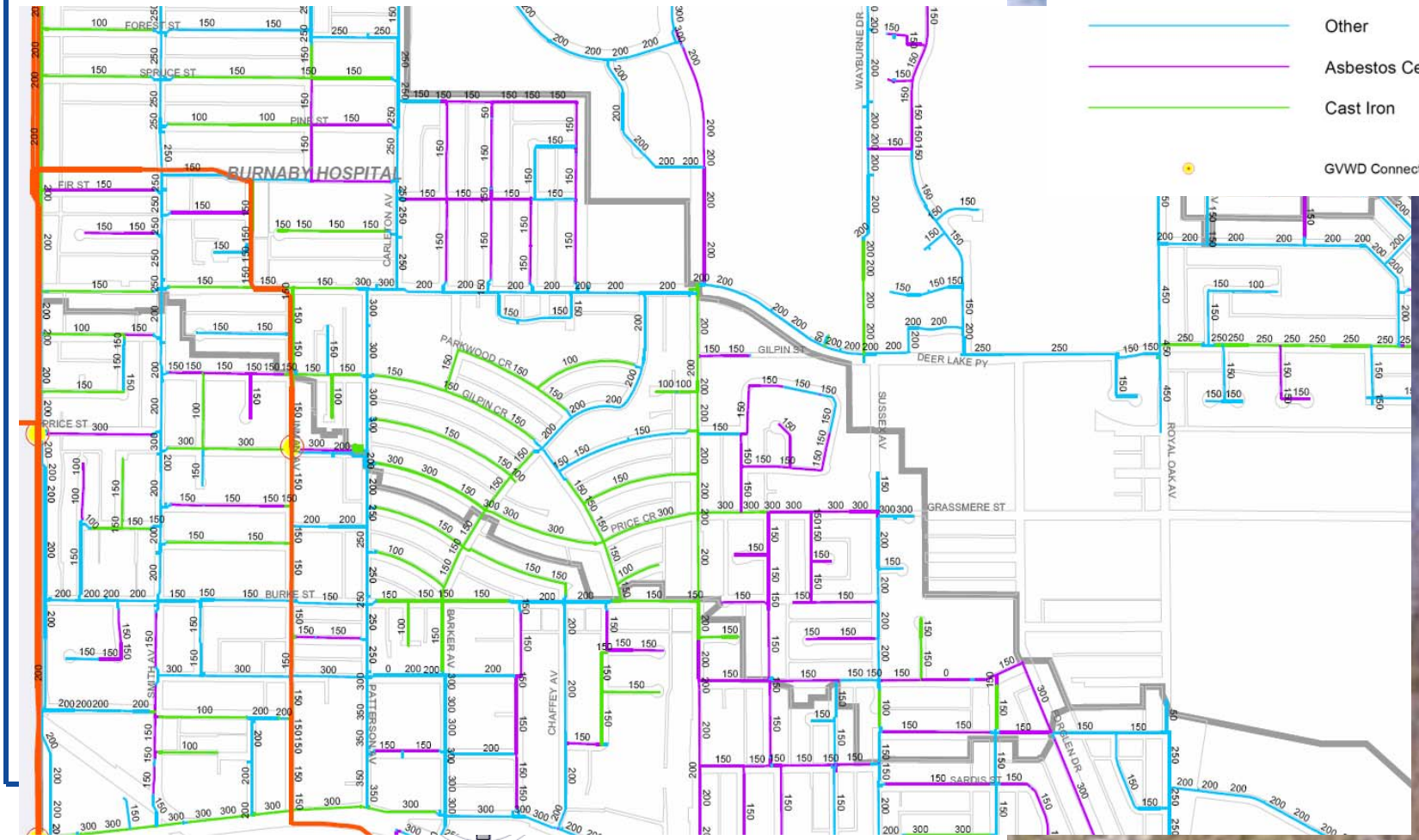


AC WATERMAINS and ROADS WITHOUT CURB
with 2005 ROAD PMS PQI Value
AC Pipe
AC Pipe Failures
Arterial/collector no curb
PQI
0.0 - 4.5
4.6 - 6.0
Local road no curb
PQI
0.0 - 4.5
4.6 - 6.0
LANE ST
IMPERIAL ST
BERESFORD ST
DORSET ST
SHORT ST
VICTORY ST
SIDLEY ST
WATLING ST
IRMIN ST
RUMBLE ST
NEVILLE ST
SOUTHWOOD ST
CLINTON ST
PORTLAND ST
MCKEE ST
EWART ST
CARSON ST
PATRICK ST
KEITH ST
ELEANOR ST
BANK ST
SUNLAND PL
FREDERICK AV
GRAY AV
WAVERLEY AV
JUBILEE AV
DUNBLANE AV
BLANE AV
PALM AV
ANTRIM AV
MACPHERSON AV
MERRITT AV
RUSSELL AV
MCKAY AV
CHURLFORD AV
BRADLEY AV
STRATHEARN AV
MCGREGOR AV
ROYAL OAK AV
ROSLYN AV
BULLER AV
MANDEVILLE AV
SANDBORNE AV
SOUTHPOINT DR
SOUTHWYNDE AV
STRIDE AV
BYRNEPARK DR
SOUTHRIDGE DR
BYRNE RD

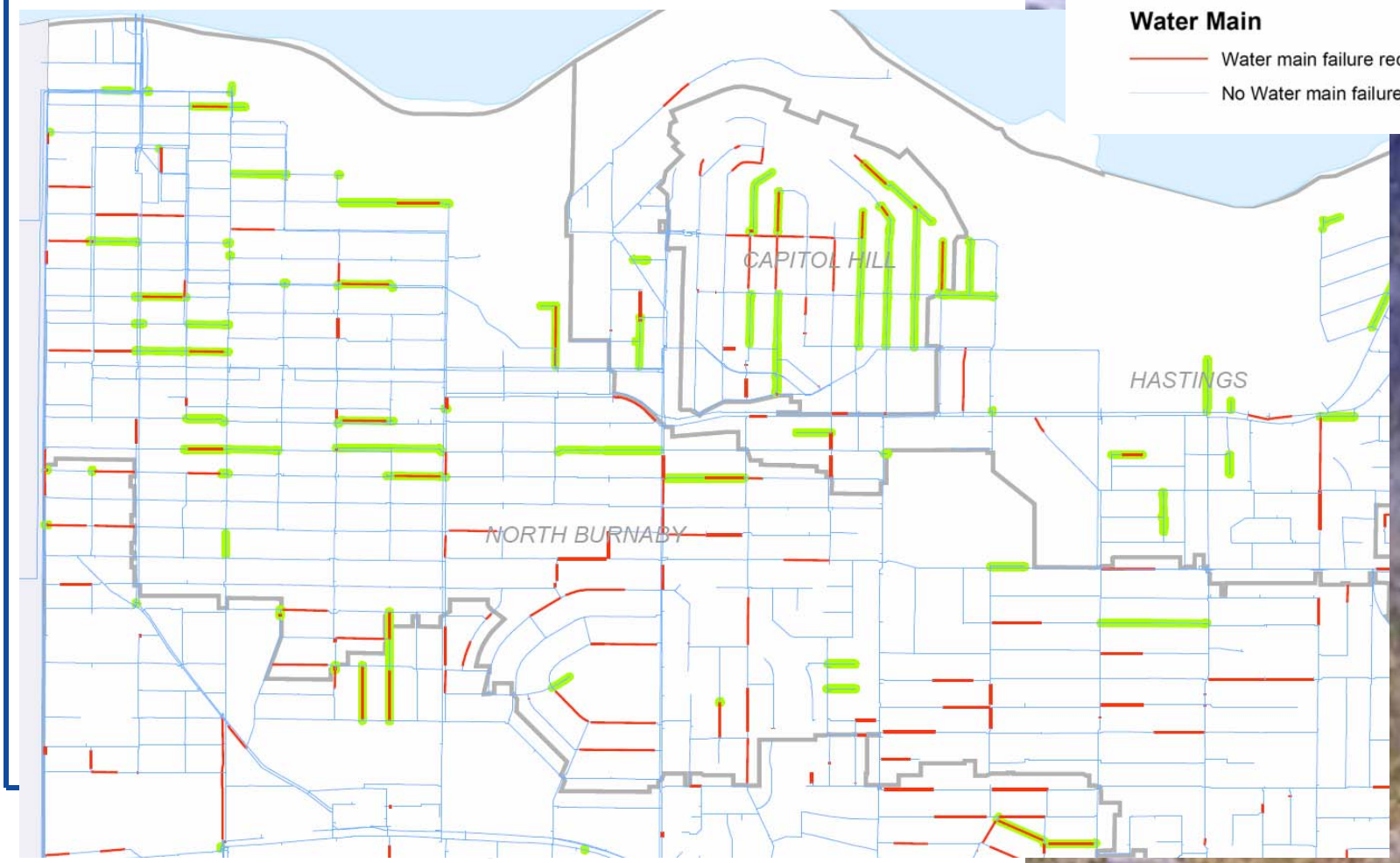
Failure by segment



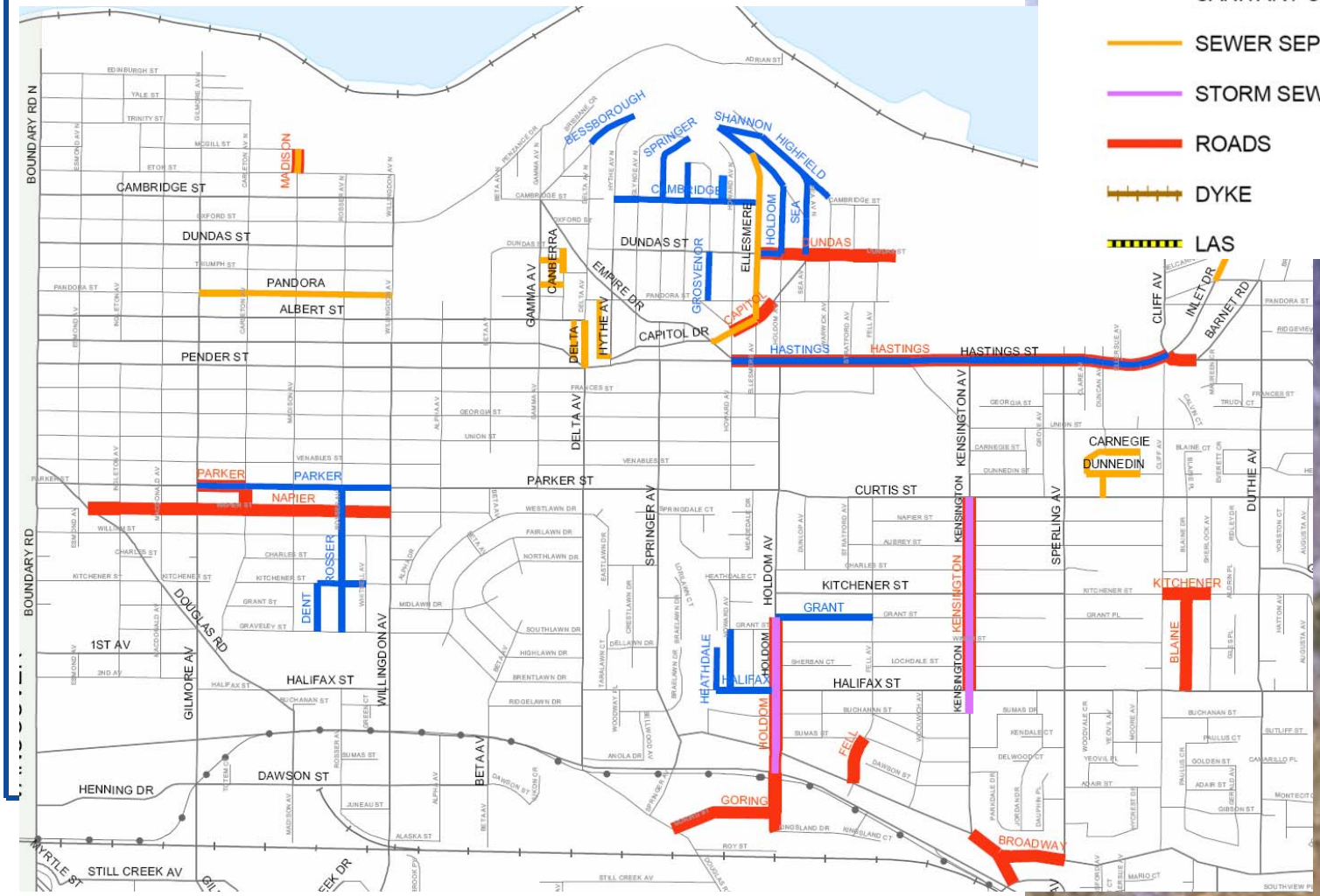
Water mains- material



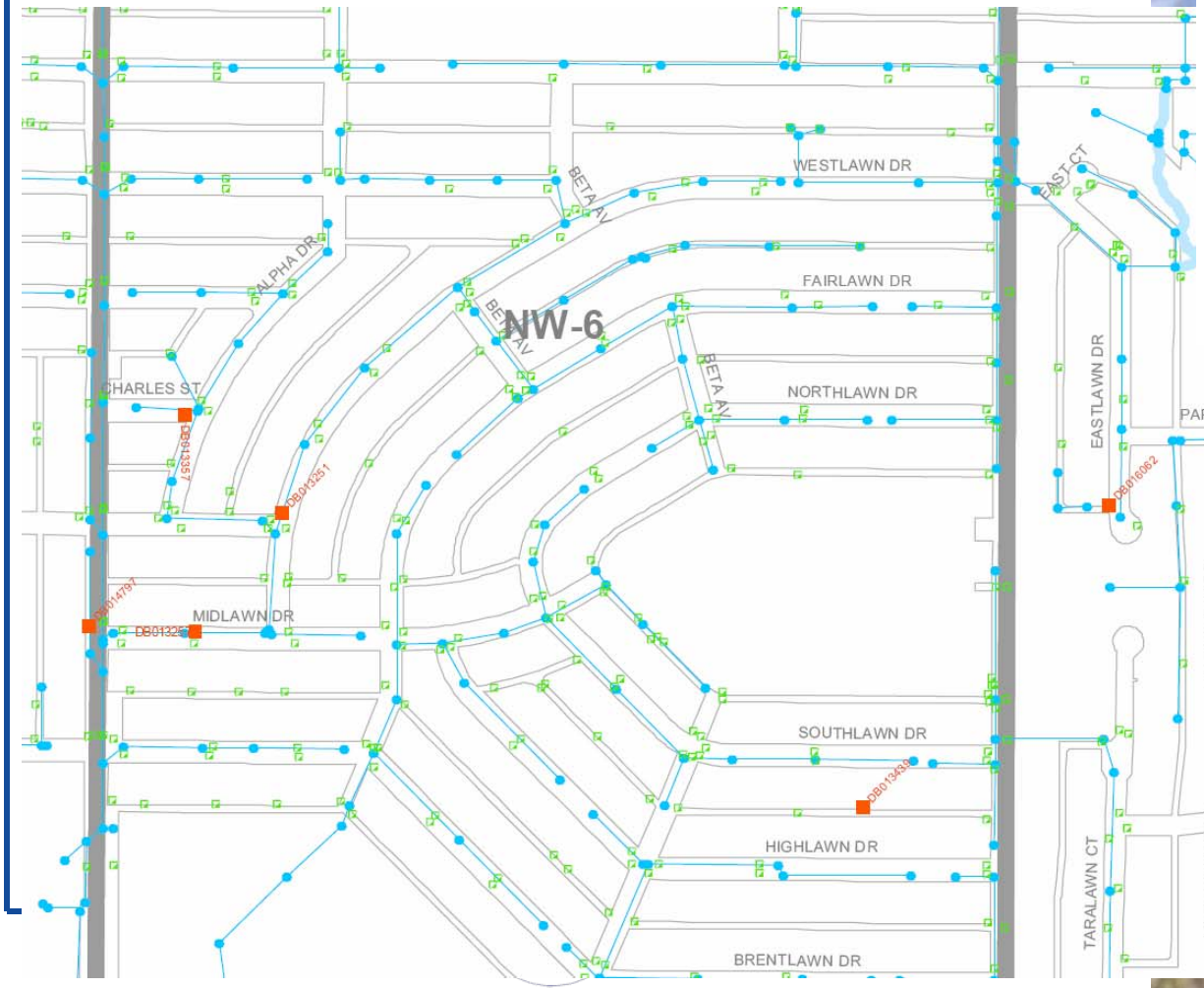
Water main failures

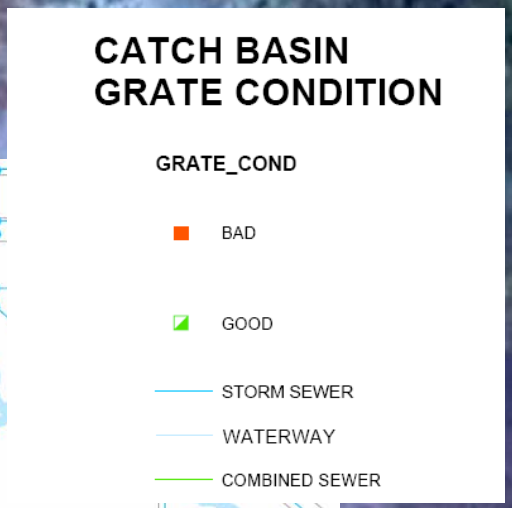


Capital Works

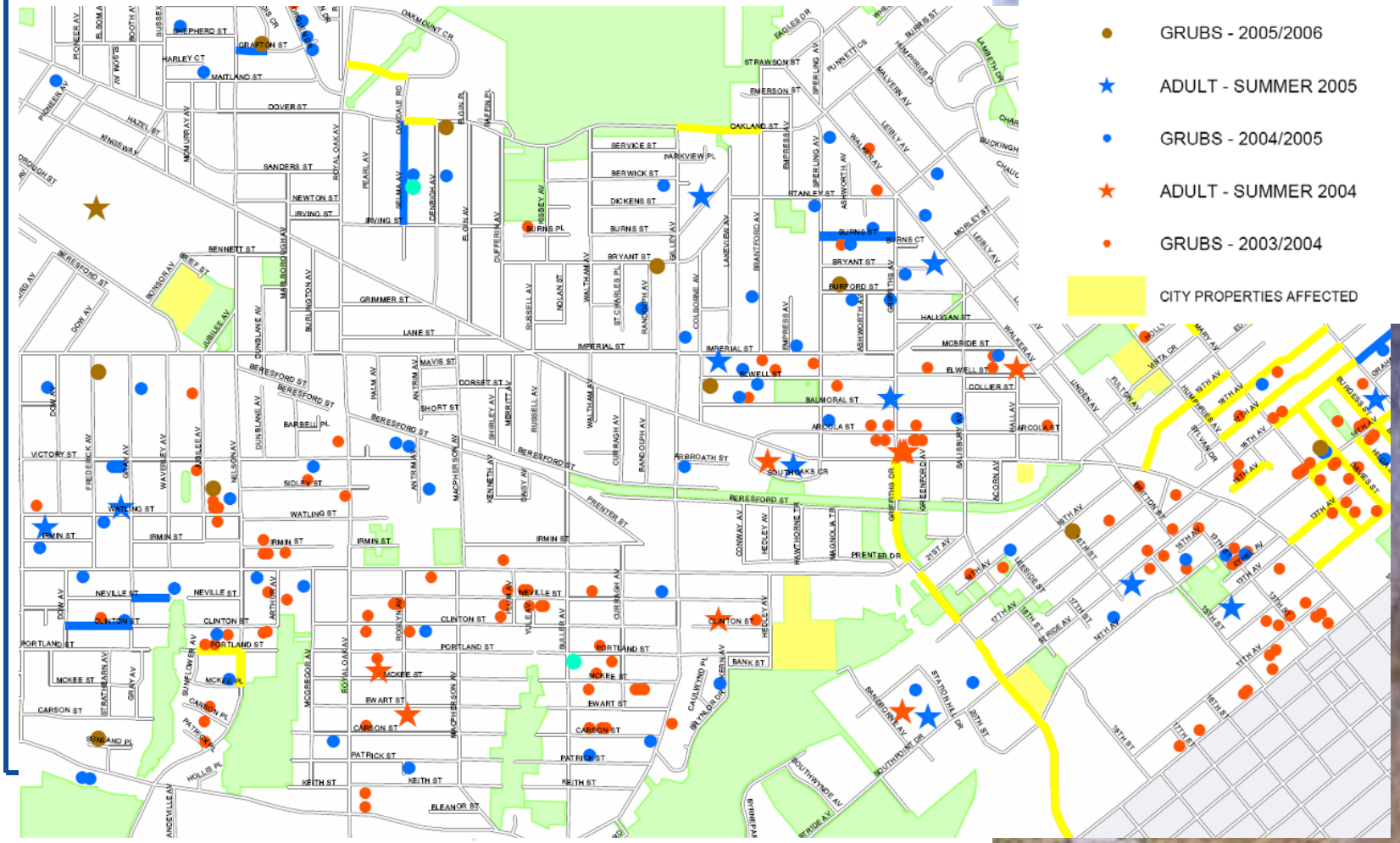


Catch Basin grates

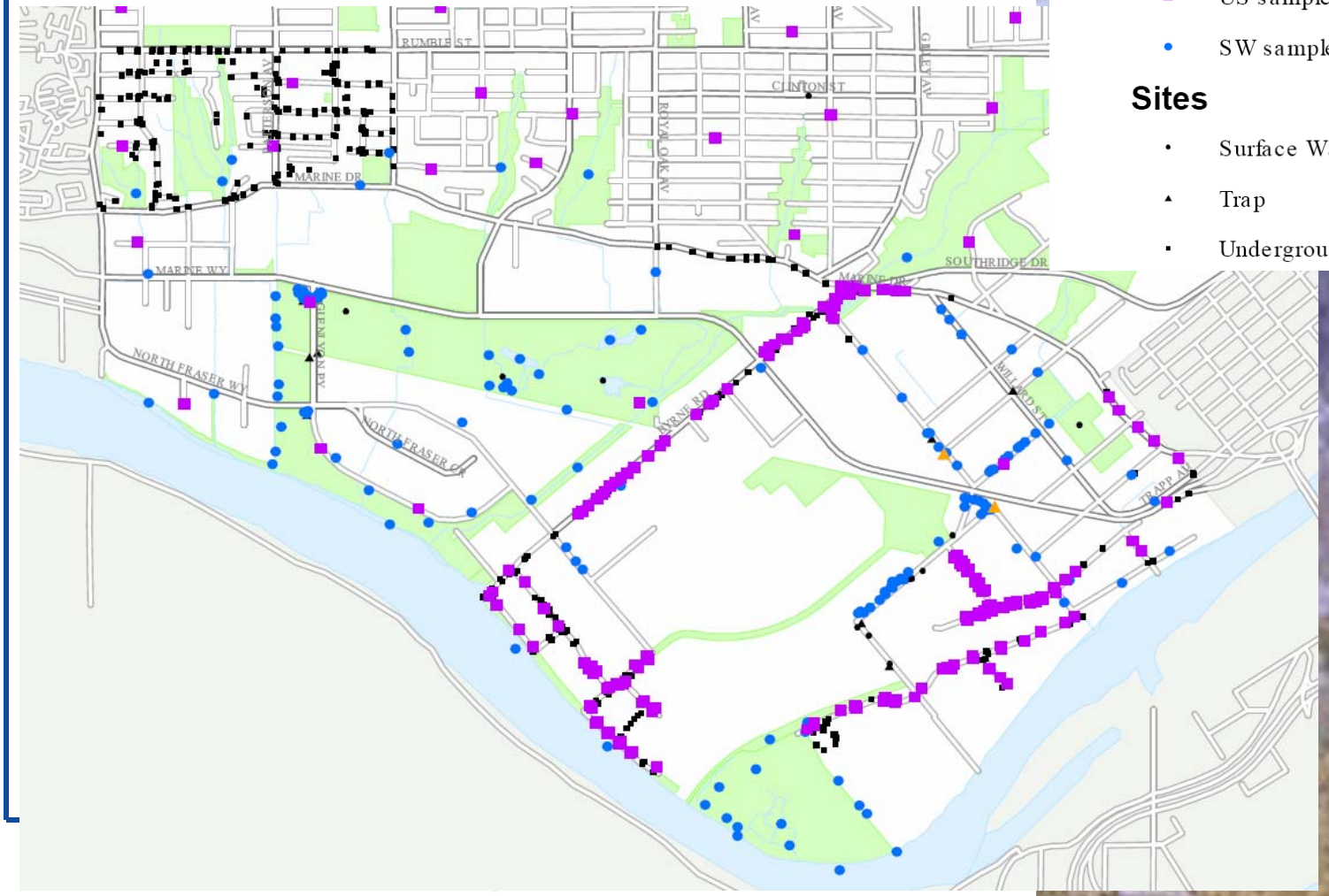




Chaffer Beetles



West Nile Virus



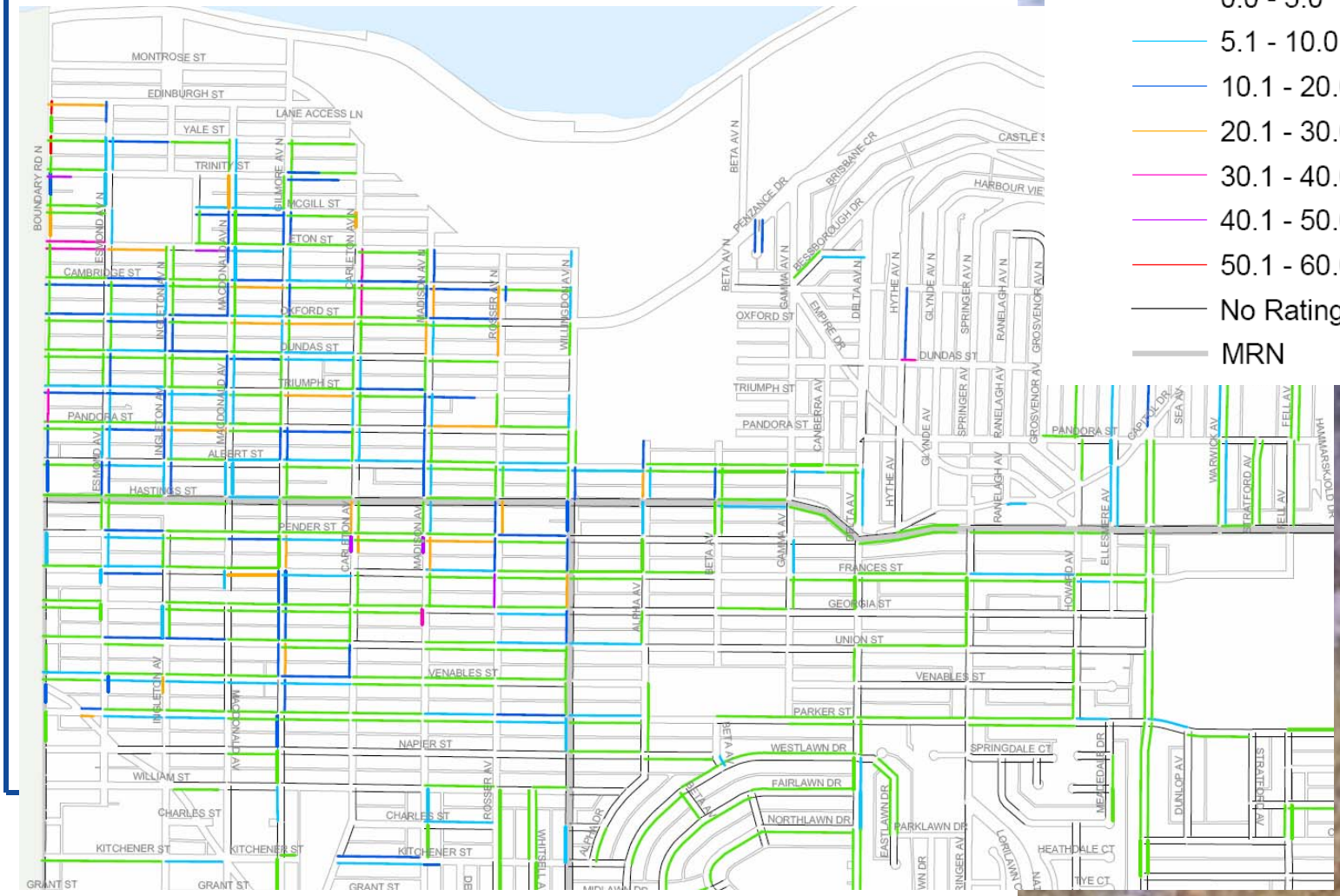
2006 WNv Program

- Adult samples
- US samples
- SW samples

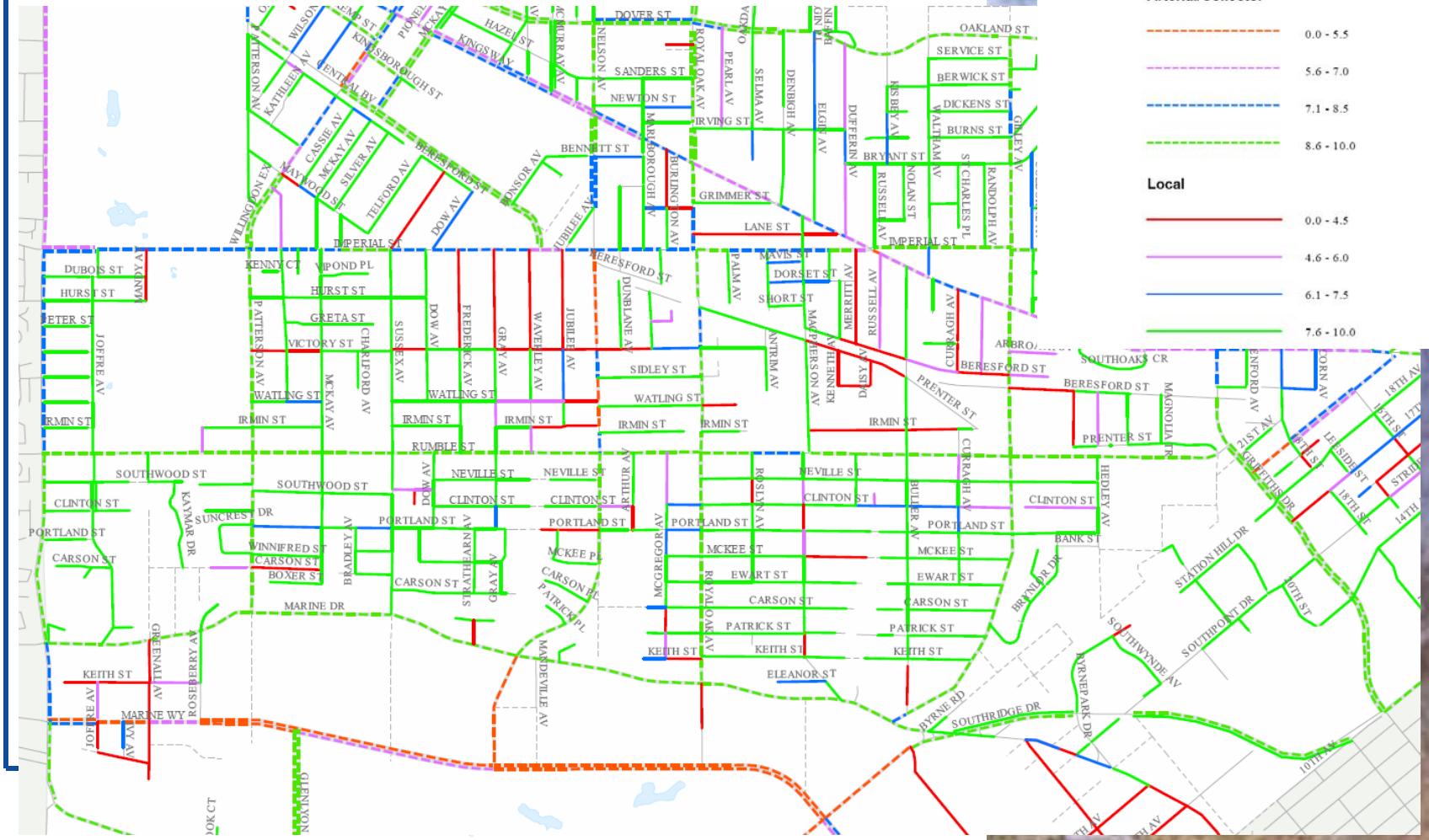
Sites

- Surface Water
- Trap
- Underground Structure

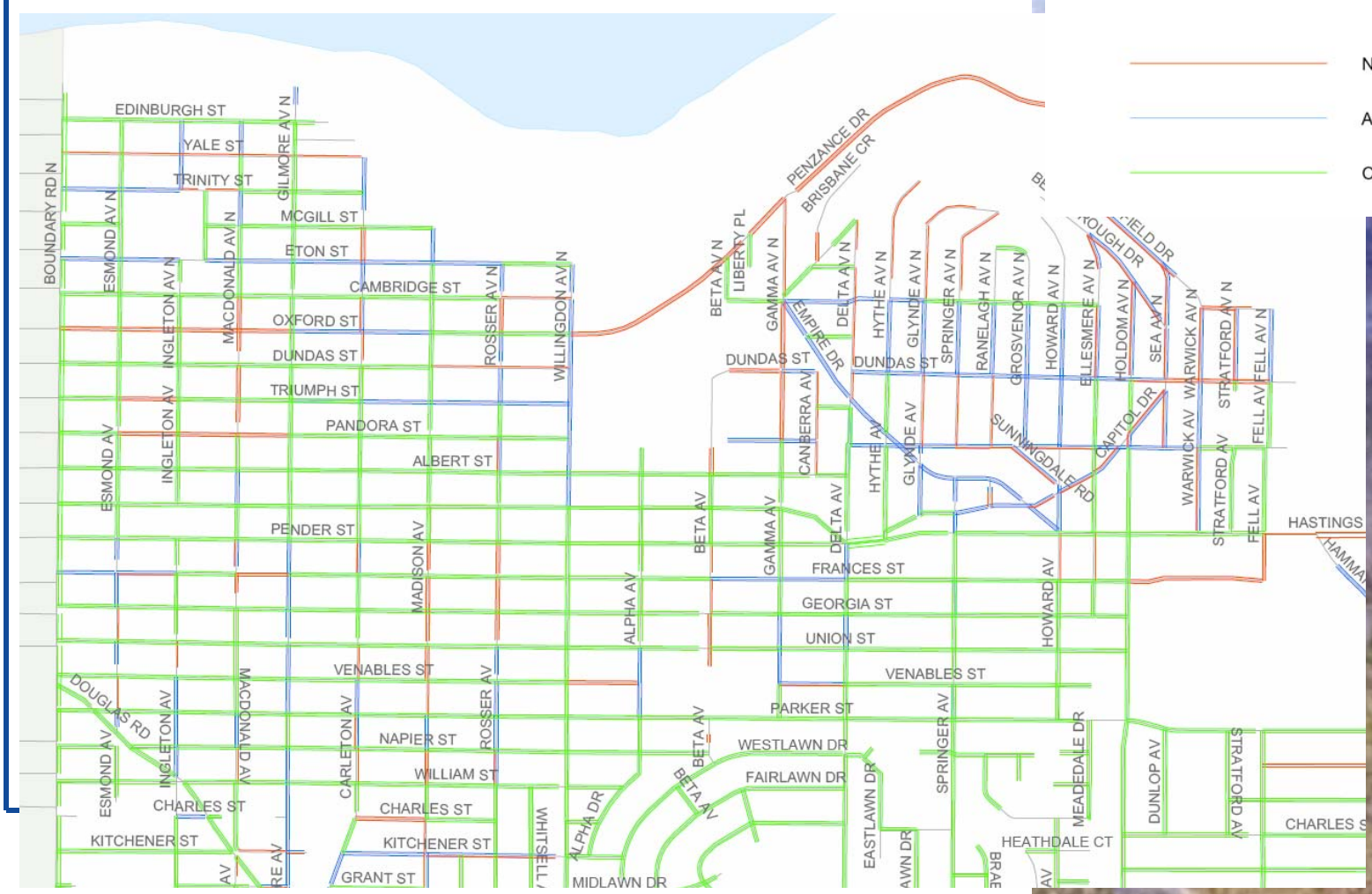
Sidewalk condition



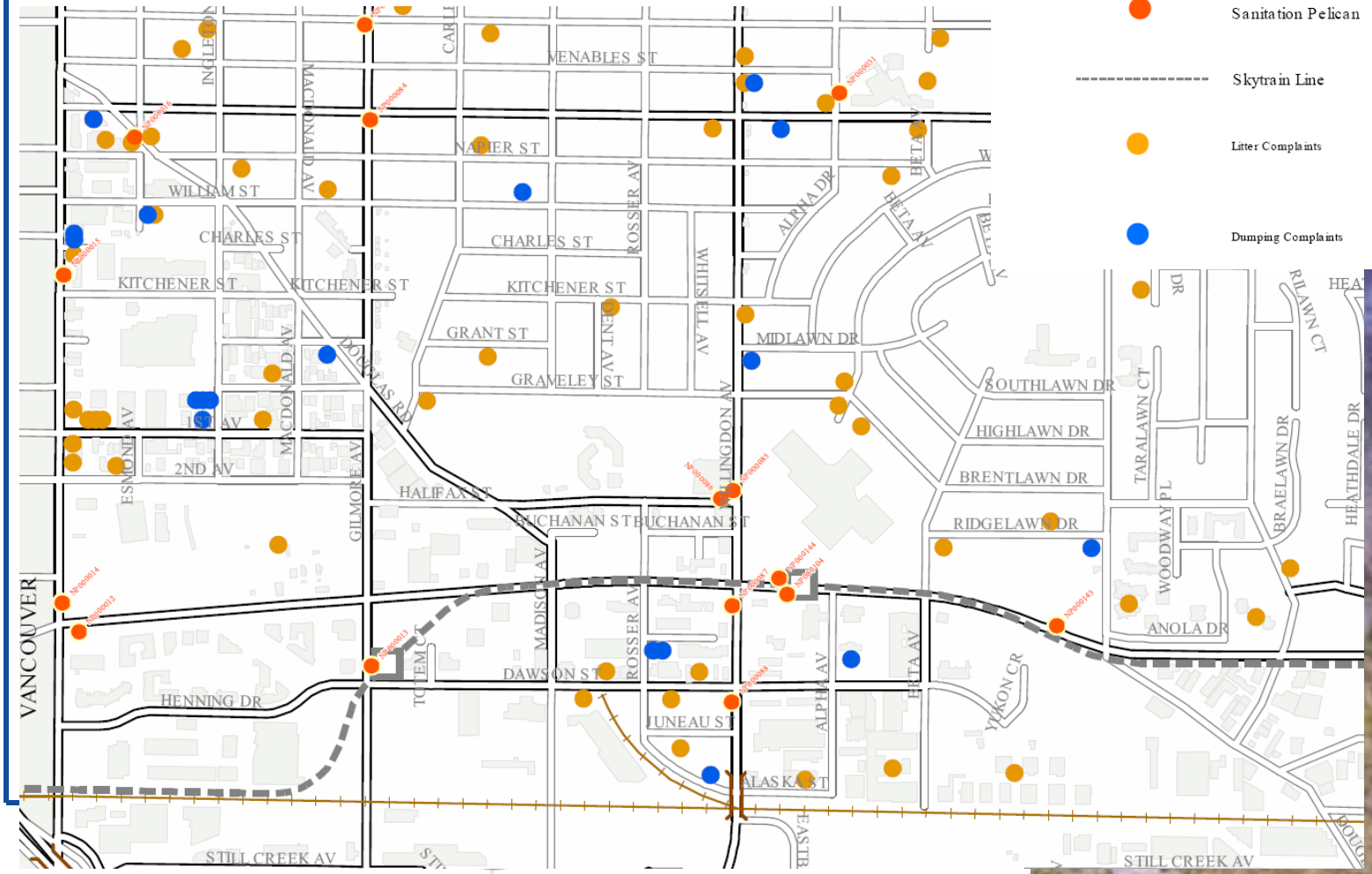
Roads - PQI


BURNABY ROADS
PAVEMENT MANAGEMENT SYSTEM
2007 PQI
Arterial/Collector
0.0 - 5.5
5.6 - 7.0
7.1 - 8.5
8.6 - 10.0
Local
0.0 - 4.5
4.6 - 6.0
6.1 - 7.5
7.6 - 10.0

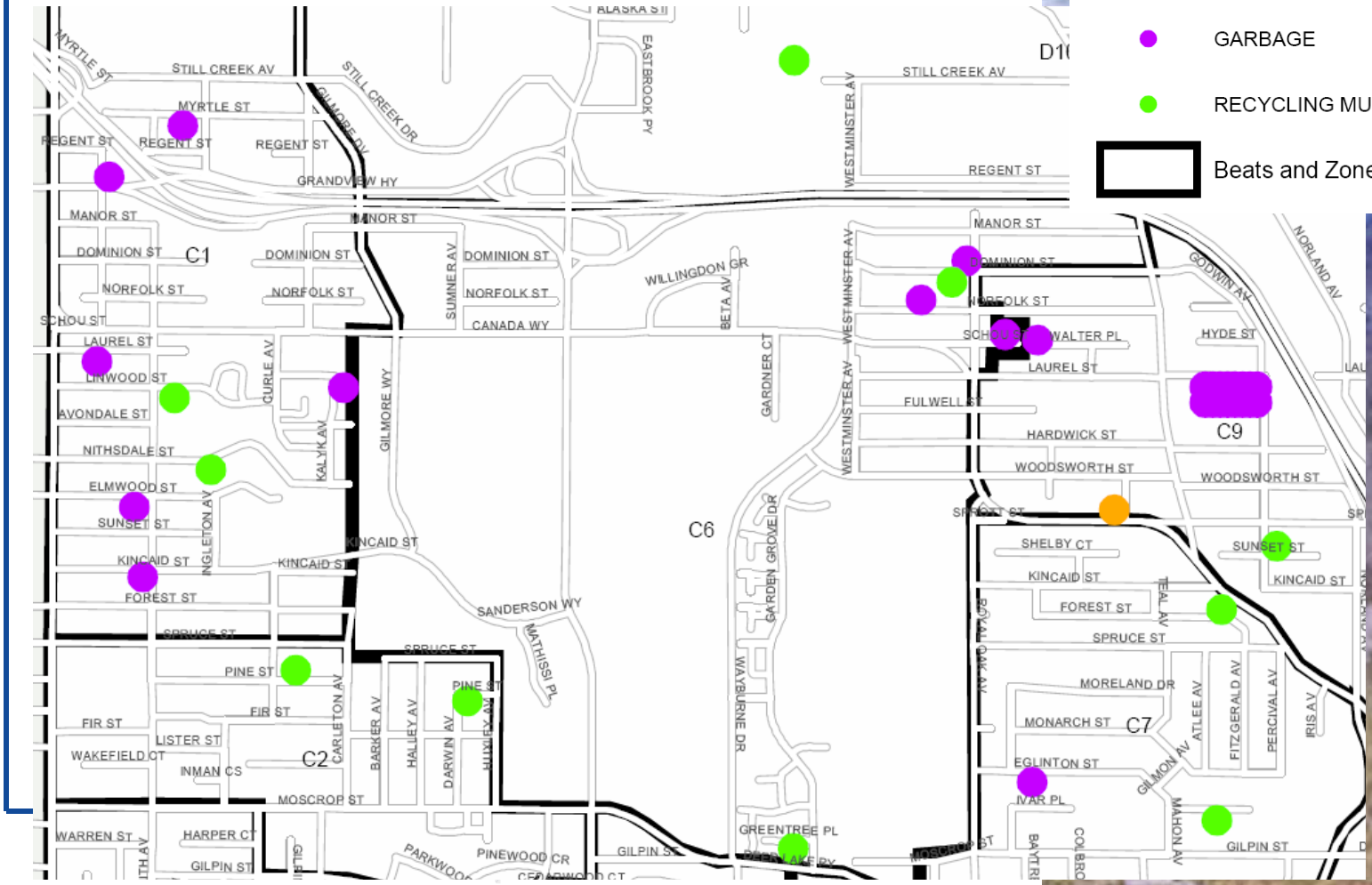
Roads - curbs


BURNABY ROADS
PAVEMENT MANAGEMENT SYSTEM
2005 CURB STATUS
No Curb
Asphalt Curb
Concrete Curb
EDINBURGH ST
YALE ST
TRINITY ST
MCGILL ST
ETON ST
CAMBRIDGE ST
OXFORD ST
DUNDAS ST
TRIUMPH ST
PANDORA ST
ALBERT ST
PENDER ST
VENABLES ST
NAPIER ST
WILLIAM ST
CHARLES ST
KITCHENER ST
GRANT ST
MIDLAWN DR
FRANCES ST
GEORGIA ST
UNION ST
PARKER ST
WESTLAWN DR
FAIRLAWN DR
HEATHDALE CT
HASTINGS
CHARLES S
BOUNDARY RD N
ESMOND AV N
INGLETON AV N
MACDONALD AV N
GILMORE AV N
ROSSER AV N
WILLINGDON AV N
PENZANCE DR
BRISBANE CR
EMPIRE DR
SUNNINGDALE RD
CAPITOL DR
DOUGLAS RD
CARLETON AV
MADISON AV
ALPHA AV
BETA AV
GAMMA AV
DELTA AV
HYTHE AV
GLYNDE AV
SPRINGER AV
RANELAGH AV N
GROSVENOR AV N
HOWARD AV N
ELLESMERE AV N
HOLDOM AV N
SEA AV N
WARWICK AV N
STRATFORD AV N
FELL AV N
CANBERRA AV
MEADEDALE DR
DUNLOP AV

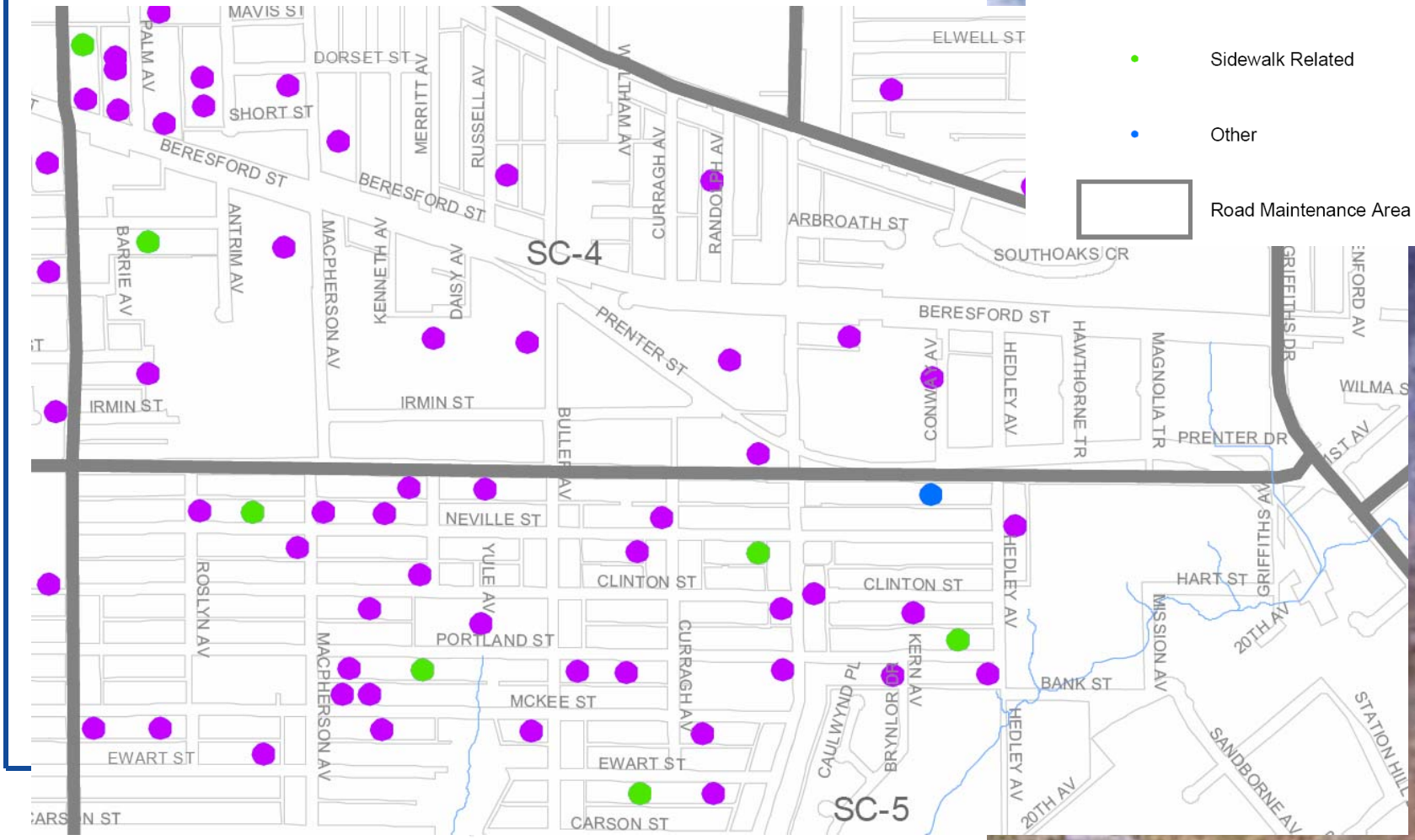
Pelican locations



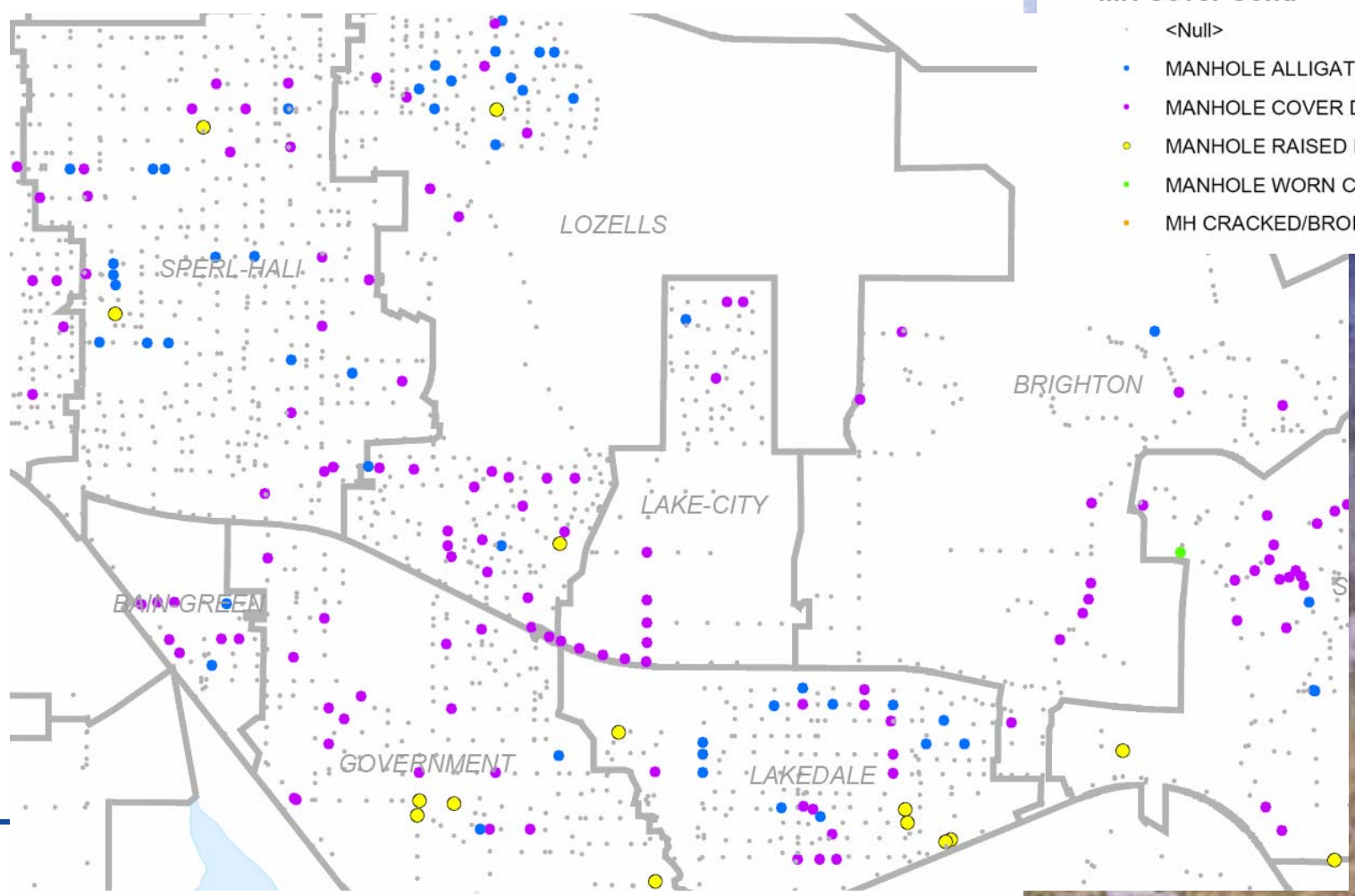
Sanitation complaints



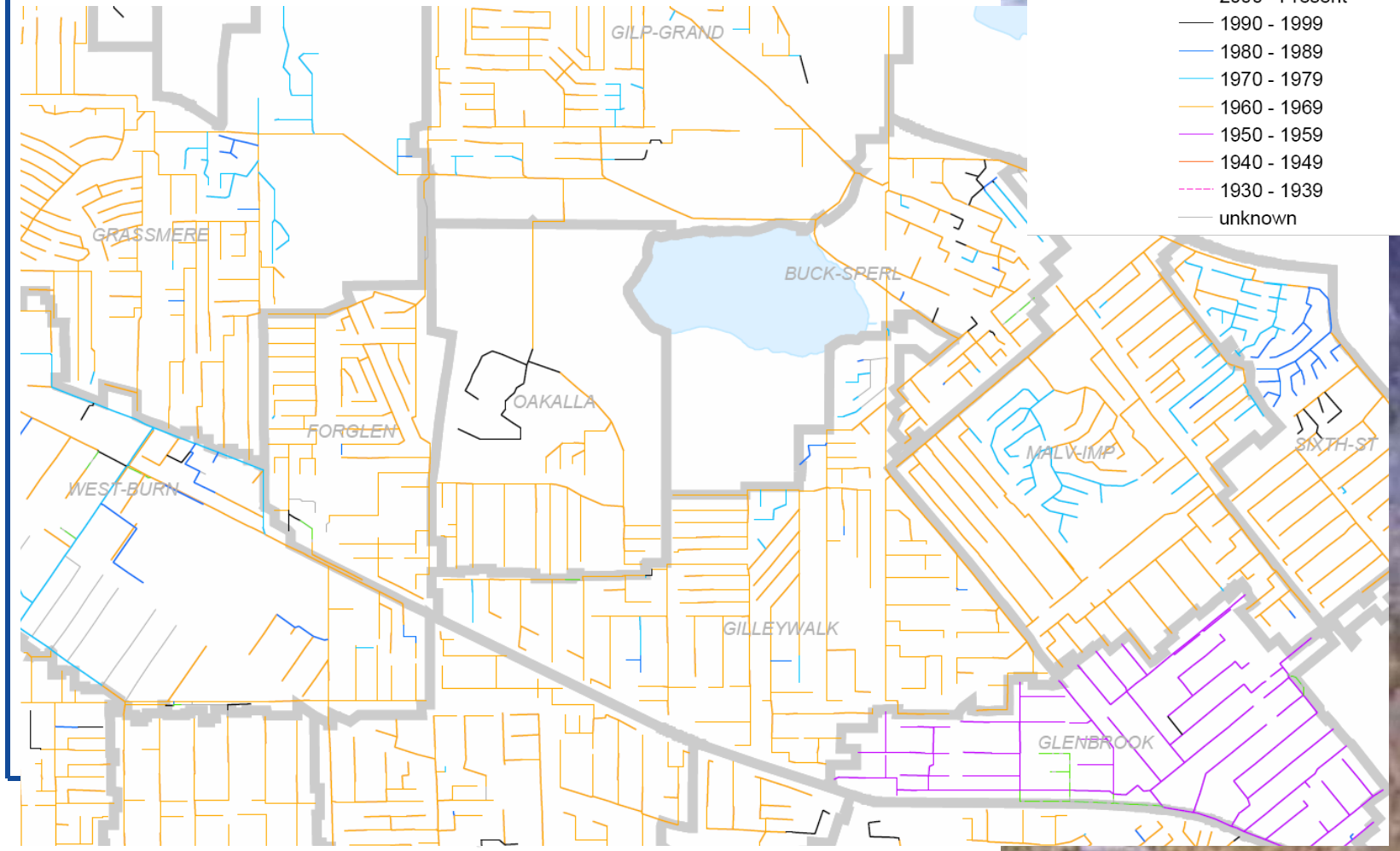
Roads - CSR


2005 SERVICE REQUESTS ASSIGNED TO ROADS
Road Related
Sidewalk Related
Other
Road Maintenance Area
SC-4
SC-5
BERESFORD ST
IRMIN ST
NEVILLE ST
CLINTON ST
PORTLAND ST
MCKEE ST
EWART ST
CARSON ST
PRENTER ST
PRENTER DR
ARBROATH ST
SOUTHOAKS CR
ELWELL ST
HART ST
BANK ST
DORSET ST
SHORT ST
MAVIS ST
PALM AV
MERRITT AV
RUSSELL AV
CURRAGH AV
ANTRIM AV
BARRIE AV
MACPHERSON AV
KENNETH AV
DAISY AV
HEDLEY AV
HAWTHORNE TR
MAGNOLIA TR
GRIFFITHS DR
GRIFFITHS AV
MISSION AV
KERN AV
ROSLYN AV
YULE AV
CAULWYND PL
BRYNLOR DR
SANDBORNE AV
20TH AV
WILMA ST

Sewer MH condition



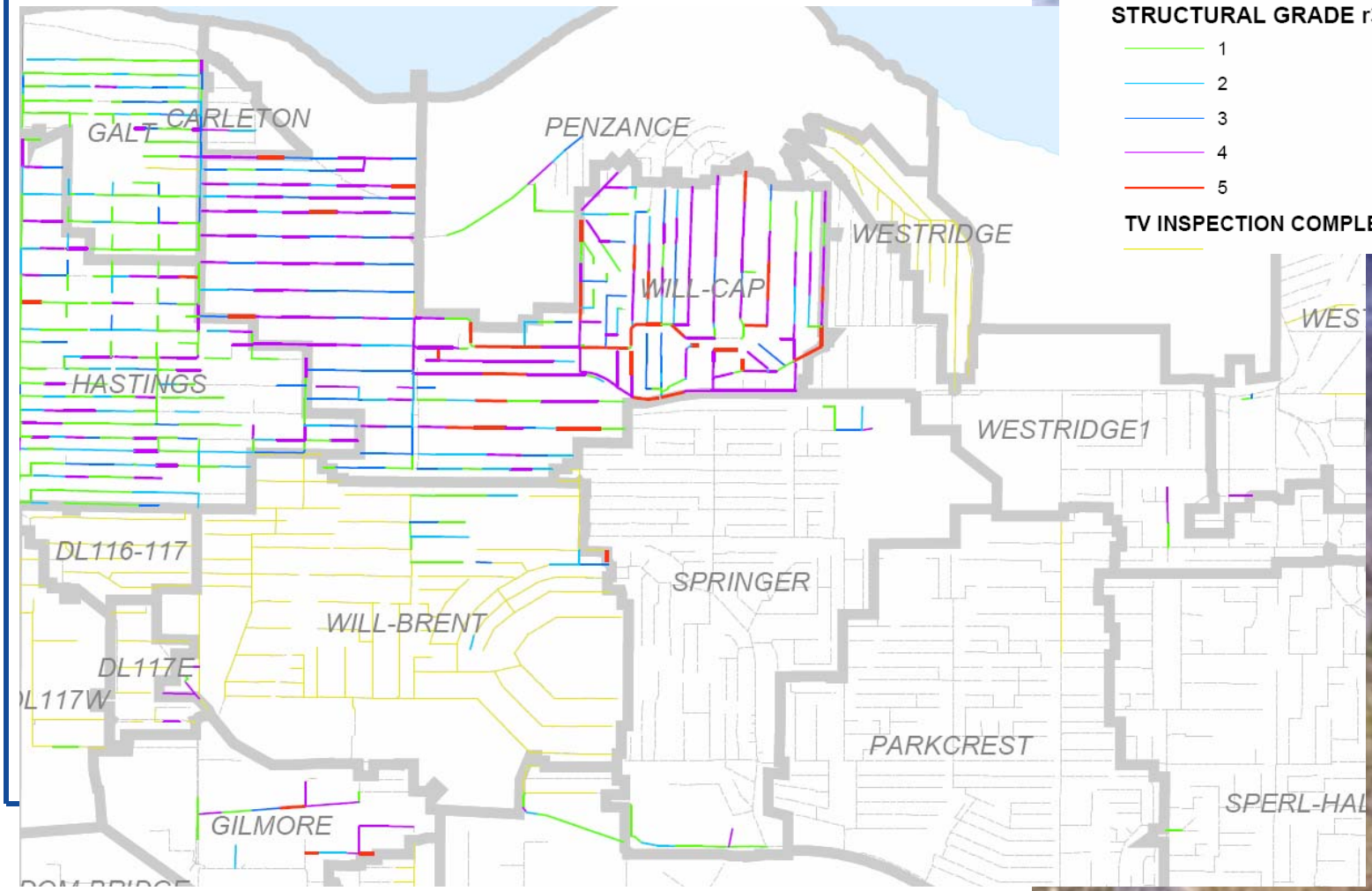
Sewer installation



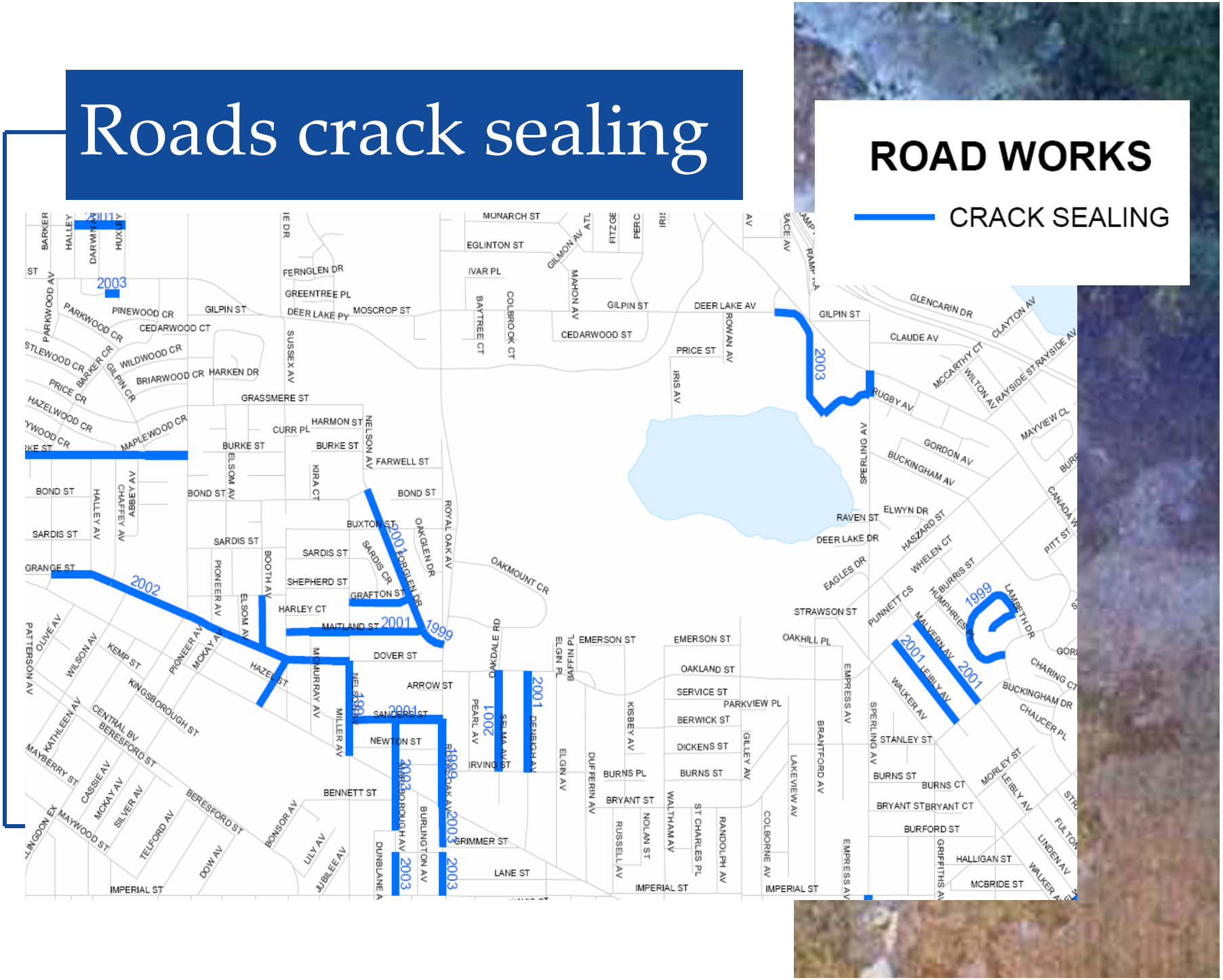
SANITARY SEWER
YEAR OF INSTALLATION

- 2000 - Present
- 1990 - 1999
- 1980 - 1989
- 1970 - 1979
- 1960 - 1969
- 1950 - 1959
- 1940 - 1949
- 1930 - 1939
- unknown

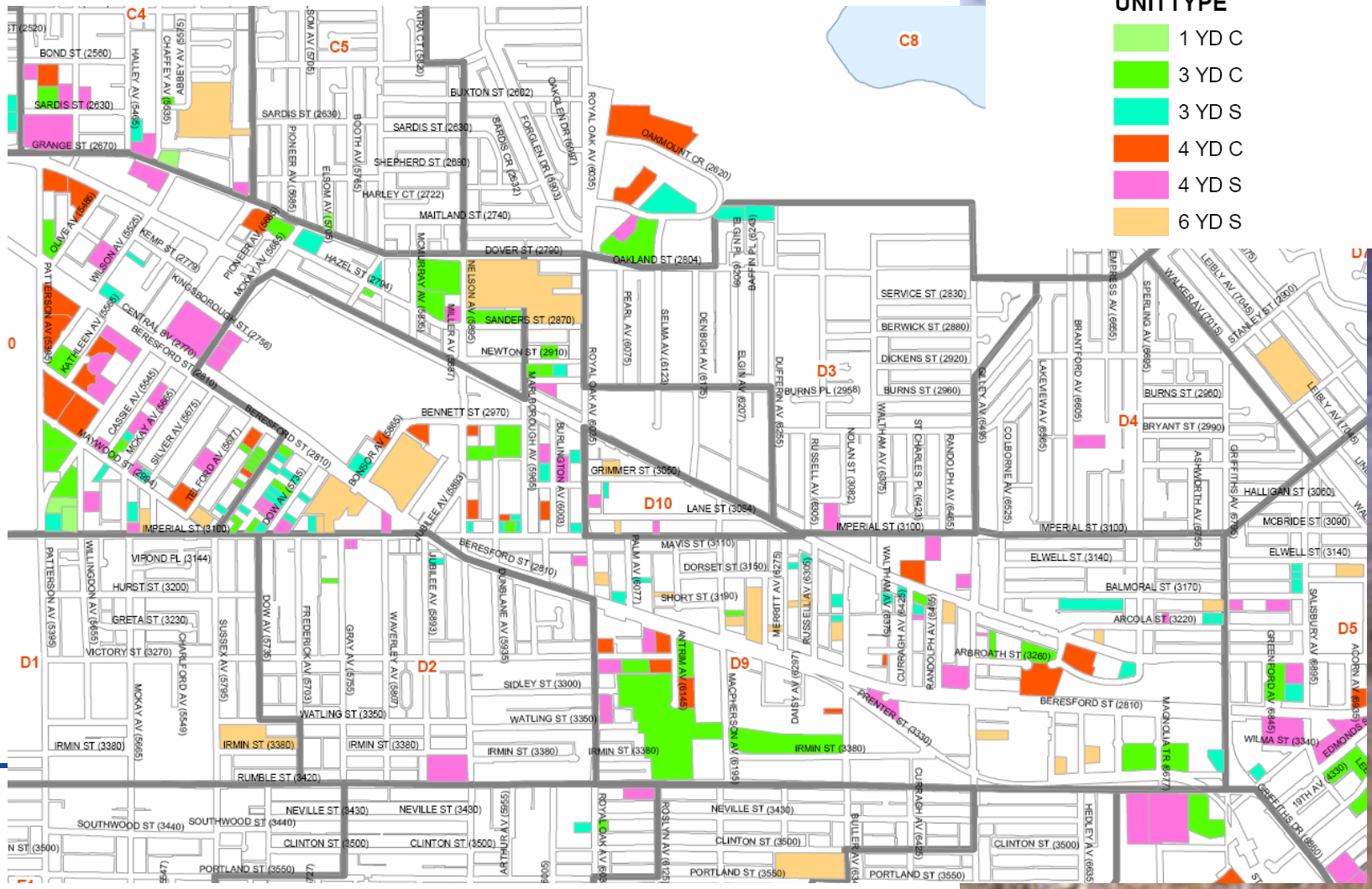
Sewer WRc


SANITARY & COMBINED SEWER
FORMULA BASED TV INSPECTION
STRUCTURAL GRADE r3 RATING
1
2
3
4
5
TV INSPECTION COMPLETED
GALT
CARLETON
PENZANCE
WESTRIDGE
WILL-CAP
HASTINGS
WESTRIDGE1
DL116-117
SPRINGER
WILL-BRENT
DL117E
PARKCREST
GILMORE

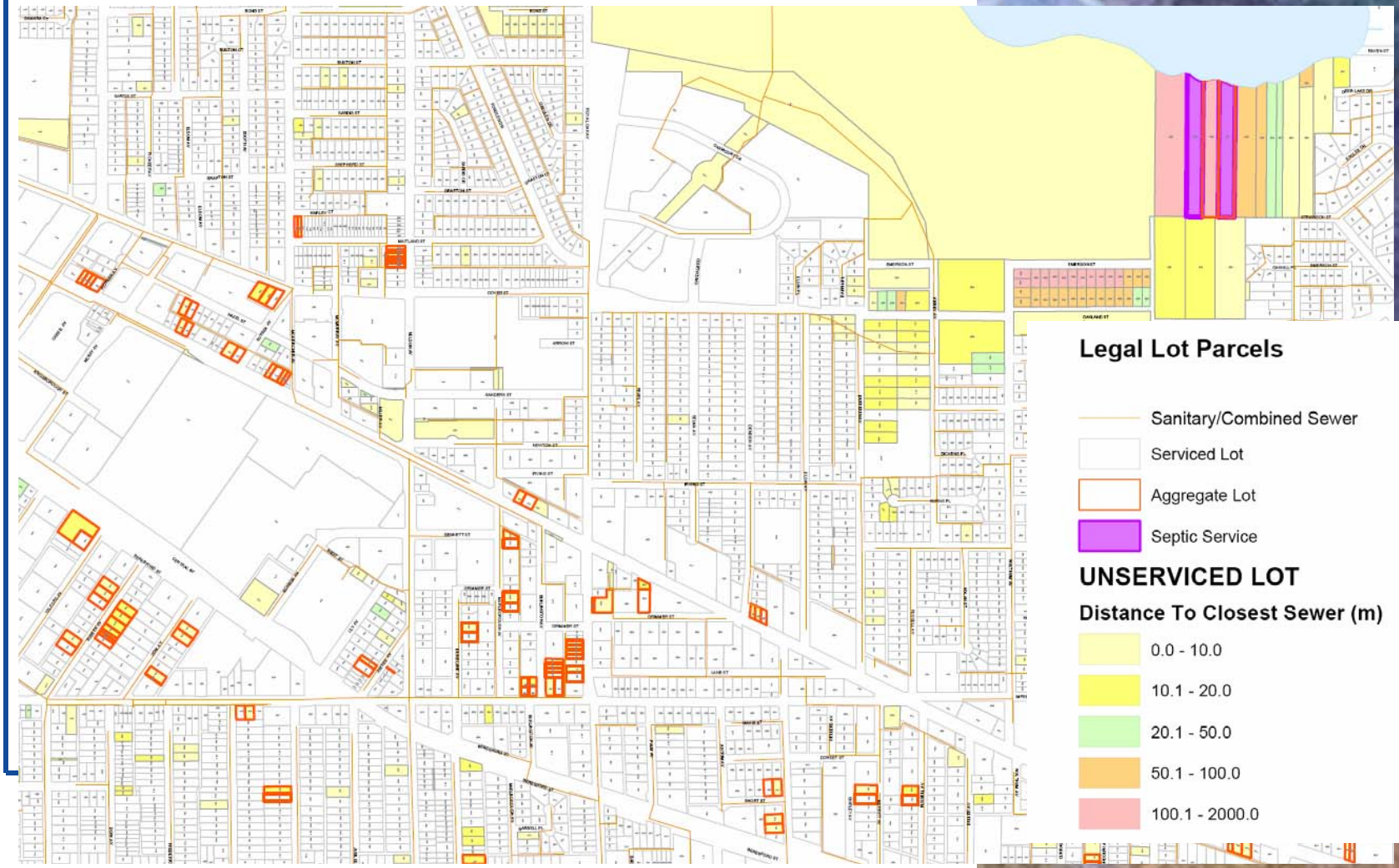
Roads crack sealing



Sanitation containers



Sewer ~ lot no service



Missing $

~ To date, we have not been able to display costs in our maps
~ Burnaby implemented SAP January 2007
~ Labour, material, corporate equipment, hired equipment, and purchase order costs are now available in SAP
~ Need to leverage that information in order to map activity and maintenance costs
~ Long term may be SAP's Business Warehouse
~ Short term likely an Excel extract of cost information linked to the assets via Crystal reports

Water main failure costs

List Edit Goto Order Environment Settings System Help

Display PM orders: List of Orders

Order | Operations | Subtotal

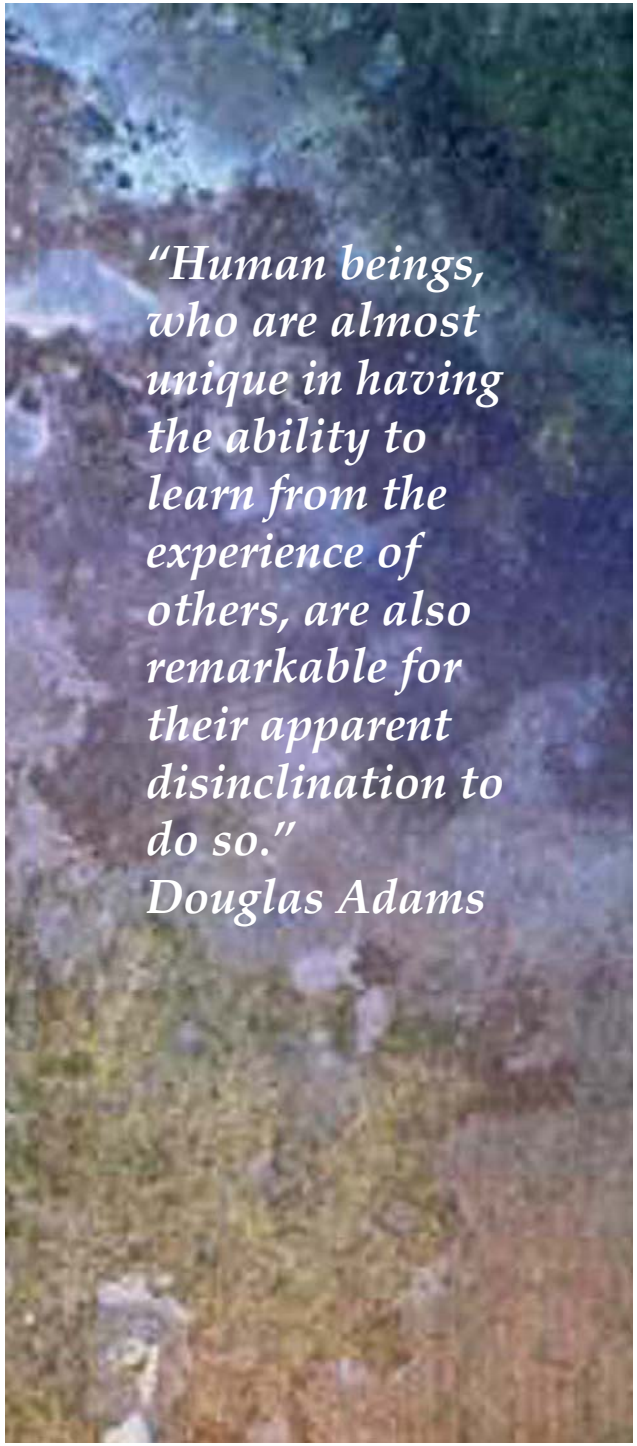
S	Order	Bsc start	Description	Total actual costs	System status	User Status
	519272	2007/03/23	WND WB005089 WMNF	5,258.07	REL PCNF GMPS NMAT PRC SETC	New
	519156	2007/03/21	WND WF004253 WMNF	1,956.56	REL PCNF GMPS NMAT PRC SETC	New
	519735	2007/03/28	WMN WF004247 WMNF	6,561.17	REL PCNF GMPS NMAT PRC SETC	New
	518567	2007/03/20	WMN WT012345 WMNF	1,595.75	REL PCNF GMPS NMAT PRC SETC	New
	519359	2007/03/26	WMN WF004248 WMNF	3,738.03	REL PCNF GMPS NMAT PRC SETC	New
	507237	2007/01/16	WMN WX001213 WMNF	1,479.84	REL PCNF GMPS NMAT PRC SETC	New
	507207	2007/01/16	WMN WF003197 WMNF	2,079.25	REL PCNF GMPS NMAT PRC SETC	New
	506852	2007/01/15	WMN WV005316 WMNF	2,709.98	REL PCNF GMPS NMAT PRC SETC	New
	505454	2007/01/02	WMN WT000285 WMNF	5.35	REL GMPS NMAT PRC SETC	New
	506447	2007/01/10	WMN WT014123 WMNF	3,270.81	REL PCNF GMPS NMAT PRC SETC	New
	515042	2007/03/02	WMN WF004227 WMNF	5,059.22	REL PCNF GMPS NMAT PRC SETC	New
	513779	2007/02/26	WMN WF004221 WMNF	4,104.24	REL PCNF GMPS NMAT PRC SETC	New
	515803	2007/03/08	WMN WR001479 WMNF	1,566.17	REL PCNF GMPS NMAT PRC SETC	New
	511569	2007/02/05	WMN WX010056 WMNF	1,910.52	REL PCNF GMPS NMAT PRC SETC	New
	512308	2007/02/09	WMN WF004219 WMNF	9,794.08	REL PCNF GMPS NMAT PRC SETC	New
	510156	2007/01/30	WMN WF004204 WMNF	3,215.89	REL PCNF GMPS NMAT PRC SETC	New
	511927	2007/02/07	WMN WV010322 WMNF	3,016.24	REL PCNF GMPS NMAT PRC SETC	New
	509154	2007/01/25	WMN WT010617 WMNF	1,896.71	REL PCNF GMPS NMAT PRC SETC	New
	508008	2007/01/22	WMN WF004213 WMNF	14,971.70	REL PCNF GMPS NMAT PRC SETC	New
	507644	2007/01/17	WMN WT011559 WMNF	2,128.50	REL PCNF GMPS NMAT PRC SETC	New
	507619	2007/01/17	WMN WV007864 WMNF	1,831.86	REL PCNF GMPS NMAT PRC SETC	New
	507618	2007/01/17	WMN WF004210 WMNF	6,885.42	REL PCNF GMPS NMAT PRC SETC	New
	505939	2007/01/05	WMN WF004218 WMNF	15,079.14	REL PCNF GMPS NMAT PRC SETC	New
				100,114.50		

Costs ~ thematic maps

Road rehabilitation costs
Sewer separation project costs
Sanitation container repair costs
Street light maintenance costs
Flood related costs
Water main failure costs
Service line maintenance
Customer service related
Projected maintenance costs
Asset life-cycle costs

What is an asset?

~ Difference of opinion as to what an asset is from a Financial and Engineering perspective
~ This leads to misunderstanding, frustration and alienation
~ Need a collective understanding of each groups information requirements
~ Better education of the business processes and the roles of each group

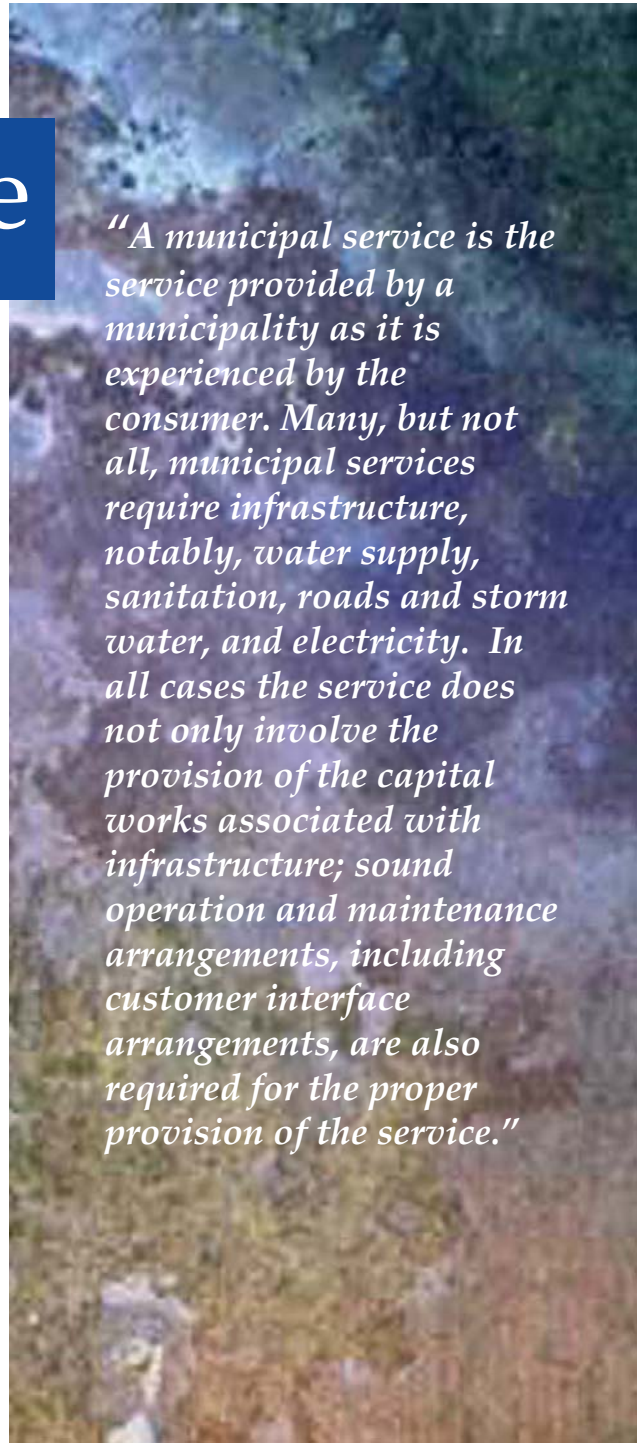


Municipal Infrastructure

… to meet the requirements as set out in Section 73 (2) of the Municipal Systems Act. Therefore, infrastructure is a tool to deliver on municipal services. The Municipal Finance Management Act defines infrastructure as capital assets which can either be movable or immovable in nature.

…municipal infrastructure is defined in broad terms as 'the capital works required to provide municipal services. It includes all the activities necessary to ensure that the works are delivered effectively, such as feasibility studies, project planning and capacity building to establish sound operational arrangements for the works.

The capital costs which are associated with the provision of municipal infrastructure include the cost of providing new infrastructure and rehabilitating such infrastructure which has reached the end of its design life. Maintenance of such infrastructure, which is associated with repairs undertaken during the design life of the infrastructure - repairs which are not associated with replacing major components of the infrastructure - is not a capital item.



Financial asset

An asset that derives value because of a contractual claim. Stocks, bonds, bank deposits and the like are all examples of financial assets. Unlike land and property-which are tangible, physical assets- financial assets do not necessarily have physical worth.

Asset Definition

Any item of economic value owned by an individual or corporation, especially that which could be converted to cash. Examples are cash, securities, accounts receivable, inventory, office equipment, real estate, a car, and other property. On a balance sheet, assets are equal to the sum of liabilities, common stock, preferred stock, and retained earnings.

From an accounting perspective, assets are divided into the following categories: current assets (cash and other liquid items), long-term assets (real estate, plant, equipment), prepaid and deferred assets (expenditures for future costs such as insurance, rent, interest), and intangible assets (trademarks, patents, copyrights, goodwill).

Capital Asset

Definition

All tangible property which cannot easily be converted into cash and which is usually held for a long period, including real estate, equipment, etc

Capital Asset

Relationship between Capital asset accounting and asset management

Both projects start with an inventory of existing capital assets
Due to the magnitude of the projects, execution will be staged rather than simultaneous

For efficiency and effectiveness, planning for both projects needs to be simultaneous

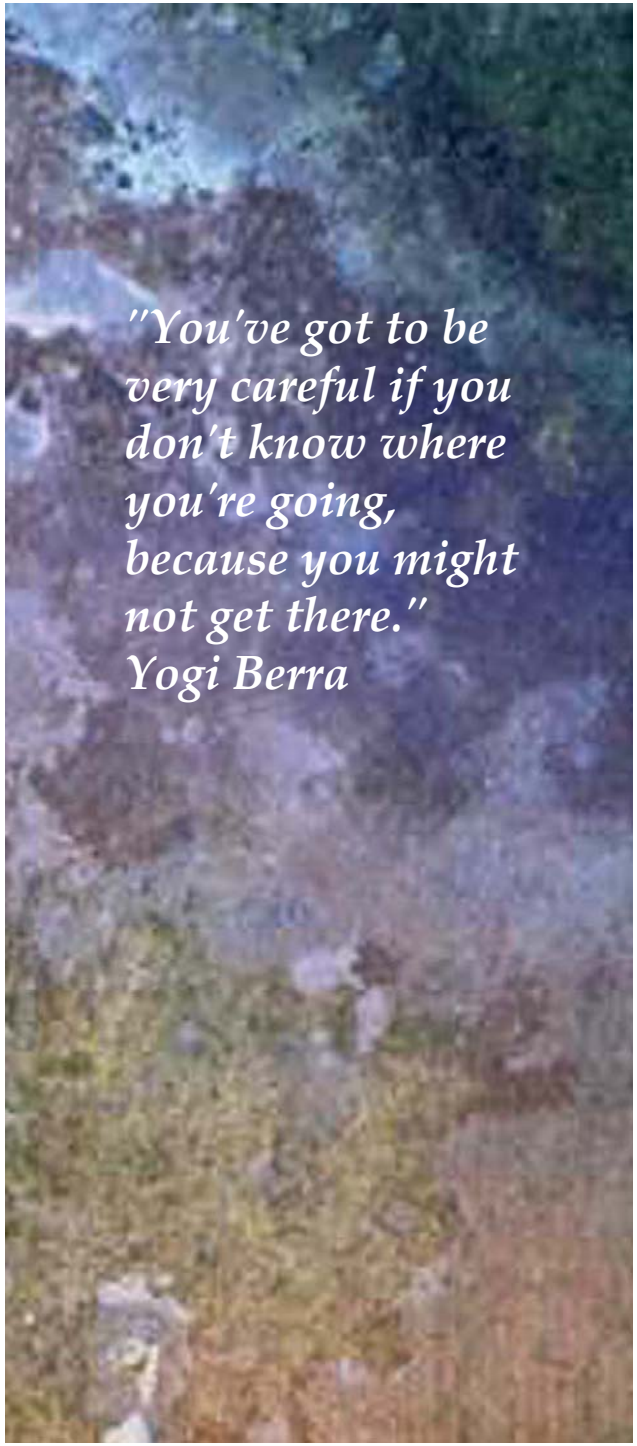
PSAB 3150

Public Sector Accounting Board – Tangible Capital Assets

PSG- 7 Tangible Capital Assets of Local Governments – transition guidelines January 2007

PSAB 3150 – January 2009

Capital expenditures be recognized as assets and amortized over expected life
Roads, buildings, equipment, vehicles, land, water, sewer and other utilities, computer hardware and software, dams, canals, bridges etc.



"Opportunities"

~ Level of detail related to your capital assets that your agency intends to report on
~ Deterioration models – requires interdepartmental discussion and mutual agreement
~ Deterioration model must recognize the extension of the asset life by rehabilitation practices
~ Push-me-pull-you concept has to go – both finance and engineering require each others input and understanding
~ Breakdown the silos between finance and engineering
~ Create an environment of cooperation

"Opportunities"

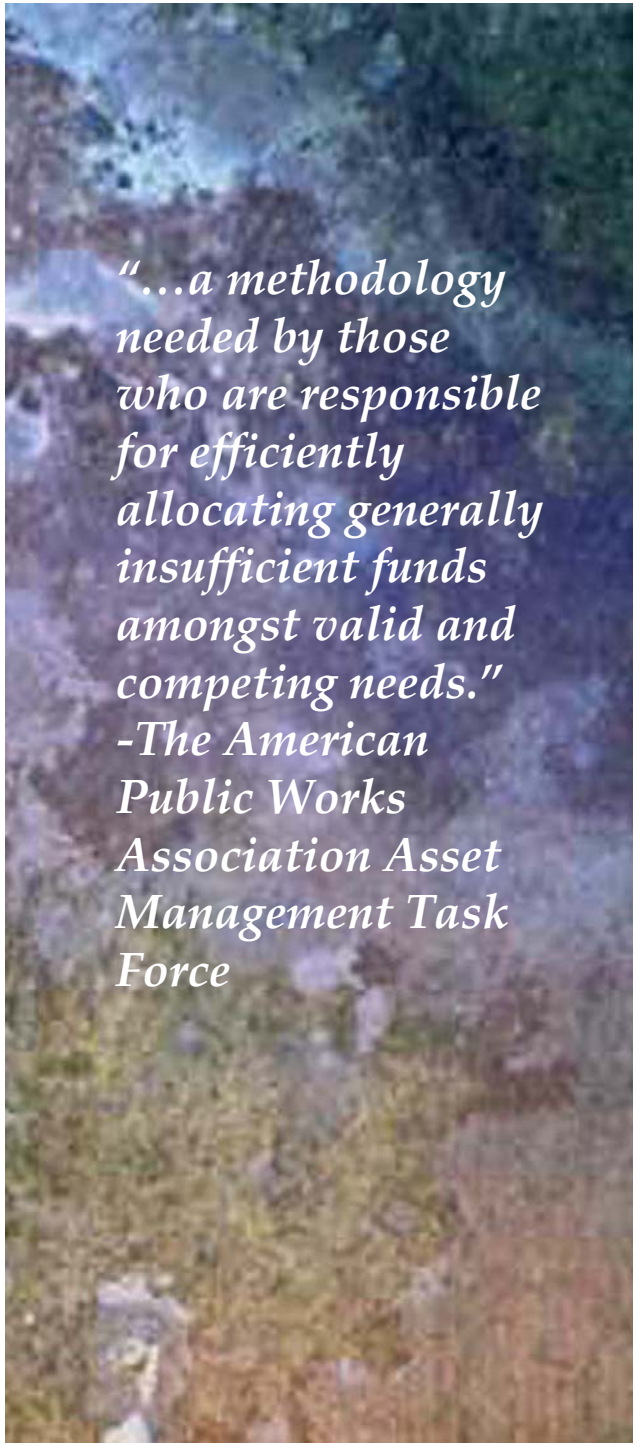
~ Balancing competing priorities in budgets
~ Growth of urban areas
~ Do you have the revenue base to support your plans

Life Cycle Costing
~ Include life-cycle costing (capital investment, operational, infrastructure renewal, rehabilitation and decommissioning) across economical, environmental and social dimensions to minimize intended and unintended costs today and for future generations.

Life cycle costing

~ What do you have and where is it?
~ What is the level of service required and the expected remaining life? (capital and operating plans)
~ What is it worth? (replacement costs)
~ How much will it cost to maintain / replace and what is the acceptable level of risk? (short and long term financial plan)

~ the same issues relate to sub-assemblies, equipment and components of your major asset types



RIVA

RIVA by Loki Innovations
~ Tool can access our Hansen, Stantech (Pavement Management) and GIS data
~ Allows us to create replacement / rehabilitation scenarios based on asset factors we deem important i.e. for Asbestos Concrete water mains ~ material, size, soil classification, construction practices, failure frequencies, number of services, expected life, budget, etc.
~ We can create deterioration curves that reflect our conditions
~ PSAB compliant

RIVA

~ RIVA allows us to relate the matrix we have made for AC pipe for example, to others for Cast iron, ductile iron, etc. as well as to other assets that exist in the same street segment

~ This allows a more holistic view of rehabilitation and replacement for all asset types and their dependencies upon each other

~ RIVA also allows the user to do interactive “what if” scenarios for budgets and level of service, rehabilitation and replacement

Further Information

IPWEA Australia ~ www.ipwea.org.au
Ingenium New Zealand ~ www.ingenium.org.nz
National Guide to Sustainable Infrastructure
American Public Works Association ~ ww.apwa.net
American Water Works Association ~ www.awwa.org
BCIT Workshop – PSAB
Municipal Infrastructure Management INFR 0101 - Preparing For PS 3150 and Beyond - April 20, 2007 – Holiday Inn Express Hotel – Metrotown, Burnaby

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~ Brian Sameshima, Chief Information Officer
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~ Karen Simpson, Utilities Information Clerk
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~ Bill McNamee, CCTV Operator
~ Kathy Wipf, Traffic Assistant
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~ Chris Tait, GIS Technician
~ Terry Richard, GIS Technician
~ Bill Zech, GIS Technician
~ James Ko, GIS Technician
~ Gary Gao, Mapping Technician 2
~ Faye Kilpatrick, Mapping Technician 2
~ Herman Louie, Drafting Technician
~ Gerry Funk, Draftperson 3

Questions?

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"I may not have gone where I intended to go, but I think I have ended up where I intended to be."
Douglas Adams