CITY OF PARKSVILLE

City of Parksville
Engineering & Operations Department

STATE OF MUNICIPAL INFRASTRUCTURE

ANNUAL REVIEW

December 2008

Many of Parksville's infrastructure assets that were built between 1950 and the late 70's are now approaching the point at which significant investment is necessary to maintain existing service levels.

This is the first "Annual Municipal Infrastructure Review" report and the beginning of a formal "Infrastructure Asset Management" system for the City of Parksville in which life cycle planning will be used to manage municipal infrastructure assets.

View of Arrowsmith Lake and Dam

This report represents a summary of the current methodology and approach used by the Engineering and Operations Department to provide a basic level of understanding of the state of municipal infrastructure assets. Currently, infrastructure asset management and condition assessment is in the development stage across North America, a common methodology has not been standardized by municipalities. The results are based on data currently available, from which analysis was undertaken and conclusions were drawn. Data related to the physical attributes of infrastructure assets are collected through as-built drawings and field survey. Data collection and analysis methods are expected to improve through the use of the City’s Geographic Information System (GIS) and will be reflected in annual updates to this report.

This effort will provide greater detail on the City’s municipal infrastructure (tangible capital assets), and further enhance its ability to meet federal legislation for local governments to report tangible capital assets on annual financial statements as per the Public Sector Accounting Board Standard 3150 (PSAB3150).

The municipal infrastructure annual review covers the main network systems that the City of Parksville operates and maintains. These include, but are not limited to the following;

- Road network consisting of approximately 76 km of Local roads, and
- 24 km of Arterial and Collector roads;
- Approximately 60 km of sidewalks and streetlights;
- Water Supply and Distribution system consisting of reservoirs, treatment facilities, pumps and approximately 95 km of piping;
- Sanitary Sewer Collection system consisting of approximately 77 km of piping;
- Storm Drainage Collection system consisting of approximately 70 km of piping.

The current **total estimated replacement value** of these infrastructure systems is **$289 million**.

A review of cost estimation methods, recent construction costs and cost indexes was performed in an effort to develop the replacement cost tables. These cost estimates are shown in Section 8. This exercise will be required on an annual basis in order to reflect economic cycles.

Construction of Reservoir No. 5—Top Bridge Park

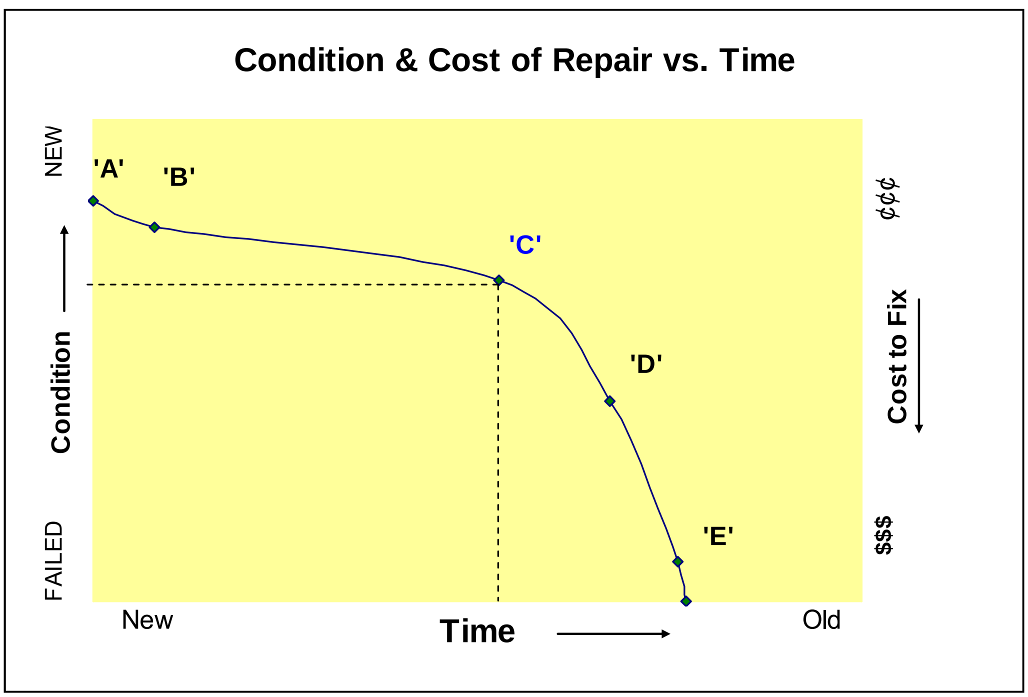
In general, almost **70%** of the City's above mentioned infrastructure is rated at **'Good'** to **'Excellent'** physical condition. Due to lack of resources, time, and tools to thoroughly assess the physical condition of underground infrastructure assets, the condition assessment employed a basic method of using an industry standard "Estimated Service Life" that is based on materials only. These "Estimated Service Life" or "Useful Life" numbers have been defined in the City's "Tangible Capital Assets Policy" as part of the requirements for PSAB 3150. Empirical data and first hand experience with these systems suggests this method of condition assessment is within the range of what staff believe to be true. However, as more data is collected and condition assessment methods improve and standardize, this picture will become clearer.

The estimated Physical Condition Assessment Reporting method consists of assigning a number or letter grade based on the estimated remaining service life of the asset. For example:

- Excellent or ‘A’ (81 to 100% estimated service life remaining)
- Good or ‘B’ (61 to 80%)
- Fair or ‘C’ (41 to 60%)
- Poor or ‘D’ (21 to 40%
- Failing or ‘E’ (0 to 20%)

This method reflects the current understanding and methodologies employed by other municipalities that have implemented official infrastructure asset management systems.

It is important that the City recognizes the state of the infrastructure and assigns the appropriate condition assessment as this will help in determining when the infrastructure needs to be replaced in a cost effective manner. The illustration below depicts the current industry accepted optimum time (i.e. Fair, **‘C’**) that the infrastructure should be rehabilitated or replaced prior to the period in which there is an increasing risk of failure. The optimum point in time of intervention is intended to result in significant costs savings and reduced risk exposure.



Introduction to Roads:

The City of Parksville owns and maintains a paved road network, approximately 100 km in length. Roads are commonly classified by their function, in terms of the emphasis placed on access to adjacent properties versus traffic movement and volume. Traffic volume thresholds typically define the three (3) common classifications of Local, Collector and Arterial roads which are listed in an ascending order of traffic volume and importance. The City of Parksville has further defined road sub-classifications within their Engineering Standards and Specifications Manual for a total of 8 road classifications. Included within the roads network infrastructure assets are typical road associated appurtenances such as traffic signals, streetlights and sidewalks.

Foster Park Area — New Local Road

Memorial Avenue— Existing Downtown Road

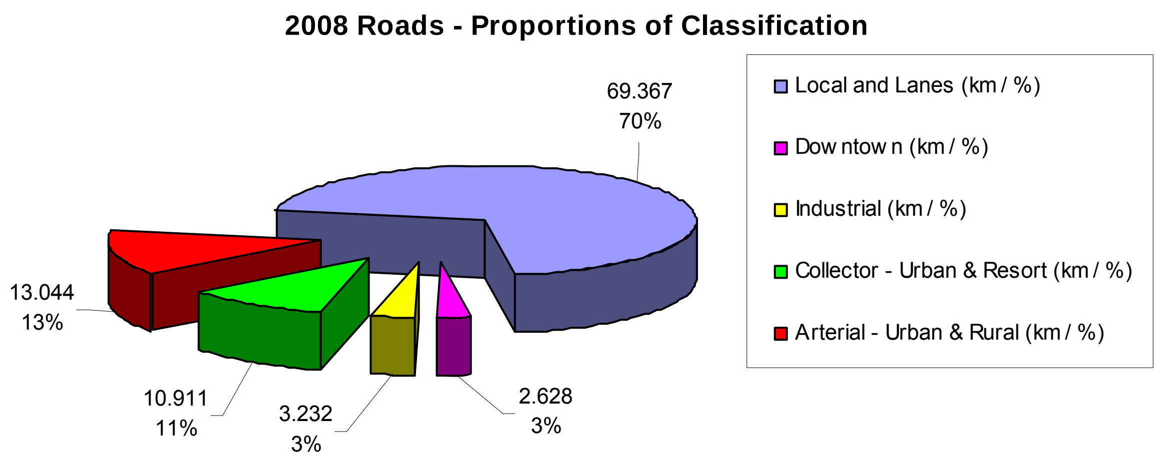
Alberni Highway Upgrade to a Downtown Road Classification

For the purposes of this review Local roads are combined with Downtown and Industrial roads as the road structures are similar. The total length of these roads collectively are approximately **76km** or 76% of the roads network. The total replacement value of **Local Roads is** estimated at being **$62 million**.

Arterial (Highway) and Collector Roads were also combined as the road structures are similar, and collectively total approximately **24km** or 24% of the roads network system. The total replacement value of Arterial and Collector Roads is estimated at being **$36 million**.

Additional appurtenances, traffic signals, streetlights and sidewalks replacement value is estimated at being approximately **$17 million**.

The total **Road Network** estimated replacement **value is $115 million**.



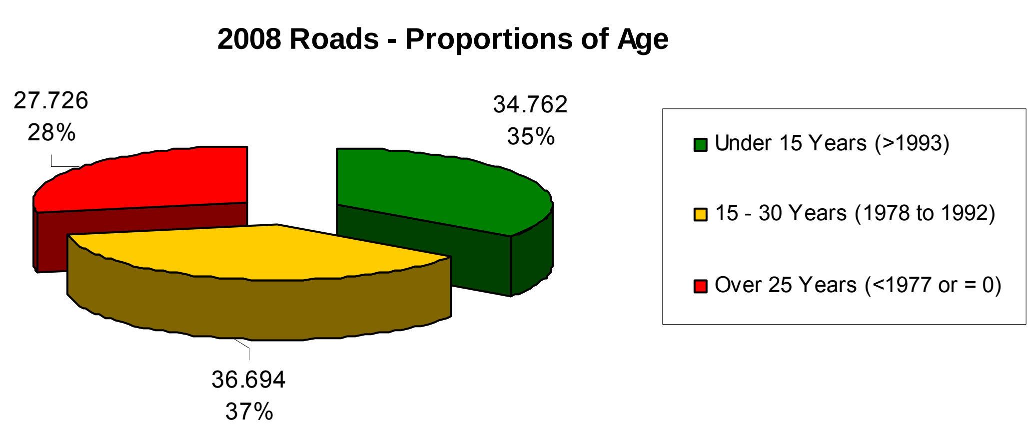
History:

The City of Parksville was incorporated as a village in 1945. It wasn't until the 1970's and 1980's that growth escalated, both in population and in area of municipal land. As areas were amalgamated into Parksville so to were the infrastructure assets that came with already developed subdivisions. The importance of this is that infrastructure assets that were inherited by the City through amalgamation were built to standards that the City of Parksville had no control of. Roads in particular can be built to many different specifications. Roads built more recently in Parksville can be assumed to have been built to more modern specifications and to have the estimated service life, as defined by the Tangible Capital Assets policy document. However data on the roads, as to exact dates of construction and specifications to which they were built, are unavailable making the accuracy of condition assessment by this method difficult.

Condition Assessment Methodology:

The physical condition assessment of the roads network is one of the easier infrastructure assets to review as they are visible and this area of condition assessment is fairly advanced with accepted standards readily available. While this is possible it was not undertaken for this review given the time constraints on meeting year end financial accounting deadlines and limited staffing resources. For this condition assessment an effort was made to establish an original date of construction or re-build of roads and using an accepted estimated service life of the road (based on classification) a percentage of remaining estimated service life was calculated to determine the condition letter grade.

Traffic volume is also critical in defining deterioration rates as roads that see higher traffic volumes such as Arterial and Collector roads tend to deteriorate at a faster rate than ones that see lower traffic volumes such as Local roads. This variability is reflected in the adopted Useful Life numbers in the City's Tangible Capital Assets policy. Demand and Capacity condition assessments are undertaken during transportation updates and annual traffic counts. This data is not being reported but is expected to be incorporated in future updates.



It has been determined through various publications and historical operations data that the Estimated Service Life of following road network infrastructure assets is as noted:

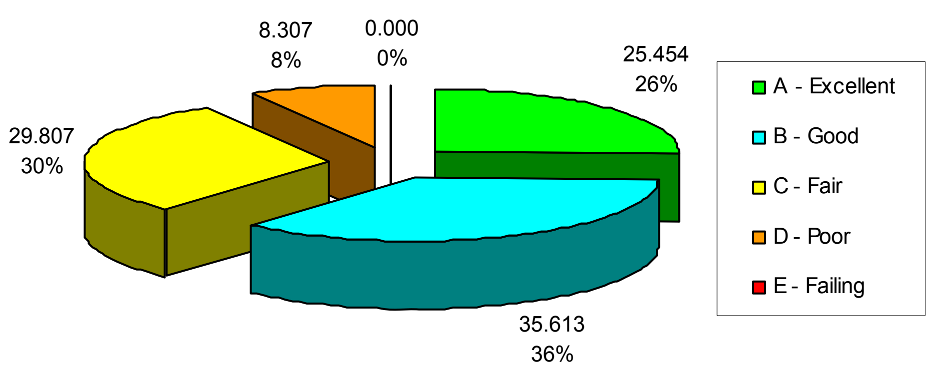
- Gravel Road Base (all standards) - 75 Years
- Asphalt Road Surface (Local Road) - 40 Years
- Asphalt Road Surface (Collector) - 30 Years
- Asphalt Road Surface (Arterial) - 20 Years
- Concrete Sidewalks - 50 Years
- Asphalt Sidewalks - 30 Years
- Street Lighting - 40 Years
- Traffic Signals - 40 Years

The above Estimated Service Life numbers have been adopted in the City's Tangible Capital Assets Policy (defined as Useful Life) as part of the financial requirements for PSAB. The average estimated service life of the total road network system is approximately 50 years.

Condition Assessment Summary:

In the assessment of the overall physical condition of the roads network, approximately **62%** is rated at **Good to Excellent** physical condition with **38%** rated at **Fair to Poor**. Using a 75 year estimated service life of a road, which includes the underlying base and sub-base structures, and the relative young age of the City of Parksville, **0%** of the roads were rated as **Failing**. However instinctively we suspect that this is portraying a slightly more positive picture than actually may be the case. With future physical condition assessment work this information is expected to improve over time and future updates will provide a more accurate picture of the road network's condition.

2008 Roads Estimated Condition Proportions



Life Cycle Cost Planning:

The City's current Long Range Capital Plan (2009-2027) annual average Capital Road (general) infrastructure budget is **$1,167,960.** The City's current annual average Development Cost Charges (DCC's) budget for road projects is **$844, 600**.

Given the previously defined road network system average Estimated Service Life (Useful Life) of approximately 50 years, the City should be planning for an average 50 year life cycle replacement. An average **50 year life cycle** replacement schedule, at the current estimated replacement cost, requires an annual average Capital replacement budget of **$2,300,000**.

Moss Avenue—A Local Road

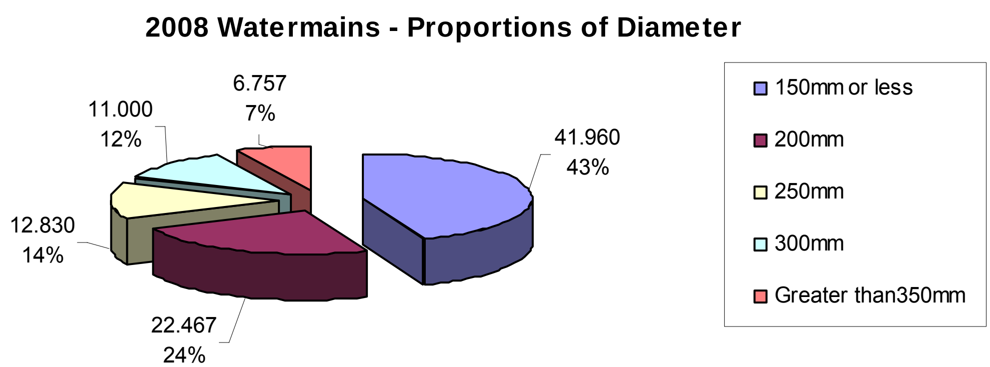
However, it has been determined that approx. 25% of the existing road network infrastructure is already at or beyond the recommended useful life and is in need of rehabilitation or replacement. With deferred maintenance the suggested average 50 year life cycle replacement annual Capital replacement budget has not been spent repairing roads which has resulted in a maintenance deficit. The life cycle replacement schedule required to overcome the deficit requires an annual average Capital replacement budget of **$3,600,000**.

See Section 8 for a detailed breakdown of the calculated road network system component costs.

Introduction to Water:

The City of Parksville owns, operates and maintains a Water Supply & Distribution System consisting of the Arrowsmith Dam (64% ownership), 5 reservoirs, 2 Well Fields, 2 Treatment & Booster Pump Facilities complete with **95km of supply & distribution piping.** Included within the water system are fire hydrants and a SCADA system that communicates information from the reservoirs, wells and treatment systems to the Engineering and Operations Center. The City of Parksville primarily supplies water to the residents of Parksville but also has an agreement with the Regional District of Nanaimo (RDN) to supply water to the residents of Nanoose during high demand periods (summer months) if required.

The water conveyance system is broken down into Supply and Distribution sub-systems, representing major and minor piping systems respectively.



A water supply system is defined as the major system that conveys water from the source to the water treatment plant or reservoirs. Accordingly this corresponds to large volumes of water and large pipes. For the proposes of this report the Water Supply sub-system has been defined as pipes that are larger than 200mm diameter. The Water Supply piping sub-system total length is approximately **30.6km** or 32% of the total water piping system. The total replacement value of the Water Supply piping sub-system is estimated at being **$21.7 million**.

A water distribution system is defined as the minor system that distributes treated water to the end users through a series of smaller pipes which are sized to provide adequate quantity and pressure for both domestic and fire demands. For the purposes of this report the Water Distribution sub-system has been defined as pipes that are 200mm in diameter or less. The Water Distribution piping sub-system total length is approximately **64.4km** or 68% of the total water piping system. The total replacement value of the Water Distribution piping sub-system is estimated at being **$36 million**.

Along with water piping sub-systems are the facilities and equipment that complete the system.

The Water Supply facilities and equipment include;

- 5 - Water Storage Reservoirs
- 2 - Pump (& Treatment) Stations
- 1 - Concrete Dam Structure (Arrowsmith Dam)
- 16 - Wells
- 1 - River Intake / Gallery

Due to time constraints and limited resources a detailed condition assessment of the water supply facilities was not undertaken but was limited to a replacement cost review and an estimation as to the physical condition based on operational history. The combined **Water Supply Facilities** estimated replacement value is **$20 million**.

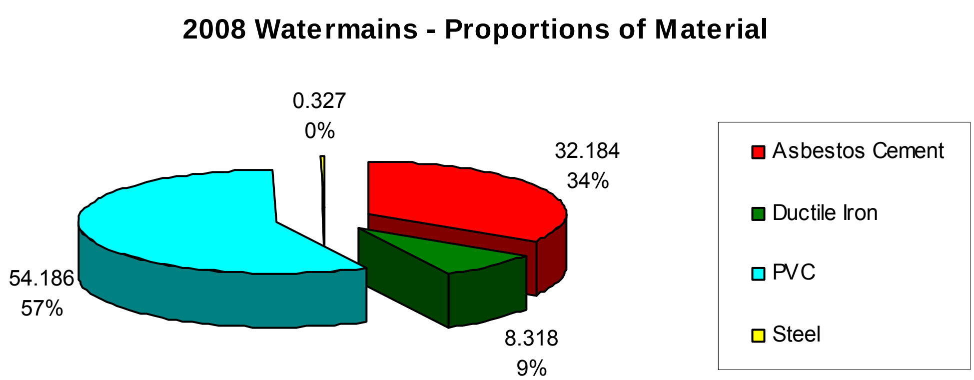
The total **Water Supply and Distribution System** estimated replacement value is **$77.7 million**.

New Geodesic Dome Roof (2008) — Springwood Reservoir No. 2

History:

Formal water supply and distribution piping systems have been in use for hundreds of years and pipe materials have improved over time primarily due to advances in (ductile iron) manufacturing industry process' and technology (PVC). Previously many different piping materials were used for various reasons including wood, cast iron, ductile iron, ductile iron and asbestos cement in water supply and distribution systems. The current trend is towards Polyvinyl Chloride (PVC) plastic pipe which is steadily gaining acceptance as the watermain material of choice.

In the mid 1940s the introduction of asbestos cement (AC) pipe was considered to be an improved product to replace cast iron pipe. In hindsight this is known to be erroneous as we have learned that AC pipe prematurely deteriorates when exposed to various chemical processes that leach out the cement binder material, leaving an un-structurally sound pipe. When AC pipe is compromised in this way it is prone to breakages in pressurized systems, as has been documented in multiple AC watermain piping systems across North America. Most communities that own asbestos cement watermains are actively working to replace them with more robust pipe materials such as PVC.
Asbestos cement pipe materials have not been shown to be hazardous to human health as the asbestos cement component of the pipe is limited to filler material that does not breakdown.



The City of Parksville owns approximately 32 km of asbestos cement piping. While the City does not currently have an active AC watermain replacement program the City is aware of the abundance of AC watermain and planning for the replacement through Capital replacement programs is a priority.

Condition Assessment Methodology:

The physical condition assessment of the water supply and distribution system have both components that are physically accessible for assessment, such as reservoirs and pumps, as well as components that are not easily accessed, such as underground pressurized piping. Due to time constraints and limited resources a detailed condition assessment of the entire Water Supply and Distribution System was not undertaken but was limited to data analysis of the piping sub-systems only. For this condition assessment GIS as-built record data was used to establish an original date of construction or re-build of watermains and using an accepted estimated service life of the pipe materials, a percentage of remaining estimated service life was calculated to determine the condition letter grade.

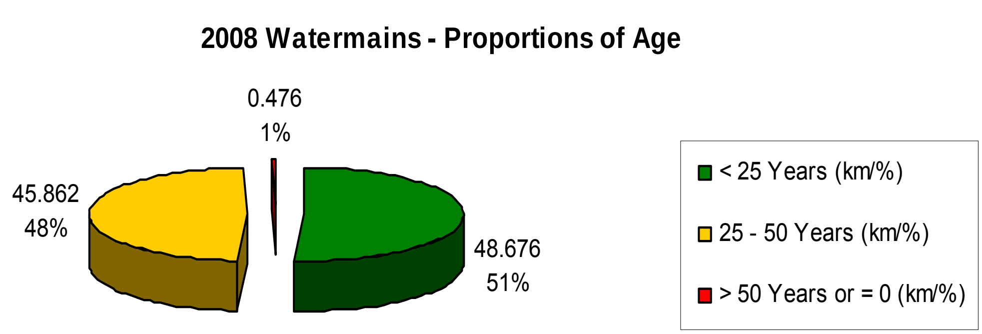
The City of Parksville has created a Water Model to better understand how the system delivers water and to plan future improvements to the system. Demand and capacity condition assessments are undertaken during updates to the Water Model. This data is not being reported but is expected to be incorporated in future updates.

The City of Parksville's 2008 total water consumption was 2,107,868m^3, the average daily consumption was 5,775m^3 with a peak daily consumption of 12,065m^3.

It has been determined through various publications and historical operations data that the Estimated Service Life of following water supply and distribution infrastructure assets is as noted:

- Water Supply Mains - 70 Years
- Water Supply Dams - 60 Years
- Water Supply Reservoirs - 50 Years
- Water Supply Pump Stations - 30 Years
- SCADA Systems - 15 Years
- Water Distribution Mains - 70 Years
- Water Meters - 25 Years
- Fire Hydrants - 40 Years

The above Estimated Service Life numbers have been adopted in the City's Tangible Capital Assets Policy (defined as Useful Life) as part of the financial requirements for PSAB 3150. The average estimated service life of the total water supply and distribution system is approximately 50 years.



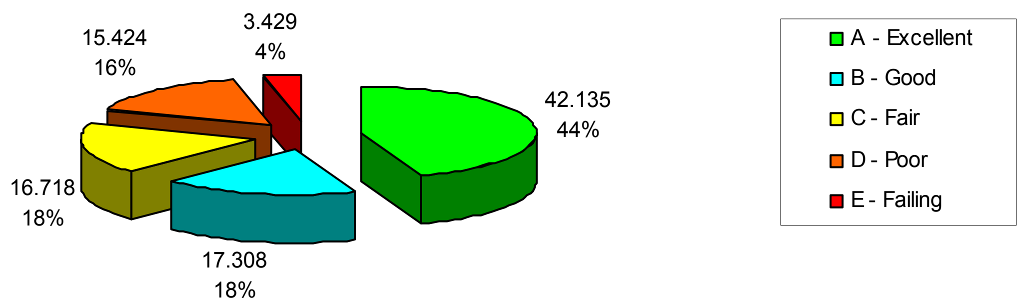
Condition Assessment Summary:

The condition assessment of the water supply and distribution system was limited to a data analysis of the piping sub-systems only due to time constraints and limited resources. The estimated overall condition assessment has been extended to include the other components of the water supply and distribution system based on the assumption that the piping systems continue to deliver good quality water that meets Canadian Drinking Water Guidelines as per our records and experience.

In the assessment of the overall physical condition of the water supply and distribution system, approximately **62%** is rated at **Good to Excellent** physical condition with 34% rated at Poor to Fair and **4%** rated as **Failing**.

Considering the noted abundance of asbestos cement watermains and the suspected compromised condition the assessment appears to be slightly more positive than actually may be the case. Ongoing Capital AC watermain replacement work will improve the overall physical condition of the water supply and distribution system. Future physical condition assessment work for watermains will require advancements in non-destructive testing technology which will reveal a more accurate picture. Future infrastructure asset condition assessment work will also include the remaining components of the water supply and distribution system that were not covered.

2008 Watermains - Estimated Condition Proportions



Life Cycle Cost Planning:

The City's current Long Range Capital Plan (2009-2027) annual average Capital Water infrastructure budget is **$627,177.** The City's current annual average Development Cost Charges (DCC's) budget for water projects is **$1,762,200**.

Given the previously defined water supply and distribution system average Estimated Service Life (Useful Life) of approximately 50 years, the City should be planning for an average 50 year life cycle replacement. An average **50 year life cycle** replacement schedule, at the current estimated replacement cost, requires an annual average Capital replacement budget of **$1,300,000**.

However, it has been determined that approx. 25% of the existing water supply and distribution system infrastructure is already at or beyond the recommended useful life and is in need of rehabilitation or replacement. With deferred maintenance the suggested 50 year life cycle replacement annual Capital replacement budget has not been spent repairing watermains which has resulted in a maintenance deficit. The life cycle replacement schedule required to overcome the deficit requires an annual average Capital replacement budget of **$2,000,000**.

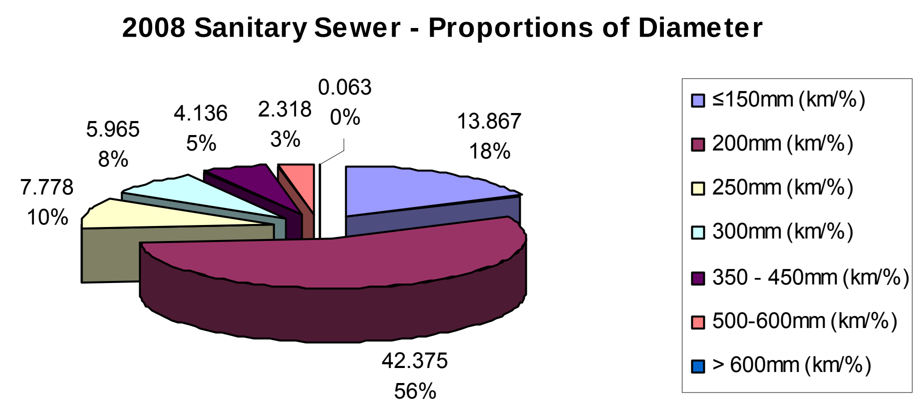
See Section 8 for a detailed breakdown of the calculated water supply and distribution system component costs.

Springwood Facility

Sanitary Sewer Introduction:

The City of Parksville owns, operates and maintains a Sanitary Sewer Collection System consisting of approximately 77 km of piping, two sewage pumping lift stations and appurtenances. The City of Parksville does not own nor operate a wastewater treatment facility. All of the City of Parksville's sewage eventually flows by gravity to a pumping station at the bottom of Bay Street where it is then pumped to the French Creek Pollution Control Centre (Wastewater Treatment Facility). The City of Parksville and surrounding areas' liquid waste is treated at the French Creek Pollution Control Centre which is owned and operated by the Regional District of Nanaimo.

The sanitary sewer system is broken down into Collector and Trunk sewer sub-systems, representing minor and major piping systems respectively.



A sanitary sewer Collection system is typically defined as the minor system that collects sewage from individual properties and conveys it to Trunk sewers. For the purposes of this report the sanitary sewer collection system has been defined as pipes that are 250mm in diameter or less. The Sanitary Sewer Collector piping sub-system total length is approximately **64.0km** or 84% of the total sanitary sewer collection piping system. The total replacement value of the Sanitary Sewer Collector piping sub-system is estimated at being **$35.0 million**.

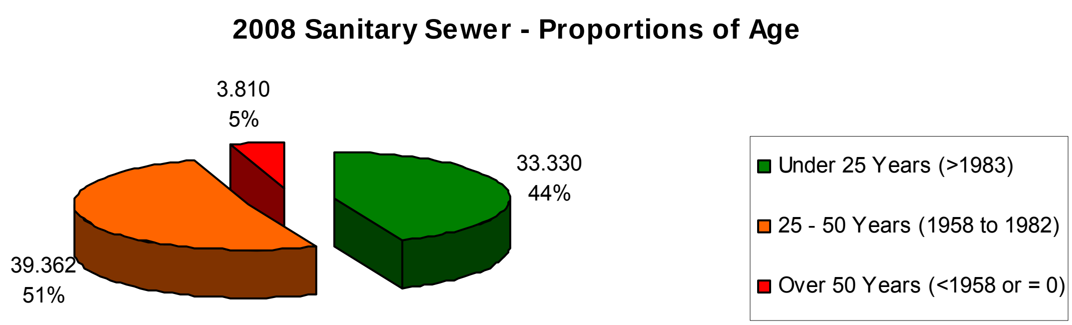
A sanitary sewer Trunk system is typically defined as the major system that conveys sewage to the waste treatment facility. Typically these are larger pipes and for the purposes of this report the trunk sewer system has been defined as pipes that are greater than 300mm in diameter. The Sanitary Sewer Trunk piping sub-system total length is approximately **12.5km** or 16% of the sanitary sewer collection piping system. The total replacement value of the Sanitary Sewer Trunk piping sub-system is estimated at being **$6.7 million**.

The total **sanitary sewer Collector / Trunk piping system** and Sewer Lift Stations estimated replacement value is **$44.0 million**.

History:

Formal sanitary sewer collection piping systems have been in use for hundreds of years but have typically been made from less technical piping materials that watermains require. Advancements in pipe materials have made their way into sanitary sewer systems, particularly PVC. Piping materials in sanitary sewer systems are not as of a concern as in water systems as sanitary sewers are primarily gravity systems and do not suffer the inherent pressure design issues of watermains.

While there is a large portion of the sanitary sewer system that is asbestos cement pipe there is less concern because AC pipe failures in sanitary sewers are not as common, tend to be less catastrophic and typically do not render the system non-functional unless the failure is in a key location. For this reason an accelerated AC pipe replacement program is not being recommended. Instead AC pipe in the sanitary sewer system will be replaced when capital replacement is required. As an alternative to replacement these pipes are able to be relined with trenchless technologies, which extend the service life.



The City of Parksville's first major sanitary sewer project was constructed in 1963 in the downtown area and Pioneer Crescent and drained into the Georgia Strait via an outfall through the community park at Arbutus Point. A second major project occurred in 1976 which brought municipal sanitary sewer service to the lower Temple Street and Forsyth Avenue to Pym Street areas.

Condition Assessment Methodology:

The physical condition assessment of the sanitary sewer system is similar to other utilities located underground in that the majority of the components are difficult to physically access and assess. Due to differences in the piping configurations and actual uses of the pipes the sanitary sewers are able to be accessed by way of manholes without disruptions in service. This is an area where recent technology innovations have produced a method that allows the visual inspection of sewer pipes with remote controlled robotic cameras (Closed Circuit Television—CCTV). In 2008 The City of Parksville undertook it's first CCTV inspection and assessment project which produced a condition assessment report, identifying structural deficiencies in the system piping components and established standardized condition grades for future reference.

Due to time constraints and limited resources a detailed condition assessment of the remainder of the Sanitary Sewer System was not undertaken but was limited to data analysis of the piping sub-systems only. For this condition assessment GIS as-built record data was used to establish an original date of construction or re-build of watermains and using an accepted estimated service life of the pipe materials a percentage of remaining estimated service life was calculated to determine the condition letter grade, establishing standardized condition grades.

The City of Parksville has created a Sanitary Sewer Model to better understand how the system collects sewage and to plan future improvements to the system. Demand and capacity condition assessments are undertaken during updates to the Sanitary Sewer Model. This data is not being reported but is expected to be incorporated in future updates.

The City of Parksville's 2008 total sanitary flow, recorded at the French Creek Wastewater Treatment Centre, was 1,672,240m^3.

It has been determined through various publications and historical operations data that the Estimated Service Life of following sanitary sewer network infrastructure assets is as noted:

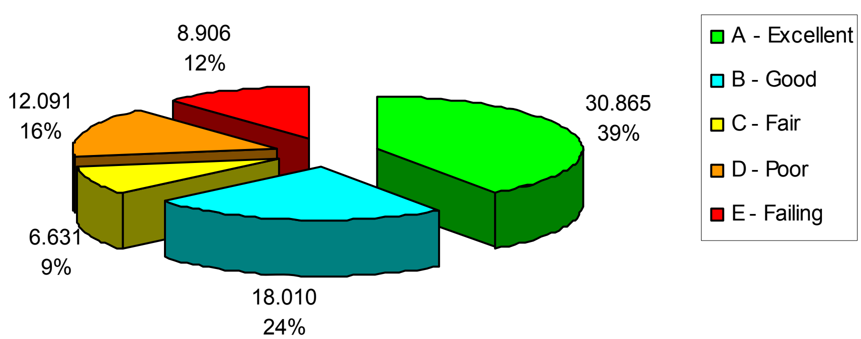
- Sewer Mains - 60 Years
- Sewer Pump / Lift Stations - 50 Years
- SCADA Systems - 15 Years

The above Estimated Service Life numbers have been adopted in the City's Tangible Capital Assets Policy (defined as Useful Life) as part of the financial requirements for PSAB 3150. The average estimated service life of the total sanitary sewer system is approximately 55 years.

Condition Assessment Summary:

In the assessment of the overall physical condition of the Sanitary Sewer System, approximately **63%** of the piping systems is rated at being in **Good** to **Excellent** condition with **24%** rated at **Poor** to **Fair** and **12%** rated as **Failing**. The results of surveying almost 11,000m of "Critical" sanitary sewers found that 93% of the pipes surveyed have an "Internal Condition Grade" of 1 or 2 (ICG is defined by the Water Resources Council standards on which CCTV inspection observed visual defects are rated and pipes are assessed by, but are not identical to the grades derived and assigned by this report) which indicates an acceptable structural condition with virtually no defects. Although the independent condition assessment only dealt with "Critical" sanitary sewers, which tend to be the larger pipes, the findings reflect the condition assessment results using data-analysis only. Additional CCTV inspection is planned for future years and should reveal a more accurate picture. Future infrastructure asset condition assessment work will also include the two sanitary sewer lift stations that were not covered.

2008 Sanitary Sewer - Estimated Condition Proportions



Life Cycle Cost Planning:

The City's current Long Range Capital Plan (2009-2027) annual average Capital Sewer infrastructure budget is **$287,594.** The City's current annual average Development Cost Charges (DCC's) budget for sanitary sewer projects is **$60,000**.

Given the previously defined sanitary sewer system average Estimated Service Life (Useful Life) of approximately 55 years, the City should be planning for an average 55 year life cycle replacement. An average **55 year life cycle** replacement schedule, at the current estimated replacement cost, requires an annual average Capital replacement budget of **$800,000**.

However, it has been determined that approx. 25% of the existing sanitary sewer system infrastructure is already at or beyond the recommended useful life and is in need of rehabilitation or replacement. With deferred maintenance the suggested 55 year life cycle replacement annual Capital replacement budget has not been spent repairing sanitary sewers which has resulted in a maintenance deficit. The life cycle replacement schedule required to overcome the deficit requires an annual average Capital replacement budget of **$3,100,000**.

See Section 8 for a detailed breakdown of the calculated sanitary sewer collection system component costs.

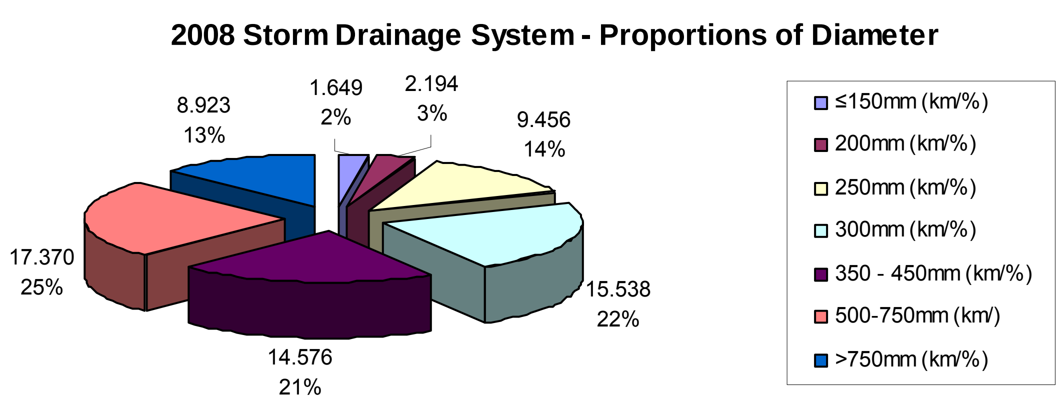
Craig Bay Sewer Lift Station

Storm Drainage System Introduction:

The City of Parksville owns, operates and maintains a Storm Drainage system consisting of approximately **70km** of piping, **30km** of open ditches**, 17 Outfalls** and miscellaneous appurtenances. Stormwater is not treated like sanitary sewer wastewater; instead it is collected and directed towards the ocean for release.

The Stormwater Drainage System is broken down into Collector and Trunk collection sub-systems, representing minor and major piping systems respectively.

A storm drainage Collector system is typically defined as the minor system that collects stormwater from individual properties and conveys it to Trunk sewers. For the purposes of this report the Storm Drainage Collector piping sub-system has been defined as pipes that are 450mm in diameter or less. The Stormwater Drainage Collector piping sub-system total length is approximately **43.4km** or **62%** of the total stormwater drainage piping system. The total Stormwater Drainage Collector piping sub-system is estimated replacement value is **$31.4 million**.



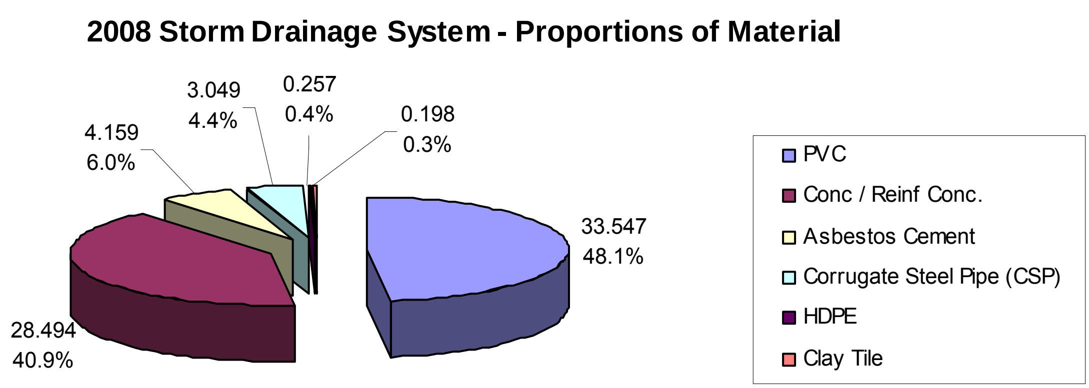
A storm drainage Trunk system is typically defined as the major system that conveys sewage to the point of discharge from the system. Typically these are larger pipes and for the purposes of this report the trunk sewer system has been defined as pipes that are greater than 450mm in diameter. The Stormwater Drainage Trunk piping sub-system total length is approximately **26.3km** or **38%** of the total stormwater drainage collection piping system. The total Stormwater Drainage Trunk piping sub-system estimated replacement value is **$19.2 million**.

The total **Storm Drainage System** estimated replacement value is **$52.2 million**.

History:

Formal storm drainage systems have not been in use as long as water supply or sanitary sewage collection systems. Historically stormwater was managed by way of open channels or ditches. For a period of time the philosophy for stormwater management was to convey stormwater with large piped systems. The current trend in stormwater management is to retain as much of the rainfall as possible to provide groundwater recharge.

Stormwater drainage piping systems have historically been less prone to changes in technology due to the relatively recent usage of formal stormwater drainage systems. The current trend in stormwater drainage collection piping systems is to use plastic (PVC) and concrete pipes, both very resilient materials. Historically, because stormwater drainage systems were less of a priority for both residents and municipalities they were less regulated. The piping materials used were also less regulated, with cost often being the overriding factor, resulting in the least expensive solution being used.



In storm drainage systems across North America the introduction of corrugated steel pipe (CSP) in the 1970's offered an economical solution to stormwater management. After almost 40 years of experience it has become apparent that CSP does not the have the estimated service life suggested by manufacturers of CSP, at least not in the coastal BC environment. In fact these pipes appear to be prematurely deteriorating causing concern in areas where larger diameter CSP have been installed, particularly in roadway crossings where these types of pipe are commonly used.

The City of Parksville is aware of the these facts and is actively replacing CSP with more resilient piping materials when the opportunity arises through Capital projects .

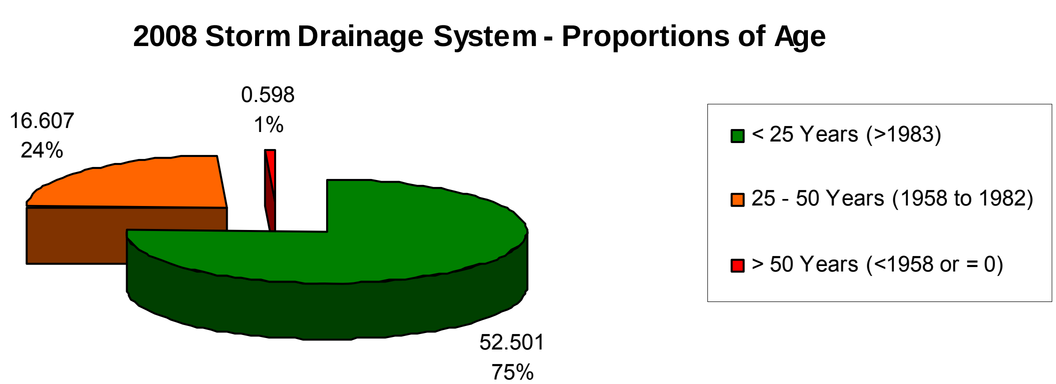
Condition Assessment Methodology:

The physical condition assessment of the storm drainage sewer system is similar to other utilities located underground in that the majority of the components are difficult to physically access and assess. Built similarly to sanitary sewer collection systems the storm drainage system pipes are able to be accessed by way of manholes without disruptions in service. Closed Circuit Television (CCTV) inspection can be employed to conduct condition assessment in storm drainage piping as well. While this technology is available for assessing the physical condition, it has not been implemented for the storm drainage system.

Due to time constraints and limited resources the physical condition assessment of the Storm Drainage System was limited to data analysis of the piping sub-systems only. For this condition assessment, GIS as-built record data was used to establish an original date of construction or re-build of storm drainage system mains and using an accepted estimated service life of the pipe materials a percentage of remaining estimated service life was calculated to determine the condition letter grade. The storm drainage system inventory data has the least as-built records on file requiring field investigation to fill out the data.

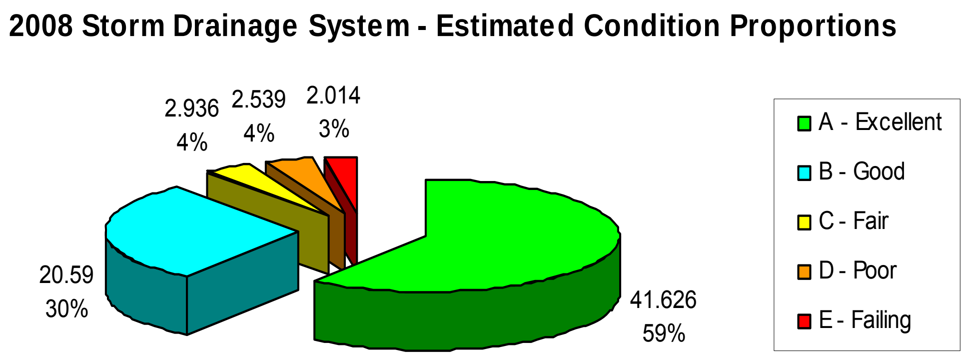
The City of Parksville has created a Storm Drainage System Model to better understand how the system conveys stormwater and to plan future improvements to the system. Demand and capacity condition assessments are undertaken during updates to the Storm Drainage System Model. This data is not being reported but is expected to be incorporated in future updates.

It has been determined through various publications and historical operations data that the Estimated Service Life of storm drainage system mains is approximately 60 years. This Estimated Service Life number have been adopted in the City's Tangible Capital Assets Policy (defined as Useful Life) as part of the financial requirements for PSAB 3150.



Condition Assessment Summary:

In the assessment of the overall physical condition of the Storm Drainage System, approximately **89%** of the piping systems is rated at being in **Good** to **Excellent** condition with **8%** rated at **Fair** to **Poor** and **3%** rated as **Failing**. Formal separate stormwater drainage systems are relatively new compared to water and sanitary sewer systems and the fairly high estimated physical condition reflects this. As-built records were also lacking in this area compared to others and may have also have affected the results. With future field survey efforts to complete the storm drainage system inventory data, this data set is expected to improve and future updates will provide a more accurate picture of this system's condition.



Life Cycle Cost Planning:

The City's current Long Range Capital Plan (2009-2027) annual average Capital Storm Drainage infrastructure budget is **$505,886.** The City's current annual average Development Cost Charges (DCC's) budget for storm drainage projects is **$133,700**.

Given the previously defined storm drainage system average Estimated Service Life (Useful Life) of approximately 60 years, the City should be planning for an average 60 year life cycle replacement. An average **60 year life cycle** replacement schedule, at the current estimated replacement cost, requires an annual average Capital replacement budget of **$870,000**.

However, it has been determined that approx. 25% of the existing sanitary sewer system infrastructure is already at or beyond the recommended useful life and is in need of rehabilitation or replacement. With deferred maintenance the suggested 60 year life cycle replacement annual Capital replacement budget has not been spent repairing sanitary sewers which has resulted in a maintenance deficit. The life cycle replacement schedule required to overcome the deficit requires an annual average Capital replacement budget of **$1,400,000**.

See Section 8 for a detailed breakdown of the calculated stormwater drainage system component costs.

Conclusion:

This premier "State of Municipal Infrastructure Report" was intended to illustrate the current basic level of understanding as to the physical state of and estimated replacement value of the infrastructure assets that the City of Parksville owns and operates. The report is also meant to be a "snapshot" in time of the methods and assumptions used in the assessment of infrastructure assets so that annual improvements and reports may provide a history for those that will follow.

Federal legislation has forced municipalities to adopt asset management practices in order to report the value of these assets on their annual financial statements. Primarily this is intended to provide a better understanding of the true costs of municipal owned and operated infrastructure but as a side benefit it also provides a better understanding of the current state of physical condition. At this point in time Infrastructure Asset Management is a relatively new science with few established practices and economical technologies in place for municipalities to make use of. It is expected that major advancements in asset management software, research and experience will improve making it easier for municipalities to effectively manage infrastructure assets.

During the analysis of the available data for the report, of which as-built record drawings were primarily used, some errors were found causing some question as to the accuracy of the assessment. Currently it is estimated that the accuracy of the assessment is within the plus or minus 20% range. This is defined as a Class B estimate and is considered an acceptable range with the amount of information available. For future reporting years it is recommended that a quality audit of existing as-built data is undertaken to validate the accuracy of the results. Along with additional data, future results will become more accurate.

It has been determined that the City has an annual average Capital replacement budget shortfall of **$7.6 million**. In an effort to avoid this deficit, the City should continue to acquire and/or apply for additional funding through developments and Federal / Provincial Grants. As well the City should be moving forward with formalizing an Asset Management System in which infrastructure records would become more detailed and easier to access for instantaneous information and annual review. This would allow the City to track the state of infrastructure and better determine when the optimum time of replacement is required.

The City should also continue to investigate and pilot new rehabilitation technologies in an effort to lengthen the useful life of infrastructure assets, postponing complete replacement. New technologies and improved operations and maintenance asset management practices will lengthen the useful life of existing infrastructure. Combined these practices will enable the City to make better infrastructure rehabilitation or replacement planning decisions, defer major capital replacement expenditures and ultimately reduce the annual deficit.

Road System Replacement Cost Table

Road Class	Suggested $ / lin. metre (2008 Unit Rates Incl Base)	Suggested $ / lin. metre (2008 Unit Rates Asphalt only)	Suggested $ / m^2 (2008 Unit Rates Asphalt only)
RC1 - Urban Local	$600	$250	$29
RC2 - Urban Collector	$1,200	$650	$51
RC3 - Resort Collector	$900	$450	$52
RC4 - Urban Arterial	$1,800	$900	$55
RC5 - Rural Arterial	$1,700	$975	$56
RC6 - Downtown Road	$1,000	$550	$50
RC7 - Inudstrial Road	$700	$450	$52
RC8 - Urban Lane	$400	$150	$28

Water Supply System Replacement Cost Table

Pipe (Nominal diameter)	Material	Class C $ /metre (2008 Unit Rates)	$ /metre (CoN Alternative Cost Est.)
100	PVC	$ 350	-
150	PVC	$ 425	$ 340
200	PVC	$ 475	$ 365
250	PVC	$ 550	$ 400
300	PVC	$ 600	$ 445
350	PVC	$ 650	$ 490
400	PVC	$ 700	$ 535

Sanitary Sewer Replacement Cost Table

Pipe (Nominal diameter)	Material	$ /metre (CoN 2005 Detail Cost Est. Sht)	**$ /metre (2008 Unit Rates)**	$ /metre (CoN Alternative Cost Est.)
100	PVC	-	**$ 350**	-
150	PVC	$ 418	**$ 420**	$ 350
200	PVC	$ 429	**$ 430**	$ 375
250	PVC	$ 494	**$ 500**	$ 400
300	PVC	$ 511	**$ 520**	$ 425
375	PVC	$ 530	**$ 530**	$ 450
400	CONC-R	$ 540	**$ 540**	-
450	CONC-R	$ 551	**$ 560**	$ 485
525	CONC-R	$ 593	**$ 600**	$ 515
600	CONC-R	$ 630	**$ 630**	$ 590
675	CONC-R	$ 640	**$ 640**	$ 700
750	CONC-R	$ 751	**$ 750**	$ 820

Storm Drainage Replacement Cost Table

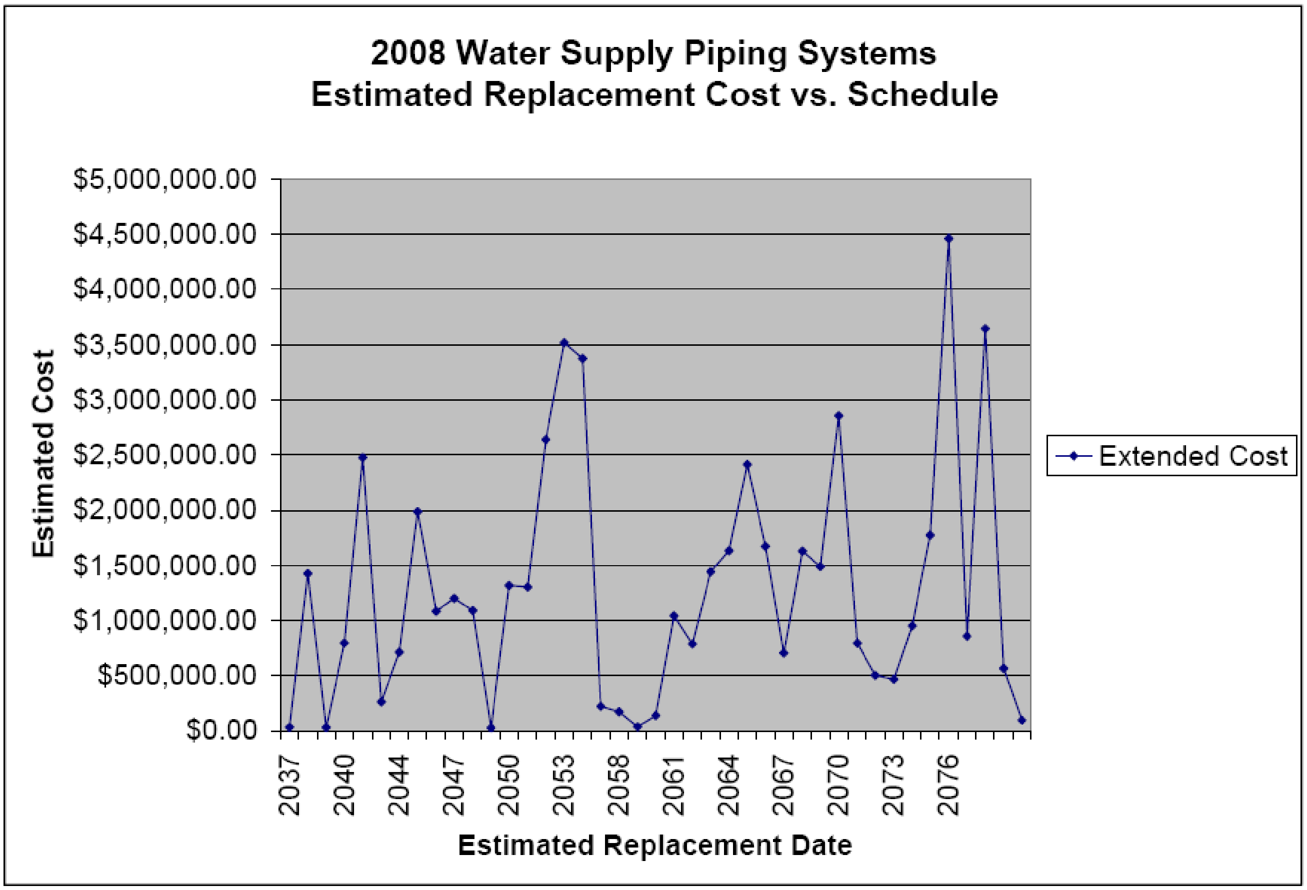
Pipe (Nominal diameter)	Material	$ /metre (CoN 2005 Detail Cost Est. Sht)	**$ /metre (2008 Unit Rates)**	$ /metre (CoN Alternative Cost Est.)
100	PVC	-	**$ 350**	-
150	PVC	$ 418	**$ 420**	$ 350
200	PVC	$ 429	**$ 430**	$ 375
250	PVC	$ 494	**$ 500**	$ 400
300	PVC	$ 511	**$ 520**	$ 425
375	PVC	$ 530	**$ 530**	$ 450
400	PVC	$ 540	**$ 540**	-
450	CONC	$ 551	**$ 560**	$ 485
525	CONC	$ 593	**$ 600**	$ 515
600	CONC-R	$ 630	**$ 630**	$ 590
675	CONC-R	$ 640	**$ 640**	$ 700
750	CONC-R	$ 751	**$ 750**	$ 820
900	CONC-R	$ 774	**$ 800**	$ 890
1050	CONC-R	$ 784	**$ 900**	$ 1,255
1200	CONC-R	$ 858	**$ 1,000**	$ 1,430
1500	CONC-R	$ 1,132	**$ 1,200**	$ 1,770

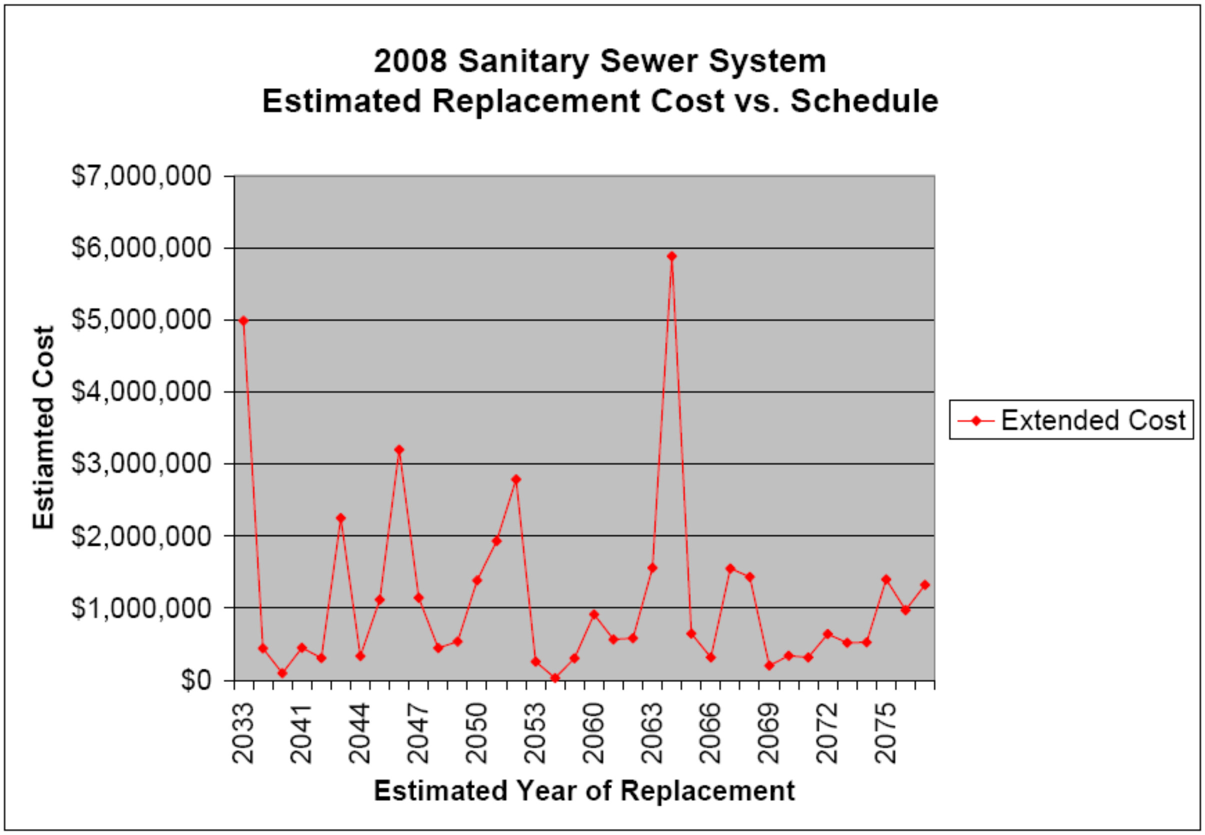
Roads Network Estimated Condition					
	A - Excellent	B - Good	C- Fair	D - Poor	E - Failing
Local, Downtown, Industrial & Lanes					
Asphalt (km)	7.87	11.64	7.79	17.35	30.57
Base Materials (km)	17.92	25.04	27.60	4.67	0.00
Arterial					
Asphalt (km)	0.00	0.00	0.00	1.69	11.35
Base Materials (km)	1.69	9.90	0.00	1.45	0.00
Collector					
Asphalt (km)	4.54	1.30	0.68	0.00	4.39
Base Materials (km)	5.84	0.68	2.46	1.93	0.00

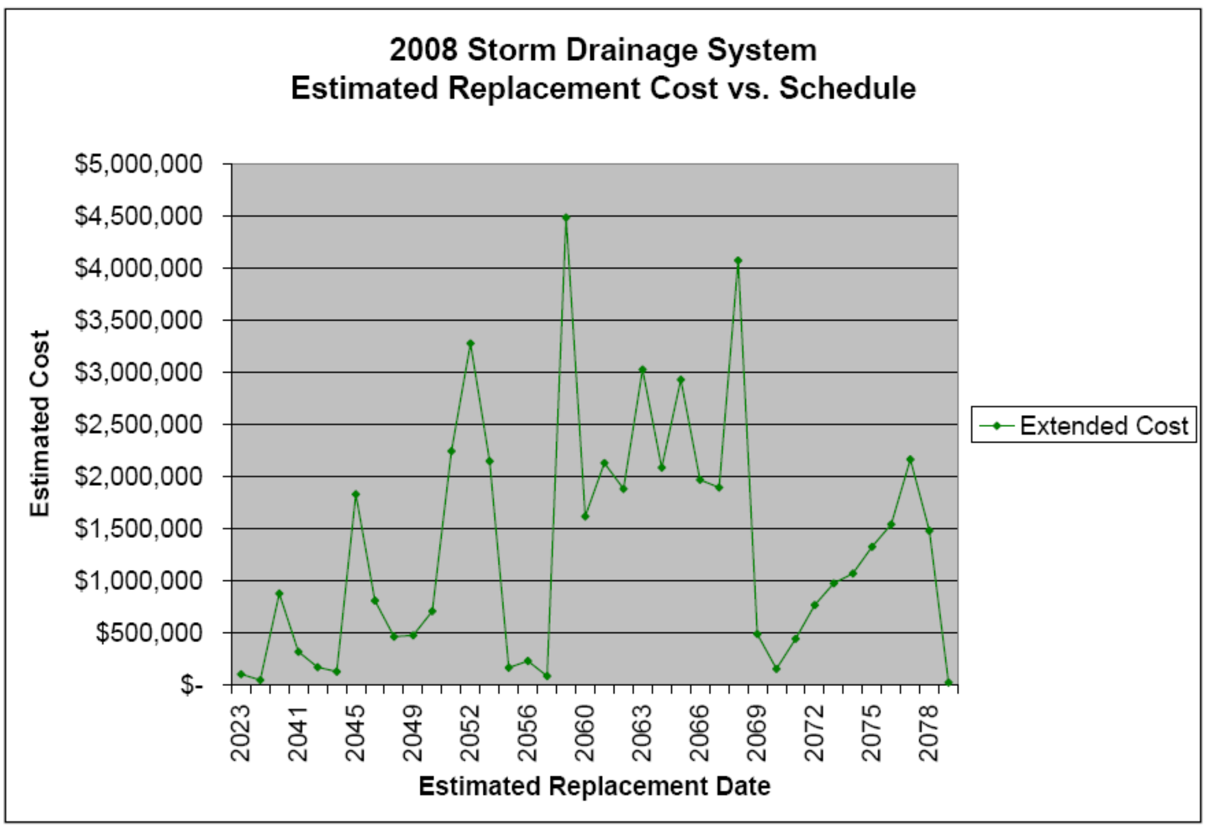
Water Supply & Distribution Piping System Estimated Condition		
	Length (km)	Percentage
A - Excellent	42.14	44.3%
B - Good	17.31	18.2%
C - Fair	16.72	17.6%
D - Poor	15.42	16.2%
E - Failing	3.43	3.6%
Total	95.01	100%

Sanitary Sewer Collection System Estimated Condition		
	Length (km)	Percentage
A - Excellent	30.86	40.3%
B - Good	18.01	23.5%
C - Fair	6.63	8.7%
D - Poor	12.09	15.8%
E - Failing	8.91	11.6%
Total	76.50	100%

Storm Drainage System Estimated Condition		
	Length (km)	Percentage
A - Excellent	41.63	59.7%
B - Good	20.59	29.5%
C - Fair	2.94	4.2%
D - Poor	2.54	3.6%
E - Failing	2.01	2.9%
Total	69.71	100%


2008 Water Supply Piping Systems
Estimated Replacement Cost vs. Schedule
$5,000,000.00
$4,500,000.00
$4,000,000.00
$3,500,000.00
$3,000,000.00
$2,500,000.00
$2,000,000.00
$1,500,000.00
$1,000,000.00
$500,000.00
$0.00
Estimated Cost
2037
2040
2044
2047
2050
2053
2058
2061
2064
2067
2070
2073
2076
Estimated Replacement Date
Extended Cost


2008 Sanitary Sewer System
Estimated Replacement Cost vs. Schedule
Estiamted Cost
$7,000,000
$6,000,000
$5,000,000
$4,000,000
$3,000,000
$2,000,000
$1,000,000
$0
2033
2041
2044
2047
2050
2053
2060
2063
2066
2069
2072
2075
Estimated Year of Replacement
Extended Cost


2008 Storm Drainage System
Estimated Replacement Cost vs. Schedule
Estimated Cost
$5,000,000
$4,500,000
$4,000,000
$3,500,000
$3,000,000
$2,500,000
$2,000,000
$1,500,000
$1,000,000
$500,000
$-
2023
2041
2045
2049
2052
2056
2060
2063
2066
2069
2072
2075
2078
Estimated Replacement Date
Extended Cost

Roads Network Estimated Replacement Cost									
	Number	Length (km)	Estimated 2008 Replacement Cost	Useful Life (New)	Annual Capital Replacement - (based on Useful Life)	Average Infrastructure Age	Annual Average Infrastructure Replacement Funding Required	Calculated Historical Cost	Net Book Value to Year End
Roads		99.18							
Asphalt			$46,343,006	20-50	$1,158,575	19	$1,931,372	$22,025,599	$11,396,014
Base Materials			$51,937,829	75	$692,504	25	$1,152,335	$24,082,081	$17,928,061
Sidewalks ***(60.0km est.)***		60.00	$9,400,000	40	$235,000	30	$313,333	$4,995,946	$1,998,378
Streetlights (882)	882	na	$4,000,000	40	$100,000	30	$133,333	$2,290,130	$1,087,812
Traffic Signals (13)	13	na	$3,400,000	40	$85,000	30	$113,333	$1,946,611	$924,640
Total:			**$115,080,835**		**$2,271,080**		**$3,643,707**	**$55,340,367**	**$33,334,905**

Water Supply & Distribution System Estimated Replacement Cost									
	Number	Length (km)	Estimated 2008 Replacement Cost	Useful Life (New)	Annual Capital Replacement - (based on Useful Life)	Average Infrastructure Age	Annual Average Infrastructure Replacement Funding Required	Calculated Historical Cost	Net Book Value to Year End
Supply System									
Watermains	1	95.01	$55,329,076	70	$790,415	21	$1,007,056	$29,987,480	$22,916,333
Arrowsmith Dam	1	na	$6,962,544	60	$116,042	10	$139,251	$5,222,129	$4,264,738
Reservoir 1	1	na	$370,200	50	$7,404	38	$30,850	$64,772	$14,250
Reservoir 2	1	na	$1,243,200	50	$24,864	38	$103,600	$217,517	$47,854
Reservoir 3	1	na	$408,000	50	$8,160	48	$204,000	$42,594	$852
Reservoir 4	1	na	$2,734,200	50	$54,684	27	$118,878	$1,224,553	$538,803
Reservoir 5	1	na	$2,335,200	50	$46,704	2	$48,650	$2,293,188	$2,155,597
Springwood Pump Station	1	na	$1,233,600	50	$24,672	8	$51,493	$925,239	$721,686
River Pump Station	1	na	$1,266,000	50	$25,320	22	$68,465	$688,898	$372,005
Railway Well No. 1	1	na	$180,000	50	$3,600	6	$4,091	$149,099	$128,225
Railway Well No. 2	1	na	$180,000	50	$3,600	14	$5,000	$123,330	$86,331
Railway Well No. 3	1	na	$180,000	50	$3,600	14	$5,000	$123,330	$86,331
Railway Well No. 4	1	na	$180,000	50	$3,600	13	$4,865	$124,766	$89,832
Railway Well No. 5	1	na	$180,000	50	$3,600	7	$4,186	$144,447	$121,335
Railway Well No. 6	1	na	$180,000	50	$3,600	6	$4,091	$149,099	$128,225
Railway Well No. 7	1	na	$180,000	50	$3,600	11	$4,615	$132,862	$100,975
Railway Well No. 8	1	na	$72,000	50	$1,440	0	$1,440	$72,000	$70,560
Trill Well	1	na	$180,000	50	$3,600	6	$4,091	$149,099	$128,225
Springwood Well No. 1	1	na	$180,000	50	$3,600	16	$5,294	$113,683	$75,031
Springwood Well No. 2	1	na	$180,000	50	$3,600	5	$4,000	$152,657	$134,338
Springwood Well No. 3	1	na	$180,000	50	$3,600	8	$4,286	$141,870	$116,333
Springwood Well No. 4	1	na	$180,000	50	$3,600	5	$4,000	$152,657	$134,338
Springwood Well No. 5	1	na	$180,000	50	$3,600	11	$4,615	$132,862	$100,975
Springwood Well No. 6	1	na	$180,000	50	$3,600	11	$4,615	$132,862	$100,975
Springwood Well No. 7	1	na	$180,000	50	$3,600	18	$5,625	$107,913	$66,906
Springwood Well No. 8	1	na	$180,000	50	$3,600	18	$5,625	$107,913	$66,906
Springwood Well No. 9	1	na	$72,000	50	$1,440	10	$1,800	$54,002	$42,122
Springwood Well No. 10	1	na	$72,000	50	$1,440	0	$1,440	$72,000	$70,560
Springwood Well No. 11	1	na	$72,000	50	$1,440	0	$1,440	$72,000	$70,560
SCADA - River Station	1	na	$54,000	15	$3,600	0	$3,600	$54,000	$50,400
SCADA - Sprinwood Facility	1	na	$78,000	15	$5,200	0	$5,200	$78,000	$72,800
SCADA - Springwood Wells	1	na	$42,000	15	$2,800	0	$2,800	$42,000	$39,200
SCADA - Railway Wells	1	na	$42,000	15	$2,800	0	$2,800	$42,000	$39,200
SCADA - Top Bridge	1	na	$42,000	15	$2,800	0	$2,800	$42,000	$39,200
SCADA - ADAM	1	na	$84,348	15	$5,623	0	$5,623	$84,348	$78,725
Water Meters *(est.)*	*3823*	na	$1,300,000	25	$52,000	13	$104,000	$959,559	$498,971
Fire Hydrants *(est.)*	*454*	na	$1,100,000	40	$27,500	20	$55,000	$643,165	$321,582
Total:		95.01	**$77,800,000**		**$1,263,949**		**$2,034,186**	**$45,019,893**	**$34,091,281**

Sanitary Sewer Collection System Estimated Replacement Cost									
	Number	Length (km)	Estimated 2008 Replacement Cost	Useful Life (New)	Annual Capital Replacement - (based on Useful Life)	Average Infrastructure Age	Annual Average Infrastructure Replacement Funding Required	Calculated Historical Cost	Net Book Value to Year End
Sanitary System									
Sanitary Collection System	1	76.50	$41,689,276	60	$694,821	24	$797,113	$21,501,202	$15,365,232
Craig Bay Lift Station	1	na	$1,130,000	50	$22,600	12	$1,128,000	$803,162	$594,340
Martindale Lift Station	1	na	$1,130,000	50	$22,600	12	$1,128,000	$803,162	$594,340
Craig Bay - SCADA	1	na	$48,000	15	$3,200	0	$48,000	$48,000	$44,800
Martindale - SCADA	1	na	$48,000	15	$3,200	0	$48,000	$48,000	$44,800
Total:		76.50	**$44,045,276**		**$746,421**		**$3,149,113**	**$23,203,527**	**$16,643,512**

Storm Drainage Collection System Estimated Replacement Cost									
	Number	Length (km)	Estimated 2008 Replacement Cost (in $ million)	Useful Life (New)	Annual Capital Replacement - (based on Useful Life)	Average Infrastructure Age	Annual Average Infrastructure Replacement Funding Required	Calculated Historical Cost	Net Book Value to Year End
Detention Ponds	1	na	$200,000	50	$4,000	20	$6,667	$119,904	$74,340
Drainage Pipe System	1	70	$50,610,787	70	$723,011	16	$1,333,497	$32,783,149	$26,149,214
Open Ditch	1	na	$1,400,000	50	$28,000	25	$56,000	$392,348	$125,551
Total:		69.72	**$52,210,787**		**$755,011**		**$1,396,164**	**$33,295,401**	**$26,349,106**

City of Parksville Infrastructure Estimated Replacement Cost Summary					
	Total Length (km)	Value ($)	Desired - Average Annual Capital Replacement Cost	Current Average Annual Capital Plan Budget	Annual Shortfall (Deficit)
Roads Network	99.18	$ 115,080,835	$3,643,707	$ 1,167,960	-$2,475,747
Water System	95.01	$ 77,800,000	$2,034,186	$ 627,177	-$1,407,009
Sanitary Sewer Collection System	76.5	$ 44,045,276	$3,149,113	$ 287,594	-$2,861,519
Storm Drainage Collection System	69.71	$ 52,210,787	$1,396,164	$ 505,886	-$890,278
Total :		**$ 289,136,898**	**$10,223,170**	**$ 2,588,617**	**-$7,634,553**