



HIMA™

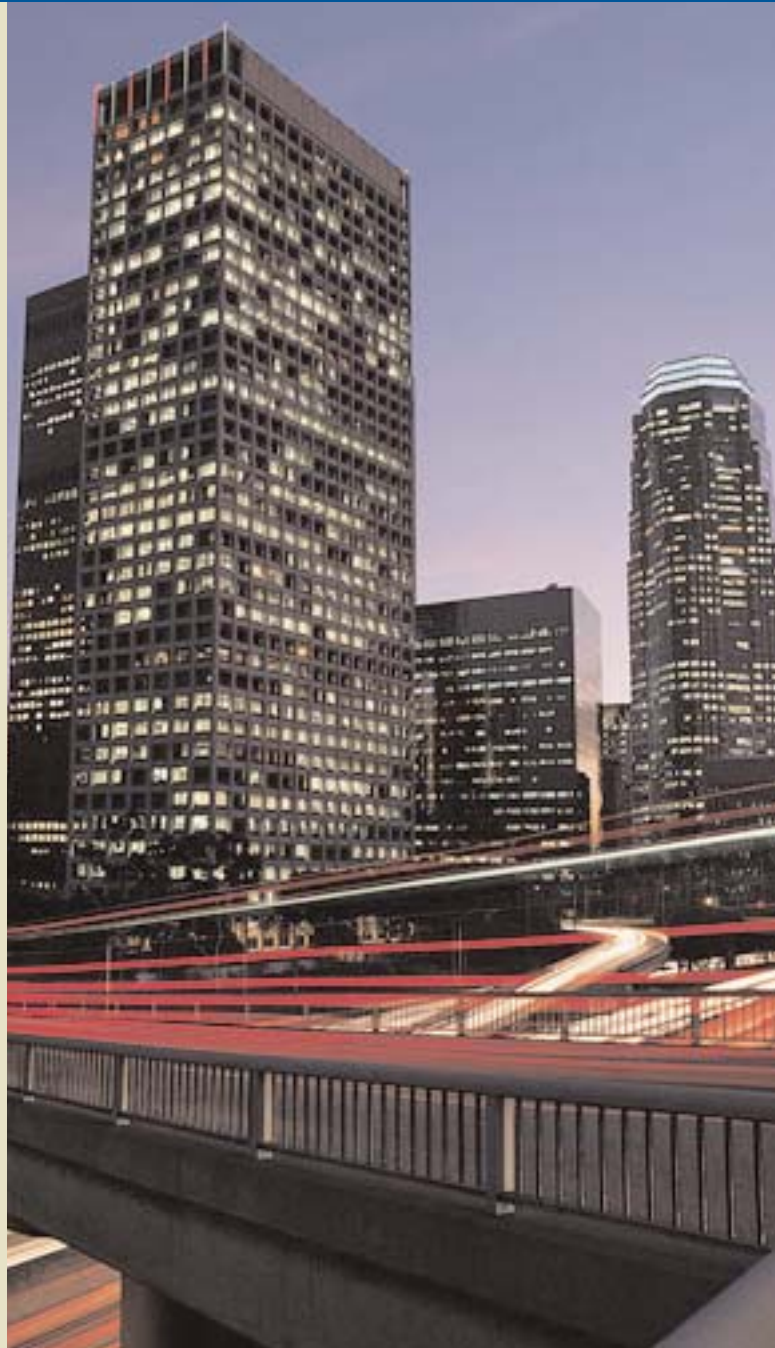
The Harfan Infrastructure Management Approach

FORSEEING TOMORROW'S PROBLEMS

GUIDING EVERYDAY ANSWERS



Harfan

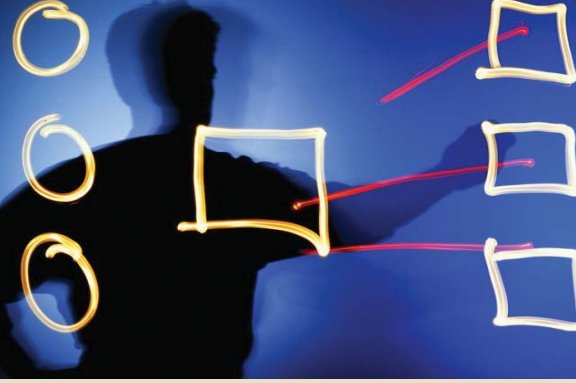


The Effective New Way to Understand and Manage Your Infrastructures

With aging populations and increasingly tight budgets, municipalities need planning tools to deal with the critical issue of older infrastructures. They need a Capital Improvement Plan (CIP) that considers their needs and budget.

AT HARFAN, WE CAN HELP

Our sophisticated decision support tools help extending assets service life, reducing operating costs, and improving services to the community.

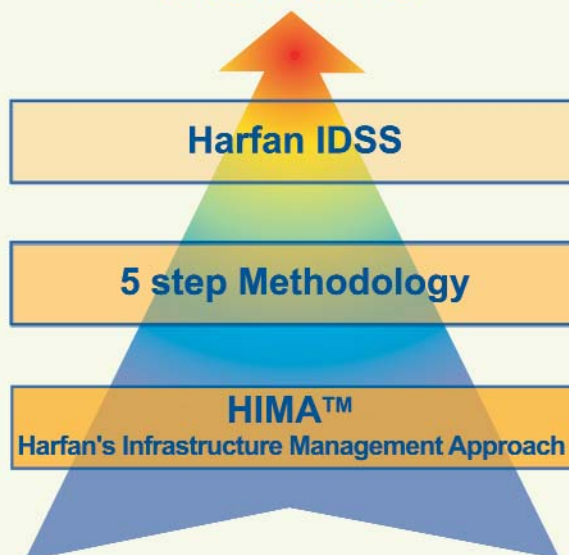


What is HIMA™ ?

The Harfan Infrastructure

The Harfan Infrastructure Management Approach (HIMA™) combines a five-step methodology with an Integrated Decision Support System (IDSS™) that enhances decision making and provides for asset management the systematic planning, control, expansion, and decommissioning of capital (infrastructure) assets. It integrates policy (strategic-level) management, system/network (mid-level) management, and operations management into one focused approach with high performance technology. In short, HIMA™ focuses on the best possible scenarios to improve decision making at the lowest cost.

INFRASTRUCTURE SUSTAINABILITY AND FAST ROI



[OVERVIEW]

Management Approach

Sustainability for Your Capital Development

Clearly, society benefits from more efficient asset management. Asset managers have a responsibility to ensure the greatest possible degree of public safety. This demands minimum standard criteria for asset sustainability which is where Harfan comes in. We can help you.

- ▶ Know the key features of your physical assets—what, when, where, and how much?
- ▷ Understand optimum expected service levels and how these levels can be adjusted to keep pace with changes in your organization;
- ▶ Know the system thoroughly enough to be able to identify the critical steps to achieving the sustainable performance you desire;
- ▷ Acquire and update the information you need to choose the right renewal strategy and make the most informed decisions;
- ▶ Develop a financial plan and budget scenarios to attain economic sustainability and the desired level of service;
- ▷ Identify the consequences of insufficient funding on the overall condition, level of service, probability of failure, and exposure to financial crisis of your assets;
- ▶ Assess priorities in order to base decisions on critical needs and ease pressure on the renewal program;
- ▷ Enable managers to adjust risk appreciation according to the organization's risk tolerance;
- ▶ The HIMA™ makes asset management easier and your organization more integrated and cost-effective in its decision making.



Harfan HIMA™

in the
Asset Management Industry

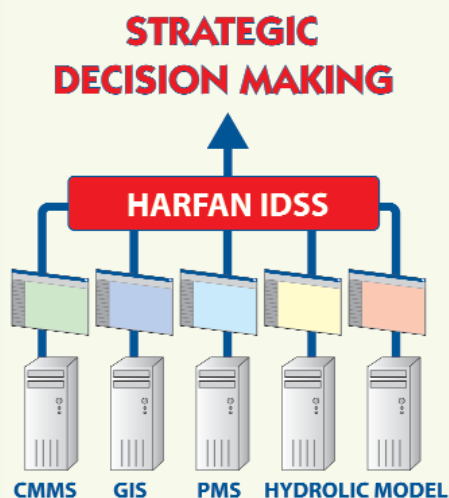
Harfan is the asset management industry's high end solution. It connects to existing information systems, such as GISs, CMMSs, PMSs, and hydraulic models, and mines data to produce multiyear CIPs and integrated CIPs.

Why is HIMA™ Unique?

Harfan is the only firm to:

- ▶ Combine a 5-steps methodology with a software tool (an Integrated Decision Support System) that produces multiyear capital improvement plans for multiple types of asset categories using precise multicriteria analysis to enhance strategic planning;
- ▶ Offer a complete knowledge base built from industry standards and past projects experience;
- ▶ Integrate all civil infrastructure networks (water, wastewater, stormwater, roads) into a single, comprehensive analysis;
- ▶ Provide predictive modeling able to estimate an asset's current and future condition based on deterioration curves;
- ▶ Identify the financial impacts of physical deterioration and produce "what if" scenarios.

The Harfan Infrastructure Management Approach can reduce total infrastructure life cycle costs by up to 35% based on total replacement value, and guarantees a ROI in less than 24 months.

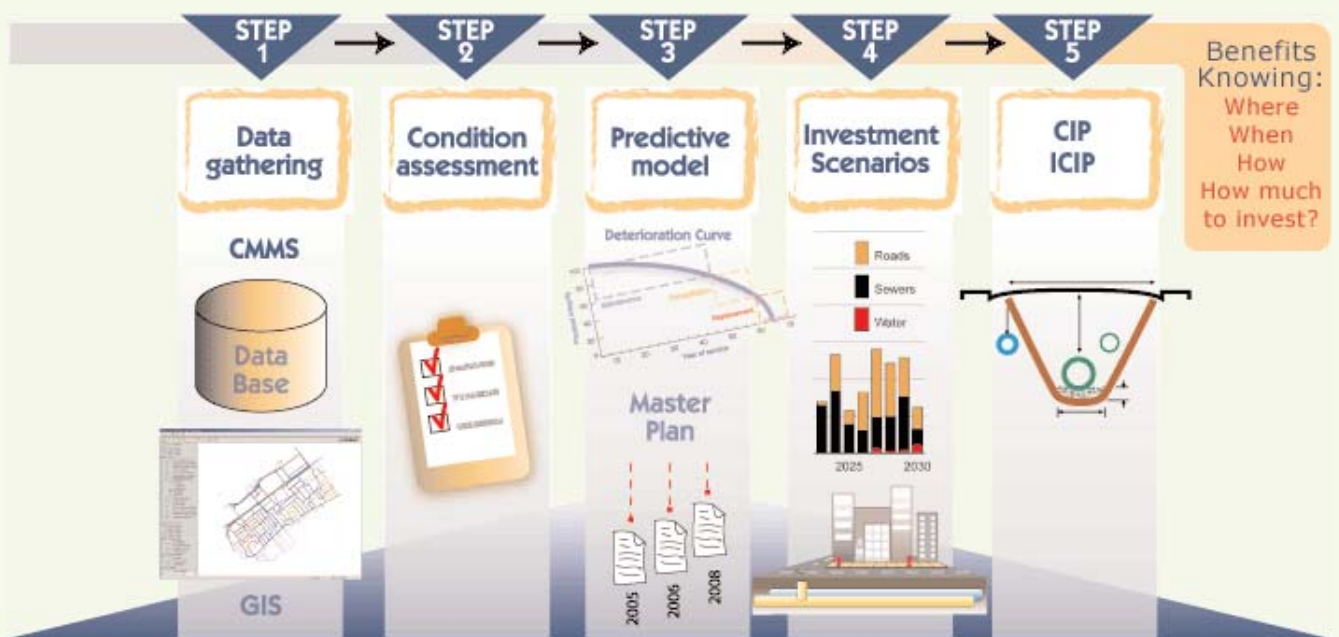


[OVERVIEW]

5-Steps Process at a Glance

The key to the success of Harfan's innovative 5-steps approach is the transfer of high-level technical knowledge to municipal decision-makers and engineering consulting firms. Projects can be implemented very rapidly from off-the-shelf patterns chosen by the organization, with each and every dollar invested in asset management optimized. Harfan's technical expertise leaves municipal administrators ample leeway to plan out their projects based on accurate and reliable information.

The Harfan 5-steps approach is enhanced with the Integrated Decision Support System (IDSS™), which guarantees an easier, more accurate decision making than under the traditional engineering approach. The Harfan IDSS™ combines four software programs - Harfan Driver, Harfan Data Warehouse, Harfan CIP Builder, and Harfan ICIP Builder - for a systematic approach to Capital Improvement Planning (CIP). The step-by-step approach is carried out as follows:





Data Gathering

What type of infrastructure do you own?

What do you know about it?

What is its value?

If you already have an inventory database in a computerized maintenance management system, you do not have to build another data set. The Harfan Driver will use your CMMS as the inventory database. Data from other sources like GISs or hydraulic modeling tools can also be used in the IDSS™. This approach puts existing data to work for capital planning, significantly boosting its value.

If you do not have an inventory database, Harfan sets up a complete infrastructure inventory, which becomes the foundation for its structured management process and the storage of information gathered later on. Harfan Data Warehouse puts descriptive and geographic data to work for a more efficient use.

The experts at Harfan have already built several optimized capital improvement plans using minimum data, focusing on the most relevant value-added information. They can help you decide what information to collect and determine the degree of precision needed. They can also give you tips on how to save money.

[STEP 1]

Type of Organization

Ready to go

- ▶ Data source quality assessment.
- ▷ One of Harfan's greatest strengths is its ability to turn legacy data into usable information for the organization and add value to it.
- ▶ Harfan Data Warehouse software is compatible with various descriptive and geographic information tools, such as computerized maintenance management systems (CMMSs), GISs, hydraulic modeling tools, as well as other data sets.
- ▷ Consulting on the choice of hydraulic modeling tools and external expert systems.
- ▶ Consulting on technical specification workup for specialized survey and data collection.

Starting from scratch

- ▶ Data source quality assessment.
- ▷ One of Harfan's greatest strengths is its ability to turn legacy data into usable information for the organization and add value to it.
- ▶ Data collection efforts are optimized, for instance, to concentrate on problem sectors to directly benefit organization.
- ▷ Harfan puts together an optimum data management plan by identifying the minimum, most essential information needed to complement the assets database.
- ▶ The organization or specialized engineering department manages the collection of descriptive and condition information.
- ▷ Consulting on the choice of hydraulic modeling tools and external expert systems.
- ▶ Consulting on technical specification workup for specialized survey and data collection.

[STEP 1]

Features

Benefits

Software:
**Harfan Data Warehouse
& Harfan Driver**

Central data repository for
an easy access and an efficient
computation;

Link to most popular data
models;

Simultaneous management of
several types of assets to
develop the organization's
corporate memory;

Compatible with most popular
computerized maintenance
management systems (CMMs);

Fully integrated with most
popular geographic information
system (GIS) on the market;

Compilation of multiple
parameters for all data (e.g.
material, diameter, installation
year, etc.);

Direct link to images,
documents, videos, and URLs
from asset inventory sheet;

Management of
defects/observations noted
during inspection (e.g., CCTV
inspection, visual pavement
inspection, etc.);

Numerous reporting and sorting
capabilities.

Quick implementation with
off-the-shelf Harfan tools;

More informed selection of
information to minimize data
maintenance costs;

Recovers and adds value to
legacy information;

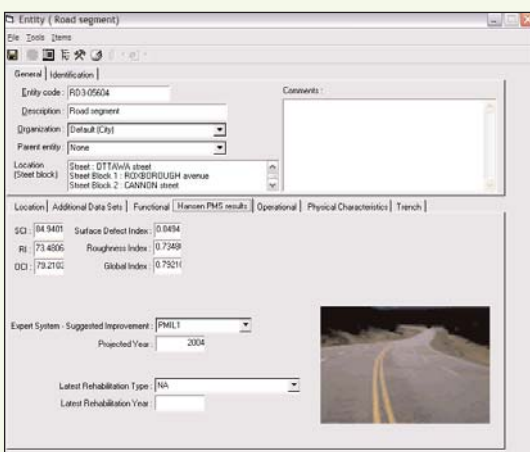
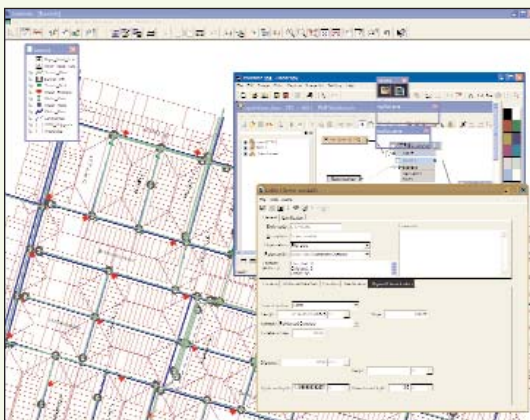
Central data repository easily
accessible to multiple users for
day-to-day use;

Numerous reporting and sorting
capabilities;

A complete infrastructure
database containing essential
descriptive, condition,
historical, and geographic
information;

Determines the net value,
annual amortization, and
replacement value
of each asset;

Lets you gather reliable
information at the lowest
possible cost.





Condition Assessment

What is the current condition of each network?

What is the integrated condition?

Silo Approach

Harfan helps municipalities to picture the condition of all their networks. The Harfan CIP condition assessment and rating module uses a highly structured process.

Integrated Approach

Due to the close proximity and high level of interaction between infrastructure networks, cost-effective decisions on asset rehabilitation/replacement require an integrated approach. Harfan's innovation lies in evaluating water, sewer and road networks by considering their high degree of spatial interaction. Knowing the condition of these networks as a whole is an incredible trump card for municipal administrators.

Approach

- ▶ Strategic counseling based on industry standards and best practices;
- ▷ The Harfan CIP Builder calculates a network's current condition and assesses the risk;
- ▶ Uses powerful, precise mathematical algorithms to produce a single, comprehensive assessment and rating of a network's condition based on multiple criteria, including physical and functional integrity, socioeconomic impact and risk;
- ▷ The Harfan CIP Builder rates an asset's current condition using criteria such as pipe breakage history, defects, events (such as sewage backups), physical configuration (frost line, spatial position), environmental conditions (such as soil aggressiveness) and action effects (bus lines);
- ▶ Evaluates unassessed assets based on the performance of similar assets to minimize the need for inspection;
- ▷ Determines the need for each improvement through integrated condition assessment;
- ▶ Can be custom-calibrated for the organization as part of Harfan's ongoing commitment to excellence.

[STEP 2]

[STEP 2]

Features

Benefits

Silo Approach
Harfan CIP Builder

Integrated Approach
Harfan ICIP Builder

Harfan CIP Builder is used to draw up condition assessments and ratings;

Harfan can integrate results from expert systems for greater accuracy;

Harfan recommends the most appropriate improvements based on assessment and rating results;

Groups assets together into a virtual entity based on spatial proximity;

Uses an integrated approach to identify repair requirements according to infrastructure condition;

Fully GIS compatible, displays results in a user-friendly interface;

Compares different service level scenarios;

Decision rule sets and models used to rate assets can be customized without programming.

Provides thorough understanding of the condition of all networks;

Allows current asset condition to be quickly determined using a minimum set of field data;

Determines the best possible improvements for each infrastructure network using complete, reliable assessments based on physical integrity, serviceability, and socioeconomic impact;

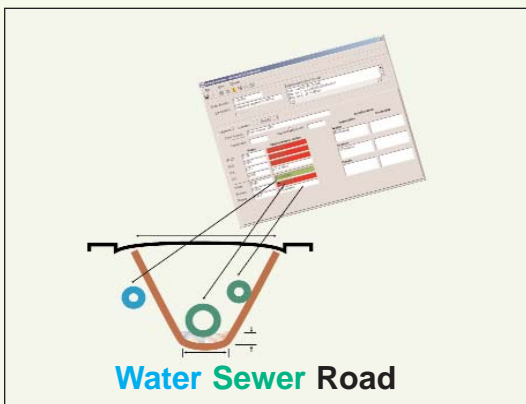
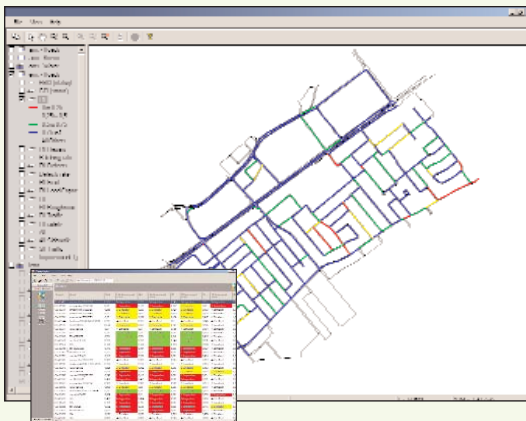
Rates compliance with regulatory standards for safety and serviceability;

Provides an integrated life cycle analysis of the condition of water, sewer and road networks;

Maximizes performance of complementary systems already in place;

Facilitates benchmarking;

Estimates the condition of unassessed assets using the "similarity" concept, minimizing inspection costs.





Predictive Deterioration Model

What is the remaining service life?

Knowing an asset's current condition and the expected service life for its family of behavior is essential to estimate its remaining service life. But Harfan goes one step further, conducting a statistical analysis of the organization's current data to forecast remaining service life. Harfan's CIP Builder features an efficient predictive module that generates realistic deterioration curves for each asset family.

Approach

- ▶ Starts with the service life assumptions and trends set out by industry, institutional or other existing expert systems;
- ▷ For greater accuracy, similar components in each infrastructure network can be grouped into families;
- ▶ A family's remaining service life can be determined, for instance, using the following data:
 - ▷ Water distribution network: Statistical analysis of repairs and leaks, breakage history, remote field testing, field sampling and testing;
 - ▶ Sewer network: Statistical analysis of defects, results of CCTV inspections, results of zoom camera inspections;
 - ▷ Road network: Statistical analysis of defects, pavement management system (PMS) results, results of visual inspections;
- ▷ The expertise of local engineering firms is used to help generate deterioration curves to determine remaining service life;
- ▶ Comparison and benchmarking with industry standards (best practices) to determine the acceptable level of service for the organization.

[STEP 3]

[STEP 3]

Features

Benefits

Software:

Harfan ICIP Builder

Statistical analysis of defects to assess life expectancy;

Deterioration curves for infrastructure assets with similar physical and functional properties within each network;

Comparison with industry standards and determination of acceptable level of service;

“What if” scenarios for each network to reflect funding impacts (lack of funding, take no action, maintain level of service, increase level of service);

Full GIS compatibility with results displayed in a user-friendly interface;

Comparison of different level-of-service scenarios;

Customized decision rule sets and models without programming.

Quick implementation: uses proven service life estimates based on 15 years of experience;

Structured methodology makes it possible to efficiently refine life cycle curves;

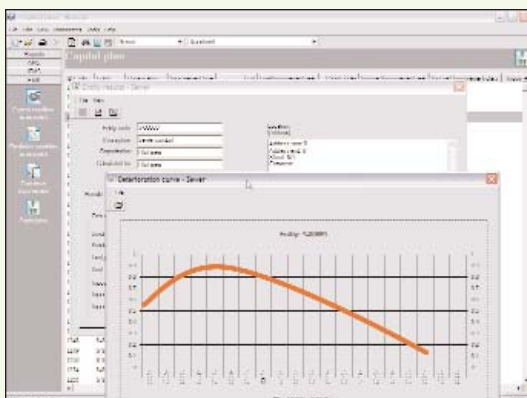
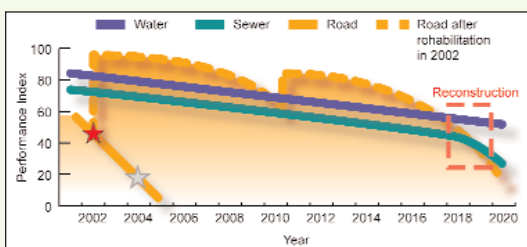
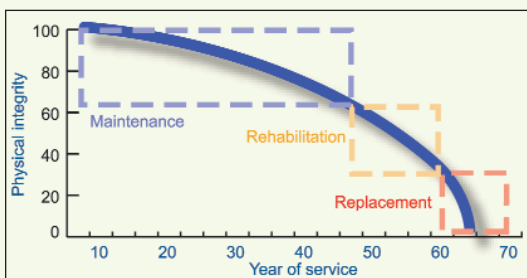
Better organization-appropriate service life assumptions; a step beyond using demographics to determine long term needs;

Identifies your short, medium, and long term needs with regard to infrastructure asset renewal and the effect on level of service, performance and reliability;

Unique predictive modeling capability prevents costly operation failure;

Reduces management risk by predicting service life and improving status timing;

Extends service life and reduces cost by using the “window of opportunity” concept to determine the best time to make improvements.





Investment Scenarios

How much should you invest
to ensure sustainability?

Harfan will demonstrate to your organization how to best plan your future capital investments and how to develop a structured approach in order to better justify your budget strategies before the City Council.

Approach

- ▶ Know the impacts of your investments on the reliability of your infrastructure networks;
- ▷ Estimate optimum spending on capital asset reconstruction and rehabilitation;
- ▶ Design various investment scenarios based on renewal policies, expansion forecasts and budgetary frameworks;
- ▷ Determine multiple “What if” scenarios of each network;
- ▶ Determine multiple integrated (e.g. Water, Sewer and Roads) “What if” scenarios for the complete portfolio of infrastructures.

[STEP 4]

[STEP 4]

Features

Benefits

Software:
Silo Approach
Harfan CIP Builder

Integrated Approach
Harfan ICIP Builder

“What if” scenarios for each network to reflect funding impacts:

- ▶ Lack of funding;
- ▶ Take no action;
- ▶ Maintain level of service;
- ▶ Increase level of service;
- ▶ Steady budget;
- ▶ Etc.

Comparison of different level-of-service scenarios;

Processes renewal strategy and budget “what if” scenarios for each network;

Forecasts the investment required over a 10, 20, 50 or even 100 years period;

Customizes financial decision rule sets and models without programming.

Target the best financial strategy to minimize rate impacts;

Identify your short, medium, and long term financial needs with regards to infrastructure asset renewal and the effect on level of service, performance and reliability;

Understand your infrastructure portfolio and make informed decisions;

A step beyond using demographics to determine long term financial needs;

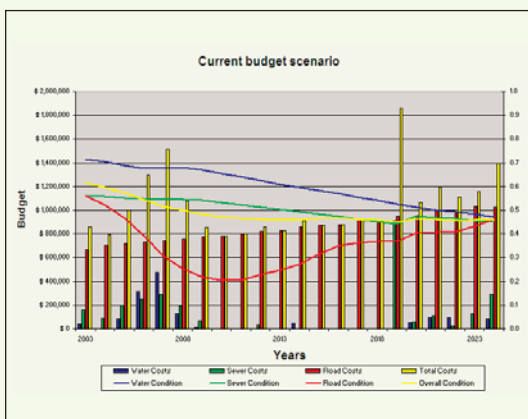
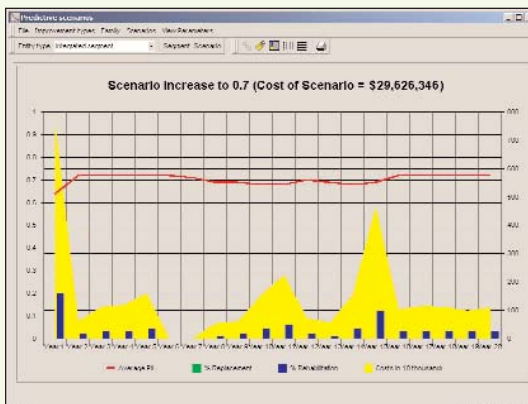
Identify infrastructures that fall below the organization’s quality standards for one or more criteria;

Determine the breaking point on infrastructure investment to ensure sustainability;

Demonstrate the expected saving with regards to rehabilitation vs replacement;

Provide answer to the key question:

- ▶ How much should you invest in your networks to maintain an adequate level of service and ensure infrastructure sustainability?





Capital Improvement Plan Integrated Capital Improvement Plan

What needs to be done and when?
What to rehabilitate, replace, maintain?

Infrastructure networks are analyzed to produce a Capital Improvement Plan (CIP). Integrated analysis of water, sewer, and road networks can also be done, taking into account their high level of interaction to produce an Integrated Capital Improvement Plan (ICIP). The Harfan CIP and ICIP Builder modules put user-defined decision-making criteria to work to generate decision trees, algorithms, and predictive scenarios based on various levels of spending. The long term analysis can forecast investments required over a 5, 10, 20, 50, or even 100 years period and identify potential major expenditures. Before the Harfan CIP and ICIP Builder modules, it was impossible to achieve these kinds of results.

Approach

- ▶ Produces an optimized, cost-effective Capital Improvement Plan, including scheduling, techniques and costs;
- ▷ Identifies repair priorities based on multicriteria analysis for cost-effective scheduling and project selection;
- ▶ Puts the expertise of a specialized engineering firm to work to help develop solutions to specific network problems with a comprehensive CIP;
- ▷ Refines results and priorities based on criteria such as risk minimization and optimization of cost/benefit, impact, socioeconomic factors, level of service and renewal policies;
- ▶ Once again, the Harfan CIP and ICIP module are calibrated according to the organization's needs.

[STEP 5]

[STEP 5]

Features

Benefits

Software:
Silo Approach
Harfan CIP Builder

Integrated Approach
Harfan ICIP Builder

Produces multiyear CIPs based on financial constraints;

Breaks down CIPs into projects with common denominators such as location, condition, scheduling, costs, work type, etc.;

Lists priorities based on minimization of risk and optimization of cost/benefit, impact, socioeconomic factors, level of service, renewal policies;

Produces multiyear Integrated Capital Improvement Plans (ICIPs), incorporating previous CIPs in a single comprehensive analysis;

Includes expansion and decommissioning projects in funding applications;

Committed projects can be managed in the system analysis;

Fully GIS compatible, displays results in a user-friendly interface.

Draws up Capital Improvement Plans;

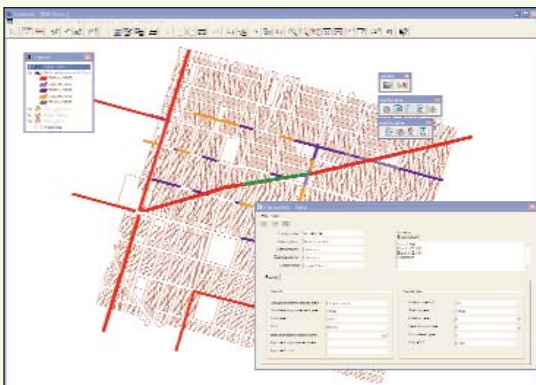
Helps you understand your infrastructure portfolio and make informed decisions;

Optimizes regular maintenance, rehabilitation, and replacement improvements;

Simultaneously analyzes the life cycles of multiple infrastructure networks to determine the optimum time for making improvements and enjoying considerable savings;

Provides answers to key questions:

- ▶ Where and when should you make major repairs?
- ▶ What is the optimal improvement in each case?
- ▶ What will the improvement cost?



Integrated segment SI-00061
5th Ave, from Peel St. to Sherbrooke St.

| Water | | | | | |
|----------------------------------|------------------------|------------|--------------------------|----------------------|--------------------------------|
| Segment Code | Improvement | Length (m) | Distance from center (m) | Diameter before (mm) | Diameter after (mm) |
| CA-02640 | Replacement | 20.4 | - 5.6 | 150 | 200 |
| 0.15 Physical Integrity | | | | | |
| Breaks per 100m | | 6 | Material | Cast Iron | |
| Year of installation | | 1960 | Soil type | Clay | |
| 0.72 Functional Integrity | | | | | |
| 0.75 Socioeconomic impact | | | | | |
| CA-02641 | Replacement | 28.4 | - 3.5 | 150 | 200 |
| CA-02647 | Replacement | 59.3 | 1.0 | 150 | 200 |
| etc. | | | | | |
| Sewers | | | | | |
| Segment Code | Improvement | Length (m) | Distance from center (m) | Diameter before (mm) | Diameter after (mm) |
| C15C333a | Reel conduit | 70.5 | - 0.6 | 300 | --- |
| CE255001 | Add conduit | 104.9 | 2.0 | --- | 250 |
| CE255002 | Add conduit | 98.3 | 2.0 | --- | 250 |
| etc. | | | | | |
| Roads | | | | | |
| Segment Code | Improvement | Length (m) | Distance from center (m) | Width (m) | Surface area (m ²) |
| 1060 | Pavement subgrade reh. | 406.8 | 0.0 | 8.6 | 3498.4 |

OVERALL BENEFITS of HIMA™

Harfan's methodology and software have changed the very nature of asset management. They let you assess and rate the condition of your assets, strategically manage their lifecycle, and devise an Integrated Capital Improvement Plan (comprehensive analysis of multiple asset types). Our efficient and innovative approach helps you decide where, when, how, and how much to invest over multiple years through a city-wide analysis.

- ▶ Improves the life quality of your community and support the economic development of your municipality;
- ▷ Reduces rate impacts with the ever-increasing infrastructure needs;
- ▶ Creates and implement an asset management strategy to reduce total lifecycle cost by up to 35% of total asset replacement value;
- ▷ Helps you make the best replacement decisions, minimizing the capital investment needed to renew your aging infrastructure;
- ▶ Reduces both your capital and operating expenses by improving the overall management of life cycle costs;
- ▷ Meets the infrastructure asset reporting requirements of the standard and integrated GASB 34 approaches, the benchmark for all state and local government reporting;
- ▶ Complies with the Canadian National Guide to Sustainable Infrastructure and the 10 objectives of its technology road map;
- ▷ Provides you with a ROI in less than 2 years. Get a fast ROI with the Harfan boomerang effect!



HARFAN IS YOUR ANSWER!

With Harfan, you will be able to identify the best improvements to extend service life, the most opportune time to make the investment, and how to do it in the most cost-effective way.



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Printed in Canada
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