



State of Good Repair Program Technical Summary

Background

The County's Infrastructure and Planning Services Department (IPS) is responsible for a number of construction initiatives including Capacity Expansion, Rehabilitation, Drainage, Engineering, and CWATS, which together provide major improvements to the roads, bridges, railway crossings, active transportation and drainage infrastructure that make up the Essex County Highway Network. The Construction Program consists of numerous components that are undertaken on an annual basis, including:

- Roadway Expansion;
- Rehabilitation;
- Traffic Operations;
- Engineering, Planning and Design; and
- Bridges and Culverts.

Each year, IPS staff evaluate various strategies to optimize the use of capital funding for these programs while considering the complexity of project scope, delivery strategy and coordination of work with Local Municipal Partners.

Focusing on the rehabilitation component of the Construction Program, IPS prepares and delivers the annual State of Good Repair Program (SOGR). The SOGR concentrates on maintaining and improving the condition of the assets in the County of Essex Road Network. Included in the program are road pavements, bridge and culverts structures, drainage structures, intersections and guiderails. It utilizes a three-tiered approach of reconstruction, rehabilitation and preventative maintenance to improve our infrastructure and extend the life of our assets.

Much like the Roadway Expansion Program, the influx of development in the area has a direct impact on the level of service values for our roads and structures. As traffic volumes increase, the County's assets see more wear and tear and consequently the rate of deterioration accelerates. The SOGR



strives each year to meet these demands and maintain the objectives of the County's Asset Management Plan.

Rehabilitation Program Development

In order to develop the SOGR, IPS annually inspects and evaluates the roads, bridges and culverts that make up the County's infrastructure network. Pavement condition is evaluated based on factors including but not limited to: rideability, surface and base conditions, rutting, drainage and friction. Bridge and culvert structures are inspected on an element-by-element basis, including but not limited to: decks, abutments, expansion joints and barrier walls. Similar to the pavement evaluations, structural inspections consider rideability, superstructure and substructure conditions, concrete and steel deterioration and roadside safety. In conjunction with these technical evaluations, IPS evaluates assets based on factors such as remaining service life, traffic volumes including truck traffic, history of maintenance and rehabilitation, cost-benefit analysis, rate of deterioration and the knowledge and experience of our team.

In developing the rehabilitation program, there are external considerations to be made as well. Operational improvements such as intersection and/or road widening, other roadway components such as drainage, underground utilities, environmental impacts, alignment with municipal works and local development initiatives all play a key role.

Closely tied to the development of the SOGR is the County's Asset Management Plan (AMP). The AMP is updated regularly to address changes resulting from updated asset condition ratings, scope of work adjustments and market forces. The AMP supports the County's corporate goals which rely upon adequate infrastructure and a defined level of service that the County is committed to providing. The objectives of the process are to establish the value of funds needed to maintain quality infrastructure and identify the means by which this infrastructure is maintained. The quality of this planning process has a significant impact on the condition of the County's infrastructure network and the life cycle cost of maintaining it.

The intent of the SOGR is to ensure a safe and reliable road network while providing for value-added and cost-effective maintenance. The SOGR supports the County of Essex Strategic Goal of "Building a Regional Powerhouse: the County will help create the conditions to make the region a



powerhouse in public and private investment attraction” by providing reliable infrastructure for partners.

Performance prediction is a critical requirement for the identification of future structure preservation needs. There are various types of preservation techniques that the County utilizes to maximize service life and minimize costs. IPS continues to consider environmental concerns and sustainability principles when evaluating rehabilitation alternatives.

Roads

The County of Essex Road Network is made up of almost 1,500 lane kilometres of roads with various classes and composition. The pavement infrastructure has been constructed, maintained and enhanced over many years. As identified in the County’s 2024 Asset Management Plan, the total replacement value of the Road Network is over \$568,000,000.

The most cost-effective way to maintain the road network is to provide timely, preventative treatments to the pavement. The benefits of this approach are realized in the form of lower overall costs, longer serviceability and less disruption to the travelling public. If pavements are allowed to deteriorate too far, the consequences can be compounding. The rate of deterioration typically accelerates as the end of service life is approached and rehabilitation efforts often become unpredictable and sporadic. The result is a pavement that has been cut and repaired in many different locations and methods. In the end, preservation options are no longer applicable and full pavement reconstruction, which is both costly and time consuming, become necessary.

IPS is always looking into new and innovative ways to address pavement deterioration. The objective is to utilize more frequent minor rehabilitation methodologies to allow more kilometers of road to be maintained for the same budgetary values.

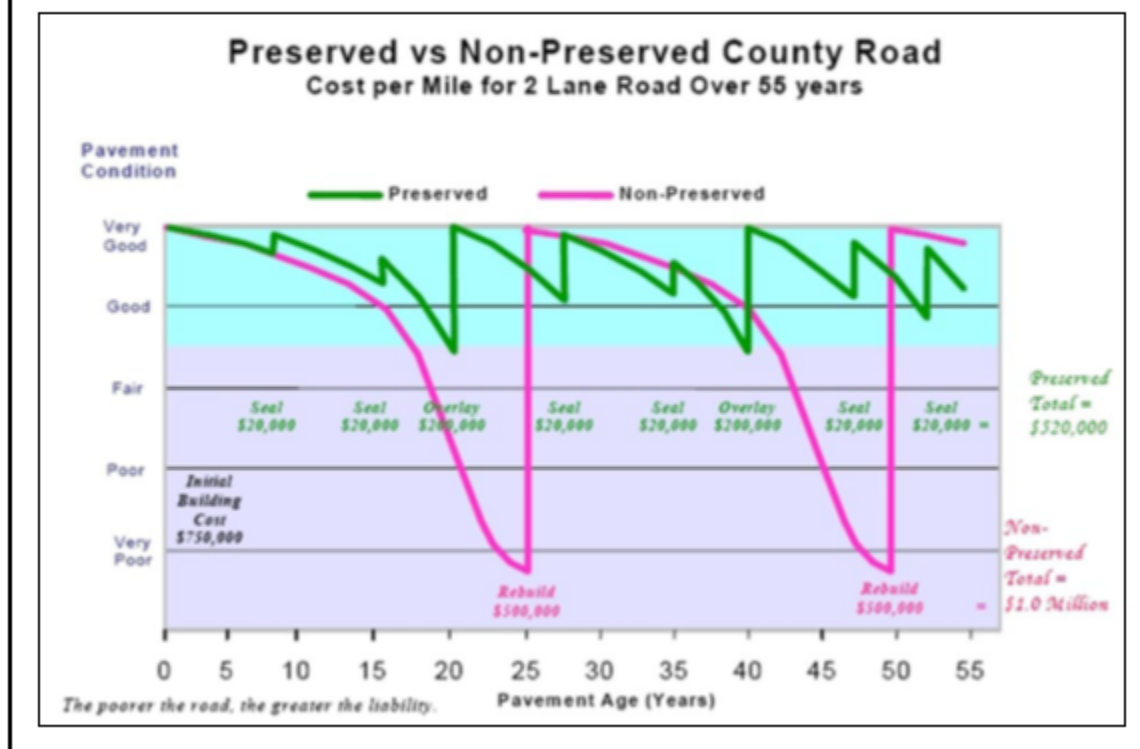
In order to optimize the County’s position in the development of this rehabilitation program, pavement evaluations are conducted biannually to determine the functional and structural condition of each road segment for the purpose of either routine maintenance or planned corrective action. Pavement Condition Surveys are completed in accordance with the Ministry of Transportation of Ontario standards in order to determine the Pavement

Condition Index (PCI), which then translates into the categories of Very Good, Good, Fair and Poor that are identified in the County's Asset Management Plan. Examples of these conditions can be seen in Figure 1. Road segments found to be in the Poor and Fair categories are then brought forward as potential candidate projects for the Rehabilitation Program. Further review of candidate projects is undertaken to evaluate potential conflicts with other planned construction efforts.



Figure 2 represents sample costs to maintain a road over a set service life through a preserved or non-preserved maintenance strategy. It shows a typical methodology, very similar to what the County employs, that demonstrates how, with the timely application of preservation works, the full life cycle costing can be reduced by up to half of the overall cost throughout a 55-year life cycle for each kilometer of 2-lane road. Procedures and methodologies such as this one, are reviewed annually by IPS for each road segment in the long-term rehabilitation plan and from this review, the differences between competing pavement design alternatives and subsequent rehabilitation strategies are evaluated.

Figure 2: Lifecycle of Pavement Condition



Bridges

The County's Bridge Inventory currently includes 84 structures that range in age from new to approximately 90 years with an average age of 52 years. The full replacement value of all the County's bridge structures is in the order of \$200,000,000.

Under the *Public Transportation and Highway Improvement Act, 1990*, *Ontario Regulation 104/97* and *Ontario Regulation 472/10 Standards for Bridges*, municipalities are required to inspect bridges every 2 years in accordance with the Ontario Structure Inspection Manual (OSIM) procedure established by the Ministry on Transportation of Ontario. Structures are evaluated on an element by element basis and required rehabilitation efforts are categorized as Excellent, Good, Fair and Poor. The individual element ratings are weighted in order to determine a Bridge Condition Index for each structure which is then translated into Now, 1-5 Year and 6-10 Year

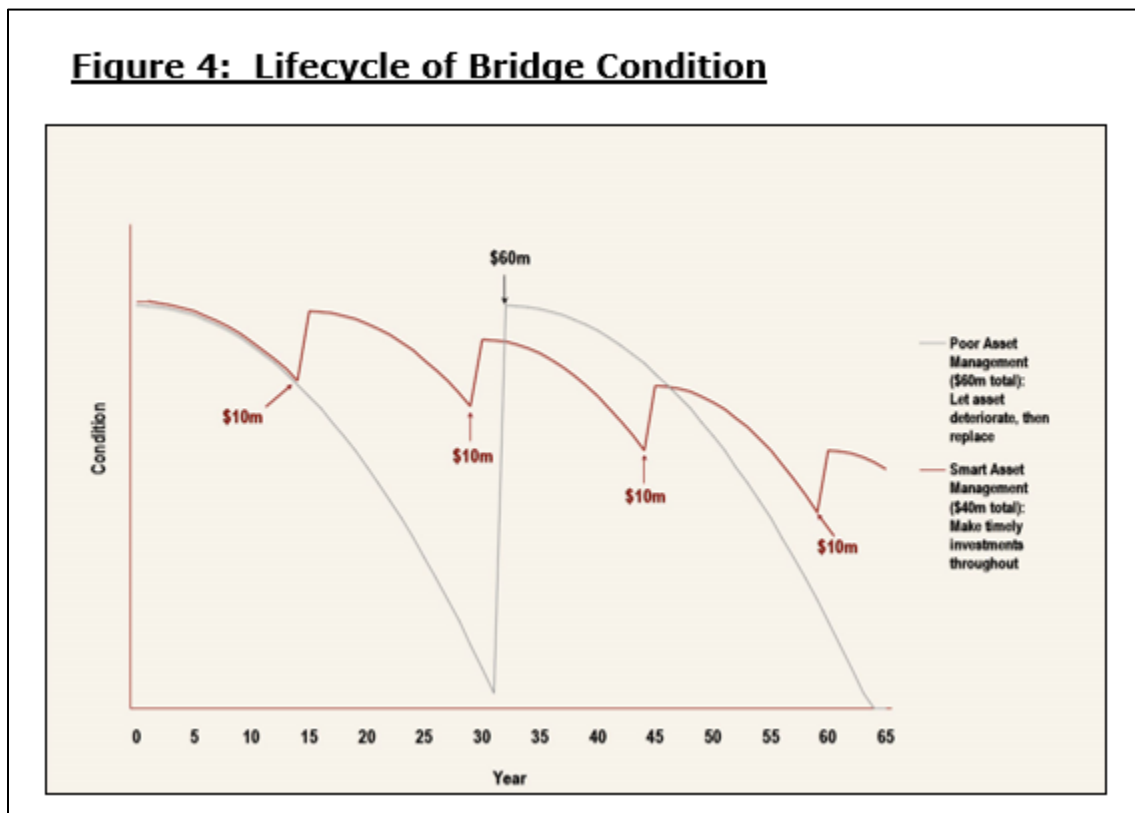
timeframes. Examples of Good and Poor structural elements can be found in Figure 3.



Based on the OSIM inspections, IPS develops and maintains a rehabilitation program both for a five-year time frame and for a 30-year time frame. These documents are updated with each new inspection to ensure the programs remain current and reflect the rate of deterioration for the County's inventory. The information included in these rehabilitation programs is based primarily on overall structure conditions, otherwise known

as “condition-based management”, with secondary consideration given to “age-based management”.

Similar to the lifecycle of pavements, bridges also require regular preventative maintenance initiatives to avoid expensive full replacement projects and extend the service life of the structure (Figure 4).

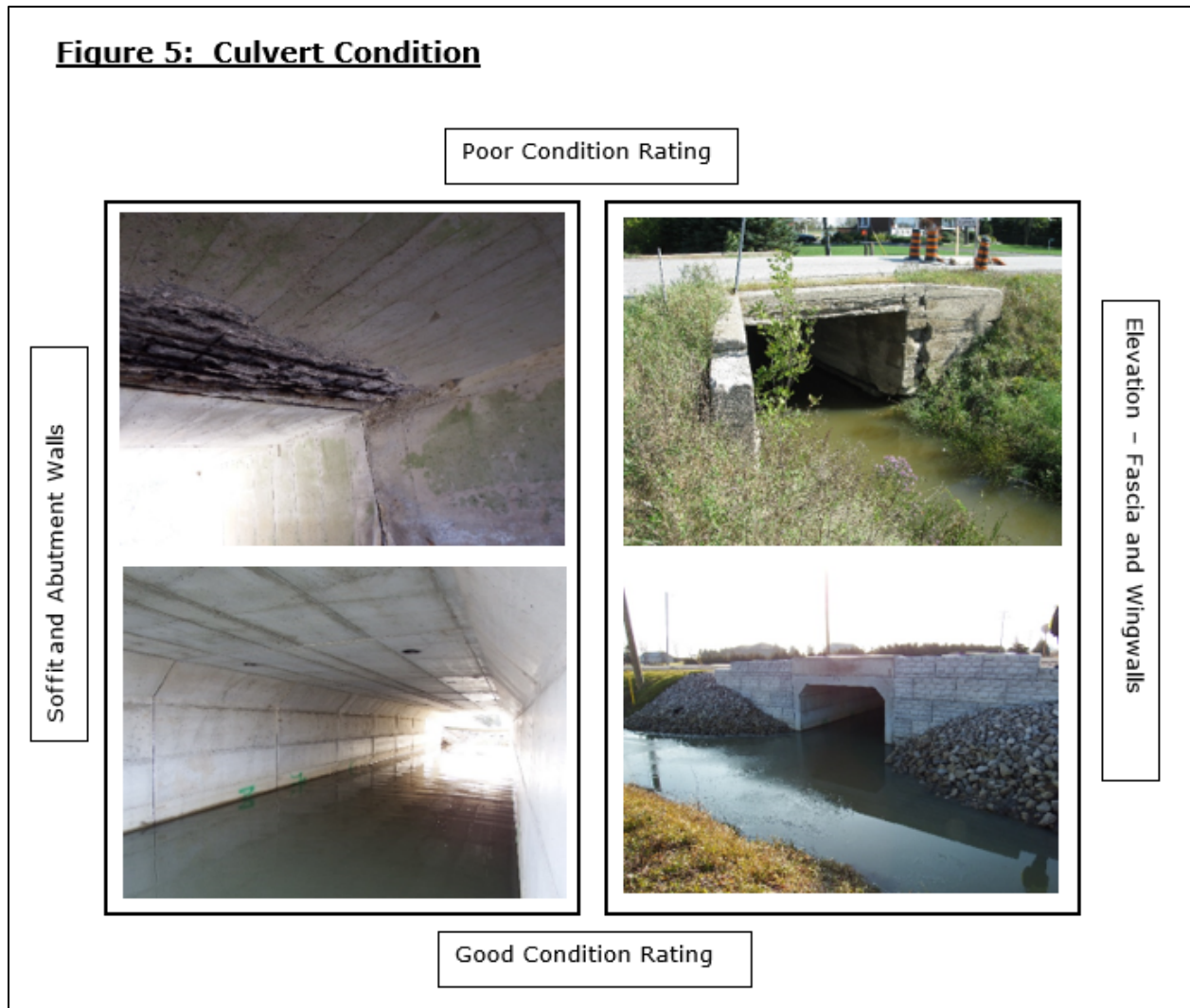


Culverts

The County’s Culvert Inventory currently includes 126 structures with spans greater than 3.0m. These structures range in age from new to approximately 90 years with an average age of 46 years. The full replacement value of the County’s culvert structures is in the order of \$65,000,000.

Although culverts are not included in the regulations for bridge inspections discussed previously, the County applies the same process for inspecting and evaluating culvert structures. OSIM procedures are followed and Culvert Condition Indices are calculated. Examples of both good and poor culvert conditions can be seen in Figure 5.

Figure 5: Culvert Condition



A 5 Year Rehabilitation program has been established for culvert structures and based on the number of culverts overall, a 35 Year Program was also created to cycle through the full inventory. The concept of preventative maintenance and lifecycle analysis is the same for culverts as it is for bridges. The objective is to address the deterioration of the structural elements before they reach the end of their service life in order to minimize costly replacement projects. However, because culverts tend to have less complex structural elements than bridges do and because the construction materials are more uniform throughout these elements, culverts are more often replaced at the end of their service life than rehabilitated intermittently.



In addition to the structures with spans greater than 3.0m, the County has in its jurisdiction numerous culverts with spans less than 3.0m. While some of these structures, with larger spans and more significant financial implication, form part of the SOGR alongside those with spans greater than 3m, these smaller culverts are typically accounted for in conjunction with road work. Where possible, the cost to repair or replace these small culverts is incorporated into the overall cost for single-year or multi-year corridor improvements. As the overall age of the County's infrastructure increases, the rate at which these smaller span culverts become deficient also increases. As a result, the 5 Year Rehabilitation Program must be adjusted to account for these priority needs.

In recent years, IPS has established and successfully implemented a Culvert Preservation Program. This program was developed to address the numerous culverts that are in good to very good condition except for a singular element that is in very poor condition. By rehabilitating this singular element, the overall condition of the culvert is improved and the useful life of the asset is extended.

Active Transportation

The County Wide Active Transportation System (CWATS) is developed with local partners to identify, construct and maintain active transportation facilities across the County. The program also supports numerous initiatives to promote and encourage active transportation.

CWATS is integrated into the SOGR as IPS strives to maximize the value of our construction efforts. Opportunities to incorporate active transportation facilities such as paved shoulders into scheduled road rehabilitation is a conscious and cooperative departmental initiative.

The construction of CWATS facilities in conjunction with the road rehabilitation program requires an additional annual budget to fully realize these opportunities. Funding to support this program comes from both the Levy and the Roadway Expansion Reserve. Included in the Active Transportation element of the SOGR is the Shared CWATS Program, which includes the paved shoulder segments that are completed each year with shared financial contributions between the County and Local Municipal Partners.



Paved Shoulders are built in accordance with Ontario Provincial Standard Specifications (OPSS) and the Ontario Traffic Manual (OTM) Book 18 with desirable measurement of shoulder widths for rural bicycle routes at 1.5m-1.8m, as field conditions allow, on both sides of the road. Buffer separation is included where identified in the CWATS Master Plan and where possible.

Pre- Approval

Since 2004, with the exception of 2025, County Council has approved a pre-committed level of expenditure for the early development and release of tendered work associated with bridge, culvert and road projects. This approach has facilitated the completion of critical projects on an expedited schedule with competitive tender results. As we see the strain on the construction industry continue, securing contractual work in a timely fashion is critical to the successful delivery of an elaborate program such as this one. Furthermore, the projects included in the SOGR are complicated in nature and rely on precise scheduling in order to be successfully completed in the face of environmental constraints and restrictions.

Early approval of select projects provides IPS with the opportunity to take advantage of "off-season" prices, develop and coordinate work schedules with less conflict and undertake bridge construction outside of environmental restriction windows. With the approval and expenditure of budget dollars in advance, our consultants can begin work prior to the approval of the overall budget and achieve tendering dates in advance of the construction season.