

Bridge Maintenance and Renewal Process

The foundation of Bridge Asset Management is outlined in the City's Infrastructure Asset Management Policy C598, focusing on the following five principles:

- Service Delivery to Stakeholders
- Long-Term Sustainability & Resiliency
- Integrated, Holistic Approaches across City Departments
- Investment Decision-Making
- Innovation & Continuous Improvement

The bridge network should be maintained and proactively renewed before structural conditions require more costly investment, such as major rehabilitation or replacement. This allows for cost effective investment in maintenance and rehabilitation strategies that extend and maximize the service life of structures. Key to this process is the ongoing inspection of bridge condition and careful prioritization of projects.

Typically bridges are designed and built for a scheduled service life of 75 years, with bridge realized lifespans being around 60 to 100 years. Some bridge elements such as the deck, joints/seals and bearings deteriorate faster than other components and their renewal is integrated into rehabilitation projects that occur over the lifespan of the bridge. As an example, under normal environmental conditions and traffic volumes, original bridge decks have an expected life of 40 years and are typically coupled with an asphalt renewal (typically pavement overlay) schedule of 10 to 15 years. Careful design, selection, and timing of rehabilitation strategies ensure the best integration of interventions to effectively and efficiently manage the risk profile and minimize the total cost of ownership of the bridge.

Bridge infrastructure is typically maintained in accordance with its asset lifecycle as outlined in the City's bridge investment models (Risk-based Infrastructure Management System (RIMS) and Bridge Management System) and Transportation Infrastructure Strategic Policy documentation. It utilizes a balanced approach, including various capital improvement techniques, to maximize asset value and asset life. Funding levels are set to allow all bridge and auxiliary structures to receive capital improvements at optimal renewal intervals. The approach provides predictable funding levels that will enable Administration to proactively meet the renewal needs of Edmonton's bridges, ensuring these structures are in reliable condition and unplanned outages are avoided.

Prior to programming a bridge for renewal, visual inspections are routinely completed. The City of Edmonton conducts these inspections according to

requirements set in place and used by Alberta Transportation. Once the visual inspection ratings and condition information show deterioration has reached a certain threshold, an extensive condition assessment is carried out to inform when and what type of renewal intervention(s) may be required.

In addition to visual inspection information, renewal decisions and prioritization of the bridge program are made based on a variety of factors, including:

- Structural condition information (such as load carrying capacity)
- Lifecycle costs and previous work history (renewal and maintenance)
- Basic bridge information (such as bridge type and bridge standards)
- Geometric design factors (such as vertical clearance)
- Environmental and geotechnical factors (such as flooding issues)
- Coordination with other capital projects to minimize conflicts and optimize investments
- Safety factors (such as traffic flow patterns, traffic projections and collision history)
- Other historical, social and political considerations
- Engineering judgement in prioritization.

Once a bridge is programmed for renewal, it follows the Project Develop and Delivery Model (PDDM), undergoing planning and design (PDDM Checkpoints 1 to 3), followed by detailed design and construction (PDDM Checkpoints 3 to 5).

Broad schedules are determined for each project during the concept planning phase (PDDM Checkpoint 2), and these schedules are used to fit projects into given years of construction. The desired year and duration of construction are factors used to determine the procurement schedule for design and construction.

The preliminary design phase (PDDM Checkpoint 3) of the project is important in determining the impacts of the project on the community. This is because the preliminary design phase determines the bridge renewal method (if the bridge was identified for rehabilitation) or the bridge type (if the bridge was identified for replacement). These critical considerations are typically weighted heavily by the life cycle value of the renewal method or bridge type. They include considerations such as the impact on the traffic network and the community. These impacts are determined using engagement with internal and external stakeholders and analysis by the project team.

Bridge Portfolio Condition Information

The following graph depicts the overall condition of the Bridge asset portfolio, relative to its parent Goods and People Movement portfolio (which contains the Bridge portfolio and all roads, sidewalks/pathways, and right of way infrastructure) and the entirety of the City's assets. The standard scale of Very Good, Good, Fair, Poor, and Very Poor is shown.

