Overview of Nighttime Construction in Greater Sudbury

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Report Summary

This report and presentation provides an overview of when and why nighttime construction may be considered and provides an analysis of where the City has completed night work on recent capital projects.

Relationship to the Strategic Plan, Health Impact Assessment and Community Energy & Emissions Plan (CEEP)

Completing capital construction work at night supports Council's Strategic Plan goal area of Asset Management and Service Excellence by demonstrating an innovative means to deliver a service by examining options to improve traffic flows and minimize service disruptions for businesses and residents during construction. Further, night work can better support the goal area of Economic Capacity and Investment Readiness by minimizing impacts to the movement of both people and goods throughout the community during business hours.

Transportation is the single largest source of emissions in Greater Sudbury, accounting for approximately 32% of total GHG emissions (CEEP 2021). Reducing the time that vehicles sit idling in traffic due to construction delays can lead to reduced local transportation-related emissions in the short-term.

Financial Implications

There are no financial implications associated with this report.

Background

During any given construction season, the City receives a number of calls to 311 from the travelling public regarding traffic delays due to road construction. Conducting road work at night has been suggested as one way to better manage this problem. Night work is conducted regularly throughout Canada, the province and to date, has been completed on select projects within the City to minimize potential negative impacts on residents and businesses.

When considering night work, there are six main factors to assess, being Operational Constraints, Traffic Impacts, Safety, Quality and Productivity, Construction Cost, and Nuisances. Each of these factors have advantages and disadvantages when it comes to night work and are discussed below:

Operational Constraints (Maintenance of Operations)

Operational constraints are the restrictions that the City places on a contractor during a given project, after considering the adjacent properties/businesses, traffic flow, and the scope of work. These typically indicate the number of vehicle lanes that are to remain open, hours of work and maintenance of services such as water, transit or waste collection. For example, when the scope of work includes work on the watermain, the operational constraints dictate when the water connections are to be made. In business and institutional areas, the water disruptions are typically required to be completed as night work or on weekends to minimize service disruptions.

Other activity and business operations are also considered. Known events are included in the contract, such as the Sudbury Rocks Marathon and the Up Here Festival, for example. In 2023, the road closure of the intersection of Larch and Durham was scheduled to occur concurrently with the road closures for the Up Here Festival, thereby minimizing any duplication of impacts to local area businesses or the overall operation of the festival.

Traffic Impacts

For some types of construction, traffic congestion and motorist delays are generally reduced or avoided altogether by completing work during nighttime hours. These are construction projects without excavations and where the equipment can be easily moved off the road to open the travel lanes during the day. Typical examples of this type of project includes asphalt resurfacing, patching, crack sealing, watermain lining and surface treatment.

Other types of construction may result in the same amount of traffic congestion and motorist delays regardless of whether the work is being completed during the day or at night. This typically includes work where excavations are required to remain resulting in traffic lanes remaining closed for the duration of the work. Typical projects where excavations are required to remain in place are when underground infrastructure is being installed, such as watermains and sanitary sewers, or when the road is being reconstructed.

Safety

Road construction on active roadways poses unique safety risks compared to other types of construction. For example, building construction takes place in a closed secure site that is off limits to the traveling public. Road construction sites, however, are open to the travelling public, which introduces a significant risk that must be properly managed.

Night work also presents challenges with ensuring the work crew remain safe while on site. For example, night work results in decreased visibility for workers and the effects of shadows created by equipment and glare from vehicles and lights around the work area can be problematic. In addition, concerns over potential degradation in worker attention levels have been raised, as well as possible decreases in the workers' quality of life because of reduced social-family interactions.

A nighttime pilot project was conducted on a section of the Trans-Canada Highway in St John's Newfoundland in 2018. Feedback from the project team and the contractor with respect to safety during the project included the following:

- Several pieces of heavy equipment could not be outfitted with appropriate lighting for working in the dark
- Concerns were raised with pieces of heavy equipment travelling at higher speeds than would be observed during the day.
- There were reports of drivers displaying behavior suggesting they were driving under the influence of drugs or alcohol.
- The project experienced high turnover rates, which meant new workers who were not familiar with the worksite, were frequently brought in.

- Reports of workers missing or skipping rest periods during the day to deal with personal/family matters resulted in more fatigue during the night.

Quality and Productivity

Work quality is highly dependent on the ability to see the work, this is especially important during finishing work such as placement of asphalt and concrete for curbs and sidewalk. For example, tack coating is applied between pavement layers to improve the bond between layers. Insufficient bonding can result in the top layer of asphalt separating from the bottom.

Although traffic volumes are significantly lower during the night, productivity is also generally lower during nighttime construction. This can be attributed to several factors including:

- Workers experience increased fatigue due to sleep disturbances caused by fluctuating sleep patterns.
- Reduced availability of support staff to perform inspection and quality assurance testing due to other ongoing daytime projects.
- Coordination with utility companies can be challenging as most utility offices are closed at night.
- Higher risk of utility strikes and potential disruptions due to reduced visibility.
- Blasting operations cannot occur at night (day light hours only), though other methods of rock removal are permitted, they tend to be more time consuming.
- Weather conditions in the early spring and fall become less favorable for placing asphalt operations as nighttime temperatures begin to dip below required minimum temperatures.

Night work can also have a negative impact on the City's ability to execute some of its projects during the daytime due to a reduced pool of resources being available to complete this work.

Construction Cost

It has been the City's experience to date that construction costs for night work are approximately 30% to 40% higher when compared to completing the work during regular daytime business hours. This can be attributed to several factors including:

- Additional equipment and traffic control, including lighting.
- Shift premiums.
- Additional costs to supply time sensitive materials such as concrete, granular material and asphalt as local suppliers must extend operating hours.
- Ability to provide parts or equipment on for repairs or unforeseen circumstances, effecting productivity or increasing stock.
- Less bidders on the original tender if there is sufficient work in the market as night work is not desirable for most contractors.

Nuisances

There are three main nuisances with nighttime construction, being noise, vibration, and additional lighting. At night, these are more of a concern in a residential setting, whereas they are generally more problematic during the day in a commercial area or institutional setting such as a school.

The noise from construction includes the beeping back up alarms on all vehicles, the running of generators to power the equipment and lights, as well as the use of specialty equipment such as hoe-rams or rock hammers to break rock where blasting is not permitted at night. City road construction is exempt from the City's Noise By-law 2018-29.

Vibration is created any time compaction is required, which is for all granular and asphalt material. Often this is large compaction equipment that will transmit vibrations into adjacent structures. It is common to have vibration monitors at some residents for road reconstruction projects to mitigate claims for damage to homes.

Lighting is included on all equipment and additional work site lighting is often required using temporary light standards. In certain situations, the temporary lighting may spill beyond the work zone onto adjacent properties, potentially causing disruptions for residents. In addition, the flashing beacons mounted on most equipment may be further disruptive for adjacent residents, particularly as they are typically situated at the second-floor height.

Night work is a viable alternative for construction only on specific and limited occasions.

Table 1 highlights examples of city-led capital projects where night work has been used to complete specific work on limited occasions with the goal of minimizing disruptions to the extent possible for local businesses, residents and the travelling public.

It should be noted that while the focus of the present report is specifically on night work, at times capital construction work may also be completed on weekends, if it is determined that it will minimize further disruptions to local area residents and the business community.

Table 1: Locations where night work has been carried out for capital projects.

Year	Location	Scope of Night Work
2023	Kingsway (Silver Hills Drive to Falconbridge Road)	Watermain connections were completed at night to minimize disruptions to local area businesses. A new storm sewer was installed through the middle of the intersection of Barry Downe Road and Kingsway using night work to minimize traffic disruptions and delays at an intersection which sees approximately 45,000 vehicles per day. The storm sewer trench was backfilled at the end of each shift, and the cost premium was 100%.
2023	Larch Street (Elgin Street to Durham Street)	Watermain connections were completed at night to minimize disruptions to local area businesses in the Downtown core, including Place des Arts
2023	Anderson Drive (Lively)	Watermain connections were completed at night to minimize disruptions to local area residents and institutions such as elementary schools and the Tom Davies Community Centre/Arena.
2022	Elm Street (Notre Dame Avenue to Durham Street)	Watermain lining was completed at night to minimize traffic disruptions on this truck route, and to minimize water service interruptions for area residents and businesses.
Various	Major Intersection Resurfacing	Work in major intersections is typically scheduled for night or weekend work to minimize the traffic disruption. Examples include the intersections of Regent Street and Paris Street (Four Corners) and Lasalle Boulevard and Notre Dame Avenue.

Project Communications

As with any capital project, communication with residents, businesses and the travelling public (where affected) begins prior to project initiation and continues regularly throughout the duration of the work, until the project is completed and closed out. Any use of night work, or work outside of regular business hours, will be communicated clearly with area residents and businesses through the usual channels, including the use of mailouts, website updates, public service announcements and social media updates.

Summary

While night work certainly provides benefits for residents and the business community through minimized disruptions to service delivery and traffic flow, these benefits come at a significant cost. Previous experience indicates that night work can cost as much as 30% to 40% more than completing the same work during daytime hours. Several factors outlined within this report should be considered when determining whether to use night work as a tool to deliver a capital project efficiently.

The City will continue to be selective in where and how it implements night work for capital construction projects to ensure that the focus is always on ensuring disruptions, particularly to the business community, are minimized to the extent possible, while balancing the need to be fiscally responsible for all residents.

Resources Cited

1. A Guidebook for Nighttime Construction: Impacts on Safety, Quality and Productivity, 2012
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