**Comparative Analysis of International Practices in Managing Utilities Road Works**

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**Abstract.** Frequent excavations of public roads take place in order to install new utilities services and/or maintain existing ones. Utilities road works may cause various risks such as delay and disruption to the road network and frustration to road users. To minimize risks, there is a need to develop an efficient road works management system, for which the collaboration of the road authority and utilities undertakings is essential, and it is useful to draw the experience and learn the lessons in international practices. In this research, international practices (legal framework, regulations and codes of practice) in road works management have been analytically compared to identify the essential common functions of road works management. Furthermore, proved procedures to make risk management plan and efficient measures to mitigate risks have been identified from international road works management practices.

**Introduction**

Road openings are frequently required by utility undertakings (UUs) to install new services and/or maintain existing ones on public streets, roads, footways, cycle paths and verges. While these utilities road works are necessary to ensure the provision of essential services to customers, they may also cause significant delay and disruption to the road network and frustration to road users. There is a need for the road authority to work in collaboration with UUs and ensure that utilities road works are carried out with minimal disturbances to the public. Here, the road authority refers to a “street authority”, “road authority”, “highway authority” or other terms as used in different countries. In a similar context, “road works” is also termed as “street works” in some countries. It is useful to draw the experience and learn the lessons from international practices with an aim to develop an improved system for the efficient management of utilities road works.

**Review of International Practices in Road Works Management**

The writer has conducted an intensive review of international practices in road works management, covering the overall legal and regulatory framework and detailed implementation measures in a number of countries including Australia, Canada, China, Japan, Singapore, United Kingdom, and United States of America. Regarding the overall legal and regulatory framework, the review is focused on the key provisions stated in the law or regulatory documents, particularly on the powers and duties of the road authority and on the rights and responsibilities of UUs who carry out works on public roads. Regarding the implementation measures, the review is concentrated on the process of road authorities of different countries in approving the permit applied by UUs in order to carry out road works, and the particular methods taken by road authorities to address potential problems that can hinder the safe and efficient utilization of the public road network and to promote the optimal occupation of road reserves for legitimate purposes.
Comparison of Laws Governing Road Works

Table 1 provides a comparison of the enabling law in Australia, Singapore and the United Kingdom on road works management, that is, the 2004 Road Management Act in Australia [1], the 1995 Street Works Act in Singapore [2], and the 1991 New Roads and Street Works Act in the United Kingdom [3]. In general, these acts empower the road authority to regulate and administer works on public roads through the establishment of corresponding regulations, codes of practice and/or a permit or license scheme that set out detailed procedures and requirements for carrying out road works, in order to provide for safe and efficient utilization of public roads, avoid unnecessary disruption caused by poorly planned works, minimize congestion and reduce disruption of necessary road works.

Roles of Regulations and Codes of Practice

In terms of regulations and codes of practice, in Victoria, Australia, there are Road Management (Works and Infrastructure) Regulations and the Code of Practice for Management of Road and Utility Infrastructure in Road Reserves [4]; in Singapore, there are Street Works (Works on Public Streets) Regulations and the Code of Practice for Works on Public Streets [5]; and in the United Kingdom, there are the Code of Practice for the Co-ordination of Street Works and Works for Road Purposes and Related Matters [6].

These regulations and codes of practice provide for more detailed protocols and procedures for the management of road works. For example, in Singapore, the Code of Practice for Works on Public Streets specifies the technical requirements on road works, such as the restricted area, positions of utilities, manhole, valves, hydrants and over ground boxes, extent of lane occupation, temporary traffic control, protection to road carriageways, adjoining structures and road-related facilities, the decking system, and site inspection, reinstatement, and materials [5].

Permit Scheme

A permit scheme is commonly adopted by road authorities in managing road works [7]. Such a permit scheme may require information in the following aspects as is the case in London, the United Kingdom [8]: (1) scope of permit scheme, (2) provisional advance authorization, (3) permit application and decisions in respect of permit applications, (4) timing of applications and responses, (5) permit requirements and conditions, (6) permit variation, revocation, inspection and sanction, (7) permit fees and dispute resolution, (8) road works register, and (9) other related matters and procedures.

Risk Management

Utilities road works may involve a wide range of risks, for example, accidents (e.g., potential increase in car crashes due to the closure of some lanes and reduced transport capacity and gas explosion due to lack of safety measures in the excavation and installation of gas utilities works beneath the road), inconvenience and disruption to road users and residents and businesses nearby, and suspension of utility services. To minimize risks, the road authority should establish detailed guidelines for road works coordination and monitoring and traffic control, and UUs should develop a workable risk management plan with specific risk mitigation measures throughout the process of carrying out the road work, including the safe reinstatement after the work is completed.

The development of an appropriate risk management plan by UUs is essential. Based on [9], in developing such a plan, UUs may consider the following procedures:

1. Identifying potential risk areas associated with road works;
2. Analyzing the identified risk areas, determining their inherent risk ratings, and classifying them into levels of low risk, middle risk and high risk;
3. Proposing mitigation measures to reduce the risk areas (particularly the high risk ones) to an acceptably low level;
Defining the requirements of risk management positions and assigning competent people to implement the risk management plan;

(5) Establishing the scope and details in each aspect of risk management and providing effective training to staff and contractors to ensure the risk management plan is followed; and

(6) Continuously monitoring, reviewing and improving the performance of the risk management plan and ensuring the plan remains up to date.

In terms of risk mitigation, UUs may take following measures to minimize the impact of road works on traffic flow [10]:

(1) Using the one for one lane replacement method at sites where there is sufficient space for replacement lanes;

(2) Adopting the trenchless method at sites where it is not possible to use the one for one lane replacement method;

(3) Applying the road decking method (i.e., placing steel/wood decks over trenches) such that pedestrians or vehicles can pass the road as normal;

(4) Allowing limited passage by closing only part of the traffic lanes at the time road work is being carried out; and

(5) Stopping road work in times that are likely to have traffic congestion, e.g., during peak hours.

Conclusions

The development of a workable road works management system is critical to the efficient management of various risks associated with utilities road works. In this regard, this research has drawn the experience and learned the lessons from international practices in managing road works. The essential common functions of road works management, the proved procedures to make risk management plan, and the efficient measures to mitigate risks have been identified. These outcomes shed some light on future road works management practices.

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References

This act includes the following provisions:

1. Introductory provisions, covering interpretations of road works, road authority and provisions on road work license and emergency works;
2. Road works register, to be maintained by a local road authority for its own geographic area to contain information with respect to the road works;
3. Notice and coordination of works, including notice of work types and starting date, direction on the working time, restriction on works and duties of coordination on road authorities and UUs;
4. General requirements on execution of road works, e.g., safety measures, avoidance of delay/obstruction, and qualifications of supervisors and operatives;
5. Requirements on the reinstatement, e.g., the materials, workmanship and standard of the reinstatement and the duty of UUs and the power of the road authority;
6. Charges, fees and contributions payable by UUs, including the charge for occupation of highway where works unreasonably prolonged, inspection fees, liabilities for cost of temporary traffic regulation and for cost of use of alternative routes, and contributions to costs of making good long-term damage; and
7. Duties and liabilities of UUs with respect to apparatus affected by road works.

Traffic Management Act (2004) gives road authority further powers to minimize unnecessary disruption caused by poorly planned works and to fulfill their duties through the permit scheme instead of the existing notice system stated in the New Roads and Street Works Act.

### Table 1. Comparison of laws governing road work.

<table>
<thead>
<tr>
<th>United Kingdom</th>
<th>Australia</th>
<th>Singapore</th>
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| This act includes the following provisions: | This Act enables road works management by: | This Act provides powers of road authority, stating:
| 1. Introductory provisions, covering interpretations of road works, road authority and provisions on road work license and emergency works; | 1. Establishing a statutory framework for the management of the road network regarding uses of road reserves for roadways, pathways, infrastructure and similar purposes; | 1. Any road work should apply for the prior approval of road Authority and the application shall be made in writing and shall be accompanied by a plan showing the location affected by the works;
| 2. Road works register, to be maintained by a local road authority for its own geographic area to contain information with respect to the road works; | 2. Setting out certain rights and duties of road users; | 2. Road authority may give written directions on an application regarding to the compliance with this Act, the location and extent of work and related apparatus to be laid/erected, the provision of footways/diversion roads and the size and specifications of such footways/diversion roads, the design and construction method, the period of the works, the provision of temporary traffic signs and other road related facilities, and the reinstatement of any affected public street/bridge;
| 3. Notice and coordination of works, including notice of work types and starting date, direction on the working time, restriction on works and duties of coordination on road authorities and UUs; | 3. Establishing the general principles on road management; | 3. For works in contravention of the provisions of this Act, the Authority can order the cessation of the works, the removal of any installations, the reinstatement of any affected public street or public bridge, work or alteration to be carried out to cause the works to comply with the provisions of this Act;
| 4. General requirements on execution of road works, e.g., safety measures, avoidance of delay/obstruction, and qualifications of supervisors and operatives; | 4. Providing for the role, functions and powers of a road authority; | 4. If an order is not complied with, the Authority may demolish, remove or alter the works or cause the works to be demolished, removed or altered, and recover all costs and expenses incurred by the Authority from the person in default;
| 5. Requirements on the reinstatement, e.g., the materials, workmanship and standard of the reinstatement and the duty of UUs and the power of the road authority; | 5. Providing for the making of Codes of Practice to provide practical guidance in relation to road management; | 5. Any person failing to comply with the order shall be guilty of an offence and liable on conviction to a fine, the amount of which depends on the situation of offence;
| 6. Charges, fees and contributions payable by UUs, including the charge for occupation of highway where works unreasonably prolonged, inspection fees, liabilities for cost of temporary traffic regulation and for cost of use of alternative routes, and contributions to costs of making good long-term damage; and | 6. Setting out the road management functions of road authorities; | 6. The Authority may levy a charge on a person carrying out road works, execute/cause any works to be properly carried out, and recover the associated costs to this person who had not executed such works to the satisfaction of the Authority;
| 7. Duties and liabilities of UUs with respect to apparatus affected by road works. | 7. Setting out the road management functions of infrastructure managers and works managers in providing infrastructure or conducting works; | |