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**Design-Build Agreements: A Case Study Review
of the Included Handover Requirements**

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Research Report SWUTC/09/167866-1

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ABSTRACT

Road infrastructure is a key component of any region's transportation system. It allows unprecedented levels of mobility, accessibility, and economic growth. On the other hand, the cost associated with inadequate road infrastructure can amount to billions of dollars.

In the U.S., the largest revenue source for the funding of transportation infrastructure is the federal and state fuel taxes. These taxes were conceived in the 1950s as an indirect charge to recover the costs of vehicle travel on the U.S. highway system. However, this tax has not increased with the inflation rate and given increasing maintenance and construction costs, and more fuel efficient vehicles, the vehicle per mile tax has become inadequate. It has thus been predicted that the Highway Trust Fund could be bankrupt by FY 2009 according to The American Society of Civil Engineers (2006). At the same time, ASCE's Infrastructure Report Card (2005) estimated a 5-year spending need of \$1.6 trillion for the nation's infrastructure. Inadequate funding from the traditional fuel tax together with increased demand for transportation and increasing maintenance needs resulting from an aging highway system have resulted in significant deficits. State budget shortfalls affect the ability to maintain existing facilities properly and may lead to delayed maintenance which in turn may reduce the lifespan of roads, bridges, ports, and other infrastructures.

EXECUTIVE SUMMARY

Road infrastructure is a key component of any region's transportation system. It allows unprecedented levels of mobility, accessibility, and economic growth. On the other hand, the cost associated with inadequate road infrastructure can amount to billions of dollars.

In the U.S., the largest revenue source for the funding of transportation infrastructure is the federal and state fuel taxes. These taxes were conceived in the 1950s as an indirect charge to recover the costs of vehicle travel on the U.S. highway system. However, this tax has not increased with the inflation rate, and given increasing maintenance and construction costs, and more fuel efficient vehicles, the vehicle per mile tax has become inadequate.

In this report, the researchers reviewed eight tolling case studies in the U.S. and abroad which have been operational for varying lengths of time. The first concession agreement was entered into in 1986 (i.e., the Queen Elizabeth Bridge II), while the most recent agreement was entered into in 2007 (i.e., Capital Beltway, Interstate 495 HOT Lanes in Virginia). In reviewing these agreements, it became obvious that there is a substantial difference between the handover detail included in earlier concession agreements compared to the more recent agreements as it relates to specific standards and maintenance requirements, inspections and timing of inspections, as well as the reporting requirements. The specificity of the handover requirements also seems to be partly a function of the length of the agreement.

The most detailed and specific handover requirements were included in the 2004 Concession Deed for the Eastlink freeway (previously called the Mitcham-Frankston Freeway) in Australia and the 2007 *"Amended and Restated Comprehensive Agreement Relating to the Route 495 HOT Lanes in Virginia Project"*. It is clear from this research that the handover requirements included in concession agreements have evolved since 1986. Also, it seems that governments are entering into longer term lease agreements exceeding 50 years with concessionaires. This complicates specifying appropriate standards and requirements at handover because technology and material changes cannot be anticipated so far into the future. In this regard, more emphasis on the inspection procedure (e.g., the use of an independent engineer, testing procedures), the timing of inspections (e.g., five years, one year, and six months prior to handover), the funding of required repairs and maintenance, the minimum life expectancy for all major systems and components after handback, and the procedures for handover and dispute resolution, seem to be appropriate. Furthermore, it seems appropriate to require of the concessionaire to meet or exceed the latest standards specified for designing, constructing, operating, and maintaining a similar class highway. This will prevent any controversy related to changes in standards or regulations – for example new standards that may emerge for roadside maintenance - during the life of a concession agreement.

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1. Introduction

Road infrastructure is a key component of any region's transportation system. It allows unprecedented levels of mobility, accessibility, and economic growth. On the other hand, the cost associated with inadequate road infrastructure can amount to billions of dollars. For example, it has been estimated that congestion costs the U.S. 3.7 billion hours of delay and 2.3 billion gallons of wasted fuel per year or almost \$200 billion considering unreliability, inventory, and environmental impacts (DeCorla-Souza, 2007).

The Cost of Congestion in the U.S.

- *“For U.S. cities with populations over 3 million, a 30 min. trip takes about 55 min. in the peak travel hours.*
- *Urban congestion (based on wasted time and fuel) costs about \$63.1 billion per year in the U.S.*
- *The average cost of urban congestion is \$794 per traveler*
- *On average, individual congestion delay is about 40 hours per year.*
- *About 40 % of daily travel takes place under congested conditions”.*

Source: Biggs, 2007

In the U.S., the largest revenue source for the funding of transportation infrastructure is the federal and state fuel taxes¹. These taxes were conceived in the 1950s as an indirect charge to recover the costs of vehicle travel on the U.S. highway system. However, this tax has not increased with the inflation rate and given increasing maintenance and construction costs, and more fuel efficient vehicles, the vehicle per mile tax has become inadequate. It has thus been predicted that the Highway Trust Fund could be bankrupt by FY 2009 (The American Society of Civil Engineers (ASCE), 2006). At the same time, ASCE's Infrastructure Report Card estimated a 5-year spending need of \$1.6 trillion for the nation's infrastructure (The American Society of Civil Engineers, 2005). Inadequate funding from the traditional fuel tax together with increased demand for transportation and increasing maintenance needs resulting from an aging highway system have thus resulted in significant deficits. For example, \$387 million are needed to fund the transportation maintenance backlog in Nevada, \$583.4 million in Oklahoma, \$110 million in Texas, \$734 million in Idaho, and \$12 billion in New Jersey. These *“budget shortfalls undermine [the] ability of states to maintain existing facilities properly, leading to deferred maintenance [and] reducing the useful lifespan of roads, bridges, ports, and other infrastructure”* (Teigen, 2007).

Traditionally, government agencies financed transportation infrastructure using the pay-as-you-go method or through debt financing (or public bonding). Both these financing methods have advantages and disadvantages (see Table 1.1).

¹ Since 1993 the United States Congress has rejected all legislation that would increase the federal gas tax (Buechner, ND).

Table 1.1: Financing Methods Used by Government Agencies

Financing Method	Advantages	Disadvantages
Pay-as-you-go	<ul style="list-style-type: none">• Future funds are not tied up in servicing debt payments• Interest savings can be put toward other projects• Greater budget transparency• Avoid risk of default	<ul style="list-style-type: none">• Long wait time for new infrastructure• Large project may exhaust an agency's entire budget for capital projects• Inflation risk
Debt financing	<ul style="list-style-type: none">• Infrastructure is delivered when needed• Spreads cost over the useful life of the asset• Increases capacity to invest• Projects are paid for by the beneficiaries of the capital investment	<ul style="list-style-type: none">• Potentially high borrowing rate• Debt payments limit future budget flexibility• Diminishes the choices of future generations force to service debt requirements.

Source: Adapted from Teigen, 2007

At the same time traditional procurement methods have had the following characteristics:

- the public sector pays for all services in advance,
- the public sector is responsible for all capital and operating costs, as well as the risks associated with project overruns and late deliveries,
- the private sector's role and risks are limited to delivering in terms of the contract and performing maintenance within a determined time period,
- the public sector is responsible for project management, and
- ultimately the private sector is accountable for the performance of the infrastructure and long-term maintenance unless otherwise specified in the contractual agreement² (Teigen, 2007).

SAFETEA-LU, passed in 2005, allows states to use tolling to supplement revenue³. One option to address the funding shortfall is to finance new roads, and the rebuilding and modernizing of existing facilities in rural and urban areas through innovative Public Private Partnerships (PPP), such as Design-Built-Operate-Transfer agreements.

In 2005, toll roads accounted for about 3 percent (or 4,800 miles) of the 160,000 miles of U.S. highways (Monnier, 2005). However, budget shortfalls, the limitations of traditional financing and procurement methods, increased demands for highway infrastructure, and enabling legislation have prompted U.S. State Departments of Transportation (DOTs) to look increasingly to the private sector to provide much needed capacity sooner. This was supported by the survey findings of PB/Strategic Consulting on the trends and analysis of current tolling and pricing activity in the U.S. (Perez, 2007). Their survey data revealed 21 toll road projects under construction and another 61 in the finance/design, NEPA process, and planning phases (see

² In Europe, warranty clauses are often used to ensure a quality pavement is constructed. The warranty clause usually lasts for five years. These types of clauses and specifications have become more common also in the US.

³ SAFETEA-LU allows for tolling to fund infrastructure projects and to reduce congestion (FHWA, 2005).

Table 1.2). Of the total 168 existing and planned toll roads and High Occupancy Toll (HOT)/Express Toll Lanes (ETC), 26 are implemented through a PPP, while in the case of another 48 a PPP is being considered (Perez, 2007).

Table 1.2: Toll Road Activity in the U.S.

Projects	Toll Roads	HOT/ETL	Number of States
Opened Since ISTEA	45	6	13
Under Construction	21	3	10
In Finance/Design	13	4	10
In NEPA Process	17	17	13
In Planning	31	11	13
Total	127	41	28

Source: Perez, 2007

This trend toward increased Public Private Partnerships (PPPs) in the delivery of highway infrastructure (i.e., roads, tunnels, and bridges) or leasing of existing transportation infrastructure is, however, not only evident in the U.S.⁴. Besides North America, toll roads had become common practice in countries such as Mexico, China, Spain, Brazil, the United Kingdom, Germany, Chile, Canada, Argentina, and even South Africa (see Table 1.3).

**Table 1.3: Top Countries – Public Private Partnerships in Highways
(Cumulative sum of number of projects and estimated costs since 1985)**

Country	Number of Projects	Project Cost (US\$ billion)	Country	Number of Projects	Project Cost (US\$ billion)
United Kingdom	37	30.5	Australia	12	8.6
China	53	21.6	Malaysia	18	7.8
Spain	47	21.1	Canada	22	7.7
Mexico	78	20.4	Russia	2	6.6
Italy	3	18.5	Chile	24	6.3
Germany	34	17.1	Argentina	20	3.7
Republic of Korea	18	16.2	Ireland	14	3.0
Japan	1	14.4	Denmark	1	2.7
Greece	11	11.8	South Africa	6	2.3
Brazil	44	11.4	Czech Republic	2	2.2
France	8	10.2	Indonesia	6	2.1
Portugal	15	9.8	Thailand	3	2.1

Source: Irigoyen, 2006

⁴ More than 26 U.S. states have expanded or modernized their road infrastructure through tollways.

However, worldwide these PPPs are dominated by a few global companies (see Table 1.4).

Table 1.4: Top Ten Transportation Developers (2004)*

Transportation Developer	PPP Projects Under Contract	Awarded
ACS Dragados	45	18
MIG/Macquarie Bank	23	4
Laing/Equion	21	1
Ferrovial/Cintra	20	14
Sacyr Vallehermoso	19	13
Abertis/ La Caixa	12	2
FCC	17	8
OHL	17	1
Cheung Kong Infrastructure	16	22
Vinci/Cofiroute	15	19

*Active ownership role in PPPs (1985 – 2004)

Source: Irigoyen, 2006

1.1 Public-Private Partnerships

Public-Private Partnership (PPP) projects can take a number of forms, but typically involves a *“long-term contractual relationship between government agencies [and] private sector partners for the provision and operation of an infrastructure asset”* (Teigen, 2007). The Federal Highway Administration (FHWA, ND) has listed a number of variations of the typical Design-Build contract, such as:

- The Design-Build⁵ (DB) contract in its simplest form uses a single contract for two services: design and build. The design-builder (private sector) is responsible for the design work and the construction of the project. Financing, maintenance, and operation are the owner’s responsibility (public sector).
- Build-Operate-Transfer (BOT) / Design-Build-Operate-Maintain (DBOM) / Design-Construct-Maintain (DCM) – In these DB variations the public sector finances the project and receives revenues from the private sector. The contractor is not only responsible for the design and construction of the facility, but also for its operations and maintenance. This provides the private sector with more flexibility in the materials chosen and construction methods selected, and allows for more innovation.
- Design-Build-Finance-Operate (DBFO) – In this variation, the private sector is responsible for financing the project in addition to designing, building, and operating

⁵

In a study by the California Design Build Coalition (2005) on 21 different projects across the USA: 76 percent of the projects finished ahead of schedule and all the 21 projects studied were completed before expected if a Design-Bid-Build (DBB) approach was to be the option. According to the owners of all the 21 projects, the quality of a DB project is equal or better than the traditional DBB approach.

the project. Fees paid by the users or the public sector in the form of “shadow tolls”⁶ or “pass-through” tolls are the major sources of revenue for the private sector. Ownership of the project remains with the public agency and the contractor must return (“handover”) the facilities to the public sector at the end of the contract period.

- Build-Own-Operate (BOO) – This variation is less prevalent in transportation projects. In this case, the private sector develops, finances, designs, builds, owns, operates, and maintains the project. The contractor is vulnerable to all the operating revenue risk, but retains all the surplus revenues in perpetuity.
- Performance Specified Maintenance Contracts (PSMC) – This type of contract pertains to the rehabilitation and maintenance of highways for a specified period.
- Concessions⁷ – This variation on DB contracts allows the concessionaire to design, build, and operate a project with the right to receive revenues from operations and/or receive payments from the public agency for an agreed time period. Thus, if the contractor does not receive adequate revenues from the agency for operations, the concessionaire can charge user fees to cover the costs. Nevertheless, the concessionaire is responsible for carrying out all the capital investment. This contract variation has many of the characteristics of the DBOM contracts and typically the average contract period is between 15 and 30 years.

Table 1.5 below lists some of the general advantages and disadvantages of concessions.

⁶ Many DBFO projects in the UK are paid for by the government through shadow tolling. In these types of contracts, the government pays the concessionaire or private investor usually considering the traffic volumes. Shadow toll rates are a function of the vehicle class, the traffic volume range, availability of safety incentives, and lane availability.

⁷ The use of concessions is very prevalent in some European countries, such as Portugal and France. In Portugal, 90 percent of the highway network consists of concessions. The concessionaire either levies a toll (paid by the users) and/or a shadow toll (paid by the government).

Table 1.5: Advantages and Disadvantages of Concessions

Advantages	Disadvantages
<ul style="list-style-type: none">• It is a mechanism to provide much needed infrastructure sooner and allows the public sector to spread the cost of the infrastructure over the life of the asset.• Most PPP infrastructure projects are completed on-time or earlier because the private sector needs the revenue streams to repay the capital costs or because payments are aligned with project deliverables.• The maintenance of the infrastructure is usually transferred to the private sector, ensuring that assets are adequately maintained. This also provides an incentive to the private sector to adhere to long term construction quality standards as it will be responsible for operation and maintenance expenses over a long term.• The private sector is more customer orientated because they rely on user fees for their revenue streams.• It frees the public sector to focus on the output instead of inputs.	<ul style="list-style-type: none">• Past agreements did not provide the public sector with additional funding if toll roads have generated significantly higher revenues than expected,• The public sector could be forced to take control of an asset if the private sector goes into default or are forced to enter into costly renegotiations, and• Toll rates are set to maximize private sector profits and are not necessarily set to maximize public interest.

Source: Adapted from Teigen, 2007

Although a number of countries have embarked on PPPs to fund infrastructure projects, the PPP models adopted vary significantly in their level of maturity. Teigen (2007) identified three stages in PPP model maturity measured in terms of the sophistication of the model adopted and the level of activity in the country (see Figure 1.2). Countries in Stage One of PPP model maturity have:

- an established policy and legislative framework for PPPs,
- started to develop a central PPP policy unit to guide the implementation of PPP projects,
- developed deal structures,
- developed a public sector model to compare the PPP model to,
- begin to develop the market for PPP and attract private investors, and

- started to apply early lessons from the transportation sector to other sectors (Teigen, 2007).

Countries, such as Portugal, New Zealand, Canada, France, and Italy, in Stage Two of PPP model maturity typically have:

- developed dedicated units in agencies to deal with PPP projects,
- begun to develop hybrid models⁸ for the development of PPPs,
- started to expand the market for PPP projects,
- leveraged new sources of funding from capital markets,
- used PPPs to initiate innovation in service delivery, and
- have multiple PPP projects in various sectors of the economy (Teigen, 2007).

Countries in Stage Three of PPP model maturity (e.g., Australia and the UK) have:

- adopted new innovative PPP models,
- applied creative and flexible approaches to the roles of the private and public sector in the delivery of PPP projects,
- adopted more sophisticated risk models,
- emphasized the total lifecycle of a PPP project,
- a sophisticated infrastructure market with access to pension and private equity funds,
- leveraged underutilized assets into financial assets, and
- have developed the organizational and skill sets required in government to implement and support a greater role for PPPs (Teigen, 2007).

⁸

Examples of hybrid models are alliancing, bundling, competitive partnerships, and incremental partnerships. Under the alliancing model, *the public and private sectors agree to jointly design, develop, and finance the project. In some cases they also work together to build, maintain, and operate the facility*. Bundling entails *“contracting with one partner to provide several small-scale PPP projects in order to reduce the length of the procurement process as well as transaction costs”*. Under the competitive partnership model, *“several private partners are selected, in competition with each other, to deliver different aspects of a project”*. In an incremental partnership, *“the public sector contracts with a private partner, in which certain elements of the work can be called off, or stopped, if deemed unproductive. The public sector can commission work incrementally, and it reserves the right to use alternative partners if suitable”* (Teigen, 2007).

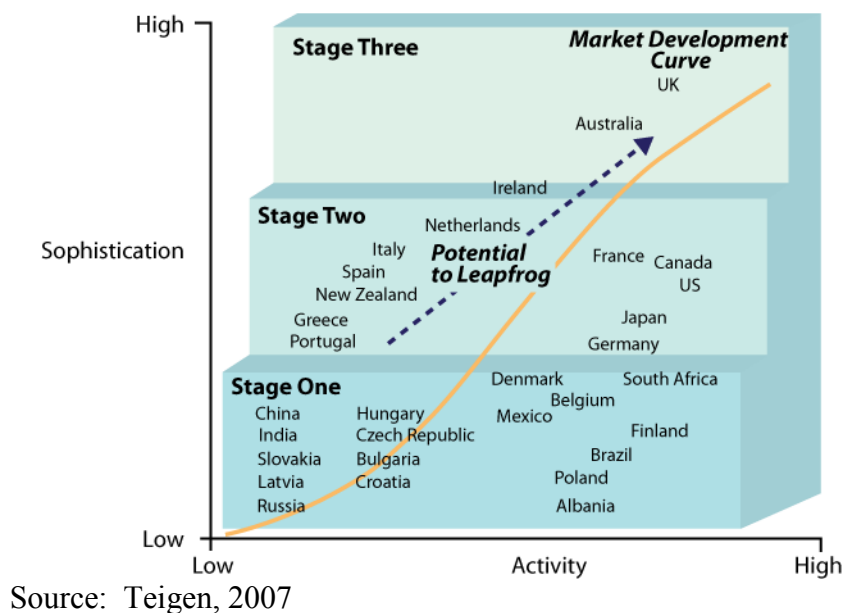


Figure 1.2: Public Private Partnership Maturity Model

The U.S. is considered to be in Stage Two of PPP model maturity, mainly because of the number of PPP agreements and not the sophistication of the models that are being entered into.

1.2 Research Objectives

The hypothesis of this research is that the motivation and objectives of the parties entering into tolling PPPs differ, which, in turn, could impact the condition of the infrastructure upon transfer. For the transportation agency, the objectives are to leverage limited state transportation funds and build needed transportation infrastructure sooner. Specifically, the objectives of state DOTs typically include:

- providing network capacity - thereby reducing congestion and increasing mobility – faster than through traditional pay-as-you-go measures,
- progressing to a sustainable funding mechanism for transportation infrastructure,
- borrowing against future revenues,
- enhancing the economic development and growth of a region, and
- supporting a legislative or political mandate (Persad, Walton, and Wilke, 2005).

For the private sector, the primary objective is to recoup their investment and make a profit. Secondary objectives include:

- the more efficient provision and operation of transportation infrastructure,
- creating opportunities for private capital investment, and
- creating construction employment (Persad, Walton, and Wilke, 2005).

From the state's perspective the ideal situation would thus be to take ownership of a road in good condition with a long remaining life upon transfer. For the private sector, the ideal situation would be a well-maintained road during the concession period – to attract users – and

that only lasts up until the point of transfer⁹. Lengthy and involved contract agreements are usually the means by which to reach a compromise between these opposing and at times conflicting agendas.

Standard agreements usually specify extensive rehabilitation at least 10 or ideally 5 years prior to the date of transfer, as well as maintenance schedules, in an attempt to ensure that the transportation agency takes ownership of a road that is in a relatively good condition. An alternative would be to specify the condition of the road upon transfer. In other words, instead of specifying the maintenance/ rehabilitation schedules, the agency can specify the condition of the road upon transfer in terms of the ride quality score, the overall condition score, deflection, number of cracks, patches, etc. Finally, the public sector can also hold the private sector accountable for any maintenance costs that have to be incurred for a certain time period beyond the transfer date. *“For example, in Ireland the private sector must ensure a 10-year maintenance-free period from the time the road is transferred to the government”* (Persad, Walton, and Wilke, 2005).

During this study, the researchers:

- reviewed DBOT agreements that are in the public domain to determine how transportation agencies have been attempting to ensure that ownership is taken of a road in good condition upon transfer. Special emphasis was placed to determine if the transfer of any roads have been predicated upon meeting certain condition standards and what these standards entail. The research team conducted a detailed review of available DBOT agreements that have been entered into in the U.S., Europe, Latin America, and Africa.
- attempted to identify cases where DBOT agreements have been concluded and the roads have been transferred to a transportation agency.
- based on the DBOT agreement reviewed and the information gleaned from the case studies, the research team summarized some of the best practices used in agreement negotiations to ensure that the agency obtains a road asset upon transfer.

The objective of the next chapter of the report is to explore through a number of case studies the negotiated handover requirements to ensure that the transportation agencies receive an asset upon transfer before Chapter 3 concludes with some brief remarks.

⁹

“However, nearing the end of the franchise, it is likely that the operator will skimp on major maintenance and at the end turn over a barely acceptable facility” (Persad, Walton, and Wilke, 2005).

2. Tolling Case Studies

As indicated in the previous chapter, several countries and states in the U.S. have embarked upon toll road projects. This involves the use of private capital to finance, design, construct, operate, and maintain the highway project for a specific period determined by a contract. The private company is allowed to collect revenue from the facility users to cover the expenses and make some profit. At the end of the contract period, the facility is transferred back to the public domain at no cost. The objective of this chapter is to document the negotiated handover requirements through the review of eight tolling agreements that could be obtained. In essence, the research attempted to determine how transportation agencies have tried to ensure that ownership is taken of a road in relatively good condition upon transfer. Special emphasis was placed on determining if the transfer of any roads had been predicated upon meeting certain condition standards and what these standards entail.

2.1 Queen Elizabeth II Bridge

In 1986, the British Government solicited private sector bids for the construction of a third crossing over the Thames River on the then new M25 motorway around London. The so-called Trafalgar House bid proposing the construction of the Queen Elizabeth II bridge¹⁰ under a DBFO concession was selected over other proposals to construct a tunnel (Cleveland Bridge, nd). In September 1986, the concession was awarded to Dartford River Crossing Ltd for a maximum time period of 20 years. However, a proviso was included that the bridge would be handed back to the government when all outstanding debts had been repaid. The Bridge opened in 1991.

The Queen Elizabeth II Bridge was handed back to the Government in 2003, due to significantly higher traffic volumes than was anticipated. This resulted in substantially higher revenues than predicted with the initial models. Revenues generated were used to cover operating costs of the bridge during the concession period and also allowed for the maintenance of the existing infrastructure (i.e., two tunnels under the river collectively known as the Dartford Tunnel, plazas, and ancillary structures), as well as the repayment of the debt incurred. Handover thus involved not only the Bridge, but also the other infrastructure, the business systems, and the future toll revenue.

No specific handover requirements were specified in the original concession agreement. Handover was thus a process where the concessionaire (Dartford River Crossing Ltd) and representatives from the Department for Transport (DfT) and the Highways Agency entered into a series of regular meetings over the last few years of the concession. It was agreed that the principal inspections of the bridge, the tunnels, and the mechanical and electrical installations would be conducted approximately two years before the end of the concession in an effort to identify any issues of concern and to allow for sufficient time to address most issues. Following the inspections, a work program was agreed to address the critical issues raised. The progress towards addressing these issues was monitored over the lead into the handover.

¹⁰ The Queen Elizabeth II bridge is an important crossing over the River Thames between Dartford and Thurrock in London (Cleveland Bridge, nd).



Source: Kilfiger¹¹

Figure 2.1: Queen Elizabeth II Bridge

Finally, it was agreed at the end of the concession period that all the identified issues were addressed to the satisfaction of all parties involved. A final General Inspection was conducted prior to handover to record the handover condition and to form the basis of an ongoing work program for the incoming provider. Many additional issues were addressed during the time leading up to handover, including a complete update and renewal of the toll system, as well as major upgrades¹² to the tunnel mechanical and electrical equipment. In addition to the infrastructure issues, there were also some issues revolving around the seamless handover of the business systems and dealing with various staffing issues.

Although the handover process occurred seamlessly without any disruption to the travelling public and although it ensured that the crossing was handed over in very good condition, it is likely that in future agreements a minimum remaining life expectancy will be specified for all major systems or components after the concession period. This will facilitate a more detailed procurement strategy and life span for, for example, paint systems and the choice of materials used in the tunnels.

¹¹ Available at: http://en.wikipedia.org/wiki/Image:Queen_Elizabeth_II_bridge_Penny_Mayes.jpg

¹² This included upgrades to the lighting, electrical distribution, and ventilation systems.

2.2 Chicago Skyway Bridge (Illinois)

The Chicago Skyway Bridge – a 7.8 mile toll road - was originally built to connect the Dan Ryan Expressway with the Indiana Tollway. Before the concession, the Skyway Bridge was the only toll road in Illinois that was not operated by the Illinois Toll Highway Authority in that for almost 50 years, the Bridge was operated and maintained by the City of Chicago Department of Streets and Sanitation.

The Chicago Skyway opened in 1958, but forecasted ridership levels and revenues did not materialize due to the construction of non-tolled interstate highway alternatives soon after the opening of the toll road. In the 1960s, a federal government takeover was proposed and in the 1970s, the City of Chicago defaulted on the issued bonds. It was not until the 1980s and 1990s when congestion and construction on the non-tolled alternatives resulted in significant ridership and revenues for the Chicago Skyway Bridge. By 2003, the revenues of the Bridge amounted to \$38.7 million before interest, taxes, depreciation and amortization (Seliga, 2007).

In 2004, the Chicago Skyway Bridge was leased to the Skyway Concession Company, LLC (SCC), which is owned by Cintra Concesiones de Infraestructuras de Transporte S.A. (Cintra) and Macquarie Infrastructure Group. The 99-year operating lease provided the City of Chicago with \$1.83 billion. In exchange, the Skyway Concession Company, LLC (SCC), who is also responsible for all maintenance and operating costs, collects all toll and concession revenue (www.chicagoskyway.com).



Source: Seliga, 2007

Figure 2.2: The Chicago Skyway Bridge

The lease agreement that was entered into with the Skyway Concession Company, LLC (SCC) includes detailed requirements, specifications, and definitions in terms of the road condition that the leasing company has to adhere to, as well as who should be involved and the responsibilities of the leasing company. For example, Volume I of the leasing agreement states the following:

- *“To the greatest extent possible, when performing Roadway work the Concessionaire must utilize the newest techniques implemented and approved State-wide for major highway contracts to provide longer pavement life, maximize the reuse of materials, and minimize motorist inconvenience”* (page B-5).
- *“The objective of every repair is to correct all roadway deficiencies to preserve the value of the Skyway as a capital asset, and to restore a riding quality satisfactory to the Skyway users”* (page B-5).
- *“The Concessionaire shall make routine Roadway Maintenance inspections part of its daily activities, and all Concessionaire staff who travel the Skyway for any reason must be instructed to report any roadway maintenance need observed”* (page B-5).

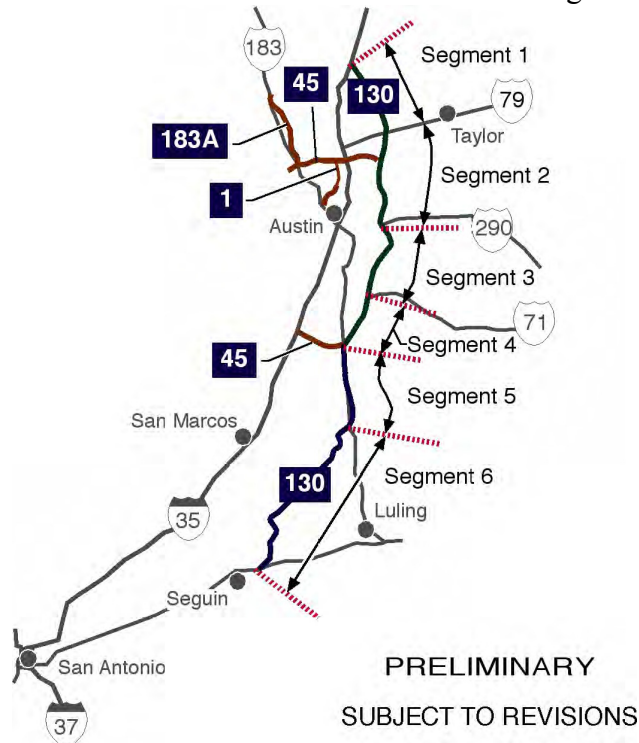
Volume I also defines the road condition, states the remedial measures required to bring the road to the specified condition, and specifies the timeframes of when repairs have to be done (page B – 8). Volume II prescribes the involvement of an independent and licensed professional consulting engineering firm in conducting the annual capital improvements for the Chicago Skyway:

- *“The Concessionaire must seek and retain an independent and Licensed Professional Consulting Engineering firm, not associated, owned or partnered with the Concessionaire, to perform the services indicated within this Chapter”* (page J-3).
- *“The Engineering firm and the Concessionaire are required to coordinate, pay for, and obtain all necessary permits and insurance required for the performance of the work...”* (Page J-4).
- *“The same Engineering firm can be retained only for a maximum four (4) year duration at which time the Concessionaire must seek, retain and employ a different Engineering Firm. The City must approve the Engineering Firm on an annual basis, and retains the right to dismiss firms that do not meet the requirements of this Chapter”* (Page J-8).

The “Policy for Annual State of the Skyway and Capital Improvement Program Reports” chapter also details, for example, what the Concessionaire and the Engineering firm must present, the structure of the annual report, the qualifications of those compiling the report, and timeframes. Finally, Volume II details the acceptance criteria for capital improvements, as well as defines the condition terms “Excellent/Good/Fair/Poor/Critical” (page J-16). No specific handback requirements are, however, listed.

2.3 SH 130 (Texas)

SH 130, paralleling IH-35 for 50 miles on the east side of Austin is an effort to alleviate congestion and provide an alternative to the highly congested IH-35 – the primary north-south route through Austin, Texas. The road is to be constructed in six segments (see Figure 2.3).



Source: Persad, Walton & Wilke, 2005

Figure 2.3: The Six Segments Comprising SH130

Segments 5 and 6 are constructed through a Design Build Finance Operate (DBFO) agreement. Under this agreement, Cintra Zachry has the right to acquire right-of-way - on behalf of TxDOT - build, operate, and maintain the toll facility for a period of fifty years. TxDOT will receive \$25 million upfront, as well as an increasing percentage of the toll revenue. For example, in the early years, TxDOT will only receive 5 percent of the toll revenue, but in subsequent years this percentage will increase to 50 percent. The revenues will be used on local projects. The agreement with Cintra Zachry includes a very restrictive non-compete clause: TxDOT cannot add or improve any facilities within a 20 mile corridor – 10 miles on each side of SH130 – with safety improvements being the only exception. Electronic Toll Collection (ETZ)¹³ will be used predominantly for collecting the tolls.

The Facility Concession Agreement (2007) details the specific handback requirements in Section 8.10 with regards to condition, inspections, and renewal work. Section 8.11 also details the requirements for establishing a handback reserve six years prior to the termination date of the agreement (see Appendix A), as well as the use, disposition, and letters of credit required. In terms of condition, Section 8.10.1 states that “*On the Termination Date Developer shall transfer the Facility, including all Upgrades, to TxDOT, at no charge to TxDOT, in the condition and*

¹³ Cintra Zachry has proposed to use video technology for collecting the tolls.

meeting all of the requirements for Residual Life at Handback specified in the Handback Requirements” (Facility Concession Agreement, 2007). It is further stated that the parties involved will inspect the facility prior to handback, among other objectives, to (a) verify the condition of the facility and its residual life, (b) determine the cost and timing of any required renewal work prior to handback, and (c) determine that the required renewal work were performed. The expected residual life upon handback was defined as a number of years equal to or greater than what was specified in Table 19.8.5.1 entitled “*Residual Life Table*” in Book 2 - Technical Requirements - of the agreement (see Appendix B). Furthermore, the Technical Requirements of the agreement also state that the concessionaire needs to develop a methodology to determine residual life to be submitted to TxDOT for approval 72 months before the Handback date. Besides the recommended evaluation and calculation criteria and the planned tests to be conducted, a proposed list of TxDOT approved independent Residual Life testing organizations needs to be submitted to TxDOT. Inspections are required at three different times in the 72 months prior to handback: between 69 and 72 months, between 15 and 18 months, and not later than 90 days before the handback date (Execution Version, Book 2 – Technical Requirements, 2007).

2.4 Capital Beltway, Interstate 495 HOT Lanes (Virginia)

The I-495 Capital Beltway - the 63.8 mile highway around Washington D.C. – traverses 22.1 miles in Virginia and 41.7 miles in Maryland. The section in Virginia starts at the Potomac River on the border with the District of Columbia at the city of Alexandria and ends at the Maryland border (i.e., the Potomac River) near Cabin John (Kozel, 2000-2003). Upon completion of the Beltway in 1964, 7.6 miles of the 22.1 miles in Virginia had six lanes and the remaining 14.5 miles had four lanes. Subsequently, almost the entire Beltway has been widened to eight lanes (Kozel, 2007). Capital Beltway serves “*the cities and towns of Alexandria, Springfield, Fairfax, Falls Church and Tysons Corner*” in Virginia (Kozel, 2000-2003).

On August 25, 2004 the Commonwealth Transportation Board Commissioner, Philip Shucet, recommended the negotiation of a comprehensive agreement to add four High Occupancy Toll (HOT) lanes to the Capital Beltway in Virginia between Springfield and the Dulles toll road (Virginia Department of Transportation, nd). This section of the Capital Beltway is estimated to carry more than 200,000 vehicles per day (Road Traffic Technology, nd). On April 28, 2005 the agreement was signed to construct four additional HOT lanes - eight general-use and four HOT lanes in a 4-2-2-4 configuration (see Figure 2.4). Buses, vanpools, and carpools with three or more passengers, and emergency vehicles would use the HOT lane without incurring a charge. Vehicles with less than three passengers will be charged a variable rate that will depend on the time-of-day, the number of passengers in the vehicle, and prevailing congestion levels. Trucks will not be allowed to use the HOT lanes (Road Traffic Technology, nd).



Source: Road Traffic Technology, nd

Figure 2.4: Proposed I-495 HOT Lanes in Virginia

The original agreement that was signed on April 28, 2005 between the Commissioner and Fluor Enterprises, Inc. and Transurban (USA) Inc., to develop, design, finance, construct, maintain, and operate the I-495 HOT lanes did not specify any hand over requirements. It also did not specify any maintenance standards. The only reference to termination was Article 9 entitled “*Termination*” that stated “*All rights and obligations of the parties hereunder and thereunder shall cease and terminate without notice or demand on Dec. 31, 2065.*”

Subsequent to environmental review and a re-evaluation of the Capital Beltway study, a revised comprehensive development agreement was entered into between the Virginia Department of Transportation and Capital Beltway Express LLC¹⁴ entitled “*Amended and Restated Comprehensive Agreement Relating to the Route 495 HOT Lanes in Virginia Project*” (2007). In terms of the revised agreement, the concessionaire is responsible for developing, designing, financing, constructing, and managing, operating, maintaining and collecting tolls on the HOT lanes for 80 years. This revised agreement includes very detailed handback requirements in Section 16.09 entitled “*Handback Obligations and Reserve*”. Specifically, the agreement states that:

- “(a) Upon the end of the Term, the Concessionaire shall hand-back the HOT Lanes Project to the Department, at no charge to the Department, with asset condition having a remaining life of the greater of: (i) five years; or (ii) life within its normal lifecycle (collectively referred to as the “Handback Requirements”). In addition, if requested by the Department, the Concessionaire will dismantle the HOT Lanes toll system as required to convert the HOT Lanes back to GP [General Purpose] Lanes; provided that the Department shall notify the Concessionaire at least one year prior to the end of the Term if the HOT Lanes

¹⁴ The two companies involved are Fluor Enterprises Inc and Transurban DRIVE LLC (Road Traffic Technology, nd).

are to be converted back to GP Lanes. Any such dismantling of the HOT Lanes toll system shall be at the Concessionnaire's sole cost and expense.

- (b) Beginning 20 years prior to the expiration of the Term and every five years thereafter, the Concessionaire, the Department, and the Independent Engineer will jointly conduct inspections of the HOT Lanes Project for the purposes of jointly (i) determining and verifying the condition of all HOT Lanes Project assets and their residual lives, and (ii) determining, revising and updating the Life Cycle Maintenance Plan to reflect the Handback Requirements..*
- (c) Beginning five years prior to the expiration of the Term, the Concessionaire, the Department and the Independent Engineer will jointly conduct annual inspections of the HOT lanes to ensure that the Handback Requirements will be met.*
- (d) The Concessionaire shall diligently perform and complete all work contained in the Life Cycle Maintenance Plan prior to the reversion of the HOT Lanes Project back to the Department, based on the required adjustments and changes to the Life Cycle Maintenance Plan resulting from the inspections and analysis under Section 16.09 (b) and (c). The Concessionaire shall complete all such work prior to the end of the Term.*
- (e) Starting five years prior to the expiration of the Term, the Concessionaire shall post a ten-year irrevocable stand-by Letter of Credit or a Performance Bond to the Department for a period of five years after expiration of the Term in an amount equal to 50% of the nominal lifecycle cost expended in the previous five years of the Term pursuant to the most recent Life Cycle Maintenance Plan approved by the Department. This Letter of Credit or Performance Bond would be drawn upon the Department only in the event that subsequent to termination or expiration of the Term, the HOT Lane assets are found to fail to address the Handback Requirements and in the amount required to address such failures up to the full amount of the Letter of Credit or Performance Bond.*
- (f) The Department will determine whether the HOT Lane assets meet the Handback Requirements based on routine inspections up to five years after termination or expiration of the Term ("Handback Period"). If the Concessionaire disagrees with the Department's determination of the condition of the HOT Lanes during the Handback Period, the Concessionaire may, at its own expense, retain an engineer to inspect the facility and review the findings of the Independent Engineer. Resolution of the issue will be subject to dispute resolution process contained in Section 17.06." (Amended and Restated Comprehensive Agreement, 2007).*

Construction of the 14 mile HOT lanes is scheduled to begin in Spring of 2008 and be completed by 2013. The total cost of the project is estimated at \$1.4 billion (Road Traffic Technology, nd).

2.5 Highway 407 Express Toll Route (Ontario, Canada)

Highway 407 – the first all electronic open access toll highway¹⁵ – in the world was envisaged as an alternative to the highly congested Highway 401 in Ontario, Canada. The road was developed as a design-build-operate agreement with the private contractor responsible for the operations and the government responsible for the financing of the road. Highway 407 was completed in 1997 and runs east – west north of Toronto in Canada. It was anticipated that the \$1.6 billion in bonds sold to fund the construction of the road would have been repaid from user fees, i.e., tolls, over a 35 year period.

However, the provincial government leased the highway in 1999 – after 18 months of operation – to 407 International Inc, which comprises Cintra Concesiones de Infraestructuras de Transporte, Macquarie Infrastructure Group, and SNC-Lavalin. The concession agreement between the private concessionaire and the Ontario government is for 99 years (Samuel, 2007). In other words, for a \$3.1 billion upfront fee, the concession company obtained the right to own, operate, and toll the 108 kilometer road for 99 years. The concession began April 6, 1999. The “*Concession Agreement*”, the “*Highway 407 Act*”¹⁶, and the “*Tolling, Congestion Relief and Expansion Agreement*” (i.e., the “*Tolling Agreement*”) are the key components governing the relationship between the Ontario government and the concessionaire. In summary, the concessionaire has the right to:

- “*develop, design, and build the Highway 407 Central Deferred Interchanges, 407 West Extension and 407 East Partial Extension*”. If the extensions¹⁷ were not completed by a specified date, the concessionaire had to pay a set penalty plus additional fees for each day of delay subsequent to the specified day of completion,
- “*finance, operate, manage, maintain, rehabilitate and toll the project*” (Personal Interview with Imad Nassereddine, 2008)

and is obligated to:

- meet all safety standards set by the Province on the 407 ETR,
- expand the 407 ETR if certain specified levels of traffic congestion are experienced on individual road segments, and
- provide free access to official vehicles, such as police cars (Personal Interview with Imad Nassereddine, 2008).

The toll road agreement has some unique features. For example, the contract stipulated that the private concessionaire has to pay the government a certain fee (as determined by a

¹⁵ A system of cameras record license plate numbers and drivers are charged subsequently. The tolls are differentiated on a peak/ off-peak basis.

¹⁶ The Act detailed the legal procedures and definitions for the toll road, including transfer agreement, management and liability, prior to the construction of the toll road (Persad, Walton, and Wilke, 2005).

¹⁷ At the commencement of the lease, only the central 69 kilometer section was opened to traffic. The dates specified for the opening of the two extensions – i.e., the 24 kilometers to the west and the 15 kilometers to the east – was July 31, 2001 and December 21, 2001, respectively (407 International Bond Issuance 1999).

formula) if congestion reached a certain predetermined level. Also, this road has not been without controversy. A number of lawsuits have been brought forward about the concessionaire's right to set toll rates (Samuel, 2004) and the government's responsibility to deny the issuing or validation of vehicle permits to frequent toll abusers.



Source: Anderchek, ND

Figure 2.5: 407 ETR, Ontario (Canada)

The “*Highway 407 Concession and Ground Lease Agreement*” entered into between the Ontario government (the Grantor) and the 407 ETR Concession Company Limited (the Concessionaire) is a comprehensive document detailing the contractual obligations of both parties, including ownership and responsibility for the toll road, general duties, safety standards, reporting and record keeping, indemnification, insurance, dispute resolution, and confidentiality.

Article 2 of the “*Highway 407 Concession and Ground Lease Agreement*” entitled “*Concession, Ground Lease and Transfer of Assets*” states that “*All buildings, structures, improvements, appurtenances and fixtures constructed, erected or situated upon the Project Lands¹⁸ following the Effective Date and prior to the Grantor becoming the owner of the Project pursuant to Subsection 24.1(i) shall be owned by the Concessionaire and not the Grantor. As of the Reversion Date ... all improvements on the Project Lands and all improvements comprising the Project (other than, for the avoidance of doubt, any vehicles, non-fixed equipment or*

¹⁸ The Ontario Government leased the project lands to the 407 ETR Concession Company Ltd. for one dollar per year for the concession period to be paid in advance.

inventories owned by the Concessionaire, which shall remain the property of, and may be removed by the Concessionaire) shall become the absolute property of the Grantor without any payment therefore to the Concessionaire... ”.

Article 24 of the Agreement entitled “*Consequences of Termination or Reversion*” further states that

- “(i) ... the Grantor shall, as of the Reversion Date, become the owner of the Project and as consideration therefore, assume full responsibility for the design, development, construction, operation, management, maintenance, rehabilitation and/or tolling of the Project.*
- “(ii) The Concessionaire shall be liable for all costs and expenses incurred with the design, development, construction, operation, management, maintenance, rehabilitation and/or tolling of the Project up to but not including the Reversion Date and the Grantor shall be liable for all such costs and expenses incurred in connection with such activities on and as of the Reversion Date ”*

However, the agreement does not specify any specific handover requirements. The only additional reference to the termination of the contract is in Article 27.4 entitled “*Holding Over*”. Under this heading it is stated that “*If the Concessionaire remains in possession of the Project Lands after the expiration of the Term, such holding over shall not be deemed to extend the Term or to renew the concession and ground lease granted hereunder, but the Concessionaire shall be, and be deemed to be, occupying the Project Lands as a tenant from month to month at a monthly rent equal to one-sixth (1/6th) of the Toll Revenues received or collected during the immediately preceding twelve (12) months and otherwise subject to the provisions of this Agreement, modified as is appropriate to such monthly tenancy*”.

Finally, the agreement stipulates that the concessionaire will be responsible for “*applying the most up-to-date Ministry Safety Standards in the same manner that the Ministry is required to apply such standards on Comparable Controlled Access Highways*”. In this regard, Table 1 in Schedule 20 (see Appendix C for a copy of this table) lists all the Ministry Safety Standards¹⁹ which applied at the date the contract came into effect. In addition, the following specific minimum standards were provided: (a) immediate rehabilitation is required when a freeway flexible pavement reaches a Pavement Condition Index of 60 and (b) immediate mitigation be considered if the surface friction skid number reaches SN 100=30 “*as measured by a breakforce trailer, conforming to ASTM Standard E-274 and E-501*” (Schedule 20).

The lack of specific handover requirements can be partly explained by the length of the contract period, i.e., 99 years. The Government is thus holding the Concessionaire accountable to the latest standards used when designing, constructing, operating, and maintaining the highway as specified in the MTO reference documents. Since the MTO standards are updated regularly, the Concessionaire is obliged to abide by the latest version of the standards (Personal Interview with

¹⁹ The Ontario Ministry of Transportation (MTO) has specific standards that apply to different classes of highways and these standards are updated regularly and are available to all operators working on highways in Ontario. The operators have to abide by these standards as required (Personal Communication, 407 ETR Concession Company Limited).

Imad Nassereddine, 2008). The Government reserved the right to conduct tests and audit the toll road to ensure that the Concessionaire abides by these standards.

2.6 Vespucio Norte Express (Chile)

The development of Chile's infrastructure was a strategic priority for Chile's democratic government in the 1990s. This resulted in the development of a legal and regulatory framework for infrastructure concessions in 1994. Considerable care was taken to ensure a framework that was fair and beneficial to both the public and private sector. Chile's "*concession laws*" governing the construction, rehabilitation, maintenance, and operations of public works projects have thus established a "*competitive bidding process, provided conflict resolution procedures, and allowed the government to offer incentives and subsidies for private investment*" (Persad, Walton, and Wilke, 2005).

In Santiago (Chile), private toll road investments has resulted in the building and upgrading of four major highways in the capital city:

- Costanera Norte (44 kilometers),
- Autopista Central (60.5 kilometers),
- Vespucio Sur (23 kilometers), and
- Vespucio Norte Express (29 kilometers).

Vespucio Norte Express forms the north-western section of a ring road around Santiago city. Inaugurated on January 4, 2006, the Vespucio Norte Highway connects the "El Salto" Avenue to Route 78, which connects Santiago to San Antonio. In 2001 the concession contract was entered into between the Ministry of Public Works of Chile (MOP) and Hochtief and partners ACS-Dragados to plan, finance, construct, and operate the toll road. Hochtief's share in this concession agreement is 45 percent. As part of this concession agreement, the existing two-lane road was expanded into a three lane road with service lanes. The 30 year concession agreement came into effect in April 2003 (see http://www.hochtief-pppsolutions.com/ppp_en/26.jhtml). The total value of the concession contract was estimated at \$670 million.



Source: http://www.hochtief-pppsolutions.com/ppp_en/26.jhtml

Figure 2.6: Vespucio Norte Express (Chile)

All four urban toll roads in Chile use open road tolling to collect user fees. The transponders and transceivers used are compliant with European standards (i.e., CEN TC 278). As part of the concession agreement, the concessionaire had to provide future users of the toll road that opened an account with a transponder free of charge. Specifically, in the case of Vespucio Norte 200,000 free transponders had to be distributed (see http://www.hochtief-pppsolutions.com/ppp_en/26.jhtml).

For 360 months (30 years) the Concessionaire is responsible for maintaining the highway, including the four bridges, the 20 structures (both unleveled and connections), the 25 pedestrian walkways, the 22 information panels, and the segregation borders for the express lanes. The estimated amount of money invested in this highway is around US\$320 million (see http://www.hochtief-pppsolutions.com/ppp_en/26.jhtml).

Section 2.4.3 of the concession agreement entitled “*Plan for Integral Maintenance*” is an attempt to ensure that the Concessionaire maintains the highway, the structures, the surfaces, bridges, etc. in a good condition to ensure the safety and comfort of the users. Maintenance works are categorized as follows: routine, periodic, and rehabilitation. The Plan furthermore states that the concessionaire has to ensure that an asset – in terms of the standards established initially - is handed over to the MOP at the end of the concession. The Plan thus not only specifies the minimum standards or requirements for each component (i.e., pavements, structures, security, signaling, etc.), but also details specifically what maintenance the concessionaire is obligated to perform and when the maintenance has to be conducted.

Section 2.4.6 lists the different reports that must be submitted to the MOP. The section also describes the content of each report in the included subsections. Specific reports are required every month, three months, six months, and annually. For example, the six month reports have to provide an evaluation of the traffic, the pavement and structural conditions in meeting the standards, and the maintenance works done on the highway. If any of these reports are not

presented on time, a fine is imposed, which may lead ultimately to the termination of the concession. In addition, although the Concessionaire prepares the reports, the MOP has the authority to review the process used in preparing the reports.

In addition to the extensive maintenance standards and requirements specified in the concession agreement that has to be adhered to during the contract period, the MOP maintained the right to evaluate the road condition a year prior to the end of the concession to determine if the concessionaire has to undertake any additional work. Section 1.11.3 of the agreement also states that twelve months prior to the end of the concession, the MOP will provide the concessionaire with a memorandum that lists all the required repairs and maintenance, as well as the timeframe for these repairs and maintenance works. These repairs and works have to be completed to ensure that the established standards are met. Even if the memorandum has not been received by the concessionaire, they will still be held responsible for these repairs. This memorandum, together with the various reports required over the concession period, represent the effort of the MOP in ensuring that the government receives an asset at handover. Handover is detailed in Section 1.11.2 of the agreement. At the end of the concession, the concessionaire has to hand over the road and all buildings to the MOP.

2.7 The South African National Roads Agency Ltd

The South African National Roads Agency Limited (SANRAL) manages and maintains the national road network²⁰ in South Africa on behalf of the Minister of Transport. The South African national road network constitutes:

- 74 percent non-toll roads that are maintained from a allocation from Treasury,
- 8 percent of public agency toll roads, and
- 18 percent concession toll roads (Alli, ND).

Figure 2.7 illustrates South Africa's national road network that is managed and maintained by SANRAL.

All concession agreements in South Africa are for a period of 30 years. Concession agreements are regarded an integral component of the South African government's strategy to seek alternative financing sources to taxes for funding South Africa's road network.

²⁰ *"These roads are usually associated with longer travelling distances at high speeds with minimum interferences to free flow of traffic. These roads are primarily provided for economic reasons and to improve and support economic growth" (SANRAL, 2004).*

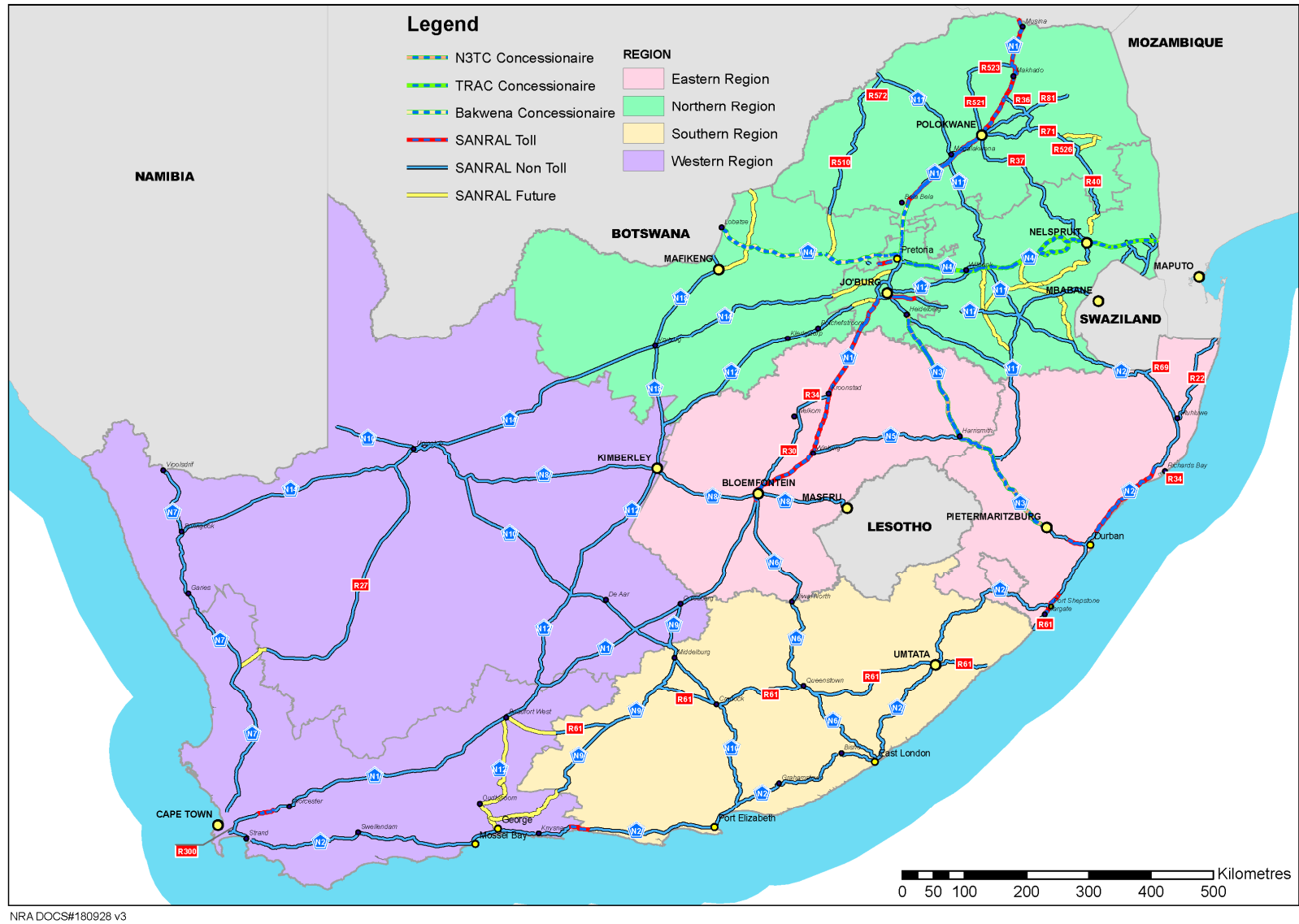


Figure 2.7: South Africa's National Road Network

The three concession toll roads are:

- the *N4 Maputo Development Corridor*, a 504 kilometer corridor that extends from the Gauteng border on the N4 to Maputo in Mozambique. The concessionaire is Trans African Concessions (TRAC) and the total concession was valued at R3.0 billion.
- the *N3 Toll Road*, a 418 kilometer long corridor from Cedara in KwaZulu Natal to Heidelberg in Gauteng. The concession was valued at R3.5 billion and the concessionaire is N3 Toll Concession (Pty) Ltd (N3TC).
- the *N4 Platinum Highway*, a 380 kilometer portion of the N1 between the N1/N4 system interchange in Tshwane and the Warmbaths interchange, westwards through Akasia, Brits, Rustenberg, and Zeerust to the Skilpadhek border post with Botswana. The total concession was valued at R3.2 billion and the concessionaire is Bakwena Platinum Concession Consortium (Pty) Ltd (BPCC) (Alli, ND).

These concession agreements are seen to offer the following benefits:

- for the duration of the concession period, the roads are built and maintained by the concessionaire with no cost implications to the government,
- the government will receive an asset that is entirely free of debt at the end of the concession period,
- the provision of road infrastructure contributes to economic development and growth, thereby increasing South Africa's international credit rating, and
- the provision and maintenance of road infrastructure by the private sector allows the South African government to divert resources originally required for these road projects to social development and affirmative action programs (SANRAL, 2004).

Table 2.1 illustrates the annual capital and maintenance expenditures that would have been required from the National Treasury if these toll roads were not concessions.

Table 2.1: Reduction in Annual Capital and Maintenance Expenditure

Project	Project Length	Reduction in Annual Capital and Maintenance Expenditure (R' million)*
N3 Cedara - Heidelberg	420	105
N4 Witbank – Maputo	410	120
N4 Platinum	484	130
Total	1,314	355

* Calculation of average annual capital and maintenance expenditure

Source: Adapted from SANRAL, 2004

An annex to all concession agreements in South Africa provides detailed and technical information specifying the design, maintenance, inspections, and inspections times of the concessioned roads. Independent engineers are appointed and have the authority to conduct the tests and inspections and therefore issue the non-conformance certificates. Non-conformance certificates are issued:

3.5.3.1 If, on an inspection of any Test Section, the Independent Engineer determines that any Acceptance Criteria is not satisfied then the Independent Engineer shall notify the Concessionaire of the non-compliance.

3.5.3.2 Within 2 Business Days of the Independent Engineer having delivered to the Concessionaire the notification referred to in clause 3.5.3.1 above, the Concessionaire may deliver to the Independent Engineer proof that the non-conformance with the Acceptance Criteria has not continued for a period longer than the relevant Correction Period for such non-conformance as specified in Schedule IIIC (the "Correction Period").

3.5.3.3 If the Concessionaire has not demonstrated to the reasonable satisfaction of the Independent Engineer within the period specified in clause 3.5.3.2 that the non-conformance of any Routine Road Maintenance feature in terms of the Acceptance Criteria has not continued for a period longer than the Correction Period, the Concessionaire shall accrue Non Performance Points for such non-conforming features (as specified in Schedule IIIC) which exceeded their respective Correction Periods."

In addition, the handover requirements specified in this annex states that:

"The Highway shall comply with the Acceptance criteria on the expiry of the Concession Period.

The Concessionaire shall request the Independent Engineer to conduct a hand-back inspection on the Highway not earlier than six (6) months and not later than three (3) months before the end of the Concession Period. The hand-back inspection shall be based on the same procedure and acceptance criteria specified in herein. Signoff of a particular Highway Section or part thereof does not relieve the Concessionaire of the responsibility to maintain such Highway Section or part thereof according to the specifications stipulated herein for the remainder of the Concession Period."

2.8 EastLink²¹ (Australia)

States and territories in Australia can regulate their own transportation networks under Australia's constitution, resulting in various and distinct policies (Persad, Walton, and Wilke, 2005). On May 1, 2003 the State of Victoria issued a call for the expression of interest for designing, constructing, financing, leasing, operating, maintaining, and repairing a project in the Mitcham-Frankston corridor (Concession Deed, 2004). In October 2004, ConnectEast Group

²¹ This route was formerly known as the Eastern Ring Road and the Mitcham-Frankston Freeway.

entered into an agreement with the Victorian Government to finance, design, construct, maintain, and operate the EastLink for 39 years – i.e., until 2043 - when it will be handed back to the government (ConnectEast, 2008).

EastLink comprises 39 kilometers of freeways, linking Melbourne's eastern and southeastern suburbs. This fully electronic tollway is anticipated to be a major commuter road and an important intracity arterial link. An innovative feature of the tollroad is 35 kilometers of bicycle and pedestrian paths. The road opened in June 2008 – five months ahead of schedule - at an estimated construction cost of A\$2.5 billion²². It is the largest urban road project in Australia (ConnectEast, 2008).



Source: Southern and Eastern Integrated Transportation Authority, nd
(Available at: <http://www.seita.com.au/pages/photo-library.asp>)

Figure 2.8: The EastLink (formerly known as the Mitcham-Frankston Freeway)

The agreement between the State of Victoria and ConnectEast Nominee Company Pty Ltd and ConnectEast Pty Ltd (together the Concessionaires) include a whole section pertaining to the handover requirements (see Appendix D for an excerpt of the handover requirements as stipulated in the Concession Deed). The most important aspects of the handover requirements section is summarized below (Concession Deed, 2004):

- Three years prior (and every six months thereafter) to the handover date, a joint inspection between the parties needs to be conducted. The objectives are for both parties to agree on the maintenance and repair work that would be required, the timeframe for the work, and the estimated total costs of the required work.
- The concessionaire must either fund a Handover Escrow Account to an amount that equals or exceeds the cost of the required work or provide the state with a bond that has a face value equal to the Estimated Handover costs.

²² The total project cost is estimated at A\$3.8 billion (ConnectEast, 2008)

- Upon completion of a specific component of the agreed maintenance and repair work, the state could inspect the work undertaken and if satisfied a mechanism for reducing the estimated handover cost amount (e.g., the amount deducted from the Escrow account) was specified.
- Three months prior to handover, the concessionaire must train personnel designated by the State to the extent that they will be able to “*manage, operate, maintain and repair the Freeway and to maintain and repair the Maintained Off-Freeway Facilities*” to specified standards upon handover.
- The agreement also specifies that the condition of the facility has to comply with the deed and provides a detailed list of what is expected to transfer to the state at handover, including plant and equipment, manuals, records, plans, software, hardware, firmware, and databases.
- The concessionaire is obliged to assist the state or its nominee in ensuring continuity in the operation, maintenance, or repair of the facility, including the provision of ongoing IT support and making concessionaire personnel available to advise the state for a period of 12 after the concession ends.
- The state has to notify the concessionaire within 45 days of handover about any matter which needs to be remedied or rectified by the concessionaire, including concerns related to residual design life. A procedure is specified to handle any disagreements which may arise between the state and the concessionaire.

In addition, the agreement also specifies specific dispute resolution processes at various stages when approaching the end of the concession period and the actions that the state is entitled to take if close-out of all the construction activities have not been achieved.

3. Concluding Remarks

Increasingly traditional funding sources are inadequate to maintain and modernize U.S. road infrastructure to ensure mobility, accessibility, and reasonable travel times. For example, the Texas Department of Transportation's (TxDOT) 2007-2011 Strategic Plan projects a funding shortfall of \$86 billion in statewide unmet needs over the next 25 years (Texas Department of Transportation, 2006). It is also becoming increasingly evident that traditional financial tools and delivery methods will be inadequate to expand the state's transportation infrastructure in the future. One option to address this funding shortfall is to finance new roads and provide additional capacity in rural and urban areas through investments that can be recovered from tolls charged to users. Depending on the structure of the agreement, the objectives could include accelerating construction, reducing the delivery time of the facilities, minimizing public tax-based funding, maximizing private investment, and sharing project risk. The literature review revealed that several U.S. states have initiated toll road projects that use private capital to finance, design, construct, operate, and maintain highway projects for a specific period determined in the contract. In exchange, the private company is allowed to collect revenue from the facility users to cover the expenses and make some profit. At the end of the contract period, the facility is transferred back to the public agency at no cost. Since these contract periods are typically in excess of thirty years, concerns have been expressed as to how to ensure that the public agency receives an "asset" at the end of the contract period.

In this report, the researchers reviewed eight tolling case studies in the U.S. and abroad that has been operational for varying lengths of time. The first concession agreement was entered into in 1986 (i.e., the Queen Elizabeth Bridge II), while the most recent agreement was entered into in 2007 (i.e., Capital Beltway, Interstate 495 HOT Lanes in Virginia). In reviewing these agreements, it became obvious that there is a substantial difference between the handover detail included in earlier concession agreements compared to the more recent agreements as it relates to specific standards and maintenance requirements, inspections and timing of inspections, as well as the reporting requirements. The specificity of the handover requirements also seems to be partly a function of the length of the agreement. For example, in the case of Highway 407, the concessionaire is held accountable to the latest standards used when designing, constructing, operating, and maintaining the highway as specified in the Ontario Ministry of Transportation reference documents. Since the MTO standards are updated regularly, the Concessionaire is obliged to abide by the latest version of the standards (Personal Interview with Imad Nassereddine, 2008). Similarly, the concession agreement for the Chicago Skyway Bridge – which is also a 99 year operating lease – seems to place more emphasis on the appropriate maintenance of the facility during the concession period than on the handback requirements.

The most detailed and specific handover requirements were included in the 2004 Concession Deed for the Eastlink freeway (previously called the Mitcham-Frankston Freeway) in Australia and the 2007 *"Amended and Restated Comprehensive Agreement Relating to the Route 495 HOT Lanes in Virginia Project"*. It is thus clear from this research that the handover requirements included in concession agreements have evolved since 1986. Also, it seems that governments are entering into longer term lease agreements exceeding 50 years with concessionaires. This complicates specifying appropriate standards and requirements at handover, because technology and material changes cannot be anticipated so far into the future. In this regard, more emphasis on the inspection procedure (e.g., the use of an independent

engineer, testing procedures), the timing of inspections (e.g., five years, one year, and six months prior to handover), the funding of required repairs and maintenance, the minimum life expectancy for all major systems and components after handback, and the procedures for handover and dispute resolution seem to be appropriate. Furthermore, it seems appropriate to require of the concessionaire to meet or exceed the latest standards specified for designing, constructing, operating, and maintaining a similar class highway. This will prevent any controversy related to changes in standards or regulations – for example new standards that may emerge for roadside maintenance - during the life of a concession agreement.

Appendix A – Handback Requirements Reserve Elements and Reserve Funding Mechanism²³

1. Developer shall make deposits to the Handback Requirements Reserve by the last day of each calendar quarter, commencing with the first calendar quarter of the sixth full calendar year before the end of the Term, and continuing thereafter.
2. Developer shall make quarterly deposits into the Handback Requirements Reserve so that by the *beginning* of each of the last five years during the Term the Handback Requirements Reserve will contain an amount equal to:
 - (a) The summation across all Elements that have a number of years stated in the “Useful Life” column in Table 19.8.5.1 – Residual Life Table of the Technical Requirements of the following factors, as set forth in the most recent Renewal Works Schedule (as it may be revised pursuant to the Handback Requirements): the estimated cost to perform the Renewal Work on such Element at the end of its Useful Life multiplied by the lesser of (i) one or (ii) a fraction of the numerator of which is the average Age each such Element will have as of the end of the current calendar year and the denominator of which is the total average Useful Life thereof, plus
 - (b) The summation across all other Elements (i.e., those Elements that have a number of years stated in the “Residual Life at Handback” column in Table 19.8.5.1 – Residual Life Table of the Technical Requirements) of the estimated cost to perform the Renewal Work on each other Element that is to be performed prior to expiration of the Term in accordance with the Handback Requirements multiplied by a fraction the numerator of which is five minus the number of full calendar years until the year in which the Renewal Work is scheduled to be performed pursuant to the Renewal Work Schedule (as it may be revised pursuant to the Handback Requirements) and the denominator of which is five; plus
 - (c) 10% of the amounts under clauses (a) and (b) above as a contingency.
3. Developer’s quarterly deposits shall equal one-fourth of the amount described in Section 2 above, provided that if Developer’s aggregate actual draws during the current calendar year exceed the planned draws by more than 10% (including draws to fund Safety Compliance work allowed under Section 8.11.3.1 of the Agreement), Developer shall adjust its quarterly deposits for the remainder of the calendar year in order to make up the excess draws.

²³

The text in this appendix is an excerpt of the handover requirements included in the Facility Concession Agreement (2007) as Exhibit 13 for Segments 5 and 6 of SH130.

4. In determining the amount of Developer's deposits to be made in the current calendar year, the Parties shall take into account the total amount in the Handback Requirements Reserve at the end of the immediately preceding calendar year and Developer's planned draws from the Handback Requirements Reserve during the current calendar year.
5. If at any time during the course of Renewal Work on an Element the actual incurred costs thereof are such that the balance in the Handback Requirements Reserve for such Element is less than the total amount required to be funded to the Handback Requirements Reserve for such Element, Developer shall promptly increase its deposits in order to fully make up the difference.
6. If after completion of and payment in full for Renewal Work on an Element there remains an unused balance in the Handback Requirements Reserve for such Element during the Term, the unused balance shall be reallocated and credited toward required balances in the Handback Requirements Reserve for other Elements.

Appendix B – Table 19.8.5-1 Residual Life Table²⁴

Element Category	Residual Life at Handback (yrs)	Useful Life	Inspection Requirements	Residual Life Methodology (RLM) Requirement
Road Pavement				
Mainlanes	A (Note 1)	10	Pavement inspections shall be undertaken by independent testing organizations.	RLM shall be capable of calculation of residual life for each 0.1 mile Auditable Section. For a nominal 10 year Residual Life at Handback, 85% of Auditable Sections shall have a Residual Life exceeding 10 years, and no Auditable Section shall have a calculated Residual Life of less than 5 years.
Ramps/direct connectors	A (Note 1)	10		
Frontage/access roads	A (Note 1)	10	Inspections shall provide a continuous or near-continuous record of Residual Life in each lane. Where the inspection method does not provide a continuous record of Residual Life, the number of valid measurements in each Auditable Section shall be sufficient to give a statistically valid result. Inspections shall be repeatable to an agreed level of accuracy and inspection contracts shall include an agreed proportion of inspections to verify accuracy. Inspections shall include ride quality, skid resistance and rutting.	
Local/collector roads	A (Note 1)	10		
Structures				
Reinforced concrete	50	N/A	Inspections of structures shall be	RLM shall:

²⁴ The text in this appendix is an excerpt of the handover requirements included in the Execution Version of the Facility Concession Agreement (2007) as Book 2 – Technical Requirements for Segments 5 and 6 of SH130.

Element Category	Residual Life at Handback (yrs)	Useful Life	Inspection Requirements	Residual Life Methodology (RLM) Requirement
Pre-stressed concrete	50	N/A	<p>undertaken by independent testing organizations.</p> <p>Inspections shall follow the latest inspection guidelines (as they apply at the relevant date that the testing is undertaken) recognized by TxDOT.</p> <p>A close examination shall be made of all parts of each structure.</p> <p>Non-destructive tests shall be undertaken appropriate to the type of structure. These shall include the measurement of structural deflection under calibrated load, the identification and measurement of delamination in bridge decks, the measurement of chloride and carbonation profiles from surface to reinforcement and/or tendon level, and the in-situ strength testing of concrete Elements.</p> <p>Testing of steel structures shall include the depth of corrosion and/or the measurement of remaining structural thickness for hidden and exposed parts.</p> <p>All lengths of weld shall be tested for cracking at key areas of structural steelwork.</p>	<p>Draw on historical asset maintenance records, inspection and test histories for each structure.</p> <p>Take account of TxDOT and FHWA records of other structures on the network with similar characteristics.</p> <p>Include an assessment of load carrying capacity based on the original structural design calculations, the as built drawings and results of load deflection tests where appropriate.</p> <p>Take account of any trends in asset deterioration to determine the rate of deterioration and to predict the future condition of individual Elements and the entire structure.</p>
Structural steelwork	50	N/A		
Weathering steel	50	N/A		
Corrugated steel	50	N/A		
Corrosion protection for structural steelwork	A (Note 1)	5		
Deck surfacing	A (Note 1)	10		
Deck joints	A (Note 1)	5		
Bearings	A (Note 1)	20		
Railing	25	N/A		
Sign/signal gantries (structural elements)	50	N/A		
Retaining walls	50	N/A		
Traffic signal poles	A (Note 1)	8		
High mast lighting	A (Note 1)	8		
Building and Maintenance Facilities (structural elements)				
	50	N/A	Inspections shall comply with Good	RLM shall draw on historical asset

Element Category	Residual Life at Handback (yrs)	Useful Life	Inspection Requirements	Residual Life Methodology (RLM) Requirement
			Industry Practice.	maintenance records, inspection and test histories for each building and maintenance facility.
Building and Maintenance Facilities (installation and finishes)				
	25	N/A		
Toll Collection and Traffic Management Facilities				
			Inspections shall comply with Good Industry Practice.	RLM shall be based on the manufacturer’s or supplier’s recommended component life, together with records of the performance of similar equipment from Developer or TxDOT records.
Drainage				
Underground storm sewer systems	50	N/A	Inspection of storm sewer systems shall include closed circuit TV inspection of all buried pipe work.	RLM shall draw on historical asset maintenance records, inspection and test histories for each Element of the drainage system.
Culverts	50	N/A		
Ditches	A (Note 1)	10	Ground water level monitoring at selected locations will be required to provide assurance through the RLM of a 10 year Residual Life for groundwater interceptor drains.	Developer shall include a methodology to determine the Residual Life of filter drains designed to intercept groundwater.
Inlets	25	N/A		
Outfalls	A (Note 1)	10		
Ancillary				
Earthwork slopes	50	N/A	For embankment and cut slopes a risk based inspection procedure shall be adopted following Good Industry Practice.	RLM shall draw on historical asset maintenance records, inspection and test histories for each ancillary Element.
Metal beam guard fence	A (Note 1)	20		
Concrete barrier	A (Note 1)	20		

Element Category	Residual Life at Handback (yrs)	Useful Life	Inspection Requirements	Residual Life Methodology (RLM) Requirement
Impact attenuators	A (Note 1)	20	<p>Deformation monitoring will be required to provide assurance through the RLM of a 50-year residual life.</p> <p>Inspections of all ancillary items shall be undertaken by personnel having adequate training on modes of failure, risk assessment and observational skills.</p>	
Lighting columns	A (Note 1)	10		
Overhead signs	A (Note 1)	5		
Traffic signals housings and mountings	A (Note 1)	8		
Fences	A (Note 1)	20		
Manhole covers, gratings, frames and boxes	A (Note 1)	10		
Curbs and gutters	A (Note 1)	10		
Luminaires	A (Note 1)	5		
Roadside traffic signs	A (Note 1)	5		
Pavement markings	A (Note 1)	3		
Delineators	A (Note 1)	5		

Note 1: Where designated by the letter “A”, a Useful Life created at the time of last replacement, renewal, reconstruction, restoration or rehabilitation before the end of the Term is specified in place of a Residual Life at Handback.

Appendix C - Reference Documents for Ministry Safety Standards

Table 1 – Reference Documents for Ministry Safety Standards:

Document	Current Distributor
Bridge Clearance and Load Restriction Manual	Ronen House Publishing
Commercial Site Access Policy and Standards Manual	Ronen House Publishing
Concrete Culvert Design and Detailing Manual	Ronen House Publishing
Contract Design Estimating and Documentation Manual	Ronen House Publishing
Design Manual for Highway Illumination – Metric	Sale Data Room
MTO Drainage Manual	Ronen House Publishing
Electrical Engineering Manual – Volume 1 – Electrical Design	Ronen House Publishing
Electrical Eng’g Manual – Volume 2 – Electrical Maintenance	Ronen House Publishing
Electrical Engineering Manual – Volume 3 – C.D.E.D	Ronen House Publishing
Electrical Engineering Manual – Volume 4 – FTMS – CDED	Ronen House Publishing
Form-work and False-work Manual	Ronen House Publishing
Geometric Design Standards for Ontario Highways – Metric	Ronen House Publishing
Construction Inspection Tasks Manual	Ronen House Publishing
Highway Engineering Standards Drawings: Structural	Ronen House Publishing
Kings Highway Guide Signing Policy Manual	Ronen House Publishing
Illumination Design Criteria	Sale Data Room
Integral Abutment	Ronen House Publishing
Maintenance Special Provisions	Sale Data Room
Maintenance Quality Standards	Sale Data Room
Manual for Condition Rating of Flexible Pavements (SP-024)	Sale Data Room
Manual for Condition Rating of Rigid Pavements (SP-005)	Sale Data Room
Manual of Uniform Traffic Control Devices	Ronen House Publishing
Modified Special Provisions and Non-Standard Special Provisions Related to Safety	Sale Data Room
Ont. Highway Br. Design Code Commentary (3 rd edition 1991)	Ronen House Publishing
Ontario Highway Bridge Design Code Update (March 1995)	Ronen House Publishing
Ontario Provincial Standards and Specifications User’s Guide	Ronen House Publishing
Ontario Provincial Standards and Specifications – Vol. 1	Ronen House Publishing
Ontario Provincial Standards and Specifications – Vol. 2	Ronen House Publishing
Ontario Provincial Standards and Specifications – Vol. 3	Ronen House Publishing
Ontario Provincial Standards and Specifications – Vol. 4	Ronen House Publishing

Document	Current Distributor
Ontario Structure Inspection Manual	Ronen House Publishing
Ontario Traffic Signal Control Equipment Specifications	Ronen House Publishing
Pavement Design and Rehabilitation Manual	Ronen House Publishing
Post Tensioned Decks	Ronen House Publishing
Pre-stressed Concrete Manual	Ronen House Publishing
Procedures for the Design of High Mast Pole Foundations	Sale Data Room
Roadside Safety Manual	Ronen House Publishing
Shoulder Rumble Strip Draft Directive	Sale Data Room
Sign Support Manual	Ronen House Publishing
Structural Manual	Ronen House Publishing
Structural Inspection Manual	Ronen House Publishing
Structural Steel Coating Manual	Ronen House Publishing
Structure Rehabilitation Manual	Ronen House Publishing
Traffic Signal Timing & Capacity Analysis for Intersections	Sale Data Room
Traffic Control Manual for Roadway Work Operations	Ronen House Publishing
1993 AASHTO Guide for the Design of Pavement Structures for Rigid and Flexible Pavements	Sale Data Room
Winter Operations for Snow and Ice Control by Contractors	Sale Data Room

Source: Highway 407 Concession and Ground Lease Agreement

Appendix D – Handover at end of Concession Period²⁵

71.1 Approaching end of Concession Period

(a) Joint inspection

If required by the State, the Concessionaires must carry out joint inspections with the State of the Freeway (and in the case of ConnectEast, the Maintained Off-Freeway Facilities) at least 3 years prior to the expected expiry of the Concession period and every 6 months after that initial inspection until the end of the Concession Period.

(b) Program and costs to achieve Proper Handover

Following an inspection under clause 71.1(a) (Joint inspection), the parties must use their respective reasonable endeavours to agree on:

- (i) the maintenance and repair work required to be carried out by ConnectEast to achieve Proper Handover (taking account of planned maintenance scheduled in accordance with Operation and Maintenance Best Practices);
- (ii) a program for carrying out those works by ConnectEast including key milestones (**Milestones**); and
- (iii) an estimate of the total costs of carrying out those works and the costs to achieve each Milestone (including an appropriate margin for risks and contingencies being not less than 10% of the estimate of those total costs without that margin or contingency added) determined in accordance with Operation and Maintenance Best Practices.

(c) Dispute resolution process

If the parties do not agree on all the matters referred to in clause 71.1(b) (Program and costs to achieve Proper Handover) within 20 Business Days after the date of inspection:

- (i) either the State or the Concessionaires may refer those aspects of the matters in dispute directly for expert determination under clause 73 (Expert determination); and
- (ii) if one of the matters in dispute relates to the estimate of total costs (including an appropriate margin for risk and contingencies) for performing the work referred to in clause 71.1(b)(iii) (Program and costs to achieve Proper Handover), the State must provide the Concessionaire with notice of the State's reasonable estimate of those costs (including an appropriate margin for risks and contingencies).

²⁵

The text in this appendix is an excerpt of the handover requirements included in the Concession Deed (2004) for the EastLink.

(d) **ConnectEast's obligations**

Without limiting ConnectEast's operation, maintenance, repair or handover obligations under this Deed, ConnectEast must:

- (i) carry out the works and implement the program agreed under clause 71.1(b) (Program and costs to achieve Proper Handover) or determined in accordance with Part L (Dispute Resolution), respectively (or, if there is more than one such program, the latest program); and
- (ii) either:
 - (A) deposit into the Handover Escrow Account all revenue it receives (after deducting operating and maintenance expenses of the Project, payments under clause 39 (Additional Lease Rental) or clause 40 (Compensable Enhancements), schedule capital expenditure and taxes) with respect to the last 3 years of the Concession Period until such time as the balance of the Handover Escrow Account equals or exceeds the estimated total cost of the works:
 - (I) as agreed under clause 71.1(b)(iii) (Program and costs to achieve Proper Handover); or
 - (II) subject to clause 71.1(f) (State to reimburse ConnectEast), as notified by the State under clause 71.1(c)(ii) (Dispute resolution process) even if the estimate of the total costs has been referred to expert determination under clause 71.1(c) (Dispute resolution process),
(Estimated Handover Costs Amount) (provided that if there is more than one Estimated Handover Costs Amount, the latest Estimated Handover Costs Amount will be the Estimate Handover Costs Amount); or
 - (B) provide to the State a bond with a face value equal to the Estimated Handover Costs Amount and which complies with the requirements of clause 5 (Bonds) (**Handover Bond**).

(e) **Only State may access Handover Escrow Account**

Each Concessionaire acknowledges that it has no right or interest in the Handover Escrow Account and that only the State may access the Handover Escrow Account.

(f) **State to reimburse ConnectEast**

If:

- (i) the amount of the estimate of total costs is referred to expert determination under clause 71.1© (Dispute resolution process) or reduced under clause 71.1(g) (Financial implications of achieving Milestones) (**Reduced Handover Costs**) or an Estimated Handover Costs Amount is superseded by a revised Estimated Handover Costs Amount; and

- (ii) ConnectEast has deposited money in the Handover Escrow Account, either:
 - (A) ConnectEast must continue to deposit money into the Handover Escrow Account until it reaches the amount determined by the expert (**Determined Handover Costs**), the Reduced Handover Costs or the revised Estimated Handover Costs Amount (as applicable); or
 - (B) the State must pay to ConnectEast from amounts deposited in the Handover Escrow Account, the excess (if any) of the amount deposited into the Handover Escrow Account over the Determined Handover Costs, the Reduced Handover Costs or the revised Estimated Handover Costs Amount (as applicable); or
- (iii) a Concessionaire has given the State a Handover Bond, clause 5.13 (Reduction in amount of Handover Bond) applies to the extent to which (if at all) the face value of the Handover Bond exceeds the Determined Handover Costs, the Reduced Handover Costs or the revised Estimated Handover Costs Amount (as applicable).

(g) **Financial implications of achieving Milestones**

- (i) ConnectEast, acting in good faith, may from time to time, but not more frequently than monthly, notify the State if it has achieved a Milestone, and submit a statement as to the cost paid to third parties in implementing the maintenance and repairs necessary to achieve that Milestone.
- (ii) ConnectEast must provide the State with such additional information concerning the Milestone as the State reasonable requires.
- (iii) ConnectEast must allow the State or its nominee to inspect any work carried out in connection with achieving the Milestone.
- (iv) If the State is satisfied that:
 - (A) the Milestone has been achieved;
 - (B) all maintenance and repair work connected with achieving that Milestone has been carried out in accordance with Operation and Maintenance Best Practices and is fit for purpose; and
 - (C) the amounts paid to third parties were properly incurred and paid, then the State must give a notice to ConnectEast that the Estimated Handover Costs Amount is reduced by an amount equal to the lesser of:
 - (D) 90% of the amounts paid to the third parties as notified by ConnectEast; and
 - (E) the difference between the amount of the Estimated Handover Costs Amount (before application of this clause 71.1 (Approaching end of Concession Period)) and the remaining total estimated costs of carrying out the work referred to in clause 71.1(b)(iii) (Program

and costs to achieve Proper Handover) which remain to be completed plus 10% of the amounts paid to the third parties as notified by ConnectEast.

(h) Dispute

ConnectEast may refer any dispute relating to the State's decision under clause 71.1(g)(iv) (Financial implications of achieving Milestones) for resolution in accordance with Part L (Dispute Resolution) (including expert determination).

(i) Succession of ConnectEast's personnel

During the final 3 months of the Concession Period, ConnectEast must train personnel nominated by the State in all aspects of the operation, maintenance and repair of the Freeway and maintenance and repair of the Maintained Off-Freeway Facilities to a level of competency that will allow those personnel to manage, operate, maintain and repair the Freeway and to maintain and repair the Maintained Off-Freeway Facilities to the standards required of ConnectEast under this Deed from the expiry of the Concession Period.

71.2 Handover of Freeway

At the end of the Concession Period:

- (a) the Trustee must handover the Freeway (other than the Freeway Plant and Equipment) and ConnectEast must handover the Freeway Plant and Equipment to the State or its nominee, including all rights, title and interest in the Freeway (or the Freeway Plant and Equipment, as applicable), free from any encumbrances and in a state and condition which complies with this Deed at the relevant time including:
 - (i) that there are:
 - (A) no repair works required to any part of the Freeway (or, in the case of ConnectEast, the Maintained Off-Freeway Facilities); and
 - (B) no Defects in the Freeway or the Maintained Off-Freeway Facilities;
 - (ii) that the Freeway is in the state and condition, fair wear and tear excepted (other than to the extent this would result in the design life requirements of the Project Scope and Project Requirements not being satisfied), which complies with this Deed;
 - (iii) that the Licensed Area and the Leased Area are in the state and condition which is no worse than the state and condition they were in at the Commencement Date (other than to the extent that state or condition is different because the Concessionaire has implemented the Project and would have of necessity been different if the Concessionaire had implemented the Project in accordance with the Project Documents); and
 - (iv) that the Residual Design Life of the Assets or any part of them is at least equal to the Specified Residual Design Life (provided that if the concession Period ends other than on the Expiry Date, the Residual Design

Life and the Specified Residual Design Life will be adjusted to account for this timing difference);

- (b) ConnectEast must transfer to the State or its nominee all rights, title and interest in Plant and equipment (including spare parts and special tools), owned by it or in respect of which it has a right to acquire ownership title, required to allow the State or its nominee to operate, maintain and repair the Freeway and to maintain and repair the Maintained Off-Freeway Facilities to the standards required of ConnectEast under this Deed free from any encumbrances;
- (c) ConnectEast must deliver to the State or its nominee all manuals, records, plans and other information under the control of either Concessionaire and which is relevant to the design, construction, operation, maintenance or repair of the Freeway or the design, construction, maintenance or repair of the Maintained Off-Freeway Facilities including the:
 - (i) manuals for the Tolling System and the Plant;
 - (ii) Operation and Maintenance Manuals;
 - (iii) maintenance records for the Freeway and the Maintained Off-Freeway Facilities; and
 - (iv) engineering specifications, design plans and survey plans (including any such plans not lodged at the Land Registry),in (if applicable) a state and condition which complies with this Deed at the relevant time;
- (d) ConnectEast must procure the novation to the State or its nominee, without any payment, of:
 - (i) such contracts for services to which either Concessionaire, the Operator or any Customer Service Contractor is a party as they relate to the Freeway or the Project and as the State specifies by notice to ConnectEast; and
 - (ii) any leases, sub-leases and licenses agreed to by the State and referred to in clause 76.3 (Restrictions on sale, lease and parting with possession);
- (e) each Concessionaire must without limiting the IP Licence Deed or clause 56.9 (Concessionaire Intellectual Property) of this Deed, grant or procure the grant to the State or its nominee of such Intellectual Property Rights as will enable the State or its nominee to be in a position to operate, maintain and repair the Freeway and otherwise undertake the businesses associated with the Freeway at the higher of the performance levels specified in this Deed and those applicable immediately before the end of the Concession Period, with minimum disruption to their public use;
- (f) each Concessionaire must pay to the State or its nominee any insurance proceeds from any insurance policy for the reinstatement or replacement of the Works or the Facilities (as applicable) to the extent not already reinstated or replaced, and assign to the State any rights available to the relevant Concessionaire under the insurance policy;

- (g) each Concessionaire must pay to the State or its nominee the balance of the Maintenance and Repairs Account and the Insurance Proceeds Account as of that date;
- (h) ConnectEast must comply with clause 28.2(b) (Removal of Advertising Signs at end of the Concession Period);
- (i) ConnectEast must provide to the State all software, hardware, firmware, equipment, materials and documentation necessary or desirable in order for the State or its nominee to fully operate and maintain the Tolling System;
- (j) ConnectEast must provide to the State, in a format acceptable to the State, all databases and other information and data collected or held by the Concessionaires relating to:
 - (i) the provision of Customer Services;
 - (ii) billing information in relation to all users of the Freeway;
 - (iii) information provided to or by operators of other tolling systems;
 - (iv) such other matters as the State may require;
- (k) ConnectEast must procure for the State an assignment or sub-licence of all licences relating to any software belonging to any third party which relates to the use or operation of the Tolling System or any other aspect of the Freeway;
- (l) ConnectEast must procure for the State or its nominee the rights to use any communication networks that were used by ConnectEast in the operation of the Tolling System or the Freeway on the same terms and at the same charges as applied to ConnectEast;
- (m) each Concessionaire must immediately cease all use of the Freeway Name, including any use of the Freeway Name (or any part of it) in any permanent trademark, company name, business name or internet domain name; and
- (n) each Concessionaire must ensure that it does all other acts and things to give effect to any of the matters referred to in clauses 71.2(a) to 71.2(l) (Handover of Freeway) in order to enable the State or its nominee to be in a position to operate, maintain and repair the Freeway and to maintain and repair the Maintained Off-Freeway Facilities at the performance levels required of ConnectEast under this Deed with minimum disruption to their public use.

71.3 If Close-Out has not occurred

In addition to the requirements set out in this clause 71 (Handover at end of Concession Period), if Close-Out of the Construction Activities in relation to all Sections has not been achieved and this Deed is terminated, the State may do any or all of the following:

- (a) require a novation to the State or its nominees of any Construction Contract, Operation and Maintenance Agreement and any other relevant contract;
- (b) require each Concessionaire to give the State and procure that its Contractors or any other person acting on its behalf (as applicable) to give the State possession of its plant, equipment, materials, temporary work and tools being used in the Works

or the Temporary Works and other things on or in the vicinity of the Licensed Area and the Leased Area, in each case which are owned by the relevant Concessionaire and are reasonably required to facilitate completion of the Works;

- (c) require each Concessionaire to deliver to the State and procure that its Contractors or any other person acting on its behalf as applicable to deliver to the State or its nominee true copies of its books of account and all plant, equipment, manuals and records in existence at the time of termination which are relevant to the Project; and
- (d) require each Concessionaire to do and procure that its Contractors or any other person acting on its behalf do all other acts and things to enable the State to undertake the Project.

71.4 Handover of equipment

If the State or its nominee takes possession of the plant, equipment, materials, temporary work and tools in accordance with clause 71.3(b) (If Close-Out has not occurred), the State must use reasonable endeavours to procure the proper use and maintenance of them and on achieving Close-Out of the Construction Activities in relation to all Sections, procure the handover to ConnectEast of that plant, equipment, materials, temporary work and tools which have not been consumed or incorporated in the Facilities or are not required for the operation, maintenance or repair of the Freeway or the maintenance or repair of the Maintained Off-Freeway Facilities.

71.5 Non-frustration of handover

Each Concessionaire must not (by act or omission) do anything which avoids or materially prejudices or frustrates:

- (a) the handover of the Project as a going concern to the State or its nominee; or
- (b) a provision of a Project Document which is included (in whole or in part) for the purpose of facilitating the handover of the Project as a going concern to the State or its nominee.

71.6 Assistance in securing continuity

(a) Concessionaires' obligation

Each Concessionaire must do everything to facilitate the continuity (as applicable) of the execution of its Works and its Temporary Works (and ConnectEast must do everything to facilitate the continuity of the operation, maintenance or repair of all or any part of the Freeway and the maintenance or repair of the Maintained Off-Freeway Facilities) from the end of the Concession Period by the State or its nominee.

(b) Provision of information

Without limiting clause 71.6(a) (Concessionaires' obligation), each Concessionaire must provide the State or its nominee with any records and information relating to or connected with the Project as the State reasonably requests (including all records of the Concessionaire relating to the relevant Concessionaire's officers, employees, consultants or advisers).

(c) **Ongoing IT support**

If requested by the State, ConnectEast must provide such ongoing support and maintenance services to the State as the State reasonably requires in relation to the Tolling System or reasonable commercial terms.

(d) **Availability of ConnectEast personnel**

For a period of 12 months after the expiry of the Concession Period, ConnectEast must ensure that it has such competent personnel who have experience with the Works, the Temporary Works, the Freeway and the Maintained Off-Freeway Facilities as the State reasonably requires available at the State's request to advise the State on any aspect of the design, construction, operation, maintenance or repair (as applicable) of those works or facilities.

71.7 Other necessary acts or things

(a) **State appointed attorney**

If a Concessionaire fails to execute an agreement or novation contemplated by this clause 71 (Handover at end of Concession Period) within 5 Business Days of receiving a request from the State, then the relevant Concessionaire with effect on and from the end of the Concession Period, irrevocably appoints the State, and such persons as are from time to time nominated by the State, jointly and severally as its attorney with full power and authority to execute any agreement or novation contemplated by this clause 71 (Handover at end of Concession Period).

(b) **Residual acts**

At the end of the Concession Period, each Concessionaire must do all other acts and things necessary to give effect to any of the matters referred to in this clause 71 (Handover at end of Concession Period) in order to enable the State or its nominee to be in a position to perform the Works and the Temporary Works and operate, maintain and repair the Freeway and maintain and repair the Maintained Off-Freeway Facilities.

71.8 Damages not an adequate remedy

- (a) The Concessionaires acknowledge that damages will not be an adequate remedy for the State for any failure by a Concessionaire to comply with clauses 71.2 (Handover of Freeway) to and including 71.7 (Other necessary acts or things) and if there is a breach or suspected breach of those clauses by a Concessionaire, nothing in this Deed prevents the State from claiming injunctive or declaratory relief or orders for specific performance to remedy such breach or suspected breach and no objection will be made by a Concessionaire to the claim for such relief on the basis of equitable defences.
- (b) Upon any application by the State for injunctive relief or orders for specific performance to remedy a breach or suspected breach of clauses 71.2 (Handover of Freeway) to and including 71.7 (Other necessary acts or things) each Concessionaire agrees that it will not raise in opposition any claims of equitable estoppels, acquiescence, hardship and unfairness, laches or 'unclean hands' by the State.

71.9 Inspection at end of Concession Period

(a) Handover Matters Notice

Within 45 Business Days after the expiry of the Concession Period, the State must give to the Concessionaires a notice (**Handover Matters Notice**) specifying:

- (i) details of matters or things (if any) which the State considers are required to be remedied or rectified by the State or its Associates due to any failure by the Concessionaires to achieve Proper Handover including (if relevant) completing the Works and the Temporary Works;
- (ii) the extent (if any) to which the State considers the Residual Design Life is less than the Specified Residual Design Life;
- (iii) the amount which the State considers is required to be spent by the State or its Associates to remedy or rectify the matters or things specified in sub-paragraph (i) and to ensure that the Assets (or any part of them) have a Residual Design Life at least equal to the Specified Residual Design Life and to carry out all necessary works:
 - (A) in accordance with the requirements of any relevant Government Agency;
 - (B) so as to minimize the impact on the use of the Facilities; and
 - (C) in a manner which causes as little inconvenience as possible to:
 - (I) users of the Facilities; and
 - (II) the general public; and
- (iv) details of how the amount in sub-paragraph (iii) was calculated.

(b) Concessionaire election

Each Concessionaire must, within 20 Business Days after receiving the Handover Matters Notice, notify the State that it:

- (i) agrees with the amount set out in the Handover Matters Notice (**Handover Matters Agreement Notice**); or
- (ii) disagrees with the details or the amount set out in the Handover Matters Notice, together with details of why the Concessionaire disagrees (**Handover Matters Disagreement Notice**).

(c) Agreement notice

If a Concessionaire gives the State a Handover Matters Notice or, fails to give a Handover Matters Disagreement Notice, then;

- (i) the amount set out in the Handover Matters Notice will be a debt due and payable by the relevant Concessionaire to the State, and
- (ii) without prejudicing any other rights the State may have, the State may draw on the Handover Escrow Account or make a demand under the

Handover Bond to recover the amount set out in the Handover Matters Notice.

(d) Disagreement notice

If a Concessionaire gives the State a Handover Matters Disagreement Notice, the relevant Concessionaire and the State must consult in good faith and use their reasonable endeavours to agree on the details or the amount referred to in clause 71.9(d) (Handover Matters Notice).

(e) Consequences following consultation

If the relevant Concessionaire and the State, following the consultation in clause 71.9(d) (Disagreement notice):

- (i) reach agreement as to the amount, then:
 - (A) the agreed amount will be a debt due and payable by the relevant Concessionaire to the State, and
 - (B) without prejudicing any other rights the State may have, the State may draw on the Handover Escrow Account or make a demand under the Handover Bond to recover the agreed amount; or
- (ii) are unable to reach agreement as to the amount within 10 Business Days after service of the Handover Matters Disagreement Notice, then:
 - (A) without prejudicing any other rights the State may have, the State may draw on the Handover Escrow Account or make a demand under the Handover Bond up to the amount set out in the Handover Matters Notice; and
 - (B) the matters in dispute will be referred directly for expert determination under clause 73 (Expert determination).

(f) State to reimburse Concessionaire

The State must pay to the Concessionaires the difference between the amount drawn from the Handover Escrow Account or paid by the Issuer of the Handover Bond following a demand under clause 71.9(e)(ii)(A) (Consequences following consultation) and any lesser amount which is determined by the expert under clause 73 (Expert determination) to be the amount referred to in clause 71.9(a) (Handover Matters Notice), within 5 Business Days of the determination.

(g) No obligation in respect to monies

Each Concessionaire acknowledges and agrees that the State is under no obligation to apply any monies it receives under this clause 71.9 (Inspection at end of Concession Period) towards the cost of satisfying the conditions precedent to Proper Handover.

(h) Money remaining in Handover Escrow Account

If after:

(i) the State has recovered the amounts (if any) owing under clauses 71.9(e)(i) (Agreement notice), 71.9(e)(ii) (Consequences following consultation) (as applicable), and

(ii) any set off or deduction by the State under clause 43.3 (Set off),

and there is any money remaining in the Handover Escrow Account, then such money must be paid by the State to the Concessionaires.

(i) **No limitation of rights**

Nothing in this clause 71 (Handover at end of Concession Period) will limit the State's rights against the Concessionaires, whether under this Deed or otherwise according to Law, in respect of any Defect or other failure to comply with clause 71.2 (Handover of Freeway).

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