St Pancras - Economic Advice
In Relation to the Application under Section 17, Railways Act 1993, by Midland Main Line Limited (MML) for Access to St Pancras Station

Final Report

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Summary

S1. This report presents MVA's recommendations on the regime by which compensation should be calculated for the disruption to MML's service during the Channel Tunnel Rail Link (CTRL) works at St Pancras station, following an Application by Midland Main Line (MML) to the Office of the Rail Regulator under Section 17 of the Railways Act 1993.

S2. MVA was asked to provide economic advice to the Office of the Rail Regulator (ORR) concerning the appropriate compensation due to MML. Specifically, MVA was asked to consider:

- whether the compensation regime proposed by MML in its section 17 application is appropriate to compensate MML for disruption caused by the CTRL works to its operations at St Pancras.
- if not, whether alternative arrangements would be more appropriate; and
- to the extent that the alternative regime differs from the existing regime, what is the justification for the difference.

S3. In developing our recommendations, MVA considered the proposal by MML, the response by London & Continental (L&C), and the further representations and responses to ORR's requests for information and comments. It was also important that the recommended compensation regime should be based on a foundation of sound economic principles.

S4. The methodology adopted was, bearing in mind the above representations, to:

- establish the economic principles regarding the compensation regime;
- formulate these into a benchmark regime which would accurately provide the correct level of compensation;
- develop a recommended regime, which would in certain ways be simpler than the benchmark, but where the trade-off between the economic principles and simplicity was transparent.
- Avoid unnecessary change from the existing agreement

S5. Our conclusions in terms of economic principles are as follows:

- **the level of compensation in the new regime should be set at a level which is a best estimate of the loss of revenue and any additional costs to MML** – we considered the possibility of setting it at the level to reflect the loss in customer amenity, and also the correct level to provide appropriate incentives to L&C, and decided that the selected level was a reasonable proxy for both of these;
- **compensation should reflect MML's current level of revenue** – this means that certain levels of compensation will increase significantly from the existing regime;
- **the benchmark against which the level of facilities should be measured is that prevailing in 1996 at St Pancras** – changes since then are not relevant;
- **positive benefits resulting from reduced walk times should be netted off against disbenefits** – this is a change from the existing regime which may result in lower levels of compensation.

S6. The overall structure of the compensation regime would follow that of the existing regime. There are three elements:

- for a wide range of specific items, there would be payments for non-availability, or for additional walking time from a specified location; in addition, there would be payments on each occasion when a change was implemented;
- a charge to represent MML's liaison costs;
- a payment to represent general damage to MML's business, not covered by the above items.

S7. We have recalculated the compensation for non-availability of passenger facilities based on current estimates of valuation of facilities and passenger usage figures. Compensation for non-provision of staff facilities remains as set out in the Existing Agreement. In general, for those facilities used by passengers, the value has increased broadly in line with MML's passenger revenue, which has grown substantially. Values for staff facilities have increased in line with inflation.

S8. On the same basis, the compensation for increased walk time to facilities has increased similarly. However, the effect of netting off any reductions in walk time may reduce the impact of these increases, as will the effect of not rounding up short walk time increases to one minute.

S9. The existing regime includes a modest level of compensation each time a facility is moved. There are clearly certain costs every time a change is made, although these are difficult to quantify. The levels in the existing regime are round numbers and are, we consider, included to incentivise L&C not to make unnecessary changes. We propose that they should be retained at their existing level (adjusted by RPI).

S10. MML's liaison costs should be retained at the same level, but increased in line with RPI. They represent on-going management costs.

S11. The element for general damages to MML in the existing regime is substantial. It is intended to cover all building site effects not covered by other items; noise and dust are specifically mentioned. There is little evidence to suggest that the likely levels of additional noise and dust will have a significant impact on passenger valuation of the station environment. However, there is an impact on visual intrusion and the general aspect of the station. This must have some negative impact on MML's revenue, hence we recommend retaining this item, but at a significantly reduced level.

S12. Furthermore, L&C's plans include relocating the whole of MML's activities to an interim location, followed by a further relocation to the final site (i.e. that designated for MML in the plans on completion of the station); the move to the final site occurs before the works on the station are completed, and hence during the timescale of the station access agreement being negotiated. Based on the plans we have seen, the interim location, and even more the final location, should be less affected by noise, dust, visual intrusion etc. Hence, we would propose to reduce further the level of compensation for general damage once these relocations are made, subject to the work being undertaken as presently planned.

S13. In assessing the overall impact of the recommended compensation regime compared with the existing regime, it is necessary to take into account the schedule of works as currently planned. In particular, the transfer of MML's activities to an interim location followed by the final location. The table below sets out, for the three planned stages of the project, the likely scale of compensation. It should be noted that the actual level of compensation will depend on final layouts and hence cannot be defined precisely at this stage. Furthermore, detailed numbers remain confidential and are presented only in Appendices.

Stage of works	**Existing regime**	**Recommended regime**
MML at current location	Compensation as now	Reduced compensation due to lower general damages
MML relocated to interim location	Significant increase in compensation due to greater walk distances	Compensation will be much increased due to higher values applied to the longer walk distances; this more than off-sets the lower general damages; overall level of compensation will be comparable to that of the existing regime
MML relocate to final location	Decrease in compensation as increases in distance to some external facilities are more than offset by many internal facilities returning to original level of accessibility	Some increase in compensation (compared with previous stage) likely due to increased walk distances not being fully off-set by reduced general damages

1 Background

1.1 CTRL Works

1.1.1 As part of the Channel Tunnel Rail Link project, St Pancras Station is undergoing major construction works which will provide a new station. This will cater for new Eurostar services, new domestic services using the Channel Tunnel Rail Link (CTRL) and existing Midland Main Line (MML) services. It will also provide better links to Thameslink and London Underground Limited (LUL) services.

1.1.2 During these works there will be significant disruption to MML services. This includes relocation to an interim station from 2004 until 2006 whilst demolition and construction works take place in the existing train shed followed by final location at a third site within the station. Also within this period, there is a planned blockade of Thameslink services heading into central London. For a period of about 6 months these services may terminate at St Pancras, increasing passenger flow through the interim station.

1.2 Existing Station Access Agreement

1.2.1 The existing Station Access Agreement was drawn up between The British Railways Board (BRB) and MML and entered into in April 1996. The rights and obligations were transferred to London & Continental Stations & Property Limited (L&C) in May of that year subject to a number of minor amending agreements.

1.2.2 A compensation regime is set out under Schedule 4 of the existing agreement which aims to:

- provide specific safeguards to ensure that MML is able to continue to use St Pancras Station during the construction of the new station
- provide MML's passengers with some protection regarding the provision and standard of the facilities at the station during the works.

1.2.3 The current regime has provision for various elements of compensation. The facilities which L&C are to provide to MML are documented in facility tables (Part V of Schedule 4 to the Existing Agreement).

- The non-provision of any of these listed facilities incurs a compensation payment, with non-conformity of the facility (sub-standard level of provision) attracting a proportion of the daily amount for non-provision.
- Movement of a facility incurs a one-off movement fee, and an additional ongoing fee for a resulting increase in walking time to the facility.

1.2.4 In addition, there are two yearly sums payable. The first is 'intended for project liaison purposes'[1] which covers the additional costs to MML arising from the need to remain informed about current and planned works and disruptions during the project. The second 'for the general damage to the Beneficiary's business', is defined as 'the damage which the parties had reasonably expected to occur to the Beneficiary's business as a consequence of general building site effects (e.g. noise and dust)'[1].

1.2.5 The Station Access Agreement is due to expire in April 2003. It was originally envisaged that the CTRL works would have been completed by this date. The CTRL St Pancras works have commenced, however the major impacts of the works on MML's services, including the relocation to the interim station, are yet to be experienced.

[1] Schedule 4 Para 11 Parts 1 and 2, Station Access Agreement, April 1996

1.3 New Station Access Agreement

1.3.1 With the agreement up for renewal, L&C and MML have been in negotiation to draft a New Station Access Agreement. Whilst they have mutually agreed to take forward the vast majority of the terms and conditions of the existing agreement into the new agreement, there has been disagreement over some of the provisions made in Schedule 4.

1.3.2 Both parties are in agreement to a continuation of the principles of the current compensation regime, which cover general damages to MML's business, CTRL related liaison costs and non-provision or movement of facilities. However it is the size of these payments which are in dispute.

1.3.3 The drafting of a new agreement provides an opportunity to re-assess the existing compensation regime to ensure that the clauses are still justified in light of the current circumstances and updated works schedule.

1.4 Objective of this Report

1.4.1 MVA has been asked to provide economic advice to the Office of the Rail Regulator (ORR) concerning the appropriate compensation due to MML. Specifically, MVA has been asked to consider:

- whether the compensation regime proposed by MML in its section 17 application is appropriate to compensate MML for disruption caused by the CTRL works to its operations at St Pancras.
- If not, whether alternative arrangements would be more appropriate; and
- To the extent that the alternative regime differs from the existing regime, what is the justification for the difference.

1.4.2 This report documents our assessment of the appropriate level of compensation payable to MML, laying out the economic principles, analyses and relevant sources of information upon which we have based our recommendations.

1.5 Structure of this Report

1.5.1 Section 2 of this report looks at the compensation regime proposed by MML in its application to the ORR under section 17. Representations from L&C and interested parties are also considered.

1.5.2 Section 3 progresses to discuss the economic principles behind a compensation regime which leads to an idealised compensation regime designed to satisfy these principles. We have called this the benchmark regime.

1.5.3 We recognise that certain data needed to operate this benchmark regime may be unavailable or expensive to collect. Hence, our recommended regime will be somewhat simpler. In addition, there are some elements of the existing regime which for reasons other than pure economics it may be appropriate to retain.

1.5.4 Section 4 presents our recommended regime, including all simplifications and alterations to the benchmark regime. Assumptions implicit to the calculation of compensation are defined.

1.5.5 The results of the calculations appear in the appendices. These are structured as follows:

- Appendix A - Terms of Reference for the study, specifying the brief for this report and the relevant issues to take into consideration.
- Appendix B – Economic proof of relationship between consumer surplus and revenue.
- Appendix C - Facility tables giving MVA's proposed compensation values. **Restricted**
- Appendix D - Overall estimated impact of MVA's proposed compensation regime compared with the proposed regime of MML & L&C. **Restricted**
- Appendix E – Sensitivity tests on the values included in MVA's proposed facility tables. **Restricted**

2 Consideration of Parties Representations

2.1 MML's Proposed Compensation Regime & Representations

2.1.1 The compensation regime proposed by MML is, in effect, a continuation of the terms set out in the existing Station Access Agreement. The amendments relevant to Schedule 4 involve the exclusion of certain facilities from the facility tables, being no longer used or no longer relevant to MML's current operations at St Pancras.

2.1.2 Therefore, the structure of the proposed compensation regime remains unchanged from the existing agreement drawn up prior to the commencement of the CTRL works at St Pancras.

2.1.3 Section 1.2 above gives an outline of the aims of the existing regime and the basis of the compensation payments.

2.1.4 The compensation tables included in MML's proposed Station Access Agreement, which was submitted with their Section 17 Application, specify:

- A movement fee related to each facility which increases in line with RPI.
- A daily non-provision fee which varies according to the importance of the facility, indexed to RPI (with the exception of public telephones)
- A table of figures giving a 'cost per minute'[2] payment for each additional minute walk time to relocated facilities. Increases in walk time remaining within the 'Permissible Range'[3] (specified for each facility) are charged a base rate per minute. This rate increases as certain thresholds are exceeded, above which the total increase in walking time is subject to an increased rate. These increase in line with RPI.

2.1.5 Of the two yearly payments mentioned in paragraph 1.2.4, the first is 'intended for project liaison purposes' which covers the additional costs to MML arising from the need to remain informed about current and planned works and disruptions during the project. This is a fixed annual sum under the present regime, also linked to RPI. The amount is an estimate of the ongoing additional management and administration costs associated with liaison.

2.1.6 The 'general damage to the Beneficiary's business' payment is also based on an annual figure, increasing in line with inflation. It is an estimate of the additional impacts of the works not covered by the other payments, as understood at the time of drafting the existing 1996 agreement.

2.1.7 MML maintain the view that the compensation provisions included in the Existing Agreement, which were reached through lengthy negotiation, provide a balanced package which represents a reasonable estimate of the damages caused to MML's business during the CTRL works.

2.1.8 MML stress the need for certainty in business planning. We accept the importance of this, however the failure of the parties in reaching a compromise has introduced an element of uncertainty. Throughout the study we have carefully considered the benefits of our recommendations weighed up against the possible costs of implementation. We have aimed to minimise change to the existing regime where possible, whilst providing a fair compensation regime based on sound economic principals.

[2] There is a lack of clarity over whether the Existing Agreement contains 'costs per minute' or costs for walk times falling within specific ranges

[3] Proposed Station Access Agreement 2002, Schedule 4 Part 1

2.2 L&Cs Representations

2.2.1 L&C are in agreement as to the structure of the regime, however they do not see the amounts set out in the existing regime as an appropriate measure of the damage MML are likely to suffer during the planned works.

2.2.2 The works plan has been modified considerably since the drafting of the existing agreement. They claim that the relocation to an interim station in order to insulate MML from the major effects of the building works was not planned in 1996[4]. L&C consider that the figures in the existing agreement should be reviewed in light of the new works schedule.

2.2.3 In particular, L&C consider that the current level of 'general damages' is too high and does not reflect MML's loss of revenue in the context of the present plans.

2.2.4 Revisions to the Existing Agreement submitted by L&C involve a significant reduction in 'general damages' compensation. L&C also proposes revised facility tables based on the 'abatement tables' in The ORR's Review of the Station Access Regime (Aug 2002).

2.2.5 The suggested abatement regime featured in The ORR's Review aims to provide a safeguard to the leasing party against poor station management resulting in disrepair of amenities. It is proposed that this may be achieved by incentivising facility owners with the levy of abatement payments whilst the facility is in disrepair. It is not linked to the station revenue.

2.2.6 We do not consider the abatement values suggested in the report to be appropriate under the prevailing circumstances at St Pancras. The ORR's abatement regime does not claim to provide an accurate measure of disbenefits to passengers (4.12). It is a guide for standard operational stations which cannot necessarily be applied to special cases, particularly in light of the very specific nature of the works being undertaken at St Pancras. The access regime under negotiation must reflect the non-standard aspect of the lease.

2.3 Representations from Interested Parties

2.3.1 A number of interested parties have submitted their comments, following requests from the ORR. These can be seen on the ORR Website – www.rail-reg.gov.uk or direct link

http://www.rail-reg.gov.uk/sec17_stpanc.htm

2.3.2 These representations have been considered carefully, and the main points resulting from the consultation have been dealt with during the course of the report.

2.3.3 The key points raised by various parties were:

- The agreement should not impede the continued implementation of the CTRL development;
- The agreement should not threaten the continued operation of the MML franchise;

[4] MML disagree with this; however, we find no reference in the Existing Agreement to the interim site

- Compensation paid by L&C should by some means be transferred to passengers, who are those who principally suffer due to the disruption;

- There was agreement that the CTRL works had been significantly delayed beyond that planned at the time of the 1996 agreement; there were differing opinions over whether this should influence the extension of the existing agreement;

- The current agreement is complex; revision would involve considerable effort with little obvious economic benefit to the parties.

2.3.4 We do not consider that either of the first two points are major issues – no likely outcome will either significantly impede the implementation of the CTRL development, or threaten the continued operation of the MML franchise.

2.3.5 We discuss the third bullet at some length in section 3.3, and the fourth in para 3.2.5.

2.3.6 With regard to complexity, we have based our proposals on the existing regime, minimising changes. We do propose certain changes on the grounds of fairness and to provide appropriate incentives. The proposed changes do not increase the overall complexity of the compensation regime, indeed the majority of them reduce the complexity. Where there is no reason to change, we have left the regime unchanged.

2.3.7 With regard to economic benefit for the parties, the regime will provide a fair reflection of the damage to MML's business associated with the nature of future CTRL works. The compensation payments may or may not significantly vary from what has been paid under the existing regime. This will be dependent on the actual progression of the works at St Pancras. The benefit of the recommended regime is that it provides a best estimate of the damages to MML's business caused by these future works and disruptions.

3 Economic Principles & Benchmark Regime

3.1 Purpose of the Compensation Regime

3.1.1 There are a number of potential purposes of the compensation regime, including:

- Compensate MML for loss of revenue and additional costs;
- Provide compensation to customers for loss of amenity;
- Incentivise L&C & MML staff to minimise the impact on passengers subject to value for money.

3.1.2 Each of the above is considered in the ORR's review of the station access regime (August 2002) – see para 4.3 (e). However, the current regime states that compensation is aimed to reflect loss of revenue and additional costs to MML[5]. This is accepted by both parties, so we therefore recommend that costs and revenue loss remain the criterion for compensation.

3.1.3 It is nonetheless instructive to understand the relationships between the three potential purposes of compensation. Our approach to computing **loss of revenue** is – in effect – to convert the disbenefit per customer (such as longer walking time) to an equivalent change in fare. "Equivalence" in this context means the change in fare that would cause the same change in demand as the disbenefit. This enables us to see the disbenefit as an increase in fare and apply a demand elasticity to establish the resulting reduction in demand. The reduction in revenue is then the actual fare level multiplied by this reduction in demand.

3.1.4 The **loss of customer amenity** is – in welfare economic terminology – represented as the reduction in consumer surplus. One can assume that passengers travelling with MML put a value on the service which must be equal or greater than the fare paid otherwise they would not travel. If the fare is being paid by someone else (e.g. business travellers), then strictly speaking it is the person paying who is putting the value on the service received by the traveller; however, this does not significantly affect the argument. Consumer surplus is the difference between this value (in terms of maximum fare which would be paid) and actual fare paid.

3.1.5 There may also be an issue of lags in the system. For example, a commuter may decide that he or she wishes not to travel in the disrupted circumstances, and would not do so if this were to be the permanent state. However, they are prepared to do so, as the cost of moving house or job is greater than that of suffering the disruption for the period; they thus might have a negative consumer surplus for the period of the disruption.

3.1.6 Disbenefit to customers can be represented as an equivalent increase in fares. As seen previously, this may lead to a reduction in demand, with some passengers deciding not to travel. Each passenger, including those no longer travelling, will experience a loss in consumer surplus due to the reduction (or elimination) of the difference between the value placed on the service and the fare paid.

[5] Station Access Agreement 1996, Schedule 4, para 17.

3.1.7 Consumer surplus can be estimated using the well-known "rule of a half": which is the disbenefit in money terms multiplied by the average of before and after demand levels. Expressing the disbenefit in money terms is identical to finding the equivalent fare change, so it is reasonable to suppose that a relationship exists between reductions in consumer surplus and revenue.

3.1.8 Indeed there is such a relationship. It can be shown that (if the money value of the disbenefit is small relative to the fare level) this depends upon only the elasticity of demand (see Appendix B). Typical values for a station refurbishment package are up to 5% of fares (Passenger Demand Forecasting Handbook (PDFH) B5.4.4) which gives a guide to the relative size of disbenefits that may be expected.

3.1.9 If demand is elastic (elasticity numerically greater than 1), the change in consumer surplus will be smaller than the change in revenue; if demand is inelastic (elasticity numerically less than 1), the change in consumer surplus will exceed the change in revenue. Particularly worthy of note is that, if MML were revenue maximising (so that fares had been set at the point where demand elasticity is numerically unity), their loss of revenue would be equal to the reduction in consumer surplus. The evidence from PDFH (Table B2.3) is that the fares elasticity on MML flows to/from London is likely to be close to unity*. (PDFH fares elasticity of 1.0 refers to flows to/from London travel card area of between 100 and 200 miles and 0.9 to between 20 and 100 miles. We therefore estimate a fares elasticity of approximately 0.95)*

3.1.10 It should be noted that because some segments of the market have an elasticity less than unity (e.g. commuters) and others greater than unity, for some segments the consumer surplus will be greater, for others less than MML's loss of revenue. Nevertheless, MML's loss of revenue will be a reasonable proxy in aggregate for the loss of consumer surplus.

3.1.11 If customers could be compensated directly by L&C for the loss of amenity, those of them who would otherwise not travel - and thereby give rise to MML's revenue loss - would continue to travel. MML would then not lose revenue. As noted above, customer compensation could be higher or lower than compensation required to offset MML's revenue loss, depending upon the demand elasticity, but in the region of revenue maximisation, these amounts would be approximately equal.

3.1.12 This implies that compensating customers or compensating MML might act as proxy for each other. However, it would be extremely difficult to compensate customers directly, and indeed effectively impossible for those who opted not to travel. The only practical means would be indirectly via MML. Thus, if achieving compensation of customers were considered to be important, there would need to be a mechanism whereby any moneys paid to MML for this purpose were transferred (possibly in kind or by means of a fare reduction) to customers. We discuss further the issue of transferring benefits to customers in section 3.3.

3.1.13 Concerning **incentives** to L&C, their response – in principle – should be to make efforts to limit negative impacts of their activity up to the point where the marginal cost of further efforts equalled the marginal additional compensation payable for inaction. ("Effort" is here used with a broad interpretation. While it includes action to reduce noise and dust, for example, it can also refer to reducing the additional walking time imposed when re-siting a customer facility.) The question of setting appropriate incentives for L&C comes back, therefore, to the basis of compensation.

3.1.14 In welfare terms, the appropriate basis of compensation should be the change in consumer surplus. This would in effect incentivise L&C to internalise a cost-benefit appraisal of their works. If L&C acted rationally, they would undertake all disruption minimisation efforts where the benefits to MML passengers outweighed the costs. If the cost of some efforts exceeded the benefit to passengers, making those efforts would not be economically justified. However, compensation to the value of the passenger disbenefit would instead be paid directly to MML. The diagram below illustrates the cost benefit analysis (CBA) for both society and L&C.

Societal CBA	**L&C CBA**
Costs: capital cost of work/effort *Benefits*: reduced passenger walk time reduced cost of staff time *Note*: both fares paid and compensation are transfer payments, and hence not included in the economic appraisal	*Costs*: capital cost of work/effort *Benefits*: reduced compensation paid to MML

3.1.15 It can be seen that, for these two to be the same, the level of compensation needs to be the same as the loss of consumer surplus to passengers plus additional costs to MML of staff walking time. In the proposed compensation package, the former is proxied by the revenue loss to MML.

3.1.16 As implied already, it would be no more difficult to estimate the reduction in consumer surplus than to estimate MML's revenue loss (since they both depend upon the same quantities). However, also as noted above, the only practical vehicle for making compensation payments to customers would be via MML.

3.1.17 For practical purposes, the estimate of MML's revenue loss would be an adequate proxy for the reduction in consumer surplus. Under this assumption, compensation paid on the basis of loss of revenue to MML would be similar to the optimal method of compensating for loss in consumer surplus. This would ensure that L&C were incentivised to an adequate degree, as they would be taking full account of all benefits to MML for any efforts to minimise disruption.

3.1.18 ***Our recommendation remains, therefore, that the level of compensation in the new regime is set at a level which is a best estimate of the loss of revenue and any additional costs to MML.*** In our view, this has the following merits:

- Both MML and L&C are agreed on this basis;
- It is more transparent and tangible than reduction in consumer surplus;

- In any case, it seems likely that loss of revenue and reduction in consumer surplus would be of the same order (and more-or-less the same if MML seeks to revenue-maximise);

- It avoids the need to set up a mechanism (requiring design, implementation, audit, etc) whereby MML is merely a vehicle for channelling compensation to customers;

- It will come close to incentivising L&C to internalise a cost-benefit appraisal of the impact of their works on customers.

3.2 Extent of Compensation

3.2.1 Compensation should be paid for disruption that occurs within the L&C boundary at St Pancras or works expressly included under the CTRL act. For example, longer walk time to an external facility (e.g. bus stop) is only compensated where this is caused within this boundary, not if it is caused by an external movement of that facility. However, if the St Pancras works make it necessary to use a different exit from the station with a resulting longer walk along the street, this does attract compensation.

3.2.2 Compensation will also exclude any disruption to train operations in the station, as this is covered under the Track Access agreement.

3.2.3 ***Compensation should reflect MML's current level of revenue***. They have been successful in growing the business since 1996, and the fact that more passengers will be affected by disruption (and hence more revenue will be lost) needs to be taken into account. There is an economic argument that future growth in MML's revenue should also be taken into account. We discuss this further in Section 4.3.

3.2.4 ***The benchmark against which the level of facilities should be measured is that prevailing in 1996 at St Pancras***. Both the original station access regime and MML's franchise (including subsidy line) were set on this basis. They thus assume (implicitly) that the access charge is appropriate for a station with this level of facility. Hence, if the level of facility changes from this, the access charge should be changed to compensate for the impact of the facility change on MML's revenue. If one considers the argument from the point of view of the passenger, the fare paid for the journey was based in 1996 on a certain level of facility, and any change from this will result in a change in consumer surplus.

3.2.5 If the incorrect level of compensation has been received under the current station access regime, then this is part of history. It was entered into in good faith by both parties (although we recognise that L&C were not a party to its negotiation, they accepted it, presumably after due diligence, when it was transferred from British Rail). There was no intention when the regime was entered into that it should be retrospectively adjusted, hence we should not seek to do so when creating a new regime. However, we clearly should learn from any mistakes made and not repeat them in the new regime.

3.2.6 There may be some positive benefits to passengers during the works in terms of better accessibility to certain facilities. This may have positive impacts on MML's revenue and L&C should be credited for improvements in passenger amenity. To retain consistency with theory, ***positive benefits resulting from reduced walk times should be netted off against disbenefits*** in terms of compensation payable. This is a change from the current regime.

3.2.7 MML have argued that the loss of opportunity to develop should be included in some form under the compensation regime. We disagree with this assertion as this was not a 'right' which MML have forgone, and we know of no other cases where actions under a hypothetical circumstance could be taken into account and used as basis for compensation.

3.2.8 When all the L&C works are complete, the St Pancras facilities enjoyed by MML passengers will differ from those of 1996 and of today. Some facilities may be of a better quality, others may involve additional or reduced walking time. All of this is irrelevant to the compensation regime of the station access regime being negotiated; it will be addressed when the subsequent station access regime is considered. However, if the disruption is expected to result in a loss of revenue after the end of the proposed station access regime, due to the time taken for revenue to recover to its 'normal' level, then this impact should be taken into account in the station access regime currently being negotiated.

3.3 Transfer of benefits to passengers

3.3.1 Several respondents to the consultation have proposed that the compensation payments should in some way be ring-fenced and transferred to the passengers who disbenefit. MML have argued that they are already providing substantial passenger benefits, and it would be inappropriate to ring-fence additional funds.

3.3.2 We incline to agree with MML, in so far as the Station Access Agreement is concerned. At the time of letting a franchise, the SRA agrees with a franchisee a level of passenger benefits; the same is true (as in the context of MML) when a franchise is extended. The latter will certainly have been undertaken in the full knowledge of the likely disruption to be caused by the CTRL works. It can thus be argued that MML's franchise, which contains substantial passenger benefits (new rolling stock, etc), already contains the appropriate level of passenger benefits. To require more would effectively be double counting.

3.3.3 Furthermore, MML operates in a competitive marketplace (as do all Intercity TOCs). This is indicated by the fact that only approximately 20% of its revenue is subject to fares regulation. Thus, MML is under strong commercial incentive to mitigate any adverse impacts of the CTRL works by delivering benefits to passengers. There is little requirement for further incentive – MML should understand their market, and be better placed to determine the appropriate action, than either the ORR or the SRA. A golden rule of regulation is to allow markets to do what they are good at, and only intervene when a market is ineffective.

3.3.4 Finally, on this topic, the Station Access Agreement is a contract between L&C and MML alone. If it were decided that passengers should receive additional compensation, then this would be a matter for the SRA to address in the context of its management of MML's franchise.

3.3.5 We thus conclude that the compensation should be paid to MML, and they should take what action they deem appropriate to compensate passengers, noting that much of this may already be contained within their existing franchise commitments.

3.4 Benchmark Regime

3.4.1 The benchmark regime sets out the ideal theoretical approach to formulating a fair regime. Once the optimal way to approach each issue has been outlined, other factors such as practicality and cost lead to a revised regime, following the guidance set out in the benchmark, but adapting to external constraints.

3.4.2 As previously discussed, the benchmark regime will provide a means of quantifying the effects of the disruptions and changes causing disbenefit to passengers and to staff, in terms of revenue loss and cost to MML.

3.4.3 The first important point to note is that the regime seeks to capture the effects of uncertain future events. Anticipated events do not always follow plans or timescales as illustrated during the span of the previous agreement. The regime must therefore be capable of disaggregating the various elements of the works package and allow valuation of each element exclusively from others. The valuations of these effects should retain validity if other elements of the works were not to transpire as planned.

3.4.4 With this in mind, we concur with the current method of considering each facility on an individual basis. Disbenefits covered by the General Damage payment also need individual consideration.

3.4.5 Station users will be those principally affected by the works, and therefore the primary consideration in compensation calculations. The disruptions will influence the decisions of each station user differently, dependent on utility attached to the various facilities, usage patterns of the station, alternative travel options, and many other factors unique to the individual. We seek the impact that the overall combination of these effects, both positive and negative, has on MML's revenue.

3.4.6 Disagregation of users will give increased accuracy to disbenefit estimates. Station users fall into two distinct groups - passengers and staff - which need separate treatment due to the different ways they contribute to MML's revenue and costs. These groups can be subdivided further along the following lines:

- Passenger - journey purpose (business, commuting, leisure)
  - access/egress, origin/destination
- Staff - job description (implying type of facility often used)
  - Cost to MML (wage + salary related overheads)

3.4.7 The profile of each user subgroup can help to define the impact of the works and influence behaviour in response to disruptions.

3.5 Passenger Revenue Loss

3.5.1 The effects on the disruptions to MML's passengers during the works may come in various forms including:

- Non-provision of facilities previously available or lower standard of facilities provided (particularly in the case of temporary facilities);
- Additional walking time to relocated facilities;

- Quality of environment including noise and dust;
- Changing location of facilities (leading to confusion for passengers).

3.5.2 The value of these disruptions in terms of loss of revenue will depend on the following factors:

- Relative importance placed on the above disruptions which is dependent on:
  - Usage - Different groups may have markedly different usage patterns, both of the station and of different facilities, for example business passengers showing an above average usage of the taxi rank;
  - Other relevant attributes such as value of time or aversion to noise.
- Response in demand to the level of disruption – based on demand elasticities which are likely to vary by user group;
- Relative impact that the change in demand has on revenue – will vary by passenger group, some contributing relatively more to revenue than others.

3.5.3 According to PDFH, passenger valuation of station improvements can be anything up to 10% of fares (for extensive station improvements, PDFH B5.4.4). However, typical values for a station refurbishment package are up to 5% of fares (PDFH B5.4.4) which gives a more suitable guide to the disbenefits which may be experienced at St Pancras.

3.5.4 Of this figure, studies on passenger valuation of the station environment and services give an indication on the relative importance of different station facilities. Following are some valuations of station attributes from PDFH (Table B5.3 adapted). They give valuations in pence per journey (2000 prices) for interchanging passengers. At interchanges, passengers are more likely to use station facilities while waiting for the next connection. This is also true of originating passengers, particularly from London termini, who are inclined to arrive earlier and have time before departure in which to make use of facilities. Hence, PDFH also recommends that these values be used for originating passengers.

Table 3.1: Value of station facilities by passenger group (pence/journey)

Station Facilities	Commuting	Business	Leisure
Information Monitors	23	38	37
Additional Staff Present	10	15	30
CCTV	10	14	13
Heated & refurbished waiting Room	5	7	10
Clear Departure Information	3	21	21
Plenty of Seats on Platform	17	25	24
Better Lighting	3	4	4
Printed Timetable Information	0	12	12

3.5.5 These give a passenger value related to the provision of a facility which, conversely, given passenger journey figures via the station, will give

appropriate compensation for **non-provision** of the facility. However, the table does not provide sufficient detail to be of great use in our study.

3.5.6 **Additional walk times** to facilities lead to a separate form of disbenefit. To quantify the disruptions in terms of revenue loss to MML, we propose to convert this type of disbenefit into increases (or decreases) in generalised journey time (GJT), the units in which PDFH mostly operates. Translating the disruptions into GJT not only assists in translating the effects into changes in revenue, but also ensures consistency so far as practical with 'industry standard' mechanisms for estimating revenue impacts of changes in various aspects of service.

3.5.7 Walk times to existing amenities have already been documented and agreed between the parties, providing a benchmark for comparison. A methodology set out in Section II of Schedule 4 will be used to calculate walk times to relocated facilities, and hence the net difference can be found. The methodology employed to calculate the walking times has been to measure accurately the distance of an agreed route between a specified point and the facility. An agreed assumed walk speed (varying with characteristics of the walk eg stairs) is then applied to the measured distance to give the walk time. This methodology means that the walk time can be accurately measured allowing for small changes in walk time to be computed.

3.5.8 Since the walk time is computed rather than surveyed by measuring the time taken to actually physically walk the distance we **do not** see that it is necessary to round the changes in walk time to whole or half minutes.

3.5.9 Walk time has been traditionally valued by transport planners as twice that of in-vehicle time (PDFH Para B3.8.4). However PDFH also includes further recommendations based on studies carried out at the Institute for Transport Studies Leeds University (ITS) which give a formula for how walk time should be valued in relation to in-vehicle time. After obtaining a copy of the latest publication of the studies and consulting with the author to confirm the validity of its application in these circumstances, we adopted the following approach to calculate walk time values.

3.5.10 The equation for the recommended time valuation of walk time (TvoWk), where WK is the amount of walk time and D denotes the overall journey distance in miles, is given as:

$$TvoWk = 1.12\ WK^{0.271}\ D^{-0.073}$$

3.5.11 Taking a 100 mile train journey as a reasonable average for MML services, the formula gives the following results:

Table 3.2: Value of Walk Time

Walk time (mins)	Value of Walk Time (VWT) (GJT mins)	Total VWT (GJT mins)	Incremental VWT (GJT mins)
1	0.80	0.80	0.80
2	0.97	1.93	1.13
3	1.08	3.23	1.30
4	1.17	4.66	1.43
5	1.24	6.19	1.53
6	1.30	7.80	1.61
7	1.36	9.49	1.69
8	1.41	11.25	1.76

3.5.12 Table 3.2 shows the value of walk time in relation to GJT dependent on different durations of walk. We calculate the value of an additional 3 minute walk on top of the current walk time of 2 minutes. We take these figures as the kind of increase which may be expected on the move to the interim station.

3.5.13 The average of incremental value of the 3rd, 4th and 5th minute's walk is 1.42.

3.5.14 PDFH makes it clear that higher values should be applied to walks involving stairs or escalators.

Table 3.3: Walk Time weightings

Stairs/escalators down	25% higher
Stairs/escalators up	100% higher
Average	62.5% higher

Source: PDFH Para 3.8.4

3.5.15 Assuming 20% of the walk time is spent on escalators or stairs this gives a walk time value equivalent to **1.6 times GJT** (1.42(1+0.2*0.625))

3.5.16 Additional walk times will be incurred only by those passengers using the facility in question. From data provided by MML and other sources we can estimate the number of passengers who on average use each facility. For each of these passengers we can apply a weighting relating to the importance of the facility to estimate the average cost of each minute of additional walk time for each passenger.

3.5.17 Some facilities may be used disproportionately by a particular passenger segment. If, for example, a particular passenger segment makes an important relative contribution to revenue, or has distinct demand elasticity to changes in GJT, applying an average usage and demand elasticity may give misleading results. To increase accuracy of the revenue loss estimates, passengers should be split by group (e.g. Business (B), Commuting (C) and Leisure (L)), particularly where facility usage is skewed toward a certain segment. Where the type of segment has no influence on usage an average estimated usage ratio can be applied to all groups.

3.5.18 Calculation of costs can therefore proceed as follows: Usage of a facility (U) multiplied by changes in walking times (W) to the relevant facility will then give average walking time change per users. Multiplying by the number of passengers (N) and value of walk time factor of 1.6 gives absolute GJT change (G) for the passengers.

$$\Delta G = U * \Delta W * 1.6 * N$$

3.5.19 The output data from MOIRA runs provided by MML facilitate conversion of changes in GJT into revenue loss. MML's version of MOIRA provides outputs specific to MML and hence gives the most accurate estimation of the required relationship between GJT and revenue. MML provided us with 3 values of revenue for different minute changes in generalised journey time. We have taken these values and converted them into proportions of 2001 yearly revenues. We then used regression analysis to calculate the change in proportion of annual revenue for each change in minutes of generalised journey time. The equation is shown below:

$$\Delta R\% = -0.01074\ \Delta G$$

As this is a straight line equation we have calculated that for every additional 1.6 minute change in generalised journey time (or additional 1 minute walk time) there would be 1.72% loss in annual revenue. If we then express this as an average cost per day by dividing by 363 days we can calculate that the average loss per day is 0.00473% of annual revenue. As this has been built from a linear equation we can then multiply this percentage of annual revenue by the number of additional walk minutes to give a total loss in revenue.

3.5.20 The increased walk time penalties in the Existing Regime become greater as certain time thresholds are crossed, which would prompt large increases in the compensation payable for a facility falling marginally outside a time threshold. The evidence provided by the MOIRA software regarding the effects of an increase in journey time on revenue does not justify stepped increases in walking time compensation for passenger facilities. This may significantly overestimate actual loss in revenue as payment for increased walking time should be based on actual revenue loss which MML would suffer from having a facility further away. We conclude that walk time compensation should be on a pro-rata basis.

3.5.21 Compensation for **noise and dust** should be in line with value of additional discomfort experienced by station users. It will therefore be dependent on the number of users and the relative level of severity compared with the station environment before the works began. Ideally, surveys revealing peoples awareness and valuation of the station environment would be taken at a number of intervals during the building works. The compensation should be a variable sum providing incentive to L&C to minimise the impact of the building works on the station environment.

3.6 Staff Loss of Amenity

3.6.1 Disbenefit to staff must be approached in a different manner to that of passenger discomfort and inconvenience. Staff are valued by MML in terms of productivity by their salary for agreed working hours, and therefore loss in productivity of staff due to disruption attracts compensation as MML may need to pay overtime or employ more staff to compensate for this deficit in productivity.

3.6.2 As GJT has no bearing on increased costs of staff disbenefit, we will deal directly with monetary costs in all instances here.

3.6.3 Disruptions affecting staff may include

- Additional walking times to staff facilities
- Non provision of staff facilities (e.g. staff car park)
- Remaining up to date with current layouts and passing this information to passengers (mainly included in liaison costs)

3.6.4 The effects on costs of movement or non-provision of a facility must be calculated according to its usage and the cost of the workers using it. Once again the existing methodology for calculating changes in walking time will be followed.

3.6.5 Costs can be calculated by estimating the additional walk time (minutes) to a relocated facility (L) multiplied by the average cost of this staff time (£/minute) (CST) and the number of single journeys made to (or from) the facility (J).

$$C = L * CST * J$$

Grouping staff by job description will increase the accuracy of estimates of average facility usage and staff costs. Note there is no factor of 1.6 in the above equation, as this was solely used to convert from walk time to generalised journey time. In this equation the value of time is calculated in £ directly from the salary costs.

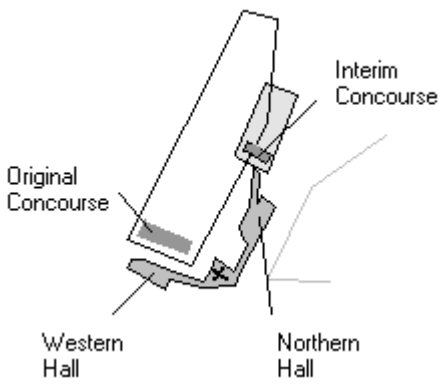
3.6.6 The output of the above calculations will be the estimated cost attributing to each relocated staff facility over a time period (per day will be appropriate).

3.6.7 Compensation for the **non-provision of staff facilities** must cover all cost attributing to its unavailability and any costs arising from necessary alternative arrangements.

3.7 LUL Relocation

3.7.1 Under the CTRL Act, LUL works have been timetabled to coincide with the works at St Pancras. Whilst these are not under L&C's control or within the boundaries of St Pancras station they are a key facility for a large number of MML passengers. Access to LUL features in the facility and walking tables, and would attract sizeable compensation penalties for increased walking times.

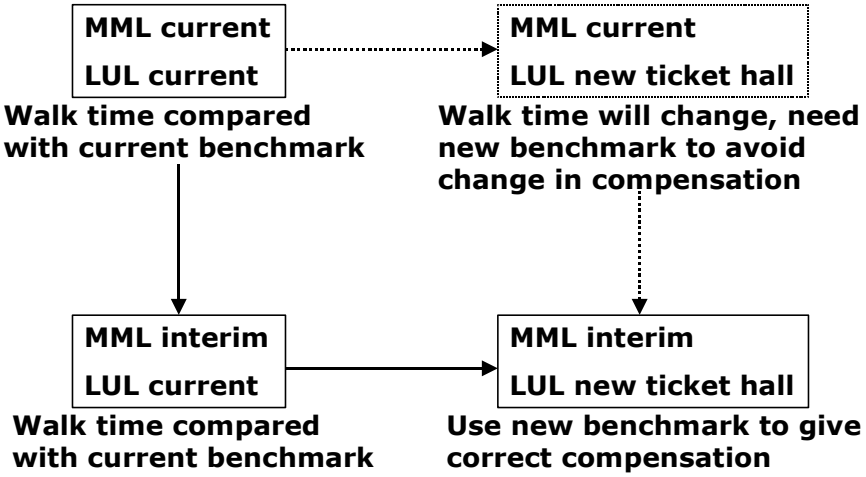
3.7.2 Two new ticket halls will be added to the existing ticket hall, one on the western side of St Pancras close to the current MML concourse, and one north of the existing hall, close to the interim station. The diagram shows the new MML location and the new LUL station (with the cross marking the existing LUL ticket hall.



From the original concourse, access to LUL's new facilities would be via the Western Hall. When the new Northern Ticket Hall is opened, this would become the new route from the interim MML concourse to LUL.

3.7.3 In consequence this will require the measuring of new walking times. However, as the existing public route specified in section II part 3 of the existing agreement will no longer be usable, this raises the question of the appropriate benchmark from which to measure compensation payments. Once MML has moved to the interim station, is the old benchmark time applicable when passengers could not have used the existing route had MML not moved location?

3.7.4 To answer this question we considered the hypothetical scenario in which MML had remained in the existing location. Following the opening of the new LUL ticket halls we conclude that new benchmark times would need to be measured. This would ensure that the move of LUL attracts no change in the compensation being paid. The following flow diagram shows the conclusions of the hypothetical order of events and their impact on the likely order of events.



3.7.5 Thus theoretically, a new benchmark walking time should be set up from the original reference buffer stop taking the shortest route to LUL's new facilities. It will be this benchmark walking time with which to compare future walking times following relocation of both LUL's and MML's activity.

3.7.6 The level of compensation should be based on the difference in walking time between the MML location and the appropriate benchmark (which will depend on which LUL facilities are open). It should be noted that the two ticket halls will have very different walk times to the two sets of LUL platforms (Metropolitan/ Circle and deep tube – Northern/Victoria/Piccadilly), hence it will be necessary to identify these flows separately.

3.7.7 Finally, in so far as the LUL changes are included within the CTRL act, it could be argued that MML should receive compensation for all changes (ie the re-benchmarking should not happen), L&C could then recharge to LUL the element due to its changes.

3.8 Quality of the Interim Station Environment

3.8.1 L&C believe that the provision of an improved station environment should be included in the regime as a benefit which offsets in part the negative impacts of the works at St Pancras. The interim station, that L&C plan to relocate MML to, is in fact the station from which Kent suburban services will operate. L&C plans indicate that the station will be finished before MML are to be moved there and will therefore be equipped with brand new facilities. L&C argue that these factors will have a positive impact on MML's business and hence should reduce the amount of compensation paid based on revenue loss.

3.8.2 There will though be hoardings alongside platforms and portakabins directly outside of the new station.

3.8.3 In the normal course of events the train operator requests improvements to the station from the station operator. The station operator will then undertake

to make those improvements in agreement with an increase in the station long term charge.

3.8.4 We do not foresee that this issue is in effect any different to the standard situation. MML have not asked for any improvement in terms of station facilities and therefore we believe that they should not have to pay (by means of reduced compensation) for the interim station. The main reason for the move is that it is convenient for L&C in order to better undertake the CTRL works in the current St Pancras train shed.

3.8.5 Due to the hoardings and the portakabins outside of the station MML are disputing that the interim station will be a 'better' environment for passengers and therefore the parties are in total disagreement.

3.8.6 We have dealt with the interim station in terms of reducing the general damages payable by L&C to MML as we believe that the building site effects of noise, dust and visual intrusion will be reduced at the interim station.

3.8.7 If the environment is judged to be of superior quality, this issue may be more appropriately addressed through the long term charge rather than treated as a compensation issue. It would be reasonable to predict that MML will be paying a higher long term charge once they have moved to the final station, which will be payment to L&C for providing better facilities.

3.8.8 The current agreement is based on walking distances to facilities within the station, which is measurable and indisputable, we do not see any reason to change this.

3.9 Additional Points

3.9.1 There are both revenue and cost implications each time a facility is moved, due to customers and staff not knowing the location of the facility and the need for altering signage, etc. The current provisions for movement fees seem justified in capturing both the disbenefit to customers for inconsistency in the location of facilities, and the disbenefit to MML staff who must be kept up to date with changes and advise passengers on movement of amenities. It also provides L&C with the incentive to minimise the number of times a facility is moved.

3.9.2 Compensation for increased walking time should not exceed the payment for non-provision, as if it did (i.e. if disbenefit of using a facility was greater than that of not using it), passengers would logically decide not to use the facility, and L&C would be incentivised not to provide it.

3.9.3 Numerous studies have found on-station congestion to be a significant cause of disbenefit to passengers. It is conceivable that congestion may become more severe whilst in the interim station, particularly during the anticipated Thameslink blockade.

3.9.4 A known measure of congestion is that developed by Fruin; it defines levels of service for pedestrian facilities including walkways, stairways and where queues form.[6] Weighting can be applied to walking times under different levels of service which take account of the discomfort caused by crowding.

3.9.5 In the current agreement between MML and L&C the benchmark walk times are based upon measuring the distance and applying an agreed walk speed. The walk speed is dependent on the type of walking involved e.g. there is a

[6] "Pedestrian Planning and Design", J J Fruin 1971

different speed for walking on the flat, climbing stairs and travelling on escalators. The regime suggested by MML and L&C both agree that future calculations will be made by agreeing the route and then applying the same walk speed. This approach does not take account of crowding of conditions either through increased demand or through smaller/narrower passageways and concourses.

3.9.6 The alternative approach would be to conduct walk and count surveys on a regular basis. These would involve using surveyors to time the key routes by walking them. In order to get a representative sample and walk time, each route would need to be walked about seven times during a single survey to capture any reliable difference in the walk time.

3.9.7 By taking passenger counts at key points throughout the station and noting the widths of passageways, Fruin's levels of passenger congestion can be measured. The surveys would also need to cover different times of day so that all passenger conditions were surveyed to get a true measure for the average conditions. Such a survey would cost approximately £2000 set up costs + £4000 per wave, where a wave consists of 3 people for each of three 3 hour shifts for each of 2 days. The costs would include supervision and analysis.

3.9.8 The survey would need to be done to set up new benchmark times against which the future survey times would be measured. If the new walk times were greater than those of the existing benchmark then this would trigger additional payments as a result of the more crowded conditions.

3.9.9 This would incentivise L&C to ensure that adequate passageways and walkways were provided for passengers throughout the period of works. The survey would need to take place every quarter as a minimum frequency.

3.9.10 Certain facilities cannot be dealt with according to standard economic principles. This is where the facilities are not provided because of a willingness to pay, but because of a licence obligation or similar requirement.

3.9.11 A classic case of this is disabled toilets. The number of passengers using such facilities is very small, and hence traditional benefit would also be small. However, there is a legal obligation to provide them (where there are normal toilets) and hence we would propose giving them the same valuation as other toilets.

4 Recommended Regime

4.1 Structure of the Compensation Regime

4.1.1 The overall structure of the compensation regime would follow that of the existing regime. There are three elements:

- for a wide range of specific items, there would be payments for non-availability, or for additional walking time from a specified location; in addition, there would be payments on each occasion when a change was implemented;
- a charge to represent MML's liaison costs;
- a payment to represent general damage to MML's business, not covered by the above items.

4.1.2 Each of the items in the first and third bullets would be calculated as a percentage of revenue or based on passenger journeys or staff trips.

4.1.3 Section 4.2 sets down some key assumptions underpinning our recommendations. In the next Section (4.3) we consider the appropriate base level of such revenue and journeys.

4.1.4 We then consider, in Section 4.4, each of the specific items and their value to MML's business. Section 4.5 considers the impact of changes in walking distance. Following this (Section 4.6), we address the issue of the new LUL ticket hall and its impact on the level of compensation.

4.1.5 Section 4.7 addresses the changes to staff facilities, and then sections (4.8 to 4.10) of this chapter consider movement payments, liaison costs, and general damage.

4.1.6 Finally, Section 4.11 describes the likely impact of the recommended compensation regime compared with the existing regime.

4.2 Assumptions

4.2.1 The application of principles set out in the benchmark regime require some assumptions to be made due to reliance on data sources and standard practices.

- The methodology for calculating passenger disbenefits and the consequent revenue losses to MML follows the PDFH (Aug 2002) best practice wherever possible.
- Data provided by MML regarding current passenger access/ egress modes provide the best representation of the true figures available to us and are therefore taken to be accurate.
- The station plans provided by L&C are assumed to be a true representation the building and facilities. (NB The regime can accommodate future states which are alterations to the specified plans).
- Usage of facilities is based on MML provided data, internal MVA figures, or those implicit in the previous agreement.

- The methodology for calculating walking times set out in the Existing Regime is taken as an accurate estimate of actual walking time.

- The number of originating and arriving passengers are similar, based on the likelihood that a passenger arriving at St Pancras will also depart.

4.3 The Appropriate Base Level of Revenue

4.3.1 The existing regime allows for compensation levels to increase in line with RPI, but no other factors. In particular they do not increase with MML's passenger numbers or revenue.

4.3.2 However, since 1996, MML have experienced substantial growth in both passenger numbers and revenue, in part due to their investment in new rolling stock and improvements in the quality of service they offer.

4.3.3 In terms of the purposes discussed in Section 3.1, if the new regime is to reflect the impact of disruption on customer disbenefit, it should reflect the new passenger volumes and revenues. Similarly, it should do so if it is to give appropriate incentivisation to L&C. However, the primary objective of the regime is to compensate MML for loss of revenue; here it is slightly less clear. MML's franchise has recently been extended, and in establishing the new subsidy required, an (implicit) assumption will have been made about the level of compensation to be received. We cannot be certain of this assumption, but it is likely to have reflected the existing agreement, one part of which is that compensation levels only increase in line with RPI.

4.3.4 The issue was no doubt considered in 1996 at the time of deciding on the existing compensation regime. The expected level of future growth would have been very uncertain. From the point of view of compensating MML, there was no strong need to increase the level of compensation in line with increasing revenue, as the competition over the MML franchise would take the actual compensation regime into account.

4.3.5 If it were decided that compensation levels should increase with future passenger volumes and revenue, then there remains the question of whether it should be emerging volumes, or a forecast of future growth. There is considerable merit in having a regime where both parties can expect to know the level of compensation in advance (depending on the circumstances); in particular, L&C should know the impact on compensation of decisions they choose to take. The recommendation is, therefore, that compensation levels should not change with emerging future levels of journeys or revenue. (This also avoids any risk of MML seeking to gain increased compensation through adapting fares levels, for example).

4.3.6 The remaining choice is between rebasing at the current level of demand (increasing thereafter in line with RPI), and increasing in line with a forecast increase in revenue. On balance, because it is likely that the franchise extension did not assume an increase in line with revenue, also to avoid having to prepare forecasts of future growth which by definition would be open to challenge, and finally because the existing agreement does not include such a provision, it is recommended not to increase compensation levels in line with future growth.

4.3.7 Our recommendation is that the compensation levels should be rebased using an estimate of a 2003 revenue figure (being the starting year of the New Agreement), but that thereafter increases only occur in line with RPI. Further details are provided in Appendix C.

4.4 Non-Provision of Passenger Facilities

4.4.1 If a facility is unavailable, the compensation due to MML should reflect the value that passengers put on that facility. PDFH gives some high level figures on the value passengers put on station facilities, but not at the level of detail required for this agreement. We have therefore used an alternative method to derive valuations based on the numbers of passengers using the facilities.

4.4.2 The usage figures are documented in section 4.5 (and particularly Table 4.1). We have derived valuations of non-provision of facilities from these figures by multiplying the valuation of a one minute increase in walk time by a factor. For the facilities we considered important to passengers (ie they were being used as a matter of need – eg travel centre, toilets) we multiplied by a factor of 8.

4.4.3 This figure was based on three sources available to us: a common sense feeling that few people are likely to walk more than 8 minutes to a facility, given the central London location and proximity of Kings Cross and Euston; supporting evidence from PDFH valuations; and the ratios implicit in the original agreement. For other non-vital facilities (eg station seating) a factor of 5 was used as it is unlikely that passengers would venture outside the station for these.

4.4.4 Where provision of a facility is outside the control of L&C it does not have a non-provision figure e.g. King's Cross LUL. Disabled toilets have been assigned a notional figure as valuation goes beyond the basis of economic principles (see 3.8.11).

4.4.5 In certain cases additional staff costs are also included where these would be incurred (e.g. passenger information systems).

4.4.6 The non-provision payments form a direct amendment to the existing non-provision values. They can be inserted into the facility tables for use with the existing methodology of calculation set out in the Existing Agreement. This includes compensation payments on the basis of non-conformity whereby compensation is due on the basis of a proportion of the non-provision payment, dependent on the degree of degradation.

4.4.7 A table with absolute values of non-provision payments is included in Appendix C; this also provides further information on the method of calculation.

4.4.8 These values will be increased in line with RPI.

4.5 Passenger Walking Distances

4.5.1 There is a methodology in place for measuring walk times, which is set out in the Existing Agreement; it is based on measuring distance and using a constant walk speed. This will be used to make any re-measurements necessary following the movement of facilities appearing in the facility tables.

4.5.2 We discussed in para 3.8.6 and following, the possibility of undertaking surveys of walk times as opposed to distances. This would cost around £20,000 per year. If there were no significant crowding, it would probably be less accurate than the existing method. If crowding were important, it would be more accurate.

4.5.3 There are a number of problems associated with the inclusion of crowding in compensation calculations. Firstly, the lack of measured benchmark level of crowding in 1996, against which all changes should be measured. Secondly, crowding could potentially result from a variety of factors, not all of which are

within L&C's control and hence liable for compensation. For example, timetable changes resulting in trains arriving at similar times is likely to significantly increase congestion at that time. MML increasing its patronage through successful marketing may also have an impact which should not fall under the compensation regime. The difficulties in attributing congestion to particular factors make this type of measurement open to dispute. On balance we would not recommend changing from the existing methodology.

4.5.4 We also considered the potential impact of the Thameslink blockade on crowding in St Pancras Station. However, due to the reduction in platforms available to MML, the Thameslink blockade is principally an issue for the Track Access Agreement and hence outside the scope of the Station Access Agreement. If including crowding effects, then the impacts of crowding on walk times could be assessed. It may also be argued that there is a need for re-basing of MML revenue through St Pancras (due to the limits on services) leading to a reduction in compensation levels, as fewer passengers are using the station. We recommend excluding this from the regime on the grounds of uncertainty and the difficulties involved in measurement.

4.5.5 Benchmark walk times from the original location of facilities at the time of drafting the agreement are documented, and will be used in the calculation of changes in walk times.

4.5.6 The compensation payable for an additional minute walk time to passenger facilities is calculated on the basis of a fixed per minute sum, calculated as discussed in the previous chapter. This is then applied to the proportion of passengers who use the facility in question, giving a daily additional minute walk time payment for each facility.

4.5.7 The benchmark regime recommends the classification of passengers into groups for greater accuracy in facility usage estimates and their impacts on revenue. For this work we have not been able to obtain any indication of the proportion of different passenger segments using specific facilities for MML passengers at St Pancras. We have therefore implicitly used the assumption that all facilities are shared between all passenger groups equally.

4.5.8 The table below shows the proportion of passengers using each facility. These estimates are based on data provided by MML (based originally on some research by SDG) and from MVA internal sources. For facilities with no available data, we refer to the facility tables in the Existing Regime and make comparisons of the relative sizes of additional walking time compensation values in order to maintain an appropriate ratio of payments with revised amounts.

Table 4.1 Passenger Facility Usage

Facility No.	Passenger Facility	Usage	Source
2	Short Term Car Parking	3.50%	MML Adapted[7]
4	Pick Up/Set Down	6.00%	MML Adapted
7	First Aid Room	0.00%	Assumed (MVA)
8	Passenger Info System	50.00%	Assumed (MVA)
9	Announcing System	50.00%	Assumed (MVA)
10	Concourse	100.00%	Assumed (MVA)
11(a)	Public Toilets (Male)	4.15%	Existing Agreement[8]
11(a)	Public Toilets (Female)	4.15%	Existing Agreement
11(b)	Disabled Toilets	4.15%	Assigned
14	Seating Area for Customers	8.30%	Existing Agreement
15	Left Luggage Office	1.85%	Existing Agreement
16	Ticket Office	7.50%	Existing Agreement
17	Travel Centre	3.70%	Existing Agreement
25	Customer Service Reception	0.50%	Existing Agreement
28	Public Telephones	5.00%	Assumed (MVA)
33	Access to Highway	0.00%	Covered elsewhere
34	Taxi Rank	10.50%	MML Adapted
35	Emergency Vehicle Access	0.00%	Not used by passengers
37	Station Catering (coffee shop)	5.57%	Existing Agreement
37	Station Catering (bar)	5.57%	Existing Agreement
37	Station Catering (food & Wine)	5.57%	Existing Agreement
38	Station Trading (WH Smith)	38.00%	Existing Agreement
	Bureau de Change	0.00%	Assumed (MVA)
50	Poster Sites	N/A	Treated differently[9]
52	Euston Station	0.50%	MML Adapted
	Euston Station (LUL)	0.00%	Assumed (MVA)
	Euston Sq (LUL)	0.00%	Assumed (MVA)
55	Kings Cross Station (KX)	1.00%	Assumed (MVA)
56	KX - LUL (Circle/Met)	15.75%	MML Adapted
56	KX - LUL (Northern, Victoria, Piccadilly)	47.25%	MML Adapted
57	Bus stops	0.00%	(combined with Euston Rd)
58	Euston Rd	9.50%	MML adapted
59	KX/Thameslink Station	6.00%	Existing Agreement

4.5.9 The daily amounts calculated from these estimates (Appendix C) can be used to revise the amounts in the Existing Regime as with the non-provision payments. Measurement of increases or decreases in walking time **will not** be rounded up to the first minute, and there is no change in value above/below a threshold. Other than this, the methodology of calculation of payments remains the same.

4.5.10 However, reductions in walking time are to be netted off against increases, hence when calculating payments using the existing methodology, walk time changes may have a **positive or negative value**.

4.5.11 Values of walking time will be increased in line with RPI.

[7] Adapted from MML passenger survey.
[8] Based on implied usage figures behind the values of additional walking time compensation in the existing agreement.
[9] See Appendix C.

4.6 Movement of LUL Ticket Hall

4.6.1 As previously mentioned, the current LUL ticket hall is to be supplemented by a new northern ticket hall located between King's Cross platforms 9 to 11 and the Great Northern Hotel and by a western ticket hall in front of St Pancras Station. This will have a major impact on walking routes and distances from St Pancras to LUL.

4.6.2 In the benchmark regime we discuss the possible impacts of the move and the need for re-benchmarking the walk times to the new LUL facilities once the old route becomes defunct.

4.6.3 However following the representations made by the parties we recommend that **the original benchmark be retained** for measurement of compensation for access to LUL facilities.

4.6.4 We come to this decision for the following reasons

- According to the current schedule of LUL works, it is unlikely that either ticket hall will open in the lifetime of the New Agreement.
- The parties accept the retention of the old benchmark.
- The impact of re-benchmarking is likely to be relatively small, as the two ticket halls have opposite effects.
- Re-benchmarking may add complexity to the New Agreement over an issue which is unlikely to occur in it's lifetime.

4.7 Relocation and Non-Provision of Staff Facilities

4.7.1 Staff facilities should be treated differently to passenger facilities. A methodology for calculating compensation due to the movement and non-provision of staff facilities is set out in the benchmark regime.

4.7.2 To simplify the estimation of this element of the facility tables, and due to difficulties in estimating accurate usage figures from an independent standpoint, we recommend **no change** from the existing provisions specified in the staff facility tables of the Existing Agreement (with the relevant increase by RPI). The exception to this is where the facility is no longer used by MML.

4.7.3 Despite stepped increases in compensation being contrary to economic theory, we recommend that the staff facility tables remain as set out, with time thresholds for stepped payments included. MML have expressed concern that the base values for staff facilities do not reflect the true value or importance for the running of the business.

4.7.4 As we do not have sufficient evidence to estimate the values of these facilities we are left with the alternative of leaving the steps as an additional incentive to ensure a practical station layout safeguarding MML's business, or a scaling up of all payments by a certain factor. We recommend continuing with the existing provisions including the stepped payments. This requires the minimum change to the Existing Regime and avoids dispute over the scaling factor.

4.7.5 We retain our recommendations with regard to no longer rounding to the first minute. Hence, any increase or decrease in walk time to a relocated staff facility would be calculated as a fraction or multiple of the relevant figure. These should be increase in line with RPI as specified in the existing agreement.

4.8 Movement Costs

4.8.1 There are both revenue and cost implications each time a facility is moved, due to customer and staff not knowing the location of the facility and need for altering signage, etc. The current provisions for movement fees (uplifted by passenger revenue) seem justified in capturing both the disbenefit to customers for inconsistency in the location of facilities, and the disbenefit to MML staff who must be kept up to date with changes and advise passengers on movement of amenities. These should be increased in line with RPI, as in the existing agreement.

4.9 Liaison Costs

4.9.1 The construction works being carried out alongside MML's operations at St Pancras will occasion the need for regular liaison between MML and the construction project team to remain informed about the proceedings. In addition, MML may need to inform its customers about possible disruptions and keep them informed of any changes to its services.

4.9.2 Time spent on the above constitutes an additional cost directly related with the works, for which MML should be compensated.

4.9.3 The existing station access agreement has an annual sum for 'project liaison purposes' which both parties are agreed on, and which we find to be appropriate. These increase in line with RPI from the base year defined in the Existing Agreement.

4.10 General Damages

4.10.1 A significant element of the current compensation regime relates to general damage to MML's business. This relates to 'general building site effects (eg noise and dust)' [1]. We would add an important other element to noise and dust, which is the general visual intrusion of building works, which often gives a very untidy/ unclean appearance.

4.10.2 As described in the discussion on a benchmark regime (Section 3.4 and following), we would prefer this both to be more closely related to the actual experiences and perceptions of passengers, and to incentivise L&C to reduce noise, dust, etc. (We would note that despite this lack of incentivisation in the regime, L&C appear to have so far been careful to minimise the amount of such nuisance).

4.10.3 L&C have provided evidence through noise surveys that, despite work already having commenced, the levels of nuisance from such sources is very small. Furthermore, the plan is now (which was not clear in 1996 when the existing agreement was prepared) to relocate MML's business to a new site before the majority of the work is undertaken. St Pancras is a noisy station due principally to the use of diesel traction by MML, and both the formal noise surveys and observation by the study team indicate that additional noise and dust due to construction work is likely to be modest. However, as with all building sites, there is considerable visual intrusion in the form of hoardings and portacabins.

4.10.4 There are no references in PDFH to noise, dust or visual intrusion. There are estimates of passengers' valuations of station facilities and also of station cleanliness. This latter is the closest parallel to the impact of building works.

4.10.5 PDFH (para B5.4.7) indicates that cleanliness might account for between 1% and 2% of the 5% station valuation (applied to departing passenger revenue).

However, much of this should be the noise and dust elements, and we would estimate that only about 25% would be related to visual intrusion. Taking a mid-point, this gives an estimate of 0.375% equivalent increase in fare. Applying the fares elasticity of 0.95 as discussed previously, this figure becomes 0.356% of departing revenue through St Pancras. Adding to this a modest amount for noise and dust, we would propose a sum of 0.4% of departing passenger revenue be paid as general damage to MML while they remain in the main trainshed at St Pancras.

4.10.6 Having made the assumption that on average, the number of arriving and departing passengers are an even split, these figures should be halved in order to make calculations using total revenue through St Pancras.

4.10.7 When MML move to the temporary location, they will be further from the building works, and hence there will be reduced impact in terms of dust, noise and visual intrusion. In the final location, the station should be fitted out to the defined final level of finish. If this is done, then visual intrusion should be minimal, indeed the overall quality of the station would probably exceed that of today's.

4.10.8 We would therefore recommend the following levels of general damage payments (as percentage of total revenue):

- In existing trainshed 0.2%
- In temporary location 0.1%
- In final location (if fully fitted out) 0%
- In final location (if fitting out not complete) 0.1%

4.10.9 The above is an approximate assessment of the impact on MML's business. It would also have the advantage of incentivising L&C to achieve the moves to timescale, and to complete the fitting out of the final location before the move.

4.10.10 The compensation under this heading should increase in line with RPI.

4.11 Overall impact of recommended regime

4.11.1 In assessing the overall impact of the recommended compensation regime compared with the existing regime, it is necessary to take into account the schedule of works as currently planned. In particular, the transfer of MML's activities to an interim location followed by the final location. This method of working had not necessarily been envisaged at the time of the signing of the existing agreement. The table below sets out, for the three planned stages of the project, the likely scale of compensation. It should be noted that the actual level of compensation will depend on final layouts and hence cannot be defined precisely at this stage. Furthermore, detailed numbers remain confidential and are presented in Appendix D.

Table 4.2 Overall Effect of Recommended Compensation Regime

Stage of works	Existing regime	Recommended regime
MML at current location	Compensation as now	Reduced compensation due to lower general damages
MML relocated to interim location	Significant increase in compensation due to greater walk distances	Compensation will be much increased due to higher values applied to the longer walk distances; this more than off-sets the lower general damages; overall level of compensation will be comparable to that of the existing regime
MML relocate to final location	Decrease in compensation as increases in distance to some external facilities are more than offset by many internal facilities returning to original level of accessibility	Some increase in compensation (compared with previous stage) likely due to increased walk distances not being fully off-set by reduced general damages

Appendix A

Terms of Reference

Appendix A

OFFICE OF THE RAIL REGULATOR

ST PANCRAS SECTION 17 APPLICATION: ECONOMIC ADVICE - TERMS OF REFERENCE FOR CONSULTANTS

5 November 2002

Background

1. The Office of the Rail Regulator is an independent public sector body created by the Railways Act 1993 with a range of statutory powers that are used to regulate Railtrack's stewardship of the national rail network, investment in the rail industry and other key aspects of rail service provision. In particular, the Regulator approves the terms, including charges, on which access is provided to track, stations and light maintenance depots.

2. Where parties are unable to reach agreement over the terms of access to a railway facility, the prospective beneficiary may apply to the Regulator, under section 17 of the Railways Act 1993, for directions from the Regulator to the facility owner. The Regulator will then establish whether access should be granted and, if so, the terms on which it should be granted.

3. The Regulator received, on 15 October 2002, an application under section 17 of the Railways Act 1993 from Midland Main Line Limited (MML) for access to St Pancras station. London and Continental Stations and Property (L&C) is the station facility owner. MML's existing station access agreement, entered into in 1996, expires on 28 April 2003. Essentially, the application from MML follows the industry template independent station access agreement, but with an additional schedule setting out compensation for disruption due to construction work for the Channel Tunnel Rail Link (CTRL) international terminal. Construction of the international terminal is expected to be completed by the beginning of 2007, following which access to the station by domestic train operators is expected to be on standard industry terms.

4. The Regulator therefore wishes to establish the appropriate level of compensation to be paid to MML for disruption at St Pancras station resulting from the construction of the international terminal.

Scope of work and key issues

5. The ORR is now seeking to appoint an organisation which can provide advice on the appropriate compensation due to MML. The advisor will need to understand the current station access agreement, in particular the compensation mechanisms contained in it.

6. ORR requires advice on the following questions:

(a) whether the compensation regime, proposed by MML in its section 17 application, is appropriate to compensate MML for disruption to its operations at St Pancras during CTRL construction work at the station;

(b) if not, whether alternative arrangements would be more appropriate; and

(c) to the extent that the alternative regime differs from the existing compensation regime, what is the justification for the difference?

7. Organisations who believe they can provide this advice should respond to this Terms of Reference by means of a short proposal: more details are given in paragraphs 17-20 below.

8. The advisor will be expected to:

(a) produce a written report (which the Regulator expects to publish) summarising the recommended approach to, and level of, compensation at St Pancras, explaining in full the economic principles, any assumptions employed, forecasts and giving detailed reasons for its recommendations; and

(b) prepare and present evidence at any hearing which the Regulator may hold. The advisor may be required to give oral evidence and answer questions based on the written and oral evidence submitted.

Current compensation regime

9. We understand that the parties are in agreement over the **structure** of the proposed station access contract (including the facility compensation tables) but that they cannot reach agreement over the appropriate **levels** of compensation. We expect the respective positions of the parties to be set out in their representations and responses.

10. In broad terms, there are two compensation mechanisms in schedule 4 of the proposed access contracts for which MML have applied:

(a) an annual index-linked fixed sum representing general damages to MML's business (business interruption); and

(b) detailed compensation tables based on additional walking time from a central reference point to a range of station facilities, or the non-provision of those facilities.

Other key issues

11. The advisor's response should have regard to the following economic issues:

(a) the appropriate balance between the fixed element of compensation (which is designed to compensate MML for revenue loss) and the variable elements (which reflect passenger disbenefits). In particular, the advisor should consider the following elements of passenger disbenefits: non-availability of facilities, increased walking time and the passenger environment (the effect of noise, dust etc.); and

(b) the reasonableness of any demand and revenue forecasts put forward by the parties and the appropriate level of demand and revenue given the parties' assumptions, also the reasonableness of these assumptions given experience elsewhere and the advisors' professional judgement.

12. The advisor should also consider whether or not the following issues affect the appropriate compensation for disruption at St Pancras:

(a) the level of passenger usage of the station, including passengers interchanging at the station with London Underground services and the interaction between passenger usage of the station and disruption at the station;

(b) the availability of station facilities;

(c) other operators' passengers using the station during the period of this agreement, in particular Thameslink, whose North of London services are expected to terminate at St Pancras (or Kentish Town if there is insufficient capacity at St Pancras) from July 2004 – January 2005 during a planned blockade at Kings Cross Thameslink; and

(d) the current and future passenger access and egress points for the station.

13. The advisor will also need to have regard to the following factors in providing its advice:

(a) the Regulator has an overriding duty in section 21 of the Channel Tunnel Rail Link Act 1996 "to exercise his regulatory functions in such a manner as not to impede the performance of any development agreement". The Regulator will therefore need to consider whether the terms of the station access agreement may affect the carrying out by any other party of their obligations under any development agreement;

(b) the representations to be made by L&C in response to MML's section 17 application, and MML's response to those representations;

(c) any overlap or interaction with compensation due under Schedule 8 or Schedule 4 of MML's track access agreement;

(d) the time and effort taken by the parties to establish and agree the compensation arrangements contained in their current station access agreement; and

(e) compensation and abatement regimes in operation at other stations, as appropriate, recognising that the arrangements currently in place between MML and L&C at St Pancras station are bespoke.

Information requirements

14. We expect to supply the following information to the advisor which it may, if appropriate, have regard to in providing its advice:

(a) MML's existing station access agreement for St Pancras station;

(b) MML's application under section 17 of the Railways Act 1993;

(c) the representations made by L&C in response to that application;

(d) MML's response to those representations;

(e) representations from other persons with an interest (if appropriate);

(f) current passenger demand and revenue figures for the station and forecasts by year up to 2007;

(g) details of current passenger movements across the station and walking times (the advisor may need to verify this information), including computer aided drawings supplied by L&C;

(h) assumptions used to generate any demand forecasts;

(i) a schedule setting out when station facilities will be available, including details of passenger access and egress points;

(j) a plan showing the station layout and the location of current and future station facilities, including any transitional arrangements for passenger access; and

(k) MML's current track access agreement.

15. The advisor should note that some of the information supplied is regarded by the applicant (MML) as meeting the test in section 71 of the Railways Act 1993, that, if published, the information "would or might…seriously and prejudicially" affect their interests (section 71 of the Railways Act 1993). The Regulator accepted the view of the applicant in this respect, and excluded the data regarded by MML as sensitive from public consultation. This may have implications for the advisor's report, in that certain data may need to be excluded from the published version. Full details of the information regarded by MML as sensitive will be supplied with the copy of the section 17 application.

16. The advisor should consider what other information (if any) it may require to provide advice to the ORR.

Timescale, deliverables and commercial arrangements

17. The successful applicant should be available to start work on the 11 November 2002.

18. The advisor should be able to deliver its draft report (consisting of its conclusions and recommendations; its reasons for those conclusions and recommendations; its analysis; and an executive summary) by 6 December 2002 and the final report (which will be used as evidence to support the Regulator's decision) by 20 December 2002. A hearing for the application is expected to take place in January 2003: the advisor should be prepared to deliver its written evidence a week in advance of the hearing and give evidence at the hearing. The work on the section 17 application will be completed by 31 March 2003 at latest.

19. The advisor will be appointed from the ORR's technical advisor panel under the terms of the framework contract agreed between the panel members and the ORR.

20. Applicants should provide a short response to this Terms of Reference setting out their approach to the study (including, as appropriate, details of advice provided to other organisations which applicants consider to be relevant to this work) and listing the staff who will form the advisory team (with expected levels of input by person). Applicants should quote an overall fixed price for provision of the deliverables in paragraph 18 above (including attendance at the hearing) based on the rates accepted for the technical advisor panel. Any further work required will be treated on a time and materials basis at the same rates (i.e. the rates accepted for the technical advisor panel). Responses should be received by 9.00am on Monday 11 November 2002.

21. The advisor will be selected primarily on the basis of its ability to undertake the work envisaged in this Terms of Reference and also on the estimated price to undertake this work.

Appendix B

Relationship Between Consumer Surplus and Revenue

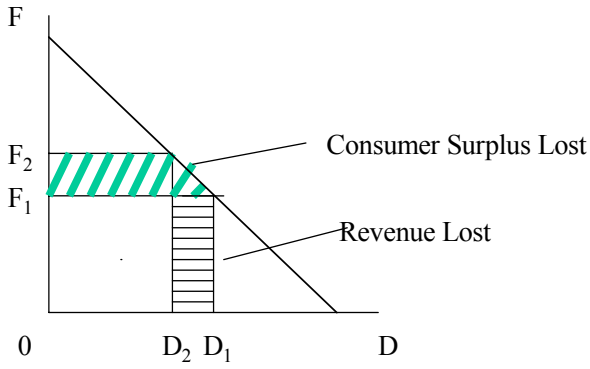
Appendix B

Revenue (R) and Consumer Surplus (CS) are dependent on Demand (D) and Fares (F).

Change in revenue = change in demand * fare

$$\Delta R = (D_2 - D_1) F_1 = \Delta D \cdot F_1.$$
$$= \left(\frac{\Delta D}{D_1}\right) R_1 \quad [\mathbf{A}]$$

Change in consumer surplus = change in fare (proxy for disbenefit) * average demand ["rule of a half"]



$$\Delta CS = -\tfrac{1}{2}(F_2 - F_1)(D_2 + D_1)$$
$$= -\tfrac{1}{2}\Delta F(2D_1 + \Delta D)$$
$$= -\Delta F\left(D_1 + \frac{\Delta D}{2}\right)$$
$$= -\left(\frac{\Delta F}{F_1}\right)\left(1 + \frac{\Delta D}{2D_1}\right) R_1$$
$$= -\left(\frac{\Delta F}{F_1}\right) R_1 - \tfrac{1}{2}\left(\frac{\Delta D}{D_1}\right)\left(\frac{\Delta F}{F_1}\right) R_1 \quad [\mathbf{B}]$$

$$\textit{Let Fare Elasticity of Demand} = \xi = \frac{\Delta D}{D_1} \Big/ \frac{\Delta F}{F_1} \quad \therefore \quad \frac{\Delta D}{D_1} = \xi \frac{\Delta F}{F_1}$$

$$\Delta R = \xi \left(\frac{\Delta F}{F_1}\right) R_1 \quad (\textit{From } [\mathbf{A}])$$

$$\Delta CS = -\left(\frac{\Delta F}{F_1}\right) R_1 - \tfrac{1}{2}\xi \left(\frac{\Delta F}{F_1}\right)^2 R_1 \quad (\textit{From } [\mathbf{B}])$$
$$\cong -\left(\frac{\Delta F}{F_1}\right) R_1 \quad \textit{if } \Delta F \textit{ is small relative to } F_1$$

Ratio of change in consumer surplus to change in revenue is:

$$\frac{\Delta CS}{\Delta R} = -\left(\frac{\left(\Delta F / F_1\right) R_1}{\xi \left(\Delta F / F_1\right) R_1}\right) = -\frac{1}{\xi} \quad \textit{for small changes to fare}$$