

# Management of the Holyrood building project

Prepared for the Auditor General for Scotland

June 2004



ADS00054\_0001

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### Acknowledgements

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## Key findings

There were difficulties associated with the construction of a very complex, densely developed, unusual building against very tight deadlines.



**1.** The subject of my report is the management of the project to provide the new Scottish Parliament building (the Holyrood project):

- Part 1 briefly describes my previous reports on the Holyrood project.
- Part 2 outlines what has happened to the project since my report of September 2000.
- Part 3 examines why the project was not completed by the earlier target of December 2002 and why there was subsequent slippage in the programme.
- Part 4 concentrates on why forecast project costs more than doubled from £195 million<sup>1</sup> in September 2000 to £431 million in February 2004.
- Part 5 assesses the management and control of the Holyrood project in the four years since my 2000 report.

**2.** The Holyrood project was an extremely difficult and complex building project. The estimated cost increased by some £220 million and there has been 20 months slippage over the last four years. In examining why this happened, it is important to take account of the quality of the building, which seems likely to satisfy the high standards specified in 1998.

**3.** The difficulties of delivering the Holyrood building using the 'construction management' method of procurement lie at the heart of the problems that arose. In my 2000 report I commented on the strengths and weaknesses of the construction management method of procuring building projects. I drew attention to the fact that with this method most of the risks stay with the client rather than transferring to the contractors.

**4.** My report concerns the management and control processes applied to the Holyrood project. This includes the role of the Holyrood Progress Group but my report

focuses on the performance of project management for which the Principal Accountable Officer of the Scottish Parliamentary Corporate Body is responsible. In undertaking this examination I did not seek to form an opinion on whether any individual contractor has been at fault. Project management is responsible for managing its consultants and contractors and assessing their performance.

- The client is the Scottish Parliament Corporate Body on behalf of the Parliament. The Holyrood Progress Group has assisted the Corporate Body in its functions as client.
- Project management in this case is the Chief Executive of the Parliament (who is the 'project owner') and the project team under the leadership of the project director. Project management is responsible for managing and delivering the project with advice and guidance from the Progress Group.

<sup>1</sup> Equivalent to £209 million including £14 million estimated landscaping costs in 2000.

- The design team are the architects and the other consultants appointed by project management. The architects are EMBT/RMJM Limited, which is a partnership between architects based in Barcelona and Edinburgh. The other principal design team members are Ove Arup and Partners and RMJM Scotland Limited.
- The cost consultant and quantity surveyor is Davis Langdon and Everest.
- The construction manager is Bovis Lend Lease (Scotland) Limited. They are responsible for coordinating the design team and the organisation of the site. They also manage all construction works contracts, but the client remains the employer for all contracts.

**5.** Lord Fraser was appointed in June 2003 by the First Minister and the Presiding Officer to conduct an inquiry into the Holyrood project. My report will be available to Lord Fraser as he prepares his report which is due for completion in September 2004.

### Slippage

**6.** The main cause of the 20 months delay to the project since September 2000 was the production of detailed design variations and the late supply of information during the construction process.

**7.** There were difficulties associated with the construction of a very complex, densely developed, unusual building against very tight deadlines. In some cases trade contractors were responsible for some elements of design. Both the architects and some trade contractors did not deliver on time some critical elements of the design work.

**8.** Project management required a very demanding timetable for completion. The construction manager consistently sought to achieve the required early target completion dates, although with the benefit of hindsight the programme set in December 2000 for completion by December 2002 was probably unachievable. By September 2002 or April 2003 the construction manager and project management should also have recognised its targets were unlikely to be achieved.

**9.** Project management should have done more to address the root causes of problems, which were adversely affecting the cost and programme. The construction manager repeatedly prepared construction programmes, which included assumptions and commitments by the design team and contractors that were subsequently not achieved. Under construction management the client ultimately bears most construction risk. As slippage became evident project management did test each new revision of the programme and sought to ensure that the design team, the construction manager and the trade package contractors had the resources and commitment to deliver on time. But it was unable to find the means to manage these risks effectively.

### Cost increases

**10.** The client did not significantly alter its requirements after the middle of 2000. The size and layout of the building were not materially altered. But the cost of realising this design escalated enormously.

**11.** The main reasons for construction cost increases after 2000 were design development and delay in the construction process. The design development was entirely

related to realising the detail of the building and aspects such as the quality of finish and the palette of materials that were used, in accordance with the client's requirements. Construction costs (including irrecoverable VAT) account for 72% of the £431 million total project costs. Between 2000 and 2004 construction cost estimates (including VAT) rose from £140 million to £311 million, an increase of more than 220%.

**12.** Detailed development of the approved design added £80 million (including VAT)<sup>2</sup> to construction costs. Design development is the process when the design of a building evolves in parallel with the tendering and appointment of contractors and subsequent building work on site. Design development carries a risk of cost increases. There should be adequate allowance for this risk when the design and its costs are approved at 'Stage D' of the architectural design. The risks should then be managed. In the Holyrood project, however, design development has driven up the costs. For this project, design development became a process of costing a developing design rather than developing the design within a cost limit.

**13.** Because many of the works packages were let when there was uncertainty about the work involved, it was difficult to achieve good competition and deliver value for money. My examination included a review of 20 of the main construction contracts for the Holyrood project, representing 56% of the estimated construction cost. Thirteen of these 20 major contracts had three or fewer tenders. This was an unusually low number for contracts of this size. For 11 of the 20 major Holyrood contracts examined there was significant uncertainty about the

<sup>2</sup> Estimate by Audit Scotland based on the audit examination.



detailed design at the tender stage. In normal contracts most of the costs are fixed at the point when the contract is awarded, but this was not possible in these contracts because significant parts of the design and/or the full extent of the works had not been determined at that point. This restricted price competition and led to much more negotiation with the contractors than was desirable.

**14.** The decisions to award contracts with a large degree of uncertainty were the result of the client's programme requirements. By awarding contracts for work with uncertain scope and design the client was in a weak position to resist subsequent claims from contractors for extra time-related costs. And in cases where the performance of trade contractors might not have been satisfactory there was little opportunity to attribute delays to these individual contractors because of delays occurring elsewhere in the overall programme.

**15.** The uncompetitive procurement of works packages has allowed contractors' claims for prolongation (ie, the extra costs of doing work over a longer period), disruption and delay, which have added £86 million (including VAT)<sup>2</sup> to the construction costs. It is not possible to say how much more it has cost to procure work priced mainly by negotiation with single contractors rather than work obtained through competitive pricing of work. The costs for disruption and delay are not for improvements in the design specified by the client or extra features that added value to the project. These extra costs are the consequence of not fully preplanning the construction works.

### Project management and control

**16.** Although it is likely that a high quality building is being delivered, the time and cost objectives have not been met. The same quality could have been achieved for less if the whole design and construction process had been better executed. In any construction project it is necessary to balance quality with time and cost. In 1998 the client required that the building should be completed by summer 2001. Time was a priority. Quality has been equally important throughout the project. The client also set cost limits that applied in the early stages although it was unclear about how important cost was compared with time and quality.

**17.** The organisation of the Holyrood project should have had a single point of leadership and control where decisions could be taken about how to balance time, cost and quality as part of the client decision-making process. Leadership and control of the project was not clearly established. Normally leadership and control should reside with the project director (sometimes called the project sponsor) who is a key member of project management. The client gives the project director the responsibility for making the project happen. In the Holyrood project there was no single point of leadership and control. Responsibility and accountability for managing the individual aspects of time, cost and quality was not clearly allocated between the various different parties.

**18.** The parties leading the project did not fully agree a cost plan. In April 2000 the Parliament had set a £195 million budget for completing the project. In my 2000 report I recommended that project management, the design team and the construction manager should

agree a cost plan to provide a sound basis for managing the remaining stages of the project within this budget. Although a draft plan was prepared in Autumn 2000 most of the information in it was an *indicator* of the costs rather than a *reliable estimate* of the costs.

**19.** Project management and the client did not use normal budgetary control procedures to allow a balanced consideration of affordability, quality and time in the decision-making process. In June 2001 the Parliament approved a motion that can be interpreted as removing the previous overall budget constraint of £195 million. After this decision by the Parliament, project management did not establish an alternative overall budget or approved cost ceiling that would allow the costs of the project to be properly managed. Because there was not a budget based on sound cost estimates after June 2001, there was a risk that project management would concentrate on achieving high quality and tight deadlines without taking full account of the cost implications.

**20.** There should have been better cost reporting and financial control. In my 2000 report I recommended that project management should review and report project costs regularly (monthly) to the client on a comprehensive and systematic basis. The Accountable Officer advised the Audit Committee in October 2000 that he had implemented this recommendation. But subsequent financial reporting of the project was not always comprehensive or systematic. For example, regular reporting to the Parliament's Finance Committee of the total estimated costs of the project (including, for example, the landscaping costs) did not start until July 2003.

**21.** Risk management for the Holyrood project was not good practice. In my 2000 report I concluded that accounting for risk was insufficient. I showed that contrary to good practice there was no quantified allowance for the major risks facing the project. I recommended that this should be established and the results used as a basis for an action plan to manage the risks. Project management introduced a process for quantifying risks from October 2000 and then conducted a number of risk reviews. However, in the Holyrood project the general approach was to accept cost increases and include them in the forecasts as the risks materialised. Because there was no agreed budget limit after June 2001, there is little evidence that forceful action was taken to prevent or reduce the increases in cost.

**22.** In my opinion project management could have taken more action at an earlier stage to control expenditure on consultants. In my 2000 report I suggested that before they appointed consultants, project management could have explored more carefully alternative fee arrangements including financial incentives linked to delivering value for money. Percentage fees do not align the objectives of the client with the commercial objectives of the consulting firms because the more a project costs the more consultants are paid. In 2000 the estimated fee cost was £23 million<sup>3</sup>, approximately 19% of the approved £119 million construction cost including contingency at that time. The client secured fee capping for one of its consultants in 2000 and for the other consultants in 2003. Fee costs are now forecast at £50 million<sup>4</sup>, 19% of the approved construction cost.

**23.** The Corporate Body limited its exposure to increases in consultants' fees in 2003, but this was very late in the programme, after the fees had increased significantly. The agreement to the fee capping at this late stage in the project did not provide a timely incentive to consultants to control costs and programme. Prior to fee capping in July and August 2003, there was no regular reporting of the significant expenditure on the consultants' fees for the Holyrood project. Project management did not seek to convert its construction manager's fee to a fixed lump sum before July 2003 although a clear opportunity to pursue this was available from 2000.

**24.** Although project management raised some significant questions about some aspects of some of its consultants' work, it should have systematically assessed their performance. An assessment was needed to safeguard public funds and to ensure fee costs provided value for money. If project management was able to show there had been significant underperformance by any of its consultants there may be options for recovering some of its additional costs.

**25.** Construction management is an unusual method of procuring construction projects in the public sector and it has not been used before for a major public building project in Scotland. The experience and expertise in construction management was not present in the early stages of the Holyrood project and therefore the risks and challenges were not fully appreciated by the client and project management.

### Lessons from the Holyrood project for public sector procurement

**26.** In the recent history of Scotland there has not been a public building project as complex or as difficult to deliver as the Holyrood project. The main lesson is, however, one that could be applied to all significant building projects, namely that the form of contracting must always be chosen with care, with a sound appreciation of the risks and benefits of each of the procurement options.

**27.** The different forms of contracting are intended to transfer risk to those best able to manage it. Under construction management, where design is incomplete and uncertain when construction starts, the risks stay with the client. It is essential therefore that the client manages design development and has a project team that gives a key role to professionals who are experienced in this construction method.

**28.** In general, however, construction management is unsuited for most building projects in the public sector. There is sound advice available from several sources in government and the construction industry on different forms of contracting.

**29.** In recent years the Office of Government Commerce has introduced 'gateway reviews' for major public sector procurement projects. These reviews allow for a qualified team to scrutinise the business need for a project at key stages in its lifecycle, before key contracts are awarded, to provide assurance that it can progress successfully to the next stage. This process is now applied across government<sup>5</sup>.

<sup>3</sup> Excluding site organisation costs of £5 million in 2000.

<sup>4</sup> Excluding site organisation costs of £18 million currently.

<sup>5</sup> The decision to proceed with Holyrood was made before the requirement to follow the gateway process was introduced.

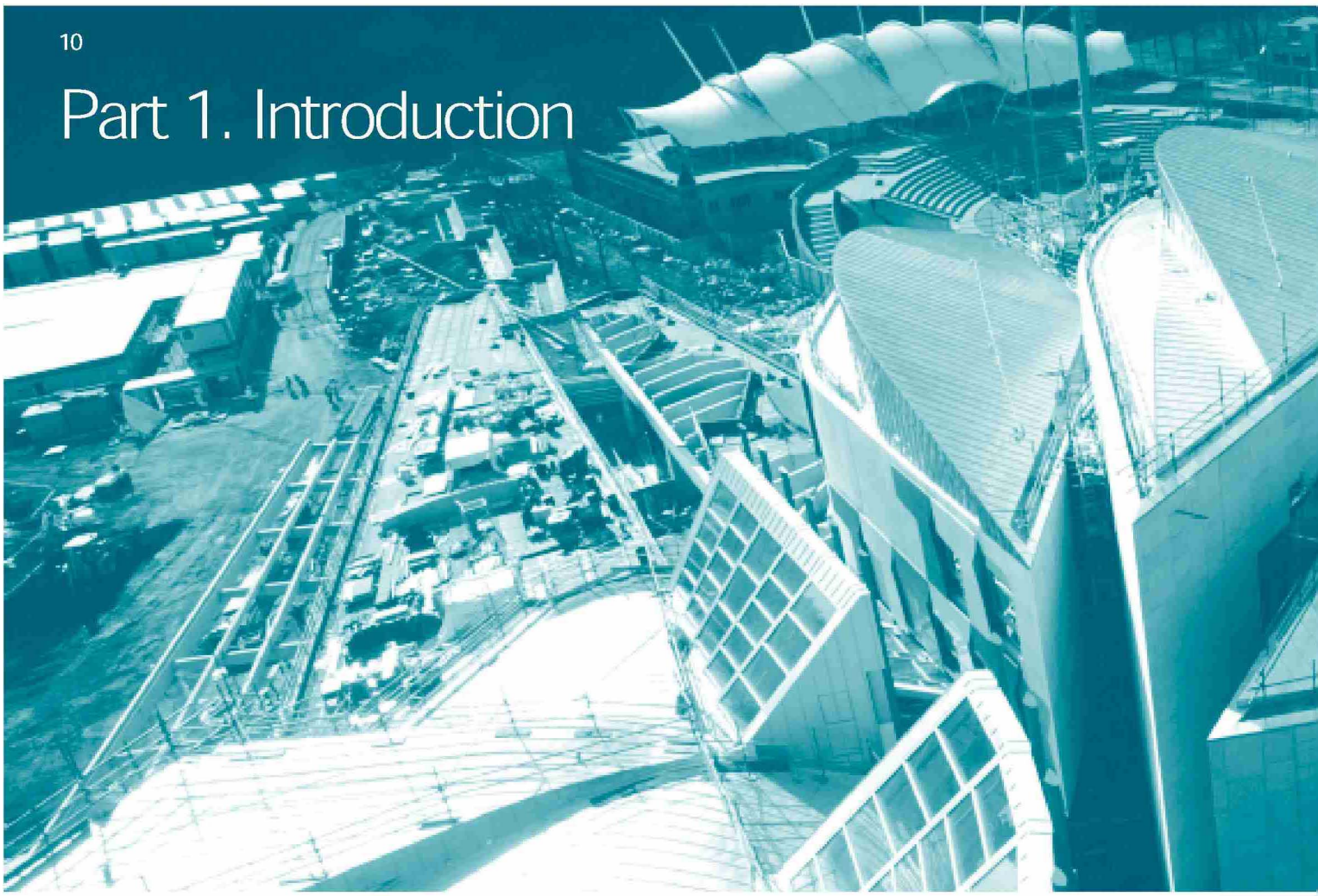
**30.** In all projects, care should be taken to put in place a payment regime that provides incentives to contractors to perform against clear targets for quality, time and cost.

**31.** In complex public sector projects, the client should ensure that there is a single point of control and leadership for the project, with explicit authority and responsibility given to the person in charge.

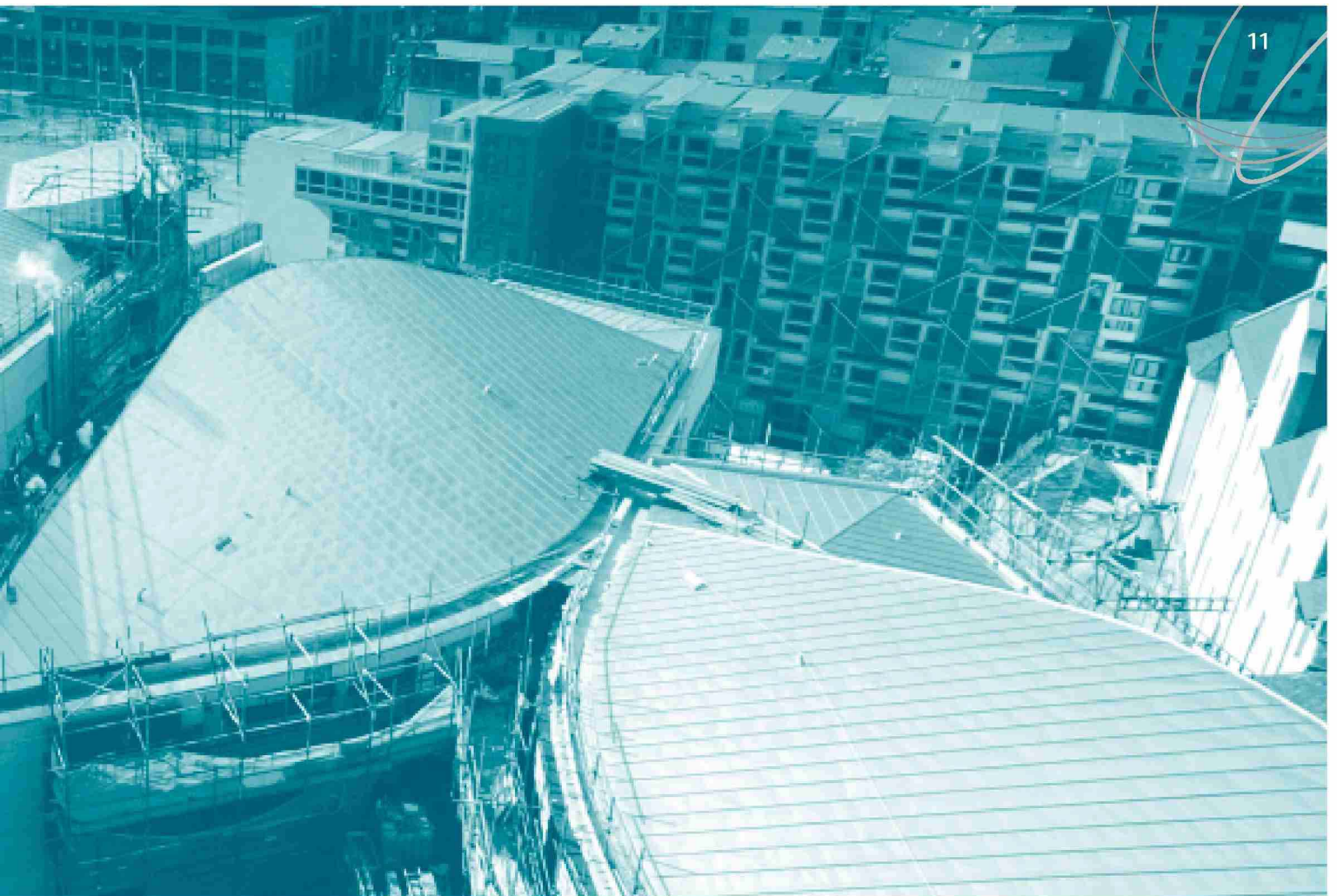
**32.** In all major projects there should be an agreed project budget and a set of key performance indicators that should be used to measure performance during the life of the project. For example the performance that is being delivered in relation to cost, time and quality can be compared with the performance that has been delivered in similar projects elsewhere.

**33.** Whatever construction method is chosen, sufficient time should be available for the planning stage, before construction starts. Good planning will involve (a) getting the construction sequence right to avoid delays and extra costs, (b) assessing and managing project risks and (c) using value management to assess the contribution of each part of the construction process to remove waste and inefficiency. There must always be sufficient time for procurement to allow the client's requirements to be adequately defined so that it may obtain fixed and firm prices for the work in a competition.

# Part 1. Introduction



I gave an undertaking in June 2003 that I would examine and report again on the key features of project management...



**1.1** This report concerns the management of the project to provide the new Scottish Parliament building at Holyrood. This is my third report on aspects of the Holyrood project.

**1.2** My report in September 2000 (Exhibit 1 overleaf) explained why the then estimated costs of the Holyrood project had increased to just over £200 million and why the then projected completion date had slipped to December 2002. It questioned aspects of project management including the procurement strategy, the forms of contract adopted, cost control and risk management.

**1.3** In December 2002 I reported on various contract management issues following the termination of the Flour City contract that had come to light during my annual audit of the Corporate Body.

**1.4** I gave an undertaking in June 2003 that I would examine and report again on the key features of project management, the escalating construction costs and the delays. My further report is intended to complement the report of the inquiry by Lord Fraser of Carmyllie, which is due for publication later in 2004.

**1.5** The Audit Scotland team was assisted by Gardiner & Theobald, one of the UK's largest providers of independent professional advice and services to the property and construction sectors.

**1.6** Completion of the Holyrood building project is a moving target (Exhibit 2 overleaf). Even at this advanced stage of construction further cost increases and slippage cannot be ruled out. Because of uncertainty about the final costs and completion of the new Parliament building it is likely that I will report again on the management of the project and its consequences at a future date.

## Exhibit 1

### The Auditor General's 2000 report on the Holyrood Parliament building project

The report described the delays and cost increases that occurred between the start of the project and the publication of the report in September 2000. The target total cost had risen from £90 million at the outset to £195 million, as agreed by the Parliament in April 2000. Within the £195 million target, estimated construction costs had increased from £50 million to £108 million and other costs rose from £40 million to £87 million. In addition, it was noted that £14 million would be required for landscaping and road works.

Almost half the construction cost increases was due to a 47% increase in the area of the building. The rest of the increase was due to other factors such as the complexity of the approved design, improvements in the quality of the building, security needs, and the costs of Queensberry House. Consultants' fees could reach £26 million and the report suggested ways that fees might be better controlled at that time (September 2000).

The Auditor General said that most of the spending had yet to be incurred and there were risks and uncertainties that needed careful management if the building was to be completed on time and within budget.

The Auditor General criticised the arrangements for project management's cost reporting to the client. It was noted that before June 1999, reports included only core construction costs and did not contain systematic and consistent references to the financial provisions which were necessary for contingency, fees, furniture and fittings, and VAT. In addition, for most of the project's life, an important shortcoming had been that the reporting of construction costs did not include a separate allowance for risk.

The report pointed out that there should have been an analysis of how to use incentive structures to promote added value in the design and construction processes. Financial bonuses for early completion and penalties for delays were common practice in major construction projects where deadlines were tight.

The report said that the handover of the project from the Scottish Executive to the Corporate Body of the Parliament in June 1999 should have been better managed. The Auditor General said it was unfortunate that an independent review had not taken place, since at that point the design was not firmly fixed and the cost consultants were estimating construction costs significantly above the budget.

Reference was also made to project management – the officials responsible for managing and delivering the project. While project management had strengths, the report questioned whether they had at all times the best mix of skills needed for this demanding project.

The report said that slippage of the completion date (from July 2001 to December 2002) was due to a number of factors, including the architects' difficulties in delivering the original brief to a very tight deadline and unforeseen changes requested by the Corporate Body to meet the emerging needs of the new Parliament in its first year of operation.

On a positive note, the report said that arrangements for oversight and management of the project, including the establishment of a Progress Group in June 2000, had been strengthened. However it said much remained to be done.

Key recommendations included the need to:

- establish an action plan to manage risk
- agree a cost plan
- set milestones to help monitor progress until the project is completed.

Source: *The new Scottish Parliament building: An examination of the management of the Holyrood project*, September 2000

## Exhibit 2

Changes in the forecast cost and completion of the Holyrood project

	<b>Originally</b> January 1998	<b>AGS's first report on the Holyrood project</b> September 2000	<b>First Minister announces inquiry</b> June 2003	<b>Latest position</b> May 2004
Estimated project cost	£90 million	£209 million	£375 million	£431 million
Forecast completion	July 2001	December 2002	November 2003	August 2004

Source: Audit Scotland

## Part 2. Project overview



**2.1** This part of the report summarises the physical features of the new building and the position now achieved with regard to its completion. It analyses the main events in the progress of the Holyrood building project since 2000, when we last examined the management of the building project.

### **The new Parliament is a striking and very complex building with high quality materials and some unusual design and construction features**

**2.2** The different components of the building range from the substantially reconstructed Queensberry House, dating from the 1650's, to the upturned boat-like towers and curved plan assembly buildings (on the east side) and to the more rectangular but still highly distinctive MSP office block (on the west side). The buildings exhibit distinctive design features, including:

- The exposed 'glulam' (laminated oak) roof beams in the debating chamber, connected by 110 uniquely specified stainless steel nodes. The chamber roof was

one of the most challenging assignments tackled both in engineering design and construction terms.

- Themed irregular window and construction forms, including the individual 'thinking module' bay windows for the MSP Block and the large granite 'trigger panels' on the east side buildings.
- The foyer roof occupying the former Queensberry House garden, with leaf themed roof-lights.
- The distinctive curved ceilings of the committee rooms and the vaulted concrete ceilings of the public area below the debating chamber.
- Materials and finishes, employing oak, granite and stainless steel, must be durable and of a quality to reflect the building's status and the required lifespan of at least 100 years for its fabric.

**2.3** Satisfying the architects' design concept for these and other features has set many challenges for the

specialist contractors, project management and the design team themselves.

**2.4** Exhibit 3 and the images at the start of each part of this report illustrate the main components of the new Parliament building and the associated landscaping.

### **The Parliament has been procured using construction management**

**2.5** In July 1998 project management chose construction management to deliver the new Parliament. It did so judging that traditional routes of design and then build could not meet the July 2001 target completion date set by the client at that time, the Secretary of State.

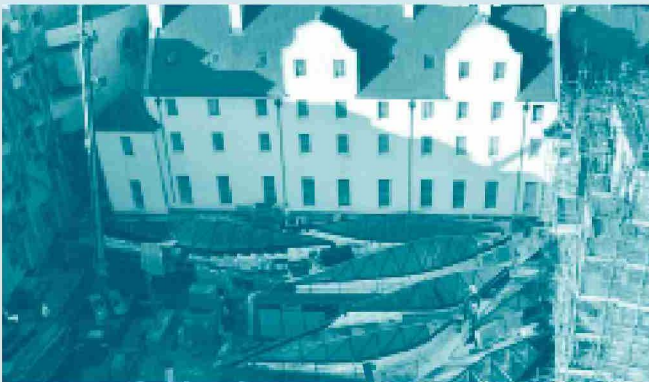
**2.6** Construction management offers an opportunity to compress project duration by commencing construction work before all detailed design is settled. To permit this to happen there is no main contractor for the fixed price delivery of a settled design. Instead the client contracts directly with individual trade contractors appointed at different times, and appoints a professional



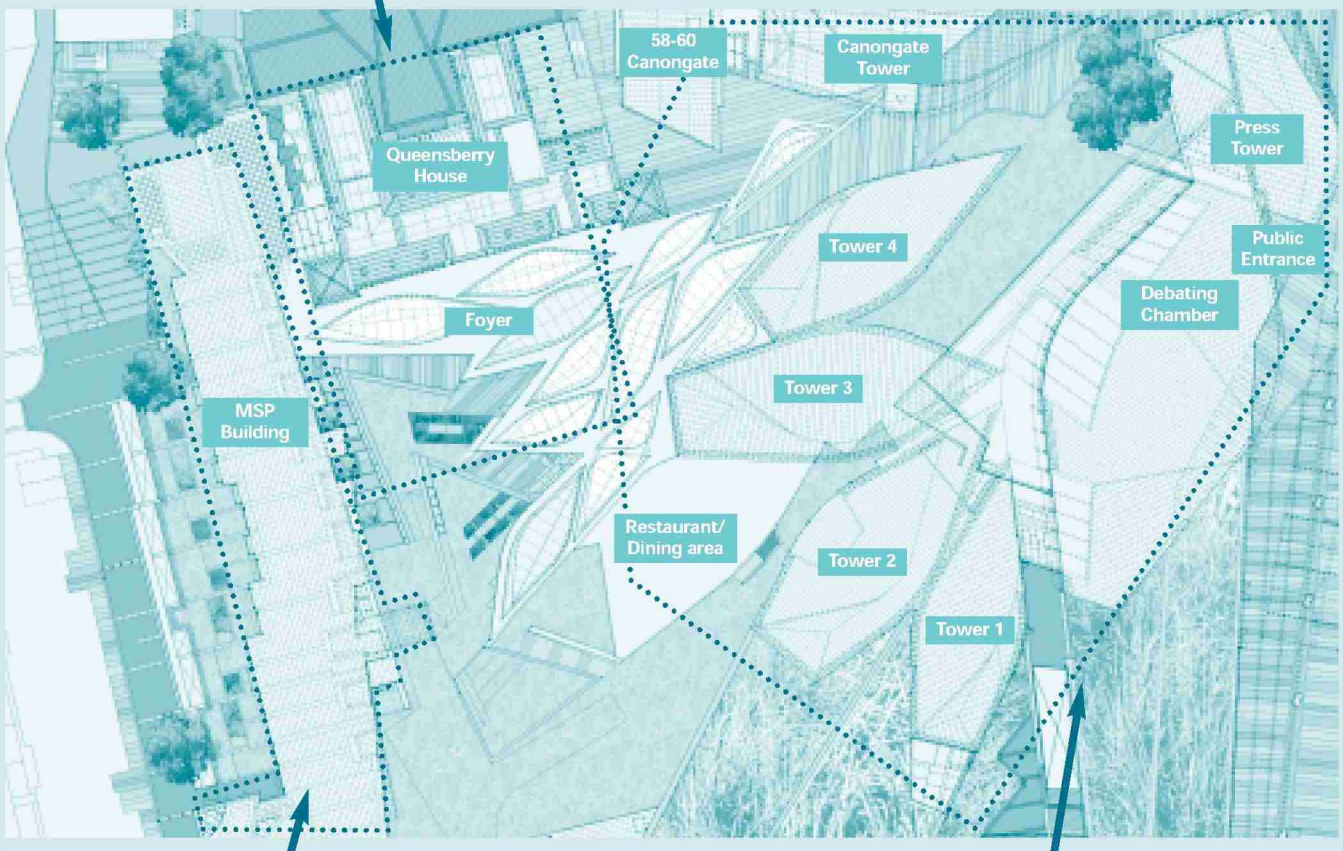
### Exhibit 3

#### The new Parliament building

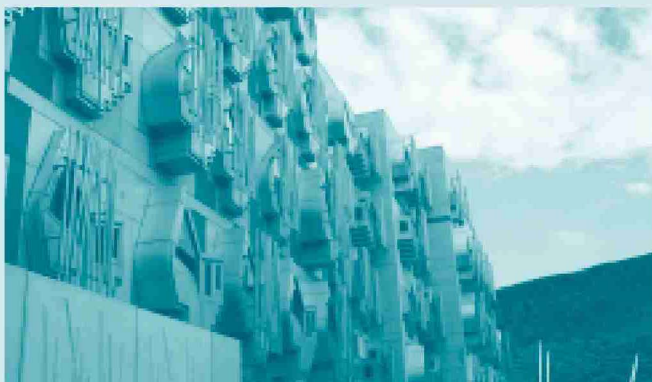
##### Queensberry House and foyer roof



The site plan for the Holyrood parliament complex is shown below. The site is flanked on the west by the MSP block (lower left image). To the northwest Queensberry House (upper left image) will house the presiding officer and parliament administration functions. It overlooks the foyer, which provides circulation space from the MSP offices to the main complex. The east of the site (lower right image) comprises the complex of buildings where the business of the parliament will be conducted, in the committee rooms and the debating chamber.



MSP Building (looking to Salisbury Crags)



Main building complex (looking from south)



Source: Audit Scotland

construction management firm to coordinate the process. Because there is no main contractor there is no opportunity for the client to transfer responsibility for managing most of the design and construction risk, including that from co-ordination of design and trade contract work. The client retains responsibility for control of the design process and avoids paying for risks that do not materialise (Exhibit 4). Whatever construction method is adopted the client always pays for risk.

**2.7** We analyse the complex interaction between the main parties responsible for completing the new Parliament building (Exhibit 41) in Part 5. In summary the main parties are:

- **The client organisation**, comprising the Scottish Parliamentary Corporate Body (as the legal client); project management including the Holyrood project team; and the Holyrood Progress Group, who have a role to work with the Corporate Body in the realisation of the project.
- **The consultants for the project**, comprising principally: the architects, who have lead responsibility for design of the new building; other members of the design team; the cost consultant; and the construction manager.
- **The individual works package contractors**. Under construction management (Exhibit 4) there is no single main contract covering all the construction works. Instead there are some 60 individual construction works package contracts, which together comprise all the necessary works. Although the construction manager oversees and coordinates each individual

trade contract, the client remains the employer for all contracts.

### **The £431 million current estimated project cost includes a large margin for risk and contingency**

**2.8** The current forecast of the estimated cost of the Holyrood project is £431 million. As is well known, the project has suffered successive increases in forecast costs since inception. Exhibit 5 illustrates the increases in total project costs affecting the project since my report in 2000.

**2.9** There is inherent uncertainty about the estimated outturn cost because in most cases the cost consultant, the construction manager and project management has yet to receive, negotiate and agree final accounts from the main trade contractors. At May 2004 the project management had approved final accounts for 21 of some 60 main construction contracts. The contract sums agreed so far total £26 million, 10% of the forecast final construction cost including the risk estimate.

**2.10** In Part 4 we show that additional payments to contractors for extensions of time and out of sequence working is a main reason for the increased costs of the project since 2000. The main risk to the current forecast is that if work is not completed by August 2004 additional time related costs would be incurred.

**2.11** However, while the precise financial commitment is therefore uncertain, the current estimate of cost (Exhibit 6 overleaf) includes a maximum £28 million as a reserve against construction risks (based on professional advice from the cost consultants). The construction reserve is 10% of the current construction cost commitment including VAT. Project management

has included a further £10 million programme contingency. This is available to cover any other variance in costs, while the main non-construction item (£50 million fees) is already capped. Overall, the total risk reserve is £38 million, which is a significant margin particularly at this advanced stage of construction.

### **The project has suffered successive slippage in its forecast completion date**

**2.12** In parallel with the cost increases since 2000 there have been five successive revisions of the programme for the completion of the Holyrood project. In total, forecast completion of construction has slipped by 20 months from December 2002 to August 2004. Exhibit 7 (overleaf) charts each programme issue between programme 3 in July 2000 and the current programme 7B issued in February 2004.

### **Construction is now well advanced**

**2.13** At this stage we cannot say whether the whole building will be satisfactorily completed in summer 2004. Currently (June 2004) construction is well advanced. All parties are working towards the target to complete construction of all critical building elements so that users – MSPs and the Corporate Body's staff – may start to occupy the building later in the Summer 2004. The programme for completion is tight and so some parts of the building – including the debating chamber and the main towers – construction will not be completed and areas declared safe for occupation until July or August 2004<sup>6</sup>. Project management has approved the retrofit of some building features, in either October or December Parliamentary recesses.

<sup>6</sup> An occupation certificate or certificate of completion is needed before any new building can be occupied. It provides formal confirmation that an approved inspector accepts that the building work has been carried out in accordance with the warrant obtained prior to work starting and with the building standards regulations, in so far as this can be ascertained from inspection.

## Exhibit 4

### Key features of construction management procurement

- Used for completing fast track projects where there is a high degree of design uncertainty.
- There is no main contractor for the fixed price delivery of a settled design.
- Design and construction work overlap leading to an earlier start on site. Later changes in design may be accommodated without necessarily incurring a high premium on construction costs, provided that there is no change or disruption to work that has already commenced.
- The client still bears most of the design and construction risk, including coordination.
- The client enters separate agreements with the designer and the construction manager.
- The client appoints all construction contractors and the construction manager receives a fee for managing this work.
- The construction manager is responsible for the management and coordination of design and construction works, encouraging teamwork and ensuring 'buildability' is considered at an early stage.
- In June 1999 the Treasury recommended that this route should only be used where there is a very clear value for money case for doing so.

Source: Audit Scotland

## Exhibit 5

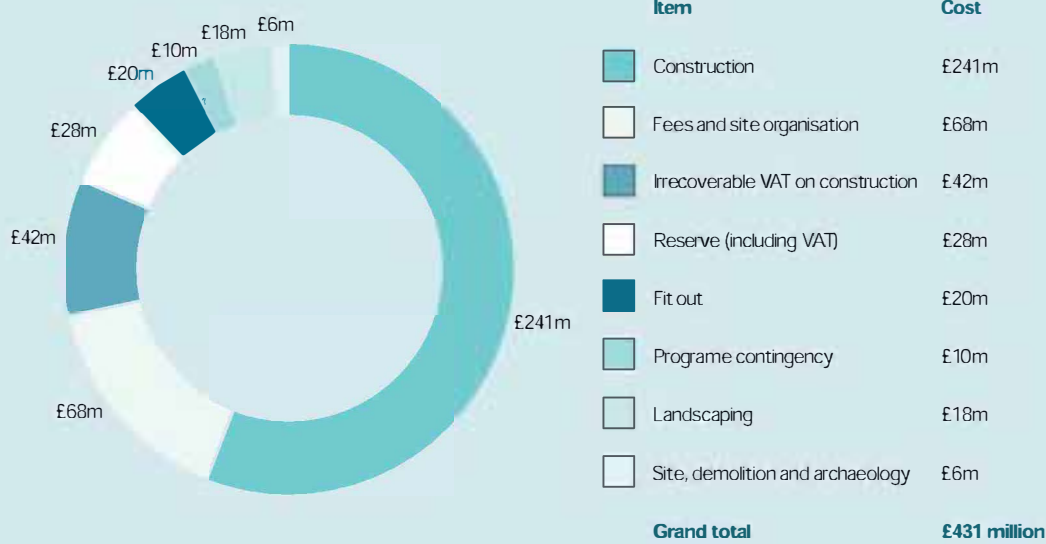
### Holyrood project costs reported to the Finance Committee 2000 to 2004



Source: Official Report

## Exhibit 6

### Holyrood project – analysis of current forecast costs



Source: Report to Finance Committee May 2004

**2.14** While it is likely that the buildings will be in a state capable of being partially occupied the risk is that by the current target for completion of August 2004 significant areas may be incomplete in other ways. Consequently the construction manager and the trade contractors may have to spend several months or even longer in the building continuing after handover to the client to complete unfinished works and snagging.

**2.15** The Corporate Body is implementing a migration strategy for users based on the assumption that there is enough time to complete construction to allow occupation and use of the building in the late summer 2004. The Chief Executive established a dedicated implementation team of staff to promote effective planning and delivery of the move to the new building. There is close coordination between the Holyrood project team and the consultants with the new implementation team.

### In summer 2000, compared to earlier difficulties, there seemed a firm basis for the Holyrood project to move forward

**2.16** In September 2000 I reported the significant challenges that had previously affected the project:

- Concerns in 1998 and 1999 about the overall size and consequently the cost of the initial designs.
- Uncertainty about cost estimates throughout 1998, 1999 and early 2000, with predicted costs which consistently exceeded the approved budget.
- Major changes in the requirements for the area and layout of parts of the building, with the client unable to freeze its requirements and consequently the design until June 2000.

**2.17** At the time of my September 2000 report on the management of the project, construction was at a comparatively early stage. Construction of the MSP building frame had commenced but the main

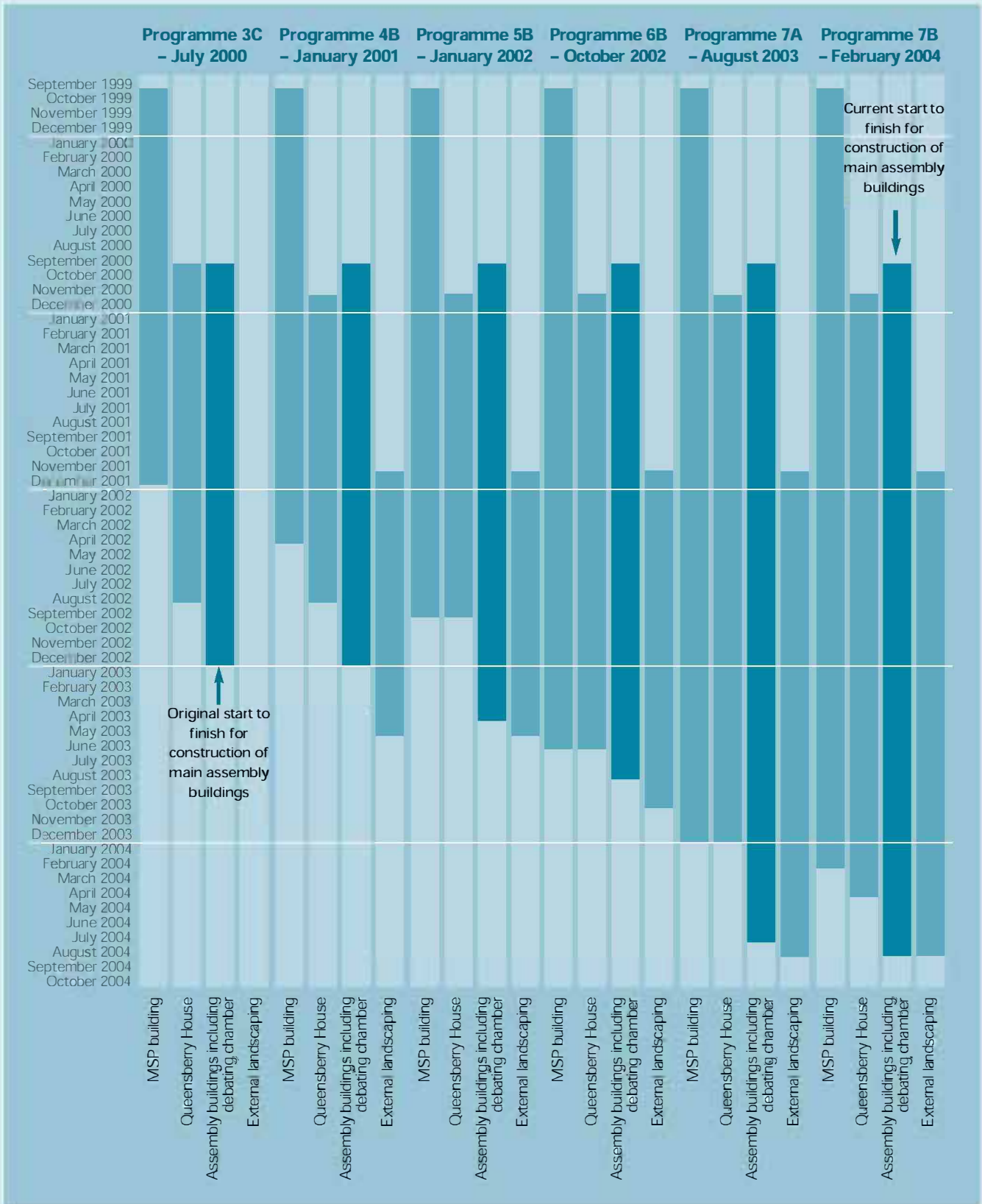
assembly building structure to the east of the site was not 'out of the ground'.

**2.18** In September 2000, however, while much remained to be done to ensure completion, there seemed a firmer basis for the project to move forward:

- In June 2000 the Corporate Body as client had approved the final scheme design proposals from the design team (known as the 'Stage D' report).
- The Corporate Body had selected the members of the new Holyrood Progress Group, with a remit to work with the progress of the project, and the Group had started its business.
- The Corporate Body approved the Stage D design on the basis of confirmation from all the main parties that the building could be completed by the end of 2002 within a target construction cost of £108 million (£119 million including construction contingency). This figure was

### Exhibit 7

#### Holyrood – main programme revisions 2000 to 2004



Note: Programme 3C did not include external landscaping

Source: Audit Scotland

## Exhibit 8

### AGS 2000 recommendations on risk and cost control

AGS recommendation, September 2000	Accountable Officer response, October 2000
<p>Project management should instruct the construction manager and the cost consultant to prepare as soon as practicable a risk analysis, which should identify all remaining risks to the project and their potential impact on costs and deadlines. This analysis should take account of the main risks identified in Part 1 of this report and quantify the most likely outcomes as well as best and worst cases. The results should be the basis for an action plan to manage the remaining risks.</p>	<p>Accepted, currently in progress</p>
<p>Project management should look again at the overall cost provision in the light of the risk analysis. They should ensure that, in accordance with good practice, there is a proper, separate allowance for risk in the estimate.</p>	<p>Accepted, currently in progress</p>
<p>Project management, the design team and the construction manager must agree a cost plan taking account of risks and uncertainty, to provide an effective basis for managing the remaining stages of the project.</p>	<p>Done, as part of routine management</p>

Source: AGS report September 2000 paragraph 27; evidence to the Audit Committee October 2000

consistent with the Parliament's overall budget of £195 million, which the Parliament had established in its April 2000 resolution<sup>7</sup>.

**2.19** In my September 2000 report I made several recommendations to help ensure that the Scottish Parliament building would be delivered on time and within budget. These included three recommendations on the management of risk and the control of overall project costs. In evidence to the Audit Committee in October 2000 the Corporate Body's Accountable Officer indicated acceptance of these recommendations, which he stated were being implemented (Exhibit 8).

**2.20** In November 2000, shortly after the AGS 2000 report, Mr Alan Ezzi took up his appointment as the Holyrood project director, following an open recruitment competition<sup>8</sup>. The purpose of this key position is to

act as the single focal point for day-to-day management of the Parliament's interest in the project, with responsibility for securing the delivery of the project to programme, within budget and to the specified quality.

**2.21** Despite these promising signs the project was to encounter significant difficulties over the following three years, as analysed below.

#### **There was at best only qualified agreement of the necessary cost plan in November 2000**

**2.22** From inception in June 2000 the Progress Group generally met at least every fortnight to fulfil its remit on behalf of the Corporate Body and the Parliament. In July, August and September 2000 the Group discussed, amongst other matters, the overall forecast cost of the project and ways of controlling this. In July 2000 the Group examined and

discounted as expensive and impracticable the option of abandoning the construction management contract and entering some form of guaranteed maximum price contract of a means of transferring risks to a contractor. The Group concluded the existing contractual arrangements were satisfactory.

**2.23** In August and September 2000 early tender results for some works packages were available which were more costly than had been forecast. The Group decided that the design team, the construction manager and the cost consultants must agree a cost plan urgently. The cost plan was needed to translate the overall construction cost approved at Stage D in June 2000 into more detailed, individual cost allowances, to allow each component trade contract package to be controlled. Preparation of the cost plan had commenced in March 2000 but the parties had not reached the necessary agreement.

<sup>7</sup> Official Report 5 April 2000: That the Parliament notes the report of the Scottish Parliamentary Corporate Body on the Holyrood project; approves its terms, and directs the Corporate Body to establish a progress group comprising representatives of the Parliament and relevant professionals to work with the Corporate Body to (a) finalise the design; (b) complete the project by the end of 2002 within a total budget of £195 million and (c) report regularly, or as from time to time may be required, on progress including on expenditure to date and estimated completion costs to the SCPB and to members.

<sup>8</sup> The appointment followed the departure of the previous project sponsor, Mrs Doig, in May 2000. Dr John Gibbons, the chief architectural advisor and a member of the Progress Group, had filled the project director post temporarily from May to November 2000.

**2.24** Discussion of the necessary cost plan by all parties in Autumn 2000 highlighted uncertainty and cost difficulties. In particular, for many packages there was insufficiently detailed design information to allow the necessary costings to be done with confidence (Exhibit 9 overleaf).

**2.25** The cost consultant and the construction manager's independent measurement of the gross area of the design also revealed an additional 2,200m<sup>2</sup> and 2,400m<sup>2</sup> respectively (7% and 8%) compared to 30,600m<sup>2</sup> which the architect had reported (and the client had approved) for the Stage D design (Exhibit 10 overleaf).

**2.26** Uncertainty about detailed design information and therefore costs is unavoidable at design approval (Stage D) but the scale of uncertainty in this case appears to have been comparatively high. To deal with the uncertainty the construction manager recommended that the cost plan should be adopted only on the basis that allowances within it were strictly regarded as target rates or budget ceilings, within which the design team should be required to work.

**2.27** Despite the uncertainty initial contract tender values subsequently came in close to – on average some 5% above – the cost plan estimate after allowing for inflation. However the eventual final contract values were substantially – on average 92% – above the cost plan estimate.

### **In November 2000 estimated risk was significantly more than the available budget**

**2.28** In October 2000, in accordance with my recommendation (Exhibit 8), the project team instructed the cost consultant to organise a risk workshop with the participation of all main parties. Similar workshops had previously taken place in 1998 and

1999, which identified risks but did not quantify their potential cost. The workshop in October 2000 for the first time placed monetary values against each identified risk. The cost consultant reported these values in November 2000, producing a total estimated risk cost of some £61 million (£51 million excluding VAT).

**2.29** The purpose of the risk workshop was to provide a management tool to monitor and help control project risks. The £61 million was the combined impact of the identified risks, if they were not controlled or managed effectively. It was significantly higher than the £11 million contingency provision associated with the £108 million construction cost within the £195 million target approved by Parliament.

**2.30** Although by definition risk is uncertain, some 70% of the risk identified by the October 2000 workshop was for items that were categorised as 'highly likely' ie, assessed by the workshop members as having at least a 95% probability of occurring. Each of these items carried with them varying levels of likely impact on programme. Moreover the risk evaluation did not attempt to evaluate the monetary value attached to the risks to the time schedule. If it had it would have added further risk cost.

**2.31** Despite these results project management and the Holyrood Progress Group seemed to be of the view that the project could be completed within the available budget. In November 2000 the Progress Group reported to the Corporate Body that the risk assessment had been completed and that the design team had been instructed to work to manage those risks they could control within the available budget.

**2.32** One obvious risk affecting the cost plan was the impact of inflation. Combining the £108 million construction cost target with the £11 million contingency gave a total target provision for construction of £119 million. At the time of my September 2000 report project management considered that £119 million was a cash limit within which the contract costs must be maintained. However, my September 2000 report noted the £108 million derived from cost estimates based on constant March 1998 prices. It therefore excluded inflation over the subsequent period to completion in December 2002, ie, almost four years. My September 2000 report had estimated inflation could add conservatively 10% (£11 million) on to estimated costs. In November 2000, as part of the risk workshop noted above, the cost consultant estimated inflation could add £13 million.

**2.33** Although £11 million contingency was available within the budget to meet construction cost inflation it also was required to meet all other construction risks, which were significant.

**2.34** These cost difficulties were not decisively resolved between the parties. In November 2000 project management reported to the Progress Group that all consultants had agreed the £108 million package cost plan subject to the availability of £11 million contingency. Despite this agreement the £119 million construction costs was not used as the basis for calculating payments to the consultants, except in one case, which indicates there was no strong agreement between the parties on construction costs:

- As an incentive to contain costs and deliver within budget all of the consultants' fee remuneration

## Exhibit 9

### Uncertainty in the November 2000 cost plan for the Holyrood building

Uncertainty about building details and therefore costs is unavoidable at design approval stage for any building. However the scale of uncertainty affecting the Holyrood project appears to have been high.

An unfortunate fact is that the Enric Miralles, who had lead responsibility for the architectural design, had died in July 2000, shortly after the client approved his proposals.

In Autumn 2000 the design of the new Parliament building was comparatively undeveloped. Although Stage D designs had been approved the necessary more detailed information in many areas was not available.

For example, for parts of the site the only drawings indicating construction proposals were at 1:250 and 1:200 scale while procurement of the work generally required drawings at 1:20 or 1:10 scale to allow the necessary construction details to be specified clearly.

The degree of detailed information available at this stage varies from project to project but it is not unusual to have plans and drawings at substantially larger scales than 1:200.

The cost plan estimates agreed in November 2000 for Holyrood consequently reflected a high degree of uncertainty. The cost plan included a large number of lump sum allowances, where there was insufficient detail to establish either a quantity or a cost rate.

Where quantities could be established they were often broad brush, particularly with regard to buildings to the east of the site where the design was least fully developed.

An example of this is *Assembly roof building – roof structures and finishes*. From the design this roof had a measured area of 3,816m<sup>2</sup>, and the cost plan included some £3.816 million for the whole item ie, the estimated roof area costed at £1000/m<sup>2</sup>. This item was assumed to include components such as the support structure, upstands, waterproofing, thermal circulation, cladding, flashings, walkways, eaves details and fascias. Because there was no specification of these individual elements there was no indication of the allocation of the £1000/m<sup>2</sup> between them.

Source: Audit Scotland

## Exhibit 10

### Estimated area of the Holyrood building

Source	Estimated gross internal area
Architect's Stage D report June 2000	30,600 m <sup>2</sup>
Calculated by the cost consultant from Stage D drawings, August 2000	32,800 m <sup>2</sup>
Calculated by the construction manager from Stage D drawings, September 2000	33,000 m <sup>2</sup>

Source: Audit Scotland



was linked to varying degrees to a calculation of the approved construction cost rather than the eventual outturn cost<sup>9</sup>.

- In August 2000 project management did agree a professional fee cap with their structural engineer consultants, based on £108 million construction cost. The fees to the structural engineers (including the negotiated costs of later, additional services) total £4 million, 8% of the total fees expenditure of £50 million.
- However project management did not agree a professional fee cap based on construction costs with any other consultants until 2003, when estimated construction costs were significantly higher.

### **By June 2001 the Corporate Body had concluded the £195 million target was not achievable**

**2.35** In January 2001 project management advised the Progress Group on the tender results for major parts of the new building including the assembly building concrete frame and the MSP building cladding and roof. Tenders were over the cost plan budget. Taking account of this and other cost pressures, the Group required the design team and the project director to complete a site wide savings exercise. The objective was to reduce construction costs whilst maintaining overall quality and functionality.

**2.36** In February and March 2001 various savings options were identified and evaluated. Changes with an estimated value (potential savings) of some £3 million were instructed but the client rejected

others valued at £2 million as compromising the integrity and/or the quality of the design.

**2.37** The process of seeking and evaluating construction cost savings showed substantial tensions between the Progress Group, the project director, the design team and the cost consultant, particularly with regard to the budget for construction costs.

- In April 2001 the project director advised the Progress Group that in his opinion the range of outturn costs for the project taking into account inflation and risks would be £211 million to £249 million ie, between 8% and 28% higher than the £195 million project cost target.
- Also in April 2001 the Progress Group informed the Corporate Body's Accountable Officer of its mounting concerns about the effectiveness both of the design team and of project management in working together to deliver on budget and programme and respecting the client's requirements.

**2.38** In May 2001, with the advice of the Progress Group, the Accountable Officer started regular meetings with the principal members of his consultant advisors to help manage the project. The Progress Group was concerned about poor coordination, evidence of misunderstanding of responsibilities with regard to cost control and whether there was sufficient resource devoted to the project. The Group also questioned the effectiveness of the relationship between the project director, the architect and the cost consultant. In the Group's opinion there was a need for the team to be welded back

together and for project management to act as a catalyst for improved coordination and joint working.

**2.39** The Accountable Officer considered that the 'principals' meetings' with his consultants improved the atmosphere. However he and the Progress Group were concerned about continued apparent weaknesses in coordination of the design work and in their view severe shortcomings in cost information, particularly with regard to design proposals received in May for the foyer roof<sup>10</sup>. The Group questioned the effectiveness of the project director and in June 2001 advised the Accountable Officer that it had lost confidence in him. The Accountable Officer concluded the situation was irretrievable and agreed with the project director that he would leave the project before the end of his contract.

**2.40** The Accountable Officer immediately appointed a new project director in June 2001. There was no competition for this post, because the Accountable Officer judged that a recruitment exercise would result in this critical post being vacant at a critical time, and a candidate considered suitable, Miss Sarah Davidson, was available immediately. The new project director was appointed, like her predecessor, as the single focal point for day-to-day management of the project. The Accountable Officer changed the previous requirement that the post holder should have substantial experience in managing major projects. Instead roles and responsibilities within project management were adjusted to provide the project director with additional professional and technical support. The client adviser's role was extended to act as the main contact

<sup>9</sup> The precise mechanism varied in accordance with individual contracts. The entire construction manager fee was a percentage of project cost, which was convertible to a fixed lump sum on agreement of the cost plan. The fee for the design team members was a percentage of contract cost, with around 60% of the total fee based on the approved cost at intermediate stages before construction commenced.

<sup>10</sup> The cost consultant's view is that project management did not relay critical Progress Group opinion and it took it as read that project management understood the cost issues it had reported.

between the project director and the design team on technical matters.

**2.41** Regarding progress on site in 2000 and early 2001, the design and construction method was that work was to commence on the west side of the site (the MSP building). It was then to proceed to Queensberry House and finally to the assembly buildings (the debating chamber and committee towers) to the east of the site. Construction had started in 1999 and continued to progress during late 2000 and 2001.

- In December 2000 work on demolition and reconstruction of Queensberry House commenced.
- In January 2001 the MSP building was 'topped out', indicating the frame of the building had reached its fullest height. In the same month winning tenderers for both the MSP cladding package and the MSP roof package were selected.
- Also in January 2001 the major contract for the construction of the assembly building frame was approved, and work on the substructure for the eastern part of the site was well advanced.
- In February 2001 the Progress Group recommended approval of the Stage D design of the landscape scheme associated with the new building<sup>11</sup>.

**2.42** In March and May 2001 the whole project team completed three more risk workshops, as in October 2000 providing estimated risk costs. The estimated additional design and construction risk including fees and forecast inflation costs was similar each time, in the range £46 to £49 million including VAT.

**2.43** In May 2001 the Progress Group reported their conclusions on

risk to the Corporate Body. Without specifying any alternative single figure for the total cost of the project the Group demonstrated that risk could significantly increase costs compared to the existing budget of £195 million. Even setting aside the overall impact of inflation and risk allowances above the contingency, it stated the project was likely to exceed the budget by up to £24 million; the total excess depended on assumptions, which the Group considered were imprecise and imponderable.

**2.44** The Group did not suggest the Corporate Body seek a new capped figure from the Parliament. It advised instead that Parliament be invited to note the current position and the relevant variables. The Corporate Body was invited to seek authority from Parliament that the project should proceed on the basis of regular reports to the Finance Committee on budget, to inform the Committee's consideration of the annual budget process.

**2.45** The Group's main reason for not proposing a new capped total project cost was that it would be misleading to suggest a high degree of certainty about cost was possible. The Group considered a new cap figure "would show our hand both to potential tenderers and to the design team just at the very time we are endeavouring to keep the latter buckled down to working within budget."

### **In June 2001 a fresh Parliamentary motion relaxed the earlier budget and completion targets**

**2.46** In June 2001, based on the Corporate Body's report and recommendation, Parliament approved a motion, which can be interpreted as removing the previous overall budget constraint of £195 million (Exhibit 11).

### **The procurement of works changed radically because of programme pressures in 2000 and 2001**

**2.47** Much of the Progress Group's and the Corporate Body's main focus during 2000 and the first half of 2001 was on design and cost issues. However important programme issues also arose, including:

- Slippage in the production by the design team of necessary design information to allow procurement of individual works packages to proceed according to plan. This was a particular concern affecting the east side of the site, where the most complicated parts of the building were to be constructed.
- Delays and re-sequencing of the planned programme for Queensberry House arising from unforeseen structural and conservation issues affecting its design. Issues included whether it would be necessary to reconstruct the Belvedere Tower, and questions about the height of a critical building element, the wallhead.

**2.48** In December 2000 the construction manager's strategic programme review (based on programme series 3 issued in July 2000) highlighted the likely impact of delays and slippage across the project. Consequently the construction manager prepared and project management approved a revised programme 4, to be consistent with the previously approved December 2002 completion date.

**2.49** In accordance with the client's desire successive versions of programme 4 continued to target completion of the main buildings (including the debating chamber) by December 2002. This was within a

<sup>11</sup> At that time the necessary land was in the ownership of Historic Scotland. Subsequently the Corporate Body and Ministers agreed that the title for this land should transfer to the Parliament. This brought responsibility for ownership of the land, approval of the design of the landscape works and control of costs within one body.

## Exhibit 11

### The Parliament's Holyrood resolution 21 June 2001

That the Parliament notes the terms of the Scottish Parliamentary Corporate Body's (SPCB) report of 13 June 2001; notes that £60 million of the construction costs for the new Parliament building has been committed to date and that a further £57 million (at 1998 prices) remains to be let; further notes that building industry inflation is currently estimated to be adding at least 16% to the costs of packages remaining to be let and that under the construction management contract there are additional and not fully quantifiable risks to which the project may be exposed between now and completion; directs the SPCB, through the Holyrood Progress Group, to work with the design and project teams to complete the project without compromising quality, while managing risks rigorously, and requires the SPCB, on a quarterly basis, to provide information to the Parliament's Finance Committee on the progress of the project in respect of inflation and materialisation of risk in order to inform the committee's consideration of the annual Budget Bill.

Source: Official Report

compressed programme, which the construction manager emphasised was conditional upon all parties achieving specified actions by specified dates.

**2.50** It was accepted that the landscaping work, which was not critical to occupation, could extend to April 2003. After construction of the main buildings was complete there would need to be more time for fitting them out. This work too was proposed for the period between December 2002 and April 2003. This would permit occupation of the new Parliament around the time of the elections due in May 2003.

**2.51** In August and September 2001 the construction manager reported to project management that the programme 4 target of completion by December 2002 could not be achieved. This took into account continuing slippage in the supply of some design information, difficulties arising from the underperformance of one contractor responsible for cladding on the MSP block and particular design issues on some packages, for example the complex

engineering in the debating chamber roof. Project management instructed the construction manager to investigate the feasibility of a revised programme, later issued as programme 5, which would mitigate the delay to a more acceptable April 2003 completion target for the debating chamber. Programme 5B targeting completion of construction by April 2003 was duly approved and issued in January 2002 (Exhibit 12 overleaf).

**2.52** The pressure to maintain the programme resulted in significant changes to the procurement of works contracts. The original procurement plan was conventional. It was to tender and award each construction works package in a single stage, based on tender/design information produced by the design team.

**2.53** In 2000 and early 2001 project management approved a range of mitigation measures recommended by the construction manager, in an attempt to maintain the planned completion date. The mitigation measures changed radically how package contracts were to be

designed, procured and managed. The particular methods chosen varied at different times, but over the whole life of the project have included:

- Using large 'provisional sum'<sup>12</sup> allowances to enable packages to be tendered and awarded earlier than would otherwise be possible because of incomplete design information.
- Extending the responsibility of trade contractors for design, to varying degrees, thereby reducing the overall workload for the design team. Some contractors were required to finalise detail design only, within a concept design from the design team. In other cases contractors had also to finalise the development of the concept design.
- Associated with trade contractor design, using 'two stage' tenders for a few selected packages. At the first stage tenderers were invited to price work where design information was sufficient and appointed on that basis. At the second stage

<sup>12</sup> A provisional sum is a sum provided for work or for costs that cannot be entirely foreseen or detailed when the tender documents are issued to contractors.

## Exhibit 12

### Slippage in programmes 4 and 5 in 2001 and 2002

#### Programme 4 – December 2000 to March 2001

Between December 2000 and March 2001 the construction manager prepared a revised programme 4 in successive versions 4A, 4B and 4C.

Programme 4 incorporated mitigation measures and all parties were required to commit to achieving specified actions by specified dates. On this basis the construction manager forecast that completion of the assembly building could be achieved on target in December 2002.

However, while main construction was targeted to finish by this date, fit-out, landscaping and commissioning works would need to extend to April 2003 before the building could be entirely handed over to the client.

Also construction completion by December 2002 was conditional upon key design information for three cladding and glazing packages being released on 12 February 2001, which was not achieved.

In August and September 2001 the construction manager reported to project management that programme 4, approved at the start of 2001, was no longer achievable. This took into account continuing slippage in the supply of some design information, difficulties arising from the underperformance of one contractor responsible for cladding on the MSP block and particular design issues on some packages, for example the complex engineering in the debating chamber roof.

The construction manager advised that even if all the outstanding design issues were resolved without delay completion based on programme 4 would be November 2003. Project management instructed the construction manager to investigate the feasibility of a revised programme, which would mitigate the delay to a more acceptable April 2003 completion target for the debating chamber.

#### Programme 5 – September 2001 to January 2002

Between September 2001 and January 2002 the construction manager issued programmes 5A and 5B. They proposed a revised procurement programme and other revisions to achieve the April 2003 completion target.

Source: Audit Scotland

## Exhibit 13

### Audit findings on the Flour City contract

- Because of the termination of the Corporate Body's contract with Flour City Architectural Metals (UK) Ltd (Flour City) in October 2001, Audit Scotland examined the contract as part of my audit of the Corporate Body's accounts for 2001/02.
- In the Flour City contract I was concerned about the Corporate Body's reliance on interim contracts and the absence of a thorough financial assessment of Flour City at key stages. The audit questioned the effectiveness of the selection procedures in that case and highlighted that the full trade contract with Flour City was not secured until August 2001, almost eight months after post tender negotiations started and only two months before the Corporate Body terminated its contract in October 2001.
- My audit showed that at that time similar risks – the use of interim contracts and delays in securing performance bonds and parent company guarantees – affected many other packages.
- In September 2002 I informed the Accountable Officer of what I considered then were the key concerns emerging from this work. He accepted that some interim contracts were allowed to continue long after trade contracts should have been finalised and that there were significant delays in obtaining some performance bonds and parent company guarantees. Fortunately, except in the Flour City case, none of the risks implicit in this situation appeared to have crystallised. Following my audit the Accountable Officer took action to ensure that where necessary full contracts, bonds and guarantees were put in place and to prevent similar risks arising again.

Source: *The 2001/02 Audit Of The Scottish Parliamentary Corporate Body*, Auditor General for Scotland, December 2002

the successful tenderer from the first stage was invited to provide a single tender for the remaining second stage work, once the necessary design information had become available. This allowed an earlier start on the initial works than otherwise would be possible.

- Re-scoping selected packages, meaning that work planned to be tendered was awarded by negotiation with contractors already appointed and working on site, thereby saving time otherwise required to complete the competition, appointment and contractor mobilisation processes.
- Revising the order of procurement of packages, to allow a small number of large critical packages to be progressed at the earliest possible dates. Re-sequencing and reducing the time allowed for some critical activities.
- Increasing use of letters of intent and interim contracts to allow works to start at the earliest possible date, before a full contract and commercial terms have been agreed.

**2.54** My audit of the Corporate Body's accounts for 2001/02 examined questions arising from the use of letters of intent and interim contracts to allow works to start at the earliest possible date. I examined these matters because of the termination of one contract (Flour City) in October 2001 (Exhibit 13). Otherwise I consider the effectiveness and propriety of the various mitigation measures noted above in Part 5 of this report.

**2.55** The construction manager advocated other strategies to promote delivery of the project on time and cost. In particular the construction manager requested a design freeze at critical points, the earliest in July 2000 (for the critical east frame package only), to avoid disruption and slippage from revisiting of designs once approved by the client.

**2.56** These various mitigation approaches were introduced to support completion of the programme by December 2002, in accordance with the construction manager's revised and compressed programme 4 issued in January 2001.

**2.57** In May and June 2001 respectively the Progress Group reported to the Corporate Body and the Corporate Body reported to the Parliament on the overall progress of the project. Neither offered any commentary on the prospects for completion of the project against the target of December 2002 other than it was on the advice of the construction manager. However in August and September 2001 the construction manager reported to project management that the programme 4 target of completion by December 2002 could not be achieved.

#### **As construction intensified in 2001 programme monitoring and coordination became more important**

**2.58** By December 2001, although delays had affected almost every package, project management had on the advice of the cost consultant and the construction manager approved tenders for 33 works package contracts (out of the total of some 60 construction works contracts for the project). This included tender recommendations

for 15 out of the 20 main construction contracts for the Holyrood project (Exhibit 14). The total value of work awarded by December 2001 was £98 million, 78% of the total estimated final construction cost at that time excluding risk.

**2.59** In October 2001 there were tensions between project management and the architectural joint venture about design management and coordination. The three partners of the architectural joint venture had disputed their respective roles in relation to design matters, and project management considered the dispute was interfering with the progress of the design work. Project management required the joint venture to vest responsibility and authority for the control of design delivery to a single named director. After exchanges involving legal advisors on both sides, the parties agreed specific roles and responsibilities within the joint venture for management of the design process, which satisfied the project management's requirements for clearer direction and control.

**2.60** In October 2001, partly in response to the project slippage, project management and the Progress Group concluded additional resources were required to allow project management to increase monitoring, manage change and provide information and decisions within a compressed timetable.

**2.61** Between October 2001 and February 2002 project management roles were redefined. In November 2001 project management commissioned Turner Townsend Project Management to examine its organisation and make recommendations. Taking account of Turner Townsend's recommendations three extra full time project managers joined the

client's project management team between July 2001 and March 2002 (although in January 2002 one project manager also left the team). In addition three other project managers and a forensic programmer were made available to the team part time, as the need arose from December 2001.

**2.62** Between November 2001 and February 2002 the forensic programmer investigated the basis of the construction manager's programming recommendations, and sought improvements both in resources dedicated to this work and the methods of analysis.

**2.63** In addition to these increases in project management resources two roles that Turner Townsend had identified as desirable were filled from existing resources:

- A cost consultant to ensure the delivery of a robust cost plan, and manage the cost dimension of the project's risk register – a member of project management assumed this role.
- A design manager, to oversee the production of design information, and manage and coordinate the design change and approval process – one of the architectural joint venture's partners agreed to undertake the duties of design team manager.

### **Cost and time problems caused the Corporate Body to consider stopping the project to take stock in November 2002**

**2.64** During 2002, the Progress Group's main focus was its concerns about the continuing difficulties with slippage from cost increases, combined with its dissatisfaction at the quality of cost and programme information it was receiving.

**2.65** In March 2002, completion was targeted for April 2003 under programme 5 issued the previous autumn. However the Progress Group had real and deep concerns about achievability within this timescale. It was dissatisfied with the construction manager mainly for providing, in the Group's view, optimistic programming advice. The construction manager's view is that its programming always sought to meet the client's desire to achieve the earliest possible completion date based on assurances and commitments given to it and the client by the design team and trade contractors.

**2.66** In June 2002 the Group noted with alarm the level of additional risk in the latest cost review led by the cost consultants. Risk workshops and cost reports in the subsequent months confirmed the forecast of a significant increase in potential project costs, potentially another £34 million. In March the Corporate Body had reported to the Finance Committee a £6 million increase in potential project costs to £265 million<sup>13</sup>. The Group was dissatisfied with the cost consultants for, in the Group's opinion, not managing costs effectively<sup>14</sup>.

**2.67** Also in June 2002, in consultation with the Progress Group and project management, the Corporate Body concluded the next quarterly report to the Finance Committee due the same month would exclude the risk figures. This was because the figures were uncertain and the Corporate Body would provide updated figures in the next report due in September. The Corporate Body's report to the Finance Committee in September indicated a potential increase in maximum costs to £295 million<sup>15</sup>.

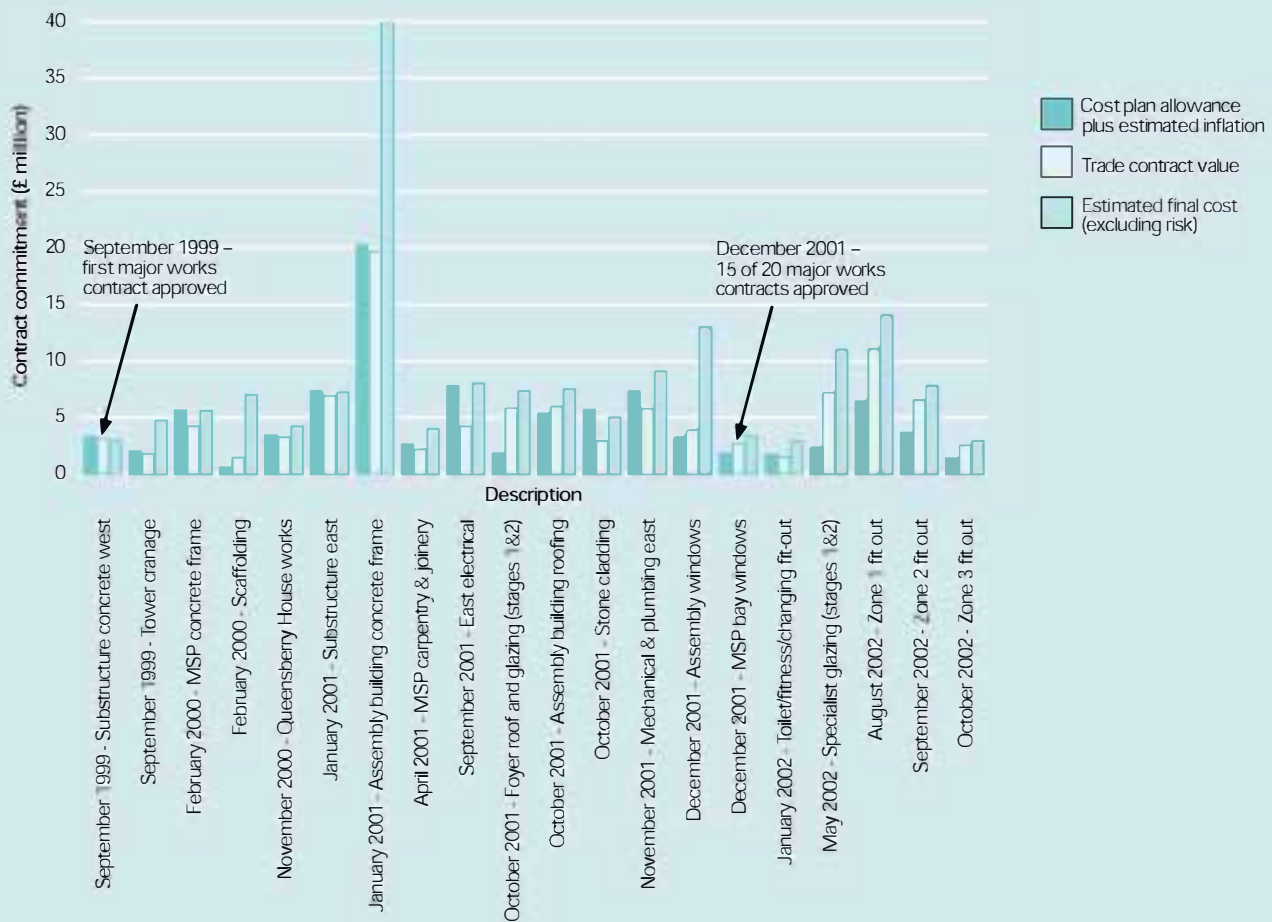
<sup>13</sup> Excluding £14 million landscaping costs.

<sup>14</sup> We discuss the roles and responsibilities in Part 5, including responsibility for managing costs.

<sup>15</sup> Excluding £14 million landscaping costs.

## Exhibit 14

### Tender approval for 20 main Holyrood construction contracts



The Exhibit shows the timing, scope and cost of the 20 highest cost trade contracts for the Holyrood building. These contracts together are now estimated to cost £177 million, 78% of the £226 million total construction cost excluding risk.

The date of project management's acceptance of the tender recommendation is only an approximate measure of the timing of the decision to proceed with each contract. In many cases project management issued letters of intent to the contractor to allow work to start as soon as possible and full contracts were not agreed until months after tender approval, while commercial terms were finalised.

The estimated cost in each case is from the cost consultant's reports to project management in 2004. In some cases estimates at the time of tender recommendation were different, because of subsequent increases or reductions in the expected scope of the work in each case.

Source: Audit Scotland

**2.68** In October 2002 project management approved programme 6B for issue, aiming for completion of the debating chamber by June 2003. In earlier drafts the construction manager had suggested November 2003 was more realistic but after presentation to the Progress Group project, management had requested measures to better this date. Programme 6B as issued did forecast June 2003 completion, but remained heavily qualified (Exhibit 15).

**2.69** In November 2002 the Progress Group had advice from the construction manager calling for fundamental changes to the production and management of design information by the design team. At the same time the architectural joint venture provided a rebuttal of this. Project management continued to question how well resources were being targeted in all areas of the project.

**2.70** In November 2002 project management and the Progress Group briefed the Corporate Body on progress with the project. Further increases in potential project costs were expected.

**2.71** In December 2002, in the light of the difficulties facing the project the Corporate Body discussed three possible courses of action: stopping the project; instructing a further 'Spenceley' type review; and putting a cap on costs. The Corporate Body was concerned that no one knew what was happening, when the project would be complete and how much it would cost.

**From January 2003 the aim was to complete the project as quickly as possible as the best way of containing costs**

**2.72** Previously, in October 2002 the cost consultant had advised the

Progress Group that the main risks to costs was associated with timing issues. The Progress Group and project management advised the Corporate Body that the cost consultant's advice was that the biggest single risk to cost was delay and the aim should therefore be to drive the project forward to the earliest possible completion.

**2.73** In December 2002:

- The Corporate Body reported to the Finance Committee that the estimated project costs including potential risks costs had increased to £311 million<sup>16</sup>. This was 14% more than the maximum £274 million potential cost reported to the Committee in January 2002
- With regard to the programme, the latest completion target (programme 6B final) was June 2003 (albeit in the same month the Corporate Body had already reported to the Finance Committee that some important areas could not be completed until August 2003).

**2.74** Just a month later, in January 2003, the cost consultants advised that the most likely outturn was £324 million<sup>17</sup>. Because of the problems with the project the Progress Group considered project management should seek to clarify the management structure of the design team, and to give the construction manager a lead role in driving progress forward.

**2.75** In subsequent months the construction manager continued to suggest a range of measures to improve project management and design team effectiveness, in the interests of achieving the programme and cost objectives. Actions included, for example:

- In January 2003 the design team introduced twice weekly

meetings to resolve design issues, with participation from both project management and the construction manager.

- Project management requested that the architectural joint venture provide a named deputy for its lead partner responsible for oversight of design, to expedite decision-making when necessary.
- There was renewed emphasis on priorities and identifying and resolving detailed design related and interface/interdependency issues, as part of the continuing programme monitoring and review process. In April 2003 at the construction manager's suggestion, project management wrote to all parties seeking to impose a 'design freeze' on all packages at the end of that month.
- Monitoring of individual trade contractors performance, including initiatives to step in and assist management where necessary.

**2.76** In April 2003 construction activity on site was starting to peak. There were 1,100 people working on the site, including trade contractors and their suppliers, project management and representatives of all the consultants.

**2.77** Also in April 2003, however, the construction manager reported that progress was four months behind programme 6B final issued in January 2003. A new and final programme 7 was therefore required to be prepared and agreed. Programme 7 was first prepared in May 2003 and issued in August 2003. The May 2003 draft programme sought completion by September 2003, but when the final version was issued in August 2003 the agreed target for completion of the debating chamber was April 2004. This was ten months later than the June 2003 target for

<sup>16</sup> & <sup>17</sup> Excluding £14 million landscaping costs.



## Exhibit 15

### Slippage in programme 6 in 2002

#### **Programme 6A interim May 2002**

This interim programme was extremely qualified. The construction manager stated there were too many impediments outstanding to predict a definitive date to completion. Design development was still ongoing, scope was changing and the construction manager and the trade contractors were not confident in supplying programme commitment.

The construction manager agreed with project management that the interim programme would be issued whilst more certainly was sought and commitment obtained from the design team.

#### **Programme 6B, for Queensberry House and the MSP building only, August 2002**

Although the construction manager anticipated that sufficient information would be available over the course of the following two to three months to enable it to produce definitive programmes, in the event this was not achieved. This issue was for Queensberry House and the MSP building only and these programmes were supplemented with a list of assumptions and programme risks. This programme referred to an April 2003 end date, highly qualified because of the extent of information and issues yet to be resolved.

#### **Full programme 6B issued for review September 2002**

This showed the debating chamber completing in August 2003 with overall completion in November 2003. This programme was presented to the Progress Group in October 2002, after which project management instructed the construction manager to put in place measures to better the debating chamber access date.

#### **Revised programme 6B issued October 2002**

This identified the debating chamber completing in June 2003. Again the programmes were highly qualified and were based upon the design team achieving critical dates. The programme also incorporated acceleration measures to a number of key trade packages.

The programmes for the MSP building and Queensberry House issued in August were in delay and had not been issued to the trade contractors. The construction manager agreed to prepare a second edition of the programmes, which would take account of further design development and trade contractor delay.

#### **Complete programme 6B final issued in December 2002 (to trade contractors in January 2003)**

With regard to the MSP building and Queensberry House the programme included instructions to accelerate the works, re-sequence the works and increase resources to achieve key dates, which would attract a significant cost premium. With regard to the more critical east side of the works at that time there were just six months to the forecast June 2003 completion of the debating chamber, and the construction manager reported a continuing trend of critical path slippage. In April 2003 the construction manager reported progress was four months behind programme 6B final.

Source: Audit Scotland

completion in the previous programme 6 and seven months later than the first draft programme 7A had proposed only four months previously (Exhibit 16).

**2.78** In May 2003 the cost consultants advised that because of the extension of time there would be significant additional project costs, as yet unquantified.

### **The First Minister announced an inquiry into the increasing costs and delay affecting the project in June 2003**

**2.79** In June 2003 the First Minister announced an independent investigation into the escalating costs and construction delays that are associated with the new Parliament building. Following discussions with the Presiding Officer, the First Minister announced that Lord Fraser of Carmyllie would lead the investigation (Exhibit 17 overleaf). There was a preliminary hearing in September 2003 and the Holyrood Inquiry commenced its main proceedings in October 2003.

### **Revised arrangements for cost reporting commenced in July 2003 and a fee cap was agreed in August 2003**

**2.80** In June 2003 the cost consultant estimated the additional costs could be some £37 million, assuming a November completion date. The Progress Group was dissatisfied with this advice, which would result in total project costs increasing to £359 million<sup>18</sup>. The Group was dissatisfied with how the costs had been reported, in its view the cost consultant appeared simply to have reacted to the new programme. The cost consultant's view was that everything was programme driven and every change had a cost attached. The role of the

cost consultant was to advise on costs but it did not give instructions. The cost estimates reflected huge change since January 2003 in how the site operated.

**2.81** The new Corporate Body<sup>19</sup> reported this increase in costs to the Finance Committee in June 2003. Reflecting its aim to be as transparent as possible, the Corporate Body commenced regular monthly reporting to the Finance Committee from that month. From July 2003 its reports on the costs of the project included landscaping costs, previously excluded.

**2.82** In July 2003 the Progress Group also instigated changes to the cost consultant's reporting of cost and risk. Hitherto the cost consultant had reported fortnightly to each meeting of the Group with a detailed, package-by-package estimate of cost excluding risk. While the cost consultant had also prepared separate estimates of risk costs, it had done so less frequently – on average every six weeks between March 2001 and July 2003. From the end of July 2003 the cost consultant provided an additional new report fortnightly to the Progress Group, detailing risk at a package-by-package level. The Group found the cost consultant's frank comments included in these reports helpful. It agreed these reports should not be issued to the design team or the construction manager because, if they were the comments may become less open.

**2.83** In July and August 2003 the Corporate Body reported to the Finance Committee on the progress of negotiations with the consultants to cap their fees. In summary project management negotiated agreements with each of the parties with the aim of ending the direct link between the consultants' fees and how much the

project would cost in total. At the time of preparing this report all the consultants had signed the necessary contract variation documents to formalise this change, with the exception of the architectural joint venture.

**2.84** We examine the value for money of the fee arrangements in Part 5 of this report.

### **Construction reached a peak in December 2003**

**2.85** On site, between August and December 2003 resolution of design issues, and site congestion and interdependencies continued to be the dominant considerations.

**2.86** There were continuing concerns with the performance of individual trade contracts, where work on individual critical packages was delayed with knock-on affects for other contractors. For individual contracts issues included, as illustrative examples:

- a lack of resources and delays in receiving necessary materials delaying work on the MSP building cladding
- a lack of resources delaying fit out works in Queensberry House
- difficulties in fitting windows preventing completion of stone and roof works by other contracts
- internal fit out being delayed by window installation delays.
- difficulties in finalising necessary design details for fixing bracketing for precast cladding panels
- a sub-contractor going into administration

<sup>18</sup> Excluding estimated landscaping costs of £14 million.

<sup>19</sup> From May 2003 the members of the Corporate Body were George Reid MSP (Chair), Robert Brown MSP, Duncan McNeil MSP, John Scott MSP and Andrew Welsh MSP.

## Exhibit 16

### Slippage in programme 7 in 2003

#### Programme 7A draft April 2003

The significant slippage identified in April meant a new programme series 7 was required. Programme 7A draft incorporated a 31-page schedule of issues to be resolved, package-by-package. The construction manager reported that completion of the debating chamber, now targeted for September 2003, was extremely ambitious.

In May 2003 project management wrote to the construction manager instructing them to release programme 7A in draft to trade contractors and to immediately report progress against this new programme. The basis for releasing the programme was that project management had got reassurances from the design team on their commitment to achieving its requirements. Project management highlighted that changes to the design at this stage would be unacceptable to the client "and the team must be focused on the delivery of the remaining design information and resolving the existing issues with trade package contractors".

In July 2003, immediately following discussion at a Progress Group meeting the previous day, the construction manager advised project management it could finalise milestone dates for the completion of the MSP building, Queensberry House and back of house areas, but not for the remaining elements of the project due to the degree of remaining key risks. The primary risk which the construction manager highlighted at that stage related to the specialist glazing package and its knock-on impact on all other trades.

#### Programme 7A final August 2003

After a review of the outstanding information and approval by project management, the construction manager issued the revised programme. It showed a revised completion date of the end of August 2004 with completion of the debating chamber in April 2004.

Therefore in the four months between the issues of 7A draft and final the programme for the debating chamber has slipped seven months, from September 2003 to April 2004. The reasons for this include a degree of continued design development, the construction complexity of the chamber and earlier programming optimism.

#### Programme 7B February 2004

Slippage on programme 7A became evident almost immediately. Consequently in February 2004 programme 7B showed a completion of the chamber in August 2004, which remains the target. In adopting this programme the construction manager continues to highlight the continued risks in issuing updated design information.

Source: Audit Scotland

## Exhibit 17

### Holyrood inquiry – First Minister's announcement June 2003

*Extracts from the Official Report Thursday 19 June 2003:*

**The First Minister (Mr Jack McConnell):** I thank the Presiding Officer for giving me the opportunity to make a statement today on my plans for an investigation into the Holyrood building project. ...

I consider that an independent investigation into the escalating costs and construction delays that are associated with the new Parliament building should be initiated because the Holyrood building project, more than any other issue, overshadows the many real achievements of this young Parliament.

Following my discussions with the Presiding Officer, I announced last week that Lord Fraser of Carmyllie has agreed to investigate the matter on our behalf. I am today making public the remit for the investigation, which I have agreed with the Presiding Officer, Lord Fraser and the Auditor General. ...

The investigation will review the policy decisions that were taken in relation to the project prior to and since its transfer to the Scottish Parliamentary Corporate Body on 1 June 1999. The investigation will build on the Auditor General's existing findings in respect of procurement strategy and cost control and contractual and project management arrangements and extend consideration of those issues to cover the subsequent stages of the project.

The investigation will produce a full account of the key decisions and factors that have determined the costs and value of the Parliament throughout the life of the project. It will also identify the lessons that are to be learned for the procurement or construction of major public buildings in the future.

The investigation will report to the Parliament and to ministers as soon as reasonably practicable, taking account of the Auditor General's intention to examine the economy, efficiency and effectiveness with which resources have been used at all stages of the Scottish Parliament building project.

Lord Fraser's report will be submitted to the Executive and the Parliament. The Auditor General's previously planned value-for-money audit will be presented to the Parliament as normal. The Parliament will determine its own processes for dealing with the report and the audit document, including such committee consideration and the calling of witnesses as is considered appropriate.

Source: Official Report

- additional work to roof lights and to the complex roof structure in the debating chamber, preventing removal of temporary access scaffolding within the chamber thereby delaying other work requiring access to the chamber.

**2.87** In October 2003 as construction approached its peak, the Progress Group and project management placed the highest priority on achieving the programme. The architectural joint venture raised concerns about quality suffering because of this. As an example of this, in October 2003 the architect proposed to remove and redo the stainless steel roof on tower 3 because the final appearance of parts of this roof did not meet what it had envisaged. The Progress Group rejected this proposal because the roof had been produced in line with its specification and the changes requested by the architect would cause unacceptable delay and extra costs.

**2.88** In December 2003 construction work was at its peak. There were 1,500 people on site every day. Substantial construction progress had been made;

- The MSP building was substantially complete, fully functional and serviced. Queensberry House was also substantially complete, although matters such as fitting some external doors, completion of plaster work and associated joinery and electrical work, completion of some flooring and decoration was outstanding.
- The progress on these buildings allowed resources to move across to complete work on the remainder of the site, including the debating chamber, the committee towers and the Canongate buildings. Here

external cladding, window and roof installation remained in progress.

**2.89** In November and early December 2003 the Progress Group noted its serious concerns regarding the performance of the design team. Project management was dissatisfied with the degree of cooperation achieved with the architects and their speed of decision making, which it considered was inhibiting the close down of packages and overall completion of the project. Because of the strength of these concerns the Chief Executive of the Corporate Body initiated meetings with the Chairman of one of the owners of the architectural joint venture. He obtained assurances in January 2004 that there would be improvements in resourcing to address the concerns about leadership of the design team. In February 2004 the Progress Group was advised that design team performance had improved.

**The current programme was agreed in February 2004 for substantial completion in August 2004 at a maximum cost of £431 million**

**2.90** By January 2004, although progress towards overall completion was substantial, slippage continued. The construction manager reported that there was delay of between two and nine weeks on every construction milestone within programme 7A and it was preparing programme 7B. The construction manager advised that the overall aim to complete construction by June 2004 remained feasible. But a new programme was required to allow work to be resequenced taking into account the latest information with regard to progress and resources available. Programme 7B concentrated on ten key package contracts that would critically affect completion.

**2.91** In February 2004 programme 7B (the current programme) was approved and issued. It aimed for completion of all areas excluding landscaping – which is not critical to building occupation – at the latest by August 2004. This included completion of the debating chamber by end July 2004. The programme was riskier than previously, because inevitably with a comparatively fixed end date there was less time to complete the same work. It increased the number of buildings to be worked on concurrently right up to the August completion date.

**2.92** In February 2004 advice from the cost consultant was that forecast costs would continue to increase, particularly from the extension of time arising from the movement from programme 7A to 7B. In its report to the Finance Committee in February 2004 the Corporate Body reported increases of £15 million in estimated construction costs including VAT plus an increase in the risk estimate of £14 million (including £2 million for landscape risks). The overall potential maximum cost of the project therefore increased from £401 million to £431 million.

**Ninety per cent of final accounts for construction remain to be finally settled**

**2.93** In April 2004 project management had approved or received recommendations for final account settlement for 21 contracts with a combined cost of £26 million. For some 90% of the construction work, therefore, final accounts have yet to be settled. The Corporate Body has also yet to settle final accounts with its consultants.

**2.94** Agreeing final accounts includes the process of negotiating:

- claims from contractors against the client for extra costs, for example as a result of delay outside the contractors' control or additional work
- claims for set off (reduction) by the client against contractors where the client has incurred extra costs because of the contractors' poor work or under performance.

**2.95** Project management are monitoring action by the cost consultant and construction manager whose responsibilities include the initial examination of claims and recommendations to the client about settlement. The consultants have audited claims for delay costs as the work has progressed. If agreement on any account cannot be reached by negotiation with a contractor there is the option for either party to seek adjudication, arbitration or litigation.

**2.96** In April 2004 project management concluded that the general approach should be to advise the Corporate Body in the Summer/Autumn of 2004 on issues in relation to the handling of all claims and seeking guidance on the framework to be adopted. Project management recognise there is scope for obtaining legal advice on some matters relating to claims in advance of providing advice to the Corporate Body. At the time of preparing this report project management had identified several possible claims cases where action may be required, but there was no agreed register of issues or actions to be considered. Project management was considering an independent review of all claim negotiations, because of the need to be certain that very significant increases in package costs could be justified in each case.

## Part 3. The reasons for later delivery



### This analysis concentrates on why the project did not achieve the 2000 target for completion by the end of 2002

**3.1** In 1998 the completion date for the new Parliament building was July 2001. In my September 2000 report I explained the reasons for the delays in the forecast completion until December 2002. One major difficulty arose from achieving a settled Stage D design. Another problem arose from difficulties encountered by the architects in complying with the original demanding brief to a tight timetable. There were also unforeseen changes requested by the client. These changes were principally an adjustment to the layout of the debating chamber in July 1999 and a significant increase in the total space required in the new building in autumn 1999<sup>20</sup>.

**3.2** In 2000 the Parliament set a target to complete the project by the end of 2002. Part 2 summarises the 20 months slippage, which has since

affected the project. In the early stages, the overall construction programme 3C (July 2000) planned for completion by December 2002. Successive programme issues have shown delays, culminating in the current programme 7B, in which the target for completion is August 2004 (Exhibit 7).

**3.3** Two significant factors should be considered in relation to the slippage of the Holyrood project since 2000:

- The client did not alter significantly the user requirements for the building once it approved the Stage D design in June 2000. The measured construction costs of accepted change requests made by the client since Stage D is some £0.6 million. This is just 0.2% of the current construction cost estimate.
- The slippage since September 2000 is 20 months in a 42-month period. It has affected all parts of

the construction of the building (Exhibit 18 overleaf). Taking into account the very small amount of client variation in this time, the slippage is exceptional when compared with other large-scale construction projects<sup>21</sup>.

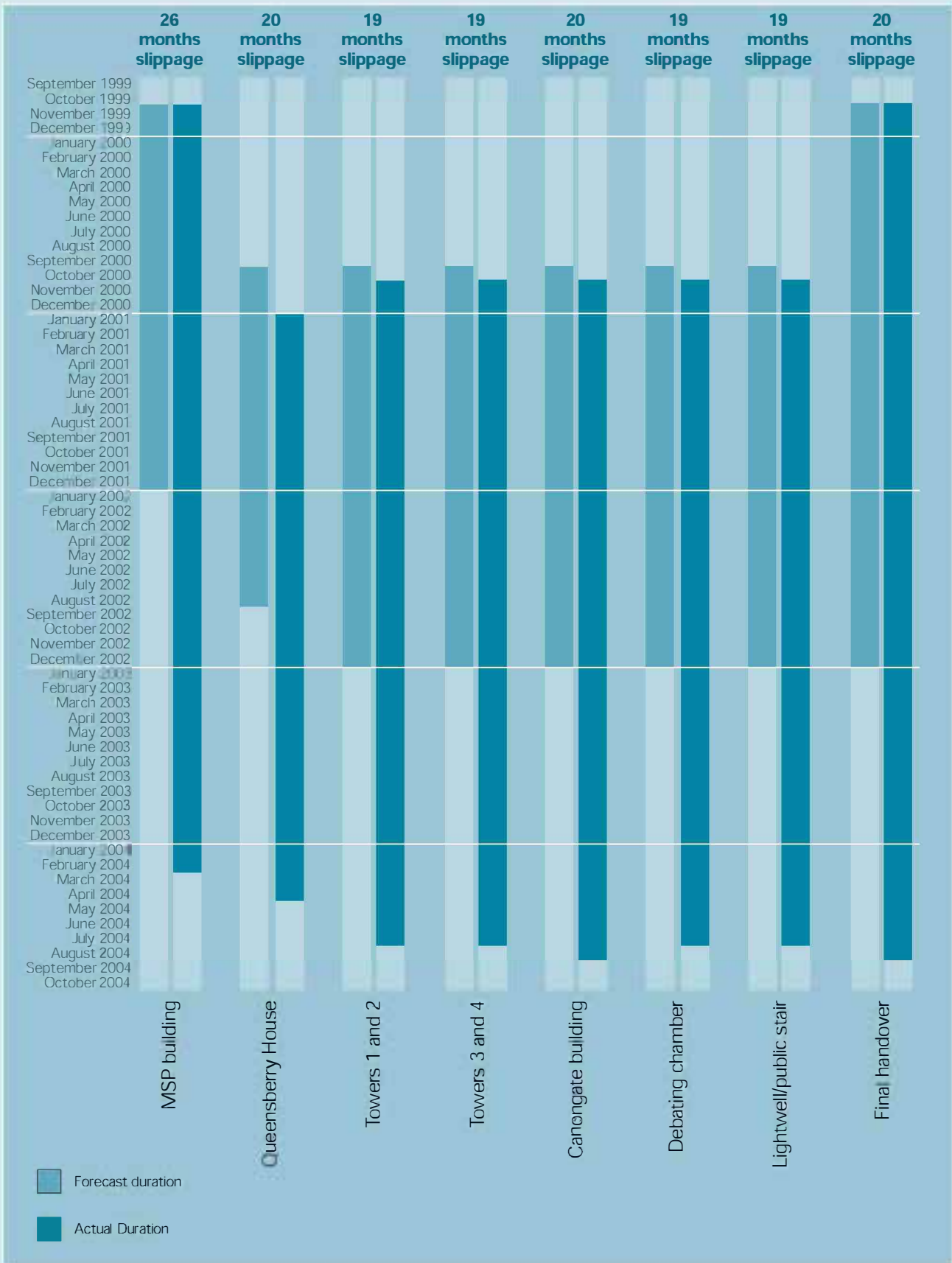
**3.4** In examining the progress of the project including the reasons for slippage, I did not seek to form an opinion on whether any individual party or contractor has been at fault. It is the responsibility of the client to manage its consultants and its contractors and to assess performance. The client should avoid duplicating the work commissioned from its consultants. The Accountable Officer is accountable for the significant public funds spent on these contracts.

<sup>20</sup> *The new Scottish Parliament building: An examination of the management of the Holyrood project*, AGS/2000/2, Paragraphs 2.7 to 2.9

<sup>21</sup> See, for example, *Review of Large Public Procurement in the UK* by Mott MacDonald for HM Treasury in 2002. This study examined seven large non-standard public buildings. It recommended that, for the purposes of risk analysis/project planning, the maximum risk allowance for slippage during the construction of non-standard buildings should be 39 per cent compared to the estimate at outline business case stage. By comparison, the construction slippage now expected on the Holyrood project will be some 72 per cent.

### Exhibit 18

Slippage in completion of the main parts of the Holyrood building



Source: Audit Scotland



## Exhibit 19

### Key features of traditional construction

- Client has separate agreements with designer and main contractor. This separation may discourage innovation and the early identification of 'buildability' issues.
- Design and construction work are sequential, extending timescales.
- Construction is 80% tendered before work starts on a lump sum basis, providing greater cost certainty once the design is completed.
- There may be a lower degree of construction risk transfer from the client to contractors compared to design and construct, PFI or prime contracting methods. Suppliers prices will reflect the degree of risk transfer achieved.

Source: Audit Scotland

### The main cause of the slippage is delays in design of a challenging project delivered against a tight timetable using an unusual procurement route

**3.5** There are five main reasons for the slippage affecting the project since 2000:

- There are inherent risks associated with the construction management procurement method but the client organisation did not have experience in this procurement route.
- There were difficulties associated with the construction of a very complex, densely developed, unusual building against very tight deadlines.
- The original timetable for completion was compressed with no room for slippage on the critical path.
- At a later stage in the project, some trade contractors were given responsibilities for design issues.

- The architects and some trade contractors had problems in delivering some critical elements of the work within the required timescales.

### Under construction management the client retains construction risk

**3.6** There are difficulties and complexities in any large construction project and all forms of procurement involve risk. Good practice is to select the form of contract which ensures risks are allocated to those best able to manage them<sup>22</sup>. Under construction management the client accepts most of the risk associated with coordinating construction.

- All contracts are placed directly between the client and the trade contractors – there is no main contractor role.
- The client consequently retains interface risk, although managed through the construction manager.
- A construction manager is appointed as a consultant,

coordinator of the design team, manager of trade contractors and construction adviser to the client.

- At the same time the client retains control of the design process and should avoid paying for estimated risks that do not materialise.
- Under any form of contract the client should pay for the risk transferred to other parties.

**3.7** Under a 'traditional' building contract (Exhibit 19) the design of the whole building is taken to sufficient detail<sup>23</sup> for a competition for the whole or greater part of the construction works before a single main contractor is appointed. Developing the design to this level of detail takes time. However the main potential advantage to the client is certainty. Once a design has been approved there is scope for the work to be tendered on the basis that most programme and delivery risk remains with the contractor provided no changes are instructed.

<sup>22</sup> In my 2000 report I explained the Scottish Office chose construction management for the Holyrood project in 1998 after due professional consideration but there should have been a systematic assessment of risks in this route.

<sup>23</sup> RIBA plan of work stage F.

**3.8** Construction management is quite different to a traditional building contract. The main benefit is shorter timescales. Construction management compresses the overall design and construction programme by allowing procurement and construction to proceed before the design of all packages is completed. It is intended for use when there is a compelling value for money case for completing a building project at the earliest possible date (eg, to benefit from forecast high rental incomes, or to achieve unmoveable opening dates).

**3.9** Under construction management contractors commence works before all design is completed. There are risks in this, for example in proceeding with the foundations and substructure of a building without a complete understanding of the superstructure design. Because the client contracts with the trade contractors directly there is no main contractor to accept and manage risks from programming and coordination of contractors. The design team must envisage the totality of the design, accommodate any uncertainty in later, dependent packages and progress long lead-time items (eg, lift packages) early in the procurement process. There needs to be experience, team spirit and cooperation to manage the risks.

**3.10** The advantage of construction management is that the design of packages of work may be changed up to the point when the contract is awarded without necessarily incurring additional costs for those packages. Once packages are let, their content should be fixed. Unforeseen change after a contract is let is likely to incur delay and additional costs.

**3.11** The audit examination does not provide a detailed assessment of all the changes made during the Holyrood project. That would be an enormous undertaking. The

Corporate Body has estimated there have been some 10,000 proposed change orders issued over the course of the project. Many of these changes could be small and some may have arisen before the Stage D approval. However the very significant impact of change in each contract at awarded is evident from a simple comparison of the cost of the contract at tender/contract award stage and the current forecast outturn (Exhibit 20).

### **The complexity of the Holyrood project has involved major challenges in programming the construction**

**3.12** Before tenders for the main building work in the east of the Holyrood site could be obtained, the design team had to develop the June 2000 Stage D design into detailed package designs to provide sufficient information for tendering. This was a very large task for the design team and the construction manager.

- The Stage D design was not a fully developed and coordinated design. The client accepted this as an architectural Stage D, though some elements, for example the foyer roof, were no more than concept design (Stage C). The client recognised the structural and service design information was not equivalent to Stage D. Despite the complex structures and organically shaped buildings, only comparatively small-scale drawings were provided at Stage D. Exhibit 21 (overleaf) illustrates design development of the foyer roof since the Stage D design, and the extent of the initial uncertainty.
- Programme 3C which envisaged completion by December 2002 was issued on 22 July 2000. There were very short timescales for subsequent design details to be provided. For example, the

target date for sending out the tenders for the assembly building superstructure package – the largest and most costly package – was 11 August 2000. This was just seven weeks after the Stage D design was approved without a Stage D engineering design.

**3.13** In addition to the challenges of the design programme particular difficulties arose because:

- unforeseen structural and conservation matters affected Queensberry House. There were delays in securing agreement on the reconstruction that was required to take into account the fact that Queensberry House was a listed building and securing the required listed building consents
- because of the complexity of much of the work, the interdependency of many elements and congestion on the site, there were unforeseen problems and delays. Exhibit 22 (overleaf) illustrates a few examples of these unforeseen difficulties.

**3.14** The construction manager's responsibilities are detailed in its contract with the Corporate Body. Its responsibilities include:

- liaison and consultation with all parties
- coordinating the services of the design team with the execution and completion of the project by the trade contractors
- securing agreement to the cost plan by the client and the cost consultant as soon as practicable
- ensuring that the project is executed and completed within the cost plan and construction period
- programming at all levels of construction

## Exhibit 20

### Post tender changes in contract costs

Number of contracts	Change in outturn costs compared to original cost	Estimated cost of these contracts at tender approval	Current estimated final cost of these contracts	Average increase (%)
5	Increased by between three and eight times	£6.7 million	£28.0 million	315%
9	Increased by between 95% and 172% ie, doubling or almost tripling	£26.1 million	£54.7 million	110%
13	Increased by 52% to 91%	£41.1 million	£69.3 million	69%
14	Increased by 21% to 49%	£37.4 million	£49.9 million	33%
11	Increased by 5% to 19%	£12.9 million	£14.0 million	9%
6	Little or no change	£4.8 million	£4.8 million	-1%
<b>58</b>	<b>All contracts</b>	<b>£129.0 million</b>	<b>£220.6 million</b>	<b>71%</b>
	(excluding landscaping and fit out)			

Source: Audit Scotland

## Exhibit 21

### Design development of the foyer roof

These images illustrate how the design of one part of the Holyrood building – the foyer roof – has developed between June 2000 Stage D design approval and as it has now been built.

Between 2000 and 2004 the estimated cost of the foyer roof increased from £1.8 million to £7.3 million. Appendix 2D provides more details of the progress of the contract for building the foyer frame and glazing.



The computer-generated image on the left, looking west to the MSP block, is how the architect presented the concept for the foyer roof to the client in June 2000.

The structure is distinguished by the extensive presence of what appear to be curved pane rooflights, with minimal supporting frame, set into what appears to be a cast structure consistent with the light grey concrete used extensively on the site.

The roof is a single span construction with no suggestion of intermediate supporting columns.

The image does not suggest blast performance was a primary consideration at this stage.

The computer-generated image on the right was presented to the client in 2001.

Rather than a single span roof the design now includes substantial supporting pillars and a heavy tubular steel superstructure.

Extensive use of oak and stainless steel linings has now superseded the previous simple light grey finish.

Oak beams now support the spine of the roof lights but the frame supporting each pane remains minimal.



The photograph to the left shows the foyer roof under construction in early 2004.

Compared with the design in 2000 the roof is much more substantial in terms of its structural strength and mass.

The roof light panes are now supported in substantial frames, themselves reinforced by secondary struts of tubular steel.



Source: Audit Scotland

## Exhibit 22

### Problems of interdependency and complexity of the Holyrood project

- In the case of the large and important **specialist glazing package** negotiations with a preferred tenderer for the work appointed in July 2001 had extended without resolution into 2002. There were consequently significant delays for this package and knock-on delays for other packages for which specialist glazing was on the critical path. Eventually, in May 2002 project management chose to terminate the negotiation with the previously preferred tenderer, and appointed immediately another contractor by negotiation.
- By the end of October 2001 the construction manager was reporting that the **MSP building cladding** was fifteen weeks in delay. A recovery strategy was put in place in November 2001, which sought to mitigate the impact of the failed Flour City contract<sup>24</sup>. This involved re-procurement of the MSP cladding in six separate packages, resequencing of the works and the adoption of temporary weather protection to allow internal finishes to progress. These measures were intended to safeguard the then target completion date of September 2002 for the MSP building.
- Another difficulty arose from the complex design for **the roof of the debating chamber**. In July 2002 the Progress Group had advice that the beams forming part of the roof were ready to start installation. Installation was assessed to be seven weeks in delay at that time. In September the Group received advice that difficulties with the installation of these beams could add 13 weeks further delay. Again this had an impact on other packages.

Source: Audit Scotland

- management of trade contractors.

The construction manager must act in the client's best interest at all times.

**3.15** The six main programmes that the construction manager issued with client approval between July 2000 and February 2004 (Exhibit 7) are only part of its very significant programming activity. Its detailed programming includes the establishment, negotiation, monitoring and maintenance of programmes for all 60 works contracts, together with all landscaping and fit out works. The construction manager has provided commentary and analysis of reasons for variation, as part of its normal programming activity. All programmes and programme reissues have been subject to review and testing by project management.

**3.16** Audit Scotland, with its expert consultant, reviewed the construction manager's design, procurement and construction programming. In the consultant's opinion, the scope and nature of this construction management service is normal. As shown in Part

2, the construction manager was very active in developing a wide range of mitigation measures to respond to programme difficulties as they arose. In 2002 project management had raised questions on the advice of its forensic programmer about the construction manager's methodology for compiling and managing the necessary construction programmes but in general the audit found no additional reason to question the methodology. One shortcoming was that the risk analysis for the programme was not equivalent to the risk analysis undertaken in relation to the project costs. The risk workshops in October 2000 had identified risks to time schedule associated with other project risks, which were categorised as 'highly likely' (Part 2). The construction manager regularly identified and reported risk to the programme, but did not assess the effects if delivery targets were not met.

#### **The client maintained a drive for the earliest achievable completion date**

**3.17** Between December 2000, when programme 4A was issued, and February 2004 the construction

manager undertook eight programme revisions to address the problems of design, procurement and construction slippages threatening the successive completion dates. The client mostly rejected the construction manager's initial draft programme revision each time and maintained a drive for completion by the earliest achievable date. Even where the construction manager's initial programme was qualified the client sought revisions to advance the completion date. Programme revisions repeatedly incorporated assumptions about design and construction performance that the design team and contractors agreed were achievable but were subsequently not achieved. The client relied on the programmes and advice recommended by its consultants, set completion targets based on these programmes and reported them to Parliament. Exhibit 23 (overleaf) shows some examples of the programme qualifications between 2000 and 2003.

<sup>24</sup> My December 2002 report on the 2001/02 audit of the Corporate Body describes the circumstances leading to the termination of Flour City's contract in October 2001 and associated contract management issues.

## Exhibit 23

### Examples of programme qualifications

#### December 2000

The programme 3C overview for the assembly buildings identified that the design team were fifteen weeks behind programme. **Delays to the procurement of critical packages could amount to a four to six months delay beyond the December 2002 completion target.**

The construction manager sought to mitigate the extent of the delay by revising the design and procurement strategies and rescheduling the construction sequence for the assembly buildings. This resulted in a sixteen-week extension to this part of the programme **but the target completion of December 2002 was maintained.** The construction manager's report states that, "cladding and roofing packages continue to experience major problems securing adequate design information. This may have a delay/effect to critical client sign-off and contract lead-in times".

#### August 2001

The construction manager reported that programme 4C was no longer achievable and that even if all outstanding design issues were resolved then **completion based on the then proposed procurement and construction sequence would be November 2003.** At that point project management requested that the construction manager investigate the feasibility of a revised strategy, which would allow access to the debating chamber ie, **completion by mid April 2003.**

#### September 2001

The programme Series 5A 'draft' again sought to re-sequence the works. It put in place a revised procurement strategy and mitigation measures to maintain the client's completion aim of April 2003.

It is to be questioned whether advancing completion of the debating chamber by some seven months was a sensible move at this time **The previous month the construction manager had reported that completion could run out to November 2003.** Significant outstanding design issues remained to be resolved.

#### May 2002

The construction manager issued programme 6A 'interim', which was extremely qualified. It stated, **"there are too many impediments outstanding to predict a definitive date to completion"**. Design development was still ongoing, scope was changing and the construction manager and the trade contractors were not confident in supplying programme commitment. The construction manager agreed with project management that the interim programme would be issued whilst more certainly was sought and commitment obtained from the design team. **The programme was highly qualified in terms of the extent of information and issues yet to be resolved but the end date remained as April 2003.**

A fifteen-page document accompanied programme 6A 'interim', highlighting assumptions and potential impediments to programme security. The impediments focussed upon design team delivery of information and the need for a 'marked improvement' in design coordination.

At this time the construction manager anticipated that sufficient information would be available over the following two to three months to enable it produce definitive programmes. In the event programme 6B was issued for Queensberry House and the MSP building only and these programmes were supplemented with a list of assumptions and programme risks.

#### December 2002

Final version of programme 6B issued. **Target for debating chamber completion – June 2003.**

### January 2003

The construction manager's private & confidential report to project management suggested strategies to address current problems and improve project management and design team effectiveness, such as:

- resolution of a fee dispute with the architects and allay their fears of future retribution for delays
- attendance by project management at all meetings to arbitrate over disputes
- eliminate revisiting of designs previously agreed
- clarification of design team members roles and responsibilities. Reallocation of non-performing members
- increase design team openness on all issues with the rest of the team
- the future involvement of Barcelona at least limited
- the client needs to send a regular, strong and unequivocal message as to their goals and aspirations to the construction manager and design teams
- architect to act immediately and to the letter on any client decisions
- appoint additional project management resources.

The construction manager's report shows that fundamental management and organisation issues were continuing to have a significant impact upon the project four years after work had commenced. It was prepared just six months from the then **forecast completion date of June 2003**.

Source: Audit Scotland

**3.18** The construction manager is responsible for programme management including exercising all the proper skill care and diligence to be expected for the work. It must apply reasonable endeavours to ensure that the project is executed and completed with the project cost plan and within the construction period, albeit it is not responsible for achieving programme. The architect's responsibility is to provide all production information (except where agreed otherwise) and to apply its best endeavours to achieve the project timetable. Against a background of continued design and procurement slippage project management and the Progress Group challenged both these parties rigorously but no decisive improvement was achieved. Programmes were issued on the basis that they were targets subject to critical issues being achieved or resolved. When programmes did not achieve the targets set new targets were sought and approved but the fundamental problems for non-performance were not overcome.

### **Design slippage was a major factor in delaying the overall programme**

**3.19** As described in Part 2 there was a considerable uncertainty about the programme throughout the project. Targets for packages were put in place but not achieved. Mitigation measures and new targets were introduced in an effort to maintain overall completion but they also failed in many cases.

**3.20** Uncertainty and slippage arose partly because:

- there was significant slippage in the production of necessary design information both by the design team and by some trade contractors that were responsible for significant design elements

- in some individual packages design development was extensive, disruptive to programme and threatened higher costs.

**3.21** Audit Scotland's consultant reviewed the progress of the twenty largest contracts. They tracked movement between the date the client approved contract action in each case and the target for this event in programme 4 issued in January 2001. Broadly speaking, the lead-time up to approval of contract depends on the flow of design information. Delays up to this point are largely a result of insufficient design information being supplied to maintain the tender programme.

**3.22** On average these twenty contracts were each delayed by 37 weeks. Four of the contracts with delays of between 19 weeks and 46 weeks were the most critical on the project (Exhibit 24). Many of the difficulties caused on site over the last year relate to the assembly building's cladding and the foyer glazing. If these packages had been procured on time, then more time could have been devoted to trade contractor design development, manufacture and the resolution of interfaces on site.

**3.23** Not only were there delays in achieving contract approval, but many packages were awarded with significant elements of work identified as provisional sums or attracting significant variation after contracts were placed. Although contracts were approved, a significant degree of design activity had yet to take place in some cases.

**3.24** The most significant impact on the programme during construction has been the timing and volume of variations. The most complex and therefore programme-critical area of the project was the assembly

building. Within this, the five most complex packages have been those for: the assembly frame; the foyer frame and glazing; specialist glazing; cladding and windows; and roofing.

**3.25** As Exhibit 25 shows, these five contracts have required significant variations, as measured by how many 'notifications of proposed change' instructions were raised during the work. Exhibit 25 also shows the period of variation extends well beyond the original programme period for construction in each of these cases.

**3.26** A detailed month-by-month analysis of the most critical package on the project – the assembly frame – is shown in Exhibit 26 (overleaf). This package is currently over 15 months late and there were substantial variations taking place months after the original planned completion of December 2001. This volume of change must have caused problems for managing the project, with consequences for the procurement and delivery of materials and the construction works.

**3.27** The main causes for delays affecting the project are summarised below:

- The primary cause of the 20 months delay to the project since September 2000 was the issue of detailed design variations and late information during construction. In some cases trade contractors were responsible for some elements of design subject to final design team approval. The process of design team approval also introduced significant delay.
- Delays resulted from late and incomplete release of design information for tenders and tender packages being returned over the cost plan allowance. In many cases trade contractors



## Exhibit 24

Initial contract delays for eight large works contracts

Contract reference	Name of contract	Date client authorised contract	Slippage to client authorisation	Critical slippage?	Trade contract value at tender stage
2600	MSP concrete frame	September 1999	23 weeks	No	£4.2 million
2205	Substructure east	September 2000	19 weeks	Yes	£6.9 million
3320	Foyer roof and glazing	July 2001	31 weeks	Yes	£5.8 million
3350	Specialist glazing	July 2001	46 weeks	Yes	£7.2 million
3525	Assembly windows	June 2001	24 weeks	Yes	£3.9 million
3528	MSP bay windows	April 2001	37 weeks	No	£2.7 million
6015	Mechanical & plumbing east	April 2001	28 weeks	No	£5.7 million
7015	East electrical	April 2001	21 weeks	No	£4.2 million

Source: Audit Scotland

## Exhibit 25

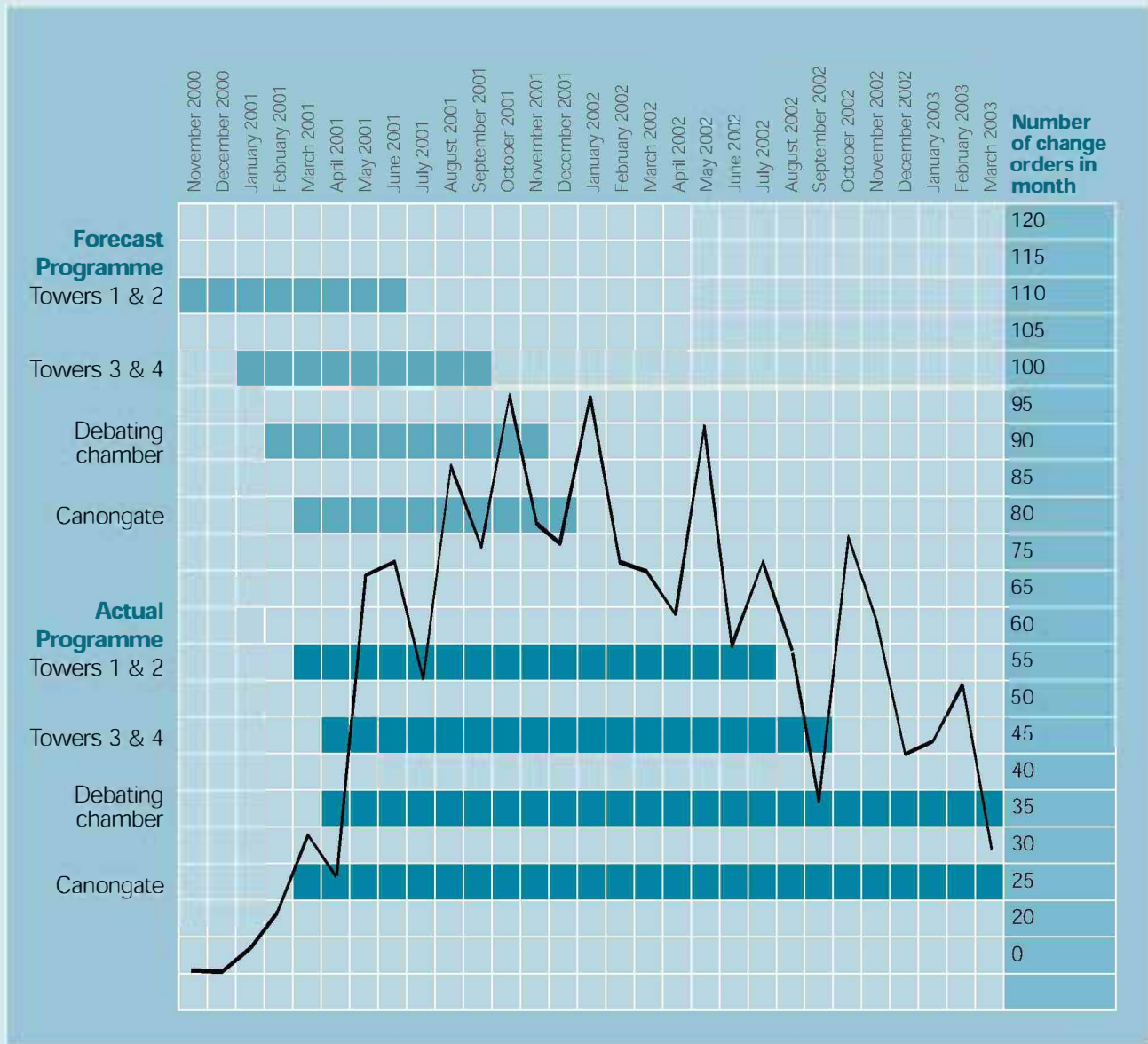
Design variations for five critical works contracts

Contract reference	Name of contract	Original programme period (programme 4)	Number of draft change orders	Period of variations
2605	Assembly building concrete frame	November 2000 to December 2001	1,800	January 2001 to March 2003
3320	Foyer roof and glazing	November 2001 to April 2002	117	August 2001 to April 2004
3350	Specialist glazing	September 2001 to May 2002	322	July 2001 to date
3525	Assembly windows	June 2001 to March 2002	288	July 2001 to date
3645	Assembly building roofing	October 2001 to May 2002	485	July 2001 to date

Source: Audit Scotland

### Exhibit 26

Analysis of impact of design variations on the main assembly buildings contract



Note: The chart shows 1,516 variations between December 2000 and March 2003. Variations due to additional work not included in the original forecast programme, such as the boundary wall, are excluded.

Source: Audit Scotland

were responsible for some elements of design subject to final design team approval. The process of design team approval in these cases also introduced significant delay.

- Because of the client's desire for the best achievable completion dates there was non-productive and out of sequence working that exacerbated the delays.
- The construction manager demonstrated its commitment to the project by consistently seeking to achieve early target completion dates. With the benefit of hindsight, the original programme was unachievable. By September 2002 or April 2003 (when respectively programmes 6 and 7 had been issued), the construction manager should have recognised its targets were unlikely to be achieved.
- It is not clear that project management did enough to address the root causes of problems, which were adversely affecting the cost and programme. The construction manager repeatedly prepared construction programmes, which included assumptions and commitments by the design team and contractors that were subsequently not achieved. Because all parties agreed that the basis for each programme was achievable the repeated programme slippage raised fundamental questions about the performance of all parties, which no party appears to have addressed effectively. Under construction management the client ultimately bears most construction risk but it was unable to find the means to manage these risks effectively.

## Part 4. The reasons for increased costs



**4.1** In 2000 the Parliament set a £195 million budget for completing the project. In my 2000 report I showed this was much higher than the estimate at the start of the project in January 1998, mainly because of:

- a 47% increase in the size of the building, largely at the client's request
- the additional complexity of the approved design compared to the original ideas for the building, resulting in a 48% increase in unit construction costs compared to the initial estimate.

**4.2** This part of my report examines why, since 2000, forecast project costs have more than doubled again to the most recent estimate of £431 million. Exhibit 27 shows the main parts of the total current £431 million project costs and how they have increased since 2000. The largest increases arise from:

- increased construction costs and associated irrecoverable VAT, now

totalling £311 million (72% of the total project costs)

- increased fees to advisers and site organisation costs of £68 million (16% of the total project costs).
- smaller increases in the remaining fit out, landscaping, site acquisition and programme contingency costs, which now total £44 million (10% of the total project costs).

### **There is a question whether the cost plan underpinning the £195 million target was adequate**

**4.3** Under the RIBA plan of work for delivering construction projects, Stage D detailed proposals should include complete development of the project brief. The project brief is concerned with agreeing concepts, performance and parameters such as time and costs. Good practice is that the project brief at Stage D will include a confirmed cost plan. The Stage D proposal for Holyrood included a cost estimate and was

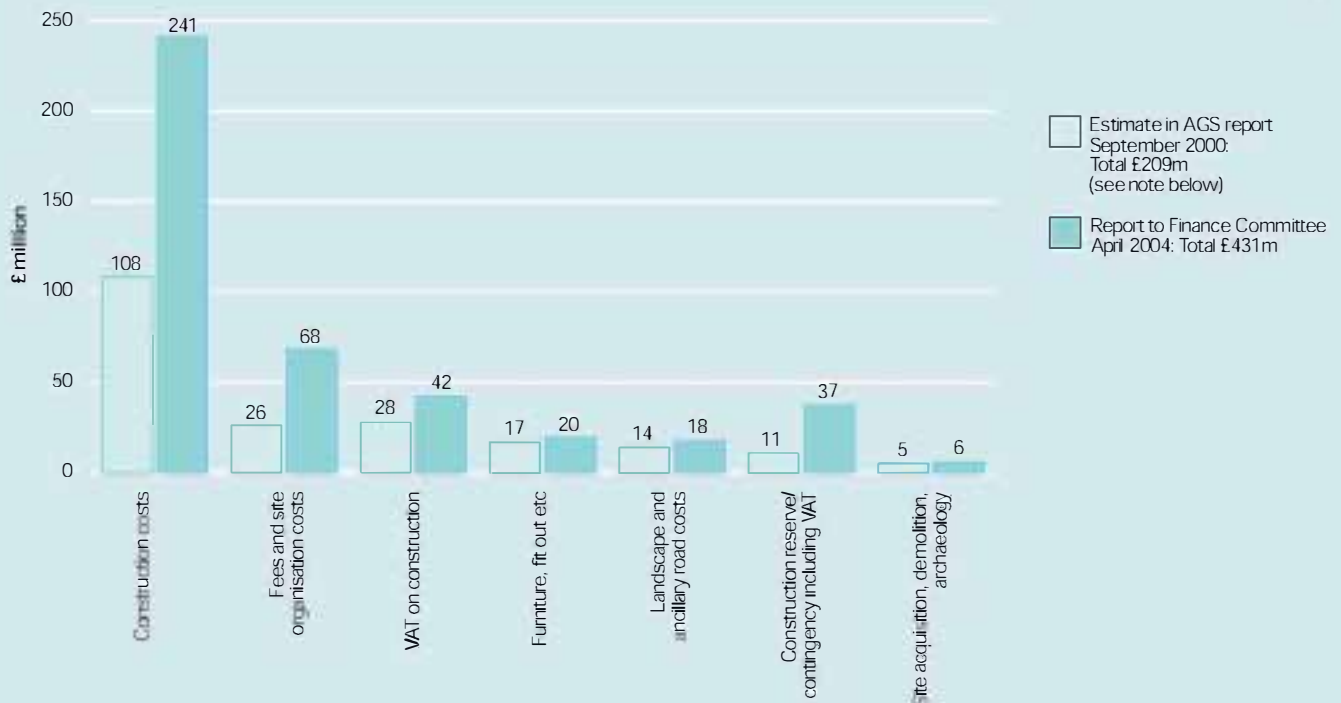
approved on the basis that the cost consultant and the construction manager would prepare a package based cost plan consistent with the estimate.

**4.4** In September 2000 I recommended that project management, the design team and the construction manager should agree a cost plan taking account of risk and uncertainty to provide a sound basis for managing the remaining stages of the project (Exhibit 8).

**4.5** In October and November 2000 the construction manager provided a commentary on the cost plan. It highlighted there was insufficient design information to provide reliable cost estimates. It stated the design was complete architecturally but incomplete structurally and significant risks remained. It advised project management to obtain a commitment from the design team that it would complete the design within the target construction cost within the draft cost plan.

## Exhibit 27

Increase in the forecast cost of the Holyrood project since September 2000



**Note:** £209 million is the £195 million target plus £14 million landscaping costs excluded from the target. The £108 million construction cost target was based on March 1998 prices. The current reported £241 million construction costs is based on outturn prices ie, including inflation estimated at some £19 million  
**Source:** Audit Scotland

**4.6** The shortcomings of the cost plan in November 2000 were that:

- Normally a Stage D budget or cost plan would be regarded as a limit that must not be exceeded. This seems to be how the client perceived it for the Holyrood project in 2000. However much of the information in the cost plan could only be regarded as an indicative target rather than a reliable prediction of cost.
- It was known in November 2000 that the impact of inflation was likely to be between £11 million and £13 million. At this level it would consume all the available contingency of £11 million. There was, consequently, no allowance at all for risks, although all parties accepted risks were very likely to occur. In November 2000 the risk workshop quantified additional costs for risks at some £61 million, for which there was no allowance in the budget.

**In most of the trade contracts the estimated final cost greatly exceeds the original cost plan allowance**

**4.7** Forty-one of 58 individual trade contracts have an estimated final cost 21% or more above the cost plan allowance (Exhibit 20). These contracts accounted for 91% of the estimated contract expenditure. A few large value contracts account for a large part of the total variance in construction costs (Exhibit 28 overleaf).

**Some of the increased costs are due to the extended construction period**

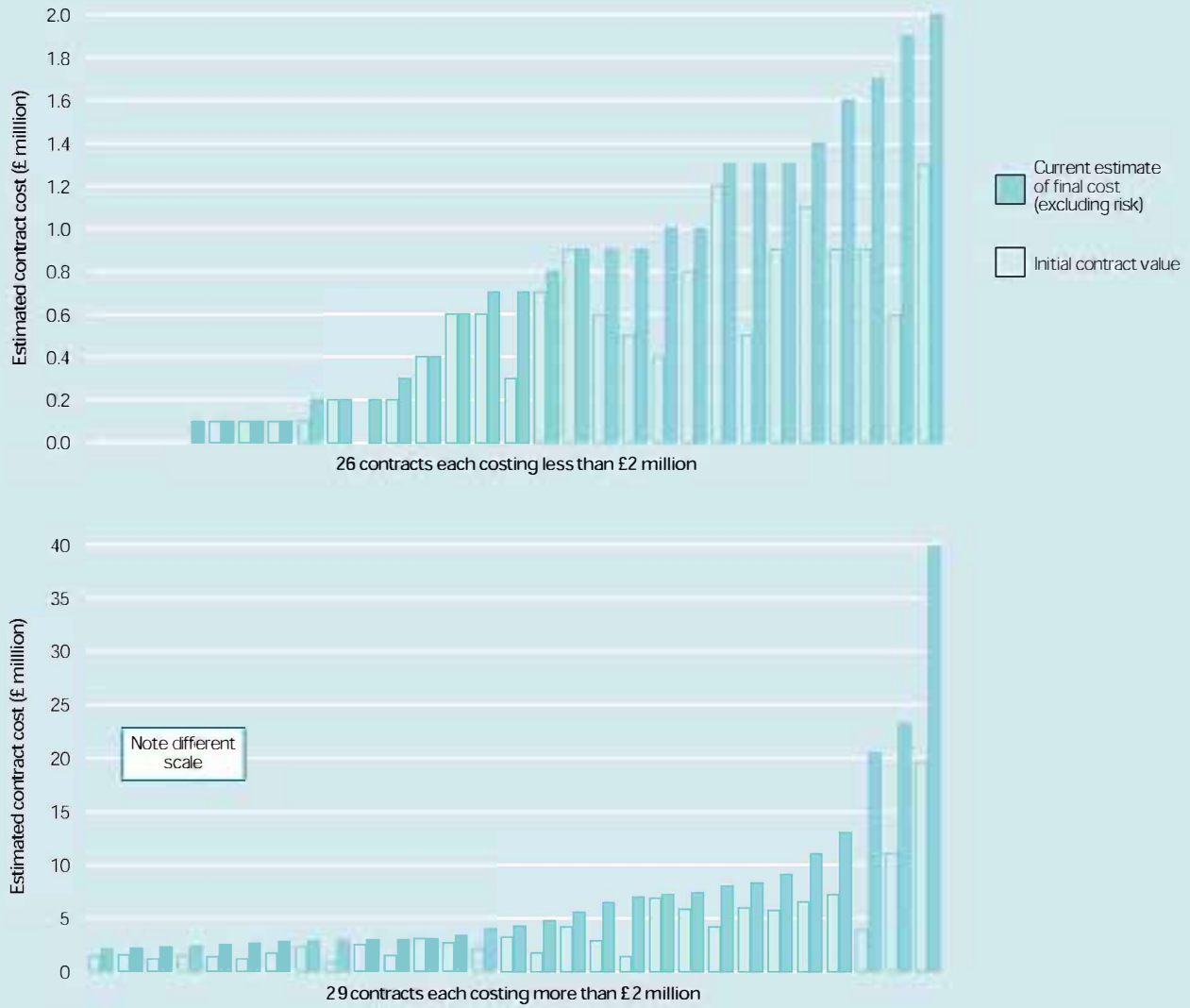
**4.8** Time is money. In construction projects, once contractors have been appointed, any time slippage can mean additional cost. Extra costs arise from prolongation, delay and disruption. Prolongation costs are the extra cost of doing the same amount of work over a longer period. The

client will usually bear these costs if prolongation occurs because of things outside a contractor's responsibility. For example, if contractor A suffers a delay in receiving design information from a third party it may claim an extension of time. If the client accepts the claim it may reimburse contractor A for labour and overhead costs for the longer period.

**4.9** Similarly, delay or disruption costs may arise where the contractor's agreed programme of work is upset for reasons outside its control and it costs money to recover the position. For example, if work by contractor A is delayed it may prevent necessary access by contractor B to an area both contractors must work in, disrupting B's work programme. Even if contractor B can make up lost time it may incur and claim additional costs in doing so, for example from necessary overtime payments or other acceleration costs.

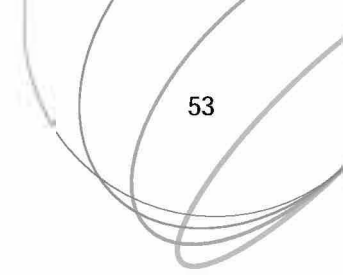
### Exhibit 28

Initial and current estimated costs for 55 Holyrood construction contracts



Note: Values for the three smallest contracts have been excluded from the upper chart

Source: Audit Scotland



**4.10** Exhibit 29 (overleaf) presents some illustrations of extra costs arising from slippage and disruption on the Holyrood project.

**4.11** Exhibit 30 (overleaf) charts the growth in estimated costs for the whole project from 2000 to 2004. It shows that most of the increase in construction costs became apparent later in the project, from late 2001 onwards when most of the main construction contracts had been committed<sup>25</sup>. In October 2001 a risk workshop identified for the first time a significant cost associated with the time related risks and this was the largest single ingredient of additional cost in subsequent risk workshops. Also from October 2001 the cost consultant's fortnightly cost reports started to show a steady increase in the base construction costs compared to the cost plan.

#### Some of the increased costs are due to a very high level of design development

**4.12** Design development is the normal process when the design of a building evolves in parallel with the tendering and appointment of contractors and subsequent building work on site:

- Once the detail design proposals (Stage D) are confirmed, the design team must develop final proposals (Stage E) to allow all components and elements of the work to be coordinated.
- The design team must also provide production information (Stage F) with sufficient further detail to allow tenders to be obtained. Production information at tender stage should be sufficient to allow tenderers to price the work accurately.
- Once a contractor is appointed it may require more information

from the design team. The additional information reflects the difference between what is needed to price a job and to physically deliver the building.

**4.13** Design development may cover a range of the aesthetic, technical, performance and functional aspects of a design. In the Holyrood project it involved architectural, structural and building service issues. Specialists and trade package contractors provided some of the design input and there was a need for coordination of the whole. Under the construction management approach for the Holyrood project the process was complicated because more design development happened at the same time as (rather than in advance of) construction. Design development included obtaining third party approvals for the design as it developed, for example from the planning authority, Historic Scotland, and the Fire Officer. An important feature for the Holyrood project was the need to develop the design to satisfy security and blast considerations.

**4.14** Design development carries a risk of cost increases. But in any project there should be adequate allowance made for this aspect in the Stage D budget or cost plan, the risks should be managed and there should be a change control process to authorise necessary change.

**4.15** For the Holyrood project the system for authorising changes was reasonable but it provided a system primarily for monitoring not actively managing and restraining costs. Before project management approved any change to a trade contract the construction manager was required to report on any programme impact and the cost consultant was required to report any cost impact. But the reporting of cost and programme implications of changes that were imminent or inevitable did not offer choice.

**4.16** In general terms, for effective control and management a cost manager/cost controller must anticipate and 'flag up' potential change at the earliest opportunity and the design team or the contractor must provide alternative solutions to give the client a real choice. In the Holyrood project, however, increased costs have been incurred partly because design development has driven the project. It seems that, for this project, design development became a process of costing a developing design rather than developing the design within a cost.

**4.17** The different components of the Holyrood building feature many novel and complex features. For many packages realising the design meant that the cost of the works increased significantly compared to the Stage D design and the November 2000 cost plan. It seems that there was not a full appreciation of the complexity of the design early enough in the project. Only as the design evolved did it become possible to estimate accurately the cost of realising it. The time pressure was such that once aspects of the design were realised and the costs understood often there was no alternative but to proceed because the potential savings from pausing and seeking a more economic design were judged to be outweighed by the potential costs of delay and disruption from not proceeding.

**4.18** In some cases complex architectural requirements involved previously untested building solutions. In these cases the difficulties were made worse by tight tolerances and multiple complex interfaces between packages. It was time consuming and expensive to develop solutions.

**4.19** A striking example of the impact of this is the foyer roof and glazing contract (Exhibit 31 overleaf).

<sup>25</sup> As shown in Part 2 (Exhibit 14) 15 of the 20 largest contract tenders had been authorised by December 2001, and by this time 78% by estimated value of all work had been awarded.

## Exhibit 29

### Holyrood – examples of time delay resulting in extra costs

#### Assembly windows package

In September 2003 the construction manager recommended an extension of time of 43 weeks, bringing the completion date to 3 September 2003.

This is only an interim award and further extensions have since been approved.

The reasons for this extension include:

- increased complexity in terms of window position and geometry
- contract to design, manufacture and install roof windows was a large addition to the original contract award
- design complexity exacerbated when the original production slot was lost due to design information taking longer to produce
- after missing the production slot the timber window manufacturers closed down for summer recess – 4 weeks
- manufacturing changes due to the addition of structural silicone – blast design requirements amended significantly
- installation complexity and re-sequencing of works – the complexity of the installation of the steel frames has increased due to the tolerance issue between adjoining structures resulting in additional setting out time, installation time for the steel frames and abortive time due to the adjustments that have been required to existing concrete openings.

Draft change orders 1 to 130 are estimated to have added £6 million to the package – this is the greatest effect on the contractor's ability to progress the works.

The estimated contract value at tender acceptance was £3.9 million. In early 2004 the estimated final cost excluding risk is £13.0 million, an increase of £9.1 million (233%). Further sums are at issue. For commercial reasons these are not disclosed here pending agreement of the final package accounts.

#### Specialist glazing

This package covers 11 areas of the site, including the glazing for the debating chamber, the public stair and the north lightwell. The contractor has encountered a range of problems in delivering the package that have led to the grant of an extension of time.

The original programme for the delivery of this package was nine months. If, as now planned it completes in July 2004 the contractor will have engaged on it for some 34 months. There have been 322 change instructions issued and from an initial tender value of £7.2 million, increases of £3.8 million (53%) have been approved.

The main delays affecting this contract have been:

- the development of design
- shortage of contractor resources deployed on site
- location of elements of the package caused significant problems for the contractor due to the presence of other trade contractors working in the same space, thus denying unrestricted access or complete access at times
- there were also problems with access to crane facilities in work areas. These access problems contributed to out of sequence working and the prolongation experienced by the contractor.



## Exhibit 30

### Holyrood – estimated construction costs from 2000 to 2004



Source: Audit Scotland

## Exhibit 31

### Design development of the foyer roof and glazing package

Late in 1999 the foyer area was introduced as a comparatively late addition to the concept design of the Parliament. It would provide necessary additional space for the client and remove the need for circulation between the MSP block and the assembly buildings complex to go through Queensberry House as previously planned.

The Stage D cost plan in November 2000 included £1.5 million for this part of the building. There was very little design information. The cost plan allowed a lump sum of £0.7 million (with no quantities or rates) plus £0.8 million for the glazed roof costed at £500/m<sup>2</sup>.

The work was procured using the two-stage process. At the first tender stage in June 2001 a price of some £2 million was obtained and accepted. As the requirements were clarified and design developed between the contractor and the architect, estimated costs increased to £4.2 million, £4.9 million and then in December 2001 £6.2 million. This included £1.2 million for oak and steel finishes alone, almost the whole value of the original cost plan allowance.

In December 2001 the Progress Group concluded there was little scope to save costs as any redesign would significantly delay the overall programme and increase costs elsewhere. It accepted the developing design reluctantly and allowed development to continue.

Exhibit 21 illustrates how the design of the area developed between 2000 and as it has now been constructed.

The current estimated cost of the contract is some £7.4 million excluding risk. The extra costs appear to be the result of the inability of the contractor to price the contract fully at tender with the limited design information available; the degree of design development on the package post tender; and extensions of time for delays due to other packages not completing on time and crane access.

Source: Audit Scotland

**4.20** We examine the additional costs that may be attributed to design development and the other underlying causes in the following section.

### **The main reasons for cost increases since 2000 are design development and delay in the construction process**

**4.21** Despite the large scale and complexity of the Holyrood project, there is no record that links particular features of the design development process with specific estimates of increased costs. There was no requirement to assign changes in cost to any category as they occurred, to allow the underlying reasons to be summarised and understood. The change control process ensured the financial commitment for each contract stayed within the overall financial limit for that contract at any time although the limits for almost every contract could and did increase.

**4.22** The audit did not examine individually the reasons for the 10,000 changes that project management has approved over the course of the project. Nevertheless construction costs increases can be shown to fall into four main areas (Exhibit 32):

- **Inflation.** The November 2000 cost plan was prepared using constant March 1998 prices. The Audit Scotland consultants made a mathematical assessment of the impact of the subsequent increase in market prices. They did so by adjusting the March 1998 cost prices for inflation using published construction price change indices. Inflation has added £19 million to the construction cost estimated in November 2000.
- **Client management of the brief.** The Corporate Body has not introduced significant additional accommodation requirements since 2000. The cost of all changes requested by the client since the Stage D design report in June 2000 is £0.6 million.
- **Prolongation, disruption and delay.** Because contractors who claim extra costs for extensions of time must demonstrate a case for doing so information about these costs is available from contract records. The Audit Scotland consultants analysed the cost consultant's records including interim account statements for all packages, current trade contractor claims and risk review information to assess this cost. Their estimate of the costs of prolongation, disruption and delay is some £73 million. This includes most of the cost consultant's current risk estimate of £24 million.
- **Design development.** Because the total increase in costs is known the cost of design development is the balancing figure, £68 million. Excluded from this heading is £4 million, which is project management's estimate of the extra costs incurred as a result of the demise of Flour City in 2001<sup>26</sup>.

### **Uncompetitive procurement has contributed to increased costs**

**4.23** Audit Scotland and its consultants' examined the procurement and management of a sample of 20 of the Holyrood trade contracts (Exhibit 33). They looked at: the trade contractor selection and award process; the status of design at tender stage; the initial estimates for each package; and the commercial terms of each trade

contract. They also examined cost reporting, cost management and forecasting, change control procedures and management of the packages in the construction phase.

**4.24** There was some competition in 17 of the 20 contracts. A single stage competitive tender followed expressions of interest at a pre-qualification stage in most cases. Although in most cases the construction manager sought reasonable sized bid lists generally fewer bidders tendered than planned. Of 17 packages tendered competitively only five had tenders returned by all of the firms on the bid list. The 20 contracts each have an estimated outturn cost of between £1 million and £40 million. For contracts of this value it would be normal to have at least four tenders. Thirteen of the 20 packages did not manage to achieve this level of competition (Exhibit 34 overleaf).

**4.25** In the consultants' opinion, the challenging scope of the work in terms of design content or the complexity of the design may have discouraged tenderers. For example two of the six tenderers for the assembly building frame contract withdrew citing lack of resources. It is possible that the two tenderers considered they did not have the resources or expertise to deal with this very large and complex package.

### **The focus on programme deadlines drove procurement and led to higher costs**

**4.26** As noted above 13 of the 20 packages had only three or fewer tenders. But perhaps a much greater challenge to obtaining competitiveness and value for money was encountered through the letting of packages with large elements of uncertainty about scope.

<sup>26</sup> My December 2002 report on the 2001/02 audit of the Corporate Body describes the circumstances leading to the termination of Flour City's contract in October 2001 and associated contract management issues.

## Exhibit 32

### Main reasons for construction cost increases since September 2000

Item	Cost	Source
Approved construction budget in 2000	£108 million	November 2000 cost plan
<i>Add:</i>		
Inflation	£19 million	Calculated from published construction inflation indices
Brief development	£1 million	From client's change control records
Prolongation, disruption and delay	£73 million	From cost consultant's contract records
Flour City demise	£4 million	From cost consultant's contract records
Design development	£68 million	Balancing item
<b>Current estimated construction cost including risk</b>	<b>£273 million</b>	

**Note:** These figures exclude VAT

**Source:** Audit Scotland

## Exhibit 33

### Audit examination of 20 works contracts

The sample of 20 works contracts for the Holyrood project included:

- a range of different work types: structural, cladding, roofing, joinery, fit-out, services, hard landscaping etc
- all the contractors with the largest share of work
- a mix of contracts awarded at different times
- a few contracts where final accounts had been agreed
- many higher value contracts; the estimated final cost of the 20 contracts is £153 million or 56% of the total construction expenditure excluding risk
- packages from different parts of the site including the MSP building, the assembly building and Queensberry House.

Appendix 1 details the 20 contracts examined.

Appendix 2 summarises the detailed findings from the examination of five of these contracts as an illustration of the scope, nature and progress of individual contracts.

**Source:** Audit Scotland

## Exhibit 34

### Competition for 20 Holyrood works contracts

Package	Tenders requested	Tenders received	Procurement route	Estimated outturn cost
Hard landscaping	6	6	Single stage	£5.6m
Mechanical and plumbing east	4	4	Single stage	£9.1m
MSP building roofing	5	4	Single stage	£1.0m
Stone flooring	5	4	Single stage	£1.8m
Assembly building frame	6	4	Single stage	£39.8m
Toilet and fitness area fit-out	6	4	Single stage	£2.9m
Electrical east	3	3	Single stage	£8.0m
Zone 2 fit-out	5	3	Single stage	£7.8m
Assembly building windows	7	3	Single stage	£13.0m
MSP building windows and cladding	3	2	Single stage	£2.8m
MSP building carpentry and joinery	5	2	Single stage	£4.0m
Queensberry House blast doors and windows	5	2	Single stage	£1.2m
Zone 1 fit-out	3	2	Single stage	£14.1m
Substructure west	3	3	Two stage	£3.0m
Substructure east	3	3	Two stage	£7.2m
Foyer roof and glazing	7	4	Two stage	£7.4m
Assembly building roofing	6	3	Two stage	£7.5m
Specialist glazing	1	1	Negotiated	£11.0m
MSP building bay windows	1	1	Negotiated	£3.4m
Assembly building rooflights	1	1	Negotiated	£1.9m
<b>Total</b>	-	-	-	<b>£152.5m</b>

Source: Audit Scotland

**4.27** The architects had accepted responsibility for completing all aspects of the design. But from 2000 project management, on the construction manager's recommendation, increasingly adopted trade contractor design for some key works packages. Under this approach the architects remained responsible for most of the concept design, but trade contractors took greater responsibility for developing the detailed design information necessary for construction.

**4.28** This provided the opportunity to enhance the 'buildability' of the detailed design and speed up completion of the work. Trade contractors brought their own designers in to supplement the architect's resources. They could provide design solutions to often complex requirements that they were more confident they could build. But this approach carried a hidden extra cost. The mixture of the commercial approach adopted – such as the use of two stage tenders and provisional sum allowances – and uncertainty about the scope of the work had the result that for a great part of the work the final price was set by negotiation with a single contractor not by a competition (although the contractor had usually been selected by competition at an earlier stage).

**4.29** To meet the programme the construction manager developed a tender event schedule to drive along the process of trade contractor selection and award. The schedule set out key milestones in the overall procurement process of each trade package, from pre-qualification stage to agreement of bid lists, preparation of tender enquiry documents, obtaining tenders, tender recommendations, contract awards and start on site.

**4.30** To meet the required programme packages went out to tender generally at the dates required in the tender event schedule, even if the amount of design information was less than would normally be expected. The further advanced the design is prior to tendering, the greater level of cost certainty that can be achieved. But as shown in Part 3 late and incomplete supply of design information was a significant factor in many Holyrood contracts.

**4.31** Based on data in the construction manager's tender event schedule there was a long period between the initial tender and the subsequent start on site in 11 contracts examined ([Exhibit 35 overleaf](#)). The time between approval of the tender recommendation and the subsequent start on site strongly suggests that the design was not sufficiently detailed at tender stage and that design input was required from the trade contractor. It was almost as if, once a package had been awarded, it then had to wait for the design to catch up.

**4.32** Tendering work with an uncertain scope adds to overall cost because it reduces the level of competitiveness in achieving eventual price certainty. The cost risk lies with the client and not the trade contractor. The trade contractor is in a very strong position to set the final cost of the provisional, undefined items. Costs are subject to review and approval by the construction manager, the cost consultant and project management. But the scope for controlling costs for these elements of the work is inevitably compromised in the absence of a competition. If there was disagreement with a supplier about costs, the client could in theory terminate the negotiation and seek another supplier. But programme pressures meant this was not an attractive option.

**4.33** The trade contractor can also, through pricing levels, ensure that any risks on costs taken to win the contract can be absorbed or eliminated in the subsequent design development. The trade contractor does not need to go out to a range of material suppliers or sub-contractors to achieve favourable prices within its cost allowances, as there is no competition.

**4.34** The inevitable consequence of letting packages before the design had been fully developed was therefore a loss of true competitiveness. Instead of securing as large a proportion of the overall costs as possible on a fixed price basis, design uncertainty led to large provisional items, which led to a much greater degree of negotiation than was desirable. In the consultant's opinion seven of the 20 trade contracts reviewed were tendered when design was not as far advanced as they would normally expect. Whilst the rationale for awarding these packages in this way was driven by programme, it had an inevitable impact on cost ([Exhibit 36 overleaf](#)).

**4.35** On 18 of the 20 packages reviewed trade contractors had some design responsibility. On four of these packages the trade contractors were required to finalise the development of the concept in addition to the detailed design, subject to final design team approval. While specialist trade contractor design input was necessary to develop certain elements of the design this input ideally should have been separated from the construction works, which should have been separately competitively tendered once the design reached the required stage. This did not happen at all in the Holyrood project.

## Exhibit 35

Tender recommendation to start on-site for 11 Holyrood contracts

Package	Client approves tender recommendation	Start on site date	Period from approval to start on-site
Assembly building frame	23 January 2001	12 March 2001	2 months
Foyer roof and glazing	1 March 2001	22 July 2002	4½ months
Assembly building windows	2 December 2001	15 April 2002	4½ months
MSP building bay windows	21 December 2001	27 March 2002	3 months
MSP building windows and cladding	21 March 2002	2 September 2002	6½ months
MSP building roofing	30 January 2001	25 June 2002	5 months
Assembly building rooflights	6 August 2002	17 March 2002	7 months
Stone flooring	8 February 2002	24 June 2002	4½ months
MSP building carpentry and joinery	4 April 2001	16 July 2001	3 months
Queensberry House blast doors and windows	23 September 2001	19 February 2002	5 months
Electrical east	25 September 2001	10 December 2001	2½ months

Source: Audit Scotland

## Exhibit 36

Examples of contracts with significant design uncertainty at contract stage

On the **assembly building frame**, out of a contract sum of £17.9 million there were provisional sums of £3 million and £0.4 million for the structural steel work and the glulam beams respectively. These were two major areas of risk, where the amounts allowed in the contract proved to be completely inadequate, due to the complexity of the design when it was finally developed, well after the trade contractor had been appointed. The current estimated outturn cost of this contract is £39.8 million, excluding risk.

On the site-wide **package for fitting out toilets and fitness areas**, the scope of work to the MSP building and Queensberry House was reasonably well defined, although the works to Queensberry House were remeasurable. However the drawings for the assembly buildings were at a scale of 1:250, which would not have been acceptable for obtaining a fixed price. The provisional, remeasurable elements of this package totalled £0.9 million out of a total contract sum of £1.5 million. The current estimated outturn cost of this contract is £2.9 million, excluding risk.

The site-wide **contract for stone flooring** was let on the same basis of design noted above. In this case the provisional, remeasurable elements of this contract totalled £1.1 million out of a total contract sum of £1.4 million. The current estimated outturn cost of this contract is £2.5 million, excluding risk.

Source: Audit Scotland

**4.36** After construction started the construction manager held regular design meetings, cost meetings and progress meetings for each package. However, the effectiveness of management and control has almost certainly been compromised by the strict requirement to adhere to programme targets that could be said to have been unachievable. Driving trade contractors to comply with unachievable programmes increases costs, in terms of prolongation costs and also in disruption costs.

**4.37** Eight of the 20 packages reviewed were awarded on the basis either that the outstanding design would be completed within an agreed period after award or simply as quickly as possible. In these cases, for coordination, the construction manager ensured that a schedule was agreed that showed the latest dates that the trade contractor needed design information from the design team. Achievement of the design programme slipped from the agreed dates and this design slippage within individual packages contributed to the overall delay, as a delay on one package can affect other packages, and so on.

**4.38** Even where the performance of trade contractors may not have been satisfactory, there was in some cases little opportunity to attribute delays to them, because of larger movements in the overall programme. For example, on the assembly windows package the satisfactory performance of the trade contractor was questioned throughout. The construction manager regularly wrote to the trade contractor to record dissatisfaction with progress of the works.

However, the construction manager had to recommend a 42 week extension of time for the trade contractor when a new strategic programme was issued which extended the time period for completion by 42 weeks.

# Part 5. Project management and control



**5.1** In this part I assess the management and control of the Holyrood project over the four years since my report of September 2000.

**5.2** In that 2000 report I examined the strengths and weaknesses of project management and compliance with good practice within the public sector. I concluded that there should have been greater recognition given to the importance of managing risk and that accounting for risk was insufficient. I said that the reporting of estimated costs was unsystematic and incomplete. I questioned whether project management had the right mix of skills. I suggested that there should have been incentives for the consultants to avoid cost increases and ensure delivery on time. I also recommended improvements to project management and governance. In evidence to the Audit Committee in October 2000 the Accountable Officer indicated acceptance of these recommendations, which he stated were being implemented (Exhibit 37).

**5.3** The estimated cost has increased by some £220 million over the last four years. It has therefore been important to examine what happened, but answering this question should take some account of the quality of the building. Although the audit has not attempted to evaluate the quality achieved, project management's view is that the end result is likely to satisfy fully the high quality standards in the user brief of 1998 (Exhibit 38 overleaf).

### **Throughout the project there was tension between the objectives of time, quality and cost**

**5.4** In 1998 the client required that the building should be completed by summer 2001. Time was a priority. Quality has been equally important throughout the project. The user brief demonstrates that the objective was to provide a high quality building of which the Scottish people could be proud.

**5.5** Construction management was seen to be the only method of procuring the Holyrood building that could deliver high quality within the deadlines.

**5.6** The client also set a budget at the outset. But there were conflicting messages about how important cost was compared with time and quality considerations.

- Construction management, the chosen procurement method, is not very well suited to any project with a fixed cost constraint.
- The client considered that there was a fixed budget for the project from the start, but it did not communicate clearly what the budget was<sup>27</sup>.
- In the early stages, full estimated costs were not reported to the Parliament and this did not happen in a systematic way until 2000.
- Parliament set a fixed budget in 2000 but by 2001 the client regarded it as no longer achievable. Subsequently, the client reported successive cost increases to Parliament and did not seek to set any new financial target or limit.

<sup>27</sup> The client stated in 1998 that the budget was £50 million. This excluded costs such as professional fees, landscaping and irrecoverable VAT then estimated at £40 million.



## Exhibit 37

### AGS recommendations on project management September 2000

AGS recommendation, September 2000	Accountable Officer response, October 2000
<p>Now that the design of the building is firm, project management should pass more responsibility to Bovis as the construction manager and avoid the danger of duplicating the services that Bovis are commissioned to provide.</p>	<p>Done, as part of routine management</p>
<p>A single authoritative point of contact between the client and project management must be confirmed. Similarly all instructions to the construction manager and the design team on the client's behalf should come only from a single authoritative point within project management.</p>	<p>Project Director, formerly Project Sponsor</p>
<p>Project management have a key role to oversee and monitor delivery of the project and represent the client's requirements and decisions. Project management should identify and agree major milestones or targets for the remaining project period for the purposes of reporting and monitoring progress, both with the client and with the design and construction teams.</p>	<p>Accepted, currently in progress</p>
<p>Project management should review and report project costs regularly (possibly monthly) to the client on a comprehensive and systematic basis. Estimates should include all relevant costs ie, including construction (works package) costs, construction risk allowance, consultants fees, construction manager fees and costs, furniture and fit out costs for the new building, any non-construction risk allowance that may be necessary, and VAT. There should be a succinct commentary which draws attention to variances since the last report and provides explanation wherever possible. The team's report should include the costs associated with the project that will be met by other public bodies.</p>	<p>Accepted and already implemented</p>
<p>In September 2000 the Clerk of the Parliament advised the Corporate Body of the results of his wider review of governance arrangements for the organisation as a whole. The Clerk and the Corporate Body should consider whether there is any need in future for independent advice and reporting on the Holyrood project.</p>	<p>Holyrood Progress Group already established. Outsourced internal audit is expected to provide assistance on governance.</p>

Source: AGS report September 2000 paragraph 27; evidence to the Audit Committee October 2000

## Exhibit 38

### Extracts from Scottish Parliament building user brief

The Scottish Parliament building presents the design team with a unique opportunity to make a significant contribution to the design of a building which marks a very significant milestone in Scotland's political history. (The aim should be to) ... reflect the aspirations of the Government and the people of Scotland for this building.

The design should respect its historic surroundings, ... at the same time be a building which reflects the prevailing mood at the end of the century and the millennium. It will be the first landmark building of the new millennium. It should have a resonance of quality, durability and civic importance of which the Scottish people can be proud.

The views to and from the building ... must play a role in integrating the building into the wider context ...

There is an opportunity to ... produce an environment in which there is considerably less intrusion from through traffic.

The building must be accessible to all ...

The design of the building must reflect the opposing requirements of openness and security ...

The Scottish Office is committed to promoting good environmental practice in terms of building design, construction and management. ... It is assumed the Parliament will share the Government's approach in this area.

The Parliament is a living changing organisation ... the building must be flexible and have the capacity to accept changes in organisation, space requirement and management.

A budget has been set for the building of the project to £50 million at March 1998 levels. This should enable the designer to reflect the requirements of the brief and also to provide quality in construction and design, and secure value for money.

The design must take account of the latest advances in technology within the budget constraints ... People must be able to see and meet their representatives within the building ...

It is the aim of the Secretary of State to have the building completed and ready for occupation by the Parliament in the year 2001. ...

This project presents an opportunity for the design team to produce a landmark building reflecting the aspirations of Scotland as a nation, with a building of quality and value.

Source: Scottish Parliament building user brief, October 1998

## Exhibit 39

### Achievement of priorities for the Holyrood project

Priority	Intended	Actual
Time	First priority	Failed – significant slippage
Cost	Fixed budget	Failed – significant increase
Quality	High quality required	Achieved

Source: Audit Scotland

**5.7** How well the tensions of time, quality and cost are managed has a significant impact for any project. Exhibit 39 illustrates the intended priorities with regard to time, quality and cost of the Holyrood project and what actually happened.

#### There were problems in ensuring clear leadership and control on the part of the client organisation

**5.8** Exhibit 40 (overleaf) illustrates a traditional model of good project team organisation, command and communication. This was the model advocated by HM Treasury in 1997. The model remains relevant, although in 2003 the Office of Government Commerce recommended clients should follow procurement methods which provide an integrated supply team not separate agreements with individual consultants, contractors and specialist suppliers<sup>28</sup>.

**5.9** The original project management organisation broadly reflected this traditional model. My 2000 report asked whether project management had always had the best possible mix

of skills for this demanding project. But it noted that the Corporate Body had adopted the recommendations of the Spenceley report and other measures intended to strengthen the management and oversight of the project. Exhibit 41 (overleaf) summarises the project organisation as it has been since June 2000, when the Holyrood Progress Group was established.

**5.10** The successful management of a project normally requires that there should be single point of accountability and control where decisions can be taken about how to balance time, cost and quality as part of the client decision-making process. Normally this control should reside with the project sponsor/director.

**5.11** Overall leadership for a project would normally reside with the project director to whom the client gives responsibility – within specified boundaries – for making the project happen.

**5.12** The organisation of the Holyrood project did not provide the

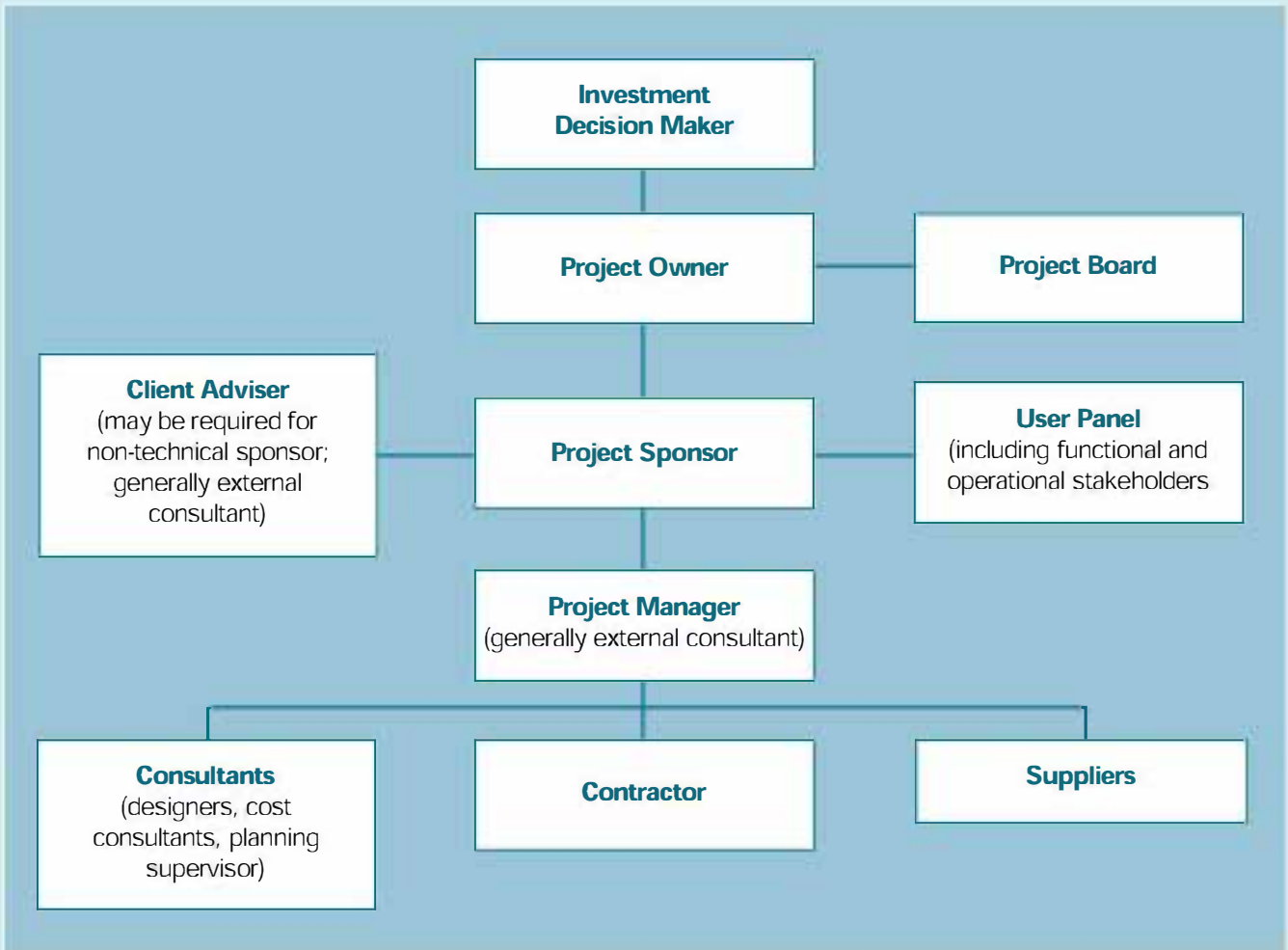
necessary clear direction and leadership. The organisation chart in Exhibit 41 (overleaf) suggests clear lines of responsibility, control, communication and accountability. But the real position was much less clear:

- The Corporate Body is the legal client and in June 2000 formally delegated responsibility for completing the Holyrood project to the Accountable Officer.
- The Accountable Officer has delegated responsibility for day-to-day control and oversight of the project to the project director with advice and guidance from the Progress Group.
- The project director's job description states that the person acts as the single focal point for day-to-day management of the Parliament's interest in the project, with responsibility for securing the delivery of the new building complex to programme, within budget and to the specified quality. In practice the project director has acted as the senior

<sup>28</sup> *Achieving Excellence in Construction Procurement Guide 2 – Project Organisation* (OGC 2003) states that "A traditional project structure is not integrated; it separates out the responsibilities of each party. For this reason it should not be followed unless it demonstrates significantly better value for money than the recommended procurement routes".

## Exhibit 40

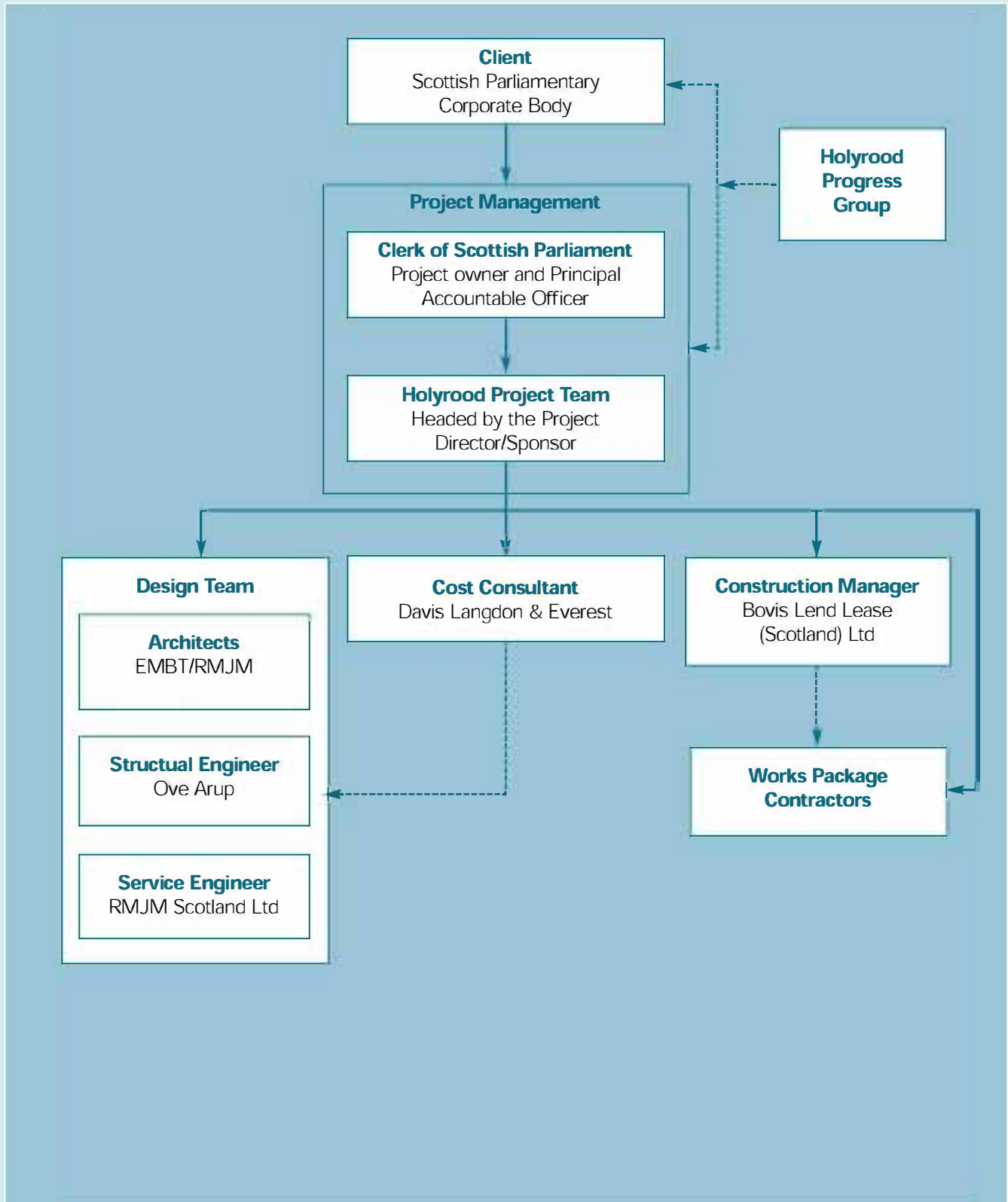
### Traditional project organisation



Source: *Essential Requirements for Construction Procurement*, HM Treasury, 1997

**Exhibit 41**

Holyrood project organisation from June 2000



Source: Audit Scotland

## Exhibit 42

### Role of the Holyrood Progress Group

Formally the Holyrood Progress Group is an advisory and monitoring group supporting the Corporate Body and the Accountable Officer.

In practice it quickly evolved into a decision-making body. For example:

- in August 2000, following advice from the architect, the Group concluded that oak should be used in window frames
- in March 2001, the Group rejected cost saving proposals from the architects and recommended the use of Kemnay as opposed to Portuguese granite
- in January 2002, the Group concluded that granite rather than slate should be used for cladding materials.

The Progress Group demonstrated leadership on many important issues. For example:

- the Group instructed the cost consultant to seek opportunities for savings in the MSP block in November 2000
- in April 2001, the Group reported its 'serious concerns' regarding the performance of the design team to the Accountable Officer. A letter was sent in September 2001, clarifying the client's expectations of the architects
- in June 2001, the Group informed the Accountable Officer of its concerns over the performance of the then project director.

Because the Progress Group is not formally a decision-making body it is not required to be accountable to any other body.

project administrator coordinating the interests of the various parties and the high level communication and reporting. There has been less emphasis on leading and making decisions because the Progress Group must guide the director.

- The senior project manager/ project manager supports the project director. The current senior project manager instructs the construction manager and the design team but is not a single authoritative point of command. He was appointed in 2001 but has not had a formal job description since taking up the role.
- The Holyrood Progress Group is an advisory and monitoring group supporting the Corporate Body and the Accountable Officer. In practice it quickly evolved into a decision-making body (Exhibit 42). While strictly the Progress Group had no executive power its terms of reference required the Accountable Officer to act on its advice or, if he disagreed, to refer the matter to the Corporate Body.

The Accountable Officer has not referred any matter of disagreement to the Corporate Body.

- The construction manager managed the construction programme but did not have control over costs or quality. The construction manager is a consultant and therefore cannot instruct third parties such as the design team or the trade contractors (except on behalf of the client), because it has no direct contractual relationship with them. The construction manager advised project management and the client on specific actions to protect programme and cost but its advice was not always acted upon. For example, in October 2000 it asked project management to obtain a written confirmation from the architects that it would carry out any redesign required to achieve the target rates and budgets set for the trade packages in the then draft cost plan. Project management did not action this request.
- Similarly the role of the cost consultant is to monitor costs and

to provide specialist advice but as a consultant it cannot instruct other parties regarding costs.

- Design team management is a critical function in a large building project (Exhibit 43). The architect is responsible for leading the design team but project management and the Progress Group have been dissatisfied with the architect's performance in this respect. At times leadership of design has not been clear or there has been conflict about the role. Enric Miralles died in July 2000 yet it was 15 months, in October 2001, before project management insisted on organisational changes within the architectural joint venture to clarify roles and responsibilities.

**5.13** The project execution plan is a vital control procedure in any major construction project (Exhibit 44 overleaf). In my 2000 report I said there should have been such a plan. Subsequently the roles, responsibilities and accountabilities of the client, the project team including the consultants were set out in a draft project execution plan in

## Exhibit 43

### Design team management

The Holyrood project design team comprised the architect (EMBT/RMJM), the structural engineer (Arup), the services engineer (RMJM Scotland), the quantity surveyor (DLE) and various specialist consultancies. The architect was designated as the design team leader. Its responsibilities include co-ordination of the work and activities of design team members.

The design team needs to work together, in an integrated way, to produce the overall design solution of the building. This is an iterative process as, for example, the architecture may need to alter to suit the structural solution; similarly the structure needs to accommodate the services engineering. Bringing all of these disciplines together to produce the 'best' solution for the client is an art. It requires an understanding of the various disciplines, an appreciation of the design processes and a reliance on effective relationships. Making all of the design happen and delivering the design information to the required programme is called design management. The leader of the design team needs to 'own' the overall vision of the design and harmonise the various strands of design towards the realisation of that vision in a timely manner.

It is not unusual for design leadership to be placed with the architect. Indeed, traditionally the architect was always the design leader. It is only over the last 20 years, with the advent of fast-track forms of design, procurement and construction, that project managers and construction managers have entered the scene and that design management has taken on a higher level of criticality. Design management becomes particularly important when design periods are 'squeezed' or shortened, as is frequently the case with fast-track approaches such as construction management.

It is important under construction management for a very close partnership to be developed between the architect and the construction manager, so as to ensure that the design programme and the procurement programme are compatible and that the works are not delayed due to the progress of the design.

Source: Audit Scotland

October 2000. The draft plan was a detailed, comprehensive document setting out clearly policies, strategies, lines of communication, key interfaces and responsibilities. But although there were significant changes in project organisation since October 2000 the plan has never been updated nor issued beyond a draft document, illustrating the unclear definition of roles.

#### After June 2001 project management did not work within an overall budget or approved cost ceiling for the whole project

**5.14** If there is an approved budget then project management must respond to cost projections that exceed the budget by taking steps to reduce the cost or by securing additional funds. The choice should be based on a reassessment of value for money at the new projected cost level.

**5.15** In April 2000 the Parliament approved a budget for the project of £195 million. At the time project management considered this was a cash limit within which the contract costs must be contained. In June

2001, however, the Parliament approved a further motion, which can be interpreted as removing the previous overall budget constraint of £195 million. At the same time the Parliament's motion called for rigorous risk management (Exhibit 11).

**5.16** Once Parliament had decided to remove the overall cash limit of £195 million, project management did not establish an alternative overall budget or approved cost ceiling that would allow the costs of the project to be properly managed. I am concerned that project management did not establish an alternative overall budget or approved cost ceiling for the purposes of managing the costs of the project. Because project management set no budget after the Parliament set aside its £195 million limit, it is not clear how considerations of affordability were taken into account.

**5.17** I have noted above the importance of – and inevitable tension between – the three priorities of time, cost and quality. Managed correctly, with an understanding of the relative weighting or importance attached to each by the client, a successful outcome can be achieved.

By not setting a project budget after 2001 there was a significant risk that project management would 'lose sight' of the aim to contain costs and would not have a budget limit as a performance target. I am concerned that project management and the client did not use budgetary control procedures to allow proper financial considerations to be given due weight in decision-making, together with those regarding programme deadlines and the quality, complexity and aesthetics of the building.

**5.18** In the annual budget of the Corporate Body the provision for capital expenditure has substantially exceeded actual expenditure every year (Exhibit 45 overleaf).

**5.19** Exhibit 46 (overleaf) shows the unit construction costs of the Holyrood project compared to a sample of other high quality buildings completed in recent years for a mixture of public and private sector clients. There has been a dramatic increase in unit costs of the Holyrood project since 2000, which is much more expensive than most recent high quality buildings.

## Exhibit 44

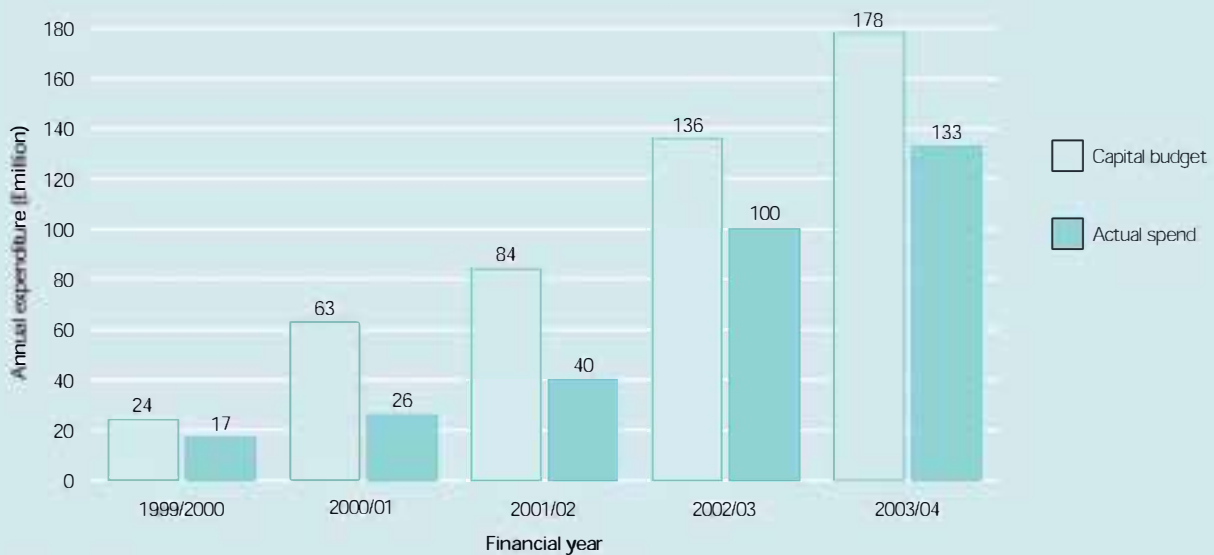
### Project execution plans

The project execution plan should set out how the client intends the project to be managed, the roles and responsibilities and any delegations of authority. The plan should be a controlled document, updated as necessary throughout the life of the project. Good practice is that the project owner should sign off the plan before the appointment of any consultants or contractors. It should name individuals for each role and delegated authority, rather than merely state the post responsible. Accountability is far more effective where individuals responsible are named. The plan must be kept up-to-date, when individual post-holders change the plan should be updated and re-issued.

Source: Audit Scotland

## Exhibit 45

### Corporate Body capital budget and expenditure 1999 to 2004



Note: Capital budget includes an element of capital spend on non-Holyrood projects

Source: Corporate Body annual financial statements



## Exhibit 46

### Comparative unit construction costs for high quality buildings

	Estimated construction or total project* cost	Gross floor area	Unit cost
<b>Holyrood – current position</b>	£273m	30,600m <sup>2</sup>	<b>£8,922/m<sup>2</sup></b>
<b>Holyrood – previously (Stage D June 2000)</b>	£119m	30,600m <sup>2</sup>	<b>£3,889/m<sup>2</sup></b>
<b>Portcullis House</b>	£161m	22,811m <sup>2</sup>	<b>£8,600/m<sup>2</sup></b>
<b>New British Library Phase 1</b>	£511m*	112,650m <sup>2</sup>	<b>£6,600/m<sup>2</sup></b>
<b>City of London financial centre – private sector client</b>	£180m*	67,350m <sup>2</sup>	<b>£3,100/m<sup>2</sup></b>
<b>Large multinational HQ – private sector client</b>	£220m	87,680m <sup>2</sup>	<b>£2,600/m<sup>2</sup></b>
<b>Greater London Authority building</b>	£43m*	18,000m <sup>2</sup>	<b>£2,600/m<sup>2</sup></b>
<b>London insurance HQ – private sector client</b>	£185m*	79,000m <sup>2</sup>	<b>£2,300/m<sup>2</sup></b>

Note\*: Where construction cost is not available the total project cost is reported. Unit costs have been updated to current outturn costs, using the ■CIS index.  
Source: Audit Scotland

### Cost reporting and financial control should have been better developed at all levels of the Holyrood project

**5.20** In my 2000 report I recommended that project management should review and report project costs regularly (monthly) to the client on a comprehensive and systematic basis. The Accountable Officer advised the Audit Committee in October 2000 that he had implemented this recommendation. But subsequent financial reporting of the project has not always been comprehensive or systematic.

**5.21** Project management provided estimates of the overall project cost to the Progress Group and the Corporate Body, in the form of drafts of the reports that the Corporate Body subsequently provided to the Parliament's Finance Committee from June 2001. Until July 2003 the reports were provided only quarterly or less often (Exhibit 5). None of the reports before July 2003 provided information about landscaping costs and only four of the eight reports

provided between June 2001 and June 2003 reported all the other main cost items. There was no other regular reporting of total project cost until July 2003 when the Corporate Body started routine monthly reporting to the Finance Committee on total project costs.

**5.22** The cost consultant reported estimated construction costs in detail every fortnight to project management and the Progress Group. The scope and format of these reports varied over time, and the Progress Group has stated that it found the reporting format unsatisfactory at different times.

**5.23** The cost consultant considers project management did not inform it of any critical opinion expressed by the Progress Group at the time. The cost consultant took it as read that project management understood the cost issues it had reported and was satisfied with the clarity and competency of its cost advice.

**5.24** The cost consultant was responsible for monitoring construction costs only and providing

risk analysis. It was not responsible for monitoring other costs such as fees, VAT and some of the landscaping and fit-out costs. Although the cost consultant also provided an overall estimate of project costs to project management this did not accurately measure fees and VAT, which the cost consultant was not responsible for monitoring. In any event project management did not report these overall estimates to the Progress Group.

**5.25** Although the cost consultant's reports highlighted variances in construction costs when they occurred, there was little narrative and no written analysis of reasons for change. Until July 2003, when the Corporate Body introduced regular monthly reporting on progress to the Parliament's Finance Committee, project management provided written reports on the costs of the project to the Progress Group and the Corporate Body on an exception basis only, which was relatively rare.

**5.26** There was no regular or detailed reporting of the significant expenditure on the consultants' fees

etc for the Holyrood project (current estimated outturn cost £68 million). Project management did not resolve important questions about the basis of each consultant's fee remuneration until August 2003 comparatively late in the project. I examine this issue later in this part of my report.

**5.27** Until July 2003, reporting by the Accountable Officer to the Corporate Body usually focussed on the value of current construction contract commitments and recent awards. Because no budget for the overall cost of the project had been set there was no routine report or commentary on overall project costs and trends or the constituent elements, relative to what would be in any budget.

**5.28** In any project it is important that all the parties have a clear understanding of how budget, risk and contingency relate to each other:

- A **budget** is an approved sum allocated for a project (a pot of money). Only the authority that approves a budget can vary it once set. A budget is not the same as a **forecast**, which will vary through the life of the project as circumstances unfold.
- A **risk** is an event that may occur and may have an impact on the outcome of the project.
- A **contingency** is an allowance within the budget for unidentified costs, including risks. Similarly a forecast is likely to include a contingency.

**5.29** At different times project management and the Progress Group acted to contain or reduce costs. However the normal financial discipline of named individuals being

accountable for controlling expenditure within limits specified in an approved budget was not present on this project. It seems that project management regarded the regular reports from the cost consultant on construction costs and on risk costs as setting a construction budget, when they were no more than forecasts. An example of this is that before payment project management checked each trade contractor's invoice to ensure it did not raise total payments above the total estimated cost for the package reported by the cost consultant. The danger of confusing forecasts with budgets is that forecasts will become self-fulfilling if effective action is not taken to contain the cost.

**5.30** Exhibit 47 illustrates how the estimated construction costs including risk reported to the Progress Group and the Parliament have steadily increased since 2000. Generally estimated construction expenditure and construction risk costs reported to the Parliament has initially been lower but has then risen to the same level as the cost consultant's forecast.

### **The approach to risk management was not fully consistent with good practice**

**5.31** In my 2000 report I concluded that accounting for risk was insufficient. I showed that contrary to good practice there was no quantified allowance for the major risks facing the project. I recommended that this should be established and the results used as a basis for an action plan to manage the risks.

**5.32** In Part 2 of this report I show that project management introduced a process for quantifying risks from October 2000 and has conducted risk reviews since then. However in

some important respects risk management for the Holyrood project has not been consistent with good practice. Under the draft project execution plan prepared in October 2000 it was project management's responsibility to arrange and convene risk management meetings at relevant intervals to review progress on all aspects of risk as they affected the project.

**5.33** Twelve risk workshops did take place, between October 2000 and December 2002. In accordance with good practice representatives from project management, the design team and the cost consultants participated. An experienced risk management specialist employed by the cost consultant led these events, in accordance with the cost consultant's contractual responsibility to undertake and lead risk assessments as part of its service.

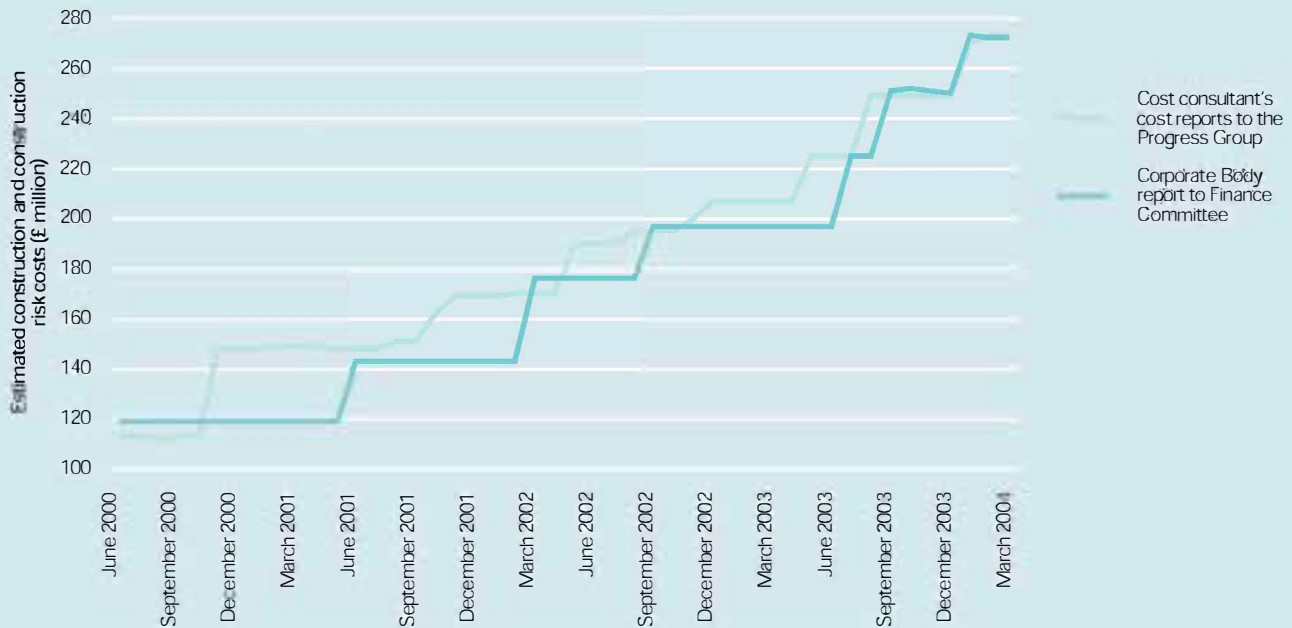
**5.34** A fundamental feature of risk management is to allocate or assign each risk to whichever party is best placed to manage it. Usually a named individual or party (an owner) is assigned to mitigate or manage out the risk, with the aim to lead action to eliminate, or at least reduce the impact of, specific risks and therefore minimise expenditure on 'contingency' or 'risk allowance'.

**5.35** Although the risk workshops for the Holyrood project did identify owners for specified risks there was no monitoring or feedback on subsequent action. It is not clear that the workshops from 2000 to December 2002 succeeded in the aim to reduce or manage risks out.

**5.36** From December 2002 risk management operated differently. There were no further workshops with the previous wide participation. There was thereafter no systematic basis for any action by project

## Exhibit 47

### Estimated construction costs for the Holyrood project 2000-04



Source: Audit Scotland

management to manage out risk, although the cost consultant continued to report its assessment of the cost of risk in accordance with its terms of engagement. In its reports the cost consultant assigned a cost to each risk and reported the total cost, which it called a reserve for outstanding construction items. This reserve was reported in parallel with the cost consultant's report on the current construction commitment and project management generally accepted the combined results of the two reports as the best estimate of the total eventual construction cost. Over time, as individual risks have materialised, the cost consultant has reported a reduction in the total risk reserve offset by a corresponding increase in the cost of the current construction commitment. However for most of the time the cost consultant has also identified and costed new risks, which increased the risk reserve – it was 'topped up', as it were. The net result was that between 2000 and early 2004 there was a steady increase in the overall forecast construction cost.

**5.37** The approach used at Holyrood appears to be an unusual way to manage risks. It seems the approach has been to tacitly accept increases to the cost of the project rather than forcing action to prevent the increases.

#### Capping has controlled consultants fees but only late in construction

**5.38** In my 2000 report I suggested that before they appointed consultants, project management could have explored more carefully alternative fee arrangements with its consultants including financial incentives linked to delivering value for money.

**5.39** Project management had appointed its main consultant advisers on broadly similar fee terms in 1998 and 1999. Each consultant's fee remuneration was wholly or mainly a percentage value of the approved construction cost of the project. The tender proposal that the successful firms had made during the process leading to their appointment set the percentage fee

that applies to them. In 2000 the estimated fee cost was £23 million, approximately 19% of the estimated construction cost including contingency of £119 million at that time. The client secured (partial) fee capping in 2000 and (more completely) 2003 and fee costs are now forecast at £50 million, 19% of the approved construction cost<sup>29</sup>.

**5.40** Percentage fees do not align the objectives of the client with the commercial objectives of the consulting firms because the more a project costs the more each consultant is paid. Percentage fees are necessary when the scope and overall cost of a project has a high degree of uncertainty, but it is advantageous to a client to fix the fees as soon as it can.

**5.41** In August 2000 project management agreed a professional fee cap with their structural engineer consultants, based on £108 million construction cost. The fees to the structural engineers have since increased because of additional work but are less than 10% of the total

<sup>29</sup> In addition to its fee the construction manager is also reimbursed for its staff costs and for the costs of site organisation. Its fee and its staff costs were convertible to a lump sum on agreement of the cost plan. The fee costs stated here therefore include the construction manager's fee and staff costs but not its site organisation costs. The estimated site organisation costs have increased from £5 million in 2000 to £18 million currently.

fees expenditure of £50 million. However project management did not agree a professional fee cap based on construction costs with any other consultants until 2003, when construction costs were significantly higher than in 2000.

**5.42** Prior to fee capping, each of the consultants' fee remuneration was linked partly to a calculation of the approved construction cost rather than the eventual outturn cost. In summary:

- The construction manager fee was a percentage of project cost which, together with its reimbursable staff costs, was convertible to a fixed lump sum on agreement of the cost plan.
- The fee for each design team member was individually and separately agreed, but in each case as a percentage of costs. Around 60% of the total fee was based on the approved cost at intermediate stages before construction commenced.

**5.43** To calculate the percentage fee payable to each consultant at each stage it was necessary to agree an amount that was the approved project cost prevailing during that stage. As each stage was reached project management should have certified or formally stated the approved project cost. They did not do so.

**5.44** Between 2000 and 2003 project management pursued various initiatives to cap the architect's fees:

- In March 2002 the architect was claiming fees based on £140 million construction costs. Although the architect was then willing to consider converting to a capped fee no agreement was achieved. As the estimated final construction cost continued to

rise this prospect became less likely.

- Later during 2002 and 2003 there was disagreement between project management and the architects as to which levels of construction costs should be applied to the measurement of its fees at each stage. No agreement was reached.
- In July 2003 the Corporate Body's initiative seeking to cap fees with all its consultants overtook this dispute. This resulted in an agreement with the architect in September 2003 to a fixed lump sum fee for its services. However the necessary contract variation documents to formalise this change had not been agreed at the time of preparing this report.

**5.45** Fee caps have been agreed for the services of the other consultants:

- A fee cap was agreed with the service engineers (RMJM Services) in July 2003 and formalised in February 2004.
- A fee cap was agreed with the cost consultant in August 2003 and formalised in January 2004.
- A cap for the construction manager's site management staff costs and for its construction management fee was agreed in August 2003 and formalised in January 2004. These caps are qualified and the construction manager is entitled to seek or claim additional fees or costs in specified circumstances.

**5.46** The Corporate Body has now limited its exposure to increases in consultants' fees. However it did so very late in the programme and after the fees had increased significantly. The agreement of the fee caps at this late stage in the project did not

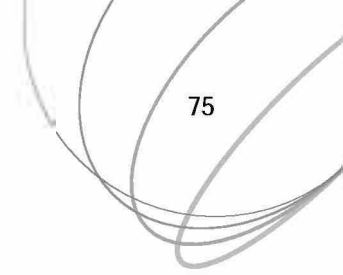
provide an effective incentive to consultants to control costs and programme. Even now, there remains a risk of increases of fees to the architects (as the cap agreement has not been finalised) and of fees to the construction manager (due to the qualified nature of the agreed cap with them).

**5.47** I am concerned that project management did not seek to convert its construction manager's fee to a fixed lump sum before July 2003. This opportunity was part of the contract with the construction manager and there seems no good reason why project management did not pursue this opportunity to contain costs as part of the development of the cost plan in autumn 2000.

**5.48** I am also concerned that although project management raised some significant questions about some aspects of some of its consultants' work, it has not systematically assessed their performance. This is important because if project management was able to show significant underperformance by any of its consultants it should also consider what options (if any) it may have for recovering some of its additional costs. There is a risk that any inaction by project management so far could limit any recourse the Corporate Body may otherwise have had.

**Project management did not implement construction management fully in accordance with usual practice**

**5.49** Parts 3 and 4 of this report discuss the reasons for the selection of construction management for procuring the Holyrood project. Construction management can provide important benefits to a client but there are particular time and cost risks flowing from it, which must be addressed. My 2000 report showed



that the original procurement strategy for the new Parliament was incomplete because it did not assess the risks implicit in the chosen procurement route (designer appointment and subsequent construction management) or how best to manage those risks.

**5.50** Construction management is a comparatively specialised procurement approach. It is unusual within the public sector particularly in Scotland. Audit Scotland's consultants compared key features of the organisation of the Holyrood project with usual construction practice. This included comparisons with seven construction management or similar projects from across the UK with outturn costs of between £38 million and £300 million.

**5.51** Although the Holyrood project is more costly than the selected benchmarks the comparison suggests important differences concerning roles and responsibilities within the Holyrood project against the usual practice.

### Project reporting

**5.52** At Holyrood, the construction manager produces a regular progress report as required by its contractual obligations, initially every fortnight, latterly monthly. Its main focus is progress and programme. The cost consultant reports separately to the client and the other consultants on project costs. Since 2002 the cost consultant has estimated the cost of project risks for the client but the detailed analysis is not shared with the other consultants.

**5.53** Normal practice is for the construction manager to produce a regular (normally monthly) report to the client including progress against programme, cost against cost plan and quality against specification. In other words the construction

manager provides an integrated view of performance against the broad goals of project cost, time and quality. There would not normally be separate reports to the client from other members of the project team, which may be divisive and make it difficult for the client to reach an integrated view of the project.

### Cost management

**5.54** Normally under construction management, the cost consultant is only responsible for cost management and reporting until trade packages are let. The construction manager takes over responsibility for cost management, reporting and control progressively as trade packages are let (in the same way that it assumes control of programme, quality, changes, variations, etc). The cost consultant retains a monitoring role and watching brief on costs, on behalf of the client.

**5.55** At Holyrood, the construction manager has not taken responsibility for cost management and reporting and control, apparently because it could not agree the cost plan without qualification in November 2000. The cost consultant has therefore retained responsibility for cost advice throughout the project but responsibility for cost control is not clear. Nor has the construction manager assumed the usual integrated responsibility for cost and programme management.

### Scoping of trade contracts and interfaces between trade contractors

**5.56** Contracts for Holyrood have been let with scope which has subsequently changed significantly, as shown in Part 4. Normally under construction management there is careful scoping of trade contracts. It is important to ensure that together the trade packages include everything required for the construction of the whole project.

Normally under construction management trade packages would be let with no, or very few, provisional sums.

**5.57** The consequence of awarding contracts with a high proportion of provisional sums is that in such circumstance the client has poor cost certainty. While tenders may appear to be in budget, the prices are not secure, as is evident in the Holyrood project.

**5.58** For construction management to be successful the common boundaries between the trade contracts and how they will integrate with each other must be carefully defined. This will include respective responsibilities for achieving tolerances, for access, for safety and for protection of completed works. Poor interface definition and/or management will result in delay and additional costs.

**5.59** At Holyrood, the construction manager has placed a high degree of effort on managing the common boundaries between contracts. Nevertheless, there are many cases of delays having been caused by problems at the boundaries – for example scaffolding having to be moved multiple times to permit the fixing of windows and adjacent glazing panels.

### The architect's role

**5.60** Under construction management it is essential to select an architect who can envisage the whole and the detail at the same time. This is to enable the scoping and design of trade packages with a long lead-time to be completed in advance of adjacent and dependant packages.

**5.61** The architectural joint venture is comprised of two reputable firms of high quality and was selected after a competition in 1998. However the original procurement strategy for the Holyrood project resulted in the selection of the architect before the client had opted for a construction management contract. The selection could not therefore make any allowance for the design team's experience and ability to work effectively under construction management. There are special features of working with a signature architect such as Enric Miralles, which can present significant challenges under construction management (Exhibit 48).

#### Risk management

**5.62** Effective risk analysis and management is fundamental to all forms of project procurement including construction management. But construction management places a higher risk with the client than other forms of procurement because there is no main contractor role. This suggests that under construction management the client should place a greater premium on risk management than under other approaches.

**5.63** As noted above, however, the client's approach to risk management on the Holyrood project was not fully consistent with good practice.

#### Fee arrangements

**5.64** Often under construction management consultants are appointed on a percentage fee basis, but the fees are converted to lump sums when the cost plan is agreed between the client and the project team.

**5.65** As noted above, although fee capping was introduced for the consultants, in most cases this was in 2003 well beyond the point first envisaged.

## Exhibit 48

### Special features of working with a signature architect

A signature architect is high-profile individual who is very clearly identified personally with a building and its design. The top (household) names in architecture can be regarded as signature architects.

Clients often choose to use a signature architect to create a special building, which is of symbolic importance and where a 'statement' is being made through the architecture. There are clearly benefits from doing so. But there can be disadvantages too. These may include:

- more likelihood of the design being novel, unusual in style, more complex and perhaps with unusual materials being selected
- may be more difficult to communicate the design to tenderers/contractors
- may be more difficult to estimate costs and price tenders
- may be more difficult to construct the building and more difficult to manage the construction
- design may take longer to produce
- architect more likely to push for higher quality levels, with less likelihood of compromise
- architect has a high reputation risk, which may influence his flexibility
- architect likely to develop a close relationship with the highest levels of the client organisation (Chairman or Ministerial level), thereby making it more difficult for the project sponsor and the project team to manage the design and the project.

Source: Audit Scotland

# Appendix 1. Trade contract case studies

The following pages of the report summarise Audit Scotland's detailed findings from its examination of 20 individual trade package contracts. This Appendix 1 provides summary data about the 20 contracts examined.

Appendix 2 summarises detailed findings from the examination of five of these contracts as an illustration of the scope, nature and progress of individual contracts.

Package	Description	Contractor	Date of contract	Basis of appointment	Cost Plan	Estimated outturn cost
1	Substructure west	O'Rourke	Sep 99	Two stage	£3.2m	£3.0m
2	Substructure east	O'Rourke	Jan 01	Two stage	£6.5m	£7.2m
3	Assembly building frame	O'Rourke	Jan 01	Single stage	£16.9m	£39.8m
4	MSP building roofing	Coverite	Jan 01	Single stage	£0.7m	£1.0m
5	MSP building carpentry and joinery	Ultimate	Mar 01	Single stage	£2.3m	£4.0m
6	Electrical east	Forth Electrical	Sep 01	Single stage	£6.8m	£8.0m
7	Queensberry House blast doors and windows	Drawn Metal	Sep 01	Single stage	£0.8m	£1.2m
8	Foyer roof and glazing	Mero	Oct 01	Two stage	£1.5m	£7.4m
9	Assembly building roofing	Coverite	Oct 01	Two stage	£4.4m	£7.5m
10	Mechanical and plumbing east	Rotary	Nov 01	Single stage	£6.4m	£9.1m
11	Assembly building windows	Drawn Metal	Nov 01	Single stage	£2.6m	£13.0m
12	MSP building bay windows	Baydale	Dec 01	Negotiated	£1.5m	£3.4m
13	Toilet and fitness area fit-out	Mivan	Jan 02	Single stage	£1.4m	£2.9m
14	Stone flooring	Vetter	Feb 02	Single stage	£1.3m	£1.8m



Package	Description	Contractor	Date of contract	Basis of appointment	Cost Plan	Estimated outturn cost	
15	MSP building windows and cladding	Mero	Mar 02	Single stage	£1.0m	£2.8m	
16	Specialist glazing	Assembly buildings specialist glazing	Mero	May 02	Negotiated	£1.9m	£11.0m
17	Hard landscaping	Perimeter walls, roads, etc	O'Rourke	Aug 02	Single stage	£4.4m	£5.6m
18	Assembly building rooflights	Space Decks	Aug 02	Negotiated	£0.2m	£1.9m	
19	Zone 1 fit-out	Fittings for chamber, towers 1 & 2, press tower	Mivan	Aug 02	Single stage	£5.0m	£14.1m
20	Zone 2 fit-out	Fittings for Canongate, foyer, towers 3 & 4	Mivan	Sep 02	Single stage	£2.9m	£7.8m
<b>Total</b>					<b>£71.7m</b>	<b>£152.5m</b>	

**Note:** Cost Plan refers to the adjusted cost plan figure.

The Estimated Outturn cost is the estimated final cost of the package including inflation but excluding risk elements.

The combined risk element for the 20 packages is £40.3 million.

Figures are rounded to the nearest £0.1 million.

Source: Audit Scotland

# Appendix 2A. East frame

<b>Contractor</b>	O'Rourke (Scotland) Limited	
<b>Scope of works</b>	The package covers the structural frame to the assembly buildings. The structures comprise in-situ concrete columns, beams, vaults and walls, precast concrete stairs and wall panels, post-tensioned and reinforced concrete floor slabs, structural steel frames and trusses and laminated structural timber roof structures. The package includes some trade contractor design responsibility, relating to concrete reinforcement, concrete vaults, pre-cast concrete, structural steel roof structures and laminated structural timber roof structures.	
<b>Programme</b>	<b>Planned</b>	<b>Actual</b>
Letter of intent date	22 January 2001	23 January 2001
Start on site	12 March 2001	12 March 2001
Contract date	–	14 May 2002
Programme period	March 2001 - May 2002	March 2001 - still on site
<b>Costs</b>		
Adjusted cost plan + inflation	£20.2 million	
Trade contract value	£23.5 million including £5.5 million for contingency and risk	
Estimated final costs	£39.8 million	
Risk still at large	No – works substantially completed.	

## Procurement

**1.** The package was procured via a single stage tender issued to six tenderers on 13 October 2000. Due to the quantity and complexity of post-enquiry tender addendum information issued the tender return date was extended by ten days to 20 November 2000.

**2.** At pre and mid-tender meetings the team noted that O'Rourke demonstrated the most enthusiasm and the best understanding of the project requirements. Two of the original tenders withdrew from the tender process and four tenders were returned on 20 November 2000, with prices ranging from £17.7 million to £19.8 million. This contrasted with the DLE pre-tender estimate for the package of £23.5 million and the current cost plan allowance, plus inflation, of £16.1 million.

**3.** The initial review of the tenders assessed that O'Rourke (lowest tenderer) best satisfied the award criteria, while the highest tender was uncompetitive and discounted. O'Rourke was given a post-tender

interview; with the two others held in reserve.

**4.** Further revisions to the tender information on finish to the concrete in the towers was given to O'Rourke the post-tender period and they advised a significant cost impact, which the team had anticipated. This information was given to the remaining tenderers for comparison and their poor response confirmed the team's earlier decision.

**5.** The construction manager's tender recommendation was not issued to project management until 19 January 2001 as the post-tender period was prolonged with attempts to mitigate the overspend on the package. Target savings of £1.4 million were identified, the bulk of which were subsequently achieved before contract award and O'Rourke received a letter of intent on 23 January 2001 and started on site on 12 March 2001. Removal and clarification of bid qualifications and the introduction of additional provisional sums increased the tender to £17,964,654.

**6.** The trade contract sum included provisional sums, totalling £4.68 million. Additional elements of the structures elements totalling £3.78 million, were based on provisional quantities re-measurable. This totalled £8.46 million, some 40% of the contract sum.

## Design issues

**7.** It was acknowledged prior to tendering that the ideal level of design information would not be available at the programmed dates. In December 2000 design was 14 weeks behind programme and the package was let with much design to be completed but work started on site at the scheduled date in the programme.

**8.** At package award, O'Rourke issued an Information Required Schedule (IRS) indicating key dates by which they required design information to progress their own design elements and proceed with the works. But the design programme slipped from the agreed dates and detailed design was carried out whilst the works were being built.

**9.** In July 2001 the construction manager was registering concern about design information still outstanding on the package and the potential critical adverse impact on the Strategic Programme. Concerns were that final cost and programme could not be established without formalising the extent and therefore value of the provisional sum items.

**10.** O'Rourke prepared a paper in October 2001 to facilitate some recovery of the programme and summarised information required issues. It records that 49% of their Requests For Information (RFIs) related to conflicts between structural and architectural drawings and 32% related to areas where information provided by the design team was considered deficient. At that point O'Rourke were typically raising 50-60 RFI's per week.

### Programme

**11.** Works started on site on the programmed date of 12 March 2001 and, according to the contract programme, should have completed by 20 May 2002. O'Rourke remained on site in May 2004.

**12.** With the trade contractor starting on site on the agreed date, in advance of key design elements being finalised, detailed design was carried out as works were built. Developing areas of complex design and the geometry required to build the structures, whilst progressing the works, proved challenging. Construction, co-ordination and solving buildability issues impacted on the design progress and had a knock-on affect on the overall programme.

### Costs

**13.** The Estimated Final Account for this package as at Cost Report No 86, 16 April 2004 was £39,825,000, representing an increase of 122% on the original trade contract sum. Costs increased due to a number of factors, including mainly:

- design development
- disruption
- prolongation
- scope changes
- provisional items resolution at a higher level than originally allowed for. For example:
  - glulam works final cost of £2,612,429 against an original allowance of £800,000
  - structural steelwork final cost of £5,448,105 against an allowance of £4,000,000
  - boundary walls added into the package at a cost of £3,000,479
  - other provisional sums generally increased by £929,201
  - stainless steel nodes in the glulam roof increasing from 90 nodes at some £2,000 per node to 111 bespoke nodes at an average of £11,000 per node.

**14.** Sundry other changes also added to the cost. There were 1,740 DCO's (Draft Change Orders) raised on this package by 31 October 2003 and a total of 141 were awaited.

# Appendix 2B. MSP bay windows

<b>Contractor</b>	Baydale Architectural Systems	
<b>Scope of works</b>	The package comprises the bay windows and adjacent stainless steel panels to the MSP Offices at the Scottish Parliament Building, Holyrood, Edinburgh. This package also includes the supply and installation of galvanised mild steel framing to support the windows, flashings, privacy screens, louvers and window actuators. There are 114 west elevation bay windows and 14 north east windows.	
<b>Programme</b>	<b>Planned</b>	<b>Actual</b>
Letter of intent date	20 December 2001 (recommended)	27 March 2002
Start on site	3 December 2001 (shown on programme)	27 March 2002
Contract date	–	
Programme period	3 December 2001 - 9 September 2002	27 March 2002 - present
<b>Cost</b>		
Adjusted cost plan + inflation	£1.8 million	
Trade contract value	£2.7 million	
Estimated final costs	£4.4 million (including some £1.0 million for package additions)	
Risk still at large	Yes	

## Procurement

**1.** Procurement for this package was initially secured through a competitive tender won by Flour City Architectural Metals (UK). Following the collapse of Flour City the package was secured through negotiation of a fixed lump sum against a single tender for £2,515,739. The package was let following tender scrutiny for an agreed £2,655,399.

**2.** The tender was qualified on programme commitment and was technically non-compliant. Baydale promised to endeavour to meet the construction manager's programme but would not be contractually bound to this. The construction manager recommended the client's acceptance to finalise the order at the earliest, to enable the works to start, with programme improvements sought on an ongoing basis during the works.

**3.** In March 2003 blast doors were transferred into the package from the Drawn Metal package; and, in April 2003, Reid's Close and the car park roof were added. Further, later, additions were the assembly building

rain screen cladding, privacy screens and the panelling to Zen Garden. At acceptance, costs associated with blast testing and additional insurance were uncertain and excluded.

## Design issues

- 4.** A number of design issues arose on the package relating to:
- increased costs from the addition and delivery time from authorisation for window actuators
  - membranes and rainscreens
  - decisions on painting of blast doors
  - manufacture of blast doors in stainless steel or mild steel
  - potential delays in manufacture
  - operation of blast doors ie, manual system – risk highlighted by Booth
  - risks associated with 25 year design specification.

## Programme

**5.** On 16 September 2002 an interim approval of extension of time was made based on a number of heads of claim:

- late contract signing meant a missed production slot at the French window factory
- late selection of stain colour
- late availability of stone cladding
- sundry site related delays, such as scaffolding obstructing access etc
- additional and enforced activity of surveying rainscreen fixing points individually
- draft change orders.

**6.** The total claim of 18 weeks 2 days was awarded and completion was extended to 16th May 2003. Although no further extension claims were allowed Baydale remained on site in December 2003 completing work and resolving issues.

**7.** The blast doors are critical to the project and the construction manager initially indicated that it was not satisfied with the level of detail contained in the contractor's programme; but it accepted that an element of uncertainty surrounded the design and acknowledged that the design team had contributed to delays in concluding the design of the blast doors.

### Costs

**8.** The initial contract award value was £2,655,399 and it expanded to an estimated final value of £3,455,339, excluding the additional blast door and Reids Close Works. The total variance equates to £943,600 or 37.5% of the original contract sum. Additional work added to this package (for escape blast doors, assembly rainscreen cladding, Reid's Close coping units, privacy screens and panelling to the Zen Garden) has added some £1 million more to these costs.

**9.** The average cost of windows contracted for with Flour City was £5,633 each compared with Baydale's £17,174 each.

# Appendix 2C. Specialist glazing (Stages 1&2)

<b>Contractor</b>	Mero (UK)	
<b>Scope of works</b>	This package covers 11 areas in the parliament complex; including the extensive glazing to the front wall of the debating chamber, the north lightwell and the public stair.	
<b>Programme</b>	<b>Planned</b>	<b>Actual</b>
Letter of intent date	–	22 May 2002
Start on site	8 October 2001	1 August 2002
Contract date	–	21 May 2002
Programme period	September 2001 - May 2002	July 2001 - July 2004
<b>Cost</b>		
Adjusted cost plan + inflation	£2.4 million	
Trade contract value	£7.2 million	
Estimated final costs	£11.0 million	
Risk still at large	Yes	

## Procurement

1. The nature of the glazing specified by the design team severely limited the range of contractors capable of delivering the package.

2. Early programmes had scheduled tendering enquiry issues for August 1999, September 1999 and then June 2000. Pre-qualification questionnaires were not issued until November 2000. The package tender was switched to a two-stage tender route because design information for the package was not complete. Tender enquiries were issued to six bidders on 14 March 2001 and three declined to bid. Returns were requested for 18 April 2001 but that date was extended at the request of tenderers until 4 May 2001.

3. Tenders were received from Schneider, Space Decks and Flour City, with bids ranging from £2 million to £8 million, the latter significantly over the cost plan target. As the lowest bidder, Schneider did not price for preliminaries, their bid was not technically compliant. However, despite being unable to agree preliminaries figure with Schneider the construction manager recommended progressing with

them; and the design team believed that the Schneider's outline proposal could be developed to a workable solution in the second stage. The client approved the Design Team's Tender Report on 25 July 2001 and engaged Schneider to progress design works to enable a lump sum contract to be concluded. Despite prolonged negotiations Schneider did not produce sufficient detail of programme and resources for the contract to satisfy the client, who formally withdrew their offer on 5 October 2001.

4. Project management took legal advice on progressing the package, which cautioned replacement of Schneider without following the procurement regulations. To progress the package, the client issued further tender invitations on a negotiated basis to Schneider and Mero (UK), who were engaged for the foyer roof package. However, issues over Schneider design ownership halted this and the client continued to negotiate with Schneider through November to April 2002. With the delay in negotiations, the client re-engaged with Mero in April 2002 as a contingency. On 1 May 2002, when Schneider rejected the terms of a

final contract offer negotiations were started with Mero and a contract agreed on 22 May with an estimated target value of £7.2 million.

## Programme

5. The package contractor contributed to the preparation of the construction manager programme through the provision of sterile<sup>30</sup> programme data but could not maintain progress to the various programmes set by the construction manager. There are a number of reasons for this, including:

- delays in the production of design information from the design team; iteration of the contractor's detailed design to satisfy the architect's design concept
- resolution of design issues to meet blast performance on non-standard designs and the necessary design testing
- sourcing glazing suppliers for the feature wood laminated windows in one area
- delays in resolving issues over the glass choice to light transmission and acoustic

30 Programmes produced assuming no constraints on the timing of the work or access.

performance of glazing in the debating chamber

- general problems of out of sequence working particularly in the North Lightwell area
- continuing design development by the architect throughout the course of the programme to meet the design concept
- resolution of multiple interface arrangements with other package contractors
- deploying insufficient resources for installation to meet ambitious programme schedules.

**6.** While the design team prepared the concept drawings and specified the performance of the glazing the package contractor was responsible for developing the design through to the detail; including the multiple interfaces with other package contractors. The complexity of the design concept for some areas was not appreciated from the early 2D drawings eg, the glazing on the North Lightwell, where the glazing meets in different planes. Much of the design involves bespoke interfaces that have not been used before.

**7.** At the outset the contract was to be completed by May 2002. As noted above the award of the contract was delayed. The client has granted an extension of time on the package, which is now scheduled to complete in July 2004.

### Cost increases

**8.** The cost plan for the package was based on an elemental allocation from the available budget using the limited design information in the Stage D proof cost plan at October 2000, to which the architect had agreed. Design development for the east side was poorly developed and allowed no appreciation of the complexity of the solution the architect might subsequently adopt and the client accept.

**9.** The contract agreed with Mero is based on actual costs plus a fixed percentage for preliminaries and profits. The use of cost plus contract removed the need for competition in supply of materials for the package. Therefore the client is required to pay the price for the materials sourced by the package contractor, who has no financial incentive to look for the best price. With more than 99 per cent of the materials manufactured in Germany and Austria the client has borne exchange rate risk but no estimate of the extent of this is presently available. The contractor could not identify for Audit Scotland any cost increases due to changes in blast requirements. Blast requirements were incorporated into the design as it developed.

**10.** At present the contract has run 53 per cent over cost on the basis of agreed commitments but further sums are still at issue. For commercial reasons these are not disclosed here pending agreement of final package accounts.

# Appendix 2D. Foyer frame and glazing

<b>Contractor</b>	Mero (UK)	
<b>Scope of works</b>	This package covers the foyer, which occupies the former 'A listed' garden of Queensberry House and provides the circulation space from the MSP building to the complex on the east side of the site. The package covers the frame supporting the roof and the distinctive leaf motif roof lights.	
<b>Programme</b>	<b>Planned</b>	<b>Actual</b>
Letter of intent date	30 July 2001	10 October 2001
Start on site	4 March 2002	22 July 2002
Contract date	–	1 October 2001
Programme period	November 2001 - April 2002	August 2001 - April 2004
<b>Cost</b>		
Adjusted cost plan + inflation	£1.8 million	
Trade contract value	£5.8 million	
Estimated final costs	£7.4 million	
Risk still at large	Yes	

## Procurement

**1.** Due to the lack of design development the package was tendered in a two-stage process with the trade package extended to cover this. The tender issue date was 9 May 2001 with returns by 11 June 2001. Under pressure from all tenderers for further details of design issues, the tender date was extended by two weeks.

**2.** Four bids were received for the package and two were non compliant by not pricing for specified elements. The two competing bids were very close and the contract was awarded to the lowest tender following post tender clarification of costs and pricing. The winning tenderer, Mero (UK), had experience of designing to a target sum and showed a willingness to move to a lump sum if the client should agree this. However a lump sum agreement was never achieved as design complications developed.

**3.** The client approved the award of the contract in October 2001 and Mero proceeded on an interim contract issued 28 November 2001.

A contract was finalised on 12 April 2002.

## Programme

**4.** The programme originally set for this package allowed 16 months. The package took 22 months to achieve practical completion in April 2004. Sterile<sup>31</sup> programmes for the package were developed by Mero and factored into the overall project programme by the construction manager. The programmes were not met due to a number of factors, including:

- insufficient design information
- design development exchanges between the design team and the trade contractor
- blast testing
- access delays due to other packages
- availability of cranes
- resourcing by the contractor.

## Design issues

**5.** The design at tender stage was based upon the architects design concept images, which looked to extensive roof lights on a light structure, with no indication of secondary supports for glazing, as the structural engineers had not engineered these at that stage. This was developed in stage 2 of the tender. The original design did not address blast loading requirements nor the added complications of blast debris in the form of the extensive granite cladding. These demanded a structure which was much more substantial than that which was presented at Stage D. The structure eventually developed comprised substantial steel sectional supports.

**6.** The tender documents envisaged a narrow silicone glass joint that was incapable of sustaining blast loadings. Subsequently, a joint was developed on the advice of Arup Façade Engineering that required the use of several metal extrusions for jointing in addition to the secondary framing supporting the blast loads.

31 Sterile programmes assume no constraints on working and design information supplied as programmed.



### Cost issues

**7.** Due to the limited level of concept design development the package cost plan stage was based on an elemental allocation from the available budget. At that point the architects had committed to design within a price of £500/m<sup>2</sup>.

**8.** In April 2001 the emerging concept design development was not adhering to the cost plan, and was costed by DL&E at £3,300/m<sup>2</sup>. Because of increasing programme pressures to complete by November 2003, HPG accepted the developing design and allowed development to continue.

**9.** Suggestions were made by the contractor to standardise elements of the design to reduce manufacture and installation costs but the architect rejected these. The original design concept envisaged the use of lead and copper, both ductile metals and readily suited to shaping on complex forms designed into this structure. The use of non-ductile stainless steel in place of lead and copper increased the complexity in manufacture, fitting and costs to achieve the architectural requirement.

# Appendix 2E. Assembly roof

<b>Contractor</b>	Coverite	
<b>Scope of works</b>	The package comprises the design, manufacture, supply and installation of stainless steel roofing to the assembly buildings. The scope of work includes roof purlins, structural steel decking, insulation and waterproofing, stainless steel roofing and gutters with integral roof edge protection system. The roof package also includes for the design, manufacture, supply and installation of rooflights to each roof.	
<b>Programme</b>	<b>Planned</b>	<b>Actual</b>
Letter of intent date	-	Tender recommended - 26 July 2002 Stage 2 to proceed with design - 2 October 2001
Start on site	-	28 January 2002
Contract date	-	26 July 2002
Programme period	January 2002 - September 2002	January 2002 - present
<b>Cost</b>		
Adjusted cost plan + inflation	£5.3 million	
Trade contract value	£7.0 million	
Estimated final costs	£7.5 million	
Risk still at large	Yes	

## Procurement

**1.** The package was procured through a two-stage process, with contractors selected through a pre-qualification process and approved by the design team and client. In December 2000 the construction manager wrote to the design team indicating that the package was not ready to be issued for tender. In January 2001 there were indications that the package could produce a significant overspend.

**2.** Six tenders were invited on 4 May 2001 but only two were returned by close on 18 June 2001. On 2 October 2001 the construction manager recommended acceptance the Coverite first stage bid, with a maximum value of £114,342 for design works to be carried out during an eight-week period.

**3.** Second stage negotiations were to commence on 9 October 2001 and complete on 4 December 2001 but were extended to March 2002. The intention was to culminate in an agreed lump sum price for the trade works not exceeding £6.5 million.

**4.** Negotiations on the full contract actually took until 26 July 2002, when the construction manager recommended accepting a contract with Coverite for £6.96 million. This exceeded the target sum and included a provisional sum allowance of £2,200,000 some 32% of the contract value.

## Design issues

**5.** Issues on detail design arose on the package in June 2001 and fundamental design issues, such as purlin spacing remained outstanding in November 2001.

**6.** Design workshops were undertaken throughout the contract. By August 2002, the construction manager was recording frustration at the time being taken by the architect to conclude the detailing of the green roofs.

**7.** In June 2003 the Architect expressed great concern to project management regarding approval by project management to a substandard detail regarding the vapour barrier. This important issue between architect and project

management remained prominent into late 2003. An independent condensation risk assessment was conducted. The architect expressed extreme concerns to project management regarding lack of progress in resolving the matter.

**8.** There are a significant number of design issues recorded throughout the progress meetings relating to design information and coordination aspects. By 14 October 2003 the design team had issued 389 instructions on the package.

## Programme

**9.** The planned programme period for the package was from January 2002 to Mid September 2002. On 14 September 2002 an extension of time of some 59 weeks was granted taking target completion to 17 November 2003.

**10.** The extension of time was granted on the basis that Coverite were given late access and were not provided with free/uninterrupted working, hence they were required to undertake the work on the basis of a multiple visits. However, further

work continued on site and by mid January 2004 design issues remained outstanding and completion was scheduled then for mid-June 2004.

### Costs

**11.** The initial tender was for £6.2 million included provisional and prime cost sums of £2.2 million. However, following design development, a fixed price contract was accepted at some £7.0 million, exceeding the £6.5 million target value originally set by the client.

**12.** In early 2004 the total contract commitment stood at £7.5 million, an increase of some 38% over the agreed cost plan plus inflation. Further sums are at issue. For commercial reasons these are not disclosed here pending agreement of the final package accounts.

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ISBN 1 904651 42 9

AGS/2004/7