

# BRIDGES ON THE TAY



## INTRODUCTION

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There are currently more than fifteen bridges which span the River Tay. If you have one of these on your doorstep, it can be an excellent focus for exploring your local history, or look at a number of bridges as a way into investigating engineering and construction.

We suggest some generic approaches for investigating your local bridge and for exploring bridge construction together with learning activities. Following these, we provide a brief fact file for some key bridges and an overview of the content for pupils shown on the website.

## SUGGESTIONS FOR TEACHING AND LEARNING ACTIVITIES

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### INTRODUCTORY ACTIVITIES

Investigate the history of your local bridge.

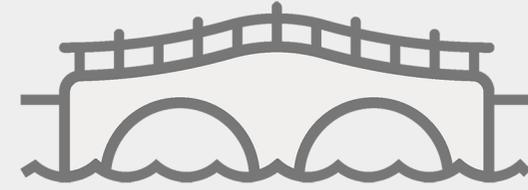
Carry out a site visit investigating the bridge. Take photographs and/or sketch. Make notes on:

- The number of arches (if any)
- How the bridge is supported
- What the bridge is made of
  - Any decorations
  - Any inscriptions

Discuss what you have found out. What new questions do pupils now have? What would they like to investigate?



# BRIDGES ON THE TAY



## SUGGESTIONS FOR TEACHING AND LEARNING ACTIVITIES

### CURRICULAR AREA

Social Studies:  
People, Past Events and  
Societies

### EXPERIENCES & OUTCOMES

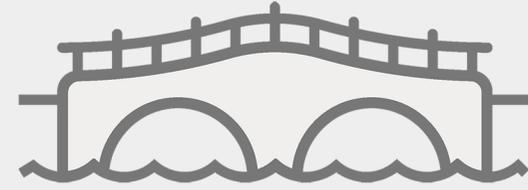
I can use evidence to  
recreate the story of a  
place or individual of local  
historical interest.  
SOC 1-03a

### KEY LEARNING ACTIVITIES

Investigate the building of  
the bridge. When was it  
built? Who designed it?

Create a leaflet or poster  
illustrating the history of  
the bridge.

# BRIDGES ON THE TAY



## SUGGESTIONS FOR TEACHING AND LEARNING ACTIVITIES

### CURRICULAR AREA

Social Studies:  
People, Past Events  
and Societies

### EXPERIENCES & OUTCOMES

I can compare aspects of people's daily lives in the past with my own by using historical evidence or the experience of recreating an historical setting.  
SOC 1-04a

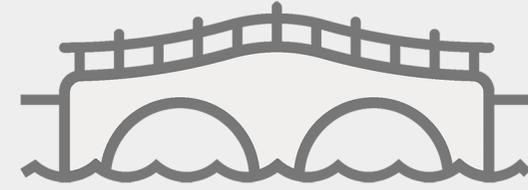
I can compare and contrast a society in the past with my own and contribute to a discussion of the similarities and differences.  
SOC 2-04a

### KEY LEARNING ACTIVITIES

Research how people crossed the river before the bridge was built. Can you find details about ferries in your local history archives? Look in your local graveyard for any graves for ferrymen. Were there any ferry disasters?

Create imaginative writing describing crossing the river by ferry.

# BRIDGES ON THE TAY



## SUGGESTIONS FOR TEACHING AND LEARNING ACTIVITIES

### CURRICULAR AREA

Social Studies:  
People, Past Events  
and Societies

### EXPERIENCES & OUTCOMES

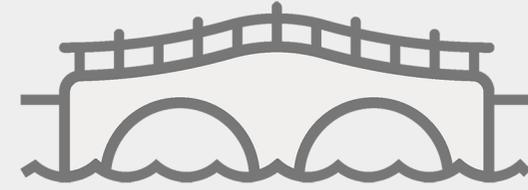
I can use primary and  
secondary sources  
selectively to research  
events in the past.  
SOC 2-01a

### KEY LEARNING ACTIVITIES

Identify 2-3 key events in  
the history of the bridge.  
Research these events  
using old newspapers and  
material from your local  
history archive.

Create a leaflet or audio  
tour highlighting the  
history of the bridge.

# BRIDGES ON THE TAY



## SUGGESTIONS FOR TEACHING AND LEARNING ACTIVITIES

### CURRICULAR AREA

Technologies: Craft, Design, Engineering and Graphics Contexts for Developing Technological Skills and Knowledge

### EXPERIENCES & OUTCOMES

Introductory Activities

### KEY LEARNING ACTIVITIES

Using maps, identify the bridges of the Tay. Look for images of them all. What different bridge designs are there?

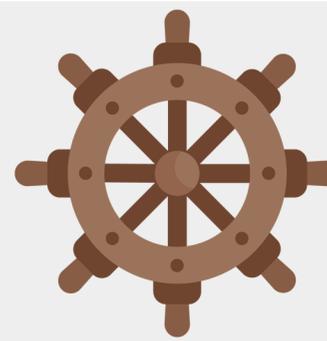
Investigate your local bridge, either by making a site visit or through research.

Make notes on:

- What the bridge is made of
- What it carries (people, cars, trains, services)
- What supports the bridge
- What kind of bridge it is.

Find out who the engineer of the bridge was.

# BOATS ON THE TAY



## ACTIVITY 3: DESIGN A BOAT

### CURRICULAR AREA

Technologies: Craft, Design, Engineering and Graphics Contexts for Developing Technological Skills and Knowledge

### EXPERIENCES & OUTCOMES

I explore materials, tools and software to discover what they can do and how I can use them to help solve problems and construct 3D objects which may have moving parts.  
TCH 1-12a

### KEY LEARNING ACTIVITIES

Look for examples of different types of boats to make on Pinterest.

(e.g. <https://uk.pinterest.com/cmartin1970/a-kids-build-it-boats/>)

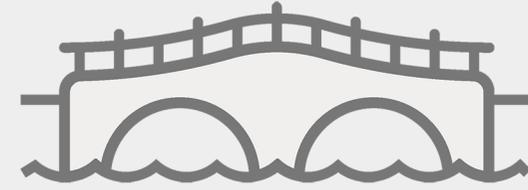
Set the pupils a challenge to design and build a boat to carry a given weight of cargo or passengers (Lego bricks? Playmobil people?) across a tank of water without sinking.

You could adapt this material to suit your purposes and stage:

[http://www.educationworld.com/a\\_lesson/cre8time/build-boat-buoyancy.shtml](http://www.educationworld.com/a_lesson/cre8time/build-boat-buoyancy.shtml)

There are many websites giving instructions on how to make a simple paddle mechanism, as used on a paddle boat (e.g. <http://momitforward.com/kids-craft-toy-boat/>). Make boats and race them. How could they be made to go faster? What happens if they are loaded?

# BRIDGES ON THE TAY



## PUPIL RESOURCES

MEDIA FOR DUNKELD  
BRIDGE

MEDIA FOR CAPUTH  
BRIDGE

MEDIA FOR ABERFELDY  
FOOTBRIDGE

MEDIA FOR WADE'S  
BRIDGE, ABERFELDY

MEDIA FOR FRIARTON  
BRIDGE

MEDIA FOR SMEATON'S  
BRIDGE

MEDIA FOR QUEEN'S  
BRIDGE, PERTH

MEDIA FOR TAY RAIL  
BRIDGE

## FURTHER RESOURCES FOR TEACHERS

### **Bridge Design**

A very thorough and useful resource relating to all aspects of bridge design. Produced to support the National Curriculum of Northern Ireland but contains many good resources and suggestions for learning activities.

[http://cea.org.uk/sites/default/files/docs/curriculum/connected\\_learning/thematic\\_units/stem/tu\\_bridges.pdf](http://cea.org.uk/sites/default/files/docs/curriculum/connected_learning/thematic_units/stem/tu_bridges.pdf)

### **Scotland's Oldest Bridges**

A map-based resource providing information and some images on Scotland's oldest bridges, those built before 1750.

<http://scotlandsoldestbridges.co.uk/index.html>

# BRIDGES ON THE TAY



## ABERFELDY FOOTBRIDGE

This is the world's first **ALL-PLASTIC** footbridge!

The towers from which the cables are suspended are **17M TALL A-FRAMES**.

It is a famously '**BOUNCY**' bridge, very easy to set in motion!

Built in **1990** to connect two parts of a **GOLF COURSE** over the Tay.

It is **THREE-SPAN CABLE STAY** structure, which means that it has three parts and is suspended from cables.

# BRIDGES ON THE TAY



## CAPUTH BRIDGE

This bridge was built in 1993 and is made mostly of concrete.

It was designed by **SIR WILIAM ARROL**, who rebuilt the Tay Bridge after its collapse in 1879.

Before the chain ferry there was an ordinary **ROW BOAT FERRY**. One of the boatmen was a man known as '**BOATY PROUDFOOT!**'

First bridge was built in **1887** and was known as the **VICTORIA BRIDGE**.

Before the bridge was built people had to cross the river by a **CHAIN FERRY**. Chains stretched across the river, and the boat was pulled across on the chains. You can still see the remains of the landing stage on the Murthly side of the river.

# BRIDGES ON THE TAY



## QUEEN'S BRIDGE, PERTH

It was built in **1960** to replace the older **VICTORIA BRIDGE**.

It is built of reinforced **CONCRETE** with **TWO PIERS**.

It was actually built underneath the old bridge! When it was being built, they raised the old bridge by 2 m, and built the new bridge below it so that traffic could keep on crossing the river.

# BRIDGES ON THE TAY



## DUNKELD BRIDGE

There used to be a wooden bridge over the Tay here which was built in **1510**, but it was washed away not long after.

In **1766** six people drowned when the East Ferry capsized with 13 passengers and four horses.

It was supposed to cost around **£15,000** - nearly **£1M** in today's prices. The government agreed to pay half the costs, and the landowner, the **DUKE OF ATHOLL** agreed to pay the rest. But in the end it cost **£34,000**, more than double!

The tolls were very unpopular and in 1868 there were **RIOTS** against the tolls. People were angry at having to pay to reach the station. Toll gates sometimes flung into river.

Before the new bridge was built, people crossed the river by **FERRY**: one at **INVER** (the Inver ferry), and one downstream of **LITTLE DUNKELD CHURCH** (the East ferry).

New bridge was designed by leading engineer **THOMAS TELFORD**.

To help pay for the costs, the Duke charged people a toll to cross the bridge until 1879. It cost **ONE HALFPENNY** for a person on foot; **TWOPENCE** for an unladen horse, **FOURPENCE** when drawing a cart, **EIGHTPENCE** for a carriage.

Sheep and pigs were **SIXPENCE** per score; cattle **ONE SHILING AND EIGHTPENCE** per score. You can still see the old tollhouse on the Birnam side.

Under the bridge on the Dunkeld side you can see where the **OLD TOWN JAIL** used to be.

## NEWSPAPER ACCOUNT OF FERRY DISASTER AT DUNKELD, ABERDEEN JOURNAL, 10 NOVEMBER 1766

*On Wednesday morning, a most melancholy accident happened near this place, of which the following is an authentic account: a number of people came to the East Ferry of Dunkeld on their way to Pitclochrie market, and called for a boat, which accordingly was sent, but scarcely had it set off with the passengers, when, by the immense rapidity of the Tay at that place, it was upset, and almost all of them were swept away by the current; two persons saved themselves by catching hold of two horses; two were taken up by a fishing boat sent to their assistance, which being unable to carry a third, who stuck by the boat and was carried down near two miles, where somebody, alarmed by his shrieks, came to his assistance with a second boat and carried him off, though almost quite senseless. Seven lives are known to be certainly lost, as the number of passengers was certainly above twelve.*

# BRIDGES ON THE TAY



## FRIARTON BRIDGE

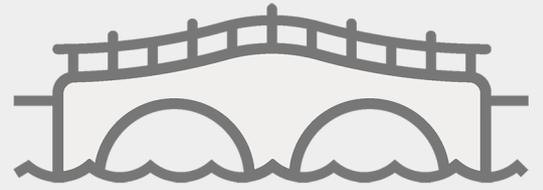
It was built in **1978**.

It is known as a '**STEEL BOX GIRDER**' bridge: the main beams of the bridge are made out of girders in the shape of a hollow box.

It carries the road about **30M** above the River Tay.

In strong winds, the bridge is often **CLOSED** to high-sided vans and lorries.

# BRIDGES ON THE TAY



## SMEATON BRIDGE

What do you call this bridge? Some people call it the **OLD BRIDGE**, others call it **AULD BRIG**; some call it **SMEATON'S BRIDGE** and others call it simply **PERTH BRIDGE**. But whatever it's name, It is the oldest surviving bridge in Perth.

People had to cross the river using one of about **30 ROW BOAT FERRIES**, moored on the shore below Kinnoull Parish church.

You had to pay a toll of one halfpenny to cross the bridge.

Marks showing **FLOOD LEVELS** can be seen on one of its piers (supports).

It was widened and altered in 1869 to cope with a **RISE IN TRAFFIC**.

There was a bridge over the Tay at Perth from **1100'S**. Floods swept away the bridge in 1621 and there was no for **150 YEARS**.

In 1766 they began to build this bridge, designed by leading engineer **JOHN SMEATON**. It was finished in 1771.

In February 1774 **BROKEN ICE** became wedged under its arches and created a dam which **FLOODED** large sections of Perth, but the bridge remained strong. Phew!

Two of the nine arches are on land to avoid flooding if the water level rises.

# BRIDGES ON THE TAY



## TAY RAIL BRIDGE, DUNDEE

This bridge was built in **1887**. It replaced the first rail bridge, which collapsed in **1879**.

It collapsed in high winds in 1879 when a train with six carriages was crossing. All **75 PASSENGERS AND CREW** were killed.

This bridge re-used some of the original **GIRDERS**.

When the first rail bridge opened in 1878 it was the **LONGEST BRIDGE IN THE WORLD**.

**STUMPS** from piers of original bridge can still be seen today.

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## WADE BRIDGE, ABERFELDY

It was built in **1733** by **GENERAL WADE** as part of a big road-building project.

When it was built, it was the **ONLY** bridge over the Tay.

The bridge replaced a ferry. Did you know the motto of Aberfeldy is: '*S Dluth Tric Bat Abairpheallaid*' meaning '*Swift and often as the boat to Aberfeldy*'?

It was designed by a famous engineer called **WILLIAM ADAM**.

It was designed to show how powerful the British government was. Carved on the bridge is the royal crest **GIIR**, meaning George II Rex - or **KING GEORGE II**.

It cost over **£4,000** to build, around **£1M** in today's money.

## NOT EVERYONE LIKED THE BRIDGE!

In 1819 a poet called Robert Southey travelled through Scotland with the engineer Thomas Telford. Here are their thoughts on Wade's bridge at Aberfeldy:

*'Aberfeldy is a place that might properly be called Aberfilthy, for marvelously foul it is. You enter through a beggarly street and arrive at a dirty inn. A sort of square or market place has been lately built, so that mean as the village or townlet is, it seems to be thriving...Near Aberfeldy is a bridge over the Tay, built by General Wade.... At a distance it looks well but makes a wretched appearance upon closer inspection. There are four unmeaning obelisks upon the central arch, and the parapet is so high that you cannot see over it. The foundations are also very insecure, for we went into the bed of the river and examined them.'*





We learn by the master of a vessel in four weeks from Jamaica, that the hurricane felt on the 16th of August passed to leeward of that island, without doing any other damage there than what was occasioned by a great swell of the sea.

2. By a gentleman who was lately at Cuba, we are informed that the late earthquake had not proved so fatal to St. Jago as has been mentioned; that only part of the castle, all the churches, and most of the dwelling houses had been destroyed: But that the shock extended through all the south side of the island, in many parts of which the ground was much rent, and in some places sunk.

From the MARTINICO GAZETTE, of Thursday the 21st of August, 1766.

3. St. Peters, Aug. 21. On Thursday, the 13th instant, about ten at night, the whole horizon darkened, the wind blowing furiously from the north-west, the clouds vomited torrents mingled with flaming bitumen and sulphur: every thing seemed to announce the dissolution of nature.—The fury of the wind increases; houses totter; their tops are carried away; a frightful noise heard from every quarter; dismay seizes on every heart.

At midnight, the hurricane continues with increased violence; nothing can resist its fury; here a wall is thrown down, there a house; an infant in the arms of its mother, the mother in those of her husband, all buried under the ruins. At the same instant, the earth quakes. Men and women, children and slaves, all endeavour to seek for safety by flight; but they are restrained by fear, and believing every moment their last, they prostrate themselves in fervent prayers.

The horrors of this terrible night are increased by disasters from the sea; the waves, intermingled with the clouds, dash upon the coast and beat to pieces all the vessels in the road; the sailors, tho' without hopes of success, raise the most lamentable cries, and are all swallowed up in the ocean.

At three in the morning the wind begins to calm; and soon after, day-light presented a view of this melancholy catastrophe. The streets appeared covered with ruins, the shore with shipwrecks, and dead bodies; the trees dashed in pieces, and torn from their roots, blocked up the roads; and the swollen rivers carried along with them in their course stones of an immense size.

At five o'clock, a thick cloud appeared suspended over mount Peleus, which burst, being over loaded with water, and, like an impetuous torrent, overwhelmed the neighbouring plains.

At six, the wind was entirely appeased, the sea no longer agitated, and a calm succeeded this most horrible tempest.

When the storm was at the height, a quantity of flaming matter was observed to come from the bosom of the earth, and some persons are said to have been burnt thereby.

Thirty five brigantines, boats, &c. have been lost in this harbour, besides twelve passage caroes. Of the former twenty-eight belonging to France, and seven to England.

To complete the calamity, we have received the most afflicting advices from the country. Hardly is there a vestige to be seen of any house all around; under the ruins of which, many of the proprietors have been crushed to death; the canes, coffee, cocoa, &c. have been all torn up and destroyed.

We know not as yet the exact number that have perished in this quarter; but suppose there may be ninety, and twice as many wounded.

Our governor was the preceding day at Caze Pilote, where he endured, with much hazard, all the violence of the storm, and returned hither next day, deeply affected with this public calamity. He has accordingly given his attention entirely to the establishment and preservation of good order, so necessary in circumstances like ours.

The above is a genuine recital of what has happened at St. Peter's. In going over the island we shall find nearly the same calamities, and in some places still worse.

The inhabitants in Cabot and Caze Pilote, have had the same fate as ours: no buildings now! no provisions! no plantations!

4. The Swallow sloop of war, and Prince Frederick store ship, outward bound on new discoveries in the South seas, were put into Barbadoes when the last letters came away.

5. Smyrna, Sept. 3. The vessels at anchor in this port receive their cargoes slowly, the importation of silk and cotton, being interrupted by the expedition of the Bashaw Sore Mustafa against the two agas, Arab Oglu, and Lara Osman Oglu,

whom he has sent orders to drive out of the country. The Bashaw is at present with 1000 men in the environs of Magnesia, Circagas, and Bergamo, where, it is said, he has gained some advantage over Arab Oglu, and that the latter lost 800 men. These hostilities are the causes why the Caravans from Brusea, Angora, and Circagas, are prevented from bringing cotton to the place, whereby the vessels in the port are detained for want of loading.

Extract of a letter from a gentleman at Dunkeld, dated Oct. 31.

6. On Wednesday morning, a most melancholy accident happened near this place, of which the following is an authentic account:—A number of people came to the East Ferry of Dunkeld, on their way to Pitclochie market, and called for a boat, which accordingly was sent, but scarcely had set off with the passengers, when by the immense rapidity of the Tay at that place, it was overset, and almost all of them were swept away by the current; two persons saved themselves by catching hold of two horses; two were taken up by a fishing boat sent to their assistance, which being unable to contain a third, who stuck by the boat, he was carried down near two miles, where somebody alarmed by his shrieks, came to his assistance with the second boat, and carried him off, though almost quite senseless.—Seven lives are known to be certainly lost, as the number of passengers was certainly above twelve, being residents in the country; if there were any strangers, their number is uncertain.

7. We hear that the Right Hon. Lord William Campbell, lately appointed Governor of Nova Scotia, being a commander in the royal navy, will be appointed to command on the Halifax station, in the room of the late Admiral Durell.

MISCELLANEOUS ARTICLES.

From the English Papers, Nov. 1.

Letters from Constantinople advise, that at the departure of the post a report revealed that the plague was broke out in a house adjoining to the English Ambassador's.

2. Letters from Paris insinuate, that the report of the Jesuits being driven from Madrid is nothing more than a forgery, owing its rise to the malignity of their adversaries.

LONDON.

3. We are told, that every thing had been made easy in regard to the reception of Mr. Wilkes in his own country, previous to that gentleman's leaving France.

4. We hear Mr. Wilkes has, since his arrival in town, been visited by many persons of distinction, to welcome him on revising his native land.

5. It is very remarkable, that in Queen Elizabeth's time, the whole body of the English nobility amounted to no more than 45, a circumstance which must render that celebrated number still more memorable in this kingdom.

6. We are assured, that the state of our finances was the grand object of deliberation at an honourable assembly convened last week; at which, we are told, the Right Hon. Charles Townshend communicated a plan for materially lessening the annual expence of the kingdom; and we farther hear it was unanimously approved of, and a determination taken to lay it before the parliament the ensuing sessions.

EDINBURGH.

Extract of a letter from London, Nov. 1.

7. It was this morning currently reported, that Lord Temple is soon to assume an important place in the administration.

8. It is talked that Mr. Wilkes, in recompence for his long exile, will be gratified with a very lucrative post in Ireland.

9. We hear from Berwick, that on the 18th instant passed over the bridge upon the Tweed, from Scotland, five hundred head of cattle bought up on account of the English grievers.

10. On Thursday last, was committed to the Tolbooth of this city, Benjamin Bridgens, victualler in Birmingham, accused of being accessory to the forging and issuing notes upon the Thistle Bank of Glasgow.—Two others had been taken up and incarcerated some time ago, for the same offence, viz. John Raybold and Daniel Parks, and information was given by them, in the course of their examination, against the above Bridgens, and that the false notes had been cast off from a copper-plate at Birmingham; in consequence of which, upon application being made by Sir William Maxwell of Pollock's agent at Birmingham, Bridgen was committed to jail there, and a warrant was afterwards obtained from Lord Pitfour, one of the

Lords of judicatory, to receive and secure him when he should arrive at Berwick, or any other part of the borders of Scotland.—The plate was found, and is now lodged in the council chamber here.—Some others are expected from England daily, accused of being art and part in the same crimes.

11. The Earl of Morton, lord Register for Scotland, has given 3000l. towards building a proper office for holding all the records and law warrants in one place.

FOREIGN NEWS.

From the English Papers, Nov. 1.

Constantinople, The revolt in the isle of Cyprus had Sept. 15. been entirely suppressed by the death of Hali Aga, and above 200 of his accomplices, whose heads have been exposed at the Seraglio. It is said that the castle will be entirely demolished where the chief of the rebels took refuge.

2. Vienna, Oct. 15. It is assured that a marriage is upon the carpet between her Royal Highness the Archduchess Maria-Josephina, who will be 16 years of age next March, and the King of the two Sicilies, who will be 16 in January.

3. Leghorn, Oct. 4. Our accounts from the island of Corsica, are so contradictory, that we know not what to make of them: it is however certain, that the Malcontents persist in their resolution of not returning under the dominion of the Genoese; therefore time will shew whether the French, or any other power, will think it worth while to make use of force to oblige them to change their resolution.

We have advice from Africa, that the Grand Signior hath written a letter to the Bey of Tripoli, to exhort him to pay more regard, for the future, to the treaty of peace which he has concluded with the republick of Venice.

4. Hamburg, October 21. On Saturday the 18th instant, the Queen of Denmark landed at Altona's and it is impossible to describe the crowds of people, as well upon the Elbe as on the shore, and in every street, through which her Majesty was to pass, waiting to see their Queen. The river was covered with boats ornamented with Danish and British colours, as well as all the ships with their respective ones, both at Altona and Hamburg. On account of the tide her Majesty did not get into her barge at Haarboung till past three o'clock: it was a new one finely ornamented, and built by the city of Hamburg on purpose for that solemnity. Her Majesty's approach to Altona was announced by the frequent discharges of cannon from the ships in the river: and as soon as she came in the sight of Hamburg, that city saluted her with 30 guns.

A quarter of an hour before the landing, his Excellency the Baron de Dehn, Stadtholder of the Dutchies of Sleswick and Holstein, handed the Grande Maitresse Madame de Plessis, followed by the maids of honour, and the rest of her Majesty's household, down to the bridge prepared for the royal reception, which was covered with scarlet cloth, on one side whereof, were ranged the ladies, and on the other the men, and at the end were two rows of young maidens dressed in white, who strewed flowers before her Majesty as she advanced. It was past six o'clock when the Queen landed. The streets were lined with the burghers under arms, and escorted by the Danish Cavaliers. Her Majesty passed under a triumphal arch finely illuminated. Another of the same kind was erected opposite to the Queen's house, where her Majesty being arrived, the ladies were immediately presented to her; after which her Majesty stepped in public. On Sunday morning the Queen went to the church as at her return there was a circle, when all the foreign ministers here were introduced to her Majesty, as were the deputies from the city of Hamburg.

After dining in public, about four of the clock her Majesty, attended by all the court, and by the English and Hanoverian suite, passed through the principal streets of Hamburg, preceded by a large detachment of Hamburg dragoons as well as by the Danish troops: Her Majesty was saluted, both at her entry and departure, by a grand discharge of the cannon upon the ramparts. The lieutenant general, Baron de Jahnus, at the head of the officers, had the honour to salute her Majesty as she passed by the grand guard. At her Majesty's return to Altona, she found the city finely illuminated. Yesterday, being Monday, her Majesty had a full court, and was graciously pleased to receive a deputation of four members of the factory, to compliment her upon her arrival; and about ten o'clock the next morning her Majesty sat out to proceed on her journey to Copenhagen. [Lond. Gaz.]





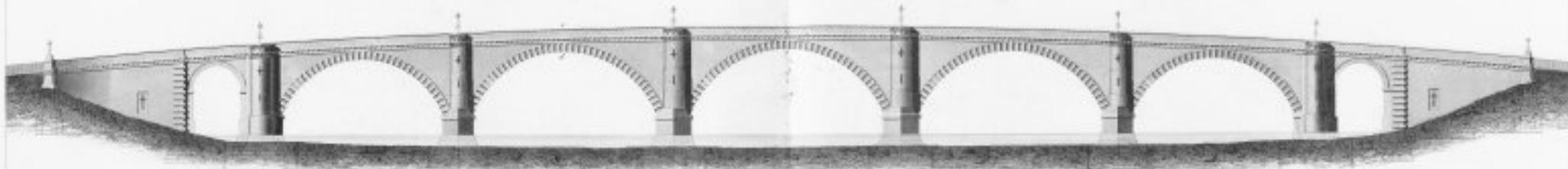
BRIDGE COLLAPSE, TAY BRIDGE. 1896. N.Y.



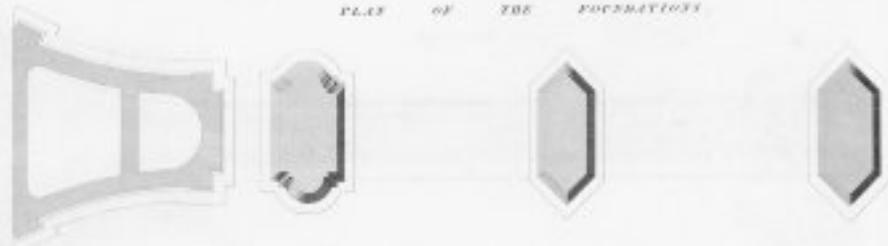




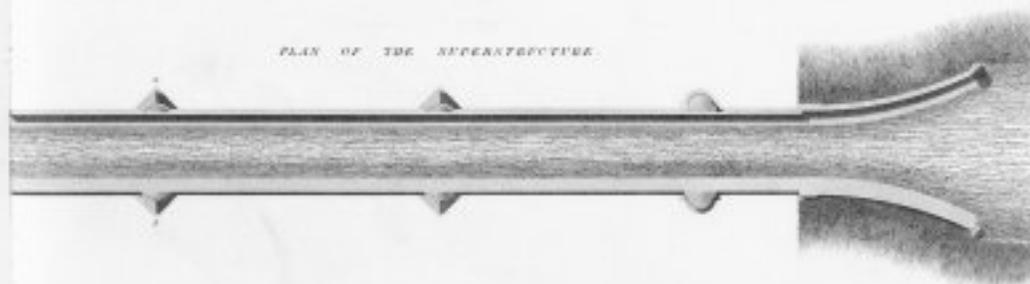
BRIDGE OVER THE RIVER TAY AT DUNKELD IN PERTSHIRE.



PLAN OF THE FOUNDATIONS



PLAN OF THE SUPERSTRUCTURE



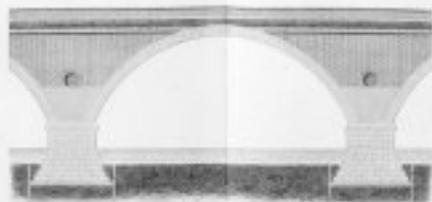
REMARKS.

- Span of the middle ..... 348. 00 feet
- " of the two adjoining " ..... 150. 00 "
- " of the two ends ..... 120. 00 "
- " of the total bridge ..... 618. 00 "
- Width of the middle arch ..... 100. 00 "
- Shoulder across the bridge ..... 12. 00 "

Transverse Section at a



Longitudinal Section of one Span



Horizontal Section of one Span showing the relative Height of the roadway & level of the Bridge

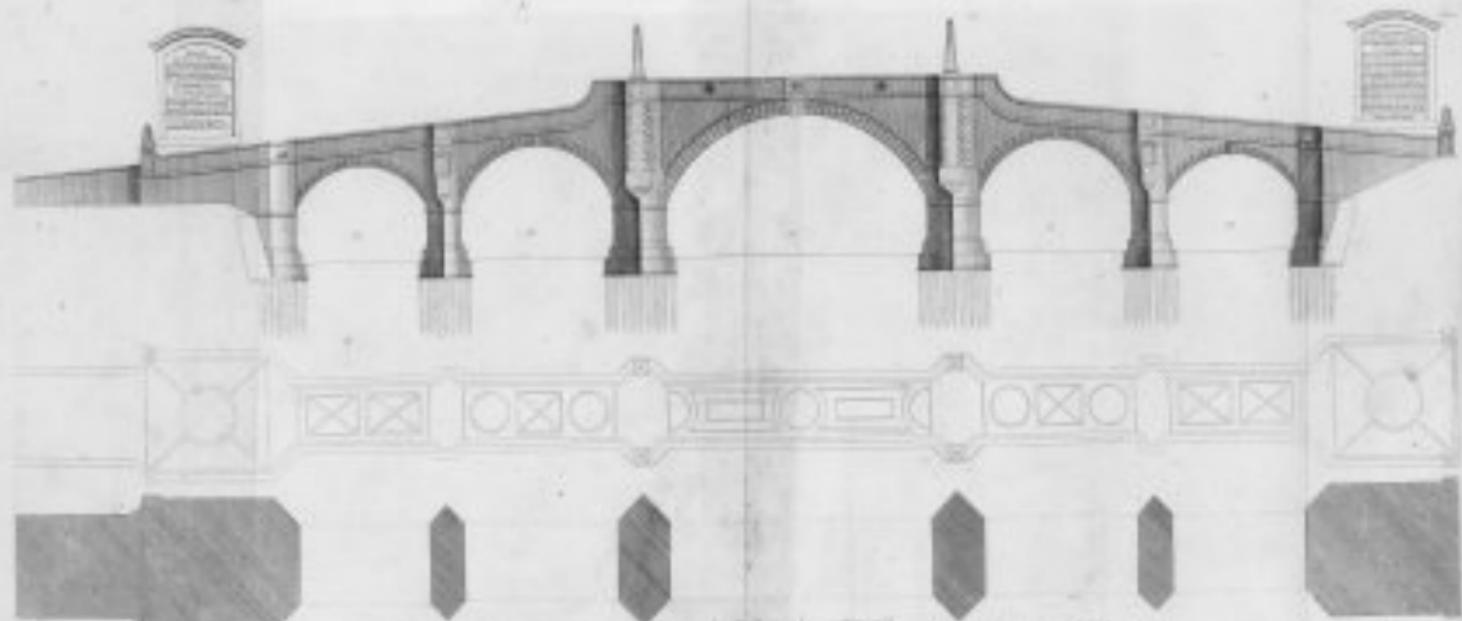


Transverse Section at b



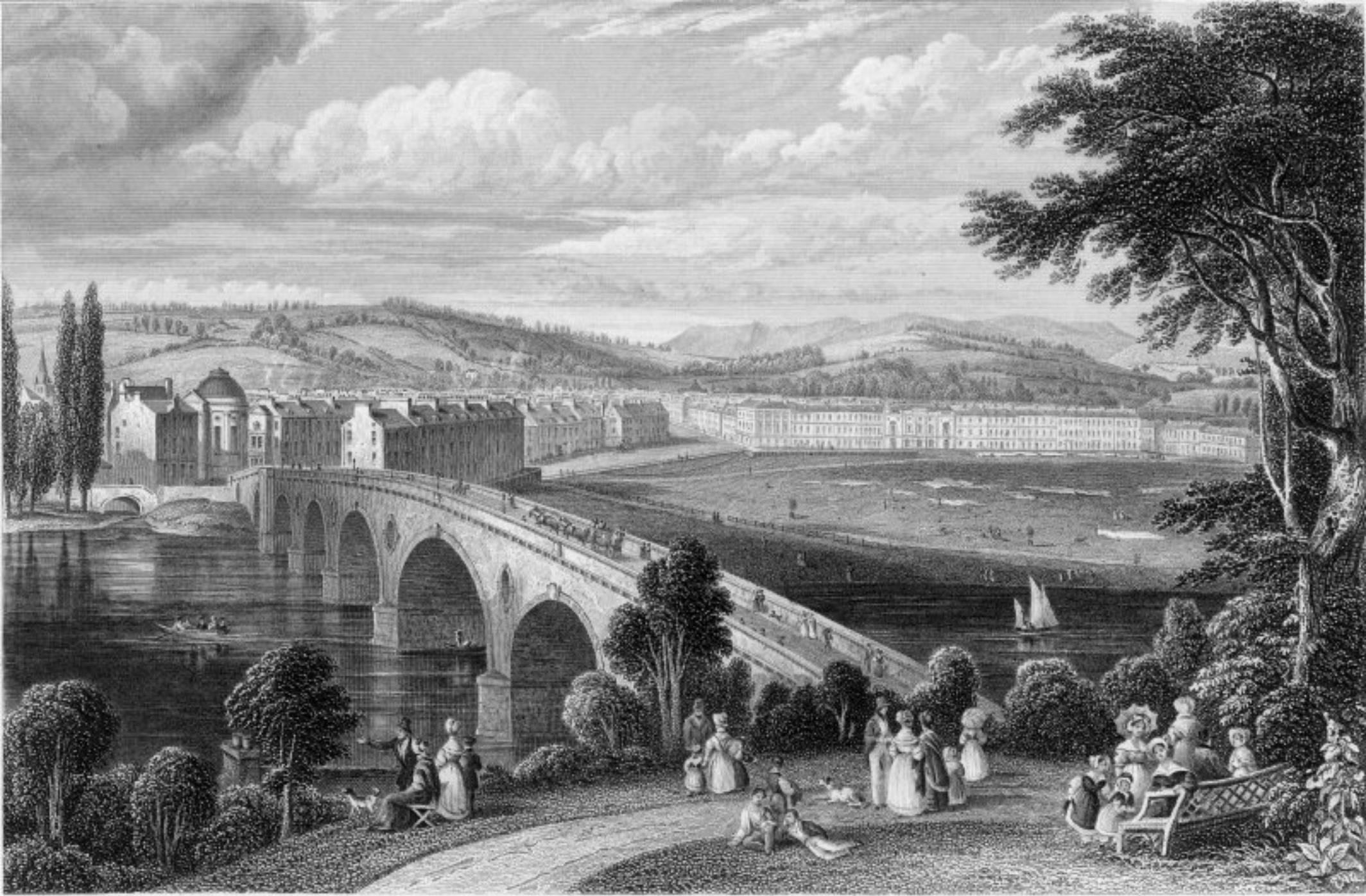
REMARKS.

- Width of Roadway between the parapets ..... 100. 00 feet
- " of Footpath on each side ..... 12. 00 "
- Thickness of each of the two middle Piers ..... 100. 00 "
- " of each of the two adjoining " ..... 150. 00 "
- " of each of the two side Piers ..... 120. 00 "
- " of the total Abutments ..... 12. 00 "



*The Perth and Aberdeen Railway Bridge, and the Plan of the Bridge, as the Right side of SCOTLAND*

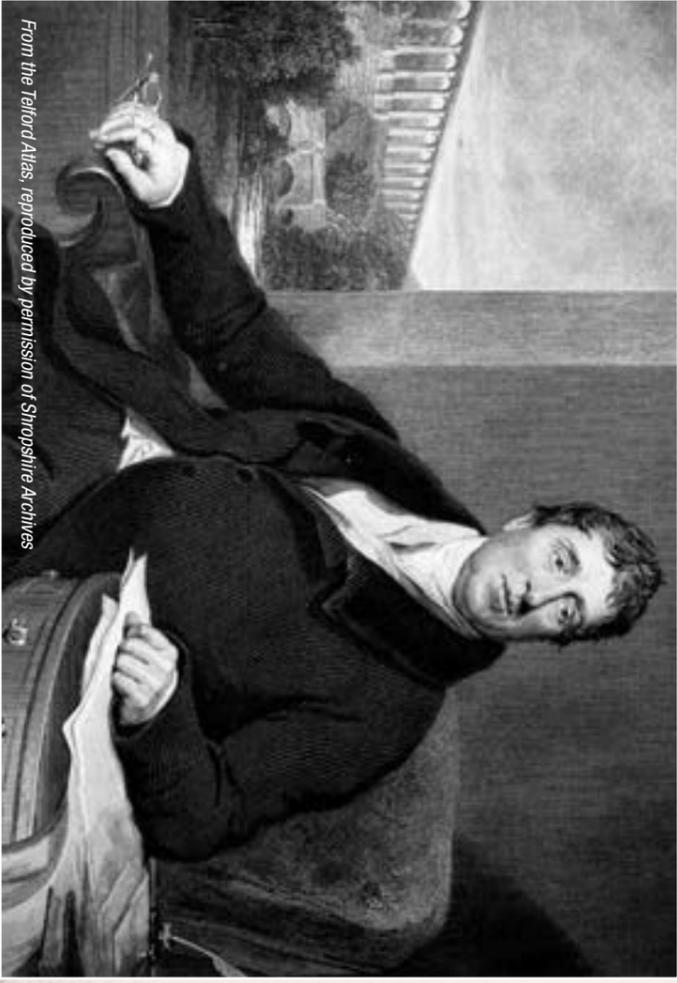




J. Stewart.

J. Swan.

*Perth Bridge North Inch, &c.*



From the Telford Atlas, reproduced by permission of Shropshire Archives

**Thomas Telford**

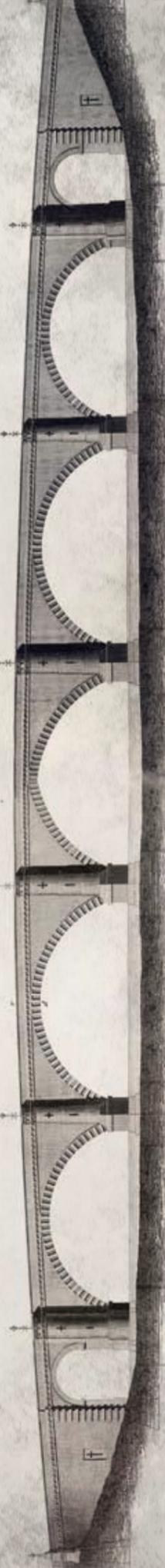
2007 is the 250th anniversary of the birth of Thomas Telford, one of the greatest civil engineers of the 19th century. He was born the son of a shepherd at Westerkirk, near Langholm, Dumfriesshire on 9th August 1757. At the age of 14, Telford was apprenticed as a stonemason and worked at this trade in Edinburgh. By 1782, he was involved in large building projects in London and Portsmouth, and working with architects such as Sir William Chambers and Robert Adam. Architects of the King's Works, he amassed a great practical knowledge of materials and building design. At the age of 36, he was appointed engineer for the Ellesmere Canal, construction of which included the Pontcysyllte Aqueduct, the most dramatic cast iron structure of its time.

Telford's work in Scotland stemmed from the government's determination to improve the economy of the Highlands by providing a better road network and infrastructure. In the period 1802 to 1823, Telford was responsible for building hundreds of miles of roads and around a thousand bridges of which the Dunkeld Bridge is a most magnificent example. He engineered the Caledonian Canal and improved many harbours including Dundee and Aberdeen. Between 1823 and 1830, Telford managed the construction of thirty-two 'parliamentary churches' and associated manse in the Highlands and Islands: two churches and manse were built in Perthshire at this time, one at Kinloch Rannoch and one at Innerwick, Glen Lyon.

# Telford's Bridge at Dunkeld



## A Brief History



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## Bridging the Tay at Dunkeld

The medieval bridge begun by Alexander Myn in 1510 had collapsed by the early 17th century and for two hundred years crossings were made by two ferries - the Inver Ferry upstream of the Cathedral and the East Ferry downstream of Little Dunkeld Church.

These ferry crossings were inconvenient and perilous as Lord Cockburn, a circuit judge, commented in his autobiography 'Circuit Journeys',

*"Those who are born to modern travelling can scarcely be made to understand how the previous age got on... there was no bridge over the Tay at Dunkeld... nothing but wretched peerless ferries let to poor cottars who rowed or hauled or pushed a crazy boat across or, more commonly, got their wives to do it",*

and in 1766 six people drowned in a bad accident at the East Ferry when a ferry boat laden with thirteen passengers and four horses capsized.

Recognising the poor state of the roads and lack of bridges in Scotland, the government instructed Telford to carry out a survey for improving communications. In 1802 he reported that a bridge could be built at Dunkeld on a straight reach of the river a little way above the East Ferry at a cost of £15,000 (nearly £1m in today's prices). The 4th Duke of Atholl agreed to give up his interest in the ferries and meet half the cost on the understanding his investment could be recovered by tolls. An Act of Parliament to construct the bridge was passed in 1803, with the factor of the Atholl Estates, Thomas Palliser, managing the project on behalf of the Duke.



4th Duke of Atholl, from the collection of Blair Castle, Perthshire

This leaflet has been produced to celebrate the 250th anniversary of Thomas Telford's birth and the 200th anniversary of the opening of the Dunkeld Bridge. Sincere thanks go to Christopher Ford, Chairman of the Dunkeld and Birnam Historical Society for his substantial input into the leaflet's text.

Perth and Kinross Heritage Trust is a registered Scottish charity that aims to promote, protect and enhance the historic environment of Perth and Kinross. For further information on the Trust, please see our website: [www.pkht.org.uk](http://www.pkht.org.uk)



Dunkeld Bridge by C J Greenwood, 1843, reproduced by permission of Perth Museum and Art Gallery, Perth & Kinross Council

## Further reading

**Dunkeld, Telford's Finest Highland Bridge** by Christopher R Ford, 2004, Perth and Kinross Libraries  
**Thomas Telford** by L T C Rolt, (new edition) 2007, Alan Sutton

# Constructing the Bridge

The bridge at Dunkeld is an A-listed building and was described as Telford's 'finest Highland bridge' by Poet Laureate Robert Southey, writing soon after its completion. It spans the River Tay, the most powerful river in Britain with a huge mountainous catchment area to the north and west of Dunkeld. Water levels can rise dramatically and the design of the bridge took this into account.

Initial plans were for the bridge to cross the Tay further to the east, where the river narrows and bends to south however, apparently on the insistence of the Duke of Atholl, the design was moved westwards to align with Atholl Street, one of the two main streets in Dunkeld. Bridge Street was constructed and a new dramatic entrance to Dunkeld created. The bridge is built in a 'gothick baronial' style with mock turreted towers with blind arrow slits between each arch. This style of building was popular in early 19th century Perthshire and other

notable gothick baronial buildings include St Paul's Church in Perth and Taymouth Castle, Kenmore.

In length, the bridge measures 685ft (over 200m) with seven spans – a central one of 90ft (27.4m), two of 84ft (25m), two of 74ft (22.5m) and two land spans of 20ft (6m). The spandrels (between the arches) are not filled with rubble stone but with internal longitudinal walls to take the thrust of the arches without over loading the external spandrel walls. This arrangement was a feature of Telford's designs and has contributed to the durability of the bridge.

Construction of the bridge began in the spring of 1803, at first supervised by Patrick Brown and then John Simpson under Telford's direction. The first tasks were to prepare materials and construct the wooden service bridge. The sandstone for the arches was quarried at Gellyburn on the Murthly Estate, some 10km to the south east of Dunkeld and the stone for the rubblework was sourced in local

quarries to the west of Birnam. The foundations of the bridge are not piled but are laid on rafts of larch cut from the neighbouring Polney Wood.

On the 24th June 1805, a ceremony was held to inaugurate the construction the stone bridge. Sir George Stewart, laird of the Murthly Estate laid the foundation stone in the Duke of Atholl's absence and, after the workmen had all received and downed a dram, construction began. Over 250 workmen (masons, carpenters, smiths, quarrymen and labourers) were employed during the construction of the bridge.

The contemporary watercolour below by George Heriot shows the construction of the bridge. Despite adverse weather conditions with high water levels often flooding foundations, the bridge was opened to the public in October 1808 and finally approved by Telford as complete in November 1809.



Construction of bridge by Heriot, reproduced with kind permission from a private collection

# Tolls and Toll Trouble

The tollhouse situated on the Birnam side of the bridge is not the original designed by Telford and is thought to date from 1834. Telford's toll houses usually have a toll collection window built into the house whereas tolls or the pontage on Dunkeld Bridge were collected from a wooden booth. The Duke let the right to collect tolls to a toll keeper for an annual rent.

The 1803 Act regarding the construction of the bridge set out the pontage. Tolls charged for a crossing ranged from one halfpenny for a person on foot through to twopence for an unladen horse, fourpence when drawing a cart to eightpence for a carriage. Sheep and pigs were sixpence per score and cattle one shilling and eightpence per score. For comparison, during the 19th century the average daily wage was between one and two shillings. The revenue per year in the early 19th century was some £750 rising to over £2,000 by 1863.

The original estimate for the construction of the bridge was £15,000 but the actual cost, including land purchase and approach roads, totalled £34,000 of which the government contributed £7,000 leaving the Duke to recover £27,000 from tolls. The Duke had raised the money for the bridge through loans and bonds and with the interest added to what had been borrowed, the debt far outstripped what could be raised from tolls.

When the decision to build the bridge was taken, it was predicted that the

bridge would be toll-free within a few years of its completion. Disgruntled with the continued tolls, the public protested - resulting in riots at the bridge and various court cases. One colourful character involved in the agitation to remove the toll was Alexander Robertson (a landowner who lived on the southern side of the river), locally known as Dundonnachie. The Duke of Atholl was accused of using the money gathered through the tolls to build his new mansion house at Dunkeld. This grand house, to the west of the Cathedral was never completed and was demolished in the 1840s, after the death of the 4th Duke in the 1830s. Tolls were paid until the bridge was taken over by the County Roads Authority in 1879.

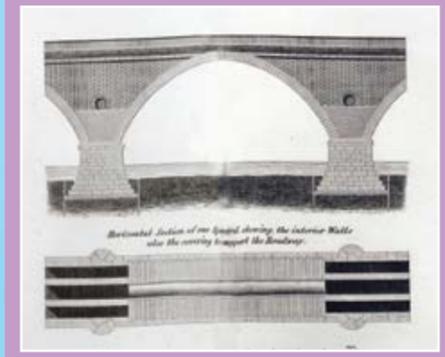
*"At fair Dunkeld, where Tays four waters roll, a mighty Duke lives by a Bawbee toll"* (Dundee Advertiser)



View of the bridge from the Cathedral, from the A K Bell Library Local Studies Section

# Sinking the Foundations

Initial ground investigation revealed loose sand and gravels to a great depth below the river bed with no sign of solid rock. Telford's usual construction method was to drive timber piles into solid rock for the foundations of the bridge piers, but at this site such construction was impractical. To solve this problem, the foundations of the bridge piers were constructed on rafts of spruce and larch timber at depth of 5ft (1.5m) below the river bed (8ft or 2.4m below the normal water level). To allow the laying of the foundations, timber piles would have been driven into the riverbed and were then lined with planks and sealed with clay to create a cofferdam from which water would be pumped.



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