

TIVERTON FAS ASSET INSPECTION

PHASE 2 DIVING WORKS

SUMMARY

SUBJECT	PROJECT NO.	DATE
Diving Works Summary	ENV6007048R	23 April 2025
AUTHOR	DISTRIBUTION	REPRESENTING
Lucy Cross	n/a	Environment Agency
DOCUMENT REFERENCE	ICEPAC NO.	ATKINSRÉALIS NO.
ENV6007048R-ATK-DW-1ZZ-TM-C-000001	n/a	n/a

Document history

Revision	Purpose description	Originated	Checked	Reviewed	Authorised	Date
C01	For Procurement	LC	AJY	AW	GW	23/04/25

Client signoff

Client	Environment Agency				
Project	Tiverton FAS Asset Inspection			Project No.	ENV6007048R
Client signature / date					

Background

The Environment Agency (EA) are asset owners and asset managers of several kilometres of flood walls along the River Exe through Tiverton, a town in mid-Devon, approximately 7 miles east of Junction 27 on the M5.

The flood walls form part of a wider flood defence scheme in Tiverton which was constructed in the late 1960s following significant flooding in the town in 1960. Multiple drawings exist from the construction of the original scheme, some of which are included in Appendix A. Photographs of the flood walls and site are included in Appendix B. It is understood that the walls were designed as reinforced concrete walls with a range of different cross-sections depending on their location. Some walls directly line the River Exe whereas others are separated from the river by a revetment and walkway.

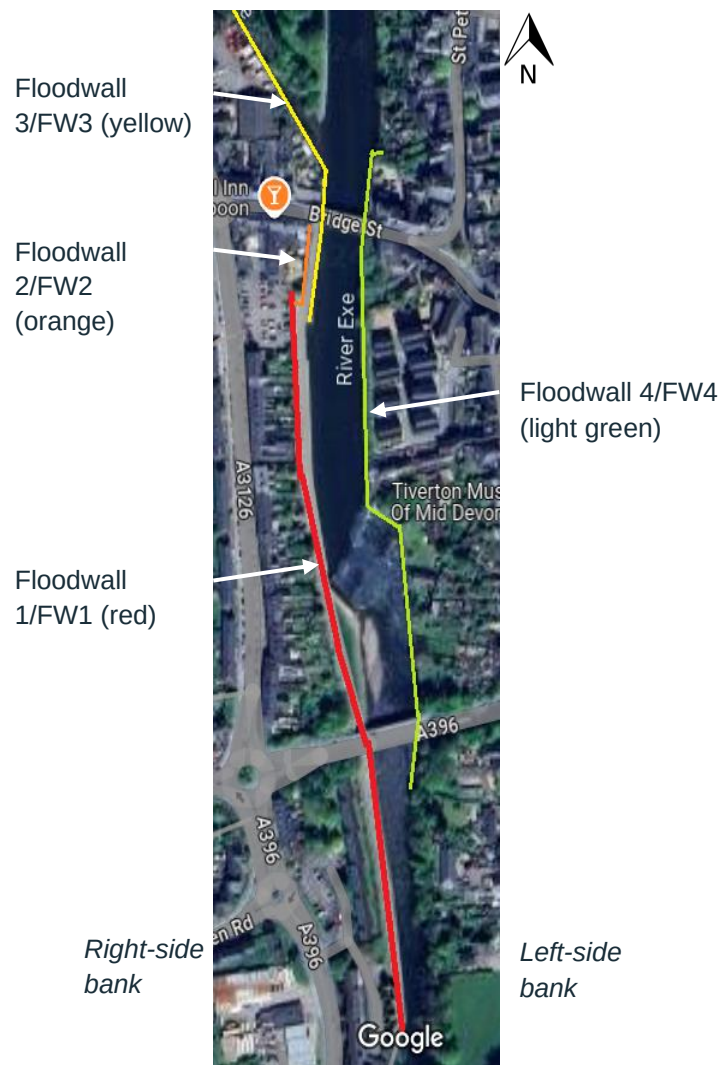
As it is approaching 60 years since the flood walls were built, the EA are keen to better understand their condition. AtkinsRéalis are currently undertaking a condition assessment project for key sections of the flood walls. A visual inspection of publicly accessible areas of these flood walls has been completed under Phase 1 of the project. A dive survey of the sections of the flood walls which are below the water level has been proposed as part of Phase 2. The main concerns for the underwater sections are undercutting of the wall from scour, particularly in the areas downstream of a weir and two road bridges over the river, and the condition of several structures along the watercourse.

The aim of this technical note is to summarise the requirements of the dive survey along the floodwalls. The EA shall procure & manage the dive survey works through a named EA Diving Contractor Co-ordinator (DCC) and ensure compliance with all health and safety legislation, including the Diving at Work Regulations (1997).

1. Works Summary

1.1 Plan of the works area

The floodwalls along the River Exe through the centre of Tiverton have been divided into four wall sections for this project, as shown in Figure 1. Two drawings showing the chainage alignment for each flood wall are included in Appendix C.



Error! Reference source not found.**Figure 1 – Map identifying different sections of flood wall along the River Exe (Imagery ©2025 Airbus, Maxar Technologies, Map data ©2025 Google)**

Table 1 shows the start and end chainage for the full extent of each wall section. The River Exe flows from north to south in Figure 1, so Floodwalls 1, 2 & 3 are on the right-side riverbank and Floodwall 4 is on the left-side riverbank.

TECHNICAL NOTE

Table 1 - Chainage lengths of the full extent of each floodwall labelled in Figure 1

Floodwall section	Side of bank	Chainage (m)	
		Start	End
1	Right	0	600
2	Right	0	54
3	Right	0	225
4	Left	-6	353

1.2 Touch & visual survey of base of flood walls

The diving survey is to incorporate the below elements:

1. Touch survey of underwater sections and visual survey of 1m above water level of the wall extents identified in Table 2 **Error! Reference source not found.**below.

Table 2 – Extents of floodwalls for which a touch & visual dive survey is to be undertaken

Floodwall	Chainage to be inspected (m)
Floodwall 1 (right bank)	+17m to +37m
Floodwall 3 (right bank)	0m to +225m
Floodwall 4 (left bank)	-6m to +353m (full extent)

2. Touch survey to be undertaken in sections of 10m (correlating to the spacing between expansion joints in the wall) with a written summary of each section in the final report. A touch of survey of the bridge abutment sections shall also be undertaken and findings recorded.
3. The reporting of the touch & visual survey is to include:
 - i) A description of the wall's surface condition;
 - ii) A record of any cracks, with length/width measurements where possible. All cracks identified during the survey are to be recorded, but given the nature of a touch survey it is anticipated that cracks below 2-3mm might not be picked up;
 - iii) Evidence of any scour or undercutting (with dimensioned length/height/depth from wall face);

TECHNICAL NOTE

- iv) A description of the foundation type, if exposed. This is very unlikely to be visible but is expected to be a concrete base slab with Larssen U profile sheet piles. If any sheet piling or other foundations exposed, taking a measurement of thickness using a Cygnus reader where possible;
 - v) A record of the chainage (accurate to within 1m) and approximate height (relative to bed level) of any issues recorded. Mark with washable road chalk (not spray paint) if needed on the wall face above the waterline for photographs and reference while on site; and
 - vi) A table of key observations (i.e. presence of cracks, scour or foundations) with a record of the chainage and short description of the observation.
4. Where necessary, brushing off any algal growth is permitted to expose the wall surface for inspection.
 5. A depth profile of the bed level adjacent to the wall is to be taken in intervals of 10m, matching each of the 10m touch survey sections. The depth profile should include the level at the top of sediment and the hard base adjacent to the wall, if identifiable.
 6. Photographs, dependent on water clarity and depth.

Exclusions:

- The condition survey does **not** include any underwater sections of revetment, which are outside of the chainages in Table 2.

1.3 Flap valves

There are approximately 12 flap valves along floodwalls 3 & 4. The exact number is to be confirmed during the survey. The survey shall include an inspection of the condition of each visible flap valve, both those above and below the water level.

The survey shall note:

1. The chainage of each flap valve and height of the invert taken from the crest of the wall;
2. Whether the flap valve is missing or present;
3. Where present, whether the flap valve is dislodged or askew;
4. Whether the flap valve hinge operates smoothly so that it can open freely under hydraulic load; and
5. Whether any blockages or damage are visible in the pipes behind the flap valves.

NB: some flap valves may be located below silt levels, especially upstream of the weir, which might limit the survey.

TECHNICAL NOTE

An example of a flap valve in the flood wall is shown in a photograph in Figure 2.



Figure 2 - Photograph showing skewed flap valve cover on floodwall 4

1.4 Weir sheet piling

There is a weir positioned diagonally across the river just upstream of the A396 road bridge. Downstream of the weir is a section of sheet piling approximately 6m in length, circled in pink in Figure 3 and shown in a photograph in Figure 4.

The condition survey for this section of sheet piling is to include:

1. A touch survey of the sheet piles above and below the water level;
2. A record of their condition (presence of erosion, cracks, displacement etc) in 1m sections;
3. A record of the chainage and depth of any defects, relative to a chainage starting at the right-bank side of the sheet piling;
4. A record of the water depth and height of exposed sheet pile on either side, in 3m increments; and
5. Measurement of sheet pile thickness using a Cygnus reader, taken every 1m at both the bed level and water level.

TECHNICAL NOTE



Figure 3 - Extract from chainage drawing 01 showing the section of sheet piling downstream of the weir, encircled in pink.



Figure 4 - Photograph looking upstream showing the section of sheet piling downstream of the weir, encircled in pink

TECHNICAL NOTE

1.5 Stop-log structure & concrete wall

Adjacent to the weir there is a stop-log structure to control the water levels and concrete walls either side of it to provide a channel. This structure is circled in green in Figure 5 and shown in photographs in Figure 6 and Figure 7. The length of the right concrete wall is approximately 35m and the length of the left concrete wall is approximately 25m. The survey extent shall include the wet side of the right concrete wall and both sides of the left concrete wall (where possible, dependent on weir water levels and safe access), so the total length of wall surveyed will be approximately $35\text{m} + 25\text{m} + 25\text{m} = 85\text{m}$. The condition survey for this section is to include:

1. Touch survey of underwater sections and visual survey of exposed sections of the concrete walls adjacent to the stop-log structure.
 - i) Description of wall surface condition and record of any cracks (with length/width measurements where possible), evidence of any scour or undercutting (with approximate size measured), and the foundation type if exposed.
 - ii) Wall to be surveyed in sections of 5m with a summary of each section.
 - iii) Chainage and depth of any defects to be recorded, relative to a chainage starting at the upstream ends of each wall. Mark with washable road chalk (not spray paint) if needed.
2. Record of the water depth and height of exposed stop logs on either side of the structure.
3. Touch condition survey of underwater part of the stop-log structure and visual survey of exposed stop-log structure, depending on safe access on the day.
4. Photographs



Figure 5 - Extract from chainage drawing 01 showing the stop-log structure and concrete wall downstream of it encircled in green.

TECHNICAL NOTE



Figure 6 - Photograph of stop-log structure adjacent to weir



Figure 7 - Photograph of section of concrete wall between stop-log structure & in-river sheet piles, with vertical crack evident

TECHNICAL NOTE

1.6 Sluice gates at Heathcoat Mill leat

A leat from the River Exe runs through the Heathcoat Mill site supplying water for operations and hydropower for the factory. The outlet of the hydropower plant discharges back into the River Exe through two timber outfall flaps, shown in Figure 8. These are located between 5m to 10m chainage on Floodwall 3.

The survey for this section is to include:

1. Summary of the condition of each outfall flap, especially noting the condition of the timber below the waterline;
2. Assessment of whether the flaps provide an adequate seal and operate properly (i.e. hinge operates smoothly, if safe to inspect);
3. Record of any blockage or damage to any visible pipe sections upstream, which may impact the operation of the outfall flaps;
4. Summary of the condition of the concrete headwall and concrete wall separating outfall flaps, including any cracks or scour (with measurements where possible); and
5. Photographs.



Figure 8 - Photograph showing two sluice gates on Heathcoat Mill leat

TECHNICAL NOTE

1.7 Deliverables

Deliverables from the dive survey shall include the following items:

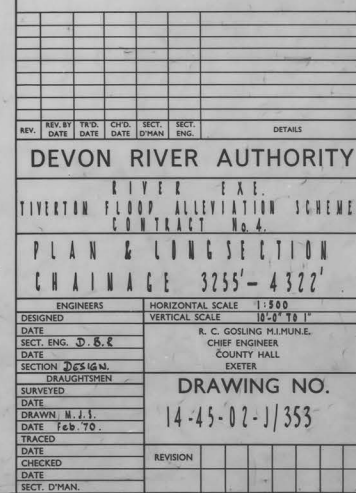
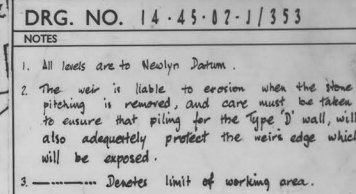
- A draft report, summarising the condition observed during the survey of each of the elements including a defect schedule and any measurements, as identified in the sections above.
 - Report to record any sections which were not able to be surveyed on site and reasons for this.
 - Report to include sensitivities of the survey and any assumptions or limitations on site (e.g. minimum width of cracks able to be identified).
- A final version of the report that takes account of a single set of Client comments, following their review of the draft report.
- Photographs taken during the survey to support descriptions of its condition (underwater photographs shall be dependent on visibility).

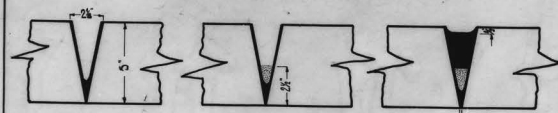
Exclusions:

- No video footage is required.

Appendix A. Original Construction Drawings

J/353

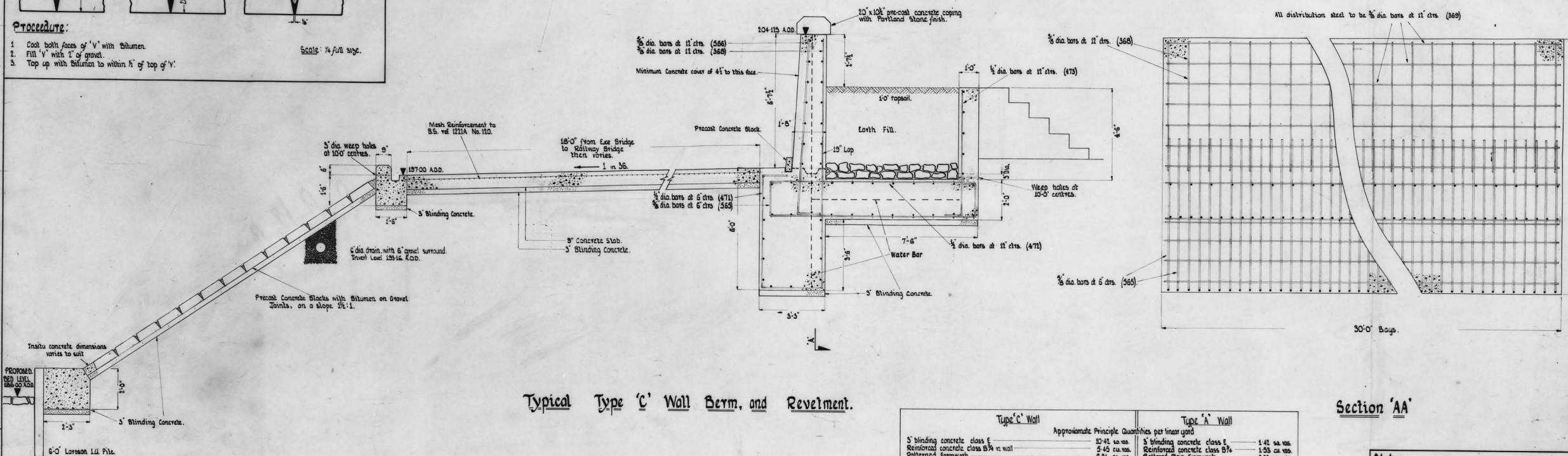




Procedure:

1. Coat both faces of 'V' with Bitumen.
2. Fill 'V' with 2" of gravel.
3. Top up with Bitumen to within 1/2" of top of 'V'.

Scale: $\frac{1}{4}$ full size.



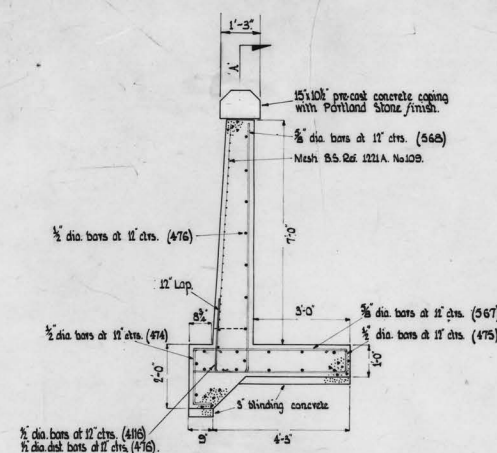
Typical Type 'C' Wall Berm, and Revetment.

Type 'C' Wall	Approximate Principle Quantities per linear yard	Type 'A' Wall
5" binding concrete class E	10-42 cu. m.	5" binding concrete class E
Reinforced concrete class B & in wall	5-40 cu. m.	Reinforced concrete class B &
Patterned formwork	2-31 sq. m.	Patterned formwork
Plan formwork	9-34 sq. m.	Plan formwork
1/2" dia. No. 10 reinforcement	2-112 mt.	3/4" dia. No. 10 reinforcement
10' x 10' coping alone	1 cu. m.	Mesh 8.5-1221A No. 10
8.5" precast concrete block	1 cu. m.	15 x 10" coping stone
Reinforced concrete class B & in beam	4-9 cu. m.	
Mesh 8.5-1221A No. 10	5-77 sq. m.	
Reinforced concrete class B & in tank including formwork	7-48 cu. ft.	
Reinforced concrete class B & in tank including formwork	13-54 cu. ft.	
5" thick concrete block masonry	5-67 sq. m.	
Item no. only up to max. thickness No. 10 sheet piling	18-50 sq. ft.	

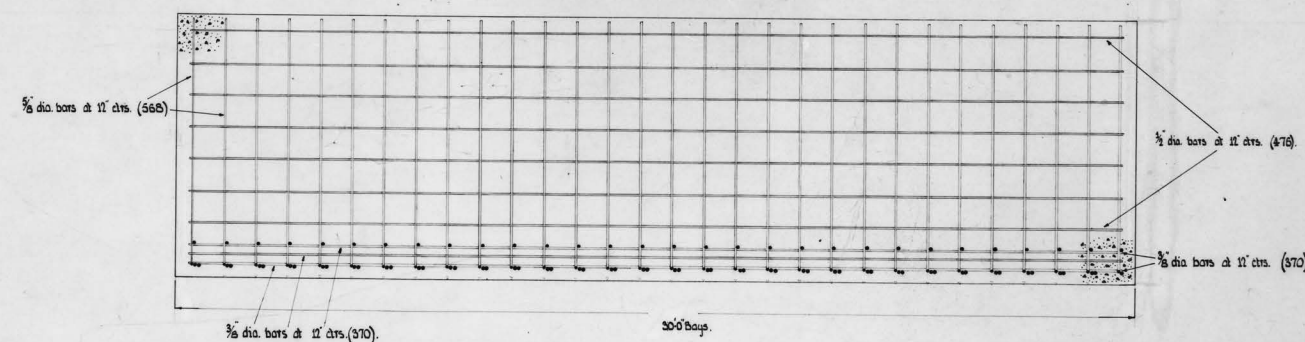
Section 'AA'

Notes.

1. All steel to have a minimum of $\frac{1}{8}$ " coat.
2. $\frac{1}{2}$ " Expansion joints to be provided at 60'-0" c/c.
3. 5" Water Bars to be provided in expansion joints & vertical construction joints
4. Berm to have wood float finish



Typical Type 'A' Wall.



Section 'AA'

REV.	REVISION	DATE	BY	CHK'D.	DATE	BY	SEC'T.	DATE	BY	SEC'T.	DATE	BY	DETAILS
1													

DEVON RIVER AUTHORITY

River Exc : Tiverton Flood Alleviation Scheme

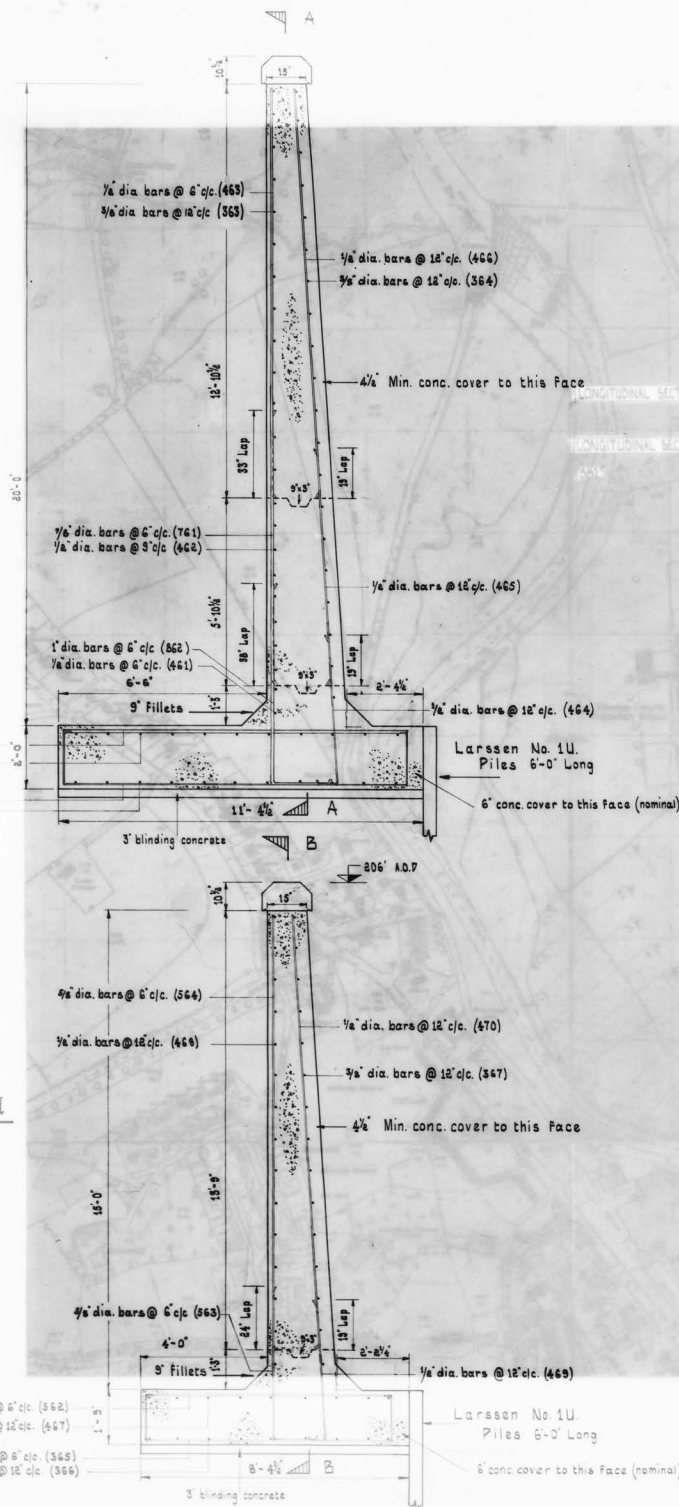
Contract 3.

Details of Walls Types

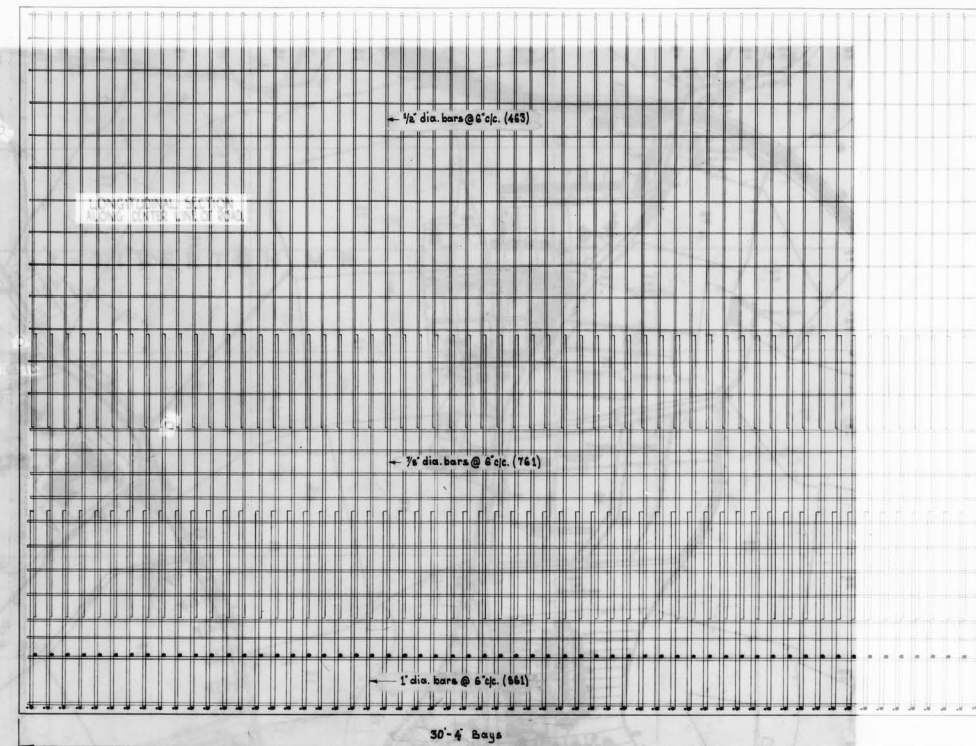
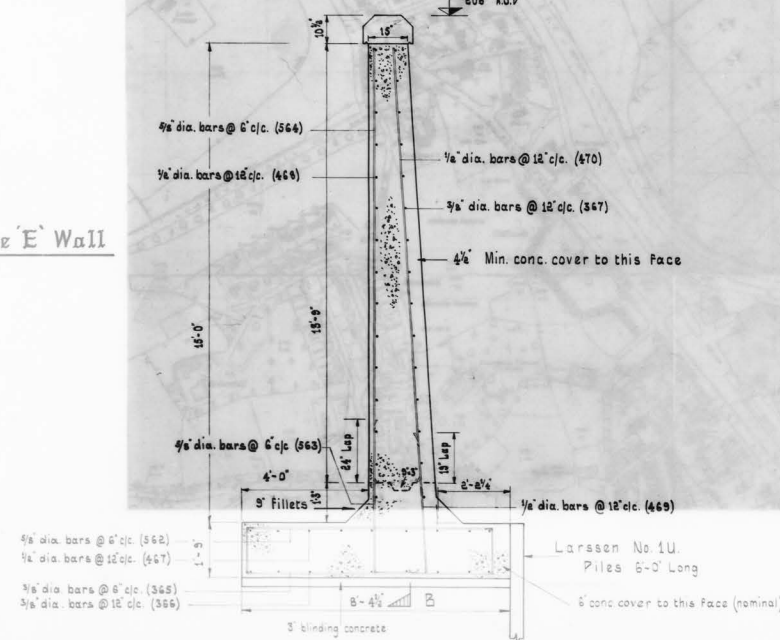
A and C

ENGINEERS		HORIZONTAL SCALE 1" = 1'-0"	
DESIGNED BY		VERTICAL SCALE 1" = 1'-0"	
DATE 5/11/87		BY JCB	
SECT. ENG. T.P.A.		BY R.C. GOSLING M.I.M.A.E.	
DATE 12/87		CHIEF ENGINEER	
SECTION DESIGNER		COUNTY HALL	
DRAUGHTSMAN		EXETER	
SURVEYED		DRAWING NO. 14-45-02-J/201.	
DATE			
DRAWN C.WILLIAMS			
DATE 19-9-87			
TRACED			
CHECKED			
DATE			
SECT. DRYAN			
REVISION			

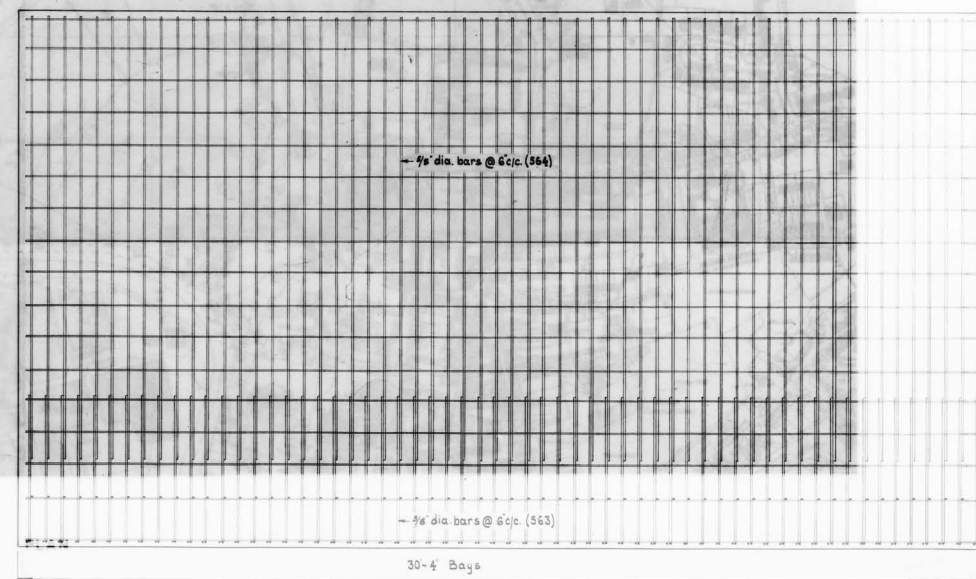
Type 'D' Wall



Type 'E' Wall



Section A-A.



Section B-B.

DRG NO.

DRG. NO. 14/45/02/202

NOTES

- Concrete cover to main steel to be 1 1/2" unless otherwise shown.
- Concrete cover on patterned face to be 1" except in rebates.
- For convenience rebated panels have not been shown on Sections.
- Where wall cross sections remain the same a plain shuttering is specified, stem reinforcement shall on the water face, be bent forward to 1/4" cover.
- For details of Coping Stones see drawing No 14-45-02-3/197
- For details of drainage layers behind walls see 1/10' 1'-0" cross sections.

TYPE D WALL - APPROX. PRINCIPAL QUANTITIES PER LIN.

ITEM	DESCRIPTION	QUAN	UNIT
1	Larssen 10 piling	18	5
2	3' Blinding concrete - Class E	3.79	5
3	Reinforced concrete - Class B 3/4	6.76	5
4	Battered Patterned Shuttering	6.42	5
5	Plain Shuttering	7.83	5
6	M.S. Reinforcement 3/8" to 1"	5.76	5
7	20" x 10 1/2" Coping	1	LR

TYPE E WALL - APPROX. PRINCIPAL QUANTITIES PER LIN.

ITEM	DESCRIPTION	QUAN	UNIT
1	Larssen 10 piling	18	5
2	3' Blinding concrete - Class E	2.79	5
3	Reinforced concrete - Class B 3/4	4.56	5
4	Battered Patterned Shuttering	4.75	5
5	Plain Shuttering	6.08	5
6	M.S. Reinforcement 3/8" to 1"	2.77	5
7	20" x 10 1/2" Coping	1	LR

- 1/2" Expansion joint to be provided at 60'-0" c/c.
- 6" Drains with Tide Flaps to be provided through Types D & E Walls from drainage layers (shown on Cross Sections) at 30'-0" c/c (14.1 per Bay).

REVISIONS

DATE

DESCRIPTION

DATE

DESCRIPTION

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DESCRIPTION

NOTES

- | TYPE 'L' WALL — | APPROX. PRINCIPAL QUANTITIES | PER LIN. YD. |
|-----------------|------------------------------|--------------|
|-----------------|------------------------------|--------------|

TYPE 'M' WALL. — APPROP. PRINCIPAL QUANTITIES PER LIN. YD.

4/ 1/2" Expansion joint & 9" Water Bar to be provided between Type 'L' & Types 'B' & 'C' Walls

REV.	A	PLAN	REV.	DATE	LEVELS ADDED	
		TRVD	DATE			
		CH'D	DATE	SECT.	SECT.	DETAILS
		DATE	DATE	10"MAN	ENG.	
DEVON RIVER AUTHORITY						
RIVER EIE						
TIVERTON FLOOD ALLEVIATION SCHEME						
CONTRACT No. 8.						
DETAILS OF						
TYPES 'L' & 'M' WALLS						
ENGINEERS			HORIZONTAL SCALE 1/4" = 1'-0"			
DESIGNED			VERTICAL SCALE 1/4" = 1'-0"			
DATE			R. C. GOSLING H.M.I.N.E.			
SECT. ENG. <i>CPW</i>			CHIEF ENGINEER			
DATE <i>JUNE 1964</i>			CITY HALL			
SECTION <i>DESIGN</i>			EXETER			
DRAWING			DRAWING NO.			
SURVEYED			14/45/02/3 203.			
DRAWN						
BY <i>E.C. MILTON</i>						
DATE <i>SEPT. 1967</i>						
TRACED <i>E.C. MILTON</i>						
DATE <i>8.8.67</i>						
CHECKED			REVISION			
DATE						
BY <i>D.MAN</i>						

Appendix B. Site Photographs



Figure 9 - View of River Exe looking downstream



Figure 10 - View of River Exe looking downstream

TECHNICAL NOTE



Figure 11 - View of flood wall 3, with the flap valves at Heathcoat Mill visible on the left



Figure 12 - View of flood wall 2

TECHNICAL NOTE



Figure 13 - View of River Exe looking upstream, across the weir and at floodwall 4



Figure 14 - View of River Exe, just downstream weir looking across stop log structure at flood wall 4

TECHNICAL NOTE



Figure 15 - View looking downstream at flood walls 1, 2 (no river frontage) & 3, and at the slipway into the river

Appendix C. Chainage Drawings

100
0 10
Millimetres



DO NOT SCALE

FOR CONTINUATION SEE
ENV6007048R-ATK-DW-2TV-DR-C-000002

SAFETY, HEALTH AND ENVIRONMENTAL
INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following:

CONSTRUCTION

N/A

MAINTENANCE/CLEANING

N/A

DECOMMISSIONING/DEMOLITION

N/A

It is assumed that all works will be carried out by a competent contractor working, where appropriate, to an approved method statement

C01	08/11/24	Issued for Information	ME	LC	AY
C02	17/01/25	Issued for Information	ME	LC	AY
C03	15/04/25	Issued for Information	ME	LC	AY

Rev.	Date	Description	By	Chk'd	App'd
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Drawing Status	Suitability
Published Design Stage Files	A4

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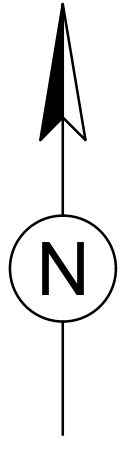
Project Title
Tiverton FAS Asset Inspection

Drawing Title
DEFENCE WALL
SITE PLAN
SHEET 1 OF 2

Scale	Drawn	Checked	Reviewed	Authorised
1:1000	ME	LC	AY	GMW
Original Size	Date	Date	Date	Date
A1	07/04/25	08/04/25	15/04/25	15/04/25

Drawing Number	Revision
ENV6007048R-ATK-DW-2TV-DR-C-000001	C03

100
0 10
Millimetres



FOR CONTINUATION SEE
ENV6007048R-ATK-DW-2TV-DR-C-000001

DO NOT SCALE

SAFETY, HEALTH AND ENVIRONMENTAL
INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following:

CONSTRUCTION

N/A

MAINTENANCE/CLEANING

N/A

DECOMMISSIONING/DEMOLITION

N/A

It is assumed that all works will be carried out by a competent contractor working, where appropriate, to an approved method statement

C01	08/11/24	Issued for Information	ME	LC	AY
C02	17/01/25	Issued for Information	ME	LC	AY

Rev.	Date	Description	By	Chk'd	App'd
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Drawing Status	Suitability
Published Design Stage Files	A4



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**Environment
Agency**

Client
Tiverton FAS Asset Inspection

Drawing Title
DEFENCE WALL
SITE PLAN
SHEET 2 OF 2

Scale	Drawn	Checked	Reviewed	Authorised
1:1000	ME	LC	AY	AY
Original Size	Date	Date	Date	Date
A1	08/01/25	08/01/25	08/01/25	17/01/25

Drawing Number	Revision
ENV6007048R-ATK-DW-2TV-DR-C-000002	C02