

REPORT

Castlefield Viaduct, Manchester

Drainage Assessment

Client: National Trust

Reference: PC2387-RHD-ZZ-XX-RP-Z-0004

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1 Introduction

Royal HaskoningDHV has been commissioned by the National Trust (the Trust) to undertake a Drainage Assessment (DA) for Castlefield Viaduct, Manchester, M3 4RU, centred at Ordnance Survey National Grid Reference (NGR) 383005, 397626 (herein referred to as 'the site').

The DA will be used to as part of the permission application for the temporary use of the site for a period of 12 weeks and support the Trust by informing an initial phase of feasibility and design.

1.1 Proposed Scheme

The Trust is currently undertaking a feasibility study to plan the repurposing of the site into an elevated urban park and transport hub. The urban park could potentially be utilised in a variety of ways, including use for exhibitions, fruit and vegetable growing, sculpture park, workspace, onward travel information, community meeting and green space.

The Trust propose to operate a temporary pilot scheme over the summer months for a period of 12 weeks. The temporary scheme is likely to comprise use of the viaduct in the form of organised walking tours. An architectural narrative booklet has been produced for the scheme by Twelve Architects, and visualisations included within the booklet indicate installation of a footpath surface be placed across areas of the viaduct ballast, the erection of overhead weather shelters and placement of plant and vegetation containers.

The use of the site during the summer months is to act as a Phase 1 pilot scheme to assess the viability of creating a permanent development within the area illustrated in Figure 1-1 and additional areas surrounding it. If successful, Phase 2 is envisioned to comprise a permanent development inclusive of food and beverage stands, garden areas, exhibition stalls, seating areas, an events space and toilet facilities. Figure 1-1 below illustrates the site boundary discussed within this report.

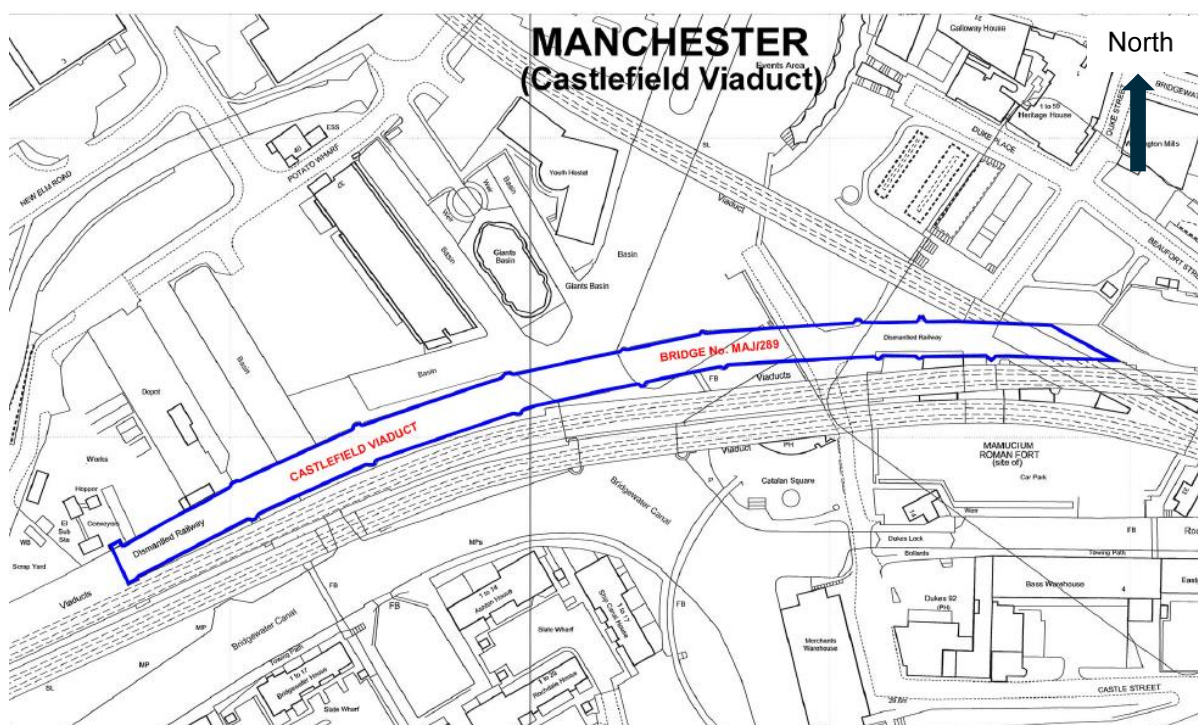


Figure 1-1: Site boundary

1.2 Objectives

The overall objectives of the drainage assessment are as follows:

- Provide an overview of the existing drainage systems at the site;
- Provide an overview of the likely requirements to enable the scheme; and,
- Provide recommendations for further works and assessments in relation the drainage works.

1.3 Legislative Context and Guidance

The assessment was undertaken in the legislative context of:

- The National Planning Policy Framework (NPPF¹) (2019).

The following good practice and statutory guidance was considered, and the assessment was undertaken in general accordance with:

- Environment Agency (EA) recommended climate change allowances for development, when considering flood risk and coastal change for planning purposes; and,
- Manchester City Council 'Planning Guide to Development in Manchester Supplementary Planning Document and Planning Guidance Adopted April 2017.

¹ National Planning Policy Framework, Flood Risk and Coastal Change. Ministry of Housing, Communities & Local Government (Last updated 19/06/2019) <https://www.gov.uk/government/publications/national-planning-policy-framework--2> (Accessed 31/03/2021)

2 Site Setting

2.1 Site Location and Description

The viaduct is a Grade II listed² structure located within the area of Castlefield within Manchester City Centre, M3 4RU and centred around Ordnance Survey National Grid Reference (NGR) 383005, 397626. The site is located approximately 200 metres (m) west of Castlefield Station and 1.5 kilometres (km) west of Manchester Piccadilly Train Station. The site is formed by a former railway viaduct structure, constructed of cast iron in the late 1880's, it is approximately 0.9 hectares (ha) in area and rectangular in shape.

The viaduct is approximately 330m in length and the underside width of the viaduct is approximately 14m wide and the surface width is narrower, approximately 10m wide. Ground level below the viaduct is variable, and the highest from the highest ground level and base of the viaduct is approximately 16m. The viaduct is constructed of cast iron and wrought iron with lattice girder work along its length. Parts of the sides of the viaduct have scaffold fitted with a wooden kickboard at the base. The ironwork structure is heavily rusted with flaking paint and metal fragments. It is understood to have comprised three railway lines, none of which could be seen on the site.

The viaduct structure raised above the ground below by approximately 16m by a series of supporting iron cylindrical columnar drum struts. The struts are of iron construction for the majority of the length of the viaduct. A brick structure supports the viaduct in the eastern area of the site towards the east from the point after the viaduct passes over the railway line below. The viaduct supports change from iron to a brick arch system on the western boundary of the site, continuing this brick arch bridge system westwards from the site.

The site is accessed from a locked gate in a palisade fence line on the eastern site boundary. The land to the east is higher than the viaduct platform and there is a step down to the viaduct of approximately 0.50m at the access point. There is also a vehicle restraint system (VRS) barrier which runs parallel to the eastern site boundary within the car park to the east. There is no vehicular access at present.

The surface cover of the viaduct comprises vegetated railway ballast. Vegetation comprises moss, plants, shrubs and stumps where shrubs have been cut. The surface undulates and peaks and dips approximately 0.20m difference in height were observed inconsistently. The average thickness of ballast is estimated as approximately 0.30m.

The land below the viaduct comprises Castle Street, which is a cobblestone road which runs in a north-south direction below the viaduct in the eastern area of the site. Two paths connect Castle Street to the wharf areas surrounding the canal network and canal basin, part of which is also below the viaduct. Duke Street is located approximately 30m north of the viaduct at the eastern end of the viaduct. Duke Street joins Castle Street at a T junction approximately 40 m north of the viaduct. Duke Street then crosses Beaufort Street approximately 50m north of the viaduct. An area of open grassland is located in this area between the viaduct and the roadways. A staircase is located in the eastern part of the grassed area which connects the ground level to a car park to the east of the viaduct and viaduct level above. The staircase is located approximately 20m south of Beaufort Street.

The site is located above the Bridgewater Canal and two basins which feed into the canal. Active tram and railway lines run along the southern boundary of the site. An active railway line also runs below the viaduct in the eastern area of the site. Two footbridges which cross the Bridgewater Canal basin are located

² [CASTLEFIELD RAILWAY VIADUCT FROM G-MEX TO DAWSON STREET, Non Civil Parish - 1292315 | Historic England](#)

below the viaduct. The Slate Wharf Bridge is closed to public access via a locked gate and is located approximately 20m south of the viaduct beyond the tram and active railway lines. This bridge connects the Bridgewater Canal Tow Path to a footpath below the viaduct which follows a north south direction to a construction site to the north of the viaduct, where it connects to Potato Wharf, which is a cobblestone road which terminates at bollards at Egerton Street, approximately 80 m west of the viaduct. Another footbridge connects Catalan Square wharf area to land directly below the viaduct on the north eastern bank of Bridgewater Canal Basin. This area of land leads to Castlefield Bowl which is an outdoor events area approximately 80m north of the viaduct.

The viaduct is owned by the department for Transport. The Bridgewater Canal is owned by the Bridgewater Canal Company, which is owned by Peel Land and Property. The land parcels below the viaduct are owned by the following (moving west to east along the viaduct):

- Lend Lease Residential (NW) Ltd western end of the viaduct
- Pemberstone Reversions Ltd
- The Council & City of Manchester
- Land parcels to the south of the viaduct are owned by Peel Land and Properties (Ports) Ltd, Peel Investments (North) Ltd, Castlefield Estates, and MJF Ssas Trustees Limited; and land to east is owned by TIGM.

A site location and layout plan is provided in Figure 1-1.

2.2 Surrounding Area

The viaduct is located within a mixed use setting comprising residential blocks of flats to the north, a youth hostel to the north east, car parks, tow paths and wharf area, cobblestone and asphalt roadways, a travel network comprising a train and tramline immediately south of the site, restaurants and public houses to the south along the wharf area of the canal and historical buildings such as a lock keepers cottage approximately 60m to the south of the viaduct adjacent to the Rochdale Canal.

Land uses adjacent to the site (up to 500m) are summarised within Table 2-1 below.

Table 2-1: Current Surrounding Site Uses

Direction	Description
North	The Bridgewater Canal complex, tow paths and wharf areas extend from the south and below the viaduct to the north of the site. Blocks of residential flats, and a construction site understood to be for another residential block of flats to the north of the western area of the viaduct. A YHA youth hostel is located on the bank of Giant's Basin. The River Medlock is located approximately 40m to the north-west of the site, which flows in a western direction and then to the south where it flows below the Dawson Street road bridge. A railway line travels in a north-west direction from where it separates from the line below the eastern end of the viaduct. A road network formed by Potato Wharf, Castle Street, Duke Street and Beaufort Street connect to tow paths. An events area referred to as Castlefield Bowl is located on the eastern bank of Giant's Basin. Grassed areas and the Castlefield Urban Heritage Park is located to the north of the eastern area of the viaduct.
East	A car park, railway and tramline line are located immediately east of the site. The car park area is flat and the car park access road slopes down along the former railway line which the viaduct once was part of to the ground level at Trafford Street,

Direction	Description
	approximately 450 m east of the site. The car park area is raised above the surrounding ground level with red brick arches which are accessed along Bridgewater Street to the north east of the site. The arches are used as commercial units and car parking facilities. Warehouses, commercial units, residential flats and offices are located in the wider area east of the site.
South	A tramline runs parallel to the viaduct immediately south, with a railway line also parallel to the south of the tramline. The Bridgewater Canal and canal basin is located to the south of the tram and rail lines. The southern area is characterised by wharf area and canal tow paths along the banks of the canal with buildings comprising art galleries, offices, residential flats, restaurants and bars. The archway area below the railway line to the west of Castle Street has been developed into a restaurant with associated outdoor dining area. The Rochdale canal is located approximately 50m south the site. It forms an east west orientation and terminates at Rochdale Canal Lock 92, approximately 30m east of a footbridge where Castle Street crosses the canal. A building which was part of the former saw mill with a chimney is located on the northern bank of the Rochdale Canal, approximately 50 m east of the site. This building appears to be repurposed to use of a gallery and residential apartments. Merchants Bridge footbridge crosses the Bridgewater canal and connect Catalan Square on the northern bank to Slate Wharf on the southern bank. The land further south of the canal basin area is characterised by residential apartment blocks, Castlefield Green area of grass, canal quay, car parks and road network.
West	Immediately west of the site is an area of flat railway ballast, the area tapers in width as the tramline to the south of the site moves further north. The point of the taper of the ballast is where the tramline curves to the south along the bend of the River Medlock. Egerton Street and Dawson Street (A56) is located approximately 50 m west of the site, which runs in a north-south direction. The River Medlock flows below Dawson Street Bridge at this point. Land to the west of characterised as similar urban city environment comprising roads, residential and commercial buildings.

3 Existing Drainage

3.1 Viaduct Drainage

During the site walkover survey a series of drainage grids covered with ballast were observed at points along the viaduct, these are circled in red in Figure 3-1.

Each cluster of grids comprises six grids sunken below the ballast, approximately 0.40m in diameter, in a row with equal spacing in a north-south direction. At some points metal grids could be seen.

Additionally, it could be observed a layer of bituminous material over the viaduct's deck, this is assumed to be intended as an impermeable membrane protecting the structure. There was evidence of damage in places, as can be seen in Figure 3-1 where the structure is exposed where the ballast has been removed.

From beneath the viaduct a metal channel drain, fixed to the underside of the structure, could be observed. These are located at regular spacings along the viaduct and are adjacent to the iron columns. Downspouts connected to the channels convey drainage to the base of the columns for discharge. These are circled in red in Figure 3-2.



Figure 3-1: Location of Drainage Inlets at Viaduct Deck Level



Figure 3-2: Location of Viaduct Drainage Under the Viaduct's Deck

Network Rail's historic engineering drawings of the viaduct confirm that the systems observed at the site are the main means of drainage for the viaduct. These are shown in Figure 3-3, Figure 3-4 and Figure 3-5, in which the drainage elements were highlighted in blue for clarity. The engineering drawings can be found in Appendix A.

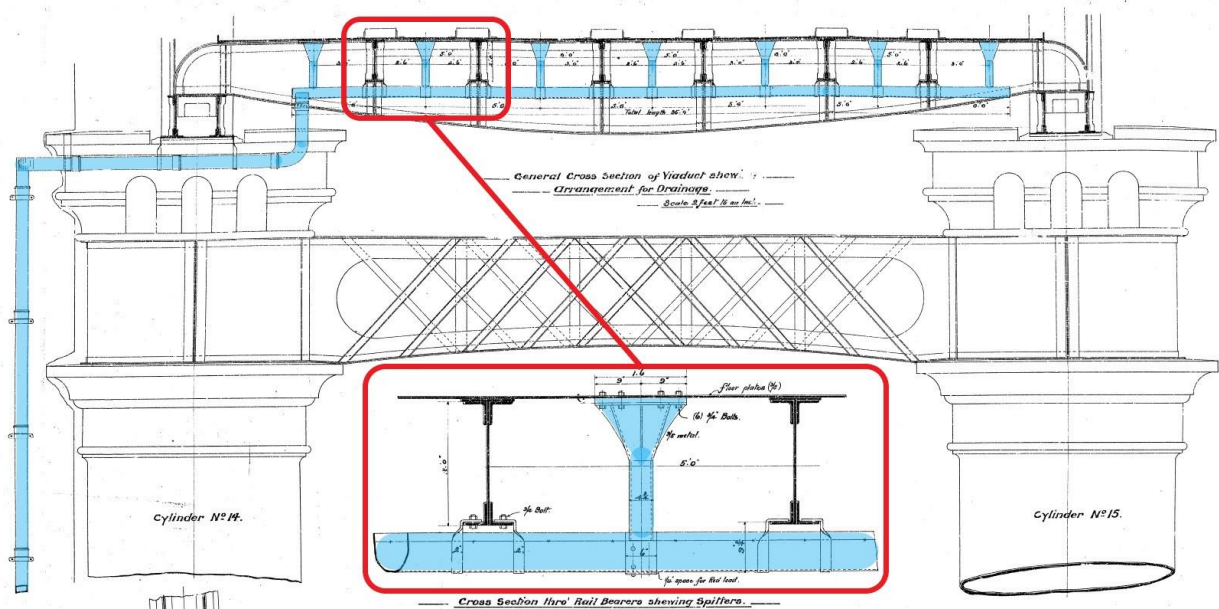


Figure 3-3: Section Through Viaduct with Drainage Inlet Detail

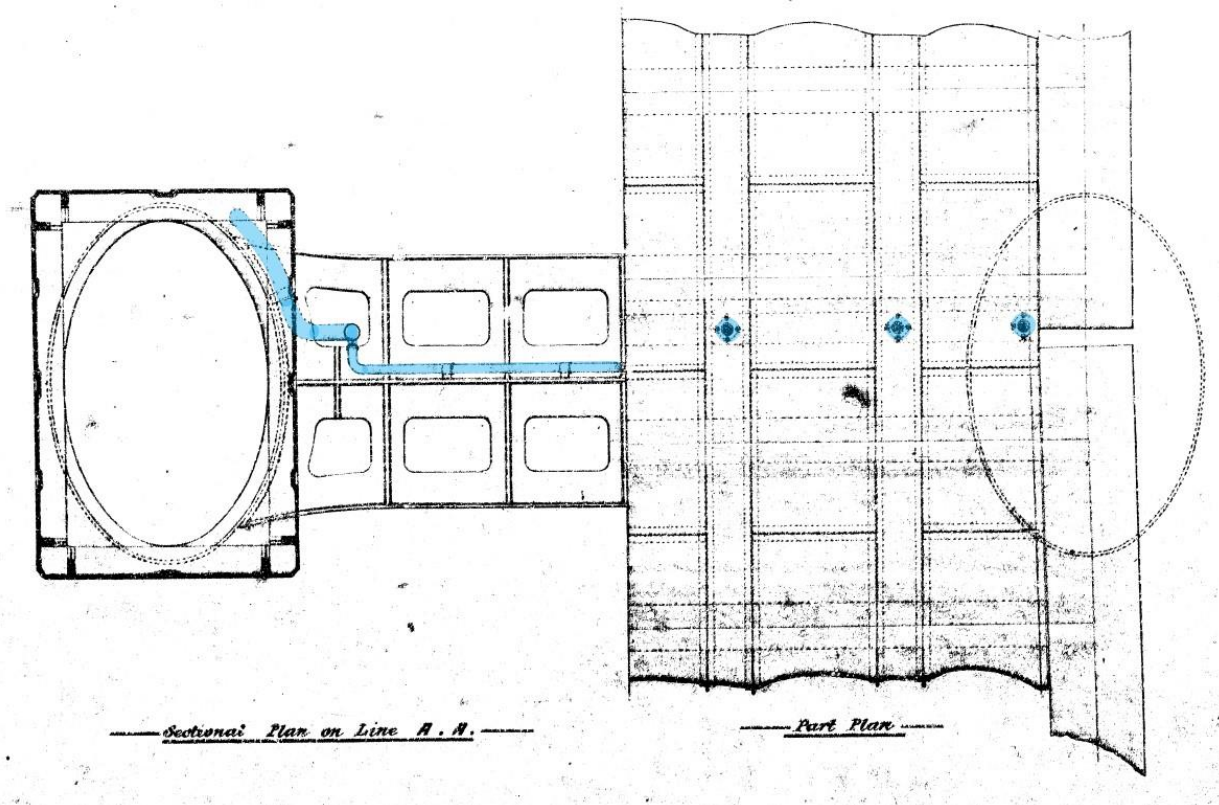


Figure 3-4: Plan View of Drainage Inlets at Deck Level and at the Underside of Deck Structure

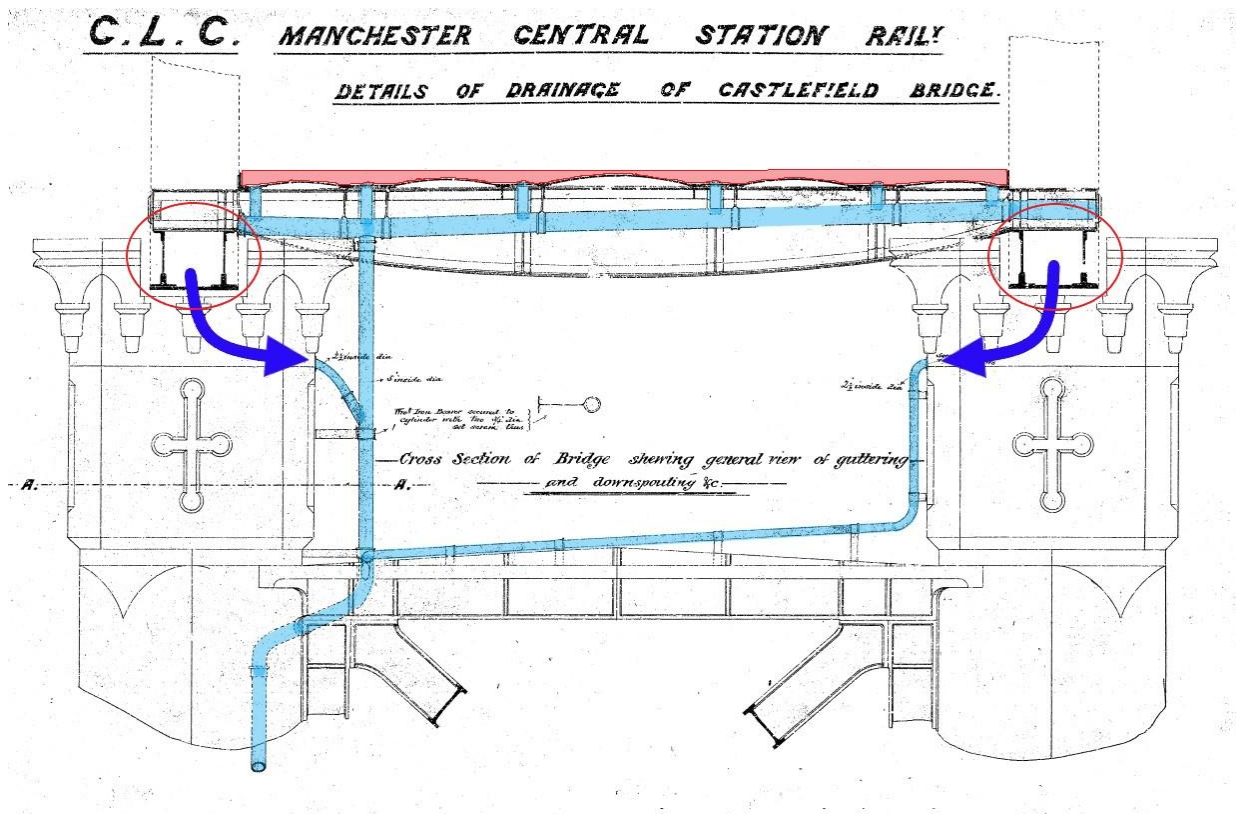


Figure 3-5: Section Through Viaduct with Additional Drainage Collectors Under Deck

From the viaduct's deck, standing water was observed in some lengths of the longitudinal edge plate girders³. There was evidence of surface water pooling, as patches of algae and mosses were observed indicating the surface water does not drain readily, this is likely to result from blockages originated by debris that settled between the beams over time. Figure 3-5 shows the existing drainage, which is likely to serve the longitudinal edge plate girders, circled in red with blue arrows highlighting the likely connections.

3.2 Existing Drainage Principles

The drainage identified on the site, evidenced in Section 3.1, is standard approach for railways. The layer of ballast would have acted as a permeable surface which would delay the runoff and offered attenuation volume during heavy rainfall, typically 30% of the stone volume would be available as void space. Figure 3-5 shows the cross-sectional area of attenuation highlighted in red over the viaduct's deck. Furthermore, the ballast would also act as hydrocarbon removal layer.

The runoff collected in each of the viaduct's spans would then be conveyed over the deck to the collector locations where it would flow by gravity to the base of the Viaduct. Figure 3-2 shows one or the downspouts discharging directly into the canal. In other locations the downspouts are connected to drainage chambers which take the flows underground into the nearest discharge point into the canal.

³The I-beam elements, spanning between the main columns, formed by separate structural plates riveted together

4 Proposed Development

To obtain approval for the scheme the Trust will apply for planning approval from Manchester City Council to use the site for the pilot scheme. The planning review will include consultation with the Lead Local Flood Authority (LLFA) who will advise on the matters of drainage and flooding relating to the scheme.

The LLFA ensures best practice approach is applied to all new developments. For developments located on brownfield sites this is likely to mean developing a solution that offers a betterment to the current scenario.

The existing drainage network is unlikely to be suited for the rainfall intensities that are observed at present. Furthermore, the climate change allowances required to future proof the drainage, would add further pressure to the system. It is therefore reasonable to assume that improvements to the current drainage system will be required.

Given the historic and heritage importance of this structure, it is proposed that no alterations take place below the viaduct's deck as not to change its appearance. The drainage strategy will aim to offer a solution that can be applied above the deck. The strategy will follow the principles of blue and green roof solutions which are applied in modern buildings.

4.1 Phase 1 The Pilot Scheme

As noted in Section 1.1, the Trust proposes to develop a temporary scheme for 12 weeks which will develop half of the viaduct.

The proposal is intended to offer a public space which facilitates a multi-purpose use.

4.1.1 Drainage Strategy

The drainage strategy for the temporary scheme will ideally offer a solution that causes minimal disturbance to the existing and requires limited enabling works. It would be recommended to develop a concept that would maintain the current drainage principle in place whilst creating a suitable working surface suited for the proposed use.

This would mean creating a platform above the ballast that allows for:

- a) public access in a safe manner with no contact with the ballast below;
- b) retain the existing draining properties of the existing surface by allowing flows to percolate through the surface into the ballast
- c) the services required for the scheme to be protected; and,
- d) enable installation and decommissioning without the need to take existing material off site.

A suitable solution may be found in the systems used for similar pop-up or temporary events, such as modular pavements, timber decking or temporary sports surfaces.

This would require clearing the area of larger vegetation and regarding the ballast in places to offer an even surface on which to lay the temporary surface. At the eastern end of the viaduct, where the ballast has been removed, it may be required to import some aggregate to even the area.

Surveying and maintenance of the existing drainage would be recommended to ensure that the system functions efficiently and to its full capacity.

Any planting proposed by the scheme would need to be introduced in raised planters or in soil laid on permeable geomembranes. The latter would mean only smaller plants or grass as this wouldn't require large pits in which to bury roots.

Portable chemical toilets are recommended as solution for the temporary scheme as this will not require any additional drainage work.

4.2 Phase 2 The Full Scheme

The proposed scheme's layout has been developed by Twelve Architects and it is shown in Figure 4-1 below.



Figure 4-1: The Proposed Scheme by Twelve Architects

The scheme proposes paths throughout the viaduct, cutting through softscape spaces and areas set for events. A new footway ramp is proposed to link the viaduct to the level beneath is also proposed, this will add extra connectivity to space above.

4.2.1 Drainage Strategy

The Viaduct

The drainage strategy for the permanent solution will require allowance for attenuation of runoff at deck level. The strategy will be similar to ones developed for green and blue roof solutions in buildings. These systems act as a runoff holding structure at high level that delay discharge into the receiving networks below.

This will require creating an impermeable base in which to hold the water. As noted on Section 3.1, the existing membrane has been damaged in places and will require repairing or completely replacing. It is reasonable to assume that the LLFA will require a system that can serve the scheme for the entirety of its lifetime, which will mean the impermeable membrane is fully replaced to ensure uniformity throughout the viaduct.

Should the attenuation volumes required permit, the concept of ballast as attenuation layer can be reused in the permanent solution. However, should the volumes prove to be too large to accommodate in the ballast void space, then a solution that maximises the attenuation per square metre will need to be considered.

As the supporting structure is a viaduct, it would be advised that the solution used is uniform throughout the viaduct to ensure uniformity of the loading during periods of heavy rainfall.

The proposals also include for provision of public toilets to the east of the 'Events Space' as shown in Figure 4-1.

It is envisaged that the foul water drainage solution could follow two approaches:

- 1) installation of a small package pump system at source pumping flows into the eastern end of the viaduct. From there the foul water could be conveyed by gravity to the level below, where it would connect to the public sewer, or;
- 2) discharge by gravity through the deck structure to a pipe fixed to the underside of the viaduct and down a column to the level below, where it would connect to the public sewer.

From review of the United Utilities (UU) asset plan, a foul water sewer can be identified on the junction of Castle Street with Duke Street and, a combined water sewer is located along the northern end of Duke Street. Both could provide potential discharge points for the foul water from the site. These are circled in purple in Figure 4-2. It is recommended that a Pre-Planning Enquiry (PPE) is submitted with UU to confirm the suitable location for discharge. Furthermore, the PPE would also advise on a suitable connection for potable water supply. The UU asset plans can be found in Appendix B.

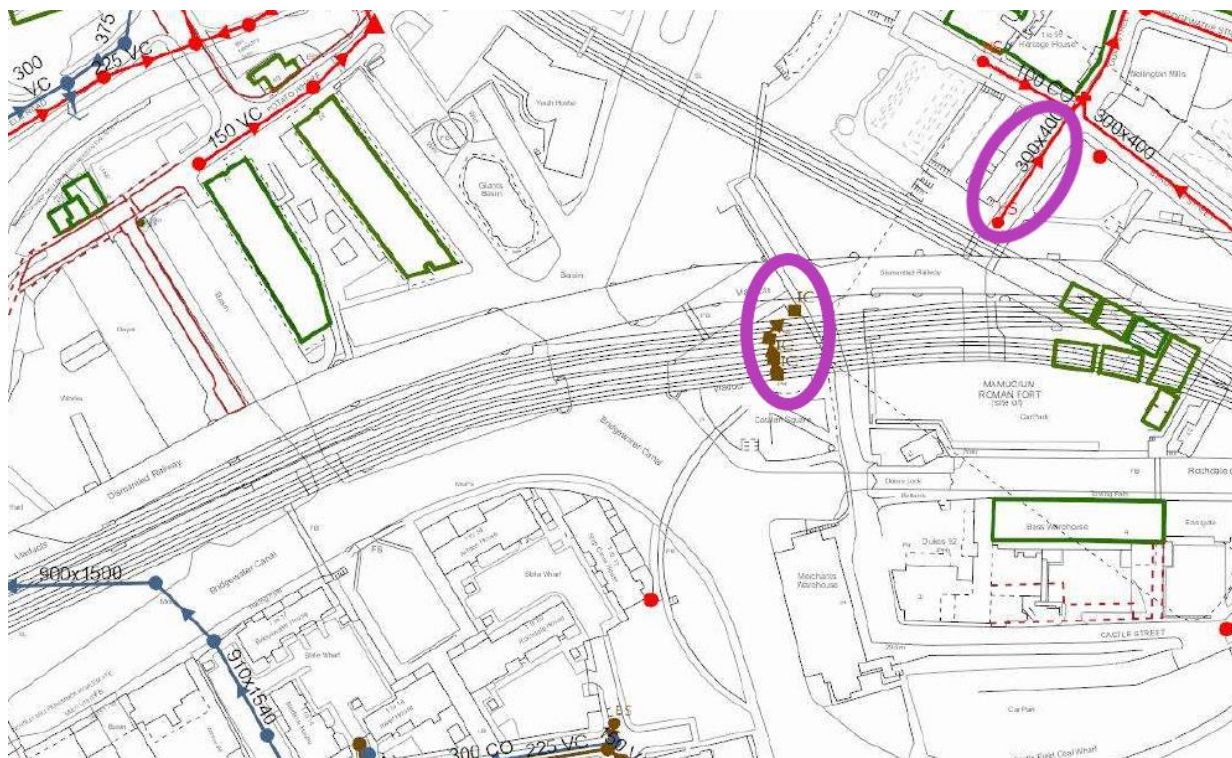


Figure 4-2: United Utility Asset Plan – Public Sewers

At Ground Level

As per the architectural layout shown in Figure 4-1, an elevated walkway connecting the viaduct to the level below is proposed.

As stated in the Flood Risk Appraisal⁴ the area at the base of the walkway is at low risk of flooding. A suitable drainage system for the walkway will need to be developed in line with the structure detail.

Should the walkway surface allow rainwater to percolate through, similarly to the Twelve Architects' visualisations, then a positive drainage system for this element of the scheme would not be required.

⁴ PC2387-RHD-ZZ-XX-RP-Z-0003 Castlefield Viaduct Flood Risk Appraisal

5 Conclusions and Recommendations

5.1 Conclusions

Clusters of grids sunken below the ballast, collect the viaduct's deck runoff. These are connected to metal channels beneath the deck which convey the flows to downspouts before discharging to the canal below.

At the deck level a layer of ballast acts as a permeable surface, offering attenuation volume during heavy rainfall, and hydrocarbon removal.

The existing drainage network is unlikely to be suited for the rainfall intensities that are observed at present. This will result in additional attenuation volume being required.

Given the historic and heritage importance of this structure, it is proposed that no alterations take place below the viaduct's deck as not to change its appearance. The strategy will follow the principles of blue and green roof solutions.

The drainage strategy for the pilot scheme will offer a solution that causes minimal disturbance to the existing and requires limited enabling works. Applying surfacing solutions used for temporary events, such as modular pavements, timber decking or temporary sports surfaces would maintain the current drainage principle in place whilst creating a suitable working surface suited for the proposed use. Portable chemical toilets are recommended as a temporary solution for the provision of toilet facilities.

The proposed permanent scheme will require a drainage system that is suited for the lifetime of the development and which offers attenuation at deck level.

Depending on the volume of attenuation required the ballast may be suitable for reuse. Alternatively, a solution offering a better volume per area ratio will need to be considered.

It is likely that the existing impermeable membrane protecting the structure will require replacement across the viaduct.

The foul water network can discharge by gravity down the structure of the viaduct or be pumped to the east end of the viaduct where it will flow by gravity to the level be low.

Possible connections into the public sewers are available locally. United Utilities must be consulted regarding the suitability for connecting into their sewers.

5.2 Recommendations

Prior to further development of the drainage strategy approach, it is recommended that the Planning Authority is consulted on the findings and recommendations of this report to understand their requirements for both the pilot and the permanent schemes.

A full survey and maintenance of the viaduct's drainage is recommended prior to installation of the pilot scheme.

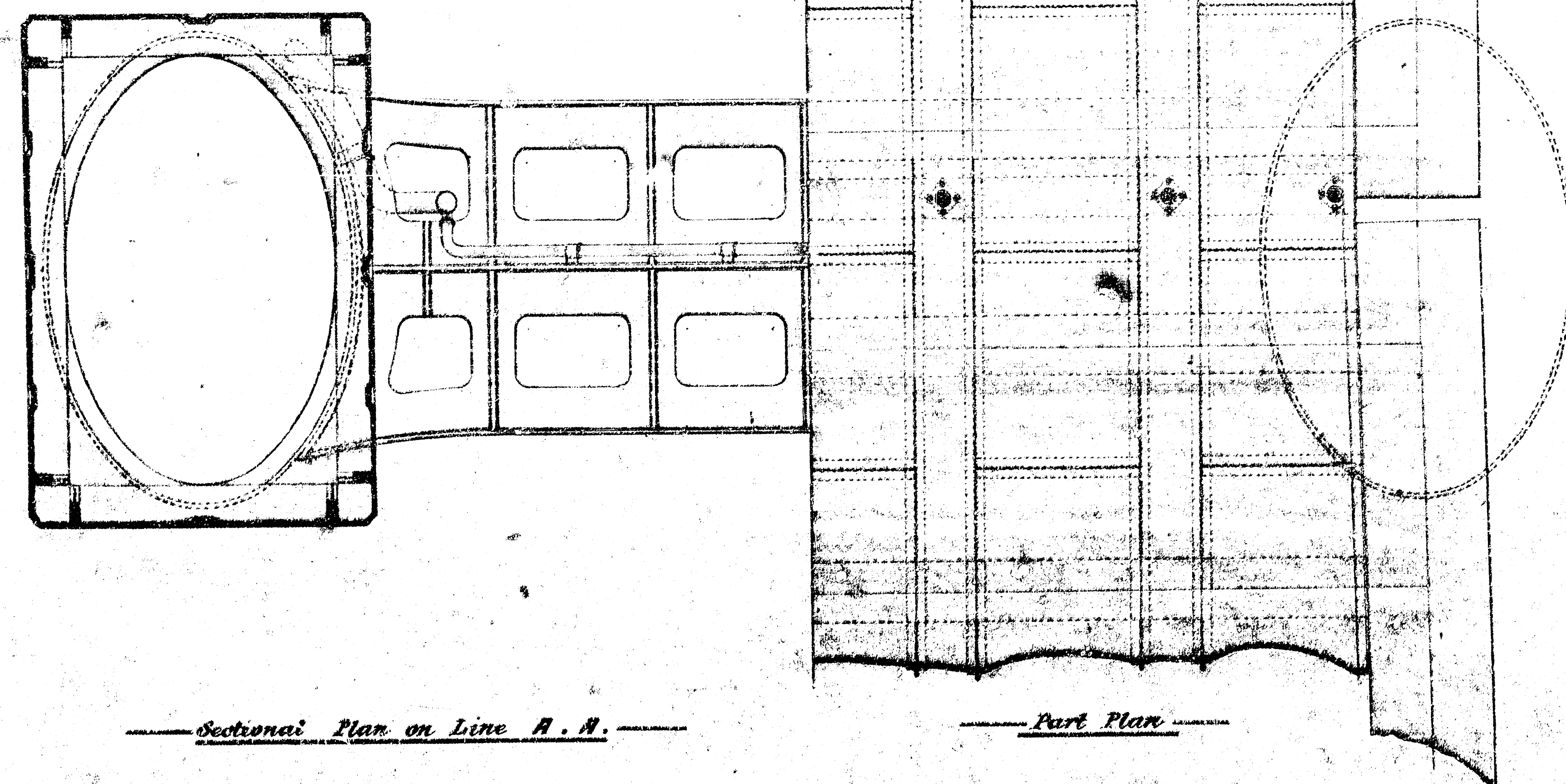
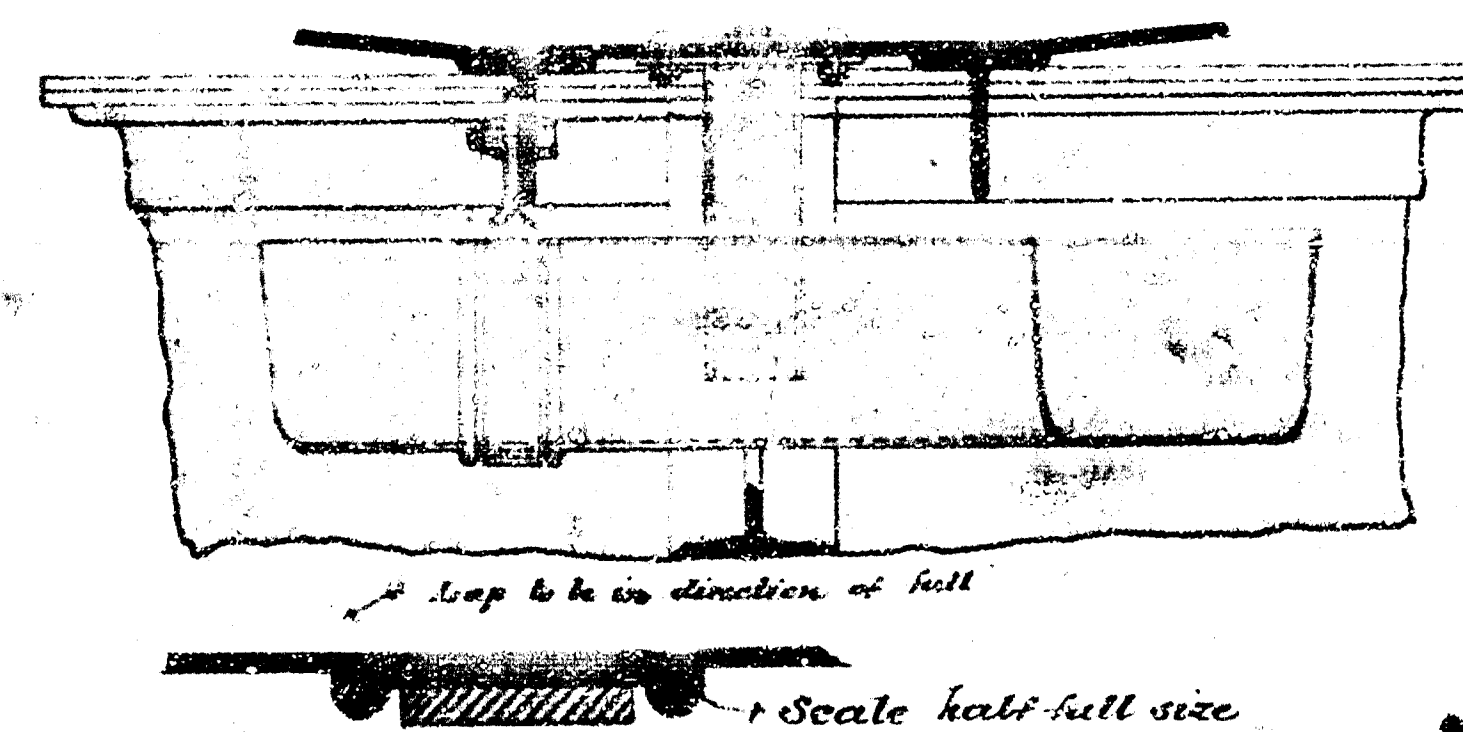
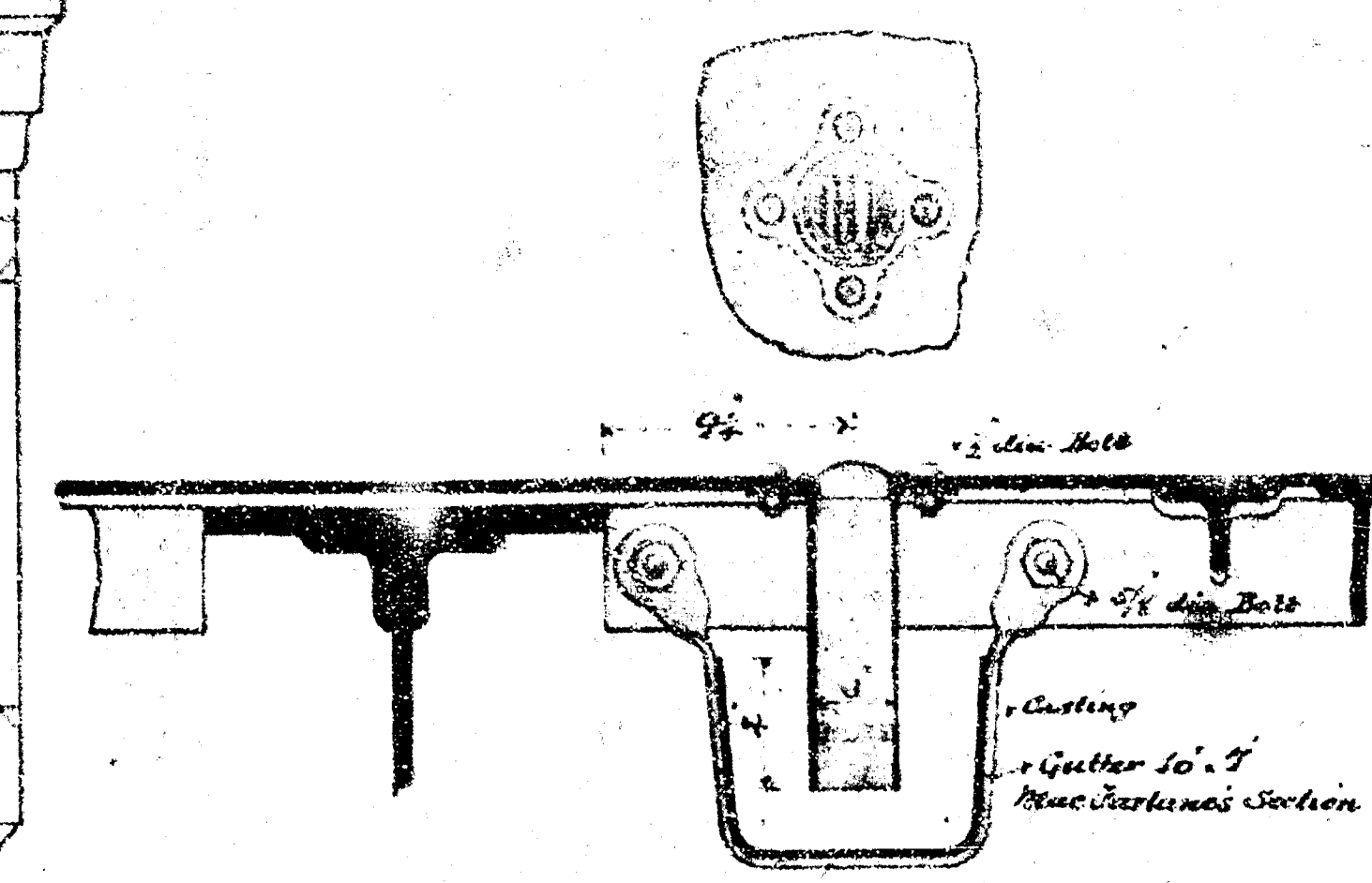
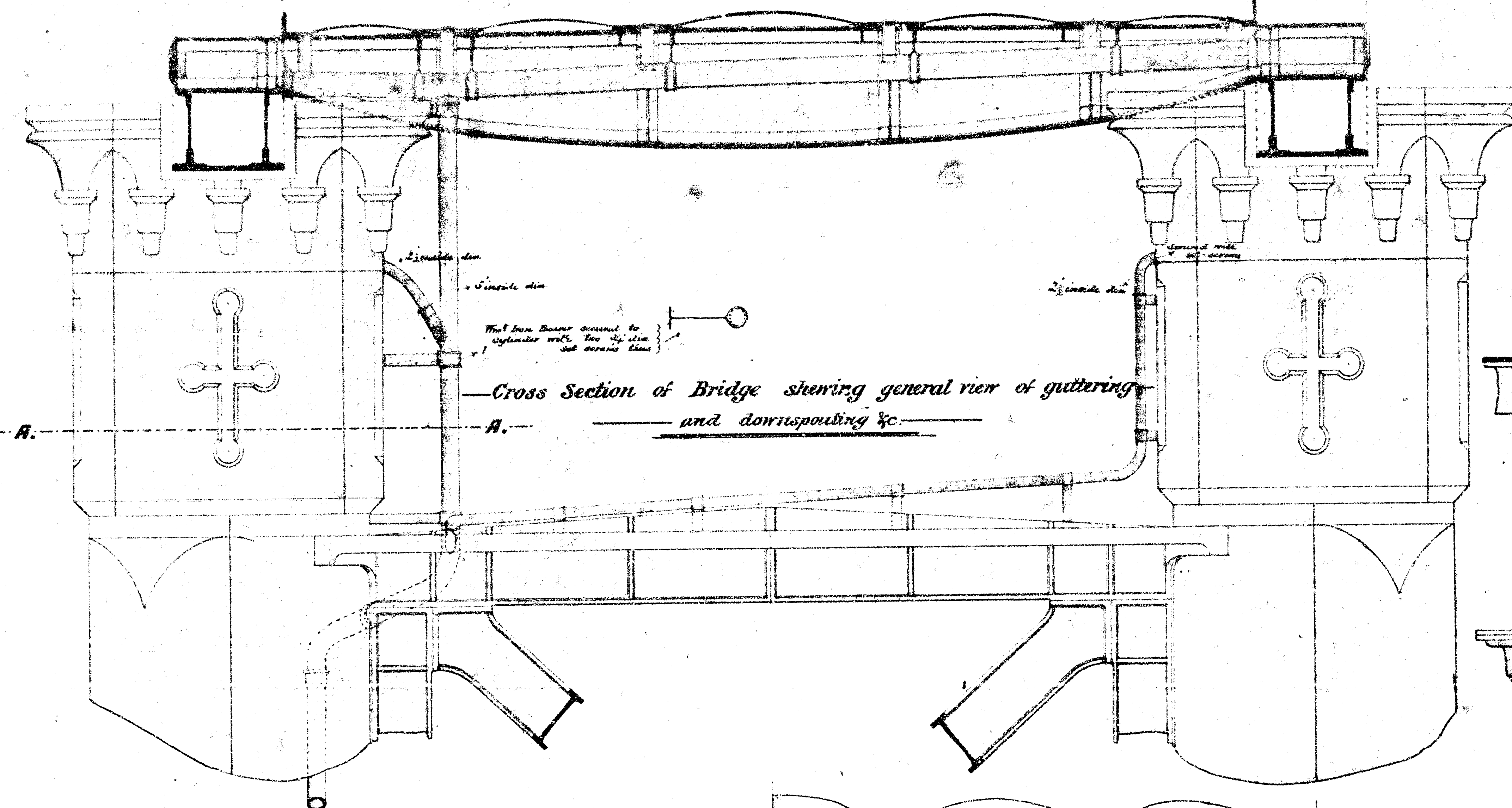
Further development of the drainage strategy and drainage design is recommended to ascertain the drainage requirements with basis on the hydraulic modelling of the network.

Appendix

Appendix A – Network Rail's Historic Engineering Drawings

C.L.C. MANCHESTER CENTRAL STATION RAIL

DETAILS OF DRAINAGE OF CASTLEFIELD BRIDGE

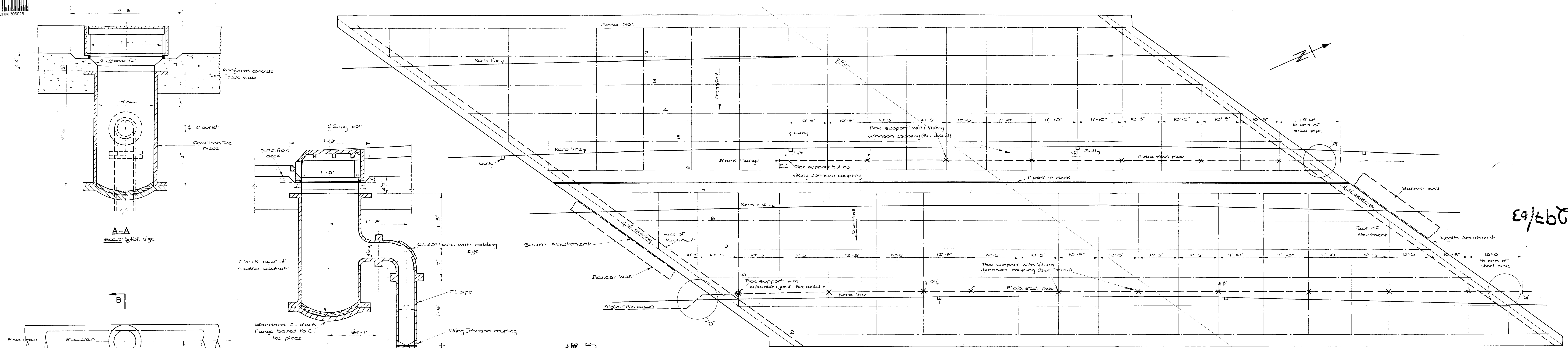


Scales
General view and Plan $\frac{1}{2}$ " = 1 foot
Enlarged Details $\frac{1}{4}$ " = 1 foot

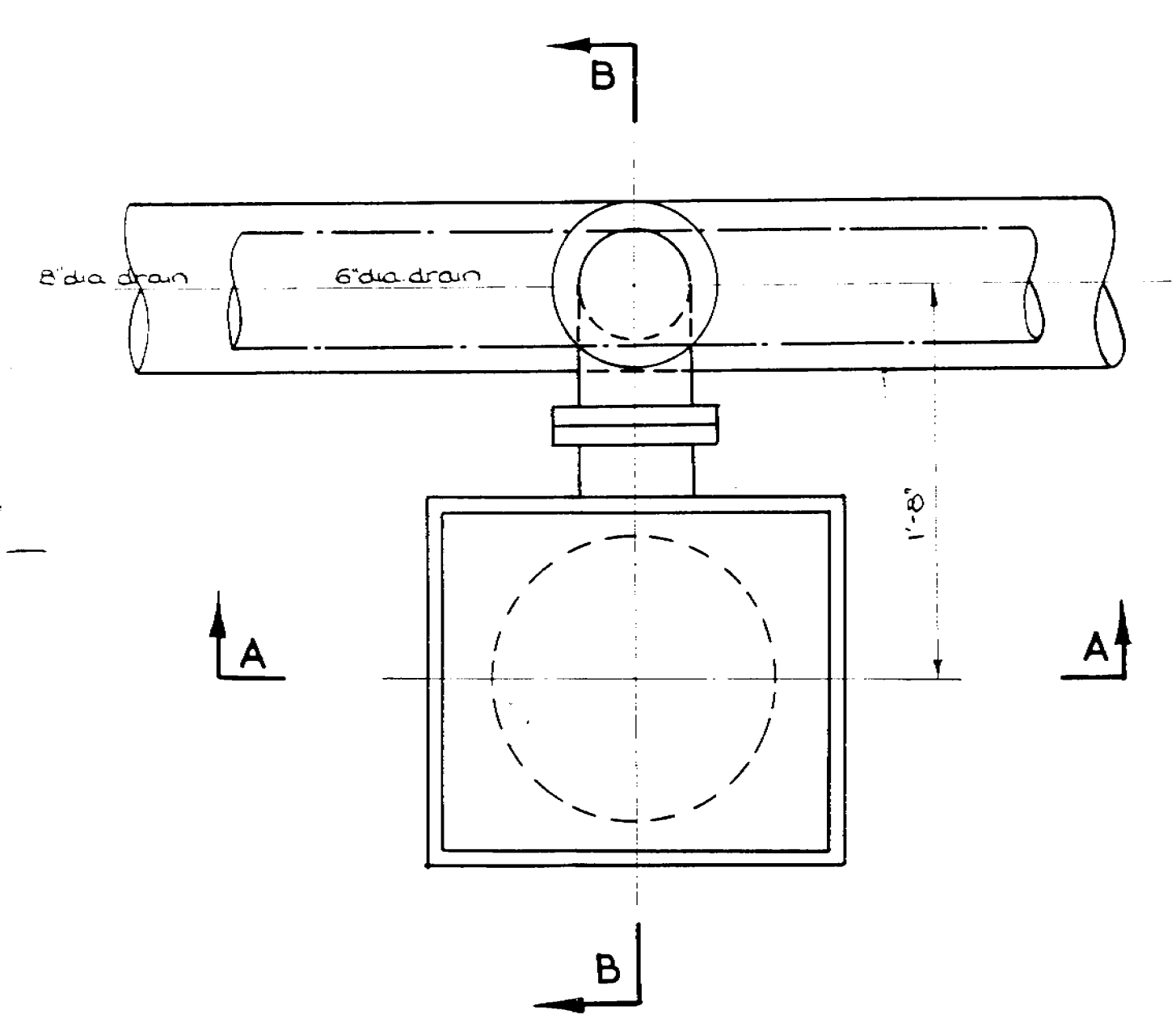
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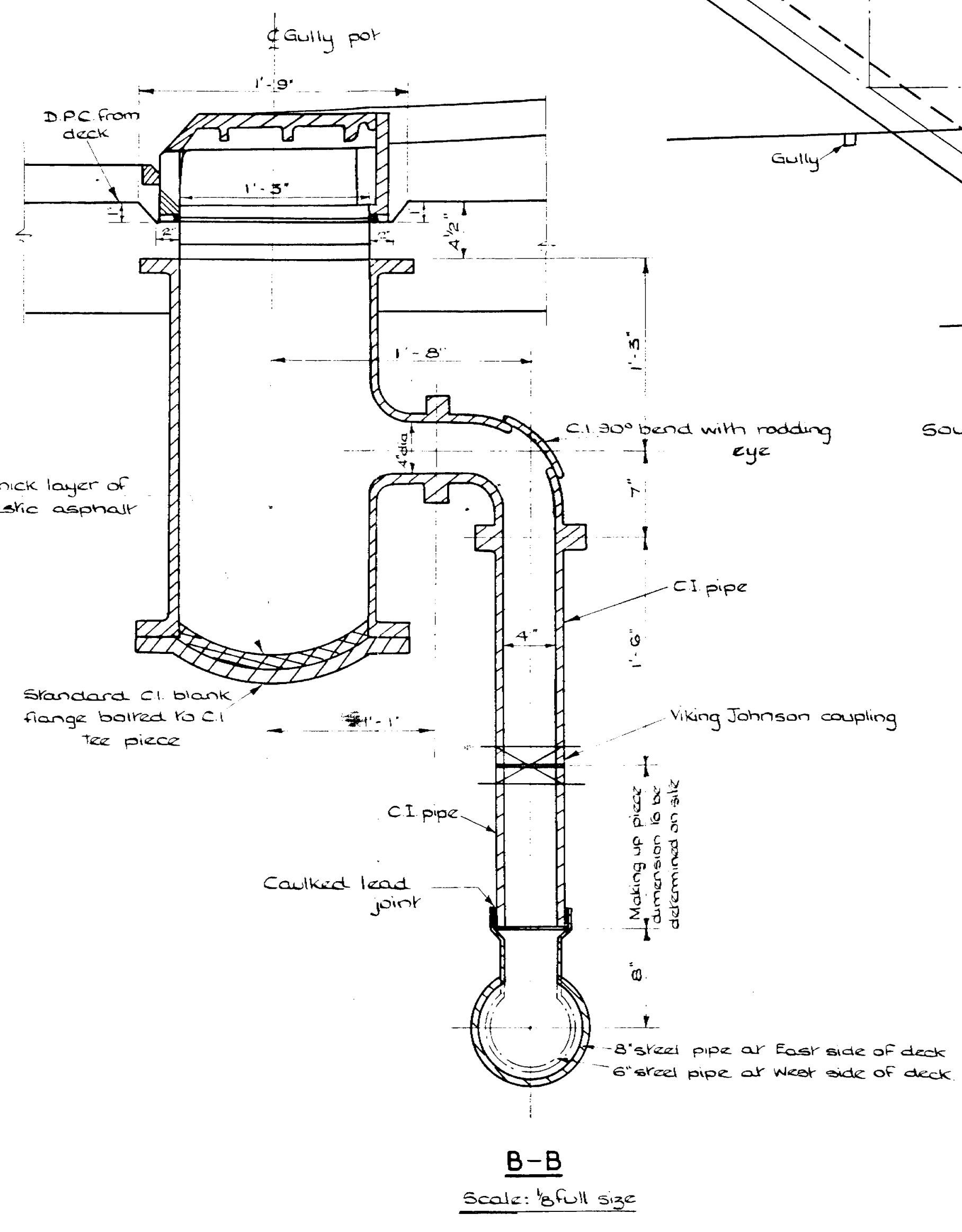
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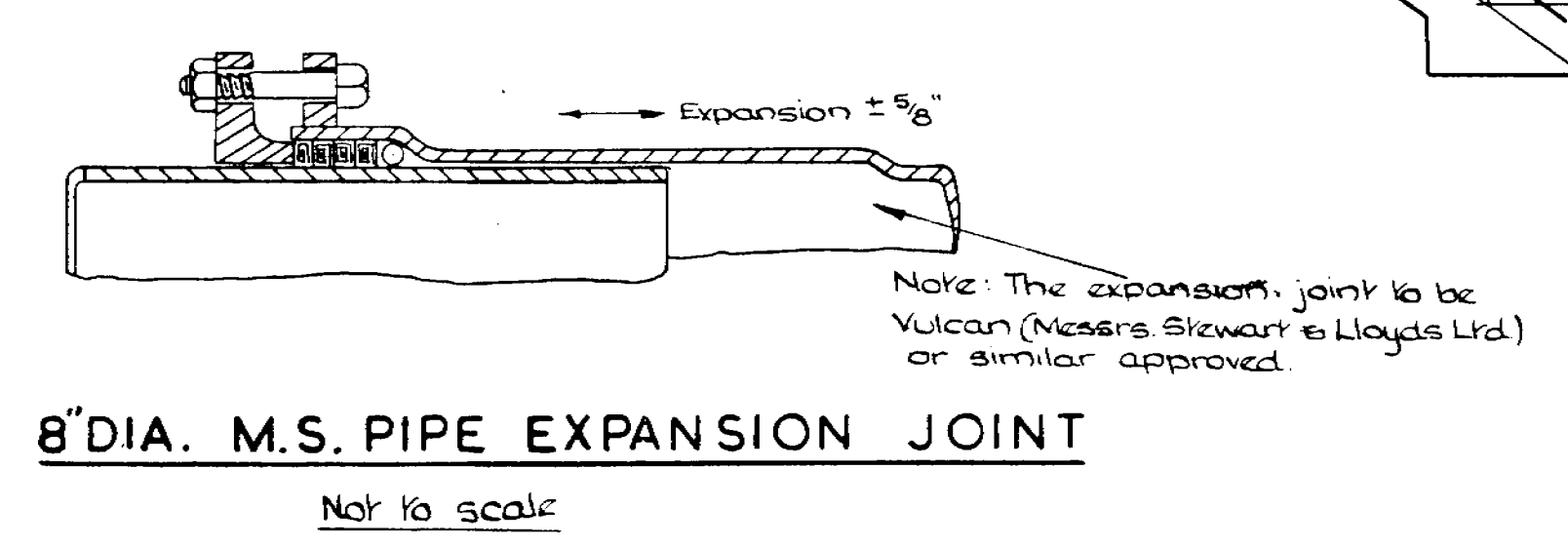


PLAN OF GULLY
Scale: 1/8" full size

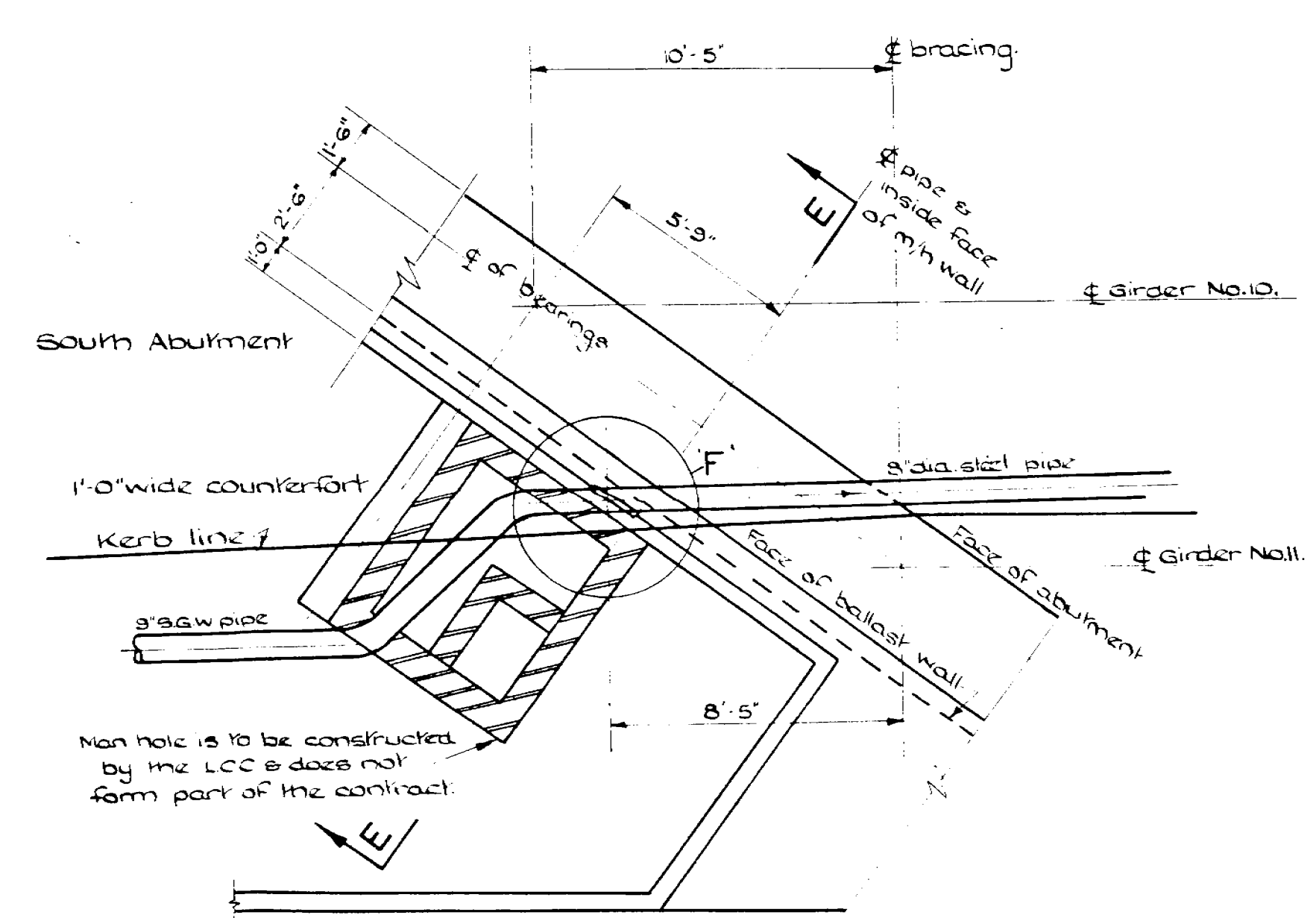


B-B
Scale: 1/8" full size

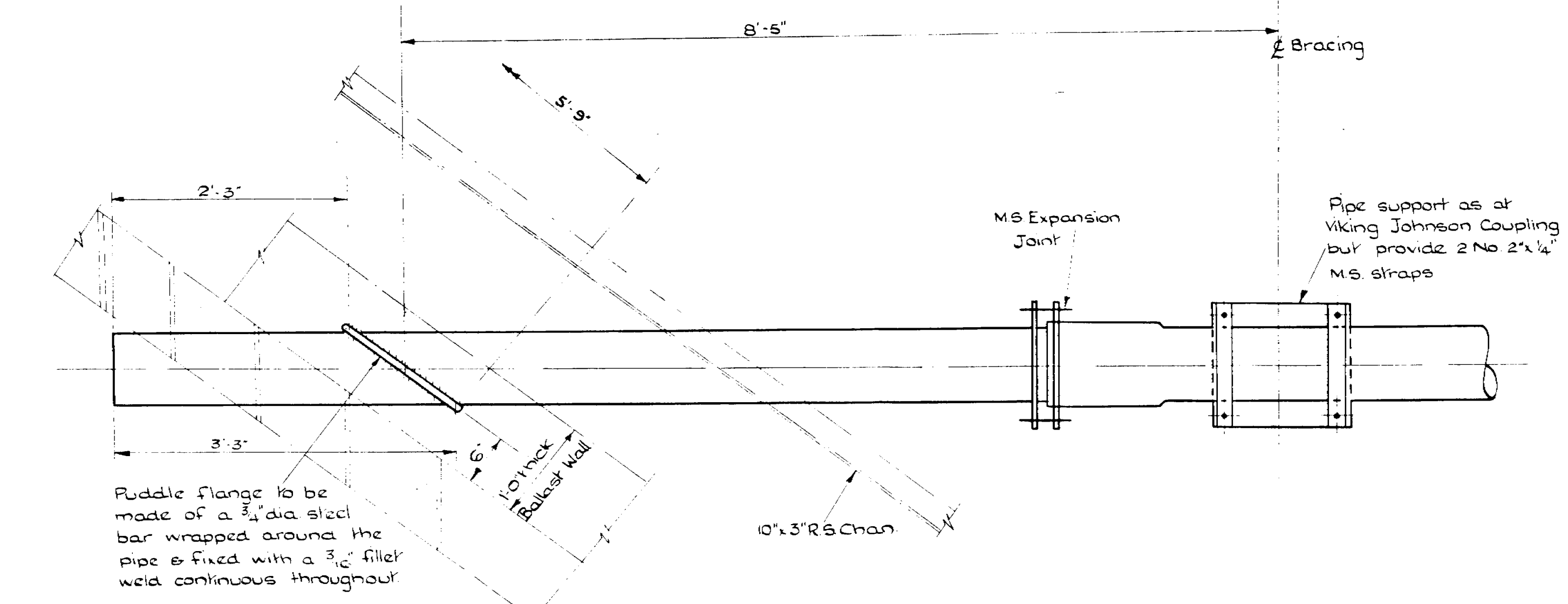
DETAILS OF SIDE ENTRY GULLY & CONNECTIONS



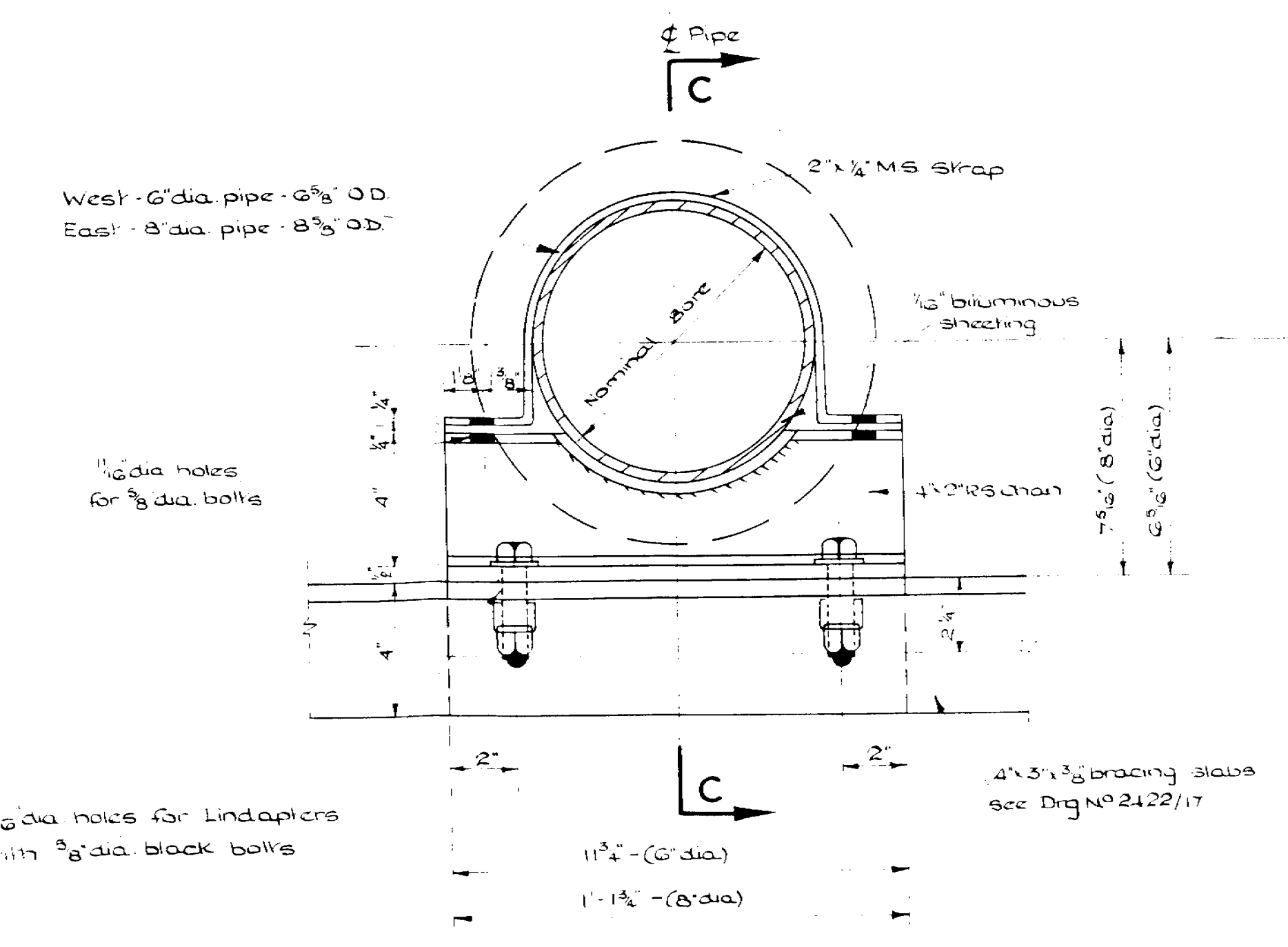
8" DIA. M.S. PIPE EXPANSION JOINT
Not to scale



DETAIL 'D'
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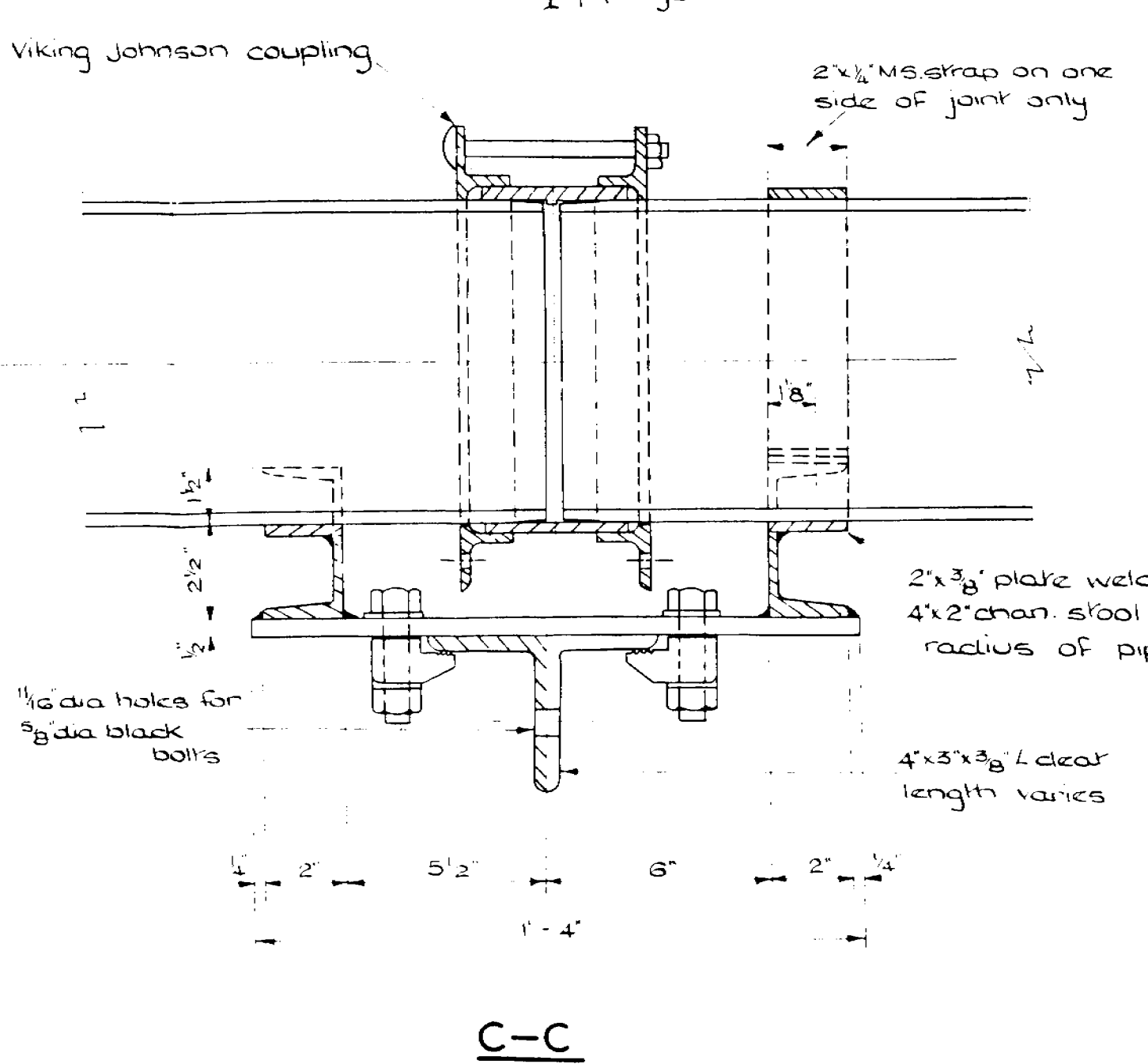


DETAIL 'F'
Scale: 1/4" inch to 1 foot

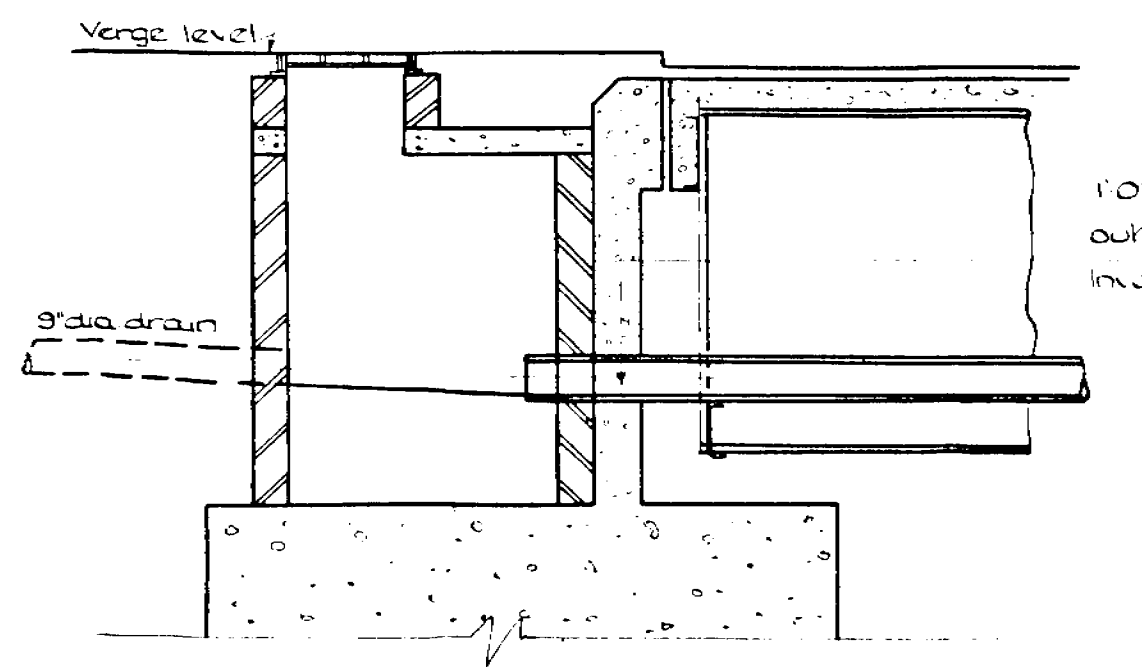


SECTION THRO' PIPE

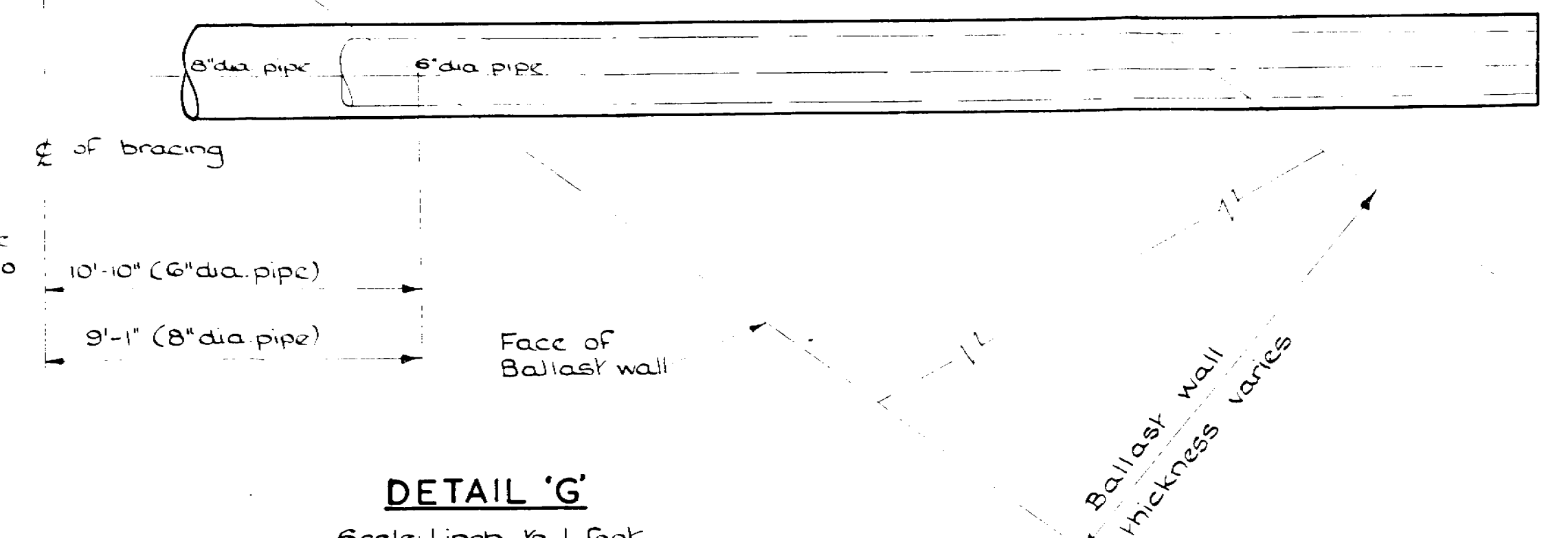
DETAIL OF SUPPORTS FOR VIKING JOHNSON COUPLINGS
Scale: 3/16" inch to 1 foot



C-C



E-E
Scale: 1/4" inch to 1 foot



DETAIL 'G'
Scale: 1/4" inch to 1 foot

SPEKE WIDNES LINK ROAD
EXTENSION FROM HALEWOOD TO WIDNES

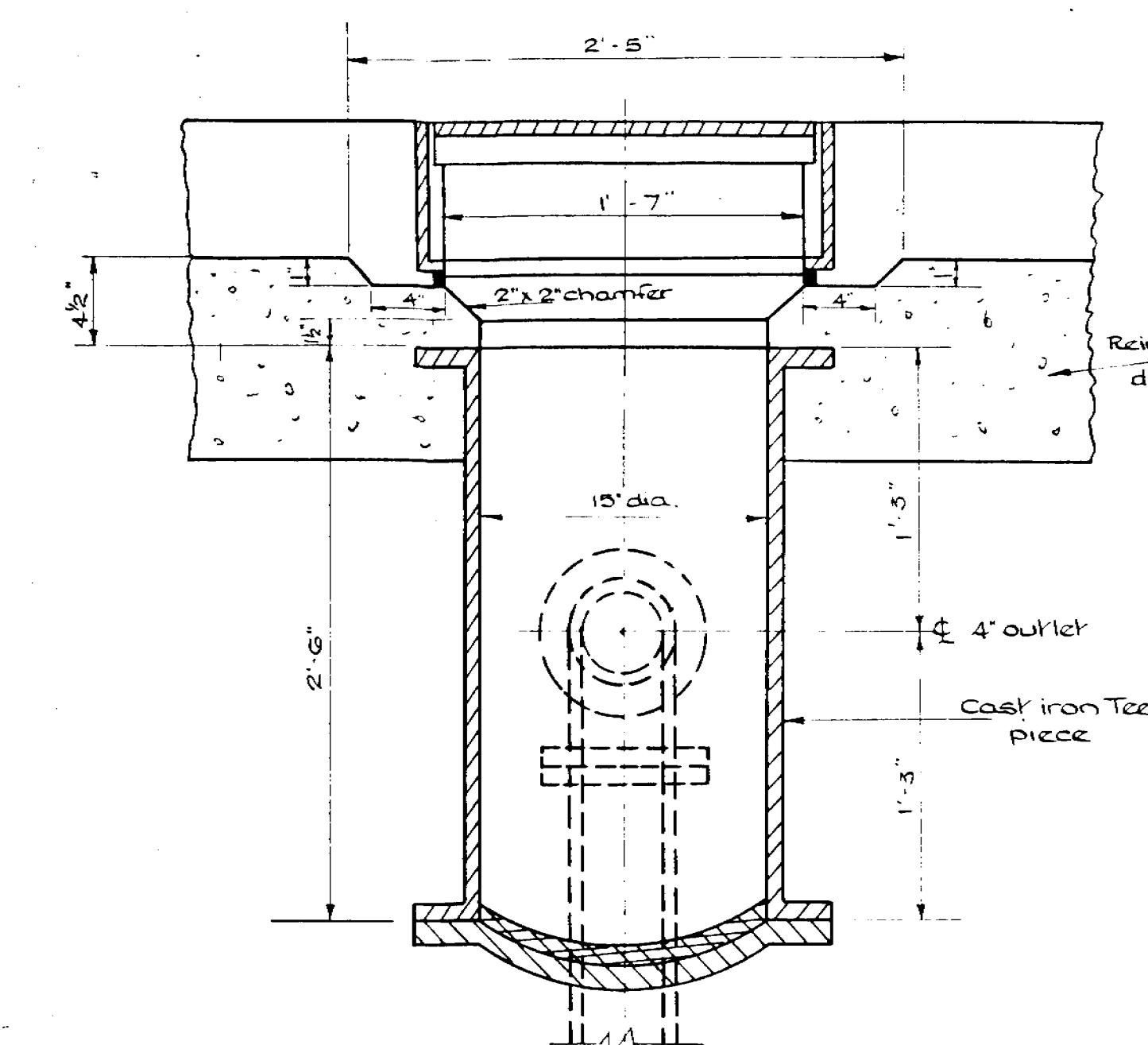
CONTRACT B

LANCASHIRE COUNTY COUNCIL
HALEWOOD RAILWAY BRIDGE No 2422
ARRANGEMENT & DETAILS OF DECK DRAINAGE

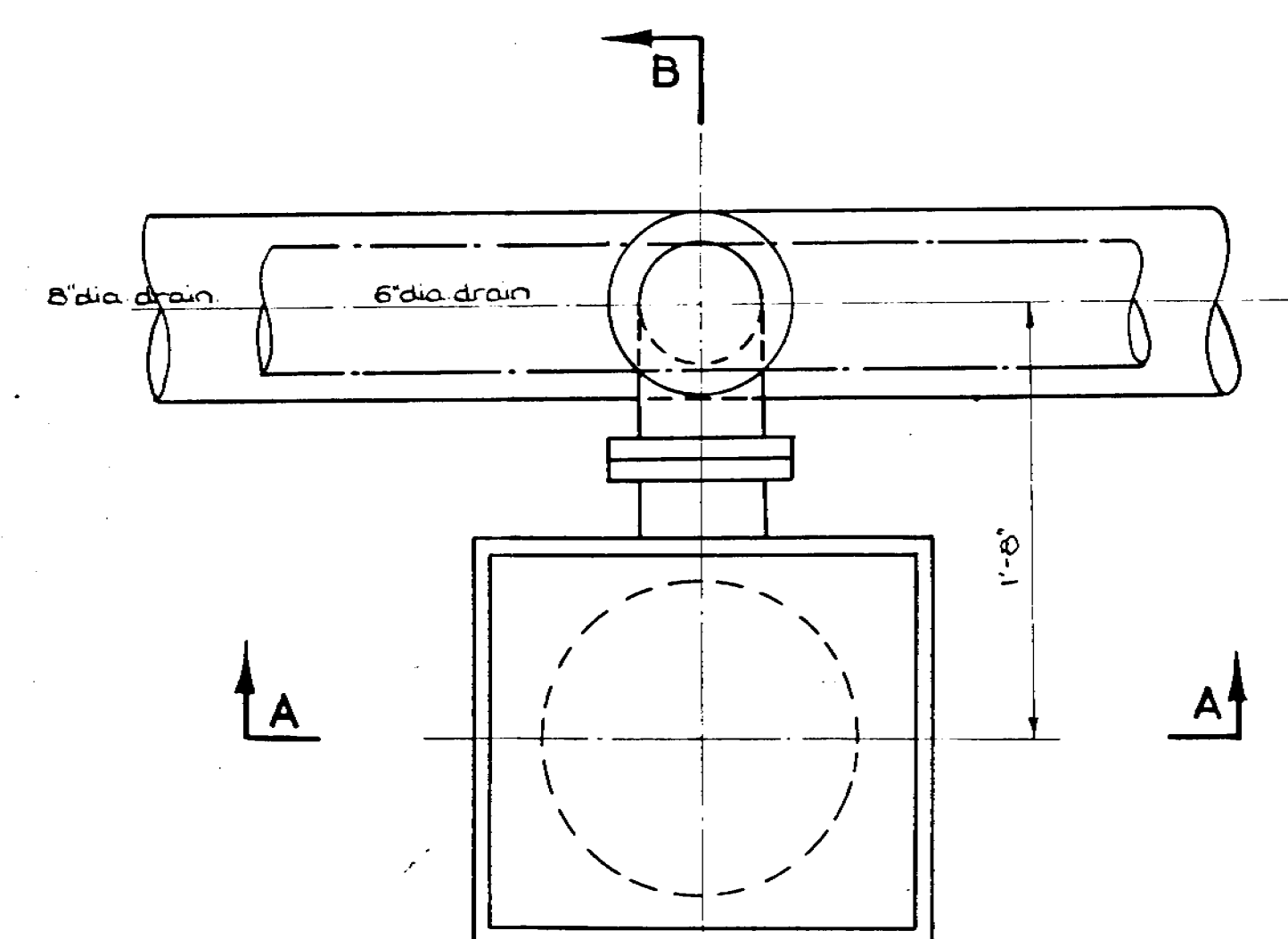
SHEET SUFFIX	REVISIONS		DATE	JAMES DRAKE, B.Sc., MICE, MIMunE, PP Inst HE, COUNTY SURVEYOR & BRIDGEMASTER, COUNTY HALL, PRESTON. DATE: JANUARY 1963	SHEET No DRAWING No 2422/16
	A	Minor Amendments & Detail 'F' added	March 1963		
B					
C					
D					

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TO BE RETURNED
TO PLAN ROOM
CIVIL ENGINEER
LIVERPOOL

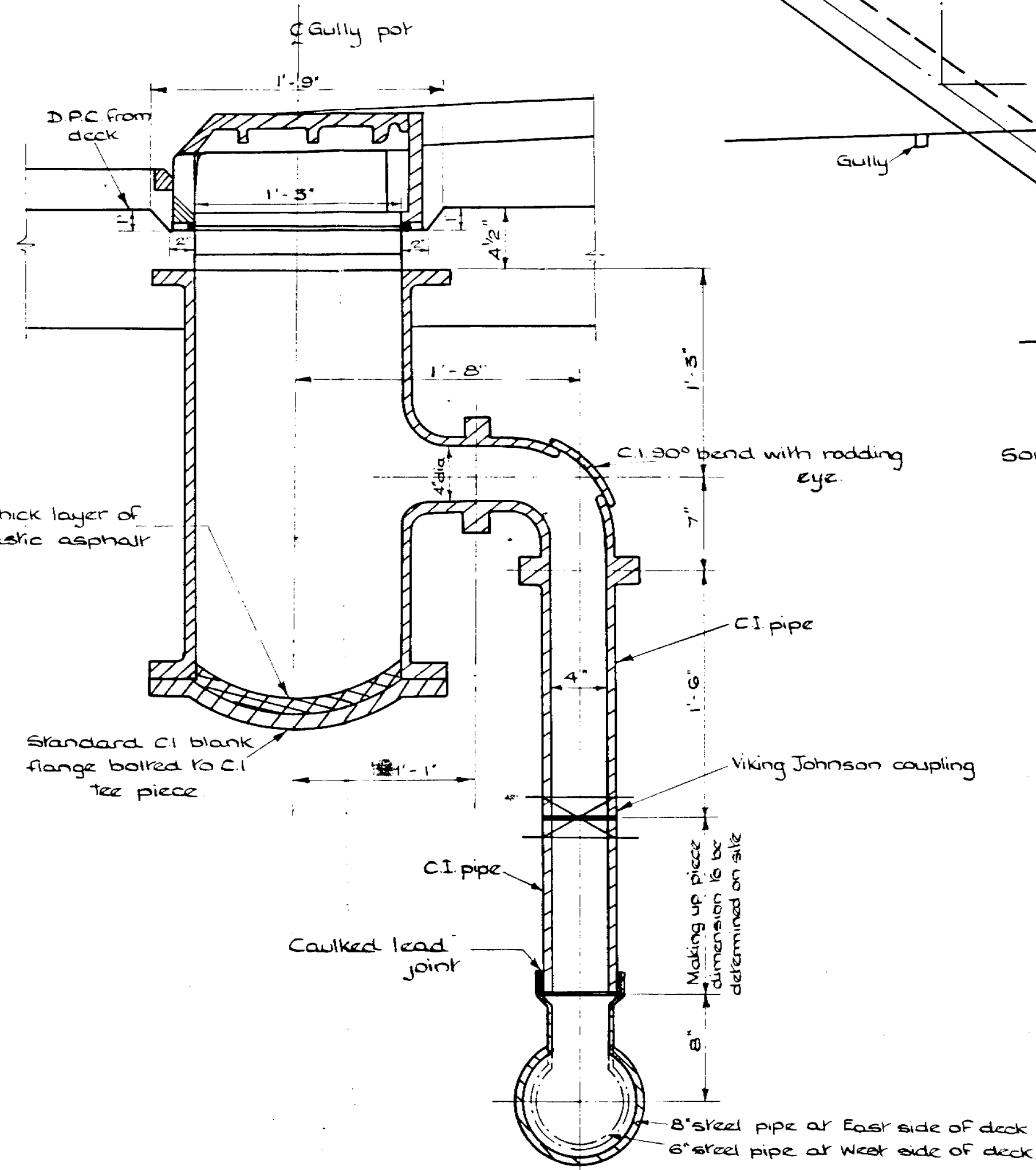
4/29/63
Rack 7



A-A
Scale: 1/2 full size

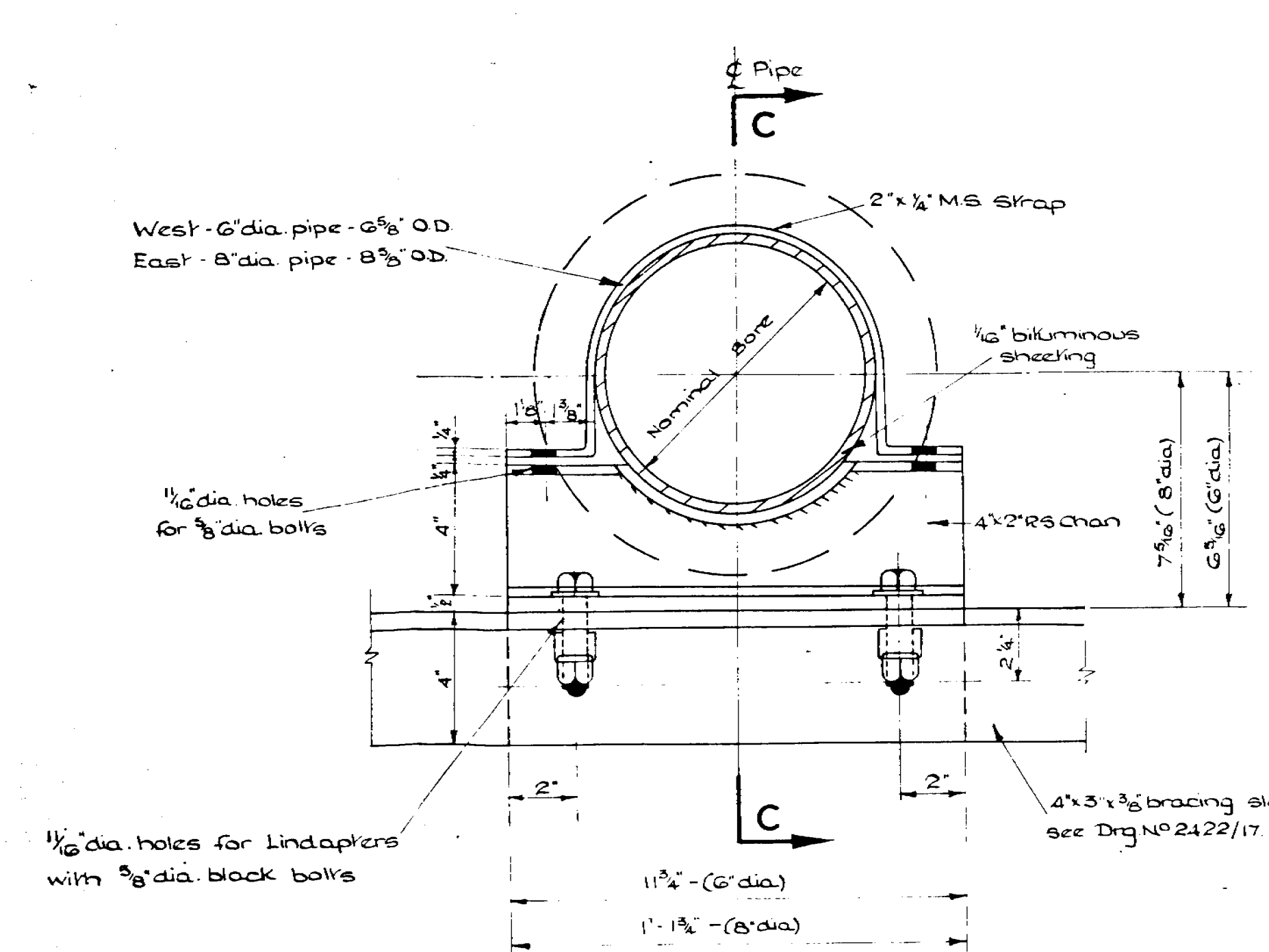


PLAN OF GULLY
Scale: 1/2 full size

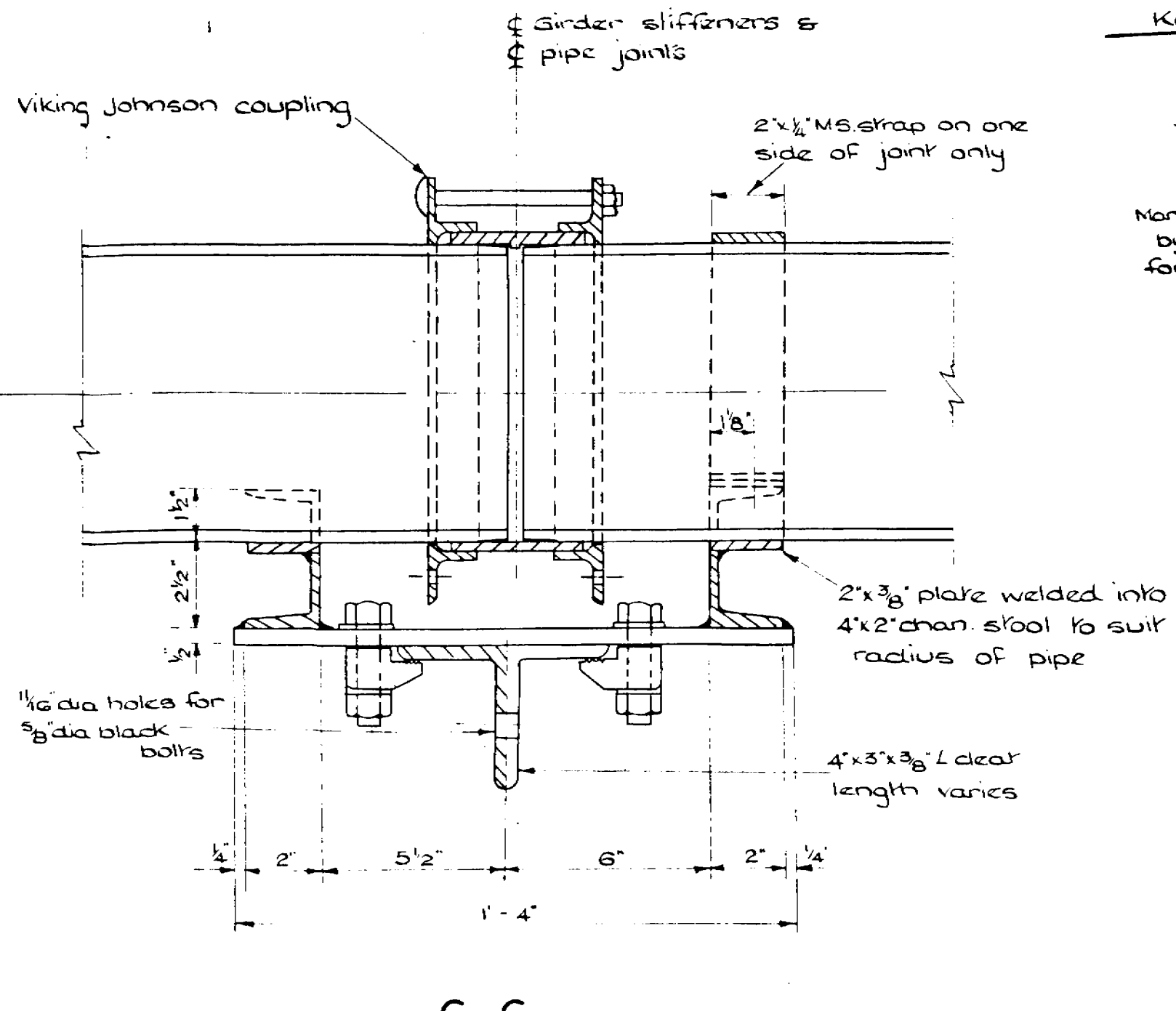


B-B
Scale: 1/2 full size

DETAILS OF SIDE ENTRY GULLY & CONNECTIONS



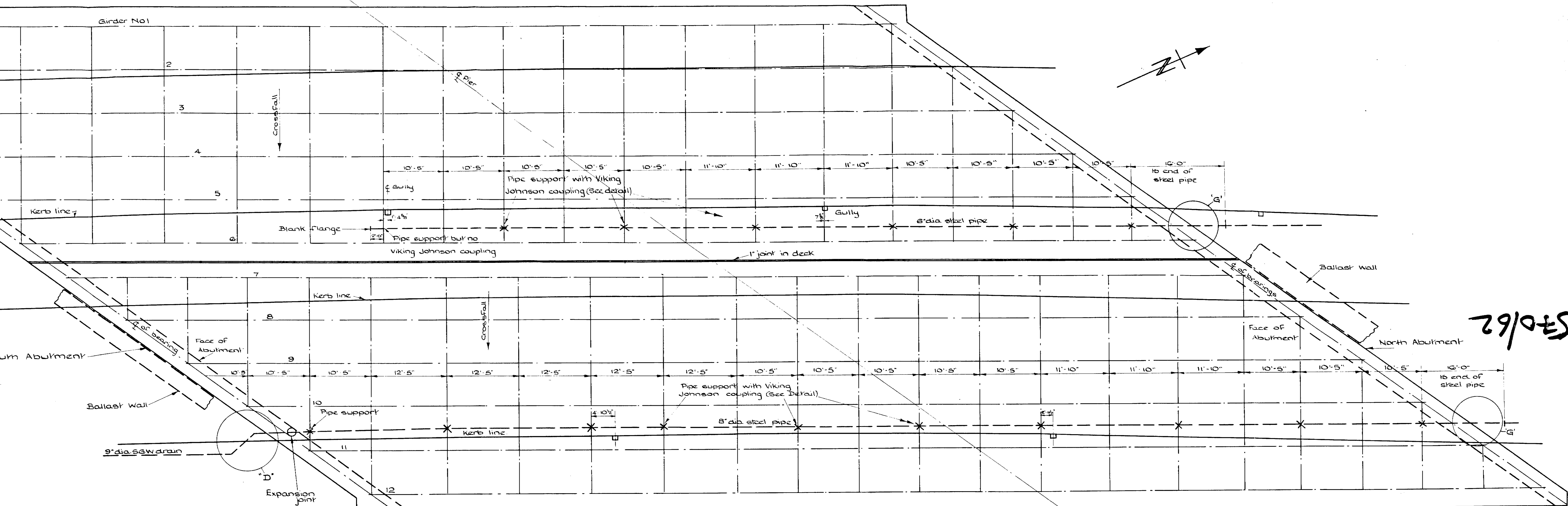
SECTION THRO' PIPE



C-C

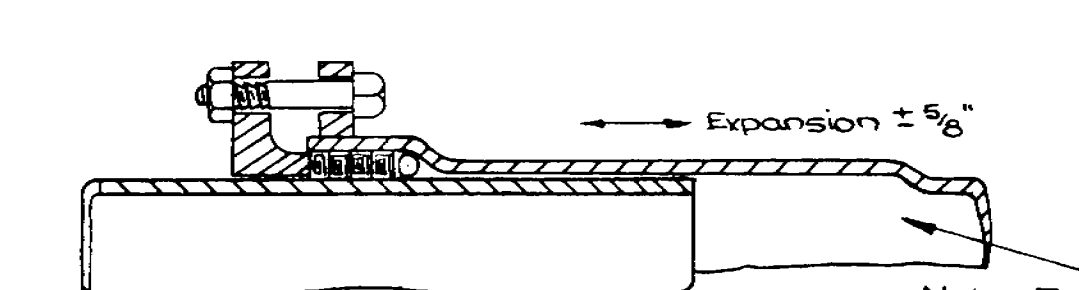
DETAIL OF SUPPORTS FOR VIKING JOHNSON COUPLINGS

Scale: 3 inches to 1 foot



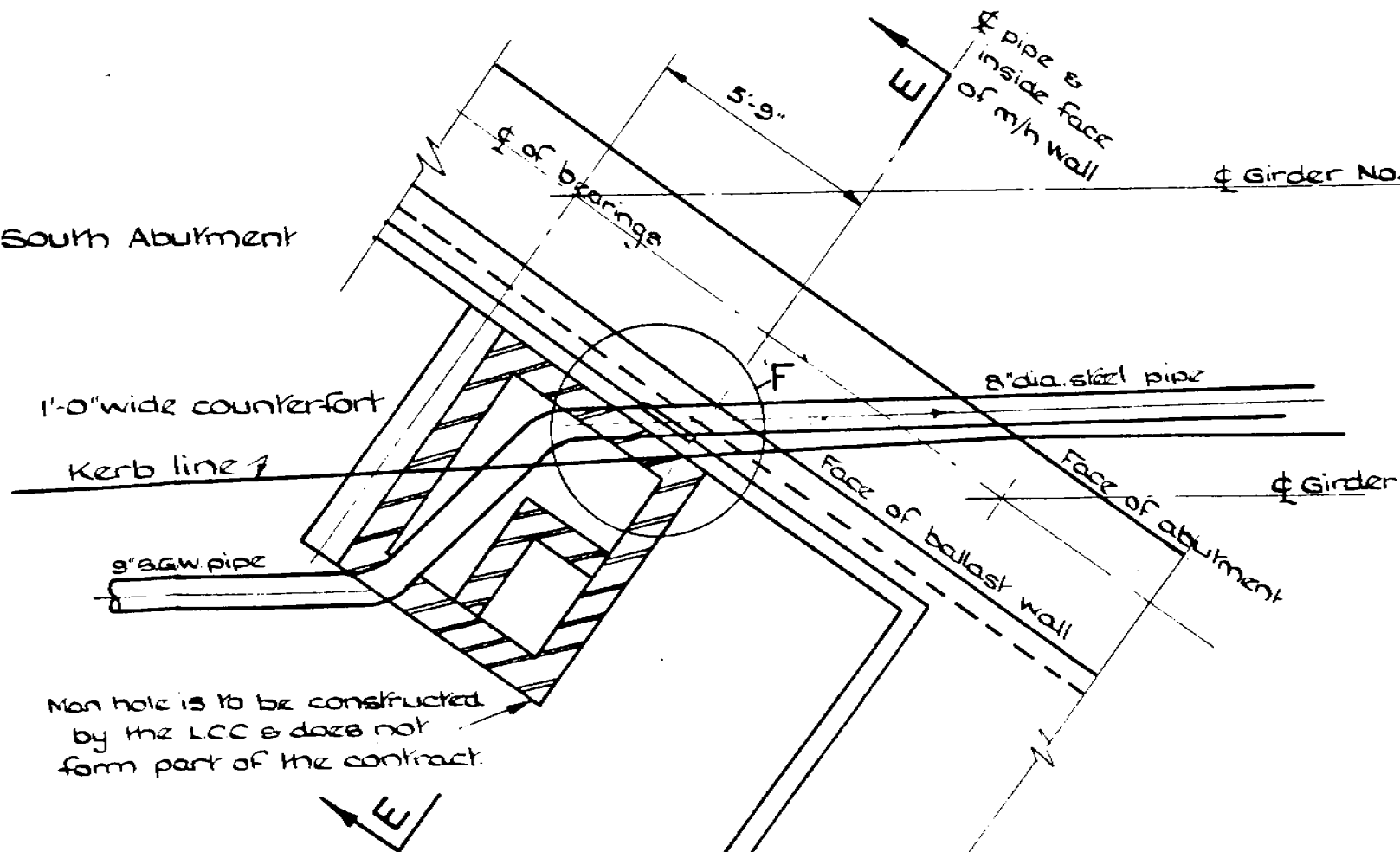
PLAN

Scale: 1/2 inch to 1 foot



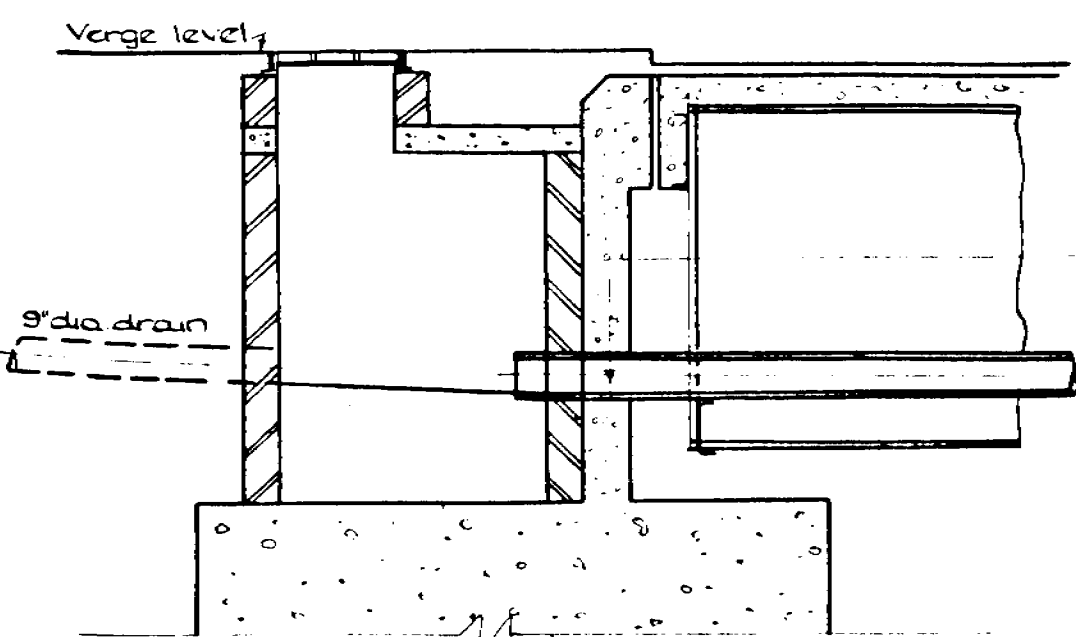
8' DIA. M.S. PIPE EXPANSION JOINT

Not to scale



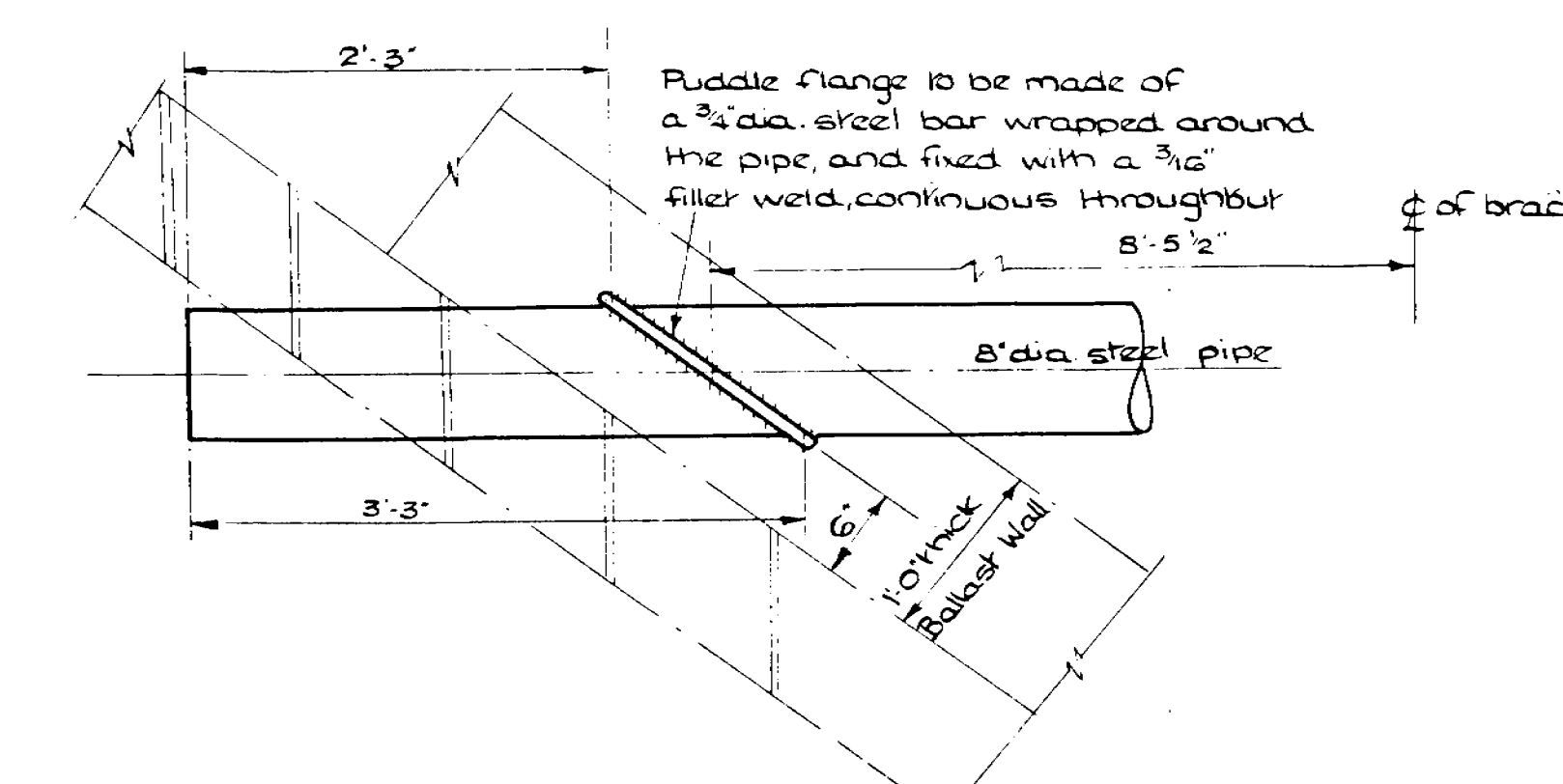
DETAIL 'D'

Scale: 1/2 inch to 1 foot



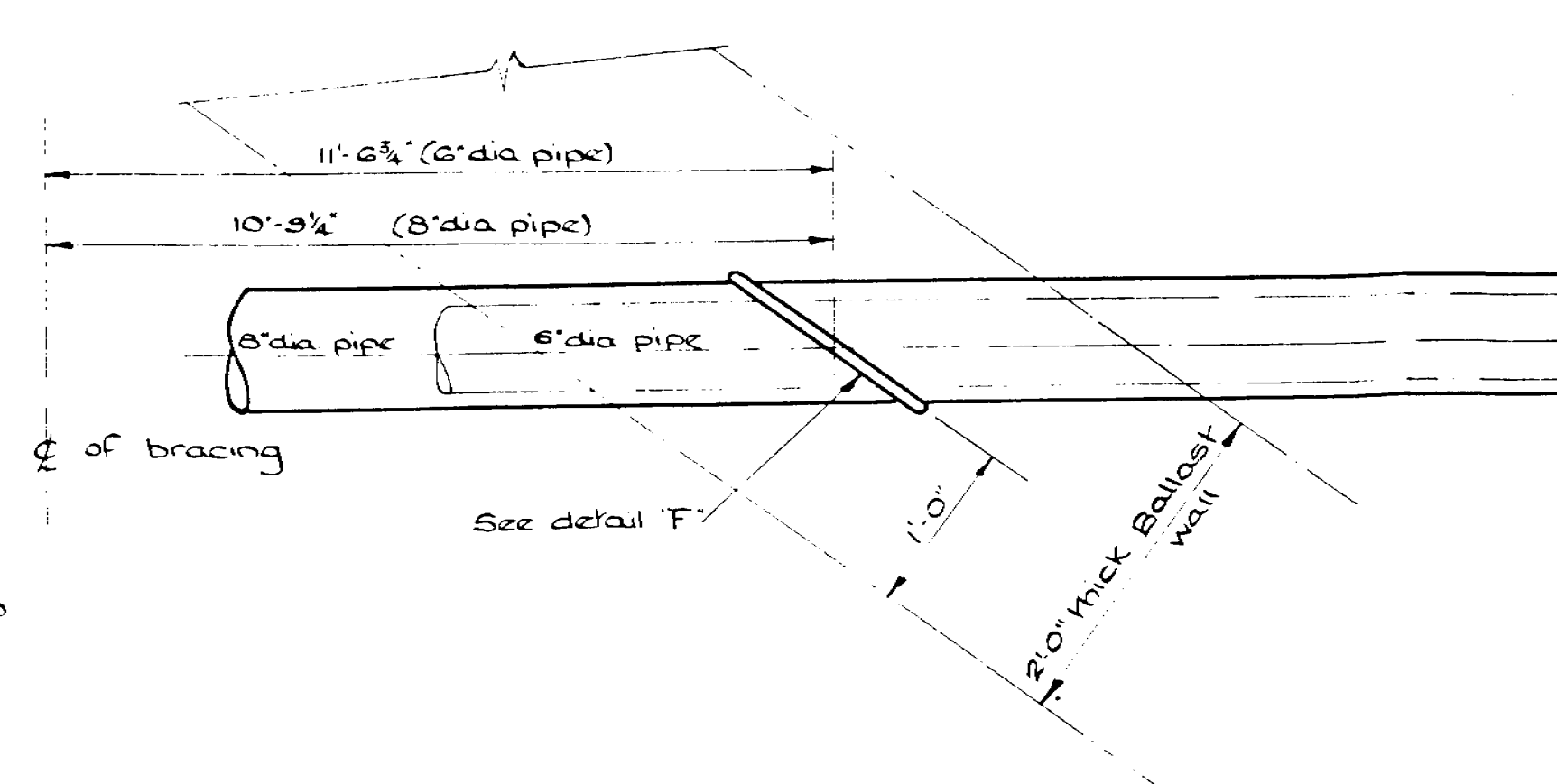
E-E

Scale: 1/2 inch to 1 foot



DETAIL 'F'

Scale: 1/2 inch to 1 foot



DETAIL 'G'

Scale: 1/2 inch to 1 foot

SPEKE WIDNES LINK ROAD
EXTENSION FROM HALEWOOD TO WIDNES

CONTRACT B

LANCASHIRE COUNTY COUNCIL
HALEWOOD RAILWAY BRIDGE No 2422
ARRANGEMENT & DETAILS OF DECK DRAINAGE

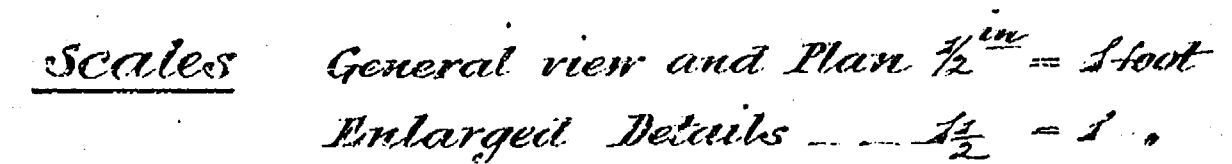
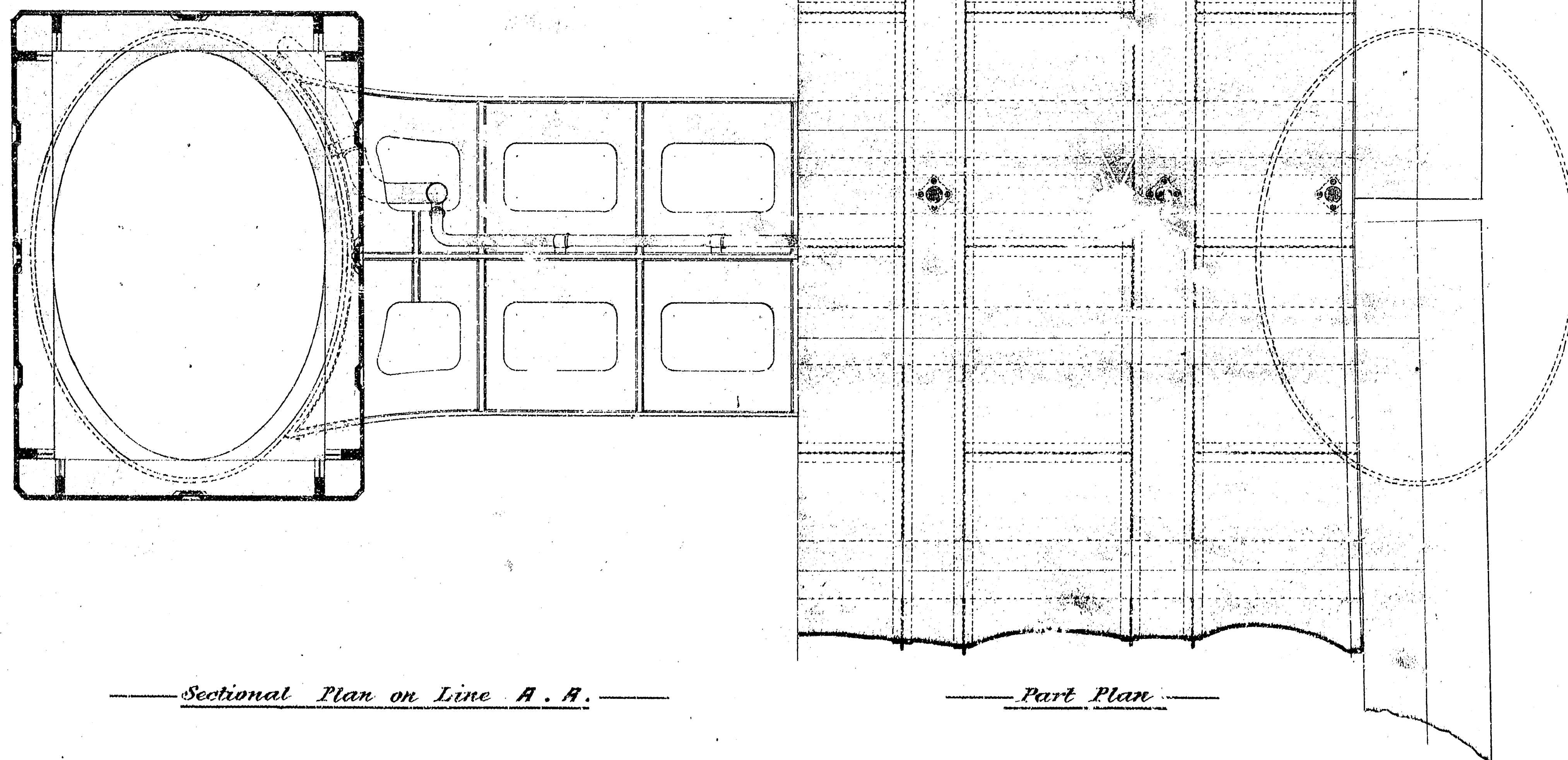
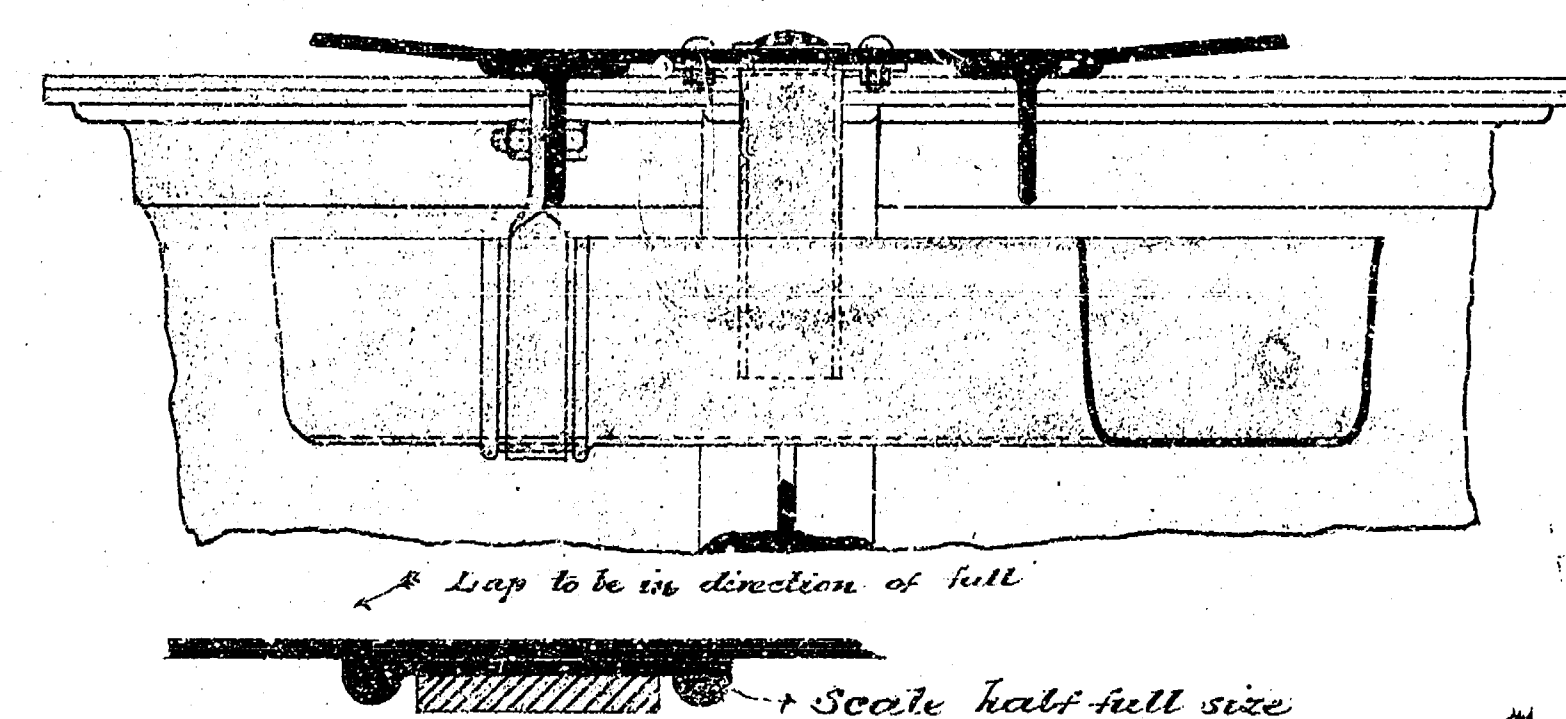
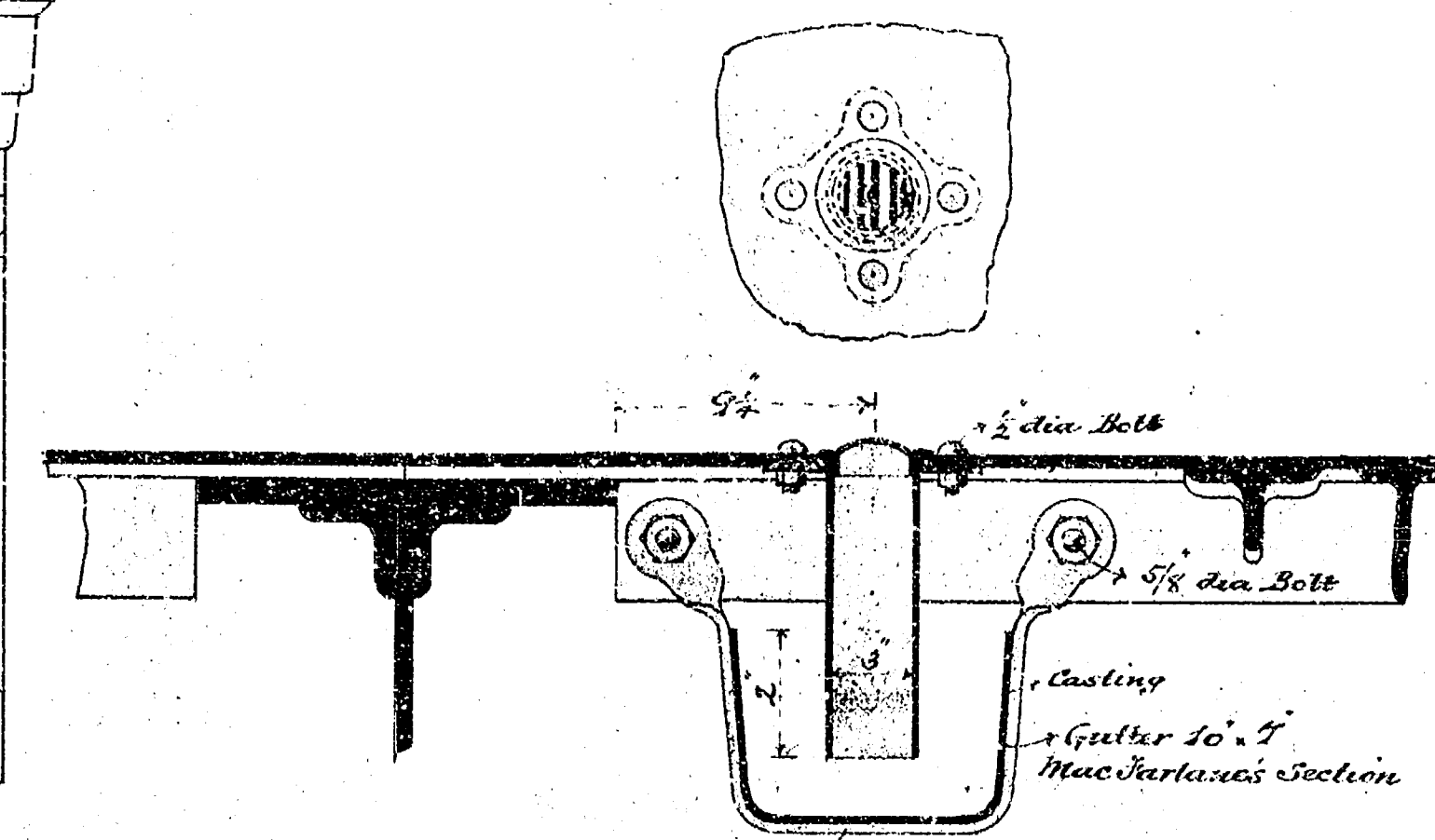
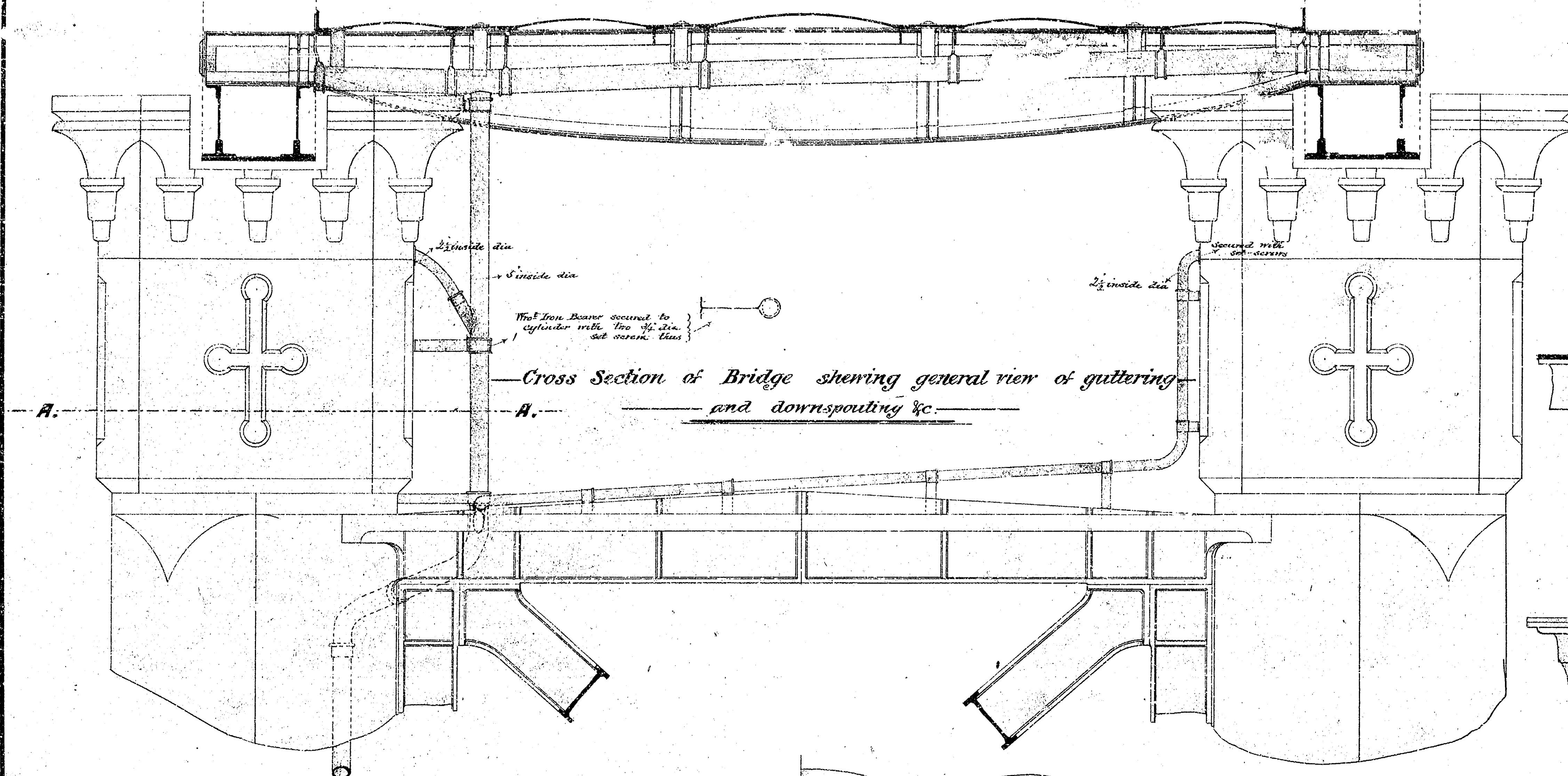
SHEET SUFFIX	REVISIONS	DATE	JAMES DRAKE, B.Sc., MICE, MIM, M.E., PP, Inst. HE, COUNTY SURVEYOR & BRIDGEMASTER, COUNTY HALL, PRESTON.	SHEET NO
A				
B				
C				
D				

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TO PLAN ROOM
CIVIL ENGINEER
JAN 1963

DRAWING NO
2422/16

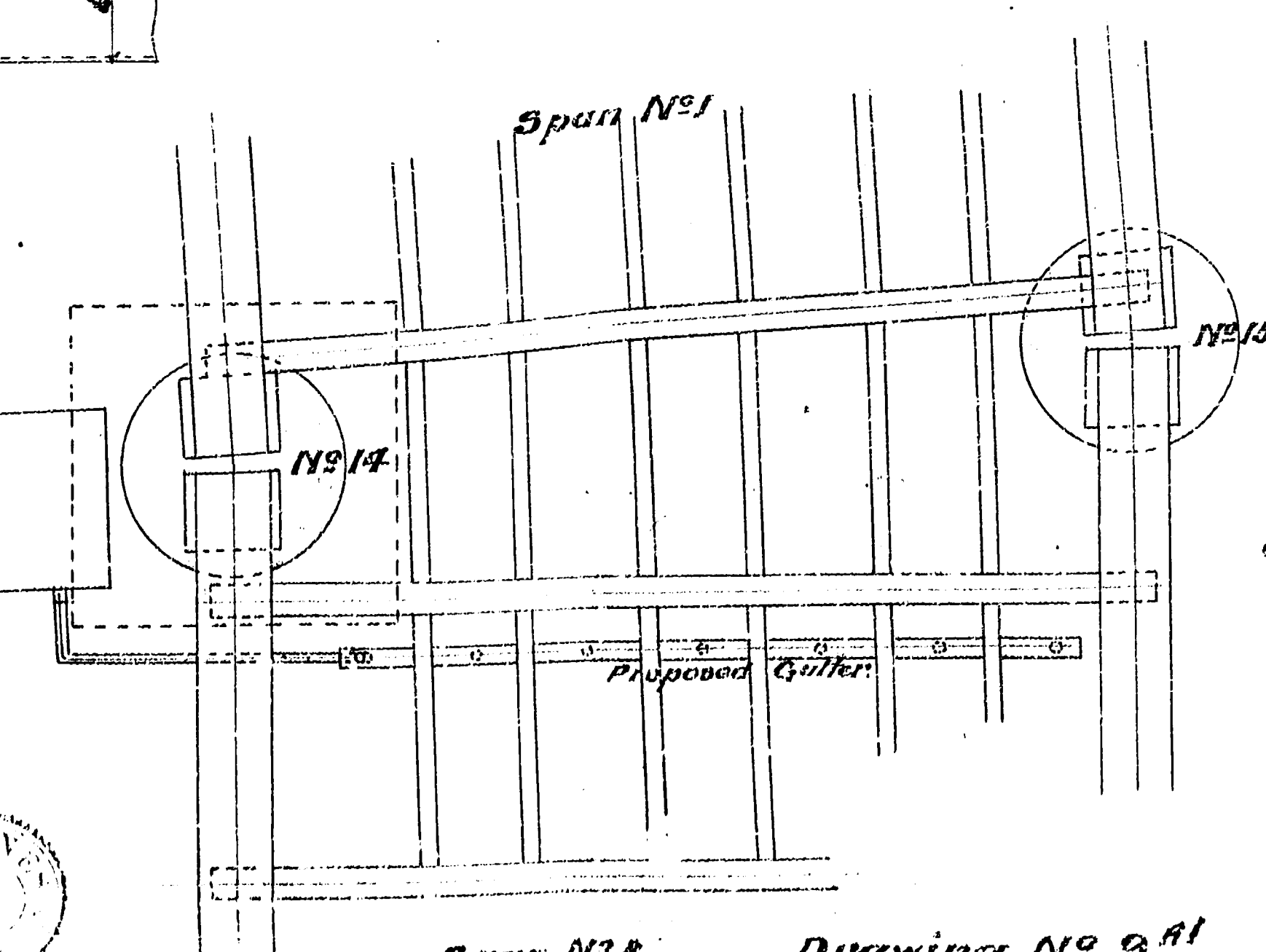
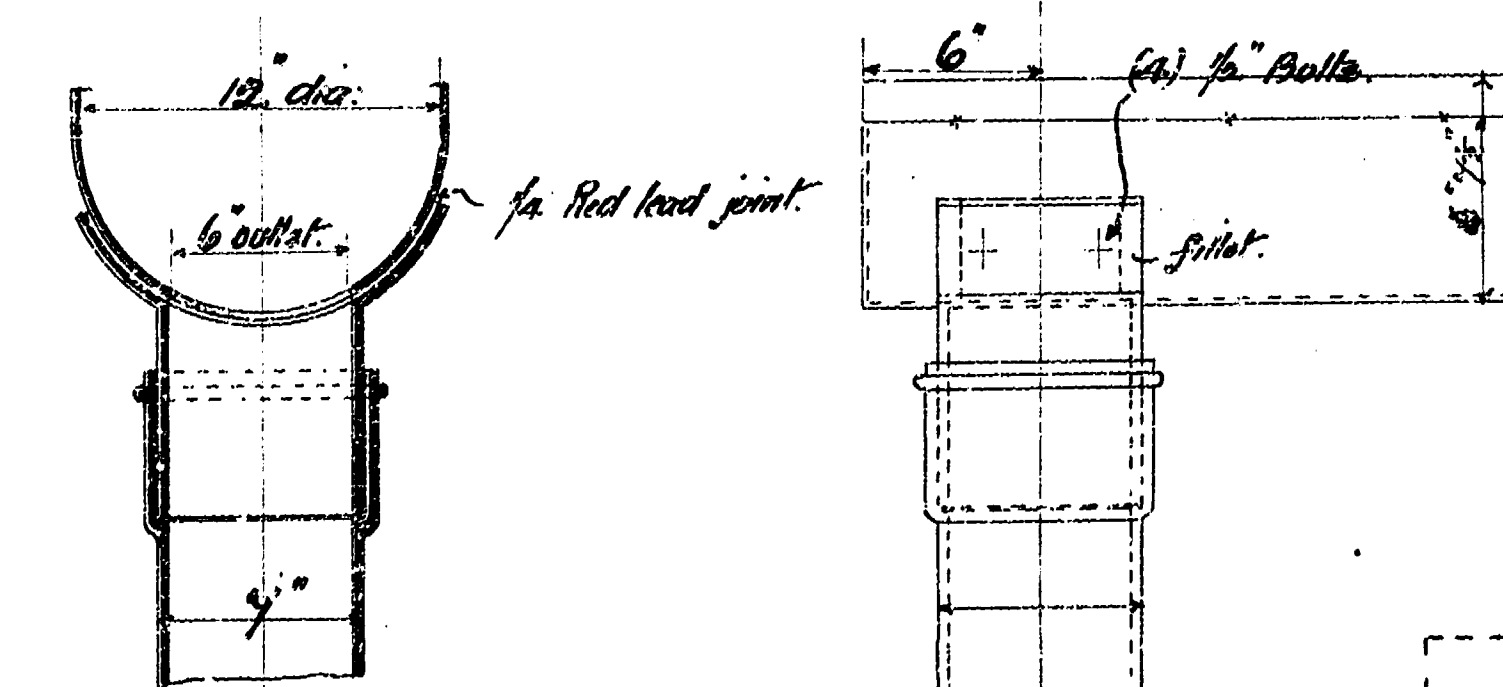
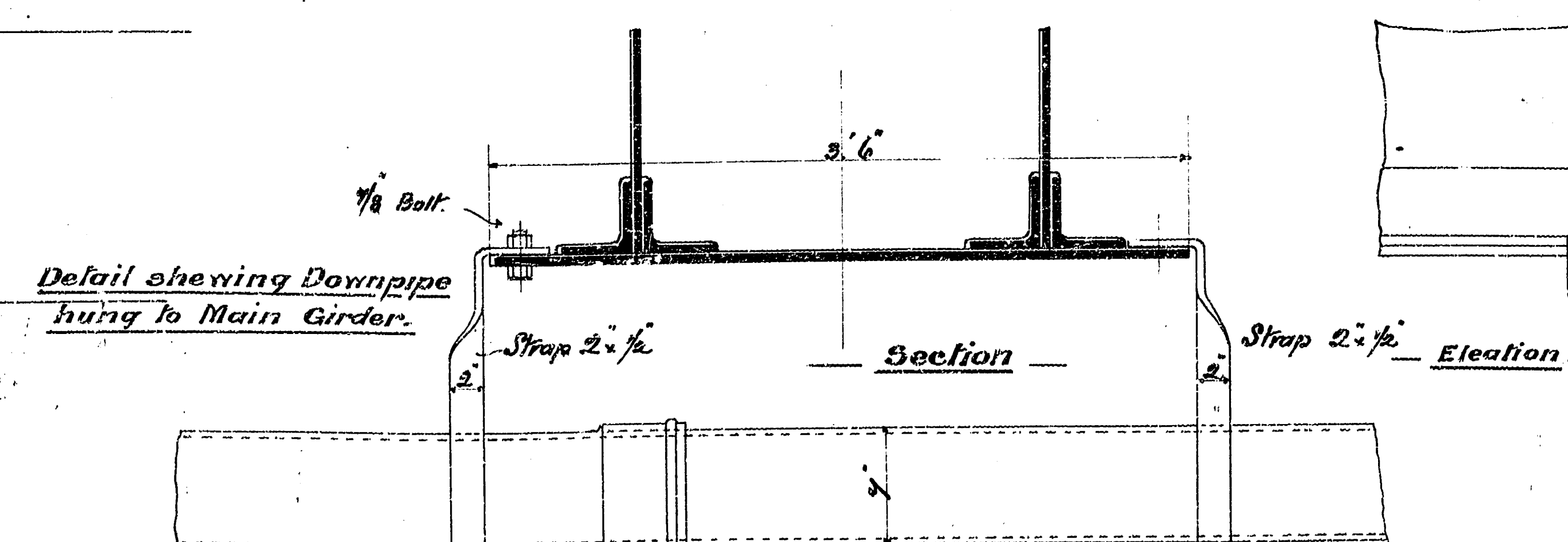
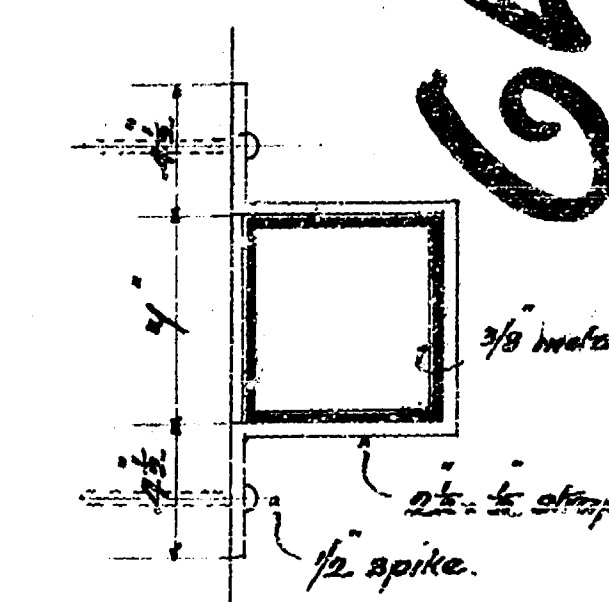
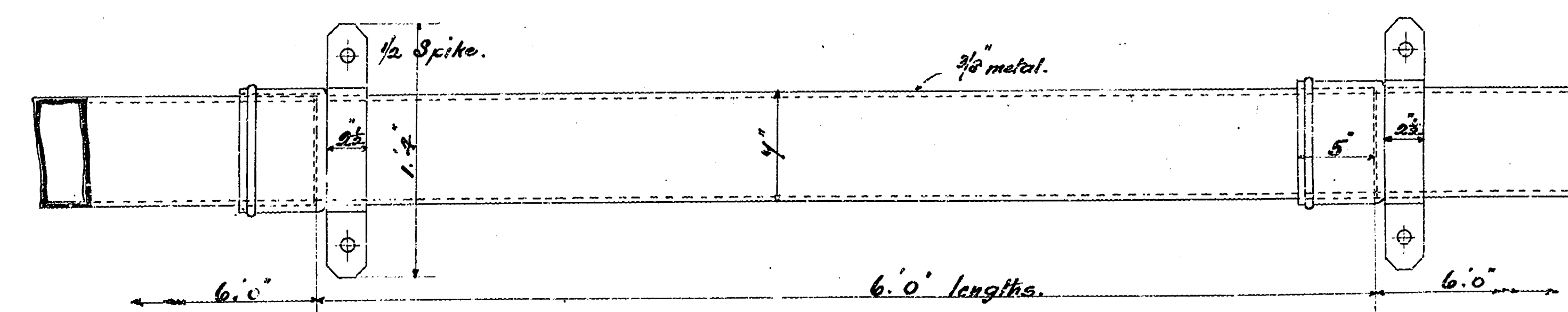
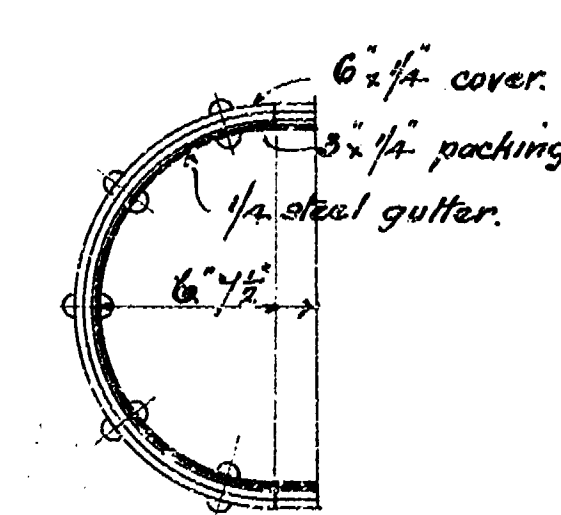
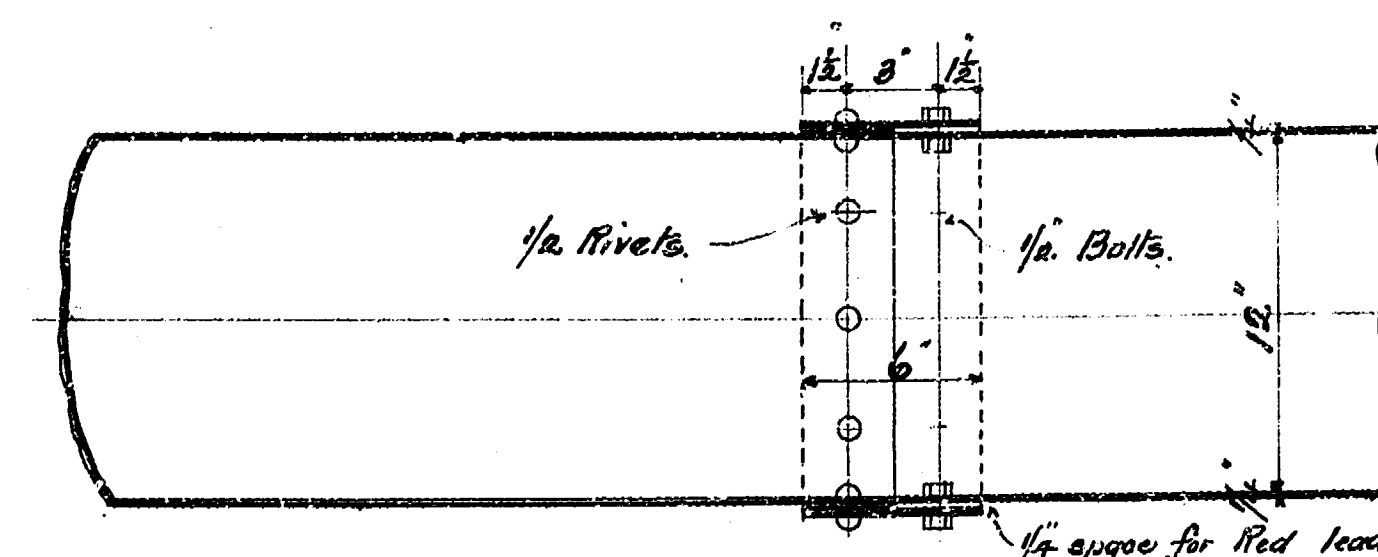
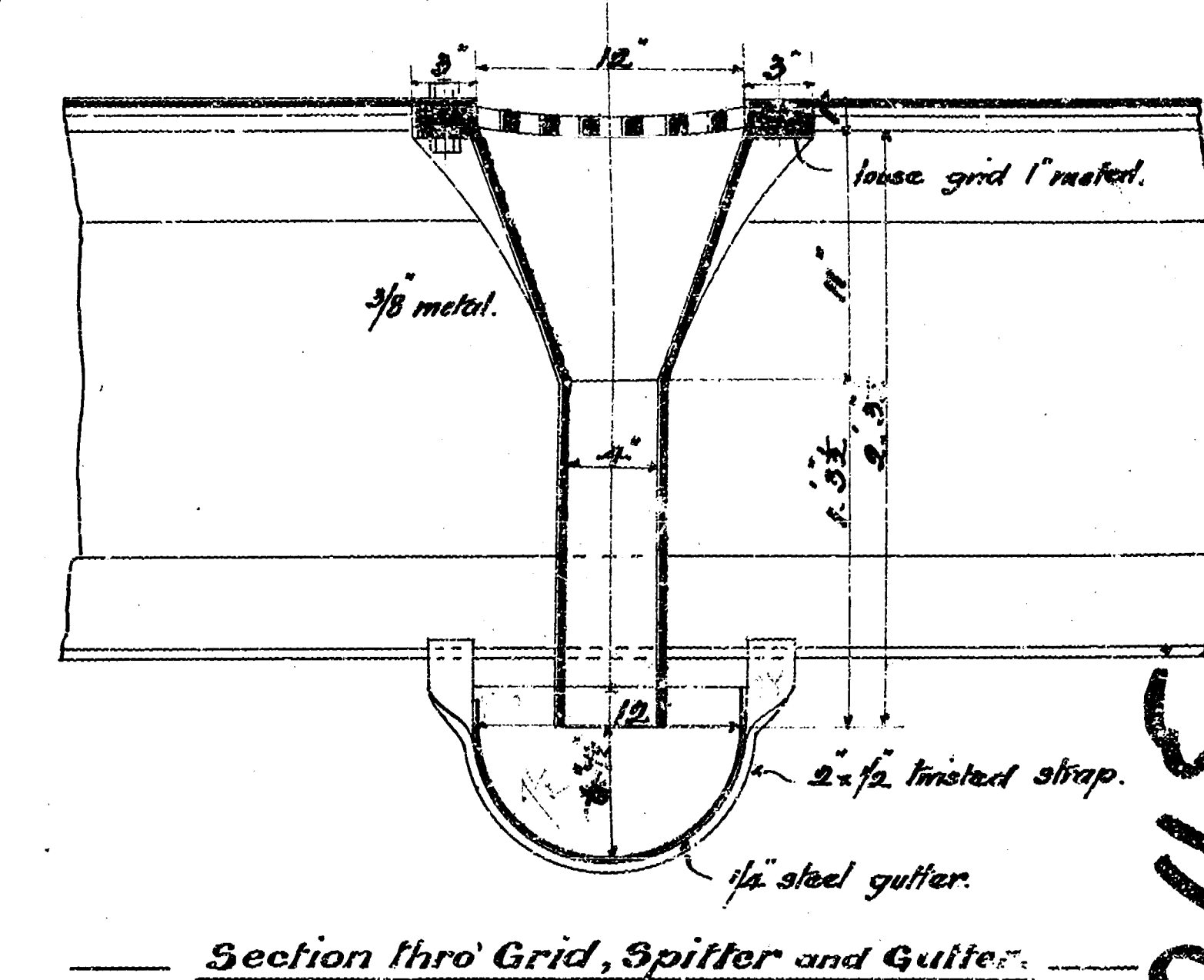
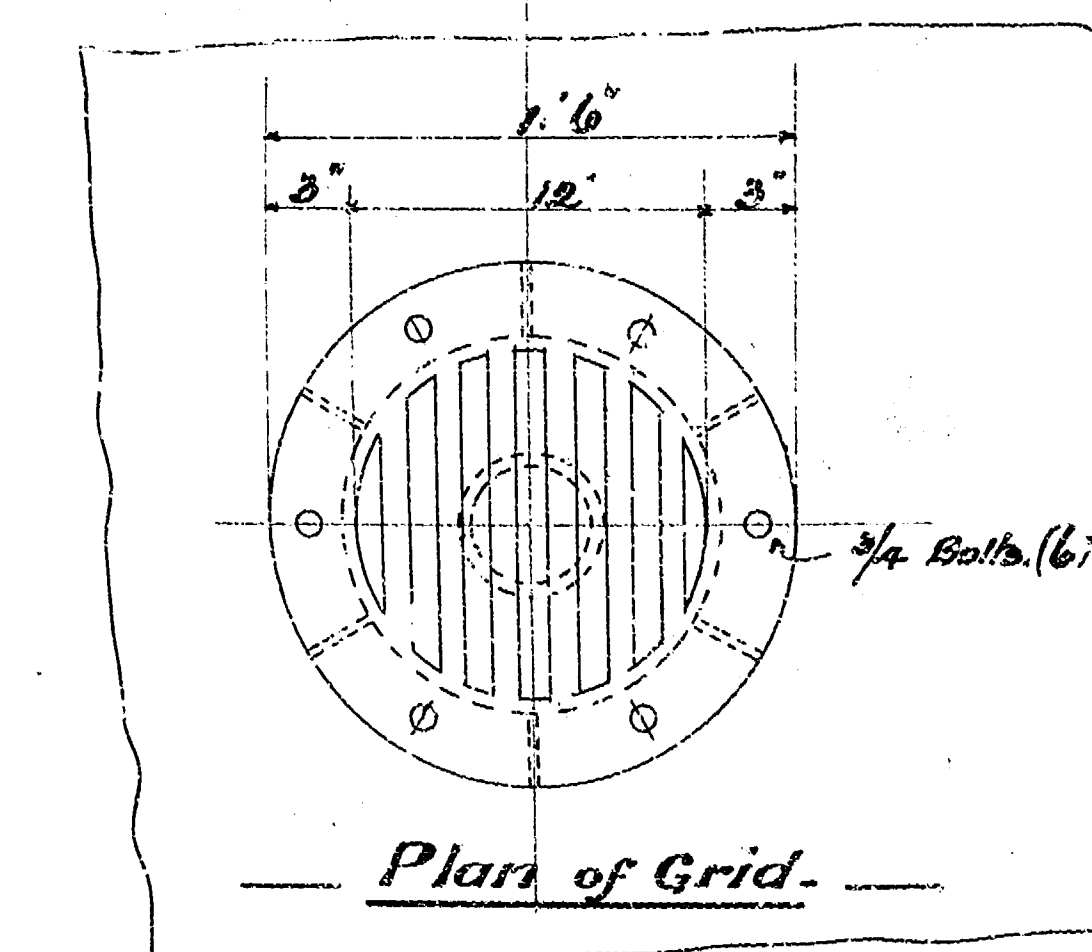
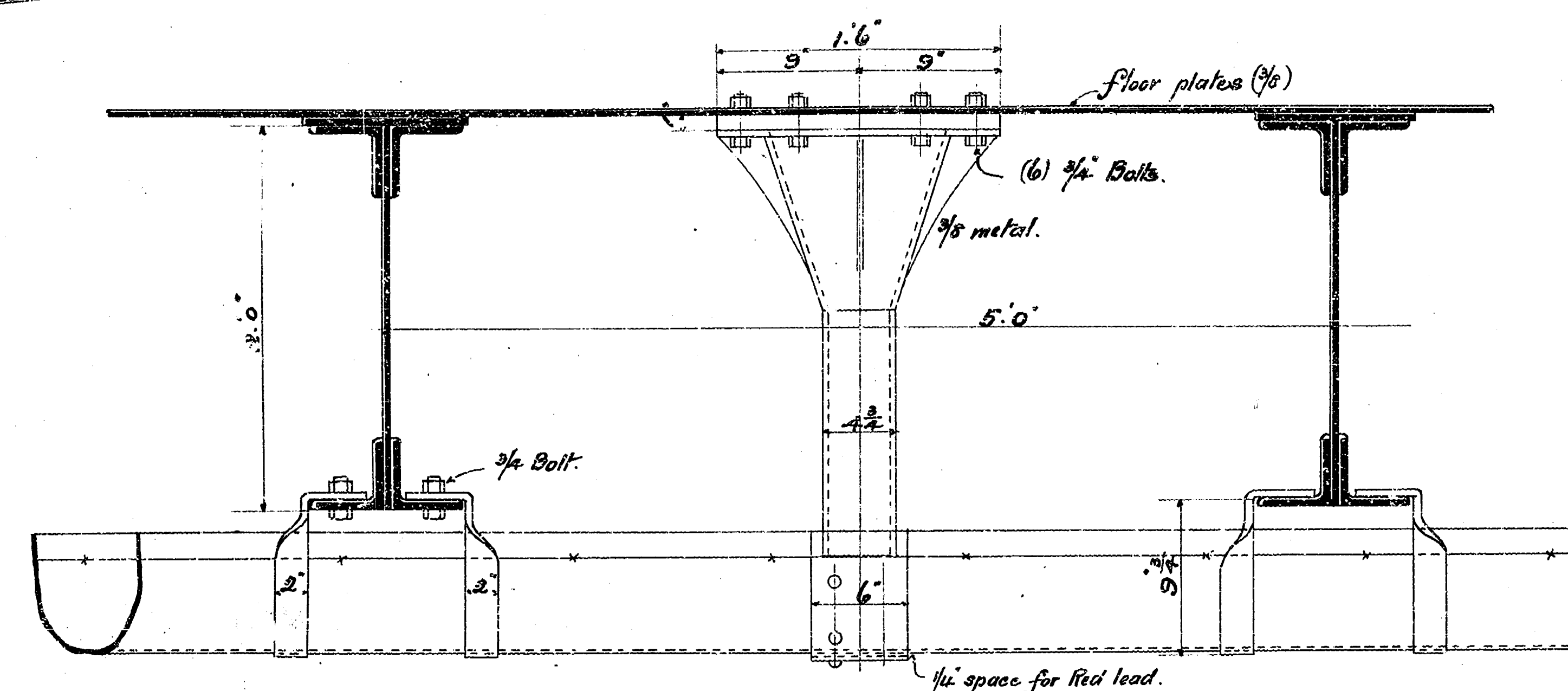
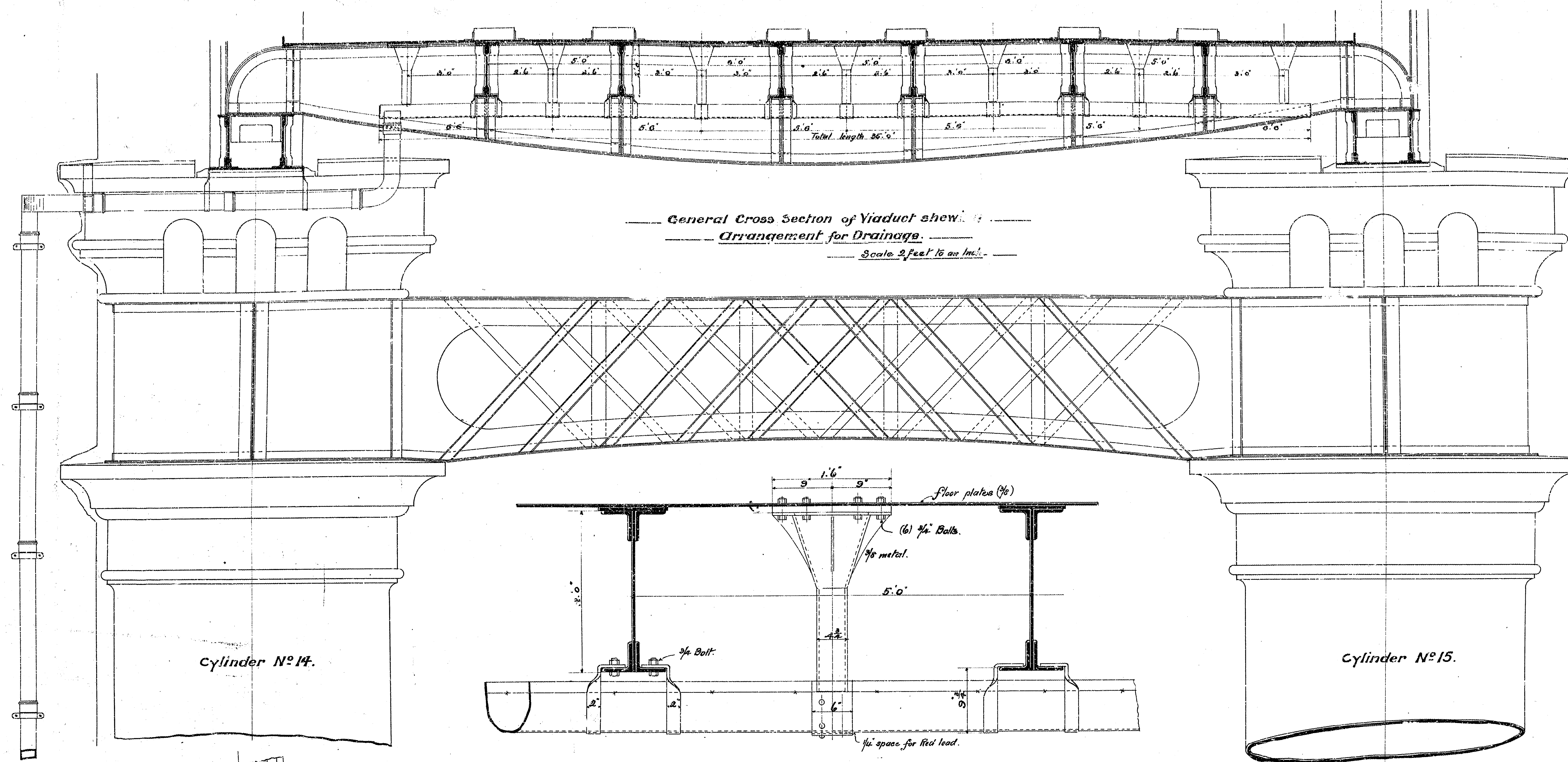
C. L. C. MANCHESTER CENTRAL STATION RAIL

DETAILS OF DRAINAGE OF CASTLEFIELD BRIDGE.



BARRO NEG
8187
No.

64022



Appendix

Appendix B – United Utilities Asset Plans

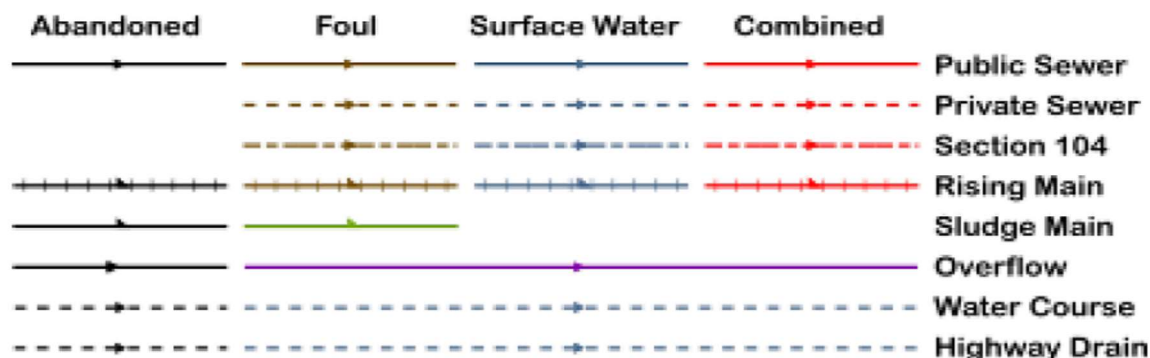
TERMS AND CONDITIONS - WASTEWATER AND WATER DISTRIBUTION PLANS

These provisions apply to the public sewerage, water distribution and telemetry systems (including sewers which are the subject of an agreement under Section 104 of the Water Industry Act 1991 and mains installed in accordance with the agreement for the self construction of water mains) (UUWL apparatus) of United Utilities Water Limited "(UUWL)".

TERMS AND CONDITIONS:

- This Map and any information supplied with it is issued subject to the provisions contained below, to the exclusion of all others and no party relies upon any representation, warranty, collateral contract or other assurance of any person (whether party to this agreement or not) that is not set out in this agreement or the documents referred to in it.
- This Map and any information supplied with it is provided for general guidance only and no representation, undertaking or warranty as to its accuracy, completeness or being up to date is given or implied.
- In particular, the position and depth of any UUWL apparatus shown on the Map are approximate only. UUWL strongly recommends that a comprehensive survey is undertaken in addition to reviewing this Map to determine and ensure the precise location of any UUWL apparatus. The exact location, positions and depths should be obtained by excavation trial holes.
- The location and position of private drains, private sewers and service pipes to properties are not normally shown on this Map but their presence must be anticipated and accounted for and you are strongly advised to carry out your own further enquiries and investigations in order to locate the same.
- The position and depth of UUWL apparatus is subject to change and therefore this Map is issued subject to any removal or change in location of the same. The onus is entirely upon you to confirm whether any changes to the Map have been made subsequent to issue and prior to any works being carried out.
- This Map and any information shown on it or provided with it must not be relied upon in the event of any development, construction or other works (including but not limited to any excavations) in the vicinity of UUWL apparatus or for the purpose of determining the suitability of a point of connection to the sewerage or other distribution systems.
- No person or legal entity, including any company shall be relieved from any liability howsoever and whensoever arising for any damage caused to UUWL apparatus by reason of the actual position and/or depths of UUWL apparatus being different from those shown on the Map and any information supplied with it.
- If any provision contained herein is or becomes legally invalid or unenforceable, it will be taken to be severed from the remaining provisions which shall be unaffected and continue in full force and affect.
- This agreement shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts, save that nothing will prevent UUWL from bringing proceedings in any other competent jurisdiction, whether concurrently or otherwise.

Wastewater Symbolology



All point assets follow the standard colour convention: **red** – combined **brown** - foul
blue – surface water **purple** - overflow

Manhole	Side Entry Manhole
Head of System	Outfall
Extent of Survey	Screen Chamber
Rodding Eye	Inspection Chamber
Inlet	Bifurcation Chamber
Discharge Point	Lamp Hole
Vortex	T Junction / Saddle
Penstock	Catchpit
Washout Chamber	Valve Chamber
Valve	Vent Column
Air Valve	Vortex Chamber
Non Return Valve	Penstock Chamber
Soakaway	Network Storage Tank
Gully	Sewer Overflow
Cascade	Ww Treatment Works
Flow Meter	Ww Pumping Station
Hatch Box	Septic Tank
Oil Interceptor	Control Kiosk
Summit	
Drop Shaft	Change of Characteristic
Orifice Plate	



Scale: 1:2179
Date: 10/04/2021

SEWER RECORDS

Address or Site Reference: Castleford Vaiduct
Printed by: Property Searches

United Utilities
Water for the North West

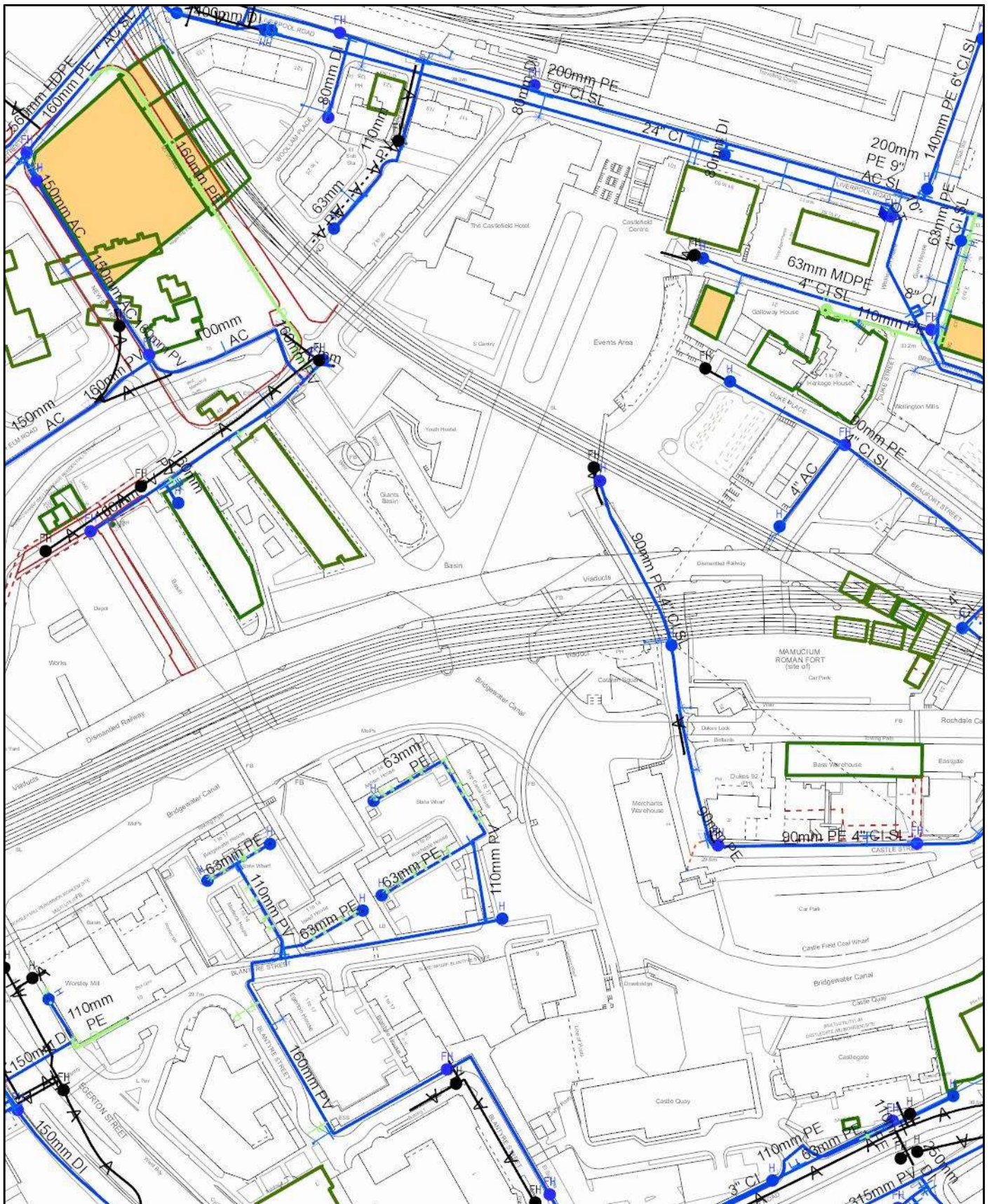
The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

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Clean Water Symbolology

Proposed	Abandoned	Live	
			Distribution Main
			Trunk Main
			Comms Pipe
			Private Pipe
			Concessionary Service
			Raw Water
			LDTM Raw Water
			LDTM Treated Water
			Air Valve
			AC Valve, open
			AC Valve, closed
			CC Valve, open
			CC Valve, closed
			Non Return Valve
			Pressure Management Valve
			OMS Valve
			Stop Tap
			Flow Meter
			Domestic Meter
			Commercial Meter
			Pump
			Hydrant
			Fire Hydrant
			Anode
			Chlorination Point
			De-chlorination Point
			Strainer Point
			Access Point
			Hatch Box
			IP Point
			Sampling Station
			Logger Box
			Bore Hole
			Inlet Point
			Bulk Supply Point
			End Cap
			Site Termination
			Change of Characteristic
			Condition Report
			<u>Property Types</u>
			Water Tower
			Valve House
			Booster Pumping Station
			Intake Pumping Station
			Water Treatment Works
			Supply Reservoir
			Service Reservoir
			Impounding Reservoir
			Pipe Bridge

Symbology for proposed assets is the same as above, but shown in **green**
 Symbology for abandoned assets is the same as above, but shown in **black**



Scale: 1:2179
Date: 10/04/2021

WATER MAINS RECORDS

Address or Site Reference: Castleford Vaiduct
Printed by: Property Searches



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Backed by expertise and experience of 6,000 colleagues across the world, we work for public and private clients in over 140 countries. We understand the local context and deliver appropriate local solutions.

We focus on delivering added value for our clients while at the same time addressing the challenges that societies are facing. These include the growing world population and the consequences for towns and cities; the demand for clean drinking water, water security and water safety; pressures on traffic and transport; resource availability and demand for energy and waste issues facing industry.

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