

7 Railway Street, Chatswood

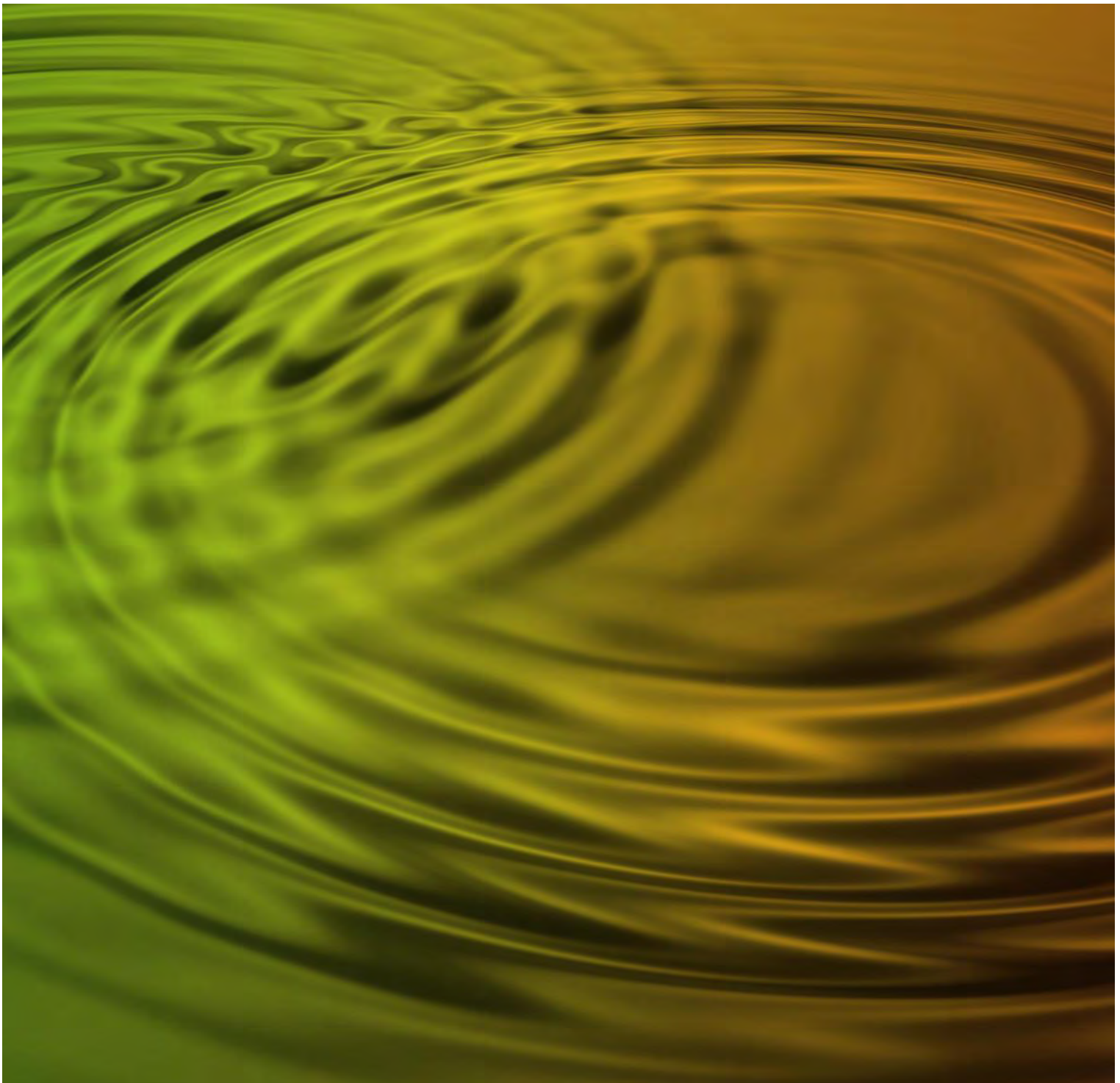
Mirvac Projects Pty Ltd

14 July 2010



Stormwater Management Plan

7 Railway Street, Chatswood



Stormwater Management Plan

7 Railway Street, Chatswood

Prepared for

Mirvac Projects Pty Ltd

Prepared by

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Quality Information

Document Stormwater Management Plan

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Date 14 July 2010

Prepared by Frank Caristo

Reviewed by Mathew Burke

Revision History

Revision	Revision Date	Details	Authorised	
			Name/Position	Signature
A	20-Jun-2010	For Review	Frank Caristo	
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1.0 Introduction

Mirvac Projects Pty Ltd has commissioned AECOM to prepare a Stormwater Management Plan for the proposed combined Residential and Commercial Development, located at 7 Railway Street, Chatswood. The site is the last remaining vacant lot of an overall development precinct. The site is bounded by Railway Street, Help Street and Cambridge Lane, with the Northern Railway Line(RES) traversing through the site.

A Master Stormwater Management and Concept Plan – designed by Bainbrigge, Barnett and Partners, was previously lodged with Willoughby Council. That Master SW management plan outlined the stormwater concept for the entire precinct, including this proposed development site. The Master SW Management Plan was assessed and approved by Willoughby Council. Refer to Appendix D for Concept details

This report relates to the proposed development site only, however it is based upon the original SW Management Plan for the precinct. In response to Willoughby Council's Engineers direction, it is proposed to complete the remaining outstanding works of the original Master SW Concept Plan in accordance with the original design criteria and concepts.

For the purposes of this SW Management Plan, it is proposed that the project be separated into four catchment areas.

- | | |
|--|----------------------|
| ➤ Catchment Area A - Commercial / Residential Building | - 1200m ² |
| ➤ Catchment Area B - Western Landscape Zone | - 1800m ² |
| ➤ Catchment Area C - RES | - 820m ² |
| ➤ Catchment Area D - Eastern Landscape Zone | - 375m ² |

It is highlighted that the majority of the original Master Stormwater Concept Plan has been installed and completed in the earlier stages of the precinct development.

1.1 Sources of Information

The following sources of information were used in compiling this report -

- Willoughby Council's Development Control Plan.
 - Part C-5 - Water Management
 - Attachment 24 - Stormwater Design Elements
 - Attachment 25 - On Site Detention Technical Standard No.1, Dated September 2005
 - Attachment 27 - Floodplain Management
- Discussions with Willoughby Council Stormwater Engineer - Eric Cheang on 16/06/2010 and 1/07/2010
- Rainfall data form Bureau of Meteorology
- Australian Standards AS/NZS 3500.3

1.2 Water Management Statement

Below is a summary of the water management measures proposed for the building.

Generally as shown on the attached Stormwater Concept Plan.

- **Water Conservation measures:**

It is proposed that all new tapware will be water efficient with a minimum 3 Star WELS rating.

- | | |
|-------------------|----------------------|
| o Toilets will be | - 4/ 3.5 litre flush |
| o Basins | - 6.0 l/min |
| o Sinks | - 7.5 l/min |
| o Shower | - 9.0 l/min |
| o Laundry tub | - 7.5 l/min |

In addition it is proposed to capture the building's roof rainwater for reuse in selected Residential Apartments for toilet flushing purposes.

- **Stormwater Management and Collection :**

Stormwater is to be collected from the four catchment areas. The Management of each area will be treated as follows ;

- Catchment Area A – Commercial /Residential Building – the rainwater from the roof will be collected and conveyed via the downpipe system, to the residential rainwater harvesting tank. The overflow from the harvesting tank will be directed to the OSD tank located on the eastern side of the Railway Corridor.
- Catchment Area B - Open Landscape Zone – Surface and subsurface water will be collected and conveyed via a series of SW pipes to a CDS filtration unit, then to the landscape rainwater harvesting tank. Overflow from the harvesting tank will be directed to the OSD tank located on the eastern side of the Railway Corridor.
- Catchment Area C - RES Zone and Open (Eastern) Landscape Zone – The surface water will be collected and conveyed via a series of SW pipes to the CDS filtration unit, rainwater harvesting tank and overflow equipment and components servicing Catchment Area B.
- Catchment Area D - Eastern side Landscape Zone – The subsurface water (only) will be collected and conveyed via a SW pipe to the OSD tank, located on the east side of the Railway Corridor.

- **Stormwater Disposal:**

The entire site's stormwater runoff will discharge directly to Council's existing 1500mm diameter pipe drainage line located within the subject property, parallel to the south east boundary.

Catchment Areas A, B C and D – the connection point shall be located within the property on the south - eastern boundary, adjacent to the Help St.

Upstream Properties - as part of adherence to the original SW Masterplan, it is proposed to extend the existing 600mm SW pipe from the adjoining upstream northern properties and convey the discharge via a combination of pipe and a box culvert to the existing Council kerb inlet pit located in Cambridge Lane.

On Site Stormwater Detention:

On site Detention is provided in accordance with Section 5 - Tables 1 and 2 of Willoughby Council's Development Control Plan.

2.0 Existing Overall Stormwater Management Plan

The Master Stormwater Management Plan for the site is an integral part of the overall Master SW Management Plan for the precinct. Council's Engineer has directed us to complete the SW System in accordance with the original concepts and designs.

Currently, as a temporary measure, the development site has two Ø 300mm SW pipes conveying the SW discharge from upstream Northern properties through the site and discharge into an existing SW pit located on the eastern side of the Northern Railway line.

The original overall SW Management Plan requires these two pipes to be replaced with a single Ø 600mm SW pipe. This Ø 600mm is to extend parallel to the Railway corridor boundary until it reaches the underground pedestrian passageway. From here the direction and piping profile changes to a 900mm x 750mm box culvert. The box culvert SW drainage line continues under the pedestrian passageway, and connects to an existing box culvert, which will convey the SW Council's kerb inlet pit and system located in Cambridge Lane.

3.0 Stormwater Concept Plan

As required by Council's Development Control Plan, attached is a copy of our stormwater concept plan Drg No's H5501 and H5502.

In accordance with Railcorp's requirements, drainage from the development will not be discharged into the railway corridor. Refer to Section 8.

4.0 On-Site Detention

In accordance with Willoughby Council's Development Control Plan, OSD Design Requirements - Table 1 Zone 2 the following OSD Storage capacities, shall be incorporated into the design . Refer to Appendix B for Calculation Sheet

- Catchment Area A - OSD Capacity of 44m³
- Catchment Area B - OSD Capacity of 65m³.
- Catchment Area C - OSD Capacity of 30m³
- Combined B + C - OSD Capacity of 95m³ - Reduced Capacity of 70m³
- Catchment Area D - OSD Capacity of 14m³

Total for Combined OSD Storage = 129m³

NOTE: Council's Engineer has requested the incorporation of additional rainwater harvesting for Catchment Areas B and C. The combined total OSD requirement for Catchment B and C is 95m³. We propose to reduce this OSD requirement (for the combined Catchment Areas only) by 25% due to the inclusion of the rainwater harvesting tank system.

5.0 Permissible Site Discharge Flows

In accordance with Willoughby Council's DCP 35, OSD Design Requirements - Table 2 Zone 2 the following OSD Tank shall be incorporated into the design . Refer to Appendix B for Calculation sheet

- Catchment Area A - Maximum discharge of 20.5 L/Sec
- Catchment Area B - Maximum discharge of 30.5 L/Sec
- Catchment Area C - Maximum discharge of 14.0 L/Sec
- Catchment Area D - Maximum discharge of 6.5 L/Sec

Total Combined PSD is 71.5 l/sec

Stormwater from the OSD tanks shall discharge through an orifice plate to the Council's stormwater drainage network at the maximum PSD rate.

6.0 Rainwater Harvesting

Catchment Area A –

The rainwater will be harvested from roof areas only. Downpipes connecting balconies will bypass the Rainwater tank and be piped directly to the OSD tank.

The collected rainwater will drain to a 50, 000 litre Rainwater tank via a first flush device and shall be located in the basement of the building. The rainwater will be filtered and treated, prior to being reticulated through the building via pressure booster pumps. Treated rainwater will be supplied to residential levels 5 to 14, for the purposes of toilet flushing only.

In the event of overflow from rainwater tank, the water will overflow to the OSD tank, via a box culvert located in the pedestrian passageway..

The water balance calculations modelled on average rainfall data over 30 years, indicates the proposed volume of harvested rainwater will on an annual average basis, meet the demand for toilet flushing 62% of the time.

Catchment Areas B and C

As requested by Council's Engineer rainwater will be harvested from the landscaped areas for reuse purposes.

Rainwater harvesting tank for irrigation reuse purposes is to be 50, 000 litres. Average irrigation water usage rate of 630mm / m² annually.

The rainwater tank shall be located prior and adjacent to the OSD tank. The rainwater harvested for reuse will be reticulated via booster pump.

In the event of overflow from rainwater tank, the water will overflow to the OSD tank, via a box culvert located in the pedestrian passageway..

The water balance calculations modelled on average rainfall data over 30 years, indicates the proposed volume of harvested rainwater will, on an annual average basis, meet the irrigation demands 90% of the time.

7.0 Overland Flow Path

Catchment Area A

The original Master SW Management and Concept plan requires an overland flow path from the proposed building forecourt area to be directed through the pedestrian passageway located under the RES corridor, and continue to discharge to sites boundary located on Help St.

Catchment Area B

The original Master SW Management and Concept plan requires an overland flow path from the adjoining northern property be continued and extended through this development site. The overland flow path is to be located parallel to the Rail corridor, and shall be constructed to match the existing pathway / profile. Refer to Appendix D for sketch details.

The overland flow paths continues through the pedestrian underpass located under the RES corridor, and continue to discharge to boundary located on Help St.

Catchment Area C+ D

The original Master SW Management and Concept plan requires an overland flow path from the RES to discharge into Help Street.

Proposed Building - Ground Floor RL'S

The Entry level to the building is RL 95.7. This is approximately 400mm above the current surrounding boundary levels on Railway Street and considerably higher than street levels in Help Street. It is approximately 1.7 meters above the levels of the proposed Pedestrian passageway. The level of the ground floor (entry) of the building shall ensure water from any overland flow paths will not ingress into the building. All overland flow paths are designed to direct stormwater runoff away from entrances into the building.

8.0 Floodplain Management

Willoughby Council's Floodplain Management Code map indicates that the subject site is not within a Zone subject to Flood Related Development Controls.



Extract from- Map of areas subject to Flood Related Development Controls

9.0 Hydrological Interface with Rail Corridor

The SW Management Plan for the site, does not direct any Stormwater onto the Rail Corridor.

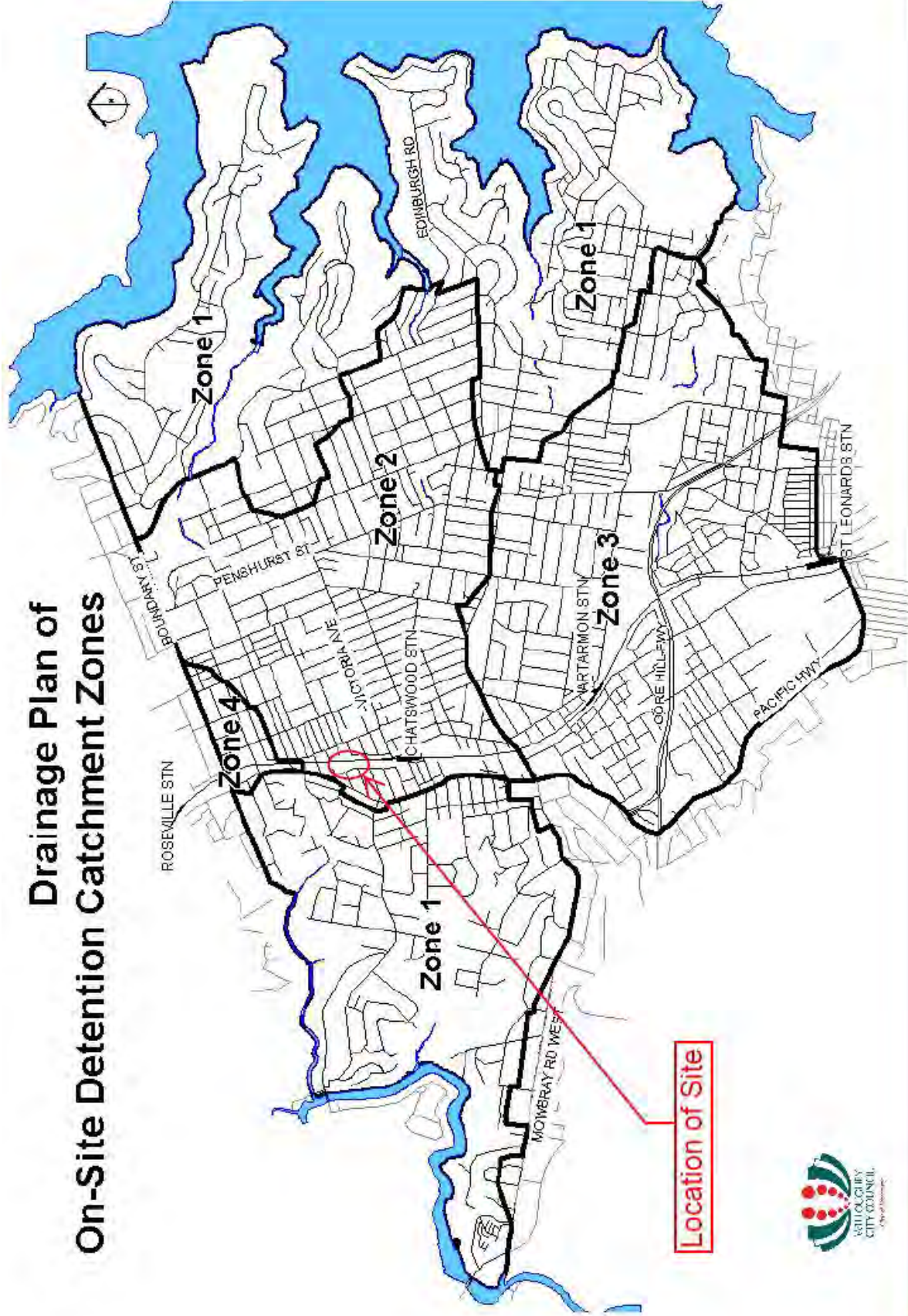
The methods employed in the physical profile of the structure incorporating the overland flow path for stormwater, ensures that the pathway is an integral part of the building's structural elements. The physical design ensures that no SW is directed onto the corridor. Under such conditions, there will be no Hydrological impact on the Rail Corridor.

All necessary measures will be taken to collect any seepage water from the Rail Corridor retaining walls, and convey it to the buildings subsoil water collection system. This measure will be employed to protect the proposed building from any water ingress from the Rail Corridor.

Appendix A

Willoughby Council's Drainage Plan of On-Site Detention Catchment Zones

Drainage Plan of On-Site Detention Catchment Zones



Appendix B

OSD and PSD Calculation Sheet

Appendix B OSD and PSD Calculation Sheet

TECHNICAL STANDARD NO.1			
Council's code requires in accordance with Table 1 and 2			
OSD Design Requirements			
Council requirements -Zone 2	Volume - m3	Area - m2	
	360	10000	
Location	Catchment Area in m2	OSD Capacity in m3	Total in m3
Catchment Area A- Building	1200	43.2	43.2
Catchment Area B- Landscape West	1800	64.8	
Catchment Area C - RES	820	29.52	
Combined B + C			94.32
Reduction of 25% of Combined B+ C OSD requirement		23.58	
			70.74
Catchment Area D	375	13.5	
Total OSD requirement			127.44
PSD Design Requirements			
Council requirements -Zone 2	PSD Rate -l/sec	Area - m2	
	170	10000	
Location	AREA	L/SEC	Total in L/sec
Catchment Area A- Building	1200	20.4	
Catchment Area B- Landscape West	1800	30.6	
Catchment Area C - RES	820	13.94	
Landscape -Eastern side	375	6.375	
PSD Requirement			71.315

Appendix C

Existing Overland Flow Path Profile



Appendix D

Original Master SW Concept Plans Produced by Baingrigge Barnett and Partners

SECTIONS

SITE

- LEGEND
- SERVICES
- SEWER DRAINAGE
 - STORMWATER DRAINAGE
 - SUB SOIL DRAINAGE
 - DOWNPIPE
 - GAS
 - EXISTING PIPE
 - EXISTING PIPE TO BE REMOVED

- SYMBOLS
- PPE DOWN
 - PPE UP
 - RISER
 - DROPPER
 - PPE BREAK
 - CAP END
 - FLOW DIRECTION
 - CLEAR OUT
 - INSPECTION OPENING
 - STORMWATER INSPECTION PIT
 - STORMWATER GATED PIT
 - SEWER MANHOLE
 - FIRE HYDRANT
 - BOUNDARY TRAP
 - ROOF OUTLET
 - EMERGENCY OVERFLOW
 - OVERLAND FLOW PATH
 - EXTEND OF OVERLAND FLOW
 - PPE REDUCER

- ABBREVIATIONS
- BD BALCONY DRAIN
 - BT BOUNDARY TRAP
 - CO CLEAR OUT
 - DP DOWNPIPE
 - E. EXISTING
 - EX. EXISTING
 - ELEC. ELECTRICITY
 - FEL FINISHED FLOOR LEVEL
 - FN FIRE HYDRANT
 - GAL GALVANISED
 - IL INVERT LEVEL
 - ID INSPECTION OPENING
 - KI KERB INLET
 - KP KERB INLET PIT
 - OG OVERFLOW GILLY
 - PHL PIPE @ HIGH LEVEL
 - PL REDUCED LEVEL
 - RV. RELIEF VALVE
 - RWD RAIN WATER OUTLET
 - RCP REINFORCED CONCRETE PIPE
 - RRJ RUBBER RING JOINTED
 - RHS RECTANGULAR YELLOW SECTION
 - SMP STORMWATER PIT
 - STM STORMWATER
 - SV STOP VALVE

PROJECT

PACIFIC PLACE

RAILWAY STREET, CHATSWOOD, N.S.W.

FOR

MIRVAC PROJECTS PTY. LIMITED

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NORTH SYDNEY, N.S.W. 2060

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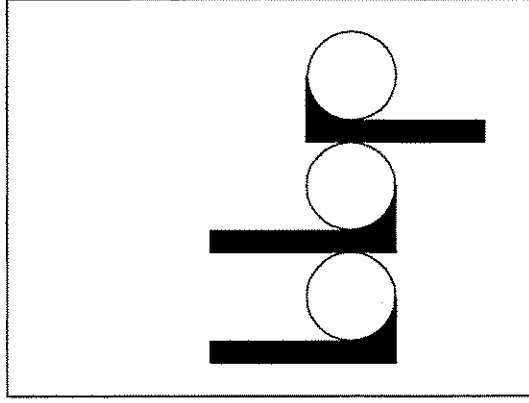
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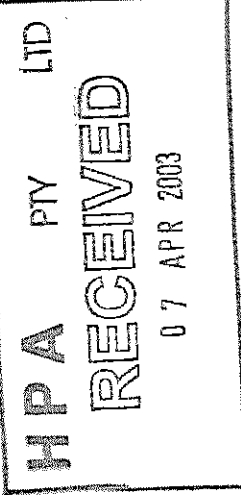
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DRAWINGS IN SET

5000	COVER SHEET & LEGEND	5012	SITE DRAINAGE PLAN – RAILWAY ENCLOSURE SHEET 1 OF 3 (1:100)	5015	DRAINAGE LONG SECTIONS – BUILDING A TO CAMBRIDGE LANE SHEET 1 OF 3 (1:250)
5001	CATCHMENT PLAN (1:1000)	5013	SITE DRAINAGE PLAN – RAILWAY ENCLOSURE SHEET 2 OF 3 (1:100)	5018	DRAINAGE LONG SECTIONS – BUILDING BCDE TO HELP STREET SHEET 2 OF 3 (1:250)
5001A	DRAWING NOTES	5014	SITE DRAINAGE PLAN – RAILWAY ENCLOSURE SHEET 3 OF 3 (1:100)	5019	DRAINAGE LONG SECTIONS – BUILDING G TO HELP STREET SHEET 3 OF 3 (1:250)
5002	OVERALL SITE DRAINAGE PLAN – GROUND LEVEL (1:250)	5030	OVERALL SITE DRAINAGE PLAN – RAILWAY ENCLOSURE (1:250)	5020	PIT DETAILS – SHEET 1 OF 5
5002A	OVERALL SITE DRAINAGE PLAN – BELOW GROUND (1:250)			5021	PIT DETAILS – SHEET 2 OF 5
5003	SITE DRAINAGE PLAN – BUILDING A SHEET 1 OF 7 (1:100)			5022	PIT DETAILS – SHEET 3 OF 5
5004	SITE DRAINAGE PLAN – BUILDING A SHEET 2 OF 7 (1:100)			5023	PIT DETAILS – SHEET 4 OF 5
5005	SITE DRAINAGE PLAN – BUILDING F SHEET 3 OF 7 (1:100)			5024	PIT DETAILS – SHEET 5 OF 5
5006	SITE DRAINAGE PLAN – BUILDING G SHEET 4 OF 7 (1:100)				
5007	SITE DRAINAGE PLAN – BUILDING G & H SHEET 5 OF 7 (1:100)				
5008	SITE DRAINAGE PLAN – BUILDING B,C,D,E & H SHEET 6 OF 7 (1:100)				
5009	SITE DRAINAGE PLAN – BUILDING B,C,D&E SHEET 7 OF 7 (1:100)				



REFERENCES

All levels are to Australian Height Datum (AHD).

Dimensions shall not be scaled from drawings.

Drawing notes to be read in conjunction with the Drainage and Civil Works Technical Specification.

GENERAL - SITEWORKS

The Contractor must verify all dimensions and existing levels on site prior to commencement of works. Report any discrepancies to the Superintendent.

All work is to be carried out in accordance with the details shown on the drawings and specification.

These plans shall be read in conjunction with approved Architectural, Structural, Hydraulic and Mechanical Drawings and Specification.

Where new work abuts existing, the Contractor shall ensure that a smooth even profile, free from abrupt changes, is obtained.

Design levels given are to finished surface level and inclusive of topsoil. (topsoil depth varies).

The Contractor shall arrange all survey setout to be carried out by a registered surveyor.

Care is to be taken when excavating near existing services. No mechanical excavations are to undertaken over telecom or electrical services. Hand excavate in these areas.

EXISTING SERVICES

Utility Information shown on the plans is not intended to depict more than the presence of any services. Actual locations should be verified by excavation prior to construction. Where necessary, obtain approval of the relevant Authority to the actual location and method of excavation prior to commencement of works.

The Contractor shall allow for the capping off, excavation and removal (if required) of all existing services in areas affected by the works.

The Contractor shall ensure, at all times, services to all buildings not affected by the works are not disrupted. The Contractor shall construct temporary services to maintain existing supply to buildings remaining where required. Once the works are complete and commissioned the Contractor shall remove all such temporary services and make good all disturbed areas.

INSPECTIONS AND APPROVALS

The Contractor is to provide notice to the Councils Engineer when inspections are required in accordance with Council Specification.

Provide notice to the relevant authority prior to connection to the Authorities drainage/sewerage, water supply, telecommunications & power and other utility systems. If required, the connection shall be carried out under the supervision of the Authorities officers.

DRAINAGE PIPES

Existing pipes which form no part of the drainage system shall be removed or sandfilled as indicated on the drawings.

Pipe lengths measured are between pit centres.

Pipes larger than or equal to 300 diameter to be reinforced concrete rubber ring jointed type (class as shown on drawings) manufactured to as 4169 (1892) U.N.O. Rubber Ring Joints to comply with AS 1946.

Pipe installation under trafficable areas is designed in accordance with Concrete Pipe Association of Australia publication "concrete pipe selection & installation" type H3 support. Type H2 support shall be used for other areas not subject to trafficable areas.

All drainage pipes less than 300 diameter shall be sewer grade Upvc with solvent welded joints (U.N.O.), all pipe junctions and lapses shall be via purpose made fittings.

Where downpipe drainage pass under floor slabs sewer grade Upvc with rubber ring joints are to be used.

Minimum grade to drainage pipes to be: 1% U.N.O. Minimum pipe size to be 300mm U.N.O.

Minimum pipe cover to be 600mm U.N.O.

The Contractor to supply and install all fittings and specials including various pipe adapters to ensure proper connection between dissimilar pipework.

Prior to the construction of any drainage works, the Contractor shall set out on site the positions of drainage pits, drainage inlets and outlet positions and bonds or junctions as shown on the drawings and present this set out for inspection by the Superintendent. No changes shall be made unless prior written approval is obtained from Council and the Superintendent.

Pipes shall be laid with the socket end placed upstream. Seal lifting holes in all pipes with a plastic plug.

DRAINAGE PITS

Pie deeper than 1200mm to be filled with sleep iron at 300 centres.

All exposed edges to be rounded with 20mm radius, or chamfered 20mm x 20mm.

Pit reinforcement for 150 thick pit walls - R6 91. Lap to be 400mm minimum. Clear cover 40 minimum cast against binding or formwork. Corner rebar may be fabric or equivalent bars.

Benching to be half outgoing pipe depth. Concrete for benching to be 20MPa mass concrete.

Approved precast pits may be used.

Diameter 100 hole for subsoil drainage outlet to be located 100mm above invert of all tiled pipes. Diameter 100 subsoil drainage to extend for a distance of 5m upstream of pit (at each inlet branch) with the upstream end sealed.

All connections to existing drainage pits shall be made in a tradesman-like manner and the internal wall of the pit at the point of entry shall be cement rendered to ensure a smooth finish.

Pit grate, frame and solid covers shall be Class B in non traffic areas and Class D in trafficable areas or in accordance with AS 3996.

SUBSOIL DRAINAGE

Subsoil drainage shall be laid at a min grade of 0.5% U.N.O.

Additional subsoil drainage shall be laid to suit site conditions and groundwater presence as directed.

Subsoil drainage to consist of a shielded 100mm diameter plastic pipe wrapped in geotextile fabric and placed a minimum off 650mm below the finished surface level and covered with 500mm of 20mm gravel

Provide minimum of 150mm gravel all around subsoil pipe.

DESIGN LOADS

Dead Load
Concrete unit weight
(including reinforcement) 25kN/m3

Liveloads
Footpath
L&L Lane Loading
TSA Truck Loading

Earthquake Loading
In accordance with AS 1170.4

Earthloads
Backfill material
Weight: 22kN/m3
Angle of internal friction 30 degrees

GROUNDWORKS PREPARATION - BOX CULVERTS

Foundations is subject to inspection by a Geotechnical Engineer. Bearing stratum must have an unconfined compressive strength of at least 180 kPa for fill height above culvert <5m.

Replace unsuitable materials in accordance with SUBGRADE REPLACEMENT.

Lay 50 concrete blinding.

PRECAST CONCRETE CULVERT UNITS

All workmanship and material shall be in accordance with the specification.

Design height of fill to be as shown on cross sections.

All unit widths shall be of the nominal internal dimensions shown on the drawings. Exposed dimensions to be provided to Contractor for set-out. No variations permitted between units of different load class.

Maximum standard unit length to be 2.47m (less gap tolerance).

special units to have cut-outs and/or starter bars as shown on the drawings.

All joints are to be sealed with 150mm dense tape type 601 (Densol Aust P/L) or similar approved U.N.O.

Height of backfill on each side of culvert to be kept to a maximum difference of 400mm during compaction, unless the culverts have been designed otherwise.

Grout for bedding to be minimum 25mpa compressive strength and not less than 1 part cement, 3 part sand.

SUBGRADE REPLACEMENT

All soft, wet or unsuitable material or areas that move visibly to be removed as directed by the Superintendent and replaced with approved select fill satisfying the requirements listed below and approved by the Superintendent.

- free from organic and perishable matter
- maximum particle size 75mm
- plasticity Index between 2% and 15%

The sub-grade and sub-grade replacement to be compacted to a minimum relative compaction of 95% when tested in accordance with AS 1289.5.4.1. The moisture content at the time of compaction shall be in the range of 60-90% of optimum moisture content in accordance with AS 1289.5.2.1.

PAVEMENT MATERIALS

Unbound crushed rock material are designated as follows:

- DGB20 20mm nominal sized densely graded base
- DGS20 20mm nominal sized densely graded subbase
- DGS40 40mm nominal sized densely graded subbase

All pavement materials (Sub-base and Basecourse) to comply with RTA Specification 3051. Supply of all pavement materials shall be accompanied by a certificate from the supplier to certify that their material complies wit the specification.

Asphaltic Concrete supply, design, production, transport, placement and compaction is to comply with RTA Specification Specification R116.

Each layer of material shall be deposited and spread in a compacted layer neither less than 100mm nor more than 200mm for all pavement layer types. When spread for compaction, the moisture content of the base or subbase materials shall be in the range of 60-90% of optimum moisture content in accordance with AS 1289.5.2.1.

Compaction of the sub-base and basecourse to achieve a minimum relative compaction of 100% when tested in accordance with AS 1289.5.4.1. Before placing the wearing course, test results verifying the compaction of the roadbase satisfying the compaction requirements shall be submitted to the Superintendent.

Compaction testing of the sub-grade, sub-base and basecourse shaa be carried out by a NATA registered soil laboratory at the rate set out below, (with a minimum of three test per lot).

- sub-grade - 1 test set per 500m2 (three test per layer min)
- sub-base - 1 test set per 500m2 (three test per layer min)
- basecourses - 1 test set per 500m2 (three test per layer min)

Report all test results to the Superintendent.

TRENCHING - GENERAL

The Contractor shall provide any shoring, sheet piling or stabilisation of sides as necessary to comply with statutory requirements.

Remove any areas that move visibly or any loose or unsuitable materials at the bottom of the trench which the Superintendent deems unsuitable shall be removed and replaced with select fill in accordance with SUBGRADE REPLACEMENT.

TRENCH FILL IN ROADWAYS (TYPE H33 SUPPORT)

The appropriate local government authority must be contacted in regards to work in footpath and roadway areas and all necessary approvals obtained prior to the commencement of work.

All works, including construction timetable and method of work, to be carried out in accordance with the approved traffic management plan (where required).

The sub-grade and/or sub-grade replacement to be compacted to a minimum relative compaction of 95% when tested in accordance with AS 1289.5.4.1.

Remove any areas that move visibly or are unsuitable and replace with select fill in accordance with SUBGRADE REPLACEMENT.

Bed and Haunch Zone Compaction

- Compaction to achieve a minimum relative compaction of 70% when tested in accordance with AS 1289.5.4.1.

Side and Overlay Zone Compaction

- Cohesiveless Materials
- Compaction to achieve a minimum relative compaction of 70% when tested in accordance with AS 1289.5.4.1.

- Cohesive Materials

Compaction to achieve a minimum relative compaction of 95% when tested in accordance with AS 1289.5.4.1.

Backfilling Compaction

- Cohesiveless Materials
- Compaction to achieve a minimum relative compaction of 70% when tested in accordance with AS 1289.5.4.1.

- Cohesive Materials

Compaction to achieve a minimum relative compaction of 98% when tested in accordance with AS 1289.5.4.1.

Minimum depth of restored pavement (roadbase plus asphalt) shall be 300 mm. Minimum depth of asphalt surfacing shall be 50mm.

Compaction of the sub-base and basecourse (restored pavement or roadbase) to achieve a minimum relative compaction of 100% when tested in accordance with AS 1289.5.4.1. Before placing the wearing course, test results verifying the compaction of the roadbase satisfying the compaction requirements shall be submitted to the Superintendent.

Compaction testing of the trench base, backhaunch zone, side overlay zone, sub-base and basecourse shall be carried out by a NATA registered soil laboratory at the test rate set out below, (with a minimum of three test per lot).

- trench base - 1 test set per 50m (2 test per layer min)
- backhaunch Zone - 1 test set per 50m (2 test per layer min)
- side/overlay zone - 1 test set per 50m (2 test per layer min)
- backfill - 1 test set per 50m (2 test per layer min)
- sub-base - 1 test set per 50m (2 test per layer min)
- basecourse - 1 test set per 50m (2 test per layer min)

Report all test results to the Superintendent.

TRENCH FILL OTHER (TYPE H2 SUPPORT)

The sub-grade and/or sub-grade replacement to be compacted to a minimum relative compaction of 95% when tested in accordance with AS 1289.5.4.1.

Remove any areas that move visibly or are unsuitable and replace with select fill in accordance with SUBGRADE REPLACEMENT.

Bed and Hauch Zone Compaction

- Compaction to achieve a minimum relative compaction of 60% when tested in accordance with AS 1289.5.4.1

Side and Overlay Zone Compaction

- Cohesiveless Materials
- Compaction to achieve a minimum relative compaction of 70% when tested in accordance with AS 1289.5.4.1.

- Cohesive Materials

Compaction to achieve a minimum relative compaction of 95% when tested in accordance with AS 1289.5.4.1.

Backfilling Compaction

- Cohesiveless Materials
- Compaction to achieve a minimum relative compaction of 70% when tested in accordance with AS 1289.5.4.1.

- Cohesive Materials

Compaction to achieve a minimum relative compaction of 98% when tested in accordance with AS 1289.5.4.1.

Compaction testing of the trench base, backhaunch zone, side/overlay zone and backfilling shall be carried out by a NATA registered soil laboratory at the test rate set out below, (with a minimum of three test per lot).

- trench base - 1 test set per 50m (2 test per layer min)
- backhaunch zone - 1 test set per 50m (2 test per layer min)
- side/overlay zone - 1 test set per 50m (2 test per layer min)
- backfill zone - 1 test set per 50m (2 test per layer min)

Report all test results to the Superintendent.

STRUCTURAL NOTES - CONCRETE

Carry out all concrete work in accordance with AS 3600-1988.

Formwork shall be provided in accordance with AS 3010. Formwork shall be inspected by the Superintendent and the placement of concrete shall not be carried out until the formwork has been accepted.

Place all concrete of the following characteristic Compressive Strength as defined as AS 3600-1988:

- mass concrete surround/encasement and benching: fc 20 Mpa
- in situ concrete for drainage pits: 150 thick walls: fc 25 Mpa
- in situ concrete for drainage pits: 280 thick walls: fc 40 Mpa
- in situ concrete for box culvert structural base slab: fc 40Mpa
- blinding concrete: fc 15 mpa

Concrete properties shall be as follows: slump 80mm, nominal size aggregate 20mm.

Cement shall be Type SP Portland Cement.

Water shall be free of materials harmful to concrete and reinforcement.

Fire aggregates shall be clean, hard, durable uncoated grains uniform in quality and shall conform to the requirements of AS 2739.1.

Coarse aggregates shall be clean, hard durable crushed stone, crushed river stone or screened river gravel and shall conform to the requirements of AS 2739.1

STRUCTURAL NOTES - REINFORCEMENT

Reinforcement shall comply with the following standards:

AS 1302 Steel Reinforcing Bar for Concrete

AS 1303 Steel Reinforcing Wire for Concrete

AS 1304 Welded Wire Reinforcing Fabric for Concrete

The clear concrete cover to reinforcement shall be as follows, unless noted otherwise on the drawings shall generally be:

- cast in situ concrete against formwork or concrete blinding: 40mm
- cast in situ concrete against ground: 75mm

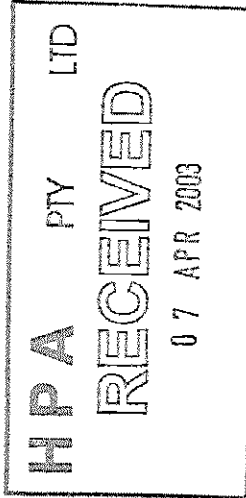
Lap lengths for reinforcement - laps and other splices in reinforcement shall only be made at the positions shown on the drawings, unless alternatives at other locations are approved in writing.

Lap lengths shall be as tabulated below, unless noted otherwise on the drawings.

Bar diameter	Minimum lap length (mm)	Minimum top bar (300 concrete below bar)
12	300	400
16	400	500
20	500	650
24	600	750
28	800	1000
32	1000	1250

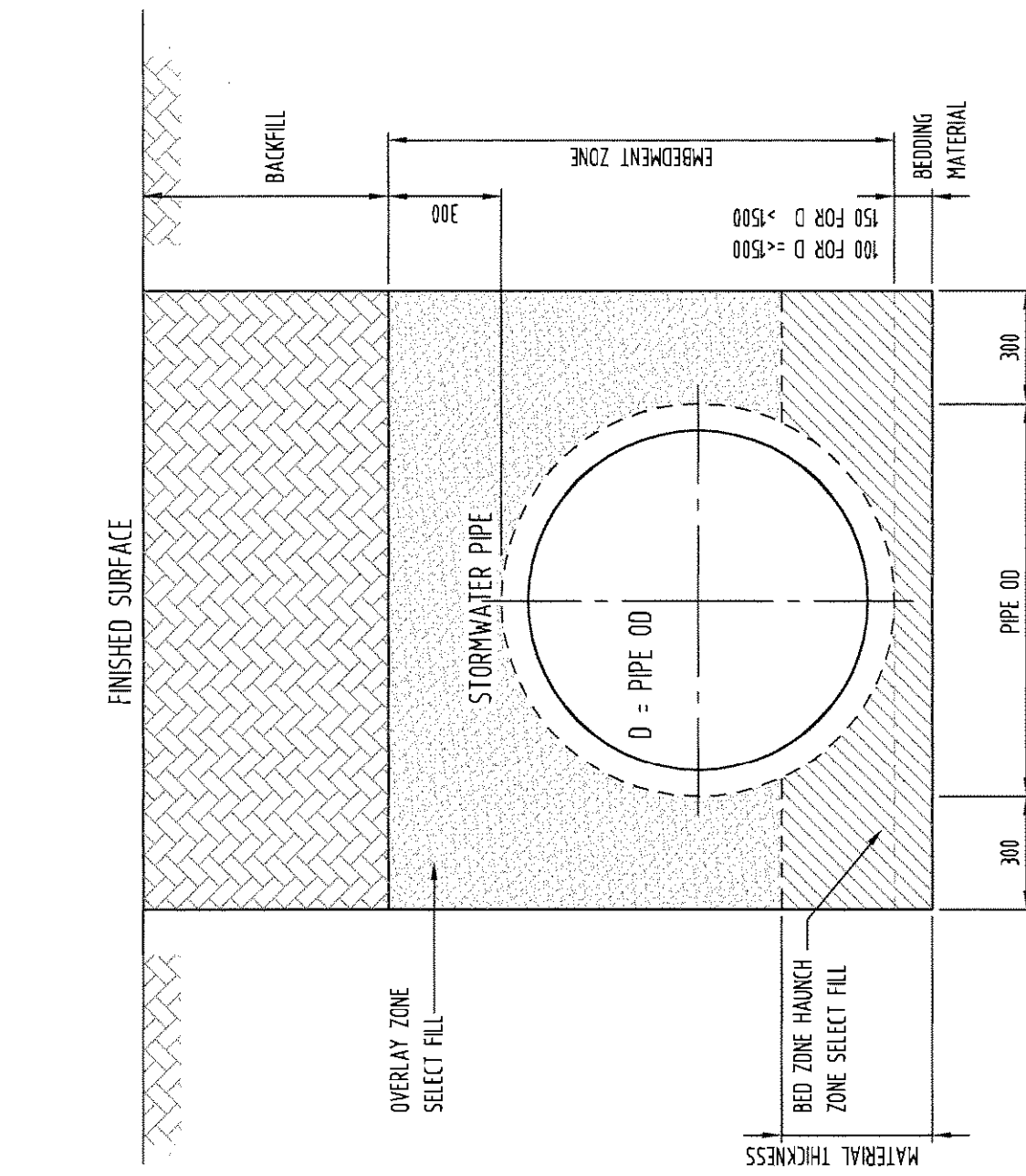
Construction joints shall be used only as shown on the drawings. No construction joints shown on the drawings shall be removed without written approval.

WHERE DRAINAGE PIPES OR CULVERTS ARE FORMED AS PART OF THE BUILDING STRUCTURE OR ROADWAY STRUCTURE, REFER TO STRUCTURAL ENGINEERS DRAWINGS AND SPECIFICATION FOR CONSTRUCTION.

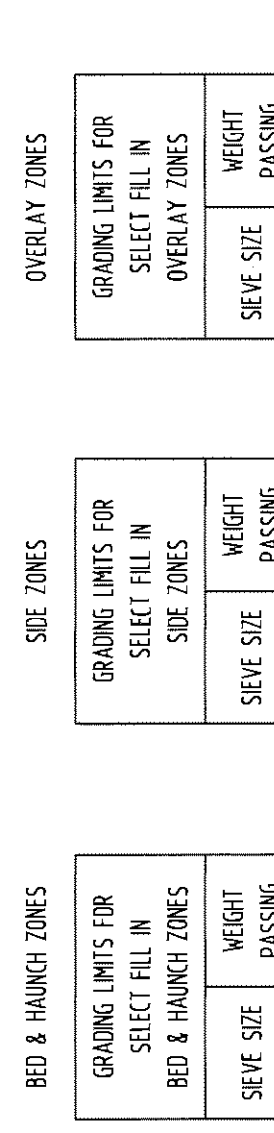


Revised	Rev	Description	date	drawn	checked	approved	date
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2		SHEET 01B - CONSTRUCTION					

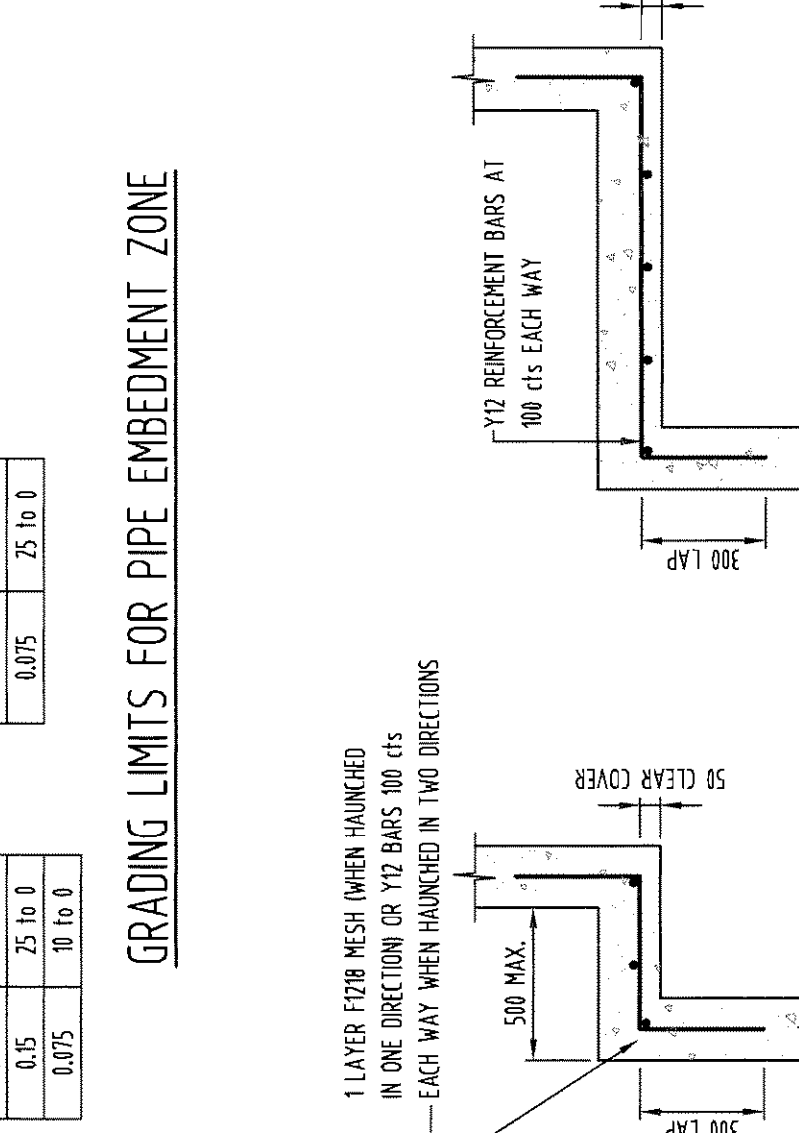
PROJECT:	ARCHITECT:	DRAWING TITLE:	CLIENT:	FOR CONSTRUCTION
PAWKE PLACE RAILWAY STREET - CHATSWOOD	HPA PTY. LTD. 40 MILLER STREET NORTH SYDNEY NSW 2060	CIVIL SERVICES DRAWING NOTES	MYVAL PROJECTS PTY. LIMITED	RAINBRIDGE BARNETT & PARTNERS PTY. LTD Hydraulic, Civil & Fire Protection Consultants Level 1, 77 Christie Street Sydney NSW 1500 Phone: (02) 9438 4377 Fax: (02) 9438 4377 E-mail: info@rainbridge.com.au Member of the Association of Specialist Building Contractors Inc.
				drawn: HR checked: HR approved: HR date: JAN 2021
				proj no: 00028 rev no: 5001A issue: 1



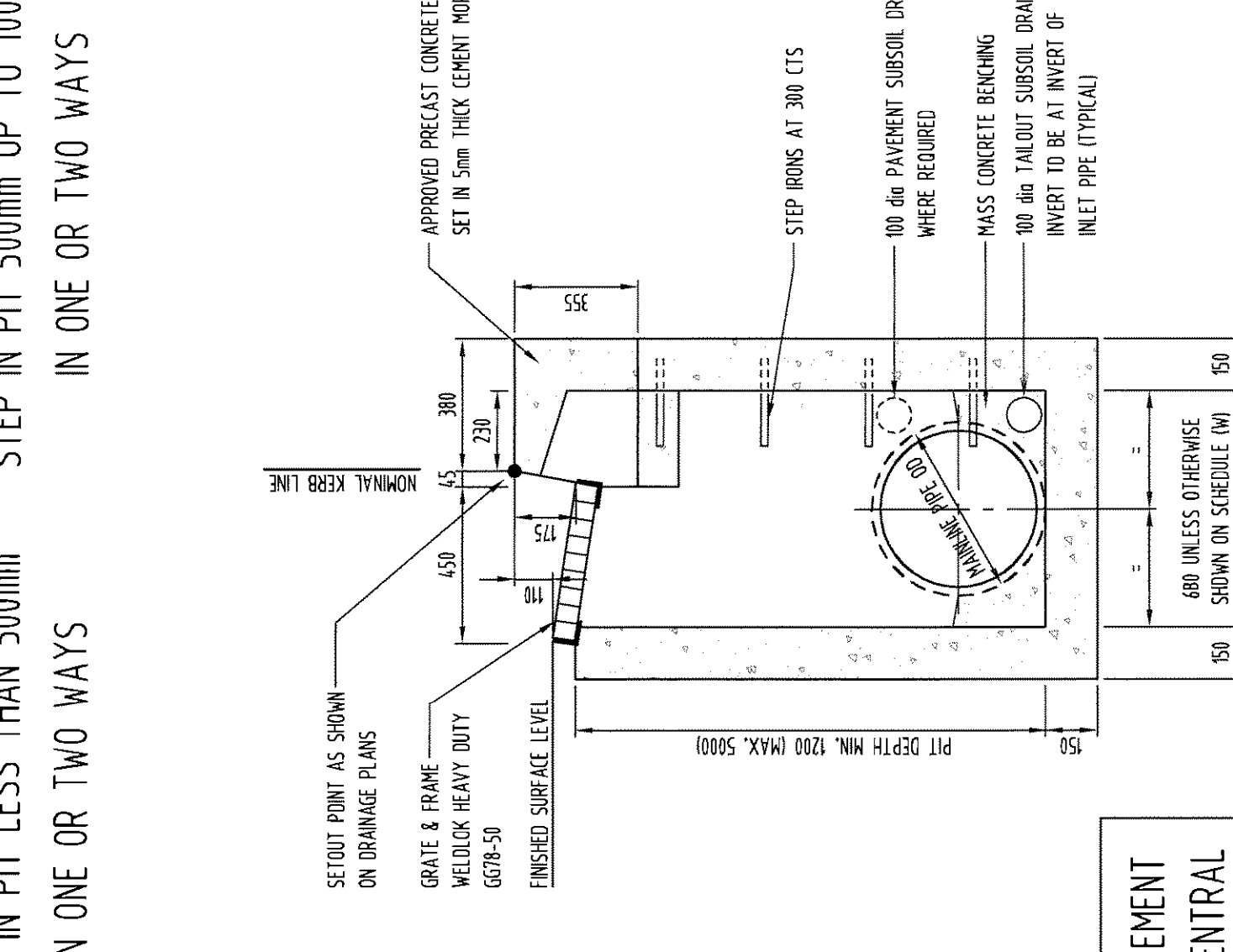
TYPICAL TRENCH SECTION - TYPE H2 SUPPORT



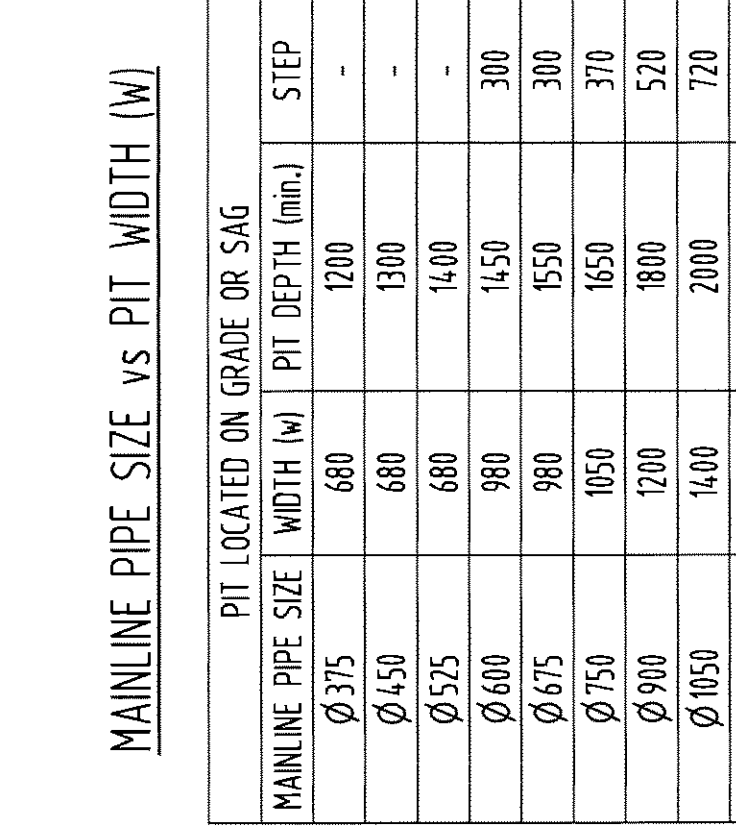
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110 to 50	95	100 to 50	51
			49



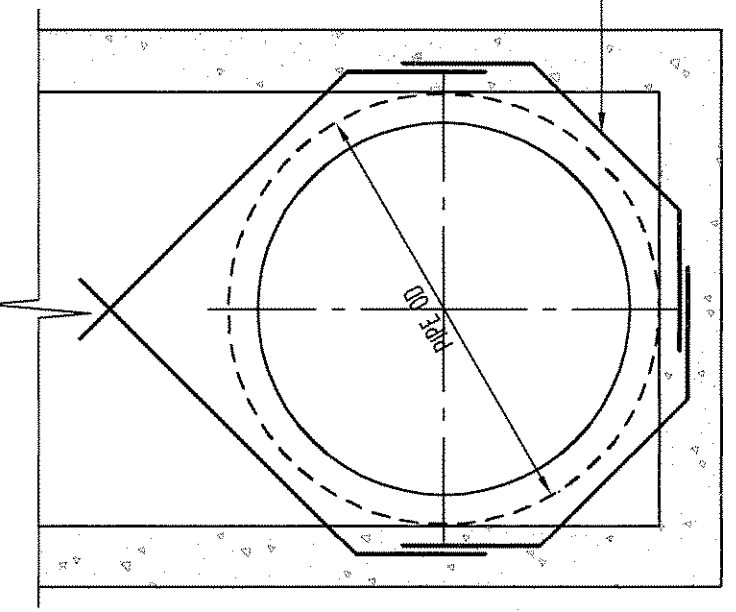
DETAIL C



SIDE LINE PIPE SIZE vs PIT LENGTH (L)	PIT LOCATED ON GRADE OR SAG			STEP
	PIPE SIZE	LENGTH (L)	PIT DEPTH (mm)	
	Ø 75	900	1200	-
	Ø 75	900	1300	-
	Ø 75	900	1400	-
	Ø 80	900	1450	-
	Ø 75	900	1550	-
	Ø 75	1000	1650	200
	Ø 90	1200	1800	300
	Ø 1050	1400	2000	500
Ø 1000	1550	2150	650	
Ø 1350	1700	2500	800	

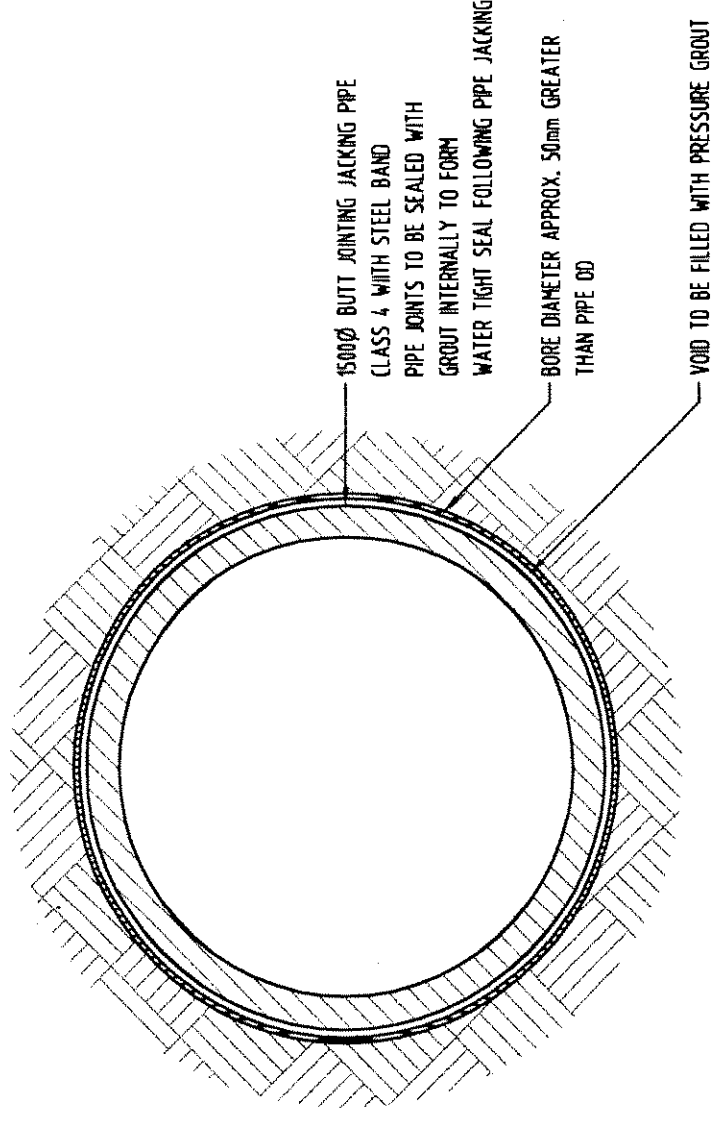
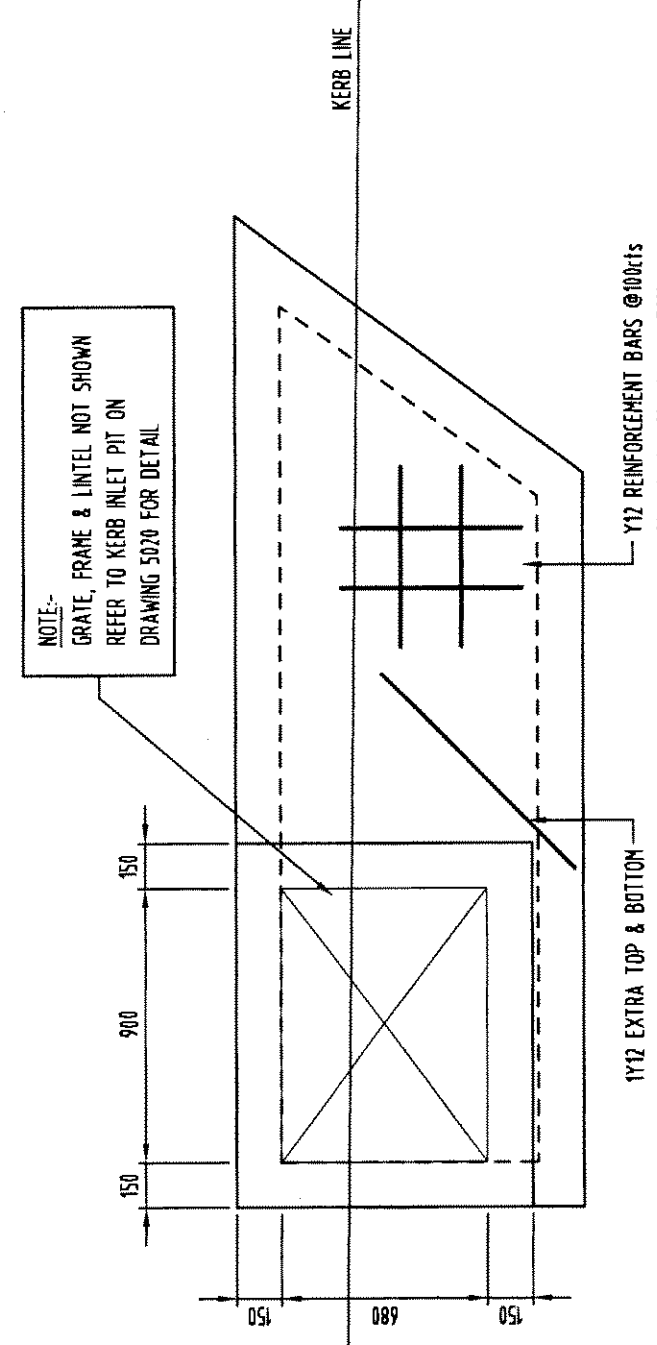


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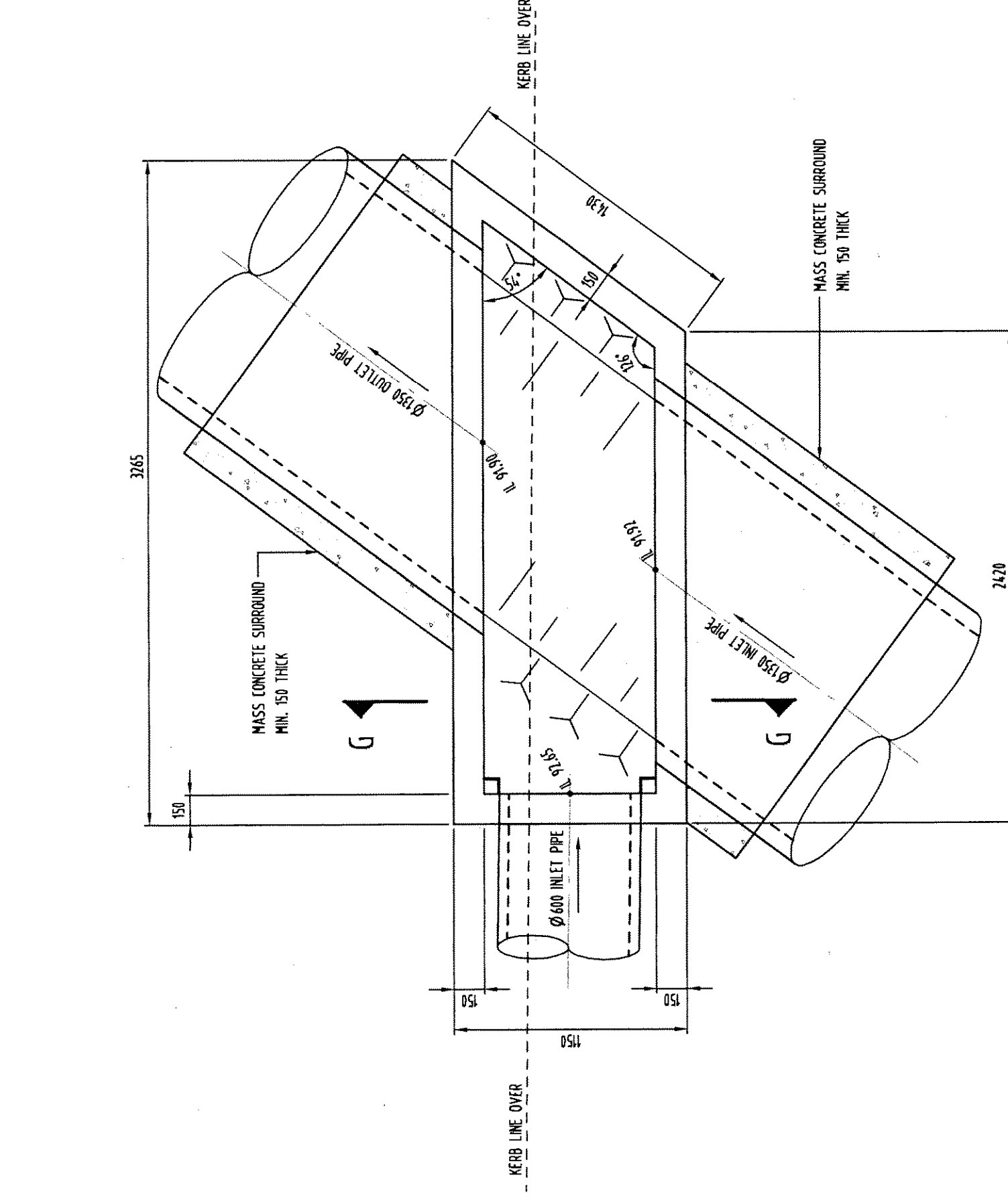
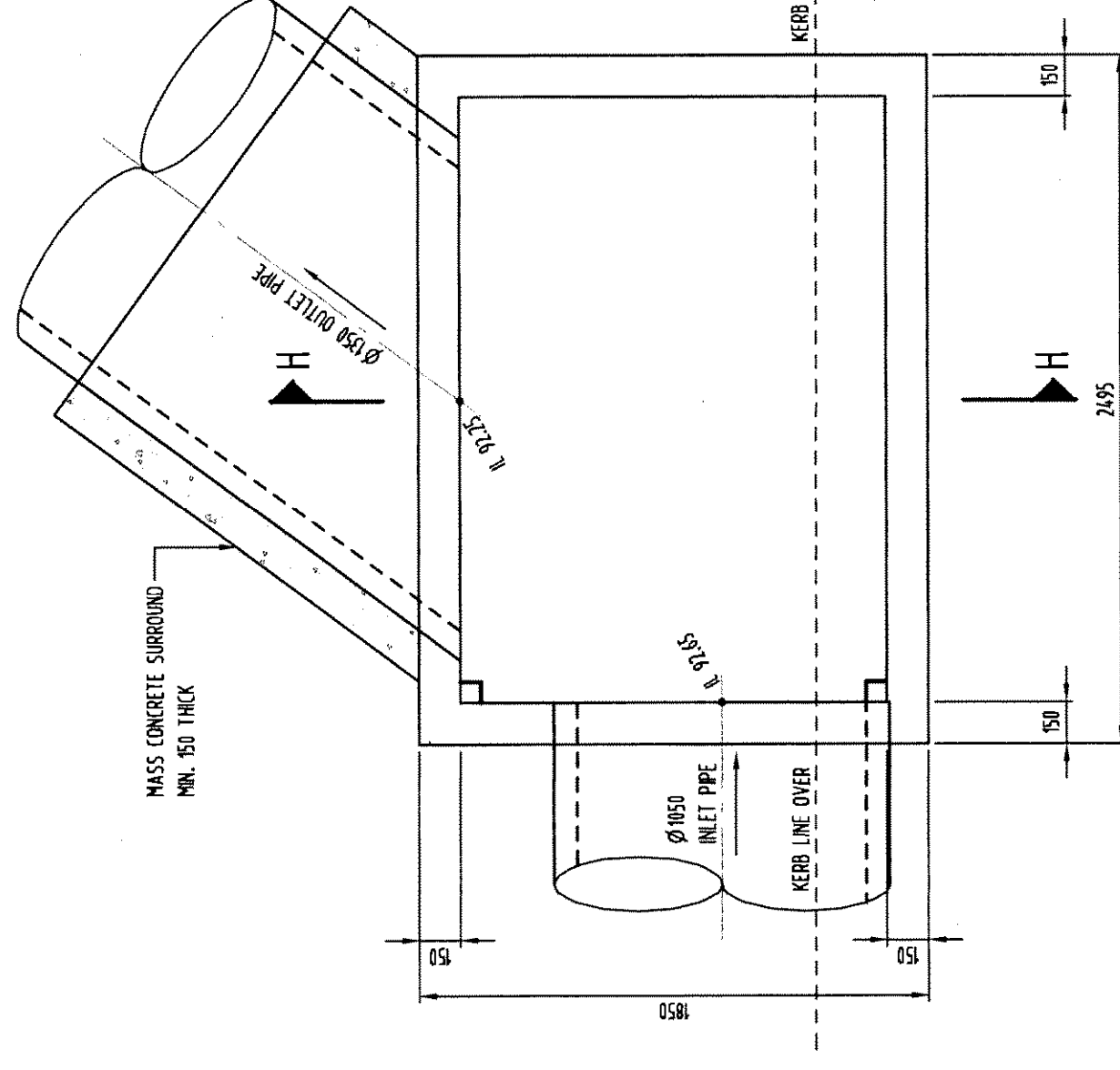
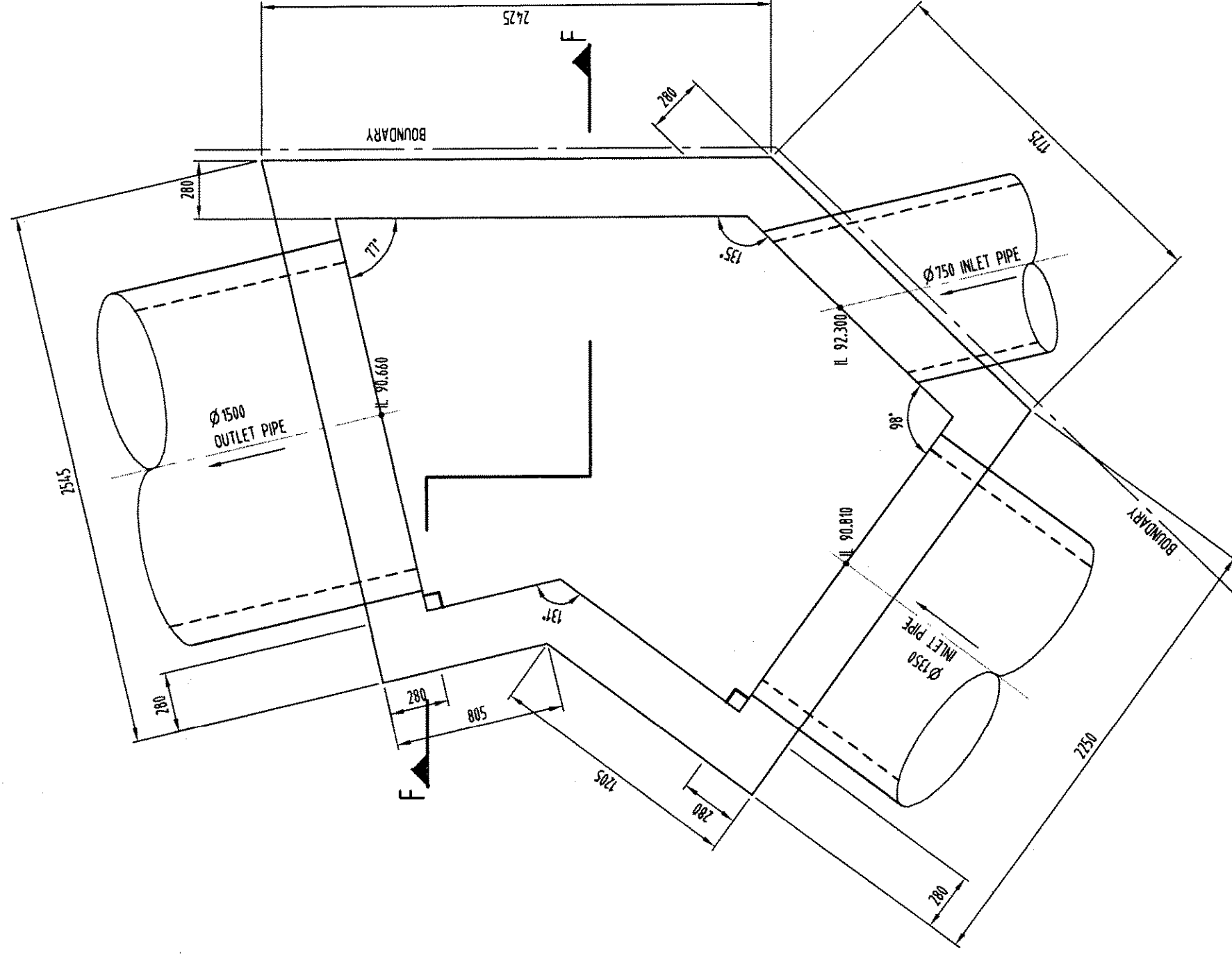
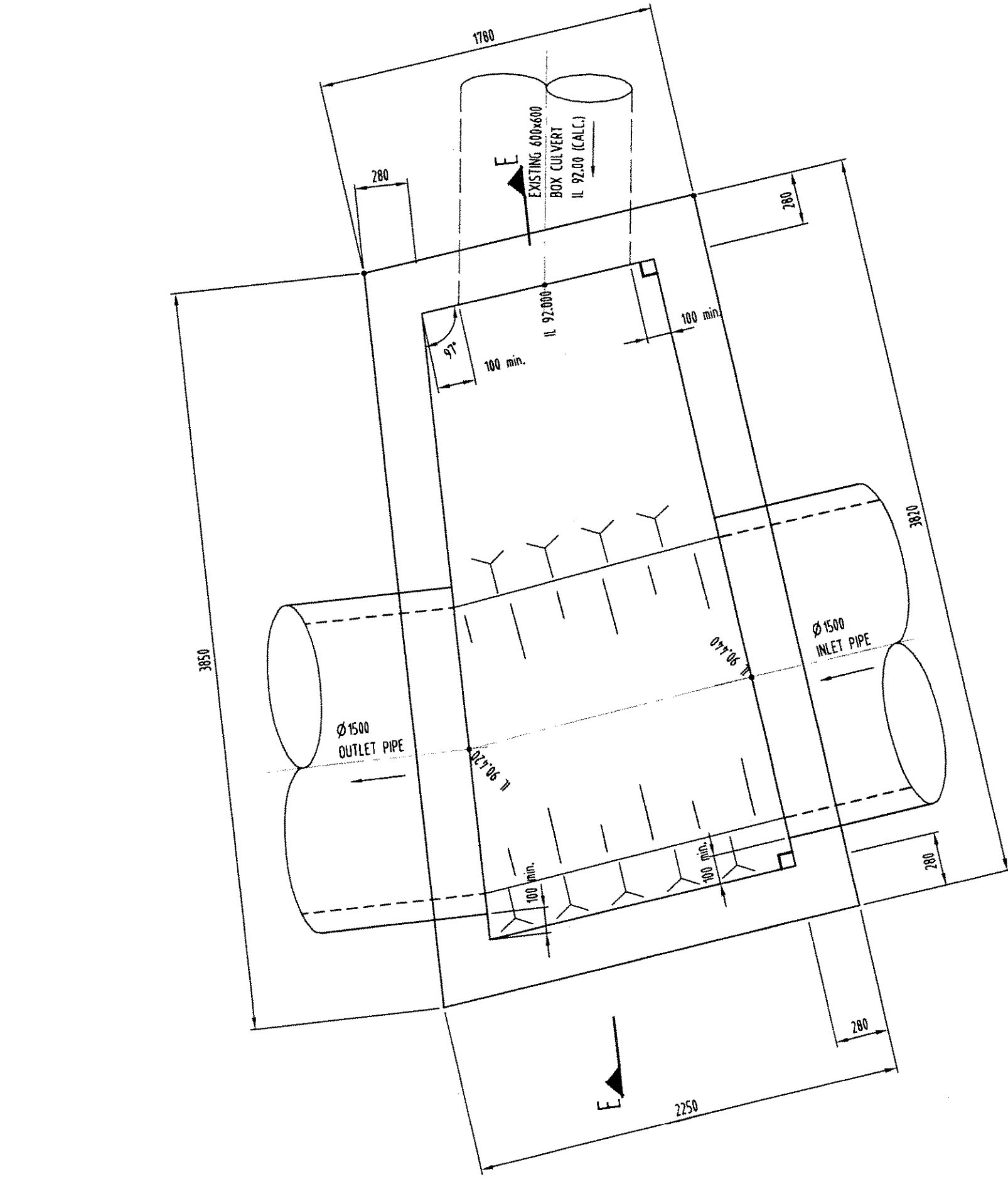


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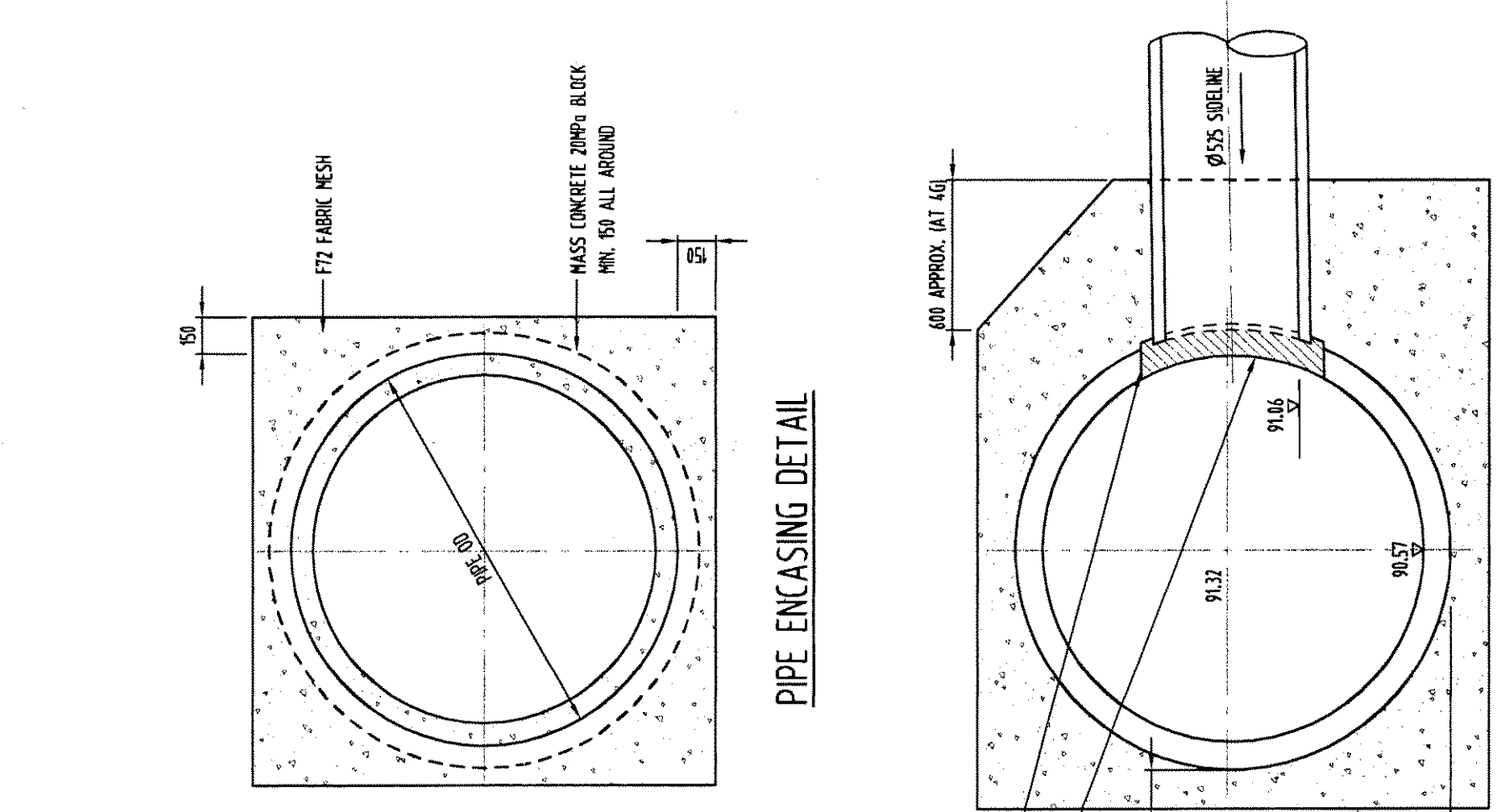
Technical drawing of a window frame assembly. The drawing includes a top-down view of the frame with dimensions: 900 (width), 100 (height), 50 (width of the central opening), 100 (height of the central opening), 50 (width of the side panel), 100 (height of the side panel), and 50 (width of the bottom panel). A callout box points to the frame with the text: "NOTE: FRAME IS LAMINATE GLASS SHEET TO GLASS SHEET. PUT ON FRAMING JOINT FOR DETAIL". Another callout box points to the frame with the text: "270° CORNER TOP & BOTTOM - 1/2\"



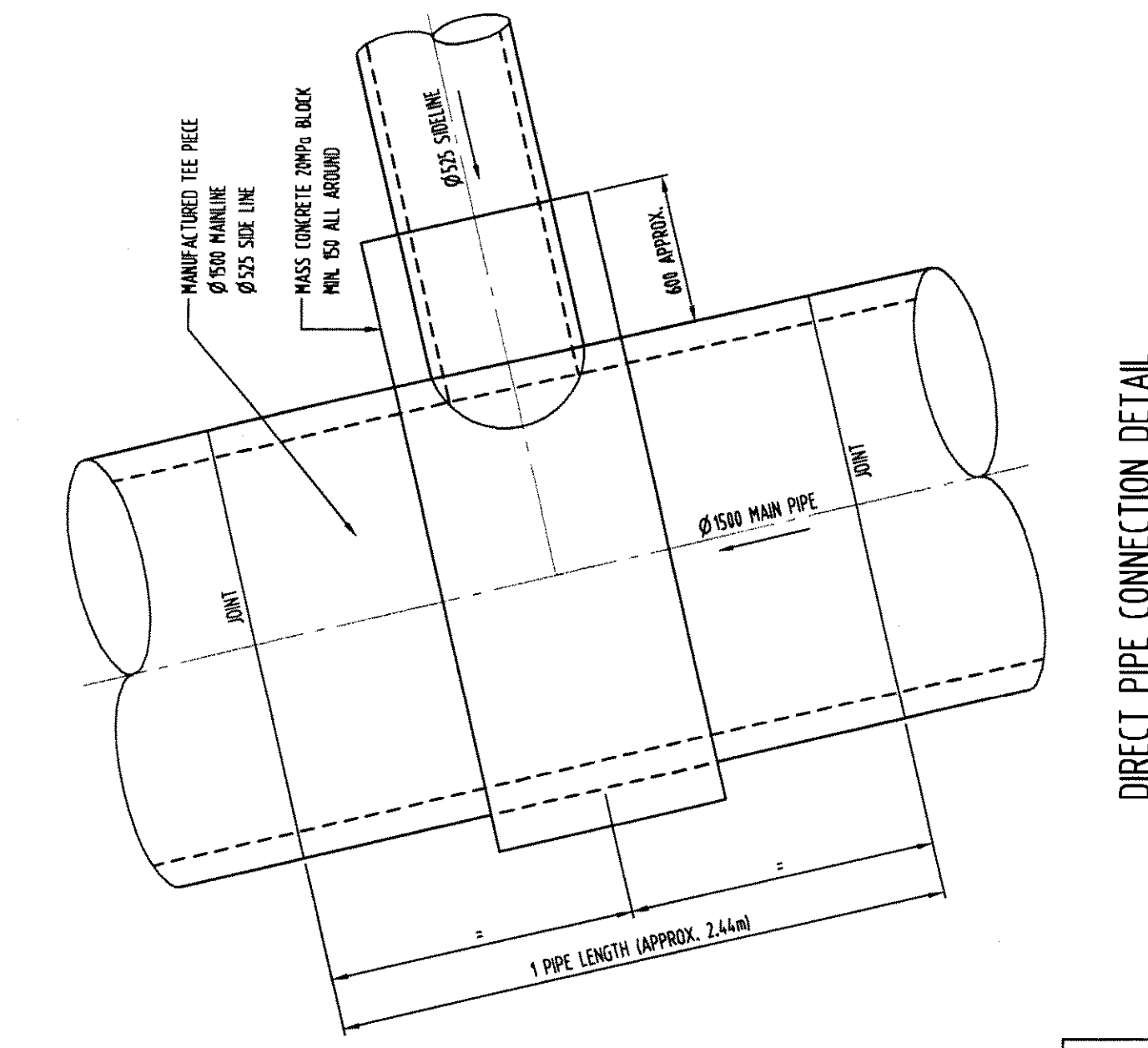
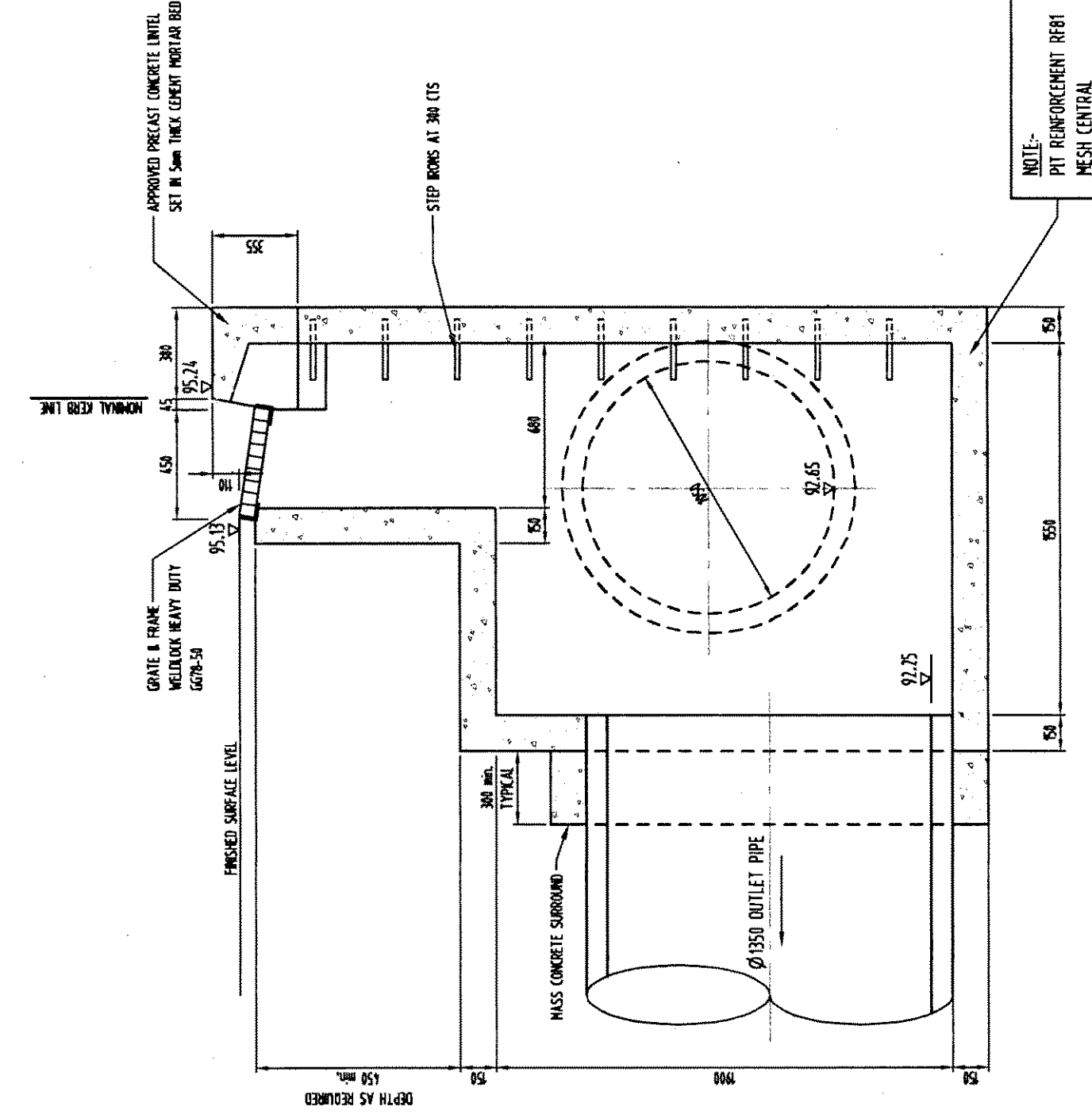
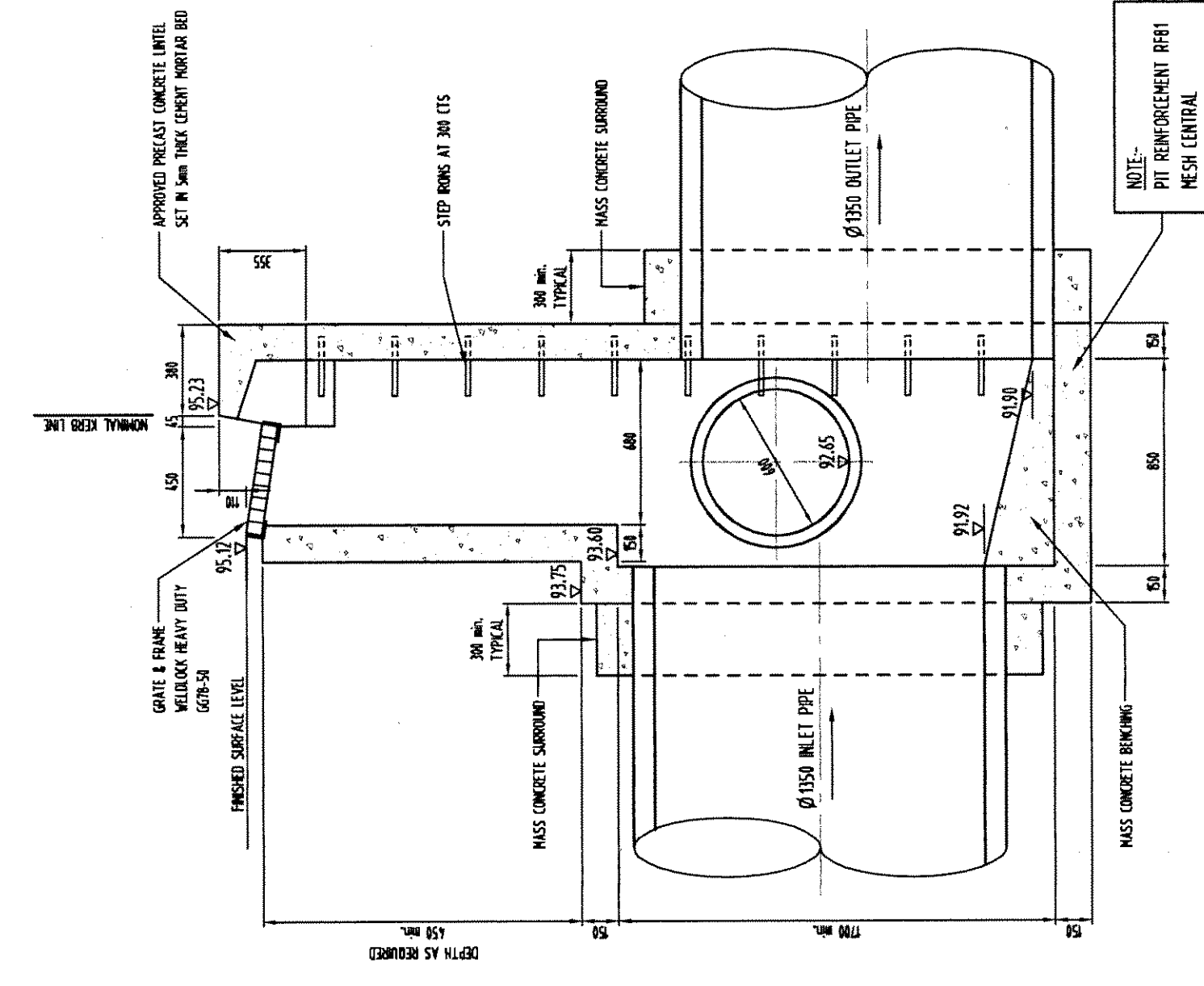
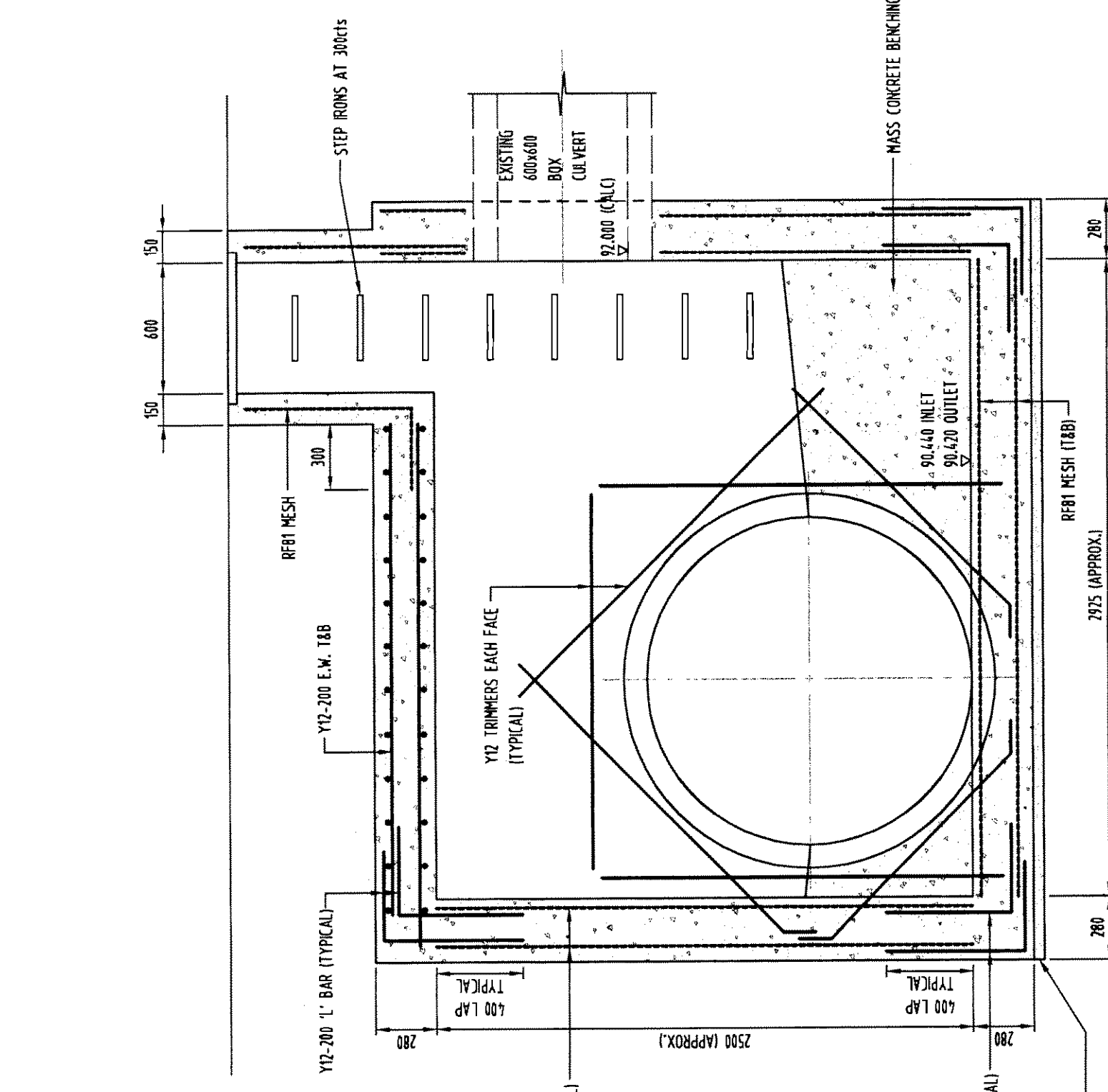
PIT 3G BONE PLAN



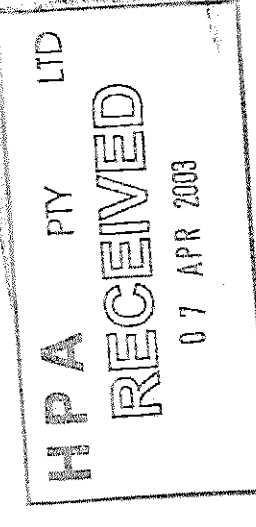
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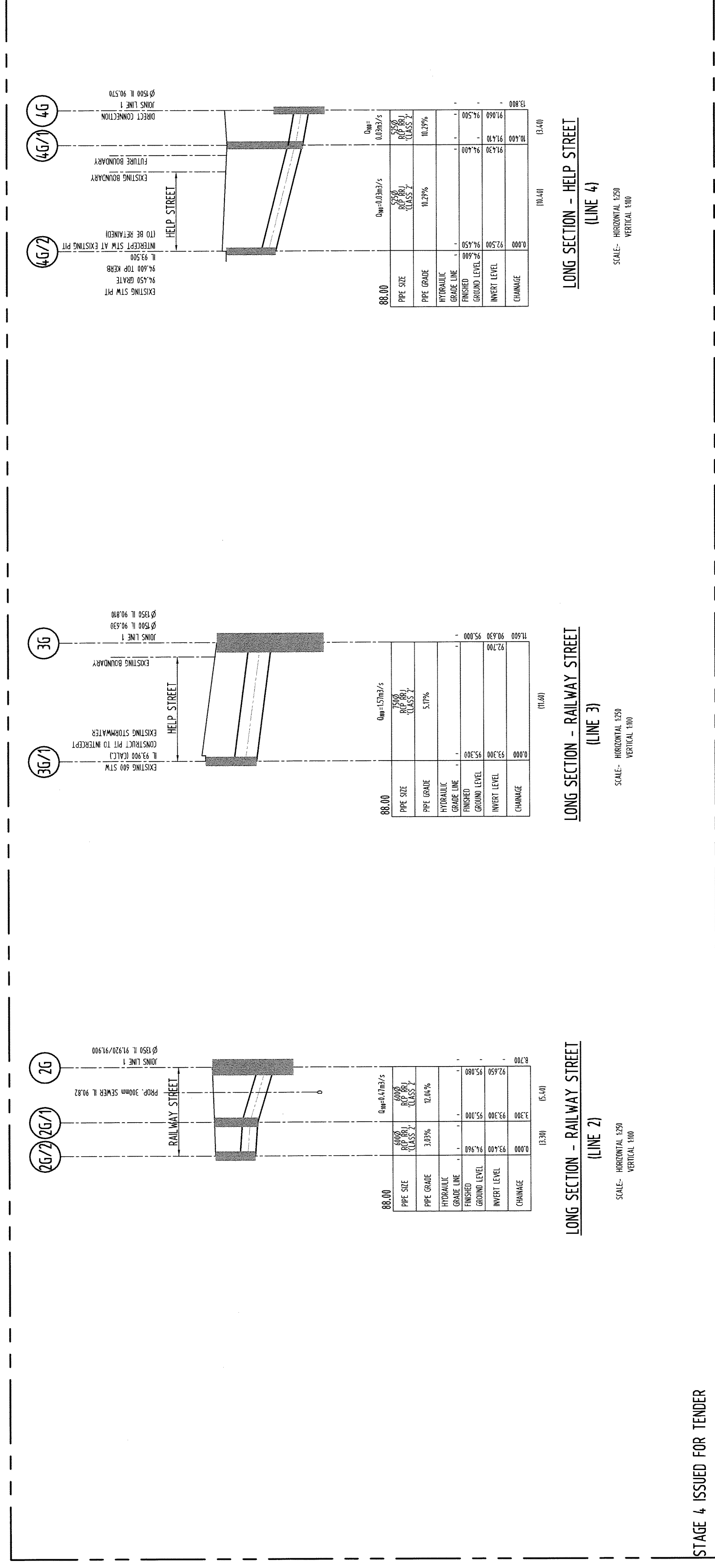
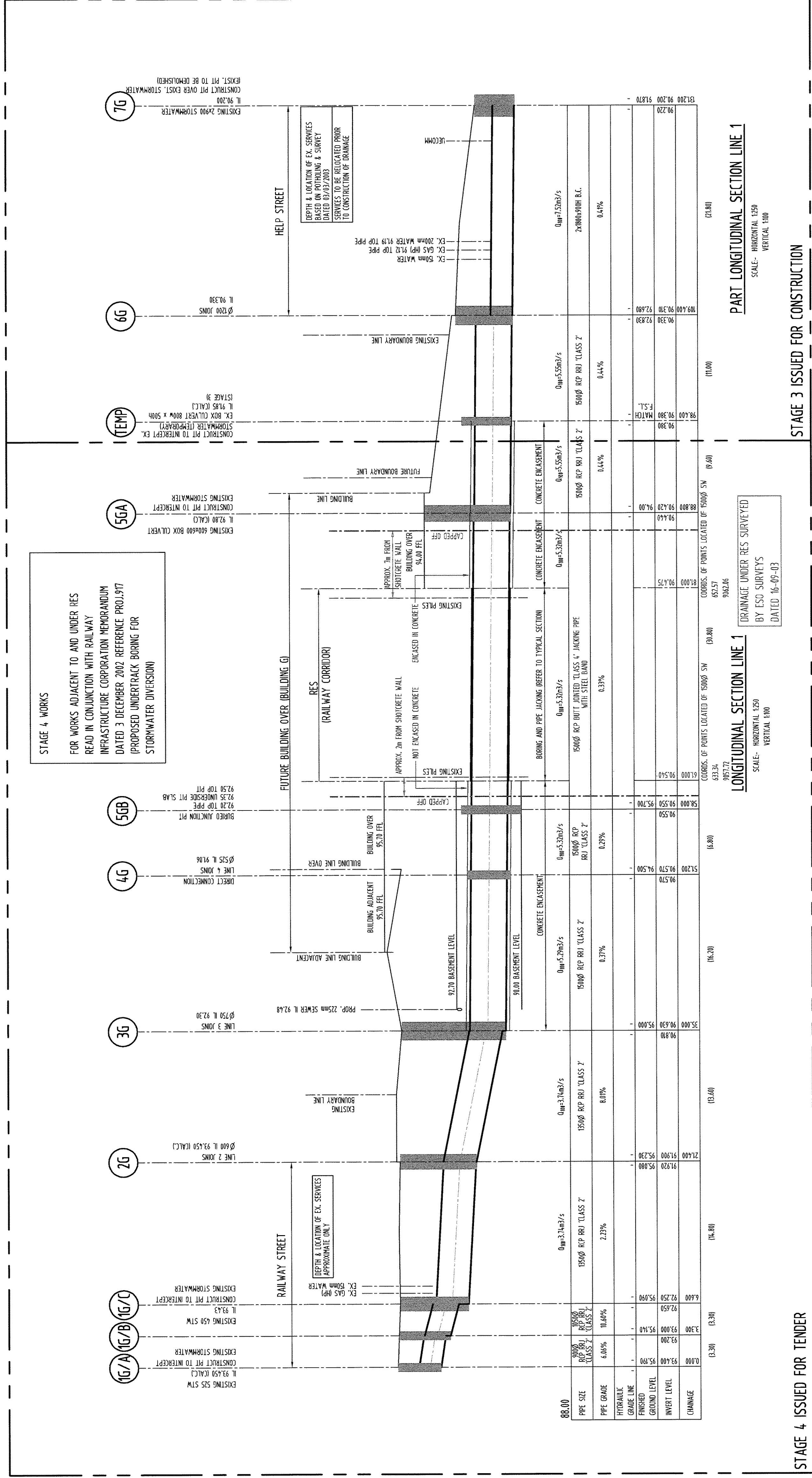


DIRECT PIPE CONNECTION SECTION



SECTION H - H

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