

MAYO COUNTY COUNCIL

This specification will apply to all group schemes subject to amendment where considered necessary.

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Specification For
Group Water Supply Schemes - General

1. SITES AND WAYLEAVES.

The sites shall mean the lands or portion of land and water, roadways, laneways in or about which the works are to be laid, constructed or erected.

The sites other than pipe routes, as shown on plans, shall be acquired permanently as agreement. Rights of free access to these sites shall be with the written permission of the Local Authority.

The Trustees shall acquire Wayleave rights over a 10m (32.8') wide strip along the routes of the pipelines where they pass through private lands. All wayleaves shall be acquired before any works commence on site.

2. LEVELS

All levels shown on drawings refer to ordnance Datum. Sections will be found sufficiently accurate for constructional purposes. Where flood levels, lake levels, stream and culvert levels are shown, these are based on the best available information. The trustees and their Contractor must verify such levels for themselves before using them.

3. INSURANCE

Tenderers must submit, prior to award of the Contract, details of the terms of the insurance they propose to effect, or which they already hold and intend to use, for the duration of the Contract.

Evidence of insurances will also be required from any proposed sub-contractors.

4. TAX CERTIFICATES

In the case of a Tenderer resident in the Republic of Ireland it shall be a pre-condition of an award of contract that the Tenderer shall within a specified period of time produce a current Tax Clearance Certificate or a Sub-Contractors C2 Certificate.

Non-resident Tenderers, and their proposed Sub-contractors will require a statement from the Revenue Commissioners of the Republic of Ireland that they are satisfied as to the suitability for tax purposes of the Tenderer to be awarded a contract. They should apply to the Office of the Revenue Commissioners for this statement, which should then be forwarded to Mayo County Council.

The Contractor and all sub-contractors shall continue to hold current issues of all certificates for the duration of the Contract.

5. SUB-LETTING

The Contractor shall not, without prior approval in writing from Mayo County Council, sublet the supply or installation of *any* portion of the works.

Prior to approval Mayo County Council will require, in addition to Tax and Insurance's outlined above, evidence of the contract agreed between Contractor and Sub-contractor.

Approval, if granted, will not relieve the Contractor of any of his obligations under the Contract.

6. NOTICES

The trustees shall notify the Local Authority when they intend to start, but only when all permissions as set out above have been obtained.

7. FAILURE OF CONTRACTOR TO CARRY OUT WORKS

In the event of the contractor failing to carry out the works in accordance with the contract documents, the Trustees may have the work done and deduct the cost of so doing from any payment due to the Contractor under contract, provided three weeks notice in writing has been given by the trustees. Such action by the Trustees shall not invalidate the Contract.

8. INSPECTION OF SITES

The contractor shall visit the sites of the proposed works and note their description and relative locations. He should acquaint himself

- (a) generally with the layout of the proposed scheme and particularly any features or irregularities of surface which could not be shown or delineated on plans.
- (b) of the exact position of all existing services (watermains, sewers, cables, etc.) and structures likely to be encountered in the course of the work.

He should in addition carry out tests on the sites as will enable him to assess the works involved in the Contract. Extra payment will not be allowed for any difficulties due to site conditions with the plans.

9. CONTRACTORS RESPONSIBILITY FOR CARRYING OUT THEIR RESPECTIVE CONTRACTS

The contractor shall be and shall continue to be until the works are handed over to the Trustees, solely and absolutely responsible for the carrying out the works, or any part thereof, or for injury or damage to any person or property of any description whatever which may be caused by, or result from the execution of the works, whether the works have been carried out skilfully and carefully to this specification or not.

The Contractors must provide all plant tools and equipment required for the execution of the works.

10. CONTRACTORS RESPONSIBILITY FOR LABOUR

Provide for all costs in respect of labour including costs of:

Social Welfare Acts.

Conditions of Employment Acts.

Insurance (Intermittent Employment) Act.

Holiday (Employees) Act.

Redundancy Payments Acts.

Industrial Training Acts.

Factories Act, Building (Safety, Health and Welfare at Work Act

Travelling time, expences, fares, transport.

Guaranteed time.

Non-Productive overtime and other expenses in connection with overtime.

Incentive and bonus payments.

Sickpay disbursements.

Subsistence allowance.

Pensions: The successful Tenderer will be required to produce proof of membership and payments to C.I.F. Sickpay and Pensions Scheme Subsistence Allowance.

By Law employers in the construction industry must register with The Dept. of Social Welfare all employees whose employment commences on or after 1/1/1989 or the engagement of subcontractors whose employment commences after 1/1/1990.

A sub-contractor is also legally bound to notify the Dept. of Social Welfare of any person engaged to perform any service either with him or on his behalf whether under contract or any other arrangement made or to be made by him.

All notifications must be sent to the Dept. of Social Welfare within one month of the new employee, subcontractor or other person being taken on.

11. HEALTH AND SAFETY REQUIREMENTS

The Tenderers attention is drawn to the obligations arising under the relevant Safety, Health and Welfare at Work (Construction) Regulations 2006 and any amendment thereof.

On the award of this Contract, the successful Tenderer will be appointed by the Employer as Project Supervisor (Construction Stage) in accordance with the provisions of the Regulations and in accordance with the terms of the Agreement attached to the Contract.

The Tender Total shall include all costs, which may be incurred by the successful Tenderer in complying with its obligations pursuant to the Regulations. An item is included in the Bill of Quantities to allow the Tenderer to separately price the obligation to accept the appointment as Project Supervisor (Construction Stage).

During the detailed evaluation of Tenders, the Tenderer shall, if requested to do so, submit its Safety Statement.

12. NOTIFICATION, LICENCES, OTHER CONSENTS OR PERMITS

The Contractor shall be responsible to obtain, at his own cost, any notifications or licences or other consent or permits required in relation to any activity involved in the carrying out and completion of the Works. This includes any dumpsite intended to be used by the Contractor for the disposal of materials relating to the works.

The Contractor will not be allowed any extension of time for the Works, by reason of any delay in obtaining any of the above.

13. STANDARD SPECIFICATION

Nothing stated in this Specification is to be construed as discriminating against products and materials manufactured in any of the member States of the European Community.

Where reference is made to a standard specification prepared by the National Standards Authority of Ireland (N.S.A.I.) or the British Standards Institution (B.S.I.) the reference shall be deemed to apply to the issue of the specification with amendments, if any, current at the date of invitation to tender for the works.

Where items to an Irish Standard Specification, (IS) a British Standard Specification, (BS) or any other standard specification of a Member State of the European Community are called for, this requirement shall be read as including items to a relevant international standard, or the relevant national standard of any Member State of the European Community, which provides an equivalent guarantee of safety and suitability.

Where items certified by the National Standards Authority of Ireland as complying with an Irish Standard are called for, the requirement shall be read as either certified by the National Standards Authority of Ireland as complying with the Irish Standard, or shall be certified as complying with a relevant international standard, or with the relevant national standard of another Member State of the European Community, which provides an equivalent guarantee of safety and suitability.

Where certified products are called for they shall carry the mark of the certifying body.

14. COMPLETION

The whole of the works and any further works reasonably necessary for the proper completion and operation of the water supply scheme shall be executed to the satisfaction of the Local Authority.

Field, road and other surfaces shall be restored and any deficiency in surfacing material shall be made good by the Contractor unless otherwise provided for in the contract.

The sites shall be left clean and tidy and all surplus material shall be levelled off or removed as the Local Authority may direct. All damage of any kind whatsoever shall be made good. The works shall be deemed to be handed over on the date on which the Trustees present to the contractor evidence from the Local Authority certifying that the works are complete to their satisfaction.

15. QUALITY OF MATERIALS AND WORKMANSHIP

The Contractor shall provide all materials required in accordance with a prepared schedule of quantities priced and extended together with labour, plant and machinery, for the complete performance of the contract. The whole of the materials and workmanship shall be of the best quality and description of their respective kinds and shall in all cases be to the approval of the Local Authority, whose decision as to the quality and suitability of materials and workmanship shall be final and binding.

16. MAINTENANCE OF EXISTING SERVICES DURING CONSTRUCTION

The Contractor shall maintain all existing services during the construction and take every precaution to ensure that the minimum of inconvenience is caused to the public by the construction of the works.

17. SETTING OUT

The contractors shall set out the works and during progression of works, shall amend at their own expense any errors from an inaccurate setting out. The Contractors shall provide all labour, materials, for testing and measuring of works and afford at their expense all means of access to inspect any parts of the works.

18. DELIVERY OF MATERIALS

The Contractors shall ensure that all materials are deposited on the site when and where required and they shall take responsibility for their protection.

19. PROTECTION OF WORKS

The Contractors shall fence, light, provide warning notices and otherwise protect the works. All such signs shall be properly maintained while in use and shall be removed when the need for them is no longer apparent. The locations, sizes and other characteristics of road traffic signs shall comply with the code of practise for traffic management. The Contractor shall be responsible for accidents or damage arising from his failure to do so and for any inconvenience caused to the Public or to property users or owners.

MATERIALS - WATERMAINS AND SERVICES PIPES

Pipes may be specified from the following:

20. P.V.C. PIPES

Unplasticised polyvinyl chloride pipes shall comply with the Local Government Provisional Specification (PLGAS/6) based on IS 123 (50 - 150mm diameter) or BS 3505 (200 – 400mm diameter). All pipes shall be certified by the NSAI as complying with the PLGAS/6.

21. POLYTHENE PIPES

Polythene pipes shall comply to IS 134 (low density 12 – 25mm) and to IS 135 (high density 32 – 100mm diameter).

22. DUCTILE IRON PIPES

Ductile Iron Pipes shall comply with the B.S. 4722: 1988

23. HIGH PERFORMANCE BLUE POLYETHYLENE PIPE

High Performance Blue Polyethylene Pipe manufactured in accordance with the Interim Water Industry Specification WIS 4-32-13 (as prepared by the Water Research Centre under the Direction of the British Water Services Foundation for Water Research) and quality assured in accordance with BS 5750 Part 2. The pipe material shall be made from PE-MRS100 as classified in CEN TC 155, the European Technical Committee responsible for drafting plastic pipe systems for water supply, and defined in WIS4-32-3P.

24. IRON CASTINGS

Unless otherwise specified Iron Castings shall comply with B.S. 1452/1990 for Flake Graphite Cast Iron.

25. CAST IRON FLANGE RINGS AND BLANK END PLATES

Cast iron Flange Rings and Blank End plates shall comply as to dimensions and numbers and size of bolts with B.S. 2035 / 1981.

26. CAST IRON TEES

Cast Iron Tees shall be used in all cases, except for smaller sizes than 50mm (2") diameter. Below 50mm (2") diameter P.V.C. or gunmetal tees shall be used.

27. BOLTS AND NUTS

Bolting for pipes and fittings shall comply with the relevant provisions of BS4504, Part 1, except that spheroidal graphite iron bolts for use with Ductile Iron Pipes and Fittings shall be manufactured from metal complying with the provisions of BS 2789 for grade 500/7.

28. WATER SERVICE CONTROL UNITS

Water Service Control units are complete with integral stopcock and extension spindle (to enable consumer to turn off supply without opening the unit), water meter with pulse unit (capable of being connected to a transponder) with quick release connection and locking lid. See attached diagram.

29. SLUICE VALVES

Sluice Valves shall comply with B.S. 5163. All sluice valves are to be clockwise closing wedge gate valves.

30. AIR VALVES

Single air valves shall be fitted to watermain at all high points where air is likely to accumulate.

These valves may be of the flange or "screw - down" with isolating plug cock. The "screw down" type may be fitted by means of a gunmetal saddle or a C.I. tee with a tapped flange.

To facilitate the filling and emptying of watermain suitable located double air valves shall be fitted (on pipe sizes of greater than 6")

All air valves shall be suitable for working pressures up to 12.2kg/cm² (175 p.s.i.).

31. SCOUR VALVES

Scour Valves shall be fitted at convenient locations so that watermain can be adequately scoured into a nearby stream or watercourse. Sluice

Valves used for scouring purposes shall be fitted on a Tee-branch as near as possible to the main.

A 75mm (3") scour shall be used on all watermains from 100mm (4") diameter to 300mm (12") diameter. A 50mm (2") scour shall be used on watermains 100mm (4") diameter.

32. FIRE HYDRANTS & FITTINGS

Hydrants shall comply with B.S. 750 / 1984, Type 2-screwdown streamline pattern.

Hydrant inlets shall be 80mm diameter flanged and outlet pieces shall be 54mm diameter male round threaded gunmetal or equivalent.

Hydrants shall be capable of withstanding 24 bar test pressures.

Hydrants shall be clockwise closing with non-rising stems.

33. BULK WATER METERS

Bulk water meters are to be fitted at the intake/source/beginning of each scheme.

In large schemes where there are significant branch lines Design engineers may specify meters on branches to enable zoning for future leak detection purposes.

When fitting a meter in order for it to work correctly it must be a distance equal to 10 times its own diameter downstream of any changes in pipe size or direction and a distance upstream of six times its own diameter.

The type of meter presently being fitted in Mayo is the Kent Helix 4000 or equivalent including pulse unit and logging device.

Care shall be taken that heavy components such as valves and meters are fully supported so that no torque or weight is transmitted to the pipeline.

Meter chambers are to be constructed on a 150mm concrete base in 225mm concrete blockwork or in approved precast concrete sections. Internal dimensions 1.2m x 0.6m with a 50mm sump in one corner to enable chamber to be pumped out if need be.

Manhole cover to be triangular multileaf hinged and locked. Ductile iron grade 500-7 in accordance with ISO 1083,1987 with 1.2m x 0.6m clear opening.

EXCAVATION LAYING WATERMAINS AND BACK FILLING

34. EXCAVATION

Excavation shall be understood to mean excavation in any material whatever except solid rock which is specified separately.

Trenches shall not be opened in excess of 800 metres ahead of pipe laying. The trench shall be kept as narrow as practicable but must allow adequate room for jointing the pipes and placing and compaction the backfill.

The minimum trench width for pipes with O.D. 60mm-110mm shall be 300mm.

Where two pipes are laid in the same trench the maximum width of trench shall be 450mm(18") greater than the combined external diameters of pipes to allow 150mm(6") for compaction between the pipes.

Mains shall be laid **with cover, measured vertically from the top of the pipe to the surface of the ground of not less than one metre (3'3")**.

Mains, which could be located under the road in future improvement schemes shall be laid so that the eventual cover, **shall not be less than one metre**.

In all cases allowance shall be made for laying the pipes on a prepared underbed of a fine grained imported granular material - (maximum particle size of 10mm). The prepared underbed, when lightly compacted, **shall not be less than 50mm(2")** or a quarter of the pipe diameter, whichever is the greater. In all cases the underbed shall provide uniform support to the pipe for its full length.

The imported granular material shall comply with the range of grading envelopes tabulated below.

Percentage Passing by Mass (Test 7a of BS 1377)

BS 410	Type 3	Type 4
<u>Sieve Size</u>	<u>Coarse Sand</u>	<u>Medium/ Fine Sand.</u>
75mm	100	100
63mm	100	100
37.5mm	100	100
20mm	60-100	100
10mm	15-60	85-100
5mm	5-20	45-85
600µm	0-10	8-45
75µ	0	0-5

35. ROCK EXCAVATION

The term “rock” is to be understood to mean solid rock in mass formation including boulders in excess of one half of one cubic metre in volume with hardness of three or more on Mohrs’ scale of hardness. Rock excavation will be measured separately and paid for at the extra rate over other excavation rates. Only the quantity excavated, (in accordance with paragraph 37) to enable the pipeline and other fittings to be laid and constructed according to the excavation contract, will be paid for at the rate for rock.

36. EXPLOSIVES

The use of explosives will not be permitted unless the contractor has the required licence from the Garda Siochana.

All existing services (sewers, watermains, cables, etc.) or structures shall be carefully protected from the effects of blasting. The Contractor at his own expense shall immediately repair any damage caused by blasting.

Blasting will only be permitted when the Contractor has informed the Engineer in writing of details of his design and proposals in respect of each blast at least 8 working days in advance and when the Engineer has confirmed these to be adequate.

Only personnel having substantial expertise in blasting work are to execute the blasting.

Tenderers may not assume that any blasting method will be allowed and should ensure that rock and boulder excavation by approved mechanical methods are provided for in the Tender.

37. EXCAVATION IN FAULTY GROUND

All soft places, faults, etc. In the bottom of the trench shall be excavated to such a depth as may be directed and void(s) filled to within 75mm (3”) of the required level with concrete composed of 20 parts of gravel to one part of the cement on which shall be placed in position a layer of 75mm (3”) of sand well rammed.

Where soft ground is encountered on the route of the pipeline or on the proposed location of any of the structures pertaining to the scheme The Local Authority Engineer will decide what extra support works **if any** are to be carried out.

Where practical the trench is to be deepened to permit the pipes to rest on firm ground. Alternatively the trench may be backfilled to a suitable level with hardcore or gravel well compacted brought up to a suitable level with sloped or embanked sides to ensure pipelaying with minimum cover of 1 metre. Depending on the nature/consistency of the material in which the pipe is being laid it may be possible to construct the gravel/hardcore embankment to a finished level of the underside of the pipe bedding material whereby the pipe could then be laid and backfilled immediately to prevent floatation of the pipe. If the consistency of the material is very watery it may be necessary to construct the embankment to a level of minimum of 600mm above the crown of the pipe and then to dig through and lay the pipe in the embankment in a granular bed and surround or as directed by Local Authority Engineer.

38. PUMPING AND BAILING

The Contractor shall remove by pumping or otherwise any water, which may accumulate in the trenches and other excavations, made under this contract and shall construct any works necessary to keep them entirely free of water while the watermains and/or foundations are being constructed.

39. TREE FELLING

The line of the watermain should be selected to avoid as far as possible all growing timber. Where, however, trees must be felled, work shall be carried out with the utmost care and with the permission of relevant authorities. The contractor shall be held responsible for any damage to other trees or any other structure during the felling. All roots shall be grubbed up and the site left clean.

40. PROTECTION OF EXISTING SERVICES AND STRUCTURE

All existing services (watermains, sewers, cables, etc.) and structures encountered in the course of the work shall be protected as directed by the person, company or Authority in whom they are vested. All road, railway and bridge crossings shall be carried out in accordance with the instructions of the person, company or Authority in whom they are vested.

Where a pipe passes underneath or through any wall or fence of any description, the work of cutting away and making good shall be carried

out by the Contractor at his expense unless otherwise provided for in the contract.

41. LAYING OF WATERMAINS

All watermains shall be completed with air valves; scour valves, sluice valves, hydrants and other specials as shown on the drawings or detailed elsewhere in the specification. All watermains shall as far as possible be laid in the road margins and clear of the road surface.

42. JOINTING OF PIPES

In all cases the pipe manufacturers instructions for laying and jointing of watermains shall be strictly adhered to. Where the manufacturers recommend the use of special jointing tackles, the Contractor shall provide for the use of these to assemble all pipe joints. All concerned with pipe jointing shall be properly trained and full conversant with the manufacturers instructions and shall be capable of carrying them out.

Before making any joints, the Contractor shall ensure that all jointing surfaces have been thoroughly cleaned and dried and maintained in such condition until all the joints have been completely made or assembled.

High performance polyethylene pipes and fittings shall be jointed using the following techniques:

- Adjacent lengths of pipe shall be butt fused using only automatic butt fusion equipment with integral data retrieval detailing values of parameters for fusion welding pertinent to each completed joint.
Butt fusion welding will be carried out using the Water Research Council Specification WIS-4-32-08.
Heating plates must be kept completely clean and the first two welds from each session must be discarded, these will be considered dummy welds.
- Coupler fittings shall be electrofused at branch tee connections and in-trench joints and for saddle fittings at house connections. Equipment and methods shall comply with the above named specification.
- Where possible the butt fusion jointing will take place outside of the trench and then be lowered into the prepared trench. This will prevent unnecessary contamination of the joint.

Before butt fusion welding will commence the Contractor will submit the following to Mayo County Council:

- A list of relevant parameter values – Appendix F of WIS-4-32-13
- Complete servicing and calibration records for each item of fusion equipment
- Names of all persons who will undertake and supervise the butt fusion and electrofusion of pipes and fittings. Certification from relevant training authority will also be required.

Sampling of welds will be at a rate of one weld per day's pipe welding programme for each machine on site. For pipe 300mm in diameter, or smaller, four test pieces are to be tooled from each selected weld at locations 90° relative to each other. These tensile test pieces shall be tested individually at an approved laboratory to ascertain the failure mode and the stress recorded across each weld at tensile failure.

The Contractor shall be deemed to have included in his rates for the cutting and discarding of the first two dummy welds each day.

43. EXTREME WEATHER CONDITIONS

Pipelaying shall not be carried out when the temperature is below 0 C. Particular care shall be exercised when laying pipes at extreme temperatures.

44. RIVER, STREAM AND FIELD DRAIN CROSSINGS

Mains and services laid under rivers or streams shall be inserted in a concrete pipe sleeve which shall be bedded in and surrounded by 150mm (6") of concrete for a length extending 1 metre (3'3") beyond either side of the river or stream (as measured at ground level). Adequate cover, in no case less than 225mm (9"), shall be provided between the top of the concrete surround and the bed of the stream. Mains or services laid under field drains shall be inserted in concrete pipes. Damaged field drains shall be made good.

45. BRIDGE AND CULVERT CROSSINGS

Where a pipeline has to be laid across a bridge or culvert, the pipeline must be laid in the road or margin provided that the depth between the road surface and the keystones of the arch is sufficient to give a minimum cover of 300mm (12") on the pipeline. In all such cases, the pipeline should be wrapped in insulation and encased in a 150mm (6") surround of concrete for the entire length of the bridge or culvert, and same brought up to surface level along parapet, arises chamfered.

Where the above cover is not possible the pipeline shall be laid with suitable bearers secured to the outside face of the parapet wall. The pipeline in these circumstances shall be encased in fibreglass or other insulating material protected by tar - reinforced paper or sheet polythene surrounded in net wire and clipped finally by metal straps to the bearers. Care shall be taken that heavy components such as valves are fully supported so that no torque or weight is transmitted to the pipeline.

46. RAILWAY CROSSINGS

Railway crossings shall be carried out in accordance with Iarann rod Eireann regulations and requirements.

47. ALTERATIONS TO EXISTING WORKS

Where it becomes necessary, in the opinion of the Local Authority to change the location of any sewer, drain or other structure not otherwise provided for in the specification, the Contractor shall do the whole of the work of making such changes of such portions as the Local Authority may direct and the work will be paid for as extra work. The contractor shall provide without additional compensation, suitable temporary channels for the water that may flow along or across the work.

48. MAINTAIN TRAFFIC

Unless permission is given to the contrary, the material excavated from the trench and the materials of construction shall be so deposited and the work so conducted as to leave free passage for pedestrians and vehicular traffic. During the progress of the work, the contractor shall maintain all cross walks, footpaths and roadways in satisfactory condition and the work shall be at all times carried out in such a manner as to cause a minimum of inconvenience to the public along the line of work.

The Contractor shall provide, where necessary, and as required, steel plates or timber planks, which he shall place over trenches so as to provide access to houses for pedestrians or vehicles and also at road intersections to permit free flow of traffic.

49. BACKFILL

For the protection of the pipe, initial backfilling should be carried out as soon as possible after laying.

The initial backfill should be of similar material to that specified above for the underbedding. It should be carefully placed and thoroughly compacted around the pipe.

When the excavated material includes stone, the consolidated depth of the initial backfill over the crown of the pipe should be 150mm (6").

This may be reduced to 100mm (4") where backfill free from stones is available in sufficient quantity to fill the next 300mm (12") of the trench. At no time should heavy irregular shaped rocks, stones or other objects be included in the backfill at such level that they might protrude through the initial backfilling layer and come in contact with the pipe. The trench should be pumped out if need be

50. ERECT BARRIERS

When required by the Local Authority suitable fences and barriers shall be placed along the sides and ends of trenches to maintain a safe site.

51. TEMPORARY REINSTATEMENT OF SURFACES

Where pipe trenches are through fields, gardens or road margins, the trench will be backfilled with suitable material to within 150mm of the finished surface, followed by 200mm of topsoil or original sods. The topsoil or sods shall be replaced and compacted in their original position and any subsidence shall be made good from time to time as required.

Where pipe trenches are in the road margin, and within 1.0m of the edge of the surfaced carriageway, the trench will be backfilled with compacted layers of 804, no greater than 200mm, to within 150mm of the finished surface and finished as outlined above.

Where pipe trenches are through tarmacadam, tar sprayed or waterbound roads, the trench is to be cut using an appropriate saw. The trench will be backfilled with compacted layers of 804, no greater than 200mm, to

within 40mm of the finished surface. The cut edge in contact with the bitumen shall be sealed with bitumen for the 40mm depth. The trench will be finished with a 40mm layer of rolled bitumen macadam wearing course.

Where pipe trenches are through unpaved or gravel road the trench will be backfilled with compacted layers of 804, no greater than 200mm, to within 100mm of the finished surface. The trench will be finished with a medium sand-blinding coat rolled in place.

All temporary surfaces shall be maintained in safe and tidy condition and any subsidence shall be immediately made good, until such time as permanent restoration has been carried out by the Local Authority.

52. PERMANENT RESTORATION OF SURFACE IN FIELDS

Permanent restoration shall not be carried out until all subsidence has ceased. After making good subsidence, trenches through fields, gardens or grass margins shall be reinstated level with the surrounding ground. Grass seed and fertiliser are to be applied.

53. PERMANENT RESTORATION OF ROADS

Mayo County Council shall carry out permanent restoration of roads.

54. ANCHOR BLOCKS

An anchor block of insitu-concrete shall be provided at any change in direction where a special or bend is required to withstand thrust resulting from internal water pressure e.g. at blank ends. The minimum size shall be 1 metre (3'3") in length and have a minimum depth of concrete equal to the diameter of the pipe plus 150mm(6"). It shall extend from the pipe to the undisturbed side of the trench.

55. VALVE CHAMBERS AND SURFACE BOXES

Each sluice valve, scour valve, air valve and hydrant shall be enclosed within a valve chamber.

Valve chambers shall be built on a 150mm(6") base in 225mm(9") concrete blockwork or in approved precast concrete sections to suit standard surface boxes and covers. Care shall be taken that no portion of the chamber shall rest on the watermain.

Valve chambers shall be provided with heavy-duty surface boxes of ductile iron.

Air valve and hydrant boxes shall be cast to incorporate the letters "A.V." and "F.H." respectively thereon. Sluice Valves surface boxes shall be badged "w" or "S.V." as specified.

Each surface box shall be provided with a Grade C20 rectangular surround keyed into chamber roof slab as detailed on the drawings. See relevant drawings.

56. MARKET POSTS

Marker posts shall be reinforced concrete manufactured in accordance with I.S. 162/1968 or to Local Authority requirements. They shall be set in concrete and shall project at least 450mm(18") over ground level.

Marker posts shall be placed to indicate position of all Sluice Valves (SV), Air Valves (AV), Scour Valves (ScV) and Meters (M).

57. SERVICE CONNECTIONS

All service connections shall conform to Local Authority requirements. All mains tapings shall be 12mm in diameter using approved types of saddles and ferrules. Minimum cover to service pipes shall be 0.6m(2'0"). Stopcock with incorporated water meter of approved type. The stopcock cover shall be set in concrete at ground level.

Where the watermain is located on the public road, the stopcock shall be fitted on the margin or footpath at the curtilage of the premises to be serviced. Where the watermain is located on private property the stopcock shall be located as near as possible to the watermain.

Water service connections shall generally terminate at the consumer's property boundary.

Service pipes to fields shall have cover as specified above and shall be connected to approved type drinking troughs **with totally enclosed ball valves.**

Each house shall have a separate tapping to the watermain and the service pipe shall be connected to a kitchen sink with separate shut off valve under the sink. Service pipe and house plumbing shall be in accordance with outline specification for the erection of a new house (obtainable from Government Publications, Sun Alliance House, Molesworth Street, Dublin).

58. WORKING PRESSURE

Maximum working pressures shall be in accordance with the following;

Maximum Allowable Sustained Working Pressures for High Density and P.V.C. Pipes

Class	Bar	M Pa or N/mm ²	Kgf / cm ²	1bf / sq. in	Head of Water meters / feet	
B	6	0.6	6.12	87	61	200
C	9	0.9	9.18	130	91	300
D	12	1.2	12.24	173	122	400

59. TESTING OF WATERMAINS

Pipelines shall be tested in sections under hydraulic pressures in accordance with the following table:-

TEST PRESSURES FOR H.D. & P.V.C. PIPES

Class H.D. & P.V.C.	Bar	Mpa or N/mm ²	Kgf / cm ²	1bf / sq. in	HEAD OF WATER Meter / Feet	
B	9	0.9	9.18	130	91	300
C	13.5	1.35	13.77	195	137	450
D	18	1.8	18.45	269	182	600

The Contractor shall give the Engineer at least 24 hours advance notice of his intention to carry out a pressure test.

The length of pipeline to be tested shall consist of one class of pipe only. The testing of pipelines in unduly long lengths is not allowable and test section shall not exceed 2,000 meters, provided that the difference in

elevation between any two parts of the pipeline being tested shall not exceed 15m.

The first section (which should not exceed 1,000 meters) must be tested before any further pipes are laid.

All sluice valves on test section shall be in a fully open position and tests shall be carried out against blank flanges.

The test pressure, in accordance with the above table, shall apply at the highest point of the section under test. Care shall be taken; however, to ensure that no point on the pipeline under test is subjected to more than twice the normal working pressure for the class of pipe under test.

Repeated stressing of pipelines by the application of water pressures in excess of the normal working pressure shall be avoided.

Prior to testing the pipeline shall be charged with water and all air released. The pipeline shall then be brought up to and maintained at the maximum sustainable operating pressure and left for a period of not less than 24 hours to allow for absorption and to achieve stable hydraulic conditions.

60. TEST CRITERIA

The following criteria shall be applied in determining the result of a test:

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- i. No loss of pressure over a 20 minute period
Or
- ii. In the case of uPVC, HDPE and Ductile Iron pipes, thereafter water shall be added by pumping until the test pressure is reached. If a drop in pressure occurs, more water will be pumped in to restore the test pressure. This procedure will be repeated at regular intervals during a test period of 4 hours. The test will be deemed satisfactory when the amount of water lost during the test period shall not exceed 0.1 litre per millimetre nominal internal diameter per kilometre length of pipeline per 30 meters applied test pressure head per 24 hour test period duration.
- iii. In the case of High Performance Polyethylene Pipe, the sustained pressure on the pipe is released and the pipe is left for a further 24 hours. The pipeline is then pumped until the test pressure is achieved. Time, t_L in minutes, is the time taken from start of pressurisation until test pressure is achieved. After further periods of t_L , $7t_L$ and $20t_L$, the reduced pressure readings P_1 , P_2 and P_3 are noted.
The times t_L , $7t_L$ and $20t_L$, are adjusted by adding $0.4t_L$ to each reading to give t_1 , t_2 and t_3 . These readings should be plotted on log-log paper

against P_1 , P_2 and P_3 . The pipeline has passed the test if the slope of the logarithmic decay against corrected time lies between 0.045 and 0.13. A slope of less than 0.045 may indicate the presence of air in the pipeline. A slope of greater than 0.13 may indicate an unacceptable leak. If a re-test is required the pipe must be left unpressurised for at least 24 hours.

61. STERILISATION OF WATERMAINS

Before handing over completed works, the Contractor shall thoroughly cleanse (using foam swabs) and sterilise all watermains in the contracts.

Watermains shall be sterilised after testing, cleaning, flushing and scouring.

Chlorine solution shall be applied at the charging point as each section of watermain is being filled. Dosing shall be continued until the main is full and until at least 25 mg/1 of free chlorine has been made available.

Flowback into already sterilised watermains shall be prevented.

The sterilised water shall be left in the pipeline for a period not exceeding 24 hours.

The sterilisation process shall be repeated if the chlorine residual, at the far end of the mains (furthest from the point of chlorine injection) reaches a level less than 10 mg/1.

Wastewater with chlorine solution shall be disposed of in such a manner as to avoid the pollution of natural water and watercourses.

CONCRETE STRUCTURES

62. STANDARD SPECIFICATIONS (CONCRETE)

Embodied in this specification are the following specifications: -

I.S.	1	:	1987	Portland Cement (amended 197S1)
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I.S.	5	:	1974	Aggregates for Concrete
I.S.	20 (Part I)	:	1987	Concrete Building Blocks
I.S.	162	:	1968	Concrete Marking Posts
B.S. 4449 (1988) & B.S. 4482 (1985)				Rolled Steel Bars
B.S. 4483 (1985)				
B.S. 4482 (1985)				Mild Steel Wire

63. CONCRETE

Concrete used in Concrete Structures for group schemes shall comply with the concrete grade parameters in the following table: -

CONCRETE GRADE		C35	C20
Characteristic 28-day cube strength	(N/mm ²)	35	20
Maximum Aggregate Size	(mm)	20	20
Minimum Cement Content	(Kg/m ³)	370	300
Slump	(mm)	50-100	30-70
Maximum Water / Cement Ratio:		0.50	0.55

Grade C 35 concrete shall be used in the following structures: -

Dams, Intake Chambers, Sumps, Reservoirs and roofs.

Grade C 20 concrete shall be used in the construction of the following: -

Pump houses, Valve Chambers, Culverts, Bridge Crossings and Anchor Blocks.

Where readymix concrete is used, it shall be in accordance with the above specification and the supplier shall provide a certificate to that effect.

64. PLACING OF CONCRETE

All concrete shall be placed in accordance with Standard Codes of Practise. During inclement of frosty weather, all concreting work shall be suspended. Concrete damaged by frost or otherwise defective shall be taken out and replaced with good concrete. All exposed concrete surfaces shall be kept moist for at least 14 days after placing.

65. CEMENT MORTARS

Cement mortars shall be mixed in one of the following proportions: -

Class	Mix	Cement	Cleaned dry washed sand
A	1 : 1	50 Kilo bag	50 Kilo (.98 Cwt.)
B	1 : 2	50 Kilo bag	100 Kilo (1.97 Cwt.)
C	1 : 3	50 Kilo bag	150 Kilo (2.95 Cwt.)

Cement mortars shall be mixed, as and when required and only in small quantities. Any mortars which has become too set or which has been mixed for a period of more than one hour shall be rejected. Class A mortar shall be used for jointing stoneware or precast concrete pipes and forming inverts, Channels and Junctions. Class B mortar for bedding bricks and blocks and for the finishing plaster cast. A Class C mortar in the under-coast for plastering.

66. PLANS

Pump houses, reservoirs, breakpressure tanks, intake chambers, treatment works shall be constructed in accordance with plans and specifications approved by the Local Authority.

67. BLOCK WALLS

Walls of concrete blocks shall be built-in foundations as specified and shown on detailed plans. They shall be built on horizontal even and uniform courses with regular joints not exceeding 8mm (5/16"). Intersecting walls shall be properly bonded with each other, all courses particularly at quoins and intersections being properly levelled and plumbed.

68. PLASTERING

Surfaces to be plastered shall be washed down and roughened or have a scudding coat applied to form a key. The undercoat 13mm (½") thick of Class C cement mortar shall, after 24 hours be brushed down with water and the finishing coat 13mm (.5") thick of Class B cement mortar shall be applied and finished with a wooden hand float. The finished surface must be level and plumb and show no markings or imperfections. Alternatively the final coat shall be a line pebbledash consisting of 6 parts by volume of pebbles passing 13mm (.5") mesh, 3 parts lime 1 part same and 1/2 part cement. A time of 24 hours shall be allowed to lapse between application of one coat and the next. As approved Water proofing additive shall be used in all plaster work to manufacturers' instructions.

69. FENCING

Sites of pump houses, treatment works, reservoirs, breakpressure tanks, intake chambers and sources shall be properly fenced using concrete fence posts, chain link fencing and suitable entrance and piers.

Concrete fence posts shall be to I.S. 136 / 1982
Chain link fencing shall be to I.S. 130 / 1980

70. WATER-RETAINING STRUCTURES

All Water-Retaining Structures to be constructed from either Insitu-reinforced concrete with appropriate waterbar detail or precast concrete in accordance with Local Authority.

71. CLEANING WATER-RETAINING STRUCTURES

On completion of construction and before any sterilisation, internal surfaces of structures shall be cleaned thoroughly in such a way as to remove all oil, grit and other deleterious material.

72. TESTING WATER RETAINING STRUCTURES

After cleaning and as far as practicable before any earth or other material is placed against the wall faces, the structure shall be filled with water at a rate approved by the Engineer.

After allowing a period of three days for absorption, the water level shall be recorded by a hook and vernier attachment or by other approved method. The water shall be allowed to stand for a further seven days,

during which the total permissible drop, after allowing for evaporation and rainfall, shall not exceed $1/500$ of the average water depth of the full tank or 10mm whichever is less.

Notwithstanding the satisfactory completion of the above test, any leakage visible on the outside faces of the structure shall be stopped. Any caulking or making good cracks in the wall section shall, where practicable, be carried out from the inside face.

73. STERILISATION OF STRUCTURES FOR POTABLE WATER

Immediately before acceptance of any structure for potable water, hypochlorite solution shall be distributed over the floor so as to give a uniform concentration of not less than 20mg/l of free chlorine in 300mm depth of water. This solution shall then be used to spray the roof soffit, walls and any columns ensuring that any exposed areas are covered. The solution shall then run to waste and the structure flushed with potable water **taking care not to cause pollution.**

