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Hunter Water Corporation A.B.N. 46 228 513 446
Standard Technical Specification for:

**CONSTRUCTION OF MINOR WATERMAIN
EXTENSIONS**

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1. GENERAL

1.1 Scope

This Standard Technical Specification details requirements for the construction of minor watermain extensions and submains up to nominal diameter DN 50.

1.2 Interpretation

Headings are for the convenience of the reader and shall not be used in the interpretation of this Standard Technical Specification.

Unless the context requires otherwise any expression such as "give notice", "submit", "approval", or "directed" means give notice to, submit to, approval by, or directed by the person nominated by the Principal or Purchaser.

2. REFERENCED DOCUMENTS

The following Hunter Water Corporation standard drawings are deemed to form part of this Standard Technical Specification:

WCP-100 Symbols for Construction of Watermains

WCP-200 Mainlaying - DICL Mains - Typical Installation of Pipes and Fittings for DN 100 to 750 Mains

WCP-201 Mainlaying - UPVC Pipes - Typical Installation of Pipes and Fittings for DN 100 to 250 Mains

WCP-202 Mainlaying - Pipe Support and Trench Fill for DN 100 to 750 Mains

WCP-203 Mainlaying - Trenchstops and Bulkheads for DN 100 to 750 Mains

WCP-207 Mainlaying - Copper Sub-Main in Cul-De-Sac for DN 50 Sub-Mains

WCP-208 Mainlaying - DN 100 DICL Watermain in Cul-De-Sac

WCP-209 Mainlaying - Polyethylene Sub-Main in Cul-De-Sac for DN 50 Sub-Mains

WCP-300 Installation - Hydrants for DN 100 to 750 Mains

WCP-301 Installation - Stop-Valve for DN 100 to 375 Mains

WCP-304 Installation - Driveway/Roadway Crossings for DN 100 to 750 Mains

WCP-400 Dual Water Service Connections for DN 100 to 750 Mains

SK7031 Thrust Blocks for 100-600mm Tees and Bends

3. GENERAL CONSTRUCTION

3.1 Order of Construction

Undertake and complete all work including fittings before connection is made to the existing watermains.

3.2 Environmental Protection Measures

Implement and maintain environmental protection measures and before disturbing the natural surface on Site submit an Erosion and Sediment Control Plan all in accordance with STS900.

3.3 Work in Roadways

Obtain and comply with the requirements of the Local Council and the Roads and Traffic Authority whenever work is to be undertaken in a roadway.

4. MATERIALS

4.1 General

Comply with all recommendations of the manufacturers regarding the storage and handling of the materials. Undertake all handling, transport and storage such that no damage occurs to the materials including coatings and linings.

Any damaged material will be rejected. Do not use any rejected material in the Works and remove it from the Site at the earliest opportunity.

4.2 On-site Stockpiles

Only store sufficient materials on site as are necessary to allow timely and efficient progress of the work. Locate stockpiles of excavated or imported material where they cause no interference to the public, drainage routes or vehicular or pedestrian traffic. Clear lines of sight for drivers must not be obstructed. Do not stack materials against structures, fences, trees or other property improvements. Leave a clear path at least 600 mm wide between the edge of any excavation and the inner toe of any stockpile or spoil banks.

4.3 Bedding Sand

Supply bedding sand embedment material in accordance with Standard Technical Specification STS101.

4.4 High Grade Compaction Sand

Supply high grade compaction sand embedment material in accordance with Standard Technical Specification STS101.

4.5 Select Fill

For select fill use excavated material, free from organic matter and having a particle size no larger than 20 mm. The material shall be suitable to allow compaction as specified without causing damage to the pipeline. If material excavated during excavation does not comply, import non-cohesive material.

4.6 Trench Fill

Where the trench is not subject to traffic loading use excavated material for fill in the trench fill zone provided it has a particle size no greater than 75 mm across the largest dimension, is free from organic matter and can be placed into a dense mass free of voids and cavities.

For trafficable areas use:

- cement stabilised trench fill in accordance with clause "Cement Stabilised Trench Fill" for all existing roads; or
- crushed rock dust in accordance with Standard Technical Specification STS101; or
- crushed rock in accordance with Standard Technical Specification STS102; or
- as directed by the authority responsible for the trafficable area.

4.7 Cement Stabilised Trench Fill

Cement stabilised trench fill shall comprise a 14:1 sand:cement mix.

4.8 UPVC Pressure Pipes and Fittings

Supply UPVC pressure pipes manufactured in compliance with Section SP4 of the Water Services Specification (WS-Spec) and as indicated for Hunter Water Corporation in the Table(s) of Water Agency Practices. WS-Spec is available from Standards Australia.

Unless specified otherwise, use Series 2 (Cast Iron Outside Diameters) flexible jointed pipes to Class 20. Do not use UPVC pressure pipes exceeding 6 months of age from the date of

manufacture. All fittings for UPVC pressure pipelines are to be ductile iron to Clause "Ductile Iron Pipes and Fittings" and internally and externally coated with a thermal bonded coating in accordance with Section SP30 of the Water Services Specification (WS-Spec) and as indicated for Hunter Water Corporation in the Table of Water Agency Practices. WS-Spec is available from Standards Australia.

4.9 Ductile Iron Pipes and Fittings

Supply ductile iron pipes and fittings manufactured in compliance with Section SP2 of the Water Services Specification (WS-Spec) and as indicated for Hunter Water Corporation in the Table of Water Agency Practices and including seal coating of the cement lining. WS-Spec is available from Standards Australia. Use flexible jointed pipes to Class K9, flanged pipes to Class K12 and fittings to Class 14 or Class 16.

4.10 Grey (cast) Iron Fittings

Supply cast iron fittings manufactured in compliance with Section SP3 of the Water Services Specification (WS-Spec) and as indicated for Hunter Water Corporation in the Table of Water Agency Practices. WS-Spec is available from Standards Australia. Use fittings to Class C. Do not use grey cast iron fittings if ductile iron fittings to clause "Ductile Iron Pipes and Fittings" are manufactured.

4.11 Steel Pipes and Fittings

Supply steel pipes and fittings manufactured in compliance with Section SP1 of the Water Services Specification (WS-Spec) and as indicated for Hunter Water Corporation in the Table of Water Agency Practices. WS-Spec is available from Standards Australia.

4.12 Copper Pressure Pipes and Fittings for Submains

Supply Copper pressure pipes, Type A or Type B, manufactured in compliance with AS 1432. Supply Copper pressure pipe fittings and connectors manufactured in compliance with AS 3688.

4.13 Polyethylene Pipes and Fittings for Submains

Supply Polyethylene pipes and fittings manufactured in compliance with Section SP6 of the Water Services Specification (WS-Spec) and as indicated for Hunter Water Corporation in the Table of Water Agency Practices. WS-Spec is available from Standards Australia. Use pressure pipe and fittings of PE 80 Type B Class PN 16 in sizes DN 63 and DN 110 only.

4.14 Joint Seals

Supply elastomeric seals manufactured in compliance with Section SP15 of the Water Services Specification (WS-Spec) and as indicated for Hunter Water Corporation in the Table of Water Agency Practices. WS-Spec is available from Standards Australia. Use seals of either ethyl propylene-diene (EPDM) or nitrile-butadiene rubber (NBR).

4.15 Concrete

Supply concrete from plant(s) with third party certified Quality Systems for the manufacture and supply of concrete. Do not use any admixtures in the concrete. Use only one of the following cements:

- Fly Ash Blended Cement conforming to the requirements of Type SR to AS 3972 and containing 20% fly ash to AS 3582 Part 1, "fine grade" only, or
- Blended Cement, other than fly ash, conforming to the requirements of Type SR to AS 3972.

4.16 Reinforcement

Supply reinforcement which complies with, AS 1302 Steel reinforcing bars for concrete, AS 1303 Steel reinforcing wire for concrete, and/or AS 1304 Welded wire reinforcing fabric for concrete.

4.17 Polyethylene Sleeving

Use green coloured polyethylene sleeving, adhesive tape, strap and buckle in accordance with AS 3680. Supply rolls with protective end flanges and perforated at 6.1 metre intervals.

4.18 Geotextile Filter Fabric

Geotextile filter fabric shall be approved inert material, BIDIM A14, manufactured by Geofabric Australia Pty Limited.

4.19 Fasteners

Supply all nuts, bolts and washers in accordance with AS 2528. All exposed boltheads and nuts shall be hexagonal and the length of all bolts shall be such that tightened bolted connections shall have a minimum of 2.5 threads and a maximum of 5 threads protruding from the nut.

All anchors, bolts, nuts and washers embedded in concrete shall be of Grade 316 stainless steel to AS 2837. All bolts, nuts and washers used in the fabrication and/or installation of stainless steel items shall be of Grade 316 stainless steel to AS 2837. All other steel anchors, bolts, washers and nuts shall be hot dip galvanised in accordance with AS 1650. Grade 316 stainless steel to AS 2837 is an acceptable alternative to hot dip galvanised steel. Passivate all stainless steel components in accordance with STS100.

4.20 Valves and Hydrants

Supply valves and hydrants in accordance with Standard Technical Specification STS103.

5. EXISTING SERVICES

5.1 Protection and Maintenance of Services

Take all actions and provide all things necessary to protect and maintain existing services to the satisfaction of the relevant authority or owner. This may include arranging or performing relocation, temporary diversion or support of the service.

5.2 Repair of Services

If a service is damaged during construction, arrange or perform repair to the satisfaction of the controlling authority or owner. Obtain from the authority or owner, a certificate stating that the repair has been carried out to their satisfaction.

If the service is not under the control of an authority and the owner cannot be located within a reasonable time, report the damage, and arrange or perform repair to an approved standard. Do not backfill, cover up or make the repair inaccessible prior to obtaining approval.

6. CLEARING

Do not destroy, remove or clear vegetation or surface improvements to an extent greater than necessary for the execution of works. Keep clearing along the pipeline to a maximum width of four (4) metres.

Obtain the approval of the Council for the removal of any trees. Take any steps necessary to prevent damage to trees that are not to be removed.

Dispose of all rubbish and surplus material within 24 hours of clearing.

Stockpile topsoil separate from other excavated material and use it to make good the surface after backfilling.

7. EXCAVATION

7.1 Safety

Do not commence any excavation until all materials necessary to make the excavation safe are on Site and available for use. This includes any necessary fencing and barriers as well as trench support systems.

7.2 Limits of Excavation

Keep the extent of excavation to the minimum possible to allow efficient construction of the Works while meeting the minimum requirements shown on the Drawings and the relevant Standard Drawings. Keep pipe trench widths within the maximum widths recommended by the pipe manufacturer.

Keep the sides of excavations vertical to at least 150 mm above the pipe.

7.3 Improved Surfaces

Bore under all improved surfaces such as pavements, driveways and kerb and gutter to avoid disturbance of the surface.

If, for some reason it becomes necessary to excavate through improved surfaces, keep the trench width to the minimum allowed. Saw cut neat straight lines at the outer limits of the excavation through bitumen, asphalt and concrete. Remove pavers, blocks or brick pavements by hand, clean them and set them aside for later replacement.

7.4 Support of Excavations

When removing, raising or withdrawing supports, exercise every precaution necessary to prevent slips or falls and ensure that no damage, disturbance or displacement occurs to the pipes, fittings, geotextile filter fabric, pipe embedment and backfill already installed. Backfill simultaneously with the raising or withdrawal of supports. Ensure that compaction of pipe embedment and backfill material occurs below such trench support and against native ground.

When directed or specified, leave the trench support system in place as permanent support. Cut off the support system at a depth below ground surface that will satisfy the structural requirements of the site.

7.5 Drainage and Dewatering

Keep all excavations free of water. Provide, maintain and operate intercepting works to prevent surface water from entering the excavations; and all equipment necessary for dewatering the excavations and keeping the Works free from water.

Lowering of the water table by well points or other external dewatering methods may only be used if no damage is likely to be caused to adjacent structures and services.

7.6 Surplus Excavated Material

Promptly remove and dispose of excavated material which is not required for reuse. Surplus material is the property of the controlling authority or owner of the excavation site.

8. PIPE BEDDING

8.1 General

Provide underlay in accordance with Drawing WCP-202, and/or WCP-205 as appropriate. Place and compact the bedding to support the pipe uniformly along the whole length of the barrel with chases provided for sockets and couplings.

8.2 Concrete Encasement

Provide concrete encasement of pipes in accordance with Drawings WCP-202 where water mains have less than the minimum cover over the top of the pipe barrel as shown on Drawing WCP-202 or where a building approval has been given to construct a structure over the pipeline.

Extend encasement to finish at the face of pipe joints.

Set pipes to line and level on either bags filled with sand and cement mix or on concrete saddles cast to the outside diameter of the barrel and located near the socket. Ensure that pipes do not move, float or deform while pouring concrete.

Provide a 1500 mm long pipe immediately upstream and downstream of the concrete encasement to allow for differential movement.

9. PIPE LAYING AND JOINTING

9.1 General

After preparing pipe underlay, lay and joint pipes using methods, materials, tools and equipment in accordance with the manufacturer's and/or suppliers instructions and recommendations, the relevant Australian Standards and further requirements of this Standard Technical Specification.

9.2 Method

Clean and examine all pipe system items before laying. Do not use any UPVC pressure pipe which is scratched or scored to a depth greater than 1 mm. Inspect each joint seal for flaws before making the joint.

Reinstate witness marks on the unmarked length of any cut pipes. Do not score pipes when reinstating the witness mark.

Whenever possible commence laying at the downstream end. Lay the pipes with their sockets at the upstream end and their barrels firmly and evenly embedded on the bedding material. Form holes in the bedding to accommodate the pipe sockets or couplings to allow even bearing along the full length of the pipe barrel.

Restrain pipes already laid before the next joint is made to prevent movement of the pipe. Prevent flotation of pipes during laying, backfilling and initial testing.

When jointing UPVC pipes to ductile iron pipes and fittings, **do not joint a ductile iron spigot to a UPVC socket.**

9.3 Pipe Laying Tolerance

Construct pipelines to the following tolerances:

- (a) Horizontal departure from the design position of any point on the pipeline shall not exceed 50 mm.
- (b) If reduced levels are shown on the drawings, departure from the design level of any point on the pipeline shall not exceed 30 mm.
- (c) Unless stated otherwise, the depth from final ground surface level to the top of the pipe shall have or exceed the minimum cover stated on Standard Drawing WCP-202.

9.4 Pressure Main Thrust and Anchor Blocks

Provide concrete thrust / anchor blocks at all valves, flexibly jointed bends, tees, enlargers and reducers or any other point where unbalanced forces resulting from internal pressures will occur. Refer to Drawing SK7031.

The thrust / anchor blocks shall bear against undisturbed material normal to the direction of the thrust over the specified bearing area.

Cure concrete thrust and anchor blocks for a minimum of seven (7) days before subjecting to any thrust load.

Provide temporary anchorage adequate to restrain the pipe when under test.

9.5 Trench Stops

Construct trench stops in accordance with Standard Drawing WCP-203.

Seal the bags in such a manner as to prevent ingress of water or leakage of the contained material.

9.6 Bulkheads

Construct concrete bulkheads in accordance with Standard Drawing WCP-203 where shown on the Drawings and at road crossings under each kerb and gutter or at each road shoulder. Take care to avoid deformation of the pipe during concrete placement.

Concrete bulkheads may be used as an alternative to trench stops on mains of grade greater than 10%.

9.7 Corrosion Protection of Ductile and Cast Iron

If ductile and cast iron items are to be buried, sleeve them with polyethylene fixed with PVC tape complying with clause "Polyethylene Sleeving". Install sleeving in accordance with AS 3681. Do not allow the polyethylene to be exposed to ultra-violet light for more than seven (7) days.

Sleeving may be omitted for items which have a thermal bonded external coating complying with Section SP30 of the Water Services Specification (WS-Spec) and as indicated for Hunter Water Corporation in the Table of Water Agency Practices. WS-Spec is available from Standards Australia.

9.8 Flanged Joints

Select bolting in accordance with AS 4087 Appendix C.

Assemble flanged joints in accordance with AS 4087 Appendix D and the following requirements.

Fit 3 mm thick insertion rubber gaskets to all flanged joints except where 'O' rings are fitted.

Use washers under all nuts. In addition, use washers under bolt heads for connection to items with protective coatings.

Where dissimilar metals would otherwise be in contact, supply and install high strength phenolic insulating washers and sleeves to all connections.

Coat all nuts and bolts, except Grade 316 stainless steel, on all flanged joints with Denso 300 Primer and 400 Mastic/440 Cord, then wrap the entire joint in Denso 600 Tape (double thickness) and over wrap with Denso 931 Overwrap (minimum 55% overlap), all in accordance with the Manufacturer's recommendations.

Apply "Loctite" nickel anti seize thread lubricant or equivalent to all stainless steel fasteners prior to fitting nuts.

9.9 Metal Detector Tape

For UPVC water mains, lay metal detector tapes -"Terratape Sentry Line Detectable 620", on top of the pipe embedment material before backfilling. At valves and hydrants connect the tape to the metal surface fitting.

9.10 Air Release Valves, Stop Valves, Hydrants, Scours and Surface Boxes

Do not construct any valve, hydrant, chamber or surface fitting in a roadway, driveway, paved area or any other area the Corporation considers may restrict access for maintenance purposes or

may endanger the pipeline when in service, unless written approval has been given by the Corporation.

Use stop valves and hydrant tees with the same nominal diameter as the through watermain unless shown otherwise on the project drawings.

9.11 Bored Pipes Under Roads, Driveways and elsewhere

Construct bored pipelines under roads, driveways, footpaths and elsewhere to Standard Drawing WCP-304.

For roads and lengths greater than 5.0 metres use an encasing pipe of sufficient strength to withstand all expected loading conditions.

Fully cement grout the annulus between the encasing pipe and the watermain commencing from the downhill end of the bore. Use a stable grout mix of water/cement ratio 1 to 0.67 by weight with fine well rounded sand added to the grout mix at a ratio of 100 kg sand for every 100 kg of cement. Adjust the consistency of the mix by the addition of a superplasticizer such as "Daracem 100". Ensure full penetration and complete filling of the void.

9.12 Marker Plates

Provide approved 250 mm x 80 mm x 1.5 mm thick aluminium marker plates bearing red reflectorised lettering "AV" for air valves, "SV " for stop valves, "H " for Hydrants and "Sc V" for scour valves opposite and facing each surface fitting.

Where the distance from any existing wall, fence or post to which the notice plate could be conveniently fixed is greater than 10 metres, provide and set firmly in the ground a 100 x 100 x 1600 mm hardwood post. The top of the post is to be 1000 mm minimum above finished surface level. Below ground, apply two coats of tar paint or hot applied tar to the post. Above ground, prime the post and then paint with two (2) coats of white exterior enamel. Drive the posts 600 mm into the ground. In rock set the posts in a 200 mm diameter hole filled with Grade 20 concrete to a minimum depth of 300 mm

Mark distances to the surface fitting, on the marker plate accurate to a tolerance of 100 mm when measured from the centreline of the surface fitting with 12 mm high die stamps.

Additionally mark surface fittings by stencilling 100 mm high letters on the adjacent kerb using yellow road marking paint.

9.13 Abandoned Surface Fittings and Marker Plates

Remove and dispose of all abandoned surface fittings and marker plates.

10. BACKFILLING

10.1 General

Provide and install side-support, overlay and trenchfilling to pipelines in accordance with Standard Drawing WCP-202, and/or WCP-205 as appropriate. Place backfill evenly on either side of pipelines to prevent uneven lateral loading.

Backfill containing boulders, large rocks, logs, stumps, tree loppings, builders refuse, broken concrete and other like material is expressly forbidden.

Keep all dewatering systems operating during backfilling so that no fill material is placed or compacted under water. At all times ensure that the pipes are not damaged or moved during placement and compaction of fill.

Place and compact pipe embedment in layers not greater than 150mm thick and trench fill in layers not greater than 300mm thick, except in roadways use layers not greater than 100mm thick. Compact to the degree noted on Standard Drawing WCP-202 and measured in accordance with;

- for granular fill - the density index determined in accordance with AS 1289.E6.1 based on the field dry density determined in accordance with AS 1289.5.3.1 or AS 1289.E3.5 and the maximum and minimum dry densities in accordance with AS 1289.E5.1
- for non-granular fill - the dry density ratio determined in accordance with AS 1289.5.4.1 based on the field dry density in accordance with AS 1289.5.3.1 and the maximum dry density in accordance with AS 1289.5.1.1.

Compact fill material by manual or mechanical tampers. Compact non-granular fill at a moisture content within plus or minus 2% of optimum and granular fill at a moisture content within plus or minus 3% of optimum. Flooding of the fill is not permitted.

11. RESTORATION

11.1 General

Restore as near as practicable to their pre-existing condition, all surfaces, services and/or improvements disturbed, destroyed, removed or damaged during construction of the Works and during installation of temporary works such as access roads. Improvements shall be deemed to include trees and shrubs, mulched areas, gardens, paving, flagging, proprietary finished areas such as 'pebble crete' and the like, retaining walls, fences and all other structures.

When necessary for the restoration of surfaces, stockpile existing topsoil separately and replace it over the areas where it was previously located when completing backfilling operations. Where there is a shortfall of existing topsoil use approved imported topsoil.

11.2 Timing of Restoration

Undertake restoration to surfaces, services and improvements progressively as the work proceeds. At all times ensure that services are maintained. Complete restoration and repair work within five calendar days after completion of backfilling of each section of the Works unless specifically stated otherwise elsewhere.

Undertake any maintenance of the restoration within two calendar days of the need for such maintenance becoming apparent.

11.3 Pavements

Immediately after backfilling of a trench excavated through a pavement, temporarily restore the surface and maintain it in a trafficable condition until final restoration is completed. Where the original pavement was bitumen or asphalt use a pre-mixed asphaltic material for the temporary restoration. Otherwise use crushed metal or gravel. Complete final restoration of pavements within one month of temporary restoration.

11.4 Turf

Restore areas of established well maintained lawns to the full limits of the disturbed area with approved imported turf. Restoration using sods removed prior to construction will only be approved if the sods are of equivalent standard to imported turf. Also use turf to restore areas where there is significant risk of erosion such as on steep or long slopes.

Following backfilling and initial settlement spread and grade topsoil to achieve a smooth surface free from lumps, stones or other debris and blending into the levels and shapes of the adjoining undisturbed ground allowing for the turf. Mix an approved fertiliser of N:P:K ratio of 10:4:6 (equivalent to "Mulitgro") into the topsoil at a rate of 40g/m².

Lay the turf without gaps on the prepared topsoil surface and lightly top dress and compact. Water regularly until regrowth is established.

11.5 Grassed Areas

For grassed areas not requiring restoration with turf, restore by replacing the pre-existing topsoil or approved imported topsoil, to a minimum thickness of 50 mm. Seed the affected area with grass seeds of the varieties prevalent in the immediate area. Water and maintain the disturbed area until regrowth is established.

If regrowth fails to occur within six weeks of restoration, reseed and maintain until regrowth is established.

11.6 Trees

Where Council or private landowners require replacement trees to be planted, provide suitable trees. Where such replacement trees will be adjacent to a sewer, provide trees suitable for planting adjacent to the sewer as detailed in Hunter Water Corporation's publication entitled "Tree Roots".

11.7 Provision for Settlement

Make good any settlement of the trench during the Defects Liability Period by placing additional approved fill such that the finished surface level conforms with the adjacent surface.

For trenches through other than pavements, turf areas, grassed areas or other improved surfaces, backfill may be placed sufficiently high to compensate for expected settlement unless it would create a hazard or inconvenience to the public. At the end of the Defects Liability Period, trim back such excess material to conform with the adjacent surface and dispose of the surplus.

11.8 Tunnelling

Where tunnelling has been used in lieu of trenching to avoid improved surfaces, backfill such as to restore full support to the surface. Repair any damage to the improved surface which occurs at anytime due to subsidence of the backfill.

11.9 Maintenance of Restored Surfaces

Maintain all restored surfaces and improvements in a satisfactory condition until expiry of the Defects Liability period notwithstanding that any deterioration, and the need for their maintenance, may or may not be due to defects which become apparent or arise from events which occur during that period.

12. CONNECTION TO EXISTING WATERMAINS

Only undertake connection to existing live watermains on completion of all other Works. Give written notice, including full details of the proposed connection procedures, 5 working days prior to making the connection and comply with any directions regarding the method and timing of the connection which are necessary to meet operational needs of the existing water supply system.

Perform the connection on the approved date and at the approved time. Do not commence the connection work unless all necessary materials and equipment are available on site. Undertake all work so as to minimise interruption to the operation of the existing water supply system.

Arrange for the Corporation to shutdown the existing watermains to allow connection. Shutdown of the Corporation's existing mains may not completely prevent the inflow of water into the sections isolated.

[END OF STS407]