THE CITY OF WINDSOR
ONTARIO, CANADA

OFFICE OF THE CITY ENGINEER

June 19, 2017

SEE DISTRIBUTION LIST ATTACHED

Dear Sir and/or Madam:

Re: NEW AND UPDATED Windsor Standard Specifications and AS Drawings
Supplementary Specifications and Mandatory Procedures and Practices
S-2 – Maintenance Holes and Catchbasins
S-8 – Sewer Pipeline and Culvert Rehabilitation by CIPP Liner
S-10 – Hot Mix Asphalt
S-11 – Culverts, Headwalls and Roadside Drainage
S-17 – Reinforcing Steel
S-35 – Private Drain Connection
S-36 – Preservation of Trees
AS--314A
AS-314B
AS-314C
AS-314D
AS-525
AS-542E
AS-554A
AS-554B
AS-559
AS-560

Over the past few years, we have had an internal Specification Review Committee working on revising our existing Standard Specifications and AS Drawings. This has resulted in the development of new Standard Specifications and AS Drawings. This group has looked at our current Specifications and reviewed them with other Municipal Standard Specifications, as well as with the Ontario Provincial Standard Specifications. This letter is to introduce you to our latest seven (7) updated and new Standard Specifications listed above, as well as an updated Supplementary Specifications and Mandatory Procedures and Practices and ten (10) updated and new AS Drawings

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CITY OF WINDSOR

SUPPLEMENTARY SPECIFICATIONS

AND

MANDATORY PROCEDURES AND PRACTICES

JUNE 2017

BOOK OF SUPPLEMENTARY SPECIFICATIONS AND MANDATORY PROCEDURES AND PRACTICES

The specifications, procedures, and practices contained in this document shall be used on all City contracts and take precedent over City of Windsor General Specifications and Ontario Provincial Standard Specifications.

These specifications, procedures, and practices shall not be revised or altered without the expressed consent of the City Engineer.

Where these specifications, procedures, and practices do not meet a site-specific condition, in whole or in part, that portion or portions of the specification, procedure, or practice shall be altered and placed in the Special Provisions for that contract only.

To avoid future ambiguity, these supplementary specifications shall be referred to as Supplementary Specifications I, (SS 1, SS 2, SS 3, etc.) These specifications shall be reviewed periodically.

BOOK OF SUPPLEMENTARY SPECIFICATIONS AND MANDATORY PROCEDURES AND PRACTICES

TABLE OF CONTENTS

BOOK OF SUPPLEMENTARY SPECIFICATIONS AND MANDATORY PROCEDURES AND PRACTICES

1. REVISED STANDARD SPECIFICATIONS AND GENERAL CONDITIONS (May 2017)

As of May 2017, the complete list of City of Windsor Standard Specifications are as follows, and shall apply to any City of Windsor Contracts *(all other Standard Specifications and Standard Drawings in Book II of the Tender shall remain in effect)*:

1. General Condition, revised September 3, 2015

2. Standard Specifications (complete list):

SECTION	STANDARD SPECIFICATION FOR	
S-1	Sewers	January 1999
S-2	Manholes, Catchbasins and Adjustments	MAY 2017
S-3	Excavation and Backfill	January 1976
S-4	Granular Base and Aggregates	January 2015
S-5	Concrete Curbs and Gutter Systems	February 2015
S-6	Concrete Sidewalk and Driveway Approaches	February 2015
S-7	Concrete Pavement and Concrete Base	February 2015
S-8	Sewer Pipeline and Culvert Rehabilitation by CIPP Liner	MAY 2017
S-9	Concrete	February 2015
S-10	Hot Mix Asphalt	MAY 2017
S-11	Culverts, Headwalls and Roadside Drainage	MAY 2017
S-12	VACANT	
S-13	Weighing of Materials	July 2012
S-14	Sodding	February 2015
S-15	Seeding Roadway Areas by Hydraulic Seeding and Mulch Cover Method	February 2015
S-16	Perforated Corrugated Polyethylene Pipe Sub-Drains	January 2015
S-17	Reinforcing Steel	MAY 2017
S-18	Routing and Sealing	July 2012
S-19	Cleaning of Gravity Sewers, Manholes and Catchbasins	January 2015
S-20	VACANT	
S-21	VACANT	
S-22	VACANT	
S-23	Maintenance Painting of Structural Steel	January 2015
S-24	Unshrinkable Backfill	July 2012
S-25	Clearing Blocked Sewer Connections	October 1974
S-26	VACANT	
S-27	VACANT	
S-28	Cold In Place Pavement Rehabilitation with Expanded Asphalt	July 2012
S-29	Utility Cut Restoration	August 2012

SECTION	STANDARD SPECIFICATION FOR	
S-30	VACANT	
S-31	Keyhole Excavations and Permanent Reinstatement of Keyhole Excavations	July 2012
S-32	CCTV Sewer Inspection	January 2015
S-33	Winter Control Snow Plowing, Salting and Snow Removal Activities	January 2015
S-34	Topsoil	February 2015
S-35	Private Drain Connections	MAY 2017
S-36	Preservation of Trees	MAY 2017
S-37	Dust Control	July 2012
S-38	Prevention of Debris from Entering Existing Sewer Systems	July 2012
S-39	Backfill Around Utilities	January 2015
S-40	Installation Method of Traffic Signage Disturbed by Construction	July 2012
S-41	Open Graded Drainage Layer	January 2015
S-42	Cold Milling of Asphalt Pavement	January 2015

3. City Standard Drawings (new release & revision list):

AS-102	**PROJECT SIGN (January 2016)**
AS-102A	**PROJECT SIGN – NO CREST (Eliminated from Book 2 Engineering Drawing March 2015)**
AS-203	**COMMERCIAL APPROACH – NO CURB (October 2015)**
AS-204	**COMMERCIAL DRIVE – CONCRETE (January 2016)**
AS-206C	**STANDARD UTILITY CROSS-SECTION (15M RIGHT OF WAY) (October 2015)**
AS-206D	**STANDARD UTILITY CROSS-SECTION (20M RIGHT OF WAY) (July 2013)**
AS-208	**STANDARD AND SUPERELEVATED CURB & GUTTER FOR RESIDENTIAL ROADS (March 2017)**
AS-208A	**STANDARD AND SUPERELEVATED CURB & GUTTER FOR COLLECTOR & ARTERIAL ROADS (March 2017)**
AS-209A	**BACKFILL OF DITCH/SWALE/TRENCH (September 2015)**
AS-210	**STANDARD CONCRETE DETAILS FOR HEAVY DUTY PAVEMENTS (November 2015)**
AS-211	**STANDARD CONCRETE DETAILS FOR RESIDENTIAL PAVEMENTS (November 2015)**
AS-213	**PAVEMENT WIDENING DETAILS (November 2015)**
AS-214	**28' WIDE ASPHALT PAVEMENT (July 2013)**
AS-221	**RESIDENTIAL DRIVE – ASPHALT (October 2015)**
AS-222	**RESIDENTIAL DRIVE – CONCRETE (January 2016)**
AS-307	**STANDARD GOSS GULLY TRAP (Aug. 2014)**
AS-309	**600mm X 600mm PRE-CAST CONCRETE CATCH BASIN (with Goss Gully Trap) (August 2014)**

AS-309A	600mm X 600mm PRE-CAST CONCRETE CATCH BASIN (August 2014)
AS-310B	CLASS "B" BEDDING DETAIL VARIOUS CASES (August 2014)
AS-313	PRIVATE DRAIN CONNECTION DETAILS (SINGLE) (December 2015)
AS-314	REMOVED
AS-315A	REMOVED
AS-316	REMOVED
AS-317	REMOVED
AS-322	REMOVED
AS-323	REMOVED
AS-324	REMOVED
AS-325	PRIVATE DRAIN CONNECTION CLEANOUT AT PROPERTY LINE (July 2013)
AS-401	RESIDENTIAL CONCRETE SIDEWALK (April 2015)
AS-402	SIDEWALK – WHEEL CHAIR RAMP (February 2016))
AS-403	COMMERCIAL CONCRETE SIDEWALK (March 2017)
AS-404	WHEELCHAIR RAMPS & PEDESTRIAN CROSSINGS AT INTERSECTIONS AND CUL-DE-SAC SIDEWALK TERMINATION (December 2015)
AS-505A	TYPICAL PARALLEL STREET FURNITURE LAYOUTS (APRIL 2015)
AS-505B	TYPICAL SKEWED STREET FURNITURE LAYOUTS (APRIL 2015)
AS-512	REMOVED
AS-513	REMOVED
AS-517	REMOVED
AS-518	REMOVED
AS-520	REMOVED
AS-523	REMOVED
AS-525	REMOVED
AS-527	INSIDE DROP SYSTEM OPEN BOWL IN MANHOLE (March 2015)
AS-528	REMOVED
AS-529	REMOVED
AS-530	REMOVED
AS-531	REMOVED

AS-532	REMOVED
AS-533	REMOVED
AS-534A	ACCESS AREA & MINIMUM CLEARANCE FOR ABOVE GROUND UTILITIES (February 2013)
AS-534B	ACCESS AREA & MINIMUM CLEARANCE FOR ABOVE GROUND UTILITIES (November 2015)
AS-542A	MAXIMUM CURB CUT FOR RESIDENTIAL DRIVEWAYS W/SINGLE DOUBLE CAR GARAGE (November 2013)
AS-542B	MAXIMUM CURB CUT FOR RESIDENTIAL DRIVEWAYS ON CORNER LOTS (November 2013)
AS-542C	FRONT YARD PARKING FOR RESIDENTIAL DRIVEWAYS (November 2013)
AS-542D	EXCEPTIONS (November 2013)
AS-548	WHEELCHAIR RAMPS & PEDESTRIAN CROSSINGS AT INTERSECTIONS (September 2013)
AS-549	TRUNCATED DOME TACTILE SURFACE INDICATORS (October 2013)
AS-550	TEMPORARY LOT DRAINAGE (October 2013)
AS-552	SIDEWALK JOINTING DETAIL (REPAIRS & NEW INSTALLS) (March 2015)
AS-553	DETAIL OF SELF LEVELING CAST IRON TELESCOPIC MANHOLE FRAME (March 2014)
AS-554	CANADA POST COMMUNITY MAILBOX (RESIDENTIAL) (September 2015)
AS-554A	CONCRETE PAVEMENT APPROACH TREATMENT TO HOT MIX AND COMPOSITE PAVEMENTS (March 2015)
AS-554B	COMPOSITE PAVEMENT APPROACH TREATMENT TO HOT MIX AND CONCRETE PAVEMENTS (March 2015)
AS-557	SUBDRAIN DETAIL FOR ASPHALT & CONCRETE PAVEMENT (June 2015)
AS-558	MANHOLE SUPPORT PLATE FOR BRICK MANHOLE LEVELLING (January 2016)

OPS Volume 2, 10-Aggregated (OPSS 1001), OPS Volume 8, 10-Aggregated (OPSS.MUNI 1002, 1003, 1004, 1006, and 1010) shall apply except where noted otherwise.

2. UNIT OF PAYMENT (December 2012)

The following contract items and their corresponding units shall be paid under the unit price bid in the Schedule of Unit Prices, as follows:

CONTRACT ITEMS	*UNITS OF MEASUREMENT*
Earth excavation	*cubic metre*
Hard surface removal	*square metre*
All concrete pavements, driveways and sidewalks	*square metre*
Sewer placement, including private drain connections	*linear metre*
Curb and gutter removal	*linear metre*

CONTRACT ITEMS	*UNITS OF MEASUREMENT*
Curb and gutter placement	*linear metre*
Landscaping restoration	*square metre*
Topsoil placement	*cubic metre*
Granular material	*tonne*
Asphalt pavements and driveways	*tonne*
Manholes	*each (lump sum, including adjustment and frame and cover)*
Catchbasin	*each (lump sum, including adjustment and frame and cover)*
Existing manhole and catch basin adjustment	*each*
Water	*cubic metre*
Dust control	*calcium chloride – tonne*
Saw cutting	*linear metre*
Milling	*square metre*

The above is a guideline designed for payment. However, specific projects may combine these items or modify units as design warrants.

3. EARTH EXCAVATION (Basis of Payment) (February 2015)

To eliminate the need of establishing the actual thickness of overlaying hard surfaces prior to and during construction, the volume of any excavation quantity measured for payment shall include the void within the established lines of the excavation which results from the removal or partial removal of any structure, with the exception of a bridge, and shall include the volume of any pavement, concrete base, sidewalk, curb and gutter or similar item which overlies and which is removed in conjunction with such excavation. For bridge related removal, the Contractor shall follow the specifications in the contract documents.

4. HARD SURFACE REMOVAL (Basis of Payment) (February 2015)

The removal of all hard surface features encountered in construction, such as pavements, alleys, driveways and sidewalks shall be by the square metre. When any curb and gutter are removed in conjunction with a hard surface, it shall be included in the square metre measurement and shall not be measured and paid separately. Saw cutting costs in conjunction with a hard surface removal shall be included in the hard surface removal unit price with the exception of sewer& watermain trench work unless otherwise identified in the tender.

For sewer construction, the trench must be sawcut and will be paid for under its own item or as per the description of the contract documents. Breaking the asphalt shall not be permitted.

All other curb and gutter shall be measured separately and paid by linear metre.

5. THE USE OF BULK WATER FILL STATIONS (BWFS) (February 2015)

The Contractor is reminded that the use of fire hydrants WILL NOT be permitted for any construction related activities. In lieu of fire hydrants, the Contractor is to use Bulk Water Fill Stations (BWFS) at EnWin's Rhodes Drive Operating Centre and other available locations.

Separate Payment will NOT be made for water required during sewer and road construction including compaction of all backfill & base material, pavement, curbs & gutters, driveways, sidewalks or any other structures. The water usage for these items shall be included in the unit prices for each item.

The water application for dust control & placed sod will be paid by unit price respectively.

6. GRANULAR MATERIAL (Basis of Payment) (February 2015)

All granular material shall be paid by the metric tonne. The quantity of Granular "A" material shall only include required Granular "A" for road base. The usage of Granular "A" materials in sidewalk, concrete & asphalt driveways, leadwalks, subdrain and catchbasin construction shall be excluded from Granular "A" unit price and shall be included in the unit price for respective items in the tender.

The quantity shall exclude any granular materials used for sewer, water, and utility trench backfill prior to the road cut, which shall be paid under the sewer and utility installation unit price.

The quantity shall be based on granular tickets collected on site. The Engineer reserves the right to monitor the supply of this material through theoretical calculation and to make a decision based on the review outcome. The Engineer reserves the right to verify the density of granular materials including water content.

7. BACKFILL PRACTICES (February 2015)

The Contractor shall follow the City of Windsor Standard Drawings AS-536, AS-310A, B & C and specific requirements shown in the tender documentation for the material use and backfilling method unless specified otherwise in the next paragraphs.

Sewer Trench Backfill

If full granular backfill is required at any section between two manholes of one sewer run, that entire run shall be backfilled with the same granular material, with the exception of the following case.

Full granular material backfill is required while sewer trench crossing a road intersection even if the sewer trench is deep enough for native backfill as per AS-536. In this case, the granular

backfill shall continue to the end of curving section of the intersection as shown on the tender drawings and then change back to required native backfill as per AS-536.

Maintenance Stone over Trench Area

All underground work shall be completed prior to the start of road cutting. This shall be applicable to all underground work including sewer main, catchbasin leads, private drain connections, and watermain and water services.

The Contractor will be required to backfill all sewer trench excavations within the roadway and the sidewalk to an elevation of 100mm (4") below the existing surface elevation with granular trench backfill material as per AS-536. The Contractor shall complete the top 100mm (4") backfilling by placing, compacting, and maintaining Granular "A" material or other approved materials to match existing surface grade before the road cut.

The cost for these materials shall be included in the unit bid price for the sewer main, watermain, catchbasin leads, and/or connections installed and shall be compensated in full for all labour, equipment and materials required to execute the work as specified herewith. There will be no payment for the maintenance of the materials above the sub-grade.

Unshrinkable Backfill

The Contractor shall refer to City of Windsor specification S-24 and OPSS 1359 – Material Specification for Unshrinkable Backfill and Appendix 1359-A for the unshrinkable backfill practice.

8. RECYCLED AGGREGATE PROGRAM AND QUALITY CONTROL (February 2013)

The Contractor should take a notice that the City of Windsor is currently streamlining the City of Windsor's Operating Manual Recycled Aggregate Program and Quality Control, revised in July 2006. The Contractor is solely responsible to the Corporation in ensuring that recycled aggregate meets the requirements of the Ontario Provincial Standard Specifications and this Supplementary Specification.

Prior to the use of recycled materials on any project, the following procedures are to be implemented:

1. Application to use recycled aggregate is completed and submitted to the Field Services Office prior to any usage of the material.
2. The City will no longer be requiring the Bill of Lading tickets.
3. Environmental testing (leachate) to be submitted for approval annually per source pile under procedures for leachate extraction in Regulation 309 of the Environmental Protection Act. If additional materials added to the tested stockpile or a new stockpile is generated, a new submission and approval shall be required. .
4. Sieve analysis testing, percentage coated asphalt particles, and plasticity index analysis shall be submitted for approval from the stockpile specifically for that project.

In the event that the recycled aggregate is not satisfactory to the Corporation, the Contractor's attention is brought to Clauses GC 5.02 and GC 5.03 of the General Conditions.

Any load of recycled material may be rejected in the field based on visual detection of deleterious materials. Such a rejection will result in the requirement for additional testing of the source stockpile.

The use of recycled materials for road base or any frost susceptible application shall not be permitted.

Under no circumstances shall material designated as hazardous waste be accepted. This shall further include testing for leachate toxic waste if the material is suspect and so requested by the Engineer.

9. ASPHALT ESCALATION (December 2012)

The payment for liquid asphalt will be adjusted based on the Ministry of Transportation's (MTO) performance graded asphalt cement price index. The price index will be published monthly on MTO Contract Bulletin and displayed on the Ontario Hot Mix Producers Association (OHMPA) website (www.ohmpa.org). The price index will be used to calculate the amount of the payment adjustment per tonne of new asphalt cement accepted into the Work.

The price index will be based on the price, excluding taxes, Freight on Board (FOB) the depots in the Toronto area, of asphalt cement grade PG 58-28 or equivalent. One index will be used to establish and calculate the payment adjustment for all grades.

A payment price adjustment per tonne of new asphalt cement (AC) will be established for each month in which paving occurs when the price index for the month differs by more than $15 from the price index for the month prior to Tender Opening. When the price index differential is less than $15, there will be no payment adjustment for that month. Payment adjustments due to changes in the price index are independent of any other payment adjustments made to the hot mix tender items.

The payment adjustment per tonne will apply to the quantity of new asphalt cement in the hot mix accepted into the Work during the month for which it is established.

The payment adjustment for the month will be calculated by the following formulae:

ASPHALT CEMENT PRICE ADJUSTMENT, PA	
I_P	**Paving within Approved Contract Time**
$I_P > I_{TO} + 15$	$PA=(I_P - I_{TO} - 15) \times T_{AC}$
$I_P < I_{TO} - 15$	$PA=(I_{TO} - I_P - 15) \times T_{AC}$

Where:

PA = Payment adjustment for new asphalt cement, in dollars.
I_{TO} = Performance graded asphalt cement price index for the month prior to Tender Opening
I_P = Performance graded asphalt cement price index for the month in which paving occurs
T_{AC} = Quantity of new asphalt cement in tonnes

The quantity of asphalt cement includes all grades of **new** asphalt cement supplied by the Contractor with and without polymer modifiers. For each month in which a payment adjustment has been established, the quantity of the escalation/de-escalation will be calculated using the hot mix quantity accepted in the Work and its corresponding asphalt cement content as required by the job mix formula. The Recycled Asphalt Product (RAP) component of the job mix formula shall not be included.

Two calculation examples are listed below including the deduction of AC content in the RAP and the payment adjustment for either the Contractor or the Owner.

	Example One ($I_P > I_{TO} + 15$)	*Example Two ($I_P < I_{TO} - 15$)*
Mix Type	HL4	HL4
Total Tonnes	100	100
% AC Total	5%	5%
%RAP used	15%	15%
%AC in RAP	4.0%	4.0%
Total Tonnes AC in Mix	100 x 5% = 5	100 x 5% = 5
Tonnes AC in RAP	100 x 15% x 4%= 0.6	100 x 15% x 4% = 0.6
Tonnes New AC (T_{AC})	Total AC – AC in RAP = 5 – 0.6 = 4.4	Total AC – AC in RAP = 5 – 0.6 = 4.4
Price Index I_{TO}	$624.25 (Feb. 2011 Index)	$679.25 (Jul. 2011 Index)
Price Index I_P	$688.75 (Jun. 2011 Index)	$641.50 (Sep. 2011 Index)
Payment Adjustment	PA=(I_P – I_{TO} - 15) x T_{AC} = (688.75-624.25 - 15) x 4.4 = $217.80	PA=(I_{TO} – I_P - 15) x T_{AC} = (679.25 – 641.50 - 15) x 4.4 = $100.10
Money to	Contractor ($I_P > I_{TO}$ - 15)	Owner ($I_P < I_{TO}$ - 15)

For mixes containing a liquid anti-stripping additive, the quantity of anti-stripping additive will be deducted from the quantity of new asphalt cement. No other deductions will be made for any other additives.

For progress payment purpose, payment adjustments will be made on the monthly progress payment certificate for the months in which hot mix paving occurs.

10. WINTER PROTECTION FOR CONCRETE (May 2017)

In addition to the City of Windsor Standard Specification S-9, the required starting date for the application of winter protection for concrete is after November 1 of each year according to historical weather record in Windsor area, unless otherwise directed by the City Engineer. Where it is predetermined that application will likely be necessary, a separate item per lineal metre and/or square metre shall be tendered. In other cases, where despite the Contractor's reasonable construction methods and efforts, this application becomes necessary, a price shall be mutually agreed between the Engineer and Contractor. In all cases, the applications shall be at the Engineer's discretion.

11. CONNECTIONS TO CONCRETE PIPE (December 2012)

Concrete pipe 375mm (15") diameter and larger may be field tapped in place. Field tapping of concrete pipe smaller than 375mm in diameter shall not be allowed. Such a connection requires the removal of a section of pipe and the installation of a plant manufactured concrete tee using mechanical couplings that conform to CSA Standard B602 to ensure a sound and watertight joint.

All allowed connection methods require that the proper sized core hole is machine drilled into the pipe. "Hammer taps" shall not be allowed.

Detailed installation requirements refer to City of Windsor Standard Drawing AS-313, Note 2b, and City of Windsor Standard Specification S-35.06.01(d)

12. CONCRETE PIPE STRUCTURAL REPAIRS (December 2012)

Concrete pipe longitudinal crack widths in the range of 0.25 – 2.5 mm (0.01 – 0.1 inch) shall be repaired by a method approved by the City Engineer prior to the acceptance of the work.

Concrete pipe longitudinal cracks larger than 2.5mm (0.10 inch) in width shall require structural repairs. Concrete pipe longitudinal cracks larger than 5 mm (whether stable or not) OR larger than 2.5 mm and that are unstable shall be removed and replaced. Circumferential cracks that allow inflow but are not offset vertically shall be repaired to provide a water-tight seal. Circumferential cracks that are offset vertically shall be repaired structurally.

Before structural repairs are undertaken on an installed RCP/CP, the pipe shall be structurally evaluated to determine if the installed pipe system has reached equilibrium and the pipe has proven to have capability to support the load.

Acceptable repair actions for a crack that needs structural repairs could include the following:

- Link-pipe or
- Cured in place pipe (CIPP) or
- Grout the cracks with sodium silicate based or epoxy based resin materials.

All above listed criteria and repair methods are subject to the review & approval of the City Engineer in each specific project.

13. PRIVATE DRAIN AND CATCHBASIN CONNECTIONS (May 2017)

Location of the Private Drain/Catchbasin Connections

The locations of existing private drain/catchbasin connections, as shown on the Contract Drawings, are in accordance with the most current information available and are NOT certified to be accurate. The Contractor shall expose an existing private drain/catchbasin connection before commencing sewer construction in order to determine its exact location if necessary. The cost of this work shall be included in the unit price bid per metre of sanitary or storm private drain connections.

In addition, the Contractor shall ensure that all buildings and catch basins on a construction project have been reconnected to the proper sewers. This shall be achieved by either dye or smoke testing, or by use of a mini-camera or C.C.T.V. inspection if necessary.

Number of Private Drain Connections

The number of sanitary and storm private drain connections listed in the Schedule of Unit Prices are estimated. The intent of this specification is to aid the Contractor in preparing the bid. No claim for an extra will be made by the Contractor on the basis of a variation in the number of connections unless under the approval of the City Engineer.

14. SALVAGE OF METAL MATERIALS (February 2013)

Where City of Windsor manhole and catchbasin frames and covers require replacement, the Contractor shall remove the old frames and covers and transport them to the City of Windsor Operations yard at 1531 Crawford Avenue.

Any miscellaneous metals encountered or removed during construction, on this contract, shall remain the property of the City of Windsor and shall also be transported to the City of Windsor Operations Yard at 1531 Crawford Avenue. **Proof of delivery (signature of City of Windsor employee at Crawford Yard) shall be provided by the Contractor.**

The cost for the above salvage and transportation shall be included as part of the unit prices bid in the Schedule of Unit Prices, as no additional cost for this work will be paid.

15. MAINTENANCE OF FLOW IN SEWERS (February 2015)

The Contractor shall maintain the flow from all sewers, private drain connections and catch basin leads during the construction of the works. The Contractor shall be prepared to pump, divert, or find other means of maintaining flows during construction. The Contractor shall submit to the Engineer for review, the proposed construction method, which shall include the equipment to be used to maintain the flow in the sewers and connections.
The unit price bid in the schedule of unit prices for construction of sewers, manholes, private drain connections and catch basin leads shall include all costs to maintain flows in sewers and connections as no additional remuneration will be paid.

16. LAYOUT (February 2015)

The Contractor will be provided with a benchmark and points of reference for setting out. The Contractor is responsible for maintaining these points and using them for locating all structures and grade stakes required for the proper location and installation of the work.

17. BOULEVARD RESTORATION (February 2015)

Boulevard restoration affected by road reconstruction

For a road work only project, the boulevard restoration shall be limited to 2 metres from the back of curb or to where a sidewalk exists from the back of curb to the front of sidewalk or where a sidewalk is constructed or reconstructed from the back of curb to 0.5 metre beyond the back edge of the sidewalk.

This boulevard restoration and that resulting from driveway and lead walk reconstruction shall be paid under boulevard restoration items in the contract.

Boulevard areas affected by both road construction and pits for private drain connections (PDC) and affected private water services

On total rehabilitation projects where all services, including roads, sewers, sewer connections, watermains, and water services are constructed to property line, the area of restoration shall be from property line to property line.

It is anticipated that surface restoration of boulevard areas affected by road construction will overlap surface restoration of pits for private drain connections and affected private water services located on the public right-of-way in a full reconstruction project. Hence, payment for surface restoration for the pits for private drain connections and private water services shall be made in accordance with the respective items for boulevard restoration due to road construction in the Unit Pricing Schedule.

The Contractor shall note that this payment provision does not apply to pits for private drain connections and affected private water services located on private property. In this case, payment for surface restoration shall be included in the price bid for the construction of private drain connections and private water services.

Where areas outside these limits are disturbed through no fault of the Contractor's construction method, the Engineer shall determine payment for restoration. Restoration outside the project limit and limits noted above caused by the placement of the project site office, tool trailer, the storing of material and equipment shall be the responsibility of the Contractor.

18. EXCAVATIONS IN THE VICINITY OF GAS LINES (December 2008)

All excavations in the vicinity of gas lines shall be carried out in accordance with:

1. The Occupational Health and Safety Act and Regulations which apply under this Act, including regulations for construction projects; and

2. The Technical Standards and Safety Act and Regulations that apply under this Act.

The Contractor is referred to the "Guidelines for Excavations in the Vicinity of Gas Lines", prepared by the Technical Standards and Safety Authority. The procedures described herein are prepared in the interest of safety to the general public, the workers carrying out the excavation, and the prevention of damage to gas lines and property.

19. BACKFILL AROUND GAS MAINS (March 2015)

The Contractor shall be responsible to backfill around all gas mains uncovered during the course of construction in accordance with City of Windsor Standard Specification S-39 Backfill Around Utilities, or any other superseding standard of Union Gas, unless otherwise directed by Union Gas, in writing. The above specification shall govern work around gas lines.

20. STREETLIGHTING INFRASTRUCTURE

Any and all materials, labour, approvals, drawings, and equipment required for the purpose of replacing existing street lighting poles are to be fully included in the lump sum tender price. The mast arms and luminaries on the existing poles are to be transferred to the new poles unless otherwise specified in the contract documents. The removed poles are to be delivered to EnWin Utilities as directed by the City Engineer.

Approval

The Contractor is to provide a shop drawing that meets all the requirements for final review and approval by the City Engineer. Once approved, a notice in writing will be sent to the Contractor for the implement.

Construction Completion

When construction is complete, the Contractor will be responsible to obtain ESA approval and contact Tech Services to provide final connection. The Contractor must also supply an as-built drawing prior to the connection. The cost for ESA approval shall be included in the unit price.

If construction matches the design, the Issue-for-Construction drawing will be acceptable with the confirmation notice "as-built" made by the Contractor on the drawing.

21. TREE PROTECTION AND FINES

Tree Protection

All City trees must be protected during the construction of the project. Tree protection fencing shall be installed around the perimeter of the tree's drip line to protect the critical root zone of the tree and their main stem (trunk) from mechanical damage. The installation and positioning of the tree protection fencing by the contractor shall be assessed and approved by the City Forester or his designate prior to the commencement of the project. It is prohibited to move or

reposition the tree protection fencing during the construction of the project unless authorization by the City Forester or his designate is obtained.

Fines and Enforcement

No trees shall be destroyed or injured along the City of Windsor Right-of-Way or on any lands owned by the Corporation.

The contractor or corporation will be held liable for any trees injured or destroyed during the construction of the project. Tree protection fencing that is altered or moved without authorization as well as trees that are injured or destroyed, will be assessed and fines will range from $1,000 to $50,000 for a first incident and from $5,000 to $100,000 for a subsequent incident.

S-2
MAINTENANCE HOLES AND CATCHBASINS

TABLE OF CONTENTS

2.01 SCOPE OF WORK

This specification covers the requirements for the new construction rebuilding, adjusting, and breaking into maintenance and catchbasins, in conformity with the contract drawings or directions of the City Engineer.

2.02 REFERENCES

This specification refers to the following standards, specifications, or publications:

- S-1 Sewers
- S-4 Granular Base and Aggregates
- S-9 Concrete
- S-17 Steel Reinforcement
- S-24 Unshrinkable Backfill
- AS-301
- AS-302
- AS-303
- AS-304
- AS-305
- AS-309

- AS-310A
- AS-314
- AS-527
- OPSD 701.021

2.03 MATERIALS

The contractor shall supply all materials in accordance with this specification and the contract documents, unless specified by the City Engineer.

2.03.01 CONCRETE

All concrete shall meet the requirements of City of Windsor Standard Specifications S-9 Concrete unless otherwise specified and pre-approved by the City Engineer.

2.03.02 FRAMES, GRATES AND COVERS

Frames, grates, and covers shall conform to the requirements of the City of Windsor Standard Engineering Drawings (AS-301, AS-302, AS-304).

2.03.03 GRANULAR MATERIAL

Granular material for bedding and backfill to be Granular 'A' unless otherwise approved by the City Engineer.

2.03.04 UNSHRINKABLE BACKFILL

Unshrinkable fill material used for backfill as per City of Windsor Standard Specifications S-24 Unshrinkable backfill.

2.03.05 MAINTENANCE HOLE STEPS

Maintenance hole steps shall conform to the requirements of City of Windsor Standard Engineering Drawings (AS-305).

2.03.06 PRECAST REINFORCED CONCRETE CATCHBASIN AND MAINTENANCE HOLE COMPONENTS

Precast units shall be supplied in accordance with City Windsor Engineering Drawings (AS-303 AS-309, AS314, AS-315).

2.03.07 STEEL REINFORCING

Steel bar reinforcement shall be hard grade deformed bars and shall comply with City of Windsor Standard Specifications S-17 Reinforcing Steel.

2.04 CONSTRUCTION

2.04.01 EXCAVATION

Maintenance holes or catchbasins of the type specified shall be excavated for and constructed to conform to the requirements of the contract drawings and shall be located at the points and elevations required on the contract drawings or as directed by the City Engineer. Structures shall not be placed or constructed on an unsuitable foundation as maybe determined by the City Engineer. Any unsuitable material shall be excavated and the resulting excavation shall be backfilled and compacted to obtain an approved foundation.

2.04.02 GRANULAR BEDDING AND BACKFILL

Once the maintenance hole or catchbasin is constructed, the excavation surrounding the exterior of the unit shall be filled with granular material or unshrinkable fill to a minimum thickness of 300 mm around all sides of the unit. The granular material shall be deposited in layers so that when compacted, each layer shall not exceed 300mm in depth. Care shall be exercised in compacting the granular material to assure the structure is not disturbed. Approved hand compaction equipment shall be used to consolidate the material where necessary. Granular material for bedding and backfill shall be compacted to 100% of the maximum Standard Proctor dry density.

Excavated materials which cannot be incorporated in the work shall be disposed by the contractor outside the contract limits.

2.04.03 CAST IN PLACE CONSTRUCTION

The Contractor shall form and pour the specified unit plumb and true to alignment and grade. Once forms have been stripped, the Contractor shall remove all inside wall protuberances.

2.04.04 PRECAST CONSTRUCTION

The precast unit shall be placed plumb and true to alignment and grade.

Precast bases shall be set to the specified grade, shall be level, and shall have uniform overall contact with the underlying bedding.

Any adjustment of the unit for plumb, alignment, and grade shall be carried out by lifting the unit free of excavation, levelling the base, and replacing the unit to proper alignment and grade.

2.04.04(a) Doghouse Maintenance Hole

When a precast doghouse maintenance hole is specified, the doghouse is to be installed straddling the existing sewer and a concrete slab poured as per AS-559. Once the slab has cured, the contractor can break into the sewer, ensuring the sewer remains free of debris.

2.04.05 JOINTS

Joints are to have a watertight seal as per the manufactures specification.

2.04.06 INSTALLATION OF INLET AND OUTLET PIPES

All connection holes in new, precast structures shall be cored or cast in place by the manufacturer. Any modifications to the OPSD 701.021 shall require the submission of detailed shop drawings for approval by the City Engineer. One hole for a 200/250mm connection and one hole for a 150mm sub drain shall be the maximum permitted in any one side of a structure without the approval of the City Engineer.

Pipe placed in the walls for inlet or outlet connections shall extend through the wall a sufficient distance to allow for connections; shall be trimmed flush with the inside wall; and shall be securely and neatly grouted into place. The inlet and outlet pipe shall be supported with Class "A" bedding to the first pipe joint as per AS-310A and AS-314.

Watertight connections of PVC pipes shall be made to structures by means of KOR-N-SEAL boots, A.C. couplings or manufacturer supplied sanded bells, as approved by the City Engineer. A flexible joint must be provided within 0.3m of the outside of the structure wall.

Watertight connections of HDPE pipes shall be made to structures by carefully grouting and filling the void between the pipe and structure with a non-shrinking, fast-setting hydraulic cement product or by the use of a flexible water stop or other resilient connector approved by the City Engineer. A flexible joint shall be provided within 0.3m of the outside of the structure wall.

When catchbasins are being installed in locations that permit the use of existing catchbasin leads, the first 1 metre of catchbasin lead measured along its centre line, shall be replaced and covered by this specification.

2.04.07 INSTALLATION OF FRAMES, GRATES OR COVERS

2.04.07(a) General

Frames, grates, or covers shall be set in a full mortar bed and adjusted to the required elevation. Mortar shall be composed of one part Portland cement and two parts masonry sand wetted with only sufficient water to make the mixture plastic. A minimum of 1 adjustment unit is required, with the total adjustment height unit to not exceed 450mm.

2.04.07(b) Maintenance Holes

If the maintenance hole frame and cover is to be located in a hard surfaced area, the grade of the frame and cover shall match the finished designed grading of the hard surface in all the directions, and be set to a minimum of +/- 5mm of the finished or temporary hard surface grade. The flat cap or riser section should be to be orientated to the satisfaction of the City Engineer.

When concrete adjustment units are used to set the frame and cover at the required position and elevation, the first adjustment unit shall be laid in a full bed of mortar. Successive units shall be laid plumb to the first unit and sealed according to the manufacturer's recommendations. The frame shall be set in a full bed of mortar.

When High Density Polyethylene (HDPE) adjustment units are used, they shall be installed and sealed strictly according to the manufacturer's instructions.

If the maintenance hole frame and cover is to be located in a concrete pavement area, the maintenance hole shall be fitted with a self-adjusting or Auto Stable maintenance hole frame and cover (AS-533) subject to the approval of the City Engineer.

2.04.07(c) Catchbasins

When concrete adjustment units are used to set the frame with grate at the required position and elevation, the first adjustment unit shall be laid in a full bed of mortar. Any successive units shall be laid plumb to the first unit and sealed according to the manufacturer's recommendations. The frame shall be set in a full bed of mortar.

When High Density Polyethylene (HDPE) adjustment units are used, they shall be installed and sealed strictly according to the manufacturer's instructions. A filter cloth wrap of the top 100mm of the catch basin and all the adjustment units in place shall be mandatory.

2.04.08 INTERNAL DROP STRUCTURE

If a drop structure is required by the City Engineer, it shall comply with City of Windsor Standard Specifications S-1 Sewers.

2.04.09 MAINTENANCE

During the progress of the work and until the completion and final acceptance, maintenance holes and catchbasins shall be kept clean and free of all foreign materials.

2.05 ADJUSTMENT OF MAINTENANCE HOLES AND CATCHBASINS

2.05.01 GENERAL

The work to be carried out shall include change of elevation of any of the above structures, regardless of type or size. Adjustment of maintenance holes or catchbasins will apply where the top of the structure is to be lowered or raised 300 mm of less.

Prior to adjustment, the existing frame and grate or cover shall be carefully removed and salvaged. Once a maintenance hole or catchbasin has been adjusted or rebuilt, the salvaged frame and grate or cover shall be set to the correct elevation in a full mortar bed on the adjusted structure. If in the opinion of the City Engineer, the frame and cover or grate is not salvageable, the material shall be returned to 1531 Crawford Yard and alternative material will be supplied.

Where cast in place units are to be raised, the top surfaces of all existing walls shall be roughened before the walls are extended upwards.

Where required on the contract drawings or when the City Engineer directs additional maintenance hole steps shall be installed in the adjusted unit.

Where asphalt or concrete pavement must be removed to adjust or rebuild a structure the edges of such pavement shall be neatly cut to give a minimum clearance of 300mm to the outside of the flange.

All construction debris resulting from adjustment or rebuilding of maintenance holes or catchbasins shall be removed at the contractor's expense.

2.05.02 CAST IN PLACE UNITS

Where the top is to be lowered the concrete shall be carefully removed to the required elevation.

2.06 BREAKING INTO MAINTENANCE HOLES AND CATCHBASINS

Under this item, the Contractor shall carefully sawcut or core the openings that are required in the walls of any of the above-mentioned structures and securely and neatly grout in the required pipes, duct banks, or sleeves as directed by the City Engineer.

2.07 MEASUREMENT FOR PAYMENT

2.07.01 MAINTENANCE HOLES

Sewer maintenance holes, unless specified otherwise, shall be on a per item basis, and shall include all labour and material components required to construct the maintenance holes. An extra or credit to the tendered price shall only be considered if there is a 300mm or more difference between the as-built depth to invert and the design depth to invert.

2.07.02 CATCHBASINS

Catchbasins, unless specified otherwise, shall be on a lump per item basis and shall include all labour and material components required to construct the catchbasin.

2.07.03 BREAKING INTO EXISTING MAINTENANCE HOLES

Breaking into existing maintenance holes shall be measured on per item basis.

2.08 BASIS OF PAYMENT

2.08.01 MAINTENANCE HOLES

Payment of maintenance holes at the contract per item prices for the various parts comprising maintenance holes shall be full compensation for all work required by this specification and shown on the contract drawings to provide complete maintenance.

Without in anyway limiting the foregoing, the work shall include the supply of all materials, all excavations, disposal of all surplus materials, the placing and compaction of granular materials, the construction of all cast in place concrete work, the installation of precast units including base, riser sections, transitional sections (where required), adjustment rings, the construction of all masonry work including benching, the installation of frame and cover, aluminum ladder rungs and all other miscellaneous metal works, all required surface restoration and all other work necessary to complete the structure in accordance with the contract requirements. Included in the lump sum price shall be the shop drawing of the maintenance hole showing the orientation, dimensions and transitional sections for any size maintenance hole.

2.08.02 CATCHBASINS

Payment at the contract price shall be full compensation for; supplying all materials, for all excavation, for the disposal of all surplus excavated materials, for the placing and compaction of granular bedding and backfill for the construction or installation of the

cast in place or precast unit, 1 metre of big 'O' pipe on either side of catchbasin and connection into subdrain, for the installation and adjustment of the frame and cover, installation of asphalt or concrete box-out as specified around the frame and cover, for the installation of up to a maximum of 1 metre of catchbasin lead when connecting to existing catchbasin leads, and all other work necessary to complete the structure in accordance with the contract requirements.

2.08.03 ADJUSTMENTS OF MAINTENANCE HOLES AND CATCHBASINS

Payment at the contract price shall be full compensation, regardless of size or type, for the removal and disposal of asphalt or concrete pavement where required, for all necessary excavation, removal and disposal of concrete in structure, for supplying, handling, placing and compaction of materials; and for all other work necessary for the satisfactory completion of the work, except for the removal and replacement of asphalt of concrete curb and gutter, which work shall be paid at the contract unit price for the items concerned.

2.08.04 BREAKING INTO MAINTENANCE HOLES AND CATCHBASINS

Payment shall be made at the contract unit price per opening and shall be fully compensation for providing opening and grouting in pipes for all pipes.

S-8
SEWER PIPELINE AND CULVERT REHABILITATION BY CURED-IN-PLACE PIPE

TABLE OF CONTENTS

8.01 SCOPE OF WORK

This specification covers the requirements for the rehabilitation of sewer pipelines by the installation of a tight fitting cured-in-place pipe liner.

8.02 REFERENCES

This specification refers to the following standards, specifications, or publications:

ASTM International

- D 638 Standard Test Method For Tensile Properties of Plastics
- D 790 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
- D 2990 Standard Test Methods for Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics
- F 1216 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube

- F 1743 Standard Practice for the Rehabilitation of Existing Pipelines and Conduits by Pulled-in –Place Installation of Cured-in-Place Thermosetting Resin Pipe (CIPP)
- S-32
- OPSS 460

8.03 DEFINITIONS

For the purpose of this specification, the following definitions apply:

a) **Cured-In-Place Pipe (CIPP)** Lining means the rehabilitation of sewers and watermains by installation of a CIPP liner system within an existing pipe.

b) **Engineer** means a professional engineer licensed by the Professional Engineers Ontario to practice in the Province of Ontario.

c) **Resin** means a general purpose, unsaturated, styrene-based, thermoset resin and catalyst system or an epoxy resin and hardener that is compatible with the inversion process.

8.04 SUBMISSION & DESIGN REQUIREMENTS

Submission requirements shall be in accordance with OPSS 460.

8.05 MATERIALS

Material requirements shall be in accordance with OPSS 460.

8.06 CCTV EQUIPMENT

Equipment requirements shall be in accordance with City of Windsor S-32 CCTV Sewer Inspection.

8.07 CONSTRUCTION

Construction requirements shall be in accordance with OPSS 460.

8.08 CCTV INSPECTION

CCTV Inspection requirements shall be in accordance with City of Windsor S-32 CCTV Sewer Inspection.

8.09 QUALITY ASSURANCE AND TESTING

Quality Assurance and Testing requirements shall be in accordance with OPSS 460.

8.10 MEASUREMENT FOR PAYMENT

Measurement for payment requirements shall be in accordance with OPSS 460.

8.11 BASIS OF PAYMENT

Basis of payment requirements shall be in accordance with OPSS 460

S-10
CONSTRUCTION SPECIFICATION FOR HOT MIX ASPHALT

TABLE OF CONTENTS

10.01 SCOPE OF WORK

This specification covers the requirements for the placement and compaction of hot mix asphalt for pavement construction and other uses in the City of Windsor.

10.02 REFERENCES

This specification refers to the following standards, specifications, or publications:

- OPSS.PROV 308
- OPSS 310
- OPSS.MUNI 1101
- OPSS 1103
- OPSS 1150
- OPSS.MUNI 1151

10.03 MIX DESIGNS

The mix design shall be the responsibility of the contractor. The job mix formula selected for use shall produce hot mix that will meet the requirements of OPSS 1150 with amendment to section 1150.04.01.01.01 Reclaimed Asphalt Pavement Proportions: part b) changed to: A maximum of 15% by mass of RAP shall be permitted for HL 4, HL 8, and medium duty binder courses. Greater than 15% would have to be approved by the City Engineer.

10.04 MATERIALS

Materials shall meet the requirements of OPSS 310.

Materials used in the production of Hot Mix Asphalt shall meet the requirements of OPSS 1150 for Marshall mixes and OPSS MUNI.1151 for Superpave and SMA mixes.

Tack coat material shall meet the requirements of OPSS.MUNI 1103.

10.05 EQUIPMENT

Equipment shall meet the requirements of OPSS 310.

10.06 CONSTRUCTION

Construction shall meet the requirements of OPSS 310 and the requirements of OPSS.PROV 308 construction specification for Tack Coating and Joint Painting.

10.07 QUALITY ASSURANCE

Quality assurance shall meet the requirements of OPSS 310.

10.08 MEASUREMENT FOR PAYMENT

Measurement for payment shall meet the requirements of OPSS 310.

10.09 BASIS OF PAYMENT

Basis of payment shall meet the requirements of OPSS 310.

S-11
CULVERTS, HEADWALLS AND ROADSIDE DRAINAGE

TABLE OF CONTENTS

11.01 SCOPE OF WORK

This specification shall cover the requirements for enclosing existing open channel drains located in the right-of-way or adjacent to municipal roadways. This enclosed drain may be used for drive approaches or sidewalk crossings over the existing drain or as an aesthetic infill to enclose the stormwater drainage system. This specification shall also cover the requirements for the field tapping of existing storm outlets into the drain being enclosed. The work shall include the tying in of the required outlets thereto, including all necessary excavation, backfilling and all other items of work as herein described. This specification is NOT to be applied to Municipal Drains which are covered under the Drainage Act.

11.02 REFERENCES OR RELATED DOCUMENTS

This specification refers to the following standards, specifications, or publications:

- OPSS 421
- OPSS 1820
- OPSS 1840 & OPSS 1841 & OPSS 1843
- OPSD 804.030
- OPSD 804.040
- AS-209

11.03 MATERIALS

Materials shall meet the requirements of OPSS 1820 for concrete pipe products, OPSS 1841 for polyvinyl chloride (PVC) pipe products, OPSS 1840 for polyethylene (PE) plastic pipe products and OPSS 1843 for polypropylene (PP) plastic pipe products.

Any manholes or catchbasins required shall be in accordance with City of Windsor Standard Specification S-2.

The contractor shall supply ALL materials.

11.04 GRANULAR & NATIVE BACKFILL

This material, unless otherwise specified, shall be 19.5mm Granular 'A' stone compacted and graded to accept the placement of the pipe.

If the culvert is to be located under a hard surface, such as a drive approach, then the remainder of the backfill is to be compacted granular 'A' material to the bottom side of the proposed hard surface. The minimum depth is 300mm.

If the culvert is to be located in a grassed area, with no hard surface, than the backfill can be an approved native soil with a minimum topping of 100mm of approved topsoil..

11.05 CONSTRUCTION

11.05.01 OPSS Reference

Installation of the pipe culvert shall be in accordance with OPSS 421 unless otherwise noted in the City of Windsor Standard Specification S-11 or as directed by the City Engineer.

11.05.02 Time and Order of Performance

The Contractor shall commence the works and carry them on at whatever point or points along the line of the drain that the City Engineer may direct.

11.05.03 Existing Conduits, Tracks, etc., Access to Property and Protection

The Contractor shall be liable and responsible for the adequate support and for protection of sewers, drains, conduits, tracks or other structures owned by the Corporation or any private company or any individual enjoying franchise rights or occupying any portion of the street or right-of-way on, or below or above the surface. The Contractor shall provide access for traffic to houses and other premises, provide for proper protection against damage, and comply with all the requirements of the contract.

11.05.04 Excavation

The trench for the new culvert shall be true to the line and grade required to match the existing line and grade of the roadside drain. The trench shall be of sufficient width to provide free working space and to permit compaction of backfill material around the pipe, but the width of the trench shall not exceed the inside diameter of the barrel of the pipe plus 300mm, unless permitted by the City Engineer in writing. When trenches are excavated wider than the above maximum caused by the use of power equipment, lack of bracing or other reasons, any increase in quantities of excavation, granular backfill or other items incurred by the excess width shall be borne by the Contractor.

Where required by conditions of the soil, sheeting apparatus shall be furnished and the cost of the sheeting, shoring, and bracing shall be borne by the Contractor.

The bottom of the trench shall be filled with a bed of 19.5 Granular 'A' stone backfill, 300mm deep, and no point of the trench bottom shall be within 300mm of the grade line of the bottom of the pipe. The foundation beneath the headwalls shall be as per AS-209.

Where the bottom of the trench is in unstable soils, such as saturated clays and/or silts or quicksand, the trench shall be deepened to the depth required for granular backfill or whatever other means for securing good foundation, as required by the City Engineer.

Not more than 100 metres of cut shall be opened at any one time or placed in advance of the completed drain, unless by written permission of the City Engineer and for such distance as therein specified.

The Contractor shall excavate for the culvert without any damage to any existing trees or the root systems of any trees adjacent to the trench where the culvert is to be placed.

11.05.05 Laying Pipes

The trench shall, at all times, be kept dry and no pipes shall be laid in water or upon a wet bed, except when authorized in writing by the City Engineer. At all times during the progress of laying and backfilling and until the work has been accepted, the pipes shall be thoroughly cleaned, kept clean and protected from coatings of dirt. All pipes shall be laid true to line and grade. No length of pipe shall be laid until the preceding length has been thoroughly embedded and secured in place so as to prevent any movement or disturbance of the joint. All junctions, if required, shall be made with the coupler bands manufactured by the culvert manufacturer and approved for use with the type of pipe used for the culvert. The City Engineer, at his discretion, may require that the junctions in the culverts be made with a watertight seal. The Contractor shall then provide culverts that can be jointed in such a way that a watertight seal is obtained. This shall be undertaken by using pipe that has a bell and spigot joining system that provides a watertight seal. No pipe shall be left in the trench overnight without backfilling to protect it.

Proper foundation shall be provided in unstable soils by the addition of granular material as directed by the City Engineer.

11.05.06 Storm Outlet Connections

While placing the culvert, the Contractor may expose existing storm private drain connections or other culverts that drained to the existing ditch and now must drain into the proposed culvert. The connections are to be made using factory or manufactured tee fittings approved for use with the type of culvert installed. At no time shall the pipe being connected to the culvert protrude into the culvert. No connections shall be abandoned unless approved by the City Engineer.

If it is required that the culvert shall be connected to a pre-cast concrete structure, such as a catch basin or manhole, this shall be done by utilizing the factory supplied "knock out" formed into the pre-cast unit for the size of culvert being tied in or by use of a cast-in-place rubber coupling to accept the size of the culvert. Should it have to be connected to an existing concrete structure, the Contractor shall core drill a hole in the existing structure no larger than 25mm greater than the pipe size. All connections to structures are to be mortared in place, using a rapid setting, waterproof, hydraulic cement mixed according to the manufacturer's directions.

11.05.07 Backfilling

Backfill, unless otherwise specified, shall be in accordance with section 3 and shall be placed over culverts only after it has been approved by the City Engineer. Any earth from cave-ins and all other objectionable matter shall be removed prior to backfilling. Any damaged pipes shall be removed and replaced and also any other repairs shall be performed prior to any backfilling. Backfilling, except for the completion of any section or at the termination of a day's work, shall be kept back at least 15 metres from the advanced end of the pipe. At the termination of a day's work, backfilling shall be completed to the end of the pipe to protect it from cave-ins, falling stones, or other damage.

The granular backfill shall be placed in layers not exceeding 150mm in depth when compacted. Care shall be taken to ensure that the backfill is placed under the haunches and around the pipe. Compaction shall be performed in such a manner as not to injure or dislodge the pipe.

11.05.08 Headwalls

Where directed by the City Engineer, the Contractor shall place headwalls at the terminal ends of the culverts. Precast or poured in place concrete headwalls shall be constructed as per OPSD 804.030 and OPSD 804.040 at locations approved by the City Engineer.

Headwalls for pipe diameters of 450mm or less can be constructed with standard jute bags filled with 14 MP a damp concrete mix at locations approved by the City Engineer.

Gabion stone with ready mix concrete poured over it will not be allowed as a headwall in a roadside drain without the approval of the City Engineer.

11.05.09 Catch Basin / Structures

The Contractor shall place all structures such as catchbasins and manholes as shown on the approved plans as per City of Windsor Standard Specification S-2.

11.05.10 Inspection

The Contractor shall prove his work throughout the entire length of the satisfaction of the City Engineer. Defective work or damaged materials shall be remedied or removed and replaced as directed by the City Engineer immediately on its discovery.

11.05.11 Disposal of Surplus Materials, etc.

As the trenches are filled in and the work completed, the Contractor shall, at his own expense and cost, removed and dispose of all surplus earth, stone, and other material from the work in such manner and at such points as directed by the City Engineer.

11.06 MEASUREMENT FOR PAYMENT

Measurements will be made in lineal metres of the length of the pipe in place. Separate measurements shall be made of different diameters laid in accordance with the specifications and schedule of payments as called for on the tender.

11.07 BASIS OF PAYMENT

11.07.01 Bid Prices for Laying Pipe

Bid prices on the above items shall be in full compensation for the excavation of the trench and for the laying of the pipes, backfilling with granular and native (if required) material, the supply and use of all appliances and materials, the disposal of all surplus excavated materials and the satisfactory cleaning of the site and for all work required under this specification, excepting those items for which other payment is herein provided.

11.07.02 Excavation for Culverts

The cost of the excavation shall be included in the linear price for the placement of the culvert.

11.07.03 Granular & Native Backfill

The cost of the granular and native (if required) backfill shall be included in the linear price for the placement of the culvert. This payment shall be compensation in full for the supply, handling, hauling, placing and compacting all work herein specified incidental to this item.

11.07.04 Catch Basin / Structure Connection

The cost of connecting the culvert to any structure shall be included in the linear price for the placement of the culvert. This payment shall be compensation in full for the connection.

11.07.05 Headwalls

The cost of excavating, placing, backfilling, and connecting the culvert to any headwall shall be included in the linear price for the placement of the culvert. This payment shall be compensation in full for the headwalk. Payment shall include, but not be limited to, the supplying and placing of the Unshrinkable Backfill and the supplying, placing and removing of the steel plates, including the steel spikes, the orange construction fencing, including the steel bars to support it or any other protection required by the City Engineer.

S-17
REINFORCING STEEL

TABLE OF CONTENTS

17.01 SCOPE OF WORK

This specification covers the requirements for reinforcing steel, in conformity with the contract drawings or directions of the Engineer.

17.02 REFERENCES

This specification refers to the following standards, specifications, or publications:

- CSA Specification W 59

17.03 MATERIALS

Unless otherwise specified, all reinforcing steel shall be hard grade deformed bars or steel wire or mesh and shall be supplied by the Contractor. The Contractor shall be responsible for unloading the reinforcing steel on delivery and for checking for and reporting any shortages or errors. The Contractor shall be responsible for the storage and proper care of the reinforcing steel until it is incorporated into the final work.

17.04 PROTECTION

Reinforcing steel shall be stored above ground on wooden platforms, skids, racks, or other means taken to protect it against dirt or injury. When placed in the work it shall be free from dirt, loose scale, paint, oil, or other foreign substances.

If reinforcing steel becomes soiled with dirt, scale, paint, oil, or other foreign substances, it shall be cleaned at the Contractor's expense.

17.05 PLACING

Reinforcing steel shall be accurately placed in the positions shown on the plans and firmly held during the placing, compacting, and setting of concrete. Bars shall be tied at all intersections except where spacing is less than one foot in each direction when alternate intersections shall be tied.

17.06 SUPPORTING

Reinforcing steel shall be supported and firmly held in the required positions at all times. Only approved supports and chairs, of strong, durable, and non-corrodible materials and which fasten or tie securely to the reinforcing steel, shall be used. Galvanized metal or plastic chairs, concrete blocks, or other devices may be used for this purpose provided they satisfy the requirements as herein specified and are approved by the Engineer.

17.07 FIELD BENDING

No field bending of reinforcing steel shall be done, except as called for on the plans, or as authorized by the Engineer.

When field bending is authorized it shall be done with or without heat, as directed by the Engineer, and shall be done slowly with a steady even pressure.

Bars developing cracks or splits at the bends shall be rejected and replaced at the Contractor's expense.

17.08 WELDING

No welding of reinforcing steel shall be done under any circumstances unless authorized in writing by the Engineer and when so authorized it shall be done in accordance with CSA Specification W 59.

17.09 MEASUREMENT AND PAYMENT

Reinforcing steel shall be measured by weight based on the total computed weight for the sizes and lengths of bars shown on the plans or authorized.

Unless specifically provided otherwise, payment for placing reinforcing steel in culverts and bridge approach slabs shall be included in the Contract Unit Price for the class of concrete specified, which price will be payment in full for furnishing all labour and equipment, including wire ties and supports, necessary for placing the reinforcing steel in the finished work, and for storing, protecting, placing and field bending when called for on the plans.

Payment for placing reinforcing steel in bridges shall be made at the contract Unit price per ton for placing reinforcing steel, which price shall be payment in full for furnishing all labour and equipment, including wire ties and supports, necessary for placing the reinforcing steel in the finished work, and for storing, protecting, placing and field bending when called for on the plans.

S-35
REPLACEMENT OF PRIVATE DRAIN CONNECTIONS

TABLE OF CONTENTS

35.01 SCOPE OF WORK

The work shall include the supply of all necessary labour, equipment, and materials to investigate and replace the existing sanitary private drain connections or constructing a new sanitary private drain connection from the exit of any dwelling to the main sewer, or designated place of disposal. The work shall also include all necessary equipment and fittings to complete the work to the satisfaction of the City Engineer.

A private drain connection replacement shall include the following:

The use of the existing tee at the municipal sewer or the installation of a new tap, tee, or similar approved apparatus as described elsewhere in this document. The private drain connection shall consist of a 150mm diameter pipe, having positive grade from the municipal sewer to the cleanout. A 150mm cleanout with terminal cleanout cap and tee fitting on the new connection shall be provided at or near the property line on the street side, where ever

possible. The cap shall be plastic when located within a boulevard or landscaped area, or cast iron when located within a paved area such as sidewalk, driveway, lead walk, etc. The private drain connection, from the 150mm cleanout at property line, to the dwelling may be either a 150mm diameter pipe or 100mm diameter pipe with positive grade from the cleanout to the interior of the dwelling, extending a maximum of 0.91m into the dwelling. The connection on the interior of the dwelling shall include a 100mm terminal cleanout for access purposes to grade and a finished floor, as the case may be, in accordance with Ontario Building Code or applicable regulations.

When connecting to a combined municipal sewer, a backwater valve shall be included, to be situated on the sanitary connection, within the dwelling interior.

A sump pit and pump may also be included at the owner's discretion as optional work.

35.02 REFERENCES

This specification refers to the following standards, specifications, or publications:

- AS-207A
- AS-207B
- AS-207C
- AS-221
- AS-222
- AS-313
- AS-325
- AS-401
- AS-504
- AS-527
- AS-536
- S-1
- S-4
- S-6
- S-8
- S-9
- S-10
- S-24
- S-29

35.03 BUILDING PERMIT REGULATIONS

The contractor shall, at all times, comply with the regulations imposed by the City Engineer. To this end, the contractor shall pay for and obtain any required Permits from The Corporation of the City of Windsor's Building Department who will inspect that portion of the work on private property. The contractor shall acquaint himself with these requirements.

35.04 WORK ON STREET OR HIGHWAY

The contractor shall obtain a Street Opening Permit from The Corporation of the City of Windsor's Engineering Department prior to work commencing. Fees shall include indemnities as determined appropriate by the City Engineer. All work carried out on the public right-of-way shall be subject to the regulations as amended from time to time which may be imposed by the City Engineer relative to excavation, backfill method and materials, compaction, provision for tunnelling under pavement, restoration, etc.

35.05 OTHER AGENCIES

All work shall be subject to all requirements of any municipal, provincial or federal regulations that may from time to time apply.

35.06 MATERIALS

All pipe supplied shall be PVC plastic pipe CSA Standard B182.1-11 - Polyvinylchloride (PVC) and chlorinated polyvinylchloride (CPVC) drain, waste, and vent pipe and pipe fittings, with the exceptions that (i) the Dimensional Ratio (DR) shall be no greater than 28 and the pipe stiffness, F/Y, shall not be less than 100 psi (ASTM D2412-73), and (ii) the impact of the pipe at -18°C (0°F.) shall be 45 ft. lb. minimum when tested as described in B182.1-11.

The pipe shall have a locked-in gasket integral bell joint.

High Density Polyethylene (HDPE) for trenchless applications must meet requirements of Ontario Building Code Part 7.

A Structural Liner is considered as an acceptable alternative for approval by the City Engineer. All Structural Liner installations must be pre approved by the City Engineer and follow City of Windsor Standard Specification S-8.

35.06.01 SPECIAL FITTINGS AND OTHER REQUIREMENTS

All sewer connections shall be provided with a 150mm x 150mm x 150mm tee, together with a terminal cleanout located on the public right-of-way side at the property line and extended to grade level as described in Section 35.07(k). The contractor shall supply and install all necessary wyes, tees, elbow, pipe sections, reducers and adaptors, and any other fitting that is required to complete the work. Cleanout situated in paved areas shall be provided with a

cast-iron sewer cap. Any connection to an existing plastic or PVC main or any new tap to a 300mm diameter pipe or smaller shall be by a tee section inserted into the main line unless approved by the City Engineer. The lump sum bid shall compensate for this cost and there will not be any claim for additional costs related to this item.

The connection to the public sewers shall be 150mm diameter and made with a connection approved by the City Engineer for the sewer in question.

35.06.01(a) ASBESTOS/CEMENT PIPE

All taps into asbestos/cement pipe shall require the use of a saddle with stainless steel straps or a manufactured tee. This tee shall be cut into the existing line and secured with mechanical couplings conforming to CSA Standard B602 to ensure a sound and watertight joint. If the saddle is used, the opening must be machine cut to exact dimensions. In all cases, a sound and watertight connection must be assured.

35.06.01(b) PVC PIPE

All connections to PVC sewers shall be made using a manufactured tee cut into the line and secured with PVC repair sleeve couplings.

35.06.01(c) VITRIFIED CLAY PIPE

When vitrified clay pipe is encountered, a section of this pipe must be removed and replaced with either a vitrified clay manufactured fitting or a PVC fitting. Mechanical couplings conforming to CSA Standard B602 shall be used to ensure a sound and watertight joint.

35.06.01(d) CONCRETE PIPE

Concrete pipe 375mm diameter and larger may be field tapped in place. Care shall be taken to ensure the connecting tee or A.C. coupling/adaptor does not protrude into the main sewer. A non-shrinking, fast setting grout shall be used and a curing period of 12 hours minimum is required before backfilling.

The use of alternative connection methods such as saddles that require the use of a compression gasket may be used if the contractor demonstrates to the satisfaction of the City Engineer that a watertight joint can be achieved.

When connecting to concrete pipe smaller than 375mm diameter, a section of pipe must be removed and a manufactured fitting of either concrete or PVC shall be installed. Mechanical couplings conforming to CSA Standard B602 shall be used to ensure a sound and watertight joint.

35.06.01(e) BRICK SEWERS

When brick sewers are encountered, a field tap shall generally be allowed. A non-shrinking, fast setting grout must be used and a minimum of 12 hours setting time is required before backfilling. A concrete, vitrified clay or asbestos cement fitting is required. A plastic fitting is not acceptable. The City Engineer reserves the right to consider other methods but in all cases a sound and watertight joint must be achieved and the City Engineer will be the sole judge in determining the acceptability of the alternate method(s).

35.06.01(f) MECHANICAL COUPLINGS

Mechanical couplings conforming to CSA Standard B602 are available to join PVC pipe to vitrified pipe, PVC pipe to concrete pipe, vitrified pipe to concrete pipe, and concrete pipe to concrete pipe. Contractors shall take note that in many cases the bells of pipes will have to be removed. This must be done in a manner that leaves a smooth and straight pipe. Where the inside diameters of the connecting pipes are slightly different, care shall be taken to minimize the lip at the connecting joint. A mechanical coupler cannot be used to transition between pipes of two different diameters.

The contractor shall, by an approved method, ensure that all joints between pipes and connections are sound and watertight. When a grout or mortar is used, it must be a fast setting non-shrinking variety. If a field tap requires grout, the joint or tap must be left undisturbed for a minimum of 12 hours. Care must be taken to ensure that the stem of the bell does not protrude into the main line. When pipes of different outside diameters are connected, care must be taken to ensure that the inverts of pipes are relatively flush.

All costs for the tapping of main sewers shall be included in the lump sum bid submitted.

The requirements of the Ontario Building Code Part 7 shall be used for cleanout spacing and size.

35.06.02 ASBESTOS CEMENT OR ASBESTOS CONTAINING MATERIAL

Any person(s) performing works on municipal sewers suspected of containing Asbestos Cement (AC) or Asbestos Containing Material (ACM) must follow methods and procedures established under the O.H.S.A. - Ont. Reg. 278/05, and the Environment Protection Act - Reg. 347.

35.07 CONSTRUCTION PROCEDURE

Notwithstanding drawings and sketches provided by the City Engineer, the contractor shall be responsible for locating the existing sewer connection to be replaced and the mainline sewer to which it is to be connected. No additional remuneration will be made to the contractor to carry out this investigation.

Existing taps to the municipal sewers are to be used where ever possible. If the existing tap is not reused, it must be capped at the main sewer with the new tap conforming to City of Windsor Standards.

At the end of any workday, the existing sanitary private drain connection shall be temporarily connected to the new sanitary private drain connection or arrangements made to keep the existing connection in service as approved by the City Engineer.

The following requirements/procedures are to be considered when completing all replacements.

(a) Open Cut:

Permitted whenever the sewer is to be constructed under lawns or any other unimproved surface or area.

(b) Sodding:

The contractor is required to take up, store, preserve, relay and supply additional sod and/or topsoil and watering unless otherwise defined in the Contract. Unit cost shall be provided with tendered cost in the event the owner is responsible for restoration.

(c) Pavement Excavation:

Is an opening over the main municipal sewer or private drain connection in the road surface or other paved surface (i.e. Driveways, lead walks, etc.) to access the municipal sewer or drain connection for the purpose of connecting to an existing tee, constructing a new tee or abandoning an existing tee, or constructing a new private drain connection, cleanout, or any part thereof.

The pavement opening and restoration shall be in accordance with City of Windsor Specification S-29 and Standard Drawing AS 207A, B, C.

All backfill under pavement (roads, sidewalks, and driveways) within the right-of-way shall be placed in accordance with City of Windsor Specifications S-24.

(d) Remove and Replace Sidewalk:

Sidewalk shall be constructed as per City of Windsor Specification S-6 and Drawing AS-401 with this note "Note: the width of the sidewalk replaced must match the width of the walk removed at the location. See AS-401."

(e) Connection to Existing Approved Sanitary Private Drain Connection:

This shall include all costs for materials necessary to make the connection to a known sanitary private drain connection in the public right-of-way. Including the cleanout and required permits (Building Permit and Engineering Permit).

(f) **Abandonment of a Connection/Tap:**

For all sewers it shall mean making the main whole to the satisfaction of the City Engineer. Excavation and restoration to the main shall be in accordance with City Standards.

(g) **Opening in Basement:**

An Opening in a basement shall include opening the floor in the basement and making the connection to the internal plumbing pipe, at a maximum of 0.91m within interior building wall as approved by the Building Department. It shall include all necessary fittings to make the connection, acceptable fill material to support the work and the floor and also include the restoration of the concrete floor. This item shall include any permits required by the Building Department.

(h) **Opening in Crawlspace:**

Opening in Crawlspace shall include excavating to the internal plumbing pipe and making the connection to the internal plumbing pipe, at the main plumbing stack as approved by the Building Department. It shall include all necessary fittings to make the connection and shall include backfilling and satisfactory restoration of the crawlspace. This item shall include any permits required by the Building Department.

(i) **Backwater Valve:**

Backwater Valve shall include the supply and installation of a "Mainline Fullport Backwater Valve" or an approved equal, in accordance with the Ontario Building Code Part 7. It shall include opening the floor; making the connection to the internal plumbing pipe, within 0.91m of dwelling interior building wall; all necessary fittings to make the connection; including 100mm riser, acceptable backfill material to support the work and floor and satisfactory restoration of the concrete floor. This item shall include any permits required by the Building Department. Unit cost shall be provided with tendered cost.

(j) **Sump Pump:**

Sump Pump shall include; supply of a CSA approved sump pump; breaking the floor and excavating for a minimum 95 Litres Sump liner; All necessary piping, and fittings to hook the sump pit to the weepers; as well as an exterior discharge pipe and fittings in accordance with the Ontario Building Code Part 7; restoring all damaged concrete floors and walls. This item shall include any permits required by the Building Department. Unit cost shall be provided with tendered cost.

(k) **Supply/Install 150mm Riser and Plastic/Cast Iron Cap at Property Line:**

Shall include all materials, labour, and equipment necessary to install a 150mm cleanout which shall include a 150mm x 150mm tee, 150mm riser section, and a 150mm plastic cap on a complete sanitary private drain connection replacement. A cast iron cap shall be provided where the same is located in a paved area (i.e. driveway, sidewalk, etc.). (Standard Drawing AS-325)

(l) Concrete Residential Driveway:

Openings in driveways required to make the tap or connection to the existing sewer, shall be reinstated in accordance with Standard Drawing AS-222.

(m) Asphalt Residential Driveway:

Openings in driveways required to make the tap or connection to the existing sewer, shall be reinstated in accordance with Standard Drawing AS-221.

(n) Supply/Install 100mm Riser and Plastic/Cast Iron Cap on private property:

Shall include all materials, labour and equipment necessary to install a 100mm cleanout as per the Ontario Building Code and approved by the Building Department on a new complete sanitary private drain connection replacement. A cast iron cap shall be provided where the same is located in a paved area (i.e. driveway, lead walk, etc.). (Standard Drawing AS-325)

35.08 EXCAVATION BACKFILL AND PAVEMENT REINSTATEMENT

When required to do so by the City Engineer, the contractor shall take up, store, preserve, and relay all sod, topsoil, and shrubbery such that the completed work is in a condition equal to or better than the original. The contractor shall supply and place new sod, topsoil and shrubbery at no additional cost, when, in the opinion of the City Engineer, the contractor has failed to satisfactorily preserve same.

All excavation and protection shall be carried out in strict accordance with Occupational Health and Safety Acts; the regulation for construction projects, Ontario Regulation 213/91 as amended by Ontario Regulation 631/94 and other prescribed legislation and regulations as they may pertain to the work.

All backfill under pavement shall be in accordance with City of Windsor Specification S-24. The Contractor shall provide a receipt for the Unshrinkable fill used on the job site to the City of Windsor Engineering Department Inspector for confirmation of materials used.

All backfill under boulevards shall be in accordance with City of Windsor Specification S-4.

The contractor shall reinstate all pavement removed. The pavement opening and restoration shall be in accordance with City of Windsor Specification S-29 and Standard Drawing AS 207A, B, C. Equivalent material having received approval from the City Engineer may be used.

35.09 PROTECTION OF SERVICE AND OTHER WORKS

The contractor shall familiarize himself with the Occupational Health and Safety Act, current edition. All work carried out under the tender shall comply with the Act at all times.

The contractor, at all times, shall protect and maintain all utility services such as water mains, gas mains, hydro and communication conduit encountered during construction. Any damage to these services shall be repaired at the expense of the contractor.

The contractor shall tunnel, bore, punch under or take up and replace all driveways, sidewalks or other structures. All replacement work shall be according to the current specifications for these works.. Throughout construction, the contractor shall keep all house services in operation and provide a minimum inconvenience to the residents.

35.10 BORING UNDER PAVEMENTS

Whenever the sewer connection is to be constructed under road pavements or driveways or other paved areas, the contractor shall bore under the pavements by means of a mechanical boring machine. The diameter of the borehole shall not be more than 50mm larger than the outside diameter of the pipe being installed.

The contractor shall open the pavement or driveway over the mainline municipal sewer as required to make the tap or connection to the existing sewer, and restoration shall be in accordance with City of Windsor Specification S-29 and Standard Drawing AS-207A, B and C for road openings or as directed by the City Engineer for driveways. All work to be done to the satisfaction of the City Engineer.

35.11 CCTV INSPECTION OF PRIVATE SEWER

The contractor must have equipment available to CCTV inspect and record to CD or DVD media the inside condition of the private drain connections as well as the underground plumbing of the home by means of a TV monitor.

This equipment must be capable of accessing 100mm, 125mm and150mm sewers as well as providing a DVD of the inside condition of the private drain connection and the underground plumbing as directed by the City Engineer.

Eeling of the sanitary private drain connection to permit video inspection may be required, and shall be provided by contractor and included in lump sum bid.

CCTV inspection of the completed private drain connection by City Staff will be required as a condition of final inspection and approval by the Chief Building Official, City Engineer, at no additional cost to The Corporation of the City of Windsor.

35.12 METHOD OF PAYMENT

Payment, on the basis of the lump sum bids submitted, shall be considered full compensation to the contractor for all work herein specified. No additional remuneration shall be made to the contractor for soil conditions, for winter conditions, or for size or depth of main sewer except as herein provided. The contractor shall take all of these factors into consideration when tendering on the work. The contractor shall submit to the City Engineer after the completion of the project, a statement showing the value of the work executed. Payment shall be as follows:

a) For Completed Projects:

- 90% of the lump sum bid.
- 10% to be held until forty-five (45) days after the project is completed.

b) For Projects that are not Completed due to Weather Conditions or Time of Year:

- 80% of the lump sum bid.
- 20% to be held until forty-five (45) days after the project has been completed.

35.13 DEFINITIONS:

Project:

The work described in each Purchase Order.

Completed Projects:

Shall be defined as a sanitary private drain connection in the ground and connected to the dwelling and the municipal main sewer, CCTV inspection record for the replaced PDC has been reviewed and accepted by the City Engineer, having passed the Building Department inspection, backfill to grade and final road patch completed and accepted by the City Engineer. The contractor shall be responsible for lawn restoration, unless the owner signs a form assuming responsibility for lawn rehabilitation.

For Work commenced in the Summer Months:

Work commenced in the summer months, defined as being from May 1st until September 30th, shall be completed within a thirty (30) calendar day period. The thirty (30) day period should be from the day the purchase order was issued until the day of the approved final inspection.

For Work commenced in Winter Months:

Work commenced in the winter months, defined as being from October 1st until April 30th, shall only be charged one (1) day and then the remainder of the days shall commence being charged on May 1st and must have approved final inspection within twenty-nine (29) calendar days from May 1st.

NOTE:

Any replacement (project) having progressed to the billing stage as stated in Section 35.12 prior to the time periods as mentioned above, must be totally complete to the satisfaction of the City Engineer within the time periods as mentioned above or the City Engineer may cause such necessary repairs to be completed and the cost of these repairs will be deducted as follows.

The Corporation may deduct any amount due under this section from any monies that may be due or payable to the contractor on any account whatsoever. The liquidated damages

payable under this paragraph are in addition to, and without prejudice to any other remedy, action or other alternative that may be available to the Corporation.

35.14 TIME LIMIT

The contractor shall have sufficient equipment and labour available to undertake and complete with reasonable dispatch, the work as noted in these Specifications. Within three (3) working days after having been instructed thereto by the City Engineer, the contractor shall relieve the blockage and maintain the connection in a running condition until the work is finalized.

If The Corporation of the City of Windsor is required to maintain any sanitary private drain connection having been given to the contractor as specified above, the contractor will be assessed any and all costs incurred.

35.14.01 REASONABLE DISPATCH:

Commencement means the contractor must start the project within fourteen (14) days after having been instructed thereto by the City Engineer unless the Chief Building Official, City Engineer provide an extension, as deemed appropriate.

35.15 WARRANTY OF WORK

The Contractor shall ensure all restoration (including seeding/sodding, settlement, paving) is free from defects from workmanship for a period of one (1) year from final inspection.

The contractor shall ensure the new sanitary private drain connection is free from defects from workmanship (dips, out of round pipe, poor joints) for a period of 30 days from discovery for a period of a maximum five (5) years.

S-36
PRESERVATION OF TREES

TABLE OF CONTENTS

36.01 SCOPE OF WORK

This specification covers the requirements for the preservation of trees during various construction activities within the City of Windsor..

36.02 REFERENCES

This specification refers to the following standards, specifications or publications:

- AS-507

36.03 MATERIALS

N/A

36.04 CONSTRUCTION

In accordance with City of Windsor policy, the Contractor shall exercise the utmost caution to ensure the protection of trees (above and below ground) during construction activities. If trees are damaged or mistakenly removed due to the construction activities, the Contractor shall be assessed the appraised value of the trees, as determined by the City Engineer. The appraised value of the trees shall be determined using the International Society of Arboriculture (I.S.A.) formula.

All City owned trees along the public Right of Way or within City parks that present interference issues for construction machinery, shall be trimmed by the Contractor in advance of the construction project in an effort to reduce damages to City owned trees

during construction. The Parks Department (Forestry Division) shall provide the Contractor, a list of approved professional Tree Care companies to retain for the project. The Contractor is responsible for coordinating an onsite meeting with the Manager of Forestry and Natural Areas or his designate along with the Contractor's chosen tree trimming sub-contractor (attained from the City's approved list of tree companies) to review the scope of the tree trimming requirements for the protection of trees during the project. The Contractor will be responsible for scheduling and monitoring the required tree trimming with the approved tree trimming sub contractor.

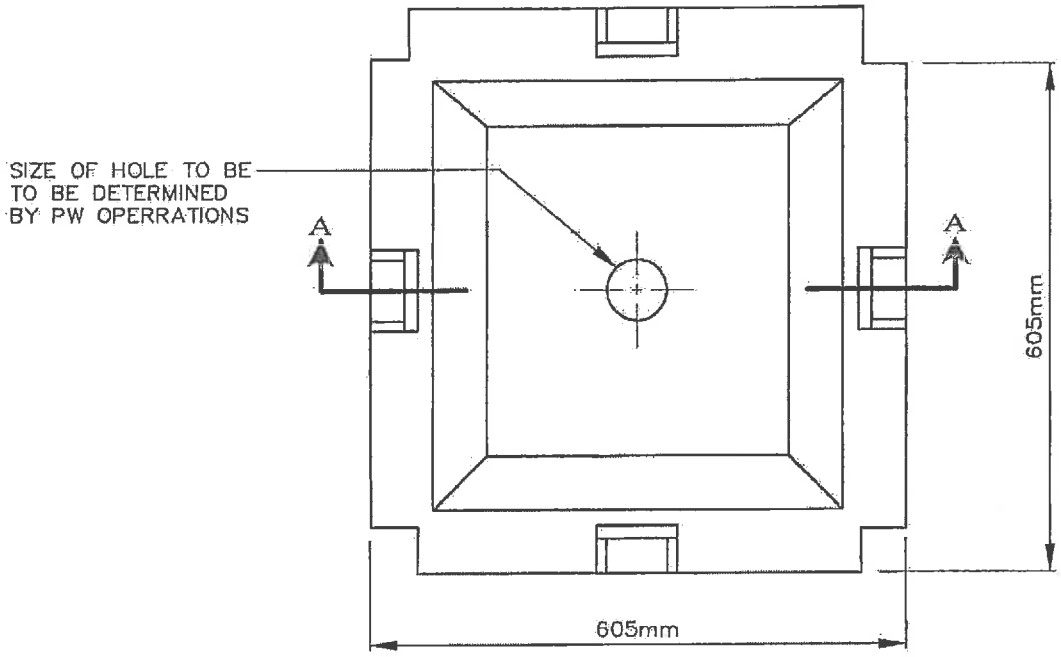
The Contractor's attention is brought to Standard Drawing AS-507, Guidelines for Tunnelling Lengths Near or at Trees, and to the fact that should it be necessary to excavate closer to an existing tree than is acceptable to the City Engineer, the Manager of Forestry and Natural Areas shall be notified prior to the work being performed.

36.05 MEASUREMENT FOR PAYMENT

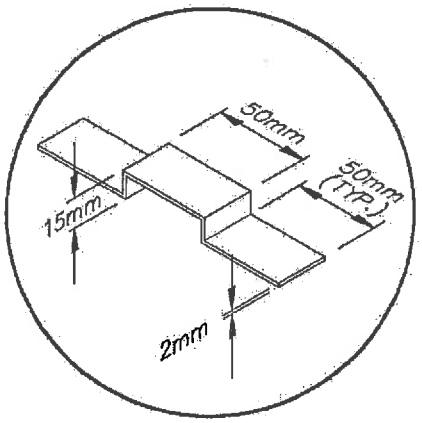
Payment for this work shall be made at the unit price bid in the Form of Tender and shall be compensation in full for all labour, equipment and materials required to complete this work.

36.06 BASIS FOR PAYMENT

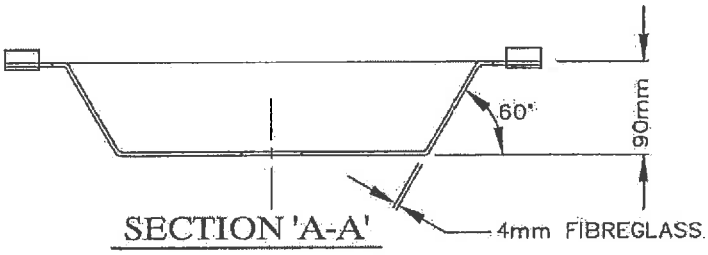
N/A



CATCH BASIN FLOW RESTRICTOR PLATE - PLAN



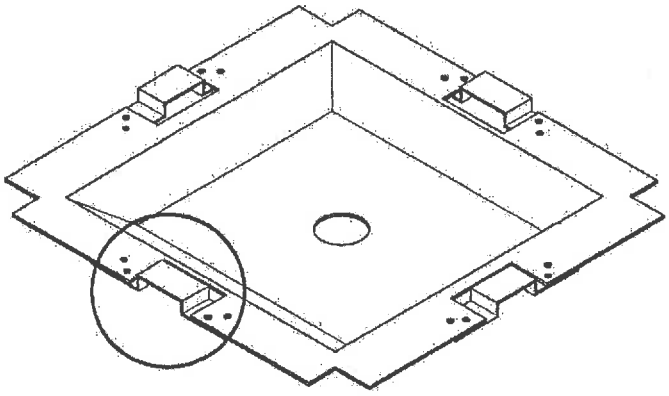
STAINLESS STEEL CLIP
(RIVETTED IN PLACE)



SECTION 'A-A'

NOTES:

- CORNER AND REAR CUT OUTS TO SUIT CATCH BASIN FRAME;
- NOT PERMITTED ON PRIVATE PROPERTY;



ISOMETRIC VIEW

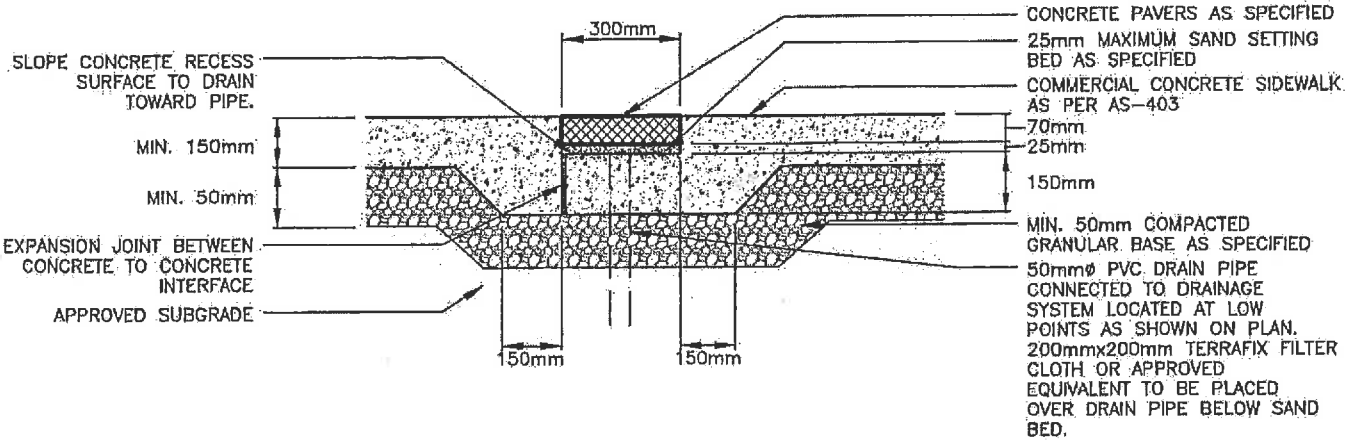
CITY OF WINDSOR
ENGINEERING DEPARTMENT

CATCH BASIN FLOW
RESTRICTOR PLATE – FOR R.O.W. ONLY

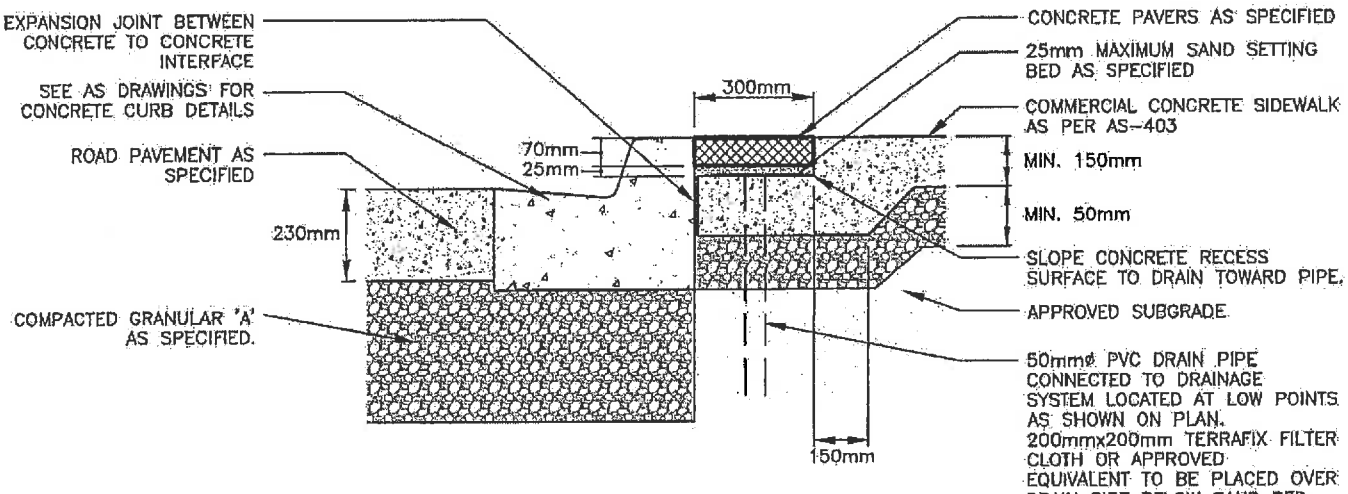
DR'N BY: S.J., N.B.	DATE: SEPT. 1997
REVISION: FEB. 2017	CH'KD BY: R.H.
CH'KD BY: P. UBENE	PASSED BY:

CITY ENGINEER

AS–525



CONDITION A



CONDITION B

GENERAL NOTES:

1. ALL WORK WITHIN THE PUBLIC RIGHT OF WAY TO BE COMPLETED TO CITY OF WINDSOR STANDARDS AND TO THE SATISFACTORY OF THE CITY ENGINEER.
2. INSTALLATION INTERVAL OF THE DRAIN PIPES AT LONGITUDINAL DIRECTION TO BE DESIGNED BY THE ENGINEER AND TO THE SATISFACTION OF THE CITY ENGINEER.

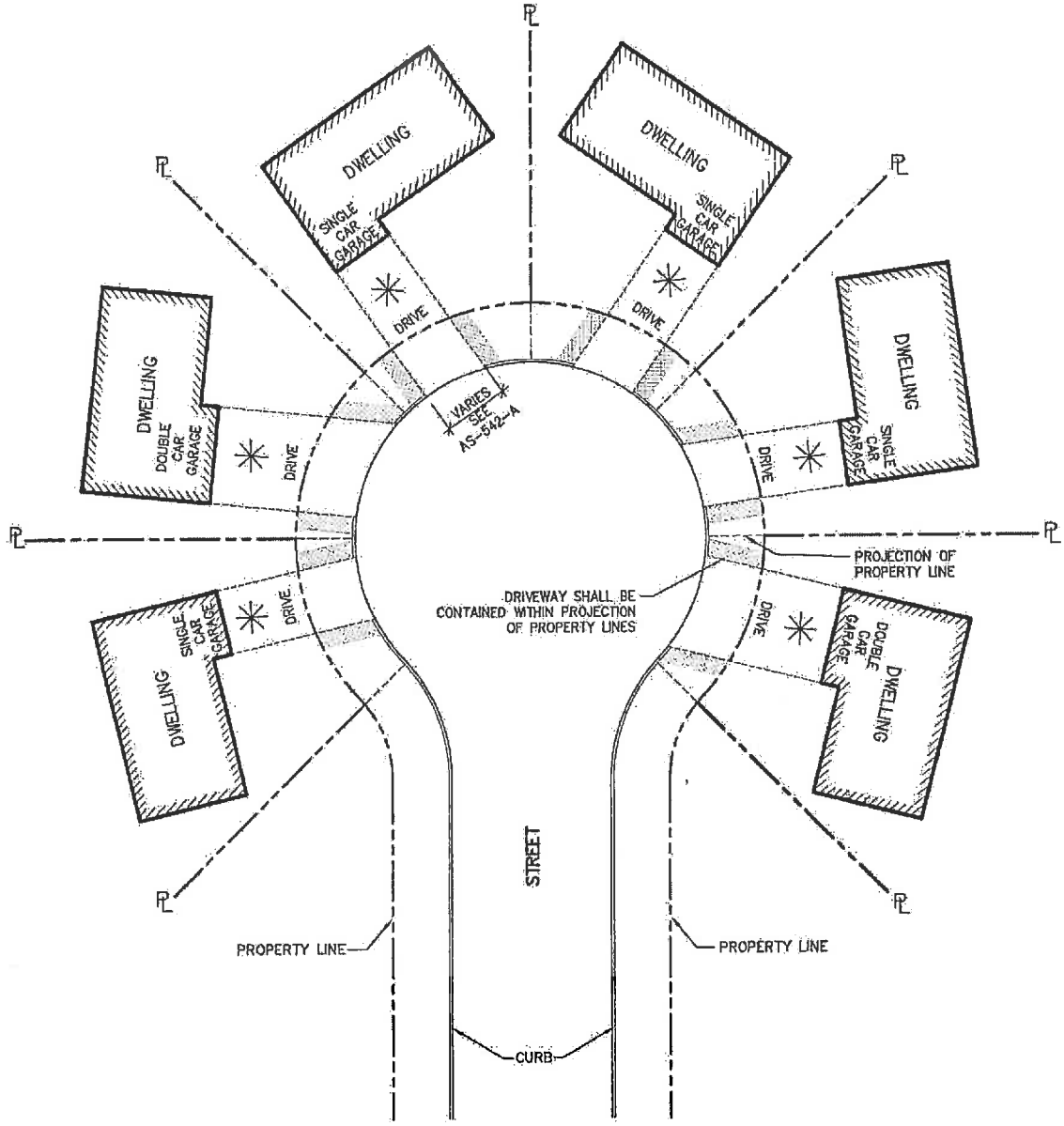
CITY OF WINDSOR
ENGINEERING DEPARTMENT

BRICK PAVERS IN THE RIGHT OF WAY

DR'N BY: S.R., M.S.	DATE: MAY 2017
REVISION:	CH'KD BY: A.L.
CH'KD BY: P.U.	PASSED BY:

CITY ENGINEER

AS-560



GENERAL NOTES:

1. NO RADIUS OR RAISED CURBS ON CITY RIGHT-OF-WAY; STRAIGHT FLARES ONLY;
2. NOTWITHSTANDING THIS DRAWING, CURB CUT WIDTH SHALL NOT EXCEED 50% OF FRONTAGE WIDTH;
3. ONE ACCESS IS PERMITTED PER LOT FRONTAGE. A PROPERTY MAY BE ACCESSED FROM AN OPEN, PAVED MUNICIPAL ALLEY;

✳ DRIVEWAY PORTION ON PRIVATE PROPERTY IS TO COMPLY WITH & BE APPROVED BY THE BUILDING DEPARTMENT AT THE CITY OF WINDSOR;

DRIVEWAY MUST HAVE A MINIMUM SEPARATION OF 0.9m (3') OF ANY VERTICAL OBSTRUCTION. Ie. HYDRO POLE, FIRE HYDRANT, CABLE BOX, TREE, ETC.

CITY OF WINDSOR

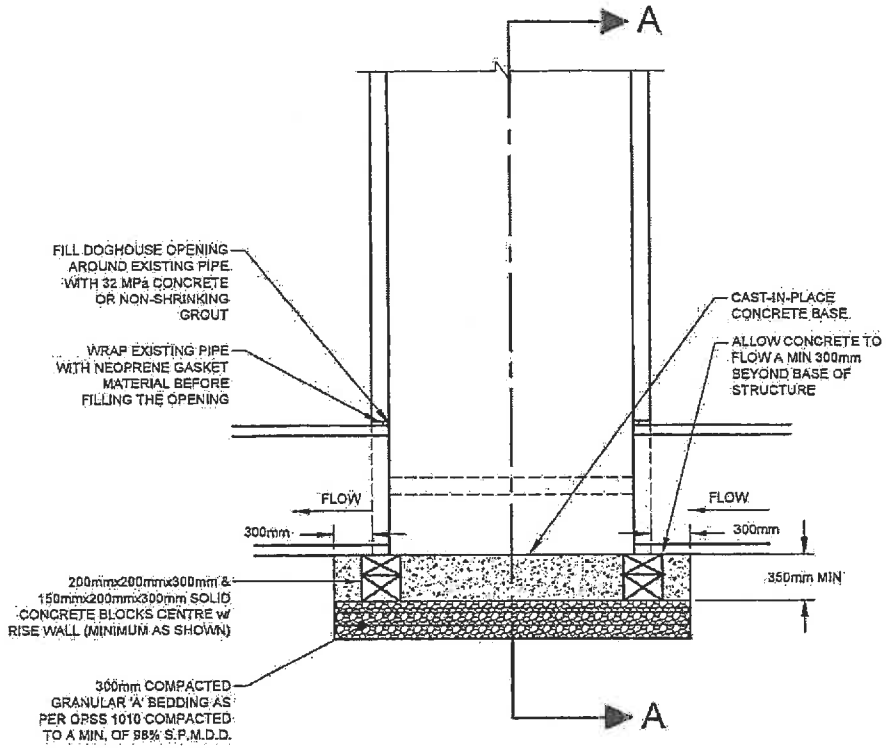
ENGINEERING DEPARTMENT

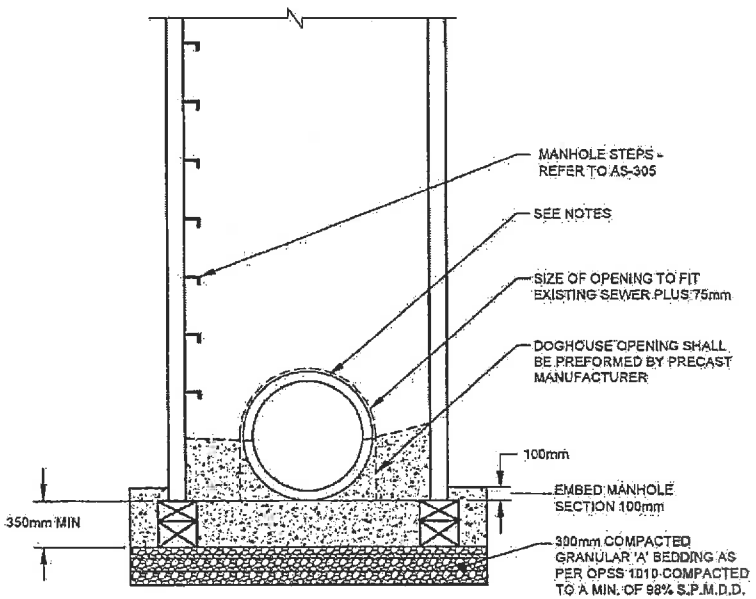
Maximum Curb Cut for Residential Driveways on Cul-de-Sacs

DRAWN BY: N. BRUSH	DATE: FEBRUARY 2017
REVISION: –	CHECKED BY: AP
CHECKED BY: –	PASSED BY: –

CITY ENGINEER

AS-542-E





SECTION A-A

NOTES:

1. ALL MAINTENANCE HOLE COMPONENTS TO MEET AS-314;
2. ALL BENCHING IS TO MEET OPSD 701.21
3. ALL CAST IN PLACE CONCRETE TO BE 32 MPa
4. CONCRETE BONDING AGENT MUST BE APPLIED TO ALL INTERFACES OF PRECAST TO CAST-IN-PLACE CONCRETE.
5. TOP OF EXISTING MAINLINE SEWER MUST BE FULLY REMOVED TO SPRINGLINE ACROSS THE FULL INTERNAL WIDTH OF THE STRUCTURE

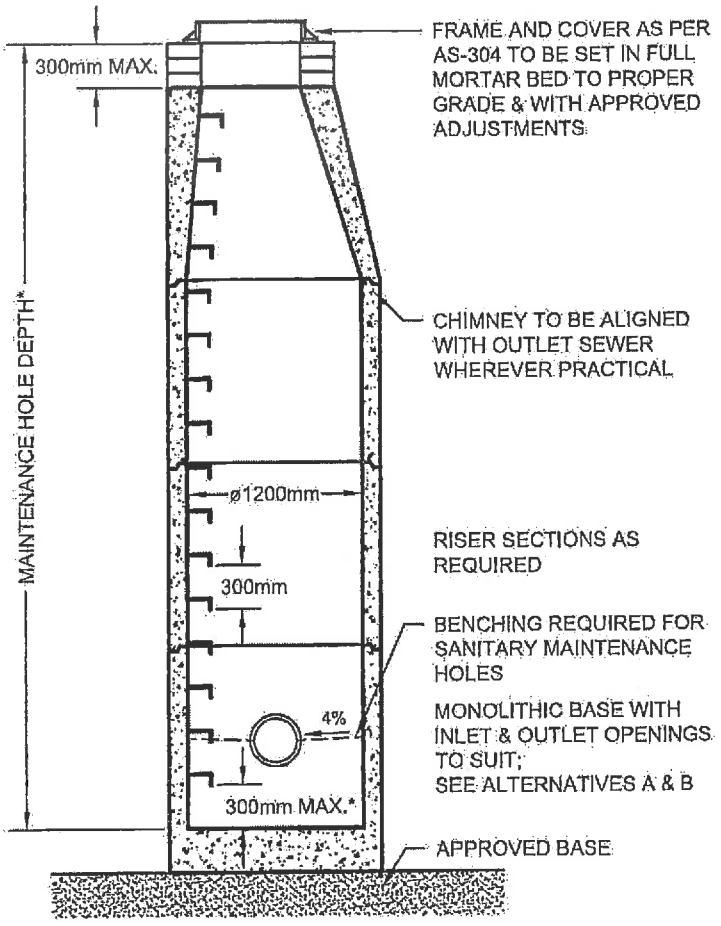
CITY OF WINDSOR
ENGINEERING DEPARTMENT

DOGHOUSE MANHOLE

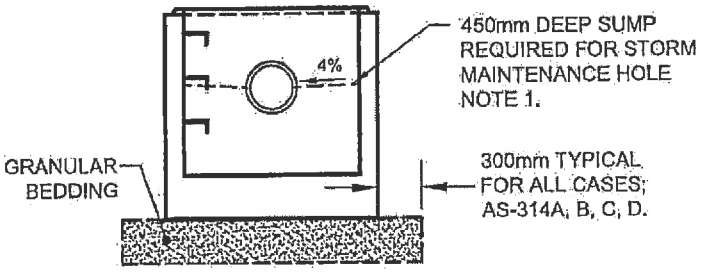
DRAWN BY: N.S.	DATE: APRIL 2016
REVISED: –	CHECKED BY: P.U.
CHECKED BY: M.C.	PASSED BY: M.W.

CITY ENGINEER

AS–559



*MEASURED TO BENCHING OR SUMP, WHICHEVER IS APPLICABLE

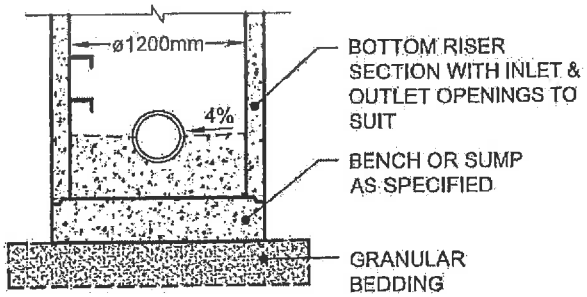


SUMP DETAIL

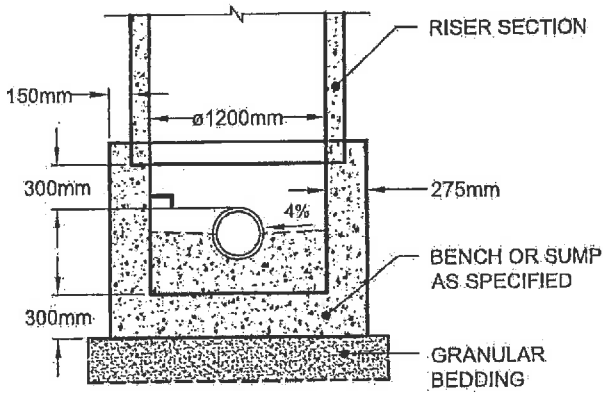
NOTES:

1. THE SUMP IS MEASURED FROM THE LOWEST INVERT.
2. COMPACTED GRANULAR 'A' BACKFILL SHALL BE PLACED TO A MINIMUM THICKNESS OF 300.0mm ALL AROUND THE MAINTENANCE HOLE.
3. PRECAST CONCRETE COMPONENTS SHALL BE ACCORDING TO OPSD 701 SERIES.
4. PIPE SUPPORT SHALL BE CLASS 'A' BEDDING TO FIRST PIPE JOINT BEYOND MANHOLE (RIGID PIPE) OR A FLEXIBLE JOINT WITHIN 900mm OF MANHOLE WALL (RIGID OR FLEXIBLE PIPE) WITH SEWER STONE BEDDING.
5. MAINTENANCE HOLE STEPS IN ACCORDANCE WITH AS-305.

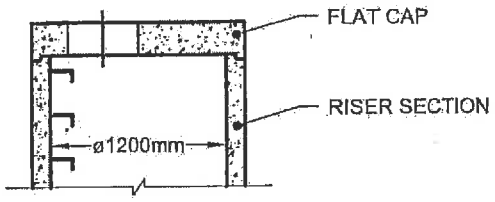
ALTERNATIVES



A. PRECAST SLAB BASE



B. CAST-IN-PLACE BASE



C. PRECAST FLAT CAP

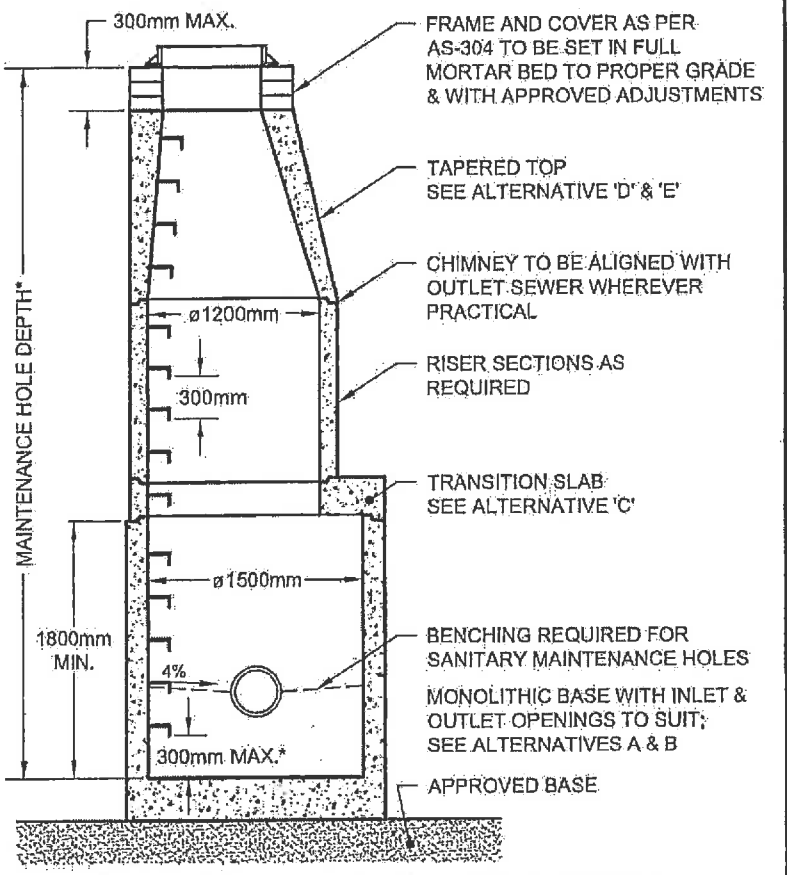
CITY OF WINDSOR
ENGINEERING DEPARTMENT

PRECAST MAINTENANCE HOLE
1200mm DIAMETER

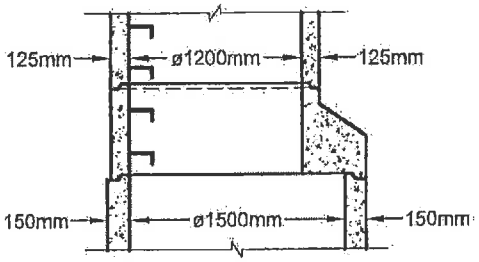
DRAWN BY: N.B.	DATE: MARCH, 2017
REVISED: –	CHECKED BY: P.U.
CHECKED BY: M.C.	PASSED BY: M.W.

CITY ENGINEER

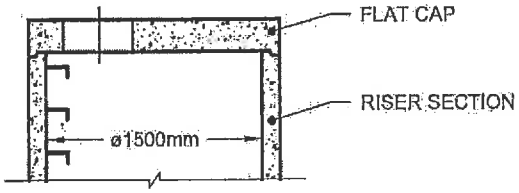
AS–314A



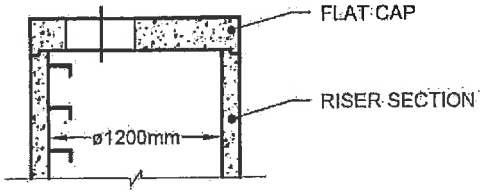
*MEASURED TO BENCHING OR SUMP, WHICHEVER IS APPLICABLE



C. TAPERED TRANSITION SLAB

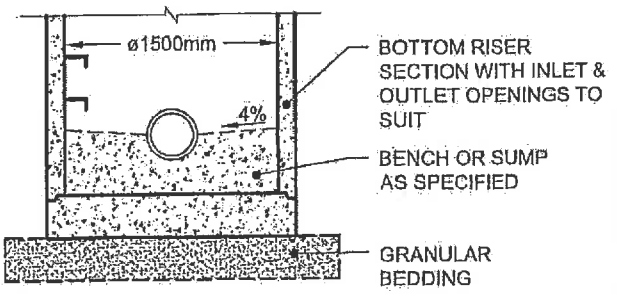


D. 1500mm PRECAST FLAT CAP

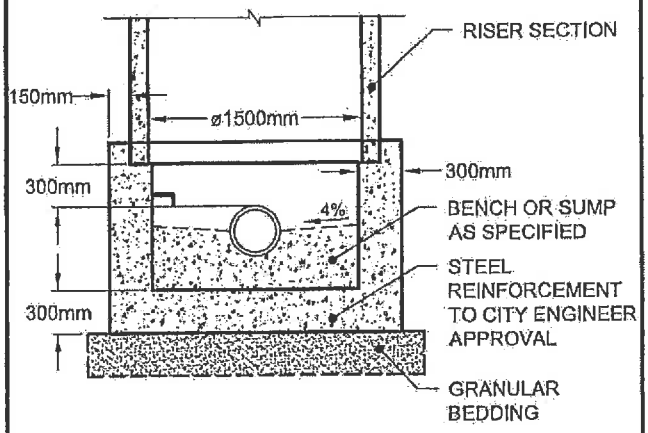


E. 1200mm PRECAST FLAT CAP

ALTERNATIVES



A. PRECAST SLAB BASE



B. CAST-IN-PLACE BASE

NOTES:

1. THE SUMP IS MEASURED FROM THE LOWEST INVERT, FOR SUMP DETAIL SEE AS-314A.
2. COMPACTED GRANULAR 'A' BACKFILL SHALL BE PLACED TO A MINIMUM THICKNESS OF 300mm ALL AROUND THE MAINTENANCE HOLE.
3. PRECAST CONCRETE COMPONENTS SHALL BE ACCORDING TO OPSD 701 & 703 SERIES.
4. PIPE SUPPORT SHALL BE CLASS 'A' BEDDING TO FIRST PIPE JOINT BEYOND MANHOLE (RIGID PIPE) OR A FLEXIBLE JOINT WITHIN 900mm OF MANHOLE WALL (RIGID OR FLEXIBLE PIPE) WITH SEWER STONE BEDDING.
5. MAINTENANCE HOLE STEPS IN ACCORDANCE WITH AS-305.

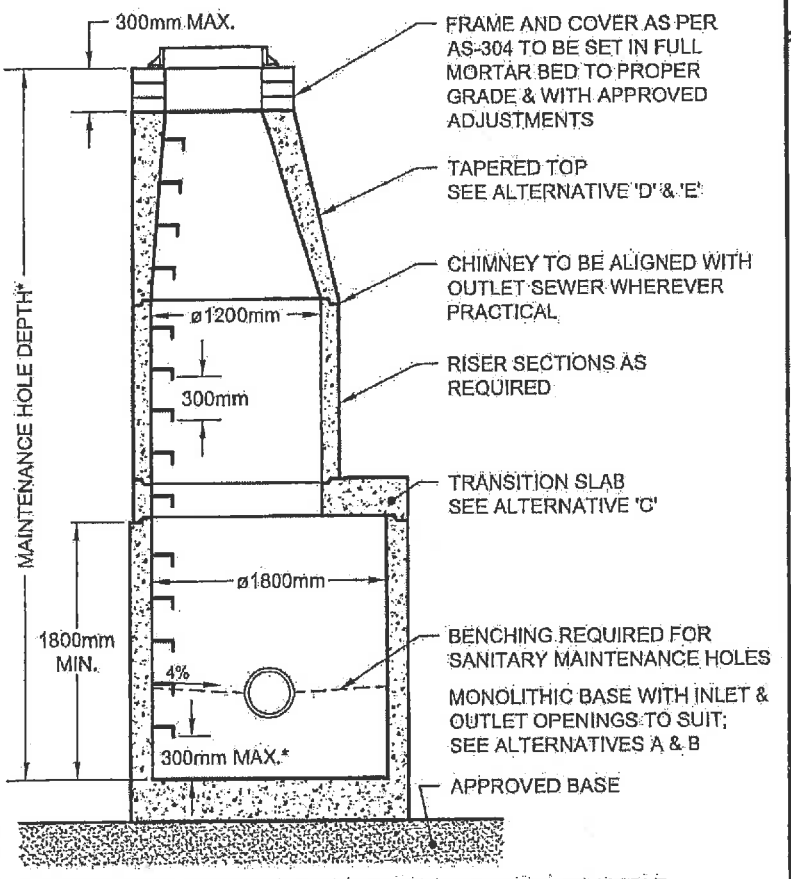
CITY OF WINDSOR
ENGINEERING DEPARTMENT

PRECAST MAINTENANCE HOLE 1500mm DIAMETER

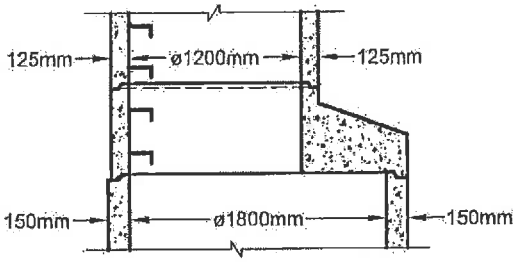
DRAWN BY: N.B.	DATE: MARCH, 2017
REVISED: –	CHECKED BY: P.U.
CHECKED BY: M.C.	PASSED BY: M.W.

CITY ENGINEER

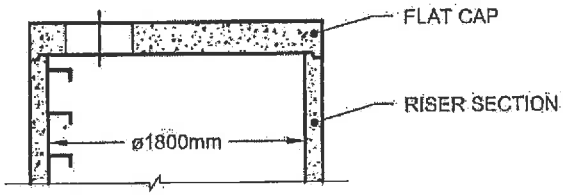
AS–314B



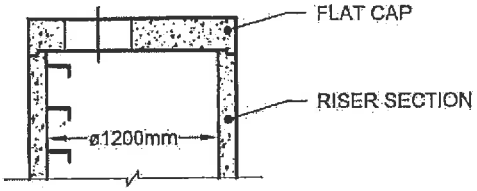
*MEASURED TO BENCHING OR SUMP, WHICHEVER IS APPLICABLE



C. TAPERED TRANSITION SLAB

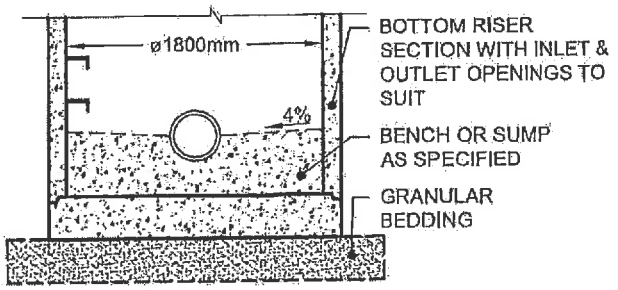


D. 1800mm PRECAST FLAT CAP

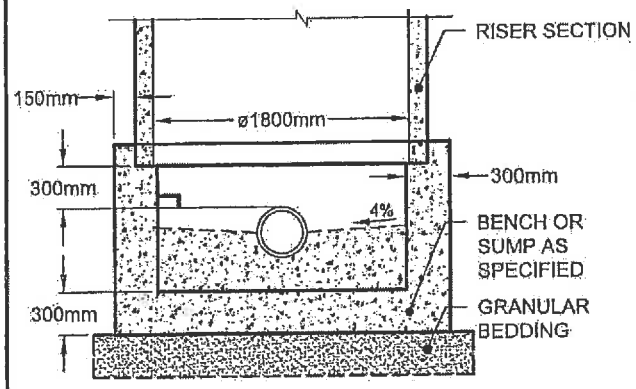


E. 1200mm PRECAST FLAT CAP

ALTERNATIVES



A. PRECAST SLAB BASE



B. CAST-IN-PLACE BASE

NOTES:

1. THE SUMP IS MEASURED FROM THE LOWEST INVERT, FOR SUMP DETAIL SEE AS-314A.
2. COMPACTED GRANULAR 'A' BACKFILL SHALL BE PLACED TO A MINIMUM THICKNESS OF 300mm ALL AROUND THE MAINTENANCE HOLE.
3. PRECAST CONCRETE COMPONENTS SHALL BE ACCORDING TO OPSD 701 & 703 SERIES.
4. PIPE SUPPORT SHALL BE CLASS 'A' BEDDING TO FIRST PIPE JOINT BEYOND MANHOLE (RIGID PIPE) OR A FLEXIBLE JOINT WITHIN 900mm OF MANHOLE WALL (RIGID OR FLEXIBLE PIPE) WITH SEWER STONE BEDDING.
5. MAINTENANCE HOLE STEPS IN ACCORDANCE WITH AS-305.

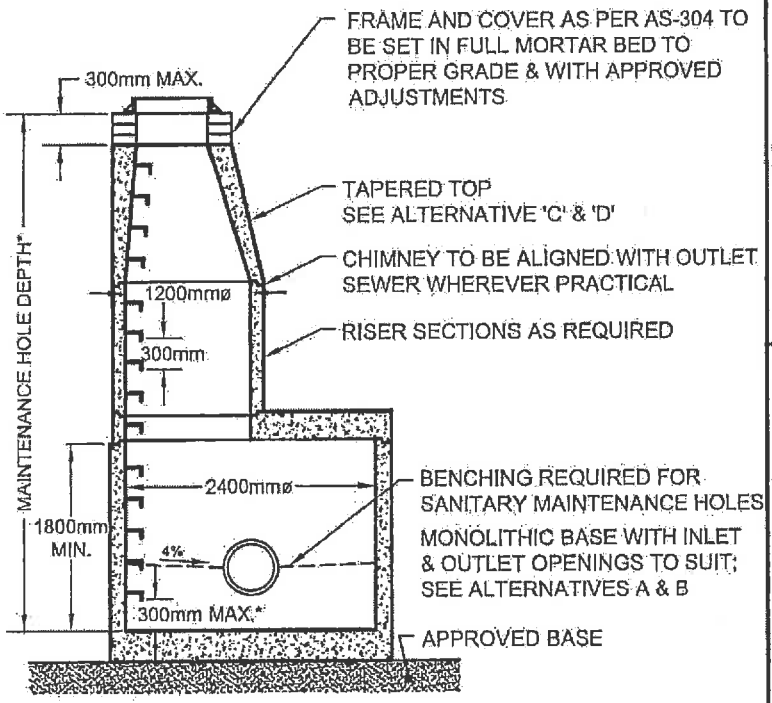
CITY OF WINDSOR
ENGINEERING DEPARTMENT

PRECAST MAINTENANCE HOLE 1800mm DIAMETER

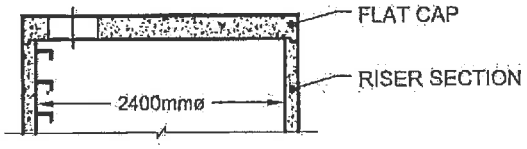
DRAWN BY: N.B.	DATE: MARCH, 2017
REVISED: –	CHECKED BY: P.U.
CHECKED BY: M.C.	PASSED BY: M.W.

CITY ENGINEER

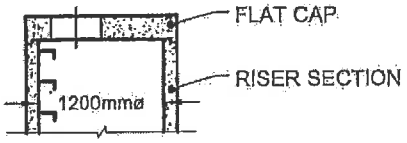
AS–314C



*MEASURED TO BENCHING OR SUMP, WHICHEVER IS APPLICABLE

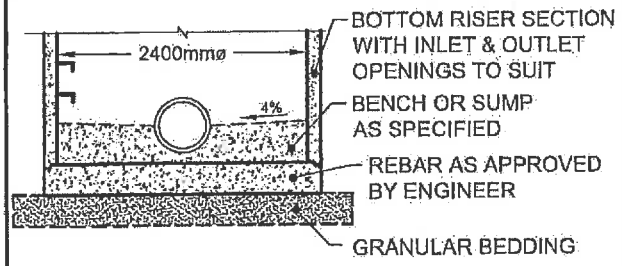


C. 2400mm PRECAST FLAT CAP

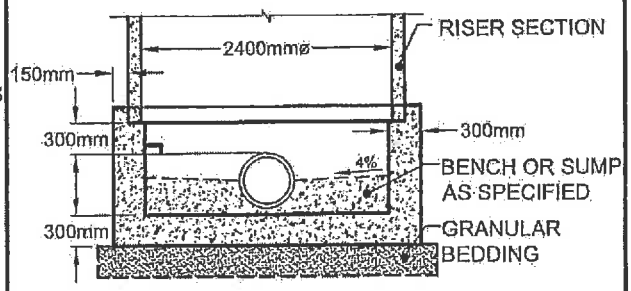


D. 1200mm PRECAST FLAT CAP

ALTERNATIVES



A. PRECAST SLAB BASE



B. CAST-IN-PLACE BASE

NOTES:

1. THE SUMP IS MEASURED FROM THE LOWEST INVERT, FOR SUMP DETAIL SEE AS-314A.
2. COMPACTED GRANULAR 'A' BACKFILL SHALL BE PLACED TO A MINIMUM THICKNESS OF 300mm ALL AROUND THE MAINTENANCE HOLE.
3. PRECAST CONCRETE COMPONENTS SHALL BE ACCORDING TO OPSD 701 & 703 SERIES.
4. PIPE SUPPORT SHALL BE CLASS 'A' BEDDING TO FIRST PIPE JOINT BEYOND MANHOLE (RIGID PIPE) OR A FLEXIBLE JOINT WITHIN 900mm OF MANHOLE WALL (RIGID OR FLEXIBLE PIPE) WITH SEWER STONE BEDDING.
5. MAINTENANCE HOLE STEPS IN ACCORDANCE WITH AS-305.

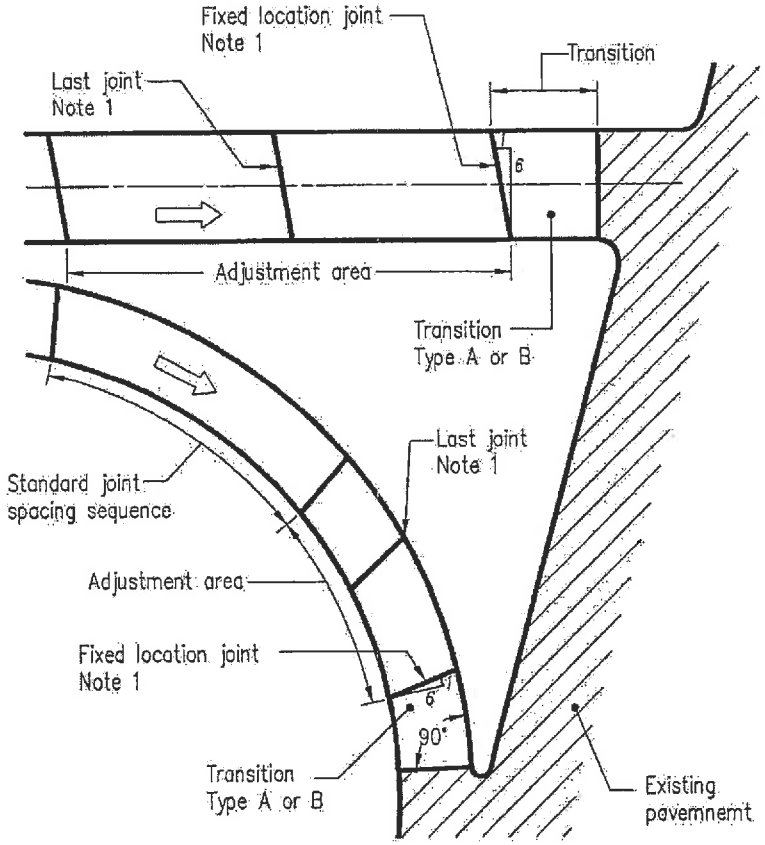
CITY OF WINDSOR
ENGINEERING DEPARTMENT

PRECAST MAINTENANCE HOLE 2400mm DIAMETER

DRAWN BY: S.S, N.B.	DATE: MARCH, 2017
REVISED: –	CHECKED BY: P.U.
CHECKED BY: M.C.	PASSED BY: M.W.

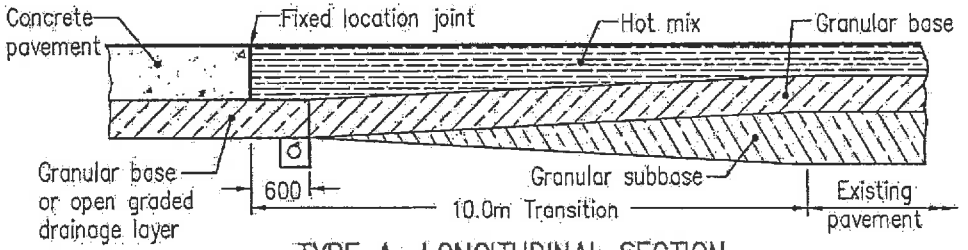
CITY ENGINEER

AS–314D

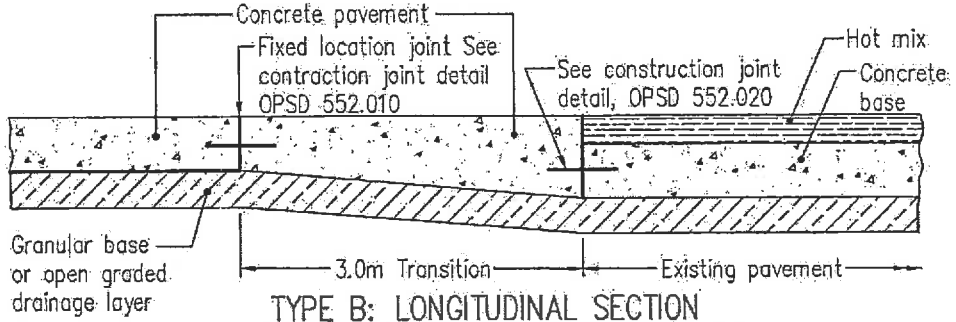


PLAN VIEW

N.T.S.



TYPE A: LONGITUDINAL SECTION
CONCRETE PAVEMENT TO HOT MIX PAVEMENT WITH GRANULAR BASE



TYPE B: LONGITUDINAL SECTION
CONCRETE PAVEMENT TO COMPOSITE PAVEMENT

GENERAL NOTES:

1 ADJUST THE POSITION OF THE LAST JOINT IMMEDIATELY PREVIOUS TO THE FIXED LOCATION JOINT, SO THAT THE SLABS ON EACH SIDE OF THIS LAST JOINT ARE NOT SHORTER THAN 3.0m, NOR LONGER THAN 5.0m. LAST JOINT TO BE AN EXPANSION JOINT FOR TYPE B SECTION.

A WHEN BASE IS OPEN GRADED DRAINAGE LAYER, A MINIMUM 100mm OF GRANULAR A MATERIAL IS REQUIRED BENEATH IT.

B ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.

CITY OF WINDSOR

ENGINEERING DEPARTMENT

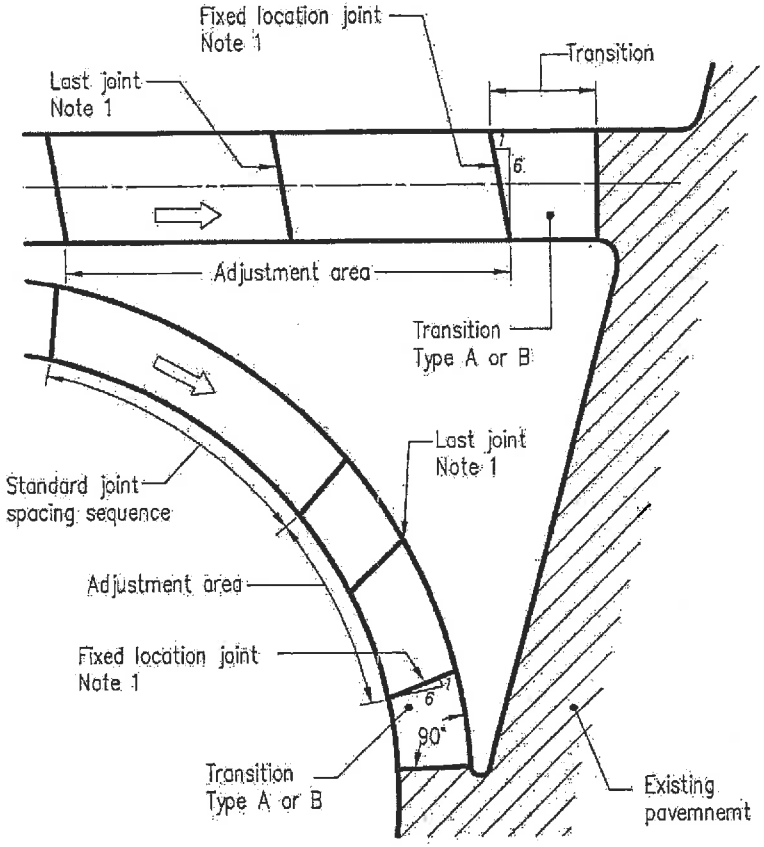
CONCRETE PAVEMENT

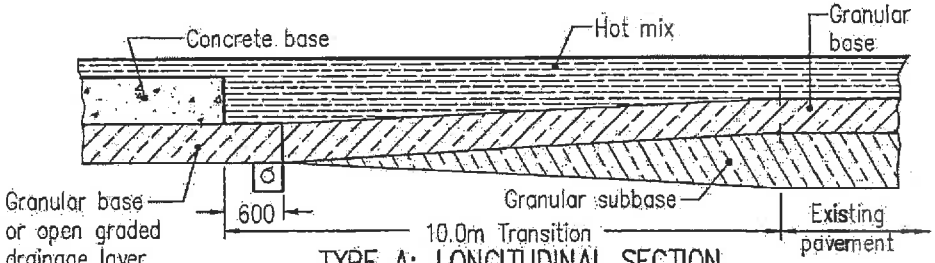
APPROACH TREATMENT TO HOT MIX AND COMPOSITE PAVEMENTS

DR'N BY: J.L./S.R.	DATE: APRIL, 2014
REVISION: FEB, 2015	CH'KD BY: A.L.
CH'KD BY: P.J.U.	PASSED BY:

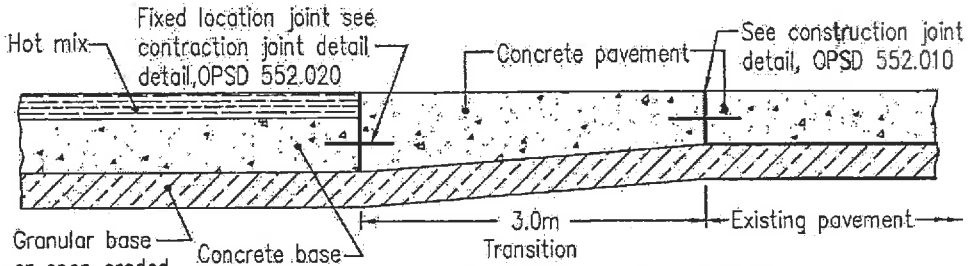
CITY ENGINEER

AS-554-A





TYPE A: LONGITUDINAL SECTION
COMPOSITE PAVEMENT TO HOT MIX PAVEMENT WITH GRANULAR BASE



TYPE B: LONGITUDINAL SECTION
COMPOSITE PAVEMENT TO CONCRETE PAVEMENT

PLAN VIEW

N.T.S.

GENERAL NOTES:

1 ADJUST THE POSITION OF THE LAST JOINT IMMEDIATELY PREVIOUS TO THE FIXED LOCATION JOINT, SO THAT THE SLABS ON EACH SIDE OF THIS LAST JOINT ARE NOT SHORTER THAN 3.0m, NOR LONGER THAN 5.0m. LAST JOINT TO BE AN EXPANSION JOINT FOR TYPE B SECTION.

A WHEN BASE IS OPEN GRADED DRAINAGE LAYER, A MINIMUM 100mm OF GRANULAR A MATERIAL IS REQUIRED BENEATH IT.

B ALL CONCRETE SURFACES IN CONTACT WITH HOT MIX PAVEMENT SHALL BE TREATED WITH A TACK COAT PRIOR TO HOT MIX PAVING.

C ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.

CITY OF WINDSOR

ENGINEERING DEPARTMENT

COMPOSITE PAVEMENT

APPROACH TREATMENT TO HOT MIX AND CONCRETE PAVEMENTS

DR'N BY: J.L./S.R.	DATE: APRIL, 2014
REVISION: FEB, 2015	CH'KD BY: A.L.
CH'KD BY: P.J.U.	PASSED BY:

CITY ENGINEER

AS-554-B