THE CORPORATION OF THE CITY OF BRAMPTON

BY-LAW

Number 108-88

To provide for a drainage works in Lots 16 and 17, Concession 4, W.H.S., geographic Township of Chinguacousy (Clark Drain)

WHEREAS the requisite number of owners have petitioned the council of the City of Brampton in the Regional Municipality of Peel, in accordance with the provisions of the Drainage Act, requesting that the following lands be drained by a drainage works:

Lots 16 and 17, Concession 4, in the geographic Township of Chinguacousy

AND WHEREAS the council of the City of Brampton in the Regional Municipality of Peel has obtained a report, prepared by Jack K. Young and dated March 17, 1988, on the proposed drainage works;

AND WHEREAS the estimated total cost of constructing the drainage works is $39,500.00;

AND WHEREAS $3,600.00 is the amount to be contributed by the City of Brampton for construction of the drainage works;

AND WHEREAS $1,400.00 is being assessed to the Regional Municipality of Peel;

AND WHEREAS the council is of the opinion that the drainage of the area is desirable;

NOW THEREFORE the council of the City of Brampton, pursuant to the Drainage Act, ENACTS as follows:

1. The report prepared by J. K. Young Company Limited dated March 17th, 1988, is hereby adopted, and the drainage works as therein indicated and set forth is hereby authorized, and shall be completed in accordance therewith.

2. To pay for the cost of constructing the drainage works, a special rate shall be levied upon lands and roads, as set forth in Schedule A to this by-law, to be collected in the same manner and at the same time as other taxes are collected.

3. All assessments are payable in the first year in which the assessment is imposed.

FIRST READING: May 9th, 1988

SECOND READING: May 9th, 1988

Provisionally adopted this 9th day of May, 1988.

KENNETH G. WHILLANS MAYOR

LEONARD J. MIKULICH CLERK

THIRD READING:

ENACTED this 27th day of June , 1988.

KENNETH G. WHILLANS MAYOR

LEONARD J. MIKULICH CLERK

SCHEDULE OF ASSESSMENTS
(Drain B - City of Brampton)

Concession	Parcel of Land (Owner)	Assessment Roll No.	Total Amount Assessed	Net Assessment After Grant
4 W.H.S.	Part Lot 17 (Springbrook Investments Ltd.)	060-002-15700	$750.00	$500.00
4 W.H.S.	Part Lot 16 (J. Clark)	060-003-12600	$3,050.00	$2,033.33

Schedule A to By-law 108-88

SCHEDULE OF ASSESSMENTS
(DRAIN A - CITY OF BRAMPTON)

Concession	Parcel of Land (Owner)	Assessment Roll No.	Total Amount Assessed	Net Assessment After Grant
4 W.H.S.	Part Lot 17 (D. Moddison)	060-002-12310	$60.00	$40.00
4 W.H.S.	Part Lot 16 (I. Moddison)	060-002-12400	$450.00	$300.00
4 W.H.S.	Part Lot 17 (Springbrook Investments Ltd.)	060-002-15700	$11,470.00	$7,646.67
4 W.H.S.	Part Lot 16 (W. & A. Bodrug)	060-003-12500	$3,390.00	$2,260.00
4 W.H.S.	Part Lot 16 (J. Clark)	060-003-12600	$8,410.00	$5,606.67
4 W.H.S.	Part Lot 17 (J. & M. VanTent)	060-005-13400	$70.00	$70.00
Roads of the City of Brampton			$800.00	$800.00
Roads of the Regional Municipality of Peel			$1,400.00	$1,400.00
SPECIAL ASSESSMENTS				
City of Brampton (Road crossing on 15 Sideroad (Wanless Road)).			$2,800.00	$2,800.00

SCHEDULE OF ASSESSMENTS
(Drain A - Town of Caledon)

Concession	Parcel of Land (Owner)	Assessment Roll No.	Total Amount Assessed	Net Assessment After Grant
4 W.H.S.	Part Lot 18 (Allelix Inc.)		$6,850.00	$6,850.00

ENGINEERING REPORT

on the

CLARK DRAIN

in the

CITY OF BRAMPTON

REGIONAL MUNICIPALITY OF PEEL

1988

J.K. YOUNG COMPANY LTD.

Brampton

J. K. YOUNG COMPANY LTD.

J.K. YOUNG, P.Eng., O.L.S.
R.H. DAVIDSON, P.Eng.

CONSULTING ENGINEERING AND SURVEYING

9 RIDGEHILL DRIVE
BRAMPTON, ONT. L6Y 2C3
Telephone: (416) 457-2555

March 17, 1988

To the Mayor and Council
City of Brampton

Re: Clark Drain

Dear Sirs:

We are pleased to submit our engineering report on the "Clark Drain", a proposed drainage project situated in the geographic township of Chinguacousy. The project was initiated through a petition submitted in accordance with Section 4 of the Drainage Act, RSO 1980.

A preliminary report for this project was submitted on September 25, 1987 and was considered at a Meeting of Council on November 9, 1987.

This project involves lands in both the City of Brampton and the Town of Caledon. The City of Brampton, as the initiating municipality, administers the project on behalf of the affected landowners in both municipalities.

It is proposed to carry out this project under the provisions of the "Drainage Act, RSO 1980". The project will be known as the "Clark Drain".

This report is the result of an engineering survey, a study of the area, and consultation with the owners. It contains a description of the work, cost estimates, drawings and specifications, and a schedule of assessments to distribute the cost of the work in accordance with the Act.

EXISTING CONDITIONS

The proposed Clark Drain is located in the northwest portion of the watershed of the recently constructed "Rowntree" drainage project. Water from the proposed Clark Drain will flow south across 15 Sideroad (Wanless Road) through an existing channel in

Lots 15 and 14 to the Rowntree Drain in Lot 13. The project is within the Credit River watershed. A natural watercourse exists along the course of this proposed drain, and some alterations have been made to the watercourse. Sheet 1 of the attached drawings shows the location of the proposed project.

In Lot 18 (Allelix Inc.) the surface drainage course has been replaced by tile drainage with an outlet constructed under Regional Road 14 (Mayfield Road). Surface water continues to drain south under the road through a corrugated steel pipe (CSP) culvert.

The natural watercourse has recently been deepened across part of Lot 17 (Springbrook Investments Ltd.) to provide an improved outlet for the Allelix tile system. The excavated material was not levelled along this section of ditch and the tile drain outlet is located below the excavated ditch bottom.

In Lot 16 (J. Clark), tile drainage has also been installed. Catch basins have been constructed to take water from the surface watercourse into the tile drains. An area of swamp and woodlot remains along the course of the channel in the north corner of the Clark property and the east corner of the Springbrook Investments property. High flows during spring runoff and summer storms result in water from this swamp area flooding the cropped portions of the Clark and Springbrook Investments farms.

The channel on the W. & A. Bodrug property has an adequate cross-section to carry the drainage flows, but the upper section of the channel is not deep enough to provide an adequate outlet for the tile main from the Clark property. The area around the tile outlet is eroding and sediment is collecting in the channel below the eroded area.

The tile drainage system on the Allelix proprety underdrains a larger area than would normally flow to this project. This will contribute to slightly larger flow volumes in the natural watercourse, but the main effect of tile drainage is the maintenance of flows over a longer period of time as the tiles remove water from the upper portion of the soil profile. This results in swampy areas along the receiving channel remaining wet for longer periods following rainfall and runoff events.

There is presently no agreement which provides for a tile drainage outlet for the Allelix and Clark properties.

The lack of an adequate channel on the Springbrook Investments and Clark properties is preventing the use of land along the channel for agriculture, and flooding of the adjacent fields reduces the agricultural productivity of these lands. The natural watercourse follows a meandering course across Lots 16 and 17, forming irregularly shaped fields which are difficult to farm economically.

The road culvert under 15 Sideroad is in only fair condition and is too small to provide an adequate outlet for the upstream lands. The existing channel south of 15 Sideroad has an adequate grade and cross-section to serve as an outlet for this project.

PROPOSED IMPROVEMENTS

It is proposed to construct two open drains, Drains A and B, along the courses indicated on Sheet 1 of the attached drawings.

Drain A will be 1,250 metres in length and will follow the existing watercourse from Regional Road 14 (Mayfield Road) to a point part way through the Bodrug property, north of 15 Sideroad (Wanless Road). Parts of the channel will be relocated to fencelines on the Springbrook Investments and Clark properties, and the abandoned sections of the old channel will be backfilled. The course of the drain will be cleared of brush and trees through the woodlot. All excavated material, including the previously excavated material on the Springbrook Investments property, will be levelled adjacent to the drain.

The culvert under Wanless Road will also be replaced as part of this drainage project. The 900 mm x 600 mm arch pipe will be removed and a 1200 mm CSP culvert will be installed.

Drain A will include a stone drop structure at the Allelix tile outlet and a second drop structure at the tile outlet on the Bodrug property. Rock rip rap will be placed to control erosion at bends in the drain's course and a temporary sediment trap will be constructed to control the movement of sediment through the drain during construction. One of the existing catch basins on the Clark property will be repaired and another replaced as part of this project.

Drain B will be constructed as a shallow ditch from an existing catch basin at the Clark/Springbrook property line to the new catch basin on Drain A. The drain will follow the course of an existing shallow ditch along the edge of the woodlot. This drain will carry overflow which currently flows south and east across the fields towards Drain A from the catch basin.

All drain banks will be seeded after excavation, but the landowners will be responsible for the reseeding of disturbed areas where levelling has taken place or where the old channel has been backfilled.

PROJECT INITIATION

This project was initiated by a petition submitted by the following landowners in accordance with Section 4 (1) of the Act:

J. Burrell W 1/2 Lot 18, Con 4 W.H.S. (Town of Caledon)
(Allelix Inc.)

J. Clark W 1/2 Lot 16, Con 4 W.H.S. (City of Brampton)

The area requiring drainage consists of the low wet lands adjacent to the course of the proposed drains in Lots 16 and 17, Concession 4 W.H.S. The farm property in Lot 18 also requires an improved outlet for an existing tile drainage system.

We have determined that the petition is sufficient to comply with Section 4 of the Drainage Act.

SITE MEETING

A site meeting for this project was held on July 7, 1987 in accordance with Section 9(1) of the Act.

PLAN

A plan showing the location of the Clark Drain and the affected properties is appended to this report. The heavy solid lines indicate the location of the proposed drains. The numbers adjacent to these lines are station numbers at property boundaries which indicate, in metres, the distance along the drains. The double broken lines indicate the approximate surface and subsurface watershed boundaries and the single broken lines indicate existing watercourses.

PROFILES

Sheet 2 of the attached drawings shows the depth and grade of the proposed drains. The upper solid line represents the existing ground level. The dashed line represents the proposed ditch bottom and the lower solid line (the grade line) indicates the proposed ditch bottom. The numbers above the profile indicate the depth of the drain measured from the ground level at the survey stake to the grade line.

ALLOWANCES

Sections 29 and 30 of the Drainage Act provide for an allowance to be paid to landowners along the drain for damages caused to lands and crops by the operation of construction equipment and by the disposal of excavated materials.

Section 33 of the Act provides for an allowance to owners for loss of access, which is paid to the landowner in lieu of constructing a farm crossing on an open drain.

The allowances payable to the owners entitled thereto are as follows:

Roll #	Owner	Damages	Loss of Access	Minimum Recommended Culvert Size
Drain A				
060-002 -13700	Springbrook Investments Ltd.	$2,800.00	$2,000.00	800 mm (2 locations)
060-003 -12500	W. & A. Bodrug	620.00	1,250.00	1000 mm
060-003 -12600	J. Clark	1,670.00	750.00	* Severance
Drain B				
060-003 -12600	J. Clark	680.00	1,000.00	800 mm
	TOTAL ALLOWANCES	$5,770.00	$5,000.00	

8737

Owners granted an allowance for Loss of Access in the above schedule shall have the option of having a farm culvert constructed as part of the construction work in lieu of accepting the preceding allowance for loss of access. To exercise this option, the owner must advise the City Clerk in writing prior to the date set for the Court of Revision.

The Loss of Access allowance granted Springbrook Investments Ltd. reflects the cost of installing crossings at two locations. Springbrook Investments Ltd. shall have the option of installing an 800 mm farm culvert upstream of the fence at Station 187A, downstream of the fence or at both locations.

The cost of installing a farm crossing on the Clark property on Drain A exceeds the value of the land severed by the drain. The allowance for severance reflects the value of the severed land and may not be forfeited in exchange for the construction of a farm culvert.

PROJECT COST ESTIMATE

The cost of constructing this work is estimated as follows:

Clearing of brush and trees	$ 1,250.00
Construct 1,250 metres of open channel (Drain A)	9,200.00
Construct 250 metres of open channel (Drain B)	1,200.00
Construct two (2) stone drop structures	2,500.00
Construct road culvert on 15 Sideroad	2,800.00
Construct one (1) concrete catch basin	500.00
Repair one (1) existing catch basin	200.00
Construct 30 square metres of rip rap protection	750.00
Construct one (1) temporary sediment trap	300.00
Level existing spoil piles	400.00
Backfill and grade abandoned channel	200.00
Allowances for damages and right-of-way	5,770.00
Allowances for loss of access and severance	5,000.00
Preliminary engineering report	3,500.00
Final engineering report	3,400.00
Tendering, supervision and final inspection	1,000.00
Contingencies and interest	1,530.00
TOTAL ESTIMATED COST	$ 39,500.00

ASSESSMENTS AND GRANTS

The Drainage Act requires that the total cost of the project be assessed against the lands and roads which contribute water to the drain or derive a benefit from its construction. The cost of this project is assessed against the lands and roads affected as shown in the annexed Schedule of Assessments. The assessments are based on the estimated cost of the work and the final assessments shall be prorated on the basis of the final project costs. The cost of constructing a new culvert on 15 Sideroad is assessed to the City of Brampton as a special assessment on the basis of the actual cost of the work.

An agricultural grant of one-third (33 1/3 %) is available from the Ministry of Agriculture and Food for all privately owned agricultural lands. This grant is not available to the following non-agricultural properties:

J. & M. Van Tent (Roll #060-003-13400)
Regional Municipality of Peel
City of Brampton

The Ontario Drainage Works Erosion Control Program provides a grant of 80 % of the cost of erosion control materials (rather than the one-third grant) to agricultural property owners. This grant applies to materials such as rock rip rap, filter fabric and grass seed. The appended Schedule of Assessments does not show the effect of this additional grant, however final assessments will be reduced by the amount of any grant received through this program.

SUBSEQUENT CONNECTIONS

Landowners shall be allowed to construct private drainage outlets into this drainage project on their own properties.

Between Stations 850A and 1+073A, Drain A is located entirely upon the Clark property in order to facilitate the maintenance of the property fences. Landowners adjacent to this section of drain (I. Moddison, W. & A. Bodrug) shall have the right to construct outlets into the open drain.

All outlets constructed into the Clark Drain shall be constructed in accordance with Detail Drawings NE-10 (Tile Outlet Protection) or NE-11 (Bank Protection for Surface Water Inlets) as contained in the appended Specifications.

WORKING CORRIDOR AND RIGHT OF WAY

The Contractor shall be allowed to operate his equipment within a working corridor as defined in Section C (Working Corridor) of the attached specifications. Each landowner is required to provide the Contractor and the Municipality with reasonable access to the drain on his property (See Section 3.14 of the General Specifications).

PROVISIONS AFFECTING LANDOWNERS

The following sections of the appended General Specifications are of particular interest to the landowners affected by this project:

3.3 - Line
3.4 - Profile, Grade & Cuts
3.8 - Construction of Road Culverts by the Municipality
3.9 - Fences
3.10 - Obstructions
3.11 - Allowances for Damages & Right-of-Way
3.12 - Allowances for Loss of Access
3.13 - Crops & Livestock
3.14 - Working Area & Access
4.2 - Levelling of Excavated Material
4.3 - Clearing
4.4 - Filling Old Channel
4.7 - Farm Bridges & Farm Culverts
4.9 - Tributary Outlets
4.10 - Surface Water Inlets
4.12 - Seeding of Side Slopes
4.13 - Temporary Sediment Traps
4.14 - Stone Drop Structure & Sediment Basin
4.15 - Rock Rip Rap
5.4 - Tributary Outlets
5.6 - Outlet Protection
5.7 - Catch Basins

MAINTENANCE

After construction, the Clark Drain shall be maintained by the City of Brampton at the expense of the lands and roads assessed herein, in proportion with the assessments contained in the appended Schedule for Outlet Assessments only, subject to any changes made under authority of the Drainage Act, RSO 1980.

The road crossing on 15 Sideroad shall be maintained at the expense of the City of Brampton.

The existing 250 mm (10") tile main between the catch basin at Station 888A and the outlet at Station 1+093A shall be maintained as part of this project by the City of Brampton at the expense of the land on which the repairs are made.

BYLAW

This report, including drawings and specifications, when adopted in bylaw form in accordance with the Drainage Act, RSO 1980, will provide the basis for construction and maintenance of this project.

All of which is respectfully submitted,

J.K. Young, P.Eng., O.L.S.

R.H. Davidson, P.Eng.

REGISTERED PROFESSIONAL ENGINEER J. K. YOUNG PROVINCE OF ONTARIO

REGISTERED PROFESSIONAL ENGINEER R. H. DAVIDSON PROVINCE OF ONTARIO

8737

SCHEDULE OF ASSESSMENTS
CLARK DRAIN
City of Brampton
Geographic Township of Chinguacousy

Lot & Roll #	Approx. Hectares	Owner	Benefit	Outlet	Net Assessment After Grant
DRAIN A					
City of Brampton, Con 4 WHS					
Pt 17 060-002-12310	2	D. Moddison	-	$ 60.00	$ 40.00
Pt 16 060-002-12400	4	I. Moddison	$ 350.00	100.00	300.00
Pt 17 060-002-15700	26	Springbrook Investments Ltd.	9,300.00	2,170.00	7,646.67
Pt 16 060-003-12500	5	W. & A. Bodrug	3,350.00	40.00	2,260.00
Pt 16 060-003-12600	16	J. Clark	8,100.00	310.00	5,606.67
Pt 17 060-005-13400	-	* J. & M. Van Tent	-	70.00	70.00
TOTAL ASSESSMENT ON LANDS in the City of Brampton			$ 21,100.00	$ 2,750.00	
Town of Caledon, Con 4 WHS					
Pt 18 120-002-13800	19	Allelix Inc.	4,200.00	2,650.00	4,566.67
TOTAL ASSESSMENT ON LANDS in the Town of Caledon			$ 4,200.00	$ 2,650.00	
15 Sideroad (Wanless Road) - City of Brampton			800.00	-	
Regional Road 14 (Mayfield Road) - Regional Municipality of Peel			800.00	600.00	

* denotes non-agricultural lands.

8737

SPECIFICATIONS

CLARK DRAIN

City of Brampton

(Geographic township of Chinguacousy)

A. EXTENT OF WORK

Station	Description	Quantity
Drain A		
	Springbrook Investments Ltd. (W 1/2 Lot 17, Con 4 WHS)	
000 to 685	Construct open drain with 1.0 m bottom width and sideslopes at 1.5:1. Level excavated material to east of drain from Sta 000A to 550A and to west of drain from Sta 550A to 685A. From Sta 187A to 274A, the drain shall be centered 4.5 m east of the fenceline. See Sheet 3 of the attached drawings.	685 m
010	Construct stone drop structure at existing tile outlet. The tile shall outlet onto the apron of the drop structure. The ditch bottom shall not be overexcavated for a sediment basin upstream of the structure. See Section 4.14 of the General Specifications and Detail Drawing NE-2.	One (1)
015 to 187	Level existing spoil piles on west bank of drain. See Section 4.2.	172 m
187 to 194	Construct rip rap bank protection on north-east bank at bend. See Section 4.15 and Detail Drawing NE-12.	10 sq m
000 to 010 & 187 to 274	Backfill old channel using material excavated from new drain. See Section 4.4.	97 m
550 to 685	Clear brush and trees from course of drain as specified in Section 4.3.	135 m

J. K. YOUNG COMPANY LTD.
Consulting Engineering and Surveying
9 Ridgehill Drive
BRAMPTON, ONTARIO L6Y 2C3
(416) 457-2555

Lot & Roll #	Approx. Hectares	Owner	Benefit	Outlet	Net Assessment After Grant
DRAIN A (cont'd)					
Special Assessment - Road Crossing on 15 Sideroad (Wanless Road) - City of Brampton			$ 2,800.00		
TOTAL ASSESSMENT - DRAIN A			$ 35,700.00		
DRAIN B					
City of Brampton, Con 4 WHS					
Pt 17 060-002-15700	9	Springbrook Investments Ltd.	$ 350.00	$ 400.00	$ 500.00
Pt 16 060-003-12600	5	J. Clark	3,050.00	-	2,033.33
TOTAL ASSESSMENT ON LANDS in the City of Brampton			$ 3,400.00	$ 400.00	
TOTAL ASSESSMENT - DRAIN B			$ 3,800.00		
TOTAL ASSESSMENT			$ 39,500.00		

8737

Station	Description	Quantity
Drain A (cont'd)		
J. Clark (W 1/2 Lot 16, Con 4, WHS)		
685 to 1+073	Construct open drain. From Sta 850A to 1+073A, the drain shall be centered 4.5 m west of the fenceline. The excavated material shall be levelled west of the drain. From Sta 888A to 1+073A, the field along the west drain bank shall be regraded to a maximum elevation of 1 m above ditch bottom. The excavated material shall be graded into the low area west of the drain. The drain shall cross the Clark/Bodrug property line to the south of the tree at Sta 1+073A.	388 m
685 to 880	Clear brush and trees from course of drain as specified in Section 4.3.	195 m
850	Construct temporary sediment trap. See Section 4.13 and Detail Drawing NE-1.	One (1)
888	Remove existing catch basin and construct 600 mm x 600 mm concrete catch basin. The catch basin shall be constructed on the east drain bank, opposite Drain B, with 3 sq m of rip rap protection. Connect to existing tile with 250 mm non-perforated plastic tile. See Section 5.7 and Detail Drawing NE-5.	One (1)
925	Grade area around existing catch basin and construct 3 sq m of rip rap protection. See Section 5.7 and Detail Drawing NE-4.	One (1)
1+073	Construct rip rap bank protection on south-west bank at bend. See Section 4.15 and Detail Drawing NE-12.	10 sq m

Station	Description	Quantity
Drain A (cont'd)		
W. & A. Bodrug (Pt Lot 16, Con 4 WHS)		
1+073 to 1+250	Construct open drain. Level excavated material to east of drain.	177 m
1+093	Construct stone drop structure to south of existing tile outlet so that the tile outlets onto the rip rap apron through the north drain bank. The drain bottom shall not be overexcavated for sediment basin upstream of the structure. See Section 4.14 and Detail Drawing NE-2.	One ([redacted]
1+096 to 1+103	Construct rip rap protection on northeast bank at bend. See Section 4.15 and Detail Drawing NE-12.	10 sq m
15 Sideroad (Wanless Road)		
1+320 to 1+333	Construct 1200 mm CSP road culvert, 2.8 mm wall thickness with 10 sq m of rip rap protection. The ditch bottom upstream shall be graded at a maximum slope of 4:1 to match existing ditch bottom. See Section D (Road Culvert) and City of Brampton Drawing #349.	13 m
Drain B		
J. Clark (W 1/2 Lot 16, Con 4 WHS)		
000 to 250	Construct open drain along course of existing ditch along edge of bush from existing catch basin at property fence (Sta 250B) to catch basin at Sta 888A. From Sta 225B to 250B, the Contractor shall maintain a distance of 1 m from the property line to the north drain bank. Material shall be levelled to maximum depth of 250 mm through bush area. The Contractor shall minimize damages to trees.	250 m

Summary of Work	Drain A	Drain B	Total
Construct open drain	1,250 m	250 m	1,500 m
Construct CSP road culvert	13 m	-	13 m
Construct stone drop structures	Two (2)	-	Two (2)
Construct catch basin	One (1)	-	One (1)
Repair catch basin	One (1)	-	One (1)
Backfill old channel	97 m	-	97 m
Level old spoil	172 m	-	172 m
Clear bush and trees	330 m	-	330 m
Construct rip rap protection	30 sq m	-	30 sq m
Construct sediment trap	One (1)	-	One (1)

B. SPECIAL PROVISIONS

1. The open drains shall be constructed with cross-sectional dimensions as shown on Sheet 3 of the attached drawings.
2. The Contractor shall supply and arrange for the delivery of all equipment, labour and materials.
3. The Contractor shall notify the City Clerk (416) 793-4110, the Credit Valley Conservation Authority in Meadowvale (416) 451-1615 and J.K. Young Company Ltd. (416) 457-2555 at least 48 hours prior to commencement of construction.

C. WORKING CORRIDOR

The Contractor shall restrict the operation of his equipment to an area not to exceed 15 metres from the centreline of the drain on the side where excavated material is to be placed and 7 metres from the drain centreline on the opposite side of the channel. If additional width is required, the Contractor shall obtain consent from the Engineer prior to operating his equipment outside of the above-defined corridor. Every effort shall be made to minimize damages to trees and crops along the course of the drain.

The Contractor shall not operate his equipment to the east of the property fence north of Station 1+073A.

This section is in addition to the provisons of Section 3.14 of the General Specifications.

D. ROAD CULVERT

The Contractor shall contact the City of Brampton Works Department at 793-4110 at least 48 hours prior to commencing work within the road right-of-way. The Contractor shall supply all necessary warning signs, barricades and flagmen. Backfill and bedding material shall be placed and compacted in lifts not to exceed 300 mm in depth in accordance with the attached Drawing #349. The culvert endwalls shall be sloped at 1.5 units horizontal to 1 unit vertical. The upstream endwall shall be covered with 10 square metres of rip rap protection and filter material. The existing road surface shall be saw-cut prior to removal and shall be restored with 75 mm of hot mix asphalt. The Contractor shall maintain the road surface at the culvert for six months and shall place additional asphalt as necessary to maintain a smooth road surface at the culvert. All work within the road right-of-way shall be constructed in accordance with applicable Works Department standards and as directed by Works Department inspectors on the job site.

E. LANDOWNERS

This project will be constructed on or adjacent to the property of the following landowners:

Springbrook Investments Ltd. (Ben Miller)	747-6085
Jim Clark	846-2615
Wesley & Anna Bodrug	451-9503
Regional Municipality of Peel (G.Dolan, P.Eng.)	791-9400
City of Brampton (D.J.Thornton, P.Eng.)	793-4110

F. BENCH MARKS

Screw in brace hydro pole, 35 m east of Sta 000A	Elev. 263.14 m
Screw in 450 mm deciduous tree, 7 m east of Sta 550A	Elev. 260.25 m
Screw in fencepost, 10 m west of Sta 1+110A	Elev. 257.11 m

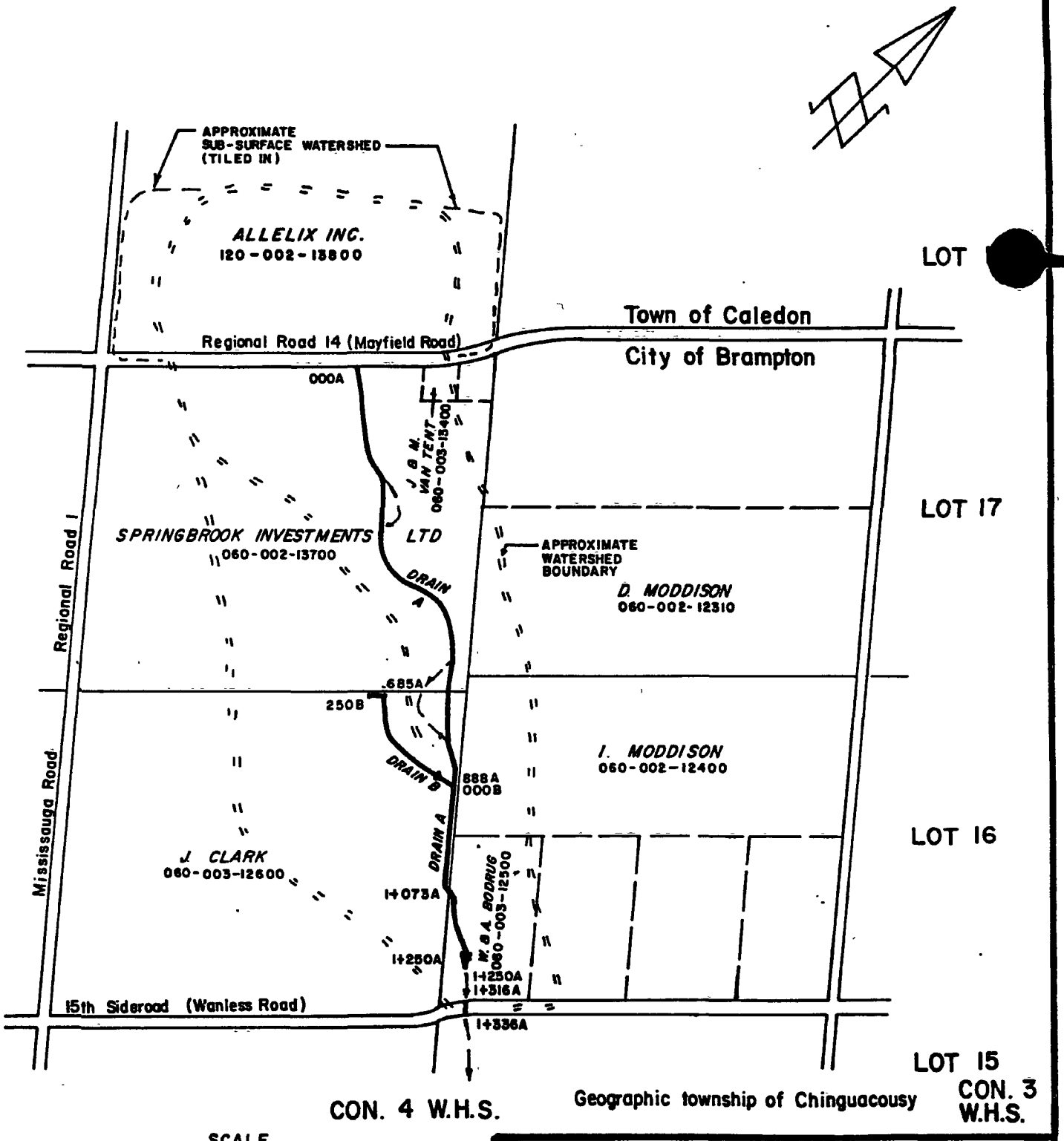
G. DRAWINGS

Sheet 1	- Plan of the Clark Drain
Sheet 2	- Profiles of Drains A and B
Sheet 3	- Typical Channel Cross-sections
NE-1	- Temporary Sediment Trap
NE-2	- Stone Drop Structure & Sediment Basin
NE-4	- 600 mm x 600 mm Concrete Catch Basin
NE-5	- Ditch Inlet Catch Basin
NE-7	- Farm Culvert Detail
NE-10	- Tile Outlet Protection
NE-11	- Bank Protection for Surface Water Inlets
NE-12	- Rip Rap for Bank Protection
Dwg No 349	- Bedding and Backfill, C.S.P. Culverts

H. GENERAL SPECIFICATIONS

In addition to the above specifications, the Contractor shall follow the complete "General Specifications for the Construction of Municipal Drains" dated March 25, 1986, which are appended hereto.

March 17, 1988
8737



REGISTERED PROFESSIONAL ENGINEER J.K. YOUNG PROVINCE OF ONTARIO

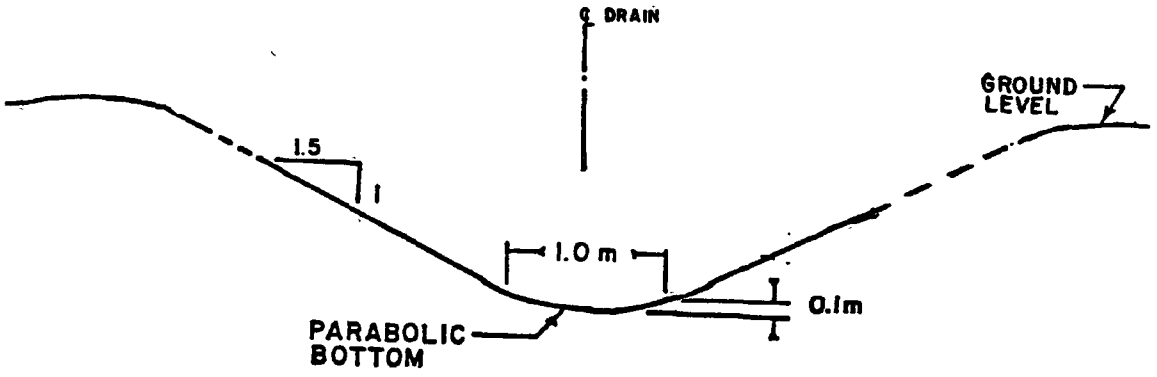
REGISTERED PROFESSIONAL ENGINEER R.H. DAVIDSON PROVINCE OF ONTARIO

CITY OF BRAMPTON

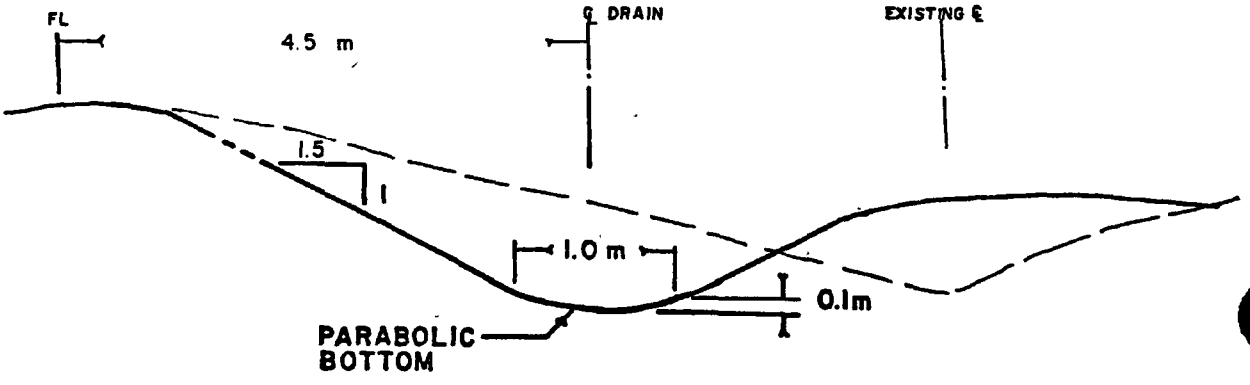
CLARK DRAIN

MARCH 17, 1988	SCALE 1:10 000	PROJECT 8737	SHEET 1

J.K. YOUNG COMPANY LTD.
CONSULTING ENGINEERING AND SURVEYING
BRAMPTON (416) 457-2555

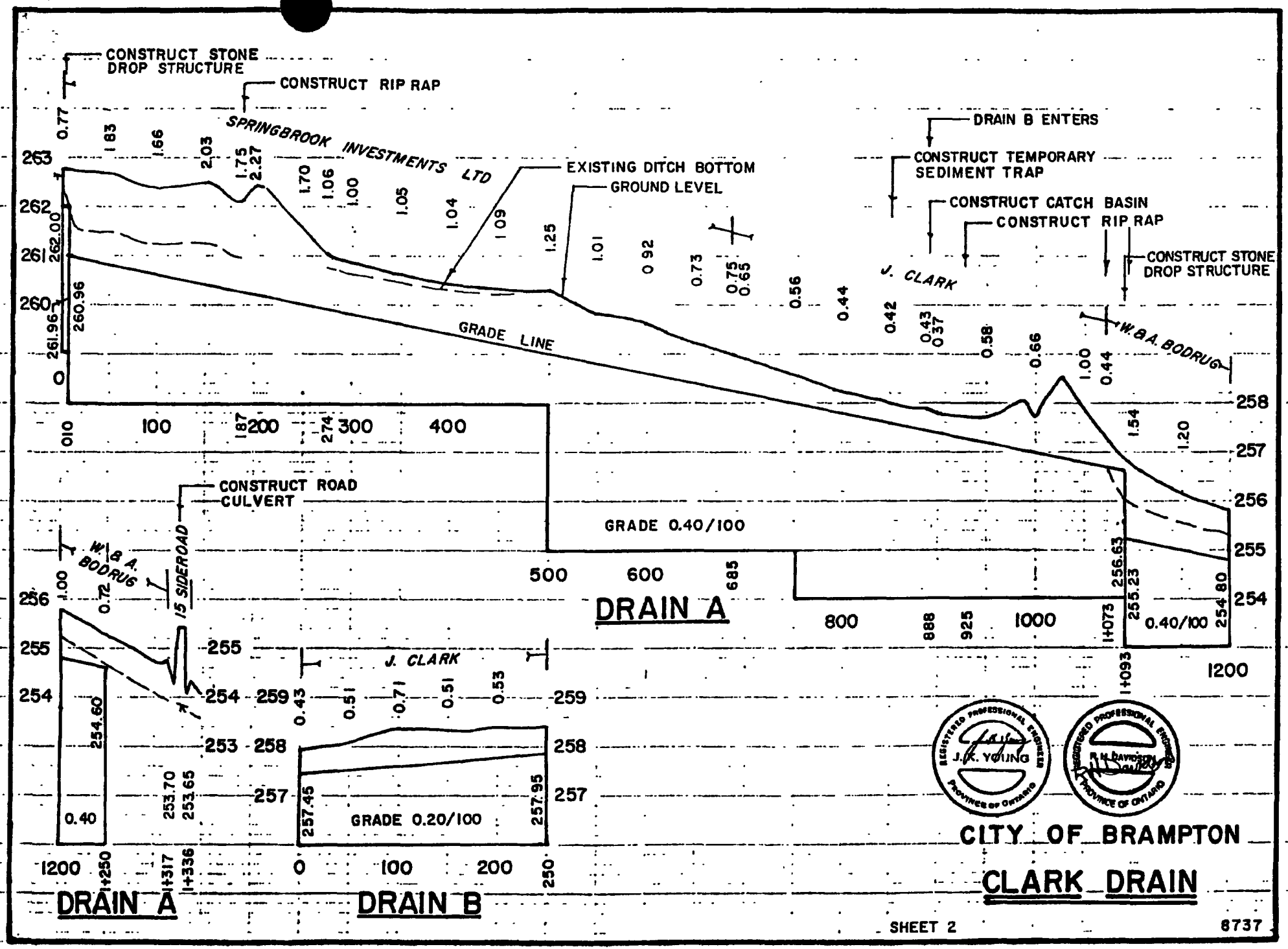


TYPICAL CHANNEL CROSS-SECTION



STA. 850 A to 1+073A

J. K. YOUNG COMPANY LTD.
CONSULTING ENGINEERING AND SURVEYING
BRAMPTON (416) 457-2555

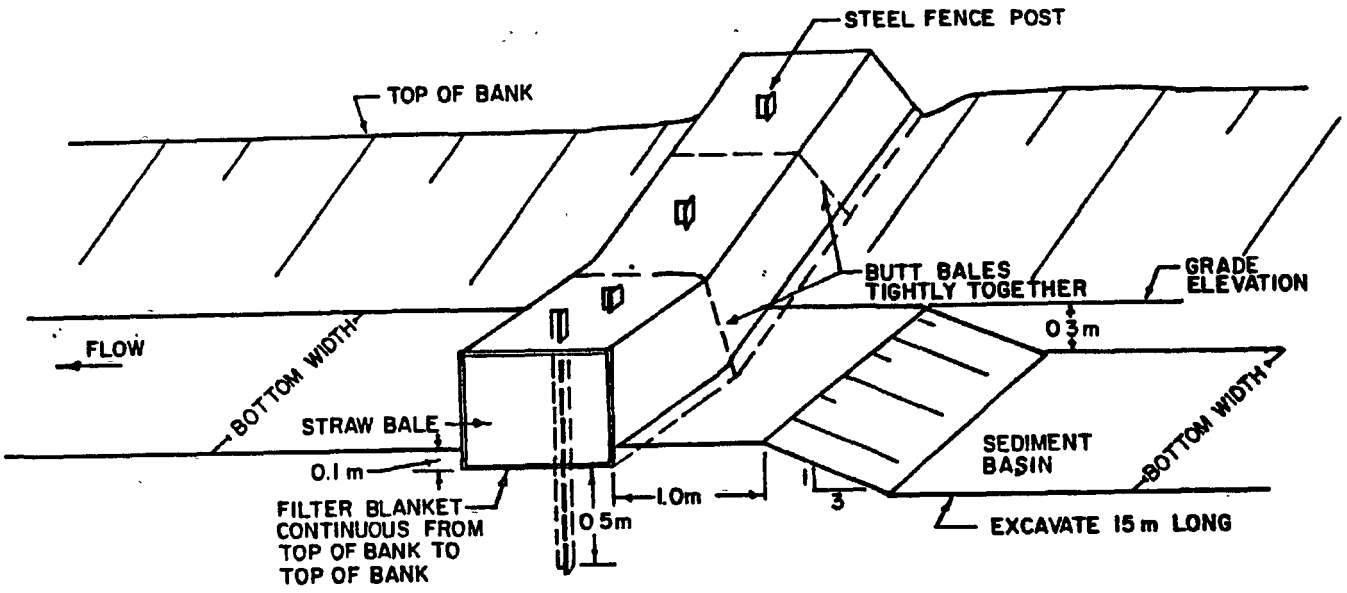


CITY OF BRAMPTON

CLARK DRAIN

SHEET 2

8737



TEMPORARY SEDIMENT TRAP

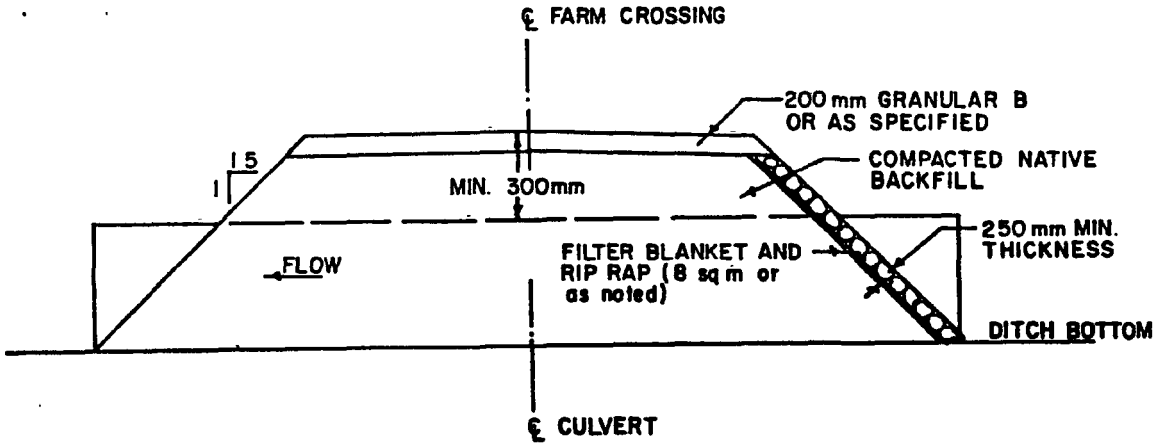
N.T.S.

SEE GENERAL SPEC. SECT. 4.13

REVISED MARCH 29, 1985

DETAIL DRAWING Nº NE-1

NOTE: NO ROCKS OR AGGREGATES WITH A DIAMETER GREATER THAN 100mm SHALL BE PLACED WITHIN 200mm OF THE PIPE.



SEE GENERAL SPEC. SECT. 4.7

FARM CULVERT DETAIL

N.T.S.

REVISED FEBRUARY 7, 1986

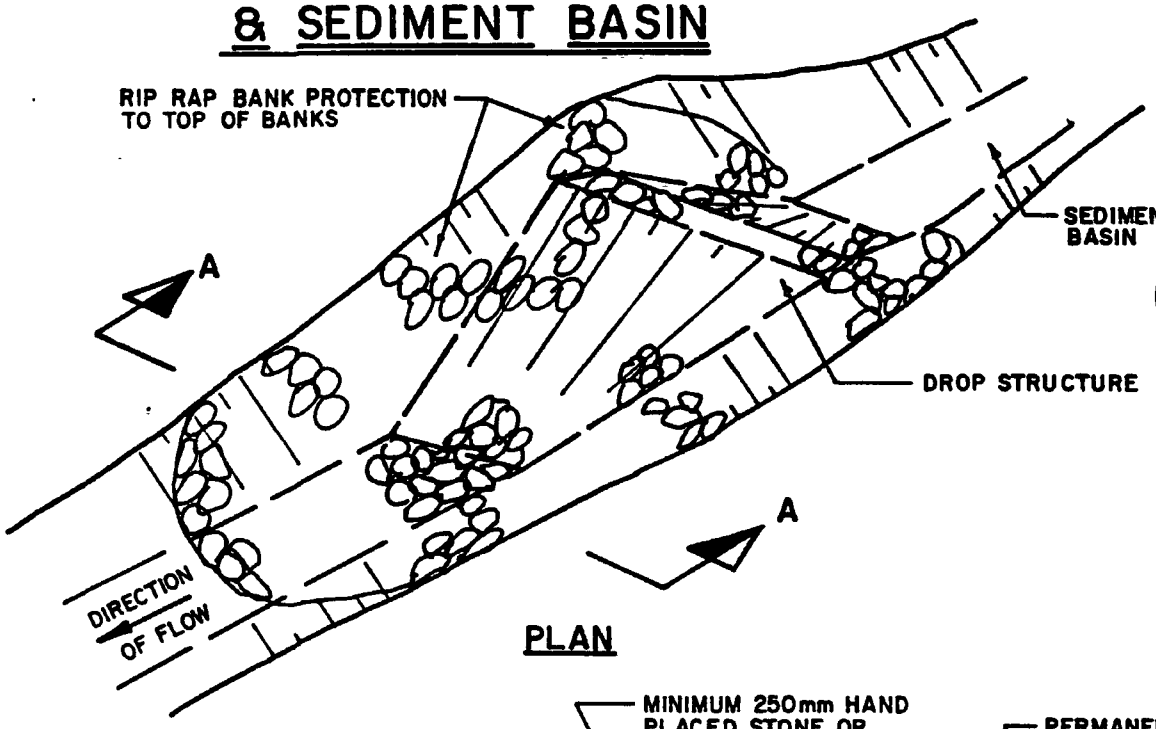
DETAIL DRAWING Nº NE-7

J. K. YOUNG COMPANY LTD.

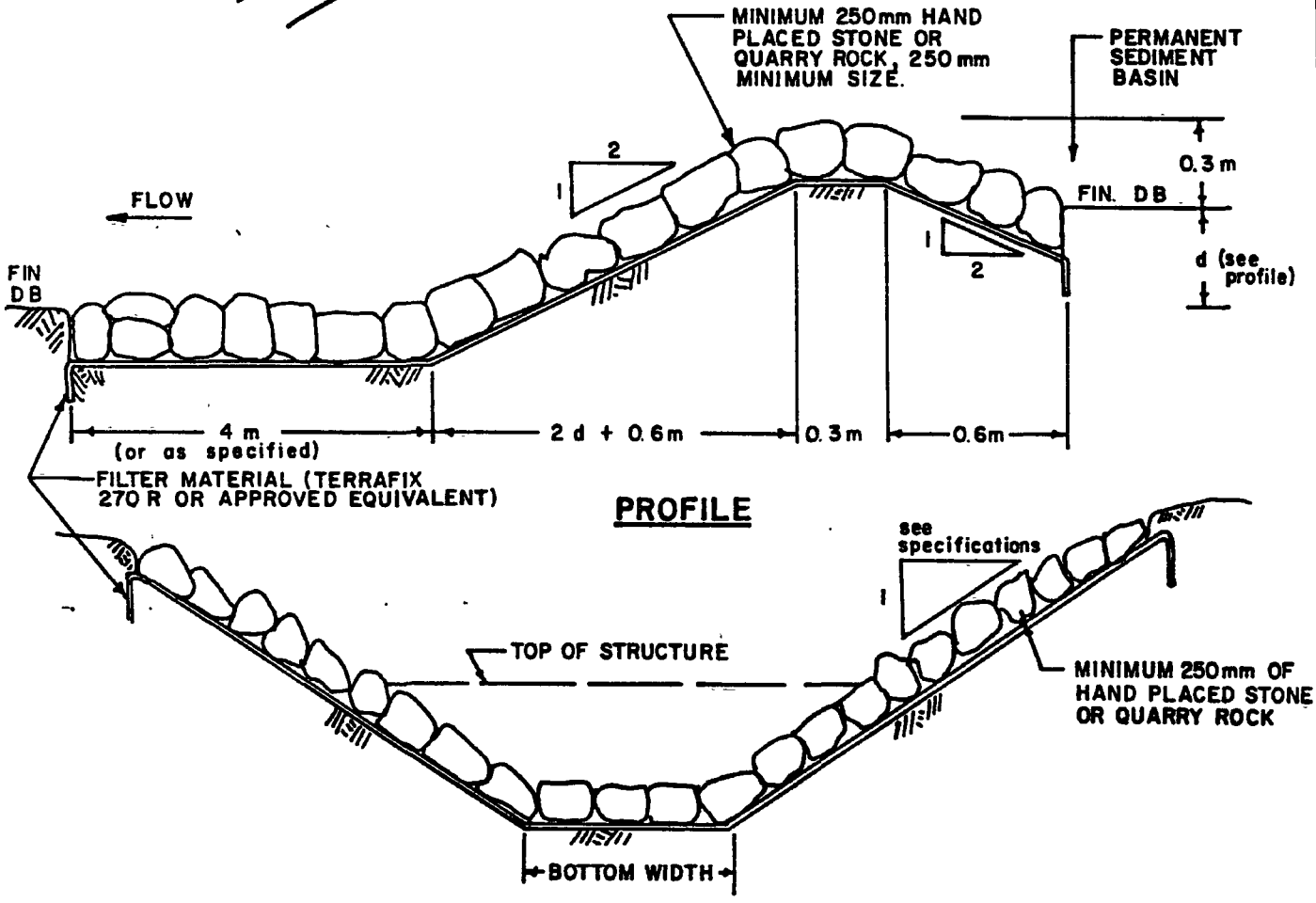
CONSULTING ENGINEERING AND SURVEYING

BRAMPTON (416) 457-2555

STONE DROP STRUCTURE & SEDIMENT BASIN



PLAN



PROFILE

SEE GENERAL SPEC. SECT. 4.14

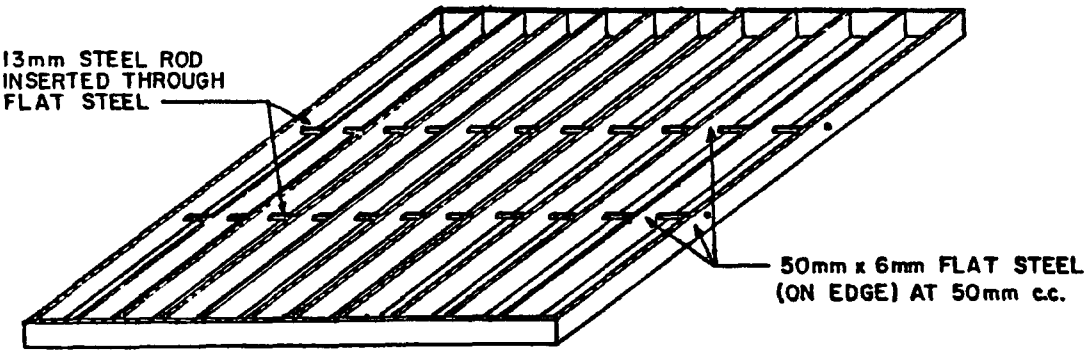
SECTION A-A

NOT TO SCALE

REVISED FEB. 7, 1986

J.K. YOUNG COMPANY LTD.
CONSULTING ENGINEERING AND SURVEYING
BRAMPTON (416) 457-2555

DETAIL DRAWING Nº NE-2

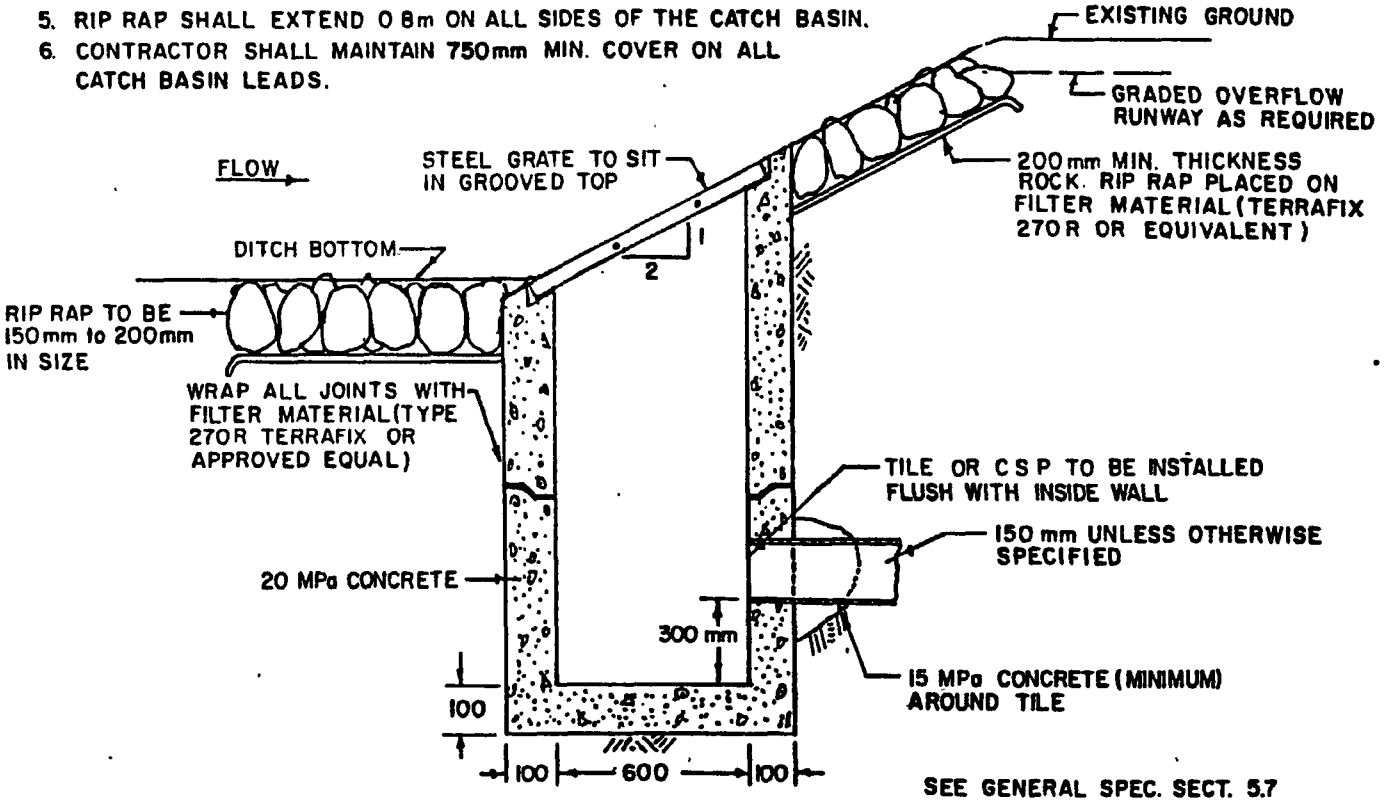


WELDED STEEL GRATE

Not to scale

NOTES

1. CATCHBASIN TO BE CONSTRUCTED WITH THE LIP OF THE CATCH BASIN FLUSH WITH THE DITCH BOTTOM.
2. GRADING OF OVERFLOW CHANNEL DOWNSTREAM (IF REQUIRED) SHALL BE OFFSET FROM THE TILE LOCATION.
3. ALL SURFACES OF THE GRATE SHALL BE COATED WITH A RUST INHIBITING PAINT (TREMCLAD OR EQUAL).
4. THE GRATE SHALL BE SECURELY FASTENED TO THE CATCH BASIN.
5. RIP RAP SHALL EXTEND 0.8m ON ALL SIDES OF THE CATCH BASIN.
6. CONTRACTOR SHALL MAINTAIN 750mm MIN. COVER ON ALL CATCH BASIN LEADS.



600mm x 600mm CONCRETE CATCH BASIN

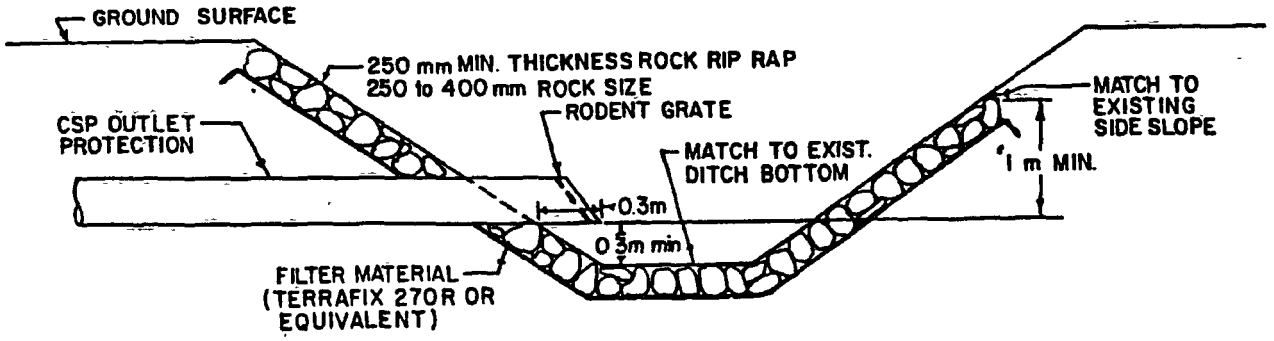
N.T.S.

REVISED FEB. 7, 1986

J.K. YOUNG COMPANY LTD.
CONSULTING ENGINEERING AND SURVEYING
BRAMPTON (416) 457-2555

DETAIL DRAWING Nº NE-4

NOTES RIP RAP SHALL EXTEND 0.8m UPSTREAM AND DOWNSTREAM OF TILE OUTLET.
CSP OUTLET SHALL BE RIVETTED PIPE LAID SO THAT FLOW IS WITH CIRCUMFERENTIAL LAP.



TILE OUTLET PROTECTION

N. T. S.

SEE GENERAL SPEC. SECT. 5.6

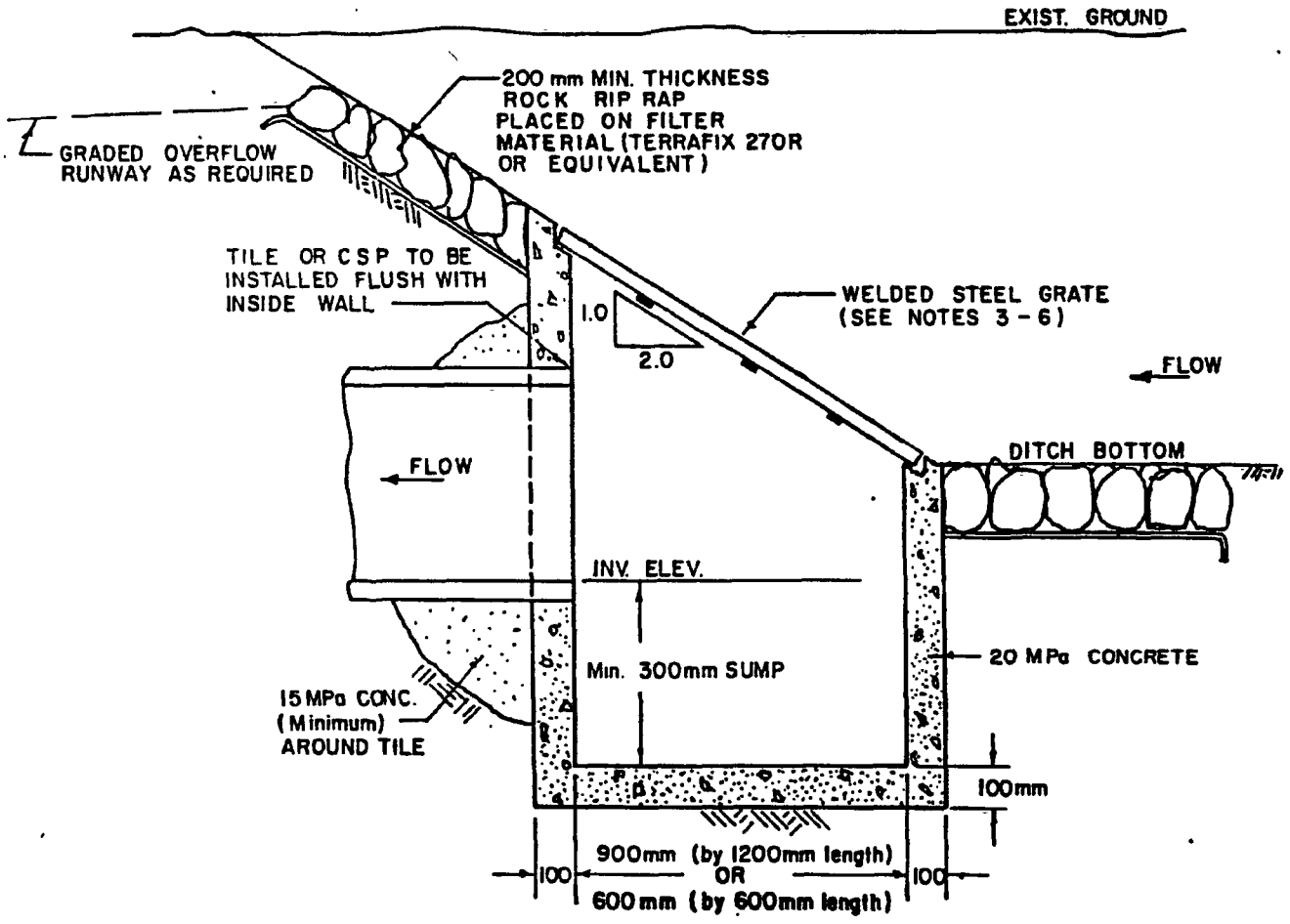
REVISED FEB. 1, 1988

DETAIL DRAWING Nº NE-10

J. K. YOUNG COMPANY LTD.
CONSULTING ENGINEERING AND SURVEYING
BRAMPTON (416) 457-2555

NOTES:

1. CATCHBASIN TO BE CONSTRUCTED WITH LIP OF THE CATCH BASIN FLUSH WITH THE DITCH BOTTOM
2. GRADING OF OVERFLOW CHANNEL DOWNSTREAM SHALL BE OFFSET FROM THE TILE LOCATION.
3. THE WELDED STEEL GRATE SHALL BE CONSTRUCTED OF 37mm x 6 mm FLAT STEEL ON EDGE AT 75mm CENTRES WELDED TO A 37mm x 37mm x 5 mm ANGLE IRON FRAME.
4. CROSS STRAPS SHALL BE 37mm x 6 mm FLAT STEEL AT 300mm CENTRES.
5. ALL SURFACES OF THE GRATE SHALL BE COATED WITH A RUST INHIBITING PAINT (TREMCLAD OR EQUAL).
6. THE GRATE SHALL BE SECURELY FASTENED TO THE CATCH BASIN.
7. RIP RAP SHALL EXTEND 0.8 m ON ALL SIDES OF THE CATCH BASIN AND SHALL BE 150mm to 250 mm IN SIZE.
8. CONTRACTOR SHALL MAINTAIN 750mm MIN. COVER ON ALL CATCH BASIN LEADS.



DITCH INLET CATCH BASIN

N. T. S.

SEE GENERAL SPEC. SECT. 5.7

REVISED FEB. 7, 1986

J.K. YOUNG COMPANY LTD.
CONSULTING ENGINEERING AND SURVEYING
BRAMPTON (416) 457-2555

DETAIL DRAWING Nº NE-5

GENERAL SPECIFICATIONS FOR THE CONSTRUCTION OF MUNICIPAL DRAINS

J.K. Young Company Ltd.
Brampton

1. INSTRUCTIONS TO BIDDERS

1.1 EXTENT OF WORK These general specifications and drawings, in general and unless otherwise specified, apply to and govern the supplying of all labour, materials, and equipment necessary to construct the work, complete and ready for use, as shown on, described by, or reasonably inferable from, the drawings, specifications and extent of work sheets.

1.2 INVESTIGATIONS BY BIDDERS The Bidders must examine for themselves the drawings, specifications and location of the work, and exercise their own judgement as to the extent of the work to be done. The Contractor must assume all risks of variance in any computation, by whomsoever made, of statements of quantities necessary to complete the work required by the contract. If any doubt exists in the mind of any person tendering as to the exact meaning of any part of the drawings or specifications, it must be removed before signing the tender form; thereafter the Contractor shall be bound by the decisions of the Engineer on all points and the Engineer's decisions shall be final, conclusive and unimpeachable for any cause.

1.3 TENDERS Unless otherwise stated, tenders will be received and contracts let only in the form of a lump sum for the completion of the whole work or of such portions as may be specified on the tender form. Unit prices shall be used only where it is necessary to make adjustments in the amount of work actually done. Rock excavation will be tendered on a unit price per cubic metre basis. Any tender which is incomplete, altered or conditional may be considered as an invalid tender. The lowest or any tender need not be accepted. The Municipality reserves the right to delete the construction of road culverts from the tender and to construct them with their own forces. (See Section 3.8.)

1.4 TENDER DEPOSIT Each bidder shall submit to the Municipality a sealed proposal clearly marked as to its contents along with a tender deposit of approximately ten (10) percent of the tender value in the amount specified on the proposal form.
The tender deposit shall be in the form of a certified cheque, unconditional letter of credit, or letter of guarantee for a period of one year, payable to the Municipality. Tender deposits, except for those of the three low bidders, shall be returned within 48 hours of the opening of the tenders. The remaining tender deposits, except for that of the successful bidder, shall be returned when the contract has been accepted by the Municipality.

1.5 CONTRACT FORM The Proposal or Tender Form, when signed and offered by the Contractor, shall constitute a formal and binding contract when accepted by and signed on behalf of the Municipality.

1.6 CONTRACT DEPOSIT Upon acceptance by the Municipality, the successful bidder's deposit shall become the contract deposit. If the contract deposit is a certified cheque, it shall be held uncashed by the Municipality until required. A certified cheque may be exchanged for a letter of guarantee at any time. The contract deposit shall be returned to the Contractor when the work has been certified as substantially complete by the Engineer.
The contract deposit may be cashed by the Municipality under the following conditions:

1. The Contractor has defaulted on the contract. (See Section 2.13.)
2. The Contractor has not started the work within ten (10) days of the starting date specified in the contract.
3. The Contractor has moved his equipment from the site without the approval of the Engineer.
4. The work has not been completed within the time period specified.
5. The term of the letter of guarantee is about to expire.

If the contract deposit is cashed by the Municipality, the Contractor shall be entitled to the payment of interest at the Prime Loan Rate as fixed by the Bank of Montreal at the first day of each quarter. Interest shall be payable from the date of cashing of the tender deposit until the completion date as shown on the tender proposal or until the tender deposit is returned, whichever occurs first.

1.7 GUARANTEE BONDS The Municipality shall have the right to require the Contractor to furnish a bond binding the Contractor to complete the work and to maintain the same for a period of one year after the date of the completion certificate. Furnishing a bond shall not entitle the Contractor to the release of any part of the bid deposit or holdback elsewhere specified.

1.8 PRECEDENCE OF DOCUMENTS In general, if a conflict or inconsistency exists between the plans and specifications, the following order of precedence shall apply:

a) Addenda to specifications
b) Extent of work and special provisions
c) Tender and contract form
d) Plans and profiles
e) General specifications

Should an inconsistency be discovered, the Contractor shall immediately contact the Engineer for an interpretation.

2. GENERAL CONDITIONS

2.1 NOTICE OF STARTING The Contractor shall give notice to the Township Clerk and the Engineer at least 48 hours in advance of starting work.

2.2 ERRORS & OMISSIONS The Contractor shall satisfy himself before commencement of any part of the work of the meaning of all stakes and marks. Any apparent omission or error which he may find shall be reported immediately to the Engineer before the work is started. Should the Contractor, without the express authorization of the Engineer, attempt to correct such an error, he shall be held liable to bring the work back to conformity with the specifications.

2.3 SUB-CONTRACTORS The Contractor shall not sublet the whole or any part of his contract without the approval of the Municipality. If the Contractor proposes to use a sub-contractor, he shall at the time of bidding include a list of the work to be done by each sub-contractor. Acceptance of the tender shall be deemed to be approval of the listed sub-contractors. Failure to comply with this sub-section shall be grounds for termination of the contract.

2.4 PERMITS, NOTICES & SUPPLEMENTARY SPECIFICATIONS The Contractor shall, before performing any work affecting the land or property of any Governmental Ministry or any Public or Private Utility, obtain at his own expense any necessary permits. The Contractor shall perform this work in strict compliance with the Ministry's or Utility's specifications as though said specifications were hereto attached.

Notices Required

Highways, Regional, Township & County Roads: Before any construction may take place on the right-of-way of any Highway, 48 hours notice in writing must be given to the appropriate District Engineer of the MTC or the appropriate Regional or County Engineer or the Road Superintendent.

Railways: Before any construction may take place on the property of any Railway, a minimum of 48 hours notice in writing must be given to the Area Engineer of the Railway Company.

2.5 BURIED UTILITIES The Contractor shall, before performing any work, determine if any buried utilities may be disturbed by the construction. The Contractor shall request each Utility to verify and locate such utilities and advise them a minimum of 48 hours in advance of construction near their utility.

2.6 PROPERTY SURVEY MARKERS The Contractor shall be responsible for the replacement of any property marker which may be disturbed during the performance of the contract. (See Sections 3.1 & 3.2.)

2.7 ALTERATIONS & ADDITIONS The Engineer may make minor changes in the work as it progresses. An amount proportionate to the tender price shall be added to or deducted from the contract price to cover the change. A major change shall be authorized by a resolution of Council. No change will be made unless authorized by the Engineer in writing.

2.8 UNFORESEEN CONDITIONS If the Contractor should encounter conditions of any sort which may not have been known to the Engineer and were not provided for by the drawings and specifications, and which would necessitate alterations to the drawings and specifications in order that the work be completed in a satisfactory and workmanlike manner, the Contractor shall immediately notify the Engineer who will make the necessary alterations. Failure of the Contractor to so notify the Engineer shall not relieve the Contractor of the responsibility of fully completing the work and maintaining it for a period of one year after the date of the completion certificate. Payment for the extra work, based on a fair evaluation, shall be determined by the Engineer. No payment will be made for work that was not authorized by the Engineer prior to being done.

2.9 ROCK EXCAVATION Should the Contractor encounter rock in the excavation which is not shown on the drawings, he shall notify the Engineer immediately and request further instructions. No payment will be made for rock excavation which was not authorized by the Engineer prior to removal. (See Section 6.)

2.10 FLOODS & CASUALTIES. The Contractor shall assume all risks from floods or casualties of any kind.

2.11 LIABILITY The Contractor shall protect and save harmless the Municipality and the Engineer against liability for any accidents, damages, casualties, losses or claims directly or indirectly arising out of the contract or manner of performance thereof by the Contractor, his agents, employees or sub-contractors. The Contractor shall pay all proven losses, damages or claims received by the Municipality. The Municipality may withhold from payment then due the Contractor an amount equal to claims filed with the Clerk pending settlement of the matter. Any such expense may be recovered from the Contractor or his sureties. The Contractor may be required to furnish proof of his insurance against all liabilities prior to obtaining the contract.

2.12 FAULTY MATERIALS & WORKMANSHIP Neither the final certificate nor payment thereunder, nor any provision in the specifications or contract document, shall relieve the Contractor from the responsibility of making good any defects resulting from faulty materials or workmanship which may appear within one year after the date of the completion certificate.

2.13 TERMINATION OF CONTRACT Time shall be deemed the essence of this contract. All the work included in the contract must be completed on or before the date fixed at the time of tendering. The Contractor shall agree that if at any time the Engineer be of the opinion, and so certifies in writing to the Municipal Council, that the work is unnecessarily being delayed, or that the Contractor is violating any of the conditions of the Contract, or is executing the work in bad faith, or if the work is not fully completed within the time named in the contract, the Council shall have the power to notify the Contractor to discontinue all further work and terminate all future performance thereof, but reserving all claims against the Contractor for breach of contract. Thereupon the Contractor shall discontinue the work and the Council shall have power to procure labour, equipment and materials by contract or otherwise, and to complete the work and to charge the expenses thereof including damages of any nature against monies due or thereafter due the Contractor, or to charge the same to his sureties.
Should the Contractor remove his equipment from the project site without the authorization of the Engineer, it shall be deemed to be a breach of contract under this section.

2.14 FINAL INSPECTION Final project inspection will be made by the Engineer within 30 days after he has received notice in writing from the Contractor that the work is completed, or as soon thereafter as weather conditions permit. All work included in the contract must at the time of completion and final inspection have full dimensions and cross-sections. Should such inspection reveal discrepancies between the work as completed by the Contractor and the drawings and specifications as provided by the Engineer, the Engineer shall notify the Contractor of such discrepancies in writing. The Contractor shall perform whatever work is necessary to correct such discrepancies within 30 days of receiving notice thereof, or within such time period as the Engineer may specify.

2.15 PAYMENT Progress payments equal to approximately 80% of the value of the work done and materials incorporated into the work shall be made to the Contractor upon the filing of a progress report by the Engineer. A further 15% may be paid to the Contractor 45 days after acceptance of the work upon the written certificate of the Engineer. An amount not to exceed 5% of the contract price may be retained by the Municipality for a period of one year after issuance of the completion certificate. After

completion, any part of the money then retained may be used to repair or correct any defects resulting from faulty materials or workmanship without prior notice being given to the Contractor. Monthly payments may be arranged when warranted.

2.16 SAFETY All work shall be performed in accordance with the Occupational Health and Safety Act, RSO 1980, and Regulation 691, RRO 1980, and any amendments made thereto.

3. DRAINAGE WORKS - GENERAL

3.1 BENCH MARKS These are established to govern the elevations of the work. The location and elevation of bench marks are shown on the drawings or in the specifications. Attention is drawn to Section 13(2) of the Drainage Act, RSO 1980, regarding liability for interference with bench marks.

3.2 STAKES Stakes are set throughout the course of the work as shown on the accompanying drawings. The Contractor shall be liable for the cost of replacing stakes or marks destroyed during the course of construction.

3.3 LINE Unless otherwise specified, a drain shall run in straight lines throughout each course, excepting at the intersection of courses where it shall run on a curve of at least 15 metres radius. The centre-line of an existing open drain shall in general be the centreline of the finished work; the existing courses shall be lined out by the Contractor and all sloping and widening shall be done in a manner to make the finished work uniform. Where possible and unless otherwise specified, the Contractor shall maintain a distance of 1.0 m between the top of the excavated bank and any existing fencelines or property boundaries. Where a ditchbank is vegetated and stable at a side slope equal to or flatter than the specified side slopes, excavation shall take place at the opposite bank, leaving the stable slope undisturbed. In general, a tile drain shall be constructed at an offset from and parallel to any ditch or defined watercourse, in order that freshly placed backfill will not be endangered by flowing surface water.

3.4 PROFILE, GRADES & CUTS On the profile drawings, the top line indicates the ground level at the stakes, the middle dashed line the average ditch bottom of an existing open drain, and the lower line shows the proposed grade line. The grade line represents the bottom of the finished open drain or the invert of a tile drain. The profile grade is indicated in metres per hundred metres (e.g. 0.15m/100 m or 0.15%). For convenience only, cuts are shown from the ground at the numbered side of the stake to the grade line, however the grade line shall be entirely governed by the bench marks. A variation of 12 mm from the grade line for a tile drain or 30 mm from the grade line for an open drain shall be deemed to be sufficient reason for the work to be rejected. (See Section 6 for rock excavation.)

3.5 SUPPLY OF MATERIALS The Contractor shall supply and arrange for the delivery, storage and security of all equipment and materials necessary to complete the project. Where the contract provides that any materials are to be supplied by the Municipality, it shall be the responsibility of the Contractor to arrange for and accept delivery of the materials from the suppliers designated by the Municipality and to ensure that materials are properly stored and handled.

3.6 EXCESS MATERIALS If supplied by the Municipality, excess materials shall be stockpiled by the Contractor at accessible locations.

3.7 ROADS & RAILWAYS (a) Highway and Railway crossings shall be constructed in accordance with the detailed specifications in the report. The Contractor shall comply with the M.T.C. or Railway specifications as though said specifications were hereto attached. (See Section 2.4.)

(b) Municipal Roads - On road allowances, all work including the disposal of excavated materials, back-filling, levelling, installing and locating culverts and catch basins, shall be performed as directed by the Engineer or Superintendent in charge of the road and to his satisfaction. Excess materials excavated on the road allowance shall be disposed of by the Contractor off the site and no excavated material shall

be spread on the right-of-way without the written consent of the Road Engineer or Superintendent. Corrugated metal pipe culverts laid under the travelled portion of a road allowance shall be laid on 150 mm of, and shall be backfilled to the surface with, approved granular material. The top lift shall be 150 mm of Granular "A" material or as specified in the extent of work.

3.8 CONSTRUCTION OF ROAD CULVERTS BY THE MUNICIPALITY Where a road culvert is to be constructed by the Municipality or as outlined in Section 1.3, the Contractor shall dig the trench across the road as part of the contract. Additional time for removing old culverts or backfilling shall be paid by the Municipality on an hourly basis. The Contractor shall notify the Road Superintendent at least three working days prior to construction of the road crossing.

3.9 FENCES The Contractor will be permitted to remove fences to the extent necessary to enable him to construct the drain and dispose of any excess material. Any such fences must be carefully handled so as to cause no unnecessary damage and shall be replaced by the Contractor. The condition of such fences as replaced shall be as close as practicable to the condition of the fences prior to their removal. Fences shall be properly stretched and fastened. The Contractor shall supply all labour, wire and/or materials necessary to properly reconstruct any fences, the cost of which shall be included as a part of the lump sum bid for the project. The Contractor shall not leave any fence open when he is not at work in the immediate vicinity. Replacing of the fences shall be to the satisfaction of the Engineer, or the Commissioner appointed to be in charge of the work. The Contractor shall have met this specification when he obtains a statement in writing signed by the owners of the lands affected that the treatment of fences is satisfactory to them. The landowners shall be responsible for any further repairs to or maintenance of fences across the drain, as well as fences subsequently constructed along or across the drain.

3.10 OBSTRUCTIONS Any brush, timber, logs, stumps, stones or other obstructions in the course of the work or along the slopes and banks of an open drain shall be removed to a sufficient distance to allow placement and levelling of the excavated material. No brush or trees are to be left within the slopes of an open drain whether or not they come within the limits of the excavation. The Contractor will be permitted to cut standing timber to the extent that may in the opinion of the Engineer be reasonably necessary for the operation of the excavating equipment. (See Section 4.3.)

3.11 ALLOWANCES FOR DAMAGES & RIGHT-OF-WAY Sections 29 and 30 of the Drainage Act, RSO 1980, provide for payment to persons entitled thereto for additional land used for the drain and for damages to ornamental trees, lawns, fences, lands and crops. This allowance compensates landowners for damages caused by the normal operation of the Contractor's equipment within the working area and for damages resulting from the placement and spreading of excavated materials, brush and other obstructions.

3.12 ALLOWANCES FOR LOSS OF ACCESS Section 33 of the Drainage Act, RSO 1980, provides for payment for loss of access caused by the construction of a drain. This allowance is made in lieu of providing for the construction or replacement of a bridge, and compensates the landowner for lands made less accessible by the drain. Where an allowance for loss of access has been paid to a landowner, the Owner shall be responsible to arrange for the supply, delivery and installation of a culvert or bridge of the recommended size. (See Section 4.7.)
Where the value of a farm crossing exceeds the value of the land severed, the Owner may be compensated by means of an "Allowance for Severance".

3.13 CROPS & LIVESTOCK The Contractor shall not be held responsible for damages to crops within the "working area" or in the access to and from such "working area", such access having been defined by the owner of the property, if he notifies the Owner thereof in writing at least two days prior to commencement of the work on that portion of the project. Similarly, a Contractor constructing a tile drain shall not be held responsible for damages or injury to livestock occasioned by leaving trenches open for inspection by the Engineer if he notifies the Owner in writing at least two days prior to commencement of work on that property. The Contractor will become liable for such damages or injury if the backfilling of such trenches is delayed more than seven days after acceptance by the Engineer. When notified as outlined above, the owner of the property on which the drain is located shall be responsible for the protection of all livestock on said property during construction and shall also be liable for any damages caused by such livestock.

3.14 WORKING AREA & ACCESS The Contractor shall confine the operation of his equipment to an area not to exceed 30 metres from any point along the centreline of the drain. This distance may be increased where 30 metres does not provide sufficient area for the levelling of excavated materials or the disposal of brush and other debris, but such an increase in the working corridor must be authorized by the Engineer. In addition, each landowner shall provide reasonable access to the working area for the Contractor's equipment, staff and materials.

4. OPEN DRAINS

4.1 DIMENSIONS In general, the bottom width shall be 1.0 metres unless otherwise specified. The drain shall have the full specified width at the grade line at the time of final inspection. Both sides of an open drain are to be sloped at a ratio of 2.0 units horizontal to 1.0 units vertical or as otherwise noted in the extent of work sheet. Sides of the drain shall have a uniform slope from top to bottom. The upstream end of all open drains shall be graded at a slope of 4.0 units horizontal to 1.0 units vertical to blend with the surrounding ground level or upstream ditch bottom. The outlet of all open drains shall be shaped to blend with the downstream channel. (See Section 4.16.)

4.2 LEVELLING OF EXCAVATED MATERIAL

1. A clear berm or margin of at least two metres shall be left between the top edge of the ditch and the spoil bank. No excavated material shall be left in any ditch, depression, furrow or tile intended to conduct water into the drain.
2. Excavated material shall be deposited as directed in the Extent of Work.
3. Should the landowner request a change in the location of depositing the excavated material, the request must be in writing and forwarded by the Contractor to the Engineer. In no instance shall this request involve the changing the depositing location from one property owner to another.
4. In general excavated material will be placed on the lower side of the drain or on the side opposite trees and fences.
5. Excavated material shall be deposited, spread and levelled so that the edge next to the ditch shall have a slope no steeper than 1.5:1 and so that the lands on which it lies may be cultivated with adjacent farm land by the use of ordinary farm machinery. In general and unless otherwise provided for, the levelled material shall have a maximum depth of 200 millimetres. All rocks and stones of a diameter in excess of 150 millimetres are to be removed from the excavated material and piled adjacent to the drain for disposal by the landowner. This specification may be considered to have been complied with upon presentation of releases signed by the Owners, but the work shall be to the satisfaction of the Engineer.
6. The Contractor shall provide openings in the spoil pile for the entry of surface water into the drain from adjacent lands. These openings shall be located at existing surface water inlets and shall be constructed at a spacing of not more than 100 metres.

4.3 CLEARING Unless otherwise specified, the cleared width shall be sufficient to allow the levelling of the excavated material to the maximum depth of 200 millimetres and shall be a minimum of 3 metres from the top of the finished bank on both sides of the drain. Care shall be exercised to prevent the scraping or barking of trees outside the clearing area. All trees shall be removed to a height of not more than 150 mm from ground level. All salvageable wood of a diameter greater than 100 mm shall be cut to reasonable lengths and piled for disposal by the landowner. All other materials shall be burned or disposed of by the Contractor. The Contractor shall be responsible for obtaining fire permits prior to the burning of debris. (See Section 3.10.)

4.4 FILLING OLD CHANNEL Where a section of existing channel is to be excluded from the drain, the material excavated from the new channel shall be used to fill the abandoned channel unless otherwise indicated by the Engineer. (See Section 5.11.)

4.5 ROADS Where an open drain is removed from a road allowance, the new channel shall unless otherwise directed by the Engineer, be constructed entirely upon the adjacent land. The abandoned channel will be filled with excavated material and the excess material will be disposed of upon on the adjoining lands. Performance of this work is governed by Section 3.7.

4.6 EXCAVATION AT BRIDGES The Contractor shall excavate the drain to full depth, and as nearly as possible to full cross-section, at the site of all bridges. Bridges of a permanent nature shall not be unnecessarily disturbed, the excavation being made, if necessary, by hand or by other suitable means. The Contractor shall be held liable for any damage to any structure caused by his carelessness, neglect or over-excavation. The Contractor shall immediately notify the Engineer if it should become apparent that the excavation of the drain to the grades shown on the plan will in any way endanger any culvert or bridge. The Contractor shall discontinue excavation at the bridge site until the Engineer instructs him to proceed.

4.7 FARM BRIDGES & FARM CULVERTS Where the specifications and the extent of work sheets call for the installation of a farm crossing, and where an allowance for loss of access has not been paid to the Owner, the Contractor shall install a crossing as part of the contract (See Detail Drawing NE-7). Farm culverts shall be placed with the invert at the grade line, and shall be backfilled with suitable native material. The upper 200 mm shall be Granular "B", and all backfill shall be compacted in place. Where it is necessary that the Contractor remove a temporary farm bridge in order to perform the necessary excavation, the material from the bridge shall be carefully handled and left at the side of the drain for the use of the owner. All farm bridges hereafter constructed or reconstructed, in order not to be regarded as obstructions, shall have minimum openings equal to the cross-sectional area recommended in the report. (See Section 3.12.)

4.8 EXCAVATION OF SOIL BY BLASTING Excavation by blasting shall not be done without the approval of the Engineer. Where blasting is approved as a method of excavation, the Contractor shall observe Section 6.6 and 2.16 of these specifications. The Contractor may be required to clean up the drain using equipment prior to final approval. No additional payment shall be made for excavation by blasting unless authorized in writing by the Engineer.

4.9 TRIBUTARY OUTLETS It shall be the Owners' responsibility to mark all tile outlets before construction on their property. The Contractor shall be responsible for any damage to marked tile and shall supply all labour and material to repair any marked tile damaged by his workmen during the course of construction. The Contractor shall contact each Owner prior to commencing construction on each property to ensure that the Owner has adequate time to mark tile outlets. Damage to unmarked tile outlets shall be the responsibility of the Owner.

4.10 SURFACE WATER INLETS Where specified, the outlets from existing surface channels into open drains shall be protected with rock rip rap as shown in Detail Drawing NE-11. (See Section 4.15.)

4.11 BEAVER DAMS Beaver dams shall be removed for a width of 8 metres from the top of finished banks on both sides of the drain.

4.12 SEEDING OF SIDE SLOPES The Contractor shall seed the excavated surfaces of the drain and any disturbed soil area within 2 metres of the top of banks on either side of the open drain. Seeding shall be done at the completion of each working day using a cyclone type hand seeder with the operator walking along the bottom of the drain or at the water line when seeding the side slopes. Seed shall be uniformly applied at the rate of 5.5 kg per 100 m of drain, using the following mixture ratio or a substitute approved by the Engineer:

creeping red fescue	6 parts
perennial rye grass	3 parts
wild white clover	1 part

Mulching with hay or straw or the application of commercially available fertilizer may be required at the request of the Engineer, for which payment will be made in addition to the contract. (See Section 4.16.) Only Canada No. 1 Grade seed will be accepted. All clover and rye grass seed shall be of no less than 98% purity with a minimum of 85% germinable. Creeping red fescue seed shall be of no less than 90% purity with a minimum of 85% germinable. Where substantial emergence of applied seed mixtures has not been established within 28 days of application, the Contractor will reseed such areas as the Engineer may specify. The Contractor shall supply the Engineer with a copy of the seed invoice, showing the seed mixture, quantity, and the project for which the seed was purchased.

4.13 TEMPORARY SEDIMENT TRAPS Unless other dimensions are supplied, temporary sediment traps shall be constructed where specified by excavating the drain bottom to 0.3 m below the grade line for a length of 15 m (See Detail Drawing NE-1). The overexcavated section shall have a bottom width equal to that of the adjacent channel, and the sides shall be sloped at the same ratio as the drain banks. The outlet from the sediment pond shall have a porous dam of baled straw, completely wrapped in a continuous piece of filter fabric (Terrafix 270R or approved equivalent) and keyed into the drain banks and bottom. Bales placed on the drain bottom shall be held in place with a minimum of two steel posts driven into place. Bales placed on the side slopes shall be held in place with a minimum of one post each. The Contractor shall maintain the sediment trap during the course of construction and for six months after the completion of the work, and then remove the dam. Temporary sediment traps shall be installed prior to any excavation taking place upstream of that location.

4.14 STONE DROP STRUCTURE & SEDIMENT BASIN The stone drop structure shall be constructed where specified in the extent of work sheet and as shown on the profiles and Detail Drawing NE-2. All rip rap shall have a minimum diameter of 250 mm unless otherwise specified. The Contractor shall maintain the sediment basin formed behind the drop structure throughout the contract and for six months after the completion of the work. Stone drop structures shall be installed prior to any excavation taking place upstream of that location.

4.15 ROCK RIP RAP Rip rap bank protection shall consist of irregularly shaped or blasted stone, 250 to 400 mm in size. Round stone will not be accepted. All rip rap, unless otherwise specified, shall be hand placed to a minimum depth of 250 millimetres. The installed rip rap shall be set into the ditch bottom and banks so that the full cross-sectional dimensions of the channel are maintained. Where rip rap protection is constructed on a surface at an incline steeper than 4 units horizontal to 1 vertical, the rip rap shall be keyed into a 0.3 metre toe trench (See Detail Drawing NE-12). All rip rap shall be underlaid completely with Type 270R "Terrafix" filter blanket or an approved equivalent. Rip rap placed as protection at catch basins may be between 150 and 250 mm in diameter, placed to a minimum depth of 200 mm.

4.16 FALL & WINTER CONSTRUCTION When the Contractor constructs an open drain after September 15, the seeding of side slopes shall be delayed until after the spring runoff the following spring. In addition, the side slopes shall be flattened by an additional 0.25 m horizontal to 1.0 m vertical beyond that specified in Section 4.1 or the extent of work sheet. Under no circumstances shall the Contractor undertake to construct a project between the dates of January 1 and May 1, unless he has requested permission and is expressly authorized to do so by the Municipality or the Engineer.

4.17 FLOWING WATER The Contractor shall not excavate an open drain through standing or flowing water of a depth exceeding 0.5 m.

5. TILE DRAINS

5.1 GENERAL Methods, materials and construction practice shall as a minimum conform to the standards specified in the Ontario Ministry of Agriculture and Food publication number 29 entitled "Drainage Guide for Ontario".

5.2 TILE All tile installed under these specifications shall be sound and shall meet the following specifications:

Clay Tile: A.S.T.M. C4 (clay drain tile) and C498 (perforated clay drain tile)
Concrete Tile: A.S.T.M. C412 (drain tile)
Plastic Tile: C.G.S.B. 41-GP-29 (corrugated plastic drainage tubing)

Tile with 200 mm diameter and less shall not be less than 300 mm in length. The length of tile larger than 200 mm in diameter shall not be less than 150% of the nominal tile diameter.

5.3 LAYING Tile are to be carefully laid in a smooth-bottomed trench with proper grade and alignment with tightly fitting joints in accordance with the most workmanlike practices. Grade shall be controlled by the use of a laser grade control system or by using horizontal sight bars and a bar mounted on the excavator. The trench shall be made with a regular wheel, an endless-chain-type excavator or by a drainage plough. A backhoe will be approved only under extraordinary circumstances and subject to special

requirements. All tile being laid on a curve shall be fitted with a maximum space between successive tiles not exceeding 6 mm at any point on the circumference. Unless otherwise specified by the Engineer, concrete and clay tile joints shall be covered for a length of 300 mm with fibre filter of type 270R "Terrafix" or equivalent placed around the tile circumference.

5.4 TRIBUTARY OUTLETS All tile encountered shall be connected into the new drain. Connections of 200 mm and larger are included as part of the contract. Connections of 150 mm or smaller shall be paid, extra to the contract. The Contractor shall supply and install up to 3 m of tile in order that the connection will be sloped at not greater than 3 m horizontal to 1 m vertical. All tributary connections will be made in the upper one-third of the circumference of the main tile, and shall be sealed with concrete to a thickness of not less than 150 mm all around. All connections shall be left uncovered for inspection by the Engineer or the Commissioner in charge of the work. Any open ends of tile left by making the connections shall be securely plugged with concrete.

5.5 BACKFILLING As the laying of tile progresses, blinding or partial filling is to be made at the side sufficient to hold the tile in place and protect them from falling stones and slides. Material used in blinding is to be free of frozen lumps and stones. After the work is inspected and passed, the remainder of the excavated material shall be used to restore and maintain the natural surface of the ground.

5.6 OUTLET PROTECTION The protection at the outlet of a tile drain shall be a 6 metre length of corrugated metal pipe fitted with a rodent-proof grate. The grate shall be hinged at the top to permit the exit of foreign material from the tile. The pipe shall be protected with hand-placed rock rip rap. (See Section 4.15 and Detail Drawings NE-8 and NE-10.)

5.7 CATCH BASINS All catch basins shall be of 20 MPa concrete, either cast-in-place or an approved precast unit or of sectional construction. Catch basins shall have inside dimensions of either 600 x 600 mm or 900 mm x 1200 mm, and shall have 100 mm walls and floor slab. A 300 mm sump is required below the lowest tile invert. Catch basins shall have a minimum height of 1200 mm (4 feet) from the base to the top of the sloped top.

All catch basins shall have tops sloped at 30 degrees from horizontal. The lip of the catch basin shall be placed flush with the surrounding ground level or ditch bottom. Where necessary, the ground shall be banked on the downstream side to direct water into the catch basin. Rip rap protection shall be placed for a distance of 0.8 m on all sides of the catch basin. Where the catch basin is located within a road allowance, the Contractor shall obtain, from the Road Superintendent, approval of the grate to be used and the elevation at which the top shall be set. A substantial iron grate shall cover all catch basins. All tile and metal pipe entering a catch basin shall be sealed all around with 15 MPa concrete, which shall extend a minimum of 150 mm beyond the outside wall of the catch basin. The inside walls of the catch basin shall be formed and the void around all tile and metal piping entering a catch basin shall be completely filled with concrete to form a smooth flush surface. All lift holes shall be sealed with 15 MPa concrete.

5.8 CONCRETE JUNCTION BOXES Junction boxes shall be of 20 MPa concrete, either cast-in-place or an approved precast unit (one-piece or sectional). The junction box shall have minimum inside dimensions of 1.5 times the nominal diameter of the largest tile connected to the junction box, and shall not be smaller than 600 mm x 600 mm. The walls, floor and cover slab shall have a minimum thickness of 100 mm. When installed, the junction box shall have a minimum of 450 mm of clear soil cover. All connections shall be sealed all around with 15 MPa concrete, formed flush with the inside walls.

5.9 BLIND INLETS Blind inlets shall be constructed, where specified, using 20 to 40 mm diameter clear stone as backfill over the tile. The blind inlet is to be constructed in the path of surface water flow, or the surrounding ground shall be graded to direct surface flow to the inlet. (See detail drawing NE-3.)

5.10 QUICKSAND In the event that quicksand or unstable soil conditions are encountered and it is necessary to alter the method of constructing the tile drain, the Contractor shall immediately advise the Commissioner in charge of the work. The Commissioner and the Engineer may then instruct the Contractor to lay the tile on crushed stone or slag, or to construct a temporary open drain to lower the water level in the ground, or to take such other action as may appear advisable. The basis of payment for such extra work shall be set by the Engineer or Commissioner in charge of the work.

5.11 GRADING OF ABANDONED CHANNELS Existing open drains which are replaced by tile drains shall be filled in by dozer or road grader. Fill material should be crowned to approximately 25% of the depth of fill to allow for settling. Rock and other non-pollutant debris may be buried in the abandoned channels only where those materials will be at least 1.0 metres below the ground surface and only upon approval of the Engineer and the affected landowner. All culverts and crossings shall be carefully removed prior to backfilling and left at the side of the drain for removal by the landowner.

6. ROCK EXCAVATION

6.1 ROCK Rock shall be defined as bedrock and boulders that are greater than one-half cubic metre in size and that require blasting for removal.

6.2 DIMENSIONS & PAY LIMITS FOR OPEN DRAINS The bottom width for rock excavation shall be the same width as that specified in the detailed specifications for the bottom width of that section of drain. Side slopes shall be vertical or sloped outward. Pay limits for the excavation of rock quantities shall be based on cross-sections taken at 3 metre intervals. The cross-sections shall be based on the following limits: the top shall be the original rock surface; the bottom shall be the grade elevation at the cross-section; and the sides shall be vertical with the width of the cross-section equal to the required bottom width of the drain. There will be no payment for overbreak.

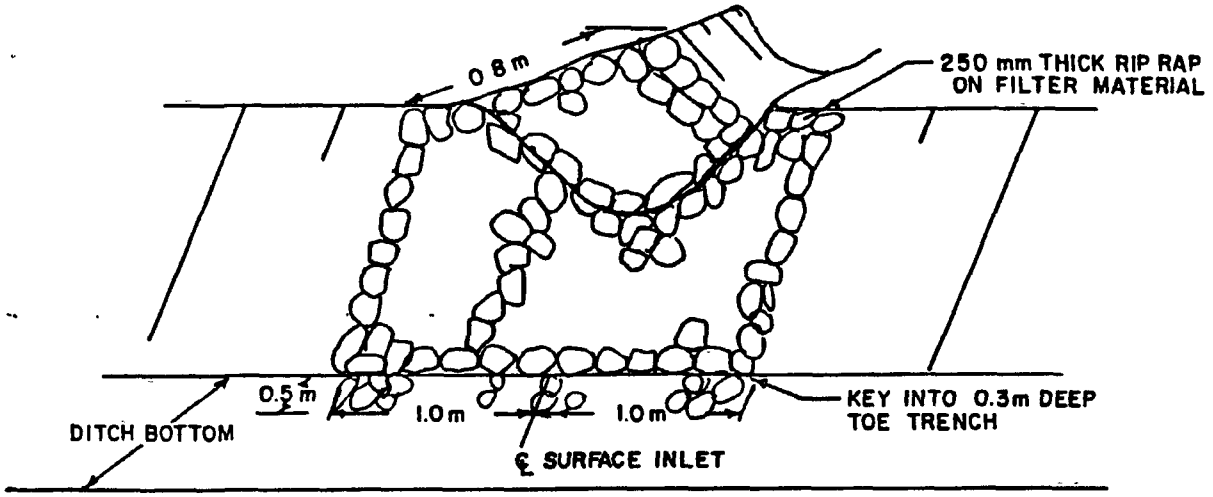
6.3 DIMENSIONS & PAY LIMITS FOR TILE DRAINS For tile drains, the trench shall be excavated to 150 mm below the grade elevation and to a width of 1.0 m. Pay limits for the excavation of rock quantities shall be based on cross-sections taken at 3 metre intervals. The top shall be the original rock surface; the bottom shall be 0.15 m below the grade elevation and the width shall be 1.0 m. There will be no payment for overbreak.

6.4 GRADES & TOLERANCES On open drains, rock shall be excavated to the grade shown on the profile. A tolerance of 25 mm above grade will be permitted over 50% of the width. In no case shall any part of the bottom of the drain be greater than 75 mm above grade.
On tile drains, the top of the rock in the trench after excavation shall at no point be less than 100 mm below the grade line.

6.5 DISPOSAL OF ROCK Broken rock excavated from the drain shall be piled adjacent to the drain and shall not be spread with the remaining excavated material. The Contractor shall insure that blasted material is removed from adjacent farmland and placed adjacent to the drain or as specified in the report.

6.6 BLASTING All blasting shall by performed by a competent qualified blaster. Extreme care shall be taken for the transport, storage and use of explosives. All local bylaws shall be observed in addition to the provincial laws. (See Section 2.15.)

6.7 HARDPAN Hardpan consists of very dense, cemented or compacted material which cannot be readily penetrated with an excavator bucket. Unless otherwise instructed, the Contractor shall excavate hardpan to the full channel cross-section, and shall dispose of the excavated material off the site. Payment shall be based on the quantity of material excavated, and no payment shall be made for overexcavation. No payment shall be made for hardpan removal unless the Contractor has contacted the Engineer prior to excavation. The Engineer's decision concerning the classification of hardpan shall be final.



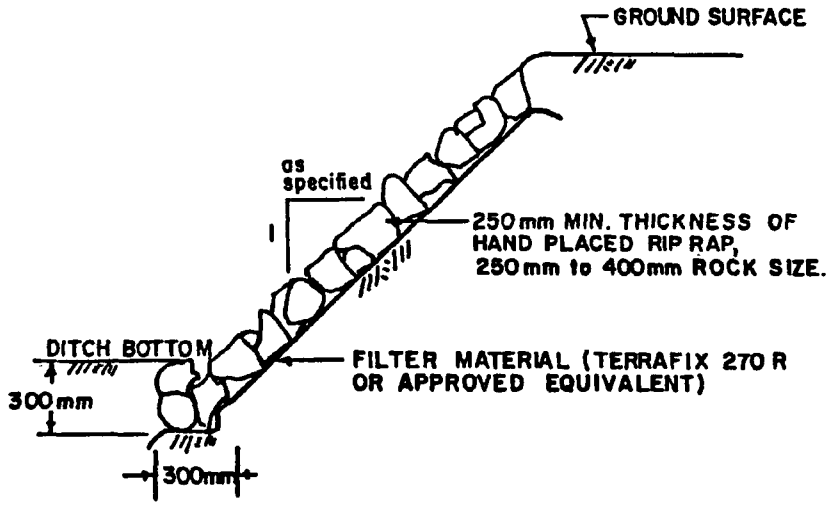
BANK PROTECTION for SURFACE WATER INLETS

N.T.S.

SEE GENERAL SPEC. SECT 4.10

REVISED FEB. 7, 1986

DETAIL DRAWING Nº NE-11



RIP RAP for BANK PROTECTION

N.T.S.

SEE GENERAL SPEC. SECT. 4.15

FEBRUARY 7, 1986

DETAIL DRAWING NE-12

J.K. YOUNG COMPANY LTD.

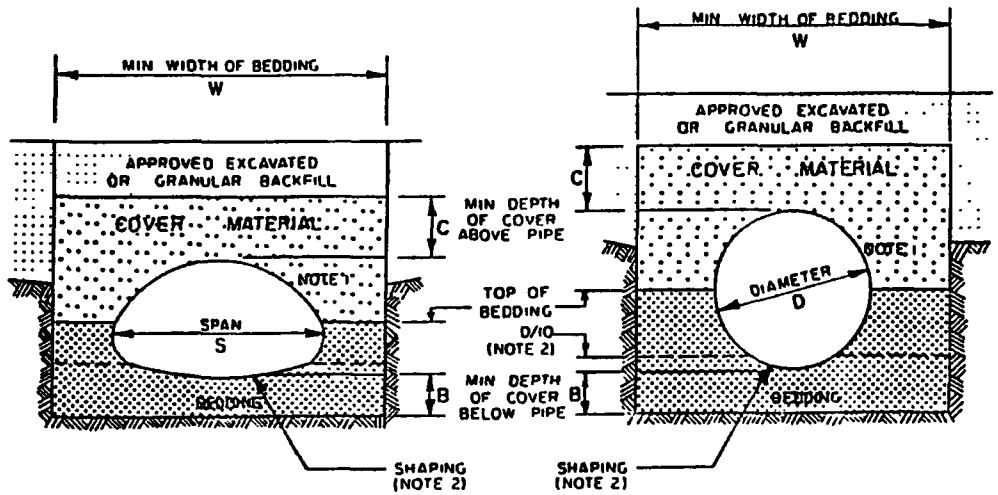
CONSULTING ENGINEERING AND SURVEYING

BRAMPTON (416) 457-2555

BEDDING AND BACKFILL
C.S.P CULVERTS

CITY OF BRAMPTON
PUBLIC WORKS DEPARTMENT

SCALE: N.T.S	DWG. No 349
APPROVED	
CHECKED	
DATE: 84-01-01	
REVISION	REV DATE



CORRUGATED STEEL PIPE ARCH

CORRUGATED STEEL PIPE

SIZE OF PIPE		B	C	W
DIA. (C.S.P.)	SPAN (C.S.P.A)			
1050mm & SMALLER		150	300	D + 750
1200 TO 1800		225	450	1.67 x D
	1125 & SMALLER	150	300	S + 750
	1125 TO 2125	225	450	1.67 x S

NOTES

1. BEDDING TO BE TAKEN TO SPRINGLINE OF PIPE AND TO TOP CORNER RADIUS OF PIPE ARCH
2. BEDDING TO BE CAREFULLY SHAPED TO RECEIVE THE LOWEST SEGMENT OF PIPE TO A DEPTH EQUAL TO 10% OF THE PIPE DIAMETER; AND IN THE CASE OF PIPE ARCHES, THE LOWEST SEGMENT OF PIPE FORMED BY THE BOTTOM RADIUS.
3. THE UPSTREAM END OF THE PIPE TO BE BEDDED IN CLAY AND PROPERLY COMPACTED TO PREVENT SEEPAGE
4. BEDDING AND COVER MATERIAL TO BE GRANULAR "A" OR CLASS 'B' BEDDING STONE SIZE WITHIN 300mm OF THE SURFACE OF THE PIPE SHALL NOT EXCEED 75mm.
5. COMPACTION REQUIREMENTS
   (a) BEDDING AND COVER MATERIAL - 95%
   (b) GRANULAR BACKFILL - 100 %
   (c) EARTH BACKFILL - 95 %
6. DEPTH OF COVER MATERIAL PLUS BACKFILL OVER TOP OF PIPE MUST BE 600mm MIN AND PROTECTIVE MATERIAL PROPERLY COMPACTED BEFORE ALLOWING HEAVY CONSTRUCTION EQUIPMENT OVER THE PIPE.