Drainage: Statistics from Time Immemorial
immemorial adjective

im·me·mo·ri·al | ˌi-mә-ˈmәr-ē-әl |

Definition of *immemorial*

: extending or existing since beyond the reach of memory, record, or tradition existing from time *immemorial*

Source: https://www.merriam-webster.com/dictionary/immemorial

Synonyms: age-old, aged, ancient, antique, dateless, antediluvian

“Before the Flood” – “Before Sufficient Outlet”
Drainage: Statistics from Before Sufficient Outlet
Actually though

- Current - Drainage Act RSO 1990
- The embodiment of the drainage act is much older than that.
- Originally part of the watercourses and line fences act…

- What I did find….
- Found in Sessional Papers (No. 52) from the Legislative Assembly on the 12th day of March 1884
- “The amount of the original indebtedness of any municipality to the Province under the Ontario Drainage Act…..”
  - [Link](https://books.google.ca/books?id=4xgxAQAAMAAJ&pg=RA10-PA35&dq=drainage+act+1872+ontario&hl=en&sa=X&ved=0ahUKEwj_n9GloqPeAhWjg-AKHSdoAf4Q6AEIQzAFv=twopage&q=drainage%20act%201872%20ontario&f=true)
1.5% Engineering Charges

Statement of quantities and expenditure on Drainage Works in the Township of Sarnia in the years 1874 to 1877.

<table>
<thead>
<tr>
<th>Drainage Area</th>
<th>Quantities</th>
<th>Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wawanosh Drain</td>
<td>63,841 cubic yards, at 18½ cents</td>
<td>$11,810 58</td>
</tr>
<tr>
<td></td>
<td>Six trap culverts, with gates, at 8</td>
<td>492 00</td>
</tr>
<tr>
<td></td>
<td>Repairs to culverts</td>
<td>21 00</td>
</tr>
<tr>
<td></td>
<td>Engineering charges</td>
<td>187 17</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>$12,510 75</strong></td>
</tr>
<tr>
<td>Perche Creek Drain</td>
<td>63,641 cubic yards, at 18½ cents</td>
<td>$11,810 58</td>
</tr>
<tr>
<td></td>
<td>Repairs to culverts</td>
<td>21 00</td>
</tr>
<tr>
<td></td>
<td>Engineering charges</td>
<td>187 17</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>$12,443 55</strong></td>
</tr>
<tr>
<td>Waddell Creek Drain</td>
<td>44,870 cubic yards, at 17½ cents</td>
<td>$7,852 75</td>
</tr>
<tr>
<td></td>
<td>Engineering charges</td>
<td>65 06</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>$7,917 31</strong></td>
</tr>
<tr>
<td>Pulse Creek Drain</td>
<td>42,309 cubic yards, at 16½ cents</td>
<td>$7,086 75</td>
</tr>
<tr>
<td></td>
<td>Engineering charges</td>
<td>182 20</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>$7,268 95</strong></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>$40,540 55</strong></td>
</tr>
</tbody>
</table>
Need more consistent data

• Lets not get bogged down in the 1800’s arguing about who owes the province money

• I found some readily available stats reports on the network so we will use those.
Wayne Wood, P.Eng., Drainage Coordinator
Soil and Water Management Branch, O.M.A.F.
Typed in Century Gothic 10 point
Highlights
- Stacked concrete headwalls no longer eligible for cost as they are viewed as equivalent to cast in place concrete.
- 80% grant for reinforced concrete capping of low level crossings designed to be flooded during peak flows
- Number of engineers who wrote reports was 69.
1989 - OMAF REPORT TO THE AOLS-APEO ANNUAL MEETING OF THE DRAINAGE PRACTITIONERS

- Ken Chow, P. Eng., Drainage Co-ordinator
- Typed in Century Gothic 11 point
- Highlights
  - Publication 73 and is published as "Handbook of Drainage Principles".
  - Flooding in Essex
- Acronyms aplenty even in 1989
1990 OMAF REPORT TO THE AOLS-APEO
ANNUAL MEETING OF THE DRAINAGE
PRACTITIONERS

• Wayne Wood, P. Eng. Acting Drainage Coordinator
• Courier New is the new font of choice
• Highlights
  – “In the drainage section you will be seeing a new Coordinator, Sid Vander Veen, former District Engineer with Ministry of Natural Resources in Timmins, around the middle of November.”
  – And a bunch of acronyms and committees
• Changes to the tables and some of the stats are reconciled
• % engineering was calculated as Engineering/construction
• It is now calculated as Engineering / Total cost. The plots you will see represent this calculation.

• Sid has changed to CG Times font and will eventually switch to Times New Roman for good.
• Table formats are starting to look like they do today.
• There was some good stats on the Tile drainage industry.
Average Maintenance Cost

Average Maintenance Cost

Year

Average Maintenance Cost


- Average Maintenance
- CPI Adjusted 1983 Maintenance
Superintendent Cost

Superintendent Cost Graph

Year


Superintendent Cost

CPI Adjusted 1992 Superintendent
Percentage Engineering Cost

![Percentage Engineering Cost Graph](image)
Percent Eng. Cost/Project Cost vs Project Cost (2018)

\[ y = 2 \times 10^{-13}x^2 - 4 \times 10^{-7}x + 0.3388 \]
Cost per Hectare

\[ R^2 = 0.8554 \]
Trends in Number of Engineers

Number of Engineers

\[ y = 0.0033x^3 - 19.688x^2 + 39314x - 3E+07 \]

-20 0 10 20 30 40 50 60 70 80

\[ y = 0.0033x^3 - 19.688x^2 + 39314x - 3 \times 10^7 \]
Questions, Comments, Conversation

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Ontario Ministry of Agricultural, Food and Rural Affairs

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