Appendix 500.2

Pole Capacity Calculator
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## Pole Capacity Program

### General

- **Project Designer:**
- **Company Name:**
- **Project Location:**
- **Project City:**
- **Project No.:**
- **Drawing No.:**
- **Date:** 13-Dec-18
- **Pole No.: pole 1

### Wind Pressure

- **Pressure:** 605 Pascals

### Poles

<table>
<thead>
<tr>
<th>Pole Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>T7</td>
<td>T1, T3, T6, T7, L, M OR H</td>
</tr>
<tr>
<td>2A</td>
<td>Luminaire Arm - 2A OR 2C</td>
</tr>
<tr>
<td>7A</td>
<td>Luminaire Arm Extension - 7A, 7B OR 7D</td>
</tr>
</tbody>
</table>

### Signal Arms

- **For T1, T3, T6, T7, L & M**
  - **SIGNAL ARM ADAPTOR:** N/A
  - **SIGNAL ARM EXTENSION:** 7A, 7B, 7C OR 7D
- **For T1, T3, T6, T7, L, M & H**
  - **SIGNAL ARM EXTENSION:** 7A, 7B OR 7C
  - **SIGNAL ARM:** L OR LB

### Sign Arms

<table>
<thead>
<tr>
<th>Arm Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>For L &amp; M Only</td>
<td>Deflection &gt; 600 is not acceptable</td>
</tr>
</tbody>
</table>

### Signal Heads

<table>
<thead>
<tr>
<th>Head Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>With Backboard</td>
<td>SPAN - 4.30</td>
</tr>
</tbody>
</table>

### Sign

<table>
<thead>
<tr>
<th>Width, Height, Span</th>
<th>Number of Luminares Per Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.20, 0.30, 2.00</td>
<td></td>
</tr>
</tbody>
</table>

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Considerable time and effort have gone into the development and testing of the program. In using the program, however, the user accepts and understands that no warranty is expressed on the accuracy or the reliability of the program.
POLE CAPACITY PROGRAM USER GUIDE

REFERENCES
- Standard Specifications for Highway Construction, MOT
- Electrical and Signing Material Standards, MOT

GENERAL
- Press "Control A" to clear all input cells
- Use UPPERCASE only (lowercase will induce wrong results)
- Enter general information (optional)

WIND PRESSURE
- Enter wind pressure
- Wind pressure tables for various areas of the Province may be found in
  the Moth Electrical and Traffic Engineering Manual or the Canadian Highway Bridge Design Code.
  CAN/CSA-S6-00
- If the location is not listed on the tables then use the nearest location listed
- Use 25 year return period for signal poles and 50 year return period for sign poles

POLES
- Enter the pole part in column to the left
- Pole parts are detailed in the current Standard Specifications for Highway Construction

SIGNAL ARMS & SIGN ARMS
- Enter the arm parts in column to the left
- Arm parts are detailed in the current Standard Specifications for Highway Construction

SIGNAL HEADS
- Enter the number of each type of signal head in the column to the left
- Enter the span of each signal head (from center of pole to center of signal head in meters) in the
  column to the right

SIGNS
- Enter "1" on left column for each sign selected (including street name sign)
- Enter the sign width, height, span and number of sign luminaires for each sign. "Sign spans" are
  measured from the center of the sign to the center of the pole shaft in meters

POLE CAPACITY
- The program will calculate the combination force ratio for each part of pole. All parts must be less
  than 1.0 or the pole is not acceptable

DEFLECTIONS
- The program will calculate the deflections at the top of the pole and also the end of the arm with
  and without any signals or signs for checking purposes. Deflection greater than 600 is not acceptable

NOTES
- Print out a hard copy backup for each pole used for the project file
- If a pole configuration or special circumstances not covered under this program, or
  if you have any questions or suggestions, please contact Bill Szto, Ministry of Transportation,
  South Coast Region, Tel: (604) 775-2477, Fax: (604) 660-4948 or Email: bill.szto@gems6.gov.bc.ca
PROGRAM ASSUMPTIONS

DESIGN CODE
- Canadian Highway Bridge Design Code, CAN/CSA-S6-00

DESIGN PARAMETERS / ASSUMPTIONS
- Wind pressure data used are summarized from page 81 and 82 of CHBDC
  25 years return periods for traffic signal structures
  50 years return periods for sign structures
- Exposure coefficients as per cl. 3.10.1.3 of CHBDC
- Gust effect coefficient = 2.5 as per cl. 3.10.1.2 of CHBDC
- Drag coefficients as per table A3.2.2 of CHBDC
  1.4 for octagonal sections with sharp corners
  1.2 for signs and signals
- Load cases for wind are 100% normal with 20% transverse or 60% normal with 30% transverse as
  per table A3.2.3 of CHBDC
- Load combinations for ultimate limit state are 1.0 for dead load with 1.3 for wind load as per
  table A3.2.1 of CHBDC
- Combined axial compression, flexure and torsion interaction as per cl. 10-24.3 CHBDC
- Plastic moment coefficients, Kp are taken from table 1.3.1B(2) AASHTO
- Maximum stresses in tubular shapes are taken from table 1.3.1B(3) AASHTO
- No deduction on wind load area on the arm regardless of area covered by signals or signs
- Anchor bolts are designed to withstand 120% of the applied loads

DESIGN DATA

SIGNALS

<table>
<thead>
<tr>
<th>TYPE</th>
<th>AREA (m²)</th>
<th>WEIGHT (kn)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(200-200-200)</td>
<td>0.56</td>
<td>0.12</td>
</tr>
<tr>
<td>(300-200-200)</td>
<td>0.78</td>
<td>0.14</td>
</tr>
<tr>
<td>(300-200-200-300)</td>
<td>1.01</td>
<td>0.20</td>
</tr>
<tr>
<td>(300-300-300)</td>
<td>0.90</td>
<td>0.18</td>
</tr>
<tr>
<td>(300-300-300-300)</td>
<td>1.14</td>
<td>0.24</td>
</tr>
</tbody>
</table>

SIGNS
- All signs are assumed to have a unit weight of 0.45 kN/m² including mounting hardware

LUMINAIRES
- All pole mounted luminaires to have area = 0.25m², weight = 0.21kn, drag coefficient = 0.70
- All sign mounted luminaires to have area = 0.14m², weight = 0.35kn, drag coefficient = 1.20

ANCHOR BOLTS

<table>
<thead>
<tr>
<th>TYPE</th>
<th>Factored Tensile Resistance, Tr (kn)</th>
<th>Factored Shear Resistance, Vr (kn)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&quot; - 4140</td>
<td>210</td>
<td>118</td>
</tr>
<tr>
<td>1&quot; Dywidag</td>
<td>284</td>
<td>150</td>
</tr>
<tr>
<td>1 1/2&quot; - 4140</td>
<td>415</td>
<td>233</td>
</tr>
</tbody>
</table>