HYDRAULIC AND ENERGY GRADE LINE CALCULATION WORKSHEET

Land user ___________________________ Field Office ________________________________
Job description __________________________________________________________________
Location _________________________________________________________________________
Planner ___________ Date ___________ Checked by ___________ Date _________________

Friction loss calculation method:

- Hazen Williams (C) ______
- Mannings (n) ______
- Darcy-Weisbach ______
- Blasius/Darcy-Weisbach ______

ENERGY GRADE AT BEGINNING OF LINE

If there is pressure at inlet:

Pressure at beginning of pipeline _________ psi
Pressure head: hp = _____ psi x 0.433 = _________ ft
Elevation at pipe entrance _________ ft
Energy grade line elevation at entrance = hp + Elevation = ___________

Gravity system:

Water surface elevation = energy grade line elevation at entrance___________ ft

PIPE FRICTION LOSS

<table>
<thead>
<tr>
<th>Pipe segment identification</th>
<th>Type/class of pipe</th>
<th>Nominal pipe diameter in.</th>
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Pipe inside diameter in.
Segment length (L) ft.
Design flow rate (Q) gpm
Friction coefficient (C or n)
Flow Area (A) sq. ft.
Velocity in pipe (V) = Q/448.8A ft/sec.
Velocity head (hv) = V^2/2g ft.
Friction loss (J) ft/100ft.
Reduction coefficient to compensate for N discharges
Head loss due to pipe friction (hf) ft.
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MINOR LOSSES

<table>
<thead>
<tr>
<th>Pipe segment identification</th>
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Coefficients (K):

<table>
<thead>
<tr>
<th>Entrance</th>
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</thead>
<tbody>
<tr>
<td>Bends</td>
<td></td>
<td></td>
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<tr>
<td>Valves</td>
<td></td>
<td></td>
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<tr>
<td>Enlargement</td>
<td></td>
<td></td>
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<tr>
<td>Contraction</td>
<td>TOTAL K coefficients</td>
<td></td>
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</tbody>
</table>

Total minor losses \( h_m = K \left( \frac{V^2}{2g} \right) \) ft

SEGMENT ENERGY/HYDRAULIC ELEVATIONS

At beginning of segment:

Energy grade line elevation
\[ = *E_{beg} \]

Hydraulic grade line elevation
\[ = *E_{beg} - hv \]

At ending of segment:

Energy grade elevation:
\[ *E_{end} = *E_{beg} - hf - hm \]

Hydraulic grade line elevation
\[ = *E_{end} - hv \]

\(*E_{beg} \) and \( E_{end} \) is the energy grade line elevation at the beginning and end of the segment.