ONCE UPON A TIME…

SURETY COMPANIES DETERMINED THAT THE BOND SHOULD BE BASED ON THE TOTAL CONTRACT VALUE
BUT WHAT IF THE INSURANCE CARRIERS SPECIFY THIS SAME CONFIGURATION?
AND THE CONTRACTOR?
AND SOME STATE REVENUE SERVICES (ARIZONA) FOR SALES TAX?
THIS CAN RESULTS IN THE FOLLOWING:

**BOND** is based on total project value including **BOND**, fee, insurance and tax.

**FEE** is based on total project value including **BOND**, **FEE**, insurance and tax.

**INSURANCE** is based on total project value including **BOND**, **FEE**, **INSURANCE** and tax.

**TAX** is based on total project value including **BOND**, **FEE**, **INSURANCE** and **TAX**.
EVEN IF THE CONTRACT ALLOWS THIS, NONE OF THE MULTIPLIERS SHOULD BE CALCULATED ON THEMSELVES
MANY SOLVE WITH TRIAL AND ERROR

...BUT THE SOLUTION IS JUST MATH
**THE ORTEGO EQUATION**

Calculates multipliers on the total value excluding the result of the individual multiplier that is currently being calculated.

\[
\text{Multiplier Result } (M_1) = \frac{HC}{1+\%M_1} \times \left(1 - \sum \left(\frac{\%M_{all \ others}}{1+\%M_{all \ others}}\right)\right) - 1
\]

**Total Cost** = \( HC + \sum M \)

Where \( HC \) = Hard Costs
HARD COSTS

- Labor
- Material
- Equipment
- Subcontractors
- General Conditions

Plus Any multipliers that are not an “Inclusive” multiplier
2 MULTIPLIERS
(BOND & FEE)

\[
\text{Bond} = \frac{\text{Direct Costs}}{\left(1 + \frac{\%\text{Bond}}{\%\text{Bond}}\right) \times \left(1 - \left(\frac{\%\text{Fee}}{1 + \%\text{Fee}}\right)\right) - 1}
\]

\[
\text{Fee} = \frac{\text{Direct Costs}}{\left(1 + \frac{\%\text{Fee}}{\%\text{Fee}}\right) \times \left(1 - \left(\frac{\%\text{Bond}}{1 + \%\text{Bond}}\right)\right) - 1}
\]
3 MULTIPLIERS
(BOND, INSURANCE & FEE)

**Bond** = \( \frac{Direct\ Costs}{\left(\frac{1 + \%Bond}{\%Bond}\right) \times \left(1 - \left(\frac{\%Fee}{1 + \%Fee} + \frac{\%Ins}{1 + \%Ins}\right)\right) - 1} \)

**Insurance** = \( \frac{Direct\ Costs}{\left(\frac{1 + \%Ins}{\%Ins}\right) \times \left(1 - \left(\frac{\%Fee}{1 + \%Fee} + \frac{\%Bond}{1 + \%Bond}\right)\right) - 1} \)

**Fee** = \( \frac{Direct\ Costs}{\left(\frac{1 + \%Fee}{\%Fee}\right) \times \left(1 - \left(\frac{\%Bond}{1 + \%Bond} + \frac{\%Ins}{1 + \%Ins}\right)\right) - 1} \)
### Example

<table>
<thead>
<tr>
<th>Description</th>
<th>%</th>
<th>Ortego Equation</th>
<th>Backcheck: Multiplier ÷ (Total – Multiplier)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard Costs</td>
<td></td>
<td>10,000,000</td>
<td></td>
</tr>
<tr>
<td><strong>Multipliers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insurances</td>
<td>1.5%</td>
<td>157,743</td>
<td>157,743 ÷ (10,673,963 - 157,743) = 1.5%</td>
</tr>
<tr>
<td>OHP</td>
<td>4%</td>
<td>410,537</td>
<td>410,537 ÷ (10,673,963 - 410,537) = 4%</td>
</tr>
<tr>
<td>Bond</td>
<td>1%</td>
<td>105,683</td>
<td>105,683 ÷ (10,673,963 - 105,683) = 1%</td>
</tr>
<tr>
<td><strong>Total Multipliers</strong></td>
<td></td>
<td><strong>673,963</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Total Costs</strong></td>
<td></td>
<td><strong>10,673,963</strong></td>
<td></td>
</tr>
<tr>
<td>Effective Multiplier % on Hard Costs</td>
<td></td>
<td><strong>6.74%</strong></td>
<td></td>
</tr>
</tbody>
</table>
WHY NOT JUST INCLUDE THE MULTIPLIER?

Total Cost = $\frac{HC}{(1-\sum Multiplier \%)}

Where:

$\sum Multiplier\% = OHP \% + Insurance \%(s) + Tax \%$

Each Multiplier can then be Calculated as follows:

Multiplier Result = Total Cost $\times Multiplier\%$
<table>
<thead>
<tr>
<th>Description</th>
<th>%</th>
<th>Ortego Equation</th>
<th>Multiplicative Inverse</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard Costs</td>
<td>100%</td>
<td>10,000,000</td>
<td>10,000,000</td>
</tr>
<tr>
<td>Multipliers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insurances</td>
<td>1.5%</td>
<td>157,743</td>
<td>160,428</td>
</tr>
<tr>
<td>OHP</td>
<td>4%</td>
<td>410,537</td>
<td>427,807</td>
</tr>
<tr>
<td>Bond</td>
<td>1%</td>
<td>105,683</td>
<td>106,952</td>
</tr>
<tr>
<td>Total Multipliers</td>
<td></td>
<td>673,963</td>
<td>695,187</td>
</tr>
<tr>
<td>Total Costs</td>
<td></td>
<td>10,673,963</td>
<td>10,695,187</td>
</tr>
<tr>
<td>Effective Multiplier % on Hard Costs</td>
<td></td>
<td>6.74%</td>
<td>6.95%</td>
</tr>
</tbody>
</table>
VISUAL COMPARISON

The Ortego Equation

Multiplicative Inverse

Effective Multiplier

Sum of the Multipliers
VISUAL COMPARISON (ALT)

Slide No. 17

The Ortego Equation
Multiplicative Inverse

Sum of the Multipliers

Effective Multiplier Logarithmic Scale
CONCLUSION

USE THE ORTEGO EQUATION AS A MATHEMATICAL SOLUTION TO MULTIPLIERS ON THE CONTRACT TOTAL EXCLUDING THEMSELVES
QUESTIONS

PRESENTED BY
JAKE ORTEGO, PE, CCE, CCA, CCP
J@JA-CEA.COM
(412) 849-2408