Special Mix Designs for Wet Sprayed Concrete

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cement</td>
<td>CEM I</td>
<td>400 kg</td>
</tr>
<tr>
<td>Aggregates</td>
<td>0 – 8 mm</td>
<td>1718 kg</td>
</tr>
<tr>
<td>Water</td>
<td>No contaminants</td>
<td>192 kg</td>
</tr>
<tr>
<td>Superplasticizer</td>
<td>Sika®ViscoCrete® SC</td>
<td>1 %</td>
</tr>
<tr>
<td>Accelerator</td>
<td>Sigunit®-L AF</td>
<td>6 %</td>
</tr>
</tbody>
</table>

**Recommended Parameters**
- Flow table spread: 600 mm
- Temperature: 20 °C
- Air voids: 4%
- Strength performance: J2
- Workability time: 2 hrs
- Water / Cement: 0.48

**Optimal Shotcrete Parameters**

**Higher Initial Strength**
- Mixed Design Change: + 30 kg Cement, CEM I
  - Product: Sigunit®-L AF
  - Effect: Higher initial strength development

**Higher Final Strength**
- Mixed Design Change: + 20 kg Silica fume, SikaFume®
  - Product: Sika®ViscoCrete® SC
  - Effect: Increased density

**Increased Ductility I**
- Mixed Design Change: + 30 kg Macro steel fibers, Hooked L=35 mm, Ø 0.5 mm
  - Product: Sika®ViscoCrete® SC
  - Effect: Higher energy absorption

**Improved Fire Resistance**
- Mixed Design Change: + 2 kg Micro synthetic fibers, PP L=6 mm, Ø 0.04 mm
  - Product: Sika®ViscoCrete® SC
  - Effect: Vapor pressure reduction

**Better Pumpability**
- Mixed Design Change: + 30 kg Fines, Fine sand / Lime stone / Fly ash
  - Product: Sika®ViscoCrete® SC
  - Effect: Lubrication

**Optimized Cost Performance I**
- Mixed Design Change: - 70 kg Cement, CEM I
  - Product: Lime stone / Fly ash
  - Effect: Substitution

**Optimized Cost Performance II**
- Mixed Design Change: - 400 kg Cement, CEM I
  - Product: CEM II
  - Effect: Substitution