** DOCUMENTATION OF CONCRETE MIX PERFORMANCE **

AMT Engineers

** Project **

** PROJECT:** Memorial Civic Center, Lima, Ohio

** ARCHITECT:** Tech 5 Architects and Engineers

** ENGINEER:** Young & Associates

** CONTRACTOR:** Howard W. Kaspar and Sons

** CONCRETE SUPPLIER:** National Services, Columbus, Ohio

** REMARKS:** All concrete supplied by National Services out of Plant Number 4

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** Mix Properties **

<table>
<thead>
<tr>
<th>MIX No.</th>
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<tbody>
<tr>
<td>SPECIFIED STRENGTH</td>
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<td>SPECIFIED SLUMP</td>
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<tr>
<td>TOTAL AIR CONTENT</td>
<td>4 to 8 %</td>
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<tr>
<td>UNIT WEIGHT</td>
<td>142 to 145</td>
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<tr>
<td>WATER/CEMENT RATIO</td>
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- Cement Type I: 417 lbs/cy
- Slag cement: 96 lbs/yd
- Coarse agg 1 in: 1825 lbs/cy
- Fine agg: 1192 lbs/cy
- Hybrid MRWRA: 6 oz/100 lbs cem
- Air entraining: 1 oz/100 lbs cem
- Water: 223 lbs/cy

Report Demo3 prepared April 22, 2014 - Mix: 3.55A
## DOCUMENTATION OF CONCRETE MIX PERFORMANCE

**AMT Engineers**

<table>
<thead>
<tr>
<th>Report Number</th>
<th>Date of Test</th>
<th>CYLINDER STRENGTHS, psi</th>
<th>Slump in.</th>
<th>Air Content</th>
<th>Conc Temp</th>
<th>Ave Test Value</th>
<th>Cumul Ave</th>
<th>Cumul STD</th>
<th>Cumul CV</th>
<th>Move 3 Ave</th>
<th>Move 3 CV</th>
<th>Cumul Ave</th>
<th>Cumul Ave Range</th>
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Analysis Criteria

Report Name: Demo3
Report Description: Legal Portrait 13 specimens
Report File: Demo3.SRC

Project(s): Memorial Civic Center, Lima, Ohio
Mix(es): 3.55A
Supplier: use all
Technician: use all
Slump filter: No lower limit to no upper limit
Air Content filter: No lower limit to no upper limit
Temperature filter: No lower limit to no upper limit
Test dates: 1/1/1980 to 11/20/2013
Specimen age: 28 days

Analysis Results (28 days)

Number of tests: 13
Additional Strength Required (ACI 301-05): 1200 psi per Table 4.2.3.3.c
Average strength: 4337 psi
Standard deviation: 497 psi
Adjusted standard deviation: n/a
Design strength (28 days): 3000 psi
Minimum required average strength (ACI 301-05): 4200 psi per Table 4.2.3.3.a
3000 + 1200 = 4200 psi
Margin of extra performance: 137 psi
(Average strength - minimum required average strength)
Probability of a test below 3000 based on normal distribution is 0.36%
Probability of a test below 2500 based on normal distribution is 0.01%
Concrete performance (ACI 214R-02): Very good per Table 3.2
Based on standard deviation of 497 psi
Using general construction testing rating system
Laboratory testing proficiency (ACI 214R-02): Excellent per Table 3.2
Based on within test coefficient of variation of: 2.98
Using general construction testing rating system
Average range: 224 psi
Maximum 2 specimen range permitted to attain a rating of good: 237 psi
Maximum 3 specimen range permitted to attain a rating of good: 356 psi

The above statistical analysis as per ACI 301 Sec. 4.2.3.2.a and ACI 318 Sec. 4.3.1.1 will also qualify mixes

Mix ID: M2 M3 M4 M5
Strength: 2000 3000 4000 5000

Report Demo3 prepared April 22, 2014
Mix: 3.55A
28 Day Strengths (o)

Specified Strength: 3000  (denoted by --- )
Required Strength: 4200  (denoted by - - - - )

Compressive Strength - psi

Analysis of 13 Tests

Number of Tests in Bracket

99% Confidence value = 3181 psi
3 Test Moving Standard Deviation - 28 Day Test Strength

Estimated 28 Day Within Batch Coefficient of Variation (+)
Average Range of 28 Day Tests (o)