

Chicago-area Roof Reflectance Monitoring Project, 2008-1012

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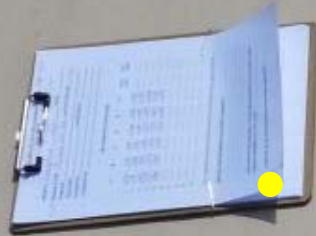
Chicago-area Roof Reflectance Monitoring Project, 2008-2012

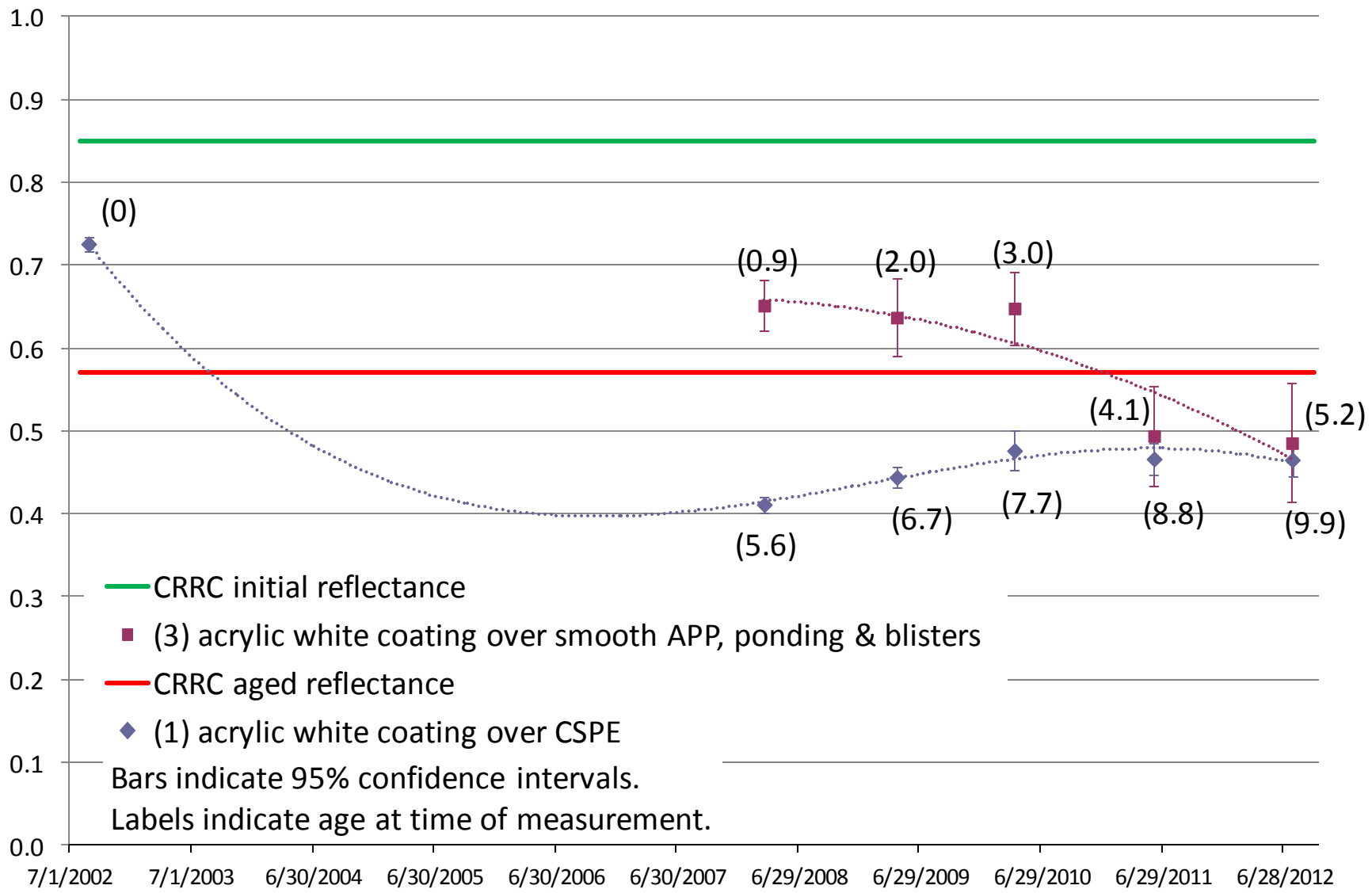
- Funded by the Roofing Alliance for Progress
- Roof access courtesy of CRCA-member contractors
- NRCA Technical Services staff performed measurements



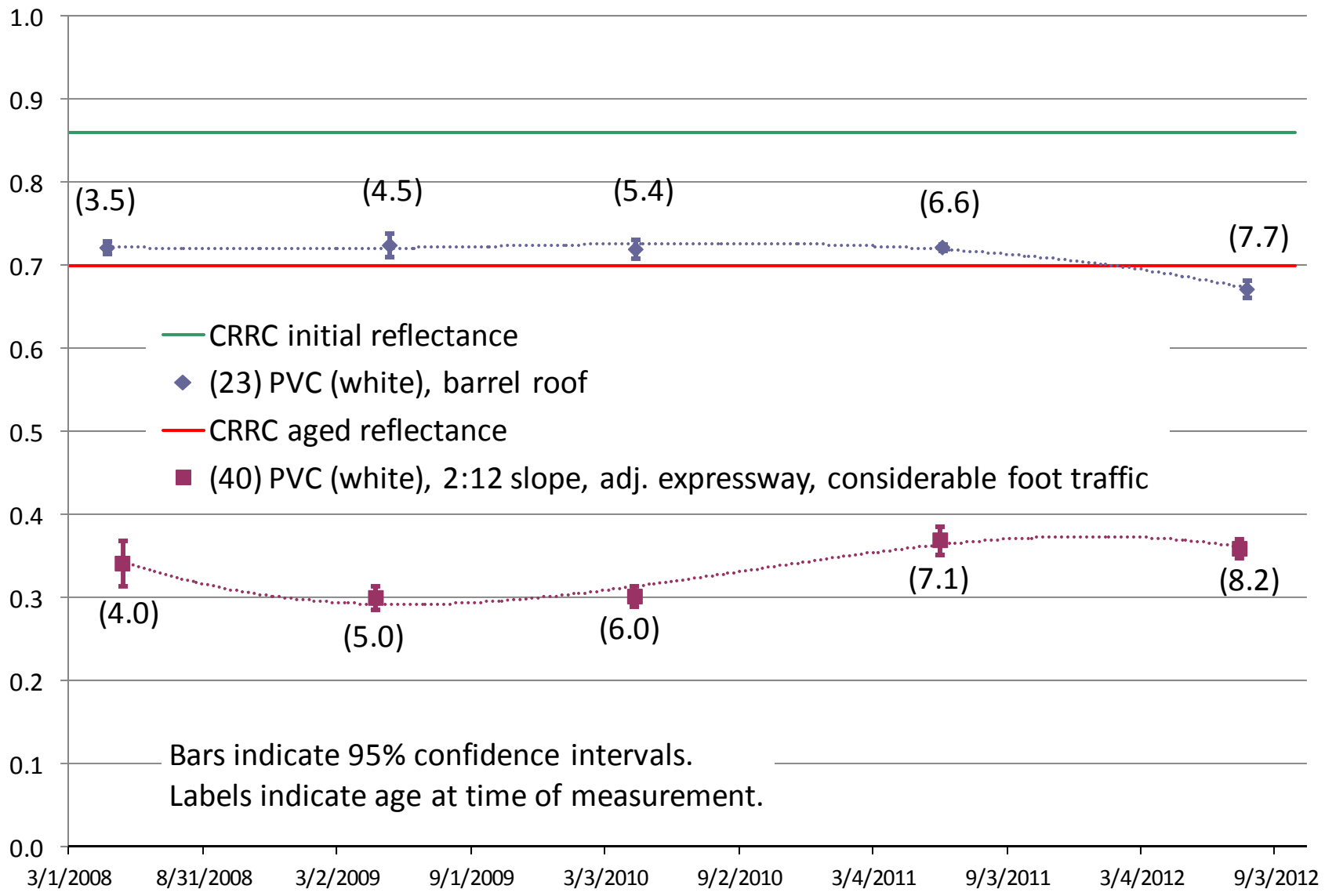
Chicago-area Roof Reflectance Monitoring Project, 2008-2012

- ASTM C1549 (portable solar reflectometer method)
- Over 6600 readings collected
- 70 roofs surveyed
- Complete record for 35 roofs
- Variety of systems commonly installed in Chicago
- Dead-level to 6:12



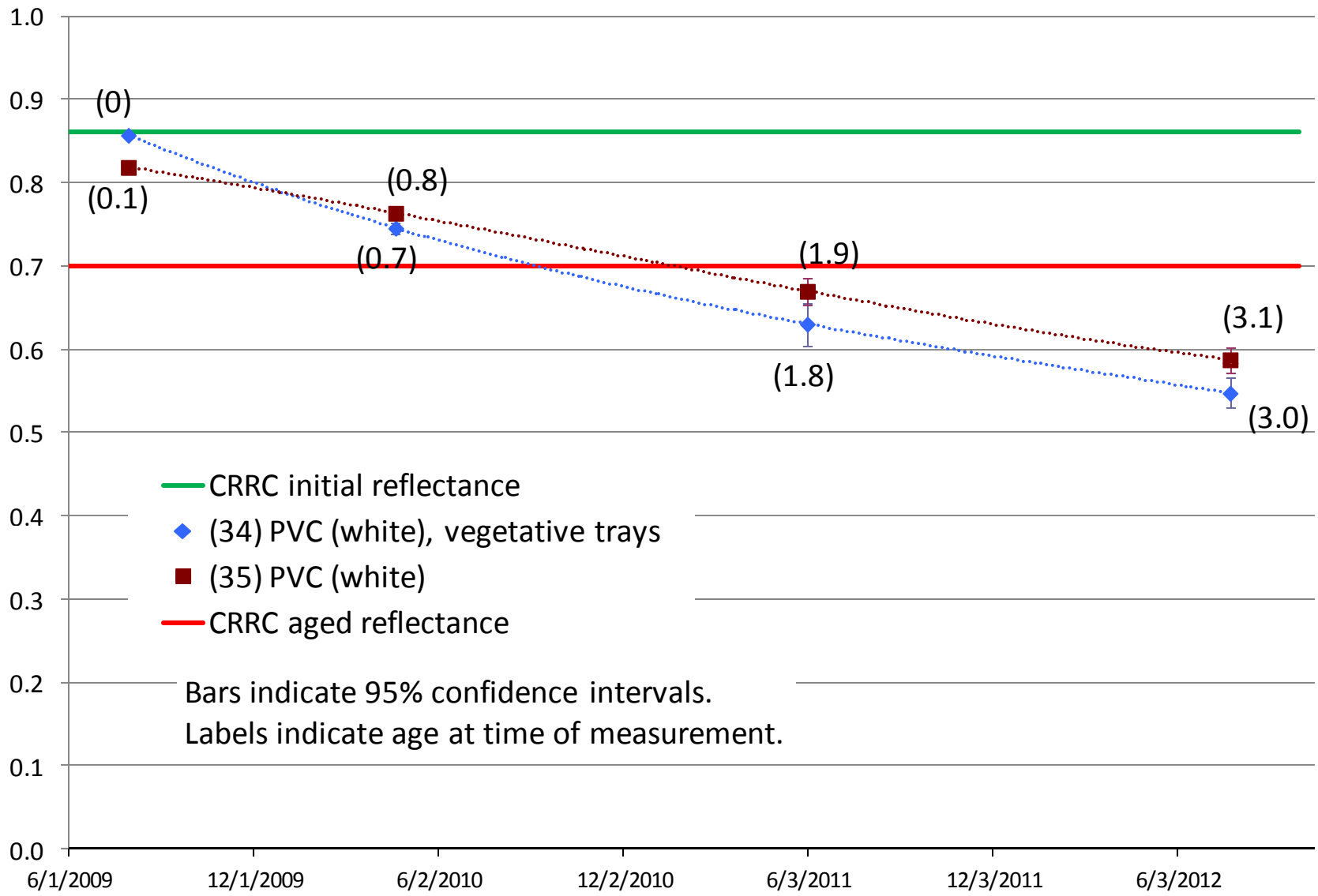


Mean reflectance: white acrylic coating

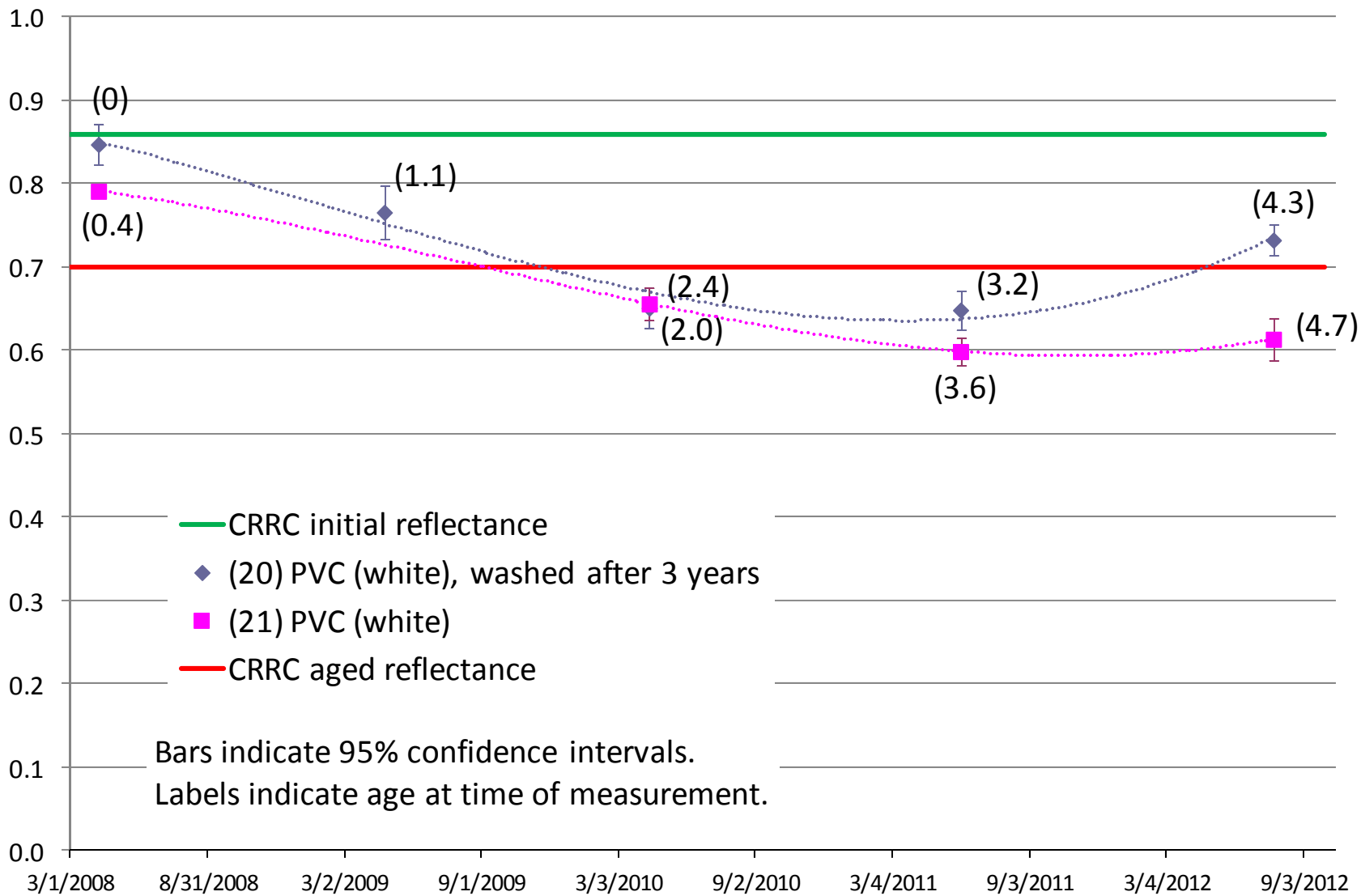


Mean reflectance: white PVC membranes with above-average slope

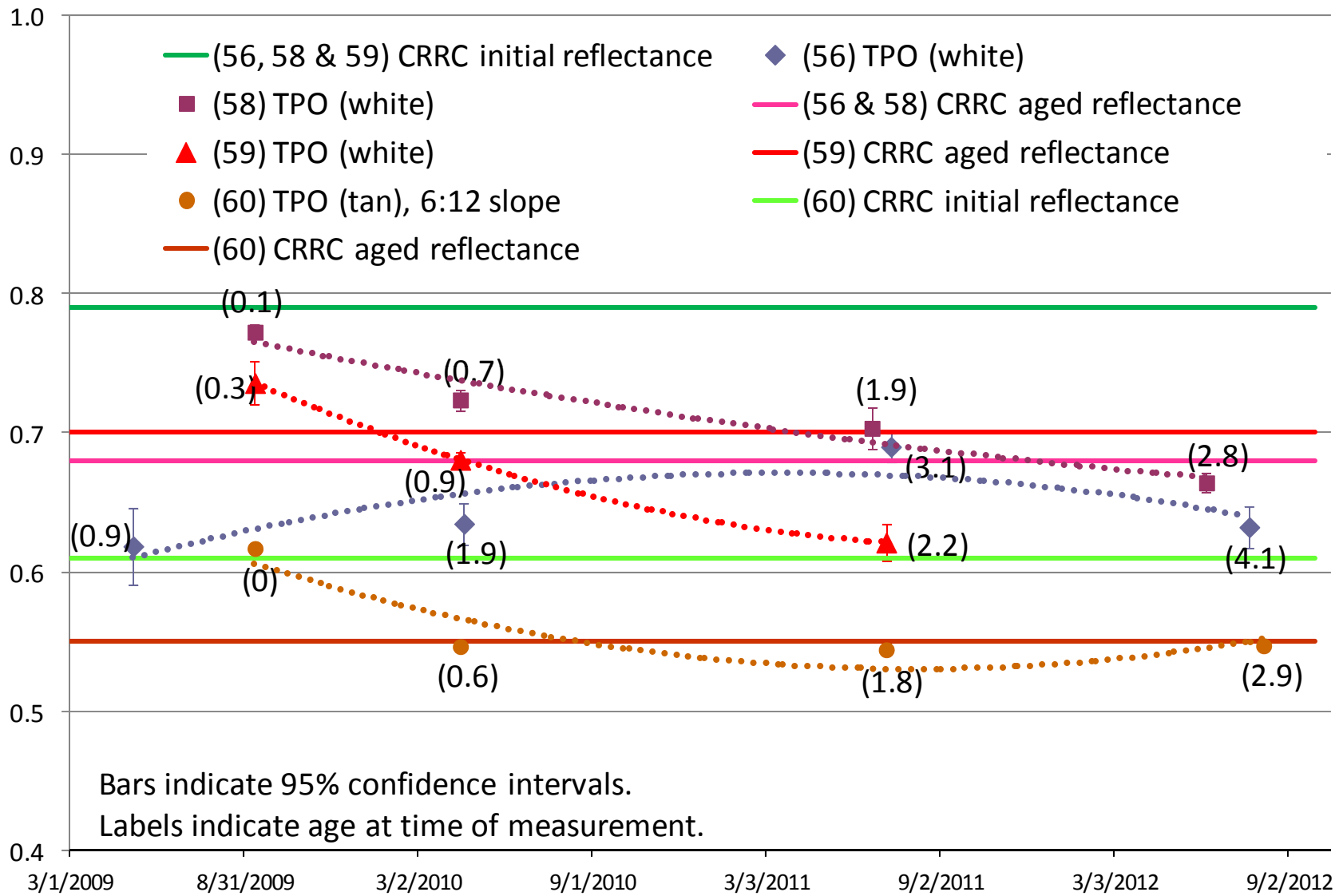




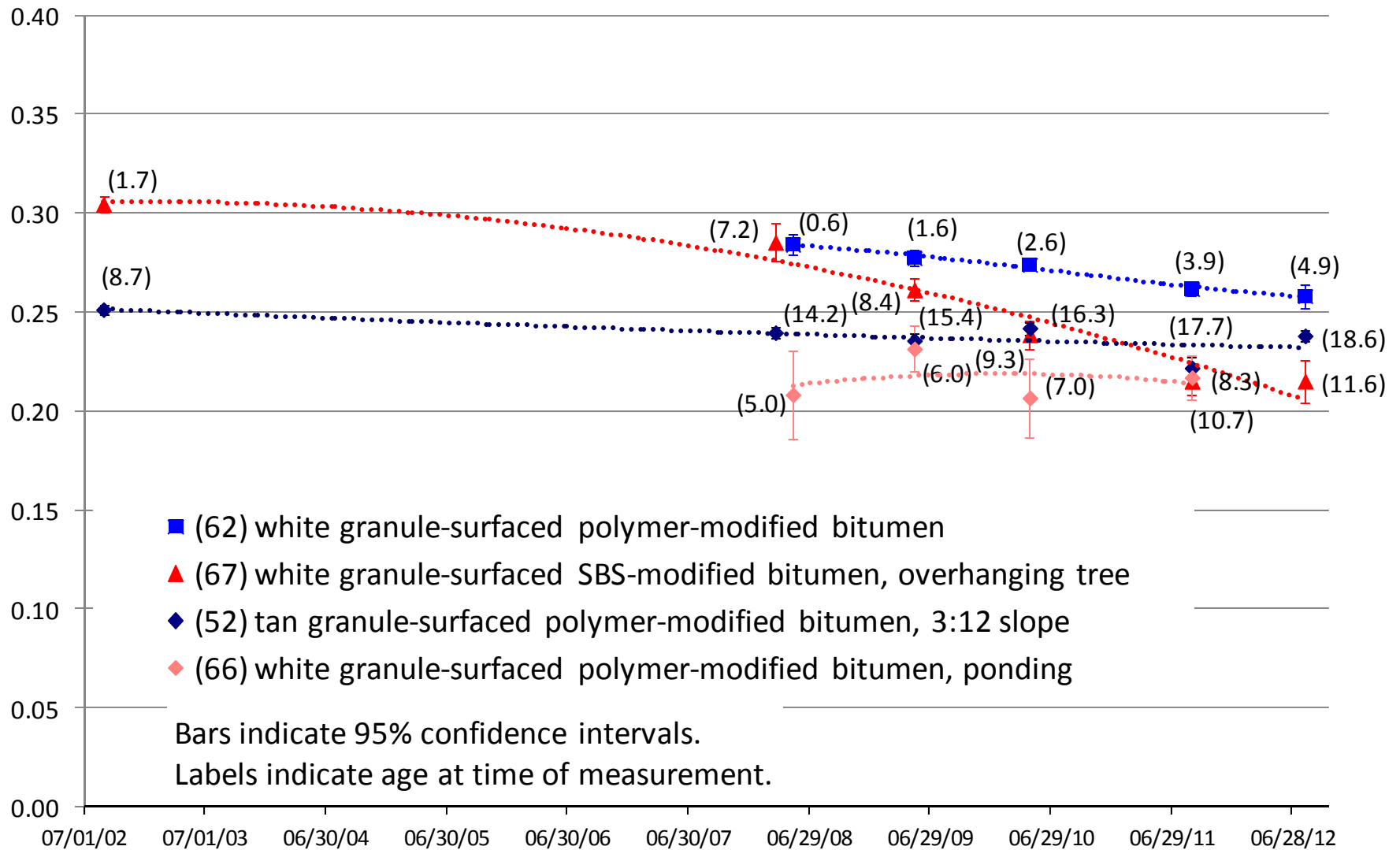
Mean reflectance: white PVC membrane, typical slope



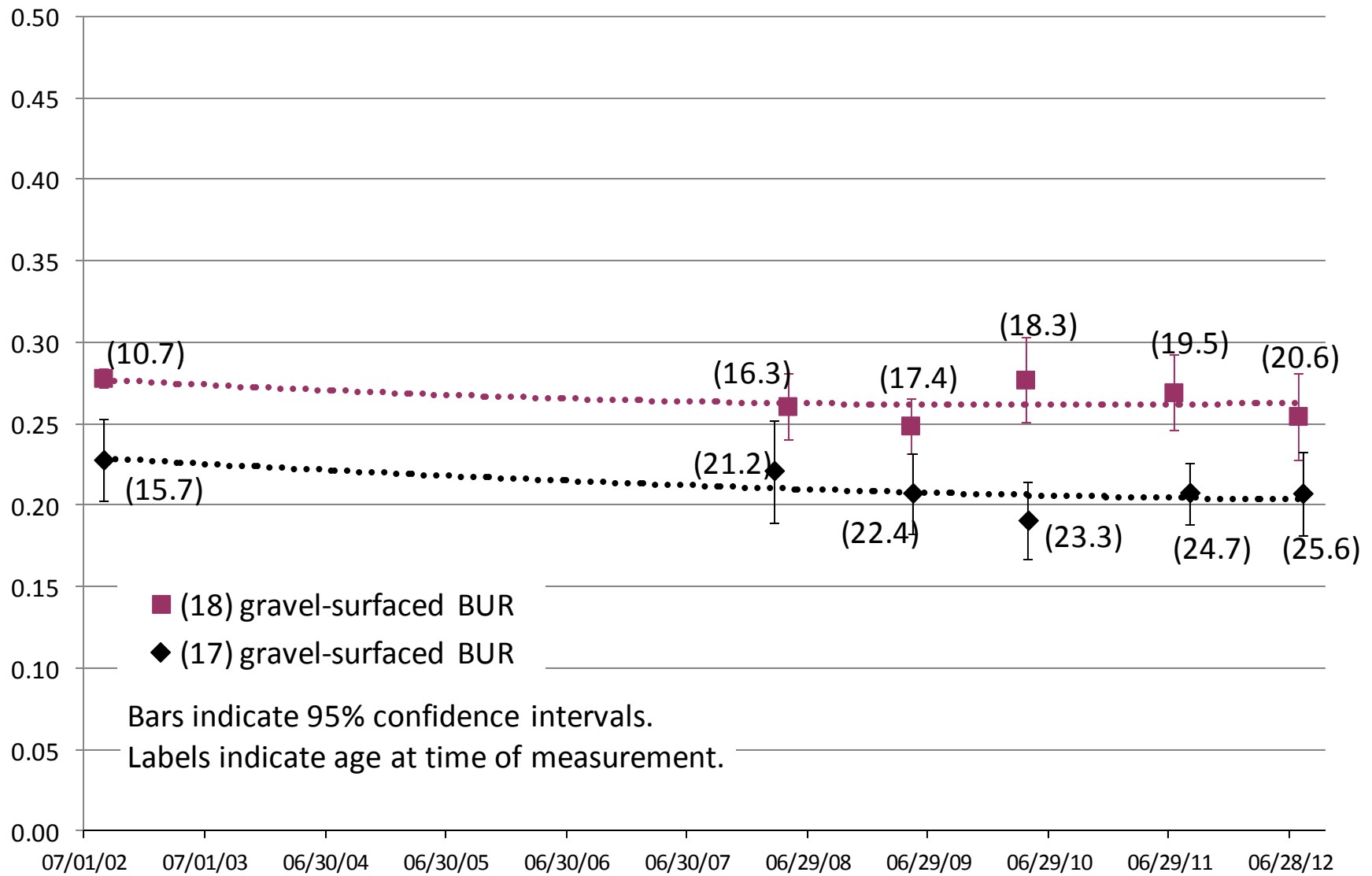
Mean reflectance: white PVC membrane, vs. washed



Mean reflectance: white TPO membranes



Mean reflectance: granule-surfaced polymer-modified bitumen



Mean reflectance: gravel-surfaced BUR

Some conclusions

- Roofs may temporarily or periodically recover measurable reflectance loss (rainstorms)
- Effective roof drainage (slope!!!) measurably improves reflectance retention
- Aged in-service reflectances are lower than corresponding CRRC aged reflectances
 - CRRC aged reflectances are for specimens exposed at 1:12 facing South (5°S).

5°S is a “typical exposure angle” provided in ASTM G7, “Standard Practice for Atmospheric Environmental Exposure Testing of Nonmetallic Materials.”

Some other reflectance values

Examples of ballast and BUR surfacing material reflectances:

concrete paver	0.45
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0.75-1.5" washed gravel	0.37
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white marble chips	0.52
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A new practice under development at ASTM International

- ASTM International Committee on Roofing Membrane Systems, TF on Accelerated Aging of Solar Reflectance and Thermal Emittance of Roofing, D08.20.45
 - New practice promises to deliver in three days the values that currently require three years to obtain
 - Manufacturers very excited

Chicago Energy Code Reflectance Provisions (roofs permitted on or after April 22, 2009)

For roofs sloped $\leq 2:12$:

- New construction: initial reflectance ≥ 0.72 OR aged reflectance ≥ 0.5
Except: (1) vegetative area $> 50\%$; balance of area reflectance ≥ 0.3
(2) entire area ballasted @ ≥ 15 lbs/sq. ft.; reflectance ≥ 0.3
- Re-roofing: initial reflectance ≥ 0.72 OR aged reflectance ≥ 0.5
Except: (1) vegetative area $> 50\%$; balance of area reflectance ≥ 0.3
(2) existing ballasted being replaced with a new ballasted
 - (a) entire area ballasted @ ≥ 15 lbs/sq. ft.; reflectance ≥ 0.3
 - (b) ballasted @ < 15 lbs/sq. ft; initial reflectance ≥ 0.72 OR aged reflectance ≥ 0.5
(3) existing roof sloped @ $\leq \frac{1}{4}:12$ being replaced with a BUR
BUR surfacing aggregate reflectance ≥ 0.3
(4) existing roof repair or maintenance
Affected portion reflectance meets requirement at time of original permit