

Subject Index

A

- AC-2.5, physical properties, 95
- AC-20 asphalt cement, 106, 135
 - properties, 107, 136
- Admixtures, foamed asphalt mixtures,
 - see* Foamed asphalt mixtures
- AE-90, 95, 100
- AE-150, 95, 100
- Aggregates, 135
 - gradation, 107
 - and specific gravities, 136
 - properties, 107
 - quality
 - absorption effects, 60–61
 - effect on resilient modulus, 60
 - tensile strength loss, 79
 - virgin, 100–102, 95
- Air-voids
 - cores from Oregon pavements, 43
 - histogram, 19
 - laboratory specimens, 59
 - pavement layers, 17–19
 - reduction, 45
- Antistripping, 134
- Antistripping additives, 22, 105
 - evaluation, 1–3, 124–126
 - liquid, 122, 3
 - moisture damage rates, 82
 - moisture resistance effects, 125–126
 - properties, 25
 - retained tensile strength, 3–4
 - stripping resistance effects, 125
 - tensile strength ratio, 75
 - use in Oregon, 26
 - see also* specific additives

- Asphalt concrete mixtures
 - effect of moisture, *see* Moisture,
 - effect on performance
 - granite and limestone/sand, 76
 - indirect tensile properties, 83
 - residual moisture, 52
- Asphalt pavement recycling, defined, 90
- ASTM Standard
 - D 1075: 90
 - D 1559: 74, 92, 110
 - D 1560: 57, 92
 - D 1561: 57
 - D 2041: 18
 - D 2172: 18
 - D 2845: 110
 - D 3387: 94
 - D 3625: 90
 - D 4123: 37, 53, 74

B

- Binders, 93, 100
- Boiling test, 1–2, 90, 119, 123

C

- CARSTAB BA-2000, 85–86
- Coatings, 120
- Cohesimeter test, results, 98–100
- Cold-recycled asphalt mixture
 - added binders, 93
 - added virgin aggregates, 95
 - attenuation of water damage, 99–101
 - evaluation, 3
 - gradation of recovered aggregates, 93–94

- gyratory compaction, 94–95
 - mixing water, 94
 - old pavement materials, 92–93
 - recycling, defined, 90
 - specimen preparation procedures, 93–94
 - ultimate curing condition, 94
 - water immersion tests, *see* Water immersion tests
 - Compaction, 121
 - effect on Hveem *R* and *S* values, 98–99
 - Coring
 - air-cooled pavement core drill, 12
 - dry, 11–12
 - extensive, 8–10
 - intensive, 10–11
 - locations, 9
 - testing program, 7
 - Curing
 - condition, 94
 - lime treatment, 126–127
 - time
 - dry, effect on moisture resistance, 127
 - retained cohesiometer value, 100
 - retained Hveem *R* and *S* values, 99
 - wet, effect on moisture resistance, 127–129
- D**
- Deformation, moisture effects, 62–64, 66–67
 - Diametral resilient modulus test, 91–92, 110
 - results, 95–96
 - Drainage, 122
 - Durability, 4
 - foamed asphalt mixtures, 104–105
 - multiple cycles of freezing and thawing, 77–87
 - fatigue deformation rates, 86
 - materials in Virginia test section construction, 84
 - method selection, 75–78
 - method uses in product development, 82–85
 - method utilization, 78–82
 - moisture damage accumulation, 86
 - procedure, 74–75
 - stress fatigue lines, 87
 - types, 105
 - Dynamic diametral fatigue tests, 2–3
- F**
- Fatigue deformation rates, Virginia plant mix asphalt concrete specimens, 86
 - Fatigue life, moisture effects, 61–62, 66–67
 - Foamed asphalt mixtures, 104–115
 - additives, 106–108
 - aggregate material, 106
 - bituminous material, 106
 - control testing, 109
 - equipment, 108–109
 - freeze-thaw test, 109
 - testing routine, 109–110
 - water sensitivity test, 109
 - Flushing, 120
 - Freeze-thaw cycle, 73
 - Freeze-thaw pedestal test, 2, 90, 111–114, 119, 123
 - crushed stone mixtures, 113
 - data, laboratory mixed and compacted specimens, 139
 - foamed asphalt mixtures, 109
 - longevity graph, 112, 114
 - outwash sand mixtures, 113
 - pit-run gravel mixtures, 112
 - pulse-velocity, 114
- G**
- Granite gneiss asphalt concrete mixtures, Lithonia and Kennesaw,

freeze-thaw cycle performance, 81
 Gravel, pit-run mixtures
 freeze-thaw test, 112
 Marshall stability, 111
 Gyratory compaction, 94–95

H

Hot mixed asphalt concrete, 137
 stripping, 22
 Hveem cohesiometer test, 92
 Hveem stabilometer *R*-value test, 92,
 101
 results, 97–99
 Hveem Stabilometer *S*-value test, 92
 results, 98–99
 Hydrated lime, 122
 asphalt concrete, 134–135
 comparison of calcitric and dolo-
 mitic, 130
 dry, field application, 129–130
 maximizing effects, 134–145
 field mixed/laboratory compacted
 mixtures, 137–138, 140–141
 laboratory mixed/laboratory com-
 pacted mixtures, 137–140
 objectives of study, 135
 scope of investigation, 137

I

Index of retained strength, 22, 24, 45
 Indirect tensile strength
 pavement layer thickness, 19–20
 retained, 2
 tests, 7, 123
 hydrated lime effects, 140
 Indulin, 105–106
 performance, 111
 properties, 108

L

Lava Butte Lookout-Sugar Pine Butte
 Road project, 35, 36

Lime, 3, 51, 64, 104–105, 115, 119,
 124–125
 analysis, 108
 asphalt concrete aggregate treat-
 ment, 45
 dry with water, field application,
 131
 evaluation, 126–129
 evaluation of treatment and curing,
 126–127
 field study, 128
 hot slurry, field application, 131
 hydrated, *see* Hydrated lime
 performance, 110–111
 recommendations, 131–132
 slurry, field application, 130–131
 type comparison, 127–128
 Lithonia and Kennesaw, granite gneiss
 asphalt concrete mixtures, 80
 Lottman procedure, 2, 73–74
 modifications, 74

M

Marshall stability, retained, 18
 Marshall stability test, 92
 modified, 3, 104
 results, 110–111
 results, 96–97
 Metalloamine complexes, indirect ten-
 sile properties, 83
 Mixing moisture, 51
 Modulus properties, cores, 44
 Moisture, 51–71
 background, 51–52
 core gradations, 54–55
 effect of additives, 64–67
 deformation results, 66–67
 fatigue results, 66–67
 modulus results, 64–66
 internal, 45
 mix design, 56–57
 mixtures without additives, 58–64
 deformation results, 62–64
 fatigue results, 61–62

modulus results, 58–61
 North Oakland-Sutherlin, 53–54
 purpose, 52
 range of mix variables, 55
 research approach, 53
 specimen preparation, 57
 test program and methods, 54–56
 Warren-Scappoose, 53–55

N

North Oakland-Sutherlin, 53–54
 moisture effects on deformation, 63, 69
 resilient modulus and moisture, 58–59, 65

O

Open-graded friction courses, 8
 air-void contents, 18
 stripping, 15

P

Pavebond Special, 51, 64
 Pavement, life, 22
 Plainview Road-Deschutes River project, 38–39
 Plant-mixed seal courses, 14, 16
 Polyamine additive, 74–75
 Portland cement, 122
 Pulse-velocity, 104
 Pulse-velocity test, 109–110
 modified Marshall stability, 114

R

Resilient modulus, 51, 56, 89, 134
 defined, 91
 diametral test, *see* Diametral resilient modulus test
 effects of asphalt quantity and aggregate quality, 60
 field mixed/laboratory compacted

mixtures, 143
 hydrated lime effects, 138
 moisture effects
 additive effects, 64–66
 mixtures without additives, 58–61
 seven-day soak moisture treatment, 140
 test, 104
 Rice specific gravity, 18

S

Saline, 119
 Sand asphalt, 14
 mixtures, air-void contents, 18
 Sand mixtures, outwash, freeze-thaw test, 113
 Saturation procedure, air-void contents, 18
 Sealing, 122
 Silane, 105, 124
 performance, 111
 properties, 108
 Splitting tension test, 142
 Stone mixtures, crushed, freeze-thaw test, 113
 Storage silos, use, 45
 Stress fatigue lines, Virginia plant mix specimens, 87
 Stripping, 105, 120
 air-voids in pavement layers, 17–19
 cause, 120
 correlation coefficients for operator error evaluation, 10
 distress
 related to aggregate source, 13–14
 related to mixture type, 14–15
 extent, 11, 13
 frequency, 7, 13, 20
 relationship with aggregate source, 14
 open-graded friction courses, 15
 plant mixed seal course, 16
 rates, 13

ratings, 10
 related to pavement age, 15, 17
 saturation in pavement layers, 17–19
 severity, 7, 11, 13
 effect of type of section, 16, 18
 extent, 1
 specification requirements, 24
 traffic group, 16–17
 Stripping prevention, 7–20
 extensive coring, 8–10
 intensive coring, 10–11
 Stripping problems, 22–49
 acceptable tolerances, 31
 aggregate source and properties for projects, 39
 changes in asphalt concrete specifications, 47–48
 Chevron Research Corporation studies, 33, 40
 core evaluation by WSDOT, 41–42
 core layout
 Lava Butte Lookout-Sugar Pine project, 37
 Plainview Road-Deschutes River project, 38
 density and voids analysis of cores, 43
 history, 23–24
 mix design results, 28–29
 modulus properties of cores, 44
 ODOT core evaluation, 26, 30
 ODOT studies, 37–48
 Oregon pavements inspected, 32
 project locations in Central Oregon, 33
 projects evaluated in February 1983, 24, 26–27, 31
 surface raveling, 34

T

Tensile strength, 134
 mixture type, 14
 ratio, 73, 75
 additives, 75

 chemical composition changes for mixtures, 83
 comparison of methods, 77, 79
 continuous soaking, 75, 77
 determination, 2
 field mixed/laboratory compacted mixtures, 140–141, 144
 freeze-thaw cycling 75, 77–78
 laboratory mixed and compacted specimens, 141–142
 See also Indirect tensile strength
 Tunncliffe method, 2

V–W

Vertical permanent strain, accumulation, 56
 Warren-Scappoose, 53–55
 moisture effects on deformation, 63, 68
 resilient modulus and moisture, 58–59, 65
 Water
 added to mix, 94
 conditioning procedure, modifications, 73
 Water damage
 cold-recycled asphalt mixtures, 90
 prevention, 119–132
 antistripping additives, 124–126
 application of tests, 123–124
 boiling test, 123
 dry hydrated lime, field application, 129–130
 freeze-thaw pedestal test, 123
 indirect tensile test on dry and wet specimens, 123
 methods of treatment, 121–122
 moisture damage, 120–121
 Water immersion tests, 89–102
 diametral resilient modulus test, 91–92
 Hveem cohesiometer test, 92
 Hveem stabilometer *R*-value test, 92
 Hveem stabilometer *S*-value test, 92

Marshall stability test, 92
procedure, 91
see also cold-recycled asphalt
mixtures

Water sensitivity test
foamed asphalt mixtures, 109
results, 110–111
Wet-dry indirect tensile test, 119