Pavement Management Workshop
Day 1 – Materials

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Summary

- Concrete Repairs
- Recycling – RCA, RAP, Tire Rubber
- Tack Coat
- Polymerized Joint Adhesive
- HMA Specifications – temperature, air voids, cores
- Non-Standard Items

Concrete Pavement Repairs

- Division 450
  - 451 – Concrete Slab Stabilization
  - 452 – Partial Depth Concrete Pavement Repair
  - 453 – Full Depth Concrete Pavement Repair
  - 454 – Retrofit Dowel Bars
  - 455 – Diamond Grinding Existing Concrete Pavement
  - 456 – Sealing Existing Joints in Concrete Pavement
- Consult with Pavements Section in design of CPR projects.

Concrete Slab Stabilization

- Pozzolan Grout
  - Used for slab stabilization only.
- Polyurethane Grout
  - Used for slab stabilization and slab lifting – same item of work for either application.
- There have been fairly severe problems on some recent projects – **DO NOT** use slab stabilization without discussing with Pavements Section and getting the most recent specification.

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Partial Depth Concrete Pavement Repair

- Partial depth is less than 1/3 of pavement thickness. If damage goes down further, go to full depth repair.
- Quick Setting Patch Type 1A or 1B
  - Standard item.
  - QSP on QPL: http://www.state.nj.us/transportation/eng/materials/qualified/
- Hot-Applied Synthetic Resin (a.k.a. Techcrete)
  - Non-Standard Item -- 452004M
  - Consult with Pavements Section on use of this NS Item.

Hot-Applied Synthetic Resin

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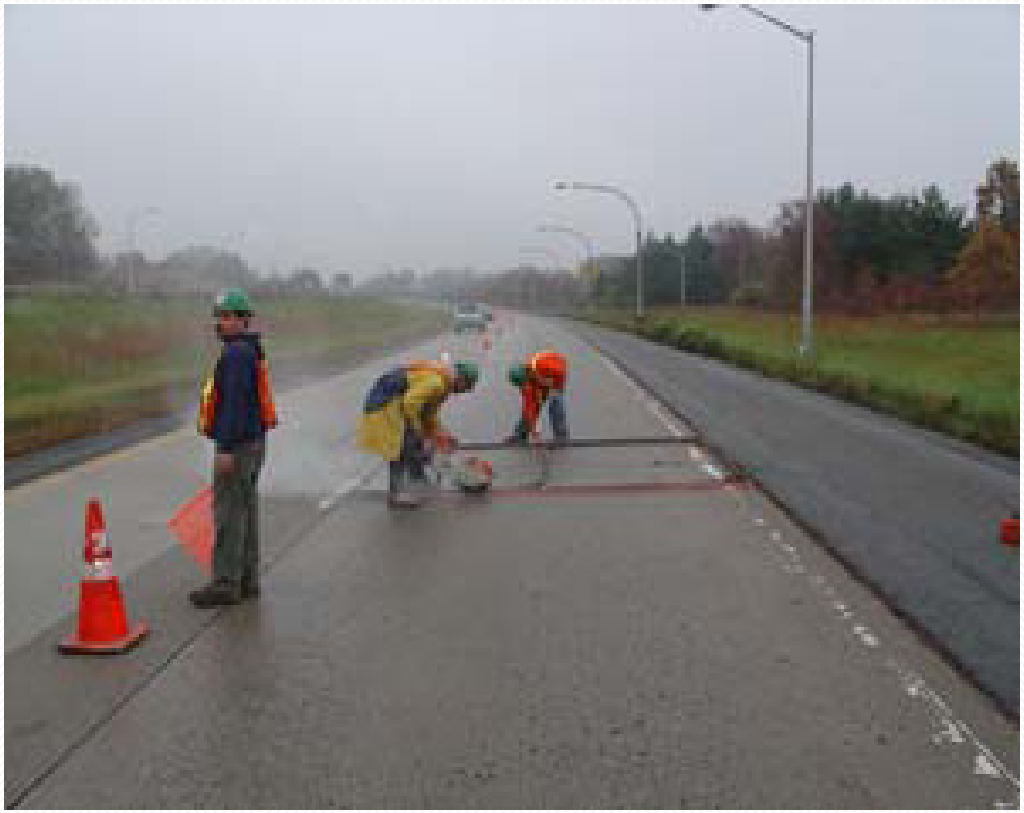
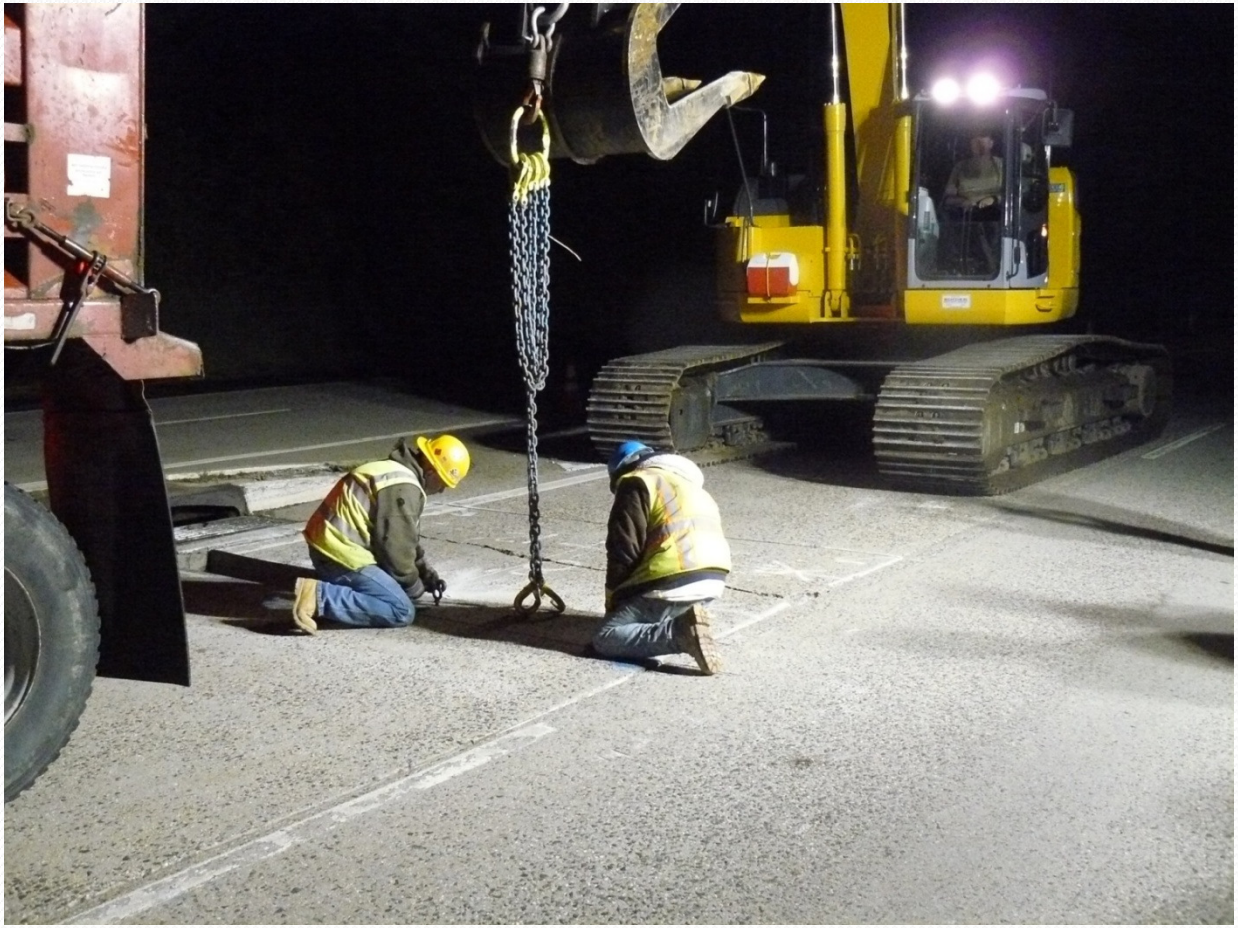
Full Depth Concrete Pavement Repairs

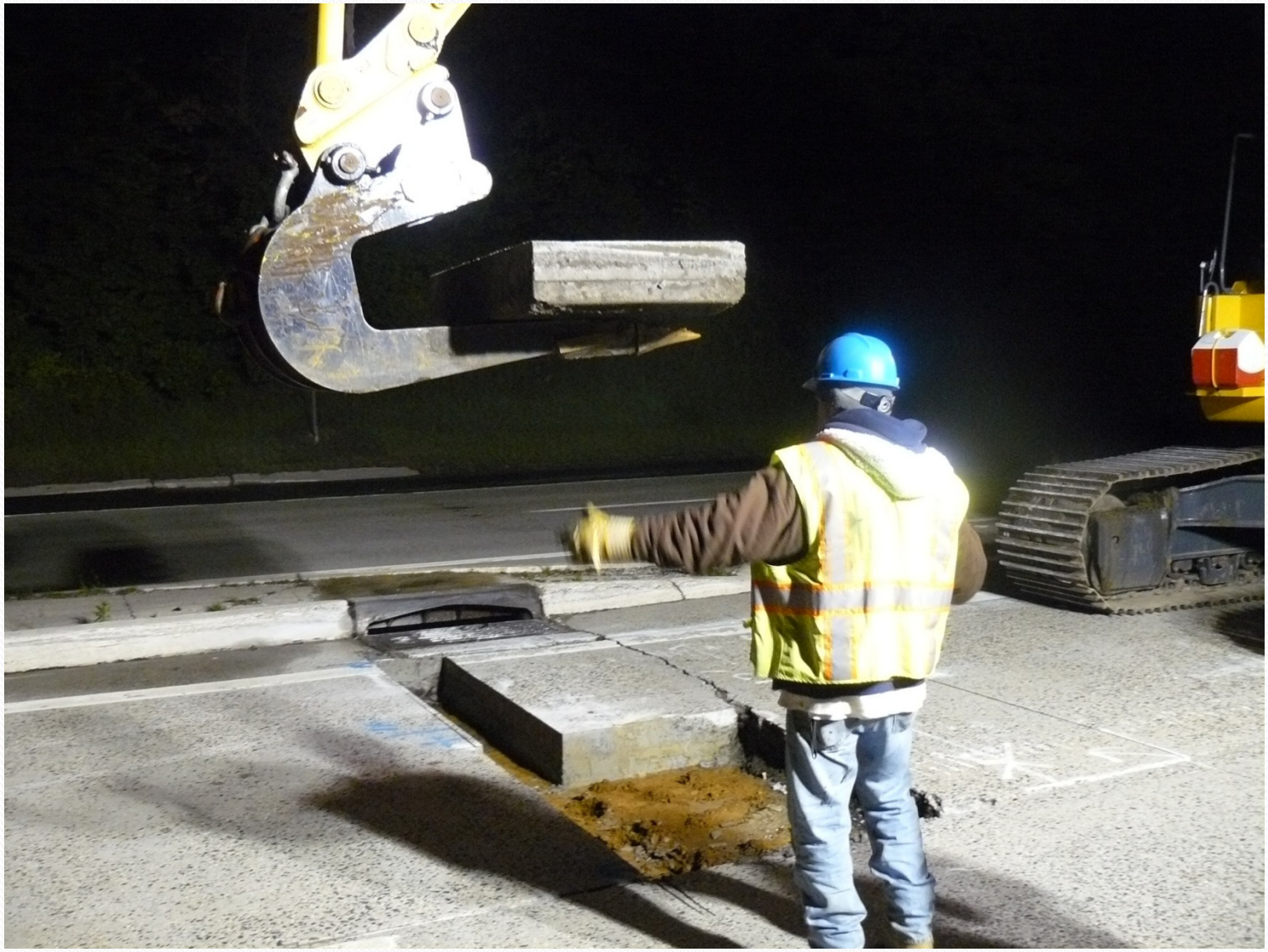
- Items classified by material used to perform the repair.
  - Concrete Class B
  - Concrete Class E
  - Concrete Class V
  - HMA (Hot Mix Asphalt)
  - Precast Concrete (NS Item #: 453013M)
  - Rapid Setting LMC (NS Item)
- For NS Items, get latest specifications from Pavements Section.

Step 1 – Sawcut pavement



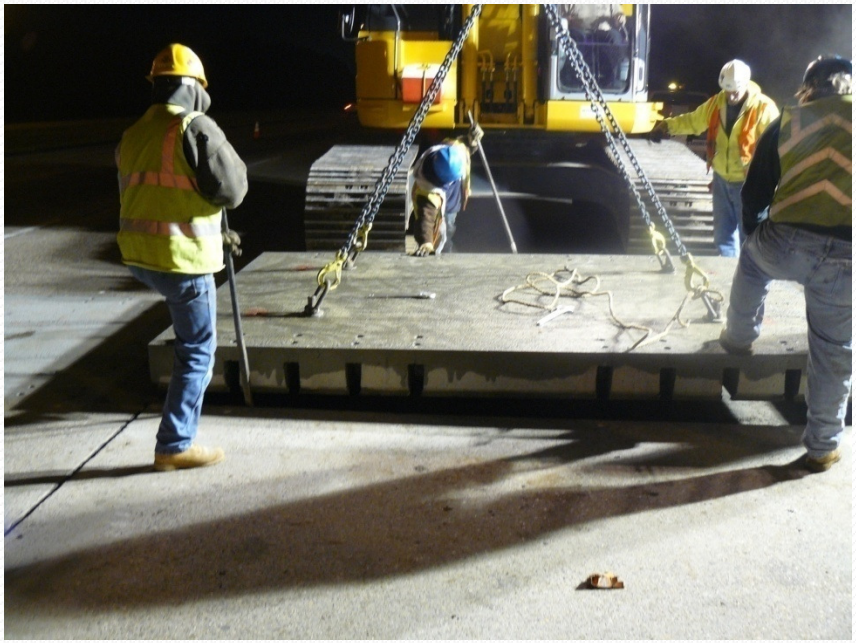
Step 2 – Remove Old Pavement





Step 3 to ? – Fill the Hole

- Dependent on what is being used to fill the hole.
  - Concrete
  - HMA
  - Precast



Steps for Concrete (Class B, E or V or Rapid Set LMC)

- Undercut (if necessary) and rough grade underlying base.
- Install dowel bars to tie into existing pavement.
- Pour & finish concrete.
- Cure
- Open to traffic
  - 14-21 days for Class B
  - 3 days (72 hours) for Class E
  - 6.5-8 hours for Class V
  - 3-4 hours for Rapid Set LMC

Steps for HMA

- Undercut (if necessary) and rough grade existing base.
- Place and compact HMA.
- Open to traffic when cool – 2-4 hours depending on depth and ambient temperature.

Steps for Precast Concrete

- Undercut (if necessary).
- Place and compact stone sand and fine grade.
- Install dowel bars to tie into existing pavement.
- Place precast panel(s).
- Open to traffic.
- Grout Slab
  - Bedding Grout
  - Dowel Grout

Full Depth Repair – Concrete Class B

Benefits

- Initial cost low.
- Excellent long term performance.
- Easy to construct.

Limitations

- Need extended full lane closure (14-21 days minimum).

Full Depth Repair – Concrete Class E

Benefits

- Initial cost relatively low.
- Good long term performance.
- Easy to construct.

Limitations

- Need extended full lane closure (3 days minimum).

Full Depth Repair – Concrete Class V

Benefits

- Easy to construct.
- Can perform work in temporary lane closure, typically overnight.

Limitations

- Poor long term performance, especially if not overlaying the roadway.
- Low production rates if have short lane closures of 12 hours or less.
- Difficult to find a concrete plant available at night for 2 or 3 loads of concrete.

Full Depth Repair – HMA

Benefits

- Initial cost lowest.
- Easy to construct.
- Can perform work in temporary lane closure, typically overnight.

Limitations

- Very poor long term performance.
- Not a viable option if not overlaying the pavement.

Full Depth Repair – Rapid Set LMC

Benefits

- Good long term performance.
- Easy to construct.
- Can perform work in temporary lane closure, typically overnight.

Limitations

- Initial cost high.
- Need to use mobile mixer.
- Production rates low.

Full Depth Repair – Precast Concrete

Benefits

- Good long term performance.
- Can perform work in temporary lane closure, typically overnight.
- Curing of concrete completed before installation.

Limitations

- Initial cost high.
- More difficult to construct.

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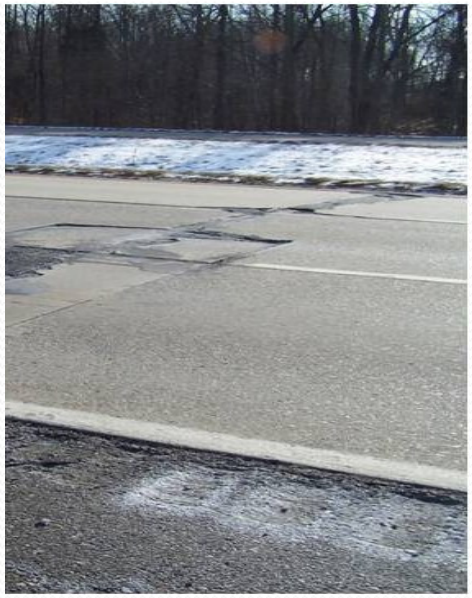
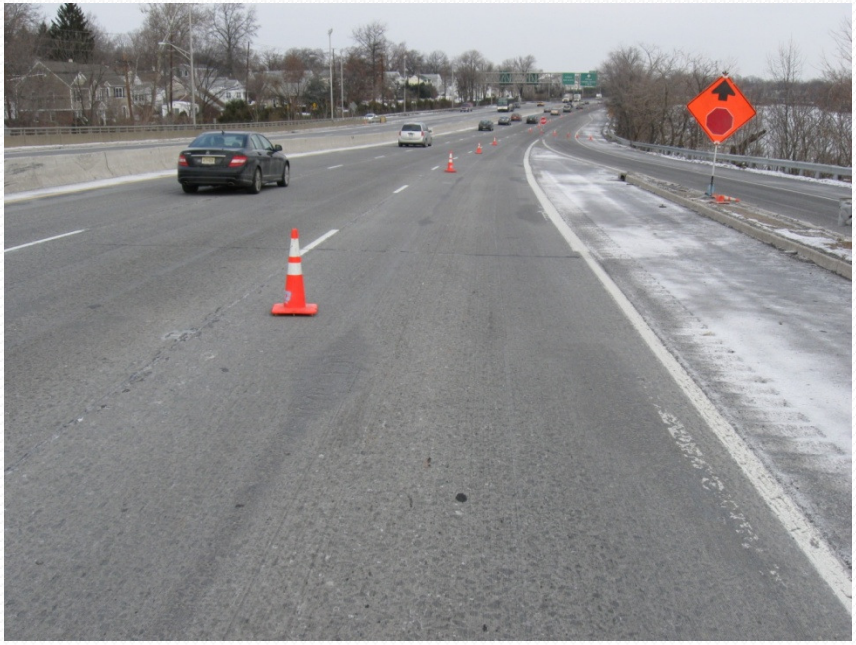
Retrofit Dowel Bars

- There have been performance issues with retrofit dowel bars.
- Do not use unless approved by Pavements Section.



Diamond Grinding Existing Concrete Pavement

- Restores ride quality.
- Reduces noise.
- Restores skid resistance.
- Only used if <u>not</u> overlaying pavement with HMA.



Joint Sealing

- Used to maintain joints for concrete pavements that are not being overlaid with HMA,
- Problematic if used with HMA overlay.
- Standard is hot-poured joint sealer.
- If recommended by Pavements Section, may use cold-poured (silicone) joint sealer.

Summary

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- Recycling – RCA, RAP, Tire Rubber
- Tack Coat
- Polymerized Joint Adhesive
- HMA Specifications – temperature, air voids, cores
- Non-Standard Items

Recycling

- Reclaimed Asphalt Pavement (RAP)
  - Most recycled Material ~ 400,000 tons/year
  - Allowed in HMA mixes. Not allowed in SMA, OGFC, Ultra-Thin, BDWSC.
  - 15% allowed in surface course HMA
  - 25% allowed in base & intermediate course HMA
  - Pilot projects allowing 25% in surface course HMA.
- RAP allowed up to 50% in Dense Graded Aggregate (DGA)

Recycling

- Recycled Concrete Aggregate (RCA)
  - Allowed as a substitute for virgin DGA.
  - Approximately 75% of DGA placed is RCA.
  - Currently, a research project has been initiated to look at RCA being recycled back into concrete.
- Glass – Allowed in HMA base & intermediate, but rarely used.
- Roofing Shingles – Allowed in HMA base & intermediate, but not used.
- Tire Rubber – Used in soil aggregate fill & HMA.

Tack Coat

- Standard Tack Coat– emulsified asphalt.
  - Used most of the time.
- Tack Coat PG 64-22
  - Used with SMA, OGFC
  - Cannot use on damp or just milled surface.
  - If placing SMA or OGFC on damp or just milled surface, use standard tack coat.
- Polymerized Tack Coat
  - Used with Ultra-Thin Friction Course only.

Polymerized Joint Adhesive

- Used on surface course to ensure watertight longitudinal cold joints.
- May be specified for intermediate course if expected to leave open for extended period of time (over winter).
  - Note: Specification modification needed to require it for intermediate course.
- Quantity in Linear Feet – assume 100% of surface course longitudinal joints unless project specifically requires echelon paving. Assume 100% of intermediate course, if required.

HMA Specifications

- Temperature Restrictions
  - Need to be considered during scheduling.
- Air Void Requirements
  - For HMA and SMA.
- Thickness Requirements
  - For new or completly reconstructed pavements with uniform thicknesses.
- Coring Requirements

Temperature Requirements

HMA

Lift Thickness (t)	Min. Base Temp
t ≤ 1”	50 °F
1” < t < 2”	41 °F
t ≥ 2”	32 °F

Other Mixes

- OGFC, MOGFC, AROGFC, Ultra-Thin Friction Course, SMA, SMAR, BDWSC.
- Minimum Base Temperature is 50 °F regardless of thickness.

Air Void Requirements

- HMA
  - 2 – 8% required
- SMA & SMAR
  - 2 – 7 % required
- OGFC, MOGFC, AROGFC, Ultra-Thin Friction Course
  - No air void requirements

Coring Requirements

- Contractor required to take cores used to determine compliance with air voids/thickness specifications.
- Quantity of Cores
  - Assume 5 cores per day's production of HMA, SMA & SMAR.
  - Use 1500 to 2000 ton/day for HMA production rate unless job very small or very large.
  - Use 800 to 1200 ton/day for HMA production rate unless job very small or very large.

Non-Standard Items

- Do not use non-standard items unless you have gotten concurrence from Pavements Section and Bureau of Materials.
- Ensure that the specification is written according to 2007 Specification Guidelines.

  http://www.state.nj.us/transportation/eng/specs/2007/styleguide/styleguide.shtm