Maine Mall Road Porous Pavement

85th NESMEA Conference

October 7, 2009

South Portland, Maine

Project location

- Maine Mall Road, South Portland
- Urban location
- Mixed commuter and commercial traffic


WYNDHAM

Project Information

- 0.35 miles in length
- AADT – 16,750 vehicles/day
- ESALs – 3,277,700 (20 years)
- Design Hourly Volume – 2412
- Percent Heavy Trucks – 5%
- Drains into South Branch of Long Creek

Why Porous Pavement?

- Long Creek is classified as an Urban Impaired Stream
- EPA Residual Designation Authority (2/09)
  - Require EXISTING development that contributes to the non attainment of water quality standards be regulated
  - Two affected waterways are Long Creek and Charles River in Boston

Long Creek Watershed

Long Creek Watershed

- Total watershed is 2200 acres; 640 acres (28 percent) is impervious
- All landowners with more than 1 acre of impervious surfaces - roofs, parking lots, roads - are regulated
- MaineDOT owns 64 acres of impervious surface within the Watershed

Permit options

- Individual Permit
  - Apply water quality practices on all 64 acres regardless of impact on stream
- General Permit
  - Participate in Long Creek Watershed Management Plan with other landowners and collectively treat priority areas

Why now?

- American Recovery and Reinvestment Act
  - 100 % Federal cost-sharing
- Satisfies part of MaineDOT Regulatory Requirements
- Opportunity to apply porous pavement to a urban highway

Porous pavement

- Proven technology
  - Over 20 years worldwide
  - Applications in colder climates
- Effective water quality treatment
  - UNH Stormwater Center
- Other DOTs – Arizona, Oregon, North Carolina, Minnesota

Water quality advantage

- 3 key criteria
  - Detains Peak Stormwater Flow Rate
  - Pollutant Filtration
  - Temperature Mitigation

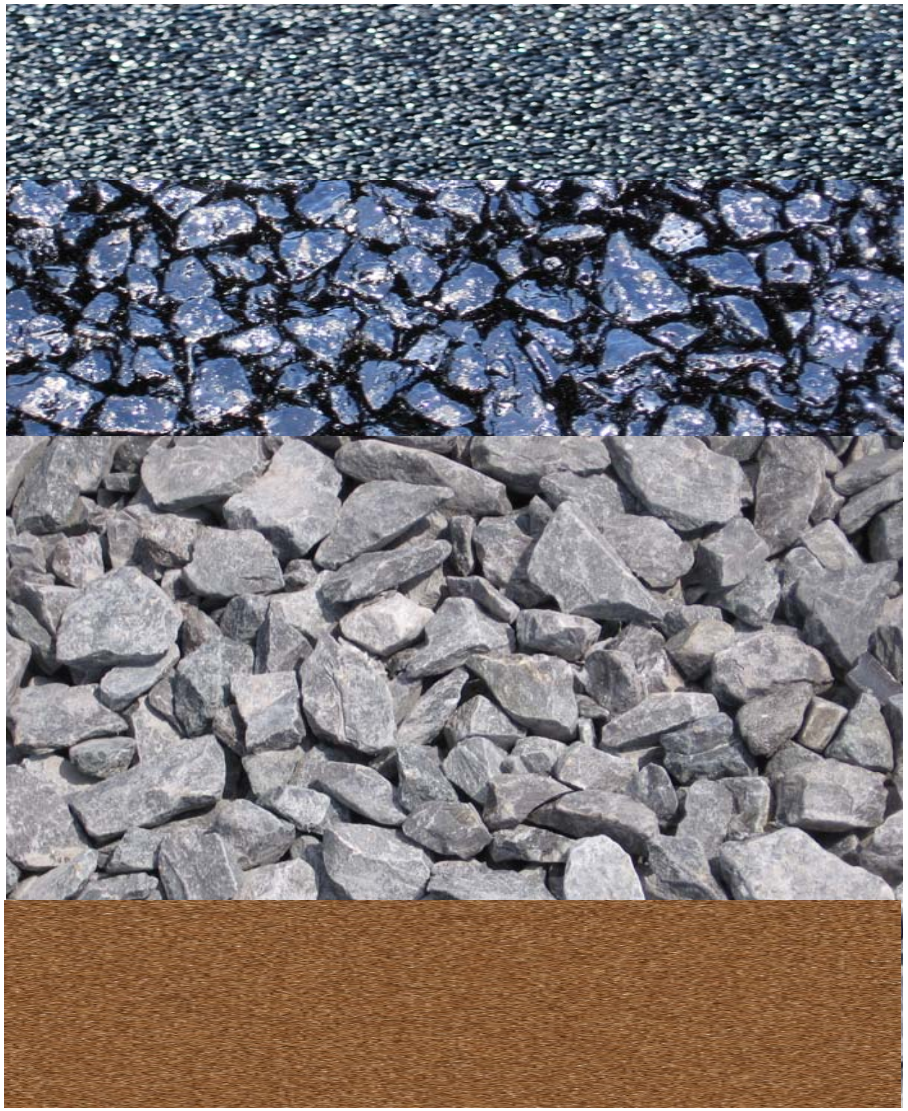
Pavement Section

OGFC

ATPB

Reservoir Stone

Filter Material



3”

6”

15”

6 – 12”

Filter Material Layer

- Filters pollutants
- Help mitigate water temperature
- Includes 3 longitudinal runs of 6” perforated UD pipe, with laterals every 120’ (each traffic direction)
- Filter material meets gradation for MaineDOT Type B underdrain sand


VOLVO

Reservoir Stone Layer

AGGREGATE REQUIREMENTS	
2-1/2”	100
2”	95 – 100
1”	0 - 30
¾”	0 – 5.0
L.A. Abrasion	25.0 max.


07/27/2009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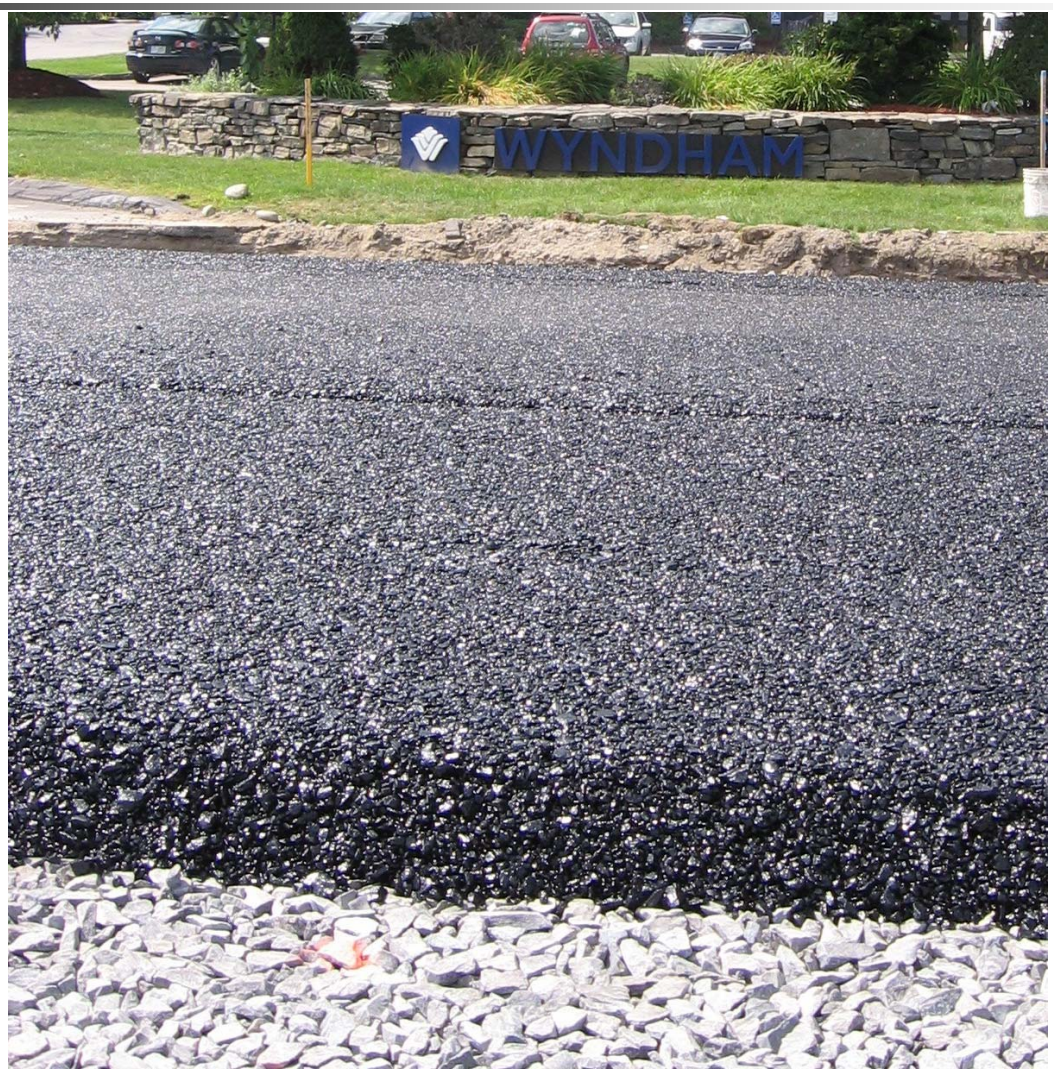
Asphalt Treated Permeable Base



GRADATION REQUIREMENTS	
37.5 mm	100
25 mm	95 – 100
19 mm	80 – 95
12.5 mm	35 – 70
4.75 mm	2 – 10
2.36 mm	0 – 5
0.075 mm	0 – 2.0
AGGREGATE QUALITIES	
Micro-Deval	18.0 maximum
% Fractured	85/80
Flat/Elongated	10

Mix requirements

- Binder : PG 76–28 with SBS polymer
- Minimum 2% binder
- Micro-Deval: 18.0 max. (composite blend)
- 95 percent coated particles (AASHTO T 195)
- 35 gyration design: looking for specimen that will be stable

JOB MIX FORMULA		
SIEVE SIZE	TARGET	SPEC RANGE
37.5 mm	**100**	100
25 mm	**96**	95 – 100
19 mm	**90**	80 – 95
12.5 mm	**48**	35 – 70
4.75 mm	**6**	2 – 10
2.36 mm	**3**	0 – 5
0.075 mm	**1.3**	0 – 2.0
Binder content	**2.0**	2.0 minimum

Open-graded Friction Course

GRADATION REQUIREMENTS		
Sieve size	12.5 mm	9.5 mm
19 mm	100	
12.5 mm	85 - 100	100
9.5 mm	55 - 75	85 – 100
4.75 mm	10 - 25	20 – 40
2.36 mm	5 - 10	5 – 10
0.075 mm	2.0 – 4.0	2.0 – 4.0

AGGREGATE QUALITIES	
Micro-Deval	18.0 maximum
% Fractured	100/90
Flat/Elongated	5 max.
Sand equivalent	50
FAA	45

MIX DESIGN CRITERIA	
Binder Grade	PG 76 - 28 w/SBS
Binder content	6.0% minimum
Voids @ N_{des}	20.0 percent
VCA_{mix}	Less than VCA_{DRC}
Draindown	0.3% max. (AASHTO T 305)
Cellulose fibers	0.3 percent
Gyrations @ N_{des}	50

JOB MIX FORMULA		
SIEVE SIZE	TARGET	SPEC RANGE
19 mm	**100**	100
12.5 mm	**96**	85 - 100
9.5 mm	**65**	55 - 75
4.75 mm	**20**	10 - 25
2.36 mm	**8**	5 - 10
0.075 mm	**2.3**	2.0 – 4.0
Binder content	**6.0**	6.0% minimum

Construction specifications

- Track mounted paver
- Minimum air temperature:
  - 50°F – ATPB
  - 60°F - OGFC
- 12 ton static steel or 10 ton oscillatory roller – minimum 3 passes
- Offsite test strip required
- No traffic for 24 hours

Construction specifications

- PGAB 64-28 Asphalt “Tack coat”
- All Construction Joints
  - Must be saw cut or milled unless paved in echelon
- Minimum placement temp of 290 deg. F
- Limited construction activity on ATPB

Test strip

- Used to establish optimum laydown and compaction process
- Test strip supersedes specified equipment and techniques
- Completed strip provides opportunity to evaluate product

Something about white hats....
They make the crew nervous....

Maine Mall Road - Before

- Extremely flat in profile
- Project consisted of mill and overlay sections on each end of the project with porous pavement in the middle section
- Super-elevated turn lanes required carrying surface water to existing catchbasins several hundred feet away, or to the porous section
- Existing granite curb sections limited changes to roadway geometrics and drainage


BE PREPARED TO STOP
TOYS R US
BE PREPARED TO STOP


THE
MAINE
SIDEWALK
CLOSED
SPEED
LIMIT
35


E
1
E
2
SIDEWALK
CLOSED

ATPB Placement

- Track mounted paver caused minimal displacement to ballast stone surface
- Haul trucks displaced the ballast stone and required constant passes with a vibratory roller to keep stone locked
- Paver sonic trackers were erratic over the ballast stone, so were shut off after the first day of placement. Slope control was used to maintain cross slope


THE
MAINE
MALL


BLAW-KNOX


SOUTH PORTLAND
Ingersoll Rand

ATPB Placement

- Production and Placement Temperatures 290 – 340 deg. F.
- Breakdown roller temperature at approx. 200 – 210 deg. F to minimize lateral movement
- Mixture needed to “stiffen” enough to support compaction equipment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SOLL-RAND
BLAW-KNOX
BAILEY
08/11/2009

ATPB Placement

- ATPB placed at 7.5 inch and compacted to 6 inch finished depth
- ATPB mixture appeared to exhibit “tender” mix characteristics, with lateral movement if compacted at too high a temperature
- Placement was straightforward with few issues, with the exception of being extremely viscous (sticky)


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ATPB Placement

- There was a requirement to keep business access open during the ATPB placement operation

- Geotextile fabric and temporary mix was placed over the ballast stone and ATPB to maintain business access


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SAFETY
ACCIDENT

ATPB Placement

- Surface and internal mixture temperatures monitored to determine compaction start
- 12 ton static roller was used as breakdown (approx. 200 – 210 deg.)
- 3-5 ton used as intermediate (approx 140 deg.)
- 10 ton static roller used as finish roller, with 3-5 to iron out any marks left behind


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BW 120 AD-3
64.6108

ATPB Placement

- Adjoining lanes placed the same day eliminated the requirement to mill or saw cut transverse or longitudinal construction joints
- Any construction joints left open were saw cut before continuing the placement of ATPB


08/12/2009

OGFC Placement

- Like the ATPB, the surface and internal mixture temperatures monitored to determine compaction start
- 12 ton static roller was used as breakdown (approx. 180-210 deg. F)
- 3-5 ton used as intermediate (approx 140 deg. F)
- 10 ton static roller used as finish roller, with 3-5 and 1 ton rollers to iron out any marks left behind

OGFC Placement

- Most in road structures raised and paved around with OGFC mixture
- Some structures were set with concrete fill
- Granite curb set and concrete fill placed along the gutter

OGFC Placement

- There was some damage to the ATPB surface due to the granite curb installation operation
- Damage was not considered severe enough to warrant remedial action, but illustrated the need to keep construction activity to a minimum

OGFC Placement

- RS-1 emulsified tack coat used around all structures and curbline rather than PGAB 64-28

- All concrete surfaces primed with approx. 0.05 gal/sq yard prior to OGFC placement


DRAIN
PORTLAND ME

OGFC Placement

- OGFC was placed at a 3.75 inch depth, and compacted to 3 inch depth.

- ATPB surface primed with approx.

  0.01 gal/sq yard prior to OGFC placement


JOINTS
OIL
ENGINEERS
RED
END


WYNDHAM
08/27/2009

OGFC Placement

- The mat was uniform, and free of any visual segregation
- The mixture did not exhibit the same “tender” characteristics as the ATPB
- Adjustments were made to the roller pattern and temperature range as the project progressed


CONSTRUCTION
VEHICLE
KEEP BACK

OGFC Placement

- Joints were trimmed to a vertical edge while hot, to minimize trimming later.
- All construction joints were tacked with a heavy application of RS-1 emulsion
- Curb areas and utility structures took extra effort due to the coarse mixture


THE
MAINE
MALL


ETHERIDGE FOUNDRY
DRAIN
PORTLAND ME

OGFC Placement

- As with the ATPB, there was a requirement to keep business access open during the OGFC placement operation

- This gave the crew the opportunity to “field test” the OGFC and ATPB layers


08/27/2009

Mill and Overlay Sections 12.5mm w/ PGAB 76-28 SBS

- The project was reviewed for drainage issues, and elevations were taken prior to and after the project was milled.
- The project was milled at night. The old surface layer (s) varied in depth from 1.5 to 2.5 inches
- Areas of delamination were minimal.


PM-565B
69.5 14
CONSTRUCTION
VEHICLE
KEEP BACK
08/06/2009


08/06/2009

Mill and Overlay Sections 12.5mm w/ PGAB 76-28 SBS

- A 9.5mm leveling course using PGAB 64-28 was placed over the milled surface to correct any surface irregularities and drainage concerns
- Structures were reset to the level course
- Due to the pavement removal depth being greater than estimated, the surface was changed to a 12.5mm PGAB 76-28 mixture, placed at a 1.5 inch depth


ON THE BORDER
MEXICAN GRILL & CANTINA
BEST BUY
BE PREPARED TO ST
09/23/2009

Overlay Sections 12.5mm w/ PGAB 76-28 SBS

- Production and Placement Temperatures 290 – 350 deg. F.
- Compaction Temperatures approx. 290+ for breakdown roller
- Pneumatic roller left off until 190+/- surface temp due to tire pick-up issues
- Finish rolled when Pneumatic was off

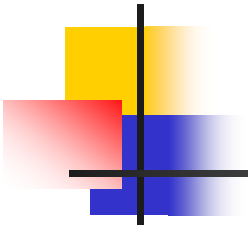

Wendy's
DICK'S
BUMP


JOBOX
BUMP


TOYS R US


VOLVO
DD90 HF
VOLVO
VOLVO

South Portland - Maine Mall Road Porous Pavement Field Testing



Questions ?