Presentation Outline

- What is rubblizing?
- What is rubblizing in an urban environment?
- Example project – STH 20 (Washington Ave.), Racine
- Pavement performance
What is rubblizing?
“The intent of rubblizing concrete pavement prior to a pavement overlay is to produce a structurally sound base which prevents reflective cracking by obliterating the existing pavement distresses and joints. . . . It is not a typical granular material and it is not an engineered material like crushed aggregate base course.”

From “Rubblizing Concrete Pavement” section of WisDOT Construction & Materials Manual
Concrete pavement in need of rehabilitation
Reflective cracking in asphalt overlay
Rubblizing concrete
Pneumatic & smooth drum vibratory rollers
Obliterating existing pavement distresses & joints
Rubblized pavement behavior

“A rubblized and compacted PCCP is an assemblage of PCC segments that form a tightly keyed, interlocked, high-density material layer. A rubblized PCCP layer is fractured, lacks continuity, and cannot sustain flexural stress. However, it possess high shear strength and rutting resistance. It is not a typical granular material.”

Typical roadway specification

“Break concrete uniformly across the pavement width into particles that have a maximum dimension less than or equal to 12 inches. Also, 75 percent of the particles, as the engineer determines visually, must have a maximum dimension less than or equal to the following:

- In the bottom half of the slab; 9 inches.
- In the top half of the slab; 3 inches.
- At the surface of the slab; 2 inches.

The engineer may direct or allow larger maximum particle dimensions.”

From Wisconsin DOT Specification “Section 335 Rubblized Pavement”
High performance, long lasting HMA over rubblized concrete
What is rubblizing in an urban environment?
Rubblizing while meeting additional challenges.
Rubblizing while meeting additional challenges.

Rubblizing near homes.
Rubblizing while meeting additional challenges.

Rubblizing near commercial buildings.
Rubblizing while meeting additional challenges.

Rubblizing adjacent to heavy traffic.
Rubbling while meeting additional challenges.

Rubbling over and near utilities.
Rubblizing while meeting additional challenges.

Rubblizing over a weak subgrade.
Rubblizing while meeting additional challenges.

Rubblizing while maintaining existing curb and gutter.
Square Yards of Rubblization by Project Type

- **Airport**
- **Urban**
- **Highway**
STH 20 (Washington Ave.), Racine
West Blvd. to Marquette Street
State Project # 2440-03-70

Constructed during summer of 2002

Owners:  City of Racine
          John Rooney, Assistant City Engineer

          Wisconsin Department of Transportation
          Frank D’ Amato (Daar Engineering), Project Engineer

Contractor:  Payne and Dolan, Inc.
             Donald Oakes, Project Manager
STH 20 (Washington Ave.), Racine
Principal Planned Quantities

- Sawing Pavement, Full Depth – 32,671 linear feet
- Removing Concrete Surface, Partial Depth (2”) – 53,583 square yards
- Rubblizing Concrete Pavement – 50,741 square yards
- Asphaltic Concrete Pavement, Type E-10 – 12,639 tons
- Crack and Damage Survey – Lump Sum 35,000 dollars (114 buildings)
Typical Existing Section

- LOT LINE
- 1/4" PER FT. NORMAL
- VAR. 30"
- 11'
- 12'
- 12'
- 11'
- 30" VAR.
- HYPERBOLIC CROWN
- TIE BAR (TYP.)
- 5" CONC. SIDEWALK
- 9" CONC. PAV'T
- VARIES 3" TO 4 1/2"
  GRANULAR CRUSHED
  STONE BASE COURSE

VARIES 66' TO 74'
Proposed Typical Section

4 1/2" ASPHALTIC CONCRETE PAVEMENT, TYPE E-10

7" RUBBLIZING EXISTING CONCRETE PAVEMENT

REMOVE CONCRETE SURFACE, PARTIAL DEPTH - 2"
Staging

- **Stage 1** – Mill off 2” of concrete surface
- **Stage 2** – Rubblize 2 inner lanes and overlay with asphalt (1” leveling and 2-1/4” binder)
- **Stage 3** – Rubblize 2 outer lanes and overlay with asphalt (2-1/4” base)
- **Stage 4** – Pave 2” asphalt surface
Meeting the challenges

Rubblizing near homes and commercial buildings.
Meeting the challenges

“Crack and Damage Survey, Item 90004A
This survey shall consist of two parts. The first part, performed prior to construction activities, shall include a visual inspection, photographs, and a written report describing the existing defects in the buildings being inspected. The second part, performed after the construction activities, shall also include a visual inspection, photographs, and a written report describing any change in the building’s condition.”

From Special Provisions for Project # 2440-03-70.
Meeting the challenges

Rubblizing adjacent to heavy traffic.
Meeting the challenges

Rubblizing over and near utilities.
### Meeting the challenges

**Depth of water mains**

<table>
<thead>
<tr>
<th>Valve #</th>
<th>Location</th>
<th>Depth</th>
<th>Valve #</th>
<th>Location</th>
<th>Depth</th>
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</thead>
<tbody>
<tr>
<td>2854</td>
<td>938 Washington Ave.</td>
<td>4'</td>
<td>566</td>
<td>n/line Washington &amp; 14th</td>
<td>2'-9&quot;</td>
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<tr>
<td>222</td>
<td>hyd. @ 10th &amp;. Washington Ave.</td>
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<td>567</td>
<td>w/line Washington &amp; 14th</td>
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<td>3'-6&quot;</td>
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<td>2859</td>
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<td>3'-11&quot;</td>
<td>Hyd. Valve</td>
<td>1327 Washington</td>
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<td>2301</td>
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<td>hyd. Valve @ Washington &amp; Ann</td>
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<td>524</td>
<td>s/line Washington &amp; 11th</td>
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<td>586</td>
<td>s/line Washington &amp; Owen</td>
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<td>2845</td>
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<td>Hyd. Valve @ 1124 Washington</td>
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<td>4589</td>
<td>S. Memorial 30&quot; valve</td>
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<td>s/line S, Memorial &amp; Washington</td>
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<td>556</td>
<td>e/line Washington &amp; 12th</td>
<td>4'-2&quot;</td>
<td>3651</td>
<td>24&quot; valve @ Washington &amp; S. Memorial</td>
<td>4'-2&quot;</td>
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<td>Hyd. @ Washington &amp; 12th</td>
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<td>2468</td>
<td>w/line Washington &amp; S. Memorial</td>
<td>3'</td>
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<td>593</td>
<td>s/line Washington &amp; Packard</td>
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<td>2833</td>
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<td>2573</td>
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<td>main line valve @ 1228 Wash.</td>
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<td>600</td>
<td>s/line Phillips &amp; Washington</td>
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<td>4&quot; service</td>
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<td>4'</td>
<td>2253</td>
<td>e/line Valley &amp; Washington</td>
<td>4'-1&quot;</td>
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<td>6766</td>
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<td>n/line Valley &amp; Washington</td>
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<tr>
<td>1302</td>
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<td>4'-10&quot;</td>
<td>2000</td>
<td>Washington 6&quot; service</td>
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<tr>
<td>558</td>
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<td>4'-8&quot;</td>
<td>2856</td>
<td>2002 Washington hyd. Valve</td>
<td>3'-9&quot;</td>
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# Meeting the challenges
## Depth of water mains

<table>
<thead>
<tr>
<th>Valve #</th>
<th>Location</th>
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<th>Location</th>
<th>Depth</th>
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<tr>
<td>2016</td>
<td>Washington 4&quot; service</td>
<td>3'-7&quot;</td>
<td>e/1ine Washington &amp; Flett</td>
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<td>2233</td>
<td>hyd. @ washington &amp; Taylor</td>
<td>4'</td>
<td>s/line Washington &amp; Flett</td>
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<tr>
<td>607</td>
<td>e/line Washington &amp; Taylor</td>
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<td>e/line Washington &amp; Wright</td>
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<td>609</td>
<td>s/line Washington &amp; Taylor</td>
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<td>s/line Washington &amp; Wright</td>
<td>4'-6&quot;</td>
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<tr>
<td>3654</td>
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<td>3'-6&quot;</td>
<td>hyd. Valve @ Washington &amp; Wright</td>
<td>4'-5&quot;</td>
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<tr>
<td>3653</td>
<td>24&quot; valve @ Washington &amp; Taylor</td>
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<td>e/line Washington &amp; Thurston</td>
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<td>service</td>
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<tr>
<td>3&quot; service</td>
<td>2218 Washington</td>
<td>4'</td>
<td>s/line Washington &amp; Quincy</td>
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<td>615</td>
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<td>5'-5&quot;</td>
<td>e/line Washington &amp; Deane</td>
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<td>hyd. Valve @ Washington &amp; Kearney</td>
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<td>s/line Washington &amp; Deane</td>
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<td>6300</td>
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<td>Washington 3&quot; service</td>
<td>4'-4&quot;</td>
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<tr>
<td>619</td>
<td>s/line Washington &amp; Boyd</td>
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<td>621</td>
<td>s/line Washington &amp; holmes</td>
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<td>Washington &amp; West Blvd.</td>
<td>3'-6&quot;</td>
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<td>1960</td>
<td>hyd. Valve @ Washington &amp;Flett</td>
<td>3'-9&quot;</td>
<td>s/line Washington &amp; West Blvd.</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2'-9&quot;</td>
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</tbody>
</table>
Meeting the challenges

Rubblizing over a weak subgrade.
“Another way to compensate for a weak subgrade is to modify the rubblizing pattern to produce larger particle sizes which maintain more of the existing concrete pavement’s structural support. Experience has shown that segments of twelve to eighteen inches in the lower half of the slab are still effective for eliminating reflective cracking.”

From draft “Rubblizing Concrete Pavement” section of WisDOT Construction & Materials Manual
Meeting the challenges

Rubbleizing while maintaining existing curb and gutter.
Meeting the challenges

Rubblizing while maintaining existing curb and gutter.
Pavement performance
Research finds that rubblizing & HMA overlay performing well

3 recent studies of the pavement performance of rubblizing and asphalt overlay projects found good performance and no evidence of reflective cracking:


Washington Street, Burlington
Constructed by B.R. Amon & Sons, Inc. in 1997

2002 survey: no longitudinal or transverse cracking, $PDI=0$. 
Taylor Drive, Sheboygan
Constructed by Northeast Asphalt, Inc. in 1998

2002 survey: no longitudinal or transverse cracking, PDI=0.
STH 67, Williams Bay
Constructed by B.R. Amon & Sons, Inc. in 1999

2002 survey: no longitudinal or transverse cracking, PDI=0.
Questions & Answers
Antigo Construction, Inc.
715-627-2222
2520 N. Clermont St.
P.O. Box 12
Antigo, WI 54409

www.antigoconstruction.com