Think Outside the Box

- 8 Eight
- 5 Five
- 4 Four
- 9 Nine
- 1 One
- 7 Seven
- 6 Six
- 3 Three
- 2 Two
- 0 Zero
Infiltration Systems

Developed in 1970’s
Franklin Institute, Philadelphia, PA
Infiltration System

• Subgrade compacted 92 – 95%
• Filter fabric
• Underlying, open-graded stone bed
  • 6” to 24” clean aggregate base
• Porous pavement surface
  • 4” to 6”

* Illustration courtesy of T Cahill Associates
• Water drains through pavement into stone bed and infiltrates slowly into underlying soil mantle
  • 0.1 – 0.5 in/hr acceptable
  • Total drawdown time should not exceed 5 days
Why Specify Pervious Concrete?
Environmental Issues

• Water Quality
  • First-Flush Pollution Mitigation
  • Groundwater Recharge
  • Flood Prevention / Management
First Flush

- First 1” of rain
  - Contains contaminants
    - EPA requires collection and treatment prior to release
  - USGS study – Austin, TX
    - High concentration of polycyclic aromatic hydrocarbons (PAH)
    - Attributed to asphalt parking lot runoff
    - Runoff from asphalt-based sealants 10 times higher
    - Runoff from coal-tar based sealants 65 times higher
- Source:
First Flush

• Pervious concrete pavement reduces runoff
  • Eliminates first flush
  • Captured by void structure
  • Minimization of PAH

• Soil chemistry and biology will naturally treat water
  • Oil drips and other automotive pollutants are “attacked” by naturally occurring soil microbes
Your Drinking Water

Pre-Development

Post-Development

LID

WWW.NRMCA.ORG
US EPA - Clean Water Act

EPA Storm Water Phase II Final Rule (EPA 2000)

- Reduce or eliminate runoff
- “Treatment” of Pollutants (Percolation)
- Groundwater and aquifer recharge
- Minimize Flooding
Sustainable Development

Version 2.2
Sustainable Sites

Credit 6.1 & 6.2: Stormwater Design

Credit 7.1: Heat Island Effect, Non-Roof

Credit 7.2: Heat Island Effect, Roof

Credit 8: Light Pollution Reduction

Highlighted Credits

Sustainable Sites

Credit 6.1 & 6.2: Stormwater Design

Credit 7.1: Heat Island Effect, Non-Roof

Credit 7.2: Heat Island Effect, Roof

Credit 8: Light Pollution Reduction

Quality
Stormwater Design  Credit 6.1 & 6.2

EPA Storm Water Phase II Final Rule (EPA 2000)
- Reduce or eliminate runoff
- “Treatment” of Pollutants (Percolation)
- Groundwater and aquifer recharge
- Minimize Flooding

Quantity

Quality
**Water Efficiency**

**Credit 1.1 & 2.2:** Water Efficient Landscaping

**Credit 3.1 & 3.2:** Water Use Reduction

<table>
<thead>
<tr>
<th>5 Possible Points</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Water Efficiency</strong></td>
</tr>
<tr>
<td>Credit 1.1</td>
</tr>
<tr>
<td>Credit 1.2</td>
</tr>
<tr>
<td>Credit 2</td>
</tr>
<tr>
<td>Credit 3.1</td>
</tr>
<tr>
<td>Credit 3.2</td>
</tr>
</tbody>
</table>
Design Considerations
Pervious Concrete (20% + Void)
Recharge Bed (40% Void Stone)
Non-woven Geo-textile
Well Draining Soil (1/2” + per. hr.)
Pervious Concrete (20% + Void)
Recharge Bed (40% Void Stone)
Non-woven Geo-textile
Poorly Draining Soil
Pervious Concrete (20% +/- Void)
Recharge Bed (40% Void Stone)
Non-woven Geo-textile
Poorly Draining Soil
Pervious Concrete (20% +/ Void)
Recharge Bed (40% Void Stone) w/ Stormwater Chambers
Non-woven Geo-textile
Poorly Draining Soil
Hydrologic Analysis Software
Hydrologic Software

- May be used as a design aid
- Provide preliminary designs for engineers
- Assist permit-granting agencies in verifying conformity to established stormwater runoff constraints
Passive Mitigation

- Used to reduce quantity of impervious surface by replacing with pervious
- Can capture much, if not all, first flush
- Not intended to offset excess runoff from adjacent impervious surfaces
Active Mitigation

- Designed to maintain total runoff of a site at some specified level
- Must accommodate runoff from a much larger area
- Used when pervious concrete system is intended to capture a sizeable portion of the runoff from other areas
  - Buildings
  - Impervious pavements
  - Traffic islands
  - Buffer zones
Active Mitigation
System Performance Goals

- Have the pervious concrete system capture all of the stormwater resulting from rain falling on pavement surfaces (passive)
- Have the pervious concrete system capture not only the rain that falls directly on the pavement, but also from directly connected sections of impervious areas (active)
- Have the pervious concrete system reduce total runoff to a target value
  - Based on conditions of the site
  - Established by engineer and/or permitting agency
How the program works

- Estimates the volume of rainfall on the site in an appropriate design storm
- Estimates the volume of stormwater stored and infiltrated
- Estimates potential runoff
- Thereby determining if capacity of pervious concrete system is adequate
Navigating Through the Hydrologic Software
Pervious Concrete Spreadsheet For Hydrologic Analysis and Design

Overview

Click "Data Input Sheet" to begin entering in values.

You can always click the top left "Home Icon" to return to this page.

Contact:
Carolinas Ready Mixed Concrete Association
1805 J. N. Pease Place - Charlotte, NC 28262
V: (704) 717-9199  F: (704) 717-8688
e-mail: info@crmca.com
Help

The following Documents will open in a Web Browser

- Instructions
- SCS Curve Numbers for various cover conditions
## Data Input Sheet

### Project Details
- **Project:** Home Depot
- **Designer:** MZ
- **Date Run:** 11/16/05

### Pervious Concrete
- **Thickness:** 5 in
- **Surface area:** 43,560 sq ft
- **Porosity:** 15%

### Gravel Base
- **Thickness:** 6 in
- **Porosity:** 40%

### Ponding Limit
- **Ponding limit:** 0 in

### Exfiltration Rate
- **Exfiltration rate:** 0.015 in/hr

### Impervious Surface
- **Surface area:** 43,560 sq ft

### Off-site Drainage
- **Area:** 0 sq ft
- **CN:** 0

### 24-hr Precipitation
- **Location:** Suwanee GA
- **Return period:** 2 yr

### Design Aim
- **Target CN:** 72

---

*After you have completed entering the above data, click the Process Button.*
Thickness Design Guidelines

- 6"
- Light-duty / standard-duty parking lots
- Residential driveways

- 8"
- Residential streets
- Commercial driveways
- Heavier-duty parking lots
### Project Details
- **Project:** Home Depot
- **Designer:** MZ
- **Date Run:** 11/16/05

### Pervious Concrete
- **Thickness:** 6 in
- **Surface area:** 43,560 sq ft
- **Porosity:** 15%

### Gravel Base
- **Thickness:** 8 in
- **Porosity:** 40%

### Ponding Limit
- **Limit:** 0 in

### Exfiltration Rate
- **Rate:** 0.010 in/hr

### Impervious Surface
- **Surface area:** 43,560 sq ft

### Off-Site Drainage
- **Area:** 0 sq ft
- **CN:** 0

### 24-Hr Precipitation
- **Location:** Suwanee GA
- **Return Period:** 2 yr
- **Precipitation:** 3.5 in

### Design Aim
- **Target CN:** 72

---

**After you have completed entering the above data, click the 'Run' button.**
Ponding limit allows for use of area above pavement surface, contained within confines off curb, to be included in calculations of temporary storage capacity
### Project Details
- **Project:** Home Depot
- **Designer:** MZ
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### Pervious concrete
- **Thickness:** 6 in
- **Surface area:** 43,560 sq ft
- **Porosity:** 15%

### Gravel base
- **Thickness:** 8 in
- **Porosity:** 40%

### Ponding limit
- **Ponding limit:** 0 in

### Exfiltration rate
- **Exfiltration rate:** 0.010 in/hr

### Impervious surface
- **Surface area:** 43,560 sq ft

### Off-site drainage
- **Area:** 0 sq ft
- **CN:** 0

### 24-hr Precipitation
- **Location:** Suwanee GA
- **Return period:** 2 yr
- **Precipitation:** 3.5 in

### Design Aim
- **Target CN:** 72

---

*After you have completed entering the above data, click the Run button.*
Exfiltration Rates

- Malcolm says;
  - In sandy soils, use 0.5 to 1.0 in/hr
  - In silty soils, use 0.1 in/hr
  - In clayey soils, use 0.01 in/hr
Calculating for Underground Stormwater Chambers

- Assume volume of tanks is 100% void
- Stone base is 40% void
- Calculate weighted average void for tanks and stone base
- Enter this number as stone base void
### Data Input Sheet

**Project Details**
- **Project:** Home Depot
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- **Date Run:** 11/16/05

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- **Thickness:** 6 in
- **Surface area:** 43,560 sq ft
- **Porosity:** 15%

### Gravel base
- **Thickness:** 8 in
- **Porosity:** 40%

### Ponding limit
- **Depth:** 0 in

### Exfiltration rate
- **Rate:** 0.010 in/hr

### Impervious surface
- **Surface area:** 43,560 sq ft

### Off-site drainage
- **Area:** 0 sq ft
- **CN:** 0

### 24-hr Precipitation
- **Location:** Suwanee, GA
- **Return period:** 2 yr

**Design Aim**
- **Target CN:** 72

---

After you have completed entering the above data, click the **Report** button.
Active or Passive Mitigation?

- Calculate impervious surface on-site
- Calculate adjacent pervious area runoff
- Calculate adjacent impervious area runoff
### SCS Curve Numbers for Various Cover Conditions

<table>
<thead>
<tr>
<th>Cover Description</th>
<th>Hydrologic Soil Group</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Impervious</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developed urban areas</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Open space</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor condition (&lt;50% grass)</td>
<td></td>
<td>63</td>
<td>79</td>
<td>86</td>
<td>89</td>
<td></td>
</tr>
<tr>
<td>Fair condition (60-75% grass)</td>
<td></td>
<td>49</td>
<td>69</td>
<td>79</td>
<td>84</td>
<td></td>
</tr>
<tr>
<td>Good condition (&gt;50% grass)</td>
<td></td>
<td>39</td>
<td>61</td>
<td>74</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>Impervious areas</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pavement, roofs</td>
<td></td>
<td>93</td>
<td>98</td>
<td>98</td>
<td>98</td>
<td></td>
</tr>
<tr>
<td>Gravel</td>
<td></td>
<td>76</td>
<td>86</td>
<td>89</td>
<td>91</td>
<td></td>
</tr>
<tr>
<td>Dirt</td>
<td></td>
<td>72</td>
<td>82</td>
<td>87</td>
<td>89</td>
<td></td>
</tr>
<tr>
<td>Urban districts</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial and business</td>
<td></td>
<td>99</td>
<td>92</td>
<td>94</td>
<td>95</td>
<td>95</td>
</tr>
<tr>
<td>Industrial</td>
<td></td>
<td>81</td>
<td>88</td>
<td>91</td>
<td>93</td>
<td>72</td>
</tr>
<tr>
<td>Residential areas</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(by lot size)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/6 acre (town houses, condos)</td>
<td></td>
<td>77</td>
<td>66</td>
<td>90</td>
<td>92</td>
<td>65</td>
</tr>
<tr>
<td>1/4 acre</td>
<td></td>
<td>61</td>
<td>76</td>
<td>83</td>
<td>87</td>
<td>36</td>
</tr>
<tr>
<td>1/3 acre</td>
<td></td>
<td>57</td>
<td>72</td>
<td>81</td>
<td>86</td>
<td>30</td>
</tr>
<tr>
<td>1/2 acre</td>
<td></td>
<td>54</td>
<td>70</td>
<td>80</td>
<td>86</td>
<td>25</td>
</tr>
<tr>
<td>1 acre</td>
<td></td>
<td>61</td>
<td>88</td>
<td>79</td>
<td>84</td>
<td>20</td>
</tr>
<tr>
<td>2 acres</td>
<td></td>
<td>46</td>
<td>66</td>
<td>77</td>
<td>82</td>
<td>12</td>
</tr>
<tr>
<td>Pasture, grassland</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td></td>
<td>68</td>
<td>79</td>
<td>86</td>
<td>89</td>
<td></td>
</tr>
</tbody>
</table>
## Data Input Sheet

### Project Details
- **Project**: Home Depot
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  - **Porosity**: 15%

### Gravel Base
- **Thickness**: 8 in
- **Porosity**: 40%

### Ponding Limit
- **Ponding Limit**: 0 in

### Exfiltration Rate
- **Exfiltration rate**: 0.010 in/hr

### Impervious Surface
- **Surface area**: 43,560 sq ft

### Off-Site Drainage
- **Area**: 0 sq ft
  - **CN**: 0

### 24-Hr Precipitation
- **Location**: Suwanee GA
- **Return period**: 2 yr

### Design Aim
- **Target CN**: 72

---

After you have completed entering the above data, click the **Run** button.
Storm Event

- Usually 2-yr event
- Suggest checking 5-yr event
- Program pre-loaded with data from US Weather Service
Rainfall Information

24 Hour Precipitation for 2-yr and 10-yr storms for all 50 states measured in inches

<table>
<thead>
<tr>
<th>State</th>
<th>2-year</th>
<th>10-year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>4.11</td>
<td>5.97</td>
</tr>
<tr>
<td>Birmingham, AL</td>
<td>4.55</td>
<td>6.64</td>
</tr>
<tr>
<td>Montgomery, AL</td>
<td>5.89</td>
<td>9.12</td>
</tr>
<tr>
<td>Mobile, AL</td>
<td>3.97</td>
<td>4.43</td>
</tr>
<tr>
<td>Huntsville, AL</td>
<td>4.41</td>
<td>6.36</td>
</tr>
<tr>
<td>Tuscaloosa, AL</td>
<td>4.25</td>
<td>6.28</td>
</tr>
<tr>
<td>Hoover, AL</td>
<td>4.78</td>
<td>7.20</td>
</tr>
<tr>
<td>Dothan, AL</td>
<td>4.84</td>
<td>6.52</td>
</tr>
<tr>
<td>Decatur, AL</td>
<td>3.91</td>
<td>5.45</td>
</tr>
<tr>
<td>Florence, AL</td>
<td>4.62</td>
<td>6.96</td>
</tr>
<tr>
<td>Alaska</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anchorage, AK</td>
<td>1.50</td>
<td>2.90</td>
</tr>
<tr>
<td>Nome, AK</td>
<td>1.50</td>
<td>2.00</td>
</tr>
<tr>
<td>Fairbanks, AK</td>
<td>1.24</td>
<td>2.10</td>
</tr>
<tr>
<td>Kodiak, AK</td>
<td>3.50</td>
<td>5.00</td>
</tr>
<tr>
<td>Juneau, AK</td>
<td>2.50</td>
<td>4.00</td>
</tr>
<tr>
<td>Arizona</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flagstaff, AZ</td>
<td>1.88</td>
<td>2.89</td>
</tr>
<tr>
<td>Alpine, AZ</td>
<td>2.01</td>
<td>2.83</td>
</tr>
<tr>
<td>Kingman, AZ</td>
<td>1.58</td>
<td>2.62</td>
</tr>
</tbody>
</table>
### Data Input Sheet

#### Project Details
- **Project:** Home Depot
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- **Porosity:** 40%

#### Ponding limit
- **Depth:** 0 in

#### Exfiltration rate
- **Rate:** 0.010 in/hr

#### Impervious surface
- **Surface area:** 43,560 sq ft

#### Off-site drainage
- **Area:** 0 sq ft
- **CM:** 0

#### 24-hr Precipitation
- **Location:** Suwanee GA
- **Return period:** 2 yr

#### Design Aim
- **Target CN:** 72

---

After you have completed entering the above data, click the **Run** button.
Design Aim

- Input target curve number
- Represents the permissible runoff
- Useful where post-construction CN must meet certain design criteria with regard to pre-construction CN
### Data Input Sheet

<table>
<thead>
<tr>
<th>Project Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project:</td>
</tr>
<tr>
<td>Designer:</td>
</tr>
<tr>
<td>Date Run:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pervious concrete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness</td>
</tr>
<tr>
<td>Surface area</td>
</tr>
<tr>
<td>Porosity</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gravel base</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness</td>
</tr>
<tr>
<td>Porosity</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ponding limit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Exfiltration rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Impervious surface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface area</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Off-site drainage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area</td>
</tr>
<tr>
<td>CN</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>24-hr Precipitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
</tr>
<tr>
<td>Return period</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Design Aim</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target CN</td>
</tr>
</tbody>
</table>

After you have completed entering the above data, click the "Next" button.
Results

Select an object from below to view

- Results Sheet
- Graph Sheet
- Simulation Sheet
- Reference Storms Sheet
### Results Sheet

**Project:** Home Depot  
**Designer:** MZ

### Configuration

<table>
<thead>
<tr>
<th>Pavement concrete</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Thickness</strong></td>
<td>6 in</td>
</tr>
<tr>
<td><strong>Water</strong></td>
<td>4,450 ft²</td>
</tr>
<tr>
<td><strong>Porosity</strong></td>
<td>10%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gravel base</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Thickness</strong></td>
<td>4 in</td>
</tr>
<tr>
<td><strong>Porosity</strong></td>
<td>40%</td>
</tr>
</tbody>
</table>

| Porous link       | 0% |
| **Efficiency**    | 0.100 |

<table>
<thead>
<tr>
<th>Impermeable surface</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Surface area</strong></td>
<td>4,516.0 ft²</td>
</tr>
<tr>
<td><strong>Off-site drainage</strong></td>
<td>0 cu ft</td>
</tr>
</tbody>
</table>

### Summary of results

<table>
<thead>
<tr>
<th>Effective CN</th>
<th>72</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated runoff (5 days)</td>
<td>1.15 cu ft</td>
</tr>
<tr>
<td>Available storage used</td>
<td>100%</td>
</tr>
<tr>
<td>Number of hours of ponding</td>
<td>0</td>
</tr>
<tr>
<td>Max ponding depth</td>
<td>0.0 in</td>
</tr>
<tr>
<td>Available storage after 24 hr</td>
<td>3%</td>
</tr>
<tr>
<td>Available storage after 3 days</td>
<td>100%</td>
</tr>
<tr>
<td>Stage after 3 days</td>
<td>0.0 in</td>
</tr>
<tr>
<td>Additional time to drain completely</td>
<td>0 hr</td>
</tr>
</tbody>
</table>

**Intermediate results**

| Total drained surface area | 57,120 ft² |
| Storage capacity, porous concrete | 5,000 ft³ |
| Storage capacity, gravel base | 0 ft³ |
| Total storage capacity | 5,000 ft³ |
| Total pond volume | 25,410 ft³ |
| 5-day runoff volume | 12,030 ft³ |
| Total runoff (overland) | 3,313 ft³ |
| Water stored after 5 days | 0 ft³ |
| Water balance error | 0.0 cu ft |

### Design info

<table>
<thead>
<tr>
<th>Stormwater drainage</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Precipitation</strong></td>
<td>0.3 in</td>
</tr>
<tr>
<td><strong>Location</strong></td>
<td>Your Location</td>
</tr>
<tr>
<td><strong>Return period</strong></td>
<td>2 y</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Target CN</th>
<th>78</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allowable runoff</td>
<td>1%</td>
</tr>
</tbody>
</table>

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**Cautions:** This spreadsheet is intended for study purposes only and is not to be used for hydraulic computations. Use it as a guide only. Use the model as an educational tool only. Check calculations and results before implementing.
Designing for Special Considerations

Freeze-Thaw
Iowa State University

- In conjunction with:
  - Center for Transportation Research and Education
  - National Center for Concrete Pavement Technology
- Prepared mixes with varying aggregates, admixtures, etc.
3400 psi @ 7 days, 3800 psi @ 28 days for this mix
Permeability is over 300 gallons per hour
Samples have passed 300 cycles with approximately 2% loss of mass
• Study conducted by NRMCA
Results available at www.nrmca.org
Freeze-Thaw Resistance

• Depends on saturation level
• Avoid critical saturation
  • Design
    • Infiltration System
    • Secret of success is to provide the water a place to go
  • Maintenance
    • Cleaning, as needed, in severe climates
Designing for Special Considerations

Heavy Traffic
Shelter Systems Ltd.
Westminster, MD

- Pavement used as staging area for completed truss systems
- Required heavy duty pavement
  - 30 to 40 trucks per day
Shelter Systems Ltd.
Westminster, MD

- R/M adjusted mix
- Added 500 lbs. fine agg. per CY
- Placed with ABG dual-compaction paver
- Rolled with small static roller
- Flexural strength 650 psi (7 days)
Shelter Systems Ltd.
Westminster, MD

- Approximately 8 acres of pavement
- Mix design can accommodate 80” of rain per hour
- 10 times intensity of 100 year rainfall event!
ACI 522 Pervious Concrete Guide to Specification
ACI 522 – Pervious Concrete

- Specification Guide Document in Final Review
- Performance specification
- Provides Guidelines for
  - Quality Assurance
    - Materials
    - Testing
  - Placement
Section 1.6: Quality Assurance

1.6.1.1 **Contractor qualification** - Unless otherwise approved by Architect/Engineer, Contractor shall provide evidence of employment of one (1) NRMCA certified Pervious Concrete Craftsman who must be on site, overseeing each placement crew, during all concrete placement, or the contractor shall provide evidence of employment of five (5) NRMCA certified Pervious Concrete Technicians, who have received hands-on training in the construction of pervious concrete pavements, and who must be on site, working as members of each placement crew, during all concrete placement, or, with the approval of Architect/Engineer, contractor may provide written evidence of project experience and proficiency in successfully completing pervious concrete pavement construction, and submit evidence of completion of a pervious concrete craftsman certification program.
NRMCA Recommended Addendums to Specification
Section 1.6: Quality Assurance

1.6.1.2 **Concrete Producer qualification** – Unless otherwise approved by Architect/Engineer, ready mixed pervious concrete **shall be produced and provided by an NRMCA Certified plant**. If, rather than ready mixed pervious concrete, a volumetric mobile mixer is used to produce the pervious concrete, the mixer(s) must conform to the standards of the Volumetric Mixer Manufacturers Bureau (VMMB), to be verified by a current VMMB conformance plate affixed to the volumetric mixer equipment.
Section 1.6: Quality Assurance

1.6.1.2 *Concrete Producer qualification* – Unless otherwise approved by Architect/Engineer, ready mixed pervious concrete shall be produced and provided by an NRMCA Certified plant. If, rather than ready mixed pervious concrete, a *volumetric mobile mixer* is used to produce the pervious concrete, the mixer(s) **must conform to the standards of the Volumetric Mixer Manufacturers Bureau (VMMB)**, to be verified by a current VMMB conformance plate affixed to the volumetric mixer equipment.
Section 1.5; Submittals

1.5.3.2 Pre-Placement Conference – A mandatory pre-placement conference will take place including at a minimum, the architect, engineer, general contractor, pervious concrete contractor, concrete supplier, and field testing agency. As a guide for the meeting, a copy of the document *Checklist for the Concrete Pre-Construction Conference* (co-published and available from the National Ready Mixed Concrete Association (NRMCA), 900 Spring Street, Silver Spring, MD, (301) 587-1400 or the American Society of Concrete Contractors (ASCC), 2025 South Brentwood Boulevard, St Louis, MO, (314) 962-0210), will be used to review all materials and personnel qualifications, concrete production, preparation, placing, curing, and testing procedures.
Resources
Specifying Pervious Concrete

- ACI 522 Guide Document
- PCA/NRMCA Pervious Concrete Pavements
- PCA/NRMCA Hydrologic Software
- www.PerviousPavement.org
Pervious Concrete Contractor Certification Program
Questions?
Thank You!

Philip Kresge
National Resource Director
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