The 3 P’s of Concrete Sidewalks

• **Product**
  • Cement vs. Concrete
  • Properties of Concrete
  • Admixtures
  • Water in Concrete

• **Placement**
  • Slump
  • Tools
  • Weather
  • Finishing

**Protection**
  Curing
  Sealing
Safety

- Hard Hat
- Vest
- Long Sleeve Shirt
- Gloves
- Rubber Boots
What is Concrete Made of

Components of Concrete - New

- Sand
- Gravel
- Water
- Cement
- Admixtures
- SCM
Advantages of air entrained concrete

• **Fresh & Hardened Concrete**
  • Improved Workability/ Reduces Segregation
  • Increased freeze-thaw resistance
  • Improved scaling resistance to deicers
  • Longer lasting concrete surface
Levels of Concrete Slump

No Admixture

Mid-Range Water Reducer

Conventional

High-Range Water Reducer
Remember When Adding Water

- Decrease in strength
- Decrease in freeze-thaw
- Decrease ability to resist chlorides
- Decrease in resistance to shrinkage
- Decrease in durability
- Decrease in service life

- Increase in risk for all
Steel reinforcement

“The use of distributed steel reinforcement will not add to the load-carrying capacity of the pavement and should not be used in anticipation of poor construction practices.”

American Concrete Pavement Association
3 Types of Joints

**Control**: formed or cut joints to provide movement & force shrinkage cracks at selected locations

**Isolation**: allows both horizontal & vertical movement

**Construction**: wherever placement end & start
Excavating and Compacting

- Excavate to uniform thickness
- For ramps and slopes, excavate so that slope will not vary
- Remove any unsuitable material and replace with compactable material
- Uniformly compact subgrade
Floating Concrete

- Floating concrete pushes the coarse aggregate particles below the surface of the concrete.
- Use magnesium floats.
- Keep float as flat as possible to keep from sealing the concrete.
No Blessing
Bleeding
Waiting for Concrete to Set

Factors affecting set:

• Time
• Ambient temperature
• Concrete temperature
• Subgrade temperature
• Use of slag cement or fly ash
• Cement brand
• Admixtures
Cold Weather Delay Set & Finishing Times

As the temperature of the fresh concrete drops, setting or hardening is delayed.

Rule Of Thumb: Each 20°F Drop In Concrete Temperature Will Double Set Time
Misconception #3

You can place concrete on frozen ground or snow without any precautions

Hurry up Bill—concrete is going to be here in 30 minutes
Test the Concrete to make sure it has Set Sufficiently to begin Final Finishing
Preparing for the Pour

- Check the weather forecast
- Do not place concrete in rain
- Have plastic covering on hand if there is a chance of rain in the forecast
- Do not place concrete in freezing weather
- Do not place concrete on frozen subgrade
Brooming

If the broom leaves deep grooves in the concrete and a lot of mortar adheres to the broom, it is a sign you are brooming to soon.
Curing

• As cement hydrates new compounds are formed
• These compounds are responsible for setting, hardening & strength properties of concrete
• Lack of water prevents hydration
• Low w/c ratio mixes especially need moist curing to insure proper hydration: 0.40 or less
Concrete Sealers
Scaling

Caused by:
• De-icing chemicals / freeze thaw action
• Poorly specified mixture designs
• Lack of air in the concrete
• Poor finishing
• Poor curing
Mortar Flaking
The Seven Deadly Sins

• Poor Specified Mix Designs
• Inadequate air
• Adding excessive water at the jobsite
• Blessing the concrete
• “Wet” finishing while concrete is still bleeding
• Finishing with steel trowels
• Poor or non existent curing