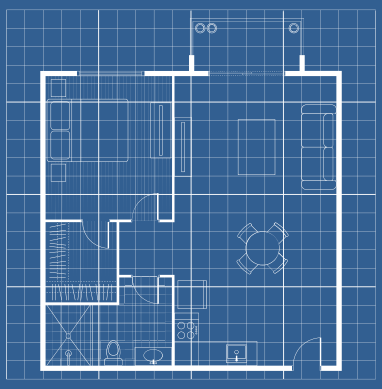
CONCRETE KIT *FOR* HOMEBUILDERS



BROUGHT TO YOU BY THE

MICHIGAN CONCRETE ASSOCIATION

SCAN ME

ABOUT THIS KIT

CONCRETE KIT FOR HOMEBUILDERS BOOKLET

The MCA Concrete Kit for Homebuilders was created to help home builders across Michigan achieve stronger, longer-lasting concrete results. Inside, you'll find essential tools and recommendations designed for Michigan's unique climate and building conditions.

Included in this kit:

- **DRIVE WAY & SIDEWALK GUIDELINES** - Best practices for durable, freeze-thaw-resistant exterior concrete.
- **EXTERIOR FINISHER CERTIFICATION** – The importance of requiring MCA-certified professionals.
- **CONCRETE CARE & MAINTENANCE** – Simple steps for long-term homeowner satisfaction.
- **SALT WARNING** – Key information for homeowners to prevent early surface damage and scaling due to the harsh Michigan winters.

Implementing these standards will reduce costly callbacks, improve quality, and build lasting concrete for homeowners.

STRONGER CONCRETE. STRONGER HOMES. STRONGER MICHIGAN.

Sincerely,

THE MICHIGAN CONCRETE ASSOCIATION

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CONCRETE KIT FOR HOMEBUILDERS BOOKLET

MICHIGAN CONCRETE ASSOCIATION

MCA EXTERIOR CONCRETE FINISHER CERTIFICATION

CONCRETE SOLUTIONS. ENGINEERED FOR EXCELLENCE.

ABOUT THE CERTIFICATION

Improperly finished concrete leads to early deterioration, surface defects, and costly repairs.

The MCA Exterior Concrete Finisher Certification evaluates contractors on their ability to properly place, finish, and cure concrete—ensuring they meet industry standards for long-lasting, durable results.

This certification program has been developed by the MCA to test the basic knowledge on best practices for placing and finishing exterior concrete. The goal of certification is to ensure that knowledgeable contractors are selected to install exterior concrete including local roads and streets, driveways and sidewalks as well as mainline paving. This certification is designed to aid in minimizing or eliminating the potential for distresses resulting from improper installation practices. These distresses may include: scaling, plastic shrinkage cracking or random cracking.

Using MCA-certified finishers helps reduce surface defects and long-term maintenance issues—especially for municipal concrete projects.

Agencies can improve quality and accountability by requiring certification in specifications for exterior concrete.

THE CERTIFICATIONS COVERS THE FOLLOWING:

1. Concrete Required for Exterior Flatwork
2. Placing and Finishing Concrete
3. Joints
4. Curing Concrete
5. Types of Surface Problems and Causes

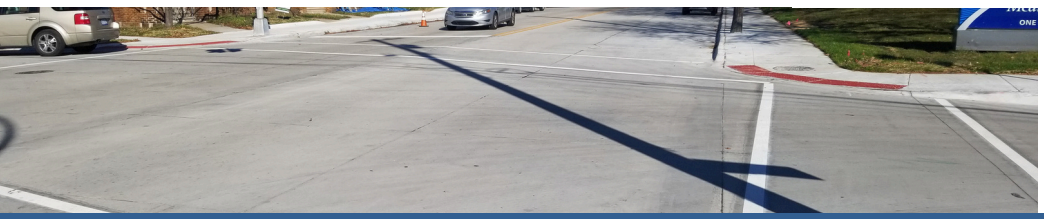
CERTIFICATION CRITERIA

- Attended a training course by the MCA
- Successfully completed the open book written exam with passing score of 70%
- Completed a performance evaluation during an installation of exterior concrete.

Note: The performance evaluation must be completed within 6 months of passing the written exam.

This certification is good for 5 years and applies to:

Roads
Sidewalks & Driveways
Parking Lots
Curb and Gutter



If you have questions or would like to set up a meeting with the MCA Director of Construction and Education to discuss the benefits of your crews certification please contact:

Mark Meddaugh
Michigan Concrete Association
2937 Atrium Dr. Suite 200, Okemos MI
Email: mark@miconcrete.org
Phone: (517) 285-4906

For more information, please visit our website at

www.miconcrete.org/mca-exterior-concrete-finisher

DRIVEWAY & SIDEWALK

DESIGN AND PLACEMENT GUIDELINES

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MATERIALS

Aggregates

- Aggregates shall conform to the physical properties of ASTM C33 class D (formerly 4S) or MDOT specifications for concrete aggregates.
- ASTM size #57 or #67 or MDOT size 6AA or 17A with MDOT 2NS should be specified in the mix design.

Portland Cement

- Portland cement shall conform to ASTM C150 or ASTM C595.

Supplemental Cementitious Materials

- Slag cement shall conform to ASTM C989. Coal ash (fly ash) shall conform to ASTM C618.

Chemical Admixtures

- Chemical admixtures shall conform to the requirements of ASTM C494.
- Air entraining admixtures shall conform to ASTM C260.

CONCRETE PROPERTIES AND PROPORTIONS OF MATERIALS

Compressive Strength and Water/Cement Ratio

- The minimum specified compressive strength (f'c) shall be 4000 psi (28 days)
  - The maximum in-place water to cement (w/c) or water to cementitious ratio (w/cm) shall be 0.45 or less.
  - NOTE: The minimum recommended cementitious content is 564 lbs.

Slump

- The maximum slump at the point of placement shall not exceed 4 inches.
- The maximum slump may be increased up to 7 inches by using a mid-range or high-range water reducing admixture.

Air Content

- Concrete shall be designed for a total air content, by volume, of 6.5% +/- 1.5%.

PREPARATION

Subgrade Preparation

- The subgrade shall be free of organic and uncompacted material.
- Removal of unstable materials shall be to a minimum depth of 6 inches.
  - Replace with crushed stone, gravel, or sand - compacted to 95% (TMD) Density.
  - Sub-base materials shall be a minimum of 4 inches in thickness compacted.
- If the sub-base is dry, it shall be dampened prior to concrete placement.
- No standing water shall be present when concrete is placed.
- In no case shall concrete be placed on frozen subgrade/sub-base materials.

Drainage

- A minimum slope of 1/8 inch per foot (1-2%) shall be maintained for drainage and the subgrade shall be drained to daylight or to a drainage system.

CONCRETE THICKNESS

- The minimum concrete thickness recommended is 4 inches.
- When traffic will include delivery vehicles, the minimum concrete thickness shall be 5 inches.

BATCHING AND DELIVERY

- Concrete shall be batched, transported and discharged in accordance with ASTM C94.
- Any water addition on site after delivery should be documented on the concrete delivery tickets.

FINISHING

- It is recommended that at least one certified finisher be involved in the finishing. (ACI or MCA Exterior Finisher)
- Use of fly ash or slag cement will change the time of finishing.
- The recommended sequence for finishing includes strike-off, bull floating, edging, curing, jointing and texturing.
  - **Do not** perform finishing operations while bleed water is still visible.
  - **Do not** use steel trowels, fresnos or other tools that may seal the surface prematurely.
  - **Do not** sprinkle water onto the surface (blessing the concrete) to aid in finishing.
  - Edge the concrete around the perimeter (maximum radius = ½ inch) and at all tooled joints.
  - Using a stiff-bristle broom, apply a "broomed" texture.
  - **NOTE: the use of an evaporation retarder is highly recommended on low humidity and/or windy days and the use of a finishing aid, either integral or topical is beneficial with Type 1L cements**

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CURING

- Curing requires the maintenance of proper temperature and moisture in the concrete.
  - As the cement hydrates concrete gains strength.
- Curing shall begin immediately after final finish.
- Curing can be accomplished by covering the concrete with polyethylene, using spray on curing compounds or by continuous water application.
  - Curing by these methods must extend for a **MINIMUM of three days.**
  - **NOTE:** when using polyethylene, discoloration may occur.
- For residential construction, it is recommended that curing be accomplished by applying a product meeting ASTM C309 immediately after final finish – Apply uniform coverage according to the manufacturers' recommendation. (150-200sft/gal)

JOINTING

Control Joints

- Shall be installed in both directions at intervals not exceeding two times the slab thickness.
  - i.e. 8 ft. for a 4 inch thick slab.
- Panels should be as square as possible and in no case shall the ratio of length to width exceed 1.5 to 1. (Example: 8' x 8' panels)
- Control joints shall have a minimum depth equal to ¼ the slab thickness.
  - i.e. 1 inch for a 4 inch thick slab.
- Control joints may be installed by pre-formed materials, hand tooling or by saw cutting.

Isolation Joints

- Isolation joints shall be installed at points of restraint to isolate freshly placed concrete from fixed objects.
  - i.e. existing structures, walls, foundations, etc.
- Isolation joints shall extend the full depth of the slab.

Saw Cutting – NOTE: the window for saw cutting is typically 8-12 hours after placement, but can vary with weather and mix designs.

OPENING TO TRAFFIC

- The driveway/sidewalk may be opened to traffic following 7 days of curing, or sooner, when testing confirms that a compressive strength of 3000 psi is reached.

SEALING

- Sealers protect the concrete by minimizing water and deicing salt penetration
- A penetrating sealer can be applied 30 days after initial placement and typically needs to be reapplied every three to five years. Note: if a curing compound meeting ASTM C309 is used, it must be worn off or removed prior to applying the sealer.

COLD WEATHER CONCRETING

(ACI 306R GUIDE TO COLD WEATHER CONCRETING)

Concrete matures at a slower rate during cool/cold weather conditions.

- Concrete shall not be placed on a frozen subgrade.
  - The subgrade temperature must be a minimum of 40°F
- The contractor shall take measures to protect the concrete (i.e. straw/hay, insulating blankets, etc.) to maintain the required curing temperature of at least 50°F for a minimum of three day.
- To develop early strengths during cool/cold weather the mix may contain additional Type IL cement, substitute Type III for Type IL, or contain an accelerator meeting ASTM C494.
- The use of supplementary cementitious materials such as harvested ash and slag cement will slow the rate of hydration.

HOT WEATHER CONCRETING

(ACI 305R GUIDE TO HOT WEATHER CONCRETING)

- Concrete hydrates faster as ambient temperatures increase.
- The maximum concrete temperature at time of placement is recommended to be ≤ 95°F, unless specificed.
- If the subgrade is dry, it should be moistened prior to placement. (no standing water should be present)
- Place concrete when ambient temperatures are most favorable, i.e. early morning.
- The use of supplementary cementitious materials such as slag cement and harvested ash will slow the rate of hydration.
- Set retarding admixtures meeting ASTM C494 may be used.
- To reduce the rate of evaporation from the surface resulting form low humidity, warm temperatures, and moderate to high winds, the use of an evaporation retarding membrane is recommended followed by immediate curing methods after finish. NOTE: the use of a finishing aid, either integral or topical, may be beneficial with IL cements

SAFETY

- Provide Material Safety Data Sheets (MSDS) as requested.

Avoid prolonged skin contact with fresh concrete by wearing gloves, waterproof boots, clothing and eye protection.

CONCRETE CARE & MAINTENANCE

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CONGRATULATIONS!

You are a new concrete owner. You have made an investment that will add value and aesthetics to your project for years to come. Like any building material, concrete requires some maintenance to maximize its service life. MCA recommends the following practices:

TIME FRAME: IMMEDIATELY!

Cure the Concrete

- Curing is a process that provides a moist environment that prevents newly placed concrete from drying out. In cold weather, additional protection is required to prevent the newly placed concrete from freezing.
- Curing is a critical step in any concrete project as proper curing maximizes the strength and durability of concrete. As soon as texturing is completed, the curing process must begin within 30 minutes.
- In cold weather, concrete should be covered with insulated blankets to prevent the concrete temperature from falling below freezing until it has reached open to traffic strength. The minimum protection period is 3 days.
    - Visit www.miconcrete.org for additional details on concrete curing.

TIME FRAME: 30 DAYS+

Seal the Concrete

- Concrete sealers are chemical compounds that are applied to the concrete surface. These products work by waterproofing the concrete surface and preventing the penetration of water and harmful substances. Sealers are clear liquids that soak into the concrete and dry, providing a protective coating to the surface. These are typically sprayed on or applied with a paint roller at a rate specified by the supplier.
- MCA recommends a high quality silane and/or siloxane sealer be applied. Your contractor or concrete supplier can provide recommendations on what products to use. The sealer manufacturer's instructions on surface preparation and application rates should be strictly adhered to.
- Be sure to ask your concrete contractor what products they used to cure your concrete. Special steps may be needed to prepare the concrete surface for sealing if certain products were used.

TIME FRAME: BEYOND 30 DAYS

Regular Maintenance

- Follow your sealer manufacturer's recommended reapplication schedule. Typically, sealers will need to be reapplied every three to five years. You can spot check portions of your concrete to determine when sealers need to be reapplied. When water no longer beads on the surface of the concrete, it is time to reapply a sealer.

Cold Weather

- **AVOID** using deicing chemicals on the concrete for the first winter. Instead, sand can be used for traction.
- After the first winter, always be sure to check the labels on deicers. **Never use products which contain magnesium chloride or calcium chloride. Fertilizer or water softener salts should never be used as a deicers.**
    - **Sodium chloride (commonly known as rock salt or table salt) is the safest deicer for use on concrete.**

FOR MORE DETAILED INFORMATION:
Call your local concrete contractor, ready-mixed producer or SCAN THE QR CODE ON THIS FLYER

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For more information, please visit our website at
www.miconcrete.org

SALT WARNING

CONCRETE CARE & MAINTENANCE (CONT.)

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ICE MELTERS CAN DAMAGE NEW CONCRETE

- Ice melters, even those advertised as “safe for concrete”, can cause damage to concrete, particularly new concrete. When ice and snow melt, the water soaks into concrete, then will refreeze when the temperature drops below freezing. When water inside the concrete freezes, it expands which exerts internal pressure throughout the concrete, which can cause tiny cracks to form. When this is repeated through multiple cycles of snowfall and melting, the cracking can cause small pieces of the concrete surface to flake off, leaving unsightly marks on the surface.
- When concrete is first poured it becomes strong enough to walk on within a day, and can handle car traffic within 7 days, even though it continues to develop strength gradually over time (even up to 90 days). It can take months for concrete to fully “dry out.” Concrete in its first year is susceptible to the pressures of freeze/thaw cycles. Salt products do provide ice control, but many of the products on today’s market attract water to the surface long after the ice has been removed. This extends the “drying out” period of new concrete and increases the potential for damage.

WHAT ABOUT SLIP AND FALL HAZARDS?

- Using sand for traction on new concrete is the best for the concrete, but may be undesirable for tracking. While the best thing for the concrete would be to use no ice melters at all, the need to eliminate slip and fall hazards is clearly more important than aesthetics, which is why ordinary rock salt (sodium chloride) is recommended.

FOR MORE DETAILED INFORMATION:
Call your local concrete contractor, ready-mixed producer or SCAN THE QR CODE ON THIS FLYER

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WHY THIS PRODUCT?

How Deicers Affect Concrete

- **Sodium Chloride** commonly know as “rock salt” or “road salt” is not chemically harmful to concrete, but can still damage new concrete through increased saturation and additional freeze-thaw cycles. **Many ice melt products include a blend of sodium chloride, magnesium chloride, calcium chloride, or other compounds. Some of these compounds are harmful (specifically calcium chloride) to the portland cement in the concrete, which can cause pits to form in the surface of the sidewalk.** This is in addition to the flaking which can occur from the freeze/thaw cycles.

Safer Deicers Options for Concrete

- The following deicer products can be found at local hardware/home improvement stores and contain only sodium chloride (NaCl) and should be safe for properly cured and sealed concrete.
  - **Morton Safe-T-Salt**
  - **Safe Step Rock Salt, Standard 3300 Ice Melter**
  - **Merit Hall bulk road salt, 98% NaCl**
  - **Compass Minerals / North American Salt bulk road salt**
  - **Cargill bulk road salt, 96% NaCl**

HOW MUCH SHOULD I USE?

- Please use only enough to provide traction over slippery areas, after snow removal has been completed. Please remove any accumulated slush after the salt has started working. Please **DO NOT** blanket the sidewalk with salt in advance of an anticipated snowfall.

BLENDED CEMENTS (Type 1L)

BEST PRACTICES QUICK GUIDE

MIX DESIGN & PLACEMENT

- **Water Demand:** Expect slightly higher water demand and reduced bleeding; strictly control w/cm ≤ 0.45.
- **Air Content:** Maintain 6.5 ± 1.5% entrained air for freeze – thaw durability.
- **Admixtures:** Adjust water reducers, accelerators, or retarders as needed—trial batches strongly recommended.
- **Placement Timing:** Anticipate variable set times and plan for proper manpower/equipment.

FINISHING

- **Window of Finishability:** Type IL often has a shorter and less predictable finishing window.
- **Avoid Overworking:** Delayed bleeding can trap water at the surface, leading to delamination.
- **Finishing Aids:** Use colloidal silica products (e.g., Day 1, E5, etc.) to reduce crusting, improve surface density, and extend workability.
- **Evaporation Retarders:** Use evaporation retarder products to reduce plastic shrinkage cracking, rapid evaporation on the concrete surface
- **Weather Sensitivity:** More prone to plastic shrinkage and crusting—monitor evaporation rate (stay below 0.2 lb/ft²/hr).

CURING

- **Start Immediately:** Apply curing methods as soon as final finishing is complete—do not wait for bleed water.
- **ACI 308 Guidance:** Initial, intermediate, and final curing should all be planned.
- **Methods:** Use curing compounds (ASTM C309 or C1315 compliant), wet curing, or coverings. Ensure continuous, uniform coverage.
- **Duration:** Maintain curing until at least 70% of design strength is achieved (often 7+ days depending on conditions).

SEALING & LONG-TERM PROTECTION

- **Cure-then-Seal Sequence:** For best durability, apply a curing compound first, then follow up with a penetrating sealer (silane/siloxane, ≥ 40% solids) ~45 days after placement.
- **Cure-and-Seal Blends:** These provide good curing but only moderate sealing; consider a secondary treatment for improved durability.
- **Cold-Climate Consideration:** Apply clear penetrating sealer before the first winter season to reduce scaling and spalling risk.

KEY TAKEAWAYS

- Type IL cement is not “plug-and-play” with Type I/II practices. Success depends on:
  - Adjusting mix designs
  - Monitoring finishing windows closely
  - Starting curing immediately and maintaining it diligently
  - Following with a two-step cure-and-seal approach for long-term durability
- Plan ahead, test locally, and communicate expectations with your supplier to ensure durable, trouble-free concrete.