



Concrete Countertops

Precast

- ▣ is done in your shop.




Concrete Countertops

Cast-in-place

- ▣ is done on site, right on top of the kitchen cabinets.




Pros and Cons of Cast-in-Place

Pros

- ▣ No heavy lifting, no slab transportation
- ▣ No templating, no separate installation
- ▣ No seams
- ▣ No shop required
- ▣ Easier to achieve troweled finish, stamped look
- ▣ Easier to achieve a more "rustic" look
- ▣ Simple, fewer tools
- ▣ Builds on flatwork finishing experience and skills



Pros and Cons of Cast-in-Place

Cons

- ▣ Done on site, right on installed cabinetry
- ▣ Greater risk of site damage
- ▣ More on-site mess
- ▣ Work site imposes significant constraints
- ▣ Little control over job site conditions
- ▣ Fewer looks possible
- ▣ Can be very dependent upon troweling skills
- ▣ Generally lower quality
- ▣ Surfaces rarely smooth, flat
- ▣ Often looks/performs like elevated sidewalk

Pros and Cons of Cast-in-Place

- ▣ Poor Quality CIP

Pros and Cons of Cast-in-Place

- ▣ Poor Quality CIP



Pros and Cons of Cast-in-Place

- ▣ High Quality CIP



Pros and Cons of Cast-in-Place

- ▣ High Quality CIP



Poll: What's your experience?

Poll: What's your preference?

Major steps in making cast-in-place concrete countertops :

- ▣ Site and workspace setup
- ▣ Site protection and masking
- ▣ Form building and reinforcing
- ▣ Mixing, placing concrete
- ▣ Screeding/floating/troweling
- ▣ Curing
- ▣ Surface finishing
- ▣ Sealing

Site Requirements

- ❑ Power
- ❑ Water
- ❑ Shelter from weather
- ❑ Heat
- ❑ Accessibility (stairs, etc)
- ❑ Mixing area / concrete truck access
- ❑ No trade conflicts

Worksite Setup

- ❑ Outdoor worksite



Worksite Setup

- ❑ Indoor worksite



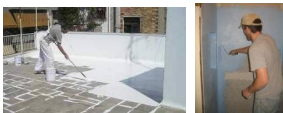
Work Site Prep

- ❑ Protect the worksite!



Cabinet Forms

- ❑ Sub-base materials:
 - Plywood
 - Formply (MDO/HDO)
 - Melamine
 - Cellular PVC board (Azek/Koma)
- ❑ Sub-base must be made waterproof
 - Plastic sheeting (PE) 4-6 mils (100-125 microns)
 - Brushable waterproofing for roofs and showers



Building Forms

- ❑ Setting plywood sub-base



Building Forms

- ▣ Setting perimeter edge forms



Building Forms

- ▣ Setting perimeter edge forms



Building Forms: Waterproofing

- ▣ Sealing sub-base with plastic and tape



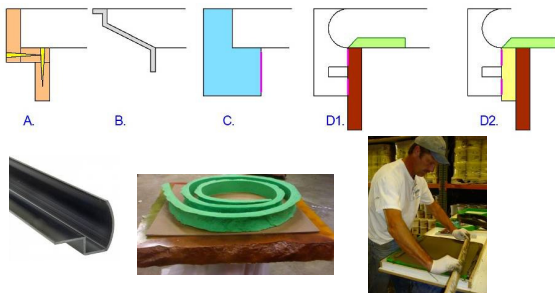
Building Forms: Waterproofing

- ▣ Sealing wall with plastic tape. The pencil line sets the depth of the concrete at the wall.



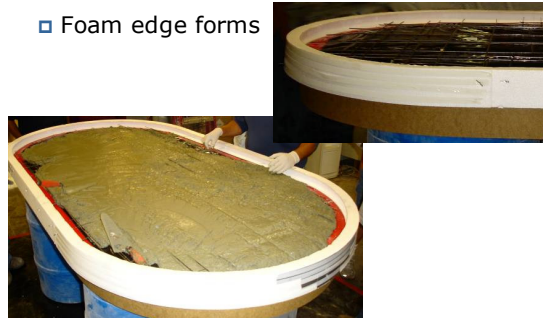
Edge Forms

- ▣ Edge form types



Edge Forms

- ▣ Foam edge forms



Edge Finishing

- ▣ Floating and smoothing edges

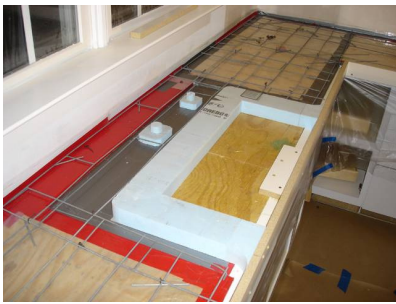


Forming Sink Opening

- ▣ Forming a farmhouse sink opening
- ▣ Drop-in sink is more typical
- ▣ Undermount sinks are advanced topic



Formed and Reinforced



Formed and Reinforced



Reinforcing

- ▣ Good Reinforcing for thin slabs (2")



Reinforcing

- ▣ Good Reinforcing for thicker slabs (3"-4")



Reinforcing

- ▣ Good Reinforcing for thicker slabs (3"-4")



Reinforcing

- ▣ Bad Reinforcing



Questions?

- ▣ Please type in any questions about forming and reinforcing.
- ▣ Mixing is next.

Mixing:

- ▣ Made on site, or
- ▣ Delivery from concrete batch plant



On-Site Mixing



Casting and Finishing:

- ▣ Placement
- ▣ Consolidation
- ▣ Screeding
- ▣ Floating
- ▣ Troweling



Casting

- ▣ Placement
 - From the mixer to the forms



Casting and Finishing:

- ▣ Placement
 - From the mixer to the forms



Casting and Finishing:

- ▣ Consolidation
 - Filling the forms and eliminating voids



Casting

- ▣ Vibrating edge forms



Casting

- ▣ Screeding



Casting and Finishing:

- ▣ Screeding
 - Striking surface flat, ensuring forms are full



Casting and Finishing:

□ Floating

- Works aggregate down
- Brings cream to surface
- Fills small voids
- Refines surface profile



- Magnesium float
- Wood float
- Resin/composite float

Finishing

- Floating to bring up cream



Casting and Finishing:

□ Floating



Casting and Finishing:

□ Floating



Casting and Finishing:

□ Floating



Casting and Finishing:

□ Floating



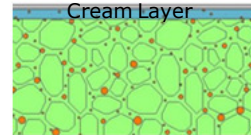
Casting and Finishing:

- Waiting
 - Minor bleedwater is acceptable
 - Wait until it disappears before troweling



Casting and Finishing:

- Troweling
 - Begins once the cement cream layer firms up
 - Only smooths the top cream layer
 - Larger trowels to start (softer cream)
 - Smaller trowels to finish (harder cream)
 - Specialized tools for shaping



Finishing

- Troweling...and troweling...



...and more troweling.

Casting and Finishing:

- Troweling



Casting and Finishing:

- Troweling



Casting and Finishing:

- Troweling



Casting and Finishing:

- Other tools



Finishing

- Trowel "strings"



Curing

- Maintaining a moist environment
- 3-7 days (longer if it's cold)
- Plastic sheeting
 - Not for troweled finishes
 - Moist area can leave dark spots
- Curing blankets
 - Synthetic felt-backed polymer sheeting
 - Felt wicks moisture and prevents spotting.

Kitchen Countertop

- Curing



Kitchen Countertop

- Revealing the concrete



Kitchen Countertop

- Underside of edges



Kitchen Countertop

- ▣ Honing edges



Kitchen Countertop

- ▣ Grouting pinholes, voids



Kitchen Countertop

- ▣ Honing surface: diamond hand pads



Kitchen Countertop

- ▣ Honing corners



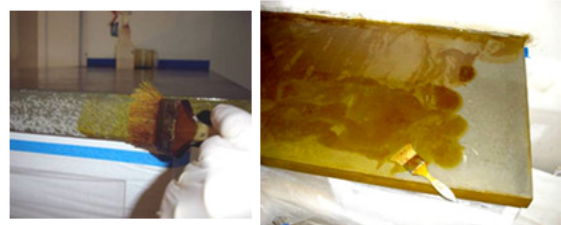
Kitchen Countertop

- ▣ Dry polishing top



Kitchen Countertop

- ▣ Acid Staining



Edges first!

Kitchen Countertop

- ▣ Acid Staining



Neutralize and clean. And clean...
and clean.

Kitchen Countertop

- ▣ Sealing: Densifier



Kitchen Countertop



Kitchen Countertop



Kitchen Countertop

- ▣ Finished!



Bar Countertop

- ▣ Georgetown Yacht Club



Bar Countertop

- ▣ Special embedments



Bar Countertop

- ▣ Forms and reinforcing



Bar Countertop

- ▣ Making the concrete



Bar Countertop

- ▣ Placing and Screeding



Bar Countertop

- ▣ Seeding Embedments



Bar Countertop

- ▣ Embedding the decorative aggregates



Bar Countertop

- Floating to bring up cream to cover embedments



Bar Countertop



Bar Countertop

- Screening out fines to use in filling in surface voids and pits.
- Only light troweling was done because we're going to grind to expose aggregate



Bar Countertop

- A river of glow-in-the-dark aggregate added and troweled into the top as the last step of casting.



Bar Countertop

- Curing
 - 3-7 days normally
 - This project: 1 day, but still kept wet during wet processing



Bar Countertop

- Compression tests



1 day: 2150 psi (14.8 MPa)
3 day: 3700 psi (25.5 MPa)
7 day: 6300 psi (43.4 MPa)
* Cast and cured at 88°F (31°C)

Strength Gain

Temperature affects strength gain

- 1/2x at 50F (10C)
- 1x at 70F (21C)
- 2x at 90F (32C)



- Cold-cured concrete is weaker at 1 week
- Hot-cured concrete is stronger at 1 week

Bar Countertop

Exposing Aggregate



Bar Countertop

MESSY!



Bar Countertop

Grouting



Bar Countertop

Honing and Polishing



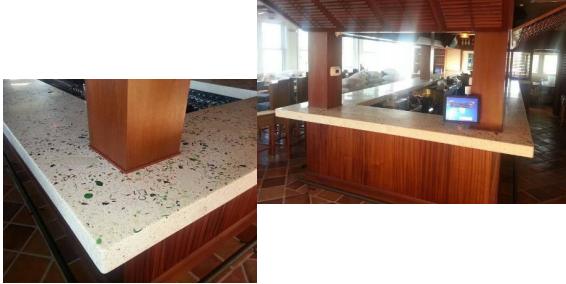
Bar Countertop

Finished in 7 days



Bar Countertop

- Opening day



Questions?

- Please type in any questions about the process.
- (I'll cover mix design and sealing next.)

Mix Design

Important Criteria for a mix:

- Low shrinkage
- Good workability
- Lower w/c ratio
- Excellent finishability
 - Creamy, "fatty"



Mix Design

Typical Basic Mix Characteristics:

- Use a good stampable flatwork mix
- W/C 0.40 to 0.50 (lower is better)
- Slump 4" (100mm)
- 4500+ psi (30+ MPa) compressive (min.)
- Cement: 580 lb/cu yd (344 kg/cu meter)
- 1/2" (13mm) max. coarse aggregate

Mix Design

Common Mistakes:

- Overwatering for workability
- Improper curing
- Overly rich/lean mix
- Oversized aggregate
- Poor finishing (not flat, rocky, etc)
- Imprecise/sloppy forms



Mix Design



Mix Design

My Recommended Mix Modifications:

- Use a pozzolan (VCAS)
 - Add 25% pozzolan by weight of cement
 - Boosts cementitious content, reduces w/c ratio, creates more cream, adds strength, reduces porosity, minimizes efflorescence
- Use superplasticizer to reduce w/c ratio to achieve target slump
- Use SRA (shrinkage reducer) 1% to 2%
 - BASF: Tetraguard AS20, WR Grace: Eclipse, Mapei: Mapecure SRA 25, Sika: Control-220, Specco: SRA-100

Mix Design

Superplasticizer (High Range Water Reducer / HRWR)

- Adds slump to a low w/c mix
- Eliminates the need to overwater
- Most batch plants have HRWR
- Riteks, Euclid, Grace, Master Builders, Sika, BASF, Specco all make appropriate HRWR (it's not critical which one)

Mix Design

Example Mix Ratios

- Aggregate: 2.82 [1630 lbs/cu yd (968 kg/cu meter)]
- Sand: 2.61 [1508 lbs/cu yd (895 kg/cu meter)]
- Cement: 1 [580 lbs/cu yd (344 kg/cu meter)]
- Pozzolan: 0.25 [145 lbs/cu yd (86 kg/cu meter)]
- Water: 0.5 [172 kg/cu meter)]



Mix Design



Sealing

Topical/Coating

- Concrete cured for 1-2 weeks
- Trowelled finishes acid-etched
- Honed to 200 grit (finest grit)
- Washed, cleaned and dried 1-2 days

Sealing

Stonelok E3/2K



Sealing

Densifying (for polishing)

- ❑ VSeal 117a (lithium silicate)
- ❑ Concrete should be 5-7 days old
- ❑ Apply to air dry concrete (overnight)
- ❑ Apply after honing/grouting completed / 200 grit
- ❑ Polish to final grit
- ❑ Densify again (Vseal 101)



Poll: Further training?

Questions?



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