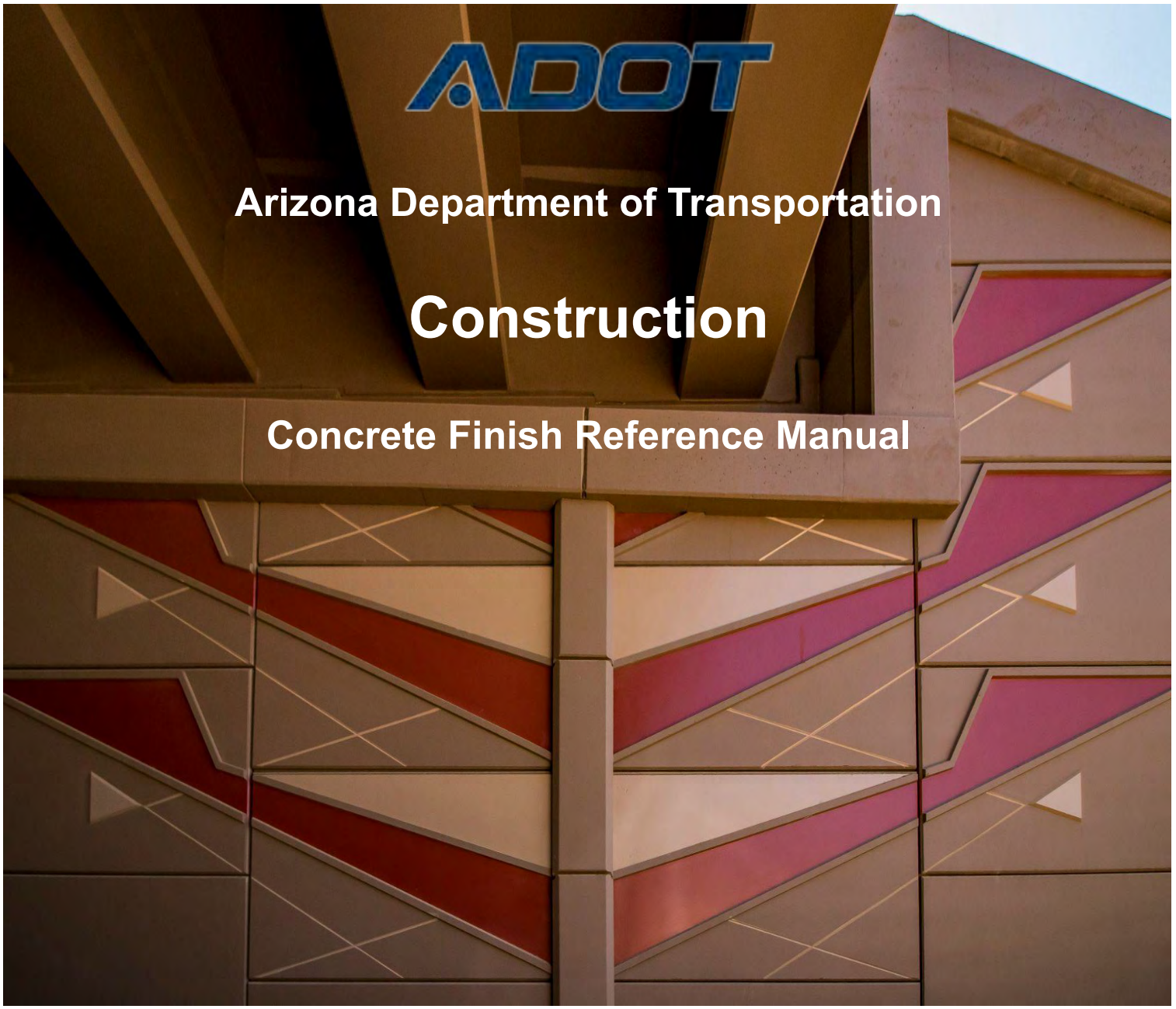

Arizona Department of Transportation

Construction

Concrete Finish Reference Manual

Infrastructure Delivery and Operations Division

Concrete Finish Reference Manual
June 2022

FOREWORD

The CONCRETE FINISH REFERENCE MANUAL has been prepared as a guide in an effort to encourage more uniform construction and inspection Statewide.

Some of the pictures shown in this manual are basic problems experienced in concrete finishing and are examples of variations of Class I Formed finish, Class II Concrete finish, Slip form finish, and Tined bridge deck finish.

Although all of the variations of concrete finishes cannot be shown, it is hoped that this manual, and explanatory comments offered will help field personnel in determining acceptable and non-acceptable concrete finishes in accordance with the 2021 edition of the Standard Specifications for Road and Bridge Construction, and the 2021 edition of the Supplemental Specifications.

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Stages of Inspection of Concrete Works

Pre-Placement

- Review the appropriate plans and specifications related to the work.
- Review the Quantlist and Construction Manual sections that would apply to this activity.
- Is a pre-activity meeting needed?
- Confirm that the earthwork has been built to the specified lines and grades and all compaction requirements have been met.
- Inspect forms prior to each use for cleanliness, excess build-up, rust, chips, cracks and other damage.
- Confirm the forms have been placed to the correct lines and grades.
- Inspect the forms for proper bracing to prevent any blow outs during placement.
- Confirm that all rebar has been placed per the plans and drawings, size, spacing and type.
- Check rebar for proper clearance to forms and plan design clearances.
- Confirm any conduits and anchor bolts are placed correct per plan.
- Make sure you have the right materials and equipment. The necessary concrete materials need to be on-hand, inspected, and approved before pouring. Depending on the project, this may include insulated blankets, wet mats, tarps, and external heaters.
- Make sure the contractor has an approved wash out area for the mixer truck.
- Make sure the correct type of cure will be used. Check with the Materials Group and make sure the cure used has been pre-sampled and approved.

During Placement

- Do a final inspection prior to placement, make sure there is no trash or debris in the form work and the rebar and other features are still in the correct locations.
- Make sure the forms have been moistened prior to concrete placement.
- Verify concrete temperatures are between 50° F and 90° F prior to placement.
- Check that the correct mix design from the approved plant is being placed. Obtain a batch ticket from the driver.
- Perform all of the required tests on the concrete per the Sample Guide requirements, minimum of slump, temperature and strength cylinders, air content if applicable.
- Observe the concrete being placed, look for clumps, unmixed concrete, and debris.
- Observe that the concrete is being vibrated correctly for the type of structure it is being placed in.
- At least two vibrators should be available on site.
- Each batch of concrete must be poured within a maximum of 90 minutes. The time should be started from the addition of water to cement.

Post-Placement

- Finish any exposed surfaces to the required finish class and apply approved cure to any surfaces not covered in formwork. If forms are left in place until concrete reaches strength, no cure is needed.
- When forms are removed, patch any defects and snap tie holes if applicable.
- Immediately apply cure after all patch work has been completed.
- Make sure the correct type of cure will be used. Check with the Materials Group and make sure the cure used has been pre-sampled and approved.
- Confirm the cure was applied at the specified rate. Record and verify curing method.
- Inspect curing process daily and randomly and record any non-compliance such as surface is not kept wet, membrane surface damaged. Corrective actions taken for each day.
- Winter conditions may require the use of blankets. Ensure blankets are kept moist.
- Make sure the new concrete will be protected against any traffic or damage.
- Complete a Quantlist for the appropriate structure type.
- Ensure that concrete cylinders are preserved on site in conformity with ACI requirements.
- Ensure that concrete cylinders are transported to the testing laboratory and consequently tested compliant with ACI requirements.

Barrier

Unacceptable joint between slip form barrier (left side) and cast in place metal form barrier (right side). Additionally, an unacceptable patch indicating no cure material was applied.

Unacceptable Slip Form Barrier finish. Slip form machine did not provide enough distance between the surface of embedded reinforcement and the outer surface of the concrete. (Insufficient concrete cover.)

Unacceptable Barrier finish. Concrete was allowed to slump. Does not meet tolerance specifications.

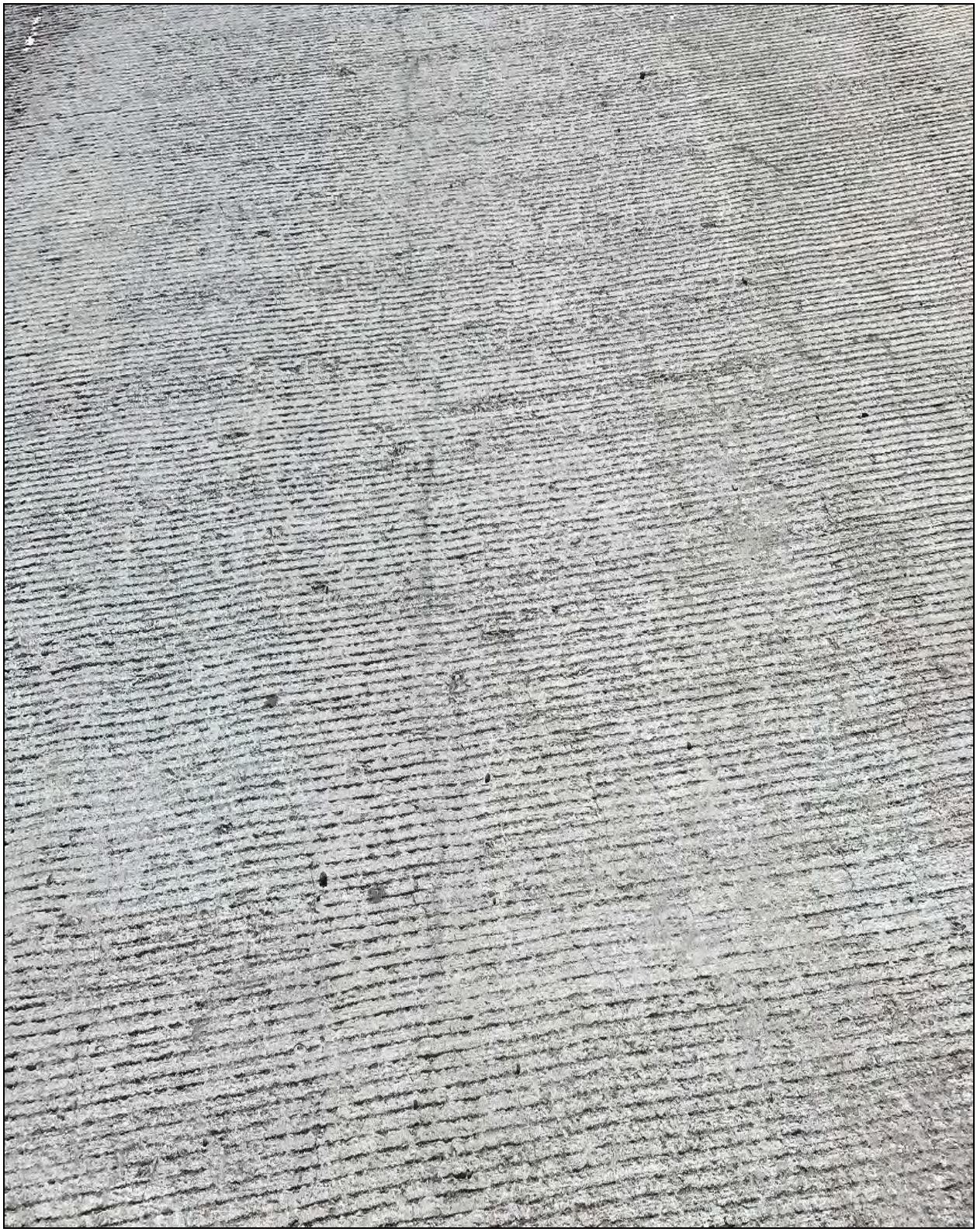
Acceptable Slip Form Barrier indicated by smooth and uniform finish.

Acceptable Barrier indicated by alignment for slip form finish.

Cast-In-Place formed Barrier. Acceptable joint in formed concrete barrier.

Bridge Deck

Unacceptable Bridge Deck surface. Surface consistency should require float finish before tining.



Acceptable Bridge Deck.

Bridge Deck surface. Acceptable bridge deck tining if depth specification is met.

Class I Finish

Unacceptable Class 1 Finish. Slobbers should be removed.

Acceptable Class I Finish. Good formed finish and joints.

Unacceptable Class 1 Finish indicated by honeycomb - Poor consolidation, better use of vibrator needed during placement. Verify an approved repair method is followed.

Unacceptable Class 1 Finish indicated by honeycomb - Poor consolidation, better use of vibrator needed during placement. Verify an approved repair method is followed.

Class II Finish

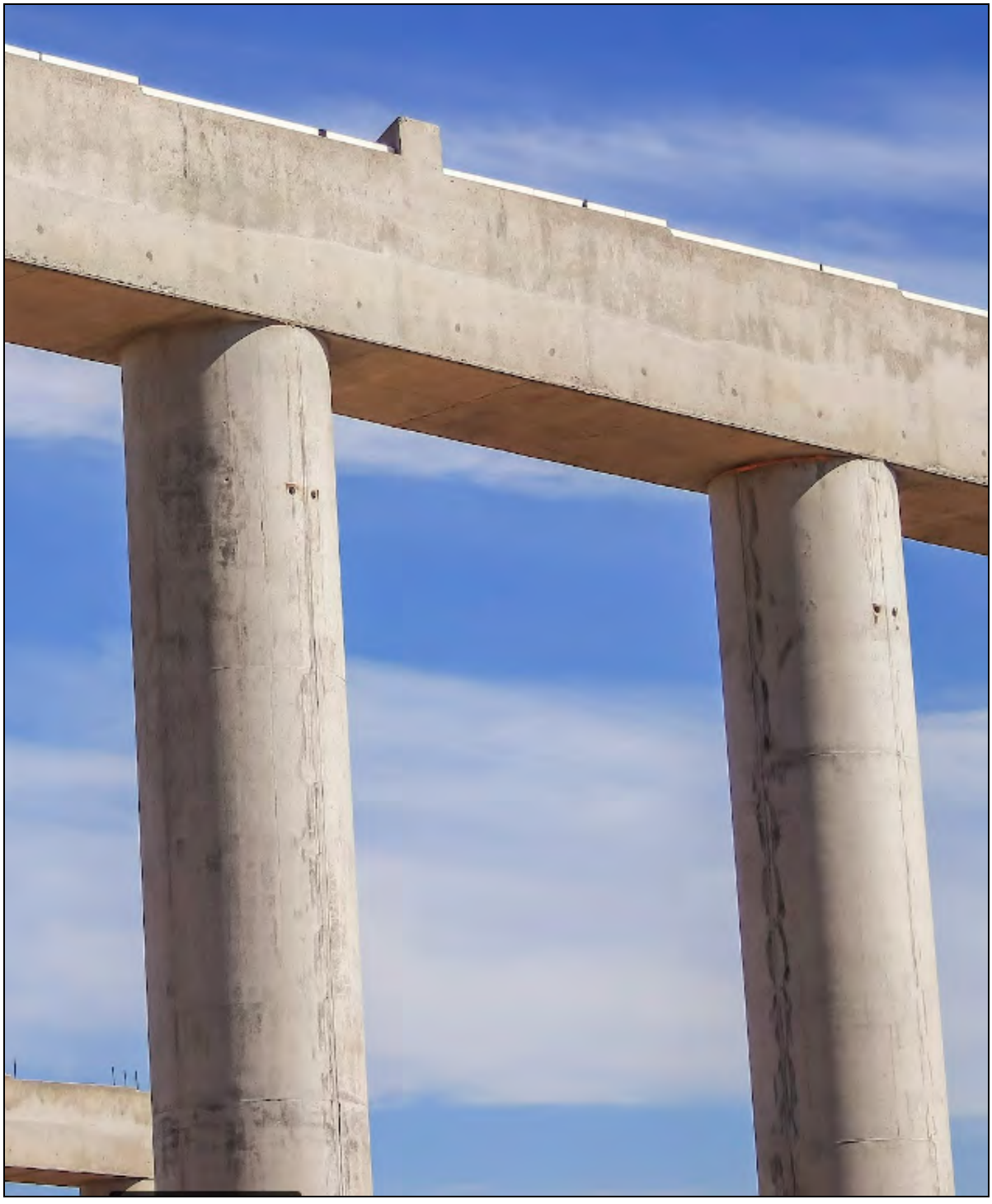
Unacceptable Class II Finish indicated by 1) Joints being too wide 2) Irregular surface caused by worn out forms.

Acceptable Class II Finish indicated by smooth and uniform finish.

Columns & Caps (Bents)

Unacceptable Bridge Column Finish indicated by poor consolidation, better use of vibrator needed during placement. Verify an approved repair method is followed.

Unacceptable Bridge Column Finish. Exposed aggregate should be patched before painting.



Acceptable Bent.

Acceptable Column Finish indicated by good form and cure material application.

Curb & Gutter

Acceptable curb and gutter indicated by good form, finish, and accurate placement of rumble strip.

Catch Basins

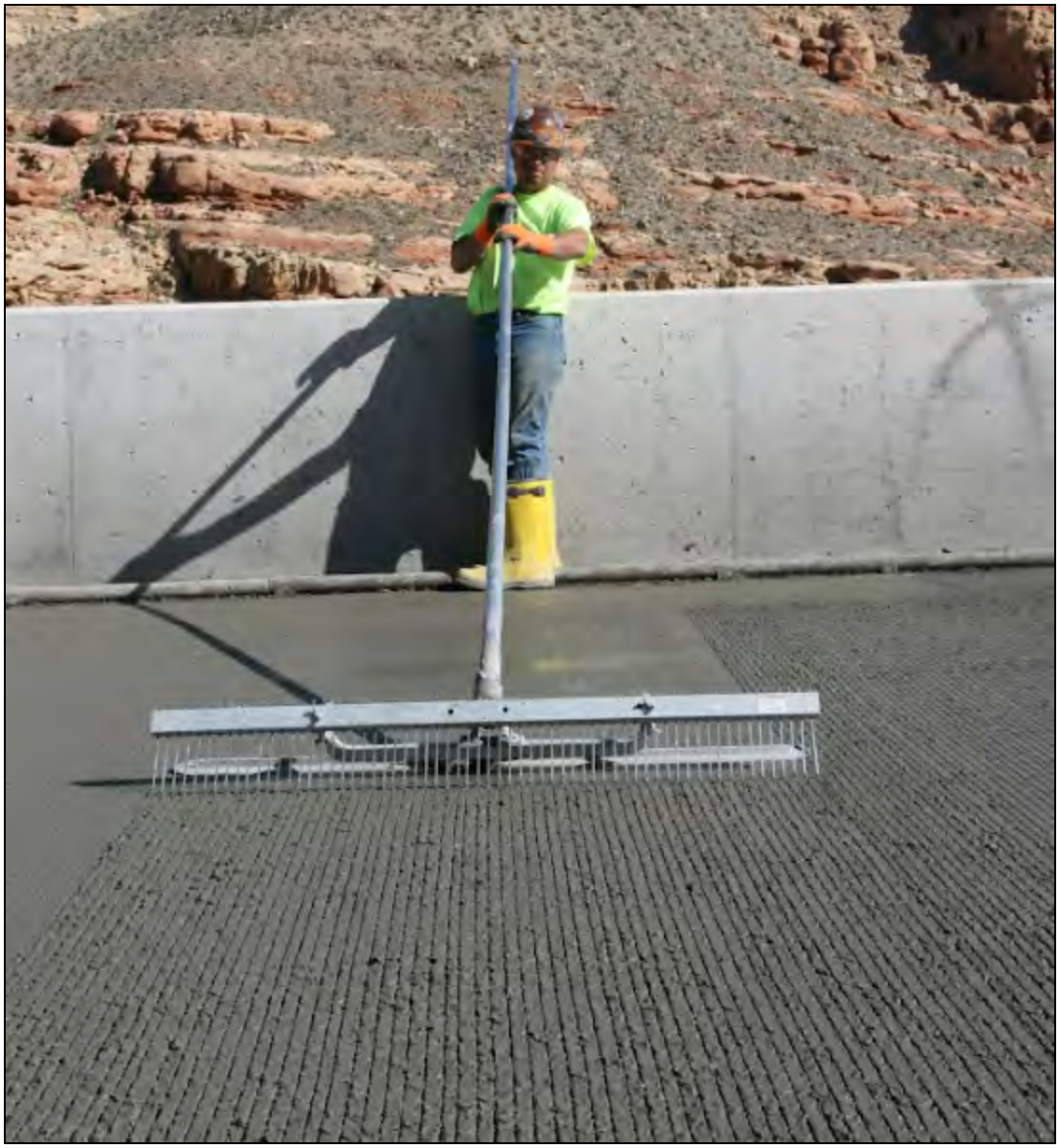
Unacceptable Catch Basin finish. Joint needs to be bushed, snap tie holes need to be pointed and slobber needs to be removed. Will require a Class II Finish.

Unacceptable Catch Basin indicated by poor consolidation, better use of vibrator needed during placement. Verify an approved repair method is followed.

PCCP Finish

Acceptable PCCP indicated by tined finish. Depth specification should be met.

Acceptable PCCP finish. Correct concrete consistency for tining. Ensure workers stay off fresh concrete.



Correct concrete consistency for hand tining.

Pedestrian Ramps

Acceptable pedestrian ramp indicated by proper placement of detectable warning strips. Surface given a fine brush finish.

Acceptable Pedestrian Ramp showing concrete thoroughly worked so that coarse aggregate is below the surface. Surface finished with a float, troweled smooth and given a final brush finish.

Wall Structures

Rustication

Unacceptable Rustication shown by spalled concrete caused. Spalls indicate poor release agent coverage or worn out forms. Should be patched before painting.

Unacceptable. Partial Rustication stopped before natural ground. Should go below ground level approximately 1ft. (unless indicated otherwise on the plans)

Acceptable Rustication.

Acceptable Rustication.

Joints, Chamfer & Bituminous Material

Unacceptable Sound Wall indicated by improper location of rustication. Construction, Weakened Plane, and Expansion joints should avoid rustication. Additionally, chamfers are missing, causing spalls to occur.

Unacceptable Retaining Wall indicated by missing chamfer and bituminous material at expansion joint resulting in spalls.

Unacceptable Sound Wall indicated by missing chamfer on construction joint resulting in spalls. Additionally, improper application of patch material.

Acceptable Retaining Wall indicated by proper use of chamfer and insertion of bituminous material.

Sidewalks

Acceptable sidewalk indicated by concrete thoroughly worked so that the coarse aggregate is below the surface. Sidewalk was given a final fine brush finish. (Sidewalk to be cleaned before acceptance)

Acceptable Sidewalk. No discolorations. Sidewalk troweled smooth and then gave a final brush finish.

Acceptable Sidewalk. Surface finished to grade with a float. The exposed edges are tooled to a ¼- inch radius. (unless indicated otherwise on the plans) Sidewalk given a final brush finish.