

## BID COST SHEET

**LIST DATE AND NUMBER OF ADDENDA RECEIVED:** \_\_\_\_\_

**BASE BID: INCLUDING BUT NOT LIMITED TO:**

MAIN POOL RENOVATIONS, REMEDIATION OF EXISTING GUTTER, SECTION REMOVAL AND REPLACEMENT OF 6" TILE LINE AT GUTTERS EDGE, REMOVAL AND REPLACEMENT OF TILE AND GROUT BED ON ZERO ENTRY, RE-PLASTER OF ENTIRE POOL SHELL, PURCHASE AND INSTALLATION OF REPLACEMENT TOT SLIDE PAD, REMEDIATION OF RUST AND PAINTING OF EXISTING FLUME SLIDES:

**BASE BID:** \_\_\_\_\_ \$ \_\_\_\_\_

**WRITTEN**

**LINE ITEM - UNIT PRICING: 1. CONTRACTOR TO PROVIDE A LINEAL FOOT PRICE OF THE 6" PERIMETER TILE REPLACEMENT BEYOND THE APPROXIMATE 180 FEET OF REPLACEMENT INCLUDED IN THE BASE BID WITH THE GUTTER EDGE.** \_\_\_\_\_ \$ \_\_\_\_\_

**WRITTEN**

**LINE ITEM - UNIT PRICING: 2. CONTRACTOR TO PROVIDE A LINEAL FOOT PRICE OF GUTTER EDGE REPLACEMENT BEYOND THE 180 LINEAL FEET OF REPLACEMENT INCLUDED IN THE BASE BID.** \_\_\_\_\_ \$ \_\_\_\_\_

**WRITTEN**

SHELL REPAIR AND 3 COATS OF PAINT ON POOL SHELL IN LOU OF BASE BID RE-PLASTER.:

**ALERNATE # 1:** \_\_\_\_\_ \$ \_\_\_\_\_

**WRITTEN**

REMOVAL AND REPLACEMENT OF REMAINING 6" PERIMETER TILE BAND:

**ALERNATE # 2:** \_\_\_\_\_ \$ \_\_\_\_\_

**WRITTEN**

REMOVAL AND REPLACEMENT OF DOUBLE FLUME SLIDE WITH NEW SINGLE FLUME SLIDE  
MIRACLE 185-105:

**ALERNATE # 3:** \_\_\_\_\_ \$ \_\_\_\_\_

**WRITTEN**

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Witness

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Company Name

Signature

Name, Title (Please Print)

Date

## STATEMENT OF BIDDER'S QUALIFICATIONS

All questions must be answered, and the data given must be clear and comprehensive. **This statement must be notarized.** If necessary, questions may be answered on separate attached sheets. A minimum of five (5) commercial pool projects of a similar nature constructed directly by the Contractor is required. The Bidder may submit any additional information he desires.

1. Name of Bidder \_\_\_\_\_
  
2. Permanent main office address and employer identification number  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
  
3. When Organized \_\_\_\_\_
  
4. If a corporation, where incorporated \_\_\_\_\_  
\_\_\_\_\_
  
5. How many years have you been engaged in the contracting business under your present firm or trade name? \_\_\_\_\_  
\_\_\_\_\_
  
6. Contracts on hand: (Schedule these, showing amount of each contract and the appropriate anticipated dates of completion). \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
  
7. General character of work performed by your company.  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
  
8. Have you ever failed to complete any work awarded to you? If so, where and why?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

9. Have you ever defaulted on a contract? If so, where and why? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

10. List the more important projects recently completed by your company, stating the approximate cost for each and the month and year completed.  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

11. List your major equipment available for this contract \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

12. Experience in commercial swimming pool construction work similar in nature to this project (list 5 with dollar amount and references.)  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

13. Background and experience of the principal members of your organization, including the officers. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

14. Credit available: \$ \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

15. Give bank reference \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

16. Will you, upon request, fill out a detailed financial statement and furnish any other information that may be required by the Ebensburg Borough.  
\_\_\_\_\_

17. The undersigned certifies for itself; it has no unsatisfied tax liabilities or other Commonwealth obligations.



18. The undersigned certifies for itself and all of its subcontractors and suppliers that it is not under suspension or debarment by the Commonwealth or any government entity, instrumentality, or authority.
19. The undersigned hereby authorizes and requests any person, firm, or corporation to furnish any information requested by the Ebensburg Borough in verification of the recitals comprising this Statement of Bidder's Qualifications.

Dated at \_\_\_\_\_ this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

By \_\_\_\_\_

Title \_\_\_\_\_

State of \_\_\_\_\_)

County of \_\_\_\_\_)

\_\_\_\_\_ being duly sworn deposes and says that they are  
\_\_\_\_\_ of \_\_\_\_\_ and that  
the answers to the foregoing questions and all statements therein contained are true and  
correct.

Subscribed and sworn to before me this  
\_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

\_\_\_\_\_  
Notary Public

# EBENSBURG BOROUGH SWIMMING POOL

## SECTION 09 3213 SWIMMING POOL TILE

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. The drawings and General Provisions of the contract, including General and Supplementary Conditions apply to work of this section.

#### 1.2 SUMMARY

- A. The cementitious pool finish shall have ceramic tile markings and trim at locations including the pool vertical tile band, stairs, depth markings, and all other tile installations as shown and detailed on the contract drawings and in strict accordance with these specifications.
- B. The CONTRACTOR shall furnish and install the work of this section.

#### 1.3 RELATED SECTIONS

- A. Division 1 – Mock Ups
- B. Division 7 - Joint Sealers
- C. Section 131100 - Swimming Pool
- D. Section 099726 - Swimming Pool Cementitious Finish

#### 1.4 QUALITY ASSURANCE

- A. Reference Standards: Conform to the following standards unless otherwise required herein.
  - 1. American National Standards Institute (ANSI)
    - a. A108.01 – General Requirements: Subsurfaces and Preparations by Other Trades.
    - b. A108.02 – General Requirements: Materials, Environmental, and Workmanship.
    - c. A108.1, Glazed Wall Tile, Ceramic Mosaic Tile, Quarry Tile and Paver Tile installed with Portland Cement Mortar.
    - d. A108.1C – Contractor's Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry Set or Latex-Portland Cement Mortar.
    - e. A108.5 – Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar.
    - f. A108.10 – Installation of Grout in Tile Work.
    - g. A137.1 Standard Specifications for Ceramic Tile.
  - 2. American Society for Testing and Materials (ASTM)

## **EBENSBURG BOROUGH SWIMMING POOL**

- a. C144-99, Aggregate for Masonry Mortar
  - b. C150-00, Portland Cement
  - c. C171-97a, Sheet Materials for Curing Concrete
  - d. C206-97, Finishing Hydrated Lime
  - e. C207-91 (R1997), Hydrated Lime for Masonry Purposes
  - f. F-1869, Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
  - g. F-2170, Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In Situ Probes
3. Tile Council of North America (TCNA); 2013 Edition, Handbook for Ceramic Tile Installation.
4. International Standards Organization (ISO)
- a. ISO 13007 – Part 1: 2004 Ceramic Tiles – Grouts and adhesives; specifies the value of performance requirements for all tile adhesives.
  - b. ISO 13007 – Part 2: 2005 Ceramic Tiles – Grouts and adhesives; test method for adhesives.
  - c. ISO 13007 – Part 3: 2005 Ceramic Tiles – Grouts and adhesives; terms, definitions and specifications for grout.
  - d. ISO 13007 – Part 4: 2005 Ceramic Tiles – Test methods for grout.
5. American Concrete Institute
- a. ACI 302 – Guide for Concrete and Floor Slab Construction
6. International Concrete Repair Institute (ICRI)
- a. Concrete Surface Profile (CSP)
- B. Tile installers shall have two years experience in similar pool projects which the Owner may require written proof thereof and proper tools to install tile.
- 1.5 MANUFACTURERS
- A. Subject to compliance with requirements provide ceramic tile, mortar and grout of the following manufacturers: MasterTile Co. (tile), Dal-Tile Co. (tile), and Laticrete International Inc. (thin-set, waterproofing, grout and admixtures) or approved equal.
- 1.6 SUBMITTALS
- A. Submit shop drawings indicating tile layout, patterns, joint layout, color arrangement, perimeter conditions, junctions with dissimilar materials, thresholds and setting details.
  - B. Submit product data indicating material specifications, characteristics, and instructions for using adhesives and grouts.

## **EBENSBURG BOROUGH SWIMMING POOL**

C. Samples:

1. Mount tile and apply grout on 24 x 24 inch backerboard to indicate pattern, color variation and grout joint size variations of each pattern. Furnish mounted tile samples as requested by the architect/owner.

D. Submit manufacturer's installation instruction.

E. Submit maintenance data.

1. Include recommended cleaning and stain removal methods, cleaning materials.

1.7 PRODUCT DELIVERY AND STORAGE

- A. Deliver tile materials to site in unopened factory containers sealed with grade seals bearing printed name or manufacturer and the words "Standard Grade". Keep the grade seals intact and containers dry until tiles are used. Keep cementitious materials dry until used.

1.8 JOB CONDITIONS

- A. Inspect and verify job conditions. Report all defects in base surfaces for correction before proceeding.
- B. Maintain a temperature range of 40 degrees Fahrenheit to 90 degrees Fahrenheit during installation of tile and grout materials. Tile installation should cure for a minimum 14 days with average an temperature of 70 degrees, while maintaining the minimum 40 degrees and maximum 90 degrees Fahrenheit, prior to filling pool with water.
- C. Vent temporary heaters to outside to avoid carbon dioxide damage to the new tile work.

1.9 COLORS

- A. Colors to be selected by the Architect or Interior Designer. Note that swimming pool regulations may dictate color selections within the pool tank. See 2.01 Tile Materials for price group breakdowns.

1.10 WARRANTIES

- A. The CONTRACTOR warrants to the Owner that materials and equipment furnished under the contract will be of good quality and new unless otherwise required or permitted by the contract documents, that the work will be free from defects not inherent in the quality required or permitted and that the work will conform with the requirements of the contract documents. Work not conforming to these requirements including substitutions not properly approved and authorized, may be considered defective. The CONTRACTOR'S warranty excludes remedy for damage or defect caused by abuse, improper or insufficient maintenance, improper operation, modifications not executed by the CONTRACTOR or improper wear and tear under normal usage. If required by the Owner, the CONTRACTOR shall furnish satisfactory evidence as to the kind and quality of materials and equipment. All warranties shall be for a period of five years, unless otherwise specified.
- B. All setting materials shall be provided by the same manufacturer. All mixing materials and application procedures shall be done in accordance with manufacturer's recommendations and requirements. Documentation shall be provided to this effect by the contractor with verification from the manufacturer. This documentation shall be included in the operations and maintenance manual under warranties as documentation qualifying the project for a 15 Year Systems Warranty by Laticrete International, Inc., Mapei, Inc. or approved equal.

## EBENSBURG BOROUGH SWIMMING POOL

- C. The CONTRACTOR shall agree to repair or replace any work at no cost to the Owner upon written notification from the Owner within the warranty period. Pro-rated warranties are not acceptable.

### PART 2 - PRODUCTS

#### 2.1 TILE MATERIALS

- A. Standard grade conforming to ANSI A137.1. Provide trimmer units as indicated and specified, including special shapes as detailed or required. Tile patterns and colors shall be as indicated and specified, colors of approved shades. Mesh mounted or perforated paper backed tile is not allowed where the mesh of paper remains as a permanent part of the installation. If dot mounting is used, a minimum of 67% of the depth of the tile shall be free from any dots to ensure proper grout curing.
- B. All tile shall be "frost-proof" and all tile and walking surfaces shall be non skid.
- C. Message Tile and Depth Markings
  - 1. Horizontal and vertical depth markings and warning signs shall be 6" x 6" with 4" high numbers and letters. All horizontal depth markers shall be slip resistant. Single tile abbreviations shall be used for 'FT' and 'IN'.

#### 2.2 SWIMMING POOL TILE SETTING MATERIALS AND INSTALLATION

- A. Surface Preparation
  - 1. Surface preparation shall be in accordance with ACI 302. The surface shall be structurally sound and free of any foreign substances and debris that could reduce or impair adhesion. Sound and remove all loose concrete to firm substrate. Surfaces shall be roughened to a CSP of 3 to 5 (reference ICRI CSP Standards 7 to 9 for acceptable profile height). Thoroughly wash/rinse with clean potable water. Surface defects or holes in the substrate shall be patched per manufacturer's recommendations.
- B. Slurry Bond Coat
  - 1. Horizontal surfaces to receive a thick bed mortar application shall be installed over a slurry bond coat of either Laticrete 254 Platinum one-step, polymer-fortified, thin-set mortar, or Mapei 4:1 bag mix with Planicrete AC Additive over a clean concrete slab, in compliance with ANSI A108.1A (2.2 & 5.2). As manufactured by Laticrete International, Mapei, Inc., or approved equal. Note that slurry bond coats are not required under vertical applications of the render and scratch coat.
- C. Mortar & Leveling Beds
  - 1. **Bonded Thick Bed Method (Floor / Horizontal Surfaces):** Provide a dry pack, thick mortar bed on horizontal surfaces consisting of either Laticrete 3701 Fortified Mortar Bed, or Mapei, 4:1 bag mix with Planicrete AC Additive. Apply over a properly prepared slurry bond coat. Maximum lift thickness not to exceed 2".
  - 2. **Render- Scratch and Float Coats (Wall / Vertical Surfaces):** Provide wall render (scratch and float coats) on vertical competition turning surfaces to a depth of 4 feet below the water surface, consisting of either Laticrete 3701 Fortified Mortar Bed, or Mapei, 4:1 bag mix with Planicrete AC additive for lift thicknesses up to 1/2". Wall render is made to a plastic consistency

## EBENSBURG BOROUGH SWIMMING POOL

when used vertically. Fill all holes and bring surface up to line and plane as required. As manufactured by Laticrete International, Mapei, Inc. or approved equal. Note that slurry bond coats are not required under vertical applications of the render and scratch coat.

### D. Tile Thin-Set

1. Use either Laticrete 254 Platinum one-step, polymer fortified, thin-set mortar or Mapei Ultraflex 3 one-step, polymer modified, thin-set mortar, used in accordance with the manufacturer's requirements. As manufactured by Laticrete International, Mapei, Inc., or approved equal.

### E. Tile Grout

1. Use Laticrete SpectraLock Grout in accordance with the manufacturer's requirements. As manufactured by Laticrete International or approved equal.

### F. Elastomeric Sealant

1. Use Laticrete Latasil sealant for all inside/outside corners, expansion/movement joints, and to seal lighting/plumbing fixture penetrations. Apply sealant over Latasil 9118 primer. All primer and sealant installation shall be in accordance with the manufacturer's requirements. As manufactured by Laticrete International, Inc., or approved equal.

- G. All mixing and application procedures shall be done in accordance with the manufacturer's recommendations and requirements. The manufacturer's representative shall visit the site to verify field conditions, confirm materials and application requirements and ascertain that all materials and systems are so installed. Documentation shall be provided to this effect.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Complete water tightness test prior to tile installation. Concrete tank shall be watertight per ASTM D5957, the Tile Council of North America, and specification 131100.
- B. Clean substrates of dust, dirt, oil, grease and deleterious substances and mechanically roughen concrete and shotcrete for bond. Conform to applicable reference standards and to recommendations of manufacturers of materials used and meeting ICRI, CSP of 3-5.
- C. Substrates to Receive Mortar Setting Beds
1. Dampen concrete substrate to receive tile work according to above referenced standards or tile manufacturer's instructions, as required.
- D. Substrates to receive thin set tile applications shall meet normal construction tolerances of 1/4" in 10' where competition tolerances do not apply, and shall meet competition tolerances where required elsewhere in these specifications, and shall be free of bumps, dips and surface irregularities that may effect the satisfactory installation of the tile.
- E. Tile Wetting
1. Dampen tile according to above reference standards or tile manufacturer's instructions, as required.
- F. Screeds

## EBENSBURG BOROUGH SWIMMING POOL

1. Accurately set temporary screeds to control the finish plane of mortar-bed set tile and remove as soon as setting bed is sufficiently hardened. Fill void spaces from screeds with same mortar.

### 3.2 TILE INSTALLATION

- A. Arrange tile according to patterns detailed. Set tile with flush well-fitted joints, finished in true planes, plumb, square, joints of uniform size. Provide approved trimmers as shown or required. Cut tile without marring. Carefully grind and joint tile edges and cuts.
- B. Follow Tile Council of North America installation methods P601 and B417 to achieve total tile system thickness for thin or thick-set.

#### 1. Thick Set

- a. Apply specified setting bed mortar, up to 1/2" in thickness, on cured and dried concrete pool shell. Tamp and screed to required planes. Spread no more mortar than can be covered with tile before initial set. Do not use re-tempered mortar. Trowel 3/32" to 1/8" thick bond coat over plastic setting bed mortar just before setting tile or apply bond coat to back of each tile placed. 95% coverage of the back of the tile or tile sheet is required. Set tile in position and beat firmly into the setting bed mortar. Bring tile faces to a true and correct plane. Complete all beating and leveling before mortar sets and in no case later than one hour after first placing. When ready, wet and remove paper and glue avoiding excess water. At this time adjust any out-of-line or out-of-level tile.

#### 2. Thin Set

- a. Apply specified bond coat on cured and dried concrete pool shell. Trowel 3/32" to 1/8" thick bond coat over concrete pool shell just before setting tile or apply bond coat to back of each tile placed. 95% coverage of the back of the tile or tile sheet is required. Set tile in position and beat firmly into the setting bed mortar. Bring tile faces to a true and correct plane. Complete all beating and leveling before mortar sets and in no case later than one hour after first placing. When ready, wet and remove paper and glue avoiding excess water. At this time adjust any out-of-line or out-of-level tile.

- C. Finished tile surface shall be level and in plane, with no sharp or protruding edges. Tiles out of plane more than 1/16" shall be removed and replaced. Sharp edges shall be stoned smooth.

#### D. Grout Joint Sizes

1. Unless otherwise approved, install tile with uniform 3/32 inch joint width. A maximum 1/8" joint width may be utilized to meet specific installation requirements, if required.

#### E. Ceramic Tile Joint Grouting

1. Mix grout to a thick creamy consistency and force into joints for entire thick depth, flush with surface. Clean off all excess and fill skips and gaps before grout sets. Color selection by Architect or Interior Designer. Provide dampness for minimum 3-day curing and polish with clean dry cloths (not required when epoxy grouts are used).

#### F. Expansion Joints

1. Place expansion joint per applicable TCNA Method P601MB, P601TB, or P602 and conforming to Method EJ171. Provide shop drawings showing backer rod and joint dimensions. All expansion, control, construction, cold, and seismic joints in the pool structure should continue through the tile work, including such joints at vertical surfaces. Movement

## EBENSBURG BOROUGH SWIMMING POOL

joints shall be placed at all changes in direction and elevation. Refer to the structural engineer for additional required movement joints. Joint size shall be a minimum of 1/8". Joints through tile work directly over structural joints shall not be narrower than the structural joint. The Contractor shall use cement compatible coatings when using chalk lines for joint layout purposes.

### G. Fill and Empty Rates

1. Use a fill and drain rate of 2 feet per 24 hours to minimize thermal shock and structural movement. Maintain a temperature differential of 10 degrees Fahrenheit or less between the pool water and the substrate during fill and drain cycles.

### 3.3 TESTING AND INSPECTION

- A. Before filling of the pool, and its subsequent provisional acceptance at substantial completion, the tile installation shall be visually inspected and sounded in the presence of the Architects and/or the Owner's representative to verify adhesion of the tile to its substrate as well as its overall compliance with the requirements of this Section.
- B. Any and all tile work found to be loose, improperly adhered, out of plane, misaligned or otherwise non-conforming shall be removed and replaced at no additional cost to the Owner.

### 3.4 CLEANING

- A. Upon completion of placement and grouting, clean tile installation as recommended by TCNA and manufacturers of proprietary materials. Tile shall be cleaned with pH neutral solutions, free of both sodium and potassium, in accordance with the tile and grout manufacturer's printed instruction.
- B. Leave finished installation clean and free of cracked, chipped, broken, un-bonded or otherwise defective tile work.
- C. Protect installed tile work with non-staining Kraft paper, polyethylene sheeting, or other approved heavy covering during the construction period to prevent damage.

### 3.5 REPLACEMENT TILE

- A. Provide Owner with approximately 10% or 25 square feet (whichever is least) of each color and type tile used on the project for Owner's repair and replacement requirements.

**END OF SECTION**



# EBENSBURG BOROUGH SWIMMING POOL

## SECTION 09 9726 SWIMMING POOL CEMENTITIOUS FINISH

### PART 1 - GENERAL

#### 1.1 SUMMARY

- a. Provide a conventional proprietary aggregate plaster finish to the pool structure(s). Provide installation of bond coat prior to application of pool finishes. A ceramic tile trim shall be furnished and installed on the pool vertical tile band, stairs, underwater bench nosings, recessed wall steps, depth markings, wall targets, floor lane markings, along construction joints, and all other tile installations as shown and detailed on the contract drawings and in strict accordance with these specifications. **Product equals may be approved up to 10 days prior to bid.**
- b. Provide water analysis and pre-fill requirements.

#### 1.2 SUBMITTALS

- a. Samples
  1. Prepare 12-inch square panel at the site showing color and texture for pool plaster. Finished cementitious finish work shall match the approved sample panel.
- b. Certificates
  1. Submit certificates attesting that the materials furnished meet the requirements specified herein.
- c. Test Report
  1. Submit results of domestic water analysis and calculation of amounts of chemicals required to balance pool water on initial fill of pool.

#### 1.3 PRODUCT DELIVERY AND STORAGE

- a. Deliver manufactured materials to site in manufacturers' original unbroken packages or containers bearing manufacturers' name and brand labels. Keep cementitious materials dry until ready to be used and stored off the ground, under cover and away from damp surfaces.

#### 1.4 JOB CONDITIONS

- a. Apply plaster in swimming pool only when ambient temperature is above 40 degrees F and below 90 degrees F, and protect applied plaster from rapid drying by sun or wind until curing is completed or pool is filled with water. Confirm and comply with all applicable manufacturers installation requirements.

#### 1.5 QUALITY ASSURANCE

- a. Plaster installers shall have two years experience in similar pool projects which the Owner may require written proof thereof and proper tools to install plaster.

#### 1.6 SURFACE PREPARATION

- a. Surface Preparation

## EBENSBURG BOROUGH SWIMMING POOL

1. Surface shall be structurally sound and free of any foreign substances and debris that could reduce or impair adhesion, free of dirt, oil, grease or other foreign materials. Sound and remove all loose concrete to firm substrate. Surfaces shall be roughened by sand blasting, water jetting, shot blasting, scarifying, or grinding. Pressure-wash the entire surface. Wash with trisodium phosphate (TSP) using a stiff broom. Thoroughly wash/rinse with clean potable water. Surface defects or holes in the substrate shall be patched per manufacturer's recommendations.
2. Apply and cure bond coat per manufacturer's recommendations. After proper curing of bond coat, lightly moisten with clean potable water prior to application of cementitious finish. Ensure bond coat is free of any foreign matter prior to plastering.

### PART 2 - PRODUCTS

#### 2.1 PEBBLETEC

- A. The CONTRACTOR shall install a slip-resistant proprietary plaster finish in the areas indicated on the drawings. Description: PebbleTec finish shall be a blend of selected aggregates and fortified Portland cement. Color and texture shall be selected by the Engineer. Confirm all installation requirements with the manufacturer.
- B. Bond Coat
  1. Bond Kote by SGM, Inc., or approved equal. Apply and cure bond coat per manufacturer's recommendations. After proper curing of bond coat, lightly moisten with clean potable water prior to application of cementitious finish. Ensure bond coat is free of any foreign matter prior to plastering.
- C. Mixing
  1. Thoroughly mix PebbleTec to a homogeneous lump-free consistency using 1-1/2 to 2 gallons of potable water per 80 lb. bag.
- D. Application
  1. PebbleTec shall be applied to a uniform thickness of 3/8" to 1/2" over the entire surface. The walls shall be scratch-coated followed by a finish coat. Material applied to the floor after the walls have been applied shall be accelerated to assure uniform setting time throughout the pool surface.
- E. Coverage
  1. Each 80 lb. bag shall cover approximately 25 square feet to a thickness of 3/8".
- F. Proprietary plaster finish is to be applied by a licensed applicator as approved by the manufacturer.

### PART 3 - EXECUTION

#### 3.1 PREPARATION OF SURFACES AND BOND COAT

- A. Clean base surfaces of projections, dust, loose particles, grease, bond breakers, and foreign matter; make sufficiently rough to provide a strong mechanical bond. Sandblast, acid etch, or waterblast to achieve appropriate profile. If acid etching, surfaces must be neutralized and

## EBENSBURG BOROUGH SWIMMING POOL

powerwashed prior to proceeding. Do not apply cementitious finishes directly to the surfaces of masonry or concrete that is coated with any acidic solution compound or similar agent until compound or agent is completely removed by water blasting. Thoroughly wash entire surface with 2,000 psi high-pressure water immediately prior to application of finishes. Wet cementitious base surfaces with a fine fog water spray to produce a uniformly moist condition and check screeds, pool equipment, and accessories for correct alignment before work is started. Do not apply finish materials to base surfaces containing frost. Install temporary coverings as required to protect adjoining surfaces from staining or damage by plastering operations.

- B. Prepare and clean concrete surfaces by removing oil or grease. Repair all cracks, surface damage as required prior to proceeding. Protect or mask all adjacent surfaces that are not scheduled to receive cementitious finish. If expansion or construction joints exist in the areas where cementitious finish will be applied cover plastic joints for protection (if plastic joints are used). Additionally, mark joints for saw-cutting if area will be saw-cut.
- C. Apply and cure bond coat per manufacturer's recommendations. After proper curing of bond coat, lightly moisten with clean potable water prior to application of cementitious finish. Ensure bond coat is free of any foreign matter prior to plastering.
- D. Contractor to thoroughly verify the site conditions prior to the application of cementitious finish. Verify concrete is free of ridges and sharp projections. Verify that all concrete surfaces that are to receive a cementitious finish have cured for a minimum of 5 days. Consideration should be given for the application of a primer for all concrete structures that is over 28 days old to improve bonding.

### 3.2 APPLICATION OF CEMENTITIOUS FINISH

#### A. General

- 1. Confirm all application requirements with the manufacturer. Apply finish plaster to the properly prepared substrate at the minimum thickness required by the manufacturer, but no less than 3/8 inch thickness at any location. Apply finish plaster by hand or machine. If plastering machine is used, control fluidity of plaster to have a slump not exceeding 2-1/2 inches when tested using a 2" by 4" by 6" high slump cone. Do not add additional water to the mix subsequent to determining water content to meet this slump. Perform slump test according to following procedure:
  - a. Place cone on level, dry non-absorptive base plate.
  - b. While holding cone firmly against base plate, fill cone with plaster taken directly from hose or nozzle of plastering machine, tamping with a metal rod during filling to release all air bubbles.
  - c. Screed off plaster level with top of cone. Remove cone by lifting it straight up with a slow and smooth motion.
  - d. Place cone in a vertical position adjacent to freed plaster sample suing care not to jiggle base plate.
  - e. Lay straightedge across top of cone being careful not to vibrate cone; measure slump in inches from bottom edge of straightedge to the top of slumped plaster sample.
- 2. All mixing of materials and application procedures shall be done in accordance with the manufacturer's recommendations and requirements. The manufacturer's representative

## EBENSBURG BOROUGH SWIMMING POOL

shall visit the site to verify field conditions, confirm materials and application requirements and ascertain that all materials and systems are so installed. Documentation shall be provided to this effect.

### B. Workmanship

1. Unless otherwise required by the manufacturer, apply finish plaster in two coats by "double-back" method with second coat applied as soon as first coat is tamped and initially floated. Apply plaster with sufficient pressure to provide a good bond on bases. Work plaster to screeds at intervals of from 5 feet to 8 feet on straight surfaces. Apply smooth trowel finish without waves, cracks, trowel marks, ridges, pits, crazing, discoloration, projections, or other imperfections. Form plaster carefully around curves and angles, well up to screeds. Take special care to prevent sagging and consequent drooping of applications. Produce surfaces free of visible junction marks in finish coat where one day's work adjoins another. Finish proprietary plaster as required by the manufacturer.
2. All cementitious finishes shall be applied by a licensed applicator as approved by the manufacturer.

### C. Curing

1. Curing cementitious finishes with fine fog water spray applied to finish coat as frequently as required to prevent dry-out of surface, or as directed by the manufacturer of the cementitious finish. Keep plaster damp until pool is filled. Prevent damage or staining of plaster by troweling or curing.

### D. Patching, Pointing, and Cleaning Up

1. Upon completion, cut out and patch loose, cracked, damaged, or defective plaster; patches matching existing plaster in texture, color, and finish, flush with adjoining plaster. Perform pointing and patching of surfaces and plasterwork abutting or adjoining any other finish work in a neat and workmanlike manner. If 10 percent or more of the pools plaster finish is found to be defective, the plaster shall be removed and replaced complete from all surfaces. Remove plaster droppings or spattering from all surfaces. Leave plaster surfaces in clean, unblemished condition ready for pool filling. Remove protective coverings from adjoining surfaces. Remove rubbish and debris from the site.

## 3.3 PRE-FILL SPECIFICATION

- A. Contractor shall employ a qualified water testing agency to analyze the domestic water with which the pool will be filled within 2 weeks of the plaster date, and shall employ a swimming pool experienced water chemistry consultant to determine types and quantities of chemicals required to ensure calcium-balanced water immediately upon the completion of water filling. Refer to section 131100 for water filling requirements.
  1. Have on hand quantities of the chemicals as determine above, plus 25% overage for follow-up treatment. These chemicals, typically including calcium chloride, bicarbonate of soda, and muriatic acid are in addition to standard bromine/chlorine products and alkalizer/pH control products required elsewhere.
- B. The pool(s) shall not be plastered until directed by the Owner's representative and the filtration system and chlorination system are complete and ready for start-up. The Contractor shall supply all chemicals required for treatment of the pool water.

**EBENSBURG BOROUGH SWIMMING POOL**

- C. The Contractor shall submit domestic water analysis to the Owner and/or Engineer at least 2 weeks prior to filling the pool(s).

**END OF SECTION**

**SECTION 13 1102 - SWIMMING POOL SHOTCRETE**

**PART 1 GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. This Section includes shotcrete applied by dry-mix or wet-mix process, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
  - 1. Swimming pool walls.
- B. Related Sections include the following:
  - 1. Division 13 Section "Swimming Pools" for pool shell tolerances and other items.
  - 2. Division 13 Section "Swimming Pool Cast In Place Concrete" for pool bottom slabs and other pool-related structures.
  - 3. Division 13 Section "Swimming Pool Cast In Place Concrete" for pool coping.
  - 4. Division 31 Section "Earth Moving" for drainage fill under swimming pools and related structures.
    - a. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve

**1.3 DEFINITIONS**

- A. Shotcrete: Mortar or concrete pneumatically projected onto a surface at high velocity.
- B. Dry-Mix Shotcrete: Shotcrete with most of the water added at nozzle.
- C. Wet-Mix Shotcrete: Shotcrete with ingredients, including mixing water, mixed before introduction into delivery hose.

**1.4 SUBMITTALS**

- A. Product Data: For manufactured materials and products including reinforcement and forming accessories, shotcrete materials, admixtures, and curing compounds.
- B. Shop Drawings: For details of fabricating, bending, and placing reinforcement. Include support and anchor details, number and location of splices, and special reinforcement required for openings through shotcrete structures.
- C. Design Mixes: For each shotcrete mix.
- D. Qualification Data: For Installer.

- E. Material Test Reports: For shotcrete materials.
- F. Material Certificates: For each material item, signed by manufacturers.
- G. Field quality-control test reports.

**1.5 QUALITY ASSURANCE**

- A. Installer Qualifications: A qualified installer employing nozzle operators who attain mean core grades not exceeding 2.5, according to ACI 506.2, on preconstruction tests.
- B. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, and acceptable to authorities having jurisdiction.
- C. Comply with provisions of the following, unless more stringent requirements are indicated:
  - 1. ACI 301, "Specifications for Structural Concrete."
  - 2. ACI 506.2, "Specification for Shotcrete."
- D. Preconstruction Testing Service: Engage a qualified independent testing agency to perform preconstruction testing and inspections indicated below:
  - 1. Produce test panels before shotcrete placement according to requirements in ACI 506.2 and ASTM C 1140 for each design mix, shooting orientation, and nozzle operator. Produce test panels with dimensions of 24 by 24 inches (600 by 600 mm) minimum and of thickness and reinforcing layout of shotcrete work on project. From each test panel, testing agency will obtain six test specimens: one set of three specimens unreinforced and one set of three specimens reinforced. Agency will perform the following:
    - a. Test each set of unreinforced specimens for compressive strength according to ASTM C 42.
    - b. Visually inspect each set of reinforced shotcrete cores taken from test panels and determine mean core grades according to ACI 506.2. Core grades higher than 2 are deemed unacceptable.
- E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management And Coordination."

**1.6 PROJECT CONDITIONS**

- A. Cold-Weather Shotcreting: Protect shotcrete work from physical damage or reduced strength caused by frost, freezing, or low temperatures according to ACI 306.1 and as follows:
  - 1. Discontinue shotcreting when ambient temperature is 40 deg F (4.4 deg C) and falling. Uniformly heat water and aggregates before mixing to obtain a shotcrete shooting temperature of not less than 50 deg F (10 deg C) and not more than 90 deg F (32 deg C).
  - 2. Do not use frozen materials or materials containing ice or snow.
  - 3. Do not place shotcrete on frozen surfaces or surfaces containing frozen materials.
  - 4. Do not use calcium chloride, salt, or other materials containing antifreeze agents.
- B. Hot-Weather Shotcreting: Mix, place, and protect shotcrete according to ACI 305R when hot-weather conditions and high temperatures would seriously impair quality and strength of shotcrete, and as follows:

## EBENSBURG BOROUGH SWIMMING POOL

1. Cool ingredients before mixing to maintain shotcrete temperature at time of placement below 100 deg F (38 deg C) for dry mix or 90 deg F (32 deg C) for wet mix.
2. Reduce temperature of reinforcing steel and receiving surfaces below 100 deg F (38 deg C) before shotcreting.

### PART 2 PRODUCTS

#### 2.1 FORM MATERIALS

- A. Forms: Form-facing panels that will provide continuous, straight, smooth, concrete surfaces. Furnish panels in largest practicable sizes to minimize number of joints.

#### 2.2 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- B. Supports: Bolsters, chairs, spacers, ties, and other devices for spacing, supporting, and fastening reinforcing steel in place according to CRSI's "Manual of Standard Practice" and as follows:
  1. For uncoated reinforcement, use all-plastic or CRSI Class 1, plastic-protected bar supports.
- C. Reinforcing Anchors: ASTM A 36/A 36M, unheaded rods or ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6), hex-head bolts; carbon steel; and carbon-steel nuts.
  1. Finish: Plain, uncoated.

#### 2.3 SHOTCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type I or III. Use only one brand and type of cement for Project.
- B. Normal-Weight Aggregates: ASTM C 33, from a single source, and as follows:
  1. Aggregate Gradation: ACI 506R, Gradation No. 2 with 100 percent passing 1/2-inch (13-mm) sieve.
  2. Coarse-Aggregate Class: 3S.
- C. Water: Potable, complying with ASTM C 94/C 94M, free from deleterious materials that may affect color stability, setting, or strength of shotcrete.
- D. Ground Wire: High-strength steel wire, 0.8 to 1 mm in diameter.

#### 2.4 CHEMICAL ADMIXTURES

- A. General: ASTM C 1141, Class A or B, but limited to the following admixture materials. Provide admixtures for shotcrete that contains not more than 0.1 percent chloride ions. Certify compatibility of admixtures with each other and with other cementitious materials.
  1. Air-Entraining Admixture: ASTM C 260.
  2. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
  3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
  4. Water-Reducing and Accelerating Admixture: ASTM C 494/C 494M, Type E.
  5. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
  6. Accelerating Admixture: ASTM C 494/C 494M, Type C.



2.5 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

2.6 RELATED MATERIALS

- A. Latex Bonding Agent: ASTM C 1059/C 1059M, Type II.
  - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following;
    - a. Latex Bonding Agent, Type II (Non-Redispersible):
      - 1) Dayton Superior Corporation; Conspec Strong Bond.
      - 2) Euclid Chemical Company (The), an RPM company; Flex-Con.
      - 3) W. R. Meadows, Inc.; Sealtight Acry-Lok.
      - 4) Kaufman Products, Inc.; Surebond
- B. Expansion- and Isolation-Joint-Filler Strips: Non Asphalt.
  - 1. Provide for coping (if coping is shown to be concrete).

2.7 REPAIR MATERIALS

- A. Concrete Patching Mortar: Chemical treatment for waterproofing concrete.
  - 1. Xypex Concrete Waterproofing by Crystallization, Xypex Chemical Corporation.
    - a. Xypex Concentrate.

2.8 WATERSTOPS

- A. Flexible PVC Waterstops: CE CRD-C 572, with factory-installed metal eyelets, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.
  - 1. Available Manufacturers:
    - a. Bometals, Inc.
    - b. Greenstreak.
    - c. Meadows, W. R., Inc.
    - d. Murphy, Paul Plastics Co.
    - e. Progress Unlimited, Inc.
    - f. Tamms Industries, Inc.
    - g. Vinylex Corp.
  - 2. Profile: Ribbed without center bulb.
  - 3. Dimensions: 4 inches by 3/16 inch thick (150 mm by 10 mm thick); nontapered.

B. Expanding Adhesive Waterstops: Manufactured rectangular strip, single-component, RX101.

1. Products: Subject to compliance with requirements, provide the following:

- a. VOLCLAY
- b. CETCO

## 2.9 SHOTCRETE MIXTURES, GENERAL

A. Prepare design mixes for each type and strength of shotcrete.

B. Limit water-soluble chloride ions to maximum percentage by weight of cement or cementitious materials permitted by ACI 301.

C. Admixtures: When included in shotcrete design mixes, use admixtures and retarding admixtures according to manufacturer's written instructions.

D. Design-Mix Adjustments: Subject to compliance with requirements, shotcrete design-mix adjustments may be proposed when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant.

## 2.10 SHOTCRETE MIXTURES

A. Proportion dry mixtures by field test data methods and wet mixtures according to ACI 211.1 and ACI 301, using materials to be used on Project, to provide shotcrete with the following properties:

- 1. Compressive Strength (28 Days): 5,000 psi (27.6 MPa).
- 2. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight, wet-mix shotcrete having an air content before pumping of 8 percent with a tolerance of plus or minus 1-1/2 percent.
- 3. Dry-mix shotcrete shall not be air-entrained.
- 4. Dry-mix shotcrete shall not be used for outdoor applications where freeze/thaw of concrete occurs.

## 2.11 SHOTCRETE EQUIPMENT

A. Mixing Equipment: Capable of thoroughly mixing shotcrete materials in sufficient quantities to maintain continuous placement.

B. Dry-Mix Delivery Equipment: Capable of discharging aggregate-cement mixture into delivery hose under close control and maintaining continuous stream of uniformly mixed materials at required velocity to discharge nozzle. Equip discharge nozzle with manually operated water-injection system for directing even distribution of water to aggregate-cement mixture.

- 1. Provide uniform, steady supply of clean, compressed air to maintain constant nozzle velocity while simultaneously operating blow pipe for cleaning away rebound.
- 2. Provide water supply with uniform pressure at discharge nozzle to ensure uniform mixing with aggregate-cement mix. Provide water pump to system if line water pressure is inadequate.

C. Wet-Mix Delivery Equipment: Capable of discharging aggregate-cement-water mixture accurately, uniformly, and continuously.

**2.12 BATCHING AND MIXING**

- A. Dry-Mix Process: Measure mix proportions by weight batching according to ASTM C 94/C 94M or by volume batching complying with ASTM C 685/C 685M requirements.
  - 1. In volume batching, adjust fine-aggregate volume for bulking. Test fine-aggregate moisture content at least once daily to determine extent of bulking.
  - 2. Prepackaged shotcrete materials may be used at Contractor's option. Predampen prepackaged shotcrete materials and mix before use.
- B. Wet-Mix Process: Measure, batch, mix, and deliver shotcrete according to ASTM C 94/C 94M and furnish batch ticket information.
  - 1. Comply with ASTM C 685/C 685M when shotcrete ingredients are delivered dry and proportioned and mixed on-site.

**PART 3 EXECUTION**

**3.1 PREPARATION**

- A. Concrete: Before applying shotcrete, remove unsound or loose materials and contaminants that may inhibit shotcrete bonding. Chip or scarify areas to be repaired to extent necessary to provide sound substrate. Cut edges square and 1/2 inch (13 mm) deep at perimeter of work, tapering remaining shoulder at 1:1 slope into cavity to eliminate square shoulders. Dampen surfaces before shotcreting.
  - 1. Abrasive blast or hydroblast existing surfaces that do not require chipping to remove paint, oil, grease, or other contaminants and to provide roughened surface for proper shotcrete bonding.
- B. Earth: Compact and trim to line and grade before placing shotcrete. Do not place shotcrete on frozen surfaces. Dampen surfaces before shotcreting.
- C. Rock: Clean rock surfaces of loose materials, mud, and other foreign matter that might weaken shotcrete bonding.

**3.2 FORMS**

- A. General: Design, erect, support, brace, and maintain forms, according to ACI 301, to support shotcrete and construction loads and to facilitate shotcreting. Construct forms so shotcrete members and structures are secured to prevent excessive vibration or deflection during shotcreting.
  - 1. Fabricate forms to be readily removable without impact, shock, or damage to shotcrete surfaces and adjacent materials.
  - 2. Construct forms to required sizes, shapes, lines, and dimensions using ground wires and depth gages to obtain accurate alignment, location, and grades in finished structures. Construct forms to prevent mortar leakage but permit escape of air and rebound during shotcreting. Provide for openings, offsets, blocking, screeds, anchorages, inserts, and other features required in the Work.
- B. Form openings, chases, recesses, bulkheads, keyways, and screeds in formwork. Determine sizes and locations from trades providing such items. Accurately place and securely support items built into forms.

**3.3 STEEL REINFORCEMENT**

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that weaken shotcrete bonding.
- C. Securely embed reinforcing anchors into existing substrates, located as required.
- D. Accurately position, support, and rigidly secure reinforcement against displacement by formwork, construction, or shotcreting. Locate and support reinforcement by metal chairs, runners, bolsters, spacers, and hangers, as required.
- E. Place reinforcement to obtain minimum coverage for shotcrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during shotcreting. Set wire ties with ends directed into shotcrete, not toward exposed shotcrete surfaces.

**3.4 JOINTS**

- A. Construction Joints: Joints to be placed straight, true and to be constructed as designed.

**3.5 WATERSTOPS**

- A. Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions. Prevent displacement during shotcrete application.

**3.6 ALIGNMENT CONTROL**

- A. Ground Wires: Install ground wires to establish thickness and planes of shotcrete surfaces. Install ground wires at corners and offsets not established by forms. Pull ground wires taut and position adjustment devices to permit additional tightening.

**3.7 EMBEDDED ITEMS**

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by shotcrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

**3.8 APPLICATION**

- A. Apply temporary protective coverings and protect adjacent surfaces against deposit of rebound and overspray or impact from nozzle stream.
- B. Moisten wood forms immediately before placing shotcrete where form coatings are not used.
- C. Apply shotcrete according to ACI 506.2.
- D. Apply dry-mix shotcrete materials within 45 minutes after predampening and wet-mix shotcrete materials within 90 minutes after batching.

## EBENSBURG BOROUGH SWIMMING POOL

- E. Deposit shotcrete continuously in multiple passes, to required thickness, without cold joints and laminations developing. Place shotcrete with nozzle held perpendicular to receiving surface. Begin shotcreting in corners and recesses.
  - 1. Remove and dispose of rebound and overspray materials during shotcreting to maintain clean surfaces and to prevent rebound entrapment.
  - 2. Rebound and overspray shall not be used for any application.
- F. Maintain reinforcement in position during shotcreting. Place shotcrete to completely encase reinforcement and other embedded items. Maintain steel reinforcement free of overspray and prevent buildup against front face during shotcreting.
- G. Do not place subsequent lifts until previous lift of shotcrete is capable of supporting new shotcrete.
- H. Do not permit shotcrete to sag, slough, or dislodge.
- I. Remove hardened overspray, rebound, and laitance from shotcrete surfaces to receive additional layers of shotcrete; dampen surfaces before shotcreting.
- J. Do not disturb shotcrete surfaces before beginning finishing operations.
- K. Remove ground wires or other alignment control devices after shotcrete placement.
- L. Shotcrete Core Grade: Apply shotcrete to achieve mean core grades not exceeding 2.5 according to ACI 506.2, with no single core grade exceeding 3.0.
- M. Installation Tolerances: Place shotcrete without exceeding installation tolerances permitted by ACI 117R, increased by a factor of 2.
  - 1. Inside pool shell tolerances to be maintained per Division 13 Section "Swimming Pools".

### 3.9 SURFACE FINISHES

- A. General: Finish shotcrete according to descriptions in ACI 506R for the following finishes:
- B. Dry-Mix Shotcrete, Natural Finish:
  - 1. Gun Finish: Natural undisturbed finish.
- C. Wet-Mix Shotcrete, Flash-Coat and Final Finish: After screeding and rodding surface, apply up to 1/4-inch (6-mm) coat of shotcrete using ACI 506R, Gradation No. 1, fine-screened sand modified with maximum aggregate size not exceeding No. 4 (4.75-mm) sieve and apply wood-float finish.
- D. Surfaces to receive plaster finish to be heavy broom or light rake finish.

### 3.10 CURING

- A. Protect freshly placed shotcrete from premature drying and excessive cold or hot temperatures.
- B. Start initial curing as soon as free water has disappeared from shotcrete surface after placing and finishing.
- C. Curing Exposed Surfaces: Cure shotcrete by one of the following methods:

## EBENSBURG BOROUGH SWIMMING POOL

1. Moisture Curing: Keep surfaces continuously moist for at least seven days with water, continuous water-fog spray, water-saturated absorptive covers, or moisture-retaining covers. Lap and seal sides and ends of covers.
- D. Curing Formed Surfaces: Cure formed shotcrete surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

### 3.11 FORM REMOVAL

- A. Forms not supporting weight of shotcrete may be removed after curing at not less than 50 deg F (10 deg C) for 24 consecutive hours after gunning, provided shotcrete is hard enough not to be damaged by form-removal operations and provided curing and protecting operations are maintained.
1. Leave forms supporting weight of shotcrete in place until shotcrete has attained design compressive strength. Determine compressive strength of in-place shotcrete by testing representative field-cured specimens of shotcrete.
  2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing materials are unacceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.

### 3.12 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Contractor shall engage a qualified independent testing agency to sample materials, visually grade cores, perform tests, monitor all shotcrete operations and submit reports during shotcreting.
- B. Air Content: ASTM C 173/C 173M, volumetric method or ASTM C 231, pressure method; 1 test for each compressive-strength test for each mix of air-entrained, wet-mix shotcrete measured before pumping.
- C. Shotcrete Temperature: ASTM C 1064/C 1064M; 1 test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and 1 test for each set of compressive-strength specimens.
- D. Test Panels: Make a test panel, reinforced as in structure, for each shotcrete mix and for each workday or for every 50 cu. yd. (38 cu. m) of shotcrete placed; whichever is less. Produce test panels with dimensions of 24 by 24 inches (600 by 600 mm) minimum and of thickness and reinforcing layout to match shotcrete work on project. From each test panel, testing agency will obtain six test specimens: one set of three specimens unreinforced and one set of three specimens reinforced.
1. Test each set of unreinforced specimens for compressive strength according to ASTM C 1140 and construction testing requirements in ACI 506.2.
  2. Visually inspect each set of reinforced shotcrete cores taken from test panels and determine mean core grades according to ACI 506.2. Core grades higher than 2 are deemed unacceptable.
- E. In-Place Shotcrete: Only if samples obtained in item D indicate unsatisfactory shotcrete, and only if directed by City or Engineer, take a set of 3 unreinforced cores for each mix and for each

## EBENSBURG BOROUGH SWIMMING POOL

workday or for every 50 cu. yd. (38 cu. m) of shotcrete placed; whichever is less. Test cores for compressive strength according to ACI 506.2 and ASTM C 42. Do not cut steel reinforcement.

- F. Strength of shotcrete will be considered satisfactory when mean compressive strength of each set of 3 unreinforced cores equals or exceeds 85 percent of specified compressive strength, with no individual core less than 75 percent of specified compressive strength.
  - 1. Mean compressive strength of each set of 3 unreinforced cubes shall equal or exceed design compressive strength with no individual cube less than 88 percent of specified compressive strength.

### 3.13 REPAIRS

- A. Remove and replace shotcrete that is delaminated or exhibits laminations, voids, or sand/rock pockets exceeding limits for specified core grade of shotcrete.
  - 1. Remove unsound or loose materials and contaminants that may inhibit bond of shotcrete repairs. Chip or scarify areas to be repaired to extent necessary to provide sound substrate. Cut edges square and 1/2 inch (13 mm) deep at perimeter of work, tapering remaining shoulder at 1:1 slope into cavity to eliminate square shoulders. Apply concrete patch by one of the following methods:
    - a. Dampen surfaces and apply new shotcrete.
    - b. Apply bonding agent per manufacturer's recommendations. Use concrete patching mortar to repair defect.
- B. Repair core holes from in-place testing according to repair provisions in ACI 301 and match adjacent finish, texture, and color. Apply bonding agent per manufacturer's recommendations. Use concrete patching mortar to repair defect.

### 3.14 CLEANING

- A. Remove and dispose of rebound and overspray materials from final shotcrete surfaces and areas not intended for shotcrete placement.

### 3.15 WATERTIGHTNESS TESTING

- A. Pool shall be tested for watertightness according to procedures stated in ACI350.1 / AWWA 400.
  - 1. Preliminary Test Criteria: HST-VIO.
  - 2. Quantitative Test Criteria: HST-100.

END OF SECTION

# MIX DESIGN

Job Name: EBENSBURG BOROUGH SWIMMING POOL  
 Location: EBENSBURG, PA

Mix ID:	1232	Water/Cementitious Ratio	0.44		
Design Strength f <sub>c</sub> :	5000 HA Shotcrete	Plastic Unit Wt. (PCF)	144.4		
	(%)	Wt. Lb	Ft <sup>3</sup>	Source	Spec.
Cementitious: Portland Cement Ty	100%	705	3.59	LEHIGH	ASTM C 150
	(%)	Wt. Lb	Ft <sup>3</sup>	Source	Spec.
Aggregates: ACI #8	39%	1160	6.79	YORK BUILDING	ASTM
ACI Sand	61%	1722	10.53	YORK BUILDING	ASTM C33
Air: (%) Design Air	4.0%		1.08		
Water	37.5	312	5.01		
Fiber / Color					
Totals		3900	27.00		
	Oz/cwt	Oz/yd <sup>3</sup>		Source	Spec.
Admixtures: Viscocrete 2100	3.00	21.2		Sika	ASTM C 494
AEA 14	0.10	0.7		Sika	ASTM C494

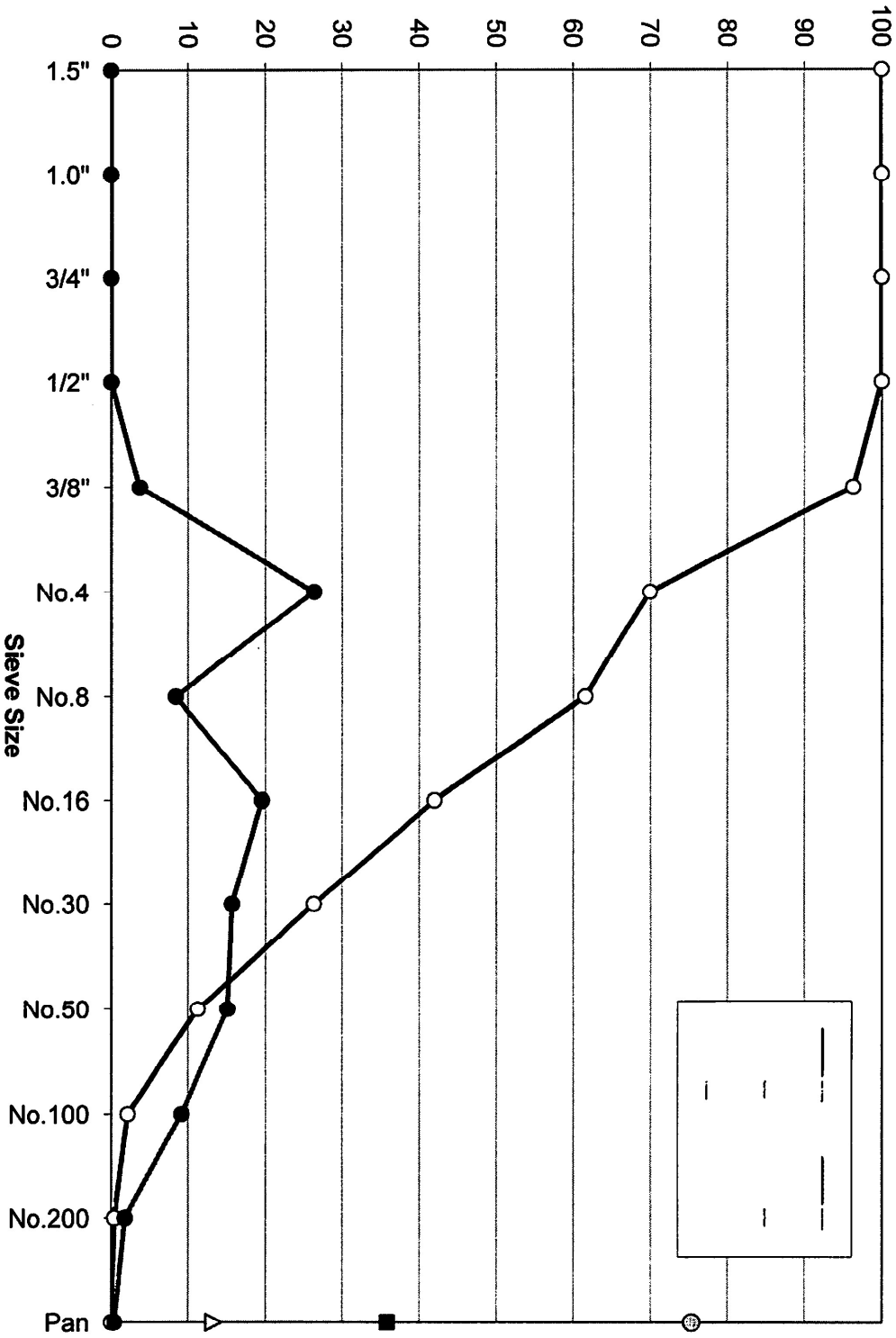
**Comments:**

Viscocrete 2100 can be used as a mid-range or high-range water reducer depending on the dosage for the slump required. Plastiment can be used as a retarder if needed. SikaSet NC can be used as a non-chloride accelerator if needed.

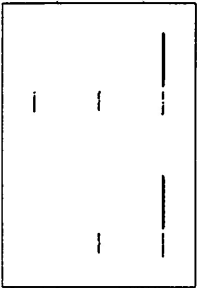
Slump Range	4"
Plastic Air Range	4.00%



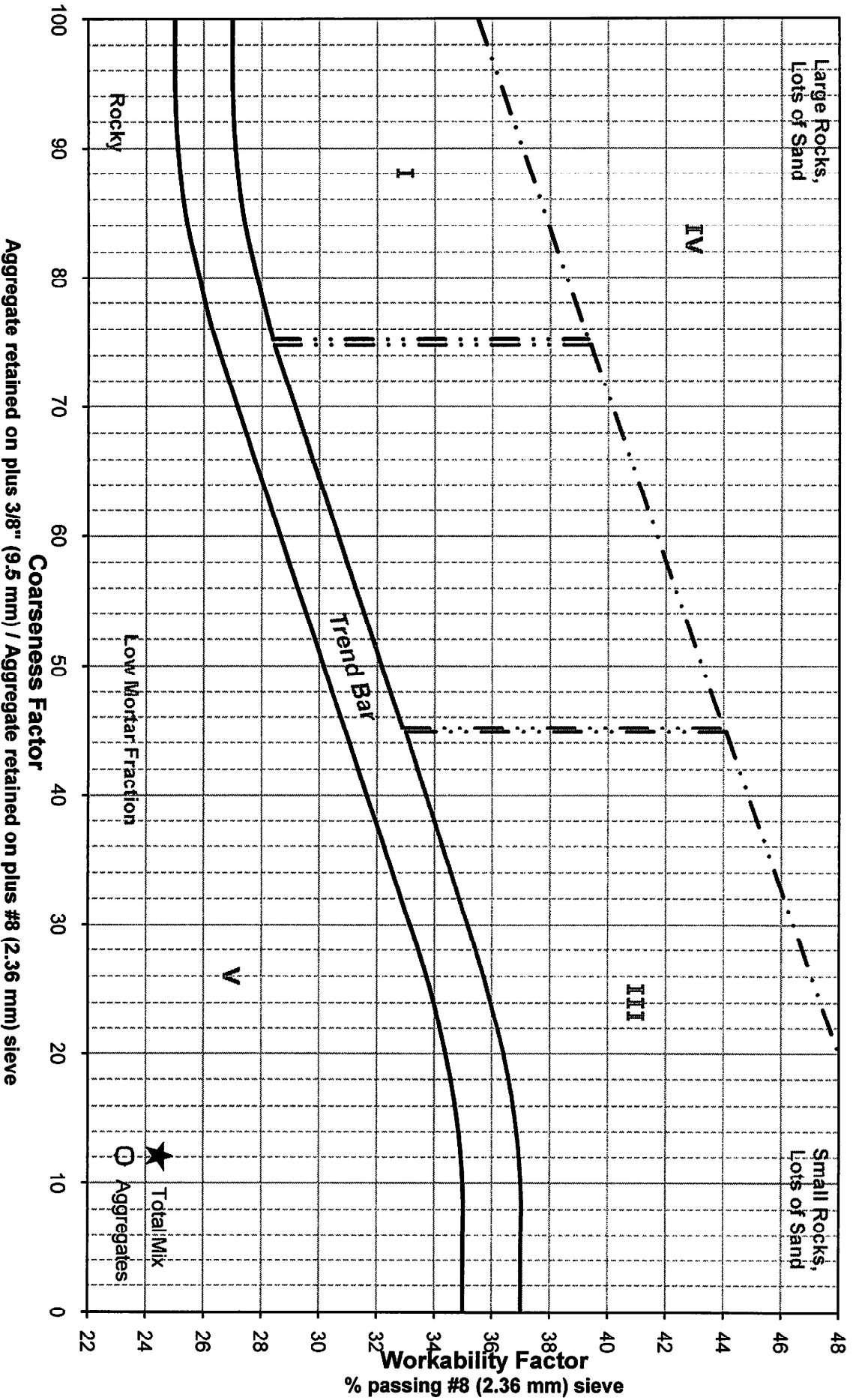
### Aggregate Volume % PASSING - RETAINED

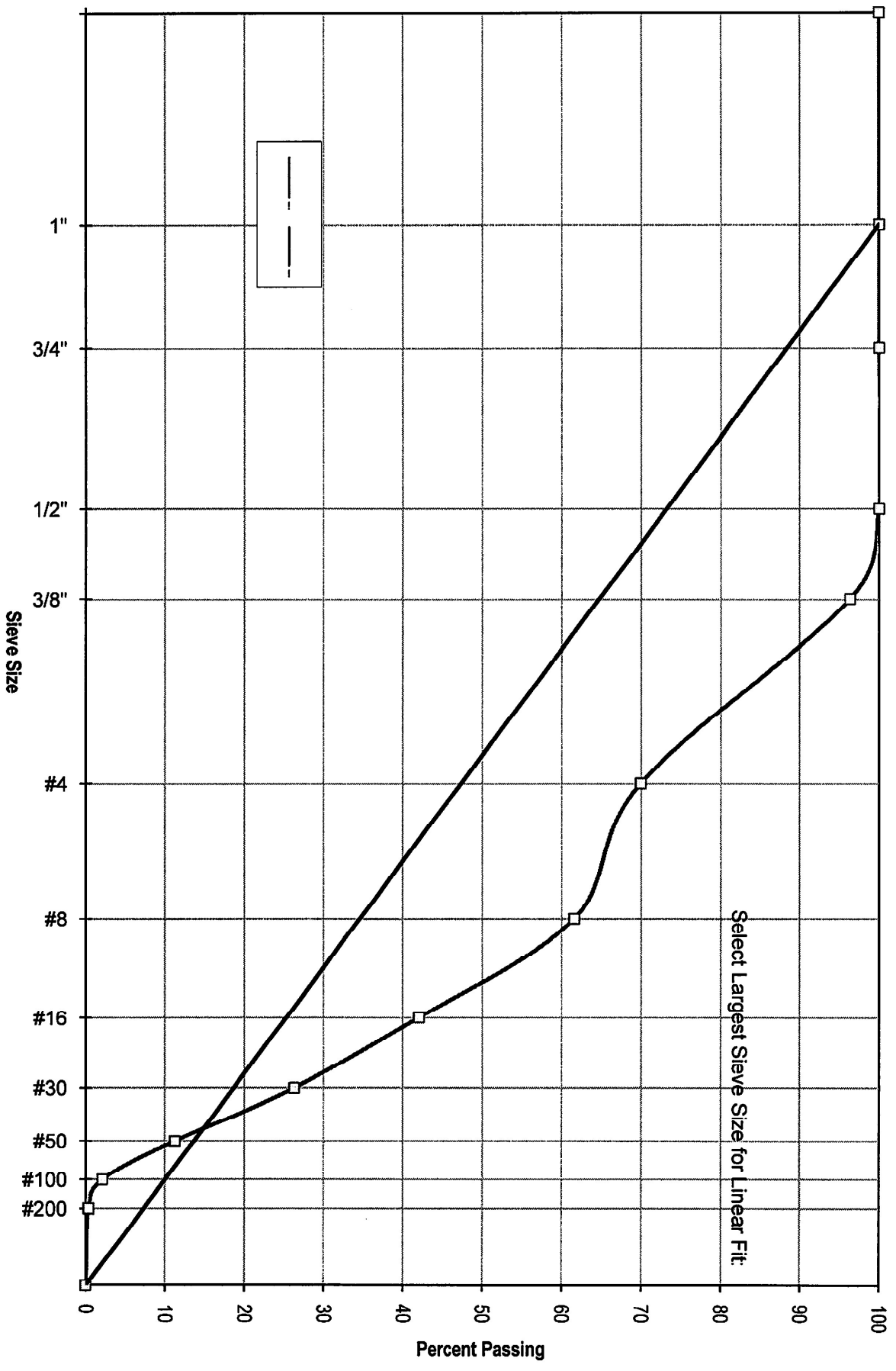


% Passing - % Retained Aggregate  
Mortar - Paste - % Cementitious



# Coarseness Factor Chart





Project: EBENSBURG BOROUGH SWIMMING POOL

Location: EBENSBURG, PA

Mix Code: 1232

Specified Strength fc: 5000

Mix Category: 1232

Design Slump Range: 4"

Placement Method: Truck

Specified Air Range: 4.0%

**Full Gradation Analysis - Percent Retained**

Sieve	ACI #8	ACI Sand	Total percent Retained on each sieve		
	3.0"	0.00	0.00	0.00	
2.5"		0.00	0.00	0.00	
2.0"		0.00	0.00	0.00	
	1.5"	0.00	0.00	0.00	
1.0"		0.00	0.00	0.00	
	3/4"	0.00	0.00	0.00	
1/2"		0.00	0.00	0.00	
	3/8"	3.69	0.00	3.69	
	No.4	25.33	1.03	26.37	
	No.8	7.33	1.03	8.37	
	No.16	1.88	17.69	19.57	
	No.30	0.98	14.71	15.69	
	No.50	0.00	15.07	15.07	
	No.100	0.00	9.12	9.12	
No.200		0.00	1.76	1.76	
Pan		0.00	0.36	0.36	
<b>Fineness Modulus:</b>	5.74	2.72		<b>3.90</b>	
% of Aggregate (Vol)	39.22%	60.78%			
% of Total Mix Volume	25.17%	39.00%		64.17%	
Aggregate Mass (Lbs)	1160	1722		2882	
Coarse Aggregat: Q	3.7%		Mortar Fraction:	75.3%	
Intermediate: I	34.7%		Paste Fraction:	35.8%	
Workability Factor: (Fines W)	61.6%		Coarseness Factor:	9.59%	
<b>Cementitious:</b>		Pounds: Volume	% of CM ( Wt)	% of Mix (vol)	% Total
Portland Cement Type I		705 3.59	100.0%	13.28%	Cementitious by volume
					13.28%
Mix Water + water in Admixture =	37.5 gallons	312 pounds	W/cm	<b>0.443</b>	

