PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The General provisions of the contract, including GENERAL CONDITIONS, SUPPLEMENTARY CONDITIONS AND DIVISION I, GENERAL REQUIREMENTS apply to the work specified in this section.

B. DEFINITIONS


1.02 DESCRIPTIONS

A. Work includes: Furnish all necessary materials, labor and equipment required to install heavy duty topping.

B. Related work specified elsewhere:

1. Cast-in-Place Concrete, see Section 03300.
2. Reinforcing Steel, see Section 03200.
3. Concrete Finishing, see Section 03346.
4. Concrete Curing, see Section 03370.
5. Joint Sealants, see Section 07900.

1.03 QUALITY ASSURANCE

A. Manufacturer's Qualifications

1. Obtain heavy duty floor topping materials from a single manufacturer with a minimum of twenty-five (25) years of experience providing materials of the type specified in this section.
2. The heavy duty floor topping manufacturer shall provide a representative who will instruct the installer on the proper techniques of applying the heavy duty floor topping.

B. Applicator's Qualifications

1. Installation shall be performed by a concrete contractor with not less than ____ years of satisfactory experience in the application of the type of system as specified in this section, and shall be approved by the manufacturer of the heavy duty floor topping.

1.04 SUBMITTALS

A. Product Data

1. Submit manufacturer's technical data on specified products of the heavy duty iron aggregate floor topping.

2. Submit a letter from the manufacturer certifying compliance with the requirements of section 2.01.B of this specification.

3. Submit a list of three installations where this system has been in use for five years or greater.

1.05 MATERIAL DELIVERY, HANDLING AND STORAGE

A. Primary system materials shall be delivered in the manufacturer's undamaged, unopened containers. Each container shall be clearly marked with the following:

1. Product name
2. Manufacturer's name
3. Lot/Batch numbers

B. Provide equipment and personnel to handle the materials by methods which prevent damage.

C. The contractor shall promptly inspect all direct job-site deliveries to assure that quantities are correct
and that materials comply with requirements and are not damaged.

D. The contractor shall be responsible for all materials furnished by him, and he shall replace, at his own expense, all such material that are found to be defective in manufacture or that have become damaged in transit, handling or storage.

E. Store materials in accordance with manufacturer's instructions, with seals and labels intact and legible. Maintain temperatures within the required range. Do not use materials which have been stored for a longer period of time than the manufacturer's maximum recommended shelf life. All materials containing portland cement or other hydrating powders are to be kept dry until use to prevent damage.

1.06 JOB CONDITIONS

A. During material application, care should be exercised to comply with the temperature and humidity limitations of the materials used as defined by the manufacturer.

PART 2 - MATERIALS

2.01 PRODUCTS

A. Concrete Base Slab: For concrete materials, see Section 03300, Cast-In-Place Concrete and provide additional items as required by this section.

1. Concrete base shall have a maximum of 3% air content. Do not use air-entraining admixtures.

2. Do not use fly ash, cement substitutes or slag cement in mix design.

3. Do not use admixtures containing calcium chloride in mix design unless topping is placed after base slab has hardened. Admixture must comply with ACI 318-83.
B. Topping Aggregate: A-H IRONTOP as manufactured by Anti-Hydro International, conforming to the following requirements:

1. Iron aggregate shall be free of rust, oil contamination, or other impurities.

2. Iron aggregate shall be graded as follows:

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<th>Sieve</th>
<th>% Retained</th>
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<tr>
<td>#8</td>
<td>0</td>
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<tr>
<td>#16</td>
<td>13-16</td>
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<td>#30</td>
<td>40-45</td>
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<td>#50</td>
<td>20-25</td>
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<td>#100</td>
<td>10-12</td>
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<td>Thru 100</td>
<td>6-9</td>
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3. Iron Aggregate Topping shall be premixed by the manufacturer and proportioned by weight at the rate of three (3) parts iron aggregate to one (1) part portland cement. Premixed iron aggregate topping shall be supplied in plastic lined 90 pound bags or 3000 pound bulk bags.

4. Abrasion resistance shall have been tested in accordance with ASTM-C-779-82 and shall have a depth of abrasion of less than 0.015 inches after 60 minutes.

5. Compressive strength shall be tested in accordance with ASTM C-109 and shall produce minimum strengths as below:

   - 1 day: 6000 psi
   - 3 days: 9000 psi
   - 28 days: 12,000 psi

6. Flexural Strength shall be tested in accordance with ASTM C-293 and shall produce minimum strengths as below:

   - 1 day: 1500 psi
   - 7 days: 1700 psi
C. Bonding Agent: A-H EPOXY BONDING #125, as manufactured by Anti-Hydro International.

D. Curing: A-H 3 WAY SEALER AIM as manufactured by Anti-Hydro International, consisting of a liquid type membrane-forming curing compound complying with ASTM-C-309, Type I, Class A. Moisture loss not more than 0.055 grams per square centimeter when applied at 200 square feet per gallon.

E. Joint Sealant: Saw cut joints shall be filled with A-H GROOVE & CRACK FILLER #250, elastic type modified epoxy filler, per Section .

F. Materials for this specification are based on products of Anti-Hydro International and terminology used may include reference to manufacturer's proprietary product. Such reference shall be construed only as establishing the quality of material and workmanship to be used under this section and shall not in any way be construed as limiting competition.

PART 3 - EXECUTION

3.01 CONCRETE PLACEMENT

A. For concrete base slab placement, see Section 03300, and provide additional items required by this section.

1. Concrete base shall be placed at 3" maximum slump.

3.02 SLAB SUB-BASE

A. The base to receive the concrete slab for the heavy duty concrete floor topping shall be well drained, uniformly well compacted and free of frost and foreign materials. The base shall be damp but free of standing water.

3.03 BASE SLAB

A. Place base slab between screed points to minimize handling. Concrete shall be placed and screeded using
proper tools and equipment to prevent segregation. Use square tipped shovels to move concrete into place; do not use rakes.

B. Surface of base slab must be textured before concrete achieves final set. Texturing is done by cutting ribs in the surface with a coarse wire broom.

3.04 APPLICATION OF TOPPING

A. Do not apply iron aggregate topping at temperatures below 45 deg. F.

B. Surface Preparation: The concrete base course shall be clean, dry, and free of laitance and foreign materials.

1. Mix and apply the specified epoxy bonding agent in strict accordance with manufacturers recommendations.

Topping: Mix topping in a concrete ready mix truck at the rate of 1.1 gallons of potable water to 90 pounds of iron aggregate topping, or 37 gallons of water to a 3000 pound bulk bag.

D. Iron aggregate topping shall be straight edged or rolled level, immediately followed by bull floating or "darbying" for secondary leveling and compaction.

3.05 FINISHING

A. After the topping has been allowed to stiffen (sustain foot pressure with no greater than 1/4" indentation), the first floating operation shall start. After completion of this operation, the topping shall be allowed to stiffen further. A second floating operation shall be done perpendicular to the first float.

B. For subsequent trowelings, the blades of the power trowel shall be slightly tilted to produce a hard, smooth, finished surface free from chatter marks or blemishes. For further burnishing, continue troweling operation.
3.06 JOINTS

A. Control Joints

1. Control joints shall be spaced in accordance with ACI Standard 302 - Concrete Floor and Slab Construction. All joints in base concrete must be carried through the topping.

2. Control joints shall be saw cut a minimum of 1/4 of the thickness of the concrete base slab and 2/3 the thickness of the Iron aggregate topping. Cuts must be made as soon as the concrete or topping can be cut without raveling the edge, but not more than 24 hours after finishing.

3. Joints shall be filled with A-H GROOVE & CRACK FILLER #250, elastic type modified epoxy joint filler per Section __________, at a minimum of 28 days after concrete placement.

B. Construction Joints

1. Construction joints shall be keyed or doweled for load transfer as shown on the drawings. Construction joint edges in the topping should be compacted with a small radius edging tool.

2. Joints shall be filled with A-H GROOVE & CRACK FILLER #250, elastic type modified epoxy joint filler per Section __________, at a minimum of 28 days after concrete placement.

3.07 CURING AND PROTECTION

A. The base concrete and topping should be wet cured for a minimum of seven days in accordance with the provisions of ACI 302.1R-30, Section 8.1.

B. As soon as the topping has been finished according to the provisions of section 3.05, apply A-H 3 WAY SEALER AIM at the rate of 300 square feet per gallon. Allow to dry and immediately flood the topping with water. Cover
with wet burlap and polyethylene. Maintain wet cure for a period of 7 days, minimum.

C. Concrete base and iron topping are not to be poured in temperatures over 80 deg. F, in the direct rays of the sun, or when exposed to drying winds. Care should be taken to prevent water loss. Erect wind barriers, finish the concrete promptly and start wet curing immediately.

D. Floor topping should not be subjected to traffic during the 7 day curing period. If the slab is to be subjected to heavy traffic during the first two weeks, it should be protected by plywood sheets or planking.

3.08 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. Quality control testing of base concrete shall conform to the requirements of Section 03300, "Cast In Place Concrete," section 3.16.

B. Quality control testing of iron aggregate topping shall conform to the requirements of this section.

C. The Owner will employ an inspector and testing laboratory approved by the Architect/Engineer to perform tests and to submit test reports to the local authorities, Owner, Architect, Engineer and Contractor.

D. Sampling and testing for quality control during placement of topping may include the following, as directed by Owner's inspector.


1. Iron Aggregate Topping Temperature: Test hourly when air temperature is 50 degrees Fahrenheit and below, and when 80 degrees Fahrenheit and above; and each time a set of compression test specimens are made.

2. Compressive Strength Tests:  ASTM C-109-80, one set (6 cubes) 2"x2"x2"for each 3 cubic
yards of iron aggregate topping placed for each day's pour; two specimens tested at 3 days, two specimens tested at 7 days, and two specimens tested at 28 days. Mold and store cubes for laboratory cured test specimens.

3. Strength level of cubes will be considered satisfactory if averages of sets of strength test results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive strength by more than 85%.

F. Test results will be reported in writing to Architect, Structural Engineer and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the project identification name and number, date of topping placement, name of concrete testing service, location of topping batch in structure, and design compressive strength at 28 days.

3.09 JOB COMPLETION

A. The contractor shall correct all defects or deficiencies to meet this specification and those of the iron aggregate topping manufacturer.

B. Clean up all debris, excess materials and equipment and remove from site.

END OF SECTION