Chapter 5
Batching and Transporting

5-1. General

Due to the use of special materials and the need to achieve uniformity, the batching and transporting of materials and concrete require preliminary planning to prevent intermingling and problems with scheduling. This would also include a provision to ensure sufficient material for the project.

5-2. Batch Plant

a. Material storage. Every architectural concrete project requiring special aggregates, cement, or color should specify that sufficient materials will be available until the architectural portion is completed. If the aggregate is imported, the producer must be capable of supplying sufficient material for the proposed schedule. Stockpiles should be arranged to prevent co-mingling of the special aggregate with other materials in the plant and any segregation. If the aggregate is stockpiled on the ground, some protection is required to prevent contamination with the base soil. Due to a gradual accumulation of fines at the bottom of a stockpile, the bottom 0.3 m (1 ft) of material should not be used in the architectural concrete, as it will change the characteristics of the surface. When the entire required supply of aggregate is stocked initially, blending of all the material will ensure that the final product is uniform in appearance.

(1) Color should be stored in bags as supplied by the manufacturer. The bagged amounts should be sufficient to color a full load of concrete. The concrete supplier should have complete instructions for partial loads from the color supplier.

(2) The concrete supplier should have the facilities to separately store any special architectural cement. If cement is obtained from more than one supplier, insurance is required that the batch plant silo is kept full of the cement brand being used for the architectural concrete to prevent mixing of different brands.

b. Inspection. Inspection is required at a ready-mix plant during the batching of architectural concrete. A preliminary inspection should be made of the plant stockpiles and batching facilities prior to any placement of the architectural concrete in the field mockup so as to provide a period for revision if required. The inspection should include checks of methods for adding and batching color, checks of any special cements and methods to ensure one brand, and checks of methods to separate any special aggregates. If precast products are to be used, a preliminary inspection of those facilities should also be made. This would include not only the inspection procedure for the ready-mix plant, but also a check of what quality control procedures are being used for acceptance prior to shipment and storage of completed products.

5-3. Mixing

a. Types. Many types of mixers can be used for mixing of architectural concrete. The most common is the transit mixer. Precast plants will generally use transit mixers or a stationary horizontal pan type of mixer. A tilt drum mixer has difficulty providing uniform color concrete unless transit mixers are used to transport and provide additional mixing. The resulting product from any mixer should be uniform from batch to batch and capable of being discharged from the mixer.

b. Time. Generally, mixing can be considered complete when all ingredients are thoroughly distributed and have a uniform appearance. Time of mixing should be controlled from one batch to another in order to maintain uniformity of color for both precast and cast-in-place concrete. Cleanness of the mixer is necessary to prevent contamination from oil, grease, dirt, or broken concrete from the inside of the mixer drum or blades. Streaks of material in the mix are an indication of insufficient mixing.

5-4. Scheduling of Trucks

An important part of preplanning is scheduling of concrete delivery to prevent delays or too many trucks. Waiting trucks cause lack of uniformity in the concrete.

Delayed arrivals may cause cold joints. Poor scheduling of trucks creates nonuniform mixing times, which often cause nonuniformity in the architectural concrete.

5-5. Contamination

a. General. Contamination of the architectural concrete, by other cements, concretes or materials requires continuous batch plant and job site inspection. As most ready-mix plants are also producing concrete for other projects or other portions of the same project, constant vigilance is required to prevent other concrete from contaminating the architectural concrete. This requires separate batching, transporting, and placing equipment. A good specification is to require that architectural concrete be placed first while all equipment is clean or to use separate equipment.

b. Color uniformity wet check. The use of a pump or transit mix truck immediately after handling gray concrete without thorough cleaning will cause contamination. White or light cements are highly vulnerable to this problem. One should also ensure against delivery of the wrong concrete to the forms by use of the wet patch test on each load of colored concrete. Dry blended material is supplied to the job inspector by the color manufacturer. After minor training, the inspector conducts the test on each concrete load by mixing a capful of the material with a certain amount of water. The result is compared to the first load to check color uniformity. Following loads are compared to the first. The test is sensitive to contamination and inadvertent batching errors. Figure 5-1 illustrates the effect of contamination of architectural concrete containing a light buff-colored cement with a normal gray cement.

Figure 5-1. Illustration of contamination of light architectural cement with regular gray cement (uncontaminated field mockup on left)