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Specification Guidelines: No Fines Concrete Backfill with Allan Block

The following specifications provide Allan Block Corporation's typical requirements and recommendations. At the engineer of record's discretion these specifications may be revised to accommodate site specific design requirements.

SECTION 5: NO-FINES CONCRETE BACKFILL

PART 1: GENERAL

1.1 Scope

Work includes furnishing and installing modular concrete block retaining wall units and No-fines concrete backfill to the lines and grades designated on the construction drawings and as specified herein.

1.2 Applicable Sections of Related Work

Allan Block Modular Retaining Wall Systems.

1.3 Reference Standards

- A. ASTM C1372 Standard Specification for Segmental Retaining Wall Units.
- B. ASTM C1262 Evaluating the Freeze-Thaw Durability of Manufactured CMU's and Related Concrete Units
- C. ASTM D698 Moisture Density Relationship for Soils, Standard Method
- D. ASTM D422 Gradation of Soils
- E. ASTM C140 Sample and Testing Concrete Masonry Units
- F. ASTM C33 Standard Specification for Concrete Aggregates
- G. ASTM C94 Standard Specification for Ready Mixed Concrete

1.4 Delivery, Storage, and Handling

- A. Contractor shall check the materials upon delivery to assure proper material has been received.
- B. Contractor shall prevent excessive mud, cementitious material, and like construction debris from coming in contact with the materials.
- C. Contractor shall protect the materials from damage. Damaged material shall not be incorporated in the project (ASTM C1372).
- D. Contractor shall be prepared for rapid placement of No-fines concrete upon delivery to site.
- E. No-fines concrete backfill shall not be placed when ambient temperature is below 40°F (4°C) without utilizing cold weather construction practices.

PART 2: MATERIALS

2.1 Modular Wall Units

- A. Wall units shall be Allan Block Retaining Wall units as produced by a licensed manufacturer.
- B. Wall units shall have minimum 28-day compressive strength of 3,000 psi (20.7 MPa) in accordance with ASTM C1372. The concrete units shall have adequate freeze-thaw protection with an average absorption rate in accordance with ASTM C1372 or an average absorption rate of 7.5 lb/ft³ (120 kg/m³) for northern climates and 10 lb/ft³ (160 kg/m³) for southern climates.
- C. Exterior dimensions shall be uniform and consistent. Maximum dimensional deviations on the height of any two units shall be 0.125 in. (3 mm).

- D. Wall units shall provide a minimum of 110 lbs total weight per square foot of wall face area (555 kg/m²). Fill contained within the units may be considered 80% effective weight.
- E. Exterior face shall be textured. Color as specified by owner.

2.2 Wall Rock

- A. Material must be well-graded compactable aggregate, 0.25 in. to 1.5 in., (6 mm - 38 mm) with no more than 10% passing the #200 sieve. (ASTM D422)
- B. Material behind and within the blocks may be the same material.

2.3 No-Fines Concrete Backfill/Stabilized Aggregate

- A. No-fines concrete is a combination of coarse aggregate, cement, and water. The cement shall comply with the requirements for use in ready-mix concrete (ASTM C94). The water to cement ratio for No-fines concrete should range between 0.3-0.5.
- B. Coarse aggregate must meet the requirements for concrete aggregates (ASTM C33). Aggregate size should be poorly graded with sizes between 5/8 in. to 1 in. (19 mm to 25 mm) aggregate with an aggregate/ cement ratio of 5.5:1 to 6.5:1.
- C. No-fines product density will range depending on the mix design. Typical unit weight will range between 100 lb/ft³ to 135 lb/ft³ (1,600 kg/m³ to 2,160 kg/m³).
- D. No-fines concrete void content shall range between 18% - 35% (ASTM C140).
- E. No-fines concrete should only be used with open celled (hollow core) blocks.

PART 3: WALL CONSTRUCTION

3.1 Excavation

- A. Contractor shall excavate to the lines and grades shown on the construction drawings. Contractor shall use caution not to over-excavate beyond the lines shown, or to disturb the base elevations beyond those shown.
- B. Contractor shall verify locations of existing structures and utilities prior to excavation. Contractor shall ensure all surrounding structures are protected from the effects of wall excavation.

3.2 Foundation Soil Preparation

- A. Foundation soil shall be defined as any soils located beneath a wall.
- B. Foundation soil shall be excavated as dimensioned on the plans and compacted to a minimum of 95% of Standard Proctor (ASTM D698) prior to placement of the base material.
- C. Foundation soil shall be examined by the on-site soils engineer to ensure that the actual foundation soil strength meets or exceeds assumed design strength. Soil not meeting the required strength shall be removed and replaced with acceptable material.

3.3 Base

- A. The base material shall be the same as the Wall Rock material (Part 12.2) or a low permeable granular material.
- B. Base material shall be placed as shown on the construction drawing. Top of base shall be located to allow bottom wall units to be buried to proper depths as per wall heights and specifications.
- C. Base material shall be installed on undisturbed native soils or suitable replacement fills compacted to a minimum of 95% Standard Proctor (ASTM D698).
- D. Base shall be compacted at 95% Standard Proctor (ASTM D698) to provide a level hard surface on which to place the first course of blocks. The base shall be constructed to ensure proper wall embedment and the final elevation shown on the plans. Well-graded sand can be used to smooth the top 1/2 in. (13 mm) on the base material.

- E. Base material shall be a 4 in. (100 mm) minimum depth for walls under 4 ft (1.2 m) and a 6 in. (150 mm) minimum depth for walls over 4 ft (1.2 m).

3.4 Unit Installation

- A. Install units in accordance with the manufacturer's instructions and recommendations for the specific concrete retaining wall unit, and as specified herein.
- B. Ensure that units are in full contact with base. Proper care shall be taken to develop straight lines and smooth curves on base course as per wall layout.
- C. Install next course of wall units on top of base course. Position blocks to be offset from seams of blocks below. Perfect "running bond" is not essential, but a 3 in. (75 mm) minimum offset is recommended. Check each block for proper alignment and level.
- D. Fill the voids of the block and backfill to the designated depth with No-fines concrete backfill. The vertical height of a pour should not exceed 16 in. (400 mm) or two courses of block.
- E. The No-fines concrete backfill shall be placed and compacted as soon as possible after mixing as it tends to dry out rapidly because of its open structure. Compaction is achieved by rodding the concrete in and around the blocks; vibration is typically not required, and heavy tamping is not necessary.
- F. Brush the top of the blocks to remove any excess material. It is recommended that this be done before allowing the concrete to harden.
- G. Install additional courses of wall units. Position blocks to be offset from seams of blocks below. Perfect "running bond" is not essential, but a 3 in. (75 mm) minimum offset is recommended. Check each block for proper alignment and level.
- H. Additional No-fines concrete backfill pours can be made as soon as the additional block courses are placed.
- I. Install each subsequent course in like manner. Repeat procedure to the extent of wall height.
- J. Allow 2-3 hours for the No-fines concrete to cure after a maximum of 4 ft. (1.2 m) of wall height.

3.5 Additional Construction Notes

- A. In straight wall segments it is recommended that at least one of the back wings of the Allan Blocks be removed to help secure the block face to the concrete backfill.
- B. Filter fabric use behind the wall is not suggested for use with cohesive soils. Clogging of such fabric creates unacceptable hydrostatic pressures in soil reinforced structures. When filtration is deemed necessary in cohesive soils, use a three-dimensional filtration system of clean sand or filtration aggregate.
- C. Filter fabric use above the No-fines concrete backfill can be used to prevent soil from migrating into the concrete mass.
- D. Water management is of extreme concern during and after construction. Steps must be taken to ensure that drainpipes are properly installed and vented to daylight and a grading plan has been developed that routes water away from the retaining wall location. Site water management is required both during construction of the wall and after completion of construction.

Consult the Allan Block Engineering Department for details at 800-899-5309.

Specifications are subject to change without notice.