

**SECTION 00 01 10
TABLE OF CONTENTS**

SPECIFICATIONS

Division 02 -- Existing Conditions

02 41 13 - Site Demolition

Division 03 -- Concrete

03 30 00 - Cast-in-Place Concrete

03 60 00 - Grout

Division 05 -- Metals

05 52 13 - Pipe and Tube Railings

Division 32 -- Exterior Improvements

32 92 00 - Finish Grading and Seeding

END OF SECTION

SECTION 02 41 13
SITE DEMOLITION**PART 1 GENERAL****1.1 DESCRIPTION**

- A. Work included:
 - 1. Complete demolition of existing sidewalk and railing and wooden landing, ramp and railings indicated or as required in preparation for alterations and construction of new concrete ramp and sidewalk with new railings.
 - 2. Take all necessary precautions to insure against damage to existing work to remain in place, to be reused, to remain the property of the Owner, and any damage to such work shall be repaired or replaced as approved at no additional cost to the Owner.
- B. Related Work specified elsewhere:
 - 1. Section 03 30 00 - Cast-In-Place Concrete.
 - 2. Section 05 52 13 - Pipe and Tube Railings.
 - 3. Section 31 23 17 - Finish Grading, Seeding.

1.2 QUALITY ASSURANCE

- A. Contractor Qualifications: Minimum of 5 years' experience in demolition of comparable structures.

1.3 SUBMITTALS

- A. Obtain, pay for, and submit all permits required for execution of demolition work including the following:
 - 1. Permit for transport and disposal of debris.
 - 2. Demolition procedures and operation sequence.
- B. Submit demolition procedures and operation sequence.
- C. Permits for Disposal of Debris:
 - 1. Arrange for legal disposal of debris and obtain written agreements with the owners of the property where the debris shall be deposited.
 - 2. Provide a certification of disposal (use form attached at the end of this section) that an agreement releasing the Owner from all responsibility in connection with the disposal of the debris was executed.

1.4 COORDINATION

- A. Maintaining Traffic:
 - 1. Do not close or obstruct public streets, sidewalks, alleys or passageways without permission from authorities having jurisdiction.
 - 2. If required by authorities, provide alternate routes around closed or obstructed traffic ways.

1.5 JOB CONDITIONS

- A. Existing Conditions: Survey existing work and examine the Contract Documents to determine extent of demolition work.
- B. Protection:
 - 1. Includes but not limited to erecting barriers, dust partitions, fences, guard rails, enclosures, chutes and shoring as required to protect structures and utilities remaining intact.

2. Protect any trees, plants, grass and other landscaping designated to remain from damage. Replace any trees, plants or other landscaping materials designated to remain that are damaged during the work under this Contract.
3. Protect the interior of the building and all materials and equipment from the weather at all times. Replace materials and equipment damaged by weather at no additional cost to the Owner.
4. Take necessary precautions to insure against damage to existing materials or equipment to remain in place, to be reused, or to remain the property of the Owner. Repair or replace damaged materials and equipment at no additional cost to the Owner.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 PREPARATION

- A. Preparation:
 1. Verify the extent of demolition work to be performed with the Architect.
 2. Verify that structures, equipment or spaces to be demolished are isolated, unoccupied and discontinued in use.

3.2 DEMOLITION

- A. Demolition:
 1. Demolish structures in accordance with demolition procedures submitted.
 2. Maintain area outside in as clean condition as possible during progress of demolition work.
 3. Use of explosives will not be permitted.
 4. Limit dust to lowest practicable level.
 5. Do not use water to extent of causing flooding, contaminated runoff or icing.
 6. Grade surface to adjacent contours and slope to drain.
 7. Repair damage to adjacent construction or structures.
- B. Owner has the right to salvage any materials or equipment.

3.3 DISPOSAL

- A. Disposal:
 1. Remove demolition debris to designated disposal area promptly.
 2. Do not store or burn materials on-site.
 3. Disposal areas shall be approved by Department of Environmental Protection and any other authorities having jurisdiction.

CERTIFICATE OF DISPOSAL

The undersigned hereby attests that they have written agreements to dispose from the Camp Lily Exterior Ramp Replacement Project, Berks County, Pennsylvania and hereby certifies that all disposal of debris is in accordance with all Federal, State and local laws and regulations.

Approximate Quantity of Material Disposed: _____ Cubic Yards

Type of Material Disposed: _____

Location of Disposal Site: _____

Contractors: _____

_____ President (Signature)
_____ (Typed/Printed Name)
_____ Treasurer (Signature)
_____ (Typed/Printed Name)
_____ (Corporate Seal)

Attest: _____ Secretary (Signature)
_____ (Typed/Printed Name)

END OF SECTION

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 DESCRIPTION

- A. The Work of This Section Includes, but is not limited to:
 - 1. Concrete Reinforcement
 - 2. Concrete Formwork
 - 3. Cast-In-Place Concrete
 - 4. Concreting Accessories
- B. Related Work Specified Elsewhere:
 - 1. Section 03 60 00 - Grout.

1.2 REFERENCED STANDARDS AND SPECIFICATIONS

- A. American Concrete Institute (ACI):
 - 1. 304 Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete
 - 2. 305R Hot Weather Concreting
 - 3. 306R Cold Weather Concreting
 - 4. 309 Recommended Practice for Consolidation of Concrete
 - 5. 315 Manual of Standard Practice for Detailing Reinforced Concrete Structures
 - 6. 318 Building Code Requirements for Reinforced Concrete
 - 7. 347 Recommended Practice for Concrete Formwork
- B. American Society for Testing and Materials (ASTM):
 - 1. A185 Specification for Welded Steel Wire Fabric for Concrete Reinforcement
 - 2. A615 Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
 - 3. A706 Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcements
 - 4. C31 Making and Curing Concrete Test Specimens in the Field
 - 5. C33 Specifications for Concrete Aggregate
 - 6. C42 Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
 - 7. C88 Test for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
 - 8. C94 Specification for Ready-Mixed Concrete
 - 9. C143 Test for Slump of Portland Cement Concrete
 - 10. C150 Specification for Portland Cement
 - 11. C171 Specification for Sheet Materials for Curing Concrete
 - 12. C172 Sampling Fresh Concrete
 - 13. C173 Test for Air Content of Freshly Mixed Concrete by the Volumetric Method
 - 14. C231 Test for Air Content of Freshly Mixed Concrete by the Pressure Method
 - 15. C260 Specification for Air-Entraining Admixtures for Concrete
 - 16. C494 Specification for Chemical Admixtures for Concrete
 - 17. C535 Test for Resistance to Abrasion of Large Size Coarse Aggregate by the Use of the Los Angeles Machine
 - 18. C920 Specification for Elastomeric Joint Sealants
 - 19. D1752 Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Construction
- C. American Welding Society (AWS):

1. D12.1 Welding Reinforcing Steel Metal Inserts and Connections in Reinforced Concrete Construction

1.3 QUALITY ASSURANCE

- A. Design Criteria:
 1. Design each required concrete group to meet the physical properties specified in Table I of this Section.
 2. In addition to structural strength and stability requirements, design and construct concrete in structures built with Concrete Groups D, E, F, and G to ensure:
 - a. Maximum density and impermeability - these qualities are achieved with low water cement ratios and a slow, moist cure.
 - b. Maximum resistance to reaction of chemicals, alternate wetting and drying, and exposure to the elements.
 - c. Well-formed and smooth surfaces to minimize resistance to flow.
- B. Testing Agency: Concrete testing for slump, compressive strength, and air content shall be performed by a testing laboratory engaged and paid by the Contractor and approved by the Architect. No concrete shall be poured unless the testing agency is on-site.
- C. Concrete Testing:
 1. Perform compressive strength, slump, and air content tests, one set of tests for each day concrete is placed. Cast at least 5 cylindrical strength test specimens for each batch. Test 2 cylinders at 7 days; test 2 cylinders at 28 days. Hold the remaining cylinder for testing in the event that any of the other cylinders are damaged prior to testing.
 2. Determine concrete strength from standard test specimens made and cured according to ASTM C31 and ASTM C172, and tested in accordance with ASTM C39. Perform core drilling and testing in accordance with ASTM C42. Compute and evaluate in accordance with ASTM C94.
 3. Determine air content in accordance with ASTM C231 or ASTM C173, as applicable.
 4. Determine slump in accordance with ASTM C143.
 5. Keep a slump cone and an air meter in close proximity to all concrete placements.

1.4 SUBMITTALS

- A. General: Submit in accordance with Section 01 30 00.
- B. Shop Drawings: Submit detailed reinforcing drawings prepared in accordance with ACI 315, including bar schedule with bar marks and bends indicated.
- C. Design Mix:
 1. Prior to start of placing concrete, submit design mix for each group of concrete, indicating that the concrete ingredients and proportions will result in a concrete mix meeting the physical requirements for each concrete group specified in Table II of this Section.
 2. Do not vary the proportions of the ingredients or source of material of the approved mix without submitting corresponding test result documentation to the Architect for approval.
- D. Certificates:
 1. Submit a certification attesting that reinforcing steel meets the requirements of ASTM A615 including Supplementary Requirement S1, and that welded steel wire fabric meets the requirements of ASTM A185.
 2. Submit, with the concrete mix design, laboratory test reports and manufacturer's certificates attesting the conformance of ingredients with these specifications (ASTM C94, paragraph 5.3.2).

-
-
3. Submit a certification or delivery ticket from the concrete supplier for each batch delivered to the site (ASTM C94, Section 15). The delivery ticket shall list: name of ready-mix batch plant, serial number of ticket, date and truck number, name of contractor, specific designation of job, batch number, amount of concrete, time loaded or of first mixing of cement and aggregates, number of revolutions, water added by receiver of concrete and his initials, type and name of admixtures and amount of same, type and brand of cement, amount of cement, total water content by producer, maximum size of aggregate, weights of fine and coarse aggregate, and indication that ingredients are as previously certified or approved.
 - E. Test Reports: Submit four copies of required slump tests, air content tests, and strength tests.
 - F. Pour Schedules: Submit concurrently with the steel reinforcing drawings six copies of concrete pour schedules showing sequence of pours and all contraction, expansion and construction joints.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Reinforcing Steel:
 1. For reinforcing steel fabricated on-site, ship from the mill in bundles, limited to one size and length, tagged with a waterproof tag showing the name of the mill, heat number, grade and size of the bars, and identifying number.
 2. For reinforcing steel fabricated off-site, deliver in bundles identified as to structure and shop drawing number. Identify each individual bar with a waterproof tag showing the grade, size and bar mark from the approved bar schedule.
 3. Protect reinforcing steel and wire fabric from damage and from dirt, oil, grease, other foreign matter, and rust-causing conditions. Do not store reinforcement in direct contact with the ground.
- B. Concrete Ingredients: Handle, control and store concrete materials in accordance with ACI 304, Chapter 2.

PART 2 PRODUCTS

2.1 READY-MIX CONCRETE

- A. Shall conform to ASTM C94, except as noted otherwise.
- B. Materials:
 1. Cement: ASTM C150, Types II, IIA, III, and IIIA as indicated in Table I.
 2. Fine Aggregate: ASTM C33, with the following additional requirements for Concrete Groups D, E, F, and G only:
 - a. Washed natural sand.
 - b. Weighted percentage of loss not more than 12 percent by weight when subjected to five cycles of the magnesium sulfate soundness test in accordance with ASTM C88.
 - c. Coarse Aggregate: ASTM C33, with the following additional requirements for Concrete Groups D, E, F, and G only.
 - 1) Percentage of wear not exceeding 45 percent when tested in accordance with ASTM C535.
 - 2) Weighted percentage of loss not more than 15 percent by weight when subjected to five cycles of the magnesium sulfate soundness test in accordance with ASTM C88.
 - d. Water: Potable
 - e. Admixtures:
 - 1) Air Entraining Admixture: ASTM C260.

-
-
- 2) Admixtures containing calcium chloride or soluble chlorides shall not be used in concrete:
 - (a) containing aluminum,
 - (b) subject to alkali-aggregate reaction, and
 - (c) for Concrete Groups D, E, F, and G of Table I.
 - (d) Admixtures other than air entraining shall conform to ASTM C494.
 - (e) All admixtures are subject to the written approval of the Architect.
 - C. Mix Proportioning:
 1. Select proportions for concrete to obtain the quality requirements for each group of concrete as specified in Table I of this Section.
 2. Where Concrete Group A is specified, Group C may be used upon written approval of the Architect. Where Concrete Group D is specified, Group F may be used upon written approval of the Architect.
 - D. Failure to Meet Strength Requirements: Paragraph 17 of ASTM C94 shall not apply. Failure to meet strength requirements will be governed by the appropriate provisions of the General Conditions.

2.2 REINFORCEMENT

- A. Reinforcing Steel Bars: ASTM A615 including Supplementary Requirement S1, Grade 60. For applications requiring welding of reinforcing steel bars, use ASTM A706, Grade 60, Low-Alloy Deformed Bars (except where smooth bars are indicated).
- B. Welded Steel Wire Fabric: ASTM A185

2.3 CONCRETING ACCESSORIES

- A. Premolded Expansion Joint Filler: ASTM D1752
 1. Sponge Rubber: Type I
 2. Cork: Type II
 3. Self-Expanding Cork: Type III
- B. Sealant: Polysulfide base, synthetic rubber sealant, non-staining, non-sag.
 1. Two-component: ASTM C920, Type M, Grade NS
 2. One Component: ASTM C920, Type S, Grade NS
- C. Bond Breaker: Non-staining liquid product which imparts a waterproof film to prevent adhesion of concrete and will not leave a paint-impeding coating on the face of the concrete.
- D. Waterproof Sheet Material for Curing: ASTM C171.
- E. Spacers, Chairs, Bolsters, Ties and Other Devices:
 1. Galvanized steel or non-corroding material conforming to the requirements of the Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice for Reinforced Concrete Construction".

PART 3 EXECUTION

3.1 GENERAL

- A. Unless otherwise specified, conform to ACI 304, 305R, and 306R for concrete installation requirements such as preparation, mixing, conveying, depositing, curing, and cold and hot weather requirements. Consolidate concrete in accordance with ACI 309.
- B. Concrete not placed within 90 minutes or 300 revolutions, whichever occurs first, after the first mixing of the cement and aggregates will be rejected.

3.2 COORDINATION

- A. Examine the drawings and specifications for work of other sections or other contractors and coordinate such work with the requirements of this Section. Make provisions for installation of such items as sleeves, pipes, conduits, inserts and hangers in a manner that will not impair or weaken concrete construction.

3.3 REINFORCEMENT

- A. Cleaning and Bending:
1. Clean metal reinforcement free of loose rust, mill scale, or other coatings that will destroy or reduce the bond.
 2. Perform cutting and bending in the shop. Bend and cut steel cold. Do not bend or straighten bars in a manner that will injure the material.
- B. Placement: Arrange and place reinforcement in accordance with the approved shop drawings. Secure in position with chairs, spacers, and ties. Concrete brick may be used to support reinforcement for slabs on grade when approved by the Architect.
- C. Splicing:
1. Furnish reinforcing bars in full lengths as indicated on the Contract Drawings and approved shop drawings.
 2. Do not splice bars unless indicated on the Contract Drawings or approved by the Architect in writing.
 3. When authorized, make splices in accordance with ACI 318. Perform welding in accordance with AWS D12.1.
 4. Lap mesh reinforcement not less than one mesh space plus 2 inches, and tie.
- D. Concrete Cover:
1. Provide clearance and spacing indicated on the Contract Drawings.
 2. Where no clearances are indicated, the thickness of concrete cover over reinforcement shall be:
 - a. 3 inches for concrete placed against ground without the use of forms
 - b. 2 inches for concrete placed in forms that will be exposed to ground or weather
 - c. 1-1/2 inches for formed concrete not exposed to ground or weather
 - d. 1 inch for slabs not exposed to ground or weather

3.4 FORMWORK

- A. Responsibility:
1. The design and construction of formwork are the sole responsibility of the Contractor.
 2. The Contractor shall remove and replace forms which no longer have smooth surfaces and/or are weak resulting in intrusions or extrusions in the concrete face.
- B. Design Criteria:
1. Design formwork system which is adequately braced and has strength and stability to insure finished concrete within the tolerances specified in ACI 347.
 2. Provide formwork sufficiently tight to prevent leakage of mortar.
 3. Chamfer external and exposed corners 1 inch.
- C. Coating Forms:
1. Coat forms with bond breaker prior to the placement of reinforcing steel.
 2. Do not allow excess form coating material to stand in puddles in the forms or to come in contact with concrete against which fresh concrete is to be placed.
-
-

-
-
3. Clean reinforcing steel that has become contaminated with bond breaker to the satisfaction of the Architect prior to placing concrete.
- D. Embedded Items:
1. Clean items to be embedded in concrete free from oil or foreign matter that would weaken the bond of the concrete to these items.
 2. Install in the formwork requisite inserts, anchors, sleeves, and other items specified under other sections of these specifications. Close ends of conduits, piping, and sleeves embedded in concrete with caps or plugs.
- E. Joints:
1. Make contraction, expansion, and construction joints where indicated on the Contract Drawings. Additional construction joints are subject to prior approval of the Architect. Locate additional construction joints to least impair the strength of the structure.
 2. Form keyways and joints as indicated on the Contract Drawings.
 3. Continue reinforcing steel and wire fabric across construction joints.
 4. Install premolded joint filler at locations indicated. Extend filler from bottom of concrete. Seal as indicated on the Contract Drawings. Make splices in premolded filler in manner to preclude penetration of concrete between joint faces.

3.5 PREPARATION OF EQUIPMENT AND PLACE OF DEPOSIT

- A. Before placement, clean equipment for mixing and transporting the concrete. Remove debris and ice from the places to be occupied by the concrete. Clean reinforcement of dirt, loose rust, and mill scale, or other coatings.
- B. Remove water from place of deposit before concrete is placed. Remove laitance and unsound material from hardened concrete before additional concrete is added.

3.6 MIXING

- A. Mix and deliver ready-mixed concrete in accordance with ASTM C94.
- B. Do not over-mix. Do not use concrete which is retained in mixers so long as to require additional water in excess of design mix water to permit satisfactory placing.
- C. Use preparation methods capable of producing concrete with a temperature not more than 85 degrees Fahrenheit, and not less than 55 degrees Fahrenheit, at the time of placement.
- D. Do not heat concrete ingredients to a temperature higher than that necessary to keep the temperature of the mixed concrete, as placed, within the specified temperatures.
- E. Do not heat water in excess of 140 degrees Fahrenheit.

3.7 CONVEYING

- A. Convey concrete from the mixer to the final deposit by methods that will prevent segregation or loss of materials.

3.8 CONCRETE PLACEMENT

- A. Deposit concrete as nearly as practical in its final position to avoid segregation due to rehandling or flowing. Do not use vibrators to move concrete horizontally with the forms.
- B. Do not use retempered concrete or concrete contaminated by foreign material.
- C. Plan and conduct concrete placement to insure that the concrete is kept plastic and that the concrete is free of cold joints.

-
-
- D. Where there is a time delay greater than 45 minutes between adjacent concrete placement, a bulkhead construction joint, complete with waterstops where required, must be installed.
 - E. Remove temporary spreaders in forms when concrete has reached an elevation rendering their service unnecessary.
 - F. Do not commence placing when the sun, heat, wind or limitations of facilities provided prevent proper finishing or curing.
 - G. Discontinue concreting when the descending natural air temperature falls lower than 40 degrees Fahrenheit unless preparations are made and in place to heat or insulate concrete in accordance with the cold weather concreting requirements of this specification.

3.9 CONSOLIDATION

- A. Consolidate concrete thoroughly as it is placed in order to secure a dense mass. Work concrete well around the reinforcement and embedded items and into the corners of the forms.
- B. Use internal vibrators inserted vertically over the entire area of the placement.
- C. Vibrate until voids are eliminated, coarse aggregate is suspended in mortar, and entrapped air bubbles begin to rise to the surface. Concrete shall move back into the space vacated by the vibrator.
- D. Space vibrator insertions such that the area visibly affected by the vibrator overlaps the adjacent just-vibrated area by a few inches.
- E. Penetrate at least 6 inches into previously placed layers in order to bond between layers and avoid cold joints.
- F. Form vibrators may not be used.
- G. Take care not to over-vibrate air entrained concrete. Place vibrator to eliminate honeycombing but avoid excess vibrating that bleeds all entrapped air from the mix.
- H. Do not use vibrators to transport concrete.

3.10 JOINTS AND KEYWAYS

- A. Construct expansion, control, and isolation joints and keyways where indicated on the Contract Drawings and at additional locations approved by the Architect.
- B. Where the placing of concrete is discontinued, clean off laitance and other objectionable material to a sufficient depth to expose sound concrete as soon as concrete is firm enough to retain its form. Smooth the top surface of concrete adjacent to the forms with a trowel to minimize visible joints on exposed faces.
- C. Immediately after the work of placing concrete is halted, remove accumulations splashed upon the reinforcement and the surfaces of the forms. Perform this removal before concrete takes its initial set. Clean reinforcing steel carefully to prevent damage to the concrete steel bond.
- D. Do not halt work within 18 inches of the top of any face.
- E. For bonded horizontal joint construction, roughen the surface and expose the aggregate. Clean the surface thoroughly by wet sandblasting, by cutting with high-pressure water jet or by other approved methods. Perform cleaning after the concrete has hardened to prevent raveling of the surface below the desired depth.
- F. Before bonding concrete is placed, clean the surface of loose or soft particles or other objectionable materials and keep wet for a minimum period of 12 hours.
- G. Cover the cleaned and saturated surface with a coating of neat cement grout and deposit new concrete before the grout has attained its initial set.

3.11 CONCRETE PROTECTION

-
-
- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperature and mechanical injury. Maintain with minimum moisture loss and relatively constant temperature for the period necessary for hydration of the cement and hardening of the concrete.
 - B. After the concrete has hardened, loosen forms as soon as possible without damage to the concrete, and run curing water continuously down inside the form.

3.12 REMOVAL OF FORMS

- A. Do not remove forms until members have acquired sufficient strength to support their own weight and imposed loads safely.
- B. In cold weather, all forms must remain in place for 5 days except those in Concrete Groups C and F of Table I where the requirement is 3 days.
- C. Notify the Architect before forms are removed in order that an examination of the newly-stripped surfaces may be made prior to patching.

3.13 REPAIR OF TIE HOLES AND MINOR DEFECTS

- A. Repair immediately after form removal.
- B. Honeycombs and Small Defective Areas:
 - 1. Remove to sound concrete.
 - 2. Wet the affected area.
 - 3. Brush on bonding grout - 1 part cement, 1 part fine sand and water to produce a consistency of thick cream.
 - 4. Apply patching mortar - 1 part cement, 2-1/2 parts sand and enough water to produce a stiff consistency.
 - 5. Consolidate patching mortar and strike off to leave the patch slightly higher than the surrounding surface.
 - 6. Finish the repaired area flush with the surrounding area after the mortar has been in place for one hour.
- C. Tie Holes:
 - 1. Thoroughly clean and dampen.
 - 2. Fill solid with patching mortar.
- D. Perform patching before curing compound is applied.
- E. Cure patched areas in the same way as adjacent concrete.
- F. Make repairs uniform in color and finish with surrounding concrete.

3.14 CURING

- A. Keep concrete moist for at least 7 curing days after placement. Concrete Groups C and F of Table I must be kept moist for only 3 curing days.
- B. A curing day is defined as 24-hour day when the concrete surfaces are kept moist and the uniform temperature of the concrete mass is between 55 degrees Fahrenheit and 75 degrees Fahrenheit.
- C. Curing may be achieved by water curing or application of a liquid membrane-forming curing compound. Curing compounds may not be used on surfaces that are to receive additional concrete, paint or tile.
- D. Water curing is the preferred method of protection. Cover exposed surfaces with a saturated material (burlap or cotton mats) and keep wet continuously with a soil soaker hose for 7 days. Leave covering in place, without wetting, for an additional 3 days.

-
-
- E. The use of curing compound (ASTM C309) is permissible. Keep surfaces moist after the forms are removed and the form tie holes repaired. After the surfaces are finished, apply the curing compound according to the manufacturer's recommendations. Do not remove too much forming at one time.
 - F. Slabs: Immediately following slab finishing, apply liquid membrane-forming curing compound or begin water curing before the surface becomes dry.
 - G. Vertical Surfaces: When the forms are removed entirely, spray the surface with water and allow to reach a uniformly damp appearance with no free water on the surface. Apply curing compound or begin water curing.

3.15 CONCRETE SLAB FINISHING

- A. Refer to Table II for type finish at each location.
 - B. Complete screeding and darbying slabs before excess moisture or bleeding water is present on the surface.
 - C. Do not begin subsequent finishing operations until surface water has disappeared and the concrete will sustain foot pressure with only approximately 1/4" indentation.
 - D. Float Finish:
 - 1. Consolidate concrete with a power-driven disc-type float or a combination floating-troweling machine with metal float shoes attached.
 - 2. Machines which have a water attachment for wetting the concrete during the finishing operation are prohibited.
 - 3. Unless otherwise indicated in Table II, check and level surface plane to a tolerance not exceeding 1/4 inch in 10 feet when tested with a 10-foot straightedge. Cut down high spots and fill low spots. Immediately after re-leveling, refloat surface to a uniform, smooth, granular texture.
 - 4. Where slab drainage is indicated, take care to maintain accurate slopes for drainage.
 - E. Steel Troweling: After float finishing, steel trowel surface as specified in Table II to increase the compaction of fines and to provide maximum density and wear resistance.
 - F. Integral Finishes:
 - 1. Use for slabs where some material other than concrete will be the final wearing surface.
 - 2. Screeded Finish - Place screed blocks at frequent intervals and strike off to surface elevations desired. Unless otherwise indicated, use on base slabs upon which grout finish, regular mortar bed ceramic tile, sand cushion terrazzo or similar type wearing surface is applied.
 - 3. Steel Trowelled Finish - Use on concrete slabs for resilient floors, ceramic tile using thin bed method, seamless flooring, epoxy or latex terrazzo, carpet and wood.
 - G. Non-slip Broom Finish: In addition to floating and troweling, provide walks, ramps, steps, and exposed floor areas subject to foot traffic and likely to be wet with a final non-slip broom finish. Draw broom over previously finished finish.
 - H. Expansion Joints:
 - 1. Edge or lightly stone the edges of expansion and contraction joints after the forms are stripped and before the adjacent slab is placed.
 - 2. Leave joints in the completed work carefully tooled and free of mortar and concrete.
 - 3. Leave joint filler exposed for its full length with clean and true edges.
 - 4. Apply sealant at expansion joints where indicated.
 - I. Abrasive Aggregate Non-slip Finish:
 - 1. Screed and float concrete to the required finish level with no coarse aggregate visible.
-
-

2. Uniformly sprinkle abrasive aggregate over the floated surface at a rate of not less than 1/4 pound per square foot.
3. Steel trowel surface to a smooth even finish.
4. Immediately after curing, remove cement coating covering the abrasive aggregate by steel brushing, rubbing with an abrasive stone or sandblasting to expose abrasive particles.

3.16 HOT WEATHER REQUIREMENTS

- A. Hot weather conditions are deemed to exist when the temperature in the forms is 75 degrees Fahrenheit or above, or a combination of high air temperature, low relative humidity and wind velocity impairs the quality of fresh or hardened concrete. Take protective measures for mixing, transporting and placing concrete in accordance with ACI 305R.
- B. The temperature of the concrete at the place of discharge may not exceed 85 degrees Fahrenheit.
 1. If ice is used to lower temperature, place crushed, shaved or chipped ice directly into the mixer as part or all of the mixing water. Mix until ice is completely melted.
 2. Record the concrete temperature at the time of discharge.
- C. Do not add water that will cause the proportions to exceed the maximum water-cement ratio shown in Table I.
 1. Notify the resident project representative before adding any water to the concrete mix.
 2. Record the amount of water added to the concrete at the jobsite.
- D. Discharge concrete within 90 minutes or 300 revolutions, whichever occurs first, after the first mixing of cement and aggregates.
- E. Placing and Curing:
 1. Place concrete promptly upon arrival.
 2. Provide at least one standby vibrator for each 3 vibrators in use.
 3. Protect concrete from direct sunlight. Keep forms covered and moist by means of water sprinkling or the application of continuously wetted burlap or cotton mats for a minimum of 24 hours.
 4. When forms are removed, provide wet cover to the newly exposed surfaces to avoid exposure to hot sun and wind.
 5. Continue specified water curing methods for 10 days. Leave covering in place 4 additional days. Do not permit alternate wetting and drying cycles.

3.17 COLD WEATHER REQUIREMENTS

- A. Cold weather is defined any time when the daily temperature is 40 degrees F or lower during placement and the protection period.
- B. Protect concrete surfaces from freezing for at least 24 hours after placement.
- C. All surfaces in contact with newly-placed concrete including formwork, reinforcement and subgrade must be above 35 degrees Fahrenheit.
- D. Place concrete at a temperature of not less than 55 degrees Fahrenheit. Mix concrete at a temperature between:
 1. 60 degrees Fahrenheit and 70 degrees Fahrenheit when outside air temperature is above 30 degrees Fahrenheit.
 2. 65 degrees Fahrenheit and 75 degrees Fahrenheit when outside air temperature is between 0 degrees Fahrenheit and 30 degrees Fahrenheit.

-
-
3. 70 degrees Fahrenheit and 80 degrees Fahrenheit when outside air temperature is below 0 degrees Fahrenheit.
 - E. Follow concrete placement with tarpaulins or other readily movable coverings, so only a few feet of concrete is exposed to the outside air at any time.
 - F. Maintain the temperature and moisture conditions specified in all parts of the newly-placed concrete by covering, insulating, housing or heating. Arrange for protection methods in advance of placement.
 - G. Maintain concrete at a temperature of not less than 50 degrees Fahrenheit nor more than 70 degrees Fahrenheit for a period of 3 days after placement. Only 2 days are required for Concrete Groups C and F of Table I.
 - H. Do not remove forms during the initial protection period.
 - I. Protect insulation against wetting that will impair its insulating value using moisture-proof cover material. Keep insulation in close contact with concrete.
 - J. Construct enclosure to withstand wind and snow loads and be reasonably air-tight. Provide sufficient space between the concrete and enclosure to permit free circulation of heated air.
 - K. Use vented heaters. Do not permit heaters to heat or dry concrete locally.
 - L. Maintain relative humidity above 40 percent within heated enclosures before construction supports are removed.
 - M. Monitor temperature to insure concrete is kept within specified limits recording time and concrete temperature every 8 hours.
 - N. Assure concrete has developed necessary strength before removing forms. Provide additional test cylinders with the same protection as the structure they represent to verify concrete strength before construction supports are removed.
 - O. If water curing is used, terminate at least 12 hours before end of temperature protection period. Permit concrete to dry.
 - P. After the required protection period, gradually reduce the concrete temperature within an enclosure or insulation at a rate not to exceed 20 degrees Fahrenheit per day until the outside temperature has been reached.
 - Q. Apply membrane-forming curing compound to concrete surfaces during the first period of above-freezing temperatures after forms are stripped and before air temperature rises to 50 degrees F. Apply membrane-forming curing compound to slabs as soon as finishing operations are completed, except where live steam curing is used.

3.18 MISCELLANEOUS CONCRETE ITEMS

- A. Concrete Sidewalks and Pads:
 1. Sidewalks and Pads, shall be 4000 psi air entrained concrete 4 inches thick.
 2. Subgrade shall be properly prepared and thoroughly wetted before placing concrete.
 3. Provide control and expansion joints as indicated on drawings.
 - a. Control joint scoring shall extend at least a third of slab thickness into slab.

SEE ATTACHED TABLES

TABLE 1
PROPERTIES OF CEMENT CONCRETE

Conc Group	REQD 7 Day Strength (psi)	REQD 28 Day Strength (psi)	Reinf. Steel Grade	Water / Cement Ratio	Max. % Air Content	Min. / Max. Slump (In.)	Max. C3A (%)	Cement Type	Max. Aggregate Size (In.)
G	2,800	4,000	60	0.45	1.5 +/- 0.5	2-4		I	1-1/2

*Compressive Strength at 3 Days

TABLE II

CONCRETE FINISH SCHEDULE

LOCATION	CONCRETE GROUP	FINISH	REMARKS
Sidewalks, Entrance Pads,	G	Non-Slip Broom Finish	
Frostwalls, Turndowns	G	Smooth Rubbed Finish	Exposed Exterior Faces of Walls to 1 Foot Below Grade
		Rough Form	Buried Faces of Walls

END OF SECTION

SECTION 03 60 00
GROUT

PART 1 GENERAL

1.1 DESCRIPTION

- A. The Work of this section includes, but is not limited to:
 - 1. Non-shrink Cementitious Grout.
- B. Related Work specified elsewhere:
 - 1. Section 03 30 00 - Cast-in-Place Concrete.
 - 2. Section 05 52 13 - Pipe and Tube Railings.

1.2 SUBMITTALS

- A. Submit a Statement of Compliance, Section 00 62 33.14, together with supporting data, from the materials suppliers attesting the conformance of products and ingredients with these specifications.
- B. Submit manufacturer's instructions for mixing, handling, surface preparation, and placing the non-shrink grout.

PART 2 PRODUCTS

2.1 NON-SHRINK CEMENTITIOUS GROUT

- A. Pre-mixed ready for use formulation requiring only the addition of water; non-shrink, non-corrosive, non-metallic, non-gas forming, no chlorides.
- B. Certified to maintain initial placement volume or expand after set and meet the following minimum properties when tested in accordance with Corps of Engineers Specification CRD-C621, for Type D non-shrink grout:

Setting Time:	Initial Final	2 hours (Approximately) 3 hours (Approximately)	ASTM C191
Expansion:		0.10% - 0.4% Maximum	
Compressive Strength:	1 day 7 days 28 days	4,000 psi 7,000 psi 10,000 - 10,800 psi	CDR-C621

PART 3 EXECUTION

3.1 SURFACE PREPARATION

- A. Remove defective concrete, laitance, dirt, oil, grease and other foreign material from concrete surfaces by brushing, hammering, chipping or other similar means until a sound, clean concrete surface is achieved.
- B. Lightly roughen the concrete, but not enough to interfere with the proper placement of grout.
- C. Remove foreign materials from metal surfaces in contact with grout.
- D. Align, level and maintain final positioning of components to be grouted.
- E. Take special precautions during periods of extreme weather conditions in accordance with the manufacturer's written instructions.
- F. Saturate concrete surfaces with clean water; remove excess water, leave none standing.

3.2 FORMWORK

- A. Construct leakproof forms anchored and shored to withstand grout pressures.
- B. Provide clearance between the formwork and the area to be grouted to permit proper placement of grout.

3.3 MIXING

- A. Non-Shrink Cementitious Grout: Mix and prepare non-shrink cementitious grout in strict accordance with the manufacturer's instructions.
- B. Mix grout components as close to the work area as possible and transport the mixture quickly and in a manner that does not permit segregation of materials.

3.4 PLACING

- A. Place grout material quickly and continuously.
- B. Do not use pneumatic-pressure or dry-packing methods.
- C. Apply grout from one side only to avoid entrapping air.
- D. Do not vibrate the placed grout mixture, or permit it to be placed if the area is being vibrated by nearby equipment.
- E. The final installation shall be thoroughly compacted and free of air pockets.
- F. Do not remove leveling shims for at least 48 hours after grout has been placed.

3.5 CURING

- A. After grout has attained its initial set, keep damp for a minimum of 3 days.
- B. Prevent rapid loss of water from the grout during the first 48 hours by the use of an approved membrane curing compound or with the use of the wet burlap method.

END OF SECTION 03 60 00

SECTION 05 52 13
PIPE AND TUBE RAILINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Ramp and landing railings and guardrails.

1.2 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Placement of anchors in concrete.

1.3 REFERENCE STANDARDS

- A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum 2020.
- B. ADA Standards - 2010 ADA Standards for Accessible Design 2010.
- C. ASTM B211/B211M - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire 2019.
- D. ASTM B241/B241M - Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube 2022.
- E. ASTM B429/B429M - Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube 2020.
- F. ASTM B483/B483M - Standard Specification for Aluminum and Aluminum-Alloy Drawn Tube and Drawn Pipe for General Purpose Applications 2021.
- G. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings 2021.
- H. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination 2020.
- I. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification 2021.
- J. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2022).

1.4 SUBMITTALS

- A. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.
 - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
 - 2. Include the design engineer's seal and signature on each sheet of shop drawings.
- B. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated within the previous 12 months.

1.5 QUALITY ASSURANCE

- A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located, or personnel under direct supervision of such an engineer.
- B. Welder Qualifications: Welding processes and welding operators qualified within previous 12 months.

PART 2 PRODUCTS

2.1 RAILINGS - GENERAL REQUIREMENTS

-
-
- A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of applicable local code.
 - B. Distributed Loads: Design railing assembly, wall rails, and attachments to resist distributed force of 75 pounds per linear foot applied to the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935
 - C. Concentrated Loads: Design railing assembly, wall rails, and attachments to resist a concentrated force of 200 pounds applied at any point on the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935
 - D. Allow for expansion and contraction of members and building movement without damage to connections or members.
 - E. Dimensions: See drawings for configurations and heights.
 - F. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.
 - G. Provide welding fittings to join lengths, seal open ends, and conceal exposed mounting bolts and nuts, including but not limited to elbows, T-shapes, splice connectors, flanges, and escutcheons.

2.2 ALUMINUM MATERIALS

- A. Aluminum Pipe: Schedule 40; ASTM B429/B429M, ASTM B241/B241M, or ASTM B483/B483M.
- B. Aluminum Tube: Minimum wall thickness of 0.127 inch; ASTM B429/B429M, ASTM B241/B241M, or ASTM B483/B483M.
- C. Solid Bars and Flats: ASTM B211/B211M.
- D. Welding Fittings: No exposed fasteners; cast aluminum.
- E. Exposed Fasteners: No exposed bolts or screws.

2.3 FABRICATION - PIPE RAILINGS

- A. Railing:
 - 1. Aluminum:
 - a. Guard pipe railings shall be fabricated of standard 6061-T6 alloy, Schedule 40 extruded aluminum structural pipe, in accordance with ASTM B429; pipe shall be nominal 1-1/4", with 1.66" O.D. and 0.144" wall thickness.
 - b. Hand pipe railings shall be nominal 1-1/4" with 1.66" O.D. and 0.144" wall thickness.
 - B. Railing systems shall be designed to meet OSHA, and IBC standards. Refer to Drawings for railing system details.
 - C. Post spacing shall be adequate to meet loading requirements but shall not exceed 6'-0" o.c. maximum.
 - D. All connections for fixed railing systems shall be continuously fillet welded and ground smooth.
 - E. Posts shall not interrupt the continuation of the top rail at any point along the railing, including corners and end terminations. The top surface of the top railing shall be smooth and shall not be interrupted by projecting fittings.
 - F. Provide for expansion and contraction in the railing. Expansion joints must align with those in the structure to which the handrail is attached. Post spacing shall be located 1'-0" maximum to the right or left of expansion and contraction joints.
 - G. Handrail post shall set in sleeves in the concrete unless otherwise noted on the Drawings.
 - H. Permanent setting in concrete shall have posts set in sleeves and set in non-shrink, expanding grout.
 - I. All metal railings shall be aluminum.
-
-

-
-
- J. Accurately form components to suit specific project conditions and for proper connection to building structure.
 - K. Fit and shop assemble components in largest practical sizes for delivery to site.
 - L. Welded Joints:
 - 1. Exterior Components: Continuously seal joined pieces by intermittent welds and plastic filler. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
 - 2. Interior Components: Continuously seal joined pieces by intermittent welds and plastic filler.
 - 3. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
 - M. Weld connections that cannot be shop welded due to size limitations.
 - 1. Weld in accordance with AWS D1.1/D1.1M.
 - 2. Match shop welding.
 - 3. Clean welds and abraded areas.
 - 4. Touch up factory-applied finishes.

2.4 ALUMINUM FINISHES

- A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.
- B. Touch-Up Materials: As recommended by coating manufacturer for field application.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.2 PREPARATION

- A. Clean and strip aluminum where site welding is required.
- B. Supply items required to be cast into concrete with setting templates, for installation as work of other sections.
- C. Apply one coat of bituminous paint to concealed aluminum surfaces that will be in contact with cementitious or dissimilar materials.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.
- C. Install railings in compliance with ADA Standards for accessible design at applicable locations.
- D. Anchor railings securely to structure.

3.4 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per floor level, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

SECTION 32 92 00
FINISH GRADING AND SEEDING

PART 1 GENERAL

1.1 DESCRIPTION

- A. The Work of this section includes, but is not limited to:
 - 1. Placing topsoil
 - 2. Soil conditioning
 - 3. Finish grading
 - 4. Seeding
 - 5. Maintenance
- B. The "Seeding Restoration Table" at the end of this section lists specific seeding restoration requirements.

1.2 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. Pennsylvania Department of Transportation (PADOT); Publication 408 Specifications.
 - 2. Pennsylvania Seed Act of 1965, Act 187, as Amended.
 - 3. Pennsylvania Soil Conditioner and Plant Growth Substance Law, Act of December 1, 1977, P.L. 258, No. 86(3P.S.68.2), as Amended.
 - 4. Pennsylvania Agricultural Liming Materials Act of 1978, P.L. 15, No. 9(3P.S.132-1), as Amended.
 - 5. Rules for Testing Seeds of the Association of Official Seed Analysts.

1.3 SUBMITTALS

- A. General: Submit in accordance with Section 01 30 00.
- B. Certificates:
 - 1. Prior to use or placement of material, submit a Statement of Compliance, from the materials suppliers, together with supporting data, attesting that the composition of the following products meets specification requirements.
 - a. Fertilizer - Analysis content and percent of each.
 - b. Lime - Analysis content and percent of each.
 - c. Seed mixture(s) - State percentage of mixtures, purity, germination and maximum weed seed content of each grass mixture.
 - 2. Submit certified soil sample analyses, including laboratory's recommended soil supplement formulation, topsoil analysis - State pH, texture, organic content, and macro nutrients.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Seed:
 - 1. Deliver seed fully tagged and in separate packages according to species or seed mix.
 - 2. Seed which has become wet, moldy, or otherwise damaged in transit or storage will not be accepted.

PART 2 PRODUCTS

2.1 TOPSOIL

-
-
- A. All topsoil stripped from the site and stockpiled may be reused provided the following requirements are met:
 1. Have a pH of between 6.0 and 7.0; contain not less than 2 percent nor more than 10 percent organic matter as determined by AASHTO T194.
 2. Fertile friable loam, sand loam, or clay loam which will hold a ball when squeezed with the hand, but which will crumble shortly after being released.
 3. Free of clods, grass, roots, or other debris harmful to plant growth. Free of pests, pest larvae, and matter toxic to plants.

2.2 SEED

- A. Fresh, clean, dated material from the last available crop and within the date period specified, with a date of test not more than 9 months prior to the date of sowing.
- B. Percentage of pure seed present shall represent freedom from inert matter and from other seeds distinguishable by their appearance.
- C. All seeds will be subject to analysis and testing.
- D. Seed mix in accordance with Seeding Restoration Table.

2.3 FERTILIZER

- A. Liquid formulations may be used in lieu of dry formulations, provided the rate of application is adjusted to apply the same quantities of nitrogen, phosphorus and potassium per unit area as specified for dry formulations.
- B. Basic Dry Formulation Fertilizer: Analysis 0-20-20 and as defined by the Pennsylvania Fertilizer Law.
- C. Starter Fertilizer: Analysis 10-5-5 or 12-6-6 and 12-18-10 or 18-24-10 as defined by the Pennsylvania Fertilizer Law.
- D. Contractor must submit soils samples to an approved laboratory for fertilizing recommendations. Recommendations shall be submitted to Owner for his review and decision relating to modifying the application rate as shown on the Seeding Restoration Table.

2.4 LIME

- A. Pulverized agricultural limestone conforming to Section 804.2(a), Publication 408 Specifications.
- B. Provide all lime in accordance with application rates shown in the Seeding Restoration Table, or as recommended by the soil test laboratory.

2.5 INOCULANT

- A. Inoculate leguminous seed before seeding with nitrogen fixing bacteria culture prepared specifically for the species.
- B. Do not use inoculant later than the date indicated by the manufacturer.
- C. Protect inoculated seed from prolonged exposure to sunlight prior to sowing.
- D. Reinoculate seed not sown within 24 hours following initial inoculation.

2.6 EROSION CONTROL FABRIC

- A. Shall be a knitted construction of yarn with uniform openings interwoven with strips of biodegradable paper, furnished in rolls with 4-mil opaque polyethylene base as protection for outdoor storage.
- B. Fabric 0.2 pound per square yard.

2.7 JUTE MATTING

-
-
- A. Shall be heavy weight, minimum 0.9 pound per square yard, jute mesh with 1 inch opening.

2.8 FABRIC/MATTING ANCHORS

- A. Staples for fastening fabric to ground shall be minimum 11 gauge wire, "U" shaped, with a 1 inch crown and 6 inch legs.

2.9 MULCHING MATERIALS

- A. Mulches for seeded areas shall be one, or a combination, of the following:
1. Wheat or oat straw; thoroughly threshed.
 - a. Cured to less than 20 percent moisture content by weight.
 - b. Containing no stems of tobacco, soybeans, or other coarse or woody material, free of mature seed bearing stalks or roots of prohibited or noxious weeds.
 2. Wood Cellulose:
 - a. Containing no growth or germination-inhibiting substances.
 - b. Green-dyed and air-dried.
 - c. Packages not exceeding 100 pounds.
 - d. Moisture Content: 12 percent \pm 3 percent
 - e. Organic Matter (Dry oven basis): 98.6 percent \pm 0.2 percent
 - f. Ash Content: 1.4 percent \pm 0.2 percent
 - g. Minimum Water-Holding Capacity: 100 percent
- B. Mulch Binders:
1. Emulsified Asphalt AASHTO M140, Grade SS-1
 2. Cut Back Asphalt AASHTO M81, RC 250
 3. Nonasphaltic Emulsion - Natural Vegetable Gum Blended with Gelling and Hardening Agents
 4. Polyvinyl Acetate Emulsion Resin, Containing 60 percent (+ 1 percent) Total Solids by Weight

PART 3 EXECUTION

3.1 TIME OF OPERATIONS

- A. Conduct seeding operations during the times specified in the Seeding Restoration Table.

3.2 PREPARATION OF SUBGRADE

- A. "Hard pan" or heavy shale:
1. Plow to a minimum depth of 6 inches.
 2. Loosen and grade by harrowing, discing, or dragging.
 3. Remove surface stones over 3 inches in any dimension and other debris.
- B. Loose loam, sandy loam, or light clay:
1. Loosen and grade by harrowing, discing, or dragging.
 2. Remove surface rocks over 3 inches in any dimension and other debris.

3.3 PLACING TOPSOIL

- A. Place topsoil and spread over the prepared subgrade to obtain the required depth and grade elevation. Final compacted thickness of topsoil not less than 4 inches.
- B. Roller weighing over 120 pounds per foot of width shall not be used for compaction.
- C. Remove all materials unsuitable or harmful to plant growth, and legally dispose off site.
- D. Do not place topsoil when the subgrade is frozen, excessively wet, or extremely dry; do not handle topsoil when frozen or excessively wet.

-
-
- E. Finish surface of topsoil shall be smooth, even and true to lines and grades with no ponding areas.

3.4 TILLAGE

- A. After seed bed areas have been brought to proper compacted elevation, thoroughly loosen to a minimum depth of 5 inches by discing, harrowing, or other approved methods.
- B. Do not work topsoiled areas when frozen or excessively wet.
- C. Liming:
1. Distribute limestone uniformly at the rate indicated by the soil test.
 2. Thoroughly incorporate into the topsoil to a minimum depth of 4 inches as a part of the tillage operation.
- D. Basic Fertilizer:
1. Distribute basic fertilizer uniformly at the rate indicated by the soil test.
 2. Incorporate into soil to depth of 4 inches by approved methods as part of tillage operation.

3.5 FINISH GRADING

- A. Remove unsuitable material larger than 1 inch in any dimension.
- B. Uniformly grade surface to the required contours without the formation of water pockets.
- C. Distribute starter fertilizer at the rates indicated on the Seeding Restoration Table, or as recommended by the soil test laboratory.
- D. Incorporate starter fertilizer into the upper 1 inch of soil.

3.6 SEEDING

- A. Uniformly sow specified seed mix by use of approved hydraulic seeder, power-drawn drill, power-operated seeder or hand-operated seeder.
- B. Do not seed when winds are over 15 miles per hour.
- C. Upon completion of seed covering, roll the area with a roller, exerting a maximum force of 65 pounds per foot width of roller.

3.7 MULCHING

- A. Mulch within 48 hours of seeding.
- B. Place straw mulch in a continuous blanket at a minimum rate of 1,200 pounds per 1,000 square yards.
- C. Anchor straw mulch by use of twine, stakes, wire staples, plastic nets, or asphalt or chemical mulch binder. Apply binders by the manufacturer's method and rate.
- D. Apply wood cellulose fiber hydraulically at a rate of 320 pounds per 1,000 square yards; incorporate as an integral part of the slurry after seed and soil supplements have been thoroughly mixed.
- E. Protect structures, pavements, curbs, and walls to prevent asphalt staining.
- F. Do not spray asphalt and chemical mulch binders onto any area within 100 feet of a stream or other body of water.

3.8 MAINTENANCE

- A. Contractor shall be responsible for maintenance of seeded work.
- B. Maintenance includes watering, weeding, two initial mowings, cleanup, edging, and repair of washouts or gullies.
- C. Keep seeded areas moist to a depth of 3 inches for a period of 14 days following seeding.
- D. Those areas which do not show a prompt catch of grass within 24 days of seeding shall be reseeded until complete grass catch occurs.
-
-

- E. When the grass reaches an average height of three inches, cut to a height of two inches; irregularities or depressions which show up at this time shall be leveled and reseeded.
- F. Contractor's maintenance shall continue until all areas are grassed and free from bare spots or off-color areas, and turf areas are accepted.

SEE ATTACHED SEEDING RESTORATION TABLE

SEEDING RESTORATION TABLE

<u>Restoration Condition</u>	<u>Topsoil</u>	<u>Lime*</u>	<u>Basic Fertilizer</u>	<u>Starter Fertilizer</u>	<u>Seed Mix & Sowing Rate (% by Weight)</u>
Temporary Cover**	N/A	N/A	N/A	N/A	100% Annual Ryegrass, Sow 9 lb. per 1,000 sq. yd. Mar thru May/Aug thru Sept
Roadside, Non-Mowed	Yes	100 lb. per 1,000 sq. ft.	No	10-5-5 at 50 lb. per 1,000 sq. ft. <u>or</u> 12-6-6 at 33 lb. per 1,000 sq. ft.	80% Kentucky 31 Fescue 20% Pennlawn Red Fescue Sow 21 lb. per 1,000 sq. yd. Mar thru May/Aug thru Sept
Roadside, Mowed	Yes	100 lb. per 1,000 sq. ft.	No	10-5-5 at 50 lb. per 1,000 sq. ft. <u>or</u> 12-6-6 at 33 lb. per 1,000 sq. ft.	50% Kentucky Bluegrass 30% Pennlawn Red Fescue 20% Perennial Ryegrass Sow 21 lb. per 1,000 sq. yd. Mar thru May/Aug thru Sept
Bank Areas, Steeper than 3:1 Slopes	Yes	100 lb. per 1,000 sq. ft.	No	12-18-10 at 18 lb. per 5,000 sq. ft. <u>or</u> 18-24-10 at 20 lb. per 5,000 sq. ft.	45% Crownvetch 55% Annual Ryegrass Sow 9 lb. per 1,000 sq. yd. Any time except Sept-Oct
Lawns	Yes	100 lb. per 1,000 sq. ft.	0-20-0 50 lb. per 1,000 sq. ft.	12-18-10 at 18 lb. per 5,000 sq. ft. <u>or</u> 18-24-10 at 20 lb. per 5,000 sq. ft.	50% Kentucky Bluegrass 30% Pennlawn Red Fescue 20% Perennial Ryegrass Sow 21 lb. per 1,000 sq. yd. Mar thru May/Aug thru Sept
Fields and pasture, Non-Cultivated	No	No	No	10-5-5 at 50 lb. per 1,000 sq. ft. <u>or</u> 12-6-6 at 33 lb. per 1,000 sq. ft.	100% Timothy Sow 9 lb. per 1,000 sq. yd. Mar thru May/Aug thru Sept
Fields, Cultivated	No	No	No	10-5-5 at 50 lb. per 1,000 sq. ft. <u>or</u> 12-6-6 at 33 lb. per 1,000 sq. ft.	100% Annual Ryegrass Sow 9 lb. per 1,000 sq. yd. Mar thru May/Aug thru Sept

Woods, Sparse	No	No	No	10-5-5 at 50 lb. per 1,000 sq. ft. or 12-6- 6 at 33 lb. per 1,000 sq. ft.	100% Red Fescue Sow 36 lb. per 1,000 sq. yd. Mar thru May/Aug thru Sept
Woods, Dense	No	No	No	No	Stabilize soil with biodegradable netting and paper fabric material

*Unless lesser rate indicated by soils tests

END OF SECTION