

SECTION 02920

LAWNS AND GRASSES

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes seeding and mulching.

1.02 DEFINITIONS

- A. Finish Grade: Elevation of finished surface of planting soil.
- B. Manufactured Soil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
- C. Planting Soil: Native or imported topsoil, manufactured topsoil, or surface soil modified to become topsoil; mixed with soil amendments.
- D. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill immediately beneath planting soil.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product certificates.
- C. Planting Schedule: Indicating anticipated planting dates.

1.04 QUALITY ASSURANCE

- A. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when planting is in progress.
- B. Retain below for imported topsoil or topsoil to be reused.
- C. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery and while stored at site.
- B. Seed: Deliver seed in original sealed, labeled, and undamaged containers.

1.06 LAWN MAINTENANCE

- A. Begin maintenance immediately after each area is planted and continue until acceptable lawn is established, but for not less than the following periods:
 - 1. Seeded Lawns: 60 days from date of Substantial Completion.
- B. Mow lawn as soon as top growth is tall enough to cut. Remove no more than 40 percent of grass-leaf growth in initial or subsequent mowings.

PART 2 - PRODUCTS

2.01 SEED

- A. Seed Species: State-certified seed of grass species, as follows:
 - 1. Sun and Partial Shade Mixture: Provide certified grass-seed blends or mixes, proportioned by weight as follows:

| <u>Proportion</u> | <u>Name</u> | <u>Min. Pct. Germ.</u> | <u>Min. Pct. Pure Sd.</u> | <u>Max. Pct. Weed Sd.</u> |
|-------------------|--|--------------------------------|-----------------------------------|-----------------------------------|
| 30 percent | Creeping Red Fescue (Festuca rubra variety) | 85 | 98 | 0.50 |
| 30 percent | Chewings red fescue (Festuca rubra variety) | 85 | 98 | 0.50 |
| 15 percent | Kentucky Bluegrass (Poa pratensis) | 80 | 85 | 1.00 |
| 25 percent | Perennial rye grass (Lolium perenne) | 90 | 98 | 0.50 |

- 2. Wetland Mixture (Detention Basin Areas): Provide certified seed of grass species, as follows:

| <u>Proportion</u> | <u>Name</u> | <u>Min. Pct. Germ.</u> | <u>Min. Pct. Pure Sd.</u> | <u>Max. Pct. Weed Sd.</u> |
|-------------------|---|--------------------------------|-----------------------------------|-----------------------------------|
| 50 percent | Reed Canary Grass (Phalaris Arundinacea) or Switchgrass (Panicum virgatum) | 85 | 95 | 80 |
| 16 percent | Redtop (agrostis alba) | 85 | 90 | 90 |
| 34 percent | Birdsfoot trefoil | 70 | 98 | 80* |

*Minimum 20% hardseed and 60% normal sprouts. Inoculate Birdsfoot trefoil with appropriate leguminous inocula.
 Application rate for the wetland mixture shall be one (1) pound per 1000 square feet.

3. Crownvetch Mix: *This is for embankment planting.

| Proportion | Name | Min. Pct. Germ. | Min. Pct. Pure Sd. | Max. Pct. Weed Sd. |
|------------|---|-----------------------|--------------------------|--------------------------|
| 50 percent | Penngift Crownvetch* (<i>Coronilla varia</i>) | 70 | 99 | 0.10 |
| 50 percent | Companion Grass Mix | | | |
| | (A) 60% Perennial Ryegass (<i>Colium perenne</i>) | 90 | 98 | 0.15 |
| | (B) 20% Hard Fescue (<i>Festuca longifolia</i>) | 85 | 98 | 0.15 |
| | (C) 20% Creeping Red Fescue (<i>Festuca rubra</i>) | 85 | 98 | 0.15 |

2.02 PLANTING MATERIALS

- A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, a minimum of 5 percent organic material content and maximum of 6; free of stones 1 inch (25 mm) or larger in any dimension and other extraneous materials harmful to plant growth.
- Topsoil Source: Reuse surface soil stockpiled on-site and supplement with imported or manufactured topsoil from off-site sources when quantities are insufficient. Verify suitability of stockpiled surface soil to produce topsoil.
- B. Inorganic Soil Amendments:
- Lime: ASTM C 602, Class T or O, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent.
 - Select appropriate sulfate compounds from subparagraphs below. Sulfur is used to lower pH and neutralize alkaline soils. Revise descriptions and add proprietary products if required.
 - Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, with a minimum 99 percent passing through No. 6 (3.35-mm) sieve and a maximum 10 percent passing through No. 40 (0.425-mm) sieve.
 - Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.
 - Aluminum Sulfate: Commercial grade, unadulterated.
- C. Organic Soil Amendments
- Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8.
 - Peat: Sphagnum peat moss, partially decomposed, finely divided or granular texture, with pH range of 3.4 to 4.8.
 - Retain subparagraph above or first subparagraph below, if applicable. Retain above if sphagnum peat moss, an acidic peat, is required. Retain below if peat types with neutral pH are required.
 - Peat: Finely divided or granular texture, with pH range of 6 to 7.5, containing partially decomposed moss peat, native peat, or reed-sedge peat and having water-absorbing capacity of 1100 to 2000 percent.

June 07, 2002

5. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture, free of chips, stones, sticks, soil, or toxic materials.

D. Fertilizer:

1. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 4 percent nitrogen and 20 percent phosphoric acid.
2. Superphosphate is an inorganic, neutral source of phosphorus useful in alkaline calcareous soils of arid areas.
3. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.
4. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
 - a. Composition: 1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m) of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
5. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 - a. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.

E. Mulches:

1. Hay Mulch: Provide air-dry, clean, mildew- and seed-free, acceptable native or forage grass, with less than 20% moisture content by weight.

F. Legume Inoculants:

1. The incident for treating leguminous seed (i.e., crownvetch) shall be a standard commercial product consisting of a suitable carrier containing a culture of nitrogen fixing bacteria specific for the seed to be inoculated. All containers must remain sealed until contents are used in their entirety. Inoculant shall not be used after the expiration date indicated on the container.

Suitable storage in a moderate temperature shall be provided at all times. All inoculants shall be subject to approval of the Contracting Officer.

2.03 PLANTING SOIL MIX

- A. Planting Soil Mix: Mix topsoil with soil amendments and fertilizers in the quantities as recommended by the topsoil analysis for the type of crop being grown.

PART 3 - EXECUTION

3.01 LAWN PREPARATION

- A. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 4 inches (100 mm). Remove stones larger than 1-1/2 inches (38 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Government's property.
 1. Spread topsoil to a minimum depth of 4 inches (100 mm) but not less than required to meet finish grades after rolling and natural settlement. Do not spread topsoil if topsoil or subgrade is frozen, muddy, or excessively wet..

2. Apply soil amendments and fertilizers according to topsoil analysis recommendations.
- B. Unchanged Subgrades: If lawns are to be planted in areas unaltered or undisturbed by excavating, grading, or surface soil stripping operations, prepare surface soil as follows:
 1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
 2. Loosen surface soil to a depth of at least of 6 inches (150 mm). Apply soil amendments and fertilizers according to topsoil analysis recommendations. Till soil to a homogeneous mixture of fine texture.
 3. Remove stones larger than 1-1/2 inches (38 mm) in any dimension and sticks, roots, trash, and other extraneous matter.
 4. Legally dispose of waste material, including grass, vegetation, and turf, off Government's property.
- C. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch (13 mm) of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future.
- D. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- E. Restore areas if eroded or otherwise disturbed after finish grading and before planting.

3.02 SEEDING

- A. Sowing rates vary with grass species and mixtures. Revise first paragraph below to suit Project.
- B. Sow seed at the rate specified for each seed mixture.
- C. Rake seed lightly into top 1/8 inch (3 mm) of topsoil, roll lightly, and water with fine spray.
- D. Retain paragraph below if straw protection is required for seeded areas.
- E. Protect seeded areas with slopes exceeding 1:4 by spreading hay mulch. Spread uniformly at a minimum rate of 2 tons/acre (42 kg/92.9 sq. m) to form a continuous blanket 1-1/2 inches (38 mm) in loose depth over seeded areas. Spread by hand, blower, or other suitable equipment.
- F. Below is usually required in warm, dry climates.
- G. Protect seeded areas from hot, dry weather or drying winds by applying potable water. Saturate soil with fine waterspray as required.
- H. Inoculating Legumes: All leguminous seed shall be inoculated with the proper cultures prior to sowing unless accompanied by a certificate of preinoculation. Inoculated seed shall be protected from prolonged exposure to sunlight prior to sowing, and all seed not sown within twenty-four hours following inoculation shall be reinoculated. When seed is to be sown by an approved dry method, the legumes shall be inoculated in accordance with the manufacturer's directions.

June 07, 2002

1. When seed is applied by hydraulic seeders, four times the manufacturer's recommended rate shall be utilized.
2. Inoculated seed shall not be held in a slurry with fertilizer for more than one hour. Reinoculation or application of legumes separate from fertilizer will be required where this stipulation cannot be complied with.

3.03 SATISFACTORY LAWNS

- A. Satisfactory Seeded Lawn: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. (0.92 sq. m) and bare spots not exceeding 5 by 5 inches (125 by 125 mm).
- B. Reestablish lawns that do not comply with requirements and continue maintenance until lawns are satisfactory.

END OF SECTION 02920

SECTION 02930

EXTERIOR PLANTS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the following:
 - 1. Trees.
 - 2. Shrubs. cover.
 - 3. Plants.

1.02 DEFINITIONS

- A. Finish Grade: Elevation of finished surface of planting soil.
- B. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
- C. Planting Soil: Native or imported topsoil, manufactured topsoil, or surface soil modified to become topsoil; mixed with soil amendments.
- D. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, before placing planting soil.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: Mulch for plants.
- C. Product certificates.
- D. Planting Schedule: Indicating anticipated planting dates for exterior plants.
- E. Maintenance Instructions: Recommended procedures to be established by Government for maintenance of exterior plants during a calendar year.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer who maintains an experienced full-time supervisor on Project site when exterior planting is in progress.
- B. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory.
- C. Provide quality, size, genus, species, and variety of exterior plants indicated, complying with applicable requirements in ANSI Z60.1, "American Standard for Nursery Stock."

- D. Preinstallation Conference: Conduct conference at Project site.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of exterior plants during delivery. Do not drop exterior plants during delivery.
- B. Deliver exterior plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set exterior plants trees in shade, protect from weather and mechanical damage, and keep roots moist.

1.06 WARRANTY

- A. Special Warranty: Warrant the following exterior plants, for the warranty period indicated, against defects including death and unsatisfactory growth, except for defects resulting from lack of adequate maintenance, neglect, or abuse by Government, or incidents that are beyond Contractor's control.
 - 1. Warranty Period for Trees and Shrubs: One year from date of Substantial Completion.
 - 2. Warranty Period for Ground Cover and Plants: One year from date of Substantial Completion.

1.07 MAINTENANCE

- A. Trees and Shrubs: Maintain during warranty period by pruning, cultivating, watering, weeding, fertilizing, restoring planting saucers, tightening and repairing stakes and guy supports, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings. Spray as required to keep trees and shrubs free of insects and disease.
- B. Ground Cover and Plants: Maintain during warranty period by watering, weeding, fertilizing, and other operations as required to establish healthy, viable plantings.

PART 2 - PRODUCTS

2.01 EXTERIOR PLANTS

- A. Tree and Shrub Material: Furnish nursery-grown trees and shrubs complying with ANSI Z60.1, with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
 - 1. Provide balled and burlapped, potted, container-grown trees and shrubs, or as indicated.
- B. Ground Cover: Provide ground cover of species indicated, established and well rooted in pots or similar containers, and complying with ANSI Z60.1.

- C. Annuals: Provide healthy, disease-free plants of species and variety shown or listed. Provide only plants that are acclimated to outdoor conditions before delivery and that are in bud but not yet in bloom.
- D. Perennials: Provide healthy, field-grown plants from a commercial nursery, of species and variety shown or listed.

2.02 PLANTING MATERIALS

- A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, organic material content ranging between 4-6 percent; free of stones 1 inch (25 mm) or larger in any dimension and other extraneous materials harmful to plant growth.
 - 1. Topsoil Source: Reuse surface soil stockpiled on-site and supplement with imported or manufactured topsoil from off-site sources when quantities are insufficient. Verify suitability of stockpiled surface soil to produce topsoil.
 - 2. Topsoil Source: Amend existing in-place surface soil to produce planting soil mix. Verify suitability of surface soil to produce planting soil. Surface soil may be supplemented with imported or manufactured topsoil from off-site sources.
- B. Inorganic Soil Amendments:
 - 1. Lime: ASTM C 602, Class T or O, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent.
 - 2. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, with a minimum 99 percent passing through No. 6 (3.35-mm) sieve and a maximum 10 percent passing through No. 40 (0.425-mm) sieve.
 - 3. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.
 - 4. Aluminum Sulfate: Commercial grade, unadulterated.
- C. Organic Soil Amendments:
 - 1. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1/2-inch (13-mm) sieve.
 - 2. Peat: Sphagnum peat moss, partially decomposed, finely divided or granular texture, with a pH range of 3.4 to 4.8.
 - 3. Peat: Finely divided or granular texture, with a pH range of 6 to 7.5, containing partially decomposed moss peat, native peat, or reed-sedge peat and having a water-absorbing capacity of 1100 to 2000 percent.
 - 4. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture, free of chips, stones, sticks, soil, or toxic materials.
- D. Fertilizer:
 - 1. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 4 percent nitrogen and 20 percent phosphoric acid.
 - 2. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.
 - 3. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

June 07, 2002

- a. Composition: 1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m) of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight <Insert composition>.
4. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 - a. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.

E. Mulches:

1. Organic Mulch: Shredded bark.

2.03 PLANTING SOIL MIX

A. Planting Soil Mix: Mix topsoil with the following soil amendments and fertilizers in the following quantities:

1. Ratio of Loose peat humus to Topsoil by Volume: 1:3.
2. Apply soil supplements and fertilizers as recommended by the topsoil analysis tests.

PART 3 - EXECUTION

3.01 EXTERIOR PLANTING

A. Bed Establishment:

1. Loosen subgrade of planting beds to a minimum depth of 6 inches (150 mm).
2. Remove stones larger than 1 inch (25 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Government's property.
3. Thoroughly blend planting soil mix off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil mix.
4. In areas of planting beds, spread planting soil mix to a depth of 6 inches (150 mm) 8 inches (200 mm) 12 inches (300 mm) but not less than required to meet finish grades after natural settlement including depth of mulch. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
5. Finish Grading: Grade planting beds to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

B. Trees and Shrubs:

1. Pits and Trenches: Excavate circular pits with sides sloped inward. Trim base leaving center area raised slightly to support root ball and assist in drainage. Do not further disturb base. Scarify sides of plant pit smeared or smoothed during excavation. Excavate approximately three times as wide as ball diameter.
2. Set trees and shrubs plumb and in center of pit or trench with top of root ball flush with adjacent finish grades.
 - a. Balled and Burlapped: Remove burlap and wire baskets from tops of root balls and partially from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
 - b. Potted and Container Grown: Carefully remove root ball from container without damaging root ball or plant.

June 07, 2002

- c. Place planting soil mix around root ball in layers, tamping to settle mix and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed. Water again after placing and tamping final layer of planting soil mix.
 3. Organic Mulching: Apply 3-inch (75-mm) average thickness of organic mulch extending to edge of planted bed area.
- C. Tree and Shrub Pruning: Prune, thin, and shape trees and shrubs according to standard horticultural practice. Prune trees to retain required height and spread. Do not cut tree leaders; remove only injured or dead branches from flowering trees. Prune shrubs to retain natural character. Shrub sizes indicated are sizes after pruning.
- D. Ground Cover and Plant Planting:
1. Set out and space ground cover and plants as indicated.
 2. Dig holes large enough to allow spreading of roots, and backfill with planting soil.
 3. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.
 4. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.
 5. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.
- E. Planting Bed Mulching:
1. Mulch backfilled surfaces of planting beds and other areas indicated. Apply 3-inch (75-mm) average thickness of mulch, and finish level with adjacent finish grades. Do not place mulch against plant stems.
- F. Protect exterior plants from damage due to landscape operations, operations by other contractors and trades, and others. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged exterior planting.
- G. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Government's property.

END OF SECTION 02930

2. Use qualified independent testing agency for preparing and reporting proposed mix designs for laboratory trial mix basis.

B. Ready-Mixed Concrete:

1. Measure, batch, mix, and deliver concrete according to ASTM C94 and ASTM C1116, and furnish batch ticket information.
2. When air temperature is between 85 and 90 deg. F (30 and 32 deg. C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg. F (32 deg. C), reduce mixing and delivery time to 60 minutes.

PART 3 EXECUTION

3.01 INSTALLATION

A. Formwork:

1. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads.
2. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
3. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, Class B, 1/4 in. (6mm).
4. Construct forms tight enough to prevent loss of concrete mortar.
5. Fabricate forms for easy removal without hammering or prying against concrete surfaces.
6. Provide crush or wrecking plates where stripping may damage cast concrete surfaces.
7. Clean forms and adjacent surfaces to receive concrete.
8. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
9. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
10. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

- d. Apply to concrete surfaces exposed to public view or to be covered with coating or covering material applied directly to concrete.
- e. Do not apply rubbed finish to smooth-formed finish.

I. Finishing Floors and Slabs:

1. General:

- a. Comply with recommendations in ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces.
- b. Do not wet concrete surfaces.

2. Float Finish:

- a. Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power-driven floats.
- b. Restraighten, cut down high spots, and fill low spots.
- c. Repeat float passes and restraightening until surface is left with uniform, smooth, granular texture.

3. Trowel Finish:

- a. After applying float finish, apply first trowel finish and consolidate concrete by hand or power-driven trowel.
- b. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.
- c. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

4. Broom Finish:

- a. Apply broom finish to exterior concrete platforms, steps, and ramps.
- b. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
- c. Coordinate required final finish with Contracting Officer before application.

J. Miscellaneous Concrete Items:

1. Equipment Bases and Foundations:

- a. Provide machine and equipment bases and foundations as shown on Drawings.
- b. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.

- h. Finish repaired areas to blend into adjacent concrete.
 - i. Correct other low areas scheduled to receive floor coverings with repair underlayment.
 - j. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce smooth, uniform, plane, and level surface.
 - k. Feather edges to match adjacent floor elevations.
 - l. Correct other low areas scheduled to remain exposed with repair topping.
 - m. Cut out low areas to ensure minimum 1/4 in. (6mm) repair topping depth to match adjacent floor elevations.
 - n. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce smooth, uniform, plane, and level surface.
 - o. Repair defective areas, except random cracks and single holes max. 1 in. (25mm) dia., by cutting out and replacing with fresh concrete.
 - p. Remove defective areas with clean, square cuts and expose steel reinforcement with min. 3/4 in. (19mm) clearance all around.
 - q. Dampen concrete surfaces in contact with patching concrete and apply bonding agent.
 - r. Mix patching concrete of same materials and mix as original concrete, except without coarse aggregate.
 - s. Place, compact, and finish to blend with adjacent finished concrete.
 - t. Cure in same manner as adjacent concrete.
 - u. Repair random cracks and single holes max. 1 in. (25mm) dia. with patching mortar.
 - v. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles.
 - w. Dampen cleaned concrete surfaces and apply bonding agent.
 - x. Place patching mortar before bonding agent has dried.
 - y. Compact patching mortar and finish to match adjacent concrete.
 - z. Keep patched area continuously moist for min. 72 hours.
5. Perform structural repairs of concrete, subject to Contracting Officer's approval, using epoxy adhesive and patching mortar.

- e. Where built-in items are to be embedded in cores of hollow masonry units, place layer of metal lath in joint below and rod mortar or grout into core.
 - 5. Fill cores in hollow concrete masonry units with grout 3 courses (24 in.) under bearing plates, beams, lintels, posts and similar items.
 - 6. Nonload-Bearing Interior Partitions:
 - a. Build full height of story to underside of solid floor or roof structure above.
 - b. Install compressible filler in joint between top of partition and underside of structure above for non-rated assemblies.
 - c. For rated assemblies, fill joint between top of partition and underside of structure to comply with requirements of Section 07841.
 - d. Wedge nonload bearing partitions against structure above with small pieces of tile, slate, or metal.
 - e. Fill joint with mortar after dead-load deflection of structure above approaches final position.
- C. Mortar Bedding and Jointing:
- 1. Hollow Units:
 - a. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells.
 - b. Bed webs in mortar in starting course on footings and in all courses of piers, columns, and pilasters, and where adjacent to cells or cavities to be reinforced or filled with concrete or grout.
 - c. For starting course on footings where cells are not grouted, spread out full mortar bed including areas under cells.
 - 2. Solid Brick Size Masonry Units:
 - a. Lay with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove in place.
 - b. Do not furrow bed joints or slush head joints.
 - 3. Hollow Brick and Structural Clay Tile:
 - a. Lay vertical cell units with full head joints and full mortar coverage on face shells and webs for bed joints.
 - b. Lay horizontal cell units with full bed joints, keeping drainage channels, if any, free of mortar and form head joints with sufficient mortar so excess is squeezed out as units are

5. Water-Repellent Admixture: Manufacturer's standard dry mixture of stearic water-repellent compounds, water reducing agents, and fine aggregates intended to reduce capillarity in mortar.

C. Glass Unit Masonry Accessories:

1. Panel (Joint) Reinforcement:
 - a. Ladder-type welded wire units prefabricated with deformed continuous side rods and plain cross rods into straight lengths min. 10 ft., and complying with following requirements.
 - b. Hot-Dip Galvanized Steel Wire: ASTM A82 for uncoated wire and ASTM A153, Class B2 for zinc coating applied by hot-dip process to products after fabrication and assembly.
 - c. Wire Size: 0.1483 in. dia.
 - d. Spacing of Side Rods: 2 in. c.c.
 - e. Spacing of Side Rods - 3-1/8 in. Thick Units: 1-5/8 in. c.c.
 - f. Spacing of Cross Rods: Max. 16 in. apart.
2. Panel Anchors: Glass unit masonry manufacturer's standard perforated steel strips, 0.0359 in. uncoated thickness x 1-3/4 in. wide x 24 in. long, hot-dip galvanized after perforating to comply with ASTM A153, Class B2.
3. Asphalt Emulsion: Water-based asphalt emulsion of type recommended by glass unit masonry manufacturer.
4. Backer Rod and Sealant: Refer to Section 07901.
5. Plastic Foam Expansion Strips: Polyethylene foam, white in color, complying with requirements of glass block manufacturer, 3/8 in. thick x 4 in. wide x 24 in. long.
6. Dovetail Wire Ties: Trapezoidal-shaped ties of size indicated, fabricated from 3/16 in. dia. steel wire, complying with ASTM A82 for uncoated wire and with ASTM A641 for Class 3 zinc coating, attached to 0.1046 in. thick galvanized strap shaped to engage dovetail slot.
7. Dovetail Slots: Fabricated from 0.0329 in. dia. hot-dip galvanized steel, with filler strips.

2.02 MIXES

A. Mortar:

1. General:
 - a. Do not lower freezing point of mortar by using admixtures or antifreeze agents.
 - b. Do not use calcium chloride.

2. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support.
3. Use type of materials indicated or specified for various components of each metal fabrication.
4. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.
5. Allow for thermal movement resulting from following maximum change (range) in ambient temperature in design, fabrication, and installation of installed metal assemblies to prevent buckling, opening up of joints, and overstressing of welds and fasteners; base design calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss.
6. Temperature Change (Range): 100 deg. F (55.5 deg. C).
7. Shear and punch metals cleanly and accurately; remove burrs.
8. Steel: Ease exposed edges to radius of approximately 1/32 in.
9. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
10. Remove sharp or rough areas on exposed traffic surfaces.
11. Welding:
 - a. Weld corners and seams continuously, complying with AWS recommendations.
 - b. Exposed Connections: Grind exposed-welds smooth and flush to match and blend with adjoining surfaces.
12. Exposed Connections:
 - a. Form exposed-connections with hairline joints, flush and smooth, using concealed fasteners wherever possible.
 - b. Use exposed fasteners of type indicated or, if not indicated, Phillips flathead (countersunk) screws or bolts.
13. Anchorage:
 - a. Provide for anchorage of type indicated, coordinated with supporting structure.
 - b. Fabricate and space anchoring devices to provide adequate support for intended use.
14. Shop Assembly:
 - a. Preassemble items in shop to greatest extent possible to minimize field splicing and assembly.

3. Include recommendations for periodic inspections, cleaning, care, maintenance, and repair of traffic coatings.

1.04 QUALITY ASSURANCE

A. Qualifications:

1. Installer:
 - a. Certified in writing by traffic coating manufacturer as licensed or approved applicator.
 - b. Installer experienced in applying traffic coatings of comparable scope to Project who is acceptable to traffic coating manufacturer.

B. Single-Source Responsibility:

1. Obtain primary traffic coating materials, including primers and aggregates, from single manufacturer regularly engaged in manufacturing traffic coatings.
2. Provide secondary materials, including sheet flashings, joint sealants, and substrate repair materials of type and from source recommended by traffic coating manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages and containers with seals unbroken and bearing manufacturer's labels containing brand name and type of material, directions for storage and mixing with other components, and following label information.

1. Date of manufacture and shelf life.
2. Lot or batch number.
3. Application instructions.
4. Color.

B. Store materials in clean, dry, protected location and within temperature range required by manufacturer; protect stored materials from exposure to direct sunlight.

C. Remove and replace material that cannot be applied within its stated shelf life.

2. Color: As selected by Contracting Officer.
3. Aggregate: Uniformly-graded washed silica sand of particle sizes, shape, and minimum hardness as recommended by manufacturer and spread at rate for service conditions.
4. Product: Carlisle Coatings & Waterproofing Inc. Model CCW-5013, Gaco Western Inc. Model Gacoflex GW-14-U, Karnack Corp. Model TD-1 Pedestrian, Mameco International Inc. Model Vulkem 350/351, Neogard Model Peda-Gard II, Pecora Corp. Model Dura-Deck 800-P, Sonneborne Building Products Div. (ChemRex Inc.) Model Sonoguard Pedestrian, 3M Construction Markets Model Pedestrian (P).

B. Miscellaneous Materials:

1. Joint Sealants:
 - a. Multicomponent urethane sealant complying with ASTM C920 as recommended by manufacturer for substrate and joint conditions, and for compatibility with following traffic coatings.
 - b. Type M, Class 25, Grade NS for sloping and vertical applications or Grade P for deck applications, and Use T where subject to traffic or Use NT elsewhere.
2. Sheet Flashing: 50-mil nonstaining uncured sheet neoprene.
3. Adhesive: Manufacturer's recommended contact adhesive.
4. Reinforcing Strip: Manufacturer's recommended fiber-glass mesh.
5. Traffic Paint:
 - a. Alkyd-resin ready-mixed, complying with AASHTO M248, Type 5.
 - b. Color: White for parking lane markings and yellow for travel lane markings.

PART 3 EXECUTION

3.01 SURFACE PREPARATION

- A. Clean and prepare substrate according to manufacturer's recommendations and as specified.
- B. Provide clean, dust-free, and dry substrate for traffic coating application.

5. Apply bond-breaker tape between sealant and preparatory base coat strip when required by traffic coating manufacturer.
 6. Comply with recommendations of ASTM C1193 for joint sealant installation.
- C. Deck-to-Wall Expansion Joints and Dynamic Joints:
Install sheet flashing and bond to deck and wall substrates according to manufacturer's recommendations.
- D. Traffic Coating:
1. General: Apply each traffic coating material according to ASTM C1127 and manufacturer's recommendations.
 2. Start installation of traffic coatings in presence of manufacturer's technical representative.
 3. Mix materials according to manufacturer's instructions.
 4. Apply primer over prepared substrate at manufacturer's recommended spreading rate.
 5. Apply coatings by spray, roller, notched squeegee, or other applicators according to manufacturer recommendations.
 6. Apply total DFT of traffic coating as indicated, but to not less than minimum thickness recommended by manufacturer.
 7. Apply each coating to thickness recommended by manufacturer.
 8. Apply aggregate into wet coating according to manufacturer's recommendations.
 9. Verify wet film thickness of each component coat every 100 sq. ft.
 10. Pedestrian Traffic Coating:
 - a. Apply base, intermediate, and top coats and aggregate according to manufacturers recommendations and as follows.
 - b. Normal-Duty: Apply min. 32 mils DFT, excluding substrate primer and aggregate.
 - c. Aggregate: Apply silica aggregate at manufacturer's recommended rate.
- 3.03 CURING, PROTECTION, AND CLEANING
- A. Cure traffic coatings according to manufacturer's recommendations, taking care to prevent contamination and damage during application stages and curing.
 - B. Protect traffic coatings from damage and wear during remainder of construction period.

1.03 QUALITY ASSURANCE

A. Fire Performance Characteristics:

1. General:

- a. Provide insulation materials identical to those whose indicated fire performance characteristics have been determined per ASTM test method indicated below, by UL, or other testing and inspecting organizations acceptable to authorities having jurisdiction.
- b. Identify products with appropriate markings of applicable testing and inspecting organization.

2. Surface Burning Characteristic: ASTM E84.

3. Fire-Resistance Ratings: ASTM E119.

4. Combustion Characteristics: ASTM E136.

- #### B. Single-Source Responsibility for Insulation Products:
- Obtain each type of building insulation from single-source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of work.

1.04 DELIVERY, STORAGE, AND HANDLING

A. General Protection:

1. Protect insulations from physical damage and from becoming wet, soiled, or covered with ice or snow.
2. Comply with manufacturer's recommendations for handling, storage, and protection during installation.

B. Protection for Plastic Insulation:

1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
2. Protect against ignition at all times.
3. Do not deliver plastic insulating materials to Project site ahead of installation time.
4. Complete installation and concealment of plastic materials as rapidly as possible in each area of work.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- #### A. Extruded Polystyrene Board Insulation:
- DiversiFoam Products, Owens/Corning Fiberglas Corp., Tenneco Building Products, The Dow Chemical Company.

