DIVISION 2
SITE WORK

SECTIONS:

SECTION 2.1 DEMOLITION

2.1 A General

1. Requirements of Regulatory Agencies – Demolition operations shall be performed in accordance with all local codes with regard to safety, protection of property, pollution and pest control, and encroachment of streets and sidewalks. The contractor shall secure all necessary permits and permissions from appropriate governing agencies. The contractor shall also provide required notifications and secure necessary permissions from the Streets Department and Police Department for erection of barricades and restriction of traffic when required.

2. Safety – The contractor shall be solely responsible for the implementation and enforcement of safe working conditions and methods of operation and shall provide all precautions, warnings, barriers and devices necessary for the protection of the general public, his workers, and inspectors having rightful access to the job site. When demolition or removal operations require work in (or the use of) exterior areas, yards, sidewalks and streets, the contractor shall erect suitable barriers, guard rails, warning signs, and lights if necessary, particularly at excavations, to provide adequate protection to the general public.

3. Pollution Control – Sprinkle debris and install temporary enclosures as necessary to limit dust to lowest practicable level. During removal of dust-generating materials, particularly plaster, from upper level windows and roofs to trucks or dumpsters below, provide dust screens or chutes, or provide constant spray of materials during removal. Remove all debris from streets and adjoining sidewalks and properties at the end of each workday. Do not store or burn materials on site.

4. Selective demolition –

    a. Selective demolition of interior partitions, systems, and building components designated to be removed is indicated on the contract drawings.

b. Selective demolition of exterior facade, structures, and components designated to be removed — including below-grade footings, foundations, utilities, and site improvements to depth necessary to avoid conflict with new construction or sitework — is indicated on the contract drawings.

c. Protect all portions of building, site improvements, and adjoining properties adjacent to or affected by selective demolition.

5. Abandoned utilities and wiring –Remomve and/0r cap off abandoned utilities and wiring systems. If there is a preference, the contract drawings will indicate removal or capping.

6. Shut-off notification – Notify OHCD/PHDC/RDA of schedule of shut-off of utilities which serve occupied spaces.

7. Disposal – Remove and legally dispose of materials not indicated to be salvaged. Materials shall be removed from the site as quickly as possible. Remove demolition materials in approved carrier to approved disposal sites in accordance with governing pollution control ordinances and applicable environmental standards and regulations.

8. Protection of trees, sidewalks and adjacent properties –

a. Protect all existing street trees in the affected area by the use of appropriate barrier and guard panels.

b. Protect adjacent properties and sidewalks from damage. The contractor shall repair, restore and correct all damage to adjacent properties using materials, colors and workmanship matching the quality and type of the damaged area or item. Provide appropriate temporary weatherproofing at all newly exposed areas of adjoining properties as necessary to prevent weather damage until new work is completed.

9. Temporary weatherproofing – When roofing is removed, the contractor shall provide the appropriate temporary weatherproofing at all areas to prevent weather damage to the property.

2.1 B Execution:

1. Verify that structure is unoccupied and no longer in use. Before beginning demolition operations, confirm by field coordination with Inspector that the address is correct and that the structure is the correct location of contract work. Review and confirm the extent of demolition work required by review of contract requirements during field inspection with Inspector.

2. Arrange for and verify terminations of utility services (to include removing meters and capping lines).

3. Exterminate vermin and rodents.

4. Sprinkle debris during removal operations. Do not allow water to cause flooding, runoff, or icing.

5. Start demolition at top levels and work down through building.

6. Break demolition materials into sizes appropriate for safe handling and removal.

7. Using clean fill, free of organic matter, provide backfilling and filling of basement and subgrade areas where required. Remove all rocks, brickbats and other matter exceeding 3 inches in any dimension. Backfill in 12 inch lifts, compacting by machine tamping. Hand tamping is permitted only when filling voids less than 12 inches deep.

8. Demolish areas as required to provide clean substrates for new work, free of nails, hooks, brackets, screws, pads, mounts and other obstructions to the installation of new materials.

9. Demolish elements as required in such a manner as to provide the least damage to existing elements to remain. Remove lath without loosening studs, remove finish flooring without loosening subflooring, remove window frames without dislodging masonry sills and jambs, etc.

10. Demolition of existing doors, windows and frames at existing unsound or deteriorated masonry openings shall be executed with care and openings shall be braced to prevent further deterioration or movement of the surrounding masonry lintels.

11. Remove all unused joists, framing, blocking, wiring, hooks, nails, or other extraneous items.

SECTION 2.2 SITE PREPARATION

2.2 A General:

1. Protect existing trees, vegetation, landscaping materials, and site improvements not scheduled for clearing or demolition which might be damaged by construction activities.

2. Use temporary erosion control, siltation control, and dust control.

3. Protect adjacent property, structures, benchmarks, and monuments.

4. Water trees and vegetation during construction activities.

5. Remove and legally dispose of cleared materials.

2.2 B Products:

1. Tree protection, erosion control, siltation control, and dust control materials suitable for site conditions.

SECTION 2.3 SITE CLEARING

2.3 A General:

1. Work included -

   a. All necessary operations in connection with the clearing of the project site, including but not necessarily limited to

      1) Clearing and grubbing
      2) Vegetation, shrub and tree removal
      3) Protection of existing trees to remain
      4) Topsoil stripping
      5) Removing above-grade improvements
      6) Removing below-grade improvements
      7) Disposal of material.

   b. Arrange and pay for disconnecting, removing, capping, and plugging utility services. Notify affected utility companies in advance and obtain approval before starting this Work.

   c. Place markers to indicate location of disconnected services. Identify service lines and capping locations on Project Record Documents.

2. Existing conditions – It is the contractor's responsibility to visit and inspect the site and verify the actual site conditions.

3. Protection of reference points – Maintain all benchmarks, monuments and other reference markers. If a marker is disturbed or destroyed, replace it as directed.

2.3 B Execution:

1. Traffic – Conduct site-clearing operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks, or other occupied or used facilities without permission from authorities having jurisdiction.

2. Protection of Existing Improvements – Provide protections necessary to prevent damage to improvements on adjoining properties and to existing improvements that are indicated to remain in place.

3. Repair of damage – Restore damaged improvements to their original condition, as acceptable to property owners.

4. Verification of service locations – Determine exact locations of existing services before starting Work.

5. Clearing and grubbing -

   a. Remove all vegetation (unless designated to remain), debris, organic matter and otherwise objectionable material which is not suitable for use as fill or support of structural loads or slabs.

   b. Remove all stumps, roots and matted root systems to a depth of not less than 12 inches below the original ground level. Unless further excavation is required, depressions made by grubbing shall be filled and compacted to the density of the surrounding soil; filled surface shall conform to the contour of adjacent ground.

   c. Removal includes digging out and off-site disposal of stumps and roots. Completely remove stumps, roots, and other debris protruding through ground surface. Use only hand methods for grubbing inside drip line of trees indicated to remain. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.

6. Tree and shrub removal – Remove, in their entirety, all trees and shrubs not designated to remain. Stumps shall be cut off 12 inches or more below the original ground surface. See 2.3 B 5 (b) above.

7. Topsoil – Topsoil is defined as friable clay loam surface soil found in a depth of not less than 4 inches. Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones, and other objects over 2 inches in diameter, and without weeds, roots, and other objectionable material. Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material. Remove heavy growths of grass from areas before stripping. Stockpile topsoil in storage piles in areas indicated or directed. Construct storage piles to provide free drainage of surface water. Cover storage piles, if required, to prevent wind erosion. Dispose of unsuitable or excess topsoil as specified for disposal of waste material.

8. Disposal -

   a. Remove all cleared and grubbed material from the site. Remove waste materials and unsuitable or excess topsoil. No trees, stumps, brush or other material shall be buried on the site.

   b. Burning of trees, stumps or other debris is not permitted.

9. Fill – Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated. Place fill material in horizontal

layers not exceeding 6 inches loose depth, and thoroughly compact each layer to a density equal to adjacent original ground.

10. Removal of improvements – Remove existing above-grade and below-grade improvements as indicated and as necessary to facilitate new construction.

11. Removal of abandoned utilities – Remove abandoned underground piping or conduits interfering with construction.

SECTION 2.4 EARTHWORK

2.4 A General:

1. Work included -

Earthwork shall include but not necessarily be limited to

a. Protection of all existing utilities and existing improvements to remain.

b. Preparing and grading subgrades for slabs-on-grade, walks, pavements.

c. Drainage and moisture-control fill course for slabs-on-grade.

d. Excavating, backfilling, compaction and grading for site improvements, underground mechanical, electrical utilities, building floor slabs, foundations, footings, paving, walls, pits, steps, utilities, lawn areas and appurtenances.

e. Backfilling against structure(s) and walls to maintain positive drainage.

f. Rough grading all areas to obtain the subgrades as required or specified.

g. Placing and compacting gravel base for slabs and paving.

h. Materials for subbase, pavements, and improvements.

i. Supply of additional materials from offsite if required for fill, backfill, rough grading and compaction.

j. Legal disposal of unsuitable and surplus excavated materials.

2. Finished Grade -

a. Unless OHCD/PHDC/RDA directs otherwise, give areas outside the structure uniform slopes to maintain positive drainage away from the structure.

b. Provide a vertical curb at locations where there is an abrupt change in slope.

3. Disposition of Utilities -

   a. In executing all work under this section, observe all rules and regulations governing the various utilities.

   b. Take adequate precautions to protect utility lines in service from any damage.

   c. Whether or not such lines are indicated on the drawings, contractor shall be responsible for repairing utility service lines that may be damaged or otherwise disrupted by construction activities. Repairs shall be performed at no cost to Owner.

4. Protection – Protect all areas adjacent to the limits of work. If they are damaged, the contractor shall restore them to the satisfaction of OHCD/PHDC/RDA.

5. Compaction -

   a. Fill shall be compacted in individual layers in accordance with the following requirements:

      1) Ordinary fill, granular fill, and bank run gravel – not less than 95% of maximum dry density.

      2) Crushed stone – mechanically compacted as further specified below.

   b. Before any fill is placed, proof roll the subgrade to not less than 75% of maximum dry density.

   c. Place all fill in layers not more than 8 inches deep before compaction.

   d. All compaction shall be by mechanical means designed specifically for the purpose. OHCD/ PHDC/RDA reserves the right to disapprove any compaction device which, in its opinion, is of inadequate capacity or unsuited to the character of the material being compacted.

6. Miscellaneous -

   a. All material to be placed where the specifications or drawings call for fill, backfilling or rough grading is to be ordinary fill.

   b. Under exterior concrete paving slabs and walks, fill shall be granular fill except the top 6 inches directly under the slab, which shall be crushed stone.

   c. Do not place fill over frozen material. No fill material shall be placed, spread, or rolled during unfavorable weather conditions.

   d. Do not begin backfill of foundations until construction below grade has been approved, any form work has been removed, and excavation has been cleaned of debris.

   e. Do not place backfill against a wall unless the wall is braced or has cured sufficiently to develop design strength. Do not place backfill against a dampproofed wall until 7 days

after dampproofing was applied. If fill is required on both sides of a wall, bring it up simultaneously and evenly on both sides. Avoid damage to the walls and to waterproofing, dampproofing, and other work in place.

7. Testing and inspection – If contractor practices do not appear to meet the standards of this specification, PHDC/RDA has the option of calling in an approved testing laboratory to supervise the installation of controlled compacted fill at the contractor's expense.

2.4 B Definitions/Products/Materials

1. Excavation – The removal of material encountered to subgrade elevations and the reuse or disposal of materials removed.

2. Subgrade – The uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

3. Borrow – Soil material obtained off-site when sufficient approved soil material is not available from excavations.

4. Ordinary fill – shall consist of a friable material; it shall contain no objects greater than 8 inches in diameter and no more than 30% by weight finer than the no. 200 sieve. It shall be free of trash, ice, snow, roots, and tree stumps.

5. Granular fill – shall consist of hard durable sand and gravel, and shall be free of ice, snow, roots, sod, rubbish and other organic or deleterious matter. When spread and compacted, it shall provide a firm stable base. Granular fill shall conform to the following gradation requirements:

sieve size	% passing
4 in.	100
1/2 in.	50-85
#4	40-75
#40	10-35
#200	0-10

6. Crushed stone – shall consist of durable crushed rock or durable crushed gravel stone, free from ice, snow, clay, sand, loam, or other deleterious material. Crushed stone shall be uniformly graded and conform to the following requirements:

sieve size	% passing
1-1/2 in.	100
1-1/4 in.	85-100
1 in.	15-45
3/4 in.	0-15

7. Washed crushed stone shall be 1 to 1-1/2 inches in diameter.

8. Subbase Course – The layer placed between the subgrade and base course in a paving system or the layer placed between the subgrade and surface of a pavement or walk.

9. Base Course – The layer placed between the subbase and surface pavement in a paving system.

10. Capillary water barrier – Course of washed granular material supporting slab-on-grade placed to cut off upward capillary flow of pore water. Washed, evenly graded mixture of crushed stone or gravel, with 100 percent passing a 1-1/2 inch sieve and not more than 5 percent passing a No. 4 sieve.

11. Unauthorized excavation – Removal of materials beyond indicated subgrade elevations or dimensions without direction by the Architect. Unauthorized excavation, as well as remedial work directed by the Architect, shall be at the contractor's expense.

12. Structures – Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below ground surface.

13. Utilities – Include on-site underground pipes, conduits, ducts, and cables, as well as underground services within building lines.

14. General – Provide approved borrow soil materials from off-site when sufficient approved soil materials are not available from excavations.

15. Satisfactory Soil Materials – ASTM D 2487 soil classification groups GW, GP, GM, SW, SP, and SM; free of rock or gravel larger than 2 inches in any dimension, debris, waste, frozen materials, vegetation and other deleterious matter.

16. Unsatisfactory Soil Materials – ASTM D 2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT.

17. Backfill and Fill Materials – Satisfactory soil materials free of clay, rock or gravel larger than 2 inches in any dimension, debris, waste, frozen materials, vegetation, and other unsuitable materials.

18. Subbase and Base Material – Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand, ASTM D 2940, with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.

19. Engineered Fill – Subbase or base materials.

20. Bedding Material – Subbase or base materials with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.

21. Drainage Fill – Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, ASTM D 448, coarse aggregate grading size 57, with 100 percent passing a 1-1/2-inch sieve and not more than 5 percent passing a No. 8 sieve.

22. Filtering Material – Evenly graded mixture of natural or crushed gravel or crushed stone and natural sand, with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 50 sieve.

23. Impervious Fill – Clayey gravel and sand mixture capable of compacting to a dense state.

24. Warning Tape – Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility. Tape Colors: Provide tape colors to utilities as follows: Red – Electric; Yellow – Gas, oil, steam, and dangerous materials; Orange – Telephone and other communications; Blue – Water systems; Green – Sewer systems.

25. Detectable Warning Tape – Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick minimum, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 2'-6" deep.

26. Filter Fabric – Manufacturer's standard non-woven pervious geotextile fabric of polypropylene, nylon or polyester fibers, or a combination. Provide filter fabrics that meet or exceed the listed minimum physical properties determined according to ASTM D 4759 and the referenced standard test method in parentheses: Grab Tensile Strength (ASTM D 4632): 100 lb. Apparent Opening Size (ASTM D 4751): #100 U.S. Standard sieve. Permeability (ASTM D 4491): 150 gallons per minute per sq. ft.

2.4 C Execution

1. Submissions – Submit the following according to the Conditions of the Contract and Division 1 Specification Sections: Test Reports required under field quality control; Laboratory analysis of each soil material proposed for fill and backfill from on-site and borrow sources; One optimum moisture-maximum density curve for each soil material; Report of actual unconfined compressive strength and/or results of bearing tests of each stratum tested.

2. Codes and Standards – Perform earthwork complying with requirements of authorities having jurisdiction.

3. Existing Utilities – Do not interrupt existing utilities serving facilities occupied by the Owner or others except when permitted in writing by the Architect and then only after acceptable temporary utility services have been provided. Provide a minimum 48-hours' notice to the Architect and receive written notice to proceed before interrupting any utility. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shutoff services if lines are active.

4. Use of Explosives – Use of explosives is not permitted.

5. Protection of facilities – Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

6. Freeze protection – Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

7. Erosion control – Provide erosion control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walk-ways. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.

8. Unclassified Excavation – Excavation is unclassified and includes excavation to required subgrade elevations regardless of the character of materials and obstructions encountered.

9. Earth excavation – Includes excavation of pavements and other obstructions visible on surface; of underground structures, utilities, and other items indicated to be demolished and removed; and of soil and other materials encountered.

10. Open excavations – Excavations more than 10 feet in width and pits more than 30 feet in either length or width.

11. Regulatory compliance – Comply with local codes, ordinances, and requirements of authorities having jurisdiction to maintain stable excavations.

12. Excavations for Footings and Foundations – Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

13. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Appurtenances – Excavate to elevations and dimensions indicated within a tolerance of plus or minus 0.10 foot. Do not disturb bottom of excavations intended for bearing surface.

14. Excavation under walks and pavements – Excavate surfaces under walks and pavements to indicated cross sections, elevations, and grades.

15. Excavation of utility trenches –

    a. Excavate utility trenches to indicated slopes, lines, depths, and invert elevations.

    b. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

    c. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 in higher than top

of pipe or conduit, unless otherwise indicated. Clearance: 12 inches each side of pipe or conduit.

d. Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove stones and sharp objects to avoid point loading.

e. For pipes or conduit less than 6 inches in nominal diameter and flat-bottomed, multiple--duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade. For pipes and conduit 6 in or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference. Fill depressions with tamped sand backfill. Where encountering rock or another unyielding bearing surface, carry trench excavation 6 inches below invert elevation to receive bedding course.

16. Notification – Notify Architect when excavations have reached required subgrade.

17. Additional excavation – When Architect determines that unforeseen unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed. Unforeseen additional excavation and replacement material will be paid according to the Contract provisions for changes in Work.

18. Restoration of subgrades – Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by the Architect.

19. Filling unauthorized excavation –

a. Fill unauthorized excavation under foundations or wall footings by extending indicated bottom elevation of concrete foundation or footing to excavation bottom, without altering required top elevation. When acceptable to the Architect, lean concrete fill may be used to bring elevations to proper position.

b. Fill unauthorized excavations under other construction as directed by the Architect.

20. Where indicated widths of utility trenches are exceeded, provide stronger pipe, or special installation procedures, as required by the Architect.

21. Stockpile excavated materials acceptable for backfill and fill soil materials, including acceptable borrow materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent wind-blown dust. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

22. Backfill excavations promptly, but not before completing the following -

    a. Acceptance of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.

    b. Surveying locations of underground utilities for record documents.

    c. Testing, inspecting, and approval of underground utilities.

    d. Concrete formwork removal.

    e. Removal of trash and debris from excavation.

    f. Removal of temporary shoring and bracing, and sheeting.

    g. Installing permanent or temporary horizontal bracing on horizontally supported walls.

23. Utility Trench Backfill – Place and compact bedding course on rock and other unyielding bearing surfaces and to fill unauthorized excavations. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

24. Concrete backfill trenches that carry below or pass under footings and that are excavated within 18 inches of footings. Place concrete to level of bottom of footings.

25. Provide 4-inch-thick concrete base slab support for piping or conduit less than 2'-6" below surface of roadways. After installation and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase.

26. Place and compact initial backfill of satisfactory soil material or subbase material, free of particles larger than 1 inch, to a height of 12 inches over the utility pipe or conduit.

27. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of utility system.

28. Coordinate backfilling with utilities testing.

29. Fill voids with approved backfill materials as shoring and bracing, and sheeting is removed.

30. Place and compact final backfill of satisfactory soil material to final subgrade.

31. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

32. Subsurface Drain – Place a layer of filter fabric around perimeter of drainage trench or at footing, as indicated. Place a 6-inch compacted course of filtering material on filter fabric to support drainage pipe. After installing and testing, encase drainage pipe in a minimum of 6 inches of compacted filtering material and wrap in filter fabric, overlapping edges at least 6 inches

33. Fill Preparation – Remove vegetation, topsoil, debris, wet, and unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placing fills. Plow strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing surface.

34. Place fill material in layers to required elevations for each location listed below:

    a. Under walks and pavements, use subbase or base material, or satisfactory excavated or borrow soil material.

    b. Under steps and ramps, use subbase material.

    c. Under footings and foundations, use engineered fill.

35. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice. Remove and replace, or scarify and air-dry satisfactory soil material that is too wet to compact to specified density. Stockpile or spread and dry removed wet satisfactory soil material.

36. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

37. Place backfill and fill materials evenly on all sides of structures to required elevations. Place backfill and fill uniformly along the full length of each structure.

38. Percentage of Maximum Dry Density Requirements – Compact soil to not less than the following percentages of maximum dry density according to ASTM D 1557:

    a. Under structures, steps, and pavements, compact the top 12 inches below subgrade and each layer of backfill or fill material at 95 percent maximum dry density.

    b. Under walkways, compact the top 6 inches below subgrade and each layer of backfill or fill material at 95 percent maximum dry density.

39. General Grading – Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated. Provide a smooth transition between existing adjacent grades and new grades. Cut out soft spots, fill low spots, and trim high spots to conform to required surface tolerances.

40. Site Grading – Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

    a. Walks – Plus or minus 0.10 ft.
    b. Pavements – Plus or minus 1/2 inch.

41. Under pavements and walks, place subbase course material on prepared subgrades. Place base course material over subbases to pavements. Compact subbase and base courses at optimum moisture content to required grades, lines, cross sections and thickness to not less than 95 percent of ASTM D 4254 relative density. Shape subbase and base to required crown elevations and cross-slope grades. When thickness of compacted subbase or base course is 6 inches or less, place materials in a single layer. When thickness of compacted subbase or base course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches thick or less than 3 inches thick when compacted.

42. Quality Assurance – Compaction: Under structures, steps, pavements, and walkways, 95 percent maximum density, ASTM D 1557. Grading Tolerances Outside Building Lines: Pavements, plus or minus 1/2 inch.

43. Protecting Graded Areas – Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

44. Repair and re-establish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or lose compaction due to subsequent construction operations or weather conditions.

45. Scarify or remove and replace material to depth directed by the Architect; reshape and recompact at optimum moisture content to the required density.

46. Settling – Where settling occurs during the Project correction period, remove finished surfacing, backfill with additional approved material, compact, and reconstruct surfacing.

47. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

48. Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off the Owner's property.

49. Remove waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off the Owner's property.

SECTION 2.5 TERMITE CONTROL

2.5 A General:

1. Provide termite control by an approved specialty subcontractor having a minimum of five years experience in the field, with an established local office.
2. Use only termiticides which bear a federal registration number.
3. Provide a one year guarantee on services performed.

4. Submit -
   a. Product data and application instructions.
   b. Certification that the products used comply with the U.S. Environmental Protection Agency (EPA) regulations for termiticides.

2.5 B Execution:

1. To ensure protection, do not apply soil treatment to frozen or excessively wet soils or during inclement weather.

2. Termite control shall encompass treatment of soil surrounding property by pressure injection methods and injection of wooden framing members at exterior grade and at interior ground floor framing.

3. Soil poisoning shall be accomplished by an approved water-based emulsion chemical type, mix and spreading rate suited to the intended use and recommended by the National Pest Control Association "Approved Reference Procedures - Subterranean Termite Control" and other applicable codes and ordinances.

4. Plug all holes drilled in existing sidewalks, steps and patios using suitable grouting material for following soil poisoning operations.

SECTION 2.6 PAVING

2.6 A General:

1. All paving and curbs shall be in conformance with the "Standard Specifications for Paving and Repaving", City of Philadelphia, Department of Streets.

2.6 B Products:

1. Concrete - See Division 3
2. Expansion Joint Filler – ASTM D1751-73, Bituminous Type.
3. Repair materials – to match existing and adjoining surfaces.
4. Bonding Agent – "Thorobond" by Standard Drywall Products or approved equal.

2.6 C Execution:

1. Obtain permits for pouring of footways and curbs from Streets Department.

2. All new paving shall be sloped away from structures to provide proper drainage and to meet existing adjacent paved surfaces.

3. Repair paving by removal of damaged areas to nearest whole joint, block, rebate or return and installation of new concrete sections as required.

4. Repair portions of neighboring sidewalks, curbs, and paving damaged during demolition.

5. All new footways, walkways, and drainage pads shall be minimum 4-inch-thick unreinforced concrete. Lay out new paved areas to provide straight edges, smooth turnings and grade transitions, and proper alignment with walls, steps and property lines.

6. Edges of all paving areas not adjacent to existing paving, curbing or building walls, shall be formed using straight pieces of clean lumber or plywood, staked adequately to hold the wet concrete without buckling or tipping, and having tops set at smooth finish grade suitable for use as a screed in pouring and leveling the concrete. Forms shall be set straight and true and shall not be removed until a minimum of 24 hours following the pour.

7. At all paved walkways and other concrete paving within yard areas, provide tooled joints in evenly spaced arrangements with maximum twenty square feet between joints. At sidewalks at street frontages, provide joints to match existing or adjoining joint layout but in no case shall joint layout exceed twenty square feet between joints. Tool all formed edges with radius edging tool. All paved patios, footways and driveways to be wood float finished leaving smooth surface without float markings. Sidewalks and driveways shall be broom finished.

8. Provide expansion joints in all paving and curbing at distances not to exceed twenty-five feet in any direction. Install 1/2 inch bituminous fill material at all expansion, construction or curb relief joints and at all locations where new concrete abuts existing concrete or building structure.

9. Lines where paving meets building shall be level unless conditions such as drainage or existing paving require otherwise.

SECTION 2.7 HOT MIXED ASPHALT PAVING

2.7 A General:

1. Hot-Mixed Asphalt Paving Over Prepared Subbase for:

   a. Patching or repair of existing asphalt surfaces which are intended to remain in service and which are damaged or have been damaged or disturbed as a result of new construction activities for this project. Replace damaged or disturbed areas with new materials of equal thickness.

   b. The addition of new asphalt surfaces as indicated on the drawings. New surfaces shall be over compacted fill and appropriate sub-base.

2.7 B Quality Assurance:

1. Construction Tolerances:

   a. Base Course Thickness: 1/2 in.
   b. Surface Course Thickness: 1/4 in.
   c. Base Course Surface Smoothness: 1/4 in.
   d. Surface Course Surface Smoothness: 3/16 in.
   e. Crowned Surfaces: 1/4 in. variance from template.

2.7 C Products:

1. Asphalt-Aggregate Mixture – Plant-mixed, hot-laid asphalt-aggregate mixture, ASTM D 3515, complying with local DOT and DPW regulations.
2. Prime Coat – Cut-back asphalt, ASTM D 2027.
3. Tack Coat – Emulsified asphalt, ASTM D 977.
4. Herbicide Treatment – Commercial chemical for weed control registered by Environmental Protection Agency and acceptable to authorities having jurisdiction.
5. Lane and Parking Area Marking Paint, White Color – Alkyd-resin type, ready-mixed, AASHTO M 248, Type I.

SECTION 2.8 PORTLAND CEMENT CONCRETE PAVING

2.8 A General:

Cast-In-Place Concrete Paving Over Prepared Subbase for:

a. New and replacement walkways/curbs where indicated on drawings.
b. Repair/replacement of existing surfaces damaged during construction.

2.8 B Products:

1. Concrete – ASTM C 150, Type 1, Portland cement; ASTM C 33, normal weight aggregates; potable water:

   a. Design Mix: ASTM C 94, 3000 psi, 28 day minimum compressive strength.
   b. Slump Limits: 8 inches minimum with superplasticizer, 3 inches otherwise.
   c. Air Content: 5 to 8 percent.
   d. Finish: Broom finish, unless noted otherwise.

2. Wire Mesh – Welded plain steel wire fabric, ASTM A 185.

3. Reinforcing Bars – Deformed steel bars, ASTM A 615, Grade 60.

4. Joint Dowel Bars – Plain steel bars, ASTM A 615, Grade 60.

5. Liquid-Membrane Forming and Sealing Curing Compound – ASTM C 309, Type I, Class A.

6. Bonding Compound – Polyvinyl acetate or acrylic base.

7. Expansion joints – Premolded bituminous filler strip; 1/2 inch thick.

2.8 C Execution and Quality Assurance:

1. Construction Tolerance – 1/8 inch in 10 feet for grade and alignment of top of forms; 1/4 inch in 10 feet for vertical face on longitudinal axis.

2. Concrete Testing Service – Engage a qualified independent testing agency to perform materials evaluation tests and to design concrete mixes. Provide laboratory test reports for evaluation of concrete materials and mix design tests.

3. Concrete Standards (Comply with provisions of the following standards, except where more stringent requirements are indicated) -

   a. American Concrete Institute (ACI) 301, "Specifications for Structural Concrete for Buildings."
   b. ACI 318, "Building Code Requirements for Reinforced Concrete."
   c. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice."

4. Concrete Manufacturer Qualifications – Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

5. Traffic Control – Maintain access for vehicular and pedestrian traffic as required for other construction activities.

6. Remove loose material from compacted subbase surface immediately before placing concrete.

7. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for paving to required lines, grades, and elevations. Install forms to allow continuous progress of work and so that forms can remain in place at least 24 hours after concrete placement. Check completed formwork and screeds for grade and alignment to following tolerances -

   a. Top of Forms: Not more than 1/8 inch in 10 feet.
   b. Vertical Face on Longitudinal Axis: Not more than 1/4 inch in 10 feet.

8. Construct contraction, construction, and isolation joints true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to the centerline, unless indicated otherwise.

9. When joining existing paving, place transverse joints to align with previously placed joints, unless indicated otherwise.

10. Tooled Joints – Form contraction joints in fresh concrete by grooving and finishing each edge of joint with a radiused jointer tool.

11. Construction Joints – Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than 1/2 hour, unless paving terminates at expansion joints.

12. Expansion Joints – Form expansion joints of preformed joint filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated. Extend joint fillers full width and depth of joint, not less than 1/2 inch or more than 1 inch below finished surface where joint sealant is indicated. Place top of joint filler flush with finished concrete surface when no joint sealant is required. Furnish joint fillers in one-piece lengths for full width being placed wherever possible. Where more than one length is required, lace or clip joint filler sections together. Protect top edge of joint filler during concrete placement with a metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

13. Inspection – Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.

14. Remove snow, ice, or frost from subbase surface and reinforcing before placing concrete. Do not place concrete on surfaces that are frozen.

15. Moisten subbase to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.

16. Comply with requirements and with ACI 304R for measuring, mixing, transporting, and placing concrete.

17. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

18. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

19. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete complying with ACI 309R. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocating reinforcing, dowels, and joint devices.

20. Screed paved surfaces with a straight edge and strike off. Use bull floats or darbies to form a smooth surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces prior to beginning finishing operations.

21. Curbs – When automatic machine placement is used for curb placement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete. If results are not acceptable, remove and replace with formed concrete.

22. Concrete Finishing – Float Finish: Begin floating when bleed water sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Finish surfaces to true planes within a tolerance of 1/4 inch in 10 feet as determined by a 10-foot-long straightedge placed anywhere on the surface in any direction. Cut down high spots and fill low spots. Refloat surface immediately to a uniform granular texture. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across concrete surface perpendicular to line of traffic to provide a uniform fine line texture finish.

23. Final Tooling – Tool edges of paving, gutters, curbs, and joints formed in fresh concrete with a jointing tool to the following radius. Repeat tooling of edges and joints after applying surface finishes. Eliminate tool marks on concrete surfaces. Radius: 1/2 inch.

24. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with the recommendations of ACI 306R for cold weather protection and ACI 305R for hot weather protection during curing.

25. Evaporation Control – In hot, dry, and windy weather, protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer's instructions after screeding and bull floating, but before floating.

26. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

27. Curing Methods – Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination.

28. Antispalling Treatment – Apply treatment to concrete no sooner than 28 days after placement to clean dry concrete surfaces free of oil, dirt, or other foreign material. Apply in 2 sprayed applications at rate of 40 sq. yd. per gallon for the first application and 60 sq. yd. per gallon for the second application. Allow complete drying between applications.

29. Remove and replace concrete paving that is broken, damaged, or defective, or does not meet the requirements of this Section.

30. Drill test cores where directed by Architect when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to paving with epoxy adhesive.

31. Protect concrete from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

32. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep concrete paving not more than 2 days prior to date scheduled for final inspection.

SECTION 2.9 CHAIN LINK FENCE

2.9 A General:

1. Chain link fabric type fence with fabric, gates, posts and accessories in conformance with Federal Specifications FS RR-F-00191/1, /2, /3 and /4.

2. Submittals – Product data in the form of manufacturer's technical data, specifications, and installation instructions for fence and gate posts, fabric, gates, gate operators, and accessories. Shop drawings showing location of fence, gates, each post, and details of post installation, extension arms, gate swing, hardware, and accessories.

2.9 B Products:

1. Acceptable manufacturers -

   a. Anchor Fence. Inc.
   b. American Chain Link Fence Company
   c. BWF Fence Systems
   d. Cyclone Fence Div./USX Corp.
   e. United States Steel

2. All components shall be galvanized steel. Fabric wire gauge shall be no. 9. All fabric shall be 2-inch mesh, 0.148-inch diameter (9 gauge), with knuckled selvage top and bottom. Fabric shall be fastened to the line posts with galvanized no. 9 gauge steel tie wires spaced at intervals not exceeding 14 inches. The fabric shall also be attached to all rails at intervals of 24 inches, and fastened to the terminal posts with adjustable clamps and tension strips. Fabric shall be placed with top flush with top of top rail and bottom flush with bottom of bottom rail (1 inch above grade). Fabricate mesh in one-piece widths for fencing 12 ft. and less in height to comply with Chain Link Fence Manufacturers Institute (CLFMI) "Product Manual".

3. Gates – Type I or III, single or double swing with zinc coated steel pipe frame assembled with corner fittings and 3/8 inch galvanized steel truss rods. Fabric shall be the same as fence fabric (unless otherwise indicated). Fabricate perimeter frames of gates from same material and finish as fence framework. Assemble gate frames by welding. Provide horizontal and vertical members to ensure proper gate operation and attachment of fabric, hardware, and accessories. Space frame members maximum of 8 feet apart unless otherwise indicated.

Secure fabric at vertical edges with tension bars and bands and to top and bottom of frame with tie wires. Bracing: Install diagonal cross-bracing consisting of 5/16-inch-diameter adjustable-length truss rods on gates to ensure frame rigidity without sag or twist.

4. Swing Gates – Comply with ASTM F 900.

5. Gate Hardware – Provide galvanized hardware and accessories for each gate according to the following:

   a. Hinges – Size and material to suit gate size, non-liftoff type, offset to permit 180-degree gate opening. Provide 1-1/2 pair of hinges for each leaf over 6-foot nominal height. Top hinge shall be mounted upside down to discourage removal of gate.

   b. Latch – Forked type or plunger-bar type to permit operation from either side of gate, with padlock eye as an integral part of latch.

6. Framework -

   a. Terminal posts, corner and gate posts - 2-1/2 inch O.D. galvanized steel pipe, type I, class 1. All posts shall have closed caps or finials.

   b. Line posts: 2 inch O.D. galvanized steel pipe, type I, class 1.

   c. Bottom and top rail: 1-3/8 inch O.D. galvanized steel pipe, type II, class 1.

   d. Extend two corner posts and provide galvanized standard clothes line finial or two hooks.

   e. Strength requirements for posts and rails conforming to ASTM F 669. Pipe shall be straight, true to section, material, and sizes specified, and shall conform to the following weights per foot:

Actual OD	NPS Size	Type I Steel	Type II Steel
1.315	1	1.68	1.35
1.660	1-1/4	2.27	1.84
1.900	1-1/2	2.72	2.28
2.375	2	3.65	3.12
2.875	2-1/2	5.79	4.64
3.500	3	7.58	5.71
4.000	3-1/2	9.11	6.56
6.625	6	18.07	----
8.625	8	28.55	----

   f. General: Posts, rails, braces, and gate frames.

      1) Type I Pipe: Hot-dipped galvanized steel pipe conforming to ASTM F 1083, plain ends, standard weight (schedule 40) with not less than 1.8 oz. zinc per sq. ft.

2) Type II Pipe: Manufactured from steel conforming to ASTM A 569 or A 446, grade D, cold formed, electric welded with minimum yield strength of 50,000 psi and triple coated with minimum 0.9 oz. zinc per sq. ft. after welding, a chromate conversion coating and a clear polymer overcoat. Corrosion protection on inside surfaces shall protect the metal from corrosion when subjected to the salt spray test of ASTM B 117 for the 300 hours with the end point of 5 percent Red Rust.

7. Line or intermediate posts.

8. Top Rail – Manufacturer's longest lengths, with expansion-type coupling, approximately 6 inches long for joining. Provide rail ends or other means for attaching top rail securely to each gate corner, pull, and end post.

9. Fittings And Accessories – Material: Comply with ASTM F 626. Mill-finished galvanized steel to suit manufacturer's standards. Zinc Coating: Unless specifies otherwise, galvanize steel fence fittings and accessories in accordance with ASTM A 153, with zinc weights as per Table I.

10. Post and Line Caps – Provide weathertight closure cap for each post. Provide line post caps with loop to receive tension wire or top rail.

11. Post Brace Assembly – Manufacturer's standard adjustable brace at end posts and at both sides of corner and pull posts, with horizontal brace located at midheight of fabric. Use same material as top rail for brace, and truss to line posts with 3/8-inch diameter rod and adjustable tightener. Provide manufacturer's standard galvanized-steel, cast-iron or cast-aluminum cap for each end.

12. Bottom and Center Rail – Same material as top rail. Provide manufacturer's standard galvanized-steel cap for each end.

13. Tension or Stretcher Bars – Hot-dip galvanized steel with a minimum length 2 inches less than the full height of fabric, a minimum cross section of 3/16 inch by 3/4 inch, and a minimum of 1.2 oz. of zinc coating per sq. ft. Provide one bar for each gate and end post, and two for each corner and pull post, except where fabric is integrally woven into the post.

14. Tension and Brace Bands – 3/4-inch-wide minimum hot-dip galvanized steel with a minimum of 1.2 oz. of zinc coating per sq. ft.

    a. Tension Bands: 0.074 inch thick (14 gage) minimum.
    b. Brace Bands: 0.105 inch thick (12 gage) minimum.

15. Tension Wire – 0.192-inch-diameter (6-gage) zinc coated steel wire with 50,000-psi minimum tensile strength.

16. Tie Wires – 0.106-inch-diameter (12-gage) galvanized steel with a minimum of 0.80 oz. per sq. ft. of zinc coating according to ASTM A 641, Class 3.

2.9 C Execution:

1. Installer Qualifications – Engage an experienced installer who has at least three years' experience and has completed at least five chain link fence projects with same material and of similar scope to that indicated for this project with a successful construction record of in-service performance.

2. Single-Source Responsibility – Obtain chain link fences and gates, including accessories, fittings, and fastenings, from a single source or manufacturer.

3. Field Measurements – Verify layout information for fences and gates shown on the Drawings in relation to the property survey and existing structures. Verify dimensions by field measurements.

4. Install fence to comply with ASTM F 567. Do not begin installation and erection before final grading is completed, unless otherwise permitted.

5. The contractor shall notify Inspector before fence posts are installed.

6. Lay out fence posts at equal spacing not exceeding eight feet on center.

7. Fencing shall be rigid, straight and plumb, following grade levels where practicable.

8. Post holes – Terminal, corner, and gate posts shall be set in 12-inch diameter, 36-inch deep concrete footings. Line posts shall be set in 9-inch diameter, 30-inch deep concrete footings. Concrete shall be min. 2500 psi at 28 days.

9. Keep surface of concrete footing below grade unless post is set in paving, where concrete shall meet surface of paving.

10. Excavation – Drill or hand-excavate (using post-hole digger) holes for posts to diameters and spacings indicated, in firm, undisturbed or compacted soil.

11. If not indicated on Drawings, excavate holes for each post to minimum diameter recommended by fence manufacturer, but not less than four times the largest cross section of post.

12. Unless otherwise indicated, excavate hole depths approximately 3 inches lower than post bottom, with bottom of posts set not less than 36 inches below finish grade surface.

13. Setting Posts – Center and align posts in holes 3 inches above bottom of excavation. Space a maximum of 10 feet o.c., unless otherwise indicated.

14. Protect portion of posts above ground from concrete splatter. Place concrete around posts and vibrate or tamp for consolidation. Check each post for vertical and top alignment, and hold in position during placement and finishing operations.

15. Stretch fabric between terminal posts and position 1 inches above ground level. Cut fabric to form one continuous length between terminal posts. Attach fabric to terminal posts using tension bars and tension bands. Tension band spacing shall not exceed 15 inches O.C. Attach top and bottom edge of fabric to top and bottom rail using wire ties or clips, spaced no more than 24 inches apart.

16. Top Rails – Run rail continuously through line post caps, bending to radius for curved runs and at other posts terminating into rail end attached to posts or post caps fabricated to receive rail. Provide expansion couplings as recommended by fencing manufacturer.

17. Center Rails – Install center rails in one piece between posts and flush with post on fabric side, using rail ends and special offset fittings where necessary.

18. Brace Assemblies – Install braces at end and gate posts and at both sides of corner and pull posts. Locate horizontal braces at midheight of fabric on fences with top rail. Install so posts are plumb when diagonal rod is under proper tension.

19. Bottom Tension Wire – Install tension wire within 6 inches of bottom of fabric before stretching fabric and tie to each post with not less than same gage and type of wire. Pull wire taut, without sags. Fasten fabric to tension wire with 0.120-inch-diameter (11-gage) hog rings of same material and finish as fabric wire, spaced a maximum of 24 inches o.c.

20. Fabric – Leave approximately 2 inches between finish grade and bottom selvage unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Install fabric on security side of fence, and anchor to framework so that fabric remains under tension after pulling force is released.

21. Tension or Stretcher Bars – Thread through fabric and secure to end, corner, pull, and gate posts with tension bands spaced not over 15 inches o.c.

22. Tie Wires – Use wire of proper length to secure fabric firmly to posts and rails. Bend ends of wire to minimize hazard to persons or clothing.

23. Maximum Spacing – Tie fabric to line posts 12 inches o.c. and to rails and braces 24 inches o.c.

24. Fasteners – Install nuts for tension bands and carriage bolts on the side of the fence opposite the fabric side. Peen ends of bolts or score threads to prevent removal of nuts for added security.

25. Install gates plumb, level, and secure for full opening without interference. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary. Install gates according to manufacturer's instructions, plumb, level, and secure.

26. Gates – After repeated operation of completed installation equivalent to 3 days' use by normal traffic, readjust gates for optimum operating condition and safety. Lubricate operating equipment and clean exposed surfaces.