SPECIAL SPECIFICATION

SECTION 02200S

EARTHWORK

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CONSTRUCTION SPECIAL SPECIFICATION

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EARTHWORK

PART 1 - GENERAL

1.01 SUMMARY

A. Earthwork includes, but is not limited to clearing, preparing, grading, excavating, filling, backfilling and compacting of soils as necessary to accomplish finished construction as indicated on the drawings.

B. Excavation for Mechanical/Electrical Work: Excavation and backfill required in conjunction with underground mechanical and electrical utilities and buried mechanical and electrical appurtenances is included as work of this section.

C. Related Section: Refer to Section 03300, "Cast-In-Place Concrete" for general excavation requirements.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

C131 Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

C136 Method for Sieve Analysis of Fine and Coarse Aggregates

D1557 Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.54-kg) Rammer and 18-in. (457-Mm) Drop

D4253 Test Methods for Maximum Index Density of Soils Using a Vibratory Table

D4254 Test Methods for Minimum Index Density of Soils and Calculation of Relative Density

D4318 Standard Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

B. Code of Federal Regulations (CFR)

Title 29 Part 1926.650 Safety and Health Regulations for Construction

1.03 DEFINITIONS

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

B. Drainage Fill: Course of washed granular materials supporting slab-on-grade, placed to cut off upward capillary flow of pore water.

C. Excavation: The removal of material encountered to subgrade elevations and the reuse or disposal of material removed.

D. Structures: Building, footing, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below ground surface.

E. Subgrade: The uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil material.

F. Unauthorized Excavation: Removing materials beyond indicated subgrade elevations or dimensions without direction by the Sandia Delegated Representative (SDR).

G. Utilities: On site underground pipes, conduits, ducts, and cables, as well as underground services within building lines.

H. Flowable Concrete Backfill: Controlled low-strength flowable backfill with no less than 6 inch (152 mm) slump and no more than 10 inch (254 mm) slump.

I. 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.

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

K. Vacuum Excavation: A means of low impact, non invasive excavation involving the use of jets of air or water to loosen soil, which is picked up through a vacuum hose.

1.04 SUBMITTALS

A. General: Submit the following items in accordance with Conditions of Contract and Section 01300S, "Descriptive Submittals."

B. Product Data: Submit product data for the following materials and items. Include laboratory test reports and other data to show compliance with specifications (including specified standards).

Each type of plastic warning tape.

C. Test Reports: Submit test reports required under Quality Assurance as well as the following:

1. Laboratory analysis of each soil material proposed for fill and backfill from on-site and borrow sources.

2. One "Optimum Moisture - Maximum Density Curve" for each soil material.

3. Report of actual unconfined compressive strength and/or results of bearing tests of each stratum tested.

D. Traffic Plan: Contractor submit shall submit a proposed vehicular and pedestrian traffic plan prior to start of construction if alterations are proposed. Traffic plan shall consist of the following, in accordance with Special Specification 01001S:

1. How street(s) will be flagged and barricaded.

2. How street will be maintained.

3. Placement and size of steel plates to be used.

4. Duration of street closure.

5. Pedestrian access routes.

1.05 QUALITY ASSURANCE

A. Sandia National Laboratories (SNL) will engage a soil testing and inspection service for quality control testing during earthwork operations. Should initial tests of Contractor's work indicate noncompliance with the specification, the Contractor shall make corrections as directed. Retesting required to determine compliance with this specification shall be performed by an approved testing laboratory at the Contractor's expense.

1.06 PROJECT CONDITIONS

A. Existing Utilities: Locate existing underground utilities in areas of work by performing vacuum excavation for the entire length and depth of the required excavation. The minimum width of the vacuum excavation shall be sufficient to determine the size and type of utility located. If utilities are to remain in place, provide adequate means of support and protection during earthwork operations. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, notify the SDR. Do not interrupt existing utilities without following the Standard Facilities Engineering procedures for utility outage. Provide a minimum of 2 weeks' notice when practical, and await notice to proceed before interrupting any utilities.

The Contractor shall support exposed existing utilities suspended across or parallel to trench excavation. Contractor shall provide a utility support design for all large and/or critical services (ex: communications and electric waterlines, exposed gravity line joints, pressurized waterline, steam lines and chilled waterlines). Support for these critical services must be designed and sealed by a registered professional engineer and submitted to Sandia for approval. Where appropriate, the Contractor may provide support for small secondary/non-critical utilities (ex: depressurized poly gas line, rigid galvanized steel conduits, depressurized waterlines and lighting waterlines) without the need for an approved design by a registered PE. The design and installation of both critical and noncritical supports shall be performed at the Contractor's expense. Any failure due to improper utility stabilization which results in an unscheduled outage shall be immediately repaired at the Contractor's expense.

B. Known Utilities: Type and location of known existing utilities and obstructions that are shown on the drawings are approximate, but are based on the best information available. Protect these and other utilities that are made known to General Contractor prior to and during excavation. Determine exact location of all known utilities by performing non-destructive vacuum excavation methods to expose the utilities, a minimum of 5 days in advance of the excavation. Hand excavation will only be utilized if approved by SNL. . When electrified utilities are to be removed, safety precautions specified under the procedure for unknown utilities shall be adhered to.

If movement of traffic or public safety makes it necessary to backfill an exploratory excavation after the utility has been located, a suitable marker shall be installed to permanently mark the location.

C. Unknown Utilities: In the event that unidentified conduits, concrete encased ducts or pipes are encountered that must be removed, all work on that part of the job will stop until the SDR is contacted and resumption of work is authorized. Contractor shall prepare to move to an alternate work location with no more than (3) hours of the delay. Contractor shall document delay experienced, the reason for the delay, the amount of time delayed and provide to Sandia Construction

Observer for approval. Contractor must provide approved delay request with each change order for compensation.

D. Underground Telephone Cable: Where an underground telephone cable is shown on the Contract drawings, NO excavation is to be attempted in that vicinity until the line is properly located and staked by either a SNL Verizon Representative or the Air Force Communications Service (AFCS). If an unknown cable is identified as a telephone cable during an excavation, all excavation is to cease until either a SNL Verizon Representative or the AFCS identifies and properly stakes the cable locations in the vicinity of the excavation. (For assistance call 844-8411.)

E. Use of Explosives: The use of explosives is not permitted.

F. Protection of Persons and Property: Flag and barricade open excavations occurring as part of this work. Protect structures, utilities, sidewalks, pavements and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations, to include shoring, bracing, or other engineered support systems as necessary.

1. Contractor shall be responsible for protection of personnel and property in the work area for the duration of the Contract. The contractor is responsible for clearly delineating, in the field with appropriate signage, the temporary pedestrian route that is currently in place.

2. Temporary Plastic Fencing: Construction plastic fencing will be required during the duration of this project in accordance with SNL Standard Specification 01561: Temporary Fencing.

   a. The contractor is responsible for installing and maintaining 4 foot high, plastic fencing, supported by standard “U” style metal fence posts, around all construction work zones while those zones are in an active or disturbed condition.

   b. Special consideration shall be given to work zones with large amount of pedestrian traffic which must cross through or around these zones.

   c. The limits of fencing in work zones shall be at the contractor’s discretion, provided that pedestrian and vehicular safety are maintained at all times.

   d. Fencing shall be extended and/or relocated within work zones by the contractor as required to protect SNL and contractor personnel from construction conditions.

3. Keep excavation free of water from any source at all times. Provide and operate pumps if necessary. Remove water from site in manner to avoid damage to adjoining property.

4. All utility trenches greater than 5 feet in depth are to be 100% shored or braced for the entire length of trench in accordance with OSHA 29CFR1926, Subpart P – Excavations, other applicable OSHA requirements, and other provisions and conditions of these specifications and Contract Documents contained elsewhere. With prior written approval from the SDR and as site conditions (utility support, traffic access, pedestrian paths) permit the utility trench may be sloped or benched in accordance with OSHA 29CFR1926, Subpart P – Excavations.

G. Pollution Control: Use water sprinkling, temporary enclosures, and other suitable methods to limit amount of dust and dirt rising and scattering in the air to lowest practical level.

1. Comply with governing regulations pertaining to environmental protection. Obtain digging permit from the SDR and earth disturbance notification from City of Albuquerque, when required in the Contract, prior to beginning any earthwork.

2. Clean adjacent structures and improvements of dust, dirt, and debris caused by earthworking operations, as directed by the SDR. Return adjacent areas to conditions existing prior to the start of the work. Contractor is required to keep all pedestrian thoroughfares free of debris on a daily basis.

H. Erosion Control: Follow requirements as dictated in the contractor submitted Storm Water Pollution Prevention Plan (SWPPP) to prevent any erosion and control sediment at the project site.

I. Street Crossings: Excavations shall be conducted in a manner so as to cause the least interruption of traffic. Maintain 14-foot width of the street open at all times unless prior approval from the SDR has been given to close the street. Request to close a street must be presented in writing to the SDR at least 2 weeks prior to the requested closing date.

PART 2 - PRODUCTS

2.01 SOIL MATERIALS

A. General: Unless otherwise noted on the Contract Documents, the existing site soils shall be used for fill and backfill materials. If the on-site soils are found by laboratory test to be unsuitable for fill and backfill material, contact the SDR for direction.

Any additional fill material used must conform with the applicable requirements of this section.

B. Structural Fill: Structural fill shall consist of a controlled fill placed in areas indicated on the drawings.

1. Structural fill material shall consist of soils that conform to the following physical characteristics:

Sieve Size (Square Openings)	Percent Passing by Weight
6 inch (152 mm)	100
No. 4 (4.75 mm)	50 - 100
No. 200 (600 μm)	10 - 30

2. The plasticity index of material, as determined in accordance with ASTM D4318 shall not exceed 15.

3. The fill material shall be free from roots, grass, other vegetable matter, clay lumps, rocks larger than 6 inches (152 mm), or other deleterious materials. Stripped topsoil shall not be used in structural fill.

C. Retaining Wall Backfill: Retaining wall backfill material shall be free-draining and conform to fill quality requirements as follows:

Sieve Size (Square Openings)	Percent Passing by Dry Weight
3/4 inch (19.1 mm)	100
No. 4 (4.75 mm)	30 - 80
No. 200 (600 μm)	0 - 5

The material should have a plasticity index of less than 5 when tested in accordance with ASTM D4318.

D. Granular Base

1. Granular base shall meet the following grading requirements as determined in accordance with ASTM C136.

Sieve Size (Square Openings)	Percent Passing by Dry Weight
1 inch (25 mm)	100
3/4 inch (19.1 mm)	80 - 100
No. 4 (4.75 mm)	30 - 60
No. 200 (600 μm)	3 - 10

2. The granular base shall have a plasticity index of no greater than 3 when tested in accordance with ASTM D4318. The coarse aggregate shall have a percent of wear, when subjected to the Los Angeles abrasion test (ASTM C131), of no greater than 50. Reconstituted asphalt base course is allowable when meeting these gradations.

2.02 ACCESSORIES

Detectable Warning Tape: Provide a polyethylene film detectable warning tape manufactured for marking and identifying underground utilities. Tape shall be 6 inches (152 mm) wide and a minimum metallic foil core of 0.5 mils (0.013 mm) and shall be reinforced consisting of 5.0 mil (0.127 mm) total thickness. Letters shall be black in color and 1 inch (25 mm) minimum in size.

A. Color Codes:

1. Electric - Red
2. Gas - Yellow
3. Water - Blue
4. Steam - Yellow
5. Sewer - Green
6. Telephone - Orange

B. Text: The lettering shall be repeated continuously for the full length of the tape as follows:

CAUTION CAUTION CAUTION

BURIED (UTILITY TYPE) LINE BELOW

PART 3 - EXECUTION

3.01 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations, to include shoring, bracing, or other engineered support systems as necessary.

B. Protect subgrades and foundation soils against freezing temperatures or frost and excessive drying or wetting. Provide protective insulating materials as necessary.

C. Protection of Personnel: Flag and barricade open excavations occurring as part of this work, to include shoring, bracing, or other engineered support systems as necessary.

D. Provide erosion control measures to prevent erosion or displacement of soils and discharge of soil-bearing water run-off or airborne dust to adjacent properties and walkways, in accordance with Contractor submitted SWPPP.

3.02 CLEARING AND GRUBBING

A. General: Clearing and grubbing will be required for all areas indicated on the drawings to be excavated, improved on or which fill is to be constructed. All cleared and grubbed materials, including trash, shall be deposited at the Kirtland Air Force Base Landfill or as directed by the SDR.

B. Clearing and Grubbing: Clearing shall consist of removal and disposal of trees, shrubbery and other vegetation as well as brush and rubbish within the areas to be improved and constructed upon.

C. Grass and Topsoil: Grass, grass roots and incidental topsoil shall not be left beneath fill area, nor shall this material be used as fill or backfill material.

3.03 EXCAVATION

A. General: Excavate to contours, shapes, dimensions and elevations required for the work indicated on the drawings; extend sufficiently to permit form placing, inspection and removal. Undercutting is prohibited.

1. Earth excavation shall consist of excavation and removal of suitable soils for use as structural fill as well as satisfactory disposal of all vegetation, debris and deleterious materials encountered within area to be graded or in a borrow area, or any combination thereof.

2. Excavated areas shall be continuously maintained in a manner so that surfaces shall be smooth and have sufficient slope to allow water to drain from surface.

3. All existing man-made fill shall be removed in its entirety.

4. Width of excavations shall be to dimensions indicated on drawings, with additional space allowed as required for erection and stripping of forms, and inspection of related work. All utility trenches greater than 5 feet in depth are to be 100% shored or braced for the entire length of trench in accordance with OSHA 29CFR1926, Subpart P – Excavations, other applicable OSHA requirements, and other provisions and conditions of these specifications and Contract Documents contained elsewhere. With prior written approval from the

SDR and as site conditions (utility support, traffic access, pedestrian paths) permit the utility trench may be sloped or benched in accordance with OSHA 29CFR1926, Subpart P – Excavations.

B. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the SDR. Unauthorized excavation, as well as remedial work directed by the SDR, shall be at Contractor's expense.

1. Under footings, foundation bases, or retaining walls, fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation. Flowable concrete fill (2000 psi minimum (14 MPa)) may be used to bring elevations to proper position, when acceptable to the SDR.

2. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of same classifications, unless otherwise directed by the SDR.

C. Additional Excavation: When excavation has reached required subgrade elevations, notify the SDR who will make an inspection of conditions.

1. If unsuitable bearing materials are encountered at required subgrade elevations, immediately notify the SDR for direction.

2. Removal of unsuitable material and its replacement shall be as directed by the SDR.

D. Stability of Excavations: All utility trenches greater than 5 feet in depth are to be 100% shored or braced for the entire length of trench in accordance with OSHA 29CFR1926, Subpart P – Excavations, other applicable OSHA requirements, and other provisions and conditions of these specifications and Contract Documents contained elsewhere. With prior written approval from the SDR and as site conditions (utility support, traffic access, pedestrian paths) permit the utility trench may be sloped or benched in accordance with OSHA 29CFR1926, Subpart P – Excavations.

E. Dewatering: Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding project site and surrounding area. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations.

F. Storage of Soil Materials: Stockpile excavated materials acceptable for backfill and fill soil materials, including acceptable borrow materials at a location on site as directed by the SDR. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent wind-blown dust. Comply with the requirements of the project's Stormwater Pollution Prevention Plan.

G. Excavation for Structures: Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 foot (30.5 mm) and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of service, other construction, and for inspection.

H. Excavation for Pavements: Cut surface under pavements to comply with cross-sections, elevations and grades as shown.

I. Excavation for Utility Trenches: Dig trenches to the uniform width required for particular item to be installed, sufficiently wide to provide ample working room. Provide minimum 6 inch (152 mm) clearance on both sides of pipe or conduit.

1. Excavate trenches to depth indicated or required. Carry depth of trenches for piping to establish indicated flow lines and invert elevations.

2. Where rock is encountered, carry excavation 6 inches (152 mm) below specified elevation and backfill with a 6 inch (152 mm) layer of crushed stone, gravel, or sand prior to pipe installation.

3. Grade bottoms of trenches as indicated, notching under pipe bells to provide solid bearing for entire body of pipe.

4. Do not backfill trenches until tests and inspections have been made and backfilling authorized by the SDR. Use care in backfilling to avoid damage or displacement of pipe systems.

5. For grade dependent utilities, the entire length of trench between manholes or terminations shall be opened prior to placement of pipe. If existing utilities conflict with the new line, adjust the grade accordingly at the direction of the SDR.

6. As-built any changes found or made and return to SNL before job completion, to include initiating Sandia GPS Support requests.

J. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F (1.66 degrees C).

3.04 BACKFILL AND FILL

A. General: Place acceptable soil material in layers to required subgrade elevations, for each area classification listed below:

1. In excavations, use satisfactory excavated or borrow material.

2. Under building slabs, use granular base material, or as noted on drawing.

3. Behind retaining walls, use retaining wall backfill material.

4. Flowable concrete backfill or lean fill in accordance with Specification Section 01000S may be used in lieu of soil when the ability to compact is affected by conditions such as safety or tight conditions. Lean fill construction shall be used when new construction passes under existing utilities or structures where compaction of material is not practical or achievable. The lean fill shall be placed between the two utilities, allowed to properly set, and then the backfill completed with satisfactory excavated or borrow material above the lean fill to the required surface elevation.

B. Backfill excavation as promptly as work permits, but not until completion of the following:

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

2. Inspection, testing, approval, recording locations and GPSing of underground utilities.

3. Removal of concrete formwork.

4. Removal of temporary shoring and bracing, and backfilling of voids with satisfactory materials.

5. Removal of trash and debris from excavation.

6. Installing permanent or temporary horizontal bracing at horizontally supported walls.

C. Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow, strip, or break-up sloped surfaces steeper than one vertical to four horizontal so that fill material will bond with existing surface.

Prior to placement of fill, notify the SDR who will make an inspection of conditions to verify satisfactory removal of unsatisfactory materials.

D. Placement and Compaction: Place backfill and fill materials in layers not more than 8 inches (203 mm) in loose depth for material compacted by heavy compaction equipment, and not more than 6 inches (152 mm) loose depth for material compacted by hand-operated tampers.

1. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

2. Place backfill and fill materials evenly adjacent to structures, piping or conduit to required elevations. Take care to prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping or conduit to approximately same elevation in each lift.

E. Utility Trench and Pit 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.

1. Backfill trenches with concrete where trench excavations pass under column or wall footings. Concrete shall fill from the bottom of the trench to the bottom of the footing and extend the full width of the trench to 18 inches (457 mm) beyond the edge(s) of the footing.

2. Provide 4-inch (102 mm) thick concrete base slab support for piping or conduit less than 30 inches (762 mm) below surface of roadways. After installation and testing, completely encase piping or conduit in a minimum of 4 inches (102 mm) of concrete before backfilling or placing roadway subbase.

3. Install continuous detectable warning tape at all utility trenches as they are backfilled. Locate the tape approximately 36 inches (914 mm) above the utility line, but not less than 12 inches (305 mm) below grade. Install it directly above and parallel to the utility line with the printed side up. Take necessary precautions to avoid distorting or misplacing the tape as backfill continues.

When backfilling gas utility trenches, follow these procedures: Install an electrically conductive 12 gage (0.0808 inch) (2.052 mm) copper wire with the pipe. This wire and all its underground connections shall be insulated to prevent corrosion. This wire shall be placed above the pipe with a 12 inch (305 mm) layer of backfill separating it from the top of the pipe. A detectable warning tape shall then be covered with 18 inches (457 mm) of backfill minimum and an additional detectable warning tape shall be placed a minimum of 12 inches (305 mm) below finish grade. (Minimum gas pipe depth is 48 inches (1.2 m)).

4. GPS of Utilities: Contractor is responsible for initiating Sandia GPS Support requests to take GPS shots of any utilities exposed in trench, included known, unknown, and new waterline installations. The contractor must leave the trench exposed for a minimum of 2 hours after GPS support has been requested. If after 2 hours the contractor has not received a call from GPS support confirming that request has been completed, the contractor may backfill area. If contractor backfills trench prior to 2 hour time period, the contractor will be responsible for

re-excavation to expose utilities. Refer to Special Specification 01701S for further information regarding GPS of utilities.

3.05 COMPACTION

A. General: Control soil compaction during construction, providing minimum percentage of density specified for each area classification indicated below.

B. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum density for soils which exhibit a well-defined moisture-density relationship (cohesive soils) determined in accordance with ASTM D1557 and not less than the following percentages of relative density, determined in accordance with ASTM D4253 and D4254, for soils which will not exhibit a well-defined moisture-density relationship (cohesionless soils).

1. Under Structures, Building Slabs, Steps, Pavement And Curb And Gutter: Compact the top 12 inches (305 mm) below subgrade and each layer of backfill or fill material at 95 percent maximum dry density unless otherwise indicated on the drawings. (Exception: Utility trenches under pavements; compact the top 12 inches (305 mm) at 95 percent maximum dry density and each layer of backfill or fill material below subgrade at 90 percent maximum dry density unless otherwise indicated on the drawings.) Where the native soil is cohesionless, compact top 12 inches (305 mm) to a minimum relative density of 72 percent.

2. Under Lawn or Unpaved Areas: Compact the top 6 inches (152 mm) below subgrade and each layer of backfill or fill material at 85 percent maximum dry density for clayey soils (more than 35 percent passing No. 200 sieve) and 90 percent relative density for all other soils.

3. Under Walkways and EZ-Go Cart Pathways: Compact the top 6 inches (152 mm) below subgrade and each layer of backfill or fill material at 95 percent maximum dry density for clayey material or 95 percent relative density for all other material.

C. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, to prevent free water appearing on surface during or subsequent to compaction operations. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

3.06 GRADING

A. General: Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surfaces within specified

tolerances, compact with uniform levels or slopes between points where elevations are indicated, or between such points and existing grades.

B. Grading Outside Building Lines: Grade areas adjacent to building lines to drain away from structures and to prevent ponding. Finish surfaces free from irregular surface changes and as follows:

1. Lawn or Unpaved Areas: Finish areas to receive topsoil to within not more than 0.10 foot (30.5 mm) above or below required subgrade elevations.

2. Walks: Shape surface of areas under walks to line, grade and cross-section, with finish surface not more than 1/2 inch (12.7 mm) above or below required subgrade elevation.

3. Pavements: Shape surface of areas under pavement to line, grade and cross-section, with finish surface not more than 1/2 inch (12.7 mm) above or 1 inch (25 mm) below required subgrade elevation.

C. Grading Surface of Fill Under Building Slabs: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 1/2 inch (12.7 mm) when tested with a 10 foot (3 m) straightedge.

D. Compaction: After grading, compact subgrade surfaces to the depth and indicated percentage of maximum or relative density for each area classification.

3.07 BUILDING SLAB DRAINAGE COURSE

Drainage course consists of placement of 6 inch (152 mm) thickness of granular base material over subgrade surface to support concrete building slabs.

3.08 MAINTENANCE

A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

B. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape, and compact to required density prior to further construction.

C. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.09 DISPOSAL OF EXCESS AND WASTE MATERIAL

Transport excess excavated material to designated soil storage areas on Kirtland Air Force Base. Waste areas will generally be within 2 miles (3 km) of project site. Stockpile soil or spread as directed by the SDR.

3.10 RECORD DRAWINGS

The Contractor shall supply one red-lined set of as-built drawings that identify the actual location of utility lines installed and the horizontal location and depth of all existing lines encountered during construction, in accordance with Special Specification 01701S: As-Built Drawing Process.

END OF SECTION