

SECTION 1013
SLOPE STABILIZATION AND SEEDING

1013.1 GENERAL

1013.1.1 SCOPE

Furnish all labor, materials and equipment necessary for preparation of seedbed, furnishing and installation of seed, erosion control measures, soil amendments, and related work specified herein and as indicated on plans or as authorized by the LANDSCAPE ARCHITECT or ENGINEER.

This specification shall apply to large ponding areas on sites where a landscape plan for building permit is not required, and all ponds that are greater than or equal to 2 acres in size.

Smaller water quality ponds shall incorporate Low Impact Development Strategies as described in the City of Albuquerque Development Process Manual (DPM). Treatments described in this specification may apply as Best Management Practices where deemed practicable by the LANDSCAPE ARCHITECT or ENGINEER.

1013.1.2 APPLICABLE STANDARDS & REFERENCES:

1013.1.2.1 Drawings and general provisions of the Contract, including City of Albuquerque Standard Specifications for Public Works Construction, Latest Edition. General Conditions and any Supplemental Special Provisions, apply to this Section.

1013.1.2.2 All seed shall be certified by state of origin. The certification authority for the state of New Mexico is the New Mexico Crop Improvement Association.

1013.1.2.3 Reclamation efforts are controlled by the requirements stipulated in the National Pollution Discharge Elimination System General Permit for Region VI of the Environmental Protection Agency.

1013.1.3 PERFORMANCE REQUIREMENTS

1013.1.3.1 The CONTRACTOR shall be responsible for protecting and caring for seeded areas until final acceptance of the work and shall repair at CONTRACTOR expense any damage to seeded areas caused by pedestrian, vehicular traffic, vandalism or other cause.

1013.1.4 SUBMITTALS

1013.1.4.1 THIS PUBLICATION - Section 1502 - Submittals

1013.1.4.2 Certification of Seed: From seed vendor for each mixture, stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging. Include state, origin and name and telephone number of supplier.

1013.1.4.3 Product Certificates: For organic amendments from manufacturer.

1013.1.4.5 Sources of supply, color, and size for aggregate mulch.

1013.1.4.6 Source of supply and product information for wood mulch.

1013.1.5 DELIVERY, STORAGE & HANDLING

1013.1.5.1 Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable.

1013.1.5.2 Bulk Materials:

a. Do not dump or store bulk materials near fuel containers, herbicides, structures, utilities, walkways and pavements, or on existing turf areas or plants.

b. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.

c. Accompany each delivery of bulk materials with appropriate certificates.

1013.2 PRODUCTS

1013.2.1 SEED

1013.2.1.1 Seed: The seed species and rate of application shall be as shown below and shall be used based on the type of soil or as specified on the plans or in the Supplemental Technical Specifications.

1013.2.1.2 Seed shall be fresh, re-cleaned seed of the latest crop, mixed in the proportions by weight, and be pure live seed as denoted within these specifications or as per the plans.

1013.2.1.3 Seed shall be delivered to the site in the original unopened containers which shall bear the vendor's guarantee of analysis. Labeling of seed shall be in accordance with Federal Seed Laws and the New Mexico Department of Agriculture labeling laws. Federal seed laws require that analysis shall be no older than five months for seed shipped interstate and no older than nine months for seed shipped intra-state. Seeds may be pre-mixed by a seed dealer. Documentation must be provided, the same as if the seeds were sold or bagged separately. The LANDSCAPE ARCHITECT or ENGINEER shall receive all labels from all bags of seed used for verification. For each species included in the mix the following information will be found on each bag tag:

a. Variety - specify if certified.

b. Kind of seed

SECTION 1013
SLOPE STABILIZATION AND SEEDING

- c. Lot number
- d. Purity
- e. Germination
- f. % of Crop seed, % inert, % noxious weed
- g. Origin
- h. Test date
- i. Pounds of this species or percentage of total lot.

<i>Oenothera pallida</i> - White Evening Primrose	.25	Perennial Wildflower
<i>Baileya multiradiata</i> - Desert Marigold	.25	Perennial Wildflower
<i>Berlandiera lyrata</i> - Chocolate Flower	.25	Perennial Wildflower
<i>Abronia fragrans</i> or <i>Abronia villosa</i> - Sand Verbena	.25	Perennial Wildflower

1013.2.1.4 Seed Mixture and Rate: Seed species mixtures and application rates shall be as follows and shall be used based on the soil type unless otherwise specified in the plans or Supplemental Technical Specifications.

b. Sandy Soils: (Mainly Westside Areas) Seed rate is given in pounds of pure live seed (PLS) per acre. Mix shall include at least four of the wildflower species listed below at a total application rate of at least 2.0# PLS/AC.

a. Gravelly Uplands and Slopes (Mainly East Foothills): Seed rate is given in pounds of pure live seed (PLS) per acre.. Mix shall include at least four of the wildflower species listed below at a total application rate of at least 2.0# PLS/AC.

a. Gravelly Uplands & Slopes	#PLS/AC	Notes
<i>Bouteloua gracilis</i> 'Hachita' - Blue Grama	7.0	
<i>Bouteloua curtipendula</i> 'Niner' - Sideoats Grama	5.0	
<i>Stipa neomexicana</i> - Needle & Thread Grass	2.0	
<i>Oryzopsis hymenoides</i> - Indian Rice Grass	2.0	
<i>Koeleria macrantha</i> - June Grass	1.0	
<i>Aristida purpurea</i> - Purple Threeawn	1.0	
<i>Pleuraphis jamesii</i> 'Viva' - Galleta	1.0	
<i>Dalea purpurea</i> var <i>purpurea</i> - Purple Prairie Clover	.25	Perennial Wildflower
<i>Ratibida columnifera</i> forma <i>pulcherrima</i> - Mexican Hat	.25	Perennial Wildflower
<i>Gaillardia aristata</i> - Blanket Flower	.25	Perennial Wildflower
<i>Sphaeralcea parvifolia</i> - Nelson Globemallow	.25	Perennial Wildflower

b. Sandy Soils	#PLS/AC	Notes
<i>Hilaria jamesii</i> 'Viva' - Galleta	7.0	
<i>Oryzopsis hymenoides</i> 'Paloma' - Indian Rice Grass	5.0	
<i>Bouteloua gracilis</i> 'Hachita' - Blue Grama	2.0	
<i>Bouteloua curtipendula</i> 'Vaughn' - Sideoats Grama	1.0	
<i>Agropyron smithii</i> 'Arriba' - Western Wheat	1.0	
<i>Sporobolus cryptandrus</i> - Sand Dropseed	1.0	
<i>Sporobolus airoides</i> 'Salado' - Alkali Sacaton	1.0	
<i>Artemisia frigida</i> - Fringed sagebush	.25	Low Shrub
<i>Sphaeralcea ambigua</i> - Desert Globemallow	.25	Perennial wildflower
<i>Sphaeralcea parvifolia</i> - Nelson Globemallow	.25	Perennial wildflower
<i>Helianthus annuus</i>	.5	Annual wildflower
<i>Oenothera pallida</i> - White Evening Primrose	.25	Perennial wildflower
<i>Baileya multiradiata</i> - Desert Marigold	.25	Biennial wildflower
<i>Abronia fragrans</i> or <i>Abronia villosa</i> - Sand Verbena	.25	Perennial wildflower

SECTION 1013
SLOPE STABILIZATION AND SEEDING

b. Sandy Soils	#PLS/ AC	Notes
<i>Dalea purpurea</i> var <i>purpurea</i> – Purple Prairie Clover	.25	Perennial Wildflower
<i>Machaeranthera canescens</i> – Hoary tansyaster	.25	Perennial wildflower
<i>Berlandiera lyrata</i> – Chocolate Flower	.25	Perennial Wildflower
<i>Ratibida columnifera</i> forma <i>pulcherrima</i> – Mexican Hat	.25	Perennial Wildflower

c. Clay, Clay Loam Soils: Mainly Valley & Bosque areas). Seed rate is given in pounds of pure live seed (PLS) per acre. Mix shall include at least four of the perennial wildflower species listed below at a total application rate of 2.0# PLS/AC.

c. Clay, Clay Loam Soils	#PLS/AC	Notes
<i>Hilaria jamesii</i> ‘Viva’ - Galleta	4.0	
<i>Bouteloua curtipendula</i> ‘Vaughn’ – Sideoats Grama	3.0	
<i>Oryzopsis hymenoides</i> ‘Paloma’ - Indian Rice Grass	2.0	
<i>Sporobolus airoides</i> ‘Salado’ – Alkali Sacaton	2.0	
<i>Agropyron smithii</i> ‘Arriba’ – Western Wheat	1.0	
<i>Bouteloua gracilis</i> ‘Hachita’ – Blue Grama	1.0	
<i>Sporobolus cryptandrus</i> – Sand Dropseed	1.0	
<i>Soraghastrum nutans</i> – Indian Grass	.5	
<i>Artemisia ludoviciana</i> – Prairie Sage	.25	Low Shrub
<i>Oenothera hookeri</i> – Evening Primrose	.25	Perennial wildflower
<i>Oenothera pallida</i> – White Evening Primrose	.25	Perennial wildflower

<i>Machaeranthera canescens</i> – Hoary tansyaster	.25	Perennial wildflower
<i>Linum lewisii</i> – Blue Flax	.25	Perennial wildflower
<i>Helianthus annuus</i> - Sunflower	.5	Annual wildflower
<i>Sphaeralcea ambigua</i> Desert Globemallow	.25	Perennial wildflower
<i>Dalea purpurea</i> var <i>purpurea</i> – Purple Prairie Clover	.25	Perennial Wildflower
<i>Ratibida columnifera</i> forma <i>pulcherrima</i> – Mexican Hat	.25	Perennial Wildflower

d. Specific seed mixture application areas shall be determined in the field with the LANDSCAPE ARCHITECT or ENGINEER prior to seed installation. Alternate seed mixes, variations of species, and variations of application rates are acceptable if noted on the plans or approved in writing by the LANDSCAPE ARCHITECT or ENGINEER. Variations in application rates due to the presence of irrigation are acceptable if noted on the plans or approved in writing by the LANDSCAPE ARCHITECT or ENGINEER.

1013.2.3 MULCHES

1013.2.3.1 Aggregate Mulch on slopes flatter than 3:1

a. Aggregate mulch shall be 1” to 4” size angular material. Pumice and black aggregate are not acceptable.

1013.2.3 Aggregate Mulch on slopes between 3:1 and 2:1

a. Aggregate mulch shall consist of 2” to 8” size angular material. Pumice and black aggregate are not acceptable.

1013.2.4 Aggregate Mulch at base of slope

a. Aggregate mulch at base of slope shall consist of 2” to 4” size angular material. Pumice and black aggregate are not acceptable.

1013.2.5 Wood mulch: Base of slope

a. Wood mulch installed under angular aggregate at base of slope shall be chipped or shredded and free of foreign materials (see materials supply guide from the City of Albuquerque). Individual pieces of wood shall vary in size.

1013.2.4 SOIL AMENDMENT

1013.2.4.1 Soil Amendments:

The Contractor shall furnish and place composted mulch in all revegetation areas flatter than 3:1 slope (see materials supply guide from the City of Albuquerque).

SECTION 1013
SLOPE STABILIZATION AND SEEDING

1013.3 EXECUTION

1013.3.1 EXAMINATION

1013.3.1.1 Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.

- a. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
- b. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
- c. Uniformly moisten excessively dry soil that is not workable or which is dusty.

1013.3.1.2 Proceed with installation only after unsatisfactory conditions have been corrected.

1013.3.1.3 If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by the LANDSCAPE ARCHITECT or ENGINEER and replace with new planting soil at no additional cost to the OWNER.

1013.3.2 PREPARATION

1013.3.2.1 Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by seeding operations.

- a. Protect grade stakes set by others until directed to remove them.

1013.3.2.2 Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways. Reference project NEPA and/or SWPPP requirements if applicable.

1013.3.3 SEED BED PREPARATION

1013.3.3.1 Prior to the starting of any seed bed preparation the final grades of all earthwork shall be inspected and approved by the LANDSCAPE ARCHITECT or ENGINEER.

1013.3.3.2 No preparation shall be performed when the surface is wet or muddy or when the soil moisture content is such that the soil is not fully loosened by the disking operation.

1013.3.3.1. No preparation shall be performed when the ground is frozen or when air temperatures are below 32 degrees Fahrenheit.

1013.3.3.3 The extent of seed bed preparation shall not exceed the area on which seeding and mulching operations can be completed prior to crusting or wind or water erosion of the prepared surface. If erosion, crusting or re-compaction occurs, the affected area shall be re-worked beginning with seed bed preparation. Depth of preparation must be approved by the LANDSCAPE ARCHITECT or ENGINEER prior to the seeding and mulching operations.

1013.3.3.4 Mechanical Preparation: All areas flatter than 3:1 slope shall be mechanically prepared. Seed beds shall be prepared to a minimum depth of 4 inches, tilling with a disc, harrow or chiseling tools. Seed bed preparation shall be confined to disturbed areas unless otherwise specifically directed by the LANDSCAPE ARCHITECT or ENGINEER. Area of heavy or compacted soil may require additional preparation such as chiseling or ripping if disking alone does not result in specified depth. All competitive vegetation shall be uprooted during seed bed preparation and the soil shall be uniformly worked to a smooth, firm surface free of clods, stones or other foreign materials, 4 inches or larger, that would interfere with seeding or crimping equipment operations and germination. Tilling shall not occur when the steady wind speed is over 15 mph and is causing a dust problem to adjoining areas. No work shall be done when the moisture content of the soil is unfavorable or the ground is frozen or is otherwise in an un-tillable condition.

Following disking of seed beds, 1" depth of compost shall be applied to all mechanically prepared areas and disked or tilled to a 4" depth.

1013.3.3.5 Hand preparation: Areas which cannot be prepared with mechanized equipment because of small size or irregular shape, significant existing vegetation which is to remain, may be loosened to a minimum depth of 2 inches using hand tools or small mechanized equipment. Any such areas will be specified on the plans or approved in writing by the LANDSCAPE ARCHITECT or ENGINEER.

1013.3.5 SEEDING

1013.3.5.1 General: Three specific seed mixes have been specified for distinct areas of the city. Seeded areas shall be drill seeded and mulched where slopes are flatter than 3:1 unless otherwise directed by the LANDSCAPE ARCHITECT or ENGINEER. Slopes steeper than 3:1 shall be broadcast seeded or hydro-seeded as per plans or as directed by the LANDSCAPE ARCHITECT or ENGINEER.

a. Seeding shall not start until the seed bed preparation has been inspected and approved by the LANDSCAPE ARCHITECT or ENGINEER.

b. CONTRACTOR'S vehicles and other equipment shall not travel over the prepared areas. If, as determined by the LANDSCAPE ARCHITECT or ENGINEER, that rain or some other factor has impacted prepared surfaces so that it is not possible to seed to the proper depth, the CONTRACTOR shall again prepare the seed bed without additional compensation.

SECTION 1013
SLOPE STABILIZATION AND SEEDING

c. No more area may be seeded than can be stabilized (i.e. covered with gravel mulch if on a slope) by the end of the work day. No seeding operations may be conducted when steady wind speeds exceed 15 mph. If steady winds exceed 15 mph, seeding operations will be halted and any areas seeded shall be mulched.

d. Weather Limitations: Proceed with seeding operations only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to this specification.

1013.3.5.2 Drill Seeding: Drill seeding is required for areas flatter than 3:1 unless otherwise specified in the plans or in the Supplemental Technical Specifications or approved in writing by the LANDSCAPE ARCHITECT or ENGINEER. Seed shall be applied with a landscape seeder with double rollers, or "rangeland" type seed drill equipped with packer wheels. Seed shall be drilled to a maximum depth of 1/2 inch unless otherwise specified. Direction of seeding shall be in long sweeping and overlapping S-curves on flats and perpendicular to slopes and on the contour whenever possible.

1013.3.5.3 Broadcast Seeding: Seed may be applied by hand or by utilizing a rotary spreader or a seeder box with a gear feed mechanism if mechanized seeding is not possible due to limited size, irregular shape, or slopes between 3:1 and 2:1. Rice hulls or other fillers shall be used to prevent uneven separation of lighter seed. Seed shall be evenly distributed and applied at a rate which is a minimum of twice that of drilled seed rate unless otherwise specified. Immediately following the seeding operation, the seed-bed shall be lightly raked to provide approximately 1/2 inch cover of soil over the seed.

1013.3.5.4 Hydro Seeding: Areas with slopes between 3:1 and 2:1 may be hydroseeded. Seed shall be applied in a slurry with biodegradable dye and 500 lbs/acre of wood fiber. Hydroseed shall be uniformly using broad sweeping strokes. Seed shall not remain in the tank for more than 30 minutes.

1013.3.7 MULCHING

1013.3.7.1 General: All seeded areas on slopes shall be mulched unless otherwise specified on the plans or in the Supplemental Technical Specifications or approved in writing by the LANDSCAPE ARCHITECT or ENGINEER. The pond bottom does not require mulching.

1013.3.7.2 On seeded areas that are level no mulch is required unless otherwise specified on the plans or in the Supplemental Technical Specifications or with prior written approval of the LANDSCAPE ARCHITECT or ENGINEER. On seeded areas that have slopes only gravel mulch may be used as specified on the plans and in the Supplemental Technical Specifications.

1013.3.7.6 Aggregate Mulch on sloped areas flatter than 3:1

a. Slopes shall receive aggregate mulch immediately following seeding operations. 1" – 4" size aggregate mulch shall be placed in a layer one rock deep over seeded areas. Aggregate mulch shall be installed at a density approximately equal to 80%-100% coverage of the surface area. Gaps present between pieces of aggregate are desired. Contractor shall not fill the inherent gaps with smaller graded aggregate. Seeding and mulching shall be completed simultaneously in strips from the top of the slope to the bottom so that seeded areas are not damaged by equipment for installation of aggregate. See sketch 1013-SKL-1.

1013.3.7.7 Aggregate mulch on sloped areas between 3:1 and 2:1

a. Slopes shall receive aggregate mulch immediately following seeding operations. 2" – 8" size aggregate mulch shall be placed in a layer one rock deep over seeded areas. Aggregate mulch shall be installed at a density approximately equal to 80%-100% coverage of the surface area. Gaps present between pieces of aggregate are desired. Contractor shall not fill the inherent gaps with smaller graded aggregate. Seeding and mulching shall be completed simultaneously in strips from the top of the slope to the bottom so that seeded areas are not damaged by equipment for installation of aggregate. See sketch 1013-SKL-2.

1013.3.7.8 Aggregate mulch at base of slope

a. An approximately 6'-0" buffer at the base of the slope shall receive a 4" depth of aggregate mulch over wood mulch. See sketches 1013-SKL-1 and 1013-SKL-2.

b. All other slopes shall receive aggregate mulch immediately following seeding operations.

1013.3.7.9 Wood Mulch at base of slope at pond edges

a. Wood mulch at base of slope at pond edges shall be installed at a 3" depth under aggregate. See sketches 1013-SKL-1 and 1013-SKL-2.

SECTION 1013
SLOPE STABILIZATION AND SEEDING

1013.3.7.10 SUMMARY OF EXECUTION

Operation	Basin Bottom	Base of Slope at ponding area	Slope flatter than 3:1	Slope between 3:1 and 2:1
<u>Disk seed bed to four inches (4")</u>	X		X	
<u>Apply one inch (1") of compost, disk to 4"</u>	X		X	
<u>Drill Seed</u>	X		X	
<u>Hand Broadcast or Hydroseed</u>	X		X	X
<u>Apply 3" depth chipped or shredded wood mulch</u>		X		
<u>Apply one-rock deep layer of 1" - 4" aggregate</u>		X	X	
<u>Apply one-rock deep layer of 2"-8" aggregate</u>				X

1013.3.8 MAINTENANCE AND PROTECTION

1013.3.8.2 The CONTRACTOR shall be responsible for protecting seeded and mulched areas until final acceptance of the work and shall repair at his/her expense any damage to seeded and mulched areas caused by pedestrian or vehicular traffic or vandalism.

1013.3.11 WARRANTY

1013.3.11.1 If at the end of one complete growing season, it has been determined by the LANDSCAPE ARCHITECT or ENGINEER that insufficient germination has occurred in the CONTRACTOR shall reseed such areas with no additional cost to the OWNER.

1013.3.11.3 CONTRACTOR shall provide a certificate to the OWNER prior to final acceptance that all requirements of this specification have been met.

1013.3.12 REVIEWS AND OBSERVATIONS

1013.3.12.1 The following shall be the minimum required reviews and observations during the course of construction. Additional reviews and observations can be made at any time

at the discretion of the LANDSCAPE ARCHITECT or ENGINEER. It shall be the responsibility of the CONTRACTOR to notify the LANDSCAPE ARCHITECT or ENGINEER, in writing, 48 hours in advance of each required review or observation.

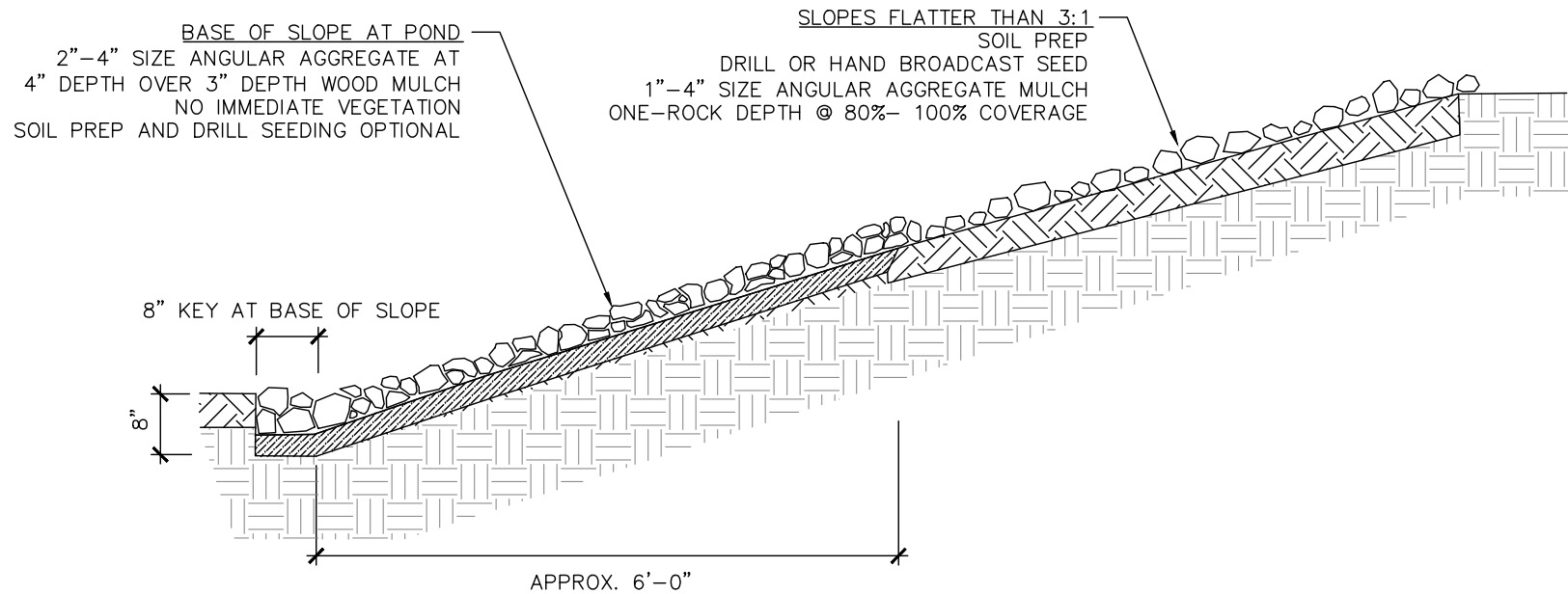
1013.3.12.2 The sequence of required reviews and observations shall not be changed from the sequence listed below. The CONTRACTOR shall not proceed with work of the next phase without written approval of the work of the previous phase by the LANDSCAPE ARCHITECT or ENGINEER. Payment will not be approved for items which have not been reviewed and approved in writing.

- a. Each phase of soil preparation shall be observed in process.
- b. Finish grade shall be reviewed.
- c. Implementation plan shall be approved prior to seeding.
- d. Seed shall be reviewed prior to seeding.
- e. Seeded area shall be reviewed after completion.
- f. Mulched areas shall be reviewed after completion.
- g. Final review and acceptance.
- h. Warranty review

1013.3.13 MEASUREMENT & PAYMENT

1013.3.13.1 Measurement: The measurement of grass seeding shall be by the acre.

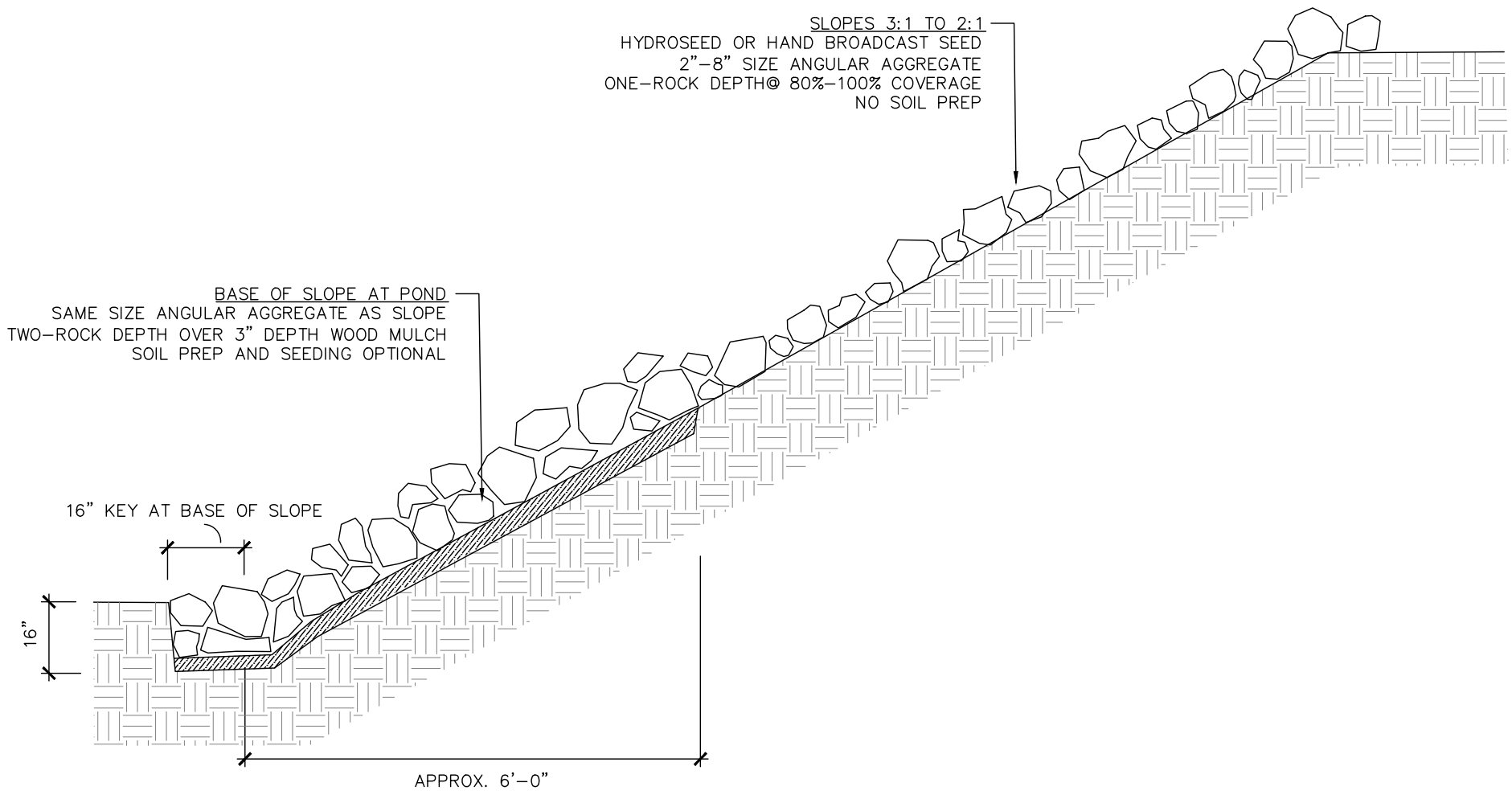
1013.3.13.2 Payment: Payment shall be made at the contract unit price per acre, of seeding complete in place, which shall include the seed, area preparation, seeding, soil amendments, and mulching.



A1

1013-SKL-1: SLOPES FLATTER THAN 3:1

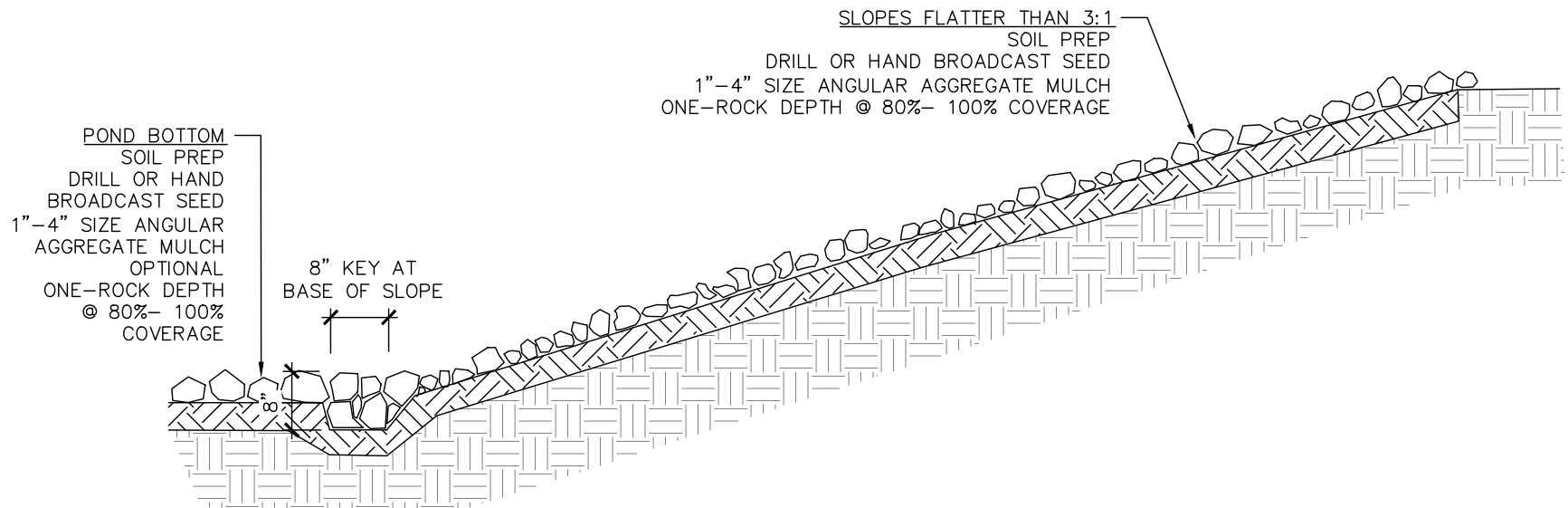
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1013-SKL-2: SLOPES 3:1 TO 2:1

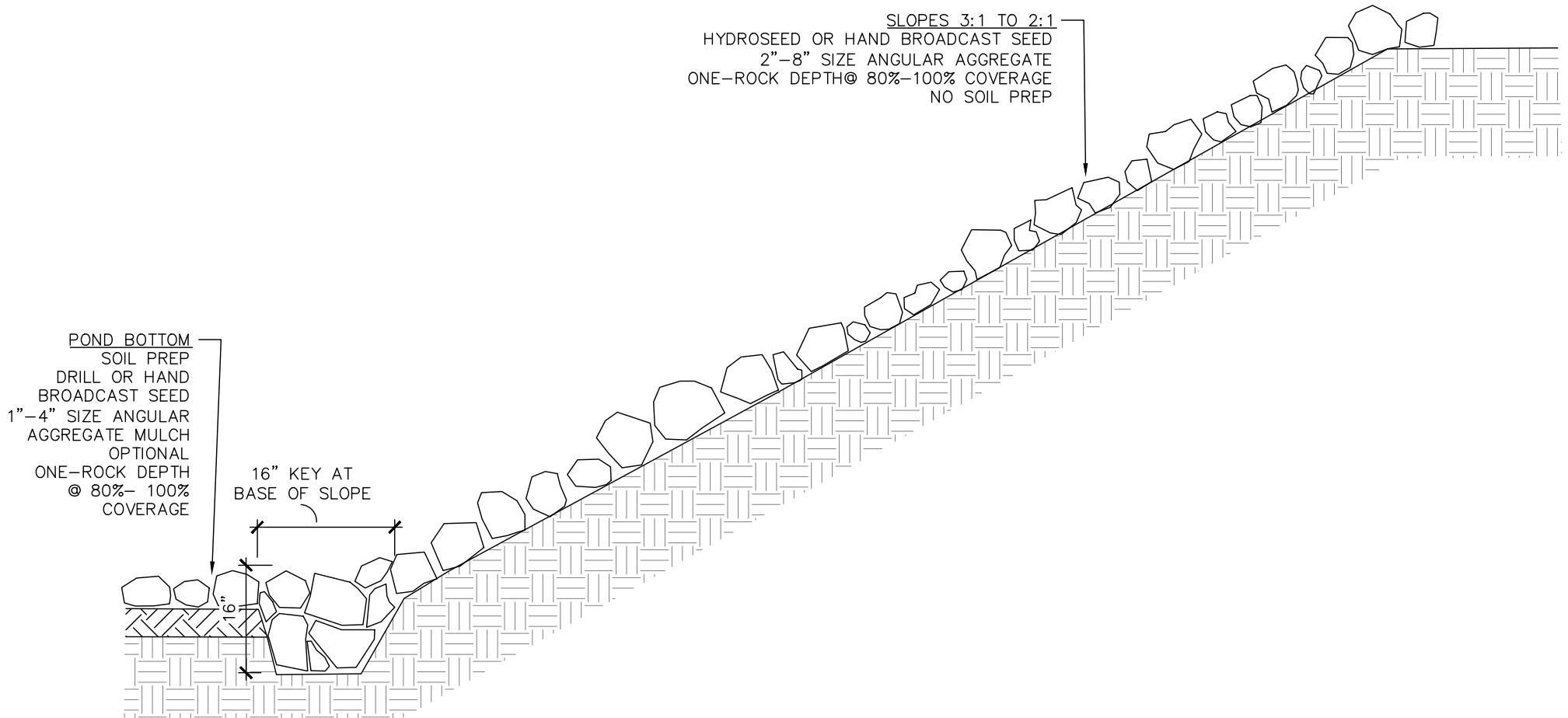
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A3

SLOPES FLATTER THAN 3:1, PRIVATE PONDS

SCALE: N.T.S.



A4 SLOPES 3:1 TO 2:1, PRIVATE PONDS

SCALE: N.T.S.