

SECTION 32 11 23

AGGREGATE BASE COURSE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. The WORK to be performed includes the preparation of the aggregate base course foundation; and the production, stockpiling, hauling, placing, and compacting of aggregate base course.

1.02 RELATED SECTIONS

- A. The following is a list of SPECIFICATIONS which may be related to this section:

1. Section 31 23 00, Excavation and Fill.
2. Section 31 23 19, Dewatering.
3. Section 32 23 33, Trenching and Backfilling.
4. Section 31 37 19, Grouted Boulders, Stcked Grouted Boulders and Grouted Boulder Retaining Walls.
5. Section 31 62 16, Steel Sheet Piles.
6. Section 32 15 40, Crusher Fine Surfacing.
7. Section 32 16 00, Sidewalks, Curbs, and Gutters.
8. Section 33 05 13, Manholes.
9. Section 33 41 00, Reinforced Concrete Pipe.
10. Section 33 46 00, Subdrainage.

1.03 REFERENCES

- A. The following is a list of standards which may be referenced in this section:

1. American Association of State Highway and Transportation Officials (AASHTO):
 - a. M147, Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base, and Surface Courses.
 - b. T11, Standard Method of Test for Materials Finer Than 75 μ m (No. 200) Sieve in Mineral Aggregates by Washing.
 - c. T27, Standard Method of Test for Sieve Analysis of Fine and Coarse Aggregates.

- d. T89, Standard Specification for Determining the Liquid Limit of Soils.
- e. T90, Standard Specification for Determining the Plastic Limit and Plasticity Index of Soils.
- f. T96, Standard Specification for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
- g. T99, Standard Specification for the Moisture-Density Relations of Soils Using a 2.5 kg (5.5 pound) Rammer and a 305 mm (12 in) Drop.
- h. T180, Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18-in) Drop.
- i. T190, Standard Specification for Resistance R-Value and Expansion Pressure of Compacted Soils.
- j. T265, Standard Method of Test for Laboratory Determination of Moisture Content of Soils.
- k. T310, Standard Specification for In-Place Density and Moisture Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

2. ASTM International (ASTM):

- a. C88, Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
- b. D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft³ (600 kN-m/m<sup>3- c. D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³(2,700 kN-m/m<sup>3- d. D1883, Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
- e. D2419, Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
- f. D4791, Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.</sup></sup>

1.04 SUBMITTALS

- A. CONTRACTOR shall cooperate with ENGINEER in obtaining and providing samples of all specified materials.
- B. CONTRACTOR shall submit certified laboratory test certificates for all items required in this section.
- C. CONTRACTOR shall submit tickets for each load of aggregate.

PART 2 PRODUCTS**2.01 MATERIALS**

- A. **Aggregates:** Aggregates for bases shall be crushed stone, crushed slag, crushed gravel or natural gravel that conforms to the quality requirements of AASHTO M147, except that the requirements for the ratio for the minus No. 200 sieve fraction to the minus No. 40 sieve fraction shall not apply. The requirements for the Los Angeles wear test shall not apply to Class 1, 2, and 3. Aggregates for bases shall meet the grading requirements as called out in the DRAWINGS. The liquid limit shall be as shown in the table and the plasticity index shall be ≤ 6 .
- B. **Gradations:**

Standard US Sieve Size	Percentage by Weight Passing Square-Mesh Sieves						
	LL < 35			LL < 30			
	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7
4 inches	--	100	--	--	--	--	--
3 inches	--	95 - 100	--	--	--	--	--
2½inches	100	--	--	--	--	--	--
2 inches	95 - 100	--	--	100	--	--	--
1½inches	--	--	--	90 - 100	100	--	--
1 inch	--	--	--	--	95 - 100	--	100
¾ inch	--	--	--	50 - 90	--	100	--
No. 4	30 - 65	--	--	30 - 50	30 - 70	30 - 65	--
No. 8	--	--	--	--	--	25 - 55	20 - 85
No. 200	3 - 15	3 - 15	20 max.	3 - 12	3 - 15	3 - 12	5 - 15

Note: Class 3 materials shall consist of bank or pit run material.

PART 3 EXECUTION**3.01 GENERAL**

- A. **Equipment:**
- Equipment shall be capable of performing the WORK as described in this SPECIFICATION. Equipment that is inadequate to obtain the results specified shall be replaced or supplemented as required to meet the requirements of this SPECIFICATION. Any equipment that is used in an improper manner may be cause for rejection of the WORK if in the opinion of ENGINEER the WORK fails to meet the requirements of this SPECIFICATION.
 - Equipment used for compaction shall be the rolling type, vibratory type, or combination of both types, and shall be of sufficient capacity to meet the compaction requirements herein.

3.02 PREPARATION OF FOUNDATION

A. General:

1. The foundation shall be considered to be the finished earth subgrade, subbase course, or base course, as the case may be, upon which any subbase, base, or surface course is to be constructed.
2. Preparation of foundation for construction of a subbase, base, or surface course shall consist of the WORK necessary to restore, correct, strengthen, or prepare the foundation to a condition suitable for applying and supporting the intended course.
3. The foundation shall be prepared and constructed such that it will have a uniform density throughout. It shall be brought to the required alignment and cross section with equipment and methods adapted for the purpose. Upon completion of the shaping and compacting operations, the foundation shall be smooth, at the required density, and at the proper elevation and contour to receive the aggregate base course.
4. Unless otherwise provided, all holes, ruts, and other depressions in the foundation shall be filled with materials similar to those existing in the foundation. High places shall be excavated and removed to the required lines, grade and section.
5. Areas of yielding or unstable material shall be excavated and backfilled with stabilization rock as determined by ENGINEER. Base course material shall not be placed on a foundation that is soft, spongy, or one that is covered by ice or snow. Base course shall not be placed on a dry or dusty foundation where the existing condition would cause rapid dissipation of moisture from the base course material and hinder or preclude its proper compaction. Dry foundations shall have water applied, reworked, and compacted as necessary.
6. ENGINEER may direct CONTRACTOR to make minor adjustments in the finish grade from that shown in the DRAWINGS as may be necessary or desirable to maintain the characteristics of a stabilized foundation by minimizing the amount of cutting into or filling.

B. Roads and Parking Areas: For aggregate base course roads and parking areas, the top six (6) inches of topsoil shall be stripped within the area to be aggregate surfaced. Following stripping of the topsoil, the upper twelve (12) inches of the subgrade shall be scarified and compacted to a minimum of ninety-five percent (95%) of the Maximum Standard Proctor Density (ASTM D698). Onsite material may be used as accepted by ENGINEER, for compacted fill for the aggregate base course. Fill shall be placed within two percent (2%) of optimum moisture content and compacted to a minimum of ninety five percent (95%) of the Maximum Standard Proctor Density (ASTM D698).

C. Pavements: Aggregate base course used as a foundation for pavements shall be placed on the subgrade within two percent (2%) of optimum moisture and compacted to a minimum of one hundred percent (100%) of the Maximum Modified Proctor Density (ASTM D1557). The top six (6) inches of topsoil shall be stripped within the area to be aggregate surfaced. Following stripping of the topsoil, the upper twelve

(12) inches of the subgrade shall be scarified and compacted to a minimum of ninety-five percent (95%) of the Maximum Standard Proctor Density (ASTM D698). Onsite material may be used, as accepted by ENGINEER, for compacted fill for the aggregate base course. Fill shall be placed within two percent (2%) of optimum moisture content and compacted to a minimum of ninety five percent (95%) of the Maximum Standard Proctor Density (ASTM D698). Deviations in aggregate base course under pavements of more than one-quarter (1/4) inch in ten (10) feet, measured with a ten-foot (10') straight edge, shall be corrected prior to pavement construction.

- D. Earth Subgrade: When the foundation is an earth subgrade it shall be prepared by removing all vegetation, excavating and removing materials, filling depressions, scarifying, shaping, smoothing and compacting to meet the required grade, section and density. Stones over six (6) inches in greatest dimension shall be removed.

3.03 PLACEMENT

- A. The aggregate base course shall be constructed to the width and section shown in the DRAWINGS. If the required compacted depth of base course exceeds six (6) inches, the base shall be constructed in two (2) or more layers of approximate equal thickness. The maximum compacted thickness of any one (1) layer shall not exceed six (6) inches.
- B. Each layer shall be constructed as far in advance of the succeeding layer as ENGINEER may direct. The WORK shall, in general, proceed from the point on the PROJECT nearest the point of supply of the aggregate in order that the hauling equipment may travel over the previously placed material, and the hauling equipment shall be routed as uniformly as possible over all portions of the previously constructed courses or layers of the base course.
- C. The material shall be deposited on the soil foundation, or previously placed layer, in a manner to minimize segregation and to facilitate spreading to a uniform layer of the required section. In the event that blending of materials is necessary to provide required gradation and properties of the material, and is done in the roadway, the same shall be accomplished by mixing the aggregate and blending material by means of blade graders, discs, harrows, or other equipment to effect a uniform distribution and gradation throughout the finished mixture. Excessive mixing and grading that will cause segregation between the coarse and fine materials is prohibited.

3.04 COMPACTION

- A. After a layer or course has been placed and spread to the required thickness, width and contour, it shall be compacted. If the material is too dry to readily attain the required density, it shall be uniformly moistened to the degree necessary during compaction operations for proper compaction.
- B. Compaction of each layer shall continue until the required density specified in Article Preparation of Foundation is reached. The surface of each layer shall be maintained during compaction operations in such a manner that a uniform texture is produced and aggregates firmly keyed.
- C. All areas where proper compaction is not obtainable due to segregation of materials, excess fines, or other deficiencies in the aggregate shall be reworked as necessary or

the material removed and replaced with aggregates that will meet this SPECIFICATION.

- D. The surface of each layer shall be kept true and smooth at all times.

3.05 MIXING

- A. Unless otherwise specified, CONTRACTOR shall mix the aggregate by any one of the three following methods:
1. Stationary Plant Method: Aggregate base course and water shall be mixed in an approved mixer. After mixing, the aggregate shall be transported to the PROJECT site while it contains the proper moisture content and shall be placed on the roadbed by means of an approved spreader.
 2. Travel Plant Method: After the material for each layer has been placed through an aggregate spreader or windrow-sizing device, it shall be uniformly mixed by a traveling mixing plant.
 3. Road Mix Method: After material for each layer has been placed, the materials shall be mixed while at optimum moisture content by motor graders or other approved equipment until the mixture is uniform throughout.

3.06 SHOULDER CONSTRUCTION

- A. Shoulders shall be constructed with base course material to conform to the elevation and section shown in the DRAWINGS. No equipment shall be used which by its design or through its manner of operation will damage the pavement or curbs. Insofar as practicable, the base course material shall be placed directly on the shoulder area. Materials that are deposited outside the shoulder area, if not contaminated, shall be recovered and placed within the required limits. CONTRACTOR shall not be compensated for materials not recovered as determined by ENGINEER.
- B. Materials shall not be deposited on the pavement or surfacing during placing unless specifically permitted by ENGINEER.
- C. The base course material as placed shall be spread and compacted to the required density in layers not exceeding six (6) inches in compacted thickness. Any material inadvertently placed on the pavement shall be broomed from the pavement. The result shall not effect a change in the gradation of the shoulder material.

END OF SECTION

SECTION 32 15 40

CRUSHER FINES SURFACING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. The WORK to be performed includes the preparation, stockpiling, hauling, placing, and compacting of crusher fines as indicated on the DRAWINGS and specified herein.

1.02 RELATED SECTIONS

- A. The following is a list of SPECIFICATIONS, which may be related to this section:
 - 1. Section 31 23 00, Excavation and Fill.
 - 2. Section 32 11 23, Aggregate Base Course

1.03 REFERENCES

- A. The following is a list of standards, which may be referenced in this section:
 - 1. American Association of State Highway and Transportation Officials (AASHTO):
 - a. M147, Standard Specification for Materials for Aggregate and Soil Aggregate Subbase, Base, and Surface Courses.
 - b. T11, Standard Method of Test for Materials Finer Than 75 μ m (No. 200) Sieve in Mineral Aggregates by Washing.
 - c. T27, Standard Method of Test for Sieve Analysis of Fine and Coarse Aggregates.
 - d. T89, Standard Specification for Determining the Liquid Limit of Soils.
 - e. T90, Standard Specification for Determining the Plastic Limit and Plasticity Index of Soils.
 - f. T96, Standard Specification for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 - g. T99, Standard Specification for the Moisture-Density Relations of Soils Using a 2.5 kg (5.5 pound) Rammer and a 305 mm (12 in) Drop.
 - h. T180, Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18-in) Drop.

- i. T190, Standard Specification for Resistance R-Value and Expansion Pressure of Compacted Soils.
- j. T265, Standard Method of Test for Laboratory Determination of Moisture Content of Soils.
- k. T310, Standard Specification for In-Place Density and Moisture Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

2. ASTM International (ASTM):

- a. C136, Standard Test Method for Sieve Analysis of fine and Coarse Aggregates
- b. D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft³ (600 kN-m/m³)).
- c. D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
- d. C88, Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
- e. D1883, Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
- f. D2419, Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
- g. D2488, Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)
- h. D4791, Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate

1.04 SUBMITTALS

- A. CONTRACTOR shall cooperate with ENGINEER in obtaining and providing samples of all specified materials.
- B. CONTRACTOR shall submit certification from the supplier certifying the crusher fines, or approved equal, meets the requirements of this Specification.
- C. CONTRACTOR shall submit certified laboratory test certificates for all items required in this section.
- D. CONTRACTOR shall submit samples and or shop drawings for the following
 - 1. Aggregate strength
 - 2. Aggregate color.

- E. CONTRACTOR shall submit the manufacturer, Material Safety Data Sheet (MSDS), Name, Trade Name, trademark, and conformance to state law of all herbicides or other chemicals.

1.05 QUALITY ASSURANCE

- A. Initial testing required to determine compliance with the requirements for the work of this section will be paid for by the OWNER. Should any tests fail, the Contractor shall pay for all further testing necessary in that area to achieve requirements.
- B. General Warranty: The special warranty specified in this article shall not deprive the OWNER of other rights the OWNER may have under other provisions of the CONTRACT DOCUMENTS
- C. Special Warranty: Submit a written warranty executed by INSTALLER agreeing to repair or replace components of crusher fines surface, or approved equal that fail in materials or workmanship within the specified warranty period. Failures include, but are not limited to, the following:
 - 1. Premature wear and tear.
 - 2. Failure of system to meet performance requirements.
- D. Warranty Period: CONTRACTOR shall provide warranty for the performance of the product. CONTRACTOR shall warranty installation of product for the time of one year from completion and acceptance of the WORK by the OWNER or OWNERs representative.

PART 2 PRODUCTS

2.01 AGGREGATE BASE COURSE

- A. Aggregate Base Course shall be furnished and installed as required and specified under Section 31 23 00, Earthwork and Trenching and Section 32 11 23 Aggregate Base Course to a minimum 6" compacted depth.

2.02 HERBICIDE

- A. Herbicide shall be Casoron 4G granular weed and grass killer or approved equal.

2.03 CRUSHER FINES

- A. **Aggregates:** Crushed stone shall consist of inert materials that are hard, durable, with stone free from surface coatings and deleterious materials.
- B. R-value minimum of 70 determined by ASTM D 2488 Methodology (R-value is a measure of wear resistance).
- C. **Sand equivalent:** - an engineering measurement of the proportion of sand to silt and clay will stay at a range of 30-55, as determined by ASTM D 2419 methodology.

D. Gradations:

1. Gradation shall meet the gradation below or approved equal as approved by ENGINEER.

Standard US Sieve Size	Percentage Passing by Weight
½ inch	100
¾ inch	100
No. 4	65-80
No. 8	48-63
No. 16	40-49
No. 30	30-40
No. 50	20-27
No. 100	10-18
No. 200	10-12
Note: Materials shall consist of bank or pit run material.	

PART 3 EXECUTION

3.01 GENERAL

A. Equipment:

1. Equipment shall be capable of performing the WORK as described in this SPECIFICATION. Equipment that is inadequate to obtain the results specified shall be replaced or supplemented as required to meet the requirements of this SPECIFICATION. Any equipment that is used in an improper manner may be cause for rejection of the WORK if in the opinion of ENGINEER the WORK fails to meet the requirements of this SPECIFICATION.
2. Equipment used for compaction shall be the rolling type, vibratory type, or combination of both types, and shall be of sufficient capacity to meet the compaction requirements herein.

3.02 LAYOUT OF WORK

- A. The Contractor shall stake or otherwise delineate the proposed alignment of the path according to the drawings. Obtain approval of the OWNER prior to proceeding with excavation and subgrade preparation.
- B. Cut/fill bench for the crusher fines as shown on the drawings.
- C. Cut existing grade to a minimum of seven (7) inches deep or as shown on the drawings within limits of paving. Wet and roll subgrade to obtain a firm, uniform, compacted subgrade. Keep cut sides vertical and true to line horizontally with a uniform width.

3.03 WEED CONTROL

A. Herbicide/Chemical Applications

1. Apply Casoron 4G granular weed and grass killer or approved equal to prepared subgrade per manufacturer's recommendations.
2. Apply Casoron 4G granular weed and grass killer at a rate of 250 - 300 pounds per acre. Apply approved equal at manufacturers recommended rate.
3. Herbicides or other chemicals shall be applied using well-maintained equipment by individuals working for CONTRACTOR who are properly licensed by any State and/or Federal Agency having jurisdiction over such applications. It shall be the responsibility of the CONTRACTOR to be knowledgeable of any and all current laws and regulations pertaining to herbicide and other chemical applications, and to notify OWNER or OWNERs Representative immediately if any request for herbicide or chemical applications by OWNER or OWNERs Representative is inappropriate as they pertain to these laws and regulations.
4. Herbicides or other chemicals shall not be applied during periods when wind or other physical conditions cause the herbicides or chemicals to be transported a distance of more than five (5) feet from the immediate area where they are being placed. It shall be the responsibility of the CONTRACTOR to stop WORK immediately and notify the OWNER or OWNERs Representative if any weather or other physical condition exists, which would make the application of herbicides or other chemicals inappropriate.
5. All herbicides or other chemicals used shall be applied at a rate and strength, and by the method recommended by the manufacturer of the product being used.

3.04 SUB-GRADE PREPARATION

- A. Aggregate Base Course shall be a minimum of 3" thick compacted Class 6 Base Course as Specified in Section 32 11 23, installed at 95% relative compaction on top of subgrade.
- B. Make any corrections necessary to base furnished and installed under Section 31 23 00, Earthwork and Trenching and Section 32 11 23 Aggregate Base Course to bring Class 6 Aggregate Base Course to the sections and elevations shown on the DRAWINGS.
- C. Pre-soak Class 6 Aggregate Base Course with water prior to installing crusher fines or approved equal as needed to compact Class 6 aggregate base course.
- D. Make sure proper drainage is available to ensure no standing water on the surface or adjacent to crusher fines including downspouts, when placed under roof overhang.

3.05 PLACEMENT AND COMPACTION

- A. The CONTRACTOR is responsible for controlling placement of the material; no additional compensation will be made for material placement in excess of the specified thickness or width.
- B. Do not install crusher fines material during rain or snow. Do not install crusher fines on sub-grade that has standing water.
- C. If the required compacted depth of the crusher fines exceeds 6 inches (6"), place course in two or more layers of approximately equal thickness. The minimum thickness of any one layer shall be four inches (4").
- D. Add water to $\pm 2\%$ wet of optimum moisture content. Use roller or mechanical hand tamper for compaction. Compact to 95% Standard Proctor Density (ASTM D698-70) to a uniform thickness.
 - 1. Use plate compactor on edges and hard to get areas.
 - 2. Loose material shall not be present on final surface.
- E. Top of path shall be flush with adjacent grade. Remove any excess gravel on edges. Ensure that there are no low spots, high spots, or standing water on or adjacent to path.

3.06 SURFACE FINISHING

- A. Use a smooth steel wheel roller for the final rolling of top surface of Crusher Fines. Water surface and evenly spread loose stones before final rolling. Make minimum of two complete passes over area to embed stones. Correct soft spots developed during rolling.
- B. Compacted surface shall be smooth and free from waves and other irregularities. Unsatisfactory portions of base course shall be torn up, reworked, re-laid, and rerolled at no additional expense to the Owner.

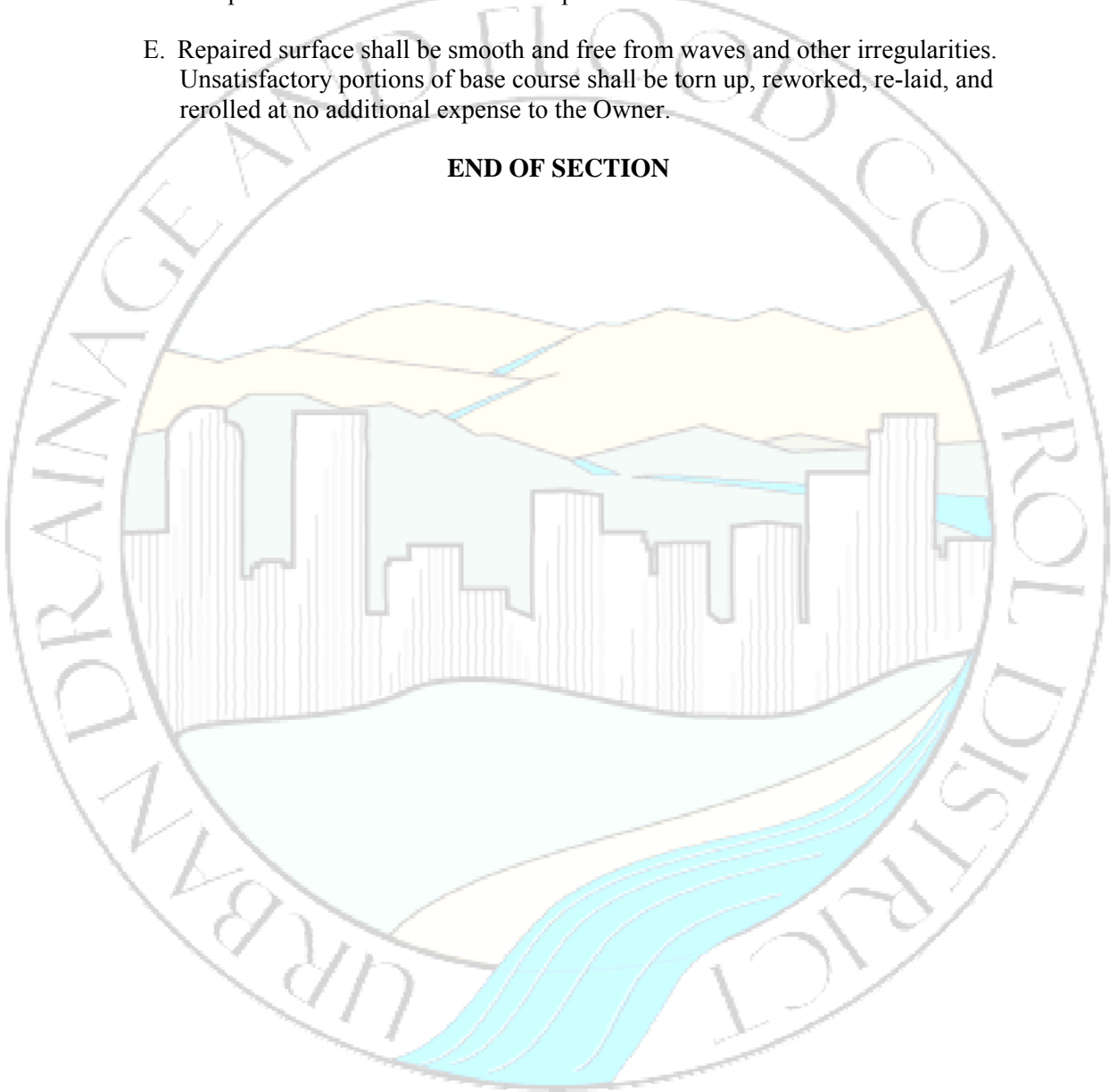
3.07 INSPECTION

- A. Finished surface shall be uniform and solid, with no evidence of chipping or cracking.
- B. Compacted paving material shall be firm to the full depth of pavement with no soft areas.
- C. Loose material shall not be present on the surface
- D. No ruts shall be visible on the surface of the pavement.
- E. Pavement sections that do not meet this specification, shall be repaired or replaced at the CONTRACTOR's expense.

3.08 REPAIRS

- A. Excavate damaged area to depth of crusher fines paving material and square off sidewalls.
- B. If area is dry, moisten damaged portion lightly and scarify.
- C. Apply crusher fines to excavated area to finished grade.
- D. Compact with an 8" to 10" hand tamp or 1000 lb. roller.
- E. Repaired surface shall be smooth and free from waves and other irregularities. Unsatisfactory portions of base course shall be torn up, reworked, re-laid, and rerolled at no additional expense to the Owner.

END OF SECTION





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SECTION 32 15 41

STABILIZED CRUSHER FINES SURFACING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. The WORK to be performed includes the preparation of the StaLok paving material or approved equal; and the production, stockpiling, hauling, placing, and compacting of StaLok material or approved equal as indicated on the DRAWINGS and specified herein.

1.02 RELATED SECTIONS

- A. The following is a list of SPECIFICATIONS, which may be related to this section:
 - 1. Section 01 25 00, Substitution Procedures
 - 2. Section 31 23 00, Excavation and Fill.
 - 3. Section 32 11 23, Aggregate Base Course

1.03 REFERENCES

- A. The following is a list of standards, which may be referenced in this section:
 - 1. American Association of State Highway and Transportation Officials (AASHTO):
 - a. M147, Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base, and Surface Courses.
 - b. T11, Standard Method of Test for Materials Finer Than 75 μ m (No. 200) Sieve in Mineral Aggregates by Washing.
 - c. T27, Standard Method of Test for Sieve Analysis of Fine and Coarse Aggregates.
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 - e. T90, Standard Specification for Determining the Plastic Limit and Plasticity Index of Soils.
 - f. T96, Standard Specification for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 - g. T99, Standard Specification for the Moisture-Density Relations of Soils Using a 2.5 kg (5.5 pound) Rammer and a 305 mm (12 in) Drop.

- h. T180, Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18-in) Drop.
 - i. T190, Standard Specification for Resistance R-Value and Expansion Pressure of Compacted Soils.
 - j. T265, Standard Method of Test for Laboratory Determination of Moisture Content of Soils.
 - k. T310, Standard Specification for In-Place Density and Moisture Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
2. ASTM International (ASTM):
- a. C136, Standard Test Method for Sieve Analysis of fine and Coarse Aggregates
 - b. D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft³ (600 kN-m/m³)).
 - c. D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³(2,700 kN-m/m³)).
 - d. C88, Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
 - e. D1883, Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
 - f. D2419, Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
 - g. D2488, Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)
 - h. D4791, Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate

1.04 SUBMITTALS

- A. CONTRACTOR shall cooperate with ENGINEER in obtaining and providing samples of all specified materials.
- B. CONTRACTOR shall submit sieve analysis of crusher fines aggregate.
- C. CONTRACTOR shall submit certified laboratory test certificates for all items required in this section.
- D. CONTRACTOR shall submit samples and or shop drawings for the following
 - 1. Aggregate strength.

2. Aggregate color.

E. CONTRACTOR shall submit the following manufacturers information

1. Literature that explains color, performance and previous applications.
2. Specifications for paving material.
3. Installation specifications, instructions and directions
4. Performance specifications for material
5. Written Warranty
6. Written maintenance instructions

F. Construction Samples

1. CONTRACTOR shall construct mock-up panels or areas for each different type of paving system as specified herein to demonstrate ability to achieve types of setting bed, joints, pattern, color and texture required herein, unless mock-up panel construction is waived by the OWNER or OWNERS Representative.
2. CONTRACTOR shall construct a 12' x 24' sample of finished path, using StaLok Paving material or approved equivalent for approval by OWNER or OWNERS representative.
 - a. Schedule mock up construction for acceptance by OWNER or OWNERS Representative at least 30-days prior to application of paving surfaces represented by the mock up.
 - b. Locate mock – up panel(s) in areas as directed by OWNER or OWNERS representative.
 - c. Mock-ups will continue to be constructed at no cost to owner until mock up is accepted by OWNER or OWNERS representative.
 - d. Accepted mock – up will become standard for inspection and acceptance of future work based on:
 - 1) Texture
 - 2) Color
 - 3) Workmanship
 - e. The same setting bed and joint mixes used in the accepted mock-up will be used in the final work unless otherwise directed by OWNER or OWNERS representative.
 - f. Protect accepted mock-up from damage until the completion and acceptance of the WORK by the OWNER or OWNERS representative.

- g. Mock-up panel(s) will be removed from site at the completion of the project, unless otherwise directed by OWNER or OWNERS representative.

1.05 QUALITY ASSURANCE

- A. INSTALLER Qualifications: INSTALLER must provide evidence to indicate successful experience in installation of StaLok Paving Material or approved equal or approval of the manufacturer.
- B. INSTALLERS shall be pre-approved for installation and execution of this WORK by the OWNER or OWNERS Representative prior to installation.

1.06 QUALITY ASSURANCE

- A. General Warranty: The special warranty specified in this article shall not deprive the OWNER of other rights the OWNER may have under other provisions of the CONTRACT DOCUMENTS
- B. Special Warranty: Submit a written warranty executed by INSTALLER agreeing to repair or replace components of StaLok Paving Material, or approved equal, that fail in materials or workmanship within the specified warranty period. Failures include, but are not limited to, the following:
 - 1. Premature wear and tear, provided the material is maintained in accordance with the manufacturer's written maintenance instructions.
 - 2. Failure of system to meet performance requirements.
- C. Warranty Period: CONTRACTOR shall provide warranty for the performance of the product. CONTRACTOR shall warranty installation of product for the time of one year from completion and acceptance of the WORK by the OWNER or OWNERS representative.
- D. CONTRACTOR shall provide, for a period of sixty days, unconditional maintenance and repairs as required by the OWNER or OWNER's representative after acceptance of the WORK by the OWNER or OWNERS Representative, provided the material is not damaged through the negligence of the OWNER and OWNER's Representatives.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. StaLok Paving Material is provided by the following manufacturer:
 - 1. Stabilizer Solutions, Inc. 33 South 28th Street, Phoenix, AZ 85304; Phone: (602) 225-5900, 1(800) 336-2468; Fax: (602) 225-5902; Website: www.stabilizersolutions.com; Email: info@stabilizersolutions.com.
- B. Alternative manufactures shall be approved by OWNER or OWNERS Representative.

2.02 STALOK AGGREGATE

A. **Aggregates:** Crushed stone shall consist of inert materials that are hard, durable, with stone free from surface coatings and deleterious materials.

B. **Gradations:**

U.S. Standard Sieve Size	Percentage Passing by Weight
½ inch	98-100
¾ inch	90-100
No. 4	65-80
No. 8	48-63
No. 16	40-49
No. 30	30-40
No. 50	20-27
No. 100	10-18
No. 200	10-12

C. R-value minimum of 70 determined by ASTM D 2488 Methodology (R-value is a measure of wear resistance).

D. Sand equivalent: - an engineering measurement of the proportion of sand to silt and clay, will stay at a range of 30-55, as determined by ASTM d 2419 methodology.

2.03 AGGREGATE BASE COURSE

A. Dense graded crushed stone base shall be furnished and installed as required and specified under Section 31 23 00, Earthwork and Trenching and Section 32 11 23 Aggregate Base Course to a minimum 6” compacted depth.

2.04 HERBICIDE

A. Herbicide shall be Casoron 4G granular weed and grass killer or approved equal.

PART 3 EXECUTION

3.01 GENERAL

A. **Equipment:**

1. Equipment shall be capable of performing the WORK as described in this SPECIFICATION. Equipment that is inadequate to obtain the results specified shall be replaced or supplemented as required to meet the requirements of this SPECIFICATION. Any equipment that is used in an improper manner may be cause for rejection of the WORK if in the opinion

of ENGINEER the WORK fails to meet the requirements of this SPECIFICATION.

2. Equipment used for compaction shall be the rolling type, vibratory type, or combination of both types, and shall be of sufficient capacity to meet the compaction requirements herein.

3.02 LAYOUT OF WORK

- A. The Contractor shall stake or otherwise delineate the proposed alignment of the path according to the drawings. Obtain approval of the OWNER prior to proceeding with excavation and subgrade preparation.
- B. Cut/fill bench for the stabilized crusher fines as shown on the drawings.
- C. Cut existing grade to a minimum of nine (9) inches deep or as shown on the drawings within limits of paving. Wet and roll subgrade to obtain a firm, uniform, compacted subgrade. Keep cut sides vertical and true to line horizontally with a uniform width.

3.03 WEED CONTROL

A. Herbicide/Chemical Applications

1. Apply Casoron 4G granular weed and grass killer or approved equal to prepared subgrade per manufacturer's recommendations. Contractor shall contact stabilized crusher fines manufacturer prior to placing herbicide to ensure compatibility of proposed herbicide with the StaLok or approved equal stabilized crusher fines material.
2. Apply Casoron 4G granular weed and grass killer at a rate of 250 - 300 pounds per acre. Apply approved equal at manufacturers recommended rate.
3. Herbicides or other chemicals shall be applied using well-maintained equipment by individuals working for CONTRACTOR who are properly licensed by any State and/or Federal Agency having jurisdiction over such applications. It shall be the responsibility of the CONTRACTOR to be knowledgeable of any and all current laws and regulations pertaining to herbicide and other chemical applications, and to notify OWNER or OWNERS Representative immediately if any request for herbicide or chemical applications by OWNER or OWNERS Representative is inappropriate as they pertain to these laws and regulations.
4. Herbicides or other chemicals shall not be applied during periods when wind or other physical conditions cause the herbicides or chemicals to be transported a distance of more than five (5) feet from the immediate area where they are being placed. It shall be the responsibility of the CONTRACTOR to stop WORK immediately and notify the OWNER or OWNERS Representative if any weather or other physical condition exists, which would make the application of herbicides or other chemicals inappropriate.

5. All herbicides or other chemicals used shall be applied at a rate and strength, and by the method recommended by the manufacturer of the product being used.
6. CONTRACTOR shall submit to ENGINEER the manufacturers, Material Safety Data Sheets (MSDS), Name, Trade Name, trademark, and conformance to state law of all herbicides or other chemicals.

3.04 SUB-GRADE PREPARATION

- A. Base shall be a minimum of 6" thick compacted Class 6 Base Course as Specified in Section 32 11 23, installed at 95% standard compaction on top of subgrade.
- B. Make any corrections necessary to base furnished and installed under Section 31 23 00, Earthwork and Trenching and Section 32 11 23 Aggregate Base Course to bring Class 6 Aggregate Base Course to the sections and elevations shown on the DRAWINGS.
- C. Pre-soak Class 6 Aggregate Base Course with water prior to installing StaLok Paving Material or approved equal as need to compact Class 6 aggregate base course.
- D. Make Sure Proper Drainage is available to ensure no standing water on the surface or adjacent to StaLok Paving Material or approved equal, including downspouts, when placed under roof overhang.

3.05 BLENDING

- A. StaLok Paving Material is a solely owned patented process.
- B. Blending Procedures for StaLok Paving Material are performed only by a licensed StaLok Paving Material blender and can only be sold through Licensed StaLok Paving Material dealers. It is a pre-blended bulk material.
- C. Approved equal material shall be obtained from manufacturer pre-blended or blended on site per manufacturer's recommendations.

3.06 PLACEMENT AND COMPACTION

- A. Consult manufacturer if installing on a slope.
- B. Do not install pavement material during rain or snow. Do not install pavement on sub-grade that has standing water.
- C. Do not place StaLok Pavement Material or approved equal at temperatures below 30° F unless directed by OWNER or Owners representative with approval from manufacturer
- D. StaLok Paver Material may form clods at temperatures less than 60° F. Break up clods with machinery. Clods will break apart on their own if left in sun to warm.
- E. Place StaLok Paving Material at a minimum 2", maximum 3" compacted depth. Using a Paver Box, Paver, Crawler Paver, Asphalt Paver, Drag Box Paver, Pavement

Profiler, Slip Form Paver, Pav-Saver Place Spreader or approved equal, Compact StaLok Paving Material.

1. Compaction can be achieved by a 5-ton double drum roller
2. Compact material making 8 – 10 passes
3. Use plate compactor on edges and hard to get areas.
4. Loose material shall not be present on final surface.

F. Approved equal pavement material shall be placed and compacted per the manufacturers recommendations.

3.07 WATERING

A. Water the area with a light spray following compaction. CONTRACTOR shall take care not to disturb the aggregate surface with the spray action.

3.08 INSPECTION

- A. Finished surface shall be uniform and solid, with no evidence of chipping or cracking.
- B. Compacted paving material shall be firm to the full depth of pavement with no soft areas.
- C. Loose material shall not be present on the surface
- D. No ruts shall be visible on the surface of the pavement.
- E. Approved equal material shall be inspected by ENGINEER per the manufactures specifications.
- F. Pavement sections that do not meet this specification, manufactures application methods, instructions, installation guidance, or specifications shall be repaired or replaced at the CONTRACTOR's expense.

3.09 MAINTENANCE

- A. Remove debris, such as paper, grass clippings, leaves, dirt or other deleterious material by mechanically blowing or hand raking the surfaces needed.
- B. Plowing programs required during winter months shall involve the use of a rubber baffle on the plow blade or wheels on the plow that maintain a 1/4" gap between the blade and the paving surface.

3.10 REPAIRS

- A. Excavate damaged area to depth of StaLok Paving Material, or approved equal, and square off sidewalls.
- B. If area is dry, moisten damaged portion lightly and scarify.

C. Apply pre-blended StaLok Pavement Material, or approved equal, to excavated area to finished grade.

D. Compact with an 8" to 10" hand tamp or 1000 lb. roller.

END OF SECTION





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SECTION 32 16 00

SIDEWALKS, CURBS, AND GUTTER

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete WORK shall consist of air entrained Portland cement constructed on a prepared subgrade in accordance with these SPECIFICATIONS. The completed WORK shall conform to the thicknesses and typical cross-sections shown on the DRAWINGS. The completed WORK shall conform to the lines and grades shown on the DRAWINGS or to those established by ENGINEER at the job site.

1.02 RELATED SECTIONS

- A. The following is a list of SPECIFICATIONS which may be related to this section:
 - 1. Section 31 23 00, Excavation and Fill.
 - 2. Section 31 23 19, Dewatering.
 - 3. Section 31 23 33, Trenching and Backfilling.

1.03 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
 - 1. American Association of State Highway and Transportation Officials (AASHTO):
 - a. M6, Standard Specification for Fine Aggregate for Hydraulics Cement Concrete.
 - b. M80, Standard Specification for Coarse Aggregate for Hydraulics Cement Concrete.
 - c. M148, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - d. M154, Standard Specification for Air-Entraining Admixtures for Concrete.
 - e. M171, Standard Specification for Sheet Materials for Curing Concrete.
 - f. M182, Standard Specification for Burlap Cloth Made from Jute or Kenaf and Cotton Mats.
 - g. M194M/M194, Standard Specification for Chemical Admixtures for Concrete.
 - h. T22, Standard Method of Test for Compressive Strength of Cylindrical Concrete Specimens.

- i. T23, Standard Method of Test for Making and Curing Concrete Test Specimens in the Field.
- j. T26, Standard Method of Test for Quality of Water to Be Used in Concrete.
- k. T27, Sieve Analysis of Fine and Coarse Aggregates
- l. T96, Standard Method of Test for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
- m. T11, Standard Method of Test for Clay Lumps and Friable Particles in Aggregate.
- n. T119M/T119, Standard Method of Test for Slump of Hydraulic Cement Concrete.
- o. T121M/T121, Standard Method of Test for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.
- p. T141, Standard Method of Test for Sampling Freshly Mixed Concrete.
- q. T152, Standard Method of Test for Air Content of Freshly Mixed Concrete by the Pressure Method.
- r. T176, Standard Method of Test for Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test.
- s. T199, Standard Method of Test for Air Content of Freshly Mixed Concrete by the Chace Indicator.
- 2. ASTM International (ASTM):
 - a. C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
 - b. C920, Standard Specification for Elastomeric Joint Sealants.
- 3. Colorado Department of Transportation (CDOT):
 - a. Section 703.01, Fine Aggregate for Concrete.
 - b. CP30, Sampling of Aggregates.
 - c. CP31A, Sieve Analysis of Fine and Coarse Aggregates.
 - d. CP60, Determining Surface Moisture in Fine and Coarse Aggregates.

1.04 SUBMITTALS

- A. CONTRACTOR shall cooperate with ENGINEER in obtaining and providing samples of all specified materials.
- B. CONTRACTOR shall submit certified laboratory test certificates for all items required in this section.

- C. Contractor shall submit mix design for concrete in writing to ENGINEER for approval prior to placement of concrete.
- D. CONTRACTOR shall submit batch tickets for each load of concrete. Tickets shall show weight of all materials and additives used in each batch.

PART 2 PRODUCTS

2.01 MATERIALS

A. Concrete Conformance:

- 1. Concrete shall conform to the following requirements:

Concrete Requirements	
28-Day Field Compressive Strength	3,500 psi
Cement/Fly Ash	600 lbs./cu. yd.
Max. Water/Cement Ratio	0.53
Air Content % Range	5-8
Maximum Slump	4"
Fine Aggregate (max. % of total Aggregate)	50%

- 2. This material shall consist of a mixture of coarse and fine aggregates, Portland cement, water and other materials or admixtures as required. The type of cement shall be Type I, II, or I/II unless sulfate conditions dictate otherwise. If sulfate conditions exist, Type V cement shall be used.

B. Concrete Aggregates: The grading and composition requirements for coarse and fine aggregates for concrete shall conform to the following tables.

Coarse Aggregates for Portland Cement Concrete	
Sieve Size or Test Procedure	% Passing or Test Requirement
1 inch	100
¾ inch	90-100
⅝ inch	20-55
No. 4	0-10
No. 8	0-5
% Wear	45, Max
Clay Lumps * Friable Particles, %	2.0, Max
Coal & Lignites, %	0.5, Max
Sodium Sulfate Soundness %	12, Max

Fine Aggregates for Portland Cement Concrete	
Sieve Size or Test Procedure	% Passing or Test Requirement
3/8 inch	100
No. 4	95 - 100
No. 16	45 - 80
No. 50	10 - 30
No. 100	2 - 10
No. 200	3, Max
Friable Particles, %	1.0, Max
Coal & Lignite, %	1.0, Max
Deleterious Material (AASHTO T112),%	3, Max
Sand Equivalent (AASHTO T176),%	80, Min
Fineness Modules	2.50 - 3.50
Sodium Sulfate Soundness, %	20.0, Max

- C. Coarse Aggregate for Concrete: Coarse aggregates shall conform to the requirements of AASHTO M80, except that the percentage of wear shall not exceed forty-five (45) when tested in accordance with AASHTO T96. Coarse aggregate shall conform to the grading in above table.
- D. Fine Aggregate for Concrete: Fine aggregates shall meet Colorado Department of Transportation, Section 703.01 requirements and gradation as shown above. Fine aggregate for concrete shall conform to the requirements of AASHTO M6. The amount of deleterious substances removable by elutriation shall not exceed three percent (3%) by dry weight of fine aggregate when tested in accordance with AASHTO T11, unless otherwise specified. The minimum Sand Equivalent, as tested in accordance with AASHTO T176 shall be eighty (80), unless otherwise specified. The Fineness Modules shall not be less than two and five-tenths (2.50) nor greater than three and five-tenths (3.50), unless otherwise approved.
- E. Fly Ash and Water: Upon approval based on a satisfactory trial mix, CONTRACTOR shall have the option of substituting approved fly ash for Portland cement, up to a maximum of twenty percent (20%) by weight. The total weight of cement and fly ash shall not be less than the specified mix design.
1. Fly ash for concrete shall conform to the requirements of ASTM C618, Class C or Class F. All chemical requirements of ASTM C618 Table 1-A shall apply with the exception of footnote A.
 - a. Class C fly ash will not be permitted where sulfate resistant cement is required.
 - b. CONTRACTOR shall submit certified laboratory test results for the fly ash. Test results that do not meet the physical and chemical requirements may

result in the suspension of the use of fly ash until the corrections necessary have been taken to ensure that the material meets the SPECIFICATIONS.

2. Water used in mixing or curing shall be clean and free of oil, salt, acid, alkali, sugar, vegetable, or other substance injurious to the finished product. Water shall be tested in accordance with, and shall meet the suggested requirements of AASHTO T26. Water known to be of potable quality may be used without test. Where the source of water is relatively shallow, the intake shall be enclosed so as to exclude silt, mud, grass, or other foreign materials.

F. Concrete Curing Materials and Admixtures:

1. Curing Materials: Curing materials shall conform to the following requirements as specified:
 - a. Burlap Cloth made from Jute or Kenaf: AASHTO M182.
 - b. Liquid Membrane-Forming Compounds Curing Concrete: AASHTO M148.
 - c. Sheet Materials for Curing Concrete: AASHTO M171.
 - d. Straw shall not be used for curing unless approved by ENGINEER.
2. Air-Entraining Admixture: Air-entraining admixtures shall conform to the requirements of AASHTO M154. Admixtures which have been frozen will be rejected. No chloride containing additives shall be permitted.
3. Chemical Admixtures: Chemical admixtures for concrete shall conform to the requirements of AASHTO M194M/M194. Admixtures which have been frozen will be rejected.
4. Joint Fillers: The joint fillers shall meet the requirements of ASTM C920.

PART 3 EXECUTION

3.01 SUBGRADE PREPARATION

- A. The subgrade shall be excavated or filled to the required grades and lines. All soft, yielding, or otherwise unsuitable material shall be removed and replaced with suitable material with ENGINEER's approval. Filled sections shall be compacted and compaction shall extend a minimum of six (6) inches outside the form lines.
- B. The moisture content of the subgrade shall be brought within +/- two percent (2%) of optimum moisture content and compacted to ninety-five percent (95%) of the maximum standard Proctor density (ASTM D698) for subgrade materials classified as A-4 through A-7 or ninety five percent (95%) of modified proctor density for materials classified as A-1 through A-3.

3.02 CONCRETE PLACEMENT

A. General:

1. Concrete transported in truck mixers or truck agitators shall be delivered to the site of the WORK and completely discharged within a period of ninety (90) minutes after the cement comes in contact with the mixing water or with the combined aggregates containing free moisture in excess of two percent (2%) by weight.
2. The concrete shall be placed either by an approved slip form/extrusion machine, by the formed method, or by a combination of these methods.
3. The subgrade shall be conditioned to provide a uniformly moist surface when concrete is placed.

B. Machine Placement: The slip form/extrusion machine shall be so designed to place, spread, consolidate, screed, and finish the concrete in one (1) complete pass in such a manner that a minimum of hand finishing will be necessary to provide a dense and homogenous concrete section. The machine shall shape, vibrate, and/or extrude the concrete for the full width and depth of the concrete section being placed. It shall be operated with as nearly a continuous forward movement as possible. All operations of mixing, delivery, and spreading concrete shall be so coordinated as to provide uniform progress, with stopping and starting of the machine held to a minimum.

C. Formed Method:

1. The vertical face of previously sawed and adjacent asphalt pavement may NOT be used as a forming surface. CONTRACTOR shall use forms on front and back of all curb and gutter, sidewalks and crosspans.
2. The forms shall be of metal or other suitable material that is straight and free from warp, having sufficient strength to resist the pressure of the concrete without displacement and sufficient tightness to prevent the leakage of mortar. Flexible or rigid forms of proper curvature may be used for curves having a radius of one hundred (100) feet or less. Division plates shall be metal. Where directed by ENGINEER, CONTRACTOR shall use a thin metal back form to preserve landscaping, sprinklers, etc. Form shall be straight and rigid and shall be approved by ENGINEER prior to use on PROJECT.
3. The front and back forms shall extend for the full depth of the concrete. All of the forms shall be braced and staked so that they remain in both horizontal and vertical alignment until their removal. No wooden stakes will be allowed. They shall be cleaned and coated with an approved form-release agent before concrete is placed against them. The concrete shall be deposited into the forms without segregation and then it shall be tamped and spaded or mechanically vibrated for thorough consolidation. Low roll or mountable curbs may be formed without the use of a face form by using a straight edge and template to form the curb face. When used, face forms shall be removed as soon as possible to permit finishing. Front and back forms shall be removed without damage to the concrete after it has set.

4. Should the removal of adjacent asphalt pavement be required beyond that shown in the asphalt patch detail to properly correct failed concrete sections, CONTRACTOR shall remove and replace said asphalt pavement to such an extent as to provide a smooth repair. ENGINEER shall be notified prior to commencing any additional asphalt removal.

3.03 FINISHING

- A. The plastic concrete shall be finished smooth by means of a wood float and then it shall be given final surface texture using a light broom or burlap drag. Concrete that is adjacent to forms and formed joints shall be edged with a suitable edging tool to the dimensions shown on the DRAWINGS.

3.04 JOINTING

A. Contraction Joints:

1. Contraction and construction joints shall be placed at the standard spacing of ten (10) feet in curb, gutter, sidewalks, crosspans, trickle channel, etc. A minimum spacing of five (5) feet shall be allowed for repairs.
2. Transverse weakened-plane contraction joints shall be constructed at right angles to the curb line at intervals not exceeding ten (10) feet for curb and gutter or five (5) feet for sidewalk. Joint depth shall average at least one-fourth (1/4) of the cross-section of the concrete.
3. Contraction joints may be sawed, hand-formed, or made by one-eighth inch (1/8") thick division plates in the formwork. Sawing shall be done early after the concrete has set to prevent the formation of uncontrolled cracking. The joints may be hand-formed either by (1) using a narrow or triangular jointing tool or a thin metal blade to impress a plane of weakness into the plastic concrete, or (2) inserting one-eighth inch (1/8") thick steel strips into the plastic concrete temporarily. Steel strips shall be withdrawn before final finishing of the concrete. Where division plates are used to make contraction joints, the plates shall be removed after the concrete has set and while the forms are still in place.

B. Expansion Joints:

1. Expansion joints shall be constructed at right angles to the curb line at immovable structures and at points of curvature for short radius curves. Filler material for expansion joints shall conform to requirements of the requirements of ASTM C920 and shall be furnished in a single one-half inch (1/2") thick piece for the full depth and width of the joint.
2. Expansion joints in a slip-formed curb or curb-and-gutter shall be constructed with an appropriate hand tool by raking or sawing through partially set concrete for the full depth and width of the section. The cut shall be only wide enough to permit a snug fit for the joint filler. After the filler is placed, open areas adjacent to the filler shall be filled with concrete and then troweled and edged. CONTRACTOR may choose to place the filler and pour the concrete around it.
3. Alternately, an expansion joint may be installed by removing a short section of freshly extruded curb-and-gutter immediately, installing temporary holding

forms, placing the expansion joint filler, and replacing and reconsolidating the concrete that was removed. Contaminated concrete shall be discarded.

4. Construction joints may be either butt or expansion-type joints. Curbs or combined curbs-and-gutters constructed adjacent to existing concrete shall have the same type of joints as in the existing concrete, with similar spacing; however, contraction joint spacing shall not exceed ten (10) feet.

3.05 PROTECTION

- A. CONTRACTOR shall always have materials available to protect the surface of the plastic concrete against rain. These materials shall consist of waterproof paper or plastic sheeting. For slip-form construction, materials such as wood planks or forms to protect the edges shall also be required. Concrete damaged by rain shall be required to be removed and replaced at CONTRACTOR's expense.
- B. Concrete being placed in cold weather during which the temperature may be expected to drop below thirty-five degrees Fahrenheit (35°F), shall be suitably protected to keep the concrete from freezing until it is at least ten (10) days old. Concrete injured by frost action shall be required to be removed and replaced at CONTRACTOR's expense.
- C. CONTRACTOR shall be responsible for correcting any vandalism or defacement (graffiti) that occurs on the concrete prior to final acceptance.

3.06 CURING

- A. Concrete shall be cured for at least seven (7) days after placement to protect against loss of moisture, rapid temperature change, and mechanical injury prior to any overlay or reconstruction work. Moist burlap, waterproof paper, white polyethylene sheeting, white liquid membrane compound, or a combination thereof may be used as the curing material. Membrane curing shall not be permitted in frost-affected areas when the concrete will be exposed to deicing chemicals within thirty (30) days after completion of the curing period.

3.07 BACKFILLING

- A. The spaces in front and back of curbs shall be refilled with suitable material to the required elevations after the concrete has set sufficiently. The fill material shall be thoroughly tamped in layers.

3.08 SEALING

- A. Where required, concrete shall be sealed with a mixture of one-half (1/2) linseed oil and one-half (1/2) diesel fuel, unless otherwise specified by ENGINEER.

3.09 TOLERANCE

- A. Forms shall not deviate from true line by more than one-quarter (1/4) inch at any point.

- B. Mixed concrete shall be not less than fifty degrees Fahrenheit (50°F), nor more than eighty degrees Fahrenheit (80°F) at the time of placement in forms, unless otherwise directed.
- C. If air temperature is thirty-five degrees Fahrenheit (35°F) or less at the time of placing, ENGINEER shall require water and/or aggregate heated to not less than seventy degrees Fahrenheit (70°F), or more than one-hundred fifty degrees Fahrenheit (150°F).
- D. Finished joints shall not deviate more than one-quarter (1/4) inch in the horizontal alignment from a straight line.
- E. Any localized humps and or depressions greater than one-quarter (1/4) inch shall require removal and replacement of the WORK in question at CONTRACTORS expense
- F. No ponding of water greater than three-eighths (3/8) inch shall be allowed.
- G. Combination curb, gutter and walk and/or vertical curb and gutter flowline depth shall not vary from adopted standards by more than +/- one-half (1/2) inch, measured vertically from the top of curb to the gutter invert.
- H. Pedestrian walks shall have a minimum of two percent (2.0%) and a maximum of two and one half percent (2.5%) slope toward the roadway.
- I. Heave or settlement of sidewalk, relative to separate curb pour, greater than one-half (1/2) inch shall be cause for corrective action. This provision shall not apply to transverse sidewalk joints.

3.10 QUALITY CONTROL

- A. Testing: Concrete testing and testing laboratory services required shall conform to the following unless otherwise determined by ENGINEER.

Section Type of Test	Project Acceptance Frequency	Point of Sampling Acceptance	Procedures	
			Test Sampling	Project Testing
Sidewalks (Concrete Aggregate Gradation)	1/1000 square yards or fraction thereof for each size aggregate of concrete placed	Stockpile, Belt or Bin	CDOT CP30	CDOT CP31A
Curbing (Concrete Aggregate Gradation)	1/2000 lineal feet or fraction thereof for each size aggregate of concrete placed		CDOT CP30	CDOT CP31A
Moisture Content (Fine Aggregate)	1 per day and as often as needed for quality control		CDOT CP30	CDOT CP60

Section Type of Test	Project Acceptance Frequency	Point of Sampling Acceptance	Procedures	
			Test Sampling	Project Testing
Moisture Content (Coarse Aggregate)	1 per day min. where moisture content is greater than +0.5% from SSD condition	Stockpile, Belt or Bin	CDOT CP30	CDOT CP60
Slump	1 set of tests for every 1000 square yards or fraction thereof of concrete placed per a day	The slump, air content, unit weight and compressive strength tests shall be carried out on the first truck of concrete for the daily placement and thereafter in conformance with this table by sampling from the mixer discharge or pumper truck discharge hose	AASHTO T141	AASHTO T119M/ T119
Air Content	1 set of tests for every 1000 square yards or fraction thereof of concrete placed per a day		AASHTO T141 T199	AASHTO T152
Yield and Cement	4 tests for every 2000 lineal feet or fraction thereof of concrete placed per a day		AASHTO T141	AASHTO T121M/ T121
Compressive (Sidewalks)	1 set (4) of cylinders per 1000 square yards or fraction thereof of concrete placed per day		AASHTO T141 T23	AASHTO T22
Compressive (Curbing)	1 set (4) of cylinders per 2000 lineal feet or fraction thereof of concrete placed per day		AASHTO T141 T23	AASHTO T22

B. Repair:

1. Prior to backfilling and after forms are removed, honeycombed, defective or damaged areas of concrete shall be repaired. Repairs shall be made within seven (7) days after the forms are removed.
2. At the time of final acceptance inspection, the repair of all cracks shall be completed.
 - a. Cracks that are less than one-quarter (1/4) inch wide, exhibit no horizontal or vertical shifting, and do not meet the conditions in 2, 3, and 4, below may, at the discretion of the OWNER, be sealed by routing approximately three-quarter (3/4) inch to one (1) inch deep by one-quarter (1/4) inch wide and filling with Sikaflex 1-A or equivalent.
 - b. Any crack that extends through a joint shall require removal and replacement of the entire cracked area.
 - c. Any longitudinal cracked section of concrete shall require complete removal and replacement of that section between joints.

- d. Repair action for hairline cracks as determined in 1, above, may be waived at the discretion of OWNER. For the purpose of this section, a hairline crack is one that is reasonably immeasurable and without separation as determined by ENGINEER.

3.11 CLEAN-UP

- A. The surface of the concrete shall be thoroughly cleaned upon completion of the WORK and prior to the substantial completion walk through, and the site left in a neat and orderly condition.

END OF SECTION





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SECTION 32 31 00**FENCES****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. This section shall consist of furnishing and installing new fence and/or removing and salvaging existing fence and restoring the same in conformance with the lines and grades and requirements shown on the DRAWINGS. Wherever the materials to be removed are not in good condition, as judged by the ENGINEER, or wherever CONTRACTOR has damaged the materials during the process of removal, equal or better quality fencing materials than the existing shall be furnished and installed by CONTRACTOR.

1.02 REFERENCES

- A. The following is a list of standards which may be referenced in this section:

1. American Association of State Highway and Transportation Officials (AASHTO):
 - a. M111M/M111, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - b. M133, Standard Specification for Preservatives and Pressure Treatment Processes for Timber.
 - c. M181, Standard Specification for Chain-Link Fence.
 - d. M232M/M232, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - e. M281, Standard Specification for Steel Fence Posts and Assemblies, Hot-Wrought.
2. ASTM International (ASTM):
 - a. A116, Standard Specification for Metallic-Coated, Steel-Woven Wire Fence Fabric.
 - b. A121, Standard Specification for Metallic-Coated Carbon Steel Barbed Wire.
 - c. A392, Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric.
 - d. A491, Standard Specification for Aluminum-Coated Steel Chain-Link Fence Fabric.
 - e. B211, Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod, and Wire.

- f. F537, Standard Specification for Design, Fabrication, and Installation of Fences Constructed of Wood and Related Materials.
3. Federal Specification (FED): FCGS-02-1, Fencing, Wire and Post, Metal (Chain-link Fence Posts, Top Rails and Braces).

PART 2 PRODUCTS

2.01 MATERIALS

- A. Timber: All timber materials for new fencing shall be No. 1 grade cedar.
- B. Barbed Wire: Steel barbed wire shall conform to the requirements of ASTM A121 Class I. Aluminum barbed wire shall be manufactured in accordance with ASTM B211 with alloy 5052-O for the line wire and alloy 5052-H38 for the barbs.
- C. Woven Wire: Woven wire shall conform to the details and requirements shown on the DRAWINGS and to the following:
 1. Zinc-coated steel woven wire shall conform to the requirements of ASTM A116, coating Class I.
 2. Aluminum-coated steel woven wire shall conform to the requirements of ASTM A116, coating Class I.
 3. Fittings and attachments shall be zinc coated to conform to the requirements of AASHTO M232M/M232.
- D. Chain Link Fabric: Chain link fabric and required fittings and hardware shall conform to the requirements of AASHTO M181 for the kind of metal, sizes of wire and mesh specified. Zinc coating for steel fabric shall conform to ASTM A392, Class I and aluminum coating for steel fabric to ASTM A491, Class I.
- E. Snow Fence: Wire-bound picket fence shall conform to the requirements of ASTM F537. Posts shall conform to the requirements of AASHTO M281.
- F. Construction Fence: Construction fence shall be bright orange woven plastic mesh, four feet (4') minimum in height.
- G. Fence Posts:
 1. Wood posts shall conform to the details and dimensions indicated on the DRAWINGS. Wood posts shall be straight, sound, and seasoned with ends sawed off square or as indicated. All knots shall be trimmed flush with the surface. Wood posts shall be peeled and treated with preservative in accordance with AASHTO M133. When native cedar posts are called for on the DRAWINGS, the requirements for peeling and for treating may be omitted.
 2. All dimension timber and lumber required for fences or gates shall be sound, straight, and free from knots, splits, and shakes. It shall be of the species and grades indicated on the DRAWINGS.

3. Concrete posts shall be made of concrete of the class specified, and shall contain steel reinforcement as shown on the DRAWINGS.
 4. Steel posts shall be galvanized in accordance with AASHTO M111M/M111. Fittings, hardware, and other appurtenances not specifically covered by the DRAWINGS and SPECIFICATIONS shall be standard commercial grade, and in accordance with current standard practice. Pipe material for fence posts shall conform to the requirements shown on the DRAWINGS and to the requirements of Class 1 Pipe, Grade A or Grade B, of FED FCGS-02-01.
 5. Construction fence posts shall be studded steel tee posts.
- H. Nails: All nails used for construction shall be galvanized.

PART 3 EXECUTION

3.01 REMOVAL OF EXISTING FENCE

- A. All rails, braces, posts, and the like shall be removed and disposed of or salvaged by CONTRACTOR to allow construction of the PROJECT as described on the DRAWINGS.

3.02 CONSTRUCTION OR REPLACEMENT OF FENCE

- A. General:
1. CONTRACTOR shall perform such clearing and grubbing as may be necessary to construct or replace the fence to the required grade and alignment as shown on the DRAWINGS.
 2. At locations where breaks in a run of fencing are required, appropriate adjustments in fence alignment and/or post spacing shall be made to satisfy requirements or conditions encountered.
- B. Posts and Rails: Posts shall be securely embedded into the ground to meet the proper alignment and elevations. Posts shall be embedded in concrete as shown on the DRAWINGS. Posts and rails shall be held in proper positions by secure bracing until such time as the concrete has set sufficiently to hold the posts. Materials shall not be installed on posts, or stress placed on bracing until the concrete has set sufficiently to withstand the stress. The complete fence shall be plumb and in straight alignment as shown on the DRAWINGS or as directed by ENGINEER.
- C. Construction Fence: Construction fence posts shall be installed at ten (10) feet on center and the plastic mesh shall be attached to each post at top, bottom, and center using plastic ties. A twelve and one-half (12-1/2) gage wire strand shall be installed along the top and bottom of the fence for added stability. The plastic mesh shall be attached to the top and bottom strand wires in three (3) equally spaced locations between each post using plastic ties. Construction fence shall be installed along the limits of disturbance. Construction fence shall remain in place and be repaired as necessary throughout construction.

END OF SECTION



SECTION 32 34 00

PEDESTRIAN AND LIGHT VEHICLE BRIDGES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This section contains requirements for a fully engineered clear span bridge and shall be the minimum standards for design and construction. Clear span length and width of the bridge shall be as shown on the DRAWINGS.

1.02 RELATED SECTIONS

- A. The following is a list of SPECIFICATIONS which may be related to this section:
 - 1. Section 31 23 00, Excavation and Fill.
 - 2. Section 31 23 19, Dewatering.
 - 3. Section 31 23 33, Trenching and Backfilling.

1.03 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
 - 1. American Institute of Steel Construction (AISC).
 - 2. ASTM International (ASTM):
 - a. A36/A36M, Standard Specification for Carbon Structural Steel.
 - b. A242, Standard Specification for High-Strength Low-Alloy Structural Steel.
 - c. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
 - d. A325, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
 - e. A490, Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength.
 - f. A588/A588M, Standard Specification for High-Strength Low-Alloy Structural Steel, up to 50 ksi (345 MPa) Minimum Yield Point, with Atmospheric Corrosion Resistance.
 - g. A606, Standard Specification for Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance.

3. American Wood Preservers' Association (AWPA): P5, Standard for Waterborne Preservatives.
4. American Welding Society (AWS): D1.1/D1.1M, Structural Welding Code – Steel.
5. The Society for Protective Coatings (SSPC): SP6, Commercial Blast Cleaning.
6. Uniform Building Code (UBC).
7. West Coast Lumber Inspection Bureau (WCLIB).

1.04 SUBMITTALS

- A. Submit complete SHOP DRAWINGS to ENGINEER for review.
- B. Submit manufacturer's certification of compliance with referenced standards.

1.05 QUALITY ASSURANCE

- A. Bridge design shall be signed and sealed by a Registered Colorado Professional Engineer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Coordinate delivery requirements with manufacturer.
- B. Comply with manufacturer's requirements for unloading, lifting, and placement.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Materials, equipment, and accessories specified in this section shall be products of:
 1. Continental Bridges; 1-800-328-2047.
 2. Big 'R' Manufacturing; 1-800-234-0734.
 3. Excel Bridges; 1-800-548-0054.
 4. Bridge America; 1-320-763-5600.
 5. Steadfast Bridges; 1-800-749-7515.

2.02 DESIGN REQUIREMENTS

- A. General:
 1. Bridge shall meet the referenced standards as called for in the following paragraphs.
 2. All allowable design stresses shall be in compliance with the SPECIFICATIONS of the design, fabrication, and erection of structural steel for

buildings by the American Institute of Steel Construction (AISC) and Uniform Building Code (UBC).

3. Minimum height of fifty four (54) inches (top of truss top chord), or as shown on the DRAWINGS.
4. Maximum horizontal opening in railing of nine inches or as shown on the DRAWINGS.
5. Unless otherwise shown on the DRAWINGS, the minimum loading shall be as follows:
 - a. Uniform live load of sixty pounds per square foot (60 psf).
 - b. Concentrated live load of ten thousand (10,000) pounds vehicle weight on bridge plus thirty percent (30%) impact.
 - c. Minimum wind load of twenty-five (25) pounds per square foot (psf).
 - d. Horizontal pressure as if enclosed surface.
 - e. Railing load of fifty pounds per linear foot (50 lbs/lf) of horizontal load.
6. Mounting plates shall allow for thermal expansion.

B. Dimensions and Requirements:

1. Length: As shown on DRAWINGS.
2. Width: Clear unobstructed inside width as shown on DRAWINGS.
3. Railings: Install for full length of bridge.
4. Camber: Five percent (5%) of one-half (1/2) of span (if required) or as shown on the DRAWINGS.
5. Abutments: Bridge to accommodate abutment elevations noted on the DRAWINGS.
6. Decking: All decking shall be secured to the bridge members along the centerline of the bridge with a minimum of two (2) screws per board or as shown on the DRAWINGS.
7. Rub Rails: Nominal two-inch by six-inch (2" x 6") wood rub rails on inside of bridge shall be placed thirty two (32) inches above the top of the bridge deck or as shown on the DRAWINGS.

C. Materials:

1. Metal Fabrication:
 - a. Material thickness and design of member shall be fully engineered for the length and style of each bridge requirement specified.

- b. Bridge shall be fabricated from high strength low-alloy atmospheric corrosion-resistance ASTM A606 Type 4 steel, self-weathering, (U.S.S. Cor Ten) ASTM A242, or ASTM A588/A588M structural steel shapes and tubing (FY = fifty thousand pounds per square inch [50,000 psi]).
 - c. Bolts and nuts shall be in accordance with SPECIFICATIONS for structural joints using ASTM A325 or ASTM A490 bolts. Anchor bolts shall be ASTM A307 or ASTM A36/A36M.
 - d. E8018 Series electrodes or equivalent shall be used for welding.
2. Wood Decking: All standard bridges shall have nominal three-inch by twelve-inch (3" x 12") planks of west coast region Douglas Fir or No. 1 Southern Yellow Pine, selected structural planks graded according to WCLIB standard grading or equal. Decking shall be treated to AWPA P5 or equal. Preservatives utilized shall be Chromated Copper Arsenate (CCA) or Ammoniacal Copper Arsenate (ACA) or equal.
3. Concrete Decking: As shown on the DRAWINGS.

2.03 FABRICATION

- A. Workmanship, fabrication, and shop connections shall be in accordance with AWS and AISC specifications.
- B. All welding shall be done by welders certified for AWS D1.1/D1.1M structural welding requirements.
- C. Welding electrodes for self-weathering, corrosion-resistant steel shall have the same weathering characteristics as E5018 or equivalent.
- D. All boldly exposed members shall have mill scale removed according to SSPC SP6.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install bridge and decking per manufacturer's recommendations. Wood decking shall be "rattle proof" and installed to the greatest extent possible to prevent warping. Confirm that concrete abutments have obtained sufficient strength before placement of steel structure.

END OF SECTION

SECTION 32 80 00

IRRIGATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. CONTRACTOR shall furnish all labor, materials, supplies, equipment, tools and transportation, and perform all operations in connection with and reasonably incidental to the complete installation of the irrigation system, the guarantee/warranty, the installation details, and as specified herein. This shall include repair to existing landscape irrigation systems for all areas disturbed by construction. Complete coverage of all turf areas and irrigation of all planting areas shall be performed using equipment similar to that existing onsite. Items of WORK specifically included are:
1. Procuring all applicable licenses, permits, and fees.
 2. Inspecting WORK site prior to construction and ascertaining utility locations.
 3. Installing irrigation system, including pumps, filters, sleeving, and other appurtenances.
 4. Connecting electrical power supply to the irrigation control system.
 5. Maintaining system until final acceptance.

1.02 GENERAL

- A. CONTRACTOR shall make an inspection of the PROJECT site where the WORK is to be performed and become aware of the ground structure and obstacles which may be encountered and all other relevant matters in connection with the WORK prior to the submitting a BID(s).
- B. CONTRACTOR is expected to base the BID on equipment and materials consistent with the existing irrigation system and in the event there are materials and/or equipment in the BID which do not conform with these specified by OWNER, CONTRACTOR shall be responsible for furnishing such materials and/or equipment which meet such qualifications at no change in the BID price.
- C. Substitutions are not encouraged and as a general rule will not be allowed. Substitutions will only be considered following BID award.
- D. Precautions have been taken to ensure accuracy and conformance of the CONTRACT DOCUMENTS with the design concept of the PROJECT. Nevertheless, CONTRACTOR shall be responsible for confirming and correlating actual job site dimensions, for acquiring information that pertains solely to the fabrication process or to techniques of construction, and for coordinating the WORK with all other trades.

- E. Beginning WORK of this section implies acceptance of existing conditions. There shall be no extra compensation by reason of any matter or thing concerning conditions about which CONTRACTOR may be informed prior to bidding.

1.03 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
 1. International Association of Plumbing and Mechanical Officials (IAPMO).
 2. National Electrical Code (NEC).
 3. Underwriters Laboratories, Inc. (UL).
 4. Uniform Plumbing Code (UPC).

1.04 SUBMITTALS

- A. Materials List: Include pipe, fittings, mainline components, water emission components, and control system components. Quantities of materials need not be included.
- B. Manufacturer's Data: Submit manufacturer's catalog cuts, specifications, and operating instructions for equipment shown on the materials list.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. CONTRACTOR shall exercise care in handling, loading, and unloading the pipe and fittings. Pipe shall be stored in accordance with the manufacturer's recommendations regarding skids, blocking, etc. to prevent damage to the pipe.

1.06 GUARANTEE AND REPLACEMENT

- A. The purpose of this guarantee/warranty is to ensure that OWNER receives irrigation materials of prime quality, installed and maintained in a thorough and careful manner.
 1. For a period of one (1) year from the date of final completion and commencement of the formal maintenance period, guarantee/warranty irrigation materials, equipment and workmanship against defects. Fill and repair depressions. Restore landscape or structural features damaged by the settlement of irrigation trenches or excavations. Repair damage to the premises caused by a defective item. Make repairs within three (3) days of notification from ENGINEER.
 2. CONTRACT DOCUMENTS govern replacements the same as new WORK. Make replacements at no cost in CONTRACT price.
 3. Guarantee/warranty applies to originally installed materials and equipment and replacements made during the guarantee/warranty period.

PART 2 PRODUCTS

2.01 GENERAL

- A. Unless otherwise stipulated in the SPECIFICATIONS, all equipment, materials and articles incorporated in this PROJECT are to be new and in the best grade of their respective kinds for the purpose.
- B. When the CONTRACT DOCUMENTS call for materials or construction of a better quality or larger size than required by the above-mentioned rules and regulations, CONTRACTOR shall provide the quality and size required by the CONTRACT DOCUMENTS.
- C. Work and materials shall be in accordance with the latest edition of the National Electrical Code, Uniform Plumbing Code as published by the Western Plumbing Officials Association, and applicable laws and regulations of the governing authorities.

2.02 PIPE AND TUBE

- A. Mainline: PVC Class 200 SDR-21 (match existing).
- B. Lateral Lines: PVC CC160 SDR-26 (match existing).

2.03 MAINLINE COMPONENTS

- A. Point-of-Connection (P.O.C.) Assembly: As shown in the installation details or matches existing.
- B. Isolation Gate Valve Assembly: As shown in the installation details.
- C. Quick Coupling Valve Assembly: As shown in the installation details.

2.04 SPRINKLER IRRIGATION COMPONENTS

- A. Automatic Remote Control Valves Assembly for Sprinkler Laterals: As shown in the installation details. Match existing heads.
- B. Sprinkler Assembly: As shown in the DRAWINGS and installation details.

2.05 PIPE SLEEVE

- A. Pipe Sleeve: PVC Schedule 40.

2.06 THRUST BLOCK

- A. Concrete for thrust blocks shall meet the following:
 - 1. PSI: Minimum of three thousand five hundred (3,500).
 - 2. Water/cement Ratio: Not greater than fifty-three hundredths (0.53).
 - 3. Air Content: Range between four and eight percent (4-8%).

4. Slump: Maximum of four (4) inches.

2.07 CONTROL SYSTEM COMPONENTS

A. Irrigation Controller Unit:

1. As presented in the DRAWINGS and installation details.
2. Wire markers are to be pre-numbered or labeled with indelible non-fading ink, made of permanent, non-fading material.
3. Primary surge protection arrestors as per manufacturer's recommendations.

B. Control Wire:

1. Type: Electric wire from the controller unit, to each remote control valve shall be American Wire Gauge (AWG) No. 14 solid copper, Type UF cable, UL approved for direct underground burial. Common wire shall be AWG No. 12 solid copper, Type UF cable, UL approved for underground burial.
2. Color: Wire color shall be continuous over its entire length. Use white for common ground wire. Use easily distinguished colors for other control wires. Spare control wires shall be of a color different from that of the active control wire.
3. Splices: As presented in installation details.

2.08 ACCESSORIES

- A. CONTRACTOR shall provide to OWNER operating keys, servicing tools, test equipment, other items and spare parts indicated in the General Notes on the DRAWINGS.

PART 3 EXECUTION

3.01 GENERAL

- A. Appoint a competent resident superintendent to be onsite whenever the WORK is in progress. The superintendent shall not be replaced without notice to ENGINEER.
- B. CONTRACTOR is responsible for locating and avoiding underground utilities, for notifying all appropriate agencies prior to beginning excavation, and for any damage caused by CONTRACTOR. CONTRACTOR is required to notify ENGINEER and the utility company should there be any damage to utilities.
- C. ENGINEER and OWNER shall at all times have access to the WORK wherever it is in preparation or progress and CONTRACTOR shall provide proper facilities for such access and inspection.
- D. ENGINEER shall have the right to reject materials and workmanship or require their correction. Any rejected or faulty WORK shall be repaired or replaced at no cost to OWNER.

E. Record Drawings:

1. CONTRACTOR shall keep an up-to-date set of DRAWINGS on the job site detailing changes made during construction.
2. After completion of the PROJECT, CONTRACTOR shall furnish OWNER with an “as-built” drawing. The “as-built” drawing shall show the correct location of all piping, valves, heads and control line locations. Instruction sheets and parts lists covering all operating equipment shall be bound in a folder and furnished to OWNER.

3.02 PREPARATION

- A. CONTRACTOR shall protect all existing site development including, but not limited to, existing buildings, equipment, underground utilities, walls, materials, etc. Any existing site development damaged by willful or negligent acts of CONTRACTOR or any of CONTRACTOR’s employees shall be replaced or repaired at no expense to OWNER and in a manner satisfactory to ENGINEER before PROJECT acceptance is given. This provision applies to onsite damage as well as to that which may occur to adjacent properties.
- B. Until the PROJECT has been accepted, CONTRACTOR shall erect and maintain shoring, barricades, guards, warning signs, and lights as necessary or required for the protection of the public, the WORK, and the workers. To the same ends, provide WORK area safety and institute side security measures, as needed.
- C. CONTRACTOR shall stake out the irrigation system. Items staked include sprinklers, pipe, control valves, manual drains, pumping plant, controller, and isolation valves. After staking out the system, OWNER shall be contacted for approval before trenching.

3.03 EXCAVATION AND BACKFILL

- A. General: All excavation shall be done by open cut except where boring is permitted or required. All trenches shall be straight with bottoms on uniform slopes. The trench shall be graded along its entire length to ensure firm bedding of the pipe.
- B. Excavation: CONTRACTOR shall do all necessary excavation for the proper installation of the WORK. Over-excavation shall be backfilled and hand-tamped prior to installation of the pipe. Any pumping, bracing or shoring shall be included in the unit cost for excavation. CONTRACTOR shall excavate to permit the pipes to be laid at the intended elevations and to permit workspace for installing connections and fittings.
- C. Minimum Cover (Distance from Top of Pipe or Control Wire to Finish Grade):
 1. 36-inch minimum over mainline pipe.
 2. 18-inch over lateral pipe.
 3. 12-inch over lateral pipe to pop-up sprinklers.
 4. 12-inch over lateral pipe to rotary sprinklers.

- D. Backfill: The material excavated from the trenching may be used for backfill when meeting the following standards. The material placed directly on top of the pipe to a depth of six (6) inches shall be free of all foreign matter and rock. After this, rock two (2) inches in diameter or less will be allowed in the backfill material. All rock or foreign matter not incorporated in the backfill material shall be hauled off the site at CONTRACTOR's expense. In the event clean backfill material from the excavation is insufficient, CONTRACTOR shall import clean fill material as needed.
- E. Compaction. All trenches shall be compacted within the pipe area by hand-tamping or by water puddling. If water is used to compact the ditch, it shall be applied after the backfill has been brought to the top of the pipe. After the initial backfill has been properly placed and tamped around the pipe, the remaining backfill material may be placed and compacted by machine. All trenches shall be compacted to the density of the surrounding material. Special attention shall be given to traffic areas to protect the pipe and to avoid future settlement because of poor compaction. Any settlement occurring within the guarantee period shall be repaired at no additional cost to OWNER.

3.04 PIPE INSTALLATION

A. General:

1. Keep pipe free from dirt and pipe scale. Cut pipe ends square and debur. Clean pipe ends.
2. Keep ends of assembled pipe capped. Remove caps only when necessary to continue assembly.

B. Mainline Pipe and Fittings:

1. Threaded Plastic Pipe: Use only strap-type friction wrenches for threaded plastic pipe.
2. PVC Rubber-Gasketed Pipe: Use pipe lubricant. Join pipe in the manner recommended by manufacturer and in accordance with accepted industry practices.
3. PVC Solvent Weld Pipe:
 - a. Use primer and solvent cement. Join pipe in a manner recommended by the manufacturer and in accordance with accepted industry practices.
 - b. Cure for thirty (30) minutes before handling and twenty four (24) hours before allowing water in pipe.
 - c. Snake pipe from side to side within the trench.

C. Lateral Pipe and Fittings:

1. Threaded Plastic Pipe: Use only strap-type friction wrenches for threaded plastic pipe.

2. PVC Solvent Weld Pipe:

- a. Use primer and solvent cement. Join pipe in the manner recommended by manufacturer and in accordance with accepted industry practices.
- b. Cure for thirty (30) minutes before handling and twenty four (24) hours before allowing water in pipe.
- c. Snake pipe from side to side within the trench.

- D. Permissible Deflection at Joints: Whenever it becomes necessary to deflect the pipe from a straight line in either a horizontal or vertical plane, the degree of deflection shall be within the limits set forth by the manufacturer and shall be approved by OWNER.
- E. Deviations for Utility Structures: Whenever existing utility structures, conduits, ducts, pipes or other obstructions to grade and alignment of the pipe are encountered, they shall be permanently supported, protected, removed, relocated or reconstructed by CONTRACTOR through the cooperation of the utility company involved.
- F. Deviations for Existing Tree Roots: Avoid cutting tree roots larger than one (1) inch in diameter.
- G. Thrust Blocking: All pipe, fittings, and valves shall be carefully placed in the trenches with concrete thrust blocks to be poured at all fittings that result in a change of flow direction in the main line on pipe larger than three (3) inches. Any concrete that is judged to be of inferior quality shall be replaced at OWNER's request. The thrust blocks shall be left exposed for forty eight (48) hours for inspection.
- H. Sleeves: All pipe under pavement shall be in sleeves PVC Schedule 40 and shall be sized two (2) times the diameter of pipe being sleeved.

3.05 SPRINKLER INSTALLATION

- A. General. All sprinklers shall be installed by CONTRACTOR at the locations indicated on the DRAWINGS. It shall be the responsibility of CONTRACTOR to notify OWNER or OWNER's representative of any deviation which may affect the spacing or location of the sprinkler heads. Unless written permission is given, CONTRACTOR shall not extend the head spacing beyond one hundred percent (100%) head-to-head coverage.
- B. Sprinkler Heads. All sprinkler heads shall be installed in strict accordance with the manufacturer's recommendations. Provide a swing pipe assembly for each sprinkler head. Prior to the installation of the nozzles, all piping shall be thoroughly flushed. Sprinklers shall be installed at grade.

3.06 CONTROL EQUIPMENT

- A. General: All manual and/or automatic control valves, automatic controllers, pressure reducing valves, check valves, vacuum breakers, and other control equipment shall be installed at the locations shown on the DRAWINGS or as specified by OWNER. In addition to these SPECIFICATIONS, CONTRACTOR shall follow the local code

requirements. In the event that a discrepancy exists between these SPECIFICATIONS and the local codes, the adopted code shall prevail.

B. Automatic Valves. Use brand model and size noted on DRAWINGS. Automatic control valves shall be installed in accordance with the manufacturer's recommendations. Install as indicated on the DRAWINGS and installation details.

1. Flush mainline before installation of remote control valve assembly (RCV).
2. Install where indicated on the DRAWINGS. Wire connectors and waterproof sealant shall be used to connect control wires to remote control valve wires. Install connectors and sealant per the manufacturer's recommendations.
3. Adjust RCV to regulate the downstream operating pressure.

C. Irrigation Controller Unit:

1. The location of the controller units shall be as shown on the DRAWINGS.
2. Install one valve output surge protection arrestor on each control wire and one for the common wire.
3. Attach wire markers to the ends of control wires inside the controller unit housing. Label wires with the identification number (see DRAWINGS) of the remote control valve to which the control wire is connected.
4. Connect control wires to the corresponding controller terminal.

D. Control Wire:

1. Bundle control wire where two (2) or more are in the same trench. Bundle with pipe wrapping tape spaced at ten-foot (10') intervals.
2. Control wiring may be pulled into the soil utilizing a vibratory plow device specifically manufactured for pipe pulling. Minimum burial depth equals minimum cover as shown on the DRAWINGS.
3. Provide a twenty-four inch (24") excess length of wire in an eight-inch (8") diameter loop at each ninety degree (90°) change of direction, at both ends of sleeves, and at one-hundred foot (100') intervals along continuous runs of wiring. Do not tie wiring loop. Coil the twenty-four inch (24") length of wire within each remote control valve box.
4. Install common ground wire and one control wire for each remote control valve. Multiple valves on a single control wire are not permitted. Install control wires along the entire length of the mainline. Provide a twenty-four inch (24") length of wire from each end of the spare control wires coiled in the control enclosure and provide a twenty-four inch (24") length of coiled wire for each spare control wire in a six-inch (6") round valve box at each distal end of the mainline pipe.
5. If a control wire must be spliced, make splice with wire connectors and waterproof sealant, installed per the manufacturer's instructions. Locate splice in a valve box

which contains an irrigation valve assembly, or in a separate six-inch (6") round valve box.

6. Unless noted on DRAWINGS, install wire parallel with and under PVC mainline pipe.
7. Protect wire not installed with PVC mainline pipe with a continuous run of warning tape placed in the backfill six (6) inches above the wiring.

3.07 FIELD QUALITY CONTROL

- A. Major Inspections: CONTRACTOR shall obtain approval of ENGINEER at these points in construction before proceeding to next operation.
 1. Trenching and Mainline Installation, Including Thrust Blocks: ENGINEER shall review thrust blocking and observe a pressure test of the mainline before any backfilling.
 2. Head Layout: ENGINEER shall review irrigation head layout before installation of the heads.
 3. Final Punch List: ENGINEER shall prepare a punch list at the completion of construction and observe coverage, controller, and pump operation and other appropriate system functions.
- B. Periodic Spot Checks:
 1. ENGINEER may make periodic spot checks to observe the WORK in progress.
 2. Follow-up visits will occur as needed.
 3. Check for proper operation/coverage of sprinkler system.
- C. System Adjustment: Adjustment of the sprinkler heads, control systems, and performance tests shall be done by CONTRACTOR to provide OWNER with a professional, complete installation. All performance tests shall be made in the presence of OWNER or OWNER's representatives. CONTRACTOR shall pay particular attention to coverage and system operation. Any areas which do not conform to designed operation requirements because of unauthorized changes or poor installation practices shall be immediately corrected by CONTRACTOR at no additional cost to OWNER.
- D. Acceptance:
 1. Once the system is operating in conformance with these SPECIFICATIONS, OWNER will issue written final acceptance of the system.
 2. In unusual cases, OWNER may elect to accept the system even though the corrections on the final punch list have not been made by CONTRACTOR. In such cases, the cost of completing the WORK will be deducted from CONTRACTOR's final payment in accordance with the BID SCHEDULE.

3. If the system is not in acceptable condition by the end of the watering season, CONTRACTOR is responsible for winterizing the system and restarting it the following spring.
4. OWNER is not required to make partial or staged acceptances of the irrigation system.

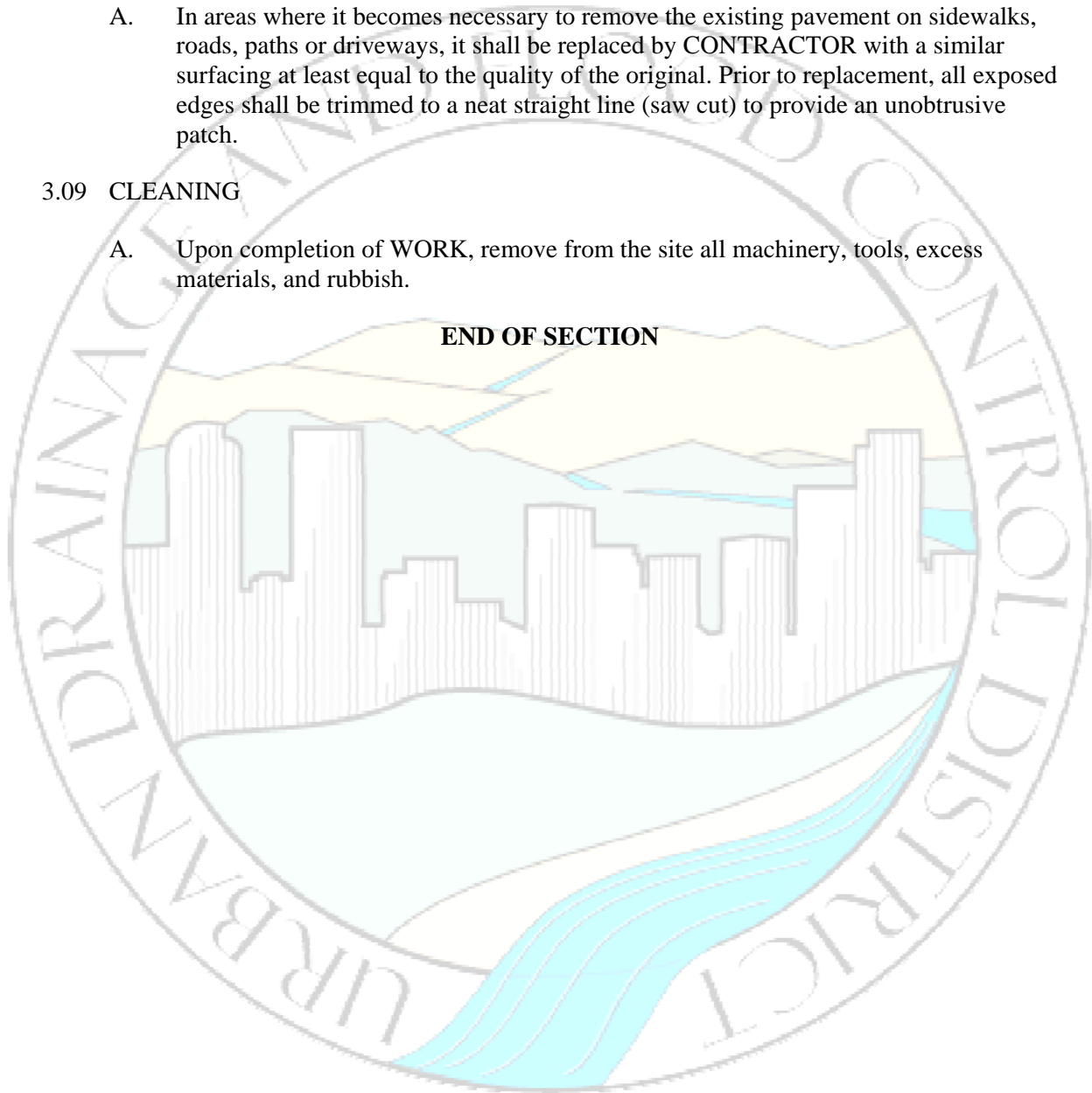
3.08 RESURFACING

- A. In areas where it becomes necessary to remove the existing pavement on sidewalks, roads, paths or driveways, it shall be replaced by CONTRACTOR with a similar surfacing at least equal to the quality of the original. Prior to replacement, all exposed edges shall be trimmed to a neat straight line (saw cut) to provide an unobtrusive patch.

3.09 CLEANING

- A. Upon completion of WORK, remove from the site all machinery, tools, excess materials, and rubbish.

END OF SECTION



SECTION 32 91 13

TOPSOIL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This work consists of placing of topsoil or wetland topsoil upon constructed cut and fill slopes or in designated areas after grading operations are complete.

1.02 RELATED SECTIONS

- A. The following is a list of SPECIFICATIONS which may be related to this section:
 1. Section 02 41 13 Selective Site Demolition
 2. Section 31 11 00 Clearing and Grubbing
 3. Section 31 41 13 Topsoil Stripping and Stockpiling
 4. Section 31 23 00 Excavation and Fill
 5. Section 31 25 00 Erosion and Sedimentation Controls
 6. Section 32 93 00 Landscape Planting
 7. Section 32 92 19 Seeding

1.03 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
 - a. ASTM International (ASTM):
 - b. D2974, Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils.
 - c. D5268, Standard Specification for Topsoil Used for Landscaping Purposes.

1.04 SUBMITTALS

- A. Informational Submittals:
 1. Certified Topsoil Analysis Reports:
 - a. Indicate quantities of materials required to bring onsite
 - b. Provide certification of topsoil compliance with gradation requirements.
 - c. Provide certification of topsoil compliance with Chemical attribute requirements.

- d. Provide certification of topsoil compliance with minimum ammonium bicarbonate DPTA (chelate) extractable nutrient requirements.

1.05 SEQUENCING AND SCHEDULING

A. TOPSOIL

- 1. Topsoil shall be placed directly upon completed cut and fill slopes whenever conditions and the progress of construction will permit.

B. WETLANDS TOPSOIL

- 1. CONTRACTOR shall prepare the wetland relocation site to elevations specified in the DRAWINGS or as approved by ENGINEER prior to excavating the wetlands topsoil. If ENGINEER determines that this is not possible, then CONTRACTOR shall stockpile wetlands topsoil material in an approved area, to remain undisturbed until the relocation site has been prepared.
- 2. Wetland topsoil shall be placed within twenty four (24) hours in the wetland relocation site.

PART 2 PRODUCTS

2.01 MATERIALS

A. TOPSOIL

- 1. Topsoil shall consist of natural, friable, sandy loam, native upland topsoil with characteristics as defined in Section 2.01 sub-section 3. Topsoil shall be obtained from pre-approved on-site collection areas or pre-approved imported materials from off site.
- 2. Topsoil shall have the following characteristics; resulting from a current agronomic and full textural class analysis of a topsoil sample collected from the actual soil proposed to be used. The results of the tests shall be submitted to the ENGINEER and must include sample date and reference the collection location.
- 3. Composition shall be in general accordance with ASTM D5268 subject to the following:
 - a. Gradation

Texture Class	% of Total Weight	Average %
Sand (0.05-2.0 mm dia. range)	25 - 75	50
Silt (0.002-0.05mm dia. range)	15 - 40	27.5
Clay (< 0.002 mm dia. range)	15 - 30	22.5

b. Chemical Attributes

Chemical Attribute	Range
pH	6.8 - 7.5
Organic Matter	1% - 3%
Salinity	EC<2 mmhos/cm

c. Topsoil shall contain the following minimum ammonium bicarbonate DPTA (chelate) extractable nutrients.

Nutrient	Concentration
Nitrogen	5 ppm air dried basis
Phosphorous	5 ppm
Potassium	30 ppm
Iron (Fe)	5 ppm

B. WETLANDS TOPSOIL

1. Wetlands topsoil shall meet the requirements of Section 2.01 A above.
2. Topsoil collected from wetlands sites shall be used only in wetlands areas.
3. Wetlands Topsoil salvaged from the site shall not be used as topsoil outside of areas designated on the DRAWINGS.

- C. Source: Stockpile material onsite, in accordance with Section 31 14 13 Topsoil Stripping and Stockpiling. Import topsoil if onsite material is insufficient in quantity, or quality.

2.02 SOURCE QUALITY CONTROL

- A. Topsoil Analysis/Testing: Performed by county or state soil testing service or approved certified independent testing laboratory.

PART 3 EXECUTION

3.01 TOPSOIL PLACEMENT

- A. Do not place topsoil when subsoil or topsoil is frozen, excessively wet, or otherwise detrimental to the WORK.
- B. Topsoil shall be placed directly upon completed cut and fill slopes whenever conditions and progress of construction permit.
- C. Approved topsoil shall be placed at locations and to the thickness as designated in the CONTRACT DOCUMENTS. Prior to final placement of topsoil, any areas compacted by construction activities shall be decompacted to at least 85 Proctor by repeated ripping in rows twelve inches (12”) or less, apart, to a depth of twelve inches (12”). All subsoil areas, including any graded areas or cut slopes should be

roughened with furrows four to six inches (4"-6") deep to key the topsoil into the subsoil.

- D. Water shall be applied to the topsoil in a fine spray by nozzles or spray bars so the topsoil areas will not be washed or eroded.
- E. Uniformly distribute topsoil to within 1/2 inch of final grades. Fine grade topsoil eliminating rough or low areas and maintaining levels, profiles, and contours of subgrade.
- F. Material shall be free from objects larger than 1-1/2 inches maximum dimension including hard clods of heavy clay, shale, decomposed shale or other subsoil, noxious weed parts (roots, seeds, or shoots), grass, refuse, stumps, roots, brush, other foreign matter, hazardous or toxic substances, and deleterious material that may be harmful to plant growth or may hinder grading, planting, or maintenance.
- G. Placed topsoil shall be stabilized immediately by:
 - 1. Preparing and seeding with the approved seed mixture and mulch,
 - 2. Installing perimeter silt fence and/or straw wattles,
 - 3. Roughening and application of 2500 pounds per acre hydromulch with 150 pounds per acre approved tackifier and later seeding and mulching, per the plans.

3.02 WETLANDS TOPSOIL PLACEMENT

- A. All subsoil areas, including any graded areas or cut slopes should be roughened with furrows four to six inches (4"-6") deep to key the topsoil into the subsoil.
- B. Wetlands topsoil salvaged from the site shall be placed in locations specified on the DRAWINGS to a depth of eighteen inches (18") or as otherwise designated.
- C. Wetland topsoil in an unworkable condition due to excessive moisture, frost or other conditions shall not be placed until it is suitable for spreading.
- D. Water shall be applied to the topsoil in a fine spray by nozzles or spray bars so the topsoil areas will not be washed or eroded.
- E. After the wetland topsoil is spread all large stiff clods, rocks, roots and other foreign matter shall be cleared and disposed of by the CONTRACTOR.

END OF SECTION

SECTION 32 92 19

SEEDING

PART 1 GENERAL

1.01 DESCRIPTION

- A. The WORK under this section consists of the revegetation with seeded grasses. CONTRACTOR shall furnish all labor, materials, equipment, tools, and transportation required to complete the WORK, and shall perform all operations in connection with and reasonably incidental to establishing, maintaining, and warranting the reseeded areas.
- B. All WORK shall be completed in accordance with these SPECIFICATIONS, the DRAWINGS and CONTRACT DOCUMENTS, and in a manner consistent with accepted horticultural practices. All permits, licenses, and fees associated with any WORK under this CONTRACT are the responsibility of CONTRACTOR, unless otherwise noted.

1.02 RELATED SECTIONS

- A. The following is a list of SPECIFICATIONS which may be related to this section:
 - 1. Section 31 41 13 Topsoil Stripping and Stockpiling
 - 2. Section 31 23 00 Excavation and Fill
 - 3. Section 31 25 00 Erosion and Sedimentation Controls
 - 4. Section 32 93 00 Landscape Planting

1.03 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
 - 1. Association of Official Seed Analysts (AOSA).

1.04 SUBMITTALS

- A. CONTRACTOR shall be required to submit statements of guarantee and/or certifications from vendors who supply seed, mulches, tackifiers, and fertilizers.
- B. CONTRACTOR shall furnish to ENGINEER a signed statement certifying that the seed furnished is from a lot that has been tested by a recognized laboratory for seed testing within six (6) months prior to the date of delivery.
- C. Seed container labels shall be submitted to ENGINEER at the completion of PROJECT.
- D. CONTRACTOR shall submit to ENGINEER the manufacturers guaranteed chemical analysis, name, trade name, trademark, and conformance to state law of all fertilizers and herbicides.

- E. Submit compost sample for approval.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. All materials shall be furnished in original manufacturers shipping bags or containers and remain in these bags or containers until they are used. All materials shall be stored in a manner that will prevent them from coming into contact with precipitation, surface water, or any other contaminating substance.
- B. Fertilizer: It shall be delivered in original, unopened containers, unless provisions are made and approved by ENGINEER for bulk deliveries to the site of the WORK.
- C. Herbicide: It shall be delivered in original, unopened containers, unless provisions are made and approved by ENGINEER for bulk deliveries to the site of the WORK. All herbicides will be stored in a manner that satisfies local, State and Federal Guidelines for Herbicide Storage.

PART 2 PRODUCTS

2.01 GENERAL

- A. All materials used shall be new and without flaws or defects of any type, and shall be the best of their class and kind. Seeds shall be prepared for sale during the year of installation.
- B. All materials and equipment furnished shall be free of noxious weeds including, but not limited to Russian knapweed, diffuse knapweed, Canada thistle, field bindweed, Johnsongrass, leafy spurge, kochia, or any state-listed noxious weed species.
- C. Any materials that have become wet, moldy, or otherwise damaged in transit or in storage shall not be used.

2.02 SEED

- A. Seed shall be only that which is specified by ENGINEER or PLANT ECOLOGIST (refer to DRAWINGS). All seed shall be mixed by a wholesale seed supplier in order to obtain the specified mixture and application rate required by ENGINEER or PLANT ECOLOGIST. No species substitutions shall be permitted without prior approval of the ENGINEER or PLANT ECOLOGIST.
- B. All seed shall conform to all current State and Federal regulations and shall be subject to the testing provisions of the Association of Official Seed Analysts.
- C. All seed and seed mixes shall be furnished in bags or containers clearly labeled to show the name and address of the supplier, the common, scientific, and variety name(s) of the seed(s), the lot number, point of origin, net weight, percent of weed content, and the guaranteed percentage of purity and germination.
- D. All seed shall be guaranteed for purity and germination, free of noxious weed seed and supplied on a Pure Live Seed (PLS) basis.

2.03 FERTILIZER

- A. Fertilizer shall be as shown on the DRAWINGS. All fertilizer shall be a standard commercial product of uniform composition, free flowing and conforming to applicable State and Federal laws.
- B. No cyanamide compounds shall be permitted in fertilizers.

2.04 MULCH

- A. The type of mulching material to be used shall be crimped weed-free straw. At least seventy percent (70%) of the mulch by weight shall be ten (10) inches or more in length. Mulch shall not contain any noxious weed, must, mold, cake, or decay. No hay may be used on the PROJECT unless approved in advance by the PLANT ECOLOGIST.

2.05 ORGANIC TACKIFIER/BINDER

- A. Organic tackifier/binder shall be applied as shown on the DRAWINGS.

2.06 EROSION CONTROL NETTING, BLANKETS, MATS, FABRICS

- A. Erosion control blankets, mats, or other commercial products for stabilizing land disturbed areas may be required in certain areas. If so, the type, manufacturer, and installation method for these products shall be specified by ENGINEER or PLANT ECOLOGIST.

2.07 WATER

- A. All water used on the PROJECT shall be free of any substances harmful to plant germination and growth or to the environment in general. CONTRACTOR shall be responsible for furnishing and applying water that meets these requirements. ENGINEER or PLANT ECOLOGIST may, at CONTRACTOR's expense, submit samples of water used on the PROJECT for laboratory analysis (of a reasonable number and kind) to ensure the quality of the water. Onsite water shall not be used unless approved by OWNER or OWNERS REPRESENTATIVE.

2.08 TOPSOIL

- A. Topsoil shall meet the requirements of Section 32 91 13

2.09 ORGANIC COMPOST (SOIL AMENDMENT)

- A. For use as a component for seed establishment use a well decomposed, stable, weed free organic matter source, derived from agricultural food, or industrial residuals' biosolids (treated sewage sludge); yard trimmings, or source-separated or mixed solid waste. The product shall contain no substances toxic to plants and shall be reasonably free (less than one percent [$<1\%$] by dry weight) of man-made foreign matter. Compost shall be processed at sustained high heat so that any weed seeds contained within it shall no longer be viable and it shall possess no objectionable odors and shall not resemble the raw material from which it was derived.
- B. Compost shall have the following characteristics:

1. pH Range: 5.5 - 8.0.
2. Moisture Content: 35% - 55%.
3. Particle Size: Pass through 1-inch screen or smaller.
4. Stability: Stable to highly stable, providing nutrients for plant growth.
5. Maturity/Growth Screening: Demonstrate ability to enhance plant growth.
6. Soluble Salt Concentrations: 2.5 dS (mmhos/cm) or less preferred.
7. Organic Matter Content: 30% - 70%.
8. Suggested Source: A-1 Organic, Eaton, Colorado (970) 454-3492 or an approved equal.

PART 3 EXECUTION

3.01 GENERAL

- A. Contractor's Site Responsibilities: It shall be the responsibility of CONTRACTOR to locate and protect all utilities, structures, roadways, parking areas, fences, survey markers, and existing vegetation (such as, trees and shrubs) on all WORK sites. Any damage caused by CONTRACTOR or SUBCONTRACTORS shall be immediately repaired or corrected by CONTRACTOR at no expense to OWNER.
- B. Timing of the Work: Seeding shall be completed as soon as practical after the completion of final grading. CONTRACTOR shall coordinate the actual start of the seeding operation with ENGINEER or PLANT ECOLOGIST. Seeding shall occur between September 15 and April 15, unless otherwise permitted by the ENGINEER or PLANT ECOLOGIST
- C. Notice to Proceed: CONTRACTOR shall inform ENGINEER when they are ready to commence permanent revegetation. Upon agreement with CONTRACTOR's preparation for this WORK ENGINEER shall provide CONTRACTOR with a Notice to Proceed. CONTRACTOR shall begin and complete the WORK as specified in this section.
- D. Performance of the WORK: All WORK is to be performed by personnel thoroughly familiar with proper and accepted methods for soil preparation, herbicide applications, fertilizing, seeding, and mulching. All WORK is to be performed under the direct supervision of CONTRACTOR's superintendent, who shall be thoroughly familiar with the provisions of this CONTRACT.
- E. Project Monitoring: CONTRACTOR shall notify ENGINEER prior to the commencement of any WORK under this section. ENGINEER shall monitor the progress of the WORK throughout the CONTRACT period, and shall assist in determining where soils samples, as required in Article Submittals, are to be collected. ENGINEER or PLANT ECOLOGIST shall also collect samples of the seed used on the PROJECT, and may collect samples of fertilizers, soil additives, water, or other materials as they deem necessary to ensure the PROJECT SPECIFICATIONS are met.

3.02 SOIL/SEEDBED PREPARATION, SOIL AMENDMENTS

- A. All ripping and tilling operations shall be done in a direction which follows the natural contour of the land on slopes of three to one (3:1) or less. Soils on slopes greater than three to one (3:1) shall be prepared for planting in a manner specified by ENGINEER. Any irregularities in the ground surface resulting from soil preparation operations shall be corrected and sloped to drain.
- B. Limit subgrade preparation to areas that shall be planted in the immediate future.
- C. Prior to spreading salvaged topsoil and seeding, thoroughly till or rip to a depth of twelve (12) inches all areas compacted by access, staging, or construction traffic. Till all remaining areas to a depth of six (6) inches. Channel bottom areas are to be ripped to a depth of at least twelve (12) inches on approximately two- (2-) to four- (4-) foot centers. The soils shall be worked until no clods greater than two (2) inches in diameter remain, unless directed otherwise by ENGINEER. Remove rocks and other objects three (3) inches or greater in any dimension.
- D. Spread topsoil to depth required to meet grades and elevations shown on DRAWINGS after light rolling and natural settlement.
- E. Either mix soils with soil amendments and fertilizers before spreading or apply soil amendments or fertilizers on surface of spread topsoil and till thoroughly into top four (4) inches before planting. Mix soil amendments at the rate that is indicated on the DRAWINGS. Delay mixing fertilizer if planting does not follow placing of planting soil within a few days.
- F. Organic Compost:
 - 1. Organic Compost Soil Amendment shall be applied at a rate of three (3) cubic yards per one-thousand (1,000) square feet or as shown on the DRAWINGS.
 - 2. Organic Compost shall only be applied if required and designated on the DRAWINGS.
- G. Prior to seeding, grade the areas to be seeded to a smooth, even surface with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades. Soils shall meet grades and elevations shown on DRAWINGS after light rolling and natural settlement. Limit fine grading to areas that can be planted in the immediate future.
- H. Moisten prepared areas to be seeded prior to planting when soils are dry. Water thoroughly and allow surface to dry before seeding. Do not create muddy conditions. Restore prepared areas if eroded or disturbed after fine grading and before planting.

3.03 SEEDING

- A. General: ENGINEER or PLANT ECOLOGIST shall be on site during seeding operations and will collect representative samples of the seed used on any PROJECT for testing/compliance purposes. CONTRACTOR shall notify ENGINEER or PLANT ECOLOGIST when seeding is to take place so these samples can be obtained (seed tags from all mixtures shall also be supplied to the ENGINEER or PLANT ECOLOGIST).

B. Drill Seeding:

1. All seed is to be drilled one-quarter (1/4) inch to one-half (1/2) inch into the soil at the specified pure live seed (PLS) per acre rate with a mechanical grass drill with depth bands and an agitator in the seed box. Rows shall be spaced not more than seven (7) inches apart. CONTRACTOR shall drill one-half (1/2) of the required PLS per acre in one compass direction, and then drill the remaining half of the required PLS per acre in a direction ninety degrees (90°) to the first half.
2. Following drill seeding of all areas, the forb patch seed mix and the grass/shrub patch seed mix should be broadcast in the areas specified on the DRAWINGS. All forb and grass/shrub patch areas shall be both drill seeded with the appropriate upland or riparian mix as specified on the DRAWINGS and then immediately broadcast with the appropriate forb or grass/shrub patch seed mix prior to mulch application

C. Broadcast Seeding:

1. Some portions of PROJECT areas may be inaccessible to a drill. In these areas, which shall be agreed upon by CONTRACTOR and ENGINEER or PLANT ECOLOGIST, seed shall be uniformly broadcast at twice the specified PLS per acre and covered with soil to a depth of one-quarter (1/4) inch to one-half (1/2) inch by hand raking or harrowing by some other means acceptable to ENGINEER or PLANT ECOLOGIST.
2. Broadcast seeding shall be accomplished using hand-operated "cyclone-type" seeders or rotary broadcast equipment attached to construction or revegetation machinery. All machinery shall be equipped with metering devices. Broadcasting by hand shall be acceptable on small, isolated sites. Prior to hand broadcast seeding, divide the seed required into two portions. Apply the first half of the seed and then follow up by applying the second portion to ensure complete coverage by seed. When broadcast seeding, passes shall be made over each site to be seeded in a manner to ensure an even distribution of seed. When using hopper type equipment, seed shall be frequently mixed within the hopper to discourage seed settling and uneven planting distribution of species.
3. Broadcast seeding shall take place immediately following the completion of final seedbed preparation techniques and upon inspection and approval of ENGINEER. Broadcast seeding should not be conducted when wind velocities would prohibit even seed distribution.

3.04 FERTILIZATION

- A. Any fertilizers specified by ENGINEER or PLANT ECOLOGIST shall be applied and mixed with the soil as specified in Article Soil/Seedbed Preparation, Soil Amendments. In some instances, as directed by ENGINEER or PLANT ECOLOGIST, fertilizers shall be spread evenly on the surface of the soil rather than tilled into the top four (4) inches. All fertilizers shall be applied using standard application equipment at rates indicated by required soils tests (Article Submittals), or in some cases as specified by ENGINEER or PLANT ECOLOGIST.

3.05 MULCHING

- A. Straw mulch shall be applied immediately after seeding has been completed with a mechanical spreader at a rate not less than one and one-half (1-1/2) tons per acre, and not more than two (2) tons per acre. Straw mulch shall then be anchored to the soil with a standard commercial crimper which shall crimp the fiber four (4) inches or more into the soil. Failure to apply designated mulch at the specified rate may result in the ENGINEER or PLANT ECOLOGIST requiring the CONTRACTOR to remobilize and complete the specified WORK at no additional cost to the OWNER.

3.06 HERBICIDE/CHEMICAL APPLICATIONS

- A. All noxious weed growth on the site shall be controlled by the CONTRACTOR during the construction period and until the final inspection by spot application of herbicides which have been pre-approved by the ENGINEER or PLANT ECOLOGIST. Spot application of herbicides means detailed application of only the targeted weed species by wand or wick with a backpack applicator. No herbicides shall be permitted for general application (broadcast) during a time when it would cause detrimental impact to germination or establishment of the seeded grasses.
- B. Herbicides or other chemicals, if required, shall be applied using well-maintained spraying equipment by individuals working for CONTRACTOR who are appropriately licensed by any State and/or Federal agency having jurisdiction over such applications. It shall be the responsibility of CONTRACTOR to be knowledgeable of any and all current laws and regulations pertaining to herbicide and other chemical applications, and to advise ENGINEER or PLANT ECOLOGIST immediately if any requests for these applications made by ENGINEER or PLANT ECOLOGIST are inappropriate as they pertain to these laws and regulations. Herbicide application shall be conducted by trained weed control personnel who also can recognize the targeted weed species.
- C. Herbicides and other chemicals shall not be applied during periods when wind or other physical conditions cause the herbicides or chemicals to be transported a distance of more than five (5) feet from the immediate area where they are being placed. It shall be the responsibility of CONTRACTOR to stop WORK immediately and to notify ENGINEER or PLANT ECOLOGIST if any weather or other physical condition exists which would make the application of herbicides or other chemicals inappropriate.
- D. All herbicides or other chemicals used (except solid fertilizers, Article Fertilizers) shall be applied at a rate and strength, and by the method recommended by the manufacturer of the product being used. Failure to properly apply herbicides (spot treatment) may result in the ENGINEER or PLANT ECOLOGIST requiring the CONTRACTOR to reseed the damaged area at no cost to the OWNER.

3.07 EROSION CONTROL NETTING, BLANKETS, MATS, FABRICS

- A. Slopes over three to 1 (3:1), concave areas on slopes, drainage swales, areas along the edges of hard surfaces (trails and roads), and any other areas which may rill, shall be mulched with jute netting or other erosion control fabric as specified in DRAWINGS. These fabrics shall be installed only after the installation area is graded smooth. All clods or rocks shall be removed from the area, so that the fabric will lie flat on the surface of the soil and not bridge over it. The edges of the fabric shall be secured by

two- (2-) foot wooden stakes installed two (2) feet on center along all edges and seams. Seams shall overlap one (1) foot and the body of the fabric shall be further secured to the soil surface on three- (3-) foot centers. The fabric shall not be stretched tight.

3.08 FIELD QUALITY CONTROL

A. Final Acceptance:

1. When WORK has been completed for the PROJECT, CONTRACTOR and ENGINEER shall inspect the site together and determine the total area of the WORK, and whether or not the WORK is complete and has been done in accordance with CONTRACT DOCUMENTS and SPECIFICATIONS. If mutual agreement cannot be reached on these issues, the determinations made by ENGINEER shall be final. Deficiencies in the WORK, if any, shall be noted and a checklist of these deficiencies given to CONTRACTOR by ENGINEER. CONTRACTOR shall immediately correct any deficiencies listed on the checklist at no cost to OWNER.
2. When all checklist items are completed to the satisfaction of ENGINEER, ENGINEER shall issue a Certificate of Final Acceptance. CONTRACTOR shall then submit these items for payment to OWNER based on the original project BID prices and any CHANGE ORDERS which have been agreed to and signed by both parties.

3.09 CLEANING

- #### A.
- All WORK sites shall be kept clean and free from all debris. At the conclusion of WORK at any site, CONTRACTOR shall remove and haul from the site all excess materials, debris, and equipment. Any damage (for example, damaged fencing, damaged road surfaces, excessive tire furrows, mud tracked onto pavement) resulting from CONTRACTOR's activities shall be repaired by CONTRACTOR to ENGINEER's satisfaction at no expense to OWNER.

END OF SECTION

SECTION 32 93 00

LANDSCAPE PLANTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. CONTRACTOR shall furnish all labor, materials, supplies, equipment, tools and transportation; perform all operations to complete installation of the plantings; and guarantee all plantings. The WORK shall include, but not be limited to the following:
1. Procurement of all applicable licenses, permits, and fees.
 2. Ascertainment of utility locations prior to construction.
 3. Site inspection.
 4. Planting of trees, shrubs, and wetland plants.
 5. Soil preparation and fine grading.
 6. Staking and guying of trees.
 7. Mulching of all trees.
 8. Cleanup, inspection, and approval.
 9. Guarantee of all plantings.

1.02 GENERAL

- A. No substitutions for specified materials shall be accepted in the base BID. Alternative BID proposals, which propose material substitutions, may be submitted for consideration by ENGINEER or PLANT ECOLOGIST. Alternative proposals shall be fully supported by necessary documentation showing compatibility/comparability with specified materials.
- B. Additional WORK shall be paid for at CONTRACT unit prices. If unit prices are not available, the WORK shall be paid for on a time and material basis or for an agreed to lump sum amount.
- C. Precautions have been taken to ensure accuracy and conformance of the CONTRACT DOCUMENTS with the design concept of the PROJECT. Nevertheless, CONTRACTOR shall be responsible for confirming and correlating actual job site dimensions, for acquiring information that pertains solely to the fabrication process or to techniques of construction, and for coordinating the WORK with all other trades.

1.03 RELATED SECTIONS

- A. The following is a list of SPECIFICATIONS which may be related to this section:

1. Section 31 41 13 Topsoil Stripping and Stockpiling
2. Section 31 23 00 Excavation and Fill
3. Section 31 25 00 Erosion and Sedimentation Controls
4. Section 32 93 00 Landscape Planting
5. Section 32 92 19 Seeding

1.04 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
 1. American Nursery and Landscape Association (ANLA): ANSI Z60.1, American Standard for Nursery Stock.

1.05 SUBMITTALS

- A. CONTRACTOR shall direct submittals and samples, if noted, to ENGINEER and receive approval in writing before WORK commences.
- B. Submit Topsoil certifications as required in Section 32 91 13 Topsoil
- C. Submit Weed free Certification and mulch sample for approval.
- D. Submit organic compost certification of characteristics for approval.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Digging, Wrapping, and Handling:
 1. Plants shall be dug and prepared for shipment in a manner that shall not cause damage to branches, shape, and future development after planting.
 2. Balled and burlapped plants shall be nursery grown stock adequately balled with firm, natural balls of soil in sizes and ratios conforming to the American Standard for Nursery Stock as cited below. Balls shall be firmly wrapped with non-treated burlap, secured with wire or jute. Broken or flattened or otherwise misshaped or otherwise damaged root balls will not be accepted.
- B. Plants are to be delivered to the site with tags bearing the botanic name as indicated by the plant list.
- C. Plant Protection: Plants shall be handled so that roots are adequately protected at all times from drying out and from other injury. Plant materials shall be securely tarped during transportation to prevent wind burn. Protect root balls and pots of plants which cannot be planted within twelve (12) hours of delivery with soil or other suitable materials. Where possible, store plants in the shade. Keep all plant roots moist before, during, and after planting. Plants shall be watered as soon as they arrive on the site and shall be kept moist until they are planted.

- D. Protect all materials used for construction from damage, deterioration, or loss of any kind while in storage and construction.

1.07 GUARANTEE AND REPLACEMENT

- A. Guarantee trees, shrubs, ground covers, and other plant materials to root and thrive free from defects from any cause until final acceptance of PROJECT.
- B. Replace plants when they are no longer in a satisfactory condition as determined by ENGINEER prior to final acceptance. This includes plants that die back and loose the form and size originally specified.
 - 1. Make replacements within seven (7) days of notification from ENGINEER.
 - 2. Replace trees in the spring planting season only, unless approved otherwise. Remove dead plants within two (2) days of notification.
- C. All replacements shall be of the same kind and size as originally specified and shall be installed as described in the CONTRACT DOCUMENTS. Repairs and replacements shall be made at no expense to OWNER.
- D. Guarantee shall apply to originally specified and installed plants and other landscape materials, and any replacements made during the construction period.

PART 2 PRODUCTS

2.01 GENERAL

- A. All materials used for construction shall be new and without flaws or defects of any type, and shall be the best of their class and kind.
- B. A complete list of plantings and necessary landscape material is provided on the DRAWINGS.

2.02 SOIL AMENDMENTS/FERTILIZERS/MULCHES/EDGING

- A. Topsoil:
 - 1. topsoil shall meet the requirements of Section 32 91 13 Topsoil.
 - 2. In-Situ: Soil in-place on the site, such as tree pit excavation, may be used provided it is free from roots, limbs, rocks, construction debris, and other foreign material.
- B. Improved Planting:
 - 1. Mix (Prepare Soil): Backfill planting pits and planters using an improved soil mix consisting of the following:
 - a. Eighty five percent (85%) onsite or imported topsoil.
 - b. Fifteen percent (15%) organic compost.

C. Fertilizer:

1. Trees and Shrubs: Osmocote Sierrablen, nine- (9-) month slow-release.
2. Turf Grasses: 18-46-0 at five pounds (5#) per thousand square feet (1,000 SF).
3. Native Grasses: Biosol at a rate of twenty pounds (20#) per thousand square feet (1000 SF).

D. Herbicide: Coordinate type of herbicide with ENGINEER.

E. Mulch: Three- (3-) inch depth shredded cedar mulch or equal cedar mulch; free from noxious weed seed and all foreign material harmful to plant life. Chips or other angular bark chips are not acceptable.

F. Edging: Steel edging, inter-locking fourteen (14) gauge by four- (4-) inch painted steel.

G. Organic Compost: Compost shall have the following characteristics:

1. pH Range: 5.5-8.0.
2. Moisture Content: 35% - 55%.
3. Particle Size: Pass through one- (1-) inch screen or smaller.
4. Stability: Stable to highly stable, providing nutrients for plant growth.
5. Maturity/Growth Screening: Demonstrate ability to enhance plant growth.
6. Soluble Salt Concentrations: 2.5 dS (mmhos/cm) or less preferred.
7. Organic Matter Content: 30% – 70%.
8. Suggested Source: A-1 Organic, Eaton, Colorado (970) 454-3492 or an approved equal.

2.03 WATER

- A. CONTRACTOR shall provide water for planting during the construction period.

2.04 TREES, SHRUBS, AND GROUND COVERS

- A. Quantities: Furnish plants in quantities required to complete the WORK as indicated on the DRAWINGS.
- B. Quality: Use plants which are symmetrical and typical of their species; healthy, well-branched, and well-proportioned in respect to height and width; free from disease, injury, insects, and weak roots; and, conforming to the requirements of the ANLA ANSI Z60.1. All plants are subject to inspection.

- C. Botanic and Common Names: Nomenclature is in conformance with standard horticultural practice in the area. Trees, shrubs, and herbaceous plant materials designated as native shall NOT be hybrid varieties.

2.05 MATERIALS FOR STAKING, GUYING, AND WRAPPING TREES

- A. Tree Stakes: Six- (6-) foot long metal T-Posts.
- B. Guying and Staking Wire: Galvanized steel twelve (12) gauge wire.
- C. Webbing: Two- (2-) inch nylon webbing or rubberized cloth.

2.06 GRASS SEED

- A. Refer to Section 32 92 19, Seeding.

PART 3 EXECUTION

3.01 GENERAL

- A. CONTRACTOR shall appoint a competent resident superintendent. The superintendent shall be on site whenever the WORK is in progress. The superintendent shall not be replaced without notice to ENGINEER. Workers shall be competent in performance of WORK they are assigned.
- B. Coordination: Coordinate WORK with other trades to ensure proper sequencing of construction.
- C. Planting Time and Completion:
 - 1. Plants shall be planted only when weather and soil conditions permit and in accordance with locally accepted practices, and as approved by ENGINEER or PLANT ECOLOGIST.
 - 2. Trees shall be planted in same growing season in which they were dug.

3.02 PREPARATION

- A. Preplanting Observation of Materials:
 - 1. ENGINEER or PLANT ECOLOGIST shall observe and approve plant material before planting. This observation may be either at the site, nursery, or holding area, at the option of ENGINEER OR PLANT ECOLOGIST. Materials planted prior to approval are subject to rejection. Observation of materials may be sequenced by major planting areas to accommodate efficient planting operations. Acceptance of plant material at the nursery or holding area does not preclude rejection at the site. All rejected materials shall be removed from the site, replaced, and reinspected before planting.
 - 2. All fertilizers, backfill, seed, mulches, and soil amendments shall be reviewed at the site by ENGINEER or PLANT ECOLOGIST before they are used in planting operations. ENGINEER shall check invoices to verify specified quantities have been delivered.

B. Site Inspection:

1. CONTRACTOR, Landscape Contractor, and ENGINEER shall inspect site prior to being accepted by ENGINEER as complete and acceptable for the Landscape Contractor to proceed.
2. Beginning WORK of this section implies acceptance of existing conditions.

C. Grades: Grades have been established under WORK of another section to within one (1) inch, plus or minus, of required finished grades. Verify that grades are within one (1) inch, plus or minus, of required finished grades. Notify ENGINEER prior to commencing soil preparation WORK if existing grades are not satisfactory, or assume responsibility for conditions as they exist.

D. Contaminated Soil: Do not perform any soil preparation work in areas where soil is contaminated with cement, plaster, paint or other construction debris. Bring such areas to the attention of ENGINEER and do not proceed until the contaminated soil is removed and replaced.

E. Dimensions: All scaled dimensions are approximate. Before proceeding with any WORK, carefully check and verify all dimensions and quantities and immediately inform ENGINEER of any discrepancy between the DRAWINGS and/or specifications and actual conditions.

F. Protection of Existing Features:

1. Protect all existing site development including, but not limited to, existing buildings, equipment, underground utilities, walls, materials, or vegetated areas including, but not limited to, trees, native grasslands, wetlands, or shrublands. Any existing site development damaged by willful or negligent acts of CONTRACTOR or any of CONTRACTOR's employees shall be replaced or repaired at no expense to OWNER and in a manner satisfactory to ENGINEER or PLANT ECOLOGIST before PROJECT acceptance is given.
2. The above provision applies to onsite damage as well as to that which may occur to adjacent properties.
3. Until the PROJECT has been accepted, erect and maintain shoring, barricades, guards, warning signs, and lights as necessary or required for the protection of the public, the WORK, and the workers. To the same ends, provide traffic control and institute site security measures, as needed.
4. CONTRACTOR shall be responsible for adhering to the following tree protection standards during construction:
 - a. During the construction stage, CONTRACTOR shall not cause, or permit the cleaning of equipment or material, or the storage or disposal or waste material including, but not limited to, paints, solvents, asphalt, concrete, mortar, or any other material harmful to the life of a tree, within the drip line or root zone of each tree, or group of trees.

- b. No damaging attachments, wires, signs, permits, or other objects may be fastened by any means to any tree preserved on this PROJECT.
5. Tree areas, shrublands, grasslands, or existing landscape areas within the PROJECT area shall be fenced and excluded from use for vehicle traffic, staging, or parking, unless specifically designated for these purposes on the DRAWINGS or by the ENGINEER.

3.03 SOIL PREPARATION

- A. **Weed and Debris Removal:** All ground areas to be planted shall be cleaned of all weeds and debris prior to any soil preparation or grading work. Any growing noxious weeds on the site shall be pretreated with approved herbicide prior to grading. Annual or biennial weeds over two (2) feet tall shall be mowed, raked, and removed prior to grading. Weeds and debris shall be disposed of off the site.
- B. **Moisture Content:** Soil shall not be worked when moisture content is so great that excessive compaction occurs, nor when it is so dry that dust will form in the air or clods will not break readily. Water shall be applied, if necessary, to bring soil to an optimum moisture content for tilling and planting.
- C. **Prior to spreading salvaged topsoil and seeding,** thoroughly till or rip to a depth of twelve (12) inches all areas compacted by access, staging, or construction traffic. Till all remaining areas to a depth of six (6) inches. Channel bottom areas are to be ripped to a depth of at least twelve (12) inches on approximately two- (2-) to four- (4-) foot centers. The soils shall be worked until no clods greater than two (2) inches in diameter remain, unless directed otherwise by ENGINEER. Remove rocks and other objects three (3) inches or greater in any dimension.
- D. **Soil Conditioning:** After soil preparation has been completed and high and low spots graded, add soil amendments as indicated below and rototill, making repeated passes with the cultivator to the depth specified until the amendments have been thoroughly mixed.
 1. Organic Compost Soil Amendment shall be applied at a rate of three (3) cubic yards per one-thousand (1,000) square feet or as shown on the DRAWINGS.
 2. Organic Compost shall only be applied if required and designated on the DRAWINGS.

3.04 FINE GRADING

- A. When weeding, soil preparation, and soil conditioning have been completed and soil has been thoroughly water settled, all planting areas shall be smooth-graded, ready for placement of plant materials and for seeding.
 1. **Grades:** Finish grades shall conform to site grading plans and produce a smooth, even surface without abrupt changes, including the interface with the adjacent undisturbed landscape. Minor adjustments of finish grades shall be made at the direction of ENGINEER or PLANT ECOLOGIST, if required.

2. Drainage: All grades shall provide for natural runoff of water without low spots or pockets. Flow-line grades shall be accurately set and shall be not less than two percent (2%) gradient wherever possible.
3. Shrub Areas: Finished grades shall be one and one-half (1-1/2) inches below top of adjacent pavement, headers, curbs, or wall, unless otherwise indicated on the DRAWINGS.
4. Lawn Areas: Finished grade shall be three-quarters (3/4) inch below top of adjacent pavement, curbs, or headers.
5. Slopes: Tops and toes of all slopes shall be rounded to produce a gradual and natural-appearing transition between relatively level areas and slopes.
6. Wetland Mitigation Areas: In wetland mitigation areas, all areas shall be graded to within six (6) inches of the expected water surface elevation or closer, if otherwise specified on the detailed DRAWINGS. ENGINEER or PLANT ECOLOGIST may require a survey of wetland planting site if there is any question to accuracy of the final grade. No wetland plantings shall be placed over six (6) inches above the expected water surface elevation or more than six (6) inches below the expected water surface elevation.

B. Inspection of turf/turf bed and grading shall occur before sodding and/or seeding.

3.05 SHRUB AND TREE PLANTING

A. Established Location: ENGINEER or PLANT ECOLOGIST shall approve location of trees and shrubs before any planting occurs.

B. Planting Pits:

1. Dig planting pits two (2) times the size of the soil ball and the depth of the soil ball, unless planting native cottonwoods in non-irrigated areas (see 3 below).
2. Roughen sides of the pit to remove any compacting or glazing.
3. Native plains cottonwood trees (*Populus sargentii*, syn. = *P. deltoides* subsp *monilifera*) to be planted in non-irrigated areas along water courses shall be deep planted to ensure good root contact with groundwater and promote substantial root support. Deep planted trees shall be installed with up to one third (1/3) the height of the tree placed into a hole with the base of the root ball resting upon the level of the top of the groundwater. It shall be verified that the root ball of the tree is placed in the capillary fringe (moist soil) just above the saturated soil zone (groundwater level). Deep planted trees shall be placed back from the edge of a water body far enough to permit at least a two- (2-) foot deep rooting zone above the water table. Deep planted trees are required to have, at least, two (2) feet of soil above the ground water level, to provide a stable root zone for the mature trees. Areas with heavy clay soils are not suitable for deep planting of cottonwoods.

4. Figure A below shows a typical installation of a deep planted native cottonwood tree.

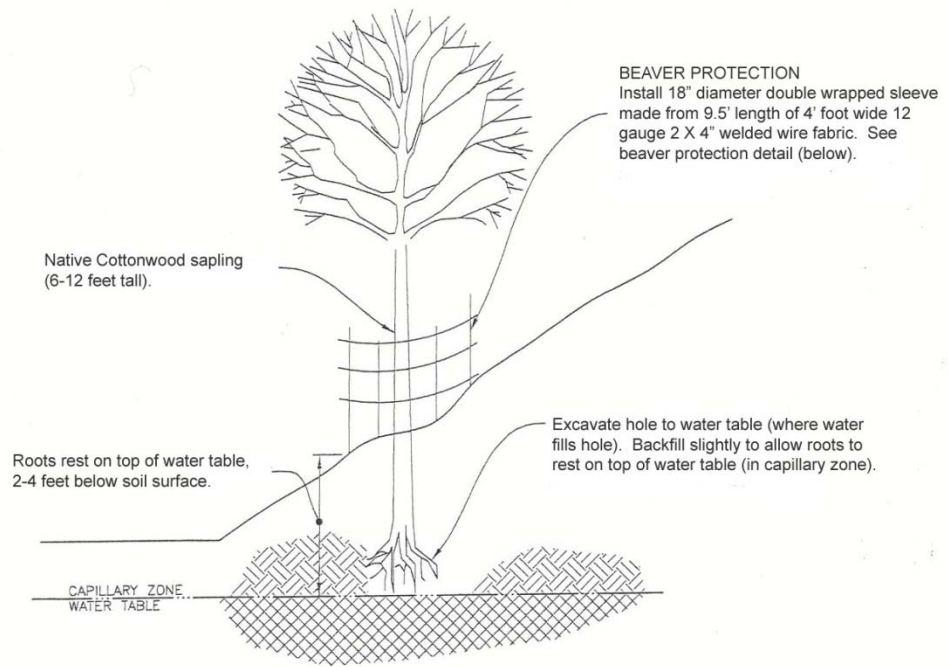


Figure A

C. Existing Tree Roots:

1. When the cutting of tree roots is necessary, each final cut shall be made as cleanly as possible for all roots over three (3) inches in diameter using the following method:
 - a. The line of excavation shall be drawn out and appropriate excavation equipment used to clear the area at least six (6) inches in front of the actual finished excavation line. Roots can then be cut using tools such as axes, stump grinders, or trenchers.
 - b. Each root over three (3) inches in diameter shall then be cut cleanly back to the final excavation line using a stump grinder operated by an experienced, licensed arborist. A sharp hand or bow saw is acceptable for roots under three (3) inches in diameter. Axes and trenchers do not cut roots cleanly and shall not be used for final root cuts.
2. The ENGINEER or PLANT ECOLOGIST, shall be contacted prior to removal of branches over four (4) inches in diameter. All branches shall be cut with a sharp pruner or saw. All cuts shall be cleanly made back to the next crotch or tree, leaving the bark collar intact at the base of the cut.

- D. Backfill Material: Tree and shrub planting pits shall be backfilled with the specified improved planting mix. (Refer to Paragraph 2.02.B.)
- E. Planting:
 - 1. On all other tree and shrub planting (other than native plains cottonwoods), excavate planting pit to depth such that the top of the root ball, when planted, shall be at finish grade.
 - 2. For balled and burlapped materials, untie and remove burlap from top third of root ball on balled and burlapped material. Remove wire baskets from top and sides of root ball. Remove twine from around tree trunks.
 - 3. Backfill one-half (1/2) of pit with backfill mixture and water thoroughly before placing any more backfill. Do not work wet soil.
 - 4. Fertilize trees and shrubs with specified fertilizer at the rate recommended by the manufacturer.
 - 5. Backfill the rest of the planting pit with backfill mixture. Water thoroughly on day of planting. Do not work wet soil.
 - 6. Stake or guy all trees.
 - 7. ENGINEER will check mulch, tree staking, and tree wrapping where appropriate.

3.06 WETLAND PLANTINGS

- A. Wetland or other potted plant materials shall be well watered before installation. Wetland plant materials shall be kept wet at all times, until installed.
- B. Wetland plant materials shall be planted within six (6) inches of the expected normal water surface elevation. In sandy soils wetland plant materials may require planting within less than two (2) inches of the normal water surface, depending upon the species. Contact PLANT ECOLOGIST to verify proper grade prior to wetland plant installation.
- C. Holes for installing 10 T or small tubeling plants may be created with a dibble or sharpened dowel. Open the holes just large enough to insert the entire plant and all the nursery soil at least one-half (1/2) inch below the native soil. The holes should not be formed more than one-half (1/2) inch deeper than the tubes. Once inserted, the hole shall be backfilled or tamped from the side with a mallet to secure the plant. If waterfowl grazing is a possibility, each plant (graminoids only) shall be trimmed to two (2) inches prior to installation and each plant shall be secured by an eight- (8-) inch landscape staple to discourage pulling by the waterfowl. Areas to be covered by erosion control mat following planting shall be planted with trimmed plants (grasses and grass-like plants trimmed to a two- (2-) inch height while in the pots, then seeded (if required) with fabric installation completed over the top of the installed plants.

3.07 MULCHING

- A. Mulch all tree plantings in irrigated landscapes with four (4) inches deep recycled cedar mulch, unless otherwise indicated on the DRAWINGS. Trees or shrubs planted in non-irrigated areas shall be surrounded with a watering dish. Trees or shrubs planted on slopes in non-irrigated areas shall be surrounded with a watering dish which shall be open on the uphill side to permit accumulation of runoff. The dishes in natural areas shall be mulched with no more than one (1) inch of wood chip mulch and may be seeded along with the adjacent area.

3.08 FIELD QUALITY CONTROL

A. Final Walk-Through:

1. The final walk-through shall be performed at the completion of all planting operations under this CONTRACT.
2. At the time of the final walk-through, the Landscape Contractor shall have planting areas free of debris. Plant basins shall be in good repair. Debris and litter shall be cleaned up, and walkways, curbs, and roads shall be cleared of soil and debris. The inspection shall not occur until these conditions are met.
3. ENGINEER or PLANT ECOLOGIST will identify any deficiencies in the form of a punch list.
4. ENGINEER will give written notice of final acceptance when WORK has been performed in compliance with the CONTRACT DOCUMENTS.
5. Correct deficiencies within the first ten (10) days of the final walk-through. Correct WORK in accordance with the CONTRACT DOCUMENTS at no cost to OWNER.
6. Final acceptance shall not be given until all deficiencies are corrected. The Landscape Contractor shall maintain site until final acceptance.

3.09 CLEANING

- A. Remove from the site excess soil resulting from tree planting and mulching operations.

END OF SECTION



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SECTION 32 93 43

SOIL BIOENGINEERING OR SHORELINE STABILIZATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. CONTRACTOR shall furnish all labor, materials, supplies, equipment, tools and transportation; perform all operations to complete installation of live willow stakes, willow fascines, willow brush layering, willow bundles and cottonwood poles; and guarantee all plantings.
- B. Live stakes and poles are straight branches or saplings that have been cut and pruned from dormant living woody plant material (plants that have lost their leaves for the winter).

1.02 RELATED SECTIONS

- A. The following is a list of SPECIFICATIONS which may be related to this section:
 - 1. Section 31 41 13 Topsoil Stripping and Stockpiling
 - 2. Section 31 23 00 Excavation and Fill
 - 3. Section 31 25 00 Erosion and Sedimentation Controls
 - 4. Section 32 93 00 Landscape Planting
 - 5. Section 32 92 19 Seeding

1.03 GENERAL

- A. No substitutions for specified materials will be accepted in the BID. Alternative BID proposals, which propose material substitutions, may be submitted for consideration by ENGINEER or PLANT ECOLOGIST. Alternative proposals shall be fully supported by necessary documentation showing compatibility/comparability with specified materials.
- B. Additional WORK will be paid for at the CONTRACT unit price. If the CONTRACT unit price is not available, the WORK will be paid for on a time and material basis or for an agreed to lump sum amount.

1.04 STORAGE AND HANDLING

- A. Cuttings shall be kept moist, cool, and shaded at all times until installed. Cuttings shall be stored at between thirty-five degrees (35°) and fifty degrees (50°) Fahrenheit for no longer than one (1) week. Cuttings shall be stored in protected locations where they are shaded and sheltered from sun and wind. The butt end (bottom end) of cuttings shall be submerged in water during storage. Prior to planting, all cuttings shall have butt ends (not tops) placed in water for a minimum of twenty-four (24) hours, but not longer than fourteen (14) days. The upper end of cuttings shall never

be submerged. Plastic trashcans may be used for storing willow or cottonwood cuttings. Cuttings shall be protected from freezing and drying at all times and protected from direct sunlight. Cuttings are never to be stored horizontally in water.

- B. Cuttings shall not be dropped or otherwise mishandled. Minor broken and damaged cuttings shall be pruned prior to planting. Major damage will be cause for rejection.
- C. Cuttings shall be covered with tarp or burlap during any transportation in vehicles.

1.05 GUARANTEE AND REPLACEMENT

- A. Guarantee plantings to root and thrive free from defects from any cause until final acceptance of the PROJECT.
- B. Replace plants when they are no longer in a satisfactory condition as determined by ENGINEER prior to final acceptance. This includes plants that die back and lose the form and size originally specified.
 - 1. Make replacements within seven (7) days of notification from ENGINEER.
 - 2. Replace plants in the dormant season only, unless approved otherwise. Remove dead plants within two (2) days of notification.
- C. All replacements shall be of the same kind and size as originally specified and shall be installed as described in the CONTRACT DOCUMENTS. Repairs and replacements shall be made at no expense to OWNER.
- D. Guarantee shall apply to the originally specified and installed plants and other landscape materials, and any replacements made during the construction period.

PART 2 PRODUCTS

2.01 CUTTINGS

- A. Willow materials shall be sandbar willow (*Salix exigua* species) and cottonwood material shall be native plains cottonwood (*Populus deltoide*, syn. = *P. sargentii*), live wood at least two (2) years old. Avoid current year's suckers and current year's growth.
- B. Willow cuttings shall be one-half- (1/2-) inch to one- (1-) inch diameter, of the following lengths:
 - 1. Willow brush layering cuttings shall be five (5) feet to six (6) feet long.
 - 2. Willow stakes shall be two (2) feet long.
 - 3. Willow fascines cuttings shall be at least three (3) feet long.
 - 4. Willow bundle cuttings shall be four (4) feet long.
 - 5. Cottonwood poles shall be one (1) to three (3) inches in diameter and ten (10) to eighteen (18) feet long.

- C. Plant materials shall be harvested from on-site sources. Any offsite sources are to be accepted by ENGINEER.

2.02 ACCESSORIES

- A. Beaver Protection Sleeve: Eighteen- (18-) inch diameter; fabricate from forty-eight- (48-) inch wide, two- (2-) inch by four- (4-) inch 12-gauge welded wire fabric, approximately nine and one-half (9-1/2) feet long and fastened to three (3) six-(6-) foot lengths of one-half- (1/2-) inch diameter rebar with two (2) hog ring fasteners.

PART 3 EXECUTION

3.01 GENERAL

- A. CONTRACTOR shall appoint a competent resident superintendent. The superintendent shall be experienced in the specified techniques of woody plant installation and be on-site whenever the WORK is in progress. The superintendent shall not be replaced without notice to ENGINEER. Workers shall be competent in performance of the WORK they are assigned.
- B. Materials planted prior to approval are subject to rejection. All rejected materials shall be removed from the site, replaced and reinspected before planting.
- C. ENGINEER or PLANT ECOLOGIST shall accept the location of all willow plantings before installation.
- D. Planting Time and Completion:
 - 1. Willows and cottonwoods shall be planted only when weather and soil conditions permit and in accordance with locally accepted practices, and as accepted by ENGINEER. Cuttings shall not be planted when freezing temperatures are forecast twenty-four (24) hours in advance or when the ground is frozen or otherwise unsuitable.
 - 2. Willows and cottonwoods shall be harvested and planted in the dormant season, February 1 to April 1. However, best success is achieved when harvested and planted in March. Live plant materials shall be properly stored and installed no more than two (2) weeks following collection.

3.02 PREPARATION

- A. Site Inspection:
 - 1. CONTRACTOR, the Landscape SUBCONTRACTOR, ENGINEER, and PLANT ECOLOGIST shall inspect site prior to being accepted by ENGINEER or PLANT ECOLOGIST as complete and acceptable for the Landscape SUBCONTRACTOR to proceed.
 - 2. Beginning WORK of this section implies acceptance of existing conditions.
- B. ENGINEER or PLANT ECOLOGIST shall inspect live woody cuttings for acceptability upon arrival at the PROJECT site.

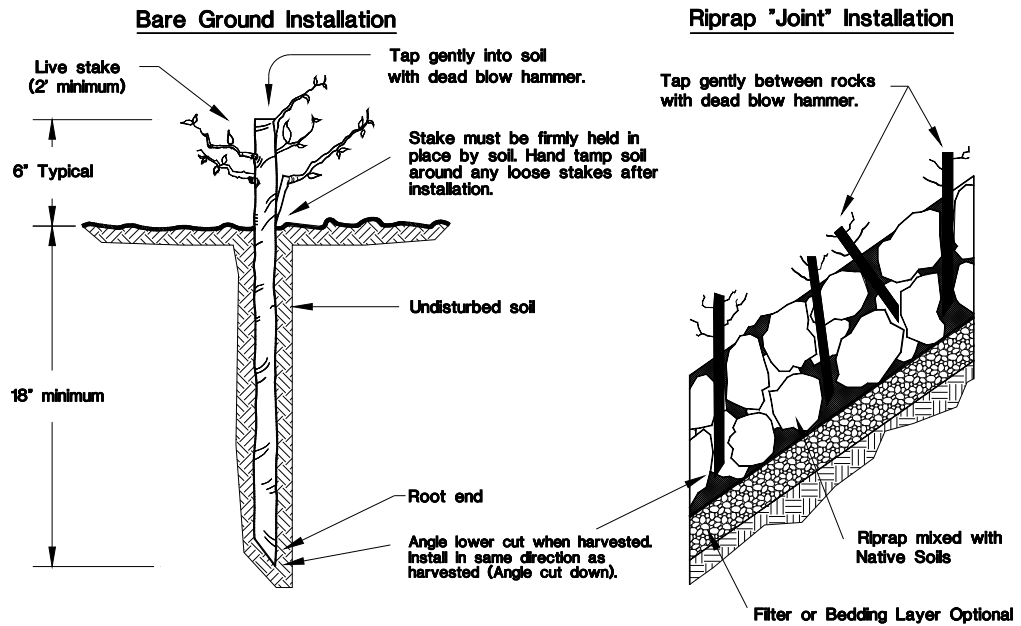
3.03 HARVESTING

- A. ENGINEER will observe and approve onsite harvesting areas or offsite source of plant materials.
- B. Use extreme care to avoid damage to all remaining plants in harvest areas and the cuttings themselves. Only forty percent (40%) of harvest plants shall be removed for cuttings.
- C. All plant material shall be collected and installed in dormant condition. Cuttings shall be harvested with sharp pruning shears or sharp saws. Cuts are to be made near the soil surface. All material shall be handled with care to avoid bark stripping and trunk wood splitting. Older, stiff or dying stems or stems with dead inner wood shall not be used. For willow stakes and bundles, all side branches and any leaves shall be trimmed from cuttings. Branches shall be left on cuttings for fascines and brush layering. Live cuttings shall be bound together with twine at the collection site for ease of handling and protection during transport. The harvesting site shall be left clean and tidy; excess woody debris material shall be promptly removed from the site. Any soil disturbance outside of construction limits caused by accessing areas for willow or cottonwood harvesting shall be ripped and re-seeded with the specified seed mixture and rate. There will be no additional payment for such disturbance.

3.04 PLANTING WILLOW STAKES

- A. Planting locations shall be staked by CONTRACTOR for approval by ENGINEER or PLANT ECOLOGIST prior to planting.
- B. Live stakes shall be single sticks. They shall be twenty-four (24) inches long, taken from the lower stems of healthy, actively growing plants, approximately one-half (1/2) to one (1) inch in diameter. Cut the apical buds plus several inches off the cutting before planting it. (The apical bud at the tip of the branch releases a plant growth hormone which discourages lateral bud development.) All side branches shall be trimmed. Bark on lower portion of the stems shall be sprayed lightly with white paint to identify lower ends for planting. Do not dip ends of cuttings into paint; butt ends shall not be painted.
- C. Cuttings shall be planted in a staggered pattern or random pattern in the locations shown on the DRAWINGS at the designated density. Prepare a pilot hole to the groundwater depth by hammering a rebar, dibble bar, or stinger, or other approved method, into the soil. Place cutting gently upright into the hole, ensuring that the base end is at or below the ground water level. Cuttings shall protrude from the ground four (4) to six (6) inches. At least two-thirds (2/3) of each cutting shall be inserted into the soil.
- D. Holes shall be backfilled with an approved soil, as necessary, so that no voids remain around the cutting. If willow stakes are to be inserted through an erosion fabric, backfill of planting holes is still required. Watering shall be done between backfill lifts to ensure all voids are filled. Do not bury top of cutting. Tamp surface around the cutting to secure it in place. Cuttings which move freely within holes will be rejected.

- E. Access corridors for heavy equipment used to facilitate digging of pilot holes for willow stakes (such as within riprap), and all disturbed or compacted soil shall be ripped and scarified prior to final seeding.
- F. Figure A below shows a typical installation of a live willow staking.



Single Willow Stake Detail
For use in granular soils with available ground water

Figure A

3.05 WILLOW BRUSH LAYERING

- A. Dig a two- (2-) foot deep by one- (1-) foot wide trench at the locations shown on the DRAWINGS. The depth may need to be adjusted to ensure that the bottom of the trench is within the wet soil (ground water level).
- B. Place a six- (6-) inch thick densely packed layer of willow cuttings five (5) feet to six (6) feet long into the trench, top end up, leaning toward the creek, as shown in the details. The ends of all willow cuttings shall be in the groundwater.
- C. Backfill the trench so that no voids remain around the stems of the cuttings. Watering should be done between backfill lifts to ensure all voids are filled. Do not bury tops of cuttings. Tamp surface around the cutting to secure it in place.

3.06 LIVE WILLOW FASCINES

- A. A continuous fascine shall be built in a prepared trench, as opposed to individual willow bundles laid end-to-end. CONTRACTOR shall contact ENGINEER or PLANT ECOLOGIST prior to beginning the WORK to arrange for oversight and guidance during the construction of fascines. Trimmings of young suckers and some smaller branches may be included in the fascines, but half of the stems in the fascines shall be at least one-half (1/2) inch in diameter. Complete live willow fascines shall be ten (10) inches in diameter, with the growing tips and butt ends oriented in alternating directions. Cuttings shall be staggered in the fascines so that the growing

tips are evenly distributed throughout the length of the bundle. Soil shall be worked into the fascines to fill the voids (stems shall be in close contact) and fascines shall be compressed and tightly tied with biodegradable rope or twine of sufficient strength and durability. Fascines shall be tied at two- (2-) foot intervals.

- B. The trench shall be dug into the base of the slope approximately one- (1-) foot deep or as specified in DRAWINGS. The coir mat shall be laid in the empty trench with the bulk of the fabric along the lower (water) side of the trench. The fabric shall be staked securely into the trench on two- (2-) foot intervals with two- (2-) foot wooden stakes. Lay twine crossways in the trench at approximately two- (2-) foot intervals, overlapping the sides of the trench sufficient length to wrap around the fascine and tie. Lay the cuttings within the trench as noted above. Backfill the trench with sand or soil; filling voids between the cuttings. Tie the twine securely around the fascine. The coir mat blanket for the adjacent slope shall be wrapped around the fascine as shown in the DRAWINGS. The trench on each side of the fascine shall be backfilled with compacted topsoil. The top of the fascine shall be slightly visible when the installation is complete.
- C. Fascines shall be staked firmly in place with one row of two- (2-) foot long diagonally cut two- (2-) inch by four- (4-) inch wooden stakes every twenty-four (24) inches, alternating sides of the fascine. Tapered ends of adjacent fascines shall be overlapped so that the overall fascine diameter is uniform and continuous. Two (2) stakes shall be used at each fascine overlap such that a stake is driven between the last two ties of each fascine.
- D. Figure B below shows a typical installation of live willow fascines.

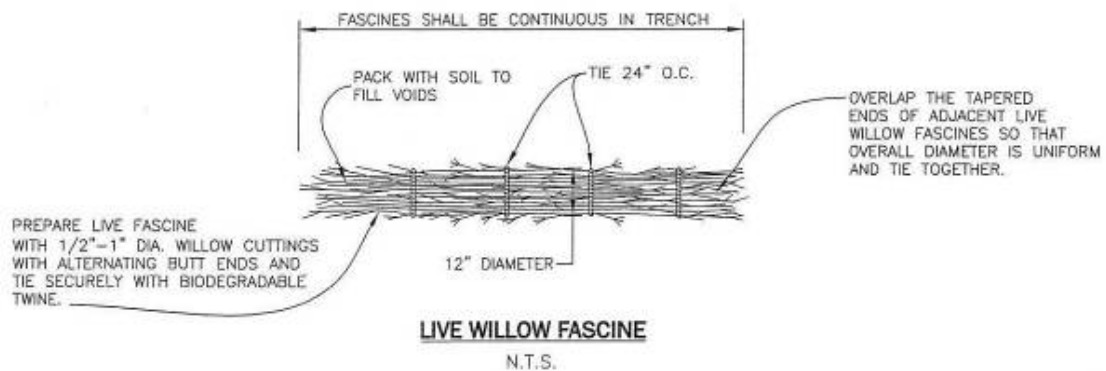


Figure B

3.07 WILLOW BUNDLING

- A. Bundles shall consist of five (5) to seven (7) cuttings bound into two- (2-) to three- (3-) inch diameter bundles. Bundles shall be planted with tops of cuttings all oriented up, at elevations to be determined by ENGINEER or PLANT ECOLOGIST with four- (4-) foot spacing or as indicated in DETAIL. Bundles shall be inserted directly into the soil or between rock riprap until they penetrate the groundwater and still protrude four (4) to eight (8) inches from the soil surface. In no case shall the cuttings protrude more than eight (8) inches above the soil surface. In the case of joint planting in riprap, the protruding measurement shall be taken from the soil level between the rocks and not from the top of rock. If tamping is necessary, care shall be taken to prevent splitting of the cuttings. Backfill around the installed bundle with the

original soil to eliminate air voids, then tamp the ground lightly around the bundle with a hammer to hold it securely in place. After the bundles are fully inserted into the soil, the top one (1) to two (2) inches of each cutting shall be pruned if necessary, to a clean, non-damaged cut.

- B. Figure C below shows a typical installation of willow bundling. Bundles, which are loose or not fully surrounded by lightly packed soil, will be rejected.

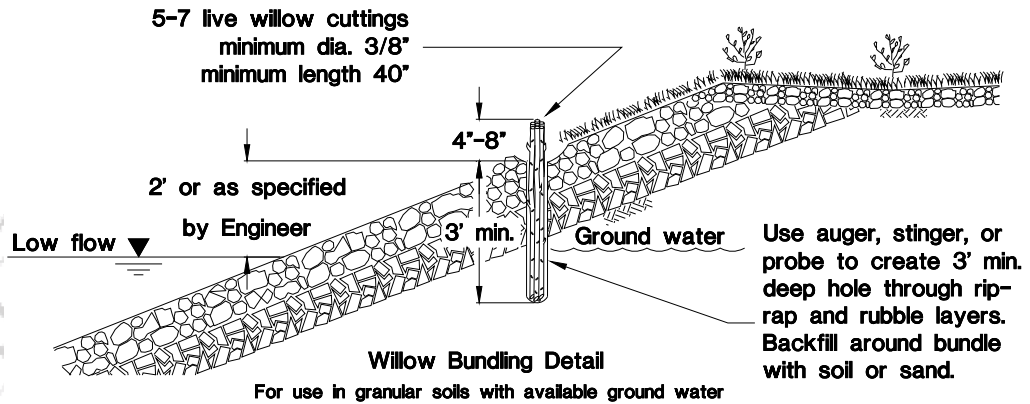
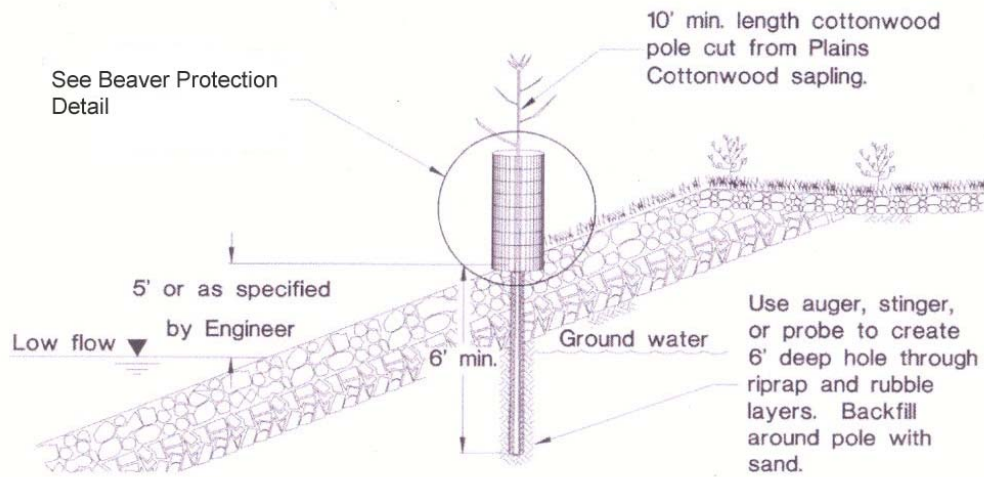


Figure C

3.08 COTTONWOOD POLING

- A. Poles shall be planted at locations shown on the DRAWINGS or as determined by ENGINEER or PLANT ECOLOGIST. Cottonwood poling is possible only in naturally "sub irrigated" areas with a shallow water table, generally two (2) to four (4) feet below the ground surface. Cottonwood poles also shall not be planted into areas with less than two (2) feet of moist aerated soil *above* the saturated soil (groundwater level). Four (4) to six (6) feet of the poles shall be inserted into the soil, with the lower foot or two of pole extending below the surface of the water table. Poles shall extend from four (4) to twelve (12) feet above the soil surface after planting, with one-third (1/3) to one-half (1/2) of the pole buried below the surface. Reduce the number of branches on the pole by trimming most of the smaller branches, starting below the upper tip on the top of pole. Do not cut the upper-most tip. There shall be at least six (6) to eight (8) upper branches, plus the tip, remaining on the trimmed pole. Prepare a pilot hole by using an auger, stinger, or probe to bore to a minimum depth of six (6) feet or as directed by ENGINEER or PLANT ECOLOGIST. The pilot hole shall be of sufficient diameter to facilitate easy insertion of cottonwood pole. Backfill around the installed vertical pole with loose sand to eliminate air voids, then tamp the ground lightly around the pole with a hammer to hold it securely in place. A slight saucer shall be formed around each pole to capture and hold precipitation. The upslope side of the saucer shall be open to receive run off and the lower portion of the saucer shall intersect the pole.

- B. Figure D below shows typical native cottonwood poling detail in rip rap. (Note: Installation of cottonwood poles may also occur into soil.)



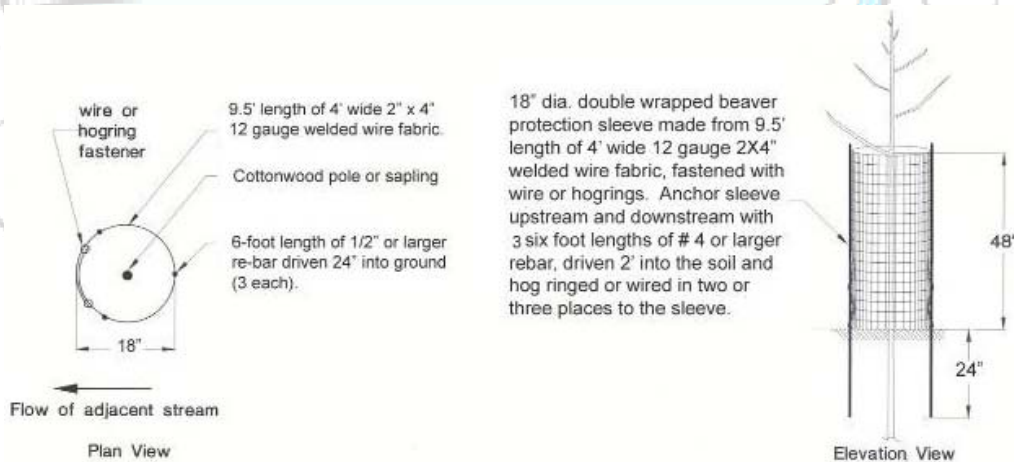
Cottonwood Poling Detail

For use in granular soils with available ground water

Figure D

- C. Unless otherwise accepted by ENGINEER or PLANT ECOLOGIST, each cottonwood pole or newly planted cottonwood tree shall be protected against beaver damage by the installation of an eighteen- (18-) inch diameter, double wrapped beaver protection sleeve made from a nine and one-half- (9-1/2-) foot length of forty-eight- (48-) inch wide, two- (2-) by four- (4-) inch 12-gauge welded wire fabric which has been fastened with at least two (2) hog rings to each of three (3), six- (6-) foot lengths of one-half- (1/2-) inch diameter rebar, inserted at least two (2) feet into the soil on either side of the tree.

- D. Figure E below shows a typical installation of a beaver protection cage.



Beaver Protection Detail

Figure E

3.09 FIELD QUALITY CONTROL

A. Acceptance:

1. The final walk-through shall be performed at the completion of all planting operations under this CONTRACT.
2. At the time of the final walk-through, the Landscape SUBCONTRACTOR shall have planting areas free of debris, and leftover woody plant materials and trimmings. Plant basins shall be installed properly and in good repair. Debris and litter shall be cleaned up, and walkways, curbs, and roads shall be cleared of soil and debris. The inspection shall not occur until these conditions are met.
3. ENGINEER or PLANT ECOLOGIST will identify any deficiencies in the form of a punch list.
4. ENGINEER or PLANT ECOLOGIST will give WRITTEN NOTICE of final acceptance when WORK has been performed in compliance with the CONTRACT DOCUMENTS.
5. Deficiencies shall be corrected within the first ten (10) days of the final walk-through. Correct WORK in accordance with the CONTRACT DOCUMENTS at no cost to OWNER.
6. Final acceptance will not be given until all deficiencies are corrected. The Landscape SUBCONTRACTOR shall maintain the site until final acceptance.

END OF SECTION

