

Attachment A1

Technical Specifications

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Plans (Issued Separately).....

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS: The General Contract Conditions, Drawings and other Division-1 Specification sections apply to Work of this section.
- 1.2 DESCRIPTION: This section includes general description of the Work with limitations or coordination with other contracts, if any.
- 1.3 GENERAL:
- A. The Work to be done under this Contract is the construction of the Work as shown, documented, and set forth in the Contract Documents, in a workmanlike manner, to the satisfaction of the Construction Manager.
 - B. If these documents or job conditions make it impossible to produce first class work or to warranty the work or the Contractor's performance, or should discrepancies appear among the Contract Documents, the Contractor must immediately request interpretation, correction or clarification.
 - C. Should a conflict occur in or between Drawings and Specifications, Contractor is deemed to have estimated on the more expensive way of doing work unless he shall have asked for and obtained written decision before submission of Bid as to which method or materials will be required.
 - D. The Contractor represents that he fully understands the nature and extent of the Work, all factors and conditions affecting or which may be affected by it and characteristics of its various parts and elements and their fitting together and functioning.
- 1.4 PROJECT DESCRIPTION:
The work to be performed generally includes the following: removal of concrete trail, site grading, culvert replacement, new concrete trail, metal rail fence, painting of existing railing, pedestrian lighting, tunnel lighting, seeding and erosion control.

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION (Not applicable)

END OF SECTION 01010

PART 1 - GENERAL

1.1 RELATED DOCUMENTS: The General Contract Conditions, Drawings and other Division-1 Specification sections apply to Work of this section.

1.2 SUMMARY:

A. Section Includes: Requirements for coordination, supervision and administration for the Work, including but not necessarily limited to:

Coordination
Administrative and supervisory personnel
General installation provisions
Cleaning and protection
Utilities and site work

B. Related Sections:

Description of the Work: Section 01010
Administration, Procedures, Codes: Section 01105
Project Meetings: Section 01200

1.3 GENERAL COORDINATION:

A. General:

1. The Contractor shall ensure that each entity involved in the performance of the Work shall cooperate in the overall coordination of the Work; promptly, when requested by the Contractor, furnish information concerning the entity's portion of the Work; and respond promptly and reasonably to the decisions and requests of persons designated with coordination, supervisory, administrative, or similar authority.
2. The Contractor shall, where necessary, prepare memoranda for distribution to each party involved outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.
3. Prepare similar memoranda for the Owner's Representative and separate Contractors where coordination of their work is required.

B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction work. Such administrative activities include, but are not limited to, the following:

Preparation of schedules
Installation and removal of temporary facilities
Delivery and processing of submittals
Progress meetings
Project close-out activities

- C. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water and materials. Salvage materials and equipment involved in performance of, but not actually incorporated in, the Work. Refer to other sections for disposition of salvaged materials that are designated as the Owner's Representative's property.
 - D. Site Utilization: In addition to the site utilization limitations and requirements shown on the Drawings and indicated by the Contract Documents, administer the allocation of available space equitably among entities needing access and space, so as to produce the best overall efficiency in the performance of the Work. Schedule deliveries so as to minimize the space and time requirements for storage of materials and equipment on the site; but do not unduly risk delays in the Work.
 - E. Coordination Meetings: Include in scheduled meetings, coordination of various entities and activities as set forth in Section 01200. Where necessary, schedule additional coordination meetings for this purpose on an as needed basis.
 - F. Layout: It is recognized that the Contract Documents are diagrammatic in showing certain physical relationships of the various elements and systems and their interfacing with other elements and systems. Establishment and coordination of these relationships is the exclusive responsibility of the Contractor. Do not scale the Drawings. Lay out and arrange all elements to contribute to safety, efficiency and to carry the harmony of design throughout the Work. In case of conflict or undimensioned locations, verify required positioning with the Construction Manager. The Contractor shall provide surveying for the layout of all improvements including both horizontal and vertical control.
 - G. Substrate Examination: The Contractor shall ensure that the subcontractor of each element of the Work examines the conditions of the substrate to receive the work, dimensions and spaces adjacent, tolerances, interfacing with other elements and services, and the conditions under which the Work will be performed. The Contractor shall require each subcontractor to notify the Contractor in writing of conditions detrimental to the proper or timely completion of the Work, and ensure that they do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to the subcontractor.
- 1.4 COMPLETE SYSTEMS: It is the intent of the Contract Documents that the system be complete and functional to provide the intended or specified performance. The Contractor shall provide all incidental items and parts necessary to achieve this requirement.
- 1.5 COMPATIBILITY: Provide products and equipment which are compatible with other work requiring mechanical interface including connections, control devices, water, drain and other piping connections. Verify requirements and other interface requirements before ordering equipment and resolve conflicts that may arise.

PART 2 - PRODUCTS (Not applicable)

PART 3 – EXECUTION

3.1 GENERAL INSTALLATION PROCEDURES:

- A. Require the subcontractor of each major component to inspect both the substrate and conditions under which work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.
- B. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items. Re-check measurements and dimensions before starting each installation.
- C. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.
- D. Installation:
 - 1. Provide attachment and connection devices and methods necessary for securing work. Secure work true to line and level. Allow for expansion and building movement.
 - 2. Install each component during weather conditions and the Work status that will ensure the best possible results. Isolate each part of the completed construction from incompatible materials as necessary to prevent deterioration.
 - 3. Coordinate work with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.
- E. Visual Effects: Provide uniform joint widths in exposed work. Arrange joints in exposed work to obtain the best visual effect. Refer questionable choices to the Construction Manager for final decision.
- F. Mounting Heights: Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Construction Manager for final decision.

3.2 CLEANING AND PROTECTION:

- A. During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from damage or deterioration prior to achieving substantial completion.

- B. Clean and maintain completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

END OF SECTION 01040

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS: The General Contract Conditions, Drawings and other Division-1 Specification sections apply to work of this section.
- 1.2 DESCRIPTION: Section includes general requirements and procedures for construction surveying.
- 1.3 RELATED SECTIONS:
 - A. Traffic control – Section 01500
 - B. Earthwork and vertical control – Section 02200
 - C. Layout of concrete items and horizontal control – Section 02520
 - D. Layout of site improvements – see affected Division 2 sections.
- 1.4 EXISTING UTILITIES:
 - A. The existence and location of underground utilities and construction indicated as existing are not guaranteed.
 - B. Before starting any work disturbing, moving or penetrating the ground, the Contractor must have all existing utilities located, staked, and depth identified by the appropriate entity.

PART 2 - PRODUCTS (Not Applicable)**PART 3 - EXECUTION**

- 3.1 CONSTRUCTION SURVEYING:
 - A. General: The work shall consist of the construction surveying, calculating, and staking necessary for the construction of all elements of the project. Layout of site elements will be accomplished either by means of coordinates or traditional baseline method or a combination of both.
 - B. The work shall be done under the supervision of a Professional Engineer (P.E.) or Professional Land Surveyor (P.L.S.) who is experienced and competent in site construction surveying and registered in the State of Colorado. Referencing, setting and restoring land monuments and the determination of property lines shall be done in accordance with Section 629 of the CDOT specifications. The P.E. or P.L.S. shall be available to review work, resolve problems and make decisions in a timely manner.

- C. The Contractor shall furnish all personnel, materials and traffic control necessary to perform the required construction surveying. All surveying equipment, including Electronic Distance Meters, tapes, tribrachs, theodolites, total stations, GPS receivers and levels shall be calibrated prior to the start of work. EDM's, total stations, and GPS receivers shall be checked on a National Oceanic and Atmospheric Administration (NOAA) calibrated baseline. Equipment calibration accuracy and adjustments made to meet requirements specified in the Colorado Department of Transportation (CDOT) Survey Manual shall be documented in the Survey Records.
- D. Contractor shall establish horizontal and vertical control for the project. A Pre-survey Conference shall be held prior to performing any surveying work. The Construction Manager, Contractor's Superintendent, and Contractor's Surveyor (P.E. or P.L.S.) shall attend. A surveying work schedule shall be submitted to the Construction Manager for review prior to the conference.
- E. Contractor shall check all Owner's Representative's-established control points, and verify and document their accuracy, prior to using them for construction surveying control.
- F. Contractor shall perform all construction surveying and staking that is necessary for construction of the project.
 - 1. The Contractor shall pay the cost of all construction surveying for line and grade.
 - 2. Working from lines and levels established by the property survey, establish and maintain benchmarks and other dependable markers to set the lines and levels for the work and elsewhere on the site as needed to properly locate every element of the Work.
 - 3. As construction proceeds, check every major element for line, level and plumb.
 - 4. Calculate and measure required dimensions as shown within recognized tolerances. Do not scale the Drawings to determine dimensions. Advise entities engaged in construction activities of the marked lines and levels provided for use.
 - 5. The Contractor is to establish all necessary benchmarks on site for layout and grading based on the control points shown on the plans.
- G. Site Improvements: Locate and lay out site improvements, including pavements, stakes for grading, fill and topsoil placement, utility line gradients and invert elevations by instrumentation and similar appropriate means.
- H. Layout Procedures:
 - 1. Verify layout information shown on the Drawings in relation to the property survey and existing benchmarks, before proceeding with the layout of the actual work. Locate and protect existing benchmarks and control points. Preserve permanent reference points during construction.
 - 2. Do not change or relocate benchmarks or control points without prior written approval. Promptly report lost or destroyed reference points, or

- requirements to relocate reference points because of necessary changes in grades or locations.
3. Promptly replace lost or destroyed project control points. Base replacements on the original survey control points.
 4. Establish and maintain a minimum of two temporary benchmarks on the site, reference to data established by survey control points.
- I. Staking: Acceptable staking placement intervals for the various construction survey control operations shall be approved by the Construction Manager prior to the beginning of work. Stationing shall be established in the field on centerline or an approved offset.
 - J. Accuracy and Tolerances: Accuracy of surveys and survey tolerances shall be as specified in the Contract or the CDOT Survey Manual. If a discrepancy should occur, the higher degree of accuracy or the more restrictive tolerance shall apply.
 - K. Responsibility and Inspection: Supervision and coordination of construction surveying is the Contractor's responsibility. The Construction Manager may inspect the Contractor's surveying; however, such inspection will not relieve the Contractor of any responsibility for accuracy or completeness of work. The Contractor shall check the work to verify the accuracy and include documentation of this check in the Survey Records. All Contractor surveying inaccuracies, errors or omissions shall be corrected at the Contractor's expense. Construction Manager's inspection or the Contractor's corrections shall not entitle the Contractor to additional payment or contract time extension.
 - L. Changes: All changes in lines and grades required by field conditions and all discrepancies in grades, alignment, location or dimensions detected by the Contractor shall be immediately submitted to the Construction Manager in writing. No changes in given data or plans will be allowed unless approved by the Construction Manager in writing. All changes shall be documented in the survey records.

END OF SECTION 01050

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS: The General Contract Conditions, Drawings and other Division-1 Specification sections apply to work of this section.
- 1.2 DESCRIPTION: Section includes general administrative requirements and procedures, and related applicable codes.
- 1.3 CODES:
- A. Obtain all permits, inspections, approvals, and certificates required by law. Conform to all laws, ordinances, rules and regulations applicable to the location of the Work.
 - B. Publication Dates: Comply with codes and standards in effect at the date of the Contract Documents, except where a standard or a specific date or edition is indicated.
- 1.4 SPECIAL WARRANTIES:
- A. Special warranties are those specified in the Technical Specification Sections, to be provided by a manufacturer or by the Contractor or his subcontractors or combinations thereof. Refer to Section 01701 for submittal of such warranties as a part of the contract completion documentation and procedures.
 - B. All such special warranties must conform to the specification requirements and be signed by persons who have the authority to commit the issuing entity to the warranty. Subcontractor issued warranties must be signed by the Subcontractor and the Contractor.
 - C. All such special warranties are in addition to and not a limitation of other rights the City may have against the Contractor under the Contract Documents.
- 1.5 EXISTING UTILITIES:
- A. The existence and location of underground utilities and construction indicated as existing are not guaranteed.
 - B. Before starting any work disturbing, moving or penetrating the ground, the Contractor must have all existing utilities located, staked, and depth identified by the appropriate entity.
- 1.6 CONTRACTOR'S CONSTRUCTION SCHEDULE:
- A. Furnish construction schedule, as required by the construction contract, not less than three (3) copies.

- B. The Contractor shall provide a bar chart schedule covering the duration of the project, beginning with the Notice to Proceed and concluding with Substantial Completion. The following guidelines shall be followed:
 - 1. The bar chart shall contain a sufficient number of activities to allow effective monitoring of the progress of the work. The bar chart shall be cost loaded.
 - 2. Each activity shall contain only the work of a single trade or subcontractor.
 - 3. Each activity shall be less than 10 working days in duration. Procurement and material delivery activities may exceed the 10 working day duration. Longer duration activities shall be broken into two or more individual activities of less than 10 working days duration by area, type of work, etc. to allow for effective monitoring of the Work.
- C. Schedule updating shall be done on a monthly basis. The revision shall indicate actual progress to date, changes resulting from change orders, and planned changes necessary to complete the Work in accordance with the Contract Documents.
- D. All costs associated with the development and maintenance of the schedule shall be borne by the Contractor.
- E. The Contractor shall submit a preliminary bar chart schedule within 10 working days of the Notice to Proceed. The Construction Manager shall review the preliminary bar chart and return comments to the Contractor within 5 working days. The Contractor then shall have 5 working days to review the schedule and return it to the Construction Manager for review. The 5 working day review and review cycles shall continue until an acceptable schedule is received by the Construction Manager. An authorized schedule shall be required for payment.
- F. The schedule may be used as a tool in analyzing any requests for the extension of the contract completion date due to changes in the Work or abnormal weather conditions. Normal weather conditions are based upon the 10 year historical weather information provided by the Lakewood branch of the U.S. Weather Service. Normal weather conditions shall be incorporated into the bar chart schedule. Additional time will be added to the Contract time only if the activities involved will affect the project's Completion Date because of the criticality of the activities changed or altered.

1.8 DELIVERY, STORAGE AND HANDLING:

- A. Properly carton, crate, cover and protect materials, products and equipment for shipping, handling and storing. Use appropriate means for hoisting and loading which will prevent damage or overstress to items being handled or shipped. Store them under roof in controlled environment whenever feasible; otherwise store off the ground under suitable coverings properly secured against wind and weather. Protect all items from rain, snow moisture, wind, cold, heat, frost, sun, staining, discoloration, deterioration and physical damage from any cause. Refer to individual sections for specific requirements.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01105

PART 1 - GENERAL

1.1 RELATED DOCUMENTS: The General Contract Conditions, Drawings and other Division-1 Specification sections apply to work of this section.

1.2 DESCRIPTION: This section includes administrative and procedural requirements for project meetings in the following categories:

Pre-construction meeting
Progress and Coordination meetings
Construction Manager-General Contractor review meetings

1.3 RELATED SECTIONS:

- A. Pre-bid conference and Site visit: Bidders' Instructions
- B. Progress schedules: Section 01105

1.4 GENERAL REQUIREMENTS:

A. Construction Manager shall schedule and administer a pre-construction meeting, weekly progress meetings and coordination meetings, and specially called meetings throughout progress of the work including the following:

1. Prepare agenda for meetings.
2. Distribute written notice of each meeting four days in advance of meeting date. Make physical arrangements for meetings.
3. Preside at meetings.
4. Record the minutes; include significant proceedings and decisions.
5. Include all issues of previous meetings until resolved.
6. Reproduce and distribute copies of minutes within four (4) days after each meeting and send to:

Participants in the meeting
Parties affected by decisions made at the meeting

- B. Representatives of Subcontractors and suppliers attending meetings shall be qualified and authorized to act on behalf of the entity each represents.
- C. Site observations required of the Construction Manager shall be included in or coordinated with the regularly scheduled meetings whenever possible.

1.5 PRE-CONSTRUCTION MEETING:

A. Construction Manager shall schedule a pre-construction meeting to take place within ten (10) days prior to date of Notice to Proceed at a central site location designated by the Construction Manager. Attendance shall include:

Construction Manager
Contractor and Contractor's Superintendent
Maintenance District Superintendent
Others as appropriate

- B. Suggested Agenda: Discuss items of significance that could affect progress including such topics as:

Tentative construction schedule
Critical Work sequencing
Designation of responsible personnel
Procedures for processing field decisions and Change Orders
Procedures for processing Applications for Payment
Distribution of Contract Documents
Submittal of Shop Drawings, Product Data and Samples
Preparation of record documents
Use of the premises
Office, Work and storage areas
Equipment deliveries and priorities
Safety procedures
First aid
Security
Housekeeping
Working hours
Temporary construction facilities and utilities

1.6 COORDINATION MEETINGS:

- A. The Construction Manager will schedule weekly job progress and coordination meetings at the site. Attendance shall include:

Contractor
Subcontractors, as appropriate to the agenda
Suppliers, as appropriate to the agenda
Construction Manager
Others

- B. Suggested Agenda:

Review, approval of minutes of previous meeting.
Review of work progress since previous meeting.
Field observations, problems, conflicts.
Problems which impede Construction Schedule.
Review of off-site fabrication, delivery schedules.
Corrective measures and procedures to regain projected schedule.
Revisions to construction schedule.
Progress, schedule, during succeeding work period.
Coordination of schedules.
Review submittal schedules; expedite as required.

Maintenance of quality standards.
Pending changes and substitutions.
Review proposed changes for:
 Effect on construction schedule and on completion date.
 Effect on other contracts of the project.

1.7 CONSTRUCTION MANAGER-GENERAL CONTRACTOR REVIEW MEETINGS:

- A. Meetings shall be scheduled as necessary to review the general progress of the job and discuss all relevant open issues. The General Contractor's superintendent shall attend these meetings unless agreed to otherwise. Additionally, Subcontractors shall be invited to attend as required and agreed to by the Construction Manager. The Construction Manager shall preside at meetings and take complete minutes. All items shall be tracked in minutes until resolved. Suggested Agenda is similar to Article 1.6.

PART 2 PRODUCTS (Not applicable)

PART 3 EXECUTION (Not applicable)

END OF SECTION 01200

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS: The General contract Conditions, Drawings and other Division 1 - Specification sections apply to work of this section.
- 1.2 DESCRIPTION: Section includes administrative and procedural requirements for submittal and review of product data, shop drawings, samples and similar items required by the specifications.
- 1.3 ADMINISTRATIVE SUBMITTALS:
- A. Refer to other Division-1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to:
- Schedules
 - Permits
 - Applications for payment
 - Schedule of Values
 - Closeout documents
 - Coordination drawings
- B. Such submittals are for information and record and do not require action on the part of the Construction Manager except where not in conformity with the Contract documents. If such non-conformity is observed, the Construction Manager will notify the Contractor. Failure to be observed or to be notified by the Construction Manager does not relieve Contractor of compliance with Contract Documents.
- 1.4 SUBMITTAL PROCEDURES:
- A. General: Make submittals from Contractor to the Construction Manager after Contractor has reviewed each submittal and indicated his action thereon except for samples and selection submittals.
- B. Scheduling:
1. Within 20 days after Notice to Proceed, prepare a separate listing and schedule organized by related specification section number sequence, showing the principal work-related submittals and their initial submittal dates as required for coordination of the work.
 2. Coordinate the submittal schedule with the construction schedule. Prepare the submittal schedule in chronological order.
- C. Schedule Updating: Revise the schedule after each meeting or activity, where revisions have been recognized or made. Issue the updated schedule concurrently with report of each meeting.

D. Coordination:

1. Coordinate the preparation and processing of submittals with the performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
2. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity.
3. Coordinate transmittal of different types of submittals for related elements of Work so processing will not be delayed by the need to review submittals concurrently for coordination.
4. The Construction Manager reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

E. Processing:

1. Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for re-submittals.
2. Allow five (5) days for processing each submittal.
3. No extension of Contract Time will be authorized because of failure to transmit submittals to the Construction Manager sufficiently in advance of the Work to permit processing.

F. Submittal Transmittal:

1. Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to the Construction Manager using a transmittal form. Submittals received from sources other than the Contractor will be returned without action.
2. On the transmittal, record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.

1.5 SHOP DRAWINGS: NA

1.6 PRODUCT DATA:

- A. Assemble Product Data into a single submittal for each element of construction or system. Product Data includes printed information such as manufacturer's installation instructions, catalog cuts, standard color charts, rough-in diagrams and templates, standard wiring diagrams and performance curves. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as "Shop Drawings". Where applicable include maintenance manual.

- B. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information:

Manufacturer's printed recommendation.
Compliance with recognized trade association standards.
Application of testing agency labels and seals.
Notation of dimensions verified by field measurement.
Notation of coordination requirements.

- C. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.
- D. Submit copies as above specified for final shop drawings. Submit a cover letter to show Contractor's review and action. Where applicable, include additional copies for maintenance manuals.
- E. Submit four (4) copies of product data.

1.7 SAMPLES:

- A. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components. Include the following:

Generic description of the Sample.
Sample source.
Product name or name of manufacturer or supplier.
Compliance with recognized standards.
Availability and delivery time.

- B. Submit Samples to the Construction Manager who will review them for a final check of elements, and for a comparison of these characteristics between the final submittal and the actual component as delivered and installed.

1. Where variation in characteristics are inherent in the material or product represented, submit multiple units (not less than 3), that show approximate limits of the variations.
2. Refer to other Sections for Samples to be returned to the Contractor for incorporation in the Work. Such Samples must be undamaged at time of use. On the transmittal, indicate special requests regarding disposition of Sample submittals.

- C. Submittals:

1. Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation and similar characteristics, submit 3 sets: one will be returned marked with the action taken.
2. Maintain one (1) complete set of Samples, as returned, at the Project

site, for quality comparisons throughout the course of construction.

- D. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION (Not applicable)

END OF SECTION 01300

PART 1 - GENERAL

1.1 RELATED DOCUMENTS: The General Contract Conditions, Drawings and other Division 1-Specification sections apply to work of this section.

1.2 DESCRIPTION: This Section includes administrative and procedural requirements for quality control services.

Field samples
Mock-ups
Inspection and testing laboratory services
Manufacturer's field services and reports

1.3 RELATED SECTIONS:

A. Inspections, testing and approvals required by public authorities: General Conditions.

B. Submittals: Section 01300
Inspections and tests required and standards for testing: Individual Specification sections.

1.4 REFERENCES:

A. ASTM D3740, "Practice for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction".

B. Should specified reference standards conflict with the Contract Documents, request clarification from the Construction Manager before proceeding.

1.5 DEFINITIONS:

A. Quality control services include inspections and tests, and related actions, including reports, performed by independent agencies, governing authorities, and the Contractor. Contract enforcement activities performed by the Construction Manager are not included.

B. Inspection and testing services required to verify compliance with requirements specified do not relieve the Contractor of responsibility to comply with requirements of the Contract Documents.

C. Requirements of this Section relate to customized fabrication and installation procedures and not production of standard products.

1. Specific quality control requirements, inspections and tests, covering production, customized fabrication and installation procedures of standard products are specified in the individual sections.

2. Inspections, tests and related actions specified are not intended to limit

the Contractor's quality control procedures that facilitate compliance with Contract Documents.

3. Requirements for the Contractor to provide quality control services requested by the Construction Manager or authorities having jurisdiction are not limited by provisions of this Section.

1.6 RESPONSIBILITIES:

A. Contractor Responsibilities:

1. The Contractor shall provide inspections, tests and similar quality control services, specified in individual specification sections and required by governing authorities, except where they are indicated to be the responsibility of the City, or are provided by another entity. Costs for City services shall not be included in the Contract Sum or bid item.
2. Notify the Construction Manager at least one (1) working day in advance so that the Construction Manager may observe the tests.

B. Retesting:

1. The Contractor is responsible for retesting where results of required inspections, tests or similar services prove unsatisfactory and do not meet specified requirements, regardless of whether the original test was the Contractor's responsibility.
2. Cost of retesting construction revised or replaced by the Contractor is the Contractor's responsibility regardless of the results, where required tests were performed on original construction.

C. Limitations: Where manufactured products or equipment are required to have representative samples tested, do not use such materials or equipment until tests have been made and the materials or equipment are found to be acceptable. Do not incorporate in the work any product that becomes unfit for use after acceptance.

D. Associated Services: The Contractor shall cooperate with Construction Manager or other agencies performing required inspections, tests and similar services and provide reasonable associated services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Associated services required include:

1. Providing access to the Work and furnishing incidental labor and facilities necessary to facilitate inspections and tests.
2. Taking adequate quantities of representative samples of materials that require testing or assisting the agency in taking samples.
3. Providing facilities for storage and curing of test samples, and delivery of samples to testing laboratories.
4. Providing adequate facilities for safe storage and proper curing of concrete test cylinders on the project site for the first 24 hours after casting as required by ASTM C31.
5. Providing the agency with a preliminary design mix proposed for use for

- 6. material mixes that require control by the testing agency.
Security and protection of samples and test equipment at the project site.

E. City's Responsibilities:

- 1. The Construction Manager will provide inspections, tests and similar quality control services specified to be performed by independent agencies and not by the Contractor, except where they are specifically indicated as the Contractor's responsibility or are provided by authorities having jurisdiction or another identified entity. Costs for these services are not included in the Contract Sum.
- 2. The Construction Manager will employ and pay for the services of an independent agency, testing laboratory or other qualified firm to perform services which are the City's responsibility.
- 3. Duties of Testing Agency:
 - a. The independent testing agency engaged to perform inspections, sampling and testing of materials shall cooperate with the City and Contractor in performance of its duties, and shall provide qualified personnel to perform required inspections and tests.
 - b. The agency shall notify the City and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 - c. The agency is not authorized to release, revoke, alter or enlarge any requirement of the Contract Documents, or approve or accept any portion of the Work.
 - d. The agency shall not perform any duties of the Contractor.
- 4. Coordination:
 - a. The Contractor and each agency engaged to perform inspections, tests and similar services shall coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.
 - b. The Contractor is responsible for scheduling times for inspections, tests, taking samples and similar activities.

1.4 SUBMITTALS:

- A. General: Refer to Section 01300 for general requirements of submittals. Certified written report of each inspection, test or similar service, will be submitted directly to the Construction Manager except to the Contractor with copy to the Construction Manager when service is the Contractor's responsibility. Submit additional copies directly to governing authorities when requested by that authority.
- B. Report Data: Written reports of each inspection, test or similar service shall include, but not be limited to:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Dates and locations of samples and tests or inspections.
 - 4. Names of individuals making the inspection or test.

5. Designation of the work and test method.
6. Identification of product and specification section.
7. Complete inspection or test data.
8. Test results and interpretation of test results.
9. Ambient conditions at the time of sample taking and testing.
10. Comments or professional opinion as to whether inspected or tested work complies with Contract Document requirements.
11. Name and signature of laboratory inspector.
12. Recommendations on retesting.

1.5 QUALITY ASSURANCE:

- A. Qualification of Service Agencies: Engage inspection and testing service agencies, including independent testing laboratories, which are pre-qualified as complying with "Recommended Requirements for Independent Laboratory Qualification" by American Council of Independent Laboratories, which are recognized in the industry as specialized in the types of inspections and tests to be performed and which have not less than five (5) years experience in such testing.
- B. Comply with requirements of ASTM E329 and ASTM D3740.
 1. Each inspection and testing agency shall be authorized to operate in the State of Colorado.
 2. Maintain a full time registered engineer on staff to review services.
 3. Calibrate testing equipment at reasonable intervals with devices of an accuracy traceable to National Bureau of Standards or of accepted values of natural physical constants.
- C. Control of Installation:
 1. Monitor quality control over products, services, site conditions, and workmanship to produce work of specified quality.
 2. Comply fully with manufacturers' instructions, including each step in sequence.
 3. Should manufacturers' instructions conflict with Contract Documents, request clarification from Construction Manager before proceeding.
 4. Comply with specified standards as a minimum quality for the work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
 5. Perform work by persons qualified to produce workmanship of specified quality.

1.6 FIELD SAMPLES:

- A. Install field samples for review at the site as required by individual specification sections.
- B. Assemble and erect specified items with specified or required attachment and anchorage devices, flashings, seals, and finishes.

1.7 INSPECTION AND TESTING LABORATORY SERVICES:

- A. Perform inspections, tests and other services specified in individual specification sections.
- B. Submit reports indicating observations and results of tests indicating compliance or non-compliance with Contract Documents.

1.8 MANUFACTURER'S FIELD SERVICES:

- A. When specified in respective Specification sections, Contractor shall require supplier or manufacturer to provide qualified personnel to observe field conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, testing, adjusting and balancing of equipment as applicable, and to make appropriate recommendations.
- B. Manufacturer's representative shall submit written report to the Construction Manager listing observations and recommendations.

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION

3.1 The City will pay for testing for soil and aggregate compaction, topsoil and inert groundcover materials. The Contractor will pay for any retesting as a result of test failures.

3.2 REPAIR AND PROTECTION:

- A. Upon completion of inspection, testing, sample taking and similar services, repair damaged construction and restore substrates and finishes to eliminate deficiencies, including deficiencies in visual qualities of exposed finishes.
- B. Protect construction exposed by or for quality control service activities, and protect repaired construction.
- C. Repair and protection is the Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing or similar services.

3.3 SCHEDULE OF INSPECTIONS AND TESTS: The following is a summary of tests and inspections specified in the appropriate sections and compiled here for convenience of reference. Additional testing as referenced in individual sections will also be required.

- A. Testing Paid by Owner's Representative (Initial Test Only):
 - 1. Fill and backfill compaction density tests: Section 02200.
- B. Testing Paid By Contractor:
 - 1. Contractor to pay for retesting if further tests are required.
- C. Schedule of quality control tests and inspections.

<u>Test/Inspection Description</u>	<u>ASTM Test Frequency</u>
Section 02200:	
Fill and backfill material	1 per each soil type
Proctor	D698
Plasticity index	D4318
Particle size analysis	D422
Field density tests	D2922
Field moisture tests	D3017
General fills for building and paved areas	1 per 2000 SF
Backfill	1 per 250 SF
Site work	1 per 400 CY
Utility lines	1 per 150 LF

END OF SECTION 01400

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS: The General Contract Conditions, Drawings and other Division 1-Specification sections apply to this section.
- 1.2 DESCRIPTION: Section includes minimum requirements for traffic control, temporary detours, barricades, services, utilities and other facilities. Construction cleaning methods and waste removal are also included. Nothing in this section is intended to limit types and amounts of temporary work required, and no omission from this section will be recognized as an indication that such temporary activity is not required for successful completion of the work. The use of alternative facilities equivalent to those specified is the Contractor's option, subject to the Construction Manager's acceptance.
- 1.3 QUALITY ASSURANCE:
- A. Standards:
1. Comply with governing regulations, industry standards and utility company regulations and recommendations, including, but not limited to, codes, permits, inspections, testing, and health, safety, fire, pollution and environmental regulations.
 2. Signage and Barricades: All signs, barricades, or other traffic control measures shall be in conformance with the requirements of the "Manual of Uniform Traffic Control Devices for Streets and Highways", U.S. Department of Transportation, Federal Highway Administration, including State of Colorado supplements or as detailed in the Contract Documents.
- B. Temporary Utilities:
1. Engage the appropriate local utility company to install temporary service or connect to existing service. Where the company provides only part of the service, provide the remainder with matching, compatible materials and equipment; comply with the company's recommendations.
 2. Arrange with the company for a time when service can be interrupted, if necessary, to make connections for temporary service.
- 1.4 SUBMITTALS:
- A. Traffic Control Plan: Prior to start of construction, submit traffic control plan for approval by the Construction Manager. Work within City right-of-ways that impacts pedestrian or vehicular traffic requires approval of the traffic control plan and issuance of a street occupancy permit by the Department of Public Works.
- 1.5 PROJECT CONDITIONS:
- A. Scheduled Uses: Provide temporary facilities and services at the time first needed at the site; and maintain, expand and modify the facilities as needed throughout the construction period. Do not remove service until it is no longer

needed. At the earliest feasible time, and when acceptable to the Construction Manager, change over from the use of temporary utility service to permanent service.

- B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities, or permit them to interfere with progress. Do not allow hazardous, dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT:

- A. Provide either new or used materials and equipment for temporary facilities. Such materials shall be in substantially undamaged and serviceable condition. Provide types and qualities that are recognized in the construction industry as suitable for the intended use in each application.
- B. Barricades and Signs shall meet the requirements of ANSI D6.1-78, "Manual on Uniform Traffic Control Devices."

2.2 TEMPORARY FENCES AND BARRICADES:

- A. General: Material may be new or used, but shall be suitable for intended purpose. Fences and barriers shall be structurally adequate and neat in appearance.
- B. Construction Barrier Fencing: Plastic orange mesh construction fence, 4' height. 6' height metal T-Post at 10'0" maximum spacing.
- C. Portable Chain Link Fencing: Shall be open mesh fencing, 6-ft. height, with top and bottom rails. Posts shall be spaced at max. 8-feet on center, and be equipped with cross bar bases for stability. Weigh bases down with sandbags if required. Provide with lockable gates. Portable chain link fencing shall be required around all playground equipment installations.
- D. Barrier Tape: Banner Guard, imprinted with "CAUTION: CONSTRUCTION AREA", manufactured by Reef Industries, Inc., Houston, Texas, or approved equal.

2.3 TEMPORARY EROSION AND SEDIMENTATION CONTROL MEASURES: Refer to Section 01565.

2.4 CLEANING MATERIALS: Use only cleaning materials recommended by manufacturer of surface to be cleaned.

PART 3 – EXECUTION

3.1 TEMPORARY FACILITIES:

- A. Sanitary Facilities: Install temporary toilets in available locations which will best serve the needs of personnel at the project site.
- B. Barricades, Warning Signs and Lights: Erect and maintain barricades, lights, danger signals, and warning signs in accordance with ANSI D6.1 and the approved Traffic Control Plan
 - 1. The Contractor shall take all measures necessary to provide safety for the public as part of his construction practices.
 - 2. Fence, barricade, or otherwise block off the immediate work area to prevent unauthorized entry into the work area.
 - 3. Adequately barricade and post all open cuts in the project area. Illuminate barricades and obstructions at night; keep safety lights burning from sunset to sunrise.
 - 4. Barrier Tape: Install where needed. Keep a minimum of two rolls on site at all times.
 - 5. Cover pipes, hoses, and power lines crossing sidewalks and walkways with troughs using beveled edge boards.
 - 6. Provide adequate signage to direct both vehicular and pedestrian traffic.
 - 7. Removal: Completely remove barriers no longer needed and when approved by the Construction Manager.
- C. Enclosure Fence (Chain link fence):
 - 1. Where required or as directed by the Construction Manager, provide temporary chain link fence to enclose partially completed areas of construction that pose a severe safety hazard to the public (e.g., playground equipment). Provide locking entrance to prevent unauthorized entrance, vandalism, theft and similar violations of security. Maintain the fence throughout the course of construction and remove only upon approval of the Construction Manager.
 - 2. Storage: Where materials and equipment must be stored, and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.
- D. Temporary Construction Fencing (plastic orange mesh):
 - 1. Provide as shown on plans to protect landscape areas and direct pedestrian traffic to play areas and garden.

3.2 PROTECTIVE MEASURES:

- A. Protection of the Work:

1. The Contractor shall obtain the advice and recommendations of his installers for procedures to protect their work. Installers are responsible for protecting their work and that of other trades in overlapping and adjacent areas. When the Installer is no longer working in the area or at the job, the Contractor shall provide protective measures and materials to assure that each element will be protected from damage or deterioration (other than normal weathering for exterior exposed materials) until Final Acceptance. Remove protective coverings and materials at the appropriate time but no later than final cleaning operations.
 2. Always protect excavations and trenches from damage by rain water, spring water, ground water, or backed up drains or sewers. Provide pumps or other equipment as required.
- B. Cold Weather Protection: Provide temporary heat required by construction activities, for curing or drying of completed installations or protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed.
- C. Protection of Existing Trees and Vegetation: Protect existing trees and other vegetation to remain in place, against damage to roots, trunks or branches. Do not stockpile construction materials or excavated materials within drip line. Provide temporary guards to protect trees and vegetation to be left standing. Refer to Section 02950.
- D. Environmental Protection: Conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result.
1. Take all necessary reasonable measures to reduce air and water pollution by any material or equipment used during construction.
 2. The contractor shall take all reasonable measures to reduce noise pollution from construction operations.

3.3 CLEANING UP:

- A. Clean-Up During Construction:
1. Oversee cleaning and ensure that grounds and public properties are maintained free from accumulation of waste materials and rubbish.
 2. Take measures to prevent spread of trash, debris, cartons, packaging or other waste materials on or off the Project Site by wind.
 3. At reasonable intervals during progress of work, clean up site and access and dispose of waste materials, rubbish and debris.
 4. Clean adjacent and nearby streets of dirt occasioned by construction operations; frequency and methods as required by governing authority.
 5. Keep volatile wastes in covered containers.
 6. Utilize excavated material as soon as possible.

- B. Wet down dry materials and rubbish to prevent blowing dust. Blowing dust from the construction areas to the public areas of the park will not be allowed. The contractor must keep dust under control at all times.

3.4 WASTE DISPOSAL:

- A. Collection and Disposal of Wastes: Establish and enforce a daily system for collecting and disposing of waste materials from construction areas and elsewhere at the project site. Provide suitable trash containers at a central collection point on the site.
 - 1. Burning or burying of waste materials on the project site is not permitted.
 - 2. Disposal of volatile fluids and wastes in storm sewers, sanitary sewers, septic systems, or into streams or waterways is not permitted.
 - 3. Immediately remove hazardous rubbish from project site.
 - 4. Recycle as much as possible.
- B. Provide daily sweeping and clean-up of dust, debris, litter trash containers and other items required to maintain a clean, orderly and accessible site. Hauling of debris to legal dump or landfill is required weekly as a minimum.
- C. Waste concrete shall be removed from the site and legally disposed of by masonry and concrete installers.
- D. Construction Debris:
 - 1. Remove construction debris, as determined by the Construction Manager, and dispose of off site. Replace with approved clean soils, in accordance with Section 02200, using materials appropriate to the location on the site and methods specified for fills and backfills.
 - 2. Construction debris includes, but is not limited to, waste concrete, debris and waste materials; areas used for cleaning tools, washing mixers and concrete trucks and areas containing oils, solvents, and similar liquids or their residues.

END OF SECTION 01500

PART 1: GENERAL

- 1.1 RELATED DOCUMENTS: The General Contract Conditions, Drawings and other Division-1 Specification sections apply to Work of this section.
- 1.2 DESCRIPTION: This section includes administrative and procedural requirements governing the Contractor's selection of products for use in the project.
- 1.3 DEFINITIONS: Definitions used in this Article are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties," "systems," "structure," "finishes," "accessories," and similar terms. Such terms are self-explanatory and have well-recognized meanings in the construction industry.
- A. Products: Are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock. The term "Product" includes the terms "material", "equipment", "system" and terms of similar intent.
 - B. Named Products: Are items identified by manufacturer's product name, including make or model designation, indicated in the manufacturer's published product literature, that is current as of the date of the Contract Documents.
 - C. Materials: Are products that are substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.
 - D. Equipment: Is a product with operational parts, whether motorized or manually operated, that requires service connections such as wiring or piping.
- 1.4 SUBMITTALS:
- A. Product List: A list of products is included in each appropriate specification division. Prepare a schedule in tabular form showing each product listed. Include the manufacturer's name and proprietary product names for each item listed.
 - 1. Coordinate product list with the Contractor's Construction Schedule and the Schedule of Submittals.
 - 2. Form: Prepare product list with information on each item tabulated under the following column headings:
 - a. Related Specification Section number.
 - b. Generic name used in Contract Documents.
 - c. Proprietary name, model number, and similar designations.
 - d. Manufacturer's name and address.
 - e. Supplier's name and address.
 - f. Installer's name and address.
 - g. Projected delivery date or time span of delivery period.

3. Initial Submittal: Within 30 days after date of commencement of the Work, submit 3 copies of an initial product list. Provide a written explanation for omissions of data and for known variations from Contract requirements.
4. Completed List: Within 60 days after date of commencement of the Work, submit 3 copies of the completed product list. Provide a written explanation for omissions of data and for known variation from Contract requirements.
5. Action: The Construction Manager will respond in writing to Contractor within 2 weeks or receipt of the completed product list. No response within this period constitutes no objection to listed manufacturers or products, but does not constitute a waiver of the requirement that products comply with Contract Documents. The Construction Manager's response will include a list of unacceptable product selections, containing a brief explanation of reasons for this action.

1.5 QUALITY ASSURANCE:

A. Source Limitations:

1. To the fullest extent possible, provide products of the same kind from a single source.
2. When specified products are available only from sources that do not, or cannot, produce a quantity adequate to complete project requirements in a timely manner, consult with the Construction Manager to determine the most important product qualities before proceeding. Qualities may include attributes, such as visual appearance, strength, durability, or compatibility. When a determination has been made, select products from sources producing products that possess these qualities, to the fullest extent possible.

B. Foreign Product Limitations: Except under one or more of the following conditions, provide domestic products, not foreign products, for inclusion in the Work:

1. No available domestic product complies with the Contract Documents.
2. Domestic products that comply with the Contract Documents are available only at prices or terms substantially higher than foreign products that comply with the Contract Documents.

C. Nameplates: Except for required labels and operating data, do not attach or imprint manufacturer's or producer's nameplates or trademarks on surfaces of products that will be exposed to view in occupied spaces or on the exterior.

1. Labels: Locate required product labels and stamps on concealed surfaces or, where required for observation after installation, on accessible surfaces that are not conspicuous.
2. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on an easily accessible surface that is inconspicuous in occupied spaces. The

nameplate shall contain the following information and other essential operating data:

- a. Name of product and manufacturer
- b. Model and serial number
- c. Capacity
- d. Speed
- e. Ratings

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Deliver, store, and handle products according to the manufacturer's recommendations, using means and methods that will prevent damage, deterioration and loss, including theft.
 1. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.
 2. Coordinate delivery with installation time to assure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 3. Deliver products to the site in an undamaged condition in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting and installing.
 4. Inspect products upon delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
 5. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.
 6. Store products subject to damage by the elements above ground, under cover in a weather-tight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

1.7 GENERAL PRODUCT REQUIREMENTS:

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, new at the time of installation.
 1. Provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and the intended use and effect.
 2. Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.
- B. It is the responsibility of the Contractor and his Installers, as experts, to notify the Construction Manager of any specified product that to his knowledge will not meet the requirements or is unsuited to the application indicated or specified.

- C. The use of manufacturer's and trade names is intended only to establish standards of quality and performance and not to limit competition.
- D. Substitution of Materials and Equipment: All bids are to be based on those materials and equipment specified in the Contract Documents. The Construction Manager will be the sole judge of the acceptability of substitute materials and equipment and may accept or reject such substitutes at any time. If a bid is based on a substituted material or equipment, the Construction Manager may require a bidder to supply those materials or equipment specified in the Contract Documents at no increase in contract price and with no extension of the period of performance. Substitution after the bid will be made per Title 406 of the General Contract Conditions.

PART 2: PRODUCTS

- 2.1 PRODUCT SELECTION PROCEDURES: The Contract Documents and governing regulations govern product selection. Procedure governing product selection include the following:
- A. Proprietary Specification Requirements: Where Specifications name only a single product or manufacturer, provide the product indicated. No substitutions will be permitted.
 - B. Semi-proprietary Specification Requirements:
 - 1. Where Specifications name two or more products or manufacturers, provide one of the products indicated. No substitutions will be permitted.
 - 2. Where Specifications specify products or manufacturers by name, accompanied by the term "or equal" or "or approved equal," comply with the Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.
 - C. Nonproprietary Specifications: When Specifications list products or manufacturers that are available and may be incorporated in the work, but do not restrict the Contractor to use of these products only, the Contractor may propose any available product that complies with Contract requirements. Comply with Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.
 - D. Descriptive Specification Requirements: Where Specifications describe a product or assembly, listing exact characteristics required, with or without use of a brand or trade name, provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements.
 - E. Performance Specification Requirements: Where Specifications require compliance with performance requirements, provide products that comply with these requirements and are recommended by the manufacturer for the application indicated. Manufacturer's recommendations may be contained in published product literature or by the manufacturer's certification of performance.

- F. Compliance with Standards, Codes and Regulations: Where Specifications only require compliance with an imposed code, standard, or regulation, select a product that complies with the standards, codes, or regulations specified.
- G. Visual Matching:
1. Where Specifications require matching an established Sample, the Construction Manager's decision will be final on whether a proposed product matches satisfactorily.
 2. Where no product available within the specified category matches satisfactorily and complies with other specified requirements, comply with provisions of the Contract Documents concerning "substitutions" for selection of a matching product in another product category.
- H. Visual Selection: Where specified product requirements include the phrase "...as selected from manufacturer's standard colors, patterns, textures..." or a similar phrase, select a product and manufacturer that complies with other specified requirements. The Construction Manager will select the color, pattern, and texture from the product line selected.

PART 3: EXECUTION

- 3.1 INSTALLATION OF PRODUCTS: Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other work. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

END OF SECTION 01600

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS: The General Contract Conditions, Drawings and other Division-1 Specification sections apply to this section.
- 1.2 DESCRIPTION: This Section includes:
- A. Administrative and procedural requirements for project closeout, including but not limited to:
 - 1. Inspection procedures.
 - 2. Submittal of warranties, maintenance manuals, and record drawings.
 - 3. Specific requirements for individual units of work are specified in those specification sections that relate to the work.
 - B. Contractor's responsibility is to complete the project in accordance with the Contract Documents and to enforce their requirements on his employees, suppliers and Subcontractors.
- 1.3 SUBSTANTIAL COMPLETION:
- A. Refer to the General Contract Conditions for procedures regarding Substantial Completion.
- 1.4 FINAL ACCEPTANCE:
- A. Refer to the General Contract Conditions for procedures regarding Final Completion and Acceptance of the Work.
- 1.5 CLOSEOUT DOCUMENTS: In order to complete the Project, provide the following documents:
- A. Printed Warranties as specified in the appropriate Sections.
 - B. Parts and Maintenance materials as specified in the appropriate Sections.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01700

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS: The General Contract Conditions, Drawings and other Division-1 Specification Sections apply to this Section.
- 1.2 DESCRIPTION: Section includes general administrative and procedural requirements for warranties required by the Contract Documents, including manufacturer's standard warranties on products and special warranties.
- 1.3 RELATED SECTIONS:
- A. Refer to the Construction Contract and Contract Documents for terms of the Contractor's special warranty of workmanship and materials.
 - B. General closeout requirements: Section 01700.
 - C. Specific requirements for warranties for work, products and installations: Individual Sections in Divisions 2.
 - D. Certifications and other commitments and agreements for continuing services to the City: Applicable portions of Contract Documents.
- 1.4 DEFINITIONS:
- A. Standard Product Warranties: Pre-printed written warranties published by individual manufacturers for particular products and specifically endorsed by the manufacturer to the City.
 - B. Special Warranties: Written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the City.
- 1.5 WARRANTY REQUIREMENTS:
- A. Related Damages and Losses: When correcting warranted work that has failed, remove and replace other work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted work.
 - B. Reinstatement of Warranty: When work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

- C. Replacement Cost: Upon determination that work covered by a warranty has failed, replace or rebuild the work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective work regardless of whether the City has benefited from use of the work through a portion of its anticipated useful service life.
- D. City's Recourse:
 - 1. Written warranties made to the City are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the City can enforce such other duties, obligations, rights, or remedies.
 - 2. Rejection of Warranties: The City reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.
 - 3. The City reserves the right to refuse to accept work for the Project where a special warranty, certification, or similar commitment is required on such work or part of the work, until evidence is presented that entities required to countersign such commitments are willing to do so.
- E. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the work that incorporates the products, nor does it relieve suppliers, manufacturers, and Subcontractors required to countersign special warranties with the Contractor.

1.6 SUBMITTALS:

- A. Submit written warranties to the Construction Manager prior to Final Acceptance.
- B. When a special warranty is required to be executed by the Contractor, or the Contractor and a Subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Construction Manager for approval prior to final execution.
- C. Refer to individual specification sections for specific content requirements, and particular requirements for submittal of special warranties.
- D. Form of Submittal: At Final Completion, compile each required warranty and bond properly executed by the Contractor, or by the Contractor, Subcontractor, supplier or manufacturer. Include the warranty documents in the project operating and maintenance manuals.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01740

SECTION 02050

REMOVAL OF PAVEMENTS AND STRUCTURES

PART 1: GENERAL

- 1.1 RELATED DOCUMENTS: The General Contract Conditions, Drawings and other Division-1 Specification sections apply to Work of this Section.
- 1.2 DESCRIPTION: The work of this section consists of demolition and removal of concrete trail, culvert and tunnel lighting. The work includes backfilling and grading.
- 1.3 RELATED SECTIONS:
 - A. Earthwork - Section 02200
 - B. Watering - Section 02233
- 1.4 SUBMITTALS:
 - A. As specified in Section 01300.
 - B. Schedule for shutting off utility services.
- 1.4 QUALITY ASSURANCE:
 - A. Comply with safety requirements for demolition, ANSI A10.6-90.
- 1.5 PROJECT CONDITIONS:
 - A. Keep dust to a minimum at removal site and on haul roads. Use sprinklers or water trucks as necessary.
 - B. Ensure safety of persons in demolition area. Provide temporary barricades as required per Section 01500.
 - C. Explosives: Not Permitted.
- 1.6 CLOSEOUT SUBMITTALS:
 - A. As specified in Section 01700.
 - B. Submit project record drawings showing all abandoned utilities. (Hard copy and digital file).

PART 2: PRODUCTS

- 2.1 BACKFILL MATERIALS:
 - A. Native soils, stone, gravel, or sand, free of debris, frozen materials, and roots

and other organic matter. Pieces of concrete and masonry smaller than 1 square foot and suitably shaped for compaction may be used in backfill.

PART 3: EXECUTION

3.1 PREPARATION:

- A. Protect structures, utilities and vegetation to remain.

3.2 DEMOLITION:

- A. Pavement and Slabs: Scarify or rip bituminous pavement; break up concrete. Saw cut material adjacent to new construction. Remove completely, including aggregate base course. Dispose of off-site.
- B. Misc. Culverts: Remove completely, including aggregate base course. Dispose of off-site.
- C. Tunnel Lighting: Remove light fixtures completely, protecting existing conduit and wiring. Dispose of off-site.

3.3 RESTORATION:

- A. Backfilling:
 - 1. Ensure that areas to be filled are free of standing water, frost, frozen material, and debris.
 - 2. Place backfill materials in horizontal layers not exceeding 6-inches in loose depth. Compact each layer, at optimum moisture content to a density equal to surrounding ground. Distribute concrete and masonry pieces in fill material in a way that ensures adequate compaction and at a depth that will not interfere with new construction and grading.
- B. Grading:
 - 1. Restored Areas: Grade surface to blend with original contours and provide free drainage flow.

3.4 DISPOSAL:

- A. Dispose of unsuitable and excess material off-site unless specified.
- B. The Contractor shall dispose of pavements, slabs and gravel at a recycling facility.

END OF SECTION 02050

PART 1: GENERAL

- 1.1 RELATED DOCUMENTS: The General Contract Conditions, Drawings, and other Division-1 Specifications apply to Work of this Section.
- 1.2 DESCRIPTION: The work of this section consists of stripping native grasses, and removing and disposing of vegetation and debris.
- 1.3 RELATED WORK:
 - A. Erosion and Sediment Control - Section 01565.

PART 2: PRODUCTS

- 2.1 BACKFILL MATERIAL: As specified in Section 02200.

PART 3: EXECUTION

- 3.1 CLEARING: Remove brush and vegetation from areas designated to be cleared. As directed by the Construction Manager, trim low hanging, unsound, or unsightly branches on trees and shrubs designated to remain. Make cuts flush with trunk or branch.
- 3.2 GRUBBING: Remove all stumps, roots, and debris a minimum of 18 inches below original ground in all areas as required. Use hand methods for grubbing inside drip line of trees to remain. Fill stump and root holes as specified in Section 02200.
- 3.3 DISPOSAL: Dispose of all removed materials, trash, debris and waste materials legally outside of the Owner's property.
- 3.4 TREE REMOVAL: In all proposed landscape areas, trees under 12" caliper shall be grubbed a minimum of 18 inches below finish grade; the stumps of trees 12" caliper and over shall be ground down a minimum of 6" below finish grade. In proposed hardscape areas, all roots shall be grubbed entirely.

END OF SECTION 02110

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS: The General Contract Conditions, Drawings, and other Division - 1 Specification sections apply to Work of this section.
- 1.2 DESCRIPTION: The work of this section consists on the following:
- A. Provide excavation, regrading, strip and stockpile of topsoil, filling, backfilling, compaction and disposal of spoil materials to meet the required lines and grade as specified to complete the work. All spoil material shall be removed from the site and properly disposed of.
 - B. Erosion Control shall be maintained during all phases of site excavation and site development and maintained throughout the construction period in order to protect adjacent properties, streets, and storm sewers from erosion and sediment runoff during the construction process. Do not commence excavation and grading work until erosion control measures are in place. Contractor shall be responsible for maintaining erosion control measures throughout construction. Frequent monitoring, cleaning and other work required for proper operation shall be Contractor's responsibility. Contractor shall modify/replace all erosion control measures to fit field conditions after continual monitoring by Construction Manager.
 - C. Referenced Standards: Comply with the requirements of the reference standards noted herein, except where more stringent requirements are listed herein or otherwise required by the Contract Documents to include specifications of local agencies exercising jurisdiction over this project.
 - D. The contractor shall furnish as-built survey plans following grading operations. Plans will be required before curb and gutter, trails and other flatwork will be approved. Plans should include contours at 1' intervals.
- 1.3 RELATED SECTIONS:
- A. Removals - Section 02050.
 - B. Excavating and Backfilling of Trenches – Section 02220.
 - C. Topsoil – Section 02925.
- 1.4 DEFINITIONS:
- A. Excavation consists of removal of material encountered to subgrade or over-excavation and subsequent disposal or placement of materials removed.
 - B. All excavation will be considered unclassified regardless of the nature of material encountered.

- C. Unauthorized excavation consists of inadvertent or purposely removing materials beyond indicated sub-grade elevations or dimensions without specific direction of Engineer. Unauthorized excavation, as well as remedial work resulting from unauthorized excavation shall be at Contractor's expense.
- D. Removal of unsuitable material and its replacement as directed will be paid on basis of Conditions of the Contract relative to changes in work.
- E. Subgrade: The undisturbed earth or the compacted soil layer immediately below proposed pavement topping materials.
- F. Structure: Walls, foundations, slabs, pavement or other man-made stationary features occurring above or below ground surface.
- G. Structural Fill: The term "structural fill", as used herein, includes soil materials used for general site filling under pavements or structures.
- H. Unclassified Excavation: The term "unclassified excavation", as used herein, includes the excavation of all materials required for the work obtained within construction limits of project, including bedrock, surface boulders, wasted sections of concrete, asphalt or other debris.

1.5 QUALITY ASSURANCE:

- A. Codes and Standards: Comply with all applicable local, state and Federal rules, regulations and ordinances concerning sloping of excavation, trenching and safety of workers, including the latest version of OSHA requirements.
- B. Testing Agency: All testing required to determine compliance for the work of this section will be done by an approved testing laboratory selected and paid for by the City and as specified in Section 01400. Correct deficiencies before placing additional embankment.

1.6 PROJECT CONDITIONS:

- A. Existing Utilities: The Contractor shall contact all public utility companies and determine the location of all existing underground utilities prior to proceeding with construction. All work performed in the area of public utilities shall be performed according to the requirements of these agencies. The Contractor shall be responsible for locating any existing utility (including depth) which may conflict with the proposed construction. The Contractor shall contact Utility Notification Center of Colorado (800) 922-1987 and other local utilities for existing utility locations. The Contractor shall protect, at his own expense, all existing utilities and be responsible for their repair if they are damaged during construction.
- B. Use of Explosives: Use of explosives is not permitted.
- C. Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights.

1. Operate warning lights as recommended by authorities having jurisdiction.
2. Protect structures, utilities, walkways, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

- D. Environmental Requirements: Blasting is not permitted. Employ jack hammering and other loud noises and methods sparingly; comply with all applicable noise abatement ordinances or regulations. Onsite burning is not allowed.
- E. Existing Benchmarks: Carefully preserve and maintain existing benchmarks, vertical/horizontal control, monuments, property line pipes and pins, and other reference points. If disturbed or destroyed, restore or replace at no additional cost to the City.

1.7 SUBMITTALS:

- A. Provide one (1) cubic foot sample of backfill material for approval by Construction Manager.
- B. Material classifications for soils, test reports and density requirements.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS:

- A. General: All fill material, regardless of intended use category, must be clean and free from organic matter, roots, brush or other vegetation, trash, debris or other detrimental substances, and rocks or unbroken lumps larger than 3 inches. Construction Manager to approve material prior to placement.
- B. Structural Fill: Existing soils obtained from on-site excavations, including granular or aggregate base course from removed pavements shall be free of organic matter or any other deleterious substances. If sufficient materials meeting the above requirements are not available from on-site sources, provide additional material obtained from off-site sources and approved by the testing and inspections agency, at no additional cost to the City. The Soils Engineer will evaluate the suitability of proposed fill material prior to placement.

2.2 ON-SITE TOPSOIL:

- A. The top 4" +/- of organic material in areas to be stripped and stockpiled prior to other earthwork operations.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS:

- A. General: Remove material of every nature or description encountered in obtaining required lines and grades. Pitch grading around excavations to prevent water from running into excavated areas.
- B. In fill areas, the natural soils should be scarified to a depth of 8 inches, adjusted to a moisture content near optimum and compacted to provide a uniform base for fill placement.

3.2 EXAMINATION:

- A. Verification of Conditions: Examine areas and conditions under which the work of this Section will be performed. Do not proceed with the work until unsatisfactory conditions have been corrected. Commencement of work implies acceptance of all areas and conditions.

3.3 GENERAL PROCEDURES:

- A. Existing Utilities: Locate existing underground utilities in areas of the work. If utilities are to remain in-place, provide protection during earthwork operations. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult Construction Manager immediately for direction. Cooperate with utility companies in keeping respective permanent and temporary utility services and facilities in operation. Repair damaged utilities to the satisfaction of the appropriate utility company.
- B. Protect of Persons and Property: Provide all necessary measures to protect workmen and passerby. Barricade open excavations occurring as part of the work, as required by municipal or other authorities having jurisdiction.

3.4 GROUND SURFACE PREPARATION:

- A. Complete clearing and grubbing operations in accordance with Section 02110. Where new material is to be placed on compacted subgrade, scarify ground surface until surface is free from ruts, hummocks or other uneven features, which would prevent uniform compaction and bond between old and new material.
- B. Prior to placing asphalt or concrete pavement, the entire subgrade shall be scarified to a depth of 8 inches. Adjust moisture content and compact as hereinafter specified.

3.5 STRIPPING AND STOCKPILING TOPSOIL:

- A. Strip all topsoil from the excavation zone for new facilities (4" depth for all disturbed areas). Stockpile topsoil in locations indicated on the Drawings or as directed by the Construction Manager.

3.6 EXCAVATION:

- A. All excavation shall be considered unclassified, including excavation to subgrade or trench elevations as indicated, regardless of character of materials and obstructions encountered.
- B. Stability of excavations: Comply with local codes, ordinances, and requirements of agencies having jurisdiction to include the latest revision to OSHA standards.
- C. Excavation for Structures: Conform to elevations and dimensions shown within a tolerance of plus or minus 0.08 foot, and extending a sufficient distance to permit installation of services, and other construction and for inspection.
- D. Excavation for Pavements: Cut surface under pavements to comply with cross-sections, elevations and grades as indicated within a tolerance of plus or minus 0.1 foot.

3.7 DEWATERING:

- A. Prevent surface water and subsurface or groundwater from flowing into excavations and from flooding project site and surrounding area.

3.8 SPECIAL CONDITIONS:

- A. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.
- B. Dust Control: Provide dust control to alleviate dust nuisance to the public, to adjacent properties and other work underway at the project site.
- C. Unanticipated Conditions: Notify the Construction Manager immediately upon finding subsurface or other conditions which are not shown or which cannot be reasonably assumed from existing surveys. Secure Construction Manager's instructions before proceeding with further work in such areas.
- D. Unsatisfactory Soils: Remove or otherwise correct unsanitary, sour, or otherwise unsatisfactory soil. Remove contaminated or unsuitable material from under paved areas.
- E. Additional Excavation: When excavation has reached required subgrade elevations, notify the City's testing agency, which will make an observation of conditions. If unsuitable bearing materials are encountered at required subgrade elevations, carry excavations deeper and replace excavated material as directed by the testing agency.

3.9 FILL AND BACKFILL:

- A. General: Place soil material in layers to required subgrade elevations, for each area classification listed below, using materials specified in this Section.

1. Under grassed areas, use satisfactory excavated or borrow material.
 2. Under walks and pavements, use satisfactory excavated or borrow materials, or a combination to meet structural fill requirements.
- B. Backfill excavations as promptly as work permits, but not until completion of the following:
1. Inspection, testing, approval, and recording locations of underground utilities have been performed and recorded.
 2. Removal of all trash and debris from excavation.

3.10 PLACEMENT AND COMPACTION:

- A. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow, strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.
1. When existing ground surface after vibratory process has a density less than required compaction for a particular area classification, break up ground surface. Scarify existing subgrade to depth of 6 inches prior to compacting and placing fill.
 2. Adjust moisture condition to Soils Engineer's recommendations regarding optimum moisture content, and recompact to the densities specified in Paragraph 3.10L.
- B. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers, each layer to be compacted to meet requirements herein.
- C. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
- D. Compaction of Fill for Hardscape Areas: Select fill material shall be placed and mixed in evenly spread layers. After each fill layer has been placed, it shall be uniformly compacted. Fill materials shall be placed such that the thickness of loose material does not exceed 8 inches and the compacted lift thickness does not exceed 6 inches.
- E. Compaction, as specified above, shall be obtained by the use of sheepfoot rollers, multiple-wheel pneumatic-tired rollers, or other equipment approved by the Construction Manager. Granular fill shall be compacted using vibratory equipment or other equipment approved by the Construction Manager. Compaction of each layer shall be continuous over the entire area. Compaction equipment shall make sufficient passes to ensure that the required density is obtained.

- F. Compaction of Landscape Slope Areas: Fill slopes shall be compacted by means of sheepfoot rollers or other suitable equipment. Compaction operations shall be continued until slopes are stable, but not too dense for planting, and there is not appreciable amount of loose soils on the slopes. Compaction of slopes may be done progressively in increments of three to five feet (3' to 5') in height or after the fill is brought to its total height. Permanent fill slopes shall not exceed 4:1 (horizontal to vertical).
1. Where natural slopes are steeper than 20 percent in grade and the placement of fill is required, cut benches shall be provided at the rate of one bench for each 5 feet in height (minimum of two benches). Benches shall be at least 10 feet in width. Larger bench widths may be required by the Construction Manager. Fill shall be placed on completed benches as outlined within this specification.
- G. Place backfill and fill materials evenly adjacent to structures, piping, or conduit to required elevations. Prevent wedging action of backfill against structures by carrying material uniformly around structure, piping, or conduit to approximately same elevation in each lift.
- H. Control soil and fill compaction, providing minimum percentage of density specified. Correct improperly compacted areas or lifts as directed if soil density tests indicate inadequate compaction.
- I. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade or layer of soil material. Apply water in minimum quantity as necessary to prevent free water from appearing on surface during or subsequent to compaction operations.
1. Moisture Content: The Contractor may be required to add moisture to the excavation materials in the stockpile area if, in the opinion of the Construction Manager, it is not possible to obtain uniform moisture content by adding water on the fill surface. The Contractor may be required to rake or disc the fill soils to provide uniform moisture content through the soils.
 2. The application of water to the embankment materials shall be made with any type of watering equipment approved by the Construction Manager, which will give the desired results. Water jets from the spreader shall not be directed at the embankment with such force that fill materials are washed out.
 3. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
 4. Stockpile or spread soil material that has been removed because it is too wet to permit compaction. Assist drying by disking, harrowing, or pulverizing until moisture content is reduced to a satisfactory value.
- K. Prior to placement of any base or surfacing materials, 100% of the subgrade shall be proof rolled with a fully loaded tandem-axle truck.
- L. Density Tests: Field density tests shall be made by the City testing laboratory at locations and depths selected by the Construction Manager. Where sheepfoot

rollers are used, the soil may be disturbed to a depth of several inches. Density tests shall be taken in compacted material below the disturbed surface. When density tests indicate that the density or moisture content of any layer of fill or portion thereof is below that required, the particular layer or portion shall be reworked until the required density or moisture content has been achieved.

1. Acceptance Criteria under pavements and structures: Intervals and quantities of tests required shall be established by the Soils Engineer and approved by the Construction Manager. On-site or imported clay materials shall be compacted to at least 95 percent of maximum standard Proctor dry density (ASTM D 698) at moisture content within 2 percent of optimum. Granular material, whether imported or developed on-site, shall be moisture conditioned to within 2 percent of optimum and compacted to at least 95 percent of maximum modified Proctor dry density (ASTM D 1557).
2. Under landscape areas: 85 percent of maximum standard Proctor dry density at moisture content within 2 percent of optimum (ASTM D 698).

3.11 GRADING:

- A. General: Uniformly grade areas within project limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations or contours are indicated or between such points and existing grades.
- B. Finish surfaces free from irregular surface changes and as follows:
 1. Lawn or Unpaved Areas: Finish areas to receive topsoil to within not more than 0.10 foot above or below required subgrade elevations.
 2. Pavements: Shape surface of areas under pavement to line, grade, and cross-section, with finish surface not more than 0.02 feet above or below required subgrade elevation.
- C. Under no circumstances shall variations from specified grade elevations create any ponding or retention of water on intermediate pavement levels, or finished surfaces.

3.12 PLACING STOCKPILED TOPSOIL:

- A. Refer to Section 02925.

3.13 MAINTENANCE:

- A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades in settled, eroded, and rutted areas to specified tolerances.
- C. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

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

3.14 DISPOSAL OF EXCESS AND WASTE MATERIALS:

- A. Removal from Owner's Property: Remove waste materials, including materials not allowed for fill, backfill or site grading as specified within, trash, and debris, and dispose of it off Owner's property at Contractor's expense.
- B. Remove any excess fill material from the site, unless otherwise directed by the Construction Manager.

END OF SECTION 02200

PART 1: GENERAL

- 1.1 RELATED DOCUMENTS: The General Contract Conditions, Drawings and other Division - 1 Specification sections apply to Work of this section.
- 1.2 DESCRIPTION: The work of this section consists of furnishing, hauling, and applying water required for compaction of embankments, backfills, subgrade, and for landscaping, dust control, and other construction operations.
- 1.3 RELATED SECTIONS:
 - A. Earthwork – Section 02200.
 - B. Turfgrass Seeding – Section 02932.
 - C. Native Seeding – Section 02933.
 - D. Trees and Shrubs – Section 02950.

PART 2: PRODUCTS

- 2.1 WATER: Free of debris, organic matter, and other objectionable substances. Coordinate with Construction Manager for water supply location. Contractor shall supply water meter to measure water usage and be responsible to pay all costs related to water usage. The cost of water shall be the same amount as charged to the City.

PART 3: EXECUTION

- 3.1 WATER TRUCK:
 - A. At least 1,000 gallon capacity.
 - B. Keep at least one water truck on site when directed by Construction Manager.
- 3.2 APPLICATION: Use pressure type distributors or a pipeline equipped with sprinkler system. Provide approved meter devices near points of discharge.
 - A. Ensure a uniform application of water for optimum moisture content. Avoid excessive runoff and minimize water waste.
 - B. The Contractor may water excavation areas before excavating. Drill full depth of excavation to make moisture determinations.
 - C. If overwatering occurs, de-water at no additional expense to the City.

END OF SECTION 02233

SECTION 02520 CONCRETE WALKS, CURBS AND MISCELLANEOUS FLATWORK

PART 1: GENERAL

- 1.1 RELATED DOCUMENTS: The General Contract Conditions, Drawings, and other Division Specification sections apply to Work of this section.
- 1.2 DESCRIPTION: The work of this section consists of constructing concrete walks, curb and gutters and misc. flatwork.
- 1.3 RELATED SECTIONS:
 - A. Earthwork – Section 02200.
 - B. Aggregate Base – Section 02232.
 - C. Cast-In-Place Concrete - Section 03300.
- 1.4 SUBMITTALS: As specified in Section 01300.
 - A. In compliance with Paragraph 5.3.2 of ASTM C94, furnish statement of composition of concrete mix and ad mixtures and evidence that mix meets specified quality.
 - B. Test reports as indicated below.
 - C. Manufacturer stain color samples of specified colors.
- 1.5 QUALITY ASSURANCE:
 - A. Strength testing shall be the responsibility of the City.
 - B. Sample Panel: If requested by the Construction Manager prior to starting concrete paving, provide a sample panel using materials indicated for project work. Build panel at the site of full thickness and approximately 10 feet by 10 feet, including expansion joints, control joint, scales, fillers, etc. Provide the workmanship proposed for the work. Correct and replace sample panel until Construction Manager's acceptance of the work. Retain panel during construction as a standard for completed paving work.
 1. The approved sample panel may be a portion of the work and remain in place. Locations as directed by the Construction Manager.
- 1.6 PROJECT CONDITIONS: Place concrete only when ambient air temperatures are above 45 degrees F and rising, unless it is protected from freezing. Do not place concrete on frozen ground.

- 1.7 TRAFFIC CONTROL: Contractor shall maintain safe and continuous flow of traffic in streets and access to private property at all times. The Contractor shall provide a safe roadway by erecting and maintaining standard advance warning signs, barricades and adequate safeguards around all excavations, embankments and obstructions. The Contractor shall provide suitable warning lights for night operation or any other time when visibility is limited. The Contractor shall further provide flagmen and/or uniformed police officers as may be determined by the City for the protection of the public. The Contractor shall coordinate his operations with the City in order that approved methods which meet City Standards are used in detouring traffic flow, parking, pedestrian flow, access to private property. See Section 01500 – Construction Facilities and Temporary Controls.

PART 2: PRODUCTS

- 2.1 SUBGRADE MATERIAL: Dense, readily compactible material, free from vegetable matter and lumps of clay. Material excavated from on-site that meets this requirement may be used if approved. See Section 02200.
- 2.2 CONCRETE:
- A. Materials: Materials, including cement, aggregates, water, and admixtures, shall meet the requirements of ASTM C94-90. Refer to Section 03300 for additional materials and requirements.
 - 1. Cement: Type II.
 - 2. Coarse Aggregate: Maximum size, 3/4 inch complying with ASTM C33-90.
 - 3. Water: Potable
 - 4. Air Entraining Admixture: ASTM C260-86. No chlorides will be permitted.
 - 5. Water Reducing Admixture: ASTM C494-86 Type A. Provide for all flatwork. No chlorides will be permitted.
 - B. Quality of Concrete: Concrete shall be furnished under Option C, ASTM C94-90, whereby the manufacturer assumes full responsibility for the selection of the proportions for the concrete mixture. Submit statement of composition as called for in Part 1 of this section.
 - C. Total Average Air Content: 5 to 7 percent.
 - D. Minimum Cement Content: 6 sacks per cubic yard.
 - E. Water Cement Ratio: Max. (.48 ±).
 - F. Slump: Maximum 4 inches.
 - G. Compressive Strength: 4,000 PSI minimum at twenty-eight days.
 - H. Manufacture and Delivery: Measurement of materials, batching, mixing, transporting, and delivery shall be as specified in ASTM C94-90. Discharge

concrete into forms within 1-1/2 hours after introduction of water to cement. When temperature of concrete is 85 degrees F or above, the time between introduction of water to cement and complete discharge of concrete into forms shall not exceed 45 minutes.

- 2.3 FIBROUS CONCRETE REINFORCEMENT: Provide fibrous concrete reinforcement for all flatwork, consisting of 100% virgin polypropylene, fibrillated fibers containing no reprocessed olefin materials and specifically manufactured to an optimum gradation utilizing 25 individual fiber designs for use as concrete secondary reinforcement. Volume per cubic yard shall equal a minimum of 0.1% (1.5 pounds). Fiber manufacturer must document evidence of 5 year satisfactory performance history, compliance with applicable building codes and ASTM C1116 Type III 4.1.3 and ASTM C1116 Performance Level I. Acceptable manufacturer: Fibermesh Company, 4019 Industry Drive, Chattanooga, Tennessee, USA, 37416 or approved equal.
- 2.4 EXPANSION JOINT FILLERS: Pre-molded closed cell polyethylene foam, equal to "Sonoflex F" by Sonneborn, Minneapolis, Minnesota. Provide ½-inch thick by depth of the slab material, allow ½ thickness for joint sealer.
- 2.5 EXPANSION JOINT SEALER : Silicone sealant material, available from CDOT's pre-approved list of manufacturers. Where color additive is used, color to match.
- 2.6 CURING COMPOUND: Clear Spray Applied Membrane Forming Liquid conforming to ASTM C309-81, Type 1. Curing Compound shall not reduce bonding or adhesion of finish materials applied to concrete surfaces.

PART 3: EXECUTION

- 3.1 PREPARATION OF SUBGRADE: Excavate to required depth. Remove soft, yielding material and replace with select fill. Compact in accordance with requirements of Section 02200.
- 3.2 MAINTENANCE OF SUBGRADE: Maintain subgrade in a compacted condition until concrete is placed.
- 3.3 FORMS: Metal or uniform warp free lumber, coated with form release agent. Slope forms to give slabs positive drainage and stake securely. Obtain approval of Construction Manager for alignment and grade before placing concrete. Radii shall be continuous and flowing to avoid angular intersections in the horizontal alignment.
- 3.4 PLACING:
 - A. Concrete shall be formed, placed, vibrated and finished by hand using conventional methods. Concrete shall be placed at the line and grade shown on plans.
 - B. Place concrete on moistened subgrade monolithically between construction joints. Deposit to full depth in one operation. Consolidate immediately. After depositing concrete, screed and darby or bullfloat.

3.5 CONCRETE FINISHING:

- A. After darbying or bullfloating, stop finishing until bleeding has ceased and until concrete can support foot pressure with only about 1/8-inch indentation. During or after the first floating, check planeness of surface with a 10-foot straightedge applied at not less than two different angles, and then cut down all high spots and fill all low spots to achieve a true plane within 1/8 inch in 10 feet.
- B. Refloat slab immediately to a uniform sandy texture. Use steel trowel to densify surface, then apply medium broom finish to slab perpendicular to line of traffic.

3.6 FORM REMOVAL: Remove forms after concrete surface is hard enough so as not to be injured in any way. Reasonable care is to be used in removing forms. Repair minor defects with mortar. Plastering will not be permitted on exposed faces.

3.7 JOINTS: Construct joints true to line with faces perpendicular to surface.

- A. Expansion Joints: Expansion joint material shall be provided at the following locations and shall be in place prior to the placing of concrete: 1) at each end of curb return; 2) between sidewalk and driveway slabs or service walks; 3) between new concrete and existing concrete; 4) as shown on the plans; 5) between new concrete and fixed vertical objects, or 6) as directed by the Construction Manager.
- B. Contraction (Control) Joints in Walks: Contraction joints shall be formed with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete that has hardened sufficiently that cutting action will not tear, abrade, or otherwise damage surface, but before development of random contraction cracks. Saw cut joints shall be spaced at a distance equal to the width of the walk and to a depth of one-fourth the slab thickness. Tooled joints will not be allowed on concrete trails, unless directed by the Construction Manager.
- C. Joints in Handicap Ramps: Joints in handicap ramps shall be heavily tooled in a 12" x 12" pattern in accordance with standard City details.
- D. Curb and Gutter Contraction (Control) Joints: Space curb and gutter joints not more than 12 feet 6 inches on center, and align them with sidewalk joints. Contraction joints shall be tooled. Form plane of weakness by inserting and later removing a metal divider, finish with an edger or groover, or by saw cutting a previously tooled joint.
- E. Sawcut "Ribbon" Joint: Contractor to handcut smooth and continuous sawcut joints of ribbon edges as shown on drawings.

- 3.8 CURING: Thoroughly cure and protect concrete by keeping the surface moist for 7 calendar days or by use of curing compound applied in accordance with manufacturer's written instructions. Cure slabs with integral color in accordance with instructions of the pigment manufacturer using a pigmented membrane-forming curing compound with integral color to match concrete pigment. On exposed slabs with integral color, do not use polyethylene or paper sheeting.
- 3.9 FIELD QUALITY CONTROL: Surfaces shall not vary more than 1/8-inch when tested with a 10 foot straightedge.

END OF SECTION 02520

PART 1: GENERAL

- 1-1 DESCRIPTION: The work of this section consists of the construction of reinforced concrete pipe for storm sewers and drain pipe, in accordance with the lines and grades indicated or established.
- 1-2 RELATED WORK SPECIFIED ELSEWHERE:
A. Excavation, Trenching and Site Earthwork - Section 02221
B. Storm Sewer Inlets - Section 02516
C. Erosion Control – Section 02540
- 1-3 QUALITY ASSURANCE: Standards, American Association of State Highway and Transportation Officials (AASHTO) and American Society for Testing and Materials (ASTM).
- 1-4 SUBMITTALS: In accordance with General and Special Conditions, submit product data on all pipeline materials used and test results on pipe material by manufacturer. Submit shop drawings for all pipe and fittings.
- 1-5 PRODUCT HANDLING:
A. Delivery: Handle pipe and fittings to insure delivery in a sound, undamaged condition.
B. Storage: Do not store materials on the ground. Use covers to protect materials from direct sunlight.
- 1-6 JOB CONDITIONS:
A. Do not lay pipe when trenches or weather conditions are unsuitable for such work.

PART 2: PRODUCTS

- 2-1 REINFORCED CONCRETE PIPE:
A. Reinforced concrete pipe shall comply with the requirements of ASTM Specification, Designation C76. The pipe shall be Class III unless noted otherwise on the drawings. The cement for the pipe shall conform to the requirements set forth in ASTM Specification, Designation C150 and shall be Type III and shall have a minimum compressive strength of 4,000 psi. All wall thickness shall be those established in "Wall B" in Table 3, of said C76 specification, and the reinforcement shall be as shown in the same "Wall B".
1. No elliptical reinforcement will be permitted.
 2. Lifting holes will not be permitted in any of the pipe.
 3. The following shall be clearly marked on the interior surface of the pipe:
 - a. ASTM Specification
 - b. Class and size

- c. Date of manufacture
 - d. Name or trademark of manufacturer
- B. The joint design shall be bell and spigot with rubber gaskets. The gaskets for the pipe shall be neoprene and shall comply with the requirements of ASTM C443.
- C. Grout for joints shall be a non-shrink grout, Master Builders Master-flo 713 grout, or approved equal.
- D. Flared end sections, bends and tees shall comply with the requirements of ASTM C76 and shall be the same class and shall have the same joint design as the pipe described above. Temporary plugs shall be specifically manufactured for the pipelines in which they are to be installed. The plug shall be constructed of concrete and shall provide a permanent water-tight installation.
- E. The pipe will be tested by the manufacturer based on the 3-edge bearing test as set forth in ASTM Specification, Designation C76. At the Contractor's own cost, which cost shall include the pipe, testing, and report to the Engineer, the pipe shall be tested at the manufacturer's plant. Not more than 1 percent of the number of pipe lengths, but no fewer than 2 pipes for each size of pipe will be tested. The Engineer may select the pieces to be tested. In addition, visual testing will be made at the job site, and pipe will be rejected on account of any deficiencies covered by ASTM Specification Designation C76 and on account of the following:

Porous spots, inside or outside, having an area greater than 10 square inches and a depth of more than 1/4 inch.

Patched or repair of porous spots, or other defects that are not approved by the Engineer.

Exposure of reinforcement which indicates the reinforcement is misplaced.

Any broken or chip in the bell or spigot that would interfere with the gasket seal.

PART 3: EXECUTION

3-1 LAYING CONDUIT:

- A. Provide proper facilities for lowering pipe sections into place. Dropping pipe will not be permitted. Place each section true to line and gradient in close and true contact with adjacent sections.
- B. Lower segment shall be in contact with shaped bedding its full length. Bedding and backfill shall conform to details in drawings. Place bell or groove ends of conduits facing upstream.

3-2 JOINING CONDUIT:

- A. The pipe bell and spigot end shall be thoroughly cleaned with a wire brush to remove any dirt or concrete. Both ends of the joint shall be inspected for

uneven surface or projection that would affect the joint. Repair damage if necessary.

- B. A lubricating solution which is not injurious to the gasket or concrete such as flax soap shall be liberally applied to the gasket groove and to the entire surface of bell ring. Following this operation, a thin film of lubricant shall be applied to the gasket which shall then be snapped into place in the groove, after which a small diameter smooth steel rod shall be inserted between the gasket and groove and run completely around the gasket to equalize the gasket tension.
- C. In the event any foreign material becomes embedded in the lubricant, or the lubricant becomes contaminated by water or other substances before the joint is started, the area affected shall be re-cleaned and new lubricant applied.
- D. The pipe being jointed shall be carefully moved into position, line and grade checked and, as the spigot end is started into the bell of the section previously laid, the gasket position shall be checked to insure uniform entry into the bell at all points. Examine the completed joint to assure that contact is complete and uniform for the full circumference.
- E. When indicated on the Drawings that alignment changes are required, the deflection shall be accomplished by the use of fabricated bends, beveled end sections or deflecting joints depending on the change required. Maximum opening shall be no more than 2-inch greater than the opposite side of the joint. Openings greater than 1-inch shall be grouted.
- F. The Contractor shall inspect the interior surface of each pipe joint and sealant location after it has been shoved home. All cracks, chips, and other defects noted in the lining shall be repaired by the Contractor with materials furnished by the pipe manufacturer. The interior joints of pipe on flat grade or where designated shall be coated and sealed with non-shrink grout materials.

END OF SECTION

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS: Drawings and general provisions of the Construction Contract, and Division – 1 Specification sections apply to Work of this section.
- 1.2 DESCRIPTION: The work of this section consists of installing landscape boulders.
- 1.3 RELATED WORK:
 - A. Earthwork – Section 02200.
- 1.4 SUBMITTALS:
 - A. As specified in Section 01300.

PART 2 - PRODUCTS

- 2.1 LANDSCAPE BOULDERS :
 - A. Stone Source:
 - 1. The Contractor shall supply and install landscape boulders as shown on the plans. The Landscape Architect will direct final placement of these boulders in all locations. The boulders shall be high quality Loveland Buff Sandstone as provided by Arkins Park Stone Co. in Loveland (970)663-1920 or approved equal.
 - B. Sizes:
 - 1. Refer to plans for exact dimensions.

PART 3 – EXECUTION

- 3.1 INSTALLATION: The Owner Representative shall be present for the placement of all landscape boulders. Place as shown on plans. Prior to backfilling, receive approval of all boulder locations. Backfill with excavated material. Thoroughly compacted backfill and blend smoothly with surrounding terrain.
 - A. All boulders shall be buried to 1/3 the total rock depth.
 - B. Exposes scrapes and machine scratch marks caused by excavating, transporting and placing of rocks shall be removed by heat treating affected areas with an acetylene torch, or approved means.

END OF SECTION 02830

PART 1: GENERAL

- 1.1 RELATED DOCUMENTS: The General Contract Conditions, Drawings and other Division - 1 Specification sections apply to Work of this section.
- 1.2 DESCRIPTION: The work of this section consists of ripping, fertilizing, soil conditioning and fine grading of topsoil in preparation for seeding, sodding, shrub beds or planting operations.
- 1.3 RELATED SECTIONS:
- A. Earthwork – Section 02200
 - B. Topsoil – Section 02925
 - C. Native Seeding – Section 02933
- 1.4 SUBMITTALS:
- A. Quality Control Submittals:
 - 1. Certificates: State, federal and other inspection certificates shall accompany invoice for materials showing source or origin. Submit to Owner's Representative prior to acceptance of material.
 - 2. Material Analysis: Provide soil conditioner analysis performed no more than 3 months prior to delivery to site.
- 1.4 DELIVERY, STORAGE AND HANDLING:
- A. Fertilizer: Deliver inorganic or chemical fertilizer to site in original unopened containers bearing manufacturer's guaranteed chemical analysis, name, trade name, trademark and conformance to state law, bearing name and warranty or producer. If fertilizers are delivered in bulk, supplier shall provide the same certification as above.
 - B. Notify Owner's Representative of delivery schedule in advance so material can be inspected upon arrival at project site. Immediately remove unacceptable material from project site.
- 1.5 PROJECT/SITE CONDITIONS:
- A. General: Do not perform work when climate and existing site conditions will not provide satisfactory results.
 - B. Vehicular accessibility on site shall be as directed by the Owner's Representative. Repair damage to prepared ground and surface caused by

vehicular movement during work under this section to original condition at no additional cost to the City.

PART 2: PRODUCTS

2.1 SOIL MATERIALS:

- A. Topsoil: Shall be as specified under Section 02925 - Topsoil.
- B. Soil Conditioner: Shall be Class 1 Compost by A1 Organics, 16350 WCR 76, Eaton, Colorado 80615 (970) 454-3492.

2.2 OTHER MATERIALS:

- A. Fertilizer: Diamonium phosphate (18-46-0).
- B. Post Emergent Herbicide: Roundup (Glyphosate) as manufactured by Monsanto Company or approved equal.

PART 3: EXECUTION

3.1 EXAMINATION:

- A. General: Verify that existing site conditions are as specified and indicated before beginning work under this Section.
 - 1. Grades: Inspect to verify rough grading is within +/- 0.1 foot of grades indicated and specified.
 - 2. Damaged Earth: Inspect to verify that earth rendered unfit to receive planting due to concrete, water, mortar, limewater or any other contaminant dumped on it has been removed and replaced with clean earth from a source approved by the Owner's Representative.
- B. Unsatisfactory Conditions: Report in writing to General Contractor with copy to Owner's Representative.
- C. Acceptance: Beginning of installation means acceptance of existing conditions by installer.

3.2 PREPARATION:

- A. Protection:
 - 1. Locate sewer, water, irrigation, gas, electric, phone and other pipelines or conduits and equipment prior to commencing work.
 - 2. Be responsible for proper repair to landscape, utilities, walls, pavements

and other site improvements damaged by operations under this section.

- B. Weed Control: Remove annual weeds by tilling. Remove perennial weeds by applying herbicide 1 week before soil preparation and as needed, but no sooner than 3 months before beginning work.
- C. Surface Grade: Remove weeds, debris, clods and rocks larger than ½". Dispose of accumulated debris at direction of Owner's Representative.
- D. Runoff: Take measures and furnish equipment and labor necessary to control the flow, drainage, and accumulation of water. Insure that all water will run off the grades.
- E. Erosion Control: Take measures and furnish equipment and labor necessary to control and prevent soil erosion, blowing soil and accumulation of wind-deposited material on the site throughout duration of work.

3.3 INSTALLATION:

A. Soil Preparation in Native Seed Areas:

- 1. Evenly distribute soil conditioner and first application of fertilizer at the following rates:
 - a. Soil conditioner at the rate of 5 cu.yds. per 1,000 square feet for sodded areas, 3 cu yds. Per 1,000 square feet for seeded areas, 3 cu yds. Per 1,000 square feet for shrub beds.
 - b. 18-46-0 fertilizer at the rate of 4 lbs. per 1,000 square feet.
- 2. After applying soil conditioner and fertilizer, thoroughly till area to depth of 6" minimum by plowing, harrowing, or disking until soil is well pulverized and thoroughly mixed.

B. Fine Grading in all Landscape Areas:

- 1. Do fine grading for all areas prior to seeding or planting.
- 2. For ground surface areas surrounding buildings to be landscaped, maintain required positive drainage away from buildings.
- 3. Establish finish grades to within 0.1 foot of grades indicated. Allow 1-1/2 inch for thickness of sod.
- 4. Noxious weeds or parts thereof shall not be present in the surface grade prior to seeding.
- 5. Prior to acceptance of grades, hand rake to smooth, even surface, free of debris, clods, rocks and vegetable matter greater than 0.5 inch.

3.4 NOTIFICATION AND INSPECTION:

- A. Inspection: Provide notice to Owner's Representative requesting inspection at least seven (7) days prior to anticipated date of completion.
- B. Deficiencies: Owner's Representative will specify deficiencies to Contractor who

shall make satisfactory adjustments and shall again notify Owner's Representative for final inspection.

3.5 CLEANING:

- A. General: Remove debris and excess materials from site. Clean out drainage inlet structures. Clean paved and finished surfaces soiled as a result of work under this Section, in accordance with direction given by Owner's Representative.

3.6 PROTECTION:

- A. General: Provide and install barriers as required and as directed by Owner's Representative to protect completed areas against damage from pedestrian and vehicular traffic until acceptance by City. Contractor is not responsible for malicious destruction caused by others.

END OF SECTION 02920

PART 1: GENERAL

- 1.1 RELATED DOCUMENTS: The General Contract Conditions, Drawings and other Division - 1 Specification sections apply to Work of this section.
- 1.2 DESCRIPTION: The work of this section consists of stockpiling and placing topsoil on a previously prepared subgrade.
- 1.3 RELATED WORK:
- A. Earthwork: Section 02200
 - B. Soil Preparation: Section 02920
 - C. Turfgrass Seeding: Section 02932
 - D. Native Seeding and Mulching: Section 02933
 - E. Trees and Shrubs: Section 02950
- 1.4 QUALITY ASSURANCE: Submit soil analysis report for imported topsoil from the State University Agricultural Extension Service or other approved soil testing laboratory. Report shall cover soil textural classification (percentages of sand, silt, and clay), pH and include additive recommendations. Testing will be at the expense of the Contractor.
- 1.5 DELIVERY, STORAGE AND HANDLING: Do not deliver or place topsoil in frozen, wet, or muddy condition.

PART 2: PRODUCTS

- 2.1 ON-SITE TOPSOIL: Topsoil previously stripped and stockpiled under Section 02200.

PART 3: EXECUTION

- 3.1 PLACING TOPSOIL:
- A. Scarify compacted subgrade to a 6-inch depth to bond topsoil to subsoil. Place salvaged topsoil to a minimum depth of 4-inches after settlement. Topsoil shall be free from weeds, sod, clods and stones larger than 1-inch, toxic substances, litter or other deleterious material. Spread evenly and grade to elevations and slopes shown. Hand rake areas inaccessible to machine grading.

END OF SECTION 02925

PART 1: GENERAL

- 1.1 RELATED DOCUMENTS: The General Contract Conditions, Drawings and other Division - 1 Specification sections apply to Work of this section.
- 1.2 DESCRIPTION: The work of this section includes native grass seeding, mulching, netting if applicable, and maintenance of the seeded areas until Final Acceptance.
- 1.3 RELATED SECTIONS:
- A. Watering - Section 02233
 - B. Irrigation System - Section 02810
 - C. Soil Preparation - Section 02920
 - D. Topsoil – Section 02925
 - E. Trees and Shrubs - Section 02950
- 1.4 REFERENCES:
- A. Reference Standards: Comply with U.S. Department of Agriculture Rules and Regulations under Federal Seed Act and be equal or better in quality than standards for certified seed.
- 1.5 SUBMITTALS:
- A. Quality Control Submittals:
 - 1. Certificates: State, Federal or other inspection certificates shall accompany the invoice for materials showing source or origin. Submit to Owner's Representative prior to acceptance of the material.
 - B. Contract Closeout Submittals:
 - 1. Operating and Maintenance Data: At completion of work, submit 3 copies in accordance with Section 01700. Include directions for irrigation, mowing and spraying as required for continued and proper maintenance through full growing season and dormant period.
 - 2. Warranty for Native Seed in Irrigated Areas: At completion of work, furnish written warranty to Owner based upon requirements as specified.
- 1.6 QUALITY ASSURANCE:
- A. Source Quality Control:

1. Seed Materials: Subject to inspection and acceptance. Owner's Representative reserves the right to reject at any time or place prior to acceptance, any work and seed which in the Owner's Representative's opinion fails to meet specification requirements.
 2. Inspection: Primarily for quality; however, other requirements are not waived even though visual inspection results in acceptance.
 3. Inspection will be made periodically during seeding, at completion of seeding and at end of warranty period by Owner's Representative.
- B. Testing Requirements: Seed and seed labels shall conform to current State and Federal regulations and be subject to testing provisions of the Association of Official Seed Analysis.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Seed: Deliver seed in sealed standard containers stating correct name and composition on the outside of the container. Seed damaged in transit or storage will not be accepted.
- B. Fertilizer: Deliver inorganic or chemical fertilizer to site in original unopened container bearing manufacturer's guaranteed chemical analysis, name, trade name, trademark and conformance to state law, and bearing name and warranty of producer.
- C. Material will be inspected upon arrival at project site.
- D. Immediately remove unacceptable material from job site.

1.8 PROJECT/SITE CONDITIONS

- A. Existing Conditions: Vehicular accessibility on site shall be as directed by Owner's Representative. Repair damage to prepared ground and surfaces, caused by vehicular movement during work under this section, to original condition at no additional cost to the City.
- B. Environmental Conditions: Do not drill or sow seed during windy weather or when ground is frozen or otherwise untillable.

1.9 WARRANTY:

- A. Warranty for Native Seed in Irrigated Areas: Warrant areas in seed to be in a healthy, vigorous growing condition, and for consistency and completion of coverage for a period of one year from date of final acceptance as a full stand of grass. After time of seed germination, re-seed any spots where seed has not germinated within the total seeded area. Continue this procedure until a successful stand of grass is growing and accepted by the Owner's Representative.

1. During the original warranty period, reseed at once with comparable blend/mix, those areas that have failed to achieve a stand of grass or which in the Owner's Representative's opinion are unhealthy.
2. Reseeding will not be required in any season definitely unfavorable for seeding.
3. Reseed in a manner to achieve quality as originally specified.

B. Warranty for Native Seed in Unirrigated Areas: No warranty will be required.

1.10 MAINTENANCE:

- A. General: The maintenance period shall begin immediately after each area is seeded and continue until Final Acceptance of entire project or a minimum of 90 days, whichever is longer. Final Acceptance of seeded areas will not be given until Owner's Representative is satisfied with germination and a full stand of grass is in a vigorous growing condition, with consistency and completion of coverage. During this time, be responsible for watering, mowing, spraying, weeding, and all related work as necessary to ensure that seeded areas are in a vigorous growing condition. Provide all supervision, labor, material and equipment to maintain seeded areas. After Final Acceptance, maintenance shall become the responsibility of the City.
- B. Irrigated Areas (if applicable): The seeded areas shall be accepted on the basis of having a uniform plant growth over the entire seeded area. Two (2) months after seeding, the seeded areas shall be reviewed by the Owner's Representative and the Contractor. Any areas (as determined by the Owner's Representative) where the seed has failed to germinate shall be reseeded and raked to cover the seed. In any area where the seed has failed to grow, reseeded shall be at the Contractor's expense until grass is established and accepted. Acceptable uniform plant growth shall be defined as when scattered bare spots, not greater than 12 square inches, do not exceed 5% of the seeded area.
- C. Unirrigated Areas: The seeded areas shall be accepted on the basis of showing evidence of growth of specified seed material over the entire seeded area.
- D. Materials: Conform to specifications or otherwise be acceptable to the City.
- E. Mowing and Trimming: Mow native/adapted grasses after the grass has gone to seed, cutting back to not less than 4" height. Remove clippings from adjacent pavement or irrigated turf areas.
- F. Weed Control: Control annual weeds by mowing. Control perennial weeds through use of selective herbicides approved by the Owner's Representative.

PART 2: PRODUCTS

2.1 MATERIALS:

- A. Native Seed Mix: Refer to plans.
- B. Mulch: Wood cellulose fiber suitable for hydromulching, in accordance with CDOT 213.02
- C. Fertilizer: Inorganic mixture with following chemical composition: 20-5-10 with 50% sulfur coated urea (no iron), or as recommended by testing lab.
- D. Water: Free of substances harmful to seed growth. Water will be furnished by the Contractor, available through quick coupler or previously installed automatic irrigation system. Hoses and other watering equipment to be furnished by Contractor.
- E. Tackifier: Shall meet the requirements of CDOT 213.02.
- F. Erosion Control Blanket: Greenfix America 100% California Straw Erosion Control Blanket- WS072B, biodegradable, supplied by Revex, Inc., 8941 Woodland Rd. Longmont, CO 80503, Ph: 1-800-666-4050, or approved substitution.

PART 3: EXECUTION

3.1 EXAMINATION:

- A. Verify that existing site conditions are as specified and indicated before beginning work under this section.
 - 1. Layout: Verify layout of seeding areas as indicated prior to starting seeding operations.
 - 2. Grades: Inspect to verify that fine grading is within 0.1 foot of grades specified and indicated.
- B. Unsatisfactory Conditions: Report in writing to General Contractor with a copy to the Owner's Representative.
- C. Acceptance: Beginning of installation means acceptance of existing conditions by this Contractor.

3.2 PREPARATION:

- A. Protection:
 - 1. Be responsible for proper repair to landscape, utilities, fences, pavements and other site improvements damaged by operations under this section.
 - 2. Pay for repairs made by Contractor(s) designated by the City.

3. Identify prepared seeding areas requiring protection and erect barriers for proper protection and traffic control.
- B. Erosion Control: Take measures and furnish equipment and labor necessary to control and prevent soil erosion, blowing soil and accumulation of wind-deposited materials on the site throughout the duration of work.
- C. Seeding Areas: Remove weeds, debris and rocks larger than 1" which may hinder seeding or subsequent operations. Dispose of accumulated debris at direction of the Owner's Representative.
- D. Fine Grading: Perform as required to maintain positive drainage, prevent ponding and direct run-off into catch basins, drainage structures, etc., and to provide smooth well-contoured surface prior to proceeding. A firm weed-free seed bed is required. Tolerance: ± 0.1 foot.
- E. Soil Amendments: Install specified amendments prior to seeding.

3.3 SEEDING:

- A. General: Accomplish seeding by a rangeland grass drill with double disk openers and depth bands. Drill in a manner such that after surface is raked and rolled, seed shall have 1/4" to 1/2" of cover. Any furrows left by drill seeding shall be rolled to a smooth surface.
- B. In areas too small or steep to operate a drill and if approved by the Owner's Representative, seeding may be accomplished by broadcast or hydraulic type seeders at twice the rate specified, at no additional cost to the project. seed by broadcasting or hydroseeding. Broadcast seed shall be raked in at least 1/4 inch.
- C. Seeding Seasons
 1. Irrigated Areas:
Spring Seeding: Spring thaw to June 30
Fall Seeding: September 1 to consistent ground freeze
 2. Unirrigated Areas:
Spring Seeding: Spring thaw to June 1
Fall Seeding: September 1 to consistent ground freeze

3.4 MULCHING:

- A. Mulch Application: Utilize an approved hydromulcher to apply cellulose fiber at a rate of 2000 lbs. per acre.
- B. Mulching shall not be done in the presence of free surface water resulting from rains, melting snow or other causes.
- C. Areas not properly mulched, or damaged due to the Contractor's negligence,

shall be repaired and remulched in an acceptable manner at the Contractor's expense. Mulching removed by wind prior to acceptance shall be re-established by the Contractor at his own expense.

- D. The seeded area shall be mulched within 8 hours after seeding. Areas not mulched within 24 hours after seeding must be re-seeded with the specified seed mix at the Contractor's expense.
- E. Contractor shall remove all hydromulch from plant materials, fences, paved areas and other objects as directed by Construction Manager.

3.5 FERTILIZING:

- A. Distribute 20-5-10 fertilizer uniformly at the rate of 1 lb. actual nitrogen per 1,000 sq.ft. or 5 lbs of material per 1,000 sq.ft. 45 days after planting of seed and every 30 days thereafter until Final Acceptance of project.

3.6 EROSION CONTROL BLANKET: Install erosion control blanket on slopes 4:1 or greater and in swales, other areas of concentrated runoff or as shown on plans. Install in accordance with manufacturer's instructions.

3.7 CLEANING: Remove debris and excess materials from site. Clean paved and finished areas soiled as a result from work under this section, in accordance with direction given by the Owner's Representative. Clean out drainage inlet structures.

3.8 PROTECTION: Provide and install barriers as required and as directed by the Owner's Representative to protect seeded areas from damage from pedestrian and vehicular traffic. Contractor is not responsible for malicious destruction of seeding caused by others.

END OF SECTION 02933