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## DIVISION 1

### SECTION 01000 – PROJECT SUMMARY

#### PART 1 - GENERAL

##### 1.01 Scope

- A. This section contains general requirements that are applicable to this project.

##### 1.02 Description of Work

- A. The Contractor shall provide all labor, materials and equipment necessary to perform the work items called for on the bid schedule.

##### 1.03 City Furnished Materials

- A. None.

##### 1.04 Conditions of Work

- A. Area of Work: The Contractor shall confine his operations to the immediate work area. Material storage shall be confined to areas shown on the Drawings or designated by the City.
- B. Regulations: The Contractor shall comply with all applicable Federal, State, and local regulations pertaining to safety, traffic control, fire prevention, erosion control and environmental protection.
- C. Working Hours: The Contractor's working hours shall be between 7:00 a.m. and 5:00 p.m., with no work on weekends or Federal holidays, unless otherwise approved by the City.
- D. Material Storage: The Contractor's material and equipment storage site shall be limited to the area of the project site. The area shall be kept orderly and free of litter.

##### 1.05 Project Cleanup

- A. The Contractor is responsible to maintain the construction site in a clean and orderly condition from the start of the project to completion. Daily cleanups are required.
  - 1. The City may require Contractor to perform cleanup within 100 feet of the progress of the work and perform cleanup of the site daily prior to work stoppage.
- B. Store volatile wastes in covered containers and dispose off-site.
  - 1. Provide on-site covered containers for the collection of waste materials, debris and rubbish.
  - 2. Neatly store construction materials, such as concrete forms, when not in use.
- C. Wastes shall not be buried or burned on the site or disposed of into storm drains, sanitary sewers, streams or waterways.
- D. At project completion the Contractor shall remove all equipment, materials, and debris from the site including toilets and dumpsters. Areas around work sites shall be cleaned with dirt and grass surfaces raked clean of any slag from the Contractor's operations. Broom clean exterior paved surfaces.

##### 1.06 Trash Removal

- A. All non-salvageable items and trash shall be hauled off the site and disposed of in accordance with applicable state and local regulations. Items shall be transported in tarp-covered or closed vehicles. Any materials dropped or blown off vehicles shall be picked up immediately by Contractor.

### **1.07 Verification of Dimensions**

- A. The Contractor shall be responsible for the coordination and proper relation of the work. He shall field verify all dimensions and advise the City of any discrepancies prior to proceeding with that phase of the work.

### **1.08 Fire Hydrants**

- A. Fire Hydrant Connections: City's permission is required for connection to fire hydrants. Only compatible adapters shall be utilized for hydrant connections. A gate valve shall be provided and installed by the Contractor between the hydrant and supply hoses to control flow. Connection shall include backflow protection. Temporary connections to fire hydrants shall be disconnected at the end of each working day. No quick closing valves such as plug or butterfly valves will be used.

### **1.09 Outages**

- A. Utility outages necessitated by the work shall be requested in writing at least fifteen (15) working days prior to the proposed outage. The request shall be directed to the City and shall stipulate the specific utility system(s) and circuits to be affected, the location of the work, the time at which the shutdown will occur, and the duration of the outage for each system. Outages shall be kept to a minimum both in number and in duration. Where multiple outages are required, as many outages as can be accurately scheduled shall be submitted as a group.

### **1.10 Fill Material**

- A. Excess fill material, including rock, gravel, sod, broken concrete or asphalt, plaster, etc., shall be hauled off the site and disposed of in accordance with applicable State and local regulations.
- B. Additional fill material, if required, shall be hauled to the site from off the site as a necessary part of the work. Material composition shall be subject to the requirements of the specifications.

### **1.11 Parking**

- A. Parking of the Contractor's vehicles shall be restricted to an area designated by the City.

### **1.12 Telephone**

- A. Business Telephone: At the beginning of construction, the Contractor shall provide the City with a telephone number at which the Contractor or his representative may be contacted at any time during regular working hours. The Contractor shall also provide a phone number for after-duty hours contact.

### **1.13 Sanitary Provisions**

- A. The Contractor shall provide temporary toilets for the use of construction personnel. Location, type, proposed maintenance, etc., shall be approved by the City prior to placing toilets. Temporary toilets shall be removed at the completion of construction and the adjacent area restored to the condition existing prior to the start of construction or as indicated on the plans.

### **1.14 Pollution Abatement**

- A. Transporting materials to or from the site shall be accomplished in a manner preventing materials or particles from becoming airborne. Earth materials shall be covered, wetted or otherwise protected. Gravel, sand and concrete shall be contained within vehicles to prevent spillage.
- B. Prevent the deposit of dirt, mud or debris on improved streets and roads, and remove all should such deposition occur.
- C. Burning of any material on site is prohibited.
- D. Stream beds, lakes, drainage ways, sanitary and storm sewers, etc., shall not be polluted by fuels, oils, bitumen, acids, or other harmful materials. Surface drainage from the construction site, which contains harmful amounts of sediment, shall not be allowed to drain onto adjacent areas. All grading shall be accomplished to allow sedimentation to settle out prior to flowing onto adjacent areas.

- E. Flushing of concrete trucks is allowed only at the project site or the designated contractor storage area, with the responsibility of control and cleanup resting with the Contractor.
- F. Toxic, corrosive and flammable materials for construction other than specified shall not be used without prior approval of the City of Fort Collins. When approved, disposal of these materials or their containers will be off site and conform to state and federal regulations.

**1.15 Protection of Property**

- A. Initiate, maintain and supervise necessary protection to prevent damage, injury or loss to:
  - 1. The Work and materials and equipment to be incorporated in the project, whether in storage on or off the site: and
  - 2. Property at the site or adjacent thereto, including fences, patios, driveways, sidewalks, pavement, trees, shrubs, lawns, walks, structures, utilities and underground facilities not designated for removal, relocation or replacement in the course of construction.
- B. Maintain, protect, and support existing utilities and other appurtenances against damage by shoring, bracing, or other means.
- C. Do not stockpile excavated material against existing appurtenances.

**1.16 Survey Requirements**

- A. Contractor shall be responsible for construction staking necessary for proper and accurate completion of the work covered by this contract. The Contractor shall provide experienced instrument personnel, competent assistants, and such instruments, tools, stakes, and other materials required to complete the survey, layout, and measurement Work. Survey work shall be performed under the direction of a licensed professional surveyor in the State of Colorado. In addition, Contractor shall furnish, without charge, competent personnel and such tools, stakes, and other materials as Engineer may require in checking survey, layout, and measurement Work performed by the Contractor.
- B. All work shall be performed to the lines, grades, and elevations shown on the Drawings. When construction falls within the following tolerances, the installation will be acceptable to the Owner, with respect to the lines and grades. If the tolerances are not met, the Contractor shall be responsible for performing modifications to the facilities to bring the project components into the tolerances.

Description:	Maximum Permissible Deviation from Alignment and Elevation shown on the Drawings:
Horizontal location of structures & playground features	0.05 feet
Horizontal location of paved areas & underground installations	0.10 feet
Horizontal location of grading & surface features (i.e. berms, swales, etc.)	0.50 feet
Vertical elevation of structures & playground features	0.05 feet
Vertical elevation of paved areas	0.05 feet
Vertical elevation of underground installations	0.05 feet
Vertical elevation of grading & surface features (i.e. berms, swales, etc.)	0.10 feet

- C. Contractor shall remove and reconstruct Work that is improperly located. Horizontal and vertical alignments shall be checked regularly as the Work progresses. Contractor shall report results to the Engineer.
- D. If the construction survey uncovers any discrepancies, the Contractor shall notify the Engineer, in writing, prior to construction proceeding. If the Contractor proceeds with work that includes apparent discrepancies without resolution by the Engineer, he assumes full responsibility for any subsequent necessary modifications.

**1.17 Construction Superintendent**

- A. The construction superintendent shall be at the job site any time work is being accomplished by any of the trades per General Conditions including, but not limited to, Article 6.

PART 2 - MATERIALS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

PART 4 - MEASUREMENT & PAYMENT (Not Applicable)

**END OF SECTION**

## **DIVISION 1**

### **SECTION 01100 - SUMMARY OF WORK**

#### **PART 1 - GENERAL**

##### **1.01 Description of Work**

- A. The City of Fort Collins **Stewart Case Park – Site Improvements** project is located on 2351 Pinecone Cr., northeast from Fort Collins High School in Fort Collins, Colorado. The work for the project includes demolition; earthwork grading; concrete installation: picnic shelter; boulder setting; soil preparation and fine grading; irrigation; landscaping; installation of site furnishings and miscellaneous items of work. The park site is approximately 15 acres in size of which 5-6 acres will be disturbed and constructed upon.
- B. Protection and Restoration.
  - 1. Replace to equal or better conditions all items removed and replaced or damaged during construction. Restore all areas disturbed to match surrounding surface conditions.

##### **1.02 Notices to Private Owners and Authorities**

- A. Notify private owners of adjacent property, utilities, affected governmental agencies, and school district when execution of the work may affect them.
- B. Give notification 48 hours in advance to enable affected persons to provide for their needs when it is necessary to temporarily deny access or services.
- C. Contact utilities at least 48 hours prior to excavating near underground utilities.
- D. Contact all agencies at least 72 hours prior to start of construction. Notify all agencies of the proposed scope of work schedule and any items that would affect their daily operation.
- E. Names and telephone numbers of affected agencies and utilities in the area are listed below for Contractor's convenience.

Water - City of Fort Collins, Colorado 221-6681

Storm Sewer - City of Fort Collins, Colorado 221-6605

Sanitary Sewer - City of Fort Collins, Colorado 221-6681

Electrical - City of Fort Collins, Colorado 482-5922, 221-8553

Gas - Public Service Company of Colorado 482-5922, 221-8553

Telephone - U.S. West Communications 484-0300, 226-6310

Roads - City of Ft. Collins, Colorado 221-6815

Cable Television – AT&T Cable Services 493-7400

Utility Locates - One-call System 1-800-922-1987

Safety - Occupational Safety and Health Administration (OSHA) 844-3061

Fire - Poudre Fire Authority Non-Emergency 221-6581/ Emergency 911

Police - City of Fort Collins Police Department Non-Emergency 221-6550 / Emergency 911

Larimer County Sheriff's Department - Non-Emergency 221-7177

Postmaster - United States Postal Service 482-2837

Ambulance - Poudre Valley Hospital Non-Emergency 484-1227 / Emergency 911

Public Transportation - TransFort 221-6620

Traffic Control - Traffic Engineering 221-6815

PART 2 - MATERIALS (Not Used)

PART 3 - EXECUTION (Not Used)

PART 4 - MEASUREMENT & PAYMENT (Not Used)

**END OF SECTION**

## **DIVISION 1**

### **SECTION 01160 – SITE CONDITIONS**

#### **PART 1 - SITE INVESTIGATIONS AND REPRESENTATION**

##### **1.01 General Investigations**

- A. The Contractor acknowledges that he has satisfied himself as to the nature and location of the work, the general and local conditions, particularly those bearing upon access to the site; handling, storage, and disposal of materials; availability of water, electricity and roads; uncertainties of weather, or similar physical conditions at the site; the conformation and conditions of the ground; the equipment and facilities needed preliminary to and during the execution of the work; and all other matters which can in any way affect the work or the cost thereof under this Contract.

##### **1.02 Soil Conditions**

- A. The Contractor further acknowledges that he has satisfied himself as to the character, quality and quantity of surface and subsurface materials to be encountered from his inspection of the site and from reviewing any available records of exploratory work furnished by the Owner or included in these Documents. Failure by the Contractor to acquaint himself with the physical conditions of the site and all the available information will not relieve him from responsibility for properly estimating the difficulty or cost of successfully performing the work.

##### **1.03 Contractor Representation**

- A. The Contractor warrants that as a result of his examination and investigation of all the aforesaid data that he can perform the work in a good and workmanlike manner and to the satisfaction of the Owner. The Owner assumes no responsibility for any representations made by any of its officers or agents during or prior to the execution of this Contract, unless (1) such representations are expressly stated in the Contract, and (2) the Contract expressly provides that the responsibility therefore is assumed by the Owner.

#### **PART 2 - INFORMATION ON SITE CONDITIONS**

##### **2.01 General**

Any information obtained by the Engineer regarding site conditions, subsurface information, groundwater elevations, existing construction of site facilities, and similar data will be available for inspection, as applicable, at the office of the Engineer upon request. Such information is offered as supplementary information only. Neither the Engineer nor the Owner assumes any responsibility for the completeness or interpretation of such supplementary information.

- A. Differing Subsurface Conditions:
  - 1. In the event that the subsurface or latent physical conditions are found materially different from those indicated in these Documents, and differing materially from those ordinarily encountered and generally recognized as inherent in the character of work covered in these Contract Documents, the Contractor shall promptly, and before such conditions are disturbed, notify the Owner in writing of such changed conditions.
  - 2. The Engineer will investigate such conditions promptly and following this investigation, the Contractor shall proceed with the work, unless otherwise instructed by the Engineer. If the Engineer finds that such conditions do so materially differ and cause an increase or decrease in the cost of or in the time required for performing the work, the Engineer will recommend to the Owner the amount of adjustment in cost and time he considers reasonable. The Owner will make the final decision on all Change Orders to the Contract regarding any adjustment in cost or time for completion.

B. Underground Utilities:

1. Known utilities and structures adjacent to or encountered in the work are shown on the Drawings. The locations shown are taken from existing records and the best information available from existing utility plans, however, it is expected that there may be some discrepancies and omissions in the locations and quantities of utilities and structures shown. Those shown are for the convenience of the Contractor only, and no responsibility is assumed by either the Owner or the Engineer for their accuracy or completeness.

### PART 3 - CONTRACTOR'S RESPONSIBILITY FOR UTILITY PROPERTIES AND SERVICE

#### 3.01 General

- A. Where the Contractor's operations could cause damage or inconvenience to railway, telegraph, telephone, television, oil, gas, electricity, water, sewer, or irrigation systems, the operations shall be suspended until all arrangements necessary for the protection of these utilities and services have been made by the Contractor.
- B. Notify all utility offices which are affected by the construction operation at least 48 hours in advance. Under no circumstances expose any utility without first obtaining permission from the appropriate agency. Once permission has been granted, locate, expose, and provide temporary support for all existing underground utilities.
- C. The Contractor shall protect all utility poles from damage. If interference of power poles, telephone poles, guy wires, or anchors is encountered, notify the Owner's Representative and the appropriate utility company at least 48 hours in advance of construction operations to permit the necessary arrangements for protection or relocation of the interfering structure.
- D. The Contractor shall be solely and directly responsible to the Owner and operators of such properties for any damage, injury, expense, loss, inconvenience, delay, suits, actions, or claims of any character brought because of any injuries or damage which may result from the construction operations under this Contract.
- E. Neither the Owner nor its officers or agents shall be responsible to the Contractor for damages as a result of the Contractor's failure to protect utilities encountered in the work.
- F. If the Contractor while performing the Contract discovers utility facilities not identified in the Drawings or Specifications, he shall immediately notify the Owners and the utility in writing.
- G. In the event of interruption to domestic water, sewer, storm drain, or other utility services as a result of accidental breakage due to construction operations, promptly notify the proper authority. Cooperate with said authority in the restoration of service as promptly as possible and bear all costs of repair. In no case shall interruption of any water or utility service be allowed to exist outside working hours unless prior approval is granted.
- H. The Contractor shall replace, at his own expense, any and all other existing utilities or structures removed or damaged during construction, unless otherwise provided for in these Contract Documents or ordered by the Engineer.

#### 3.02 Interfering Structures

- A. Take necessary precautions to prevent damage to existing structures whether on the surface, aboveground, or underground. An attempt has been made to show major structures on the Drawings. The completeness and accuracy cannot be guaranteed, and it is presented simply as a guide to avoid known possible difficulties.

#### 3.03 Field Relocation

- A. During the progress of construction, it is expected that minor relocations of the work will be necessary. Such relocations shall be made only by direction of the Owner's Representative. If existing structures are encountered that prevent the construction, and that are not properly shown on the Drawings, notify the Owner's Representative before continuing with the construction in order that the Owner's Representative may make such field revision as necessary to avoid conflict with the existing structures.

If the Contractor shall fail to so notify the Owner's Representative when an existing structure is encountered, and shall proceed with the construction despite the interference, he shall do so at his own risk.

### **3.04 Easements**

- A. Easements and permits will be obtained by the Owner where portions of the work are located on public or private property. Easements will provide for the use of the property for construction purposes to the extent indicated on the easements. Copies of these easements and permits are available upon request to the Owner. It shall be the Contractor's responsibility to determine the adequacy of the easement obtained in every case and to abide by all requirements and provisions of the easement. The Contractor shall confine his construction operations to within the easement limits or make special arrangements with the property owners or appropriate public agency for the additional area required. Any damage to property, either inside or outside the limits of the easements provided by the Owner, shall be the responsibility of the Contractor as specified herein. The Contractor shall remove, protect, and replace all fences or other items encountered on public or private property. Before final payment will be authorized by the Owner's Representative, the Contractor will be required to furnish the Owner with written releases from property owners or public agencies where side agreements or special easements have been made by the Contractor or where the Contractor's operations, for any reason, have not been kept within the construction right-of-way obtained by the Owner.
- B. It is anticipated that the required easements and permits will be obtained before construction is started. However, should the procurement of any easement or permit be delayed, the Contractor shall schedule and perform the work around these areas until such a time as the easement or permit has been secured.

### **3.05 Land Monuments**

- A. The Contractor shall notify the Owner's Representative of any existing Federal, State, Town, County, and private land monuments encountered. Private monuments shall be preserved, or replaced by a licensed surveyor at the Contractor's expense. When Government monuments are encountered, the Contractor shall notify the Owner's Representative at least two (2) weeks in advance of the proposed construction in order that the Owner's Representative will have ample opportunity to notify the proper authority and reference these monuments for later replacement.

**END OF SECTION**

## **DIVISION 1**

### **SECTION 01300 – COORDINATION AND PROJECT MEETINGS**

#### **PART 1 - GENERAL**

##### **1.01 General**

- A. In order to provide for an orderly progression of work, all parties involved in the construction will meet at various times during the project to discuss pertinent items regarding the work.
- B. Coordinate operations under contract in a manner that will facilitate progress of the Work.
- C. Conform to the requirements of public utilities and concerned public agencies in respect to the timing and manner of performance of operations that affect the service of such utilities, agencies, or public safety.

##### **1.02 Conferences**

- A. The pre-construction conference will be held at a time to be determined by the Owner, after the award of the contract and prior to the issuance of the Notice to Proceed. The meeting will involve the Owner, the Engineer, the Contractor and representatives of the owners of utilities and other properties that will be directly affected by the work. Among the Contractor's representative on the site. The Contractor will have a complete construction schedule ready for review at the time of the pre-construction conference.
- B. Hold conferences for coordination of the Work when necessary.
- C. The City may hold coordination conferences to be attended by all involved when Contractor's operations affects, or is affected by, the work of others.

##### **1.03 Progress Meetings**

- A. Contractor and the City shall schedule and hold regular progress meetings at least weekly and at other times as requested by the City or required by the progress of the Work.
- B. Attendance shall include:
  - 1. Contractor and Superintendent
  - 2. Owners Representative
  - 3. Landscape Architect
  - 4. Others as may be requested by contractor, Landscape Architect or Owner
- C. Minimum Agenda shall include:
  - 1. Review of work progress since last meeting
  - 2. Identification and discussion of problems affecting progress
  - 3. Review of any pending change orders
  - 4. Revisions of Construction Schedule as appropriate

##### **1.04 Job Site Administration**

- A. Contract administration and construction observation services will be provided by the Owner. The Owner will make decisions regarding changes in the work and adjustments in contract quantities and/or unit prices.

**END OF SECTION**

## DIVISION 1

### SECTION 01310 - CONSTRUCTION SCHEDULES

#### PART 1 - GENERAL

##### 1.01 General

- A. It is the intent of the Owner to begin construction on approximately February 1, 2006. The signing of the contract and issuance of a Notice to Proceed will be completed promptly to accomplish that objective. The Notice to Proceed will authorize the Contractor to begin project administration and construction work on the site. Construction work shall not begin on site prior to the pre-construction conference.
- B. The Contractor shall complete all work, as specified in the Agreement, subject to the "Liquidated Damages" provision described under "Instructions to Bidders."
- C. Delays during project contract period outside control of the Contractor are subject to time extension consideration but not financial compensation unless such delay is significant enough to reasonably require Owner initiated work suspension (demobilization) as determined in the field by the Owner at the time of occurrence. See Paragraph 1.04 for requirements for modifying the Contract Time due to weather delays.
- D. Contractor shall plan and schedule his own work effort (personnel, equipment and material) to complete the project satisfactorily within the project time limits. Such schedule shall be in general conformance with the schedule submitted at the pre-construction conference. This includes the requirement that the Contractor conduct his operations to enable a shift of work effort from one part of the project to another to reasonably accommodate unexpected delays, and to conduct his daily operations so as to not create a public nuisance including but not limited to access or traffic obstruction, dust and mud generation, work outside of construction limits, noise, unsatisfactory cleanup or site restoration, unacceptable equipment/materials staging, flooding, etc. No work is to begin at the site until City's acceptance of the Construction Schedule.
- E. Contractor shall prepare and submit a Critical Path Method (CPM) schedule. The schedule shall show all work completed within the contract time and shall cover the time from the date of Notice to Proceed to the completion date. Contractor shall use Microsoft Project 2000 or approved equivalent to develop and manage the CPM schedule.
- F. Schedule shall include milestones that demonstrate the Contractor's approach to completing the project within project time limits. Milestones shall be of sufficient number to indicate regular progress of work and shall identify major components of the work. Milestones are subject to Owner approval prior to work beginning at the site. If Contractor fails to meet a milestone, contractor shall submit an updated schedule subject to Owner approval and demonstrate how the remaining milestones will be met. The Owner may order work shut down or suspended for nonconformance with the approved schedule (See Paragraph G. below)
- G. Milestones (minimum required items) The following items shall be indicated on the schedule with completion dates:
- H. The Contractor may voluntarily shut down or suspend work due to conditions beyond his control provided a minimum of 24 hours notice is provided to the Owner together with the reasons for subject suspension of work. The Contractor shall leave the project conditions in such a way so as not to cause a public nuisance or a threat to public safety. Neither remobilization costs nor additional time will be allowed for such suspension unless agreed to in writing in advance.
- I. The Owner or Engineer may order work shut down or suspended for such nonconformance issues as unsafe conditions, nonconformance with schedule, cause of public nuisance, unnecessary private property disturbance, materials and labor unsuited to the task, nonconformance to technical specifications, failure to comply with permits, etc. The Owner or Engineer will give a written warning to the Contractor with a specified deadline during which time the Contractor shall remedy the cause(s) described on the warning. Failure to do so shall justify the Owner or Engineer to order work shut down

or suspended. Such shutdown will not be compensated by cost reimbursement or time schedule adjustment.

- J. Failure to promptly execute the approved schedule in the judgment of the Owner will result in a written warning submitted to the Contractor explaining the specific compliance needed. Failure of the Contractor to remedy the noted items may be considered a breach of contract possibly leading to work shutdown for cause or contract termination.

### **1.02 Format and Submissions**

- A. Prepare Construction and Procurement schedules in a graphic format suitable for displaying schedule and actual progress.
- B. Submit two copies of each schedule to owner for review. Owner will return one copy to contractor with revisions suggested or necessary for coordination of the Work with the needs of Owner or others.

### **1.03 Progress Revisions**

- A. A schedule update shall be submitted to the Owner at each weekly progress meeting that will reflect work performed in the previous week and the upcoming two-(2) weeks. Schedule updates shall not change any Contract times.
- B. A complete schedule update shall be submitted with each application for progress payment.
- C. Show changes occurring since previous submission.
  - 1. Actual progress of each item to date.
  - 2. Revised projections of progress and completion.
- D. Provide a narrative report as needed to define:
  - 1. Anticipated problems, recommended actions, and their effects on the schedule.
  - 2. The effect of changes on schedules of other work.

### **1.04 Modifications to Time of Completion in the Approved Schedule**

- A. The date of beginning and the times for completion of the work are essential conditions of the Contract Documents and the work embraced shall be commenced on a date specified in the Notice to Proceed.

The Contractor will proceed with the work at such rate of progress to ensure full completion within the contract time. It is expressly understood and agreed, by and between the Contractor and the Owner that the contract time for the completion of the work described herein is a reasonable time, taking into consideration the climatic and other factors prevailing in the locality of the work.

Every effort shall be made by the Contractor to complete the project within the "Contract Time" shown in the proposal. The "Contract Time" anticipates a "Normal" weather and climate condition in and around the vicinity of the Project site during the times of year that the construction will be carried out. Extensions of time based upon weather conditions shall be granted only if the Contractor demonstrates clearly that such conditions were "unusually severe," would not have been reasonably anticipated, and that such conditions adversely affected the Contractor's work and thus required additional time to complete the work.

- B. The following specifies the procedure for the determination of time extensions for unusually severe weather. The listing below defines the anticipated number of calendar days lost to adverse weather for each month and is based upon National Oceanic and Atmospheric Administration (NOAA) or similar data for the geographic location of the project.

#### **Monthly Anticipated Calendar Days Lost to Adverse Weather Conditions**

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
(7)	(4)	(4)	(4)	(6)	(3)	(4)	(2)	(3)	(3)	(2)	(5)

The above schedule of anticipated adverse weather will constitute the base line for monthly (or portion thereof) weather time evaluations. Upon acknowledgment of the Notice to Proceed and continuing throughout the contract on a monthly basis, actual adverse weather days and the impact of adverse weather days that delay the work will be recorded on a day-to-day basis. It is assumed that the work will be carried out Mondays through Fridays (holidays excepted) unless an approved construction schedule or written authorization from the Owner indicates otherwise. The number of days of delayed work due to adverse weather or the impact thereof will then be compared to the monthly adverse weather schedule above.

An actual adverse weather day must prevent work for 50 percent or more of the Contractor's workday, delay work critical to the timely completion of the project, and be documented by the Contractor. The City Representative observing the construction shall determine on a daily basis whether or not work can proceed or if work is delayed due to adverse weather or the effects thereof. The Contractor shall notify the Construction Coordinator in writing of any disagreement as to whether or not work can proceed on a given date, within 2 calendar days of that date. The Owner will use the above written notification in determining the number of working days for which work was delayed during each month.

- C. At the end of each month, if the number of working days for which work was delayed due to adverse weather exceeds that shown in the above schedule, a Change Order will be executed which increases the Contract Time. The number of workdays delayed due to adverse weather or the impact thereof will then be converted to Calendar Days based on the contract completion day and date. This conversion assumes a 5-day work week, Mondays through Fridays, holidays excepted; should the Contractor have authorization to work weekends and/or holidays, then the method of conversion of workdays to calendar days would take this into consideration. The contract time period will then be increased by the number of calendar days calculated above and a new contract completion day and date will be set.
- D. The Contractor's schedule must reflect the above-anticipated adverse weather delays on all weather-dependent activities.
- E. While extensions of time shall be granted for "unusually severe" weather or climate conditions, the Owner shall make no monetary compensation for any costs to the Contractor arising out of such delays. The Contractor shall comply with the portions of the Contract Documents relating to his project schedule and amendments thereto which result from the "unusually severe" weather condition.
- F. Breakdowns in equipment or lack of performance by the Contractor will not be considered justification for an extension of time. Liquidated damages will be assessed as delineated elsewhere.
- G. The Contractor shall not be charged with liquidated damages or any excess cost when the delay in completion of the work is due to the following, and the Contractor has promptly given written notice of such delay to the Owner or Engineer.
  - 1. To any preference, priority, or allocation order duly issued by the Owner.
  - 2. To unforeseeable causes beyond the control and without the fault or negligence of the Contractor, including but not restricted to, acts of God, or of the public enemy, acts of the Owner, acts of another Contractor in the performance of a contract with the Owner, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and abnormal and unforeseeable weather as provided above; and
  - 3. To any delays of Subcontractors occasioned by any of the causes specified in paragraphs 1 and 2, above.

**1.05 City's Responsibility**

- A. City's review is only for the purpose of checking conformity with the Contract Documents and assisting Contractor in coordinating the Work with the needs of the Project.

B. It is not to be construed as relieving Contractor from any responsibility to determine the means, methods, techniques, sequences, and procedures of construction as provided in the General Conditions.

PART 2 - MATERIALS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

PART 4 - MEASUREMENT & PAYMENT (Not Applicable)

**END OF SECTION**

## DIVISION 1

### SECTION 01330 – SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

#### PART 1 - GENERAL

##### 1.01 Shop Drawings

- A. Submit newly prepared information drawn accurately to scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not a Shop Drawing.
- B. Shop Drawings include fabrication and installation Drawings, setting diagrams, schedules, patterns, templates, and similar Drawings. Include the following information:
  1. Dimensions.
  2. Identification of products and materials included by sheet and detail number.
  3. Compliance with specified standards.
  4. Notation of coordination requirements.
  5. Notation of dimensions established by field measurement.
  6. Sheet Size: Except for templates, patterns and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 24 by 36 inches.
  7. Submittal: Submit 3 blue- or black-line prints and 2 additional prints where required for maintenance manuals, plus the number of prints needed by the Contractor for distribution. The Owner's Representative will retain 2 prints and return the remainder.
    - a. One of the prints returned shall be marked up and maintained as a "Record Document."
  8. Do not use Shop Drawings without an appropriate final stamp indicating action taken.

##### 1.02 Product Data

- A. Collect 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, roughing-in diagrams and templates, standard wiring diagrams, and performance curves.
  1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products that are not required, mark copies to indicate the applicable information. Include the following information:
    - a. Manufacturer's printed recommendations.
    - b. Compliance with trade association standards.
    - c. Compliance with recognized testing agency standards.
    - d. Application of testing agency labels and seals.
    - e. Notation of dimensions verified by field measurement.
    - f. Notation coordination requirements.
  2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.
  3. Preliminary Submittal: Submit a preliminary single copy of Product Data where selection of options is required.

4. Submittals: Submit 2 copies of each required submittal; submit 4 copies where required for maintenance manuals plus additional copies as needed by the Contractor for distribution. The Owner will retain one and will return the other marked with action taken and corrections or modifications required.
5. Distribution: Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.
  - a. Do not proceed with installation until a copy of Product Data is in the Installer's possession.
  - b. Do not permit use of unmarked copies of Product Data in connection with construction.

### **1.03 Samples**

- A. Submit full-size, full-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, cuts or containers of materials, color range sets, and swatches showing color, texture, and pattern.
  1. Mount or display Samples in the manner to facilitate review of qualities indicated. Include the following:
    - a. Specification Section number and reference.
    - b. Generic description of the Sample.
    - c. Sample source.
    - d. Product name or name of the manufacturer.
    - e. Compliance with recognized standards.
    - f. Availability and delivery time.
  2. Submit Samples for review of size, kind, color, pattern, and texture. Submit Samples for a final check of these characteristics with other elements and a comparison of these characteristics between the final submittal and the actual component as delivered and installed.
    - a. Where variation in color, pattern, or other characteristic is inherent in the material or product represented, submit at least 3 multiple units that show approximate limits of the variations.
    - b. Refer to other Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.
    - c. 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, indicated special requests regarding disposition of Sample submittals.
    - d. Samples not incorporated into the Work, or otherwise designated as the Owner's property, are the property of the Contractor and shall be removed from the site prior to Substantial Completion.
  3. Preliminary Submittals: Submit a full set of choices where Samples are submitted for selection of color, pattern, texture, or similar characteristics from a range of standard choices. The Owner will review and return preliminary submittals with the Owner's notation, indicating selection and other action.
  4. Submittals: Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation, and similar characteristics, submit 3 sets. The Owner will return one set marked with the action taken.
  5. Maintain sets of Samples, as returned, at the Project Site, for quality comparisons throughout the course of construction.

- a. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
  - b. Sample sets may be used to obtain final acceptance of the construction associated with each set.
- B. Distribution of Samples: Prepare and distribute additional sets to subcontractors, manufacturers, fabricators, suppliers, installers, and others as required for performance of the Work. Show distribution on transmittal forms.

#### **1.04 Quality Assurance Submittals**

- A. Submit quality-control submittals, including design data, certifications, manufacturer's instructions, manufacturer's field reports, and other quality-control submittals as required under other Sections of the Specifications.
- B. Certifications: Where other Sections of the Specifications require certification that a product, material, or installation complies with specified requirements, submit a notarized certification from the manufacturer certifying compliance with specified requirements.
  - 1. Signature: an officer of the manufacturer or other authorized individual shall sign Certification documents.
- C. Inspection and Test Reports: Requirements for submittal of inspection and test reports from independent testing agencies are specified in Division 1 Section "Quality Control and Testing," and in the applicable technical specifications.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

**END OF SECTION**

## **DIVISION 1**

### **SECTION 01340 - SURVEY DATA**

#### **PART 1 - GENERAL**

##### **1.01 Survey Requirements**

- A. Contractor is responsible for the layout of the Work. The City will not provide surveying.
- B. Base all measurements, both horizontal and vertical, on established control points. Verify all established control points at site prior to laying out the work.
- C. Perform layout of the Work with qualified personnel.
  - 1. At a minimum stake corners and shelter post locations.
  - 2. At a minimum, stake concrete sidewalks, concrete pavement and changes in pavement type at grade changes, changes in horizontal alignment, and at 25-foot stations along the sidewalk centerline.
- D. All field books, notes, and other data developed by Contractor in performing surveys required by the Work will be available to City for examination throughout the construction period.

##### **1.02 Submittals**

- A. Submit to City all survey data with other documentation required for final acceptance.

PART 2 - MATERIALS (Not Used)

PART 3 - EXECUTION (Not Used)

PART 4 - MEASUREMENT & PAYMENT (Not Used)

**END OF SECTION**

## **DIVISION 1**

### **SECTION 01450 - QUALITY CONTROL AND TESTING**

#### **PART 1 - GENERAL**

##### **1.01 General**

- A. Provide such equipment and facilities as the City may require for conducting field tests and for collecting and forwarding samples. Do not use any materials or equipment represented by samples until tests, if required, have been made and the materials or equipment are found to be acceptable. Any product that becomes unfit for use after approval hereof shall not be incorporated into the work.
- B. All materials or equipment proposed to be used may be tested at any time during their preparation or use. Furnish the required samples without charge and give sufficient notice of the placing of orders to permit the testing. Products may be sampled either prior to shipment or after being received at the site of the work.
- C. Tests shall be made by an accredited testing laboratory selected by the Owner. Except as otherwise provided, sampling and testing of all materials and the laboratory methods and testing equipment shall be in accordance with the latest standards and tentative methods of the American Society for Testing Materials (ASTM).
- D. Where additional or specified information concerning testing methods, sample sizes, etc., is required, such information is included under the applicable sections of the Specifications. Any modification of, or elaboration on, these test procedures which may be included for specific materials under their respective sections in the Specifications shall take precedence over these procedures.

##### **1.02 Test Reports**

- A. Submit 2 copies of the reports of all tests made by testing laboratories, plus copies to be returned to the contractor.

##### **1.03 City's Responsibilities**

- A. City of Fort Collins shall be responsible for and shall pay all costs in connection with the following testing:
  - 1. Soils compaction tests.
  - 2. Pipe and structural bedding.
  - 3. Tests not called for by the Specifications of materials delivered to the site.
  - 4. Concrete, mortar and grout tests.

##### **1.04 Contractor's Responsibilities**

- A. In addition to those inspections and tests called for in the General Conditions, Contractor shall also be responsible for and shall pay all costs in connection with testing required for the following:
  - 1. All performance and field testing specifically called for by the specifications.
  - 2. All re-testing for Work or materials found defective or unsatisfactory, including tests covered under 1.03 above.
  - 3. Testing of pipe.
  - 4. Vacuum testing of manholes.
  - 5. Concrete materials and mix designs.
  - 6. Gradation tests for embedment, fill and backfill materials.
  - 7. Irrigation mainline pressure test and operational test.

8. Material Substitution - any test for basic material or fabrication of equipment offered as a substitution for a specified item on which a test may be required in order to prove it compliant with the specifications.

Nothing contained herein is intended to imply that the Contractor does not have the right to have tests performed on any material at any time for his/her own information and job control so long as the Owner does not assume responsibility for the cost or for giving them consideration when appraising quality materials.

#### **1.05 Transmittal of Test Reports**

- A. Submit 2 copies of each report of tests and engineering data furnished by the Contractor for City Representative's review. The Owner's Representative will retain one and will return the other marked with action taken and corrections or modifications required.
- B. The testing laboratory retained by the Owner will furnish three (3) copies of a written report of each test performed by laboratory personnel in the field or laboratory. Two (2) copies of each test report will be transmitted to the City Representative and one (1) copy to the Contractor within seven (7) days after each test is completed.

#### **1.06 Contractor's Quality Control System**

- A. General: The Contractor shall establish a quality control system to perform sufficient inspection and tests of all items of work, including that of his subcontractors, to ensure conformance to the functional performance of this project. This control shall be established for all construction except where the Contract Documents provide for specific compliance tests by testing laboratories or engineers employed by the City. Contractor's control system shall specifically include all testing required by the various sections of the Specifications.
- B. Contractor's quality control system is the means by which he assures himself that his construction complies with the requirements of the Contract Documents. Controls shall be adequate to cover all construction operations and should be keyed to the proposed construction schedule.
- C. Records: maintain correct records on an appropriate form for all inspections and tests performed, instructions received from the City and actions taken as a result of those instructions. These records shall include evidence that the required inspections or tests have been performed (including type and number of inspections or test, nature of defects, causes for rejection, etc.) proposed or directed remedial action, and corrective action taken. Document inspections and tests as required by each section of the Specifications. Provide copies to City in a reasonable time.
- D. Pipe alignment and grade is to be maintained through the use of suitable surveying instruments or laser equipment operated continuously during construction. Horizontal tolerances of  $\pm 0.3$  feet and vertical tolerances of  $\pm 0.1$  feet maximum deviation from plan and construction staking are to be maintained, except that visible "snaking" of the horizontal alignment and changes in directions of slope will not be permitted.

PART 2 - MATERIALS (Not Used)

PART 3 - EXECUTION (Not Used)

PART 4 - MEASUREMENT & PAYMENT (Not Used)

**END OF SECTION**

## **DIVISION 1**

### **SECTION 01500 - TEMPORARY CONTROLS**

#### **1.01 Noise Control**

- A. Take reasonable measures to avoid unnecessary noise when construction activities are being performed in populated areas.
- B. Construction machinery and vehicles shall be equipped with practical sound muffling devices, and operated in a manner to cause the least noise consistent with efficient performance of the work.
- C. Cease operation of all machinery and vehicles between the hours of 6:00 p.m. and 7:00 a.m.

#### **1.02 Dust Control**

- A. Dusty materials in piles or in transit shall be covered to prevent blowing.
- B. Earth and road surfaces subject to dusting due to construction activities and detouring of traffic shall be kept moist with water or by application of a chemical dust suppressant.
  - 1. Chemical dust suppressant shall not be injurious to existing or future vegetation.

#### **1.03 Pollution Control**

- A. Prevent the pollution of drains and watercourses by sanitary wastes, concrete, sediment, debris and other substances resulting from construction activities.
  - 1. Retain all spent oils, hydraulic fluids and other petroleum fluids in containers for disposal off the site.
  - 2. Prevent sediment, debris or other substances from entering sanitary sewers, storm drains and culverts.

#### **1.04 Erosion Control**

- A. Take such measures as are necessary to prevent erosion of soil that might result from construction activities.
  - 1. Measures in general will include:
    - a. Control of runoff.
    - b. Trapping of sediment.
    - c. Minimizing area and duration of soil exposure.
    - d. Temporary materials such as hay bales, sandbags, plastic sheets, riprap or culverts to prevent the erosion of banks and beds of watercourses or drainage swales where runoff will be increased due to construction activities.
- B. Preserve natural vegetation to the greatest extent possible.
- C. Locate temporary storage and route construction traffic so as to preserve vegetation and minimize erosion.
- D. Comply with the City of Fort Collins' Storm Drainage Erosion Control Manual.

**END OF SECTION**

## **DIVISION 1**

### **SECTION 01510 - TEMPORARY UTILITIES**

#### **PART 1 - GENERAL**

##### **1.01 Utilities**

- A. Furnish all utilities necessary for construction including, but not limited to temporary electric power and pay all cost associated with utilities during and used for the contract period. All temporary utilities installation shall meet the construction safety requirements of OSHA, State and local governing agencies.

##### **1.02 Water**

- A. Contractor is responsible for obtaining water for construction and shall pay all costs associated with establishing a temporary meter used during construction.

##### **1.03 Sanitary Facilities**

- A. Furnish temporary sanitary facilities at the site in the vicinity of the construction for the needs of construction workers and others performing work or furnishing services on the Project.
- B. Properly maintain sanitary facilities of reasonable capacity throughout construction periods.
- C. Enforce the use of such sanitary facilities by all personnel at the site.
- D. Obscure sanitary facilities from public view to the greatest extent practical.

PART 2 - MATERIALS (Not Used)

PART 3 - EXECUTION (Not Used)

PART 4 - MEASUREMENT & PAYMENT (Not Used)

**END OF SECTION**

## **DIVISION 1**

### **SECTION 01570 - TRAFFIC CONTROL**

#### **PART 1 - GENERAL**

##### **1.01 General**

- A. Traffic Control necessary to complete the project as depicted in the plans and specifications will be provided by the Contractor and will not be paid for separately.
- B. The Contractor must submit traffic control plans and coordinate all traffic control with the City's Traffic Control Coordinator. The traffic control plans must be submitted and approved 72 hours prior to starting construction and before making each modification.
- C. Conformance: City of Fort Collins Work Area Traffic Control Handbook, Manual of Uniform Traffic Control Devices (U.S. Dept. of Transportation), or applicable statutory requirements of authority having jurisdiction.
- D. Limited closures may be permitted for short periods up to three days to allow installation of concrete pavement. Closures must be requested and approved 72 hours prior to anticipated closure.
- E. Limited alternating one-way traffic operation may be permitted during the hours from 9:00 A.M. to 3:30 P.M. One-way traffic operation must be requested and approved 72 hours prior to anticipated operation.
- F. At all times, Contractor must maintain two-way traffic with a minimum of one lane of traffic in each direction. Limited closures may be allowed.
- G. The Contractor must coordinate with adjacent residents to provide and maintain them sufficient access during the duration of the project. It will be the Contractor's responsibility to coordinate and communicate with the residents during construction.
- H. Keep traffic areas free of excavated material, construction equipment, pipe, and other materials and equipment.
- I. Keep fire hydrants and utility control devices free from obstruction and available for use at all times.
- J. Conduct operations in a manner to avoid unnecessary interference with public and private roads and drives.
- K. Provide and maintain temporary approaches or crossings at streets, businesses, and residences.
- L. Keep roads open and in acceptable condition, unless closure or detour has been approved by City's Traffic Control Coordinator 72 hours prior to closure or detour.
- M. Define a temporary pedestrian access route for children coming from the surrounding neighborhoods. This pedestrian access route shall be located outside of the project limits. The pedestrian access route shall be kept free of excavated material, construction equipment, pipe, and other materials.

##### **1.02 Traffic Control Plan**

- A. Submit a detailed traffic control plan to Traffic Control Coordinator for review and acceptance. Plan must be accepted 72 hours prior to work commencing at the site. Maintain the accepted plan throughout all phases of construction. Provide copy to Owner prior to submittal.
  - 1. Notify police, sheriff, ambulance services, and fire authorities of traffic control plan and the schedule of it. Distribute copies if requested.

##### **1.03 Flagmen**

- A. Required where necessary to provide for public safety, or the regulation of traffic, or by jurisdictional authorities.

- B. Shall be properly equipped and licensed.

#### **1.04 Warning Signs and Lights**

- A. Provide suitable barricades and warning signs for:
  - 1. Open trenches and other excavations.
  - 2. Obstructions, such as material piles, equipment, piled embankment.
- B. Illuminate by means of warning lights all barricades and obstructions from sunset to sunrise.
- C. Protect roads and driveways by effective barricades on which are placed acceptable warning signs.

#### **1.05 Parking**

- A. Provide suitable parking areas for the use of all construction workers and others performing work or furnishing services in connection with the Project so as to avoid interference with private property, public traffic, City's operations, or construction activities. Such parking shall occur on the project site or another suitable location, approved by the City.

#### **1.06 Roadway Usage between Operations**

- A. At all times when Work is not actually in progress, Contractor shall make passable and shall open to traffic such portions of the Project and temporary roadways or portions thereof as may be agreed upon between Contractor and City and all authorities having jurisdiction over any properties involved.

PART 2 - MATERIALS (Not Used)

PART 3 - EXECUTION (Not Used)

PART 4 - MEASUREMENT & PAYMENT (Not Used)

**END OF SECTION**

## **DIVISION 1**

### **SECTION 01600 – MATERIALS AND EQUIPMENT**

#### **PART 1 - GENERAL**

##### **1.01 Related Documents**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

##### **1.02 Summary**

- A. This Section includes administrative and procedural requirements governing the Contractor's selection of products for use in the Project.

##### **1.03 Definitions**

- A. 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.
  - 1. "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," "systems," and terms of similar intent.
  - 2. "Materials" are products substantially shaped, cut, worked, mixed, finished, refined, or otherwise fabricated, processed, or installed to form a part of the Work.
  - 3. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections, such as wiring or piping.

##### **1.04 Submittals**

- A. Product List: Prepare a list showing products specified in tabular form acceptable to the Owner. Include generic names of products required. 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 Specifications 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 of date commencement of the Work, submit 3 copies of an initial product list. Provide a written explanation of omissions of data and for known variations from Contract requirements.
  - 4. Complete 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 variations from Contract requirements.

5. Owner's Action: The Owner will respond in writing to Contractor within 2 weeks of 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 Owner's response will include a list of unacceptable product selections, containing a brief explanation of reasons for this action.

### **1.05 Quality Assurance**

- A. Source Limitations: To the fullest extent possible, provide products of the same kind from a single source.
- B. Compatibility of Options: When the Contractor is given the option of seeking between 2 or more products for use on the Project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.
- C. Foreign Product Limitations: Except under one or more of the following conditions provide domestic products, not foreign products, for inclusion in the Work:
  1. Not 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.

### **1.06 Product Delivery, Storage and Handling**

- A. Delivery, 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. Delivery 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 heavy materials away from the Project structure in a manner that will not endanger the supporting construction.
  7. Store products subject to damage by the elements above ground, under cover in a weather-tight enclosure, with ventilation adequate to prevent condensation.

## **PART 2 - PRODUCTS**

### **2.01 Product Selection**

- 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.
- B. Product Selection procedures: The Contract Documents and governing regulations govern product selection. Procedures governing product selection include the following:
  1. Proprietary Specification Requirements: Where Specifications name only a single product or manufacturer, provide the product indicated. No substitutions will be permitted.
  2. Semiproprietary Specification Requirements: Where Specifications name 2 or more products or manufacturers or where Specifications specify products or manufacturers by name, accompanied

by the term “or equal” or “or approved equal,” provide one of the products listed or comply with the Contract Document provisions concerning “substitutions” or obtain approval for use of an unnamed product.

3. Nonproprietary Specification Requirements: When Specifications list products or manufacturers that are available and may be incorporated in the Work, but do not restrict the Contractor to use 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.
4. Descriptive Specification Requirements: Where Specifications describe a product or name, provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements.
5. 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.
6. Visual Matching: Where Specifications require matching an established Sample, the Owner’s decision will be final on whether a proposed product matches satisfactorily.
7. 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 Owner will select the color, pattern, and texture from the product line selected.

## PART 3 - EXECUTION

### 3.01 Installation of Products

- A. 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.

## END OF SECTION

## DIVISION 1

### SECTION 01700 – CONTRACT CLOSEOUT

#### PART 1 – GENERAL

##### 1.01 Related Documents

- A. Drawings and general provisions of the Contract, including general and supplementary conditions and other Division 1 specification sections, apply to this section.

##### 1.02 Summary

- A. This Section includes administrative and procedural requirements for contract closeout including, but not limited to, the following:
  - 1. Inspection procedures.
  - 2. Project record document submittal.
  - 3. Operation and maintenance manual submittal.
  - 4. Submittal of warranties.
  - 5. Final cleaning.
- B. Closeout requirements for specific construction activities are included in the appropriate Sections in Divisions 2 through 16.

##### 1.03 Substantial Completion

- A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.
  - 1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete.
  - 2. Advise the Owner of pending insurance changeover requirements.
  - 3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents.
  - 4. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
  - 5. Submit record drawings, maintenance manuals, final project photographs, damage or settlement surveys, property surveys, and similar final record information.
  - 6. Deliver tools, spare parts, extra stock, and similar items.
  - 7. Make final changeover of permanent locks and transmit keys to the Owner. Advise the Owner's personnel of changeover in security provisions.
  - 8. Complete startup testing of systems and instruction of the Owner's operation and maintenance personnel. Discontinue and remove temporary facilities from the site, along with mockups, construction tools, and similar elements.
  - 9. Complete final cleanup requirements, including touchup painting.
  - 10. Touch up and otherwise repair and restore marred, exposed finishes.
- B. Inspection Procedures: On receipt of a request for inspection, the Owner will either proceed with inspection or advise the Contractor of unfilled requirements. The Owner will prepare the Certificate of Substantial Completion following inspection or advise the Contractor of construction that must be

completed or corrected before the certificate will be issued.

1. If the Owner's Representative determines that the work is not substantially complete at the time of review or that deficiencies remain at time of compliance review, the Contractor shall pay for the additional review(s) by Owner's Representative.
2. Results of the completed inspection will form the basis of requirements for final acceptance.

#### **1.04 Status after Substantial Completion**

- A. The date of substantial completion marks the beginning of the maintenance period defined in Section 02970 – Planting Maintenance.
- B. During maintenance period, the following conditions hold:
  1. Insurance: Same as during construction.
  2. Electricity and Irrigation Water: Supplied by Owner, as installed by Contractor under this contract.
  3. Bonds: Remain in effect.
  4. Retainage: Same as during construction.

#### **1.05 Final Acceptance**

- A. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.
  1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include insurance certificates for products and completed operations where required.
  2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.
  3. Submit a certified copy of the Owner's final inspection list of items to be completed or corrected, endorsed and dated by the Owner. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance and shall be endorsed and dated by the Owner.
  4. Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of the date of Substantial Completion or when the Owner took possession of and assumed responsibility for corresponding elements of the Work.
  5. Submit consent of surety to final payment.
  6. Submit a final liquidated damages settlement statement.
  7. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
- B. Reinspection Procedure: The Owner will reinspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except for items whose completion is delayed under circumstances acceptable to the Owner.
  1. Upon completion of reinspection, the Owner will prepare a certificate of final acceptance. If the Work is incomplete, the Owner will advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
  2. If necessary, reinspection will be repeated.

#### **1.06 Record Document Submittals**

- A. General: Do not use record documents for construction purposes. Protect record documents from deterioration and loss in a secure, fire-resistant location. Provide access to record documents for the Owner's reference during normal working hours.
- B. Record Drawings: Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies

substantially from the Work as originally shown. Mark which drawing is most capable of showing conditions fully and accurately. Where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.

1. Mark record sets with red erasable pencil. Use other colors to distinguish between variations in separate categories of the Work.
2. Mark new information that is important to the Owner but was not shown on Contract Drawings or Shop Drawings.
3. Note related change-order numbers where applicable.
4. Organize record drawing sheets into manageable sets. Bind sets with durable-paper cover sheets; print suitable titles, dates, and other identification on the cover of each set.
5. Prior to Contract Closeout, obtain from the Owner a reproducible mylar copy of the Drawings. Using technical drafting pen, duplicate information contained on the Record Drawings maintained on site.

Label each sheet "Record Drawing." On the first sheet, the Contractor or resident

Superintendent shall execute the following statement:

Having reviewed this document and all attachments, I affirm that, to the best of my knowledge, the information presented here is true and accurate.

Signed: \_\_\_\_\_ Date: \_\_\_\_\_

Position: \_\_\_\_\_

- C. Record Specifications: Maintain one complete copy of the Project Manual, including addenda. Include with the Project Manual one copy of other written construction documents, such as Change Orders and modifications issued in printed form during construction.
  1. Mark these documents to show substantial variations in actual Work performed in comparison with the text of the Specifications and modifications.
  2. Give particular attention to substitutions and selection of options and information on concealed construction that cannot otherwise be readily discerned later by direct observation.
  3. Note related record drawing information and Product Data.
  4. Upon completion of the Work, submit record Specifications to the Owner.
- D. Record Product Data: Maintain one copy of each Product Data submittal. Note related Change Orders and markup of record drawings and Specifications.
  1. Mark these documents to show significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the site and from the manufacturer's installation instructions and recommendations.
  2. Give particular attention to concealed products and portions of the Work that cannot otherwise be readily discerned later by direct observation.
  3. Upon completion of markup, submit complete set of record Product Data to the Owner.
- E. Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record keeping and submittals in connection with actual performance of Work. Immediately prior to the date or dates of Substantial Completion, complete miscellaneous records and place in good order. Identify miscellaneous records properly and bind or file, ready for continued use and reference. Submit to the Owner.

- F. Maintenance Manuals: Organize operation and maintenance data into suitable sets of manageable size. Bind properly indexed data in individual, heavy-duty, 2-inch (51-mm), 3-ring, vinyl-covered binders, with pocket folders for folded sheet information. Mark appropriate identification on front and spine of each binder. Include the following types of information:
1. Emergency instructions.
  2. Spare parts list.
  3. Copies of warranties.
  4. Wiring diagrams.
  5. Recommended “turn-around” cycles.
  6. Inspection procedures.
  7. Shop Drawings and Product Data.
  8. Fixture lamping schedule.

### **1.07 Warranties and Bonds**

- A. Provide duplicate notarized copies. Maintain copies of all Contractor’s submittals and assemble documents executed by subcontractors, suppliers, and manufacturers. Provide table of contents and assemble in binder with durable plastic cover.
- B. Submit material prior to final application for payment. For items of Work delayed materially beyond date of substantial completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

### **1.08 Final Payment**

- A. At the end of maintenance period, submit written certification that Contract Documents Work has been reviewed and that Work is complete in accordance with Contract Documents and ready for Owner Representative’s review.
- B. In addition to submittals required by the conditions of the Contract provide submittals required by governing authorities, and submit a final statement of accounting giving total adjusted Contract Sum, previous payments and sum remaining due.
- C. Owner’s Representative will issue a final Change Order reflecting approved adjustments to Contract Sum not previously made by Change Order.
- D. Retainage will be held until advertisement for liens and encumbrances is completed.

## **PART 2 – PRODUCTS (Not Applicable)**

## **PART 3 – EXECUTION**

### **3.01 Closeout Procedures**

- A. Operation and Maintenance Instructions: Arrange for each Installer of equipment that requires regular maintenance to meet with the Owner’s personnel to provide instruction in proper operation and maintenance. Provide instruction by manufacturer’s representatives if installers are not experienced in operation and maintenance procedures. Include a detailed review of the following items:
  1. Maintenance manuals.
  2. Record documents.
  3. Spare parts and materials.
  4. Tools.
  5. Lubricants.
  6. Fuels.
  7. Identification systems.
  8. Control sequences.
  9. Hazards.
  10. Cleaning.

11. Warranties and bonds.
  12. Maintenance agreements and similar continuing commitments.
- B. As part of instruction for operating equipment, demonstrate the following procedures:
1. Startup.
  2. Shutdown.
  3. Emergency operations.
  4. Noise and vibration adjustments.
  5. Safety procedures.
  6. Economy and efficiency adjustments.
  7. Effective energy utilization.

### **3.02 Final Cleaning**

- A. General: The General Conditions require general cleaning during construction. Regular site cleaning is included in Division 1.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.
1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion.
- C. Removal of Protection: Remove temporary protection and facilities installed for protection of the Work during construction.
1. Remove labels that are not permanent labels.
  2. Clean transparent materials, including mirrors and glass in doors and windows.
  3. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films, and similar foreign substances. Restore reflective surfaces to their original condition. Leave concrete floors broom clean.
  4. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.
  5. Clean the site, including landscape development areas, of rubbish, litter, and other foreign substances. Sweep paved areas broom clean; remove stains, spills, and other foreign deposits. Rake grounds that are neither paved nor planted to a smooth, even-textured surface.
- D. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from the site and dispose of lawfully.
1. Where extra materials of value remain after completion of associated Work, they become the Owner's property. Dispose of these materials as directed by the Owner.

**END OF SECTION**

## **DIVISION 1**

### **SECTION 01800 – DEFINITION OF BID ITEMS**

The following items describe the scope of work for this contract and are further clarified through limit-of-work lines, notes on the drawings and specifications. The work described in each Bid Item may contain work from one or several technical specification sections. The contractor shall refer to the technical specifications that apply to the individual components.

#### **GENERAL REQUIREMENTS**

**Bid Item 1 - Mobilization**

This work includes the mobilization of personnel, equipment and supplies at the project site in preparation for work on the project, as well as the establishment of the Contractor's offices, buildings and other necessary facilities, and all other costs incurred or labor and operations which must be performed prior to beginning the other items under the Contract. This item shall also include marshalling, disassembly and security of all items indicated on the plans or specifications. Payment will be made as Work progresses. Payment for this item will follow in accordance with CDOT Standard Specifications for Road and Bridge Construction, Section 626. The total amount for mobilization shall not exceed five percent (5%) of the total bid.

**Bid Item 2 - Surveying**

Contractor shall furnish a licensed surveyor for construction staking and to verify grades as stated in the specifications including, but not limited to, Section 01340, 1.16. Contractor shall submit a schedule of values for all surveying to be performed in accordance with the Drawings and Specifications prior to the preconstruction conference.

#### **DEMOLITION**

**Bid Item 3 - Removal of 4 & 5" Concrete**

Contractor shall remove concrete as shown on the drawings. Bid amount includes labor, equipment and hauling for a complete item in accordance with the Drawings and Specifications.

**Bid Item 4 - Remove of Planting Beds**

Contractor shall remove planting beds with plant material and topsoil as shown on the drawings. Bid amount includes labor, equipment and hauling for a complete item in accordance with the Drawings and Specifications.

**Bid Item 5 - Removal of Playground Header & Wall**

Contractor shall remove exposed aggregate playground header and wall as shown on the drawings. Bid amount includes labor, equipment and hauling for a complete item in accordance with the Drawings and Specifications.

#### **EARTHWORK**

**Bid Item 6 - Erosion Control**

Contractor shall install and maintain erosion control items during construction in accordance with the Drawings and Specifications. These items are subject to City Stormwater inspection and approval.

#### **SIDEWALKS AND COURT**

**Bid Item 7 - Concrete - 6 Inch Flatwork**

Contractor shall provide all labor, equipment, sub-grade preparation, installation, concrete and earthwork to construct flatwork for a complete item. The price bid shall also include: Furnishing and placing the concrete; forming; furnishing and applying curing compounds; finishing and edging the concrete surfaces; joints and joint materials; base course as required under the flatwork areas, irrigation sleeving, and all other related and necessary materials, work, and equipment required to construct the flatwork areas in accordance with the Drawings and Specifications.

**Bid Item 8 - Concrete - 6 Inch Exposed Aggregate Flatwork**

Contractor shall provide all labor, equipment, sub-grade preparation, installation, concrete and earthwork to construct flatwork for a complete item. The price bid shall also include: Furnishing and placing the concrete; forming; furnishing and applying curing compounds; finishing and edging the concrete surfaces; joints and joint materials; base course as required under the flatwork areas, irrigation sleeving, and all other related and necessary materials, work, and equipment required to construct the flatwork areas in accordance with the Drawings and Specifications.

**Bid Item 9 - Concrete Basketball Court**

Contractor shall provide all labor, material, and equipment to construct the basketball court per drawings and specifications. Work includes earthwork, concrete, reinforcement, finishing, and painting lines for a complete item in accordance with Drawings and Specifications.

**Bid Item 10 - Basketball Court Striping**

Contractor shall provide all labor, material and equipment for painting lines on the basketball court, as shown on the drawings; for a complete item in accordance with Drawings and Specifications.

## **PLAYGROUND AREAS**

### Bid Item 11 - Exposed Aggregate Wall

Contractor shall provide all labor, materials, and equipment to construct playground retaining wall as shown on the drawings. Work includes minor earthwork, reinforcement, chamfered edges, and an exposed aggregate finish finishing for a complete item in accordance with Drawings and Specifications.

### Bid Item 12 - Exposed Aggregate Playground Header

Contractor shall provide all labor, material and equipment to construct the playground header on large playground area as shown on the drawings. Work includes earthwork, concrete, and an exposed aggregate finishing for a complete item in accordance with Drawings and Specifications.

### Bid Item 13 - Engineered Wood Safety Surfacing

Includes all labor, materials, shipping, placement costs and all related work for the installation of engineered wood mulch safety surfacing at a depth of 15" in the new addition to the playground area. Item includes geotextile fabric installed under safety surfacing as shown on the detail drawings.

### Bid Item 14 - Poured-in-Place Safety Surfacing

Includes all labor, materials, shipping, placement costs and all related work for the installation of the poured-in-place safety surfacing at a depth of 1 3/4" thick in the new playground area. Item also includes aggregate base course installed under safety surfacing as shown on the detail drawings.

### Bid Item 15 - Climbing Boulder

Includes all labor, materials, shipping, placement costs and all related work for the installation of the climbing boulder play equipment as shown on the drawings.

## **SITE FURNISHINGS**

### Bid Item 16 - Prefabricated Picnic Shelter

Contractor shall furnish and install shelter per specifications and manufacturer's recommendations. Bid amount includes excavation; earthwork; footings and foundations; columns; roofing; and all related items. Bid amount includes all labor; equipment; material; City Building Code Inspections for a complete item in accordance with Drawings and Specifications. (Note: Building permit fees to be paid by City)

### Bid Item 17 - Bench - Non-Backed

Contractor shall provide all labor, material and equipment to install 5(five) non-backed benches in accordance with Drawings and Specifications.

### Bid Item 18 - Bench - Backed

Contractor shall provide all labor, material and equipment to install 1(one) backed bench in accordance with Drawings and Specifications.

### Bid Item 19 - Bench - 6 Foot Swing

Contractor shall provide all labor, material and equipment to install 1(one) 6 foot bench swing in accordance with Drawings and Specifications.

### Bid Item 20 - Picnic Table

Contractor shall provide all labor, material and equipment to install 2(two) picnic tables at the new prefabricated picnic shelter area in accordance with Drawings and Specifications.

### Bid Item 21 - Bicycle Rack

Contractor shall provide all labor, material and equipment to install 1(one) bicycle rack near restroom in accordance with Drawings and Specifications.

### Bid Item 22 - Basketball Equipment

Contractor shall provide all labor, material and equipment to install 1 pair of basketball rims, backboards, and poles including footings in accordance with Drawings and Specifications.

### Bid Item 23 - Relocation of Drinking Fountain

Contractor shall provide all labor, material and equipment to relocate the existing drinking fountain including tie into existing drinking fountain water and sewer connection, materials, preparation and labor for a complete relocation.

### Bid Item 24 - Repainting Shelter

Contractor shall provide all labor, materials, preparation and equipment for a complete repainting of the existing picnic shelter excluding metal roofing in accordance with Drawings and Specifications.

## LANDSCAPING

### Bid Item 25 - 2 Inch Caliper Deciduous Tree

Contractor shall provide all labor, trees, fertilizer, mulch, stakes and other items for the planting of deciduous trees in accordance with Drawings and Specifications.

### Bid Item 26 - 6 Foot Evergreen Tree

Contractor shall provide all labor, trees, fertilizer, mulch, stakes and other items for the planting of evergreen trees in accordance with Drawings and Specifications.

### Bid Item 27 - Relocation of Existing Tree

Contractor shall provide all labor, equipment, materials, preparation, and labor for complete relocation of 2(two) existing trees to specified areas on the drawings.

### Bid Item 28 - Deciduous Shrub #5

Contractor shall provide all labor, plants, soil preparation, fertilizer, mulch and other items for the planting of shrubs in accordance with Drawings and Specifications.

### Bid Item 29 - Ornamental Grass #1

Contractor shall provide all labor, plants, soil preparation, fertilizer, mulch and other items for the planting of shrubs in accordance with Drawings and Specifications.

### Bid Item 30 - Irrigated Fescue Sod

Contractor shall provide all soil preparation, amendment, herbicide, fertilizer, sod, labor, equipment and maintenance to sod areas in accordance with Drawings and Specifications.

### Bid Item 31 - Granite Turf Area Boulders

Contractor shall provide labor and equipment to transport and install boulders in turf and turf beds as shown on the drawings. The bid price for this item shall include all of the CONTRACTOR's costs of whatsoever nature including loading, hauling, weighing, delivering, placing, and all other incidental items for a complete item in accordance with Drawings and Specifications.

### Bid Item 32 - Granite Stepping Path Boulders

Contractor shall provide labor and equipment to transport and install stepping path boulders in the northeast corner of the irrigation pond as shown on the drawings. The bid price for this item shall include all of the CONTRACTOR's costs of whatsoever nature including loading, hauling, weighing, delivering, placing, installing a temporary coffer dam and all other incidental items for a complete item in accordance with Drawings and Specifications.

## ALTERNATE BID ITEMS

### Alternate Bid Item 1 - Irrigated Fescue Seed

Contractor shall provide all soil preparation, amendment, herbicide, fertilizer, seed, labor, equipment and maintenance to sod areas in accordance with Drawings and Specifications.

## **DIVISION 2**

### **SECTION 02100 - MOBILIZATION**

#### **PART 1 - GENERAL**

##### **1.01 Work Included**

- A. Prepare the site for construction.
- B. Move in and move out personnel and equipment.
- C. Set up and remove temporary offices, buildings, facilities and utilities.

##### **1.02 Site Conditions**

- A. The City has provided the right-of-way, easement or project site for all permanent access or permanent construction for the project. Any additional access, access right-of-way, construction areas, or additional needed land which may be involved in the construction of this project shall be the responsibility of the Contractor.
- B. The land owned by the City may be used as site headquarters, storage yard, or base of operations provided that the use of said land meets with all of the requirements and restrictions imposed by the City at the time of usage.

##### **1.03 Site Preparation for Contractor Occupancy**

- A. The Contractor shall provide all temporary facilities as required for performing the work. The Contractor shall secure and maintain proper storage areas for equipment and materials in locations she/he may deem necessary for the proper execution of the job as approved by the City Representative. No storage yard or project headquarters site may be utilized in conflict with objections from the adjacent property owners unless the Contractor obtains from the City specific written permission for such objectionable use. No objectionable material will be allowed to blow from, wash off or drain off of any storage yard on to adjacent property.
- B. The Contractor shall maintain all storage yards in as neat and orderly a manner as possible, allowing no accumulation of waste materials or disposal piles. The Contractor may construct a temporary security fence for the protection of materials, tools, and equipment. The fence shall be maintained during the construction period. Upon completion of work, the security fence shall be removed from the site. The Contractor shall provide adequate parking facilities within the designated area for personnel working on the project.
- C. The Contractor shall obtain the necessary permits for connection to necessary services provided by utility companies serving the project area.
- D. Materials, equipment, and work required for temporary storm water management during the construction period shall be provided by the Contractor as required to ensure public safety and to protect the work in progress and materials stored on site.

##### **1.04 Damage or Use-Fee Claims**

- A. Any damage or use-fee claims filed against the Contractor may become a part of the final settlement of this project and may be cause for delay of final acceptance or delay of final payment.

PART 2 - NOT USED

PART 3 - EXECUTION

**3.01 Obstructions**

- A. The location of some utilities and obstructions may not be shown. Bidders are advised to carefully inspect the existing facilities before preparing their proposals. The removal and replacement of minor obstructions such as electrical conduits, air, water, and waste piping and similar items shall be anticipated and accomplished, even though not shown or specifically mentioned. Major obstructions encountered that are not shown on the Contract Drawings or could not have been foreseen by visual inspection of the site prior to bidding should immediately be brought to the attention of the City Representative. The City Representative will make a determination for proceeding with the work. If the City Representative finds that the obstruction adversely affects the Contractor's costs or schedule for completion, a proper adjustment to the Contract will be made in accordance with the General Conditions.

**3.02 Demolition**

- A. Any pipes or existing structures encountered during construction shall be preserved until accepted for removal by the City Representative. The Contractor shall be required to repair pipes or structures in use that are damaged during construction at no cost to the City. The removal of abandoned pipes shall be reviewed by the City Representative.

**3.03 Removal and Salvage of Materials**

- A. The Contractor shall carefully remove materials specified to be reused or salvaged so as not to damage the material. Reuse by the Contractor of salvaged material will not be permitted, except as specifically shown or specified herein. Existing materials to be removed or replaced and not specifically designated for salvage shall become the property of the Contractor. Provide and maintain dust tight temporary partitions, bulkheads, or other protective devices during the construction to permit normal operation of the existing facilities. Construct partitions of plywood, insulating board, plastic sheets, or similar material.

**END OF SECTION**

## **DIVISION 2**

### **SECTION 02122 - TREE PROTECTION**

#### **PART 1 - GENERAL**

##### **Description of Work**

- A. The Contractor shall provide all labor, materials, and equipment necessary to perform the work items called for on the bid schedule.
- B. The Contractor shall perform tree protection regardless of the type, nature, or condition of trees encountered, as specified or required in order to accomplish the construction.

#### **PART 2 - MATERIALS**

##### **2.01 Temporary Fencing**

- A. Orange construction fencing, five feet or greater in height as required to fulfill the intent of this section.
- B. Fencing anchors for small trees shall be T posts. Anchors for fencing within the drip line of large trees shall be dual-socket portable concrete pier blocks sufficient to secure the fence in a vertical position for the construction period.

#### **PART 3 - EXECUTION**

##### **3.01 General**

- A. Prior to and during construction, barriers shall be erected around all protected existing trees. Barriers shall be orange construction fencing located no closer than six (6) feet to the surface of the trunk or one-half (½) of the drip line radius, whichever is greater. Posts shall be anchored in movable concrete blocks so as not to require excavation within the tree's drip line. There shall be no storage or movement of equipment, material, debris, or fill within the fenced tree protection zone. The drip line is defined as the area on the ground covered by the spread of branches.
- B. There shall be no cleaning of equipment or material or the storage and disposal of waste material such as paints, oils, solvents, asphalt, concrete, motor oil or any other material harmful to the life of a tree within the drip line of any protected tree or group of trees.
- C. No attachment, wires, signs, or permits may be fastened to any protected tree.
- D. Large areas containing clumps, groves, or copses of protected trees which are naturally separated from construction or land clearing areas, road rights-of-way and utility easements may be "ribboned off," rather than erecting protective fencing around each tree as required above. This may be accomplished by placing metal t-post stakes a maximum of thirty (30) feet apart and tying ribbon or rope from stake-to-stake along the outside perimeters of such areas being cleared.
- E. The temporary fencing shall be removed by the Contractor only after all heavy equipment has been permanently withdrawn from the site.

##### **3.02 Excavation**

- A. Install shoring or other protective support systems to minimize sloping or benching of excavations.

- B. Do not excavate within the tree drip line, unless otherwise indicated. Where excavation for new construction is required within tree drip lines, hand excavate to minimize damage to root systems. Use narrow-tine spading forks and comb soil to expose roots.
- C. Relocate roots in backfill areas wherever possible. If encountering large, main lateral roots, expose beyond excavation limits as required to bend and relocate without breaking. If encountered immediately adjacent to location of new construction and relocation is not practical, cut roots approximately 3 inches back from new construction.
- D. After excavation outside the drip line of trees, any severed roots should be cut again smoothly with flush cuts.
- E. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with compost and wrap with burlap. Water and maintain in a moist condition and temporarily support and protect roots from damage until they are permanently relocated and covered with earth.
- F. Root Pruning: Do not cut main lateral roots or tap roots; cut only smaller roots that interfere with installation of new work. Cut roots with sharp pruning instruments; do not break or chop. Roots 1 inch and larger shall be painted with two coats of Tree Seal or approved equal.
- G. Trenching should be done outside the drip line of trees. The installation of utilities, irrigation lines, or any underground fixture requiring excavation deeper than six inches shall be accomplished by boring under the root system of protected existing trees at a minimum depth of 24 inches. The auger distance is established from the face of the tree (outer bark) and is scaled from tree diameter at breast height as described in the chart below.

Tree Diameter at Breast Height (Inches)	Auger Distance from Face of Tree (Feet)
0-2	1
3-4	2
5-9	5
10-14	10
15-19	12
Over 19	15

### **3.03 Tree Repair and Replacement**

- A. Promptly repair trees damaged by construction operations to prevent progressive deterioration.
- B. Remove and replace dead and damaged trees that the City Forester determines to be incapable of restoring to a normal growth pattern.
  - 1. Provide new trees of same size and species as those being replaced. Plant and maintain as specified herein.

**END OF SECTION**

## **DIVISION 2**

### **SECTION 02200 - EARTHWORK AND GRADING**

#### **PART 1 – GENERAL**

##### **1.01 Section Includes**

- A. Stockpiling of topsoil
- B. Grading to contours within specified tolerances, cutting, and filling.
- C. Establishment of subgrades, compacting, and preparing the site for paving and vegetation.
- D. Erosion control measures
- E. The Contractor shall perform all excavation regardless of the type, nature, or condition of material encountered, as specified or required in order to accomplish the construction.

##### **1.02 Related Sections**

- A. Section 01290 – Measurement and Payment: requirements applicable to unit prices for the work of this section.
- B. Section 01450 – Quality Control and Testing: testing compaction of earth fill areas.
- C. Section 02250 – Topsoil.

##### **1.03 Unit Price Measurement and Payment**

- A. Topsoil: by the percent complete as determined by the schedule of values. Includes removing, stockpiling, and redistributing topsoil.
- B. Subsoil: by the percent complete as determined by completed progress topographic surveys.
- C. Erosion control: by the percent complete.

##### **1.04 Project Record Documents**

- A. Submit under provisions of Section 01700.
- B. Accurately record actual location of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.
- C. Accurately document finished grades and other information for use in preparing the City of Fort Collins Drainage Certification.

##### **1.05 Quality Assurance**

- A. Reference standards listed hereunder and referenced elsewhere in these specifications shall become a part of this specification and are incorporated herein by reference. The latest edition, amendment or supplement thereto in effect thirty days (30) before the date of bid invitation shall apply.
  - 1. American Association of State Highway and Transportation Officials (AASHTO).

2. American Society of Testing and Materials (ASTM).

**1.06 Submittals**

- A. Submit reports of testing service: Contractor shall provide soil testing service for quality control testing of soil compaction during earthwork operations, as required under City rules and regulations. Contractor will coordinate schedules with the Engineer in order to allow for adequate time to conduct tests.
- B. Testing Methods and Frequency

Testing shall be done with the following methods and frequency:

<b>Item</b>	<b>AASHTO</b>	<b>ASTM</b>
Sampling	T 87	D 420
Soil Classification	M 145	D 3282
Moisture-Density (Proctor)	T 99	D 698
Density (Nuclear)	T 180	D 1557
	T 238	D 2922
Moisture Content (Nuclear)	T 239	D 3017

**1.07 City Furnished Materials**

- A. None, unless otherwise noted on the Bid Schedule.

**1.08 Site Conditions**

- A. A geotechnical investigation may have been performed for the City in order to obtain relative data concerning the character of material in and upon which the project is to be built. If an investigation has been performed, the information will be available to the Contractor for information purposes only. The Contractor shall satisfy himself as to the kind and type of soil to be encountered and any water conditions that might affect the construction of the project.
- B. The locations of existing utilities are shown in an approximate way only and not all utilities may be shown. The Contractor shall determine the exact location of all existing utilities prior to commencing work. The Contractor shall be fully responsible for any and all damages that might be occasioned by his failure to exactly locate and preserve any and all utilities. If utilities are to remain in place, the Contractor shall provide adequate means of support and protection during construction.
- C. Should drawn, or incorrectly drawn, piping or other utilities be encountered during excavation, the Contractor shall advise the City within thirty (30) minutes of encountering the utility. The Contractor shall cooperate with the City and utility companies in keeping respective services and facilities in operation to the satisfaction of the respective owners. The City reserves the right to perform any and all work required should the Contractor fail to cooperate with the respective companies, and back charge the Contractor for any and all expenses.
- D. The Contractor shall provide barricades and signs in accordance with the Uniform Manual of Traffic Control Devices where applicable. The Contractor shall maintain all devices in a working manner.

- E. Limit of Operations:
  - 1. The Contractor will limit his operations to only those areas identified on the drawings. If the remaining area of the site is disturbed, in the opinion of the Owner, the Contractor will repair and re-seed the disturbed area. All costs of this work will be borne solely by the Contractor.
  - 2. If unauthorized over-excavation occurs, the Contractor shall be responsible for the repair of the area, backfilling with approved material, and compacting to the specified density.
- F. Drainage: Maintain the excavations and site free from water throughout the course of the project.
- G. Interruption of Service:
  - 1. Coordinate interruption of utility services with the Owner and the utility operator. Make connections to the existing system requiring the service interruption during the time designated by the Owner (weekends, nights, holidays).
  - 2. Obtain permission to cut and replace existing service lines. Notify affected users two hours in advance of interruption and restore service within four hours after interruption. Repair damage at no additional cost to the Owner.
  - 3. Operate valves or other controls on the existing system only after obtaining Owner approval.
- H. Erosion Control: The Contractor will follow the requirements of the Erosion Control Plan. The Contractor's earthwork schedule is to be identified and submitted on the schedule required by the General Conditions of the Contract. The Contractor will implement erosion control measures as described and herein referenced by the City of Fort Collins Erosion Control Manual.

**1.09 Material Imports and Exports**

- A. Waste or demolition material, including rock, gravel, sod, broken concrete or asphalt, plaster, etc., shall be hauled off the site and disposed of in accordance with applicable regulations.
- B. Additional fill material, if required, shall be hauled to the site from off the site as a necessary part of the work. Material composition shall be subject to the requirements of the specifications.

**PART 2 - MATERIALS**

**2.01 Soil Materials**

- A. Coarse-grained soils free from debris, roots, organic material, and non-mineral matter containing no particles larger than 4-inch size and classified as either:
  - 1. Sands with fines (SM, SC) and less than 25 percent of the soil particles passing the No. 200 sieve, or
  - 2. Clean sands (SW, SP)
  - 3. Native soils as determined acceptable by the Engineer.

**2.02 Filter Fabric**

- A. Filter Fabric shall be Typar 3451W, Mirafi 700X or approved equal.

## PART 3 - EXECUTION

### 3.01 Preparation

- A. Field measurements: Before commencing work, locate all baselines and coordinates required for control of the work, establish required grade staking for control of excavation, fill and embankment construction. Field verify by excavation the location all utility crossings, service connections, and connections to existing lines before proceeding with earthwork.
- B. Layout Lines and Levels:
  - 1. Verify that survey bench mark and intended elevations for the Work are as indicated.
  - 2. The drawings indicate existing elevations and proposed elevations. The existing elevations and proposed are given for the convenience of the Contractor to assist him in arriving at the quantities of excavation, grading, backfilling etc.
  - 3. Before earthwork operations are started, all construction items shall be completely staked out for the Owner's approval. For any area with a two- percent slope or flatter, the Contractor shall lay out a 50-foot on-center grid and calculate the exact elevation at every intersection of the grid lines. These calculations will be approved by the Owner's Representative. For complex grading in the core area of the park, the contractor shall exercise craftsmanship and diligence in the establishment and layout of detailed slopes and precise landform shapes. Additional surveying and smaller equipment are likely to be required to precisely achieve specified convex and concave berm grades in these areas to the specified tolerances.
  - 4. Preliminary grade stakes for subgrade elevations shall be set at 50 feet on center for the center line of walks; all drainage swales; breaks in grade; spot elevations; and as otherwise required to complete the work of this section to the elevations shown on the Drawings or as modified in the field by the Owner.
  - 5. Protect benchmarks, temporary benchmarks, survey control points, sidewalks, paving, curbs, existing above and below grade utilities, and existing vegetation that is to remain from excavating equipment and vehicular traffic.
- C. Removal of Topsoil: Strip existing earthen material (topsoil) to a depth of 4 inches over the entire site. Stockpile on site in area approved by Owner's Representative. Keep topsoil segregated. Place, grade, and shape stockpile for proper drainage.

### 3.02 Excavation

- A. Prior to beginning excavation operations, accomplish all site preparation in accordance with these specifications. Perform excavation of every description to the lines and grades indicated on the drawings.
- B. Complete excavation work to the grade elevations shown on the drawings for all areas to be paved.

### 3.03 Clearing the Site

- A. All areas underlying new structures, paved areas, site fills and embankments shall be cleared of stumps, shrubs, brush, and other vegetative growth.
- B. Any material containing roots, grasses and other deleterious or organic matter generally found in the top four to six inches of undisturbed natural terrain shall be stripped from all areas requiring

excavation, grading, trenching, subgrade preparation for foundations and embankment work. The City will require stripped topsoil deemed suitable for spreading over the finished grades to be stockpiled and preserved until the finished grading operation, at which time it shall be spread uniformly over areas to be seeded or sodded.

- C. Upon completion of the project, completion of a particular phase of the project, or termination of the use of any particular area, site, storage yard right-of-way or easement, the Contractor shall promptly and neatly clean up the area and re-establish the ground to the contours required by the project or conditions prior to project commencement.

### **3.04 Earth Fill Construction**

- A. Install the work in accordance with the Geotechnical Engineering Report and in accordance with the City of Fort Collins standards.
- B. The Contractor shall perform all grading to the lines and grades specified and/or established by the Engineer, with an appropriate allowance for topsoil. All slopes shall be free of all exposed roots and stones exceeding 3-inch diameter, which are loose and liable to fall. Tops of banks shall be rounded to circular curves not less than 6-feet in radius or as shown on the drawings.
- C. Rounded surfaces shall be neatly and smoothly trimmed. Topsoil shall be replaced to a depth of 4-inches in areas to be revegetated.
- D. The Contractor shall protect the fill against freezing when atmospheric temperature is less than 35 degrees F (1 degree C).

### **3.05 Compaction**

- A. The Contractor shall meet minimum percentage density specified for each area classification as follows. Percentage of Maximum Density Requirements: Compact soil to not less than the indicated percentages of maximum density relationship determined in accordance with ASTM D 698.
  - 1. Foundations, Paved Areas, Utilities, and Sidewalks - 95 percent
  - 2. Unpaved Areas - 90 percent
- B. Control moisture content within 2% of optimum moisture content as determined by ASTM D 698. Where subgrade or layer of soil material is too dry to permit compaction to the specified density, uniformly apply water to surface of cut area, subgrade, or loosely placed layer of soil material. Mix soil and applied water by blading, disking, or other methods to achieve uniform moisture content throughout the soil mass to be compacted.
- C. Remove and replace, or, scarify and air dry, soil material that is too wet to permit compaction to specified density. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by disking, harrowing or pulverizing until moisture content is reduced to a satisfactory value.
- D. Puddling is not an acceptable method of compaction.

### **3.06 Grading**

- A. Paved Areas: Immediately prior to placing structural pavements, shape area to the required lines, grades, and limits to enable achievement of the finished elevations indicated and roll with an approved heavy vibratory roller until compacted to the specified density. Maintain moisture content within 2% of optimum during final rolling and until subgrade is covered by subsequent construction. Remove loose material and protect subgrade until covered.
- B. Landscape Area and Remainder of Site:
  - 1. Rough grade areas as indicated on grading plan to 4 inches below finish grade. After rough grading is finished, compacted and approved, scarify area to a depth of at least 6 inches.
  - 2. Place previously stockpiled topsoil in all areas within the limits of the project not indicated to receive subsequent foundations, slabs on grade, walks, safety surfacing or other similar materials.
  - 3. Uniformly distribute topsoil on the disturbed area and evenly spread to a thickness of 4 inches deep after light compaction. Perform spreading so that planting can proceed with little additional soil preparation or tillage. Do not place topsoil when subgrade is frozen, excessively wet, extremely dry or in a condition otherwise detrimental to specified grading, seeding and planting specifications.
- C. Finish Grading:
  - 1. Grade all excavated sections, filled sections, construction disturbed areas and adjacent transition areas to finish elevation. Make finished surfaces smooth, compacted and free from irregular surface changes. Remove all construction debris.
  - 2. Unless indicated otherwise on drawings, finish grade area adjacent to sidewalks and pavements to ½ inch below finish elevation of sidewalk and pavement.
  - 3. Grades not otherwise indicated shall be uniform levels or slopes between such points and existing finish grade. Abrupt change in slopes shall be rounded.

### **3.07 Tolerances**

- A. Tolerances for areas to receive paving shall be plus or minus 0.05 foot. In the areas to receive new vegetation and the remainder of the site, tolerances shall be within plus or minus 0.10 foot.

### **3.08 Field Quality Control**

- A. Section 01400 – Quality Assurance: Field inspection and testing.
- B. Testing: In accordance with AASHTO T180.
- C. Allow testing service to inspect and approve subgrades and fill layers before further construction work is performed. Notify testing service not less than 8 working hours in advance. Testing shall be at the discretion of the Owner.
- D. If tests indicate that the Work does not meet the specified requirements, remove work, replace and retest.
- E. Verification of grading within allowable tolerances shall be conducted as requested by the Owner. The Contractor shall provide all necessary surveying equipment and a survey crew, if requested

by the Owner. If, in the opinion of the Owner, the grading does not conform to the required grades and tolerances, the Contractor shall regrade the area and bear all costs associated with the regrading and reverification until the specifications are met.

### **3.09 Settlement**

- A. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, the Contractor shall scarify the ground surface, re-shape, and compact to required density prior to further construction.
- B. Any settlement in backfill, fill, or in structures built over the backfill or fill, which may occur within the guarantee period in the General Conditions will be considered to be caused by improper compaction methods and shall be corrected at no cost to the City. Any structure damaged by settlement shall be restored to their original condition by the Contractor at no cost to the City.

### **3.10 Disposal of Excess Excavation and Waste Materials**

- A. The Contractor shall dispose of all excess excavated material not required for fill on-site, as directed by the Engineer. The grading design is intended to balance on site. Utility trench excavation material was not included in the calculation of earthwork balance.
- B. The Contractor shall remove and be responsible for legally disposing of excess fill material not placed on-site, waste materials, trash and debris.
- C. The Contractor shall conduct all site grading operations and other construction activities to minimize erosion of site soil materials. The contractor shall be responsible to maintain streets/public right-of-way daily by removing any spillage of dirt, rocks or debris from equipment entering or leaving the site.

### **3.11 Dust Control**

- A. Obtain Larimer County Fugitive Dust Permit.
- B. Control the amount of dust generated from construction to prevent hazardous conditions or public nuisance. Use of water will not be permitted when it will result in hazardous conditions such as ice, flooding, or pollution. Blowing dust will not be permitted.

### **3.12 Cleaning**

During and upon completion of earthwork operations, clean areas within contract limits and within the public rights-of-way. Remove tools and equipment. Provide site clear, clean, free of debris, and suitable for site work operations.

**END OF SECTION**

## **DIVISION 2**

### **SECTION 02220 - DEMOLITION**

#### **PART 1 - GENERAL**

##### **1.01 Description of Work**

- A. Demolition or salvage and removal of boulders (if found) for re-use in landscape; and remove fencing, other plant material, and debris or other items on the site necessary for the construction of the project.

##### **1.02 Quality Assurance**

- A. Standards listed hereunder and referenced elsewhere in these specifications shall become a part of this specification and are incorporated herein by reference. The latest edition, amendment or supplements thereto in effect thirty (30) days before date of invitation shall apply.
  - 1. City of Fort Collins, Street Cut and Excavation Repair Standards
  - 2. City of Fort Collins, Stormwater Drainage Design and Construction Standards

#### **PART 2 - MATERIALS - Not Used**

#### **PART 3 - EXECUTION**

##### **3.01 Inspection and Reviews**

- A. Schedule site meeting with Owner's Representative to verify and mark limits of demolition.

##### **3.02 Protection**

- A. Refer to the General Requirements for site protection and temporary controls.
- B. Erect barriers and warning signs as necessary to prevent injury to the public and construction personnel.
- C. Protect features and areas not marked for demolition. Limit use of site to the delineated areas.
- D. Use of explosives is prohibited.

##### **3.03 Demolition and Removal**

- A. Items listed for salvage remain the property of the City. Items listed for demolition become the property of the Contractor.
- B. Remove from site items shown on demolition plan.
- C. Arrange for and pay costs associated with off-site disposal.

##### **3.04 Hidden Conditions**

- A. A hidden condition is any feature that could not be discovered or reasonably inferred from a careful inspection of the site prior to demolition.
- B. Promptly report hidden conditions to the Owner's Representative.
- C. Hidden conditions may cause damage to features that are to remain in a finished work if demolition operations continue. Stop demolition operations affected by hidden conditions until a determination is made by the Engineer.
- D. Hidden conditions may cause a change in contract time or price; refer to the General Conditions.

### **END OF SECTION**

## **DIVISION 2**

### **SECTION 02221 – TRENCHING, BACKFILLING, AND COMPACTION**

#### **PART 1 - GENERAL**

##### **1.01 Scope**

Furnish all labor, materials, and equipment, and perform all operations to complete trenching, including excavation, subgrade preparation, drainage, filter fabric installation, bedding, backfilling, compacting, and finish grading for underground pipelines, service lines, sleeving, and appurtenances as shown on the drawings and as specified herein.

##### **1.02 Related Work**

- A. Section 02200 – Earthwork and Grading.
- B. Section 02520 – Portland Cement Concrete Paving.
- C. Section 02600 – Domestic Water Supply.
- D. Section 02700 – Sanitary Sewerage Systems.
- E. Section 02810 – Irrigation.
- F. Section 16000 – General Electrical.

##### **1.03 Protection**

- A. Obtain utility locations before commencing work. Protect all existing underground utilities, above ground structures or plantings, or repair to original condition.

#### **PART 2 - MATERIALS:**

##### **2.01 Trench Backfill Material**

- A. Trench excavation or imported material free from frozen material, stumps, roots, brush, other organic matter, cinders or other corrosive material, debris, and rocks or stones greater than 2 inches in any dimension.

##### **2.02 Other**

- A. Bedding, piping, filter fabric, and other materials specified on the drawings and in related sections.

#### **PART 3 - EXECUTION**

##### **3.01 Preparation**

- A. Remove and stockpile topsoil from areas to be disturbed by construction. Keep topsoil segregated from non-organic trench excavation materials and debris.

##### **3.02 Trenching**

- A. Excavate trenches by open cut methods. Segregate suitable backfill. Rough trench excavation will leave trench with uniform width and vertical sidewalls from an elevation one foot above the top of installed pipe to the bottom of pipe.
- B. Minimum trench width will provide 6 inch space between pipe wall and side of trench. Maximum trench width will be shown on the drawings or in the appropriate pipeline section. If not specified elsewhere the maximum trench width is the pipe O.D. plus 20 inches.

- C. Grade trench bottom to provide uniform clearance for bedding material. De-water trench. Remove loose material and foreign objects. When required, install filter fabric per manufacturer's specifications.
- D. Unstable subgrade is not expected. If unstable subgrade material is encountered, report the condition to the Owner. Remedy and payment for subgrade stabilization will be based on the actual conditions encountered.

### **3.03 Bedding**

- A. Pipe will be bedded in accordance with the detailed drawings or the appropriate pipeline specification.

### **3.04 Backfilling and Compaction**

- A. Backfill trench promptly after completion of pipe bedding.
- B. Deposit material in uniform layers with thickness commensurate with the soil encountered and the compaction equipment used.
- C. Compaction requirements will be made at the moisture content and will meet the densities, by zone, specified in Section 02200 – Earthwork and Grading.
- D. Coordinate and schedule compaction tests with City Representative.

### **3.05 Surface Restoration**

- A. Restore pavements according to City of Fort Collins Standards.
- B. Restore landscaped areas according to Section 02900 – Landscaping.

**END OF SECTION**

## **DIVISION 2**

### **SECTION 02240 - WATER CONTROL AND DEWATERING**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. The work of this section consists of controlling groundwater, site drainage, and storm flows during construction. The CONTRACTOR is cautioned that the work involves construction in and around drainage channels, local streams or rivers, and areas of local drainage. These areas are subject to frequent periodic inundation.

##### **1.02 RELATED SECTIONS**

- A. Section 02315 – Excavation and Embankments

#### **PART 2 PRODUCTS**

##### **2.01 MATERIALS**

- A. On-site materials may be used within the limits of construction to construct temporary dams and berms. The materials such as plastic sheeting, sand bags, and storm sewer pipe may also be used if desired by the CONTRACTOR.

#### **PART 3 EXECUTION**

##### **3.01 CONSTRUCTION REQUIREMENTS**

- A. General: For all excavation, the CONTRACTOR shall provide suitable equipment and labor to remove water, and he shall keep the excavation dewatered so that construction can be carried on under dewatered conditions where required by the Drawings and Specifications. Water control shall be accomplished such that no damage is done to adjacent channel banks or structures. The CONTRACTOR is responsible for investigating and familiarizing himself with all site conditions that may affect the work including surface water, level of groundwater and the time of year the work is to be done. All excavations made as part of dewatering operations shall be backfilled with the same type material as was removed and compacted to 95% of Maximum Standard Proctor Density (ASTM D698) except where replacement by other materials and/or methods are required. The CONTRACTOR shall conduct his operation in such a manner that storm or other waters may proceed uninterrupted along their existing drainage courses. By submitting a bid, the CONTRACTOR acknowledges that he has investigated the risk arising from such waters and has prepared his bid accordingly, and assumes all of said risk. At no time during construction shall the CONTRACTOR affect existing surface or subsurface drainage patterns of adjacent property. Any damage to adjacent property resulting from the CONTRACTOR's alteration of surface or subsurface drainage patterns shall be repaired by the CONTRACTOR at no additional cost to the OWNER. CONTRACTOR shall remove all temporary water control facilities when they are no longer needed or at the completion of the project. Pumps and generators used for dewatering and water control shall be quiet equipment enclosed in sound deadening devices.

- B. Surface Water Control: Surface water control generally falls in to the following categories:

1. Normal low flows along the channel;
2. Storm/flood flows along the channel;

3. Flows from existing storm drain pipelines; and,
  4. Local surface inflows not conveyed by pipelines.
- C. The CONTRACTOR shall coordinate, evaluate, design, construct, and maintain temporary water conveyance systems. These systems shall not worsen flooding, alter major flow paths, or worsen flow characteristics during construction. The CONTRACTOR is responsible to ensure that any such worsening of flooding does not occur. The CONTRACTOR is solely responsible for determining the methods and adequacy of water control measures.
- D. At a minimum, the CONTRACTOR will be responsible for diverting the quantity of surface flow around the construction area so that the excavations will remain free of surface water for the time it takes to install these materials, and the time required for curing of any concrete or grout. The CONTRACTOR is cautioned that the minimum quantity of water to be diverted is for erosion control and construction purposes and not for general protection of the construction-site. It shall be the CONTRACTOR's responsibility to determine the quantity of water which shall be diverted to protect his work from damage caused by storm water.
- E. The CONTRACTOR shall, at all times, maintain a flow path for all channels. Temporary structures such as berms, sandbags, pipeline diversions, etc., may be permitted for the control of channel flow, as long as such measures are not a major obstruction to flood flows, do not worsen flooding, or alter historic flow routes.
- F. Groundwater Control: The CONTRACTOR shall install adequate measures to maintain the level of groundwater below the foundation subgrade elevation and maintain sufficient bearing capacity for all structures, pipelines, earthwork, and rock work. Such measures may include, but are not limited to, installation of perimeter subdrains, pumping from drilled holes or by pumping from sumps excavated below the subgrade elevation. The foundation bearing surfaces are to be kept dewatered and stable until the structures or other types of work are complete and backfilled. Disturbance of foundation subgrade by CONTRACTOR operations shall not be considered as originally unsuitable foundation subgrade and shall be repaired at Contractor's expense.
- G. Any temporary dewatering trenches or well points shall be restored following dewatering operations to reduce permeability in those areas as approved by the ENGINEER.

**END OF SECTION**

## **DIVISION 2**

### **SECTION 02250 – TOPSOIL**

#### **PART 1 – GENERAL**

##### **1.01 Scope**

- A. This work shall consist of excavating, stockpiling, and placing topsoil on the project site ( and/or furnishing, hauling, and stockpiling) and placing topsoil from approved sources. This work shall also include preservation of vegetation and objects designated to remain from injury or defacement.

#### **PART 2 – MATERIALS**

##### **2.01 Topsoil**

- A. Topsoil shall consist of the organic growing layer of soil which is reasonably free of admixtures of subsoil, refuse, stumps, roots, rocks, brush, weeds, heavy clay, hard clods, toxic substances or other material which would be detrimental to proper development of vegetative growth.

#### **PART 3 – EXECUTION**

##### **3.01 Protection of Existing Improvements**

- A. Provide protection necessary to prevent damage to existing improvements indicated to remain in place.
- B. Protect improvements on adjoining properties and on City's property
- C. Restore damaged improvements to their original condition, acceptable to parties having jurisdiction.
- D. Protect existing trees and other vegetation indicated to remain in place, against unnecessary cutting, breaking, or skinning of roots, skinning and bruising of bark, smothering of trees by stockpiling construction materials or excavated material within drip line, excess foot or vehicular traffic, or parking of vehicles within drip line. Provide temporary guards to protect trees and vegetation to be left standing.
- E. Water trees and other vegetation to remain within limits of contract work as required to maintain their health during the course of construction operations.
- F. Provide protection for roots over 1-1/2" diameter cut during construction operations. Temporarily cover exposed roots with wet burlap to prevent roots from drying out; cover with earth as soon as possible.
- G. Repair or replace trees and vegetation indicated to remain which are damaged by construction operations, in a manner acceptable to parties having jurisdiction. Employ qualified tree surgeon to repair damages to trees and shrubs. Replace trees which cannot be repaired and restored to full growth status, as determined by the City.

##### **3.02 Construction Requirements**

- A. Materials selected for topsoil shall be excavated and stockpiled (and/or furnished, hauled, and stockpiled) and placed at the site and graded. Topsoil shall be placed directly upon constructed cut and fill slopes without the use of stockpiles whenever conditions and the progress or work will permit.
- B. Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material.

- C. Limit stripping to limits of construction shown on the drawings; or to as small an area as practical within the right-of-way or limits of construction.
- D. Remove heavy growths of grass from areas before stripping.
- E. Where trees or bushes are indicated to be left standing, stop topsoil stripping a sufficient distance from the trees or bushes to prevent damage to main root system.
- F. Stockpile topsoil in storage areas designated or agreed to prior to starting work. Construct storage piles to freely drain surface water. Cover storage piles if required to prevent wind-blown dust. Maintain topsoil free from contamination.
- G. The area where topsoil shall be removed are:
  - 1. Where final contours on the drawings indicate excavation or filling.
  - 2. Under all asphalt pavement.
  - 3. Under all walkways.
  - 4. Under all graveled driveways and storage areas.
  - 5. Under all new building sites.
- H. Topsoil shall be placed and graded in landscaped areas. Placement shall not impede drainage patterns. Topsoil shall not be placed until the areas to be covered have been properly prepared and grading operations in the area have been completed.

**END OF SECTION**

## DIVISION 2

### SECTION 02304 – AGGREGATE BASE COURSE

#### PART 1 – GENERAL

##### 1.1 Description of work

- A. The current edition of the Colorado Department of Transportation Standard Specification Booklet is referenced into these specifications.

#### PART 2– REVISIONS

- A. Subsection 304.01 is revised to include the following:

This work shall consist of placing Aggregate Base (Class 5) over previously prepared subgrade approved by the Engineer. Aggregate Base will be used as fill under the curb, gutter, and sidewalks if there is not any acceptable material onsite.

The proposed material shall meet the following minimum requirements:

LL Maximum:	30
PI Maximum:	6
“R” Value Minimum:	78

The minimum strength coefficient of the Class 5 Aggregate Base shall be 0.12.

- B. Subsection 304.07 is revised to include the following:

Aggregate Base Course will be measured by the ton at proper moisture. Quality will be adjusted accordingly if moisture is too high. Haul and water necessary to bring mixture to optimum moisture will not be measured paid for separately, but shall be included in the price for Aggregate Base.

- C. Subsection 304/08 is revised to include the following:

The accepted qualities of Aggregate Base Course will be paid for at the contract price per ton.

- D. Payment will be made under:

Pay Item	Pay Unit
304-01 A.B.C. (C-5)	Tons

The above prices and payments shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all work involved in placing Aggregate Base Course including haul and water, complete-in-place, as shown on the plans, as specified in the specifications, and as directed by the Engineer.

**END OF SECTION**

## **DIVISION 2**

### **SECTION 02306 – RECONDITION SUBGRADE**

#### **PART 1 – GENERAL**

##### **1.01 Scope**

- A. This work shall consist of blading, shaping, wetting, and compacting the subgrade with moisture density control, in accordance with these specifications, at locations and in reasonably close conformity with the details shown on the plans or as staked.

#### **PART 2 – MATERIALS – Not used**

#### **PART 3 – EXECUTION**

##### **3.01 Construction Requirements**

- A. The top 6 inches of the entire subgrade, UNLESS OTHERWISE SHOWN ON THE DRAWINGS shall be reconditioned by scarifying, blading, and rolling. Sufficient water shall be added to meet the density requirements as specified on the plans. The reconditioned surface shall not vary above or below the lines and grades as staked by more than 0.08 foot. The surface shall be tested prior to the application of any base course material. Where bituminous surfacing materials are to be placed directly on the subgrade, the subgrade plane shall not vary more than .04 foot. All defective work shall be corrected as directed. The surface shall be satisfactorily maintained until base course has been placed.
- B. Compaction shall be 95% of ASTM D698 UNLESS OTHERWISE SHOWN ON DRAWINGS.

**END OF SECTION**

## **DIVISION 3**

### **SECTION 02315 - EXCAVATION AND EMBANKMENT**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. This work shall consist of excavation, embankment fill, disposal of excess material, shaping, and compaction of all material encountered within the limits of work, including excavation and backfill for structures. The excavation shall include, but is not limited to, the native soils which must be excavated for the project work. All work shall be completed in accordance with these Specifications and the lines and grades on the Drawings.

##### **1.02 DEFINITIONS**

- A. Unclassified Excavation shall consist of the excavation of all materials on site to final grades, excluding the bid items included in section 02220. Excavation of unsuitable material will only be paid for if it is found to be unsuitable in its original state.
- B. Muck Excavation shall consist of the removal and disposal of mixtures of soils and organic matter not suitable for foundation material and replacement with approved material. Material damaged due to rain or weather will not be paid for as Muck excavation and is entirely the responsibility of the CONTRACTOR.
- C. Rock Excavation shall consist of igneous, metamorphic and sedimentary rock which cannot be excavated without the use of rippers, and all boulders or other detached stones each having a volume of 1/2 cubic yard or more, as determined by physical or visual measurement. It shall also include replacement with approved material as required.
- D. Embankment (Complete in Place): shall consist of placing all excavated material, except material being hauled and disposed, as embankment and compacted to final grades as specified in the Contract Documents and on the Drawings.

##### **1.03 DESCRIPTION**

- A. This work shall consist of excavation, disposal, placement, and compaction of all material encountered within the limits of the work, and not being completed under some other item, necessary for the construction of the project in accordance with the Specifications and the lines, grades, and typical cross-sections shown on the Drawings. All excavation will be classified, "unclassified excavation", or "muck excavation" or "rock excavation", as hereafter described. All embankment will be classified "embankment material" as hereafter described.

##### **1.04 RELATED SECTIONS**

- A. Section 02240 – Water Control and Dewatering

##### **1.05 QUALITY ASSURANCE**

- A. Final topography and/or cross-sections will be surveyed of areas that are to finished grade and compared to the design section for accuracy. Final grade shall match design grades within the tolerances discussed in PART 3 EXECUTION.

## PART 2 PRODUCTS

### 2.01 MATERIALS

- A. Embankment material may consist of approved material acquired from excavations or material hauled from outside the project limits. Suitable material identified on-site shall be used first for embankments and backfill. Excess excavated native soils which are not used as embankment or backfill shall become the property of the CONTRACTOR and shall be disposed of off-site by the CONTRACTOR, in a location acceptable to the ENGINEER.
- B. Muck excavation encountered in all areas other than within the lakes shall also include the replacement of excavated muck with uniformly graded rock, riprap, on-site or imported soils, or other material whichever is most suitable for the specific situation encountered. The ENGINEER will determine which type of aggregate or other material which shall be used after observing the specific site conditions.

## PART 3 EXECUTION

### 3.01 GENERAL EXCAVATION/EMBANKMENT

- A. General: The excavation and embankment for the project work shall be finished to reasonably smooth and uniform surfaces. Variation from the subgrade plane shall not be more than .08 feet in soil or more than .08 feet above or .50 below in rock. Materials shall not be wasted without permission of the ENGINEER. Excavation operations shall be conducted so that material outside of the limits of slopes will not be disturbed.
- B. When the CONTRACTOR's excavating operations encounter remains of pre-historic people's dwelling sites or artifacts of historical or archaeological significance, the operations, shall be temporarily discontinued. The ENGINEER will contact archaeological authorities to determine the disposition thereof. When directed, the CONTRACTOR shall excavate the site in such a manner as to preserve the artifacts encountered and shall remove them for delivery to the custody of the proper state authorities. Such excavation will be considered and paid for as extra work.

C. Excavation:

- 1. Unclassified: All excess suitable material excavated from the project site and not used for embankment shall be removed from the project site and become the property of the CONTRACTOR. Where material encountered within the limit of the work is considered unsuitable for embankment (fills) on any portion of this project work, such material shall be excavated as directed by the ENGINEER and replaced with suitable fill material. All unsuitable excavated material from excavation consisting of any type of debris (surface or buried), excavated rock, bedrock or rocks larger than 6 inches in diameter and boulders shall be hauled from the project site and disposed of. Debris is defined as "anything that is not earth which exists at the job site".
- 2. Muck: Where excavation to the finished grade section results in a subgrade or slopes of unsuitable soil, the ENGINEER may require the CONTRACTOR to remove the unsuitable materials and backfill to the finished graded section with approved material. Disposal of the material shall be at the CONTRACTOR's expense.

Good surface drainage shall be provided around all permanent cuts to direct surface runoff away from the cut face.

Rock: Unless otherwise specified, rock shall be excavated to a minimum depth of 0.5 feet below subgrade within the limits of the channel area, and the excavation shall be backfilled with material shown on the Drawings or as designated by the ENGINEER. Disposal of material and replacement with suitable approved material shall be at the CONTRACTOR's expense.

- D. Embankment Construction: Embankment construction shall consist of constructing all fill areas, including preparation of the areas upon which they are to be placed, and the placing and compacting of embankment material in holes, pits and other depressions within the project area. Only approved materials shall be used in the construction of embankments and backfills.

Approved materials shall consist of clean on-site cohesive soils or approved imported soils. On-site cohesive soils are suitable for use as compacted fill provided the following recommendations are met:

Excavation and Embankment will only be paid when a significant change in grade is required, as determined by the ENGINEER. Minor cuts and fills will be considered incidental to the work, and will not be paid for separately under this section.

**Percent Finer by Weight**

<u>Gradation</u>	<u>(ASTM C136)</u>
½-Inch	100
3/8-Inch	70 – 100
No. 4 Sieve	50 – 100
No. 200 Sieve	60 (min)

**Percent Finer by Weight**

<u>Gradation</u>	<u>(ASTM C136)</u>
• Liquid Limit	35 (max)
• Plasticity Index	20 (max)
• In-Situ Coefficient of Permeability	1x10 <sup>-6</sup> cm/sec

On-site cohesive soils or imported soils should be placed and compacted in horizontal lifts, using equipment and procedures that will produce recommended moisture contents and densities throughout the lift and embankment height. On-site or imported cohesive soils should be compacted within a moisture content range of 2% below, to 2% above optimum moisture content and compacted to 95% of the Maximum Standard Proctor Density (ASTM D698).

When embankment is to be placed and compacted on hillsides, or when new embankment is to be compacted against existing embankments, or when embankment is built 1/2 width at a time, the slopes that are steeper than 4:1 when measured longitudinally or at right angles to the adjacent ground shall be continuously benched over those areas where it is required as the work is brought up in layers. Benching shall be well keyed and where practical a minimum of 8 feet. Each horizontal cut shall begin at the intersection of the original ground and the vertical sides of the previous cuts. Material thus cut out shall be recompacted along with the new embankment material at the CONTRACTOR's expense.

The ground surface underlying all fills shall be carefully prepared by removing all organic matter, scarification to a depth of 8 inches and recompacting to 95% of the Maximum Standard Proctor Density (ASTM D698) at optimum moisture content + or - 2% prior to fill placement.

Embankment material shall be placed in horizontal layers not exceeding 8 inches (loose measurement) and shall be compacted to 95% of the Maximum Standard Proctor Density (ASTM D698) at optimum moisture content + or - 2%. Effective spreading equipment shall be used on each lift to obtain uniform thickness prior to compacting. As the compaction of each layer progresses, continuous leveling and manipulating will be required to assure uniform density.

For embankments which serve as berms, the downstream portion shall be “keyed” into the subsurface soils a minimum of 3 feet to enhance the stability of the slope.

Materials which are removed from excavations beneath the water table may be over the optimum moisture content and will require that they be dried out prior to reusing them.

Cross hauling or other action as appropriate will be ordered when necessary to insure that the best available material is placed in critical areas of embankments, including the top 2 feet of all embankments. No additional payment will be made for cross hauling ordered by the ENGINEER.

Frozen materials shall not be used in construction of embankments.

During the construction of the channels, the channel bottom shall be maintained in such condition that it will be well drained at all times.

Excavation or Embankment (Fill), and Structural Backfill work either completed or in a stage of completion that is either eroded or washed away or becomes unstable due to either rains, snow, snow melt, channel flows or lack of proper water control shall be either removed and replaced, recompact or reshaped as directed by the ENGINEER and in accordance with the Drawings and Specifications at the CONTRACTOR's sole expense. Removed unsuitable materials shall be hauled away and disposed of at the CONTRACTOR's expense. Placing of replacement materials for removed unsuitable materials shall be purchased, placed and compacted at the CONTRACTOR's expense.

- E. Proof rolling with a heavy rubber tired roller will be required, if designated on the Drawings or when ordered by the ENGINEER. Proof rolling shall be done after specified compaction has been obtained. Areas found to be weak and those areas which failed shall be ripped, scarified, wetted if necessary, and recompact to the requirements for density and moisture at the CONTRACTOR's expense.

Proof rolling shall be done with equipment and in a manner acceptable to the ENGINEER. Proof rolling as shown on the Drawings or as ordered by the ENGINEER shall not be measured and paid for separately, but shall be included in the unit prices bid for the work.

**END OF SECTION**

## DIVISION 3

### SECTION 02375 – RIPRAP AND BEDDING, SITTING ROCK AND STEPPING STONES

#### PART 1 GENERAL

##### 1.01 Section Includes

- A. The work of this section shall include excavation, grading and installation of all riprap, bedding, and sitting rocks placed at the locations shown on the Drawings. The materials to be used for the construction of such structures shall be as specified herein.

##### 1.02 Related Sections

- A. Section 02240 – Water Control and Dewatering
- B. Section 02315 – Excavation and Embankment

##### 1.03 Submittals

- A. The CONTRACTOR shall submit certified laboratory test certificates for bedding material. No submittals or testing is required for riprap, sitting rocks and stepping stones.

#### PART 2 PRODUCTS

##### 2.01 Materials

- A. Riprap: Type 2 Gray Riprap. The source of the riprap to be used shall be Granite Canyon Quarry in Wyoming, on Interstate Highway 80 between Cheyenne and Laramie, (888) 638-3582, contact Pete Bovis.
- B. Bedding:
  - 1. Gradation for Granular Bedding

<u>U.S. Standard Sieve Size</u>	<u>Percent by Weight Passing Type I</u>	<u>Square Mesh Sieves Type II</u>
¾ Inch		20 - 90

Granular bedding designation and total thickness of bedding shall be as shown on the Drawings.

- C. Sitting Rock and Stepping Stones: The source of rock for sitting rock and stepping stones shall be City of Fort Collins, Gateway Mountain Park. The park is located on Highway 14, 5 miles west of the intersection of Highway 287 and Highway 14. Rock shall be selected on site by the Owner's Representative. The rock shall be the following approximate sizes:

<b>Quantity</b>	<b>Approx. Size</b>
7	4' x 3' x 2'
5	5' x 4' x 3'
4	6' x 4' x 3'

#### PART 3 EXECUTION

##### 3.01 Construction Requirements

- A. Channel slopes, bottoms, or other areas that are to be protected with riprap shall be free of brush, trees, stumps, and other objectionable material and be graded to a smooth compacted surface. The

CONTRACTOR shall excavate areas to receive riprap to the subgrade for granular bedding. The subgrade for bedding materials shall be stable. If unsuitable materials are encountered, they shall be removed and replaced as Muck Excavation in accordance with Section 02315 of the Specifications. Unsuitable materials shall be disposed of from the site by the CONTRACTOR at his expense. After an acceptable subgrade for granular bedding material is established, the bedding shall be immediately placed and leveled to the subgrade elevation. Immediately following this, the riprap shall be placed. If bedding material is disturbed for any reason, it shall be replaced and graded at the CONTRACTOR's expense. In-place bedding materials shall not be contaminated with soils, debris or vegetation before the riprap is placed. If contaminated, the bedding material shall be removed and replaced at the CONTRACTOR's expense.

### 3.02 Placement

A. Following acceptable placement of granular bedding, riprap placement shall commence as follows:

1. Machine Placed Riprap: Riprap shall be placed on the prepared slope or channel bottom areas in a manner which will produce a reasonably well-graded mass of stone with the minimum practicable percentage of voids. Riprap shall be machine placed, unless otherwise stipulated in the Drawings or Specifications.

When riprap is placed on slopes, placement shall commence at the bottom of the slopes working up the slope. Place the riprap in a stepped fashion with the bottom of the uphill riprap below the top of the downhill riprap by half of the height of the riprap minimum.

The entire mass of riprap shall be placed on either channel slopes or bottoms so as to be in conformance with the required gradation mixtures and to lines, grades, and thickness shown on the Drawings. Riprap shall be placed to its full course thickness at one operation and in such a manner as to avoid displacing the underlying bedding material. Placing of riprap in layers, or by dumping into chutes, or by similar methods shall not be permitted.

All material going into riprap protection for channel slopes or bottoms shall be so placed and distributed that there will be no large accumulations of either the larger or smaller sizes of stone. Some hand placement may be required to achieve this distribution.

It is the intent of these Specifications to produce a fairly compact riprap protection in which all sizes of material are placed in their proper proportions. Unless otherwise authorized by the ENGINEER, the riprap protection shall be placed in conjunction with the construction of embankments or channel bottoms with only sufficient delay in construction of the riprap protection, as may be necessary, to allow for proper construction of the portion of the embankment and channel bottom which is to be protected. The CONTRACTOR shall maintain the riprap protection until accepted. Any material displaced for any reason shall be replaced to the lines and grades shown on the Drawings at no additional cost to the OWNER. If the bedding materials are removed or disturbed, such material shall be replaced prior to replacing the displaced riprap.

2. Hand Placed Riprap: Hand placed riprap shall be performed during machine placement of riprap and shall conform to all the requirements of Section 02375 PART 2 above. Hand placed riprap shall also be required when the depth of riprap is less than 2 times the nominal stone size, or when required by the Drawings or Specifications.

After the riprap has been placed, hand placing or rearranging of individual stones by mechanical equipment shall be required to the extent necessary to secure a flat uniform surface and the specified depth of riprap, to the lines and grades as shown on the Drawings.

3. Soil Replacement In and Over Riprap: Where riprap is designated to be buried, place onsite excavated material that is free from trash and organic matter in riprap voids by washing and rodding. Prevent excessive washing of material into stream. When voids are filled and the surface accepted by the ENGINEER, place a nominal 6 inches of soil over the area, or as designated on the Drawings. Fine grade, seed, and mulch per the Specifications.

4. Rejection of Work and Materials: The ENGINEER shall reject placed riprap which does not conform to this Section and the CONTRACTOR shall immediately remove and relay the riprap to conform with said sections.

Riprap shall be rejected, which is either delivered to the job site or placed, that does not conform to this Section. Rejected riprap shall be removed from the project site by the CONTRACTOR and at his expense.

B. Sitting rock and Stepping Stone placement:

1. Place sitting rocks with flat side up. Bury rock approximately 1/3 the height of the rock. Location to be determined on site by the Owner's Representative.
2. Place stepping stones on bedding material with flat side up. Set stepping stones so that top of stone is a minimum 4" above high water level.

**END OF SECTION**

## **DIVISION 2**

### **SECTION 02750 – PORTLAND CEMENT CONCRETE PAVING**

#### **PART 1 - GENERAL**

##### **1.01 Scope**

- A. Furnish all labor, materials, supplies, equipment, transportation, and perform all operations in connection with and reasonably incidental to complete installation of concrete paving as shown on the drawings and as specified herein. Items of work specifically included are:
- B. Subgrade preparation for plazas, walks, ramps, playground curbs and headers.
- C. Form work.
- D. Reinforcement.
- E. Surface finish.
- F. Construction, expansion and control joints.
- G. Curing.
- H. Concrete plazas, sidewalks, ramps, playground curbs and headers.
- I. Interior slabs-on-grade in restroom, etc.

##### **1.02 Work Not Included**

- A. Items of work specifically excluded or covered under other sections:
- B. Excavation and backfill.
- C. Earthwork and grading.
- D. Cast-in-place structural concrete or precast concrete, such as foundations, drainage appurtenances, and pad and building.
- E. Joint sealers.

##### **1.03 Related Work**

- A. Division 2 – Site Work:
  - 1. Section 02050 – Demolition.
  - 2. Section 02200 – Earthwork/Grading.
  - 3. Section 02220 – Trenching, Backfilling, and Compaction.
- B. Division 3 – Concrete
  - 1. Section 03100 – Concrete Formwork
  - 2. Section 03200 – Concrete Reinforcing
  - 3. Section 03300 – Cast-in-Place Concrete
- C. Division 7 – Thermal and Moisture Protection:
  - 1. Section 07900 – Joint Sealers.

##### **1.04 References**

- A. ACI 301 – Specifications for Structural Concrete for Buildings.

- B. ASTM C33 – Concrete Aggregate.
- C. ASTM C150 – Portland Cement.
- D. ASTM C260 – Air Entraining Admixtures for Concrete.
- E. ASTM C309 – Liquid Membrane – Forming Compounds for Curing Concrete.
- F. ACI 304 – Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete.
- G. ACI 305R – Hot Weather Concreting.
- H. ACI 306R – Cold Weather Concreting.
- I. ACI 308 – Standard Practice for Curing Concrete.
- J. ACI 309 – Recommended Practice for Consolidation of Concrete.
- K. ACI 318-89 – Building Code Requirements for Reinforced Concrete.

#### **1.05 Regulatory Requirements**

- A. Conform to applicable code of governing authority for paving work within public right-of-way.

#### **1.06 Tests**

- A. Submit proposed mix design to testing laboratory for review prior to commencement of work. For standard premix concrete mixes, the supplier's quality control records may be substituted for job mix testing.
- B. Refer to Division 1, Section 01450 Quality Control and Testing.
- C. Coordinate and schedule sampling testing during concrete placement with City Representative.

#### **1.07 Submittals**

- A. Submit product data under provisions of Section 01600 – Materials and Equipment.
- B. Submit data on admixtures and curing compounds.
- C. Submit a ten pound sample of aggregate for exposed aggregate finish.
- D. Submit manufacturer's data on leave-in-place construction joint form.
- E. Submit sample chips of specified colors indicating pigment number and required dosage rate. Submittals are for general verification of color and may vary somewhat from concrete finished in field according to Specifications.
- F. Submit samples of colored sealers.

#### **1.08 Test Panels**

- A. Provide a 3' x 3' test panel for finish and tooling of joints for Owner approval. Provide one panel for each pavement type specified. In casting the panels, use personnel and methods to be employed on the work.
- B. If sample disapproved, cast additional samples until approval is obtained. Maintain test panel on site until finished work is accepted. Test panel will represent minimum workmanship standard.
- C. Work completed prior to test panel approval shall be subject to removal and replacement at Owner's request.

PART 2 MATERIALS

**2.01 Concrete Materials**

- A. General: Provide materials of same brand and source throughout the project unless otherwise noted.
- B. Portland Cement: ASTM C150, Type I or Type I/II, gray color.
- C. Aggregates: ASTM C33, normal weight. In addition, the combined aggregate shall comply with the following gradation, shown in percent passing.

<u>Sieve Size</u>	<u>¾-Inch Nominal Maximum Size</u>
¾ Inch	90 – 100
3/8 Inch	60 – 80
No. 4	40 – 60
No. 8	30 – 45
No. 16	20 – 35
No. 30	13 – 23
No. 50	5 – 15
No. 100	0 – 5

- D. Fly Ash and Water: Upon approval based on a satisfactory trial mix, the CONTRACTOR shall have the option of substituting approved fly ash for Portland cement, up to a maximum of 20 percent by weight. The total weight of cement and fly ash shall not be less than the specified mix design.
  - 1. Fly ash for concrete shall conform to the requirements of ASTM C 618, Class C or Class F. All chemical requirements of ASTM C 618 Table 1-A shall apply with the exception of footnote A. Class C fly ash will not be permitted where sulfate resistant cement is required. The CONTRACTOR shall submit certified laboratory test results for the fly ash. Test results that do not meet the physical and chemical requirements may result in the suspension of the use of fly ash until the corrections necessary have been taken to insure that the material meets the specifications.
  - 2. Water used in mixing or curing shall be clean and free of oil, salt, acid, alkali, sugar, vegetable, or other substance injurious to the finished product. Water will be tested in accordance with, and shall meet the suggested requirements of AASHTO T 26. Water known to be of potable quality may be used without test. Where the source of water is relatively shallow, the intake shall be so enclosed as to exclude silt, mud, grass, or other foreign materials.
- E. Coarse Aggregate for Exposed Aggregate Finish: 5/8-inch maximum size; rounded shape, ratio of maximum to minimum dimensions not to exceed 2.5:1; color to be tan to brown, no more than 2% white or black combined, no pink, no red, no green.
- F. Water: Clean and not detrimental to concrete.

**2.02 Pigments for Integrally Colored Concrete**

- A. Manufacturer:
  - 1. Davis Colors manufactured by Davis Colors: phone (213) 269-7311.
  - 2. Substitutions: Comply with Section 01600 for substitution request procedures.
- B. Materials: Pigments shall contain pure, concentrated mineral pigments especially processed for mixing into concrete and complying with ASTM C979.

- C. Packaging: If pigments are to be added to mix at Site, furnish pigments in pre-measured Mix-Ready disintegrating bags to minimize job site waste.
- D. Colors: Concrete mix shall contain the dosage rate of pigments indicated in this specification. Dosage rate shall be based on weight of Portland cement, fly ash, silica fume, lime and other cementitious materials but not aggregate or sand. Refer to the site plans for locations of the various colors of concrete.

### **2.03 Form Materials**

- A. Slab Edges: Two by lumber permitted for surfaces not exposed to view in the final work. Use concrete-form grade hardboard, “plyform” grade plywood, or metal for forming surfaces exposed to view. Forms shall be straight and sufficiently stiff and well braced to meet line tolerances specified in Part 3.
- B. Keyed Joint Form: Wooden key or leave-in-place metal construction joint form.
- C. Form Coatings: Commercial form-coating compounds that will not bond with, stain, or adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.

### **2.04 Reinforcement**

- A. Reinforcing Steel: ASTM A615; 60 ksi yield grade; deformed billet-steel bars, uncoated finish.
- B. Fibermesh: Bundled, fibrillated, virgin polypropylene fibers manufactured for use in premix concrete and having the following characteristics:
  1. Special Gravity: 0.91.
  2. Tensile Strength: 70 to 100 ksi.
  3. Fiber Lengths: ½ inch, ¾ inch.
  4. Accepted Materials: “Fibermesh” by Fibermesh Company of Chattanooga, TN; or “Forta CR” by Forta Corporation of Groove City, PA.
- C. Dowels: ASTM A615; 40 or 60 ksi yield grade, plain steel, uncoated finish; matched sleeve and cap one end. Provide dowel basket to hold dowels in parallel alignment.

### **2.05 Admixtures**

- A. General: Unless specified in the mix or directed in Part 3, no admixtures shall be used without approval of the Owner’s Representative. Do not use admixtures that would result in mixing water with a concentration of more than 150 ppm of chloride ion.
- B. Air Entraining: ASTM C260.
- C. Water Reducing: ASTM C494, Type A.
- D. Accelerator: Nonchloride, ASTM C494, Type C or E.
- E. Retarder: ASTM C494, Type B or D.
- F. Color Agent: Davis Colors of Los Angeles, California.

### **2.06 Related Materials**

- A. Expansion Joint Filler: ASTM D1752, closed cell polyethylene, ½ inch thickness.
- B. Joint Sealant: See Section 07900.
- C. Surface Retardant: Surface retarding agent intended for exposed aggregate. Retardx-SR0” by Prokrete of Denver, Colorado, or approved equal.

- D. Curing Compound for Standard Non-Colored Walks, Curbs, Gutters, Etc: White pigmented, wax-resin based compound, ASTM C309, Type I, Class A. Recommended by manufacturer for use on exterior sidewalks and driveways.
- E. Curing Compound for Concrete with Coloring Agent: Davis Seal Color to match colored concrete.
- F. Curing Compound and Sealer for Exposed Aggregate Concrete: Acryseal by Prokete Industries of Denver, Colorado.
- G. Curing Compound for Interior Slabs: Protex Promulsion 100 or equal.
- H. Interior Floor Sealer: Protex Triple Seal or equal.

**2.07 Concrete Mix**

- A. Mix concrete in accordance with ASTM C94.
  - 1. Provide non-colored concrete for exterior slabs on grade, sidewalks, curb and gutter, walls, aprons and ramps (except panel inserts) with the following characteristics:

<u>Unit</u>	<u>Measurement</u>
a. 28-Day Field Compressive Strength	4,000 psi
b. Cement/Fly Ash	615 lbs./cu. yd. Min.
c. Max. Water/Cement Ratio	0.44
d. Air Content % Range	5-8
e. Maximum Slump	4"
f. Fine Aggregate (max. % of total Aggregate)	50%

- 2. Provide colored concrete for plazas, ramps and other flatwork with the following characteristics:

<u>Unit</u>	<u>Measurement</u>
a. 28-Day Field Compressive Strength	4,000 psi
b. Cement/Fly Ash	615 lbs./cu. yd. Min.
c. Max. Water/Cement Ratio	0.44
d. Air Content % Range	5-8
e. Maximum Slump	4"
f. Fine Aggregate (max. % of total Aggregate)	50%
g. Coloring Agent	Per manufacturer's recommendations (refer to Definition of Bid Items and/or Drawings for designated colors)

- B. Use accelerating admixtures in cold weather as directed in Part 3.
- C. Use set-retarding admixture during hot weather as directed in Part 3.
- D. Water reducing agent is permitted.

**2.08 Selection of Proportions**

- A. Mix Design: Cost of concrete mix design is responsibility of Contractor.
- B. Selection of Proportions: Use method of ACI 301 3.9. Proportioning base on method of ACI 301 3.10 not allowed.

1. Field test records used for documentation of the average strength produced by a proposed mix in accordance with ACI 301 3.9.3.2 shall, in addition to the requirements listed, comply with the following:
  - a. The test record shall represent production concrete from a single design mix produced during the past year.
  - b. The test record shall represent concrete proportioned to produce the maximum slump allowed by these specifications, and for air-entrained concrete, within a  $\pm 0.5\%$  of the maximum air content allowed.
2. Mixes proportioned on the basis of trial mixtures shall meet the provisions of ACI 301 3.9.3.3.

## PART 3 EXECUTION

### 3.01 Subgrade Preparation

- A. Shape and compact subgrade to match appropriate detail. Compact to 95% density as measured by ASTM D698. Coordinate with Section 02200 – Earthwork, Article 3.05, Compaction.
- B. Where subgrade cannot be compacted, remove subgrade. Replace with bed course. Compact to 95% density as measured by ASTM D698.
- C. Moisten subgrade to minimize absorption of water from fresh concrete. Subgrade shall not be muddy, soft, frozen, or covered with standing water when concrete is placed.

### 3.02 Form Work

- A. General: Design, construct, and brace forms in accordance with ACI 301 and ACI 347. In addition to those requirements, forms shall be placed and braced so the finished edges and joints meet the tolerances listed later in this section.
- B. Preparation of Form Surfaces:
  1. Clean reused forms of concrete matrix residue; repair and patch as required to return forms to acceptable surface condition.
  2. Coat contact surfaces of forms with specified form-coating compound before reinforcement is placed. Apply form-coating compound according to manufacturer's instructions. Do not allow excess form-coating material to accumulate in forms or to come in contact with concrete surfaces against which fresh concrete will be placed.
- C. Slipforming: Slipforming of vertical curb and gutter sidewalks is permitted.
- D. For Surfaces Exposed To View: Form faces shall be free from raised grain, tears, worn edges, patches, dents, or other defects which would impair texture of the concrete surfaces. Minimize number of seams in form material, and arrange seams in an orderly manner.

### 3.03 Reinforcement and Embedments

- A. General:
  1. Fabricate, position, and secure reinforcement and embedded items according to ACI 301 and ACI 315. Coordinate with other sections for locations, instructions, or equipment for embedded items.
  2. Shop drawings are not required.
  3. Welding reinforcement is not permitted.
  4. In the event of discrepancy, immediately notify the Owner's Representative. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

- B. Field-Bending of Reinforcement: Reinforcement partially embedded in concrete shall not be field-bent, except as noted on the drawings or specifically permitted by the Owner's Representative.
- C. Inspection of Reinforcement: Completed installation of concrete reinforcement must be reviewed by the Owner's Representative before depositing concrete.
- D. Unless otherwise indicated, place reinforcement where required at top of slabs on grade. Provide ½-inch minimum cover over reinforcement.
- E. Dowels: Grease sleeves, insert dowels and through form, secure dowel basket against movement.
- F. Notches for Sleeving: Notch both vertical sides of walk or slab where sleeving occurs.
- G. Welded wire fabric shall be overlapped one full mesh and tied.
- H. Fibrous Reinforcement:
  - 1. Add fibrous concrete reinforcement to concrete materials at the time concrete is batched in amounts in accordance with approved submittals for each type of concrete required.
  - 2. Mix batched concrete in accordance with manufacturer's recommendations for uniform and complete dispersion.

### **3.04 Joints**

- A. General: Place joints in accordance with ACI 301. Conform to the tolerances listed later in Part 3.
- B. Isolation/Expansion Joints: Isolation joint and expansion joint are synonymous for concrete paving.
  - 1. Place isolation joints where work abuts existing walls, curbs and structures, and where shown on the drawings.
  - 2. Interrupt reinforcement at isolation joint. Install dowels only where indicated on drawings.
  - 3. Joint filler shall extend full depth of the slab. Hold back filler from top of slab as required for sealant. Attach joint filler to first placement.
  - 4. Seal all expansion joints and joints between concrete and asphalt per Section 07900.
- C. Keyed/Construction Joints: Keyed joint and construction joint are synonymous for concrete paving.
  - 1. Reinforcement, if required, shall continue through the joint.
  - 2. Install where indicated on drawings, or where required by concrete delivery or finishing rate.
  - 3. Key first placement. Key shall be 1½ inches wide and ¾ inches deep.
  - 4. After first placement has hardened, clean and roughen face. Install control joint form at top of slab.
  - 5. Subject to Owner's Representative approval; manufactured leave-in-place cold joint form may be used.
- D. Control/Score Joint: Control joint and score joint are synonymous for concrete paving.
  - 1. Control joints shall penetrate 1/3 of slab thickness.
  - 2. Sawn Joints: Control joints on play area curb shall be sawn. Kerf shall be 3/16-inch wide. Start cutting as soon as concrete is able to be sawn without dislodging aggregate. Complete cutting before shrinkage cracks occur. Joints perpendicular to walls may be less than required depth within 6 inches of the wall, and may stop 2 inches from the wall. Wash slurry from concrete to avoid staining of slab.

3. Tooled Joints: Control joints may be cut into the plastic concrete during finishing operations. Tooled joints shall have ¼ radius, and shall not incorporate a troweled edge unless specifically noted on the drawings.
4. Formed control joints are permitted only in conjunction with keyed joints.
5. Unless otherwise indicated, provide control joints at the following intervals:

<u>Use</u>	<u>Type</u>	<u>Maximum Spacing</u>
Uncolored Exterior & Interior Slabs, Sidewalks	Tooled broom over joint	Symmetrically placed: 10' maximum or 1 ½ times width of walk, whichever is smaller
Curb and Gutter	Tooled joints	10' maximum
Pans	Tooled joints	15' maximum
Play Area Curb & Header	Tooled joints	10' maximum
Concrete	Tooled joints	10' maximum

### 3.05 Concrete

- A. Preplacement Inspection: Form work installation, reinforcing steel placement, and installation of all items to be embedded or cast in, to be verified by the Owner's Representative prior to placement.
- B. General: Comply with ACI 301, ACI 304, and as herein specified.
- C. Added Water: Concrete mix has been designed to a specific water cement ratio in order to enhance durability of the final product. Do not add water at the job site or concrete will not be accepted.
- D. Cold Weather Placement: When depositing concrete after the first frost or when the mean daily temperatures area below 40 degrees, follow recommendations of ACI 306 as modified herein. Use specified accelerator. Maintain concrete temperature at a minimum of 55 degrees for not less than 72 hours after depositing. Do not place concrete without approval of the Owner's Representative on days when temperature at 9:00 a.m. is below 30 degrees. Job-cured cylinders for verification of strength and/or the adequacy of the Contractor's protective methods will be required.
- E. Hot Weather Placement: When depositing concrete in hot weather, follow recommendations of ACI 305 as modified herein. When the air temperature is expected to exceed 90 degrees, the Contractor shall obtain acceptance from the Civil Engineer or Owner's Representative of the procedures to be used in protecting, depositing, finishing, and curing the concrete. The temperature of concrete at the time of placement shall not exceed 90 degrees. Protect to prevent rapid drying. Start finishing and curing as soon as possible. Specified water reducing retarding admixture may be used. The use of continuous wetting or fog sprays may be required by the Owner's Representative for 24 hours after depositing.
- F. Placing: Deposit and consolidate concrete slabs in a continuous operation, within the limits of construction joints, until the placing of a panel or section is completed. Deposit concrete as nearly as practicable in its final location to avoid segregation.
- G. Consolidation: Consolidate concrete with internal vibrators with a minimum frequency of 7,000 rpm. Maintain one standby vibrator for every three vibrators used. Consolidate according to ACI 309. Do not transport concrete with vibrators. Work concrete into corners and around embedments and reinforcement.
- H. Surface Leveling: Strike off and level surface with screed of sufficient length to span the slab. On slabs greater than 15 feet wide, use intermediate screed strips.

- I. Integral colored concrete: Add color by weight directly into the mixer along with the aggregate, cement and water while the mixer is operating at mixing speed. Continue mixing for 5-10 minutes or from 50 – 100 revolutions.

### **3.06 Finishes**

- A. Float Finish: After surface stiffens enough to support the operation, float with hand floats or powered disc floater. Use magnesium float; do not use wood float on air entrained concrete. Check surface planeness with a 10-foot straight edge, applied at not less than two different angles. Cut down high spots and fill low spots to produce a surface with Class B tolerance. Refloat the slab to a uniform sandy texture.
- B. Broom Finish: Concrete flatwork shall receive a heavy broom finish applied at a right angle to the direction of travel. The plaza area shall have smooth troweled joints, 1½ inches from the centerline of the joint, to result in a total trowel width of 3 inches. All other flatwork shall have broom finish over joints.
- C. Exposed Aggregate Finish: Immediately after floating, apply surface retardant. Apply retardant uniformly. Cover with polyethylene sheet to retain moisture. When mortar is hard enough to retain aggregate but soft enough to be removed by brushing, wash the surface with water and remove mortar from surface aggregate by brushing. Do not dislodge aggregate.
- D. Coordinate rate of concrete placement with pace of washing crew.
- E. Formed Finishes:
  1. Surfaces Not Exposed to View: Patch tie holes and defects. Chip off fins greater than ¼ inch in height.
  2. Surfaces Exposed to View: Patch tie holes and defects. Completely remove fins.
- F. Schedule of Finishes:
  1. Curbs, gutters, ramps within ROW – per City Specifications.
  2. Sidewalk – heavy broom finish.
  3. Plaza paving – as shown on plans.
  4. Playground curbs and header – exposed aggregate finish.
  5. Interior slabs at restroom – medium broom finish.
- G. Notch both vertical sides of concrete flatwork to indicate location of irrigation sleeves.

### **3.07 Curing/Sealing**

- A. Apply curing compound within 30 minutes of completing finish. Follow manufacturer's recommendations for applying compound. Reapply in areas exposed to rain within 3 hours of initial application. Maintain continuity of coating and repair damage during 7-day curing period. Follow manufacturer's instructions for sealing interior slabs.
- B. Integral colored concrete is to be cured with the matching Davis Color Seal. Follow manufacturer's recommendations for application.

### **3.08 Tolerances**

- A. Surface Planeness: Unless otherwise specified, produce slabs with a Class B tolerance.
  1. Finishes with Class B tolerances shall be true planes within ¼ inch in 10 feet, as determined by a 10-foot straight edge placed anywhere on the slab in any direction.
  2. Slope interior slabs to drains as indicated.

B. Formed Surfaces, Joints, and Embedments: Unless otherwise specified, the finished work shall meet the following tolerances:

1. Variations of formed, or cut or tooled linear element:

- a. In 20 feet: ½ inch.
- b. For entire length: 1 inch.

### 3.09 Field Quality Control

A. Field inspection and testing will be performed under provisions of Paragraph 1.06, Tests, and as specified below.

B. Concrete Tests:

1. Shall be provided by the Contractor and shall be accordance with requirements of ACI 301, Chapter 16 – Testing, except as noted or modified in this section.

a. Strength test.

- i. Mold and cure four cylinders from each sample.
- ii. Test one at 7 days and one at 14 days for information and one at 28 days for acceptance. Keep the remaining one as a spare to be tested as directed by the Owner.

b. Minimum samples.

- i. Collect the following minimum samples for each 28-day strength concrete used in the work for each day's placing:

<u>Quantity</u>	<u>Number of Samples</u>
50 cubic yards or less	one
50 to 100 cubic yards	two
100 cubic yards or more	two plus one sample for each additional 100 cubic yards

c. Sample marking.

- ii. Mark or tag each sample of compression test cylinders with date and time of day cylinders were made.
- iii. Identify location in work where concrete represented by cylinders was placed.
- iv. Identify delivery truck or batch number, air content, and slump.

d. Slump test.

Conduct test for each strength test sample and whenever consistency of concrete appears to vary.

e. Air content.

Conduct test from one of first three batches mixed each day and for each strength test sample.

C. Acceptance of Concrete:

- 1. If the average of three consecutive 7-day tests falls below the specified 7-day strength, the Owner shall have the right to require conditions of temperature and moisture necessary to secure the required strength and may require core tests in accordance with ASTM C-42.
- 2. Strength level of concrete will be considered satisfactory so long as average of all sets of three consecutive strength test results equals or exceeds specified 28-day strength and no individual strength test result falls below specified strength by more than 500 psi.

D. Failure of Test Cylinder Results:

- 1. Upon failure of the 28-day test cylinder results, Owner may require Contractor, at his expense, to obtain and test at least three cored samples from area in question.

2. Concrete will be considered adequate if average of three core tests is at least 85 percent of, and if no single core is less than 75 percent of the specified 28-day strength.
  3. Upon failure of core test results, Owner may require Contractor, at his expense, to perform load tests as specified in ACI 318, Chapter 2.
  4. In the event an area is found to be structurally unsound, the Owner may order removal and replacement of concrete as required. The costs of the core tests, the load test and the structural evaluation shall be borne by the Contractor.
  5. Fill all core holes with a non-shrink grout as Master Builders Masterflo 713 or approved equal.
- E. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

**END OF SECTION**

## **DIVISION 2**

### **SECTION 02810 – IRRIGATION**

#### **PART 1 – GENERAL**

##### **1.01 Work Included**

Furnish labor, materials, supplies, equipment, tools, transportation, and perform operations in connection with and reasonably incidental to complete installation of the irrigation system, and guarantee/warranty as shown on the drawings and as specified herein.

##### **1.02 Related Work**

Refer to System Plans and Installation Detail drawings.

##### **1.03 Submittals**

- A. Materials List: Submit materials list for all components to be used in the irrigation system.
- B. Weekly redline drawings of changes made in irrigation system installation from those on construction plans and drawings.

##### **1.04 Handling and Storage**

- A. Protect materials used for construction from damage, deterioration, sun exposure, or loss while in storage and during construction.

##### **1.05 Reviews**

- A. Reviews of the irrigation installation will be ongoing during the contract. Reviews shall be made of irrigation mainline, lateral, head, valve and other equipment locations prior to installation.
- B. Review of head coverage as zones are completed will be ongoing. Any changes of head locations or nozzles shall be completed immediately.
- C. Other reviews shall take place as outlined under Execution.
- D. Submit redline installation drawings with changes made in installation from those on plans every week to City representative and/or General Contractor.

##### **1.06 Environmental Conditions**

- A. Irrigation installation shall be only when weather and soil conditions permit and in accordance with locally accepted practices, and as reviewed by the owner's representative.

##### **1.07 Guarantee/Warranty and Replacement**

The purpose of this guarantee/warranty is to insure that the Owner receives materials of prime quality, installed and maintained in a thorough and careful manner.

- A. Guarantee/warranty materials and workmanship against defects due to any cause for a period of two years from the date of substantial completion of all work.
- B. This guarantee/warranty will not be enforced should defects be due to improper maintenance procedures carried out by Owner involving watering, mower damage, improper operation of system, fire, flood or damage, or other similar circumstances beyond the control of the Contractor.

- C. Replace components when they are no longer in satisfactory condition as determined by the Owner's representative for the duration of the guarantee/warranty period. Make replacements within seven days of notification from the Owner's representative.
- D. Replacements shall be of the same kind and size as originally specified and shall be installed as described in the contract documents. Repairs and replacements shall be made at no expense to the Owner.
- E. Guarantee/warranty shall apply to originally specified and installed materials, and any replacements made during the guarantee/warranty period.

## PART 2 – MATERIALS

### 2.01 Quality

- A. All materials used for construction shall be new and without flaws or defects of any type, and shall be the best of their class and kind.

### 2.02 Mainline

- A. Mainline shall be PVC Class 200, NSF approved pipe. 3" and larger pipe shall be ringtite pipe. 2 ½" and smaller pipe shall be glued joint.

### 2.03 Laterals

- A. 2" or larger: Class 200 PVC, NSF approved.
- B. 1 ½" or 1": Class 200 PVC, NSF approved.
- C. No laterals smaller than 1" are permitted. Trickle tubing shall be weather and UV resistant material.
- D. ¾" & ½" Polyethylene Drip Pipe: NSF approved, SDR pressure rated pipe, only as approved for drip applications.

### 2.04 Pipe Fittings

- A. Funny Pipe (pop-up spray turf heads only): to be compatible to the elbows needed for head installation, maximum length is 3 feet.
- B. Lateral fittings: Schedule 40, Type 1, PVC solvent weld with ASTM Standards D2466 and D1784.
- C. Wrought copper or cast bronze fittings, soldered or threaded per installation details for all copper pipes.
- D. Mainline fittings: Ductile Iron for 3" and larger, PVC Schedule 80 for 2 1/2" and smaller.

### 2.05 Sleeves

- A. Ductile Iron Pipe or CL 200 PVC under all paved surfaces.
- B. Sizes to be a minimum of two sizes larger than the pipe being sleeved. Minimum 2" diameter or larger for irrigation lines.
- C. Wires to be in separate sleeve from pipe, 2" min. size pipe for control wire sleeves.
- D. Sleeves shall have marker tape on upper side and both ends for future locates. Install per drawing details.

### 2.06 Valves

- A. Remote Control Zone Valves: Electrically operated, appropriate for the water supply, with manual bleed device and flow control stem. Shall have a slow-opening and slow-closing action for

protection against surge pressure. Brand and model to be Rainbird PESB or 300BPE valves with Dial Pressure regulator size as shown on plans.

- B. Isolation Gate Valves: Kennedy 1571X or Matco #100M, able to withstand a continuous operating pressure of 150 psi. Clear waterway equal to full diameter of pipe. Resilient wedge gate valve conforming to AWWA C-509 standards Shall be opened by turning 2" square nut to the left (wheel opening is unacceptable).
- C. Manual Drain Valve: 3/4" ball valve with tee handle. Watts, #B-6000, or approved equal.
- D. Quick Coupling Valves: 1" brass, Rainbird #5RC units with rubber cover. Keys Rainbird 55K 1" brass key.

## **2.07 Valve Boxes**

- A. House valves in valve box with matching locking cover (AMETEK brand only). Only one valve per box. Install in box sizes to allow work on components.
- B. Install 3/4" drip tubing ends with end closure in 10" round valve box with cover at end of each run.

## **2.08 Control System**

- A. Use Irritrol MC-24 Plus-B controller. Mount terminal strips in the pedestal to change from 14 gauge field wire to 18 gauge wire for run into controller.
- B. Surge Protection: 8 foot copper grounding rod, #4 solid copper wire, grounding buss receptacle, ground terminal strip and/or as recommended by manufacturer.
- C. Install Hunter Wireless Rain Klik rain sensor (one per controller) at location near the controller but not where it will receive precipitation from the irrigation system. Owner must approve location.
- D. Provide Eicon remote receiver and field transmitter with frequency as specified by Owner.

## **2.09 Electric Control Wiring**

- A. #14 feed wire and #14 common wire solid copper direct burial UF or PE cable, UL approved, or larger, per system design and manufacturer's recommendations.
- B. Five wires with consistent color scheme throughout:
  - 1. Red = live (one per valve)
  - 2. White = ground
  - 3. Black, blue and green = extra from controllers to furthest extent of mainlines.
- C. Wire connectors and waterproofing sealant to be used to join control wires to remote control valves.
- D. Run wire for remaining zones on controller to the end of the mainline that the controller supports.

## **2.10 Sprinkler Heads**

- A. All heads shall be of the same manufacturer as specified on the plans, and marked with the manufacturer's name and model in such a way that materials can be identified without removal from the system. Owner will specify brand and models to match other equipment in use in public system in the vicinity.
- B. Gear driven Rotor heads: Rainbird.
- C. Pop-Up Spray heads: Rainbird.
- D. Xeri-Pop Heads: Rainbird.

## **2.11 Backflow Device**

- A. Backflow device shall be Febco 2 ½" Reduced Pressure Principle device installed in a Guard Shack enclosure (per manufacturer's recommendations).

## **PART 3 – EXECUTION**

### **3.01 Pipe trenching**

- A. Install pipe in open cut trenches of sufficient width to facilitate thorough tamping/puddling of suitable backfill material under and over pipe.
- B. Trench depths:
  - 1. Mainline - Minimum of 24" deep from top of pipe to finished grade for 6" and under mainline. Minimum of 32" deep from top of pipe to finished grade for 8" and larger.
  - 2. Lateral - Minimum of 16" deep from top of pipe to finished grade. ¾" drip pipe 8" deep from top of pipe except in shrub beds.
  - 3. Sleeves - Install sleeves at a depth, which permits the encased pipe or wiring to remain at the specified burial depth.

### **3.02 Sleeves**

- A. Boring shall not be permitted unless obstruction in pipe path cannot be moved, or pipe cannot be re-routed.
- B. Mainline installed in existing sleeves at greater depth than adjacent pipe, shall have a manual drain valve at each end if the sleeve is longer than 20 feet, or at one end if the sleeve is less than 20 feet.
- C. Install sleeve so ends extend past edge of curb, gutter, sidewalk, bike path or other obstruction, a minimum of 2 feet.
- D. Mark sleeves with an "x" chiseled in walk (or other surface) directly over sleeve location.
- E. Sleeves installed for future use shall be capped at both ends.
- F. Separate sleeve (2" min. size) shall be used for all wiring.
- G. Sleeves shall not have joints. If joints are necessary, only solvent welded joints are allowed.
- H. Compaction of backfill for sleeves shall be 95% of Standard Proctor Density, ASTM D698-78. Use of water puddling around sleeves for compaction will not be allowed.

### **3.03 Pipe Installation**

- A. Use Teflon tape on all threaded joints; only schedule 80 pipe may be threaded.
- B. Reducing pipe size shall be with reducing insert couplings: at least 6" beyond last tee of the larger pipe.
- C. Snake PVC lateral pipe from side to side within trench.
- D. Backfill shall be free from rubbish, stones larger than 2" diameter, frozen material and vegetative matter. Do not backfill in freezing weather. If backfill material is rocky, the pipe shall be bedded in 2" of fill sand covered by 6" of fill sand.
- E. After puddling or tamping, leave all trenches slightly mounded to allow for settling.
- F. Compact to proper densities depending on whether surface area over the line will be paved or landscaped.

### **3.04 Thrust Blocks**

- A. Shall be installed where PVC mainline (2 ½" or larger) changes direction over 20 degrees.
- B. Use ThrustFORM standard fitting configurations for changes in direction in main line. See installation details for Thrust Form Blocks.
- C. ThrustFORM Systems, P.O. Box 2717, Georgetown, TX, Tel: (866) 306-3676, Fax: (512) 528-1671.
- D. Keep pipe joint clean of concrete. Do not encase.
- E. Place wiring away from thrust block to avoid contact with the concrete. Use clear plastic sheeting to isolate the concrete from other materials.

### **3.05 Valve Installation**

- A. Install at least 12" from and align with adjacent walls or paved edges.
- B. Automatic Remote Valves: Install in such a way that valves is accessible for repairs. Make electrical connection to allow pigtail so solenoid can be removed from valve with 24" (min.) slack to allow ends to be pulled 12" above ground.
  - 1. Flush completely before installing valve. Thoroughly flush piping system under full head of water for three minutes through furthest valve, before installing heads.
  - 2. Valve assembly to include ball valve and union for ease of maintenance and repair.
  - 3. Install in valve box per details.
- C. Quick Coupler Valve: Install in 10" round locking valve box. Flush completely before installing valve. Thoroughly flush piping system under full head of water for three minutes through furthest valve.
- D. Isolation Gate Valves: Install in valve box as per detail.
- E. Valve Boxes:
  - 1. Brand all valve boxes with the following codes: "SV" and the controller valve number per as built plans for all remote control valves; "DV" for all drain valves; "GV" for all isolation valves; "DRGV" for all drip system isolation valves; "QC" for all quick coupling valves; "WA" for all winterization assemblies; "FM" for all flow meter assemblies; and "MV" for all master valve assemblies. Use a branding iron stamp with 3" high letters.
  - 2. Valve box shall NOT rest on mainline. Use brick or other non-compressible material per detail. Top of valve box to be flush with finish grade. Use add-ons to depth of valve gravel.
  - 3. Install valves in box with adequate space to access valves with ease. Valves shall not be too deep to be inaccessible for repairs. 3" depth of ¾" washed gravel to be placed in the bottom of each valve box with enough space to fully turn valve for removal (see detail).

### **3.06 Head Installation**

- A. Set heads plumb and level with finish grade. In sloped area, heads to be tilted as necessary to provide full radius spray pattern.
- B. Flush lateral lines before installing heads. Thoroughly flush piping system under full head of water for three minutes through furthest head, before installing heads. Cap risers if delay of head installation occurs.
- C. Survey and stake head locations along the edge of the baseball infield to establish a smooth arc. The arc of the infield shall be established as a line between turf and infield mix. See Section - Turf Seed Construction.

- D. Pop-Up Heads along walks and bikeways: Install heads in 6" layer of sand under the base of the head.
- E. Nozzles: Supply appropriate nozzle for best performance.
- F. Adjustment: Adjust nozzles and radius of throw to minimize overspray onto hard surfaces.

### **3.07 Backflow Device**

- A. Install and test backflow preventer in compliance with the Colorado Primary Drinking Water Regulations.

### **3.08 Controller Installation**

- A. To be installed in a building or an above ground location suitable to prevent vandalism and provide protection from adverse weather conditions, and per Owner direction. All exposed wiring to and from the controller shall be encased in galvanized metal conduit. Exterior controllers to be installed per manufacturer recommendations.
- B. Install Controller(s) at eye level.
- C. Install Controller per Owner direction and in accordance with manufacturers' specifications. Install surge protection, grounding rods and other accessory components as specified.
- D. Attach wire markers to the ends of control wires inside the controller unit. Label wires with the identification number of the remote control valve activated by the wire.

### **3.09 Wiring**

- A. Comply with local electrical codes.
- B. Power source brought to controller to a ground fault receptacle installed within controller casing.
- C. String control wires as close as possible to mainline, consistently along and slightly below one side of the pipe.
- D. Leave minimum loop of 24" at each valve and controller and at each splice, at the ends of each sleeve, at 100-foot intervals along continuous runs of wiring, and change of direction of 90 degrees or more. Band wires together at 10' intervals with pipe wrapping tape.
- E. Install common ground wire and one control wire for each remote control valve. Multiple valves on a single control wire are not permitted. Install three extra wires, as specified, to the furthest valve on the system and/or each branch of the system.
- F. Run 14 gauge wire to terminal strips in the controller pedestal and 18 gauge from terminal strips to controller.

### **3.10 Point of Connection**

- A. Make connection at a point (minimum of five feet) from the outside meter pit wall. Run 3" metal pipe into the backflow device and out to the winterization assembly. Begin running PVC pipe for mainline (3") five feet after the WA.

### **3.11 Testing**

- A. All tests to be run in the presence of Owners' representative. Schedule all tests a minimum of 48 hours in advance of tests. Repeat any failed tests until full acceptance is obtained.
- B. Pressure Test: Leave mainline uncovered at joints and fittings. Place a pressure gauge (capable of reading pressures up to 120 psi minimum) on a Quick Coupling valve attached to the system. Fill mainlines with water and bring to full pressure. If new system is an add-on to existing system, isolate the new system from the old system after filling. Record pressure readings at 15-minute

intervals for 4 hours. Pressure shall not drop more than 3 of initial reading. If pressure drops more than 3%, a thorough walk through of the mainline shall be made to discover leakage and corrected. Repeat test until maximum desired pressure drop is achieved.

- C. Operational Test (prior to seeding operations): Activate each remote control valve from the central control system in the presence of Owners' representative. Replace, adjust or move heads and nozzles as needed to obtain acceptable performance of system. Replace defective valves, wiring or other appurtenances to correct operational deficiencies.

### **3.12 Completion Services**

When project construction is complete, request from Owners' representative a punch list inspection for Construction Acceptance:

- A. Demonstrate system to Owner personnel.
- B. Provide Owner personnel with ordering information including model numbers, size and style for all components.
- C. Provide two sets of as built drawings as listed below, showing system as installed with each sheet clearly marked "AS-BUILT DRAWINGS", the name of the project and all information clearly provided. As-builts shall reflect changes indicated on weekly red line submittals.
  - 1. One set of reproducible Mylar, no larger than 24" x 36".
  - 2. One set of all sheets reduced to 11" x 17", with each station color coded, and each sheet plastic laminated.
  - 3. Provide as-built drawing on computer disk in a \*.DWG format.
- D. Clean Up: Remove all excess materials, tools, rubbish and debris from site.
- E. Contractor shall request Final Acceptance inspection from Owner.
- F. Provide Owner personnel operating keys, servicing tools, test equipment, warranties/ guarantees, maintenance manuals, and contractor's affidavit of release of liens. Keys, tools and other operating equipment need to be turned over to Owner. Submittal of all these items must be accompanied by a transmittal letter and delivered to the Owner offices (delivery at the project site is acceptable with signed receipt).

**END OF SECTION**

## DIVISION 2

### SECTION 02870 - MISCELLANEOUS SITE FURNISHINGS

#### PART 1: GENERAL

##### Section Includes

- A. Bike Rack
- B. Site Benches
- C. Bench Swing
- D. Picnic Tables
- E. Basketball Equipment
- F. Playground Safety Surfacing (Engineered Wood Fiber)
- G. Playground Safety Surfacing (2-Layer Poured-in-Place EPDM System)
- H. Playground Climbing Boulder
- I. Miscellaneous Hardware

##### Submittals for Review

- A. Submittals shall be directed to the Owners Representative and shall be approved in writing before affected work commences.
- B. Submit shop drawings and technical literature from manufacturer for all items specified in Section 1.01 above.
- C. Submit all color swatches on finish metal colors for each of the above site furnishings at the same time.
- D. Submit warranty information at time of review.

##### Substitutions

- A. Alternative bid proposals, which propose material substitutions, must be fully supported by necessary documentation showing compatibility/comparability with specific materials. Substitutions must be submitted to the Owners Representative **prior to the bid opening**. Substitutions must also comply with the General Conditions. Some Materials may not be substituted.

#### 1.04 Warranty

- J. Warranty all products under this section for a period of two years from the date of Substantial Completion. In addition to the manufacturer's product Warranty, Contractor shall warranty the installation of all products in this section exclusive of normal wear and tear and damage caused out of the Control of the Contractor. This Warranty shall extend to removal and replacement of any defective materials or damaged products arising out of the failure of the product of improper installation of the Contractor.

#### PART 2: MATERIALS

##### 2.01 Bike Rack

- One (1) Namesake Bike Rack.

Bicycle Capacity: 2-4

Mounting: Flanged Surface Mount.

Finish: Polyester Powder Coated.

Color: (To Be Determined). Submit Color Samples

Allow 8-10 weeks for delivery

Factory Representative: Creative Pipe, Inc., PO Box 2458, Rancho Mirage, California 92270-1087.  
Toll Free (800) 644-8467. Web Site [www.creativepipe.com](http://www.creativepipe.com).

## **2.02 Site Benches**

One (1) Pullenium 3 Seat Modular with Back Curved, Surface Mount – Model #PL2MCU3

Four (4) Pullenium 3 Seat Modular Flat Curved, Surface Mount – Model #PL1MCU3

Color: (To Be Determined) Submit Color Sample.

Allow 10-12 weeks for delivery

Factory Representative: Keystone Ridge Designs, Inc. P.O. Box 2008, 670 Mercer Road, Butler, Pennsylvania 16003-2008, 1-800-284-8208. Website [www.keystoneridgedesigns.com](http://www.keystoneridgedesigns.com)

## **2.03 Bench Swing**

One (1) WEBCOAT Inc., Visions Innovative Products; Model #B6WBCLASSSWING; 6 Ft. Bench Swing with Contoured Back and Arms, In-ground Mount.

Finish: Black Powder Coat Metal, Webcoating

Color: (To Be Determined) Submit Color Sample.

Allow 8-12 weeks for delivery

Factory Representative: Ermold Park and Recreation Products, Eastlake, CO 1-877-880-5382.  
Website [www.ermoldpark.com](http://www.ermoldpark.com)

## **2.04 Picnic Tables**

Two (2) WEBCOAT Inc., Visions Innovative Products; Model #T8RCHDCPALT; 8 Ft. Mesh Table, 2 Attached 6 Ft. Seats Centered, 3/4" #9 Expanded Metal, 2 3/8" Legs, Portable.

Finish: Black Powder Coat Metal, Webcoating

Color: (To Be Determined) Submit Color Sample.

Allow 8-12 weeks for delivery

Factory Representative: Ermold Park and Recreation Products, Eastlake, CO 1-877-880-5382.  
Website [www.ermoldpark.com](http://www.ermoldpark.com)

## **2.05 Basketball Equipment**

One Pair Gared Sports; Model #GNB45 4 1/2" O.D. Gooseneck Post and Brace w/ 4' Extension

One Pair Gared Sports; Model #1850B Premium Fan Aluminum Backboard w/ White Finish Target & Border

One Pair Gared Sports; Model # 7550 Titan Playground Super Goal w/ Nylon Net

Factory Representative: Ermold Park and Recreation Products, Eastlake, CO 1-877-880-5382.  
Website [www.ermoldpark.com](http://www.ermoldpark.com)

## **2.06 Playground Safety Surfacing (Engineered Wood Fiber)**

15 CY of Fibar or equivalent engineered shredded wood fiber. Manufacturer must submit proof of compliance to: U.S. Consumer Product Safety Commission publication entitled "Handbook for Public Playground Safety" American Society for Testing and Materials standard F1487-98 entitled "Standard Consumer Safety Performance Specification for Playground Equipment for Public Use." U.S. Access Board guidelines

Submit Fibar Sample

Factory Representative: Recreation Plus, Ltd., 15209 West Ellsworth Drive, Golden, CO 80401 1-888-278-1455. Website [www.recreationplus.com](http://www.recreationplus.com)

## **2.07 Playground Safety Surfacing (2-Layer Poured-in-Place EPDM System)**

1,200 SF of the Surface America 2-Layer Poured-in-Place EPMD system with premium aliphatic binder, one and three quarters inch thick. 1,100 SF of the 50/50 black/color topcoat and 100 SF of the 100% color topcoat for the stepping stone areas.

Color: (To Be Determined) Submit Color Sample.

Factory Representative: Woods Site & PLAYSCAPES, PO Box 6, Elizabeth, CO 1-888-688-2132. Website [www.woodssite.com](http://www.woodssite.com)

## **2.08 Playground Climbing Boulder**

One (1) BOLDR Crystal Climber

Color: Umber

Allow 8-12 weeks for delivery

Factory Representative: Made in the Shade, PO Box 2870, Evergreen, CO 80437, 1-888-670-3721. Website [www.MadeInTheShade.com](http://www.MadeInTheShade.com)

## **2.09 Miscellaneous Hardware**

- A. Hardware: All hardware including nuts, bolts, and washers, shall be cadmium plated, and shall conform to ASTM A307.
- B. Expansion Bolts: Expansion bolts and anchors shall be galvanized. Where expansion bolts are to fasten to concrete, they shall be Hilti KWIK BOLT or approved equal.
- D. Where expansion bolts are used to fasten to concrete block or other masonry construction, they shall be RAWL3" anchors or approved equal.
- E. Anchor picnic tables with a Pool Cup Anchor, Model #58290; 3" round CPB cup anchor with cross bar; Spectrum Aquatic Catalog 1-800-776-5309 or local pool supply company.

## **PART 3: EXECUTION**

### **3.01 Bike Rack**

- A. Install bike racks per manufacturer's recommendations.
- B. Set racks plumb with grade, as shown on plans, and parallel and perpendicular to building walls and/or walks.
- C. Provide all concrete footings and hardware necessary for installation per plans and manufacturer's recommendations.
- D. Prior to completion of project, clean bike racks, as needed, to remove dust and dirt. Provide a clean factory finish at time of final review. Touch up paint as needed.

### **3.02 Site Furniture**

- A. Locate picnic tables, benches on site for review by Engineer prior to installation. See plan for dimensional locations.
- B. Anchor picnic table and benches per plans and manufacturer's recommendations.
- C. Provide all concrete footings and hardware necessary for installation per plans and manufacturer's recommendations.
- D. Prior to completion of project, clean all furniture, as needed, to remove any dust and dirt, and provide a clean factory finish at time of final review. Touch up paint as needed.

### **3.03 Basketball Pole, Backboard, Ring and Net**

- A. Assemble and install Pole, backboard and ring as per drawings and manufacturer's specifications.

### **3.04 Protection**

- A. Protect all painted surfaces from cracking or chipping during installation. Use blankets, tarps etc., to protect paint surfaces while handling.
- B. Do not accept materials damaged during shipping. Damaged parts shall not be accepted. If minor repairs are required, it shall be at the discretion of the Owners Representative whether the items are acceptable.
- C. Verify proper operation of all equipment prior to acceptance. Contractor shall be responsible for proper operation of all materials.

**END OF SECTION**

## **DIVISION 2**

### **SECTION 02875 – PREFABRICATED SHELTERS – STEWART CASE PARK**

#### **PART 1 – GENERAL**

##### **1.01 Furnish and Install**

- A. Prefabricated Picnic Shelter

##### **1.02 Related Work**

- A. Earthwork: Division 2
- B. Caste-in-Place Concrete: Division 3

##### **1.03 Quality Assurance**

- A. Installer Qualifications: An experienced installer who has specialized in installing work similar in material, design and extent to that indicated for this project and who is acceptable to manufacturer of prefabricated shelters.
- B. Standards and Guidelines: Provide prefabricated picnic shelter complying with or exceeding requirements in the following:
  - 1. Applicable ASTM standards.
  - 2. State of Colorado and applicable federal standards and guidelines for structures of this type.
  - 3. Local Codes.
  - 4. Member: American Institute of Steel Construction
  - 5. All welding by AWS certified welders

##### **1.04 Submittals**

- A. Product Data: For each of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles and finishes.
- B. Shop Drawings: Include materials, plans, elevations, sections, details, method of field assembly, connections and installation details.
  - 1. Submit complete set of shop drawings signed and sealed by a Professional Engineer registered in the State of Colorado.
- C. Samples of Initial Selection: Manufacturer's color charts or 6-inch (150mm) lengths of actual material showing the full range of colors and textures available for components with factory applied color finishes.
- D. Maintenance Data: For prefabricated shelter and finishes to include in maintenance manuals specified in Division 1.

##### **1.05 Project Conditions**

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated.
  - 1. Notify owner's Representative at least two days in advance of proposed utility interruptions.
  - 2. Do not proceed with utility interruptions without Owner's Representative's written permission.
  - 3. Before excavating, contact utility-locator service for area where project is located.

## **1.06 Delivery, Storage and Handling**

- A. General: Comply with Section 01600. Deliver and store panels and accessories in a dry place to avoid condensation or contact with materials which might cause staining such as lime, cement, fresh concrete or chemicals.

## **PART 2 – PRODUCTS**

### **2.01 Manufacturers**

- A. Approved Manufacturer
  - 1. Litchfield Industries.  
Distributor: Recreation Plus, Ltd. 15209 West Ellsworth Drive, Golden Co 80401  
Telephone: (303)278-1455 / (888)278-1455

### **2.02 Product**

- A. Picnic Shelter
  - 1. ‘Pittsburg’ All Steel Octagon DUO –Top Shelter, 20’ with Standing Seam 24 Gauge Pre-Cut Metal Roof. Shelter to include:
    - 1.02 DUO-TOP
    - 1.03 Cupola
    - 1.04 Overhead Lattice
    - 1.05 Handrails (6 sections).
  - 2. shelter colors:
    - 2.02 Columns, frames and supports; “**Litch-Kicker**” -Catalyzed, Baked, Electrostatically Applied Epoxy/Polyurethane Standard Paint Finishing per Litchfield standard color selection. Submit Color Samples
    - 2.03 Roof color; per Pittsburg standard pre-cut metal roof color chart – Submit Color Samples

## **PART 3 – EXECUTION**

### **3.01 Examination**

- A. Examine areas and conditions with Installer present for compliance with requirements for site clearing earthwork, site surface and foundations and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.02 Preparation**

- A. Verify locations of footings and paving.

### **3.03 Installation, General**

- A. General: Comply with manufacturer’s written installation instructions, unless more stringent requirements are indicated. Anchor prefabricated shelter securely, positioned at locations and elevations indicated on Shop Drawings.

### **3.04 Cleaning**

- A. After completing prefabricated picnic shelter installation, inspect components and remove surplus materials. Remove spots, dirt and debris from the shelter. Repair damaged finishes to match original finish or replace components.

### **3.05 Extra Stock**

- A. Extra paint: At the completion of painting, deliver to the City one full gallon of each paint color and type used along with the color number or formula for each type.

**END OF SECTION**

## DIVISION 2

### SECTION 02912 – LANDSCAPE TREES, SHRUBS AND PERENNIALS

#### PART 1 - GENERAL

##### 1.01 Work Included

- A. Furnish all labor, materials, supplies, equipment, tools, and transportation, and perform all operations in connection with and reasonably incidental to complete installation of the plantings and guarantee as specified herein. Items of work specifically included are:
  - 1. Procurement of all applicable licenses, permits, and fees.
  - 2. Installation of trees, shrubs and perennials.
  - 3. Mulch.

##### 1.02 Related Work

- A. Tree Protection: Section 02122
- B. Irrigation Installation: Section 02810
- C. Seed Construction: Section 02940
- D. Sod Construction: Section 02950
- E. Planting Maintenance: Section 02970

##### 1.03 Submittals & Quality Assurance

- A. Submittals and test results shall be directed to the City Representative and shall be approved in writing before affected work commences. **ALL COSTS TO ENSURE QUALITY SHALL BE PAID BY THE CONTRACTOR.**
  - 1. Submit three copies of manufacturer's specifications and literature on all products.
  - 2. Submit three copies of complete materials list including quantities and descriptions of materials.
- B. Summary of submittals from this section:
  - 1. Soil amendment analysis.
  - 2. Mulch.
  - 3. Landscape Fabric
  - 4. Plant material.
- C. Provide at least one person who shall be present at all times during execution of this portion of the work and who shall be thoroughly familiar with the type of materials being installed and the best methods for their installation and who shall direct all work performed under this section.

##### 1.04 Inspections

- A. Site Inspection:
  - 1. Contractor will inspect existing site conditions and note irregularities affecting the work of this section. Verify that grading operations have been satisfactorily completed and that topsoil of adequate quantity and quality has been placed in all disturbed areas as specified. Verify that the areas to be revegetated are protected from concentrated runoff and sediment from adjacent

areas. Note any previous treatments to the areas such as temporary seeding or mulching and discuss with the City Representative how these treatments will affect permanent revegetation. Report all irregularities affecting work of this section to the City Representative before initiating work. When the Contractor begins work under this section, it implies acceptance of existing conditions.

2. Contractor shall notify City Representative prior to start of work. City Representative will be responsible to monitor the work.

B. Pre-planting Inspections:

1. All plant material shall be inspected by a City Forestry Representative before planting. Inspection of materials may be sequenced by major planting areas to accommodate efficient planting operations. Plants for inspection must be in a single location preferably on the project site. All rejected materials must be removed from the site, replaced and reinspected before planting. If the supplier is a local nursery, tagged plants may be inspected at the nursery. Photographs of the plant materials to be obtained from non-local sources may be submitted to the City Forestry Representative for preliminary inspection. This preliminary inspection is subject to final approval of plants at the job site. The Owner reserves the right to reject any plant material at any stage of construction or guarantee period.
2. All soil amendments, backfill mixes and mulches will be inspected at the site by the City Representative before they are used in planting operations.
3. City and Forestry Representatives will inspect staked locations of all trees before digging for those plants occurs. City Representatives will inspect the location of all shrubs in their containers at the proposed locations before digging commences. Contact City Representatives at least two days in advance.

C. Final Inspection:

1. As soon as all planting is completed, a review and preliminary inspection to determine the condition of the vegetation will be held by the City Representatives upon request by the Contractor.
2. The inspection will occur only after the following conditions have been met:
  - a. All areas will be free of weeds and neatly cultivated;
  - b. All plant basins shall be in good repair;
  - c. Irrigation systems shall be fully operational with all heads properly adjusted;
  - d. All debris and litter shall be cleaned up and all walkways and curbs shall be cleaned of soil and debris left from planting operations.
3. If, after the inspection, the City Representative is of the opinion that all work has been performed as per the Contract Documents, and that all vegetation is in satisfactory growing condition, he will give the Contractor Written Notice of Acceptance and the Guarantee Period shall begin.
4. Work requiring corrective action in the judgment of the City Representative shall be performed within the first ten (10) days of the guarantee period. Any work not performed within this time will necessitate an equivalent extension of the guarantee period. Corrective work and materials replacement shall be in accordance with the Contract Documents, and shall be made by the Contractor at no cost to the Owner.
5. Final approval and Substantial Completion notice will be given when all deficiencies are corrected.

D. End of Guarantee Period Inspection:

1. At the end of the second full growing season City Representatives will inspect all trees for satisfactory condition. The inspection shall take place in September and the City shall contact the Contractor concerning replacements. Replacements may take place the following spring if deemed proper or necessary.
2. The Contractor is responsible for removal of all tree stakes, wire and webbing at the end of the guarantee period.

**1.05 Guarantee**

- A. Guarantee landscape construction materials against defects due to any cause for a period of two years.
- B. Guarantee plant material used in this section against defects due to any cause for a period of two full growing seasons from the date of acceptance of all work. This guarantee includes insect infestation or infection by disease organisms.
- C. This guarantee will not be enforced should woody vegetation die due to vandalism; improper maintenance procedures carried out by the Owner involving over or under watering, lawn mower damage, over-fertilization, fire, flood, or hail or other similar circumstances beyond the control of the Contractor.
- D. Replace woody vegetation when it is no longer in a satisfactory condition as determined by the City Representative for the duration of the Guarantee Period. Make replacements within fourteen days of notification from the City Representative. Replacement planting for trees shall be done in the spring planting season, except as approved otherwise. Remove dead plants within seven days of notification. If a tree is in marginal condition at the end of the guarantee period it may be agreeable to both parties to wait until the end of the growing season before deciding whether to replace that tree.
- E. All replacements shall be of the same kind and size as originally specified and shall be installed as described in the contract documents unless changes are approved by City Representatives. Repairs and replacements shall be made at no expense to the Owner.
- F. Guarantee shall apply to originally specified and installed plants and other landscape materials, and any replacements made during the guarantee/warranty period.

**PART 2 - MATERIALS**

**2.01 Plant Material**

- A. A complete list of plants including a schedule of quantities, sizes and other requirements is shown on the Landscape Plan. If discrepancies occur between quantities of plants indicated in the plant list and as indicated on the plan, the plan quantities shall govern.
- B. No substitutions shall be accepted without approval from the Owner's Representative.
- C. Plant material shall be a first-class representative of its species; healthy, vigorous, well-branched and well proportioned with respect to height and width relationships. Inspect to assure that all plants are free from disease, injury, insects and weed roots; and conform to the requirements of the American Standard for Nursery Stock, ANSI 260.1. All plants are subject to inspection see 1.04 B.
- D. Plant material that is grown in a zone more mild than USDA zone 5 shall be acclimated to Colorado conditions prior to planting.
- E. Digging, Wrapping, and Handling: Plants shall be dug and prepared for shipment in a manner that will not cause damage to branches, shape, and future development after planting:

1. Balled and burlapped plants shall be nursery grown stock adequately balled with firm, natural balls of soil in sizes and ratios conforming to the Colorado Nursery Act as cited above. Balls shall be firmly wrapped with non-treated burlap, secured with wire or jute, Broken balls will not be accepted.
  2. Container grown plants shall have been nursery grown in containers and shall have sufficient roots to hold the entire soil mass together after container removal without being root-bound.
  3. Options as to method: If all other requirements are met, a container grown plant may be substituted for a balled and burlapped or field collected plant. Trees transplanted by mechanical tree spade may be substituted for balled and burlapped trees as long as minimum ball sizes are equal to or larger than AAN Standards.
- F. Plant Protection: Plants shall be handled so roots are adequately protected at all times from drying out and from other injury. Protect balls of balled plants which cannot be planted within twelve hours of delivery with mulch or other suitable material. Where possible, store plants in the shade. Keep all plant roots moist before, during, and after planting.

## **2.02 Soil Amendment**

- A. Use compost or two year cured manure free from lumps, stones or other foreign matter. Do not use Colorado mountain peat, sphagnum peat is acceptable. Soil amendment must be free of mineral matter or chemical composition harmful to plant life and have the following properties:

Organic Matter:	35-40%
pH:	7.4 to 8.5
Salt:	< 7 mmhos/cm

Submit test results prior to application.

## **2.03 Staking Materials**

- A. Tree Stakes: 6-foot long metal "T" posts, safety caps.
- B. Guying and Staking Wire: Galvanized iron or steel 12-gauge wire.
- C. Webbing: 2-inch nylon webbing.

## **2.04 Landscape Fabric**

- A. Weed barrier by Dewitt, Mirifi, Typar, Pro 5 or equal.

## **2.05 Mulch**

- A. Shredded wood: Mulch shall be shredded branches, chipped or shredded pallets is not acceptable. Mulch shall be free from noxious weed seed and all foreign material harmful to plant life. Submit samples.

## **2.06 Herbicide:**

- A. Round-Up

## **2.07 Watering:**

- A. No water will be available on site until installation of the irrigation system is complete. It is the intent that all plant material be watered using the irrigation system after installation.

## PART 3 - EXECUTION

### 3.01 Planting Woody Vegetation

- A. Location: stake tree locations and place container shrubs as shown on the plans. Coordinate review of locations with City Representative.
- B. The following table identifies the minimum distances from trees to utilities etc.

<u>Item</u>	<u>Minimum Distance (feet)</u>
Curbs	5
Sidewalks	5
Electric buried cable	4
Water lines	6
Sewer lines	10
Gas lines	4
Street lights – Shade trees	40
Street lights – Ornamental trees	15
Street signs	7
Intersections	30
Vaults and pits	5-10
Irrigation rotor heads	12-20
<u>In turf areas:</u>	
Tree to tree – Shade trees	25
Tree to tree – Evergreen trees	15
Tree to tree – Ornamental trees	15

- C. Planting Pits:
  - 1. Dig planting pits two times the width of the root ball, see planting detail.
  - 2. Roughen sides of the pit to remove any compacting or glazing. Mix loosened soil with specified backfill.
- D. Backfill Material: Tree and shrub planting pits shall be backfilled with the following mix:
  - 1. 2/3 existing pit soil by volume.
  - 2. 1/3 soil amendment by volume.

Thoroughly mix backfill material in accordance with industry accepted technique in order to obtain a uniform, evenly blended consistency, free from pockets of unblended material and clods or stones greater than two inches in diameter. Coordinate review of backfill mix with City Representative.

- E. Planting:
  - 1. Place each tree and shrub in the planting pit so that it will be two inches above finish grade for trees and one inch above finish grade for shrubs.
  - 2. Untie and remove burlap from top third of root ball on balled and burlapped material. Remove all burlap that is treated (green in color). Complete removal of wire baskets is preferred, at a minimum remove wire baskets from top and sides of root ball.

3. Backfill planting pit with backfill material and tamp to compact. Water in thoroughly. Be sure no soil is placed on top of the root ball.
4. Stake all trees in a true vertical position per the appropriate construction detail.
5. Place safety caps on tree stakes within 15 feet of the playground curb.
6. Coordinate woody vegetation operations with other construction activities so that the irrigation system can be used to water the vegetation immediately after planting.

### **3.02 Placing Fabric and Mulch**

- A. Place weed barrier in all shrub beds and perennial beds. Lay out weed barrier around shrubs using staples to secure edges and seams.
- B. Place a layer of wood mulch in all tree rings to the depth of 3-4 inches as shown on the construction detail. Do not install weed barrier in tree rings. Deciduous tree rings shall be 4 feet in diameter, coniferous tree rings shall extend 1 foot beyond the drip line.
- C. Place mulch in all planting beds, if shrub or perennial beds are planned. Place mulch to a 3-4 inch depth. Gently brush mulch off of perennials once installed. Take care in placement not to damage newly planted vegetation.

### **3.03 Maintenance**

- A. Continuously maintain all plantings included in the Contract from the beginning of Contract work and during the progress of work, see Section 02970 Planting Maintenance.
- B. The Owner will assume the responsibility of maintenance including watering, fertilizing, weeding, etc. upon written acceptance of Substantial Completion from the Owner. The Contractor shall periodically inspect the project during the two year guarantee period and immediately notify the Owner's Representative of any irregularities or deficiencies which will affect the guarantee.
- C. Round-Up herbicide may be used in mulched tree rings if grass seed has sprouted from seeding operations.
- D. The Contractor shall be responsible for resetting of any plants to an upright position or to proper grade and for the removal and replacement of any dead plant material.

### **3.04 Project Record (As-Built Drawing)**

- A. Maintain one complete set of contract documents on site. Keep documents current. Record any changes in location, quantity and species of plant material. Submit corrected drawings to the Owner's Representative prior to final inspection.

### **3.05 Tree Stakes**

- A. Remove all metal T-posts, wire and webbing one year after installation or at the end of the two year warranty period.

**END OF SECTION**

## **DIVISION 2**

### **SECTION 02920 – TURF SEED CONSTRUCTION**

#### **PART 1 - GENERAL**

##### **1.01 Work Included**

- A. The Contractor shall furnish all labor, materials, tools, equipment and perform all work and services necessary for irrigated turf seed construction in the quantities required. Furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a healthy, sound, and complete, craftsman-like installation. Work to include:
  - 1. Application of herbicides.
  - 2. Soil preparation.
  - 3. Fine grading of all planting areas.
  - 4. Seeding and mulch.
  - 5. Maintenance during establishment.

##### **1.02 Related Work**

- A. Tree Protection: Section 02122
- B. Irrigation Installation: Section 02810
- C. Sod Construction: Section 02950
- D. Planting Maintenance: Section 02970

##### **1.03 Submittals & Quality Assurance**

- A. Submit three copies of:
  - 1. Manufacturer's specifications and literature on all products;
  - 2. Manufacturer's tests (within 6 months of application) on supplied products;
  - 3. Complete materials list including quantities and description of materials.
- B. Summary of submittals from this section:
  - 1. Seed mix content.
  - 2. Soil amendment analysis.
  - 3. Mulch.
  - 4. Seed tags from bags.
- C. Provide at least one person who shall be present at all times during execution of this portion of the work and who shall be thoroughly familiar with the type of materials being installed and the best methods for their installation and who shall direct all work performed under this section.

##### **1.04 Inspections**

- A. Initial Inspection:

Contractor will inspect existing site conditions and note irregularities affecting the work of this section. Verify that grading operations have been satisfactorily completed and that top soil of adequate quantity and quality has been placed in all disturbed areas as specified. Verify that the areas to be revegetated are protected from concentrated runoff and sediment from adjacent areas.

Note any previous treatments to the areas such as temporary seeding or mulching and discuss with the City Representative how these treatments will affect permanent revegetation. Report all irregularities affecting work of this section to the City Representative before initiating work. When the Contractor begins work under this section, it implies acceptance of existing conditions.

**B. Substantial and Final Acceptance:**

1. Contractor shall notify City Representative prior to start of work. City Representative will monitor the work.
2. Upon completion of the seeding operations, the contractor shall notify the City Representative to review the work. If all work is acceptable, the City Representative shall record the date and issue a "Conditional Acceptance" certificate which states that the Contractor shall begin maintenance of all seeded areas as specified.
3. Seeded areas shall receive "Final Acceptance" provided a healthy, even colored, viable turf is established, free of weeds and undesirable grass species, disease and insects. Seeded areas shall meet the required coverage for seed establishment.

**1.05 Guarantee**

- A. Guarantee seeded areas against defects for a period of one growing season from the date of final acceptance.
- B. This guarantee will not be enforced should seeded area die due to vandalism, improper maintenance by Owner, lawn mower damage, or other circumstances beyond the control of the Contractor.
- C. Replace seeded turf when it is no longer in a satisfactory condition as determined by the Owner's Representative for the duration of the guarantee period.
- D. Areas seeded in the spring shall be inspected for required coverage the following fall no later than October. Areas seeded in the fall will be inspected October of the following year.

**PART 2 - MATERIALS**

**2.01 Herbicide**

- A. Round-Up

**2.02 Soil Amendment**

- A. Use compost or well rotted manure free from lumps, stones or other foreign matter. Do not use Colorado mountain peat, sphagnum peat is acceptable. Soil amendment must be free of mineral matter or chemical composition harmful to plant life and have the following properties:

Organic Matter: 35-40%  
pH: 7.4 to 8.5  
Salt: < 7 mmhos/cm

Submit test results prior to application. Apply at a rate of six cubic yards per 1,000 square feet in areas of high traffic and sports fields. See landscape plan for designated area.

**2.03 Seed**

- A. Seed shall be of the latest crop available and shall be certified seed with a PLS (pure live seed) rate no lower than 92%. Seed shall meet the requirements of Colorado Department of Agriculture Seed Laws, Chapter 35, Article 27. Seed shall be no greater than one year old. Seed which has become wet, moldy, or otherwise damaged in transit or in storage shall not be used. All seed shall be delivered in sealed bags showing weight, analysis, and vendor's name.

**1. Irrigated Turf Seed Mix: Dwarf Type Tall Fescue**

The seed mixture shall be a blend of four to five dwarf type tall fescue cultivars to be approved by the City Representative and Parks & Public Places Department. The seeding rate shall be 9 lbs. Per 1,000 square feet. The following list is representative of the desired mix.

Grande	35%
Crew Cut II	20%
Endeavor	20%
Olympic Gold	15%
Coronado Gold	10%

**2.04 Fertilizer**

**COMMERCIAL FERTILIZER CONTENT & APPLICATION RATE**

Commercial fertilizer (18 – 46 – 0)	Percent available by weight
--	-----------------------------

Nitrogen	18
Phosphorus	46
Potassium	0

Application rate of 242 lbs. per acre.

**2.05 Mulch**

- A. Clean Graminae (grass family) straw supplied from local area. Free of weed seeds and other matter that has not been specified in this section.

**2.06 Tackifier**

- A. Non toxic organic tackifier.

**PART 3 - EXECUTION**

**3.01 Site Preparation**

- A. Prepare areas as follows:
  1. Remove any existing vegetation not scheduled to remain. Apply Roundup herbicide to all weeds and undisturbed areas that shall be re-seeded. Allow herbicide to sit for 7 to 10 days before tilling or preparing soil for seed. Apply Roundup at manufacturer's recommended rate for vegetation type specified.
  2. Rip existing topsoil to a minimum depth of eight (8) inches in one direction using an agricultural ripper with tines spaced at no greater than 18 inches. Areas adjacent to walks, structures, curbs, etc., where the use of large mechanical equipment is difficult, shall be worked with smaller equipment or by hand.
  3. Place soil amendment at a rate of six (6) cubic yards per 1,000 square feet in areas to be irrigated as indicated on plans.
  4. Till all areas to be planted to a depth of six (6) inches.
  5. In tree protection areas, the topsoil shall be worked by hand to a depth of 3 inches.
  6. Remove all rubble, stones, plant material and extraneous material over 1½ inches in diameter from the site.
  7. Apply pre-planting fertilizer specified in Part 2 of this Section.

8. Restore fine grade with float drag to remove irregularities resulting from tilling operations. Float drag in two directions. Coordinate restoration of fine grade to establish the vegetation subgrade at one inch below adjacent paved surfaces. Match grade at property lines and work-limit lines.
- B. Remove any additional stones over 1½ inches that have come to the surface. Perform drainage test by applying water with the irrigation system. All grades shall provide for run-off of water without low spots or pockets. Do not plant until the finished grade is reviewed by the City Representative. This review does not reduce Contractor's responsibility to provide a finished product that drains properly.

### **3.02 Seed Application**

- A. Seed areas indicated on drawings and areas disturbed by construction.
- B. Selection of the time of seeding shall be Contractor's responsibility, consistent with germination and erosion control requirements. Optimal seeding time for Tall Fescue is mid May through early September.
- C. Re-work previously prepared areas that have become compacted or damaged by rains or traffic.
- D. Apply by drilling, drill in a minimum of two directions at right angles to one another. Broadcast or hydro seed in areas that are inaccessible or too steep to drill or as indicated on plans.
- E. Do not drill or sow during windy weather or when ground is frozen or untillable.
- F. Cover seed to depth of 1/4 inch by raking or dragging.
- G. Firm seeded areas with a roller weighing maximum of 100 lbs. per foot of width.

### **3.03 Hydraulic Seeding and Mulching Option**

- A. Where areas to be seeded are too steep or inaccessible for equipment, Contractor shall seed, fertilize and or mulch by hydraulic spray application. Seed is required at double the rate specified and wood cellulose fiber mulch is required to be applied at a rate of one ton per acre. If hydraulic seeding is used with drill seeding then use the specified application rate.
- B. Combine seed with water to provide a slurry. Perform hydraulic application in such a manner that the liquid carrier will uniformly distribute the material over the entire area to be seeded at rates not less than specified. Do not compact hydraulically seeded areas following application. If seed and mulch are applied in a single application the rate of seed application shall be doubled.

### **3.04 Maintenance**

- A. Seed Establishment Period:
  1. Water seeded areas as needed, minimum of two times per day, until grass is established. Water so that no erosion or movement of seed or mulch occurs. Hand water as necessary to prevent movement of seed.
  2. Seed establishment period shall begin upon completion of seeding operations and continue through the first mowing or until the turf is established.
  3. Post "keep off the grass" signs until turf is established.
  4. Maintain seeded areas until all the grass is established and has been mowed once. Maintenance shall include watering, fertilizing and herbicide weed control as necessary. Do not apply herbicide before the first mowing, do not mow before the majority of seedlings have three leaf blades.
  5. After germination or turf establishment remove any turf that has germinated within the baseball infield. Establish a smooth arc along the edge of the infield and either rototill or spray any seed that has germinated.

6. Mowing: Mow when grass is over four (4) inches. Mow at a height of three (3) inches. Do not mow more than one third (1/3) height of grass. Reduce irrigation prior to mowing to prevent damage to turf.
7. Required coverage for grass seed areas shall be twenty five (25) viable live seedlings of the species specified per square foot as measured from five (5) feet directly overhead. Determination of required coverage will be based on a random sampling of the entire project area, and shall consist of a minimum of five samples, each two square feet in area. Bare spots are defined as those areas larger than one square foot which do not meet the required coverage. After the inspection it is the Contractor's responsibility to perform the required maintenance within one week to insure a healthy established seeding condition.
8. The total area occupied by bare spots larger than 0.5 square feet must not exceed ten percent (10%) of the total seeded area. Maximum single bare spot size is one square foot. All seeded grass areas which do not meet the satisfactory stand of growth qualification shall be reseeded and hydromulched.
9. Once the maintenance periods are completed and seed establishment is accepted, the City Representative shall issue a written notice of Final Acceptance. The guarantee period extends for one full growing season after Final Acceptance.

### **3.05 Reseeding and Repair**

- A. Reseed areas where there is not a satisfactory stand of grass at the end of establishment period. Scratch the surface to prepare seed bed and over-seed with drill seeder or hydromulch.
- B. Reseed areas that have been damaged or disturbed by the Contractor's operation according to these specifications.
- C. After one growing season, there shall be no visual difference between seed and healthy sod in irrigated areas.

**END OF SECTION**

## **DIVISION 2**

### **SECTION 02930 - SOD CONSTRUCTION**

#### **PART 1 - GENERAL**

##### **1.01 Work Included**

- A. The Contractor shall furnish all labor, materials, tools, equipment and perform all work and services necessary for sod construction in the quantities required.
- B. Furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a healthy, sound, and complete, craftsman-like installation. Work to include:
  - 1. Application of herbicides.
  - 2. Soil preparation.
  - 3. Fine grading of all planting areas.
  - 4. Sod installation.
  - 5. Maintenance during establishment.

##### **1.02 Submittals & Quality Assurance**

- A. Submit three copies of:
  - 1. Manufacturer's specifications and literature on all products.
  - 2. Manufacturer's tests (within 6 months of application) on supplied products.
  - 3. Sod grower's letter certifying the sod's species composition.
- B. Provide at least one person who shall be present at all times during execution of this portion of the work and who shall be thoroughly familiar with the type of materials being installed and the best methods for their installation and who shall direct all work performed under this section.

##### **1.03 Inspection**

- A. Initial Inspection:
  - 1. Contractor will inspect existing site conditions and note irregularities affecting the work of this section. Verify that grading operations have been satisfactorily completed and that topsoil of adequate quantity and quality has been placed in all disturbed areas as specified. Verify that the areas to be sodded are protected from concentrated runoff and sediment from adjacent areas. Note any previous treatments to the areas such as temporary seeding or mulching and discuss with the City Representative how these treatments will affect permanent revegetation. Report all irregularities affecting work of this section to the City Representative before initiating work. When the Contractor begins work under this section, it implies acceptance of existing conditions.
- B. Substantial and Final Acceptance:
  - 1. Contractor shall notify City Representative prior to start of work. City Representative will be responsible to monitor the work.
  - 2. Sodded areas shall receive "Final Acceptance" provided a healthy, even colored, viable turf is established, free of weeds and undesirable grass species, disease and insects.

**1.04 Guarantee**

- A. Guarantee sod against defects for a period of one growing season from the date of final acceptance.
- B. This guarantee shall not be enforced should sod die due to vandalism, improper maintenance by Owner, lawn mower damage or other circumstances beyond the control of the Contractor.
- C. Replace sod when it is no longer in a satisfactory condition as determined by the Owner's Representative for the duration of the guarantee period.
- D. Areas sodded in the spring shall be inspected for required coverage the following fall not later than October. Areas sodded in the fall will be inspected in October of the following year.

**PART 2 - MATERIALS**

**2.01 Herbicide**

- A. Round-Up

**2.02 Soil Amendment**

- A. Use compost or two year cured manure free from lumps, stones or other foreign matter. Soil amendment must be free of mineral matter or chemical composition harmful to plant life and have the following properties:

- Organic Matter: 35-45%
  - pH: 7.4 to 8.5
  - Salt: < 7 mmhos/cm

**2.03 Fertilizer**

- A. Commercial Fertilizer (20 – 20 – 10) apply at manufacturers recommendation.

**2.04 Sod**

- A. Provide strongly rooted sod not less than 2 years old and free of weeds.
- B. Species composition shall be a mix of Kentucky Bluegrass and Perennial Rye. Furnish in rolls:
  - 1. Uniformly mowed height when harvested.
  - 2. Free of disease, nematodes, pests and pest larvae.
  - 3. Thickness: Soil thickness of sod cuts shall not be less than 3/4 inch nor more than 1 inch.
- C. Weeds:
  - 1. Free of Bermuda grass, Quack grass, Johnson grass, poison ivy, nut sedge, nimble will, Canada thistle, bindweed, bent grass, wild garlic, ground ivy, perennial sorrel.
  - 2. Containing less than 10 Jimsonweed, mustard, lamb's quarter, chickweed, cress or crab grass plant per 100 sq. ft.

**2.05 Water**

- A. Free of substances harmful to plant growth. Contractor responsible for watering even if area sprinkler system is not operational.

**2.06 Pegs**

- A. Softwood, 3/4 inch diameter, 8 inch length.

## PART 3 - EXECUTION

### 3.01 Site Preparation

- A. Prepare areas as follows:
  1. Remove any existing vegetation not scheduled to remain.
  2. Rip existing topsoil to a minimum depth of eight (8) inches in one direction using an agricultural ripper with tines spaced at no greater than 18 inches. Areas adjacent to walks, structures, curbs, etc., where the use of large mechanical equipment is difficult, shall be worked with smaller equipment or by hand.
  3. Place soil amendment at a rate of six (6) cubic yards per 1,000 square feet.
  4. Till all areas to be planted to a depth of six (6) inches.
  5. In tree protection areas, the topsoil shall be worked by hand to a depth of 3 inches.
  6. Remove all rubble, stones, plant material and extraneous material over 1½ inches in diameter from the site.
  7. Apply pre-planting fertilizer as specified in Part 2 of the Section.
  8. Restore fine grade with float drag to remove irregularities resulting from tilling operations. Float drag in two directions. Coordinate restoration of fine grade to establish the vegetation subgrade at one inch below adjacent paved surfaces. Match grade at property lines and work-limit lines.
- B. Remove any additional stones over 1½ inches that have come to the surface. Perform drainage test by applying water with the irrigation system. Do not plant until the finished grade is reviewed by City Representative. This review does not reduce Contractor's responsibility to provide a finished product that drains properly.

### 3.02 Installation

- A. Sod areas indicated on drawings.
- B. Selection of the time of sodding shall be the Contractor's responsibility, consistent with weather limitations. Coordinate with Parks Maintenance if fall watering is required for establishment.
- C. Begin sodding from bottom of slopes.
- D. Lay first row of sod in a straight line with long dimension of pads parallel to slope contours.
- E. Butt side and end joints.
- F. Stagger end joints in adjacent rows.
- G. Do not stretch or overlap sod.
- H. Peg sod on slopes greater than 3 to 1 with a minimum of two pegs per sq. yd.
- I. Water sod immediately after transplanting.
- J. Roll sod, except on pegged areas, with roller weighing not more than 150 lbs. per foot of roller width.
- K. Water sod and soil to a depth of 4 to 6 inches within four hours after rolling.
- L. Provide sufficient barriers and signage notifying the public to keep off the newly sodded areas.

### 3.03 Maintenance

- A. Sod establishment period:

1. Sod establishment period shall begin immediately after installation and continue through the second or third mowing when turf is established. Maintenance shall include watering, mowing, fertilizing and weed control as necessary.
2. Watering: Water sod areas as needed to keep wet to a depth of 4 to 6 inches for 2 to 3 weeks until grass is established. Avoid standing water, surface wash or erosion from over-watering. Reduce water application after the first few weeks.
3. Mowing: Mow when grass is over four (4) inches. Mow at a height of three (3) inches. Do not mow more than one third (1/3) height of grass. Reduce irrigation prior to mowing to prevent damage to turf. Mow with walk behind mower.
4. Disease and Insect Control: A licensed applicator shall apply fungicides and insecticides as required to control disease and insects in accordance with state law requirements.

#### **3.04 Re-sod and Repair**

- A. Resod areas where there is not a satisfactory stand of grass at the end of establishment period.
- B. Sod shall be established at least 30 days prior to Final Acceptance.
- C. Re-sod spots larger than 1 sq. ft. not having a uniform stand of grass.

**END OF SECTION**

## **DIVISION 2**

### **SECTION 02935 – PLANTING MAINTENANCE**

#### **PART 1 - GENERAL**

##### **1.01 Scope**

- A. Furnish all supervision, labor, material equipment, and transportation, and perform all operations in connection with and reasonably incidental to maintaining all planting, including winter watering, called for under this contract. Maintain landscape materials in an attractive, healthy, operable condition until seeded areas are established, landscape punch list items are complete, and all landscape work is accepted by Owner.

##### **1.02 Quality Assurance**

- A. Work Force: Contractor's representative shall be experienced in planting and irrigation maintenance.
- B. Maintenance Record: Submit to the Owner's Representative a monthly record of all maintenance operations performed, including a record of all herbicides, insecticides, and disease control chemicals used.

##### **1.03 Environmental Conditions**

- A. The requirements for winter treatment of plants will be applicable when the maintenance period extends past October 15.

#### **PART 2 - MATERIALS**

##### **2.01 Materials**

- A. Replacement materials shall conform to the specifications for original installation.

#### **PART 3 - EXECUTION**

##### **3.01 Tree Care**

- A. Watering: When hand watering, use a water wand to break the water force. All trees and shrubs shall be winter watered using a need type root feeder at least once per month between irrigation system winterization and spring start-up. Irrigation system may be used for winter watering, providing the system is re-winterized after each use.
- B. Staking: Inspect stakes monthly to prevent girdling of trunks or branches, and to prevent rubbing that causes bark wounds. Remove stakes and guys after one year, or as determined by Owner's Representative. Stakes will remain the Contractor's property and shall be removed from the site.
- C. Weed Control: Keep planting areas free of weeds. Use recommended legally approved herbicides. Avoid frequent soil cultivation that destroys shallow roots. Weed at least once per week.
- D. Insect and Disease Control: Maintain reasonable control with approved materials to prevent visual and structural damage to the plants.
- E. Wounds: All wounds or injuries should be traced out and disinfected with alcohol or equal. No tree wound compounds or paints shall be applied.
- F. Tree rings: Mulched tree rings shall be kept tidy and weed free.

- G. Replacement of Plants: Remove dead and dying plants and replace with plants of an equal size, condition, and variety or original planting plan. Replacements shall be made at no expense to Owner.
- H. Trash Removal: Remove trash, clipped grass, and blown dirt weekly from shrub beds, lawns, walks, and tree basins. Keep the entire area within the limits of planting free from trash and dirt (water or wind carried) at all times. Repair erosion damage for duration of maintenance period.

### **3.02 Turfgrass Care**

- A. Mowing: Mow only the turf areas as needed to maintain a height of 3 inches. Do not mow wildflowers.
- B. Edging: Trim edges at least twice monthly or as needed for neat appearance. Catch clippings and removed from lawn areas. Vacuum or blow off walks.
- C. Watering: Water turf areas at the frequency required to obtain proper turf establishment and to maintain a lush, green lawn. Apply water in such a way to encourage deep root growth.

### **3.03 Low Maintenance Grasses**

- A. Mowing: Mow low maintenance grasses and wetlands grasses only after they have produced mature seeds and/or gone dormant for the winter or for weed control.
- B. Watering: Water as frequently as needed to obtain plant establishment (usually 6 to 8 weeks) and thereafter as needed to avoid dieback. Apply water slowly and deeply to prevent runoff and encourage deep root growth.
- C. Weed Control: The Owner will determine the need for weed control.

**END OF SECTION**

## **DIVISION 3**

### **SECTION 03100 – CONCRETE FORMWORK**

#### **PART 1 – GENERAL**

##### **1.01 Work Included**

- A. Furnish labor, materials and equipment necessary for the complete construction of required formwork for cast-in-place concrete.
- B. Furnish and install anchor bolts, connectors, embedded plates, dovetail slots and anchors and other accessories required to be cast into concrete work.
- C. Furnish materials and equipment necessary to strip and remove formwork.
- D. Install embedded items furnished by other Sections.
- E. Related work specified elsewhere:
  - 1. Section 02220, Excavating, Filling and Grading.
  - 2. Section 02225, Structural Excavation, Backfilling and Compacting.
  - 3. Section 02515, Portland Cement Concrete Paving: Forming equipment.
  - 4. Section 02230, Drilled Piers: Concrete formwork for piers.
  - 5. Section 03300, Cast-in-Place Concrete.
  - 6. Section 07900, Sealants and Joint Fillers.

##### **1.02 Quality Assurance**

- A. General: Conform to the requirements and recommendations of ACI 301, "Specification for Structural Concrete in Buildings", and ACI 347, "Recommended Practice for Concrete Formwork", unless otherwise shown.
- B. Contractor shall be responsible for the design and engineering, construction and maintenance of formwork, as well as its adequacy and safety.
- C. Contractor shall design formwork for all loads and lateral pressures before and during placement of concrete. Maintain position and shape of formwork at all times. Provide positive means of adjustment for shores and forms which rest on compressible material.

##### **1.03 Product Delivery, Storage and Handling**

- A. Fiber Forms: Store prefabricated fiber forms on site horizontally if length requires, supported along the entire length of the form and elevated a minimum 4" off of ground, completely covered with waterproof membrane including ends, and not stacked over 5'-0" high. If stored vertically, the ends shall be covered with waterproof membrane and elevated a minimum 4" off of ground.

#### **PART 2 – PRODUCTS**

##### **2.01 Formwork and Exposed Concrete**

- A. Construct all formwork for exposed concrete surfaces with metal-framed/plywood-faced, metal or plastic panel-type materials to provide continuous, straight, smooth, solid exposed surfaces. Furnish in largest practicable sizes to minimize number of joints. Do not use any forms having defects on contact surfaces.
  - 1. Plywood forms will only be acceptable upon specific approval of the Owner Architect, and then only after visual inspection on the job site.

2. Plywood shall be sufficiently thick to withstand pressure of wet concrete without bow or deflection but shall not be less than 5/8" thick, complying with U.S. Product Standard PS-1, "B-B High Density Overlaid Concrete Form, Class 1 ", or "B-B Exterior Type DFPA Plyform, Class 1".
- B. Chamfer exposed external corners and edges, using chamfer strips accurately fabricated to produce uniform smooth lines and tight-edge joints.
  - C. Refer to the Drawings for locations where special joints may be required.
  - D. Arrangement for sheets or liner sheets shall be orderly and symmetrical. Form ties shall be spaced uniformly and aligned horizontally and vertically where locations are exposed to view in the completed project.

## **2.02 Formwork and Unexposed Concrete**

- A. Form concrete which will be unexposed in finished structure with plywood, boards, metal or other acceptable material. Provide lumber that is dressed on at least two (2) edges and one (1) side for a tight fit.
  1. Below-Grade Pier Forms: Sonotube Fiber Form "An or equal, specified in paragraph 2.03 below.
- B. Earthen or trenched forms shall not be used for vertical formwork.

## **2.03 Round Tubular Fiber Forms**

- A. General: Prefabricated round, one-piece tubular fiber forms for exposed, round cast in-place concrete columns, formed from multiple layers of high quality fiber, spirally wound and laminated with non-water sensitive adhesives.
- B. Finish:
  1. Coated form producing visible spiral seam, Sonotube Fiber Form "A" coated or equal.
- C. Size(s): Diameter and lengths as required to produce finished columns of the size(s) shown on the Drawings.
- D. Approved Manufacturers:
  1. Sonotube as manufactured by Sonoco Products Company, Hartsville, SC, (800) 532-8248, and represented locally by RW Specialties, Inc., Henderson, CO, (800) 332-6682.
  2. Manufacturers providing form materials of same type, function, quality and performance are acceptable.

## **2.04 Accessory Materials**

- A. Premolded Joint Fillers: In joints caulked or sealed with silicone or thiokol-based compound, filler shall be non-bituminous, non-extruding, conforming to ASTM D1752. In all other joints, filler shall be bituminous type conforming to ASTM D1751. Filler shall be 1/2" thick, unless otherwise indicated.
  1. Non-Bituminous Filler: Sonoflex F by Sonneborne or equal.
- B. Premolded Fiberboard Joint Fillers (Bituminous-Type): Preformed rigid cane fiberboard material, impregnated with a durable asphaltic compound, conforming to AASHTO-M213. Fillers shall be 1/2" thick, unless otherwise indicated.
  1. Bituminous Filler: Flexcell by Celotex or approved equal.
- C. Bond Breaker: Where shown on the Drawings or required by the work, provide minimum two (2) layers 15-lb. non-bituminous felt bond breaker.

- D. Column Isolation Joints: Joints around columns may be formed with minimum 30# nonbituminous building felt left in place with neatly trimmed top edge or approved joint filler material.
- E. Keyways: Provide nominal 1-1/2" deep keyways in all construction joints in walls, slabs and joints between walls and slabs, unless otherwise shown.
- F. Form Ties: Provide factory-fabricated break-back, removable, or snap-type form ties designed to prevent spalling concrete surfaces on removal and which will leave no metal within 1/2" of concrete surface. Use stainless steel, plastic-coated or hot-dipped galvanized at exposed concrete with cone-shaped tie heads, manufactured by Dayton, Gates, Heckman, Richmond or approved equal.
- G. Release Agent: Provide commercial formulated synthetic resin or oil-type form coating compounds that will not bond with or adversely affect concrete surfaces and will not impair subsequent finish treatment of surfaces, manufactured by Protex Pro-Coat, Euclid Eucoslip, J & P Tex-Mastic or approved equal.
  - 1. Contractor shall ensure that release agent is compatible with the finish requirements of concrete to be exposed to view.
- H. Metal Inserts: Provide adjustable wedge inserts of malleable cast iron complete with bolts, nuts, washers, 3/4" bolt size, unless otherwise shown, manufactured by Hohmann and Barnard, Gateway, Dayton or approved equal.
- I. Embedded Dovetail Anchor Slots and Anchors: Refer to Section 03250, Concrete Accessories.
- J. Embedded Plates, Sleeves and Anchor Bolts: Miscellaneous embedded items furnished by other Sections. Refer to the appropriate Section(s) in these Specifications.

## PART 3 – EXECUTION

### 3.01 Preparation

- A. Site preparation and compaction of existing and/or imported fill materials shall be in accordance with the requirements of the Soils Investigation Report and Section 02225. If the foundation structure design shown on the Drawings and/or specified will not strictly conform to this requirement, advise Owner/Architect/Engineer before proceeding with work of this Section.
- B. Expansion, Construction and Other Joints: Properly layout work and make necessary preparations for construction of specified joints in cast-in-place concrete work.
  - 1. Take special care to provide joints to allow for removal of sections of concrete foundations, walls or flatwork for future construction where shown on the Drawings.
- C. Ensure that connector plates, sleeves, dovetail anchor slots and other concrete accessories embedded in concrete are properly located, aligned and secured prior to placing concrete.

### 3.02 Fabrication

- A. Construct forms complying with ACI 347 to the exact sizes, shapes, lines and dimensions as shown on the Drawings and as required to obtain accurate alignment, location, grades, level and plumb work in finished structures. Use selected material to obtain the required finishes. Concrete tolerances shall be as specified in Section 03300.
- B. Construct formwork to be readily removable without impact, shock or damage to cast in-place concrete surfaces and adjacent materials.
- C. Provide formwork sufficiently tight to prevent leakage of cement paste during concrete placement. Solidly butt all joints and provide backup materials at joints as may be required to prevent leakage. Ensure that formwork is properly braced and tied.

- D. Provide openings in forms as required to accommodate other work. Accurately place and securely support all items required to be built into the forms. Size and locations of openings, recesses, chases and other built-in items shall be obtained from the Contractor or the trades involved.

### **3.03 Preparation of Form Surfaces**

- A. Prior to each use, coat contact surfaces of forms with release agent prior to placement of reinforcement, in accordance with the manufacturer's recommendations. Do not allow excess coating material to accumulate in forms or to come into contact with concrete surfaces against which fresh concrete will be placed.
- B. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings which are affected by agent. Refer to Section 03300 for required concrete finishes.
- C. Ensure that all debris and frost has been removed from forms before placing concrete.
- D. Clean, repair and recoat surfaces of forms that are to be reused. Split, frayed, delaminated or otherwise damaged form facing materials will not be acceptable.
- E. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and tighten forms to close all joints. Align and secure all joints to avoid offsets.

### **3.04 Erection of Round, Tubular Fiber Forms**

- A. General: Erect, brace and maintain prefabricated fiber forms in accordance with the manufacturer's written instructions and recommendations.
- B. Provide fiber forms in continuous, one-piece lengths for all project applications.
- C. Ensure that cages of reinforcing steel have been properly fabricated and tied, inspected and approved before installing fiber forms.
- D. Drop fiber forms over reinforcing steel cage either manually, with block and tackle, or by crane, depending upon sizes and lengths.
- E. Take all necessary precautions to prevent damaging the interior surfaces of the forms.
- F. Brace fiber forms as recommended by the manufacturer and as required by job conditions before, during and after concrete placement.

### **3.05 Removal of Formwork**

- A. Formwork not supporting weight of concrete such as sides of grade beams, walls and similar parts of work may be removed 48 hours after placing concrete, providing concrete is sufficiently hard to not be damaged by removal operations and providing that curing and protection operations are maintained. Refer to specific requirements for hot- and cold- weather concreting in Section 03300.
- B. Formwork for beam soffits, slabs and other parts that support the weight of concrete shall remain in place at least 14 days and until concrete has reached its specified 28-day strength.
- C. Whenever formwork is removed during the curing period, cure exposed concrete as specified in Section 03300.
- D. Prefabricated Fiber Forms: Remove forms as soon as possible after concrete has set. This is to generally occur between 24 and 48 hours, but not exceeding 5 days, in strict accordance with the manufacturer's written instructions and recommendations. Take all necessary precautions not to mar concrete surfaces.
- E. Prefabricated Fiber Forms: Forms for unexposed, below-grade piers need not be removed. Trim excess form material flush with top of pier, or finish grade for exterior locations.
- F. Contractor shall verify required tolerances specified in Section 03300 immediately after removal of forms.

- G. Carefully remove fins or other minor surface defects from concrete to remain exposed in the final construction, and leave surfaces prepared for sealers, paint, skim coats or other finishes. Repair minor imperfections as specified in Section 03300.

**END OF SECTION**

## **DIVISION 3**

### **SECTION 03200 – CONCRETE REINFORCING**

#### **PART 1 – GENERAL**

##### **1.01 Work Included**

- A. Furnish, bend and install all reinforcing bars, welded wire fabric, ties and supports.
- B. Furnish and install fiber reinforcing materials.
- C. Related work specified elsewhere:
  - 1. Section 03300, Cast-in-Place Concrete.

##### **1.02 Quality Assurance**

- A. Fabricate and place reinforcing steel in accordance with the latest edition of ACI 315, "Manual of Standard Practice for Detailing Reinforced Concrete Structures", and as detailed on the Drawings.
- B. Contractor Quality Assurance Program: Refer to Section 03300 for requirements.
- C. Reference Standards: Comply with requirements of the following codes and standards, except as otherwise shown or specified:
  - 1. ACI 318, "ACI Standard Building Code Requirements for Reinforced Concrete".
  - 2. ACI 315, "Manual of Standard Practice for Detailing Reinforced Concrete Structures".
  - 3. ACI 301-72, "Specifications for Structural Concrete for Buildings".
  - 4. CRSI "Manual of Standard Practice".
  - 5. CRSI "Recommended Practice for Placing Reinforcing Bars".
  - 6. CRSI "Recommended Practice for Placing Bar Supports".
  - 7. AWS D12.1, "Recommended Practices for Welding Reinforcing Steel, Metal Inserts and Connections in Reinforced Concrete Construction".
- D. Contractor shall obtain specific approval from the Architect/Engineer for the following items:
  - 1. Relocation of bars to an extent that causes placement tolerances to be violated.
  - 2. Bar chairs and spacers.
  - 3. Splices not shown on the Drawings and mechanical connectors.
  - 4. Bending of reinforcement embedded in hardened concrete.

##### **1.03 Product Delivery, Storage and Handling**

- A. Deliver reinforcement to site in strongly tied bundles with metal tags corresponding to bar schedules and diagrams. Store on the site free of rust, scale, oil or other coating. Store bars off the ground and protect from moisture, dirt, oil or deleterious coatings.
- B. If concreting is delayed for any considerable period of time after reinforcement is in place, it shall be protected by suitable covering.
- C. Protect exposed reinforcement intended for bonding with future extensions by suitable covering, if applicable.

## PART 2 – PRODUCTS

### 2.01 Reinforcing Materials

- A. Bars: ASTM A615-82, 60 KSI grade, deformed billet steel bars, plain finish, as indicated on the Drawings. Bars shall be free of scale or other bond-reducing coatings.
- B. Ties, stirrups and field bent bars, #3 or smaller, may be ASTM A615, 40 KSI grade. Welded Wire Fabric: ASTM A185 or A497, plain type in flat sheets, plain finish, welded intersections, in sizes as indicated on the Drawings. Use of coiled rolls shall not be permitted.
- C. Steel Wire: Provide plain cold-drawn wire conforming to ASTM A82.
- D. Fiber Reinforcing: Collated, fibrillated polypropylene fiber, Fiber Mesh I, Fiber Mesh, Inc., Chattanooga, TN, or equal.

### 2.02 Accessory Materials

- A. Accessories shall be of suitable type conforming to ACI 315 and shall include spacers, chairs, tie bars, support bars and all other devices for properly assembling, placing and supporting reinforcement, weight of concrete and workmen without displacement of reinforcement. Wood, brick, block, concrete chips and other non-metallic devices are not acceptable.
- B. For exposed-to-view concrete surfaces where legs of supports are in contact with forms, provide supports with legs which are hot-dipped galvanized, plastic protected or stainless steel protected.
- C. Wire Ties: Wire for tying shall be annealed, cold-drawn wire of at least 16-gage.

### 2.03 Fabrication

- A. Shop fabricate reinforcing bars to conform to the required shapes and dimensions with fabrication tolerance complying with ACI 315. Cold bend bars in a manner which will not injure material.
- B. Straightening or rebending at site will not be permitted for bars over 40 KSI yield strength.
- C. Where reinforcing bars are shown welded to structural steel, bars are to be furnished by rebar supplier and welded in place by structural steel erector.

## PART 3 – EXECUTION

### 3.01 Preparation

- A. Site preparation and compaction of existing and/or imported fill materials shall be in accordance with the requirements of Section 02225. If the foundation structure design shown on the Drawings and/or specified will not strictly conform to this requirement, advise Architect/Engineer before proceeding with work of this Section.

### 3.02 Splices

- A. Splices not shown on the Drawings must be approved by the Architect/Engineer.
- B. Lapped splices shall be securely wired together. Minimum laps shall be in accordance with requirements of ACI 318 and ACI 301-72 and as shown on the Drawings. Offset vertical lap splices at least one bar diameter.
- C. Lapped splices for welded wire fabric shall be made so that overlap of outermost wires is not less than one full mesh. Lace splices together with 16-gage wire.

### **3.03 Placing Reinforcing Steel**

- D. Prior to placing into position, thoroughly clean reinforcement of mill and excessive rust, scale, dust, mud, oil, ice and all other deleterious coating which may destroy or reduce bond.
- E. All reinforcing shall be placed in accordance with the Drawings and the "Manual of Standard Practice for Detailing Reinforced Concrete Structures", ACI 315, ACI 301 and ACI 318.
- F. Accurately place and support reinforcing steel with chairs, bar supports, spacers or hangers as recommended by ACI detailing manual except in slab-on-grade work. Support bars in slabs-on-grade and footings with approved accessories.
- G. Place reinforcing bars to a tolerance of  $\pm 1/4"$ , except that minimum spacings between bars shall be to a tolerance of  $\pm 1/4"$ . Bars may be moved as necessary to avoid interference with other reinforcing steel, conduit or embedded items. The Architect/Engineer's approval must be obtained prior to moving bars under these circumstances.
- H. Securely anchor and tie reinforcing bars and dowels prior to placing concrete.
- I. Place reinforcement to obtain at least the minimum coverage for concrete protection shown on the Drawings and specified. Do not place reinforcement with additional concrete cover unless expressly approved by the Structural Engineer.
- J. Steel reinforcing bars shall run continuous through cold joints.

### **3.04 Placing Welded Wire Fabric**

- A. Welded wire fabric shall be placed 2" below slab surface or as indicated on the Drawings and shall not be permitted to be placed on subgrade prior to concrete placement and hooked into position. Reinforcement shall be fully supported at required elevation prior to concrete placement. Use continuous chairs or support bars in structural slabs to maintain proper locations as shown on the Drawings.
- B. Install welded wire fabric using full sheets as large as possible. Lap adjoining pieces as specified herein. Offset end laps in adjacent widths to prevent continuous laps in either direction.

### **3.05 Placing Fiber Reinforcing**

- C. Place fiber reinforcing in accordance with manufacturer's written instructions and recommendations.
  - 1. 1-1/2 lbs. per cu. yd., unless otherwise recommended by manufacturer.

## **PART 4 – SCHEDULES**

### **4.01 Schedule of Reinforcing Materials**

- A. Reinforcing materials shall be placed in quantities, sizes and spacing as shown on the Drawings and/or as scheduled herein:
  - 1. Reinforcing bars and welded wire fabric shall be installed where shown or scheduled on the Drawings.
- B. Fiber reinforcing shall be placed in all poured-in-place concrete flatwork, including exterior concrete drives, apron pavements and curb and gutter sections, sidewalks, etc., regardless of whether these already are reinforced with steel or wire materials.
- C. Fiber reinforcing is not required in footings, foundation walls, grade beams and piers.

## **END OF SECTION**

## **DIVISION 3**

### **SECTION 03300 – CAST-IN-PLACE CONCRETE**

#### **PART 1 – GENERAL**

##### **1.01 Scope**

- A. Furnish all labor, materials, supplies and equipment and perform all operations including mixing, forming, reinforcing, placement, consolidation, curing, stripping, and finishing. Items of work include but are not limited to: drainage appurtenances, wall foundations and any other cast-in-place structural concrete.

##### **1.02 Work Not Included**

- A. Walks, curb and gutter, interior slabs, and other site paving.

##### **1.03 Related Work**

- A. Section 02200 – Earthwork and Grading.
- B. Section 02221 – Trenching, Backfilling and Compaction.
- C. Section 02750 – Portland Cement Concrete Paving.
- D. Section 02810 – Irrigation Installation.
- E. Section 02870 – Site Furnishings/Miscellaneous Facilities.
- F. Section 07900 – Joint Sealers

##### **1.04 Quality Assurance**

- A. Contractor Experience
  - 1. The work shall be done in a thorough, workmanship manner by contractors experienced in concrete construction.
  - 2. Contractor references for five similar, successfully executed projects will be required.
  - 3. The Contractor(s) guarantee their respective work against defective materials or faulty workmanship for a period of one year.
- B. City Standards: The requirements for curb, gutter, and sidewalk in the City of Fort Collins Design Criteria and Standards for Street (which for the remainder of this section shall be referred to a “City Standards”) will apply, except where specifically modified herein.
- C. Quality Control: Concrete Testing Service; Owner will engage a testing laboratory to perform materials evaluation, testing and design of concrete mixes. If test results meet the applicable specification, all testing costs will be borne by the Owner. Should any test(s) fail to meet the specifications, the cost of the failed test and all subsequent testing until the item meets specifications shall be borne by the Contractor.

The following sampling and testing shall occur during concrete placement, as follows:

- 1. Sampling: ASTM C172, “Specific Gravity and Absorption of Concrete Aggregate.” ASTM C31, “Making and Curing Concrete Test Specimens in the Field.”
- 2. Slump: ASTM C143, “Slump of Portland Cement Concrete,” one test for each set of compressive test specimens taken at point of discharge.
- 3. Air Content: ASTM C231, “Air Content of Freshly Mixed Concrete by the Pressure Method,” one for each set of compressive strength specimens.

4. Compressive Strength: ASTM C39, "Compressive Strength of Cylindrical Concrete Specimens."
  5. Report test results in writing to the Owner's Representative, Structural City Representative, Architect, Contractor, and Concrete Producer on same day tests are made.
- D. Mix Proportions and Design: City Standards shall be a minimum, unless more restrictive standards are listed.
- E. References:
1. ACI 301 – 89 - Structural Concrete for Buildings.
  2. ACI 318 – 89 – Building Code Requirements for Reinforced Concrete.

### **1.05 Submittals**

- A. Test Results: Perform and submit test reports for the following products in accordance with above general reference standards and specific requirements of these specifications.
- B. Proposed Mix Design:
1. The proportions of ingredients shall be selected to produce the proper placeability (slump), durability (air content), strength and other required properties of the section.
  2. Prior to commencing concrete work, submit and obtain Owner's approval of certified test reports describing proposed concrete mix design.
- C. Cylinder Compression Test Reports: Submit two copies of certified test reports to Owner.
- D. Shop Drawings for Reinforcement Bars:
1. Before fabrication of reinforcing steel, the Contractor shall review and approve shop drawings, bar lists, fabrication and setting drawings and shall submit same to Owner for review. Include 1/8-inch scale plan of all floors and walls with reinforcing indicated.
  2. Show sizes, quantity and dimensions for fabrication and placing of reinforcing bars and bar supports.

### **1.06 Test Panels**

Not applicable

### **1.07 Job Conditions**

- A. For hot or cold weather concreting refer to City Standards.

### **1.08 Guarantee/Replacement**

- A. The Contractor shall guarantee all concrete work for a period of **two (2) years** after acceptance against defective workmanship and materials. The determination of the necessity during such guarantee period for the Contractor to repair said curb, gutters, walks, driveways or crosspans, or any portion thereof, shall rest entirely with the Owner whose decision upon the matter shall be final and binding upon the Contractor.

## **PART 2 – MATERIALS**

### **2.01 Concrete**

- A. Cement: ASTM C150, Type II or Type I/II Portland Cement.
- B. Aggregates: ASTM C33, Specifications for Concrete Aggregates, maximum size not to exceed  $\frac{3}{4}$  inches.

- C. Water: Clean and not detrimental to concrete.
- D. Air-Entraining Admixture: ASTM C494, Type A.
- E. Water-Reducing Admixture: Refer to City Standards.
- F. Calcium Chloride: Use is prohibited.
- G. Related Materials:
  - 1. Construction Joints: Preformed metal keyway with removable plastic cap strip to be filled with joint sealer. John Screedkey or equal.
  - 2. Expansion Joint Fillers: ASTM D1752, ½ inch thick, nonextruding, preformed flexible closed-cell foam filler. Compression at 50%, 13.3 psi; extrusion 0.1 inch; recovery 99.21%; water absorption percent by volume 0.246%. Test method D545. Submit sample.
  - 3. Joint Sealing: See Section 07900.
  - 4. Curing Materials: Refer to City Standards.
- H. Form Materials: Refer to City Standards.
- I. Form Release Agent: Nonstaining agent that will not impair color or bonding characteristics of concrete.
- J. Chamfer Strips: ¾ inch, 45 ° job cutwood, or ¾ inch 45 ° PVC for unexposed surfaces. Use PVC for exposed surfaces.
- K. Reinforcing Materials:
  - 1. Reinforcing Steel: Deformed billet-steel, uncoated finish.
  - 2. Deformed Reinforcing Bars: ASTM A615, Grade 60 unless otherwise indicated. Use Grade 40 for ties and for dowels to be field bent.
  - 3. Dowels: ASTM A615, 40 ksi yield grade plain steel, uncoated finish.
  - 4. Tie Wire: No. 24 or No. 16 gauge, black, soft iron wire.
- L. Dovetail Anchors: Open triangular stainless steel type, 3/16 inch in diameter and 3 ½ inches long. Dur-O-Wall D/A 720 or equivalent, to consist of an anchor and a dovetail slot. The dovetail slot shall be cast into the concrete prior to installation of stone masonry.

## 2.02 Concrete Production

### A. Proportioning:

1. Design and proportion concrete to meet the following minimum compressive strengths and other criteria:

Location	Design Strength 28-Day	Required 7-Day Strength	Slump $\pm 1''$	Minimum Cement Factor	Maximum Water-Cement Ratio by Weight	Air Entrainment
Structural Footings, Grade Beams, Foundations, Walls and all Other Concrete	4,000	2,800	4	564	0.45	6% $\pm 1\%$

2. Other (e.g., drainage structures, manholes): Refer to individual specification sections.
3. For additional requirements, refer to City Standards.

## PART 3 – EXECUTION

### 3.01 Preparation

- A. Ensure that subgrade elevation is correct as shown on the drawings, that the subgrade has been compacted to the specified density, and that the required density and moisture tests have been performed within 48 hours of starting concrete work.
- B. Where rough grading operations have over excavated, place, shape and compact bed course to the specified density.
- C. Allow a minimum of two hours for Owner's Representative's checkout before first concrete is placed.
- D. For further subgrade preparation requirements refer to City Standards.
- E. Cover masonry walls, glazing and other finish materials with polyethylene or other to protect from damage.

### 3.02 Forming

#### A. Formwork

1. Erect forms substantial and sufficiently tight to prevent leakage of mortar and boarded or tied to maintain the desired position, shape and alignment before, during and after concrete placement. The use of earth as a form will not be allowed.
2. Forms shall conform to shape, lines and dimensions indicated on the drawings.
3. Forms shall be reviewed by Owner's Representative prior to concrete placement. Notify Owner three days prior to pouring.
4. Anchors, Inserts, Blockouts and Built-In-Items: Securely fasten built-in items to formwork, or hold in place with templates. Insertion into concrete after placement will not be permitted.
5. For additional formwork requirements, refer to City Standards.

B. Joints

1. Expansion Joints: Place where shown on the details and drawings.
2. Construction Joints: Place construction joints at all cold joints and as shown on the details and drawings. Submit to Architect for approval the locations of joints desired. Locate joints in walls and footings at least 8 feet from any corner. Leave joints in reinforced structural members rough and provide longitudinal keys at least 1 ½ inches deep.

C. Embedded Items

1. Place all sleeves, inserts, anchors and embedded items required for adjoining work or for its support prior to concreting. Coordinate with other construction trades before placing concrete.
2. Position expansion joint material, waterstops, anchor bolts, masonry anchors, castings, steel shapes, conduits, sleeves, and/or other embedded items accurately and support against displacement. Fill voids in sleeves, inserts and anchor slots temporarily with readily removable material to prevent the entry of concrete into the voids.
3. Install conduits between reinforcing steel in walls or slabs with reinforcing in both faces and below reinforcing in slabs with only one layer of reinforcing steel.
4. Embedments shall be clean when installed. Remove concrete spatter from all surfaces not in contact with concrete.
5. Provide dovetail slots for masonry anchors at a minimum of 18 inches on centers. Coordinate with project mason.

**3.03 Reinforcement**

- A. Comply with the specified codes and standards, CRSI “Manual of Standard Practice,” ACI 301 and CSI-WCRSI “Placing Reinforcing Steel.”
- B. No bars shall be field-bent, except as indicated on the drawings or specifically permitted by the Owner.
- C. Position, support and secure reinforcement against displacement. Locate and support with metal chairs, runners, bolsters, spacers and hangers as required. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces. Do not use pebbles, pieces of broken stone, common or face brick, metal pipe, or wood blocks to support reinforcement.
- D. Provide standard reinforcement splices by lapping ends, placing bars in contact and tightly tying wire. Comply with requirements of ACI 318 for minimum lap of spliced bars.
- E. Assure that excavation, formwork and reinforcement are completed and that dirt, mud, encrusted concrete, debris and ice, frost and excess water are removed.
- F. Check that reinforcement is secured in place as shown on the drawings.
- G. Verify that embedded items are secured in position.
- H. Verify that all required tests for pipes under slabs have been completed. Assure that all hardened concrete and foreign material is removed from the inner surface of conveying equipment.

**3.04 Placement of Concrete**

A. Conveying

1. Convey concrete from mixer to final position as rapidly as practicable without segregation or loss of material.
2. Use only metal or metal-lined chutes with maximum length of 20 feet, having a maximum slope of one vertical to two horizontal and a minimum slope of one vertical to three horizontal.

3. Provide a hopper at the end of long-belt conveyors and chutes not meeting the requirements in Paragraph 2 above.
4. Conveying by pumping methods shall conform to ACI 304, Chapter 9.
  - a. Maximum loss of slump, 2 inches.
  - b. Do not pump concrete having a slump of less than two inches.

B. Depositing

1. Place concrete in compliance with the practices and recommendations of ACI 304, "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete," and as herein specified.
2. Notify Owner not less than 8 working hours in advance of any pour and as soon as formwork and reinforcing are substantially complete. Notify Owner's testing service not less than 8 working hours in advance of any pour to schedule necessary testing.
3. No water shall be added to concrete at job site.
4. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section.
5. Maximum height of concrete free fall shall be 4 feet.
6. Perform concrete placing at such a rate that concrete which is being integrated with fresh concrete is still plastic. Deposit concrete as nearly as practicable to its final location to avoid segregation due to rehandling or flowing.
7. Do not subject concrete to any procedure that will cause segregation.
8. Protect concrete from physical damage or reduced strength due to weather extremes during mixing, placement and curing.
9. Allow concrete to thoroughly settle before top is finished. Remove all laitance, debris and surplus water from surfaces at tops of forms by screeding, scraping or other effective means.
10. Overfill forms wherever top of a wall will be exposed to weathering and after concrete has settled, screed off excess.
11. In cold weather comply with City of Fort Collins Specifications.
12. In hot weather comply with City of Fort Collins Specifications.

C. Consolidation

1. During and immediately after placement, thoroughly compact and work around all reinforcements, embedments and into corners of forms, eliminating all air or stone pockets which may cause honeycombing, pitting or planes of weakness, in accordance with the recommended practices of ACI 309 "Recommended Practice for Consolidation of Concrete."
2. Where vibration is necessary to achieve proper consolidation:
  - a. Use mechanical vibrators that will maintain at least 9,000 cycles per minute when immersed in concrete.
  - b. Minimum horsepower per vibrator shall be 1 ½.
  - c. Number and type of vibrators shall be acceptable to Owner.
  - d. Overvibrating and the use of vibrators to transport concrete laterally in forms will not be allowed.
  - e. Vertically insert vibrators at points approximately 18 inches apart and to a depth to penetrate 6 inches into the preceding layer.

- f. Vibrate each location for a length of time to obtain adequate consolidation (generally 5 to 15 seconds).

### **3.05 Concrete Finishes**

- A. Where work will be hidden from view, use rough form finish.
  1. Patch tie holes and defects.
  2. Remove fins greater than ¼ inch in height.
- B. Unless otherwise indicated, use formed surfaces or smooth form finishes where surfaces will be visible.
  1. Patch tie holes and defects.
  2. Completely remove fins.

### **3.06 Form Removal**

- A. Do not remove or disturb forms until the concrete has attained sufficient strength to safely support all dead and live loads. Use care in form removal to avoid surface gouging, corner or edge breakage and other damage to the concrete. Forms shall not be removed earlier than the following schedule:
  1. Walls and columns not yet supporting loads: 24 hours.

### **3.07 Curing**

- A. For curing requirements, refer to City Standards.

### **3.08 Repair of Defective Concrete**

- A. Repair to satisfaction of Owner, within 24 hours after removal of forms, all defects, including tie holes, in concrete surfaces.
- B. Replace to satisfaction of Owner, within 48 hours after adjacent forms have been removed, all honeycombed or otherwise defective concrete.
- C. Cut out and remove to sound concrete, with edges square cut to avoid feathering, all honeycombed or otherwise defective concrete.
- D. Replace flatwork that does not match appearance standards of Contractor's reference projects or sample panels
- E. Fill all holes with a non-shrink grout such as Master Builders Masterflo 713 or approved equal.

### **3.09 Quality Control**

- A. Concrete Tests: Coordinate and schedule testing with Owner's Representative
- B. Acceptance of Concrete
  1. If the average of three consecutive 7-day tests falls below the specified 7-day strength, the Owner shall have the right to require conditions of temperature and moisture necessary to secure the required strength and may require core tests in accordance with ASTM C-42.
  2. Strength level of concrete will be considered satisfactory so long as average of all sets of three consecutive strength test results equals or exceeds specified 28-day strength and no individual strength test result falls below specified strength by more than 500 psi.
- C. Failure of Test Cylinder Results

1. Upon failure of the 28-day test cylinder results, the Owner may require the Contractor, at his expense, to obtain and test at least three 2-inch diameter cored samples from area in question.
2. Concrete will be considered adequate if average of three core tests is at least 85 percent of, and if no single core is less than 75 percent of the specified 28-day strength.
3. Upon failure of core test results, the Owner may require the Contractor, at his expense, to perform load tests as specified in ACI 318, Chapter 2.
4. In the event an area is found to be structurally unsound, the Owner may order removal and replacement of concrete as required. The cost of the core tests, the load test and the structural evaluation shall be borne by the Contractor.
5. Fill all core holes with a non-shrink grout such as Master Builders Masterflo 713 or approved equal.

**END OF SECTION**

## **DIVISION 7**

### **SECTION 07900 - JOINT SEALERS**

#### **PART 1: GENERAL**

##### **1.01 Work Included**

- A. Furnish and Install: Provide all caulking and sealant indicated on the Drawings, specified herein, and not specified under other sections. In general, seal all openings indicated on the Drawings and at other locations requiring caulking to seal visually and against infiltration from air and water, including but not limited to the following:
  - 1. Expansion joints in concrete walks
  - 2. Exterior wall joints
  - 3. Masonry control joints
  - 4. Isolation joints, between structure and other elements
  - 5. Joints at penetrations of walls, decks, and floors by piping and other service equipment
  - 6. Joints between items of equipment and other construction
  - 7. Joints between door and window frames and adjacent materials, exterior and interior
  - 8. Bedding for door thresholds
  - 9. Open joints between dissimilar materials as required to close and conceal jointing of the work
  - 10. Construction and expansion of joints, joints between dissimilar materials; joints around windows, door frames, louvers, and other penetrations and openings
  - 11. Other joints as indicated

##### **1.02 Submittals for Review**

- A. Color Samples: Submit color chart for each type of sealant in accordance with Division 1.
- B. Product Data: Submit for each material intended for use and location of application in accordance with Division 1.

##### **1.03 Delivery, Storage and Handling**

- A. General: Comply with Section 01600. Deliver in original unopened containers and store in an area not subject to extreme heat or cold.

##### **1.04 Project Conditions**

- A. Environmental Conditions: Do not apply exterior sealants during wet weather or when the outside temperature is below 40°F. Do not apply interior sealants when the inside temperature is below 60°F.

##### **1.05 Warranty**

- A. Provide a written three year warranty in writing covering materials and workmanship in accordance with Section 01700. Warranty shall require installer, at no cost to Owner, to repair or replace sealants which fail to perform as air-tight and water-tight joints; or fail in joint adhesion, cohesion, abrasion resistance, weather resistance, extrusion resistance, migration resistance, stain resistance, or general durability; or appear to deteriorate in any other manner not clearly specified as an inherent quality of the material by submitted manufacturer's data.

## PART 2: PRODUCTS

### 2.01 Joint Backing Material

- A. General: Size joint backing material for minimum 30% compression when inserted in that joint. Material shall be round or semi-circular type.
- B. Acceptable Manufacturers:
  - 1. Dow Chemical Company, Ethafoam
  - 2. Sonneborn, Sonofoam
  - 3. Schlegel Manufacturing Company, Schlegelfoam
  - 4. Denver Foam
  - 5. Accepted Substitute

### 2.02 Sealant Material

- C. Acceptable Manufactures:
  - 1. DAP Incorporated
  - 2. Parr, Inc.
  - 3. Pecora Corporation
  - 4. Products Research and Chemical Corporation
  - 5. Sonneborn Building Products
  - 6. Tremco Manufacturing Company
  - 7. Mameco International
  - 8. W.R. Grace and Company
  - 9. Accepted Substitute
- D. Silicone Sealant Manufacturer:
  - 1. General Electric
  - 2. Dow Corning
  - 3. Accepted substitute in accordance with Section 01600
- E. Acceptable Materials:
  - 1. Interior and Under Thresholds: Latex acrylic, ASTM C834-761.
  - 2. Other Caulking: Two component polyurethane, FS IT-S-00227E, Type II, Class A, non-sag
  - 3. Primer: As recommended by the sealant manufacturer.
  - 4. Sealant at Concrete Paving: Two-component self-leveling polyurethane, FS IT-S-00227E, Type I, Class, pourable type.
  - 5. Sealant at Lavatories: Silicone sealant.
  - 6. Colors: As selected by Architect from standard colors.

### 2.03 Bond Breaker Tape

- A. Tape: Polyethylene tape or other plastic tape as recommended by the sealant manufacturer to be applied to sealant-contact surfaces where bond to the substrate or joint filler must be avoided for proper performance of sealant. Provide self-adhesive tape wherever possible. Site Benches

## PART 3: EXECUTION

### 3.01 Inspection

- A. Inspection: Inspect work of others prior to application of any work under this section. If any joint or space to receive this work is not according to detail and cannot be put into proper condition to receive the work by specified methods; notify the General Contractor in writing or assume responsibility for and rectify any unsatisfactory caulking and sealing resulting.

- B. Acceptance: Beginning of installation means acceptance of existing conditions.

### 3.02 Preparation

#### A. Preparation of Surfaces

1. Clean surfaces in accordance with manufacturer's recommendations.
2. Mask edges, if required to protect adjoining surfaces and produce a straight finish line.
3. Clean joint surfaces immediately before installation of sealant. Remove dirt, insecure coatings, moisture and other substances which would interfere with bond of sealant.
4. Do not proceed with installation of sealant over joint surfaces which have been painted, lacquered, waterproofed or treated with water repellent or other treatment of coating. Remove coating or treatment joint surfaces before installing sealant.
5. Each concrete masonry joint surfaces to remove excess alkalinity unless sealant manufacturer's printed instruction indicates that alkalinity does not interfere with sealant bond and performance. Etch with 5% solution of muriatic acid, neutralize with diluted ammonia solution, rinse thoroughly with water and allow to dry before sealant installation.

- B. Priming: If required, prime surfaces which are to be caulked with manufacturer's recommended or standard primer, after the surfaces have been prepared as specified. Before use, check primers for discoloration and dirt pick-up on adjacent surfaces. If staining occurs, after exposure, take adequate measures to prevent the primer from being applied over the face of adjacent porous materials by masking or other suitable measures.

#### C. Joint Backing:

1. Joints shall be of depth necessary to provide for the specified allowable thickness of sealant and also the required backing where and as specified. Provide backing of extent and type as specified and required to provide for the allowable depth of the sealant.
2. Back-up Materials for Sealants: Non-staining, compatible with the sealant and primer, shall be of a resilient nature and as recommended by the manufacturer of the sealant. Size and shape of the backing shall be as required by the width of the joint and specified. Do not use materials impregnated with oil, solvents, or bituminous materials.
3. Compress backing material a minimum of 30% when inserted in the joint. Backing material for the upper portion of joint shall be a round rod or semi-circular in cross-section with the arc in contact with the sealant.

- D. Bond Breaker Tape: Install where indicated and as required by manufacturer's recommendations to ensure that sealants will perform properly.

### 3.03 Application

- A. Exterior Metal Sills: Set in full bed of polyurethane sealant.

- B. Thresholds: Set in full bed of latex acrylic sealant.

#### C. Caulk Joints:

1. Apply sealants in continuous beads without open joints, voids, or air pockets, using a ratchet hand gun or mechanical powered gun.
2. Confine sealants to joint areas with masking tapes or other precautions. Apply compounds in concealed compression joints accurately so that excess compound will not extrude from joints.

3. Remove excess compound or sealant promptly as work progresses, and clean adjoining surfaces.
  4. In rough surfaces or joints of uneven widths, install sealant, well back into joint. Recess equal to width of joint, or 3/8" minimum at masonry.
  5. Use anti-tack agent where necessary to protect freshly applied sealant from public traffic and dirt.
  6. Slightly recessed joints as to facilitate a painter's line. Handtool and finish joints throughout construction.
  7. Comply with manufacturer's printed instructions and specifications.
- D. Concrete Paving Expansion Joints: Cut expansion joint filler down to allow joint depth equal to 75% of joint width, but neither more than 0.625" deep nor less than 0.375" deep. Seal over expansion joint filler with poured sealant.
- E. Workmanship: Employ only proven installation techniques, which will ensure that sealants will be deposited in uniform, continuous ribbons without gaps or air pockets, with complete "wetting" of the joint bond surfaces equally on opposite sides. Except as otherwise indicated, fill sealant rabbet to a slightly concave surface, slightly below adjoining surfaces. Where horizontal joints are between a horizontal surface and a vertical surface, fill joint to form a slight cove, so that joint will not trap moisture and dirt.
- F. Joint Sizes: Install sealants to depths as indicated or, as recommended by the sealant manufacturer but within the following general limitations:
1. For normal moving joints sealed with elastomeric sealants but not subject to traffic, fill joints to a depth equal to 50% of joint width, but not more than 1/2" deep or less than 1/4" deep.
  2. For joints sealed with non-elastomeric sealants and caulking compounds, fill joints to a depth in the range of 75% to 125% of joint width.
- G. Spillage:
1. Do not allow sealants or compounds to overflow or spill onto adjoining surfaces, or to migrate into the voids of adjoining surfaces. Use masking tape or other precautionary devices to prevent staining of adjoining surfaces, by either the primer/sealer or the sealant.
  2. Remove excess and spillage of compounds promptly as the work progresses. Clean the adjoining surfaces by whatever means may be necessary to eliminate evidence of spillage. Do not damage the adjoining surfaces or finishes.

### **3.04 FIELD QUALITY CONTROL**

- A. Samples: Where directed by the Architect, cut out and remove a total of three samples consisting of the undisturbed sealant and back-up material from the joint. Samples shall be 6" in length. Reseal cut out areas with the same materials.

### **3.05 CURING, PROTECTION AND CLEANING**

- A. Curing: Cure sealants and caulking compounds in compliance with manufacturer's instructions and recommendations, to obtain high early bond strength, internal cohesive strength and surface durability.
- B. Protection:

1. Advise the General Contractor of procedures required for the protection of sealants during the construction period, so that they will be without deterioration or damage (other than normal weathering) at the time of acceptance.

C. Cleaning:

1. Protect surfaces from damage. Clean soiled surfaces immediately. Replace with new material any damaged material which cannot be cleaned with new material.

**END OF SECTION**

## **DIVISION 9**

### **SECTION 09900 – PAINTING**

#### **PART 1 – GENERAL**

##### **1.01 Work Included**

- A. Prepare surfaces to receive opaque painted finishes as specified.
- B. Finish surfaces as indicated in the schedule at the end of this Section. Generally, the scope of work shall include painting all exposed surfaces, whether specifically noted or not, and certain concealed surfaces, except where materials are prefinished or where intended to remain unfinished as described in paragraph 1.02 below.

Related work specified elsewhere:

- C. 1. N/A

##### **1.02 Work Not Included**

- A. Unless otherwise indicated, painting is not required on surfaces in concealed areas and inaccessible areas such as furred spaces, foundation spaces, utility tunnels, pipe spaces and duct shafts.
- B. Metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials will not require painting under this Section, except as may be so specified.
- C. Materials, fixtures and equipment specified or supplied by the manufacturer as prefinished shall not be painted, unless otherwise indicated in the Schedule at the end of this Section.
- D. Materials supplied with factory-applied primer coats shall be field finished by this Section, unless otherwise indicated. Do not paint moving parts of operating units, mechanical or electrical parts such as valve operators, linkages, sensing devices and motor shafts, unless otherwise indicated. Priming or finishing of certain surfaces may be specified to be factory-applied or installer performed under other Sections.
- E. Priming or finishing of certain surfaces may be specified to be factory-applied or installer-performed under other Sections.

##### **1.03 Quality Assurance**

- A. Finish work shall be performed only by qualified personnel employed by firms specializing in work of this type, with a minimum of five (5) years successful experience in projects of similar size and complexity.
- B. Materials shall be applied with appropriate equipment and tools as specified herein, or as required to provide the specified quality.
- C. Coordination of Paint Finishes, Primers and Substrates:
  - 1. Provide finish coats which are compatible with the prime coats actually used.
  - 2. Review other Sections of these Specifications as required, verifying the prime coats to be used and assuring compatibility of the total coating system for the various substrates.
  - 3. Upon request, furnish information on the characteristics of the specific finish materials to assure that compatible prime coats are used.
  - 4. Provide barrier coats over non-compatible primers or remove the primer and reprime as required.

5. Notify the Architect in writing of anticipated problems in using the specified coating systems over prime coatings or substrates supplied under other Sections.
- D. Certification: Supplier shall certify that all paint materials supplied contain no lead or other toxic substances.

#### **1.04 Submittals**

- A. Product Data: Submit manufacturer's product literature and specifications to show compliance with the specified requirements.
- B. Materials List: Submit materials list of all items proposed to be provided under this Section.

#### **1.05 Delivery, Storage and handling**

- A. Deliver paint materials in original, sealed and labeled containers bearing manufacturer's name, type of paint, brand name, color, designation and instructions for mixing and/or reducing.
- B. Provide adequate storage facilities to store materials at minimum ambient temperature of 45° F in a well-ventilated area.
- C. Take precautionary measures to prevent fire hazards and spontaneous combustion.

#### **1.06 Environmental Conditions**

- A. General: Follow manufacturer's written specifications and recommendations for product handling and application. Adhere to all applicable OSHA regulations related to product application and handling of removed paint, rinse water and other residual materials.
- B. Ensure that surface temperature or the surrounding air temperature is above 40° F before applying finishes. Minimum application temperatures for latex paints for interior work is 45° F; 50° F for exterior work.
- C. Provide adequate continuous ventilation and sufficient heating facilities to maintain temperatures above 45° F for 24 hours before, during and 48 hours after application of finishes.
- D. Provide minimum 15 foot-candles of lighting on surfaces to be finished.

#### **1.07 Protection**

- A. Adequately protect other surfaces from paint and damage. Repair damage as a result of inadequate or unsuitable protection.
- B. Furnish sufficient drop cloths, shields and protective equipment to prevent spray or droppings from soiling surfaces not being painted and, in particular, surfaces within storage and preparation area.
- C. Place cotton cloths and any material which may constitute a fire hazard in closed, metal containers and remove daily from the site.
- D. Remove electrical plates, surface hardware, fittings and fastenings prior to painting operations. These items are to be carefully stored, cleaned and replaced on completion of work in each area. Do not use solvents to clean hardware that may remove permanent lacquer finish.

#### **1.08 Maintenance Materials**

- A. Contractor shall furnish Owner additional maintenance stock of not less than one (1) gallon shall be adequate for all accent and trim colors.
- B. Containers are to be tightly sealed and clearly labeled for identification.

## PART 2 – PRODUCTS

### 2.01 Finish Materials

- A. Paints, Enamels and Fillers: Type and brand scheduled herein, ready-mixed, except field catalyzed coatings. Pigments fully ground maintaining a soft paste consistency, capable of readily and uniformly being dispersed to a complete homogeneous mixture. Paints shall have good flowing and brushing properties and be capable of drying or curing free of streaks or sags.
  - 1. Paint materials shall contain no lead or other toxic substances. Refer to paragraph 1.03.c.
- B. Paint Accessory Materials: Linseed oil, shellac, turpentine and other materials not specifically indicated herein but required to achieve the finishes specified, of high quality and approved manufacturer.
- C. Color(s) as selected by the Architect from manufacturer's full color selection, unless otherwise indicated. Painter shall prepare samples for the Architect's approval of each paint color selected. Remake samples until approved, at no additional cost to the Owner.
- D. Approved Manufacturers: Use the same brand throughout the project for each type of paint material specified:
  - 1. Sherwin-Williams ProMar 200, as basis of design.
  - 2. Paint: Pittsburgh, Diamond Vogel, ICI Dulux, Fuller O'Brien, Benjamin Moore, Kelly
  - 3. Moore, Kwal-Howell and Sophir Morris. Using product lines of same quality, function and performance are acceptable only as approved by the Architect prior to bidding.
  - 4. Powder coating: Refer to Section 09901.
  - 5. Strippers and Paint Removers: Refer to Section 09905.

### 2.02 APPLICATION EQUIPMENT

- A. For application of the specified paint, use only such equipment as is recommended for application of the particular paint by the manufacturer.
- B. Prior to use of application equipment, verify that the proposed equipment is actually compatible with the material to be applied and that integrity of the finish will not be jeopardized by use of this equipment.

### 2.03 COLOR SCHEDULES

- A. The Architect will prepare marked-up elevations or a color schedule with samples for guidance in painting. Contractor shall furnish samples of all other related finish materials for coordination in preparation of the color schedule.
- B. The Architect may select, allocate and vary colors on different surfaces throughout the work, subject to the following:
  - 1. A maximum of three (3) different colors will be used, plus variations for miscellaneous work.

## PART 3 – EXECUTION

### 3.01 Inspection

- C. Subcontractor shall thoroughly examine surfaces scheduled to be painted or finished prior to commencing work. Notify the Architect of any condition that may potentially affect proper application and final appearance. Do not commence work until such defects have been corrected to the satisfaction of the painting subcontractor. Beginning work shall be considered acceptance of surfaces.

### 3.02 Preparation of Surfaces

- A. General: All preparatory work shall be subject to evaluation and acceptance by the Architect. Painting subcontractor will accept responsibility for the preparation of all surfaces, as specified herein, prior to finishing.
- B. Ensure that the Contractor has corrected defects in all surfaces which may adversely affect work of this Section, including but not limited to:
  - 1. Metal doors and frames.
  - 2. Metal stair components.
  - 3. Gypsum wallboard surfaces and texturing.
  - 4. Plaster surfaces and finishing.
  - 5. Welding and other attachments.
  - 6. Steel plate connectors at exposed wood trusses.
- C. Remove surface contamination and oils from galvanized surfaces and wash with solvent. Apply a coat of etching-type primer.
- D. Remove grease, rust, scale, dirt and dust from steel, ferrous metal and iron surfaces. Where heavy coatings of scale are evident, remove by wire brushing, sandblasting or any other necessary method.
  - 1. Clean unprimed surfaces by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring that weld joints, bolts and nuts are similarly cleaned. Prime surfaces as required.
  - 2. Sand and scrape shop-primed surfaces to remove loose primer and rust. Feather out edges to make touch-up patches inconspicuous. Clean surfaces with solvent and prime surfaces as required.
  - 3. Back-prime structural steel and ferrous metal surfaces to be in contact with concrete, unless furnished by other Sections.
  - 4. Ensure that excess weld slag or flux deposits are removed, and that all exposed welds are ground or sanded to specified appearance.
- E. Remove all hardware from doors before painting. Masking of hardware is unacceptable.
- F. Schedule painting prior to installation of prefinished materials, specialties, furnishings and fixtures to the extent possible, including but not limited to:
  - 1. Finish hardware.
  - 2. Cabinetry and casework.
  - 3. Surface-mounted mechanical and electrical devices such as thermostats, prefinished grilles and diffusers, switch plates and outlet cover plates, etc.

### 3.03 Application

- A. General: Apply finish materials in accordance with the manufacturer's instructions and recommendations. Ensure that surfaces have been properly prepared and primed prior to application of finish coats.
- B. Apply each coat at the proper consistency. Allow each coat of finish to dry before the following coat is applied, unless directed otherwise by manufacturer. Sand lightly between coats to achieve the required finish.
- C. Brush Applications:

1. Brush out and work the brush coats onto the surface in an even film.
  2. Finish coats shall be finished by roping the paint, moving from wet to dry areas.
  3. Cloudiness, spotting, holidays, laps, brush marks, runs, sags and other surface imperfections will not be acceptable.
- D. Spray Applications:
1. Except as specifically otherwise approved by the Architect, confine spray application to metal framework and similar surfaces where hand brush work would be inferior.
  2. Gypsum wallboard walls, ceilings and soffits shall be finished by spray application, then back-rolled with roller equipment to result in specified mil thickness, moving from wet to dry areas.
  3. Where spray application is used, apply each coat to provide the hiding equivalent of brush coats.
  4. Do not double back with spray equipment to build up film thickness of two (2) coats in one (1) pass.
- E. For completed work, match the approved samples as to texture, color and coverage. Remove, refinish or repaint work not in compliance with the specified requirements.

### **3.04 Painting Mechanical and Electrical Equipment**

- A. General: Painting of exposed equipment, louvers, ductwork, piping, conduits, etc. shall be work of this Section, unless otherwise indicated.
1. Paint all ductwork, piping, conduit and devices to be exposed to view in the completed project, unless prefinished or in concealed areas as defined in paragraph 1.02.
  2. Coordinate extent of field finishing of mechanical and electrical equipment with the Architect as necessary.
  3. Architect retains the right to require prefinished diffusers, grilles and other mechanical or electrical devices to be field finished, whether or not specifically called for.
  4. Prime and paint insulated and bare pipes, conduits, boxes, insulated and bare ducts, hangers, brackets, collars and supports in exposed locations, except where items are plated or covered with a prefinished coating, or where located in mechanical chase spaces. Finish paint primed equipment to color selected.
- B. Color Coding: Refer to Mechanical and Electrical Sections for requirements concerning color coding, identification branding of equipment, ducting, piping and conduit, if required.
1. Color code equipment, piping, conduit and exposed ductwork in accordance with requirements indicated.
  2. Color banding and identification (flow arrows, naming, numbering, etc.).
- C. Remove grilles, covers and access panels for mechanical and electrical systems from location and paint separately.
- D. Paint face(s) and edges of plywood backboards for electrical equipment before installing backboards and mounting equipment on them.
1. Replace identification markings on mechanical or electrical equipment when painted over or spattered.
- E. Do not paint gas meters, electric meters and similar exterior equipment provided by outside utility providers, if not permitted by those agencies. Coordinate requirements with the appropriate Subcontractor prior to painting.

1. Exposed gas piping leading to the gas meters shall be painted.
2. Exterior surface-mounted meter centers, disconnects, CT cabinets and similar equipment shall be painted, where not specifically excluded above.
3. Interior panel board cabinet frames and doors shall not be painted, unless specified elsewhere.

### **3.05 Areas of Special Concern**

- A. The bus shelter light poles and lights, street sign and railings shall be powder coated with touch up by the painting subcontractor using materials provided by powder coating subcontractor.

### **3.06 Cleaning**

- A. Promptly remove paint from adjacent materials or surfaces as work proceeds where spilled, splashed or splattered.
- B. During progress of work, keep premises free from any unnecessary accumulation of tools, equipment, surplus materials and debris.
- C. Place cotton cloths and material which may constitute a fire hazard in closed metal containers and remove daily from the site.
- D. Upon completion of work, leave premises neat and clean, to the satisfaction of the Architect.

### **3.06 Quality Control**

- A. Painted finishes shall be subject to evaluation and approval to the satisfaction of the Architect, including but not limited to, the following characteristics:
  1. Consistency and smoothness of surface.
  2. Coverage and mil thickness.
  3. Color match between adjacent areas.
  4. Compliance with approved sample(s).

## **PART 4 – SCHEDULES**

### **4.01 Exterior Painting and Finishing Schedule**

NOTE: MWF indicates minimum wet film thickness which is a per coat measurement in mils thickness. Systems are based on Sherwin-Williams (S-W) or as noted.

- A. Exterior Exposed Steel Surfaces:
  1. Location: Exposed surfaces of exterior steel structures and railings.
- B. Exterior Metal Surfaces:
  1. Location: Metal doors and frames.
  2. Primer: One (1) coat shop prime or inhibitive metal primer, MWF 3.6 mils.
  3. Finish: Two (2) coats alkyd enamel, semi-gloss, MWF 4.4 mils.
  4. Product: SoW Industrial Enamel.
  5. Color(s): To be selected.
- C. Metal Boxes, Conduits and Mechanical Equipment:
  1. Location: As shown on the Drawings.

2. Primer: One (1) coat, factory primed.
  3. Finish: Two (2) coats acrylic latex, MWF 3.6 mils where not factory finished.
  4. Product: \$-W A-100 Satin Latex House and Trim.
  5. Color: To match adjacent surfaces.
- D. Louvers and Vents: Paint where not prefinished by manufacturer.
1. Exterior Signage: Prefinished by manufacturer.

**END OF SECTION**