

TECHNICAL PROJECT SPECIAL PROVISIONS AND MEASUREMENT AND PAYMENT

SPECIFICATIONS

All WORK completed under this contract shall be completed in accordance with the CDOT Standard Specifications for Road and Bridge Construction (2019) and the City of Thornton Standards and Specifications for the Design and Construction of Public and Private Improvements (2012). Revisions to the CDOT and City specifications are included herein. Any revisions to CDOT or the City standards and specifications are included in these Special Provisions and supersede the CDOT and City Specifications. For all Bid Items, a separate Measurement and Payment is provided in this section which supersedes CDOT's "Method of Measurement" and "Basis of Payment" for their Specifications.

DESCRIPTION OF PROJECT

The WORK performed under this contract generally consists of constructing a trail segment connected to a regional trail near Thorncreek Golf Course. The improvements include the construction of approximately 400 linear feet of a concrete multi-use trail. More than 100 linear feet of that trail is a pedestrian bridge crossing Big Dry Creek. The trail also crosses Tanglewood Creek and will include a culvert crossing under the trail. Minor grading and site restoration is also included in the WORK. One trail light will also be installed. WORK not specifically called for, but which must be completed to properly and fully construct the project under this CONTRACT shall be considered as a part of this CONTRACT, whether or not specifically detailed.

Also to be included in unit prices shall be all costs whatsoever to obtain any and all permits, taxes, licenses, fees, and bonds that may be required by City of Thornton, other municipal government agencies, and the State of Colorado to perform the WORK.

FEES AND PERMITS

The CONTRACTOR will be required to obtain a City of Thornton contractor's license from the City. In addition, the following permits will need to be obtained:

- a. City of Thornton Construction Permit
- b. City of Thornton Traffic Permit
- c. Colorado Department of Public Health and Environment Water Quality Construction Permit

MATERIALS TESTS, FIELD TESTS AND CERTIFICATES

Specific job mix designs conforming to SPECIFICATIONS for this project shall be submitted for approval within ten (10) consecutive calendar days of award of the contract or a minimum of fourteen (14) consecutive calendar days prior to use of the material.

All materials used in the Project shall be subject to sampling and testing in accordance with generally accepted standards and as required in the SPECIFICATIONS; or as directed by the OWNER. The CONTRACTOR shall cooperate with the OWNER or his representatives in collecting and forwarding required samples. The CONTRACTOR shall furnish all samples without charge. The CONTRACTOR shall cooperate with the OWNER or the OWNER's Geotechnical representatives in collecting, handling, storing and forwarding required samples including the furnishing of manpower and equipment when necessary.

QC testing frequencies and types will be as follows:

- Moisture Content and Density – Testing will be completed on proposed subgrade for every 50 linear feet at a minimum. Additional testing may be required as requested by the OWNER or ENGINEER.

- Concrete deliveries shall be tested for slump, air entrainment, and strength. Testing will occur on the first truck of the delivery. Concrete testing shall include the following:
 - Bridge Abutment - 2 tests each abutment
 - Caissons – 2 tests each caisson
 - Trail – 4 tests total
 - Bridge Deck – 4 tests

The CONTRACTOR shall not incorporate any materials into the Project or cover any part of the WORK until they have been observed, tested and approved in accordance with the SPECIFICATIONS.

Costs for quality control (QC) field and laboratory testing shall be borne by the CONTRACTOR and is to be considered incidental to the contract costs. The cost of quality assurance (QA) field and laboratory testing shall be borne by the OWNER. The cost of re-testing work and materials previously rejected by the OWNER's QA testing shall be borne by the CONTRACTOR. Test results obtained by OWNER's representatives shall be considered correct by the OWNER unless proven otherwise. Costs of any third-party testing shall be borne by the CONTRACTOR.

After the subgrade has been compacted, tested and found to meet specifications, the entire subgrade shall be proof-rolled with a heavily loaded vehicle. The vehicle shall have a certified loaded GVW of 50,000 pounds with a loaded single axle weight of at least 18,000 pounds and a tire pressure of 90 psi. Subgrade which is pumping or deforming must be reworked, replaced, or otherwise modified to form a smooth, stable, non-yielding base for subsequent paving courses. The OWNER shall be notified at least 48 hours before final proof-rolling.

The CONTRACTOR shall notify the OWNER a minimum of 24 hours in advance of placing any concrete or asphalt so that both parties may observe field testing. The OWNER reserves the right to reject any payment for materials placed with less than 24 hours' notice to the OWNER. The CONTRACTOR agrees to pay any and all minimum call out charges or standby time for QA testing incurred by the OWNER due to CONTRACTOR'S failure to place materials on schedule for any reason except by the action of the OWNER.

QA testing provided by the OWNER does not relieve the CONTRACTOR of his responsibility to provide materials and workmanship that meet the project SPECIFICATIONS.

All WORK performed and all material and equipment furnished by the CONTRACTOR shall strictly conform to the DRAWINGS and SPECIFICATIONS. Competent labor, mechanics and tradesmen shall be used on all WORK.

The acceptance at any time of the materials by or on behalf of the OWNER shall not bar the OWNER from future rejection if they are subsequently found to be defective or inferior in quality or uniformity to the material specified.

Whenever the OWNER rejects any material, such material shall be removed at once from the line of WORK at the CONTRACTOR's expense and shall not be brought back. WORK rejected by the OWNER shall be replaced with approved WORK at the expense of the CONTRACTOR.

The OWNER shall have the right to observe and witness routine testing of all WORK and materials covered by the SPECIFICATIONS. He shall have the right to approve the manner in which special or requested tests are conducted.

Any inspections, tests, or approval of waiver of test shall not in any way relieve the CONTRACTOR of full responsibility for furnishing apparatus, equipment and all materials meeting the guaranteed performance and requirements of the CONTRACT.

SURVEYING

The CONTRACTOR will be responsible for all construction surveying required for completing this CONTRACT. Immediately upon entering the project site for the purpose of beginning WORK, the CONTRACTOR shall locate reference points and survey monuments and take such actions as are necessary to prevent their destruction. If during construction, survey monuments are destroyed or damaged, the CONTRACTOR shall be held responsible for replacement. If replacement is necessary, the CONTRACTOR, shall, prior to final payment, obtain the services of a Professional Land Surveyor who shall re-establish all such monuments with reference points at no cost to the OWNER.

The CONTRACTOR shall be responsible for ensuring that positive flow can be achieved within all areas marked for replacement, prior to placing new concrete features, storm sewers or grading. The CONTRACTOR shall not place new concrete at, or contiguous to, locations where positive flow has not been verified or cannot be achieved and shall promptly notify the CITY in advance of placing new concrete in questionable areas. If discrepancies are discovered in the DRAWINGS, the surveyor or CONTRACTOR shall notify the OWNER and/or ENGINEER immediately.

UTILITIES

The CONTRACTOR should be aware that he could be working on or near various existing utility mains, conduits, structures, pedestals, and poles. The CONTRACTOR must take sole responsibility for damage to any utility line encountered. The CONTRACTOR shall notify the utility companies for field locations before the start of construction. If the exact location and depth of existing underground utilities are unknown, the CONTRACTOR shall perform all necessary exploratory excavation to locate these facilities, which may affect the WORK prior to beginning construction. The CONTRACTOR shall notify the OWNER immediately of any utility discrepancies.

The CONTRACTOR is responsible for protecting sanitary and storm sewer facilities, including any construction material debris found within these facilities. If material is found within these facilities, it is the CONTRACTOR's responsibility to remove and/or pay for removal by the respective district. The CONTRACTOR shall notify the respective district and CITY immediately of material found in these facilities.

CITIZEN NOTIFICATION

The CONTRACTOR shall notify all affected residents and businesses 48 to 72 hours prior to beginning any construction activities. The CONTRACTOR shall provide proposed language and delivery methods to the OWNER for approval one week prior to delivering them.

EXISTING IMPROVEMENTS

Prior to starting WORK on the project, the CONTRACTOR shall walk the project in the areas scheduled for WORK with the OWNER to determine the condition of fences, curbs, walks, walls, drives, asphalt, lawns, landscaping, sprinklers, and any other existing improvements (collectively surface improvements) that are to remain on both public and private property. The OWNER may record the existing condition of specific features using a video camera. The CONTRACTOR is also encouraged to document the condition of existing improvements in the project area. If in the opinion of the OWNER, there is sufficient operating space to perform the WORK in a reasonable manner without removing or destroying existing improvements, the CONTRACTOR shall perform the WORK without removing or destroying such improvements. The

CONTRACTOR, at his own expense, shall replace any existing improvements damaged by the CONTRACTOR.

The CONTRACTOR may be directed by the OWNER to trim, remove, or relocate shrubs or other minor landscaping improvements, if necessary, to install the improvements. However, in no event shall the CONTRACTOR remove trees, shrubs, border materials, minor landscaping improvements, signs, or other items not included in the approved plans without the prior approval of the OWNER. Payment for shrub trimming, minor landscape/improvement relocation, replacement or removal, if required and authorized by the OWNER, shall not be paid for separately, but shall be incidental to the unit price of the trail bid items. The CONTRACTOR shall make every effort to prevent or limit damage to surface improvements. The CONTRACTOR is responsible for protecting or restoring all such surface facilities to their original or improved condition. The CONTRACTOR at his own expense shall replace any existing improvements damaged by the CONTRACTOR.

POTHOLING

The CONTRACTOR is responsible for verifying the exact locations of all utilities present in the WORK area. Potholing for present utilities will not be measured or paid for separately but included in the overall project cost.

MEASUREMENT AND PAYMENT

All materials will be measured and paid for in accordance with these SPECIFICATIONS. All material shall arrive at the job site with load or batch tickets indicating time loaded or batched, material type, material quantity, and date. A copy of the tickets shall be given to the OWNER's Inspector on the site.

All WORK performed and all materials furnished shall conform to the requirements, including tolerances, provided herein. Materials not in conformance with these SPECIFICATIONS, but allowed to remain in place by the OWNER may be subject to applicable price reductions as specified in *Colorado Procedure 65* and/or Section 601.17 of the *Colorado State Department of Transportation Standard SPECIFICATIONS for Road and Bridge Construction*. Price adjustment for elements not included in this section will be determined by the OWNER.

The CONTRACTOR is responsible for providing a product that is in conformance with the SPECIFICATIONS provided herein. Suitability of finished product will be determined by the OWNER. A finished product that is not found suitable by the OWNER may be subject to:

1. Disapproval and subsequent removal and replacement of the material/product at CONTRACTOR's expense.
2. A reduction in pay as outlined in *Colorado Procedure 65 (CP65)* and/or the *Colorado Department of Transportation Standard Specifications for Road and Bridge Construction*. CP65 and the Colorado Department of Transportation Standard Specifications are strictly used for determining the actual reduction of pay for unsuitable material/product and are **not** used to determine suitability of a final product. The OWNER will determine suitability and the appropriate specification identified above for determining reduction in pay.
3. The OWNER may allow questionable product/material to remain in place with the CONTRACTOR providing some type of remedial action to make the product/material suitable. Type of remedial action shall be determined by the OWNER and paid for by CONTRACTOR.

4. The addition of an extended warranty for questionable materials/products to allow further review to determine suitability and any further action by CONTRACTOR at end of the warranty period.

PAYMENT PROCEDURES

1. For each BID item, the WORK will be measured and paid for on either a unit price basis or on a lump sum basis. The quantities provided on the BID are estimates of the actual quantities of WORK only, and are included solely for determining the probable cost of WORK. The actual quantities of WORK may differ from the BID quantities. The basis of measurement and payment for each unit price BID item will be the actual amount of WORK authorized, completed, and accepted unless otherwise described in that Bid Item. All labor, equipment, materials, and any incidentals required to complete the WORK will be considered subsidiary to that BID item and will not be measured or paid for separately. The CONTRACTOR agrees to make no claim for damages, loss of anticipated profits, or otherwise, due to differences between the actual WORK quantities and the estimated BID quantities.
2. Payment will be made only for each item included in the BID. No WORK will be paid for that is not completed in accordance with the DRAWINGS and SPECIFICATIONS, and accepted by the OWNER. Except as may be otherwise stipulated, no labor, equipment, materials, or any incidentals required to complete the WORK will be furnished by the OWNER.
3. The basis of measurement and payment for each BID item is described herein. A general listing of BID items, accompanied by a brief summary of the WORK, is provided. It is not intended to completely describe all WORK. Refer to the DRAWINGS and SPECIFICATIONS for detailed information on each BID item.

CLEARING AND GRUBBING

This WORK consists of clearing, grubbing, removing, and disposing of vegetation and debris within the limits of the right of way, easement areas, borrow pits, and other areas shown in the CONTRACT or required by the WORK. Vegetation and objects designated to remain shall be preserved free from injury or defacement.

The OWNER will designate all trees, shrubs, plants, and other objects to remain. Every object that is designated to remain and is damaged shall be repaired or replaced as directed by the OWNER, at the CONTRACTOR's expense.

Clearing and grubbing shall extend to the toe of fill or the top of cut slopes, unless otherwise designated.

Requirements:

All surface objects, trees, stumps, roots, riprap, and other protruding obstructions not designated to remain shall be cleared and grubbed. Rocks smaller than 30 inches in their largest diameter are to be removed. In areas to be rounded at the tops of backslopes, stumps shall be removed to at least 2 feet below the surface of the final slope line.

Except in areas to be excavated, all holes resulting from the removal of obstructions shall be backfilled with suitable material and compacted in accordance with CDOT Section 203.06.

Burning of perishable material will not be permitted without the written approval of the OWNER. If permitted, perishable material shall be burned under the constant care of the CONTRACTOR, at times and in a manner that will not endanger the surrounding vegetation, adjacent property, or objects designated to remain. Burning shall be done in accordance with applicable laws and ordinances.

No material or debris shall be disposed of within the project limits without the written permission of the OWNER. Material or debris that is disposed of within the project limits shall be buried to a depth of at least 2 feet and the surface shall be reshaped to match the adjacent ground line. The CONTRACTOR shall make all arrangements to obtain written permission from property owners for disposal locations outside the limits and view of the project. Copies of this written agreement shall be furnished to the OWNER before the disposal area is used.

All cleared merchantable timber shall be removed from the project and shall become the property of the CONTRACTOR. Branches on trees or shrubs shall be removed as directed.

Branches of trees extending over the trail surface shall be trimmed to give a clear height of 10 feet above the trail surface. All trimming shall be done in accordance with good tree surgery practices and under direction of the OWNER.

Measurement and Payment:

BID ITEM 1: Clearing and Grubbing

Measurement will be based on an estimated approximate percentage of the WORK completed and accepted. Measurement for payment will not be made for any labor, equipment, and materials required for this item. The lump sum price shall include all of the CONTRACTOR's costs. This BID item includes but is not limited to:

- Completing the clearing and grubbing
- Shrub removal
- Removal of trees equal to or less than 6-inches in diameter
- Removal of miscellaneous landscape materials and materials not otherwise specified in the BID form
- Excavation, backfill, disposal of excess materials offsite, in accordance with the DRAWINGS and SPECIFICATIONS
- Removal or trimming of vegetation that may be considered as an obstruction of the trail shoulders
- Removal and disposal of existing erosion control blanket or other geosynthetic materials
- Providing all other related and necessary labor, equipment, and materials to complete the WORK

Payment will be based on the percentage of the Lump Sum price as the WORK is completed and accepted.

<u>Bid Item</u>	<u>Pay Unit</u>
Clearing and Grubbing	LS

REMOVAL OF STRUCTURES AND OBSTRUCTIONS

This WORK consists of the removal and disposal of pavements, trees, and all other obstructions that are not designated or permitted to remain. It shall also include salvaging, stockpiling and loading salvable materials, plugging structures, cleaning culverts, and sawing and cutting to facilitate controlled breaking and removal of concrete and asphalt to a neat line. Except in areas to be excavated, the resulting trenches, holes, and pits shall be backfilled.

Materials removed and not designated in the CONTRACT to be salvaged or incorporated into the WORK shall become the property of the CONTRACTOR.

Sawing of concrete shall be done to a true line, with a vertical face, unless otherwise specified. The minimum depth of a saw cut in concrete shall be 2 inches or to the depth of the reinforcing steel, whichever occurs first. All concrete pavement, sidewalks, structures, curbs, gutters, etc., designated for removal, shall be disposed of in accordance with CDOT Section 201.02.

Removal of concrete curb and gutter, crosspans, sidewalks, driveways, asphalt, excavated materials, trees, shrubs, fences, signs, sign posts and any other related obstructions necessary to complete the WORK, becomes the property of the CONTRACTOR and shall be disposed of by him or her. Removal of concrete shall be done so as not to damage existing features. New chips or cracks greater than 1.5 inches (1.5") into existing adjacent features, as measured from the joint or saw cut line, will require saw cutting across the entire length or width of the section and removal of the damaged area.

Pedestals and bases from sign posts, fence posts, and similar structures shall be removed to a minimum of one (1) foot below the proposed subgrade.

Surface objects and trees, stumps, roots, and other protruding obstructions not designated to remain shall be cleared and/or grubbed as required, to ensure complete removal; however, nonperishable, non-toxic objects which shall be a minimum of two (2) feet below subgrade may remain when such objects will not impede other subsurface operations.

Measurement and Payment Procedures:

BID ITEM 2: Removal of Tree (including Stumps)

BID ITEM 3: Removal of Concrete Pavement

BID ITEM 4: Removal of Fence

The measurement for payment for these items will be the actual number of square yards, linear feet, or actual number of units completed in accordance with the DRAWINGS and SPECIFICATIONS, or as otherwise directed by the OWNER. The unit price will include all of the CONTRACTOR'S COSTS. This BID item includes but is not limited to:

- Removal of pavements and required saw cutting
- Removal of subsurface obstructions related to the removal of surface objects
- Applying herbicide to stumps
- Removing, hauling, and disposing of existing park benches
- Removing, hauling, and disposing of structures and obstructions including dump fees
- Removal of existing pipe/culverts, inlets, concrete, asphalt, fences, fence posts, signs, sign posts and any structures and obstructions which interfere with the WORK that are not covered under other separate bid items
- Backfilling of excavations for removal of structures and obstructions with suitable material
- Disposal of all excess material generated as part of the removal WORK
- Moisture conditioning, compaction, and
- Providing all other related and necessary labor, equipment, and materials to complete the WORK

Payment will be made under:

<u>Bid Item</u>	<u>Pay Unit</u>
Removal of Tree (including Stumps)	EA
Removal of Concrete Pavement	SY
Removal of Fence	LF

EARTHWORK

This WORK consists of excavation, hauling, disposal, placement, and compaction of all material encountered within the limits of the WORK, including construction of dikes and excavation for ditches and channels, necessary for the construction of the trail in accordance with the CONTRACT.

Requirements:

Unclassified Excavation. Unclassified excavation shall consist of the excavation of all materials of whatever character required for the WORK, obtained within the right of way, including surface boulders and excavation for ditches and channels that is not removed under some other item.

Removal of Unsuitable Material. Removal of unsuitable material shall consist of the removal of soils or mixtures of soil and organic matter identified in the CONTRACT or as directed by the OWNER that would be detrimental to the project if left in place in its existing condition. If unsuitable material is encountered during the project the OWNER shall be notified immediately prior to the CONTRACTOR completing any WORK related to the bid items Unsuitable Material (Aggregate Base Course), and Unsuitable Material (Soft Soils).

Unsuitable materials encountered in the subgrade, trail, abutments, or embankment that are determined to be detrimental to the trail, abutments or embankment shall be removed to the depth and extents directed by the OWNER. The excavated area shall be backfilled to the finished graded section with approved material. Materials that contain organics or that cannot be dried or moisture conditioned, then compacted to the required density shall be disposed of and shall not be reused as embankment fill. Materials that don't contain organics and that can be dried or moisture conditioned and compacted to the required density may be reused as embankment fill as approved by the OWNER. Should unsuitable material be encountered by existence of soft soils during construction of the bridge abutments, these soft soils shall be mitigated by using the Soft Soil Mitigation Detail shown on the Construction Drawings.

General. The excavations and embankments shall be finished to smooth and uniform surfaces conforming to the typical sections specified. Variation from the subgrade plan elevations specified shall not be more than 0.08 foot. Where asphalt or concrete surfacing materials are to be placed directly on the subgrade, the subgrade plane shall not vary more than 0.04 foot. Materials shall not be wasted without written permission of the OWNER. Excavation operations shall be conducted so material outside of the WORK limits will not be disturbed. Prior to beginning grading operations, all necessary clearing and grubbing in that area shall have been performed. The CONTRACTOR shall notify the OWNER at least five working days prior to beginning excavation.

If Archaeological and/or paleontological materials are encountered during the WORK, all WORK in the area shall be halted and the CONTRACTOR shall notify the OWNER immediately prior to proceeding with the WORK.

Proof Rolling. Subgrade shall be proof rolled and inspected prior to paving operations. Proof rolling shall be done in accordance with the Subgrade Preparation SPECIFICATION.

Upon approval of the proof rolling, the sub base, base course, or initial pavement course shall be placed within 48 hours. If the CONTRACTOR fails to place the sub base, base course, or initial pavement course within 48 hours or the condition of the subgrade changes due to weather or other conditions, proof rolling and correction shall be performed again at the CONTRACTOR's expense.

Quantity for Unclassified Excavation (Complete-in-Place) will not be measured in place, but shall be paid for at the quantity shown in the bid schedule. If the Contractor considers that there is discrepancy in the bid schedule quantity to actual field quantity, the Contractor shall notify the City. An appropriate adjustment shall be made to the earthwork quantities if the Contractor can demonstrate, through survey or other approved means that the actual quantity of earthwork excavated and/or placed differs from the plan quantities by more than 15 percent after adjusting for the work and materials listed under measurement and payment procedures.

The OWNER will provide the appropriate CAD DRAWINGS to the CONTRACTOR that is awarded the work.

Measurement and Payment Procedures:

BID ITEM 5: Unclassified Excavation (Complete in Place)

Excavation and Embankment shall not be measured but shall be the quantities designated in the Contract as stated above. The excavation and embankment quantities included in the bid schedule and on the drawings have been estimated based on the existing grades and finished grades. Adjustments have not been made to account for items including but not limited to: structures, aggregate base course, concrete for sidewalk, concrete trail excavation, and all other items that will affect the overall earthwork from an existing surface to final surface comparison. Excess material generated by the project shall become the property of the Contractor and shall be hauled off-site and disposed of by the Contractor at a location approved by the City. Excavation and embankment quantities have not been adjusted to account for shrinkage or swell.

Water and compaction will not be measured and paid for separately but shall be included in the WORK. This BID item includes all necessary WORK to complete the earthwork including but not limited to imported fill, excavation, fill on-site, cross hauling, haul off-site and disposal, benching requirements, moisture conditioning and compaction, and providing all other related and necessary labor, equipment, and materials to complete the WORK.

Structural excavation and backfill will not be measured and paid for separately but shall be considered incidental to structures.

Payment will be based on:

<u>Bid Item</u>	<u>Pay Unit</u>
Unclassified Excavation (Complete in Place)	CY

BID ITEM 6: Unsuitable Material (Soft Soils)

BID ITEM 7: Unsuitable Material (Aggregate Base Course)

The measurement for payment for this item will be the total number of cubic yards of unsuitable material replaced with approved material, beyond what is required for the construction of the improvements in accordance with the DRAWINGS and SPECIFICATIONS or as otherwise directed by the OWNER. Measurement will be based upon actual field measurements and calculated volumes (no allowance for shrinkage or swell). The unit price will include all of the CONTRACTOR's costs. This BID item will only be used at the direction of the OWNER and will include but is not limited to; excavating and disposing muck or unsuitable soil, proof rolling, furnishing and installing suitable material replacement, aggregate base course, geotextile fabric, Riprap (18-inch), 3" rock, moisture conditioning and compaction, and all other related and necessary labor, equipment, and materials to complete the WORK.

Payment will be based on units completed and accepted and will be made only if approved in writing by OWNER prior to completing the WORK.

<u>Bid Item</u>	<u>Pay Unit</u>
Unsuitable Material (Soft Soils)	CY
Unsuitable Material (Aggregate Base Course)	CY

TOPSOIL

Seeding, sodding, soil preparation and fine grading are required for restoration along the trail and sidewalks. Topsoil is required for all surfaces treated with seeding and sodding. The limits of seeding and sodding are generally shown in the DRAWINGS including limits of fine grading (+/- 3 inches).

Requirements:

Topsoil: Topsoil shall consist of loose friable soil from the zone of major root development free of subsoil, refuse, stumps, woody roots, rocks, brush, noxious weed seed and reproductive plant parts from current state and county weed lists, heavy clay, hard clods, toxic substances, or other material which would be detrimental to its use on the project. Wetland topsoil material shall consist of the moist, organic soil, including any existing wetland vegetation and seeds, to be excavated from areas as shown on the plans or as directed.

Existing topsoil for the project shall be excavated, stockpiled or replaced separately from common earthwork. Existing topsoil shall be removed, stockpiled, and utilized, and paid for under the Topsoil (Strip, Stockpile, and Re-spread) bid item. If during the project it is determined that on-site topsoil is insufficient, the CONTRACTOR shall provide imported topsoil mix. The SPECIFICATIONS of the imported topsoil mix is subject to approval by the OWNER and shall only be used with written approval from the OWNER. Imported topsoil mix, if necessary, shall be paid for under the Topsoil (Import) bid item. Imported topsoil and topsoil mix shall be of textural classification of sandy loam, loam, or sandy clay loam. Topsoil shall have a pH less than 8.5, with soluble salts less than 5.0 mmhos/cc, with organic matter between 2% and 5%. Topsoil mix is 80% specified topsoil and 20% Class 1 Compost. Excess topsoil salvaged by the CONTRACTOR will not be measured and shall be hauled off at the CONTRACTOR’s expense.

Measurement and Payment Procedures:

BID ITEM 8: Topsoil (Strip, Stockpile, and Respread)

Measurement for payment will be the actual number of cubic yards completed as part of the WORK. The unit price will include all of the CONTRACTOR's costs required to complete the WORK. The Topsoil (Strip, Stockpile, and Respread) BID item includes but is not limited to stripping, stockpiling and replacing existing topsoil on site to a depth of six (6) inches. The WORK includes but is not limited to, excavation, stripping, stockpiling, stockpile protection, placing, fine grading; and providing all other related and necessary labor, equipment, and materials to complete the WORK.

Payment will be based on the percentage of completed and accepted and will be made only if approved in writing by the OWNER prior to completing the WORK.

<u>Bid Item</u>	<u>Pay Unit</u>
Topsoil (Strip, Stockpile, and Respread)	CY

EROSION CONTROL

This WORK consists of constructing, installing, maintaining, and removing when required, Best Management Practices (BMPs) during the life of the CONTRACT to prevent or minimize erosion, sedimentation, and pollution of any State waters as defined in CDOT Section 107.25, including wetlands.

The CONTRACTOR shall coordinate the construction of temporary BMPs with the construction of permanent BMPs to assure economical, effective, and continuous erosion and sediment control throughout the construction period. BMPs shall be maintained during construction and may be removed once the OWNER has issued Initial Acceptance of revegetation. Initial Acceptance shall be in accordance with Native Seeding and Sodding SPECIFICATIONS.

When a provision to CDOT Section 208 or an order by the OWNER requires that an action be immediate or taken immediately, it shall be understood that the CONTRACTOR shall at once begin effecting completion of the action and pursue it to completion in a manner acceptable to the OWNER, and in accordance with the Colorado Discharge Permit System Stormwater Construction Permit (CDPS-SCP) requirements.

Requirements:

Silt Fence. Silt fence posts shall be wood with a minimum length of 36 inches. Wood posts shall have a minimum diameter or cross section of 2 inches. Geotextile shall be attached to wood posts with three or more staples per post. Silt Fence shall be constructed in accordance with Thornton Standard Detail 400-08.

Silt fence geotextile shall conform to the following requirements:

Property	Wire Fence Supported Requirements	Self-Supported Requirements Geotextile Elongation <50%	Test Method
Grab Strength, lbs	90 minimum	124 minimum	ASTM D4632
Permittivity, sec-1	0.05	0.05	ASTM D4491
Ultraviolet Stability	Min. 70% Strength Retained	Minimum 70% Strength Retained	ASTM D4355

Concrete Washout Structure. The CONTRACTOR shall construct a washout structure that will contain washout from concrete placement and construction equipment cleaning operations. The structure shall be constructed in accordance with Thornton Standard Detail 400-6.

Vehicle Tracking Pad. Aggregate for the vehicle tracking pad shall be constructed in accordance with Thornton Standard Detail 400-7.

Recycled crushed concrete or asphalt shall not be used for vehicle tracking pads.

Vehicle tracking pads shall be located at the point of access where the haul road meets public roadway. Protection of the haul road is the CONTRACTOR'S responsibility.

Inlet Protection. All inlet protection shall be installed in accordance with Thornton Standard Detail 400-10. All crushed stone shall be No. 4 stone with 0% passing the 3/4" sieve or shall be in accordance with the Class A, B, or C Crushed Stone for aggregate bags in this section of the Project Special Provisions.

Inlet Protection at Culverts. All culvert inlet protection shall be installed in accordance with MHFD Standard Detail SC-6.

Measurement and Payment Procedures:

BID ITEM 9: Inlet Protection

BID ITEM 10: Culvert Inlet Protection

BID ITEM 11: Silt Fence

BID ITEM 12: Vehicle Tracking Pad

BID ITEM 13: Concrete Washout Structure

The measurement for payment of each specific erosion and sediment control BMP will be the actual number of units or linear feet installed, as designated below, complete in place, installed in accordance with the DRAWINGS and SPECIFICATIONS or as otherwise directed by OWNER. The unit price shall include all of the CONTRACTOR'S costs for installation, maintenance, and removal of each specific BMP. These BID items shall include but is not limited to:

- Furnishing, transporting, and placing all materials per manufacturer's SPECIFICATIONS, City of Thornton details, or as specified elsewhere in the CONTRACT Documents
- Excavating, moisture conditioning, backfilling, and compacting
- Furnishing and compacting all materials required for a stable subgrade
- Removing and disposing of excavations, debris and captured sediment
- Protecting aboveground and underground utilities and service connections
- Providing all other related and necessary labor, equipment, and materials to complete the WORK
- Inspection and maintenance of all BMPs including updating the Erosion and Sediment Control Plans to match the BMP's actually placed in the field
- Erosion Control Management, Inspection and testing as required by the permit and the SWMP

Payment will be based on units completed and accepted.

<u>Bid Item</u>	<u>Pay Unit</u>
Inlet Protection	EA
Culvert Inlet Protection	EA
Silt Fence	LF
Vehicle Tracking Pad	EA
Concrete Washout Structure	EA

Stabilized Staging Areas and Concrete Washout Structures will not be measure and paid for separately but shall be included in the cost of the WORK.

MAINTENANCE OF PERMANENT BMPs

This WORK includes coordination with the City, monthly site visits, site visit after significant storms, site inspection, removal and disposal of sediment as necessary, watering, mowing, weed control, reseeding as necessary, removal of any temporary BMPs left on site, and inspection reports.

Maintenance of Permanent BMPs. The CONTRACTOR shall provide routine inspection and maintenance of final erosion control BMPs and temporary BMPs left on-site for six (6) months after final acceptance of the project by the CITY. After six months, the CONTRACTOR shall remove all temporary BMPs. The CONTRACTOR shall prepare inspection reports and the inspection reports shall be delivered to the CITY within 48 hours of each inspection.

When maintenance is required, the CONTRACTOR shall notify the CITY 48 hours prior to completing maintenance. Growth and stabilization of the final landscaping is the responsibility of the CONTRACTOR. Watering of the native seed shall be done a minimum of 2 times per month. The CONTRACTOR shall notify the CITY 24 hours prior to watering activities.

BID ITEM 14: Maintenance of Permanent BMPs

Measurement for Maintenance of Permanent BMPs will be based on an approximate percentage of the WORK completed and accepted. Measurement for payment will be full compensation for all labor, equipment, and materials required for the SWMP Management and Administration requirements. The lump sum price shall include all of the CONTRACTOR'S costs. This BID item includes but is not limited to:

- Erosion Control Inspection and the Administration of the SWMP including, but not limited to, inspection documentation, meeting participation, and preparation and update of the SWMP notebook.
- Coordination with the City, monthly site visits, site visit after significant storms, site inspection and inspection reports, removal and disposal of sediment as necessary, watering, mowing, weed control, reseeding as necessary, and removal of any temporary BMPs left on site.

Payment will be based on the percentage of completed and accepted WORK.

<u>Bid Item</u>	<u>Pay Unit</u>
Maintenance of Permanent BMPs	LS

WATER CONTROL AND DEWATERING

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

Submittals

- A. CONTRACTOR shall submit to the CITY a Water Control Plan 2 weeks prior to execution of the PROJECT. At a minimum, the Water Control Plan shall include:
 - 1. Descriptions of proposed groundwater and surface water control facilities including, but not limited to, equipment, methods, standby equipment and power supply, means of measuring inflow to excavations, pollution control facilities, discharge locations to be utilized, and provisions for immediate temporary water supply as required by this section.
 - 2. Drawings showing locations, dimensions, and relationships of elements of each system.
 - 3. Design calculations demonstrating adequacy of proposed dewatering systems and components.
 - 4. If system is modified during installation or operation, revise or amend and resubmit Water Control Plan.

Requirements

Materials

- A. Onsite materials may be used within the limits of construction to construct temporary dams and berms. Materials such as plastic sheeting, sandbags, and storm sewer pipe may also be used if desired by CONTRACTOR.

Execution - General

- A. For all excavation, CONTRACTOR shall provide suitable equipment and labor to remove water, and keep the excavation dewatered so that construction can be carried on under dewatered conditions.
 - 1. Water control shall be accomplished such that no damage is done to adjacent channel banks or structures.
 - 2. Continuously control water during course of construction, including weekends and holidays and during periods of work stoppages, and provide adequate backup systems to maintain control of water.
- B. CONTRACTOR is responsible for investigating and becoming familiar with all site conditions that may affect the WORK including surface water, potential flooding conditions, level of groundwater and the time of year the work is to be done.
- C. CONTRACTOR shall conduct operations in such a manner that storm or other waters may proceed uninterrupted along their existing drainage courses.

1. By submitting a BID, CONTRACTOR acknowledges that CONTRACTOR has investigated the risk arising from such waters and has prepared BID accordingly, and assumes all of said risk.
- D. At no time during construction shall CONTRACTOR affect existing surface or subsurface drainage patterns of adjacent property.
1. Any damage to adjacent property resulting from CONTRACTOR's alteration of surface or subsurface drainage patterns shall be repaired by CONTRACTOR at no additional cost to CITY.
- E. Pumps and generators used for dewatering and water control shall be quiet equipment enclosed in sound deadening devices.
- F. CONTRACTOR shall remove all temporary water control facilities when they are no longer needed or at the completion of the PROJECT.
- G. All excavations made as part of dewatering operations shall be backfilled with the same type material as was removed and compacted to ninety-five percent (95%) of Maximum Standard Proctor Density (ASTM D698) except where replacement by other materials and/or methods are required.

Execution - Construction

- A. Surface Water Control:
1. Surface water control generally falls into the following categories:
 - a. Normal low flows along the channel.
 - b. Storm/flood flows along the channel.
 - c. Flows from existing storm drain pipelines.
 - d. Local surface inflows not conveyed by pipelines.
 2. CONTRACTOR shall coordinate, evaluate, design, construct, and maintain temporary water conveyance systems.
 - a. These systems shall not worsen flooding, alter major flow paths, or worsen flow characteristics during construction. CONTRACTOR is responsible to ensure that any such worsening of flooding does not occur.
 - b. CONTRACTOR is solely responsible for determining the methods and adequacy of water control measures.
 3. At a minimum, CONTRACTOR shall 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. 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.

- a. It shall be CONTRACTOR's responsibility to determine the quantity of water which shall be diverted to protect the WORK from damage caused by stormwater.
4. CONTRACTOR shall, at all times, maintain a flow path for all channels.
 - a. 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.
- B. Groundwater Control:
1. 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 rockwork.
 - a. 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.
 - b. Dewatering from within the foundation excavations shall not be allowed.
 2. The foundation bearing surfaces are to be kept dewatered and stable until the structures or other types of work are complete and backfilled.
 - a. Disturbance of foundation subgrade by CONTRACTOR operations shall not be considered as originally unsuitable foundation subgrade and shall be repaired at CONTRACTOR's expense.
 3. Contractor shall dispose of groundwater as follows:
 - a. Obtain discharge permit for water disposal from authorities having jurisdiction.
 - b. Treat water collected by dewatering operations, as required by regulatory agencies, prior to discharge.
 - c. Discharge water as required by discharge permit and in manner that will not cause erosion or flooding, or otherwise damage existing facilities, completed Work, or adjacent property.
 - d. Remove solids from treatment facilities and perform other maintenance of treatment facilities as necessary to maintain their efficiency.
 4. Any temporary dewatering trenches or well points shall be restored following dewatering operations to reduce permeability in those areas as approved by CITY.

Measurement and Payment Procedures:

BID ITEM 15: Water Control and Dewatering

Measurement for payment of Water Control and Dewatering will be based on an approximate percentage of the WORK completed and accepted. Measurement for payment will be full compensation for all labor, equipment, maintenance, and materials required for the CDPHE permit requirements. The lump sum price shall include all of the CONTRACTOR’S costs. This BID item includes but is not limited to:

- Obtaining and upkeeping required permits
- Devices and structures used to capture, filter, and treat water
- Structures and equipment used to protect excavations, such as coffer dams
- Equipment used to bypass and divert water such as dams, pumps, and conduits
- Maintenance and upkeep of all equipment and structures
- Repair of damages caused by inadequate water control and dewatering
- Labor and tools to maintain compliance of construction permits
- Removal of equipment and structures with approval and final acceptance

Payment will be based on a percentage of the Lump Sum bid price as the WORK is completed and accepted by the OWNER. For any requested progress payment, the percentage of the lump sum bid price for water control and dewatering, shall be equal to the percentage of the CONTRACT amount completed until water control and dewatering is completed.

<u>Bid Item</u>	<u>Pay Unit</u>
Water Control and Dewatering	LS

WATERING

This WORK consists of applying water to soils or aggregates for moisture and density control, landscaping, prewetting an excavation area, and dust palliatives.

Requirements:

Water applied for moisture and density control, as dust palliative, and for prewetting shall be free from injurious matter. Water for landscaping shall be free from oil, acids, alkalis, salts, or any substance injurious to plant life.

Moisture and Density Control. Sprinkling equipment shall deliver uniform and controlled distribution of water without ponding or washing. Water for finishing operations shall be uniformly applied by spraying across the full width of the course. The CONTRACTOR is responsible for obtaining a legal source for water to complete the WORK as specified in the CONTRACT, including any necessary permits or fees.

CONTRACTOR shall obtain a water meter, for a refundable deposit, from the City of Thornton for any city water source which is to be used for site project watering.

Prewetting. Prewetting material in excavation areas prior to its removal for placement in embankments will be allowed when approved. The CONTRACTOR shall furnish a prewetting layout for each area to be prewetted including nozzle size, spacing, number of lines, and other equipment to be used. The CONTRACTOR shall obtain the approval of the OWNER for each prewetting layout prior to each prewetting operation.

Landscaping. The CONTRACTOR shall furnish water for seeding, mulching, planting, transplanting, sodding, herbicide treatment, and any other landscaping WORK when shown on the plans or when designated.

Measurement and Payment Procedures:

Water required for all WORK covered under the CONTRACT will not be measured or paid for separately but shall be included in the WORK.

RESET STRUCTURES

This WORK consists of removing, relaying, resetting, or adjusting structures and related materials. All designated items shall be carefully removed, stored, reinstalled, or adjusted, in a manner that will avoid loss or damage.

Requirements:

Relocate Rain Gauge. Existing rain gauge designated to be reset shall be removed, cleaned, safely stored onsite, and reset at designated locations. WORK shall include providing new fastening equipment, where required. Relocated rain gauges shall be fully functioning and in like kind condition or better. The Contractor shall have the option to salvage or reuse existing materials. In the event that it is not feasible to reinstall salvaged materials, new materials shall be installed.

Measurement and Payment Procedures:

BID ITEM 16: Relocate Rain Gauge

Measurement for payment will be the actual number of rain gauges relocated and accepted by the City as part of the WORK. The unit price shall include all of the CONTRACTOR's costs required to complete the WORK. This BID item includes but is not limited to:

- Providing all other related and necessary labor, equipment, and materials to complete the WORK

Payment will be based on the number of benches relocated complete in place and accepted.

Payment will be made under:

<u>Bid Item</u>	<u>Pay Unit</u>
Relocate Rain Gauge	EA

NATIVE SEEDING

Seeding: All seeding shall conform to Community Services Native Seed Guidelines. Seed shall be drilled unless otherwise approved by the OWNER.

Materials:

The specific Seed mix shall be Pawnee Buttes Native Lawn Mix consisting of the following:

COMMON NAME	BOTANICAL NAME	LBS PLS/ACRE
Blue Grama	Bouteloua gracilis	5.8
Buffalograss	Buchloe dactyloides	5.0
Green Needlegrass	Nassella viridula (Stipa viridula)	1.0
Sideoats Grama	Bouteloua curtipendula	4.0
Western Wheatgrass	Pascopyrum smithii (Agropyron smithii)	4.0
Sand Dropseed	Sporobolus cryptandrus	0.2
Blue Flax	Helianthus annuus	2.0
Prarie Coneflower	Echinacea purpurea	1.0
	TOTAL	23

Requirements:

Seedbed Preparation: The seedbed shall be free of debris including weeds, plant matter, rocks, clods, and other impervious material over one (1) inch in diameter.

The City will inspect and approve the seedbed preparation prior to adding soil amendments and inspect and approve the seedbed after adding soil amendments and prior to seeding. The CONTRACTOR shall give the City 48-hours notification for both inspections.

Soil Amendments: A minimum four (4) cubic yards per 1,000 square feet of a Class I non-manure compost shall be distributed across the soil surface of all landscape areas in a uniform two (2) inch layer and incorporated into the top eight (8) inches of soil with a rototiller capable of tilling to eight (8) inches in depth. Biosol product shall be broadcast on planted seed bed.

1200 lbs/Ac (if high organic results after soil test) to 1800 lbs/Ac (if low organic results after soil test) Biosol Mix 7-2-3 topically applied after drilling. (available at Rocky Mountain Bio Products, Denver, 303-696-8964)

OR Biosol at 1500 lbs/Ac topically applied after drilling (available at Pawnee Buttes Seed Company, Greeley, 970-356-7002 or 800-782-5947)

Or approved equal

Seeding: Seeding shall be done immediately after soil preparation operations to discourage weed competition. Seed shall be evenly distributed over fertilized ground on a still day into a slightly moist seedbed, using an approved grass drill followed by packer wheels. Hand-broadcasting methods shall be at double the seeding rate and shall be ‘raked in’ or otherwise covered with soil to a depth of ¼ inch. Hydraulic seeding can be used in areas not accessible for machine methods; seed and mulch shall not be applied in the same operation.

Generally, dormant seeding of cool season non-irrigated grass shall occur between November 15th and April 15th on unfrozen ground. Seeding of non-irrigated warm season grasses shall occur between March 15th and June 15th.

All seeded areas shall be hydro mulched, applied with tackifier at rates recommended by the manufacturer unless otherwise specified on the drawing. Hydraulic mulching shall not be performed in the presence of free surface water. Within 12 hours of seeding, water seeded area frequently and lightly. Water enough to keep the soil moist, but not so heavily as to cause soil washing and loss of the grass seed.

Biodegradable blankets shall be installed over all native seed on 3:1 slopes as shown on the drawings and in accordance with the specifications.

City Acceptance Criteria for Seeded Area:

1. Initial Acceptance may occur when the city has received and approved all product certifications and quantities and given written acknowledgement that the designated area has been prepared, seeded, mulched and maintained to meet the specification requirements.
 - Contractor shall maintain seeded area until Initial Acceptance including watering.
 - Re-grading, reseeded, re-mulching and weed control is required until Initial Acceptance for areas of little or no seed germination and to repair areas damaged by erosion, wind, vandalism, fire or other causes.
2. Final Acceptance may occur one year after Initial Acceptance when the stand of grass displays uniform coverage at minimum three to five leaf stage of the seed mix planted (minimum 80% healthy grass coverage over any 10 square foot area and bare spots not exceeding 10” by 10”), with all species of the mix being well represented, minimal weeds present and the area free of surface irregularities (no rills & gullies), as determined by the city.

Any areas that do not comply with Final Acceptance criteria shall be reseeded by the Contractor at the CONTRACTOR’s cost in accordance with these specifications, using specified materials

Following Initial Acceptance, the CONTRACTOR is responsible for maintaining the native seed and sod in accordance with this Specification. Growth and stabilization of the native seed is the responsibility of the CONTRACTOR. Watering of the native seed shall be done a minimum of 2 times per month for a period of six (6) months following Acceptance. The CONTRACTOR shall notify the CITY 24 hours prior to watering activities.

Measurement and Payment Procedures:

BID ITEM 17: Native Seeding

The measurement for payment of this item will be the actual number of acres completed in accordance with the DRAWINGS and SPECIFICATIONS or as otherwise directed by the OWNER. The unit price shall include all of the CONTRACTOR'S costs for installation, maintenance and watering during the project. This BID shall include but is not limited to:

- Furnishing, transporting, and placing all seed and mulch per manufacturer's SPECIFICATIONS or as specified in the CONTRACT Documents
- Spraying and/or mowing for weed control
- Spraying for insect and disease control
- Installing temporary fence and barriers as required
- Maintenance and watering per project requirements
- Providing fertilization, compost, and soil preparation in accordance with the SPECIFICATIONS
- Providing all other related and necessary labor, equipment, and materials to complete the WORK

Payment will be based on units completed and accepted.

<u>Bid Item</u>	<u>Pay Unit</u>
Native Seeding	AC

Fertilization, compost, watering, and soil preparation for seeding will not be paid for separately but shall be included in the cost of the WORK.

PRAIRIE DOG MANAGEMENT

As part of the CONTRACTOR’s grading permit with the City of Thornton a letter must be submitted that indicates the proposed actions for removing Prairie Dogs from the site. In general, the actions should correspond to Thornton’s Prairie Dog Relocation Information document, updated August 2017. The CONTRACTOR shall explore passive relocation options as the primary method of Prairie Dog Management. Efforts shall be detailed in the submitted letter and include monitoring throughout the duration of the project until final acceptance is obtained from the OWNER.

Measurement and Payment Procedures:

BID ITEM 18: Prairie Dog Management

No separate measurement for payment will be made for any labor, equipment, and materials required for this item. The lump sum price will include all of the CONTRACTOR's costs. This BID item includes, but is not limited to:

- Providing a written plan for prairie dog management
- Capturing, transporting, relocating, euthanizing of prairie dogs as necessary per the approved prairie dog management plan.
- Providing all other related and necessary labor, equipment, and materials to complete the WORK

Payment will be based on the percentage of the Lump Sum price as the WORK is completed and accepted.

<u>Bid Item</u>	<u>Pay Unit</u>
Prairie Dog Management	LS

AGGREGATE BASE COURSE (CLASS 6)

In general, aggregate base is included on this project to stabilize the trail or abutment subgrade in locations where existing soils are unable to meet subgrade requirements. The use of Aggregate Base Course on the project will only be measured and paid for if, prior to the use, the CONTRACTOR obtains written approval from the OWNER.

Materials:

Aggregate Base Course: This material shall consist of hard, durable particles or fragments of stone or gravel, crushed to required sizes, containing an appropriate quantity of sand or other finely-divided mineral matter which conform to the requirements of AASHTO M 147, and to CDOT Section 703.03. In addition, the material shall have an R-value of 78 or greater or a CBR of 80 or greater and shall be moisture stable. Moisture stability is determined by R-value testing which shows a drop of 12 points or less in R-value between exudation pressures of 300 psi and 100 psi.

Only aggregate from approved sources shall be used. Approval of sources shall be at the discretion of the OWNER and submissions shall, at a minimum, consist of supplying documented gradation, Atterberg limits and CBR/R-value testing on an annual basis. Gradation SPECIFICATIONS are as follows:

Sieve Designation	% Passing By Weight Class 6
¾"	100
No. 4	30-65
No. 8	25-55
No. 200	3-12
Liquid Limit (LL)	30, Maximum

Requirements:

Placing: The maximum compacted thickness of any one layer shall not exceed 6 inches. When vibratory or other approved types of special compacting equipment are used, the compacted depth of a single layer may be increased to 8 inches upon request, provided that specified density is achieved and written approval is given.

Mixing. The CONTRACTOR shall mix the aggregate by methods that insure a thorough and homogenous mixture.

Shaping and Compaction. Compaction of each layer shall continue until a density of at least 95 percent of the maximum density has been achieved as determined in accordance with AASHTO T 180 as modified by CP 23. The moisture content shall be at ± 2 percent of optimum moisture content. The surface of each layer shall be maintained during the compaction operations so that a uniform texture is produced and the aggregates are firmly keyed. Moisture conditioning shall be performed uniformly during compaction.

The surface of the base course will be tested with a 10-foot straightedge, or other approved device. The surface shall be tested prior to the application of any pavement. The variation of the surface from the testing edge of the straightedge between any two contacts with the surface shall not exceed $\frac{1}{4}$ inch. All irregularities exceeding the specified tolerance shall be corrected to the satisfaction of the OWNER at no additional cost to the OWNER.

Measurement and Payment Procedures:

Aggregate base course will not be measured or paid separately, but shall be included in the BID ITEMS Unsuitable Material (Aggregate Base Course) and Unsuitable Material (Soft Soils), if approved for use by the OWNER.

CRUSHER FINES SHOULDER

In general, the Crusher Fines Shoulder is intended to serve as an alternate trail surface adjacent to the concrete trail on this project. This SPECIFICATION and Bid Item on the project will only be measured and paid for in accordance with the DRAWINGS and specified herein.

The CONTRACTOR shall submit certification from the supplier certifying the crusher fines, or approved equal meets the requirements of this SPECIFICATION. The submittal shall include laboratory test certificates or samples for aggregate strength and aggregate color.

Materials:

Crusher Fines: Aggregates shall be Crushed stone shall consist of inert materials that are hard, durable, with stone free from surface coatings and deleterious materials. Aggregates shall be Grey in color and submitted for approval.

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

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

Gradation SPECIFICATIONS shall meet the gradation below or approved equal as approved by the OWNER.

Sieve Designation	% Passing By Weight
1/2"	100
3/8"	100
No. 4	65-80
No. 8	48-63
No. 16	40-49
No. 30	30-40
No. 50	20-27
No. 100	10-18
No. 200	10-12

Note: Materials shall consist of bank or pit run material

Equipment:

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

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

Placement and Compaction:

Subgrade shall be prepared in accordance of the SPECIFICATIONS prior to placement of crusher fines.

The CONTRACTOR is responsible for controlling placement of the material; no additional compensation will be made for material placement in excess of the specified thickness or width.

Do not install crusher fines material during rain or snow. Do not install crusher fines on subgrade that has standing water.

Add water to $\pm 2\%$ wet of optimum moisture content. Use roller or mechanical hand tamper for compaction. Compact to 95% Standard Proctor Density (ASTM D698-70) to a uniform thickness. A plate compactor shall be used on edges and hard to get areas.

Top of path shall be flush with adjacent grade. Remove any excess gravel on edges. Ensure that there are no low spots, high spots, or standing water on or adjacent to path.

A smooth steel wheel roller shall be used for the final rolling of the top surface of Crusher Fines. Prior to final rolling, the surface shall be watered and loose stones shall be evenly spread. A minimum of two complete passes over the area shall be done to ensure stones are embedded and loose material is not present on the final surface.

Compacted surface shall be smooth and free from waves and other irregularities. Unsatisfactory portions of crusher fines shall be torn up, reworked, re-laid, and rerolled at no additional expense to the OWNER.

Inspection:

The finished surface shall be uniform and solid, with no evidence of chipping or cracking.

Compacted material shall be firm to the full depth of pavement with no soft areas.

Loose material shall not be present on the surface.

No ruts shall be visible on the surface of the pavement.

Pavement sections that do not meet this specification, shall be repaired or replaced at the CONTRACTOR's expense.

Repairs:

Excavate damaged area to depth of crusher fines paving material and square off sidewalls.

If area is dry, moisten damaged portion lightly and scarify.

Apply crusher fines to excavated area to finished grade.

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

Repaired surface shall be smooth and free from waves and other irregularities. Unsatisfactory portions of base course shall be torn up, reworked, re-laid, and rerolled at no additional expense to the OWNER.

Measurement and Payment Procedures:

BID ITEM 19: Crusher Fines Shoulder

The measurement for payment for this item will be the total number of square feet of material placed in accordance with the DRAWINGS and SPECIFICATIONS or as otherwise directed by the OWNER. Measurement will be based upon actual field measurements and load tickets (no allowance for shrinkage or swell). The unit price will include all of the CONTRACTOR's costs. This BID item will include but not be limited to:

- Furnishing, transporting, placing, and compacting
- Providing water as necessary to meet moisture and density requirements
- Providing all other related and necessary labor, equipment, and materials to complete the WORK.

Payment will be based on units completed and accepted.

<u>Bid Item</u>	<u>Pay Unit</u>
Crusher Fines Shoulder	SF

Water will not be measured and paid for separately but shall be included in the cost of WORK.

RECONDITIONING

This WORK consists of blading, shaping, wetting, and compacting the existing subgrade with moisture and density control.

Requirements:

The top twelve (12) inches of the existing subgrade shall be reconditioned by ripping and re-compacting. Sufficient water shall be added to meet the density requirements as specified in the subgrade section of these SPECIFICATIONS. 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 for smoothness and density prior to the application of any base course or pavement material. All irregularities exceeding the specified tolerance shall be corrected to the satisfaction of the OWNER at no additional cost to the OWNER. The surface shall be satisfactorily maintained until base course or pavement has been placed.

Measurement and Payment Procedures:

BID ITEM 20: Reconditioning

The measurement for payment for this item will be the actual number of square yards of reconditioning completed in accordance with the DRAWINGS and SPECIFICATIONS or as otherwise directed by the OWNER. The unit price will include all of the CONTRACTOR's costs. This BID item includes, but is not limited to:

- Blading, shaping, scarifying, compacting, finishing, and maintenance of the finished surface
- Providing all other related and necessary labor, equipment, and materials to complete the WORK

Payment will be based on units completed and accepted.

<u>Bid Item</u>	<u>Pay Unit</u>
Reconditioning	SY

Water will not be measured and paid for separately but shall be included in the cost of the WORK.

GEOTEXTILE (EROSION CONTROL) (CLASS 1)

This WORK consists of furnishing and installing geotextiles for erosion control.

Materials:

All Geotextile for erosion control on this project shall be North American Green SC150BN or approved equal.

Requirements:

Geotextiles for erosion control or drainage shall be loosely laid (not stretched) with the roll direction the same as the anticipated water flow, and in a manner that avoids any rupture of the cloth. The geotextile shall be anchored in place with stakes and a staking pattern consistent with that shown on the DRAWINGS. Full rolls shall be used whenever possible in order to minimize the number of roll end laps. Lengths and widths of individual sheets shall be at the CONTRACTOR's option.

Measurement and Payment Procedures:

BID ITEM 21: Geotextile (Erosion Control) (Class 1)

The measurement for payment for this item will be the actual number of square yards of erosion control blanket placed measured along the exposed slope (length x width), but will not include the material buried in the anchor trenches or required lapping of the blanket, in accordance with the DRAWINGS and SPECIFICATIONS or as otherwise directed by the OWNER. The unit price will include all of the CONTRACTOR's costs. This BID item includes, but is not limited to:

- Furnishing and installing all materials, including the erosion control blanket, anchors, and wood stakes
- Preparing subgrade
- Placing the blanket per manufacturer's SPECIFICATIONS
- Excavating, trenching, backfilling, and compacting for anchoring
- Providing all other related and necessary labor, equipment, and materials to complete the WORK

Payment will be based on units completed and accepted.

<u>Bid Item</u>	<u>Pay Unit</u>
Geotextile (Erosion Control) (Class 1)	SY

RIPRAP

This WORK consists of the construction of riprap in accordance with Section 506 of the CDOT Standards and Specifications and in conformity with the lines and grades shown on the plans.

Materials:

Riprap shall consist of hard, dense, durable stone, angular in shape and resistant to weathering. Rounded stone or boulders shall not be used as riprap material. The stone shall have a specific gravity of at least 2.5. Each piece shall have its greatest dimension not greater than three times its least dimension.

Material used for riprap may be approved by the Engineer if, by visual inspection, the rock is determined to be sound and durable. The Engineer may require the Contractor to furnish laboratory results if, in the Engineer's opinion, the material is marginal or unacceptable. At the request of the Engineer, the Contractor shall furnish laboratory test results indicating that the material meets the requirements for abrasion resistance or compressive strength as indicated in Table 506-1.

Table 506-1

Test Description	Test Method	Specification Requirement
Abrasion Resistance by Los Angeles Machine	ASTM C 535	50% Loss, max.
Unconfined Compressive Strength of Drilled Core Specimen	AASHTO T 24	2500 psi, min.

Riprap shall conform to the gradation requirements give in Table 506-2

Table 506-2

RIPRAP		Percent of Material Smaller than Typical Stone	Typical Stone Dimensions (Inches)	Typical Stone Weight (Pounds)
	Stone Size d50 (Inches)			
Riprap	12	70-100	21	440
		50-70	18	275
		35-50	12	85
		2-10	4	3
Riprap	18	70-100	30	1280
		50-70	24	650
		35-50	18	275
		2-10	6	10

Nominal stone size and total thickness of the riprap shall be as shown on the plans.

Control of gradation will be by visual inspection. The Contractor shall provide two samples of rock at least 5 tons each, meeting the gradation specified. One sample shall be provided at the construction site and may be a part of the finished riprap covering. The other sample shall be provided at the quarry.

These samples will be used as a reference for judging the gradation of the riprap supplied. When it is determined necessary, conformance of the gradation will be verified by dumping and checking the gradation of two random truck loads of stone. Mechanical equipment, a sorting site, and labor needed to assist in checking gradation shall be provided at the Contractor's expense.

Requirements:

Stones with typical stone dimensions that are equal to d50 and larger shall be placed at the top surface with faces and shapes matched to minimize voids and form as smooth a surface as practical. Dumping and backhoe placement alone is not sufficient to ensure a properly interlocked system. The material may be machine-placed and then arranged as necessary by use of an excavator with a multi-prong grappling device or by hand to interlock and form a substantial bond.

Excavation for toe or cut-off walls shall be made to the neat lines of the wall. Allowance will not be made for work outside the neat lines.

Measurement and Payment Procedures:

BID ITEM 22: Riprap (12 inch)

BID ITEM 23: Soil Riprap (12 inch)

The measurement for payment for this item will be the actual number of cubic yards of Riprap material. Measurement will be by the method of average end areas based on dimensions shown on the DRAWINGS or ordered. The unit price will include all of the CONTRACTOR's costs. This BID item includes, but is not limited to:

- Furnishing and installing all materials, including the riprap and bedding
- Preparing subgrade
- Excavating, trenching, backfilling, and compacting of materials
- Mixing of riprap with soil
- Providing all other related and necessary labor, equipment, and materials to complete the WORK

Payment will be based on units completed and accepted.

<u>Bid Item</u>	<u>Pay Unit</u>
Riprap (12 Inch)	CY
Soil Riprap (12 Inch)	CY

Bedding will not be measured and paid for separately but shall be included in the cost of the WORK.

Riprap (18-inch) will not be measured and paid for separately but shall be included in the bid item "Unsuitable Materials (Soft Soils)"

BEDDING

This WORK consists of the construction of Bedding for riprap in accordance with Section 506 of the CDOT Standards and Specifications and in conformity with the lines and grades shown on the plans.

Materials:

Granular bedding shall meet the same requirements for specific gravity, absorption, abrasion, sodium sulfate soundness, calcite intrusion, and freeze-thaw durability as required for riprap. The requirements for the wear test in AASHTO T96 shall not apply.

Broken concrete asphalt pavement or sledge, shall not be acceptable for use in the WORK. Rounded river rock is not acceptable unless specifically designated on the DRAWINGS.

Gradation for granular bedding shall conform to the DRAWINGS

Material used for bedding may be approved by the Engineer if, by visual inspection, the rock is determined to be sound and durable. The Engineer may require the Contractor to furnish laboratory results if, in the Engineer's opinion, the material is marginal or unacceptable. At the request of the Engineer, the Contractor shall furnish laboratory test results indicating that the material meets the requirements for abrasion resistance or compressive strength as indicated in Table 506-1.

Requirements:

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

Measurement and Payment Procedures:

No measurement or payment will be made for bedding used under riprap. Bedding shall be considered incidental to bid item for

PRE-FABRICATED PEDESTRIAN BRIDGE, HAND RAILING, AND PARK BENCHES

628.01 This work consists of the design, fabrication, and erection of a simple span, welded self-weathering steel (ASTM A 709 Grade 50W), pedestrian truss bridge with a concrete deck and handrails in accordance with the specifications and plan details. New park benches shall be provided and installed as presented on the drawings.

Potential bridge suppliers are:

1. Continental Pedestrian Truss (Contech)
9025 Centre Pointe Drive
West Chester, Ohio 45069
1-800-338-1122
2. Steadfast Bridges
4021 Gault Ave. South
Fort Payne, Alabama 35967
256-845-0154
3. Excel Bridge Manufacturing Company
12001 Shoemaker Avenue
Santa Fe Springs, California 90670
562-944-0701
4. Big R Manufacturing LLC
19060 County Road 66
Greeley, Colorado 80631
1-888-339-1684
5. Wheeler Lumber, LLC
9330 James Avenue South
Minneapolis, Minnesota 55431
952-929-7854

Materials:

628.02 Structural Steel. All structural steel shall be new (unused) material and shall conform to the requirements in Section 509. Floor beams, stringers, and members of each truss (upper and lower chords, diagonals, end posts and vertical posts) utilized in the bridges shall meet a longitudinal Charpy V notch (CVN) values per Table C6.6.2.1-1 of the AASHTO LRFD Bridge Design Specifications for Temperature Zone 2 (typically 25 ft. lbs. at 40 degrees Fahrenheit). Testing shall be in accordance with AASHTO T 243 (ASTM A 673). The H frequency of heat testing shall be used. The Contractor shall provide the Engineer and the Staff Bridge Branch Fabrication Inspection Unit with copies of all certified mill test reports and CVN test reports, heat numbers and Buy America documentation for all structural steel and bolts. Minimum thickness of closed structural tubular members shall be 1/4 of an inch.

Requirements:

628.03 Concrete. When concrete deck is used, concrete shall be Class D (Bridge) unless specified otherwise in the plans. The concrete and reinforcement shall conform to the requirements in Sections 601 and 602 respectively.

628.05 Design. The current editions of the AASHTO LRFD Bridge Design Specifications, LRFD Guide Specifications for the Design of Pedestrian Bridges, and CDOT Bridge Design Manual Section 31, shall govern the design.

All welded tubular connections shall be designed in accordance with Section 2, Part A and Section 9, Part A of the Structural Welding Code-Steel ANSI/AWS/D1.1 (Latest Edition).

Openings between horizontal or vertical members on pedestrian railings shall be small enough that a 4 in. sphere cannot pass through them for the lower 34" of the pedestrian rail.

½ inch diameter drain holes shall be drilled (flame cut holes will not be allowed) at all low points of all steel tubing members as oriented in the in-place, completed structure. In members that are level, or flat, a total of two drain holes shall be drilled, one at each end. Drain holes and their locations shall be shown on the Shop Drawings.

628.06 Submittals. The Contractor shall submit certified copies of all the required submittals per Section 105 and this specification to the Owner. The submittals can be electronic. All pdf's with text or numerical data shall be 300 dpi, page aligned, text searchable, and in conformance with ISO PDF/A-1b archival specification.

628.07 Shop Fabrication. Welding and fabrication of weathering steel pedestrian bridges shall conform to the requirements of the Structural Welding Code-Steel ANSI/AWS D1.1 (Latest Edition) as amended by the following:

1. As required in Subsection 4.7, a welding procedure shall be established by qualification in accordance with the requirements of Subsection 3.3 for the ASTM A 847 material used on the bridge. The results of the Procedure Qualification shall be recorded on Form M1 in Annex M of AWS D 1.1.
2. The Contractor shall submit a Quality Control Plan. The Plan shall include personnel qualifications, certifications, and a Written Practice in accordance with ASNT SNT-TC-1A.
3. The quality of all welds shall be in accordance with Section 6, Table 6.1 for non-tubular and Section 9 and 9.16 for tubular. In Table 6.1, Undercut 7(B), the criteria for primary members shall apply to the bottom chord members.
4. All Complete Joint Penetration Groove Welds in butt joints in the bottom chord members shall be 100% Magnetic Particle tested in accordance with ASTM E709. Acceptance shall be determined in accordance with Section 6.10 and Table 6.1 for non-tubular using alternating Current. Section 9 and Table 9.16 for tubular, UT in accordance with 9.27.1. In addition, complete joint penetration groove butt welds welded from one side without backing of bottom chord members shall be examined by ultrasonic testing in accordance with Section 6.11.
5. Magnetic Particle Testing shall be performed on 100% of all attachment welds to the bottom chord, using Alternating Current, in accordance with Section 6.10 and Table 6.1 for non-tubular, Section 9 and 9.16 for tubular.
6. Welder Qualification Test Records shall follow 4.2.3 Period of Effectiveness.
7. A copy of all Procedure Qualification Records, Welder Qualification Test Records, Quality Control Plan and all visual and nondestructive test reports shall be provided to the Owner.

628.07 The structure shall conform to the clear span, clear width, structure depth, railing and any other requirements as shown on the plans. Metal handrails shall be installed at a height of 42 inches from top of deck. For bridges seven feet and wider, post with an R12-1 weight limit signs in conformance with MUTCD.

All weathering steel shall be blast cleaned, Steel Structures Painting Council Surface Preparation No. 6 (SSPC-SP6, Commercial Blast Cleaning), to remove mill scale and foreign material which would prohibit rusting to a uniform color.

628.08 Field Construction. The substructure shall be constructed in accordance with the details shown in the plans and the pedestrian bridge shop drawings. Before construction begins on the substructure, the Contractor shall determine the anchor bolt requirements and substructure dimensions needed to properly erect the structure. The Engineer shall be provided with two copies of detail sheets delineating these requirements before work begins.

The Contractor shall comply with CDOT Standard Specification Subsection 509.26 through 509.31 for Field Construction Requirements paying particular attention to Section 509.28 for Connections Using High-Strength Bolts. Fastener assemblies shall be tested using a Calibrated Tension Measuring Device. DTI washers shall be subject to tension verification by use of a separate direct tension measuring device.

A Pre-Erection Conference will be held at least one week prior to the beginning of erection. At least one week prior to the Pre-Erection Conference, the Contractor shall submit an Erection Plan (as specified in Section 509) to the Engineer for review. The Erection Plan will be reviewed by the Engineer. Written comments submitted by the Engineer shall be discussed at the Pre-Erection Conference and incorporated into the Final Erection Plan. The Final Erection Plan shall be signed and sealed by the Contractor's Engineer and Marked "Approved for Construction". If false work drawings are required, they shall conform to and be submitted in accordance with subsection 601.11.

When a bridge spans traffic of any kind, including those where vehicles, railroad, watercraft or pedestrians have access onto, underneath or adjacent to, the Contractor's Professional Engineer shall inspect and provide stamped written approval of the stability of the erected bridge components prior to opening the area beneath the bridge to traffic. The Contractor is responsible for coordination of any inspection and submittal of construction documents with the local agencies, railroad etc. as required.

Measurement and Payment Procedures:

BID ITEM 24: Pre-fabricated Pedestrian Bridge

BID ITEM 25: Park Bench (New)

Prefabricated pedestrian bridge will be paid for on a lump sum basis. New Park benches will be measured and paid for per each bench installed and accepted by the City. The bid prices shall include all of the CONTRACTOR's costs. This BID items includes, but is not limited to:

- Furnishing and installing all structures, materials, parts and equipment including but not limited to park benches, arms, legs and posts
- Furnishing and installing all structures, materials, parts and equipment including but not limited to; Pedestrian bridge, rub rails, toe plates, other plates, floor beams, brace members, nuts and bolts
- Furnishing and installing all structures, materials, parts and equipment including but not limited to; handrailing, plates, nuts and bolts, caps, weep holes, and anchors.
- Excavation and backfill including moisture conditioning
- Shop drawings
- Touch up paint and painting
- Furnishing and placing concrete deck, including vibration or tamping
- Sawcutting of control joints
- Providing hot and cold weather concrete protection
- Protecting concrete from elements, vandalism, and physical damage
- Providing all other related and necessary labor, equipment, and materials to complete the WORK

Payment will be based on the percentage of the Lump Sum price as the WORK is completed and accepted.

<u>Bid Item</u>	<u>Pay Unit</u>
Pre-fabricated Pedestrian Bridge	LS
Park Bench (New)	EA

STRUCTURAL CONCRETE

This WORK consists of furnishing and placing Portland cement concrete in accordance with Section 600 of the CDOT Standards and Specifications and in conformity with the lines and grades shown on the plans.

Measurement and Payment Procedures:

BID ITEM 26: Structural Concrete (Bridge Abutment)

BID ITEM 27: Structural Concrete (Caisson)

The measurement for payment for bridge abutment concrete will be the number of cubic yards of concrete measured in accordance with the dimensions shown on the plans. The measurement and payment for the caisson foundations will be the number of linear feet. Deductions will not be made for the voids or volumes occupied by reinforcing. The unit price will include all of the CONTRACTOR's costs. This BID item includes, but is not limited to:

- Excavating and disposal of excess material and debris
- Subgrade fine grading and compaction
- Furnishing and placing concrete, including vibrating or tamping
- Furnishing and installing reinforcing steel and constructing all formwork and ties.
- Finishing and edging the concrete surface
- Furnishing, installing, and sealing expansion joints
- Sawcutting control joints
- Furnishing and applying curing compounds
- Backfilling including moisture conditioning, and compacting
- Providing hot and cold protection
- Protecting concrete from elements, vandalism, and physical damage.
- Protecting aboveground and underground utilities and service connections
- Providing all other related and necessary labor, equipment, and materials to complete the WORK

Payment will be based on units completed and accepted.

<u>Bid Item</u>	<u>Pay Unit</u>
Structural Concrete (Bridge Abutment)	CY
Structural Concrete (Caisson)	LF

Reinforcing steel will not be measured and paid for separately but shall be included in the cost of the WORK.

Backfill material will not be measured and paid for separately but shall be included in the cost of the WORK.

CULVERTS AND SEWERS

This WORK consists of furnishing and installing reinforced concrete pipes and end sections accordance with Section 603 of the CDOT Standards and Specifications and Section 400 of the City of Thornton Standards and Specifications and in conformity with the lines and grades shown on the plans.

Materials:

Pipe material shall be class III and meet the following standards: ASTM C-76/C-506/C-507/C-789/C-850 or AASHTO M-170/M-206/M-207/M-259/M-273.

Rubber gasketed joints shall conform to the requirements of ASTM C443 and shall be flexible and able to withstand expansion, contraction, and settlement.

All rubber gaskets shall be stored in as cool a place as practicable, preferably at 70 degrees F or less. Rubber gaskets shall not be exposed to the direct rays of the sun for more than 72 hours.

Rubber gaskets, of the type requiring lubrication, shall be lubricated with the lubricant recommended and supplied by the manufacturer of the pipe.

Precast reinforced concrete end sections shall have at least one line of reinforcement conforming to the requirements of AASHTO M 170 equivalent to the square inches per linear foot for elliptical reinforcement in circular pipe, Class II, Wall B.

Pipe shall be obtained from a manufacturer that is a current plant quality certified member of the American Concrete Pipe Association (ACPA), meeting all current ACPA requirements for this certification.

Concrete used for headwalls on concrete end sections shall meet the standards of Section 601 of the CDOT Standards and Specifications for Class B concrete.

Requirements:

Trenches shall be excavated in accordance with the requirements of Section 206 to a width sufficient to allow for proper jointing of the conduit and thorough compaction of the bedding and backfill material under and around the conduit.

The completed trench bottom shall be firm for its full length and width. The trench for cross drains shall have a minimum longitudinal camber of 1 percent of the length of the pipe. Camber may be increased to suit height of fill and supporting soil.

Excavation shall be by open cut from the surface.

Bedding shall be prepared in accordance with details as shown on the plans. The bed shall consist of a layer of loose structure backfill at least 3 inches in thickness. Recesses shall be made to accommodate the bell of bell-and-spigot pipe. Adjustments to line and grade shall be made by scraping or filling under the body of the conduit. Wedging or blocking the bell will not be permitted.

The conduit laying shall begin at the downstream end of the conduit line. The lower segment of the conduit shall be in contact with the prepared bedding throughout its full length. Bell or groove ends of concrete or clay conduits and outside circumferential laps of metal or plastic conduits shall be placed facing upstream.

After the conduit or section of conduit is placed, it shall be inspected before any backfill is placed. Conduit found to be damaged shall be replaced, and conduit found to be out of alignment or unduly settled shall be taken up and re-laid. The trench shall then be backfilled with material in accordance with Section 206 of the CDOT Standards and Specifications.

Special care shall be taken when backfilling around conduit to bring the backfill materials up on both sides of the conduit, evenly and simultaneously. Protection of conduits during construction shall be the Contractor's responsibility. Damage to the conduit due to Contractor's operations shall be repaired or replaced at the Contractor's expense.

Measurement and Payment Procedures:

BID ITEM 28: 42 Inch CL-III Reinforced Concrete Pipe

BID ITEM 29: 42 Inch Reinforced Concrete End Section

The measurement for payment for this item will be the net length of pipe called for on the plans, except when field changes are ordered or when there are errors on the plans. In case of exceptions, the quantity to be measured shall be the actual net length of conduit measured along the bottom centerline. Extra length of conduit due to joint creep will not be measured and paid for. End sections will be measured and paid for by the number of units installed. The unit price will include all of the CONTRACTOR's costs. This BID item includes, but is not limited to:

- Furnishing and installing all materials, including the conduit, joint material, braces, joint fasteners, and bedding
- Preparing subgrade
- Excavating, trenching, backfilling, and compacting of materials
- Excavating and disposal of excess material and debris
- The following work for the concrete cut-off walls
 - a) Forming for concrete cut-off walls
 - b) Subgrade fine grading and compaction
 - c) Furnishing and placing concrete, including vibrating or tamping
 - d) Furnishing and installing reinforcing steel and constructing all formwork and ties.
 - e) Finishing and edging the concrete surface
 - f) Furnishing and applying curing compounds
 - g) Backfilling including moisture conditioning, and compacting
 - h) Providing hot and cold protection
 - i) Protecting concrete from elements, vandalism, and physical damage.
- Protecting above ground and underground utilities and service connections
- Providing all other related and necessary labor, equipment, and materials to complete the WORK

Payment will be based on units completed and accepted.

<u>Bid Item</u>	<u>Pay Unit</u>
42 Inch CL-III Reinforced Concrete Pipe	LF
42 Inch Reinforced Concrete End Section	EA

Concrete and reinforcing steel for end section cut-off walls will not be measured and paid for separately but shall be included in the cost of the WORK.

FENCE

This WORK consists of the construction of temporary fence, and removal of temporary plastic fence in accordance with these SPECIFICATIONS and in conformity with the DRAWINGS. This work also includes installation of 3-rail fence in accordance with the City of Thornton’s standard detail 800-7.

Materials:

Construction Fence shall be orange colored plastic material, at least four (4) feet in height. Material for 3-rail fence shall be in accordance with the City’s detail.

Requirements:

The CONTRACTOR shall perform such clearing and grubbing as may be necessary to construct the fence to the required grade and alignment.

Construction Fence shall be placed as shown on the DRAWINGS or as directed to define the limits of the work area beyond which no access is allowed to the surrounding golf course, wetlands, or vegetation to be protected.

Measurement and Payment Procedures:

BID ITEM 30: Construction Fence

BID ITEM 31: Fence (3-rail) (42-inch)

The measurement for payment for this item will be the actual number of linear feet of Fence installed in accordance with the DRAWINGS and SPECIFICATIONS or as otherwise directed by the OWNER. The unit price will include all of the CONTRACTOR's costs. This BID item includes, but is not limited to:

- Furnishing and installing all materials, including posts, rails, wire, fabric, edging, paint, stain, maintenance strip, and all other necessary materials
- Maintenance, of temporary fence including replacement, if necessary
- Removal and disposal of temporary fence
- Providing all other related and necessary labor, equipment, and materials to complete the WORK

Payment will be based on units completed and accepted.

<u>Bid Item</u>	<u>Pay Unit</u>
Construction Fence	LF
Fence (3-rail) (42-inch)	LF

CONCRETE

This WORK consists of the construction of concrete bikeways, rumble strips, bench pads, and bridge deck in accordance with these SPECIFICATIONS and in conformity with the DRAWINGS. All Concrete WORK shall be in accordance with these SPECIFICATIONS including Section 600 in the City of Thornton Standards and SPECIFICATIONS and CDOT Division 600 & 700.

Materials:

All concrete materials shall be in accordance with these SPECIFICATIONS including Section 600 in the City of Thornton Standards and SPECIFICATIONS and CDOT Division 600 & 700.

Concrete for bikeways, rumble strips, bench pads, and bridge deck shall be CDOT Class B with a required field compressive strength of 4500 psi at 28 days, air content 5-8% total, and a water to cementitious material ratio maximum range of 0.45. Concrete shall also include a fibrous reinforcement in accordance with the City of Thornton Standards and Specifications.

Class D, H or P concrete may be substituted for Class B concrete with design mix approval from the OWNER. The coarse aggregate shall have a nominal maximum size of 3/4 inches or smaller.

All concrete mixes will be subject to inspection and tests as required to assure compliance with quality requirements

Joint Materials: Full depth (6" minimum) Pre-formed joint material shall be installed at all construction joints as well as between new concrete placements and existing driveways, service walks, and other structures as required.

Concrete Coating: The coating shall be self-priming, semi-opaque colored toner containing only methyl methacrylate ethyl acrylate copolymer resins. The toning pigments shall be suspended in solution at all times by a chemical suspension agent and solvent. The toning pigments shall be laminar silicates, titanium dioxide, and inorganic oxides. There shall be no settling or color variation. Use of vegetable or marine oils, paraffin materials, stearates, or organic pigments in any part of the coating formulation shall not be permitted.

Physical Properties	
Weight by Gallon	8.3 lbs, min.
Solids by Weight	30% min.
Sand (Silicone)	3.2 to 3.8 lbs/gallon (exclude at retaining walls with form liner finish)

Reinforcing Steel: Reinforcing steel shall be epoxy coated and meet the requirements of ASTM A775/A775M. Reinforcing steel may be grade 40 or 60.

Requirements:

Adding Water: CONTRACTOR will not be allowed to add water once a truck has begun to discharge its load. If the CONTRACTOR adds water it shall be done prior to beginning discharge of the truck. If water has been added at site it must be mixed a minimum of 30 revolutions and a maximum of 250 mixing revolutions.

Slump: If at any time the slump exceeds 4", the entire load may be rejected at no cost to the OWNER.

Finish: Concrete shall be finished with a medium broom finish with the direction of the broom strokes being perpendicular to the length of trail.

Any evidence of lack of consolidation or over-consolidation shall be regarded as sufficient reason for requiring the removal of the section involved and its replacement with new concrete at the CONTRACTOR's expense. The CONTRACTOR shall be responsible for any defects in the quality and appearance of completed WORK.

Rumble Strip: Where shown on the DRAWINGS, concrete surface shall have tooled scoring pattern. Pattern shall be tooled to neat dimensions as detailed in the DRAWINGS.

Concrete shall be at least fourteen (14) days old before the bonding agent and coating may be applied.

Within twenty-four (24) hours before the coating is applied, the concrete surfaces to be coated shall be hot water blasted at a minimum of three thousand (3,000) psi followed by a cold-water rinse to remove dirt, curing agents, form release agents, or other foreign substances that would be detrimental of the coating penetration or color.

All surfaces to be coated shall be clean, dry, and free of frost or other foreign substances at the time of application.

The coatings shall be applied to all exposed concrete elements above the ground line and shall extend a minimum of one (1) foot below the ground line or as shown on the DRAWINGS.

The coating shall be applied only when the ambient temperature is between forty degrees Fahrenheit (40°F) and ninety degrees Fahrenheit (90°F).

The coating shall be mixed by a mechanical mixer and shall be applied by spraying. A roller shall be used immediately after the spray application to obtain texture and fill minor voids as approved by ENGINEER. A brush may be used to apply coating to form liner finishes as approved by ENGINEER.

The process shall be applied uniformly in the following sequences:

1. Application of the first coat applied at a rate of forty-five (45) square feet per gallon, and eighty (80) square feet per gallon for the second coat.
2. The second coat shall not be applied until at least twelve (12) hours after application of the first coat, but not to exceed ninety-six (96) hours, or as recommended by the manufacturer.
3. Workmanship shall be such that the final coated surface is colored uniformly and presents a pleasing appearance.

Control Joints: All control joints along the trail and sidewalk shall be sawcut. Spacing for control joints for the trail shall be as shown on the DRAWINGS. Spacing for sidewalks control joints shall be as shown on the DRAWINGS.

Construction/Expansion Joints: Spacing for expansion joints for the trail shall be at all Construction joints and not to exceed 200-foot intervals, where pavement abuts existing pavements or structures, at all cold joints, or as designated by the OWNER.

Where concrete sidewalk abuts to existing concrete sidewalk, 18" long #6 tie bars shall be evenly spaced at 28" across the width of the sidewalk and be centered on the construction joint. These tie bars will be epoxy anchored into the existing sidewalk by means of drilling horizontally with a diameter as recommended by the epoxy manufacturer for the #6 rebar. The tie bars will be evenly spaced in the sidewalk so as to provide a minimum of 2 ½" of concrete cover on all sides.

Curing: Immediately upon completion of the finishing, sidewalks and bikeways shall be moistened and kept moist for three days, or they shall be cured by the use of membrane forming curing compound. The method and details of curing shall be subject to the approval of the OWNER.

Concrete shall not be left exposed for more than two (2) hours between the time finishing is completed and commencement of curing treatment unless otherwise approved by the OWNER.

During the curing period all traffic, both pedestrian and vehicular, shall be excluded. Vehicular traffic shall be excluded for such additional time as the OWNER may direct.

It shall be the CONTRACTOR's responsibility to protect the concrete from the elements, vandalism, and physical damage. Any concrete showing any signs of exposure to precipitation, flowing water or freezing, or showing any signs of physical damage shall be removed and replaced by the CONTRACTOR's expense.

Sections of concrete sidewalks, and concrete curb ramps which develop random cracking shall be removed and replaced, or repaired in a satisfactory manner approved by the OWNER, at the CONTRACTOR's expense.

Deviation from Design Slope: Deviation from design slope in any direction shall not exceed plus or minus 0.25%. Notwithstanding the foregoing, in no case shall deviation from design slope cause water to pond.

Surface Tolerance within Design Slope:

1. Deviation of Pavement in Longitudinal Direction: Except at curb and gutter transitions to inlets, the gap below a 10' straightedge resting longitudinally on high spots shall not exceed ¼". On tangent trail alignments and curves with a radius of greater than 1,000', and on sharp vertical curves and horizontal curves with radius of 1,000' or less, the total maximum allowable deflection shall be 0.25 inch from the edge of the straightedge with allowance made for curve deflection. Should the length of the longitudinal segment or segments being measured not accommodate a 10' straightedge, a shorter straightedge shall be used and the allowable gap shall be proportioned accordingly.
2. Deviation of Pavement in Transverse Direction: The gap below a 10' straightedge resting on high spots shall not exceed ¼". Should the width of the transverse direction being measured not accommodate a 10' straightedge, a shorter straightedge shall be used and the allowable gap shall be proportioned accordingly.
3. Deviation in Surface Tolerance of Ramps, Sidewalks, Curb and Gutter, and Intersection Cross Pans: In any direction, the gap below a 10' straightedge resting on high spots shall not exceed ¼". Should the length of the direction being measured not accommodate a 10' straightedge, a shorter straightedge shall be used and the allowable gap shall be proportioned accordingly.

Movement: Movement of ramps, sidewalks, curb and gutter, and intersection cross pan occurring after placement, but before the end of the Warranty Period:

1. Lateral, (horizontal) movement shall not exceed ¼" from original approved lines.

2. Differential settlement or heaving, in any direction, within a monolithic segment or between adjacent segments separated by a control joint, expansion joint, or construction joint, shall not exceed ¼” in any 10’ length.

Any concrete not within the ¼” tolerance shall be replaced or ground smooth at Thornton’s sole option, by the CONTRACTOR at no cost to Thornton. Notwithstanding the above, any settlement or heaving that causes water to pond shall be cause to remove and replace, or with Thornton’s approval to grind the concrete, to restore proper drainage.

Cracks: All concrete shall be installed with saw cut control joints meeting requirements of the Project SPECIFICATIONS and/or Thornton standards. Construction joints shall be saw cut. Joints shall be cut while concrete is still green and prior to the appearance of any shrinkage cracks and shall be made to a depth of at least ¼” of the total thickness of the concrete. Cracks of any size, width, or length that does not fall within the width of the saw cut control joint are not acceptable. All concrete panels or segments with cracks not within the saw cut joints shall be replaced by the CONTRACTOR at no cost to Thornton.

Damaged Concrete: All chipped, scratched, grooved, spalled, pitted, honeycombed, vandalized, or concrete damaged in any way shall be replaced by the CONTRACTOR at no additional cost to the OWNER.

Replacement of all Defective Concrete: All replaced concrete shall be uniformly tied horizontally and vertically into the existing concrete on each side of the replaced concrete section and shall adhere to all SPECIFICATIONS and tolerances. Removal of concrete for replacement shall be to the nearest existing control joint, construction joint, or expansion joint in either direction, or if prior approval is obtained from Thornton to a new saw cut joint; provided however, no resulting sidewalk or curb and gutter segments shall be less than 5’ from control joint to control joint in length. All edges shall be saw cut cleanly with no chips or spalling in existing concrete to remain. Saw cut edges shall be parallel and perpendicular to the existing work. Saw cut joints shall not over cut into existing material to remain. Should any concrete become chipped, cracked, or damaged in any way during removal, the CONTRACTOR shall remove and replace this damaged concrete back to the next control joint at no additional cost to Thornton. Curb and gutter replacement and segments shall be tied to existing curb and gutter on each side of the replaced segment with two (2) tie bars (#4 rebar x 2’ long), one (1) placed under the gutter section and one (1) placed under the curb section of the repair. These tie bars will be epoxy anchored into the existing curb and gutter by means of drilling horizontally a 1’ long hole with a diameter as recommended by the epoxy manufacturer for #4 rebar and anchoring the dowels in the hole using Hilti HY-150 or approved equal epoxy adhesive. The remaining 1’ of the dowel will be embedded in the replacement curb and gutter section. The tie bars will be evenly spaced in the pan section of the curb and gutter so as to provide a minimum of 2 ½” of concrete cover on all sides.

Reinforcing Steel: When rebar is placed in the WORK, the reinforcing bars shall be free from dirt, loose mill scale, paint, oil, loose rust, or other foreign substance.

Care shall be taken during the handling of rebar. Damaged epoxy coating shall be repaired with patching material conforming to ASTM A775/A775M in accordance with the material manufacturer’s recommendations. When rebar is cut in the field, the ends of the bars shall be coated with the patching material.

Unless otherwise shown on the plans, the minimum clear cover for reinforcing steel shall be the following, which is specified in ACI 301, Section 5.5:

1. Bottom bars on soil bearing foundations and slabs: three (3) inches.
2. Bars adjacent to exposed surfaces or earth backfill:

- a. For bars more than three-fourths (3/4) inch in diameter: two (2) inches.
 - b. For bars three-fourths (3/4) inch or less in diameter: one and one-half (1 1/2) inches.
3. Interior Surfaces: slabs, walls, joints with one and three-eighths (1-3/8) inch diameter or smaller: three-fourths (3/4) inch.

Measurement and Payment Procedures:

BID ITEM 32: Concrete Trail

BID ITEM 33: Concrete Park Bench Pad

BID ITEM 34: Concrete Finishing (Rumble Strip)

The measurement for payment of these items will be the total number of square yards of concrete placed, when constructed in accordance with the DRAWINGS and SPECIFICATIONS.

Finishing of the rumble strip including but not limited to; finishing and edging the concrete surface including tooled joints, finished edges, light broom finish, bonding agent and coating will be paid for as “Concrete Finishing (Rumble Strip)”.

The unit prices will include all of the CONTRACTOR’s costs. This BID item includes:

- Excavating and disposal of excess material and debris
- Sawcutting, removing, and disposing of all damaged and broken concrete, or other surface debris
- Subgrade fine grading and compaction
- Forming, furnishing and placing concrete, including vibrating or tamping
- Welded Wire Mesh and Fiber Mesh
- Finishing and edging the concrete surface including tooled joints, finished edges, and light broom finish, bonding agent and coating
- Furnishing, installing, and sealing expansion joints
- Sawcutting control joints
- Furnishing and applying curing compounds
- Backfilling including moisture conditioning, and compacting
- Providing hot and cold protection
- Protecting concrete from elements, vandalism, and physical damage.
- Protecting aboveground and underground utilities and service connections
- Providing all other related and necessary labor, equipment, and materials to complete the WORK

Payment will be based on units completed and accepted.

<u>Bid Item</u>	<u>Pay Unit</u>
Concrete Trail	SY
Concrete Park Bench Pad	SF
Concrete Finishing (Rumble Strip)	SY

Fiber mesh reinforcement and welded wire mesh will not be measured and paid for separately but shall be included in the WORK.

Reinforcing steel will not be measured and paid for separately but shall be included in the WORK.

SUBGRADE PREPARATION

Requirements:

The subgrade for concrete flatwork shall be compacted to 95% of standard proctor density for subgrade material classified as A-4 through A-7 according to AASHTO T-99 or 95% modified proctor density for material classification as A-1 through A-3. The moisture content of the subgrade shall be brought to within +/- 2% of optimum moisture content. If over excavation of base material is required to repair poor subgrade conditions (**Bid Item: Unsuitable Materials (Aggregate Base Course)**), the CONTRACTOR shall remove said material, after obtaining the OWNER's approval via written field order, and place and compact aggregate base course (**Class 6**) in layers not to exceed 6" loose measurement. The aggregate base course shall be compacted to 95% modified proctor density in accordance with AASHTO T180. The CONTRACTOR shall be paid the unit price per cubic yard of subgrade material removed and replaced with aggregate base course per the bid schedule. **Unsuitable Materials (Aggregate Base Course)** will only be used for repair of poor subgrade conditions, as approved by the OWNER and not for fine grading or water control. **A field order must be fully executed for payment for Unsuitable Materials (Aggregate Base Course).**

Fine grading material can be used by the CONTRACTOR, but will not be measured or paid for separately. If the CONTRACTOR proposes to utilize material other than native material for fine grading, the CONTRACTOR shall submit SPECIFICATIONS for such material for approval by the OWNER. In general, the material shall be clean and free from organic substances and be of suitable granular consistency. The fine graded material shall be placed on subgrade, which meets the project SPECIFICATIONS.

After the subgrade has been compacted, tested and found to meet specifications, the entire subgrade shall be proof-rolled with a heavily loaded vehicle. The vehicle shall have a certified loaded GVW of 50,000 pounds with a loaded single axle weight of at least 18,000 pounds and a tire pressure of 90 psi. Subgrade which is pumping or deforming must be reworked, replaced or otherwise modified to form a smooth, stable, non-yielding base for subsequent paving courses. The OWNER shall be notified at least 48 hours before final proof-rolling.

Measurement and Payment Procedures:

Subgrade preparation will not be measured and paid for separately and shall be included in the CONTRACTOR's cost for reconditioning, concrete trail, concrete curb ramp, concrete sidewalk, or other applicable pay item.

SAW CUTTING

Measurement and Payment Procedures:

Saw cutting of asphalt and concrete materials will be required for completion of this project. Saw cutting will not be paid for separately, but shall be considered incidental to the WORK.

Saw cutting of concrete pavements shall at the nearest contraction joint in full stone increments only. No partial stone replacement shall be permitted. Saw cuts shall be in a straight, true line with a vertical face. Sawing shall be done carefully, and damages to pavements to remain in place, which are caused by the CONTRACTOR's operations shall be repaired by the CONTRACTOR at his or her expense.

LIGHTING

This work includes but is not limited to the following:

- 20-ft tapered black steel pole by Valmont Industries or equal, grounded as required by NEC
- 23” x 48” concrete foundation flush with ground level
- Foundation certified by a structural engineer that the proposed foundation will be adequate to support the pole
- Anchor bolts, no base cover, no break away base, no mag chloride resistant finish
- LED Evolve Salem Post Top black luminaire by GE, 3000K or equal

Requirements:

Conduit, cable, pull box structures, and light pole foundations shall meet the requirements of Section 700 of the the City of Thornton’s standard specification.

Measurement and Payment Procedures:

BID ITEM 35: Trail Lighting (1 Light)

Measurement will be based on an estimated approximate percentage of the WORK completed and accepted. Measurement for payment will not be made for any labor, equipment, and materials required for this item. The lump sum price shall include all of the CONTRACTOR's costs. This BID item includes but is not limited to:

- Excavating and disposal of excess material and debris
- Furnishing and installing all parts and equipment including conduit, PVC sleeves, cable, pull boxes, poles, luminaires, etc.
- Subgrade fine grading and compaction
- Backfilling including moisture conditioning, and compacting
- Coordination with utility owners
- Disconnecting, reconnecting, and testing of power utility
- Protecting aboveground and underground utilities and service connections
- Providing all other related and necessary labor, equipment, and materials to complete the WORK
- 4” Schedule 80 sleeves at Station 2+90.

Payment will be based on the percentage of the Lump Sum price as the WORK is completed and accepted.

<u>Bid Item</u>	<u>Pay Unit</u>
Trail Lighting (1 Light)	LS

Conduit, cable, pull box structures, light poles, luminaires, light pole foundations, coordination with Xcel Energy, and fees from Excel Energy to supply power will not be measured and paid for separately but shall be included in the cost of the WORK.

TRAIL SIGNAGE

This WORK includes furnishing and installing ground signs in conformance with Section 700 of the City of Thornton’s SPECIFICATIONS.

Materials:

Sign posts shall conform to the City of Thornton’s standard details 700-11 and 700-12.

Sign panels shall conform to City of Thornton requirements for material composition and reflective sheeting. Items used in the fabrication, manufacturing, and installation of traffic control signing in the City shall be manufactured in the United States with domestic materials and parts. Domestic materials and parts are those which are melted, cast, formed, shaped, drawn, extruded, forged, fabricated, or otherwise processed in the United States using raw materials produced in the United States.

Sign Sizes and configuration shall conform to MUTCD 2009 edition, Part 9 for shared-use paths.

Requirements:

The CONTRACTOR shall, prior to installing sign support bases, contact utility agencies providing services, to locate buried services and to avoid damage when the base is installed. This shall include contacting the Utility Notification Center of Colorado.

Sign supports shall be straight in alignment with the trail and vertically straight from top and bottom. Bending of the support to achieve the vertical alignment shall not be permitted unless approved by the OWNER.

Sign installation shall conform to Section 704.5 of the City of Thornton Standards and Specifications.

Measurement and Payment Procedures:

BID ITEM 36: Sign Panel (Class I)

The measurement for payment for this item will be the square feet of facing placed in accordance with the DRAWINGS and SPECIFICATIONS or as otherwise directed by the OWNER. The unit price will include all of the CONTRACTOR's costs. This BID item includes:

- Furnishing, transporting, and installing all materials including signs, supports, paint, bracing, and necessary hardware
- Providing all other related and necessary labor, equipment, and materials to complete the WORK

Payment will be based on the units completed and accepted.

<u>Bid Item</u>	<u>Pay Unit</u>
Sign Panel (Class I)	SF

BID ITEM 37: Steel Sign Post

The measurement for payment for this item will be per each basis placed in accordance with the DRAWINGS and SPECIFICATIONS or as otherwise directed by the OWNER. The unit price will include all of the CONTRACTOR's costs. This BID item includes:

- Furnishing, transporting, and installing all materials including posts, supports, anchors, bracing, and necessary hardware
- Excavation and compaction
- Providing all other related and necessary labor, equipment, and materials to complete the WORK

Payment will be based on the units completed and accepted.

<u>Bid Item</u>	<u>Pay Unit</u>
Steel Sign Post	EA

BID ITEM 38: Trash Receptacle

The measurement for payment for this item will be per each trash receptacle placed, installed and approved in accordance with the DRAWINGS, SPECIFICATIONS, and manufacturer's recommendations, or as otherwise directed by the OWNER. The unit price will include all of the CONTRACTOR's costs. This BID item includes:

- Furnishing, transporting, and installing all materials necessary for installation
- Preparation of the site for installation
- Providing all other related and necessary labor, equipment, and materials to complete the WORK

Payment will be based on the units completed and accepted.

<u>Bid Item</u>	<u>Pay Unit</u>
Trash Receptacle	EA

CONSTRUCTION SURVEYING

This WORK consists of the construction surveying, calculating, and staking necessary for the construction of all elements of the project. The WORK shall be done under the supervision of a Professional Land Surveyor (PLS) or Professional Engineer (PE) who is experienced and competent in road and bridge construction surveying and licensed in the State of Colorado.

Surveyor shall immediately, upon discovery, notify the ENGINEER and/or OWNER of any discrepancies to the DRAWINGS.

Locating, preserving, referencing, installing and restoring land monuments such as Primary Control monuments from which the Right of way or any land boundary will be calculated, described or monumented, Public Land Survey System (PLSS) monuments, General Land Office (GLO) monuments, Bureau of Land Management (BLM) monuments, Mineral Survey (MS) monuments, Right of way (ROW) monuments, property boundary monuments, easement monuments, and other monuments that are required by law or regulation to be established by a PLS, and the determination of any land boundary, shall be done in accordance with Section 629, under the supervision of a Professional Land Surveyor (PLS) who is experienced and competent in Right of way and boundary surveying and licensed in the State of Colorado.

The PLS or PE shall be available to review work, resolve problems, and make decisions in a timely manner.

Materials:

The CONTRACTOR shall furnish all personnel, survey equipment, safety equipment, materials, and traffic control necessary to perform the required construction surveying and staking. All surveying equipment, including:

Electronic Distance Meters (EDM), total stations, theodolites, levels, rods, tapes, tripods, tribrachs, and Global Positioning System (GPS) receivers and equipment, shall be checked and calibrated in accordance with the CDOT Survey Manual, Chapter 6, Section 6.1.10, and documented in the survey records prior to the start of WORK and every six months thereafter.

EDM and total stations shall be checked and calibrated on a National Oceanic and Atmospheric Administration/ National Geodetic Survey (NOAA / NGS) calibrated baseline in accordance with the CDOT Survey Manual, Chapter 2, Section 2.1 and 2.2, and documented in the survey records prior to the start of WORK and every six months thereafter.

GPS receivers and equipment shall be checked and calibrated on a NOAA / NGS calibrated baseline in accordance with the CDOT Survey Manual Chapter 3, Section 3.3, and documented in the survey records prior to the start of WORK and every six months thereafter.

Levels shall be checked and calibrated in accordance with the CDOT Survey Manual, Chapter 6, Section 6.4.5, and Chapter 5, Section 5.9.12, and documented in the survey records prior to the start of any level circuit.

If any survey equipment is found to be functioning outside the manufacturer's specified tolerance, certification from an approved repair facility showing that the instruments have been repaired, properly adjusted, or both if necessary, shall be included in the survey records and submitted to the OWNER before being used.

The CONTRACTOR is responsible for providing all necessary Traffic Control to complete the survey at no additional cost to the project.

Requirements:

CONTRACTOR Surveying: The CONTRACTOR shall perform all construction surveying and staking that is necessary for construction of the project. Construction surveying and staking shall be based on the Primary Control established by the Project. The CONTRACTOR shall check all Project established Primary horizontal and vertical control points and verify and document in the survey records their horizontal accuracy tolerance.

Changes: All changes in lines and grades required by field conditions and all discrepancies in grades, alignment, location or dimensions detected by the CONTRACTOR shall be immediately submitted to the OWNER in writing. No changes in given data or plans will be allowed unless approved by the OWNER in writing. All changes shall be documented in the survey records.

All survey records generated shall be the property of the City of Thornton.

Measurement and Payment Procedures:

BID ITEM 39: Construction Surveying

No separate measurement for payment will be made for any labor, equipment, and materials required for this item. The lump sum price will include all of the CONTRACTOR's costs. This BID item includes, but is not limited to:

- Staking horizontal and vertical alignments
- Providing cut sheets to the OWNER or OWNER's representative
- Providing replacement stakes
- Locating existing utilities
- Staking overlot grading as required
- Setting subgrade elevations and offsets
- Setting temporary control points
- Re-establishing land monuments
- Finishing grades and structure elevations by a Professional Licensed Surveyor, as required, for record or as-built DRAWINGS
- Finishing grades and elevations by a Professional Licensed Surveyor, as required, for Pond Volume Certification as required
- Providing all other related and necessary labor, equipment, and materials to complete the WORK

Payment will be based on the percentage of the Lump Sum price as the WORK is completed and accepted.

<u>Bid Item</u>	<u>Pay Unit</u>
Construction Surveying	LS

MOBILIZATION

This WORK consists of the mobilization of personnel, equipment and supplies at the project site in preparation for WORK on the project. This item shall also include 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.

Staging is available within the limits of disturbance presented on the DRAWINGS. If additional staging is required, the CONTRACTOR may coordinate with other neighboring owners and is responsible for all coordination, protection, and restoration of the area. The CONTRACTOR will be required to provide erosion and sediment control BMP's for additional staging areas and will be required to restore the areas back to original conditions. All work and materials required for staging areas shall be considered incidental to mobilization.

Measurement and Payment Procedures:

BID ITEM 40: Mobilization

1. The Pay Item price for mobilization shall also include any "start up" or incidental costs necessary to begin the WORK, including any necessary Construction Equipment, offices, buildings, Materials or Equipment, personnel that are to be located at the Project site in preparation for the WORK, Bonds, Insurance, permits, and any other incidental expenses that cannot otherwise be attributed directly to the other Bid Proposal Pay Items.

2. Payments for mobilization shall be made in accordance with the following formula:

CONTRACT Amount Completed		Mobilization Paid
5%	=	25%
10%	=	50%
25%	=	60%
50%	=	100%

3. The overall Pay Item price for mobilization should not exceed ten percent (10%) of the original CONTRACT Price. If the overall Pay Item price for mobilization exceeds ten percent (10%), and if the City of Thornton does not reject the Bid, Thornton shall have the option of withholding payment of the amount exceeding ten percent (10%) of the CONTRACT Price until the date of Final Payment.

<u>Bid Item</u>	<u>Pay Unit</u>
Mobilization	LS

PAVEMENT MARKING

This WORK consists of furnishing and applying pavement marking in accordance with Section 705 of the City of Thornton Standards and Specifications, Section 627 of the CDOT Standards and Specifications, the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD), and in conformity to the lines, dimensions, patterns, locations and details shown on the plans or established.

Materials:

Epoxy pavement marking materials shall meet the requirements of Section 713.17 of the CDOT Standards and Specifications

Requirements:

The modified epoxy pavement marking compound shall be applied with equipment that will precisely meter the two components in the ratio given in subsection 713.17(a). The equipment shall automatically shut off or warn the operator if one component is not being mixed. The equipment shall produce the required amount of heat at the mixing head and gun tip to provide and maintain the temperatures specified.

Before mixing, the individual components A and B shall each be heated to a temperature of 80 to 140 °F. After mixing, the application temperature for the combined material at the gun tip shall be 80 to 140 °F. The 140 °F upper limit is the maximum temperature under any circumstances.

Both pavement and air temperatures shall be at least 35 °F at the time of modified epoxy pavement marking application.

The surface areas of new portland cement concrete pavement and decks that are to receive markings shall be water blasted prior to placement of the modified epoxy pavement marking. The amount of water blasting shall be sufficient to remove all dirt, laitance, and curing compound residue.

The surface areas of new asphalt pavement, existing asphalt pavement, and existing concrete pavement that are to receive markings shall be cleaned with a high pressure air blast to remove loose material prior to placement of the modified epoxy pavement marking. Should any pavement become dirty, from tracked mud etc. as determined by the Engineer, it shall be cleaned prior to the placement of the modified epoxy pavement marking.

When recommended by the modified epoxy manufacturer, a high pressure water blast integrated into the gun carriage shall be used to clean the pavement surface prior to modified epoxy pavement marking application. The water blast shall be followed by a high pressure air blast to remove all residual water, leaving only a damp surface.

Modified epoxy pavement marking shall be applied to the road surface according to the modified epoxy manufacturer's recommended methods at the application rate or coverage shown below. Glass beads shall be applied into the modified epoxy pavement marking by means of a low pressure, gravity drop bead applicator.

Modified epoxy pavement marking and beads shall be applied within the following limits:

**Application Rate or Coverage
Per Gallon of Modified Epoxy Pavement Marking**

	Minimum	Maximum
18 mil Marking:	85 sq. ft.	90 sq. ft.
Beads:	23 lbs.	

Measurement and Payment Procedures:

BID ITEM 41: Epoxy Pavement Marking

The measurement for payment of these items will be the total number of square feet of pavement marking when constructed in accordance with the DRAWINGS and SPECIFICATIONS. The unit price will include all of the CONTRACTOR's costs. This BID item includes:

- Surface preparation in accordance with the specifications and manufacturer's specifications or recommendations
- Furnishing and proper storage of material
- Mixing of pavement marking mixture components
- Layout of pavement markings
- Providing all other related and necessary labor, equipment, and materials to complete the WORK

Payment will be based on units completed and accepted.

<u>Bid Item</u>	<u>Pay Unit</u>
Epoxy Pavement Marking	SF

RESTORATION OF EXISTING CONDITIONS

Requirements:

The CONTRACTOR is responsible for promptly restoring the existing landscaping, repairing damaged sprinkler systems, adjust existing sprinkler systems, and/or replacing any existing improvements that were damaged or displaced during construction. The CONTRACTOR shall repair all damaged or displaced sprinkler systems to working condition within five (5) consecutive days of disruption to service. All cost associated with this work shall be considered incidental to the CONTRACT. Should the CONTRACTOR fail to repair damaged sprinkler systems within five (5) consecutive days from the date of disruption, the OWNER reserves the right to have sprinkler systems repaired by others and deduct these payments from the CONTRACTOR'S contract as well as the cost for any additional damaged items due to not meeting this requirement. Irrigation systems may not be owned by the project OWNER and it is the CONTRACTOR's responsibility to appropriately coordinate with the private owner of the irrigation system.

Measurement and Payment Procedures:

Restoration of existing conditions will not be measured and paid for separately and shall be included in the CONTRACTOR's cost of the WORK.

CLEAN UP

Requirements:

The ***CONTRACTOR shall provide access and general construction controls such as vehicle tracking control at all entrance and exit points at the construction site.*** CONTRACTOR shall clean-up the area and roadways in which they work during that day at the end of the work day and prior to leaving the site for the night. If track-out from the site has occurred, it shall be cleaned up as soon as is reasonable, but no later than the end of the work day, including street sweeping as necessary at no COST to the OWNER.

Measurement and Payment Procedures:

Clean up will not be measured and paid for separately and shall be included in the CONTRACTOR's cost of the WORK.

CONSTRUCTION ZONE TRAFFIC CONTROL

This WORK consists of furnishing, installing, moving, maintaining, and removing temporary traffic signs, advance warning arrow panels, flashing beacon (portable), barricades, channelizing devices, delineators, temporary traffic signals, temporary portable rumble strips, mobile pavement marking zones, temporary emergency pull-off areas, masking and unmasking existing signs in construction zones, and concrete barriers as required by the Manual on Uniform Traffic Control Devices for Streets and Highways and the Colorado Supplement thereto, in accordance with the CONTRACT. Devices shall comply with the performance criteria contained in NCHRP Report 350 (only applicable for devices developed prior to 2011) or MASH (acceptable for all devices). Devices temporarily not in use shall, as a minimum, be removed from the shoulder area. Moving will include devices removed from the project and later returned to use.

Materials:

All materials used for construction zone traffic control shall be in accordance with CDOT Section 630.

Requirements:

The CONTRACTOR shall develop an individual Traffic Control Plan (TCP) and supporting Method of Handling Traffic (MHT) for each of the locations included in the CONTRACT to be approved by the CITY prior to starting construction. Individual Traffic Control Permits will be issued for each respective location included in the CONTRACT. The CONTRACTOR shall submit all TCP's and MHT's to the CITY for approval within 10 Days after formal Award of the CONTRACT. Failure of the CONTRACTOR to submit detailed, comprehensive and clearly legible TCP's and MHT's will constitute grounds for rejection of TCP's and MHT's without extensive elaboration or comment from the CITY. The CITY will return approved or "redlined" TCP's and MHT's to the CONTRACTOR within 5 Days from receipt of the submittal. The CONTRACTOR shall then present final corrected TCP's and MHT's to the CITY for final approval and issuance of a Traffic Control Permit.

Pedestrian movements shall also be fully addressed in the TCP and MHT submittals. No plan will be approved that unreasonably impedes or restricts pedestrian movements. No devices required for the implementation of the CONTRACT requirements will be permitted to be installed on or above sidewalk surface areas unless otherwise approved by the CITY in the respective MHT.

When a roadway is restricted to one lane of traffic, the CONTRACTOR shall coordinate access to the construction zone at private driveways to ensure that traffic does not enter into one-way traffic in the wrong direction.

The CONTRACTOR shall also obtain traffic control permits as required by other municipal, county or state agencies when the WORK requires traffic control devices to be installed within the limits of their respective jurisdictions. The CONTRACTOR shall contact other appropriate municipalities at least seventy-two (72) hours before starting WORK in any areas that will affect or change traffic flow within other jurisdiction(s). The CONTRACTOR shall obtain approval from the respective responsible representative of other jurisdictions for any lane or street closure, or any change or interruption of the flow of traffic within that respective City. If the CONTRACTOR desires to revise the approved TCP or MHT as a result of comments received from other jurisdictions, the CONTRACTOR shall submit such revisions to the CITY and allow one (1) week for review and comment. The CITY will approve a plan that, in his judgment, provides adequately for the safety and convenience of the public and provides the same or greater service as the previously approved plan.

The CONTRACTOR shall work only between the hours of 8:30 a.m. and 3:30 p.m. on Arterial and Collector streets, with the stipulation that only one direction of travel be interrupted at any given time unless working in median areas. Active traffic control devices shall be installed and removed between the hours of 8:30 a.m. and 3:45 p.m. The CONTRACTOR must maintain at least one (1) lane of traffic in each direction as well as a median lane for left turn movements on all Collector and Arterial Streets unless otherwise approved by the CITY and incorporated into an approved MHT. Business access closures may only occur on Monday through Thursday for duration not to exceed 2 hours before reopening each access. Businesses must have at least one access point open during construction. Requests for other hours, special conditions or time allowances will be subject to approval by the CITY. Separate turn lanes will be required at all signalized intersections during the course of construction at intersections.

The CONTRACTOR shall notify the project construction coordinator at least two weeks in advance of the need for a uniformed police officer for traffic control during paving or excavation at any signalized intersection when his operations require either his equipment or the public to operate contrary to the signals. The uniformed police officer will be supplied at the CITY's expense. The contract coordinator shall notify the Thornton Police Department of the need for a uniformed police office for traffic control. The CONTRACTOR shall coordinate the electrical "shut-down" of the respective signal operation by the CITY. CONTRACTOR's personnel shall **NOT** direct traffic through a signalized intersection. All CONTRACTOR personnel on site, including superintendents and principals, are required to wear a visible safety vest in conformance with the MUTCD.

Drums shall be placed at a maximum spacing of ninety (90) feet. Each barricade shall be furnished with two steady-burn beacons. Other construction traffic control devices shall be used where applicable.

The CONTRACTOR will not be permitted to have construction equipment, personal vehicles, or materials in the lanes open to traffic unless permitted by the CITY. The CONTRACTOR is cautioned that all personal vehicle and construction equipment parking will be prohibited where it conflicts with safety, access, or flow of traffic at any time. Personal vehicle and construction equipment parking will be prohibited on all private lots without the respective property owner's permission.

Traffic lanes through construction areas shall be maintained as shown on the approved traffic control plans or with a clear width of at least eleven (11) feet per lane. When directed by the CITY, the CONTRACTOR shall provide and maintain an acceptable temporary asphalt surface for temporary roads or driveways. Temporary surfacing shall conform to the applicable portions of Section 400 of the SSRBC.

In the event there is a violation of the working hours limitations or any other Traffic Control requirement, the CONTRACTOR will automatically be subject to a "Stop Work Order" immediately. Work shall not resume until the CONTRACTOR assures the CITY, in writing, that there will not be a reoccurrence of the violation. In the event more violations take place, there will be an Incident Credit issued to the CITY for each incident.

"No Parking" signs shall be placed not less than forty-eight (48) hours in advance of any temporary on-street parking restrictions and shall conform to the requirements listed under the section titles Legal Relations and Responsibilities to the Public. During non-construction periods (evenings, weekends, holidays, etc.), all WORK shall be adequately protected to ensure the safety of vehicular and pedestrian traffic. Open trenches during non-construction periods are not permitted. The CONTRACTOR must periodically check on the condition of traffic control devices that may be utilized during the course of the Project on weekends or holidays as may be warranted to ensure that devices that are damaged or moved during non-Work hours are restored in an expedient fashion.

Measurement and Payment Procedures:

BID ITEM 42: Construction Zone Traffic Control

All construction Traffic Control shall be measured on a lump sum basis. The traffic control plans provide in the DRAWINGS are a recommendation only and the CONTRACTOR shall be responsible for developing the actual traffic control plan to be submitted to the City for a traffic control permit.

Traffic Control shall be paid for by one lump sum as listed on the respective Bid Proposal Form. The CONTRACTOR can base their lump sum cost on the traffic control tabulations provided in the DRAWINGS but shall include any additional traffic control items the CONTRACTOR anticipates will be necessary to complete the WORK including controlling access to private properties when a roadway is restricted to one lane. The CONTRACTOR shall be aware that the traffic control plans and tabulations presented on the DRAWINGS are only a suggestion and are for information only. Payment for all traffic control devices, personnel, equipment, material and any other related expense for traffic control shall be included in the lump sum Bid unit price for Traffic Control and will be based on the CONTRACTOR's approved Traffic Control Plans.

Payment for the traffic control necessary to complete the WORK shall be full compensation for furnishing, erecting, cleaning, maintaining, resetting, repairing, replacing, moving, removing, and disposing of the construction traffic control devices. All construction traffic control devices that are not permanently incorporated into the project will remain the property of the CONTRACTOR.

Temporary pavement marking required for Traffic Control and the removal of temporary pavement marking for Traffic Control will not be paid for separately but shall be considered incidental to the Lump Sum Price for "Traffic Control".

Payment will be based on the percentage of the Lump Sum price as the WORK is completed and accepted.

CONTRACT Amount Completed		Traffic Control Paid
25%	=	33%
50%	=	66%
Initial acceptance	=	100%

Payment will be made under:

<u>Bid Item</u>	<u>Pay Unit</u>
Construction Zone Traffic Control	LS