

Standard Specifications Manual

SERIES 100 – EARTHWORK
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Item No.

- 101 Preparing Right of Way
- 102 Clearing and Grubbing
- 104 Removing Portland Cement Concrete
- 110 Street Excavation
- 111 Excavation
- 120 Channel Excavation
- 130 Borrow
- 132 Embankment

**ITEM NO. 101
PREPARING RIGHT OF WAY**

101.1 Description

This item shall govern the preparation of the right of way for construction operations by removal and disposal of all obstructions from the right of way and from designated easements, where removal of such obstructions is not otherwise indicated as a separate pay item.

Such obstructions shall be considered to include remains of houses not completely removed by others, foundations, floor slabs, concrete, brick, lumber, plaster, cisterns, water wells, septic tanks and drain fields, basements; abandoned utility pipes, conduits, underground service station tanks, fences, retaining walls, outhouses, shacks and all other debris.

This item shall also include the removal of trees, stumps, roots, bushes, shrubs, curb and gutter, driveways, paved parking areas, miscellaneous stone, brick, sidewalks, drainage structures, manholes, inlets, abandoned railroad tracks, scrap iron, and all rubbish and debris whether above or below ground. Care should be taken to identify and protect existing infrastructure.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text the inch-pound units are given preference followed by SI units shown within parentheses.

101.2 Submittals

The submittal requirements of this specification item may include:

- A. A permit when utility adjustments are made in right-of-way, and
- B. A plan for removal and deposition of all non-salvageable materials and debris.

101.3 Construction Methods

Prior to commencement of this work, all required erosion controls and tree protection measures shall be in place. Existing utilities shall be located and protected or as specified on the Drawings.

Areas within the construction limits shall be cleared of all obstructions, abandoned structures, and other items as defined above. All vegetation, except trees or shrubs indicated for preservation, shall also be removed. Trees and shrubs, which are scheduled for preservation, shall be carefully trimmed as directed by the City Forestry Manager and shall be protected from scarring, barking or other injuries during construction operations in accordance with Item No. 610, " Preservation of Trees and Other Vegetation". All exposed cuts, exposed ends of pruned limbs or scarred bark shall be treated as required by, and in accordance with specifications approved by, the City Forestry Manager.

Construction equipment shall not be operated nor construction materials stockpiled under the canopies of trees, unless otherwise allowed by the City Forestry Manager.

Excavation or embankment materials shall not be placed within the drip line of trees until tree wells are constructed as approved by the City Forestry Manager.

Culverts, storm sewers, manholes and inlets shall be removed in proper sequence for maintenance of traffic and drainage.

Unless otherwise indicated on the Drawings and/or Contract Documents, all underground obstructions, stumps and roots shall be removed to the following depths:

1. In areas to receive 6 inches (150 mm) or more embankment, a minimum of 12 inches (300 mm) below natural ground.
2. In areas to receive less than 6 inches (150 mm) of embankment, a minimum of 18 inches (450 mm) below the lower elevation of embankment, structure or excavation.
3. In areas to be excavated a minimum of 18 inches (450 mm) below the lower elevation of the embankment, structure or excavation.
4. In all other areas, a minimum of 12 inches (300 mm) below natural ground.

Holes remaining after removal of all obstructions, objectionable material, trees, stumps, etc. shall be backfilled with select embankment material and compacted by approved methods.

When a utility in service conflicts with the construction, it shall be modified as approved by the City Engineer or as specified on the Drawings.

Where an abandoned underground piped utility is found, it shall be cut and plugged with 6 inches (150 mm) of concrete (in accordance with Specification Item 403, "Concrete for Structures") brick and mortar (in accordance with Specification Item 506, "Manholes"), a precast stopper grouted in place, or equal approved by the Engineer.

101.4 Measurement

The preparation of right of way for new construction, when included in the contract as a pay item, will be measured by the acre (hectare: 1 hectare equals 2.471 acres), 100 foot (100 feet equals 30.5 meters) stations or lump sum, regardless of the width of the right of way.

Measurement for payment will be made only on areas indicated and classified as "Preparing Right of Way".

101.5 Payment

This item will be considered subsidiary to [Item No. 110](#), "Street Excavation", [Item No. 111](#), "Excavation", [Item No. 120](#), "Channel Excavation" and [Item No. 132](#), "Embankment" unless included as a separate pay item in the contract. When included for payment, it shall be paid for at the contract bid price for "Preparing Right of Way". This price shall include full compensation for work herein specified, including the furnishing of all materials, equipment, tools, labor and incidentals necessary to complete the work.

Payment, when included as a contract pay item, will be made under one of the following:

- Preparing Right of Way - Per Acre.
- Preparing Right of Way - Per 100 foot Station.
- Preparing Right of Way - Per Lump Sum.

End

<u>SPECIFIC</u> CROSS REFERENCE MATERIALS
Specification Item 101, "PREPARING RIGHT-OF-WAY"

City of Round Rock Standard Specifications

<u>Designation</u>	<u>Description</u>
Item No. 110	Street Excavation
Item No. 111	Excavation
Item No. 120	Channel Excavation
Item No. 132	Embankment
Item No. 403	Concrete for Structures
Item No. 506	Manholes
Item No. 610	Preservation of Trees and Other Vegetation

<u>RELATED</u> CROSS REFERENCE MATERIALS
Specification Item 101, "PREPARING RIGHT-OF-WAY"

City of Round Rock Standard Specifications

<u>Designation</u>	<u>Description</u>
Item No. 102	Clearing and Grubbing
Item No. 104	Removing Portland Cement Concrete
Item No. 201	Subgrade Preparation
Item No. 203	Lime Treatment for Materials In Place
Item No. 204	Portland Cement Treatment for Materials In Place
Item No. 230	Rolling (Flat Wheel)
Item No. 232	Rolling (Pneumatic Tire)
Item No. 234	Rolling (Tamping)

RELATED CROSS REFERENCE MATERIALS- (continued)

Specification Item 101, "PREPARING RIGHT-OF-WAY"

City of Round Rock Standard Specifications

<u>Designation</u>	<u>Description</u>
Item No. 236	Rolling (Proof)
Item No. 602	Sodding for Erosion Control
Item No. 604	Seeding for Erosion Control
Item No. 622	Diversion Dike
Item No. 628	Sediment Containment Dikes
Item No. 642	Silt Fence

Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges

<u>Designation</u>	<u>Description</u>
Item No. 100	Preparing Right of Way
Item No. 110	Excavation
Item No. 112	Subgrade Widening

Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges – Continued

<u>Designation</u>	<u>Description</u>
Item No. 132	Embankment
Item No. 150	Blading
Item No. 158	Specialized Excavation Work
Item No. 160	Furnishing and Placing Topsoil
Item No. 164	Seeding for Erosion Control

Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges

<u>Designation</u>	<u>Description</u>
Item No. 204	Sprinkling
Item No. 210	Rolling (Flat Wheel)
Item No. 211	Rolling (Tamping)
Item No. 213	Rolling (Pneumatic Tire)
Item No. 260	Lime Treatment for Materials Used as Subgrade (Road Mixed)
Item No. 265	Lime-Fly Ash (LFA) Treatment for Materials Used as Subgrade

RELATED CROSS REFERENCE MATERIALS- continued

Specification Item 101, "PREPARING RIGHT-OF-WAY"

Texas Department of Transportation: Manual of Testing Procedures

<u>Designation</u>	<u>Description</u>
Tex-103-E	Determination of Moisture Content of Soil Materials
Tex-104-E	Determination of Liquid Limit of Soils
Tex-105-E	Determination of Plastic Limit of Soils
Tex-106-E	Method of Calculating the Plasticity Index of Soils
Tex-114-E	Laboratory Compaction Characteristics and Moisture-Density Relationship of Subgrade & Embankment Soil
Tex-115-E	Field Method for Determination of In-Place Density of Soils and Base Materials

ITEM NO. 102 CLEARING AND GRUBBING

102.1 Description

This item shall govern the removal and disposal of all trees, stumps, brush, roots, shrubs, vegetation, logs, rubbish and other objectionable material.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text the inch-pound units are given preference followed by SI units shown within parentheses.

102.2 Submittals

The submittal requirements of this specification item may include:

- A. A permit when utility adjustments are made in the right-of-way, and
- B. A plan for removal and deposition of all clearing and grubbing materials and debris.

102.3 Construction Methods

Prior to commencement of this work, all required erosion control and tree protection measures shall be in place. Existing utilities shall be located and protected or as indicated on the Drawings.

Areas within the construction limits indicated on the Drawings shall be cleared of all trees, stumps, brush, etc., as defined in section 102.1; except trees or shrubs scheduled for preservation which shall be carefully trimmed as directed by the City Forestry Manager, and shall be protected from scarring, barking or other injuries during construction operations in accordance with Item No. 610, " Preservation of Trees and Other Vegetation". All exposed cuts, exposed ends of pruned limbs or scarred bark shall be treated as required by, and in accordance with specifications approved by, the City Forestry Manager.

Construction equipment shall not be operated nor construction materials stockpiled under the canopies of trees, unless otherwise allowed by the City Forestry Manager. Excavation or embankment materials shall not be placed within the drip line of trees until tree wells are constructed as approved by the City Forestry Manager.

Within the construction limits or areas indicated, all obstructions, stumps, roots, vegetation, abandoned structures, rubbish and objectionable material shall be removed to the following depths:

1. In areas to receive 6 inches (150 mm) or more embankment, a minimum of 12inches (300 mm) below natural ground.
2. In areas to receive embankment less than 6 inches (150 mm), a minimum of 18 inches (450 mm) below the lower elevation of embankment, structure or excavation.
3. In areas to be excavated a minimum of 18 inches (450 mm) below the lower elevation of the embankment, structure or excavation.

4. In all other areas a minimum of 12 inches (300 mm) below natural ground.

Holes remaining after removal of all obstructions, objectionable material, trees, stumps, etc. shall be backfilled with select embankment material and compacted by approved methods. All cleared and grubbed material shall be disposed of properly. Unless otherwise provided, all materials as described above shall become the property of the Contractor and removed from the site and disposed of at a permitted disposal site.

102.4 Measurement

"Clearing and Grubbing", when included in the contract as a pay item, will be measured by the acre (hectare: 1 hectare is equal to 2.471 acres), 100 foot (100 feet is equal to 30.5 meters) stations or lump sum, regardless of the width of the right of way.

102.5 Payment

This item will be considered subsidiary to [Item No. 110](#), "Street Excavation" or [Item No. 111](#), "Excavation", unless included as a separate pay item in the contract. When included for payment, it shall be paid for at the unit bid price for "Clearing and Grubbing". This price shall include full compensation for all work herein specified, including the furnishing of all materials, equipment, tools, labor and incidentals necessary to complete the Work.

Payment, when included as a contract pay items, will be made under one of the following:

Clearing and Grubbing	Per Acre.
Clearing and Grubbing	Per 100 foot Station.
Clearing and Grubbing	Lump Sum.

End

<i>SPECIFIC</i> CROSS REFERENCE MATERIALS
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Specification Item 102, "CLEARING AND GRUBBING"

City of Round Rock Standard Specifications

<u>Designation</u>	<u>Description</u>
Item No. 110	Street Excavation
Item No. 111	Excavation
Item No. 610	Preservation of Trees and Other Vegetation

RELATED CROSS REFERENCE MATERIALS

Specification Item 102, "CLEARING AND GRUBBING"

City of Round Rock Standard Specifications

<u>Designation</u>	<u>Description</u>
Item No. 101	Preparing Right of Way
Item No. 104	Removing Portland Cement Concrete
Item No. 120	Channel Excavation
Item No. 132	Embankment
Item No. 201	Subgrade Preparation
Item No. 203	Lime Treatment for Materials In Place
Item No. 204	Portland Cement Treatment for Materials In Place
Item No. 230	Rolling (Flat Wheel)
Item No. 232	Rolling (Pneumatic Tire)
Item No. 234	Rolling (Tamping)
Item No. 236	Rolling (Proof)
Item No. 602	Sodding for Erosion Control
Item No. 604	Seeding for Erosion Control
Item No. 622	Diversion Dike
Item No. 628	Sediment Containment Dikes
Item No. 642	Silt Fence

Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges

<u>Designation</u>	<u>Description</u>
Item No. 100	Preparing Right of Way
Item No. 110	Excavation
Item No. 112	Subgrade Widening
Item No. 132	Embankment
Item No. 150	Blading
Item No. 158	Specialized Excavation Work
Item No. 160	Furnishing and Placing Topsoil
Item No. 164	Seeding for Erosion Control
Item No. 204	Sprinkling
Item No. 210	Rolling (Flat Wheel)
Item No. 211	Rolling (Tamping)
Item No. 213	Rolling (Pneumatic Tire)
Item No. 260	Lime Treatment for Materials Used as Subgrade (Road Mixed)
Item No. 265	Lime-Fly Ash (LFA) Treatment for Materials Used as Subgrade

RELATED CROSS REFERENCE MATERIALS - continued

Specification Item 102, "CLEARING AND GRUBBING"

Texas Department of Transportation: Manual of Testing Procedures

<u>Designation</u>	<u>Description</u>
Tex-103-E	Determination of Moisture Content of Soil Materials
Tex-105-E	Determination of Plastic Limit of Soils
Tex-106-E	Method of Calculating the Plasticity Index of Soils
Tex-114-E	Laboratory Compaction Characteristics and Moisture Density Relationship of Subgrade & Embankment Soil
Tex-115-E	Field Method for Determination of In-Place Density of Soils and Base Materials

ITEM NO. 104 REMOVING PORTLAND CEMENT CONCRETE

104.1 Description

This item shall govern the demolition, removal and satisfactory disposal of existing Portland cement concrete, as classified, when encountered or at locations indicated on the Drawings.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text inch-pound units are given preference followed by SI units shown within parentheses.

104.2 Submittals

The submittal requirements of this specification item may include:

- A. A permit when utility adjustments are made in the right-of-way, and
- B. A plan for removal and deposition of all 'broken up' existing Portland cement (p.c.) concrete materials and debris.

104.3 Classification

Existing Portland cement concrete, when removed under this section, will be classified as follows:

1. Concrete Curb will include curb, curb and gutter and combinations thereof,
2. Concrete Slabs will include, but not be limited to, house slabs, patio slabs, porch slabs, concrete riprap and concrete pavement,
3. Sidewalks and Driveways will include concrete sidewalks and driveways,
4. Concrete Walls will include all walls, regardless of height, and wall footings,
5. Concrete Steps will include all steps and combinations of walls and steps,
6. Abandoned Foundations will include abandoned utility foundations,
7. Miscellaneous Concrete shall include all other concrete items, which are not identified in items 1 through 6 above.

104.4 Materials

Mortar shall conform to mortar specified in Standard Specification [Item No. 403](#), "Concrete for Structures".

104.5 Construction Methods

Prior to commencement of this work, all required erosion control and tree protection measures shall be in place. Existing utilities shall be located and protected.

The existing Portland cement concrete shall be broken up, removed in accordance with [Item No. 101](#), "Preparing Right of Way" and disposed of at a permitted disposal site.

When it is specified that only a portion of the existing Portland cement (p.c.) concrete is to be removed and that the remaining p.c. concrete will continue to serve its purpose, special care shall be exercised to avoid damage to that portion which will remain in place. Unless otherwise approved by the Engineer, existing p.c. concrete shall be cut to the neat lines, that are indicated on the Drawings, by sawing with an appropriate type circular type circular concrete saw to a minimum depth of ½ inch (12.5 mm). Any reinforcing steel encountered shall be cut off 1 inch (25 mm) inside of p.c. concrete sawed line. Any existing p.c. concrete, which is damaged or destroyed beyond the neat lines so established, shall be replaced at the Contractor's expense. Remaining p.c. concrete shall be mortared to protect the reinforcing steel and provide a neat clean appearance.

When reinforcement is encountered during the removal of portions of existing structures to be modified, a minimum of 1 foot (300 mm) of steel length shall be cleaned of all old p.c. concrete and left in place to tie into the new construction where applicable. All unsuitable material shall be removed and replaced with approved material. All foundations, walls or other objectionable material shall be removed to a minimum depth of 18 inches (450 mm) below all structures and 12 inches (300 mm) below areas to be vegetated.

104.6 Measurement

The removal of p.c. concrete curb and p.c. concrete wall as prescribed above will be measured by the lineal foot (meter: 1 meter is equal to 3.281 feet) in its original position regardless of the dimensions or size. The removal of p.c. concrete slabs, p.c. concrete sidewalks and driveways, as prescribed above, will be measured by the square foot (square meter: 1 square meter is equal to 10.764 square feet) in original position, regardless of the thickness and existence of reinforcing steel. Portland cement concrete steps removed will be measured per lineal foot (meter: 1 meter is equal to 3.281 feet) of each individual step tread including the bottom step. The removal of p.c. concrete foundations will be measured per each individual foundation. The removal of miscellaneous concrete will be measured per each.

104.7 Payment

This item will generally be considered as subsidiary to specification items [110](#), "Street Excavation", [111](#), "Excavation", [120](#), "Channel Excavation" and [132](#), "Embankment". When included for payment the item will be paid for at the contract unit bid price(s) for "Remove P.C. Concrete Curb", "Remove P.C. Concrete Slab", "Remove P.C. Concrete Sidewalks and Driveways", "Remove P.C. Concrete Walls", "Remove P.C. Concrete Steps", "Remove P.C. Concrete Foundations" and "Remove Miscellaneous P.C. Concrete". The bid prices shall include full compensation for all Work herein specified, including the disposal of all material not required in the Work, the furnishing of all materials, equipment, tools, labor and incidentals necessary to complete the Work.

Payment will be made under one of the following:

Remove P.C. Concrete Curb	Per Lineal foot.
Remove P.C. Concrete Slab	Per Square foot.
Remove P.C. Concrete Sidewalks and Driveways	Per Square foot
Remove P.C. Concrete Wall	Per Lineal foot.
Remove P.C. Concrete Steps	Per Linealfoot.
Remove P.C. Concrete Foundations	Per Each.
Remove Miscellaneous P.C. Concrete	Per Lump Sum.

End

<u>SPECIFIC</u> CROSS REFERENCE MATERIALS
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Specification Item 104, "REMOVING PORTLAND CEMENT CONCRETE"

City of Round Rock Standard Specifications

<u>Designation</u>	<u>Description</u>
Item No. 101	Preparing Right of Way
Item No. 110	Street Excavation
Item No. 111	Excavation
Item No. 120	Channel Excavation
Item No. 132	Embankment
Item No. 403	Concrete for Structures
Item No. 610	Preservation of Trees and Other Vegetation

<u>RELATED</u> CROSS REFERENCE MATERIALS

Specification Item 104, "REMOVING PORTLAND CEMENT CONCRETE"

City of Round Rock Standard Specifications

<u>Designation</u>	<u>Description</u>
Item No. 201	Subgrade Preparation
Item No. 602	Sodding for Erosion Control
Item No. 604	Seeding for Erosion Control
Item No. 622	Diversion Dike
Item No. 628	Sediment Containment Dikes
Item No. 642	Silt Fence

RELATED CROSS REFERENCE MATERIALS - continued

Specification Item 104, "REMOVING PORTLAND CEMENT CONCRETE"

Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges

<u>Designation</u>	<u>Description</u>
Item No. 100	Preparing Right of Way
Item No. 104	Removing Concrete
Item No. 110	Excavation
Item No. 112	Subgrade Widening
Item No. 132	Embankment
Item No. 158	Specialized Excavation Work
Item No. 420	Concrete Structures

ITEM NO.110 STREET EXCAVATION

110.1 Description

This item shall govern: (1) the excavation and proper utilization or otherwise satisfactory disposal of all excavated material, of whatever character, within the right of way or other limits of the work indicated and (2) the construction, compaction, shaping and finishing of all earthwork on the entire project in accordance with the specification requirements herein outlined, in conformity with the required lines, grades and typical cross sections indicated on the Drawings or as approved by the Engineer. When not otherwise indicated, this item shall include the Work described in specification Item Nos. [101](#), "Preparing Right of Way", [102](#), "Clearing and Grubbing", [104](#), "Removing Portland Cement Concrete", [132](#), "Embankment", [201](#), "Subgrade Preparation" and [236](#), "Proof Rolling".

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text inch-pound units are given preference followed by SI units shown within parentheses.

110.2 Submittals

The submittal requirements of this specification item may include:

- A. A permit when utility adjustments are made in the right-of-way,
- B. A plan for removal and deposition of all 'Waste' materials, and
- C. A Blasting Permit if blasting is required and allowed on the project.

110.3 Classification

All excavation shall be unclassified and shall include all materials encountered regardless of their nature or the manner in which they are removed.

110.4 Construction Methods

Prior to commencement of this work, all required erosion control and tree protection measures shall be in place. Existing utilities shall be located and protected or as indicated on the Drawings.

Construction equipment shall not be operated nor construction materials stockpiled under the canopies of trees, unless otherwise approved by the City Forestry Manager. Excavation or embankment materials shall not be placed within the drip line of trees until tree wells are constructed, as approved by the City Forestry Manager.

All street excavation shall be performed as specified herein and shall conform to the established alignment, grades and cross sections. The Contractor will be required to set blue-tops for the subgrade along centerlines, at quarter points and curb lines or edge of pavement at intervals not exceeding 50 feet (15.25 meters). Suitable excavated materials shall be utilized, insofar as practicable, in constructing any required embankments. The construction of all embankments shall conform to Item No. [132](#), "Embankment".

All earth cuts for base and/or pavement structure construction shall be scarified to a uniform depth of at least 6 inches (150 millimeters) below the required finished subgrade elevation for the entire roadbed width. The material shall be mixed, reshaped by blading, sprinkled and then rolled in accordance with Section 2 of Specification Item [132](#), "Embankment".

High PI materials (i.e. $PI \geq 20\%$) which exhibit a Plasticity Index (PI) greater by 5 % than the surrounding materials or any materials with a moisture content greater than 2% in excess of optimum moisture shall be classified as unsuitable and must be removed or manipulated to meet the above criteria before use.

Unsuitable excavated materials or excavation in excess of that needed for construction shall be known as "Waste" and shall become the property of the Contractor. Unsuitable material encountered below the subgrade elevation in roadway cuts, when declared "Waste" by the City Engineer, shall be replaced with material from the roadway excavation or with other suitable material as approved by the Engineer or designated representative. It shall become the Contractor's responsibility to dispose of this material off the limits of the right of way in an environmentally sound manner at a permitted disposal site.

110.5 Measurement

All accepted street excavation will be measured by either Method A or B as follows:

A. Method A

Measurement of the volume of excavation in cubic yards (cubic meters: 1 cubic meter is equal to 1.308 cubic yards) by the average end areas. Cross sectional areas shall be computed from the existing ground surface to the established line of the subgrade over the limits of the right of way or other work limits shown on the Drawings, including parkway slopes and sidewalk areas.

B. Method B

Measurement of the volume of excavation in cubic yards (cubic meters: 1 cubic meter is equal to 1.308 cubic yards), based upon the average end areas taken from pre-construction cross sections and planned grades. The planned quantities for street excavation will be used as the measurement for payment of this item.

110.6 Payment

This item will be paid for at the contract unit bid price for "Street Excavation", as provided under measurement Method A or B as included in the bid. The bid price shall include full compensation for all work herein specified, including subgrade preparation, unless specified otherwise, and the furnishing of all materials, equipment, tools, labor and incidentals necessary to complete the work.

Payment will be made under one of the following:

Street Excavation	Per Cubic yard.
Street Excavation, Plan Quantity	Per Cubic yard.

End

SPECIFIC CROSS REFERENCE MATERIALS

Specification Item 110, "STREET EXCAVATION"

City of Round Rock Standard Specifications

<u>Designation</u>	<u>Description</u>
Item No. 101	Preparing Right of Way
Item No. 102	Clearing and Grubbing
Item No. 104	Removing Portland Cement Concrete
Item No. 132	Embankment
Item No. 201	Subgrade Preparation
Item No. 236	Proof Rolling
Item No. 610	Preservation of Trees and Other Vegetation

RELATED CROSS REFERENCE MATERIALS

Specification Item 110, "STREET EXCAVATION"

City of Round Rock Standard Specifications

<u>Designation</u>	<u>Description</u>
Item No. 111	Excavation
Item No. 120	Channel Excavation
Item No. 203	Lime Treatment for Materials In Place
Item No. 204	Portland Cement Treatment for Materials In Place
Item No. 230	Rolling (Flat Wheel)
Item No. 232	Rolling (Pneumatic Tire)
Item No. 234	Rolling (Tamping)
Item No. 602	Sodding for Erosion Control
Item No. 604	Seeding for Erosion Control
Item No. 610	Preservation of Trees and Other Vegetation
Item No. 622	Diversion Dike
Item No. 628	Sediment Containment Dikes
Item No. 642	Silt Fence

RELATED CROSS REFERENCE MATERIALS - continued

Specification Item 110, "STREET EXCAVATION"

Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges

<u>Designation</u>	<u>Description</u>
Item No. 100	Preparing Right of Way
Item No. 110	Excavation
Item No. 112	Subgrade Widening
Item No. 132	Embankment

Item No. 150	Blading
Item No. 158	Specialized Excavation Work
Item No. 160	Furnishing and Placing Topsoil
Item No. 164	Seeding for Erosion Control
Item No. 204	Sprinkling
Item No. 210	Rolling (Flat Wheel)
Item No. 211	Rolling (Tamping)
Item No. 213	Rolling (Pneumatic Tire)
Item No. 260	Lime Treatment for Materials Used as Subgrade (Road Mixed)
Item No. 265	Lime-Fly Ash (LFA) Treatment for Materials Used as Subgrade

Texas Department of Transportation: Manual of Testing Procedures

<u>Designation</u>	<u>Description</u>
Tex-103-E	Determination of Moisture Content of Soil Materials
Tex-104-E	Determination of Liquid Limit of Soils
Tex-105-E	Determination of Plastic Limit of Soils
Tex-106-E	Method of Calculating the Plasticity Index of Soils
Tex-114-E	Laboratory Compaction Characteristics and Moisture-Density Relationship of Subgrade & Embankment Soil
Tex-115-E	Field Method for Determination of In-Place Density of Soils and Base Materials

ITEM NO.11 EXCAVATION

111.1 Description

This item shall govern: (1) the excavation and proper utilization or satisfactory disposal of all excavated materials, of whatever character, within the limits of the Work and (2) construction, compaction, shaping and finishing of all designated earthwork areas in accordance with the specification requirements outlined herein and in conformity with the required lines, grades and typical cross sections indicated on the Drawings or as approved by the Engineer or designated representative. When not otherwise indicated, this item shall include the work described in Specification [Item Nos. 101](#), "Preparing Right of Way", [No. 102](#), "Clearing and Grubbing", [No. 104](#), "Removing Portland Cement Concrete", [No. 132](#) "Embankment" and [No. 201](#), "Subgrade Preparation".

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text inch-pound units are given preference followed by SI units shown within parentheses.

111.2 Submittals

The submittal requirements of this specification item may include:

- A. A permit when utility adjustments are made in the right-of-way,
- B. A plan for removal and deposition of all 'Waste' materials, and
- C. A Blasting Permit if blasting is required and allowed on the project.

111.3 Classification

All excavation shall be unclassified and shall include all materials encountered regardless of their nature or the manner in which they are removed.

111.4 Construction Methods

Prior to commencement of this work, all required erosion control and tree protection measures shall be in place. Existing utilities shall be located and shall be protected or as indicated on the Drawings.

Construction equipment shall not be operated nor construction materials stockpiled under the canopies of trees, unless otherwise approved by the City Forestry Manager. Excavation or embankment materials shall not be placed within the drip line of trees until tree wells are constructed as approved by the City Forestry Manager.

All excavation shall be performed as specified herein and shall conform to the established alignment, grades and cross sections indicated on the Drawings. Suitable excavated materials shall be utilized, insofar as practical, in constructing required embankments. The construction of all embankments shall conform to Specification [Item No. 132](#), "Embankment". No material shall be stockpiled within the banks of a waterway.

Unsuitable excavated materials or excavation in excess of that needed for construction shall be known as "Waste" and shall become the property of the Contractor. Unsuitable material encountered below the subgrade elevation in roadway cuts, when declared "Waste" by the Engineer or designated representative, shall be replaced with material from the roadway excavation or with other suitable material as approved by the Engineer. It shall become the Contractor's responsibility to dispose of this material off the limits of the right of way in an environmentally sound manner at a permitted disposal site.

Adequate dewatering and drainage of excavation shall be maintained throughout the time required to complete the excavation work.

111.5 Measurement

All accepted excavation will be measured by either Method A or B as follows:

(1) Method A

Measurement of the volume of excavation in cubic yards (cubic meters: 1 square meter is equal to 1.196 square yards) by the average end area methods. Cross-sectional areas shall be computed from the existing ground surface to the established line of the subgrade, as shown on typical sections in the Drawings, over the limits of the right of way or other work limits, including parkway slopes and sidewalk areas.

(2) Method B

Measurement of the volume of excavation in cubic yards (cubic meters: 1 square meter is equal to 1.196 square yards), based upon the average end area method taken from pre-construction cross sections and planned grades. The planned quantities for excavation will be used as the measurement for payment for this item.

111.6 Payment

This item will be paid for at the contract unit bid price for "Excavation", as provided under measurement Method A or B as included in the bid. The bid price shall include full compensation for all work herein specified including dewatering, drainage, subgrade preparation, unless otherwise indicated, and the furnishing of all materials, equipment, tools, labor and incidentals necessary to complete the work.

Payment will be made under one of the following:

Excavation Per Cubic Yard.

Excavation Per Cubic Yard, Plan Quantity.

End

SPECIFIC CROSS REFERENCE MATERIALS

Specification Item 111, "EXCAVATION"

City of Round Rock Technical Specifications

<u>Designation</u>	<u>Description</u>
Item No. 101	Preparing Right of Way
Item No. 102	Clearing and Grubbing-
Item No. 104	Removing Portland Cement Concrete
Item No. 132	Embankment
Item No. 201	Subgrade Preparation
Item No. 236	Proof Rolling
Item No. 610	Preservation of Trees and Other Vegetation

RELATED CROSS REFERENCE MATERIALS

Specification Item 111, "EXCAVATION"

City of Round Rock Standard Specifications

<u>Designation</u>	<u>Description</u>
Item No. 120	Channel Excavation
Item No. 203	Lime Treatment for Materials In Place
Item No. 204	Portland Cement Treatment for Materials In Place
Item No. 230	Rolling (Flat Wheel)
Item No. 232	Rolling (Pneumatic Tire)
Item No. 234	Rolling (Tamping)
Item No. 602	Sodding for Erosion Control
Item No. 604	Seeding for Erosion Control
Item No. 622	Diversion Dike
Item No. 628	Sediment Containment Dikes
Item No. 642	Silt Fence

RELATED CROSS REFERENCE MATERIALS - continued

Specification Item 111, "EXCAVATION"

Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges

<u>Designation</u>	<u>Description</u>
Item No. 100	Preparing Right of Way
Item No. 110	Excavation
Item No. 112	Subgrade Widening
Item No. 132	Embankment
Item No. 150	Blading
Item No. 158	Specialized Excavation Work
Item No. 160	Furnishing and Placing Topsoil
Item No. 164	Seeding for Erosion Control
Item No. 204	Sprinkling
Item No. 210	Rolling (Flat Wheel)
Item No. 211	Rolling (Tamping)
Item No. 213	Rolling (Pneumatic Tire)
Item No. 260	Lime Treatment for Materials Used as Subgrade (Road Mixed)
Item No. 265	Lime-Fly Ash (LFA) Treatment for Materials Used as Subgrade

Texas Department of Transportation: Manual of Testing Procedures

<u>Designation</u>	<u>Description</u>
Tex-103-E	Determination of Moisture Content of Soil Materials
Tex-104-E	Determination of Liquid Limit of Soils
Tex-105-E	Determination of Plastic Limit of Soils
Tex-106-E	Method of Calculating the Plasticity Index of Soils
Tex-114-E	Laboratory Compaction Characteristics and Moisture-Density Relationship of Subgrade & Embankment Soil
Tex-115-E	Field Method for Determination of In-Place Density of Soils and Base Materials

ITEM NO. 120 CHANNEL EXCAVATION

120.1 Description

This item shall govern (1) excavation of channels within the limits indicated, regardless of the type of material encountered, (2) removal and proper utilization or otherwise satisfactory disposal of all excavated materials and (3) construction, shaping and finishing of all earthwork involved in conformity with the required line, grades and cross sections indicated.

When not otherwise indicated, this item shall include the work described in Specification Item Nos. [101](#), "Preparing Right of Way", No. [102](#), "Clearing and Grubbing", No. [104](#), "Removing Portland Cement Concrete" No. [132](#), "Embankment" and No. [236](#), "Proof Rolling".

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text inch-pound units are given preference followed by SI units shown within parentheses.

120.2 Submittals

The submittal requirements of this specification item may include:

- A. A plan for removal and deposition of all 'Waste' materials, and
- B. A Blasting Permit if blasting is required and allowed on the project.

120.3 Classification

All channel excavation will be unclassified and shall include all materials encountered regardless of their nature or the manner in which they are removed.

120.4 Construction Methods

Prior to commencing this work, all required erosion control and tree protection measures shall be in place. All existing utilities shall be located and protected or as indicated on the Drawings. Construction equipment shall not be operated within the drip line of trees, unless otherwise approved by the City Forestry Manager. Construction materials shall not be placed under the canopies of trees. Excavation or embankment materials shall not be placed within the drip line of trees until tree wells are constructed approved by the City Forestry Manager.

All channel excavation shall be performed as specified herein and shall conform to the established alignment, grades and cross sections. When fill sections are required, Specification Item No. [132](#), "Embankments" shall govern the construction method. Suitable excavated materials shall be utilized, insofar as practicable, in constructing the required embankments. Precautions will be maintained at all times to protect all trees in the area of construction. Where removal of trees is necessary, they shall be marked and approved by the City Forestry Manager.

Unsuitable excavated materials or excavation in excess of that needed for construction shall be known as "Waste" and shall become the property of the Contractor. It shall become his sole responsibility to dispose of this material off the limits of the right of way in an environmentally sound manner at a permitted disposal site.

120.5 Measurement

Accepted channel excavation will be measured by either Method A or B as follows:

A. Method A

Measurement of the volume of excavation in cubic yard (cubic meters: 1 cubic meter is equal to 1.308 cubic yards) by the average end areas. Cross-sectional areas shall be computed from the existing ground surface to the established final section indicated.

B. Method B

Measurement of the volume of excavation in cubic yards (cubic meters: 1 cubic meter is equal to 1.308 cubic yards), based upon average end areas taken from preconstruction cross sections and planned grades. The plan quantities for channel excavation will be used as the measurement for payment for this item.

120.6 Payment

This item will be paid for at the contract unit bid price for "Channel Excavation", as provided under measurement Method A, or B and included in the bid. The bid price shall include full compensation for furnishing all materials, equipment, tools, labor and incidentals necessary to complete the work.

Payment will be made under one of the following:

Channel Excavation Per Cubic Yard.

Channel Excavation, Plan Quantity Per Cubic Yard.

End

<u>SPECIFIC</u> CROSS REFERENCE MATERIALS
Specification Item 120, "CHANNEL EXCAVATION"

City of Round Rock Standard Specifications

<u>Designation</u>	<u>Description</u>
Item No. 101	Preparing Right of Way
Item No. 102	Clearing and Grubbing
Item No. 104	Removing Portland Cement Concrete
Item No. 132	Embankment
Item No. 201	Subgrade Preparation
Item No. 236	Rolling (Proof)
Item No. 610	Preservation of Trees and Other Vegetation

<u>RELATED</u> CROSS REFERENCE MATERIALS

Specification Item 120, "CHANNEL EXCAVATION"
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City of Round Rock Standard Specifications

<u>Designation</u>	<u>Description</u>
Item No. 111	Excavation
Item No. 203	Lime Treatment for Materials In Place
Item No. 204	Portland Cement Treatment for Materials In Place
Item No. 230	Rolling (Flat Wheel)
Item No. 232	Rolling (Pneumatic Tire)
Item No. 234	Rolling (Tamping)
Item No. 602	Sodding for Erosion Control
Item No. 604	Seeding for Erosion Control
Item No. 622	Diversion Dike
Item No. 628	Sediment Containment Dikes
Item No. 642	Silt Fence

Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges

<u>Designation</u>	<u>Description</u>
Item No. 100	Preparing Right of Way
Item No. 110	Excavation
Item No. 132	Embankment
Item No. 158	Specialized Excavation Work
Item No. 160	Furnishing and Placing Topsoil
Item No. 164	Seeding for Erosion Control
Item No. 204	Sprinkling
Item No. 210	Rolling (Flat Wheel)
Item No. 211	Rolling (Tamping)
Item No. 213	Rolling (Pneumatic Tire)

Texas Department of Transportation: Manual of Testing Procedures

<u>Designation</u>	<u>Description</u>
Tex-103-E	Determination of Moisture Content of Soil Materials
Tex-104-E	Determination of Liquid Limit of Soils
Tex-105-E	Determination of Plastic Limit of Soils
Tex-106-E	Method of Calculating the Plasticity Index of Soils
Tex-114-E	Laboratory Compaction Characteristics and Moisture-Density Relationship of Subgrade & Embankment Soil
Tex-115-E	Field Method for Determination of In-Place Density of Soils and Base Materials

**ITEM NO. 130
BORROW**

130.1 Description

This item shall govern required excavation, removal and proper utilization of materials secured from sources, selected by the Contractor and approved by the Engineer or designated representative. The compaction of embankments constructed from borrow as provided herein shall conform to the appropriate sections of Specification Item Nos. [132](#), "Embankment" and [236](#), "Proof Rolling".

Borrow will be used only when indicated on the Drawings or directed by the Engineer or designated representative and shall only be acquired from sources approved by the City.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text inch-pound units are given preference followed by SI units shown within parentheses.

130.2 Submittals

The submittal requirements of this specification item may include:

- A. Identification of Class, source and characteristics (P.I., linear shrinkage, etc.) of proposed borrow material, and
- B. A plan for managing and maintaining borrow sites.

130.3 Materials

All authorized borrow shall conform to one of the following classes:

Class A (Select Borrow)

Class A Borrow material shall consist of suitable granular material, free from vegetation or other objectionable matter and reasonably free from lumps of earth. When tested by standard TxDOT laboratory methods Tex-105-E, Tex-106-E and Tex-107-E, the Class A Select Borrow, shall meet the following requirements:

The Liquid Limit shall not exceed	45
The Plasticity Index shall not exceed	15
The bar linear shrinkage shall not be less than	2

Class B (Borrow)

Class B Borrow material shall consist of suitable non swelling [i.e. soils with a plasticity index (P.I.) less than 20] earth material such as loam, clay or other such materials that will form a stable embankment.

Class C (Topsoil)

Class C Borrow material shall consist of approved soils, which shall be clean, friable and capable of supporting plant life. This material shall also be free of stones and all other debris.

130.4 Construction Methods

Prior to commencing this work, all required erosion control and environmental measures shall be in place. All suitable materials removed from excavations shall be used, insofar as practicable in the formation of embankments conforming to Specification [Item No. 132](#), "Embankment", as otherwise indicated on the Drawings or as directed by the Engineer or designated representative. The completed work shall conform to the established alignment, grades and cross section as shown on the Drawings. The additional material necessary to complete the work described above shall be "Borrow" of the class specified.

The Contractor shall arrange for borrow from one of the following sources:

1. Existing borrow pit,
2. New borrow pit, or
3. Surplus excavated material from a site, with a site development permit.

The Contractor shall notify the Engineer 3 weeks prior to opening a pit or any other borrow source to allow necessary testing for approval of materials. All borrow sites shall comply with the requirements of the site development permit.

During construction, borrow sources shall be kept drained to permit final cross sections to be measured, when required.

Borrow sites shall be managed and maintained to minimize the impact of the appearance of the natural topographic features and at no time create a potential hazard to the public.

130.5 Measurement

Borrow will be measured by the cubic yard (cubic meters: 1 cubic meter is equal to 1.196 cubic yards) in its final position based upon the average end areas, calculated from pre-construction cross sections and plan grades. The plan quantities for Borrow or Topsoil will be used as the measurement for payment for this item.

130.6 Payment

All work performed as required herein and measured as provided under "Measurement" will be paid for at the unit bid price. The bid prices shall include full compensation for furnishing all labor; all materials; all royalty and freight involved; all hauling and delivering on the road; and all tools, equipment and incidentals necessary to complete the work. Payment will not be made for unauthorized work.

Payment will be made under one of the following:

Class A (Select Borrow), Plan Quantity	Per Cubic Yard.
Class B (Borrow), Plan Quantity	Per Cubic Yard.
Class C (Topsoil), Plan Quantity	Per Cubic Yard.

End

<u>SPECIFIC</u> CROSS REFERENCE MATERIALS
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Specification Item 130, "BORROW"

City of Round Rock Standard Specifications

<u>Designation</u>	<u>Description</u>
Item No. 132	Embankment
Item No. 236	Rolling (Proof)

Texas Department of Transportation: Manual of Testing Procedures

<u>Designation</u>	<u>Description</u>
Tex-105-E	Determination of Plastic Limit of Soils
Tex-106-E	Method of Calculating the Plasticity Index of Soils
Tex-107-E	Determination of Bar Linear Shrinkage of Soils

<u>RELATED</u> CROSS REFERENCE MATERIALS

Specification Item 130, "BORROW"

City of Round Rock Contract Documents

<u>Designation</u>	<u>Description</u>
00700	General Conditions

City of Round Rock Standard Specifications

<u>Designation</u>	<u>Description</u>
Item No. 101	Preparing Right of Way
Item No. 102	Clearing and Grubbing
Item No. 110	Street Excavation
Item No. 111	Excavation
Item No. 230	Rolling (Flat Wheel)
Item No. 232	Rolling (Pneumatic Tire)
Item No. 234	Rolling (Tamping)
Item No. 602	Sodding for Erosion Control
Item No. 604	Seeding for Erosion Control
Item No. 610	Preservation of Trees and Other Vegetation
Item No. 622	Diversion Dike
Item No. 628	Sediment Containment Dikes
Item No. 642	Silt Fence

Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges

<u>Designation</u>	<u>Description</u>
Item No. 100	Preparing Right of Way
Item No. 110	Excavation
Item No. 132	Embankment
Item No. 158	Specialized Excavation Work
Item No. 160	Furnishing and Placing Topsoil
Item No. 164	Seeding for Erosion Control
Item No. 204	Sprinkling
Item No. 210	Rolling (Flat Wheel)
Item No. 211	Rolling (Tamping)
Item No. 213	Rolling (Pneumatic Tire)

Texas Department of Transportation: Manual of Testing Procedures

<u>Designation</u>	<u>Description</u>
Tex-103-E	Determination of Moisture Content of Soil Materials
Tex-104-E	Determination of Liquid Limit of Soils
Tex-114-E	Laboratory Compaction Characteristics and Moisture-Density Relationship of Subgrade & Embankment Soil
Tex-115-E	Field Method for Determination of In-Place Density of Soils and Base Materials

ITEM NO. 132 EMBANKMENT

132.1 Description

This item shall govern the placement and compaction of suitable materials obtained from approved sources for utilization in the construction of street or channel embankments, berms, levees, dikes and structures. When not otherwise indicated, this item shall include the work described in Specification [Item Nos. 101](#), "Preparing Right of Way", [102](#), "Clearing and Grubbing", [104](#), "Removing Portland Cement Concrete", [201](#), "Subgrade Preparation" and [No. 236](#), "Proof Rolling."

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text inch-pound units are given preference followed by SI units shown within parentheses.

132.2 Submittals

The submittal requirements of this specification item may include:

- A. A plan identifying source, material type, classification and characteristics (P.I., optimum moisture-density, etc.) of the proposed embankment material,
- B. Type and size of equipment proposed to produce the required compaction,
- C. Compaction (Density-moisture, etc) test results for in-place embankment layers, and
- D. Additional Easements.

132.3 Construction Methods

A. General

Prior to the placement of any embankment, all required tree protection and tree wells and erosion control devices shall be in place and all operations involving Standard Specification [Item No. 101](#), "Preparing Right of Way" and/or Standard Specification [Item No. 102](#), "Clearing and Grubbing" shall have been completed for the areas over which the embankment is to be placed. Stump holes or other small excavations encountered within the limits of the embankments shall be backfilled with suitable material and thoroughly tamped by approved methods before commencement of the embankment construction.

The area of embankment placement shall be proof rolled (Specification [Item No. 236](#), "Proof Rolling") and any unstable or spongy areas shall be undercut and backfilled with suitable material or otherwise mechanically manipulated and compacted by approved methods. Where shown on the Drawings or required by the Engineer or designated representative the ground surface thus prepared shall be compacted by sprinkling and rolling. The surface of the ground, including those plowed and loosened or roughened by small washes, shall be restored to approximately its original slope and the ground surface thus prepared shall be compacted by sprinkling and rolling.

Construction equipment shall not be operated within the drip line of trees, unless otherwise approved by the City Forestry Manager. Construction materials shall not be stockpiled under the canopies of trees. Excavation or embankment materials shall not be placed within the drip line of trees until tree wells are constructed as approved by the City Forestry Manager.

Unless otherwise indicated and with the exception of rock, the surface of the ground of all unpaved areas, which are to receive embankment, shall be loosened by scarifying or plowing to a depth of not less than 4 inches (100mm). The loosened material shall be re-compacted with the new embankment as hereinafter specified.

The surface of hillsides, which are to receive embankment, shall be loosened, by scarifying or plowing, to a depth of not less than 4 inches (100 mm) and benches constructed before the embankment materials are placed. The embankment shall then be placed in layers, as hereinafter specified, beginning at the low side with partial width layers and increasing the widths of the layers as the embankment is raised. The material, which has been loosened during preparation of the original ground surface, shall be re-compacted simultaneously with the embankment material placed at the same elevation.

Where embankments are to be placed adjacent to or over existing roadbeds, the roadbed slopes shall be plowed or scarified to a depth of not less than 6 inches (150 mm) and the embankment along the roadbed slopes shall be built up in successive layers, as hereinafter specified, to the elevation of the old roadbed. Then, if specified, the top surface of the old roadbed shall be scarified to a minimum depth of 6 inches (150 mm) and re-compacted along with the next layer of the new embankment. The total depth of the scarified and added material shall not exceed the permissible layer depth, specified hereinafter.

Trees, stumps, roots, vegetation or other unsuitable materials shall not be placed in embankment.

All embankment shall be constructed in layers approximately parallel to the finished grade and unless otherwise indicated, each layer shall be so constructed as to provide a uniform slope of 1/4 inch per foot (20 mm per meter) from the centerline of the roadbed to the outside. In the case of superelevated curves, each layer shall be constructed to conform to the specified superelevation or cross slope.

The embankment shall be continuously maintained at its finished section and grade until that portion of the work is accepted. After completion of the embankment to the finished section and grade, the Contractor shall proof roll the subgrade or finished grade in accordance with Specification [Item No. 236](#), "Proof Rolling". Any unstable or spongy areas shall be undercut and backfilled with suitable material or otherwise mechanically manipulated and compacted by approved methods. After acceptance of the embankment, re-vegetation activities shall commence immediately to minimize the soil loss and air pollution.

B. Earth Embankments

Earth embankments shall be defined as embankments composed of soil material other than rock and shall be constructed of acceptable material from approved sources.

Unless directed otherwise, earth embankments shall be constructed in successive layers, with a thickness of 8 inches (200 mm) or less in loose measure, for the full width of the individual cross section and in a length that is best suited to the sprinkling and compaction methods utilized.

Minor quantities of rocks with a maximum dimension of 4 inches (100 mm) may be incorporated in the earth embankment layers, provided that the rock is not placed immediately adjacent to structures.

Each layer of embankment shall be uniform as to material type and classification, density and moisture content before beginning compaction. Where layers of unlike materials abut each other, each layer shall be feathered on a slope of 1:20 or the materials shall be so mixed as to prevent abrupt changes in the soil. Any material placed in the embankment by dumping in a pile or windrows shall not be incorporated in a layer in that position. All such piles or windrows shall be incorporated in an embankment layer by blading and mixing or by similar methods. Clods or lumps of material shall be broken down into smaller sizes and the embankment material in a layer shall be mixed by blading, harrowing, discing or similar methods to insure that a uniform material of uniform density is secured in each layer.

The water required in sprinkling the layers, to obtain the moisture content necessary for optimum compaction, shall be evenly applied. It shall be the responsibility of the Contractor to secure uniform moisture content throughout the layer by such methods as may be necessary.

All earth cuts, whether full width or partial width side hill cuts and which are not required to be excavated below the subgrade elevation, shall be scarified to a uniform depth of at least 6 inches (150 mm) below grade. The material shall be mixed and reshaped by blading, sprinkled and rolled in accordance with the requirements outlined above for earth embankments to the same density required for the adjacent embankment.

Compaction of embankments shall conform to [Item No. 201](#), "Subgrade Preparation". Each layer shall be compacted to the required density by any method, and/or type and size of equipment, which will produce the required compaction. Prior to and in conjunction with the rolling operation, each layer shall be brought to the moisture content necessary to obtain the required density and shall be kept leveled with suitable equipment to insure uniform compaction over the entire layer.

It is the intent of this specification to provide the required density and moisture control for each layer of earth embankment and select material based on the plasticity characteristics of the embankment soil. Each layer shall be sprinkled as required and compacted to the extent necessary to provide the density specified in Item No. 201, "Subgrade Preparation".

The Plasticity Index (PI) will be established in accordance with TxDOT Test Methods Tex-104-E, Tex-105-E and Tex-106-E and the density determination will be made in accordance with TxDOT Test Method Tex-114-E, "Laboratory Compaction Characteristics and Moisture-Density Relationship of Subgrade and Embankment Soil". Field density measurements will be made in accordance with TxDOT Test Method Tex-115-E, "Field Method for Determination of In-Place Density of Soils and Base Materials".

After each layer of earth embankment or select material is complete, tests will be conducted at intervals specified in Item 201, "Subgrade Preparation". Testing locations shall be subject to the City Inspectors discretion. If the material fails to meet the density specified, the course shall be reworked as necessary to obtain the specified compaction.

C. Rock Embankments

Rock embankments shall be defined as those composed principally of rock and shall be constructed of accepted material from approved sources. Rock embankments shall not be placed immediately adjacent to structures.

Except as otherwise indicated on the Drawings, rock embankments shall be constructed in successive layers of 18 inches (450 mm) or less in thickness for the full width of the cross section. When, in the opinion of the Engineer or designated representative, the rock sizes necessitate a greater thickness of layer than specified, the layer thickness may be increased as necessary, but in no case shall the thickness of layer exceed 2 1/2 feet (750 mm). Each layer shall be constructed by starting at one end and dumping the rock on top of the layer being constructed then pushing the material ahead with a bulldozer in such a manner that the larger rock will be placed on either the ground or the preceding embankment layer. Each layer shall be constructed in such a manner that the interstices between the larger stones are filled with small stones and spalls which have been created by this operation and from the placement of succeeding layers of material.

The maximum dimension of any rock used in embankment shall be less than the thickness of the embankment layer and in no case shall any rock over 2 feet (600 mm) in its greatest dimension be placed in the embankment, unless otherwise approved by the Engineer or designated representative. All oversized rocks, which are otherwise suitable for construction, shall be broken to the required dimension and utilized in embankment construction when indicated. When preferred by the Contractor and acceptable to the Engineer or designated representative, oversized rocks may be placed at other locations where the

embankment layer is of greater depth, thus requiring less breakage.

Each layer shall be compacted to the required density as outlined for "Earth Embankments", above, except in those layers where rock will make density testing difficult, the Engineer or designated representative may accept the layer by visual inspection or proof rolling conforming to Specification [Item No. 236](#), "Proof Rolling".

Unless otherwise indicated, the upper 3 feet (1 meter) of the embankment shall not contain stones larger than 4 inches (100 mm) in their greatest dimension and shall be composed of material so graded that the density and uniformity of the surface layer may be secured in accordance with TxDOT Test Method Tex-114-E.

Exposed oversize material shall be broken up or removed.

D. At Culverts and Bridges

Embankment materials, which are to be placed adjacent to culverts and bridges and cannot be compacted by the blading and rolling equipment that was used in compacting the adjoining sections of embankment, shall be compacted in the manner prescribed under [Item No. 401](#), "Structural Excavation and Backfill".

Embankment constructed around 'spill through type abutments shall be constructed in 6 inch (150 mm) loose layers of a uniform suitable material and shall be placed so as to maintain approximately the same elevation on each side of the abutment. All materials shall be mixed, wetted and compacted as specified above. Embankment material placed adjacent to any portion of a structure or above the top of any culvert or similar structure shall be free of any appreciable amount of gravel or stone particles and shall be thoroughly compacted by mechanical compaction equipment.

132.4 Measurement

All accepted embankment, when included in the contract as a separate pay item, will be measured in place and the volume computed in cubic yards (cubic meters: 1 cubic meter is equal to 1.196 cubic yards) by the method of average end areas. No allowance shall be made for shrinkage.

132.5 Payment

This item is usually subsidiary to Excavation (Standard Specification [Item 111](#)) and/or Borrow (Standard Specification [Item 130](#)) and is not paid for separately. However, when included in the contract as a separate pay item, it shall be paid for at the contract unit bid price for "Embankment". The bid price shall include full compensation for all work herein specified, including the furnishing of all materials, (except "Borrow" when paid as a separate bid item) compaction, equipment, tools, labor, water for sprinkling, proof rolling and incidentals necessary to complete the work.

Payment, when included in the contract as a separate pay item, will be made under:

Embankment	Per Cubic Yard.
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End

<u>SPECIFIC</u> CROSS REFERENCE MATERIALS
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Specification Item 132, "EMBANKMENT"

City of Round Rock Standard Specifications

<u>Designation</u>	<u>Description</u>
Item No. 101	Preparing Right of Way
Item No. 102	Clearing and Grubbing
Item No. 104	Removing Portland Cement Concrete
Item No. 110	Street Excavation
Item No. 111	Excavation
Item No. 130	Borrow
Item No. 201	Subgrade Preparation
Item No. 236	Proof Rolling
Item No. 401	Structural Excavation and Backfill
Item No. 610	Preservation of Trees and Other Vegetation

Texas Department of Transportation: Manual of Testing Procedures

<u>Designation</u>	<u>Description</u>
Tex-103-E	Determination of Moisture Content of Soil Materials
Tex-104-E	Determination of Liquid Limit of Soils
Tex-105-E	Determination of Plastic Limit of Soils
Tex-106-E	Method of Calculating the Plasticity Index of Soils
Tex-107-E	Determination of Bar Linear Shrinkage of Soils
Tex-114-E	Laboratory Compaction Characteristics and Moisture-Density Relationship of Subgrade & Embankment Soil
Tex-115-E	Field Method for Determination of In-Place Density of Soils and Base Materials

<u>RELATED</u> CROSS REFERENCE MATERIALS

Specification Item 132, "EMBANKMENT"

City of Round Rock Standard Specifications

<u>Designation</u>	<u>Description</u>
Item No. 230	Rolling (Flat Wheel)
Item No. 232	Rolling (Pneumatic Tire)
Item No. 234	Rolling (Tamping)
Item No. 602	Sodding for Erosion Control
Item No. 604	Seeding for Erosion Control
Item No. 622	Diversion Dike
Item No. 628	Sediment Containment Dikes
Item No. 642	Silt Fence

RELATED CROSS REFERENCE MATERIALS - continued

Specification Item 132, "EMBANKMENT"

Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges

<u>Designation</u>	<u>Description</u>
Item No. 100	Preparing Right of Way
Item No. 110	Excavation
Item No. 132	Embankment
Item No. 158	Specialized Excavation Work
Item No. 160	Furnishing and Placing Topsoil
Item No. 164	Seeding for Erosion Control
Item No. 204	Sprinkling
Item No. 210	Rolling (Flat Wheel)
Item No. 211	Rolling (Tamping)
Item No. 213	Rolling (Pneumatic Tire)

Texas Department of Transportation: Manual of Testing Procedures

<u>Designation</u>	<u>Description</u>
Tex-103-E	Determination of Moisture Content of Soil Materials
Tex-107-E	Determination of Bar Linear Shrinkage of Soils