

## **PART D – DETAIL SPECIFICATIONS**

<b><u>TABLE OF CONTENTS</u></b>	<b><u>PAGE</u></b>
D-1 General Conditions, Supplemental General Conditions, and Plans	1
D-2 Construction and Material Specifications	1-2
D-3 Seasonal Suspension of Work	2
D-4 Contractor Overtime	2
D-5 Contractor Work Hours and Noise Control	3
D-6 Plan Elevations	3
D-7 Utility Locations	3
D-8 New Material Specifications	3
D-9 Restoration of Roadways, Driveways, Sidewalks, Curbing, and Treelawns	4
D-10 Inconvenience to the Public	4
D-11 Work Permits and Fees	4
D-12 Water Supply	4
D-13 Force Accounts	5
D-14 Reduction/Elimination of Work And/Or Increase in Work	5
D-15 Pavement and/or Base Removed	5-6
D-16 Undercutting Subgrade and Subbase	6
D-17 Removal, Misc.: Track Removed	6
D-18 Pole Removal-Wood, Metal, or Concrete	6-7
D-19 Vault Removed	7
D-20 Linear Grading, As Per Plan	7
D-21 Material Disposal	7-8
D-22 Erosion Control (SWPP)	8
D-23 Construction of Concrete Base, Pavement, Sidewalks, Driveways, and Curb	9-15
D-24 Concrete Design Mix	15-17
D-25 Concrete Design Mix (MS)	17-18
D-26 Concrete Design Mix (FS)	18-19
D-27 Reinforced Concrete Pavement, Misc.: Decorative Crosswalk	19-21
D-28 Portland Cement Concrete Sealing	22-25
D-29 Asphalt Concrete	25

## **PART D – DETAIL SPECIFICATIONS**

<b><u>TABLE OF CONTENTS</u></b>	<b><u>PAGE</u></b>
D-30 Backfill Material	25-26
D-31 Cleveland LSM	27-28
D-32 Pipe Culverts and Sewer	28-29
D-33 Connections to Existing Utilities	29
D-34 Catch Basins	29-30
D-35 Clean Catch Basins and Connections	30
D-36 Preconstruction Audio-Video	30-31
D-37 Clean and Televiser Sewer	31
D-38 Catch Basin, Reconstructed To Grade	31-32
D-39 Adjusting Street Castings	32
D-40 Monument Assemblies	32-33
D-41 Monument Box, Adjusted To Grade	33-34
D-42 Unclassified Pipe Underdrain	34-35
D-43 Underdrain, Misc: Prefabricated Edge Underdrain	35
D-44 Driveway Access	35-36
D-45 Field Office	36
D-46 Computer Equipment	36
D-47 Construction Layout Stakes	36-37
D-48 Signal Support Foundation, As Per Plan	37
D-49 Maintenance of Traffic Signal/Flasher Installation	37-38
D-50 Power Service (Traffic Control)	38-39
D-51 Conduit 2”, 3”, or 4”	39
D-52 Signalization, Misc. Foundation Test Holes	39
D-53 Sign, Lighting Misc.: Sign Lighting Cable	39
D-54 Lighting, Misc.: Luminaire Lighting Cable	39
D-55 Power Cable, Misc.: Power for Sign Lighting Power for Luminaire Lighting	39

## **PART D – DETAIL SPECIFICATIONS**

<b><u>TABLE OF CONTENTS</u></b>	<b><u>PAGE</u></b>
D-56 Power Cable, Misc.: Pushbutton Cable	39
D-57 Pull Box, Misc.: 13”x 24” As Per Plan Pull Box, Misc.: 17”x 30” As Per Plan Pull Box, Misc.: 24”x 36” As Per Plan	40-42
D-58 Ground Rod	42
D-59 Temporary Facilities and Construction In the Pedestrian Access Route	42
D-60 Controller Actuated, 8 Phase Solid State Digital Microprocessor	42-49
D-61 Plastic Caution Tape	49-50
D-62 Removal of Traffic Signal Installation	50
D-63 Sign Hangar Assembly, Mast Arm As Per Plan	50
D-64 Combination Signal Support and Signalization, Misc: Signal, Overhead Signal and Light Pole Support, As Per Plan	50-52
D-65 Water Work Details	52-54
D-66 Seeding and Mulching	55
D-67 Water for Seeding	55
D-68 Commercial Fertilizer	55-56
D-69 Tree Pruning	56-57
D-70 Tree Removal	57
D-71 Root Pruning	57-61
D-72 Miscellaneous Metal	61
D-73 Testing of Construction Materials	62-66
D-74 Asphalt Rejuvenating Agent	66-72
D-75 ADA Curb Ramp, As Per Plan	72-73
D-76 ADA, Sidewalk, and Driveway Subbase	73
D-77 As-Built Record Plan Set	73-75

**D-1 GENERAL CONDITIONS, SUPPLEMENTAL GENERAL CONDITIONS  
AND PLAN DIMENSIONS**

The provisions of Part B-General Conditions, as amplified or modified by Part C –Supplemental General Conditions, apply to all work performed under these detail specifications, except as otherwise expressly provided herein.

Where there is a conflict, the Detail Specifications (Part D) shall govern over the Supplemental General Conditions (Part C). Between the plans and the specifications, where there is a conflict, the plans shall govern.

Supplemental Detail Specifications (DS) shall govern over Detail Specifications should there be a conflict.

The Detail Specifications (Part D) and Supplemental Detail Specifications (DS) shall govern over the State of Ohio, Department of Transportation (ODOT), Construction and Material Specifications, or other specifications for any other City Division, should there be a conflict between the specifications.

The plan calculated dimensions shall take precedence over measurements by scale should there be a conflict.

**D-2 CONSTRUCTION AND MATERIAL SPECIFICATIONS**

The most recent edition of the State of Ohio, Department of Transportation, Construction and Material Specifications Part 200, EARTHWORK, through Part 700, MATERIAL DETAILS, inclusive, as may be modified on the Construction Plans or in these Specifications, shall govern this project. All of these modifications are in the specifications or are shown on the plans. No other portion of the ODOT Construction and Material Specifications shall apply.

Copies of the ODOT Construction and Material Specifications are available, cost involved, from the:

Ohio Department of Transportation  
Office of Contracts  
P.O. Box 899  
Columbus, Ohio 43216-0899  
Telephone: (614) 466-3778, 466-3200

The terms in the State of Ohio Department of Transportation, Construction, and Material Specifications shall apply to this project in the following manner:

Department: The Mayor's Office of Capital Projects

Director: The Director of the Mayor's Office of Capital Projects or authorized designee

Engineer: The Administration Bureau Manager of the Division of Engineering and Construction or authorized designee

Laboratory: The testing firm and laboratory contracted by the City of Cleveland

State: The City of Cleveland acting through its authorized representatives

### **D-3 SEASONAL SUSPENSION OF WORK**

Prior to the seasonal suspension of work the Contractor all areas and locations disturbed by the Contractor's operation must be restored to a safe and passable condition for pedestrian and vehicular access as determined by the Engineer.

Temporary sidewalk installation, if necessary, shall be constructed as per ODOT Item 608 concrete walk. Temporary street installation, if necessary, shall be constructed using 12" of ODOT Item 304 aggregate base per ODOT CMS with the dimensions for same to be approved by the Engineer.

Temporary work due to seasonal suspension of work will be maintained for the duration of the suspension and at the Contractor's expense. All temporary work will be removed and replaced with permanent construction materials at the resumption of Contractor operations, weather permitting.

### **D-4 CONTRACTOR OVERTIME**

Unless the requirement is specifically replaced in the City specifications, the Contractor shall pay for any overtime which requires City inspection. Prior to the commencement of construction the Contractor shall deposit a minimum of \$1,000 with the Division of Accounts to cover the City inspector's overtime costs. Any remaining balance will be returned to the Contractor after the project has been completed. No additional compensation shall be given for such expense. If the deposit is exhausted before the end of the project, another minimal deposit of \$1,000 will be required before any additional overtime work is authorized. The estimated overtime rate for inspection shall be the current billing rate established by the City of Cleveland.

**D-5 CONTRACTOR WORK HOURS AND NOISE CONTROL**

The default Contractor work hours shall be an eight-hour day, five days a week for a maximum of 40 hours, unless a different work schedule has been submitted by the Contractor and approved by the City.

The Contractor shall restrict his working hours to those permitted by local or other applicable ordinance, laws and regulations unless a written variance has been accepted from the appropriate governing authorities.

The noise level resulting from Contractor operations shall be within the limits specified by local ordinances and OSHA regulations.

**D-6 PLAN ELEVATIONS**

The plan elevations refer to sea level datum unless otherwise noted.

Pavement thickness, pavement composition, and utility locations are approximate and subject to actual field verification by the Contractor. The City does not guarantee accuracy for construction plans and/or specifications and is not liable for delays resulting from differing field conditions encountered during construction. The Contractor shall perform appropriate research and field investigation to ensure accuracy at his expense.

**D-7 UTILITY LOCATIONS**

The City is not liable for utilities or connections not shown on the plans or abandoned utilities or connections. The Contractor shall cut out any abandoned utilities and all costs incurred for this work shall be included in the Bid Item for that work.

**D-8 NEW MATERIAL SPECIFICATION**

The materials for the Bid Items specified are to be considered all new material unless clearly and distinctly indicated on the plans and/or specifications as recycled, reset, or used. The use of any other material is prohibited.

The substitution of the materials specified in the Bid Items is prohibited unless permission has been approved by the City and granted by the Engineer.

**D-9 RESTORATION OF ROADWAYS, DRIVEWAYS, SIDEWALKS, CURBING, AND TREELAWNS**

The Contractor shall properly and promptly restore all roadways, driveways, sidewalks, curbing, and treelawns not designated on the plans that have been damaged or disturbed during construction or due to Contractor negligence at no cost to the City.

The areas for restoration also include behind the sidewalk and the Right-of-Way line.

Partial restoration will be permitted only if approved by the City and granted by the Engineer.

**D-10 INCONVENIENCE TO THE PUBLIC**

The construction work shall be done in a timely and efficient manner to minimize the inconvenience to the general public. With the exception of the seasonal suspension of work, the Contractor shall submit bi-weekly updated construction schedules to the Engineer prior to construction progress meetings and as part of the invoice submittal process to ensure the work is occurring in a timely and efficient manner. The schedule submittal shall be done at the Contractor's expense and at no cost to the City.

**D-11 WORK PERMITS AND FEES**

The Contractor shall obtain all work permits and pay all applicable fees to the respective municipalities, regional agencies, and the City of Cleveland for project construction work. Fees include cost for plan reviews, utility field inspection, and utility connection fees. The cost for said fees shall be included in the applicable unit prices bid by the Contractor and the City will not reimburse the Contractor for fees incurred during construction unless otherwise noted in the plans or supplemental specifications.

**D-12 WATER SUPPLY**

Water will be supplied to the Contractor at the nearest hydrant. The cost of the water supply and permit fees for same shall be paid by the Contractor. The Contractor shall obtain the necessary permit from the City of Cleveland Water Department.

The Contractor will be required to provide approved standard tight hose and fittings with which to make connections to hydrants and outlets. No improper, wasteful, or undue use of water will be permitted.

**D-13 FORCE ACCOUNTS**

The Division of Engineering and Construction utilizes Force Accounts to pay for construction work and/or items related to unforeseen, unexpected, or unanticipated site conditions resulting in cost overruns for City of Cleveland projects.

The payment from the Force Account shall be by signed and approved City Change Order. The change order shall be numbered, titled, quantified, and priced. The Contractor shall deliver to the Engineer a complete cost breakdown of labor, materials, equipment, fuel, and appurtenances for the review and approval of the change order.

Any exception of the use of Force Accounts by the Division, such as specific projects funded through agreements with the Ohio Department of Transportation, shall be noted in the Supplemental Detailed Specifications and absent from the Schedule of Items for the individual project. The revised change order procedures and other related detail information shall also be noted in the Supplemental Detailed Specifications for these exceptions.

**D-14 REDUCTION/ELIMINATION OF WORK AND/OR INCREASE IN WORK**

The City of Cleveland reserves the right to reduce or eliminate portions of work or items of work. If the project is over budget, work will be eliminated and quantities will be adjusted accordingly.

A revised schedule of items will be prepared using the reduced quantities and the bid unit prices and submitted to the Contractor and other vested agencies for review and approval for the adjusted work total.

**D-15 PAVEMENT AND/OR BASE REMOVED (ODOT ITEM 202)**

The item shall consist of the removal of existing asphalt wearing course, brick, grout, granite, sandstone block, and concrete to the top of the existing cushion/base course. The limits for removal shall be indicated on the plans and/or as directed by the Engineer.

The cost of removing and disposing of items pursuant to ODOT Item 202.05, including but not limited to pavement concrete, aggregate base course, wearing course removals, sidewalk, driveways, and pipe shall include the cost for full depth saw cutting.

The City does not guarantee the pavement composition is uniform through the roadway, intersection, or sidestreet.

The quantity as provided shall be paid for at the applicable contract price per unit

of measurement, which price and payment shall be full compensation for all materials, labor, equipment, tools, and incidentals necessary to complete the work required by this section of the specifications. No additional compensation will be made in the performance of this item.

**D-16 UNDERCUTTING SUBGRADE AND SUBBASE (ITEM SPECIAL)**

The unsuitable material from soft subgrade encountered shall be excavated to the depth required by the Engineer and properly disposed of.

The undercut subgrade shall be replaced in accordance with ODOT Item 204 and then proof-rolled to confirm adequate stabilization was achieved.

The item shall be paid at the unit price per cubic yard, Item Special-Undercutting Subgrade and Subbase and shall include all excavation, aggregate, additional proof-rolling, and all other material, labor, and equipment as described herein. The use of geotextile fabric, if required by the Engineer, shall be paid as a separate item.

**D-17 REMOVAL, MISC.: TRACK REMOVED (ODOT ITEM 202)**

The removal and proper disposal of buried trolley rail tracks encountered during excavation, as directed by the Engineer, will be paid at the square yard cost as per ODOT Item 202.

The use of additional excavation and/or embankment required between the bottom of the track base and the proposed subgrade will be paid under a separate item.

The limits of payment shall be the width of the railroad tie by the length of the railroad removal. Payment will include removal and disposal of brick pavers, ties, angles, rails, ballast, concrete base or aggregate base and all appurtenances associated with this item as well as the removal of the asphalt courses and base course for roadway areas with complete pavement removal and replacement.

**D-18 POLE REMOVAL-WOOD, METAL OR CONCRETE (ODOT ITEM 202)**

The work performed under this item shall include the removal and disposal of existing abandoned poles as shown on the plan drawings or as directed by the Engineer as per ODOT Item 202.

All pole foundations encountered shall be removed as a part of the applicable light pole removal item. Removal of the pole foundation shall conform to Item 202, Pole Removed, As Per Plan. Existing pole foundations shall be removed below the finished subgrade or ground surface and the remaining cavity backfilled as required.

Payment will include removal of pole foundations, sweeps, bolts, backfill, and all

appurtenances associated with this item to complete the removal of this item.

**D-19 VAULT REMOVED (ODOT ITEM 202)**

The work performed under this item shall include the removal and disposal of existing utility vaults as shown on the plan drawings or as directed by the Engineer as per ODOT Item 202. The remaining cavity will be backfilled with LSM as required by City specifications or as directed by the Engineer.

Payment will include labor, material, and equipment associated with this item to remove the vault and appurtenances and restore the area, complete in place.

**D-20 LINEAR GRADING, AS PER PLAN (ODOT ITEM 209)**

This item of work shall be performed as per ODOT Item 209, except as modified herein:

1. The Contractor shall remove all excess material so that the ground elevation is one quarter of one inch (1/4") below the elevation of a theoretical plane projected from the top of the existing sidewalk to the top of the existing curb;
2. The Contractor shall remove all excess material so that the ground elevation is one quarter of one inch (1/4") below the elevation of a theoretical plane projected from the top of the existing sidewalk following the natural contour of the existing ground.

Payment for all labor, equipment, and incidental costs necessary to complete the work, including the removal and disposal of materials deemed unfit for reuse by the Engineer and additional approved replacement topsoil material regardless of the source, shall be included in the contract unit price bid.

Payment shall be for work performed to the nearest 100 foot station as measured along the left or right of the centerline for the street. This measurement will constitute the work performed both for the area between the curb and sidewalk and the area behind the sidewalk within the work limits.

**D-21 MATERIAL DISPOSAL**

The Contractor shall institute a waste management plan detailing the procedures for disposal and/or recycling of construction materials for the project. Included in the plan will be the identification of project waste, disposal sites, and the handling of said materials. Payment for the waste management plan is considered incidental to site mobilization and demobilization and will not be paid for separately.

The Contractor shall not dispose of any construction materials or implement the

waste management plan prior to the written approval of the waste management plan by the Director of the Mayor's Office of Capital Projects or duly appointed representative.

Payment for the waste management plan is considered incidental to site mobilization and demobilization and will not be paid for separately.

**D-22 EROSION CONTROL (SWPP)**

All of the work performed under this contract shall be in compliance with all the pertinent plan specifications and/or details, local regulations, State agencies ( i.e. Ohio Environmental Protection Agency), and Federal regulatory agencies regulating the control of erosion and sediment.

At the pre-construction meeting, the Contractor shall submit their SWPP for the erosion and sediment control measures, within the construction limits, for review and acceptance by the City for compliance with all applicable regulations. Construction shall not begin until all sediment and erosion control measures have been installed and approved by the Engineer.

The City's acceptance does not relieve the Contractor from full compliance with erosion and sediment controls required by the above agencies. It is the Contractor's responsibility to control any sediment or erosion produced by the Contractor's activities.

Sediment controls shall be installed as a first order of work. Sediment controls shall remain in place until the project is completed and disturbed areas are restored. All devices are to be maintained and kept in good condition. Any additional sediment control devices as directed by the Engineer shall be placed at no additional cost to the City.

After construction of the project, all disturbed areas are to be restored as provided in these specifications and/or plans. Upon approval of the Engineer, the Contractor shall remove all sediment control devices and insure that the project site and structures are in reasonably clean condition. If sediment and erosion control devices fail, the contractor shall clean the site of sediment including all structures and conduits within the project limits at no additional cost to the City. Those areas outside that are affected by such failure shall also be cleaned at no additional cost to the City.

If no unit bid item is provided in the contract, erosion and sediment control shall be considered incidental to the Project/Bid Items. If erosion and sediment control Unit Bid Items are provided, payment will be made under those bid items.

**D-23 CONSTRUCTION OF CONCRETE BASE, PAVEMENT, SIDEWALKS, DRIVEWAYS AND CURB**  
**(ODOT ITEMS 305, 451, 452, 608 & 609, SPECIAL)**

1. WORK INCLUDED

The Contractor under this section of the specifications shall construct concrete base, pavement, sidewalk, driveway aprons, curb, curb and gutter sections, handicap ramps, and integral radius curb and walk. This includes the restoration of all adjacent surfaces which are disturbed by this construction and not scheduled to be restored under a separate item of payment.

2. MATERIALS

The concrete used shall be the concrete design mix as per D-24, D-25, and D-26, as appropriate, of these specifications.

3. GRADING

Grading shall include all excavation, fill, and embankment required to permit the construction of the proposed pavement, sidewalk, driveway aprons, and curb to the designated lines and grades.

a. Excavation

- i. The cost of all excavation for proposed work shall be included in the price bid for the various items of work including removal and disposal. Excavation shall include the removal of all concrete, stone, earth, roots, and other material of every description within the limits of the proposed work.
- ii. Except as otherwise ordered, excavation at the elevation of the finished grade of the construction shall extend one (1) foot beyond each edge and then on a slope of one (1) vertical to one and one-half (1-1/2) horizontal and shall be paid for as excavation at the price per cubic yard for such work as it appears on the price sheet of the contract. When so ordered, excavation shall extend to a sufficient width to permit proper drainage with the cost of excavating beyond the limit stated above paid for as excavation.
- iii. The cost of excavation for a depth in excess of the thickness of the concrete base/pavement slab shall be paid for as excavation at the lump sum or unit price bid for Item 203 - Excavation.
- iv. The Contractor shall use extreme care, by whatever methods and procedures are necessary, in the removal of pavement, sidewalk,

driveway aprons, and curb, to ensure that no adjacent slabs beyond those marked for removal by the City Inspector will be disturbed, removed or damaged. Should any pavement, walk, driveway apron or curb be damaged, either in whole or in part, other than that which is marked for removal by the City Inspector, the Contractor shall remove and replace said damaged slabs, in whole, without cost to the City.

b. Fill or Embankment

- i. Fill or embankment shall be ODOT Item 203-Embankment as per plan notes and meet the following two (2) requirements:
- ii. It shall be substantially free from vegetable or organic matter and shall contain not more than ten (10) percent of loam or clay.
- iii. It shall weight not less than ninety (90) pounds per cubic foot, dry compacted weight.
- iv. The upper six (6) inches of embankment outside of the edge of the sidewalk, driveway apron or curb shall be topsoil or excavated material approved by the engineer (No sand).
- v. Fill shall extend at least one and one-half (1-1/2) feet beyond each side of the construction unless otherwise ordered or permitted. Side slopes shall be trimmed to a slop of one (1) vertical to one and one-half (1-1/2) horizontal, except as otherwise ordered by the City.
- vi. Fill shall be in place in advance of construction to allow for settlement. The fill material shall be thoroughly compacted by tamping or rolling, or both, so as to produce a solid dense sub-grade.
- vii. It shall be the Contractor's responsibility to raise all municipally owned utility castings to finished grade of new work. Adjusting these castings to new grade shall constitute a separate item of work and payment.
- viii. Non-municipally owned castings are the responsibility of their respective owners to adjust to the proper grade, but coordinating the work is the responsibility of the Contractor. Adjusting these castings to the new grade shall not be paid for under this contract.

4. CONCRETE DELIVERABLES

- a. All concrete delivered shall be subjected to any or all tests described in the "Testing of Construction Materials" section of these Detail Specifications. All concrete failing any of these tests shall be removed and replaced as

many times as necessary, until it passes all required tests. The removal and replacement shall be at no cost to the City.

- b. All concrete delivered to the construction site shall be accompanied by dray slips. Dray slips shall contain all of the information required by ASTM C-94, Paragraph #16, and Batch Ticket Information. Any concrete truck without a dray slip or with an incomplete dray slip shall be rejected.
- c. Trucks shall conform to AASHTO M 157 - 10.1, 10.2, 11.5, 11.6, 11.7, & 11.8.
- d. The slump and percent of air entrainment shall conform to the limits shown in section D-24 (Concrete Design Mix) of these specifications.
- e. All concrete shall be discharged from the truck within ninety (90) minutes of the batching time as indicated on the dray slip.
- f. The temperature of the concrete at the time of placement shall be between minimum concrete temperatures as per AASHTO M157-1997 section 11.1.1. Minimum concrete temperature table as shown below and ninety (90) degrees Fahrenheit as per the American Concrete Institute (ACI) recommendations for hot weather concrete.

<u>Air Temperature</u>	<u>Thin Sections and Uniformed Slabs</u>	<u>Heavy Sections and Mass Concrete</u>
<u>Fahrenheit</u>	<u>Degrees</u>	<u>Degrees</u>
30 to 45 degrees	60	50
0 to 30 degrees	65	55
Below 0 degrees	70	60
<u>Centigrade</u>		
-1 to 7 degrees	16	10
-18 to -1 degrees	18	13
Below -18 degrees	21	16

- g. Rejected Trucks and Loads - Any truck and its load of concrete rejected for failure to meet all the requirements of paragraph's 4c and 4d as stated above shall have the following condition imposed:  
  
Any truck rejected from any construction site covered by this section of the specifications shall also be banned from all construction sites covered by this section of the specifications.
- h. Any concrete which fails to meet all of the requirements of paragraph's 4e, 4f, and 4g as stated above, or the requirements of the job mix, shall not be

used on this or any other construction project where the specifications have been prepared by the Division of Engineering & Construction.

## 5. CONSTRUCTION

All of the various types of pavement, sidewalk, driveway aprons, curb or any combination thereof shall be constructed as per these specifications, plans, details and the respective Standard Drawings.

Except as otherwise directed, all concrete for pavement, sidewalk, driveways aprons, curb, handicap ramps and integral radius curb and walk shall be of one (1) course. Sidewalk shall be a minimum of four inches (4") thick. Driveway aprons shall be a minimum of six inches (6") thick for residential and eight inches (8") thick for commercial driveways. The minimum thickness for integral concrete radius curb and walk shall be eight inches (8") and as also shown on City of Cleveland Standard Drawing #244ME.

The thickness of the pavement, sidewalk and/or driveway aprons shall be increased as indicated on the plans or as directed by the Engineer. Sidewalk through the driveway and driveway aprons of the same thickness may be combined into one item of work and payment.

### 5.1 Forms

- a. Forms for pavement, sidewalk, and integral concrete radius curb and walk, and driveway apron construction shall be made of steel.
- b. Where standard lengths of steel forms cannot properly be used, a wooden form will be permitted for closure. Said wooden form shall not be less than one and five-eighths inches (1-5/8") in thickness. The minimum depth shall be as shown below:

Sidewalk	4", 6" or 8"
Driveway Apron	6" or 8"
Integral Concrete Radius	8"
Curb and Walk	8"
Base, Plain and Reinforced Pavement	9", 10" or 12"

### 5.2 Saw Cutting and Concrete Removal

When existing concrete pavement, drive aprons, curb or sidewalk necessitates cutting into the existing slab for removal, the cutting shall be accomplished by using a suitable concrete power saw which will produce a straight and smooth finish along the sawed edge. The depth of cutting or scoring shall be such that no damage will result to the remaining slab after removal of the designated section.

The location of all saw cuts shall be determined by the Engineer. Any damage to the slab not designated for removal shall be replaced at no expense to the City.

### 5.3 Affidavit

An affidavit shall be secured from each company supplying the concrete stating that only the concrete design mix as per City of Cleveland specifications will be supplied. This affidavit shall also state that the material supplier has read the specifications relative to the concrete being supplied. It shall be signed by an officer of the supplying company and notarized.

### 5.4 Placing Concrete

- a. No concrete shall be poured until the inspector has approved the preparation of the foundation bed.
- b. No concrete shall be poured unless the inspector is on the jobsite observing the work.
- c. If any concrete is poured without the observation by the inspector or without the prior approval of the foundation bed, the concrete poured shall not be accepted by the City for payment.
- d. Foundation beds shall be sprinkled immediately prior to depositing of concrete during hot or dry weather conditions.
- e. All welded steel wire fabric for concrete reinforcement, as per construction plans, shall meet the requirements of Section 709.10 of ODOT Construction and Material Specifications.
- f. Concrete shall be continuously deposited between bulkheads to a uniform thickness and to the full depth and width. The concrete, after being placed, shall be thoroughly compacted and brought to the proper pitch and grade with a template or straightedge.
- g. No concrete showing segregation or clumps of material shall be deposited in the work.
- h. Immediately prior to the finishing of the surface, the concrete shall be cut into slabs not longer than six feet (6') on any one side for walks and driveways. Pavements shall be cut as per plan details and Standard Construction Drawings. The joints shall be formed by a cutting tool or some other means satisfactory to the City and shall not be less than one-quarter (1/4) of the depth of the slab. All edges shall be rounded, with an approved edging tool, to a radius of one-quarter inch (1/4").

### 5.5 Surface Finish

- a. The finishing of the concrete shall immediately follow the placing and compacting of the concrete. Unless otherwise ordered, a broom finish shall be required. Rubbing with floats or other acceptable method shall be done only at the direction of the Engineer. All concrete slabs shall be edged around the entire perimeter unless otherwise directed by the Engineer. The surface shall be free from depressions and inequalities.
- b. The application of dry cement to hasten drying of the surface is prohibited.

### 5.6 White Liquid Film Method

- a. All concrete pavement, sidewalk, driveway aprons, curb, curb and gutter sections, handicap ramps, and integral radius curb and walk shall be cured by the use of white liquid film. This white liquid film shall have twenty-five (25%) to thirty percent (30%) effective solids and meet the requirements of ODOT Construction Materials Specifications Item 705.07 Type 2.
- b. The white liquid film may be used for curing all concrete placed except for concrete which is to be bonded to future concrete placement.
- c. The curing materials shall be applied uniformly by means of an approved pressure spray distributor at the rate of one (1) gallon to each two hundred (200) square feet of surface, and it shall be so applied that the concrete surface is completely coated and sealed in one (1) application. The curing material shall be applied immediately after the concrete surface to be cured has been finished and before any marked dehydration has occurred. After the surface has been coated, it shall be protected from all traffic or abrasive action from any source.
- d. When this method of curing is used, a complete duplicate spraying system shall be on the site before starting the placement of the concrete.
- e. Final curing by the white liquid film method shall be considered to extend for two (2) complete days from the time the material is placed. During this period, the surface of the concrete shall be protected by barricades from all traffic or work operations.
- f. A transparent liquid film may be substituted with the prior written approval of the Engineer.

### 5.7 Expansion Joints

- a. Prepared strips of preformed expansion joint material meeting the requirements of 705.03 of the ODOT Construction and Material

Specifications shall be one-half inch (1/2") in thickness and of sufficient width to extend the entire depth of the concrete. They shall be placed in such a manner that the joint will be filled to within one-half inch (1/2") of the finished surface of the walk. Joints shall be constructed at intervals no greater than fifty feet (50') in all sidewalks, driveway aprons, curb and gutter section, cast-in-place curb and integral curb and walk unless otherwise ordered. Pavement expansion joints shall be placed as per plan details.

- b. Joints shall be placed where the walk abuts curbing or other lateral walks and along the building line where the walk is placed full width from the curb to the building or other structures or as otherwise directed by the Inspector in the field. The edges of all joints so placed shall be rounded as herein before specified. The cost for expansion joints shall be included in the unit price bid for the respective items of work.
- c. Where new concrete curb or the curb portion of integral concrete radius curb and walk abuts existing pavement, a three-quarter inch (3/4") thick preformed expansion strip as called for in 705.03 of the ODOT Construction and Material Specifications shall be placed to separate the pavement and curb. The upper one-half inch (1/2") of the joint shall be hot sealed.

#### 5.8 Contraction Joints

All concrete for ADA ramps, sidewalks, and driveways shall have retraced picture frame tooled edge joints.

#### 5.9 ODOT Item 305-Portland Cement Concrete Base

ODOT Item 305 – Portland Cement Concrete Base shall meet all requirements for Item 452 – Non-Reinforced Portland Cement Concrete Pavement. All jointing and transfer devices are to be installed. The concrete shall have a broom finish.

#### 5.10 Payment

The quantity as provided shall be paid for at the applicable contract price per unit of measurement, which price and payment shall be full compensation for all materials, labor, equipment, tools, and incidentals necessary to complete the work required by this section of the specifications.

### **D-24 CONCRETE DESIGN MIX**

All applicable work items specified in D-23 shall be bid using the concrete mix design specified in this section. Under this section of specification the Contractor is required to submit a separate mix design for each combination of cement type, aggregate type and concrete supplier for use under this contract. Each mix shall be designed in accordance with ASTM-C94-04 Option C and as herein modified.

1. MINIMUM COMPRESSIVE STRENGTH

4,000 PSI strength for 28-day test. Four cylinders will be taken and tested as per ASTM C-39-04. One to be tested at seven days and the remaining three will be tested at twenty-eight days. Acceptance will be based on the average results of the three cylinders.

2. MINIMUM CEMENT CONTENT

650 lbs. per cubic yard. The cement shall conform to ASTM C-150-04 or C-595-04. The use of limestone may be used with prior approval of the Engineer upon review of the submittal.

3. WATER CEMENT RATIO

0.45 maximum.

4. SLUMP

Nominal three inches (3") as per ASTM C-94-04 (2"- 4" actual). The use of chemical admixtures meeting ASTM C-494, to increase the slump to a maximum of 7", may be used with prior approval of the Engineer upon review of the admixture and resultant maximum slump.

5. AIR CONTENT

Four percent (4%) to seven and one half percent (7-1/2%) ASTM C-173-04 or C-231-04.

6. AGGREGATE

Aggregate Size No. 57 for course aggregate shall be limestone, gravel or crushed air-cooled blast furnace slag. Both course & fine aggregate as per ASTM C-33-04.

If crushed air-cooled blast furnace slag is used it shall meet all of the requirements of ODOT 703.01 and 703.02. Copies of all tests and certifications for the crushed air-cooled blast furnace slag, if used, shall be submitted as a part of the concrete mix design.

Steel Slag Aggregate (703.01E) is not permitted for use in Cleveland 650 Concrete Mix.

When high early strength is required, ASTM C-150-04 Type III A cements or admixtures in accordance with ASTM C-494-04 shall be used.

The Contractor is required to furnish a signed affidavit, in triplicate, from each concrete supplier to the Engineer giving dry weight and type of cement, saturated surface-dry weight and the type of fine and course aggregate, quantity, type and name of each admixture and weight of water per cubic yard of concrete. The contractor shall also furnish twenty-eight (28) day cylinder tests (per testing section) as verification that the materials used and the proportions selected will produce concrete of the quality specified.

Hot and cold weather protection (Blankets, heaters, ice, etc.) shall be included in the unit bid price.

The Contractor is required to comply with all the above requirements. The contractor shall require that all of the sub-contractors placing concrete under this contract also comply with all of the above requirements.

#### **D-25 CONCRETE DESIGN MIX (CLASS MS-ITEM SPECIAL)**

All applicable work items shall be bid using the concrete mix design specified in this section. Under this section of specification the Contractor is required to submit a separate mix design for Class MS Concrete with D-24 Concrete Mix Design and as herein modified.

##### **1. MINIMUM COMPRESSIVE STRENGTH**

400 PSI Modulus of Rupture as per ASTM C-78 in 24 hours. The results of the 24-hour beam test shall be furnished in addition to the results of the twenty-eight (28) day cylinder tests.

##### **2. MINIMUM CEMENT CONTENT**

800 lbs. per cubic yard. Fly ash or additional aggregate shall not be used as a substitute for cement.

##### **3. WATER CEMENT RATIO**

0.43 maximum.

Calcium chloride is not permitted for use in Class MS concrete mix.

The Engineer will mark in the field the areas that require construction using Class MS Concrete. These marks will be limits of the payment for the various bid items using Class MS Concrete.

If the Contractor chooses to place Class MS Concrete outside of the Engineers marks for the Contractor's own convenience, then it will be measured and

paid for as concrete which only meets the requirements of D-24 Concrete Mix Design.

Payment for Class MS Concrete shall be a surcharge to the unit bid price per cubic yard as per D-23 and D-24.

**D-26 CONCRETE DESIGN MIX (CLASS FS-ITEM SPECIAL)**

All applicable work items shall be bid using the concrete mix design specified in this section. Under this section of specification the Contractor is required to submit a separate mix design for Class MS Concrete with D-24 Concrete Mix Design and as herein modified.

1. MINIMUM COMPRESSIVE STRENGTH

400 PSI Modulus of Rupture as per ASTM C-78 in 4 hours. The results of the 4-hour beam test shall be furnished in addition to the results of the twenty-eight (28) day cylinder tests.

2. MINIMUM CEMENT CONTENT

900 lbs. per cubic yard. Fly ash or additional aggregate shall not be used as a substitute for cement.

3. WATER CEMENT RATIO

0.40 maximum.

4. CALCIUM CHLORIDE

1.6% by weight of cement for 94-97% purity.  
2.0% by weight of cement for 70-80% purity.

The source, purity, and amount of calcium chloride shall be in each mix design for review and approval by the Engineer. For any alteration in the mix design, the Contractor shall resubmit the revised mix design for review and approval noting the proposed changes.

The Engineer will mark in the field the areas that require construction using Class FS Concrete. These marks will be limits of the payment for the various bid items using Class FS Concrete.

If the Contractor chooses to place Class FS Concrete outside of the Engineers marks for the Contractor's own convenience, then it will be measured and paid for as concrete which only meets the requirements of D-24 Concrete Mix Design.

Payment for FS Concrete shall be a surcharge to the unit bid price per cubic yard as per D-23 and D-24.

**D-27     REINFORCED CONCRETE PAVEMENT, MISC.:  
DECORATIVE CROSSWALK (ODOT ITEM 451, SPECIAL)**

As specified on the plans, the Contractor shall furnish and install colored and stamped reinforced concrete as per the Detail in the Drawings and as specified herein.

Furnishing and installation of the integrally colored concrete admixture and stamping of the concrete shall be in conformance with the following specification:

1. MATERIALS

The admixture shall be a colored, water-reducing admixture containing no calcium chloride with coloring agents that are limeproof and UV resistant. The colored admixture shall conform to the following:

- a. ASTM C979 – Standard Specification for Pigments for Integrally Colored Concrete
- b. ASTM C494 – Standard Specification for Chemical Admixtures for Concrete
- c. AASHTO M194 – Chemical Admixtures

2. CURING COMPOUND

Curing compound shall comply with ASTM C309 and be approved by color additive manufacturer for use with colored concrete.

3. EXPANSION JOINT SEALANT

Joint sealers shall be color-matched to the concrete and specially formulated for high-performance vehicular traffic areas.

4. CONCRETE MIX DESIGN

- a. A cement content in accordance with D-24 shall be used.
- b. Calcium chloride shall not be added to the mix.
- c. Supplemental admixtures, such as additional water-reducing admixtures, water-proofing agents, and super plasticizers shall not be used.

- d. Color additives: Mix in accordance with manufacturer's instructions. Mix until color additives are uniformly dispersed without mixture and disintegrating bags, if used, have disintegrated.
- e. Do not add water to the mix in the field.

5. CONCRETE COLORS

- a. Colors for the decorative crosswalk shall be as shown on the plans. Colors for the crosswalk border shall be as shown on the plans. Contractor is to coordinate color with Engineer for approval prior to installation.
- b. Colored admixture shall be added to the mix per manufacturer's written instructions in a premeasured bag and shall not be added by weight of cement content.

6. CURING

Apply curing compound for colored concrete in accordance with manufacturer's instructions using manufacturer's recommended application techniques. Apply curing compound at consistent time for each pour to maintain close color consistency.

7. STAMPING

- a. Stamped patterns for the decorative crosswalk shall be as shown on the plans. Contractor is to coordinate pattern with Engineer for approval prior to installation.
- b. The concrete shall be placed and consolidated so as to completely fill spaces in the forms and to provide suitable surface for finishing. The concrete adjacent to the forms shall be spaded. All surrounding surfaces shall be protected to prevent discoloration. Water must not be sprayed on the surface to retemper the plastic concrete for additional troweling. Hard steel troweling shall be minimized to avoid trowel burns.
- c. The surface shall be broom finished (light) and have a flat surface finish, unless otherwise specified by the City.

## 8. SEALING

- a. The sealant required for this work shall be as recommended by the coloring manufacturer.
- b. The sealer specified under City Detailed Specification D-28 shall not be used to seal the stamped and colored concrete.
- c. All stamped concrete to be sealed shall be sufficiently cured prior to application of said sealant. Also, all expansion joint work shall be fully cured prior to application of the sealant. The coverage rate shall be 100 to 125 square feet per gallon, unless otherwise specified by the manufacturer and approved by the City.
- d. The material involved in this application shall be guaranteed by the manufacturer. The guarantee shall ensure the moisture performance of the system for a period of five years from the date of application. Provisions of the guarantee shall include responsibility for water penetrations, chloride (salt), and freeze-thaw damage through structurally sound areas.
- e. Application of the sealer will be in accordance with the manufacturer's recommendations. Application methods may range from brush/push broom to airless spray. There may be a need to broom the sealing compound into the surface even with an airless application. The City will determine the need for brooming an airless application.
- f. All materials shall be delivered in the original manufacturer's sealed containers. Materials shall be stored to prevent damage to the containers. The sealer shall be thoroughly stirred before and during use. Surface, air, and material temperatures shall not be less than 50° F during application or within 4 hours after said application. Protect other surfaces not being sealed as necessary during the application process.
- g. The Contractor shall not allow foot or vehicular traffic on surfaces which have been sealed until such time as they are thoroughly dry, as determined by the City.

## 9. PAYMENT

The quantity as provided shall be paid for at the applicable contract price per unit of measurement, which price and payment shall be full compensation for all materials, labor, equipment, tools, and incidentals necessary to complete the work required by this section of the specifications.

## **D-28 PORTLAND CEMENT CONCRETE SEALING (ODOT ITEM SPECIAL)**

### **1. SUBMITTALS**

- a. The Contractor shall submit technical information and a certified statement stating that the material to be furnished conforms to the material requirements of this section of the specifications.
- b. Copies of waybills and delivery tickets shall be submitted to the contracting officer during the progress of the work. Before final payment is allowed, the Contractor shall file with the contracting officer certified waybills and delivery tickets for all concrete sealer used in the work.

### **2. PORTLAND CEMENT CONCRETE SEALING TREATMENT**

- a. The concrete sealer shall be an approved non-epoxy, non-silicone, non-toxic, non-hydrophobic, non-solvent material, and shall meet the following qualifications and AASHTO and ASTM test performance criteria, based in accordance with the manufacturer's recommended rate of coverage.
- b. The penetrating concrete sealer, after finished application, shall not darken, stain or discolor the treated concrete.
- c. Application of the sealer shall not alter the surface texture or form a film or coating on the surface, and shall be compatible with the concrete pavement joint materials.
- d. AASHTO T 259 Resistance of Concrete to Chloride Ion Penetration

Sealer-treated test specimens shall exhibit the following average values when an average of 0.125 inches of the treated concrete specimen has been abraded from the surface to simulate 10-12 years of traffic wear. Abrasion will be performed after treatment with sealer and before ponding with chloride solution.

#### **SALT WATER TEST (90 DAY DURATION)**

Average Absorbed CL = 2.50 lbs per cubic yard

Depth of Measurement = 1/16" to 1/2"\*

Testing Method: AASHTO T 259

\*Based on abraded concrete specimens

PONDING TEST (2160 HOUR DURATION)

Average Absorbed CL = 0.04 lbs per cubic yard

Depth of Measurement = 1/2" to 1"

Testing Method: AASHTO T 260

e. ASTM C 672 Scaling Resistance of Concrete Surfaces

Sealer-treated test specimens shall exhibit a 0 (zero) scale reading, and an improvement over untreated specimens after completion of a minimum of 50 freeze-thaw cycles; or until a difference between treated and untreated specimens develops. Example after 50 cycles:

<u>SPECIMEN</u>	<u>SCALE RATING</u>
Untreated	2+ (light to moderate scaling)
Treated	0 (no scaling)

f. AASHTO T 161/ASTM C 666 Resistance of Concrete to Rapid Freezing and Thawing

Treated specimens shall demonstrate equal or better durability to surface scaling than the frost resistant concrete used as a control upon completion of the test after a minimum of 300 freeze-thaw cycles.

EXAMPLE:

<u>CYCLES</u>	<u>CONTROL</u>	<u>TREATED</u>
146	Slight	None
237	Slight	Slight
480	Slight	Slight

g. ASTM C 501 Relative Resistance to Wear

Treated test specimens shall meet or exceed the improvement percentages as specified below on nominal 3,000 psi concrete after 1,000 revolutions:

<u>SPECIMEN</u>	<u>AVG. ABRASIVE WEAR INDEX</u>	<u>AVG. DEPTH OF WEAR</u>	<u>AVG. ABSOLUTE WEIGHT LOSS</u>
Treated	27.4	.026 in	3.227 gm
Untreated	19.9	.033 in	4.525 gm
Improvement	37.7%	21.2%	28.7%

h. ASTM C 882 Bond Strength of Epoxy-Resin Systems Used with Concrete

Test results shall demonstrate bond strength of treated samples equal to untreated samples used as a control.

i. Depth of Penetration

Depth of penetration shall be a minimum of 1/8 in. as demonstrated by successful testing in accordance with AASHTO T 2590 (based on abroad specimens).

3. SURFACE PREPARATION

The Contractor shall prepare surfaces to be sealed by thoroughly cleaning same with mechanical sweepers of an approved type and with wire brooms where necessary. To be clean, the surfaces shall be free of sand, clay, dust, salt, grease, oil and other foreign matter that might adversely affect the penetrating capability of the sealer.

4. APPLICATION OF CONCRETE SEALER

- a. Equipment to be used shall be as recommended by the manufacturer and shall include a low pressure airless or gravity type sprayer with an application pressure of approximately 40 psi, using a spray tip large enough to deliver an even fan spray without misting.
- b. Application of the concrete sealer shall be recommended by the manufacturer and in accordance with the following:
  - i. The application shall consist of two coats minimum.
  - ii. Each coat shall be in a light, even coat that shall be allowed to dry completely before continuing application.
  - iii. If a light sheen is visible when the second coat is dry, stop sealer application, and proceed to the water spray application.
  - iv. If no sheen is visible when the second coat is dry, repeat coats until a light sheen is apparent. Immediately after the final seal coat has been applied and allowed to dry, a light, even water-spray shall be applied to all treated surfaces to ensure complete penetration of the sealer.
  - v. If a sheen is still visible after the water coat has dried, additional water coats shall be applied until the sheen is no longer evident and the concrete finish appears dull.

5. WEATHER LIMITATIONS

Sealer should not be applied when temperatures are below 40 degrees F or are expected to fall below 32 degrees F within 24 hours or when rain is forecasted within 24 hours.

6. METHOD OF MEASUREMENT

The quantity to be paid for will be measured by the actual number of square yards of accepted pavement sealed with concrete sealer in accordance with this section of the specifications.

7. PAYMENT

The quantity as provided shall be paid for at the applicable contract price per unit of measurement, which price and payment shall be full compensation for all materials, labor, equipment, tools, and incidentals necessary to complete the work required by this section of the specifications.

**D-29 ASPHALT CONCRETE (ODOT ITEM 301, 446, AND 448)**

Asphalt concrete shall comply with ODOT Item 301, 446, and 448, PG64-22 and PG70-22, unless otherwise specified in the contract.

Recycled material shall be limited to wearing course maximum of 10%, intermediate maximum of 20% and bituminous base course maximum of 30% unless otherwise specified in the contract.

Gutters shall be sealed with asphalt concrete for a distance of 4 inches from the curb. The gutter seal shall be applied at a uniform rate, width, and without excess material left on the surface. The gutter seal shall be applied at a temperature between 300-350 degrees Fahrenheit immediately upon completion of the surface course. The cost of the gutter seal shall be included in the unit bid price per square yard for the asphalt surface course.

The quantity as provided shall be paid for at the applicable contract price per unit of measurement, which price and payment shall be full compensation for all materials, labor, equipment, tools, and incidentals necessary to complete the work required by this section of the specifications.

**D-30 BACKFILL MATERIAL (ODOT ITEM 611, SPECIAL)**

The use of Cleveland LSM “Flowable Fill” as specified in D-31 is required as backfill material for use under any pavement within the public Right-of-Way.

The use of granular backfill material is prohibited unless granted by the Administration Bureau Manager of the Division of Engineering and Construction upon request by the contractor with documentation of existing project site

conditions.

No payment will be made to the contractor for any granular backfill installation costs without proper compaction and supporting compaction testing documentation.

In addition, granular backfill placed in the public Right-of-Way without approval by the Administration Bureau Manager and confirmed acceptable compaction methods shall be removed and replaced with Cleveland LSM at the contractor's expense.

If granted, the granular backfill material used under any pavement shall be crushed limestone or gravel as per ODOT Item 304 - Aggregate Base. Crushed air-cooled slag meeting # 304 gradations may be used with prior approval of the Engineer. The use of sand or # 57 aggregate as premium backfill is prohibited.

If granted, the granular backfill shall be installed in 8 inch (8") lifts and compacted using mechanical means only. The compaction and testing shall meet the requirements of ODOT Item 304 and Supplement 1015.

The use of water to achieve compaction is prohibited (Flooding, ponding, etc.).

Sand used as embankment construction and as backfill around structures shall be as per ODOT Item 203 - Embankment or meeting the requirements of ODOT 703.11 Structural Backfill. Sand may only be used as indicated on the plan details.

Material used for backfilling trenches outside of pavement areas and for such similar purposes, as may be specified, shall consist of hard, durable particles of a natural or artificial aggregate, such as gravel, sand, crushed air-cooled slag. At least eighty-seven percent (87%) by weight of the grains or particles shall be retained on a No. 200 sieve.

It shall be substantially free from vegetable or organic matter and shall not contain more than ten percent (10%) of loam or clay as determined by decanting over No. 200 sieve.

Except in the case of slag, backfill material shall weigh not less than ninety (90) pounds per cubic foot, dry compacted weight.

**D-31 CLEVELAND LSM “FLOWABLE FILL” BACKFILL MATERIAL**  
**(ODOT ITEM 611, SPECIAL)**

1. CERTIFICATE OF COMPLIANCE

Material must come from a plant with a current Certificate of Compliance demonstrating the ability of the mix design to meet the specified requirements. Certificates in excess of one year will not be accepted. Certificates must contain the name of supplier, date, contract number and mix design data on each delivery ticket.

2. MATERIALS

All materials shall conform to the applicable requirements stated herein.

- a. Cement shall be ASTM C-150 Type I.
- b. The use of fly ash is strictly prohibited.
- c. Fine aggregate shall conform to ODOT Specification 703.03 Fine Aggregate for Mortar or Grout. (ODOT Construction and Materials Specifications most current edition).
- d. The use of spent foundry sand or core sand is strictly prohibited.

3. PERFORMANCE ENHANCING ADMIXTURE

An air-enhancing admixture shall be incorporated in the mix that will have the effect of lowering the water/cement ratio to between 95 and 105 lbs/cubic foot. The air entrained content for the mix shall be 30% to eliminate/minimize the excessive water and segregation. Compressive strengths shall have a range of 50 PSI to 80 PSI at 28 days will be required if additional excavation by machine or hand is required.

APPROVED ADMIXTURES

<u>Manufacturer</u>	<u>Product Name</u>
a. Master Builders	Rheofill
b. Axim	Flow Air
c. W.R. Grace	DaraFill
d. Or approved equal	

4. FLOWABLE FILL MIX DESIGN

The mix design shall be proportioned as follows:

Cement (Type I)	50 lbs/cubic yard
Sand (SSD)	2475 lbs/cubic yard
Water	25 gallons/cubic yard
Admixture (Air)	3 oz/cubic yard

Variations of the aforementioned mix design are strictly prohibited.

5. APPLICATION

- a. Flowable fill shall begin 12 inches above the top of pipe and continue in the trench in conformance with the City Standard Trench Repair Details (PR-1).
- b. Material for pipe bedding and pipe zone to a maximum depth of 12 inches over the top of pipe shall be as specified by the utility.
- c. Exposed bolts and valves exposed in the trench should be wrapped with polyethylene material conforming to ODOT 748.07 (8 mill. thick).
- d. Cover all joints in clay pipe in the trench area with polyethylene material before pouring flowable fill.
- e. Repair all observed openings in any pipe or manhole in the trench area prior to backfilling with flowable fill. Repair techniques shall be in accordance with the utility company's standard repair procedures.
- f. Contact the respective utility owner for repair procedures.

**D-32 PIPE CULVERTS AND SEWERS (ODOT ITEM 611)**

The City supplemental to the ODOT Item 611 specification shall apply to all the City sewer work unless otherwise noted specifically in additional specifications.

1. MATERIALS

For City projects, the following pipe materials apply:

- a. Vitrified Clay Pipe (VCP), Extra Strength (ES), C-700, with premium joints, (ODOT item 706.08) for all proposed main sewer pipe 18" and smaller.
- b. Reinforced Concrete Pipe (RCP) with premium joints, (ODOT Item 706.02) for all proposed main sewer pipe 21" and larger.
- c. Ductile Iron Pipe (DIP) may be used if approved by the WPC engineer.

- d. Backfill, bedding, cover, and testing requirements as per City of Cleveland Standard Drawings, Water Pollution Control Sewer Standards, and D specifications.

## 2. INSTALLATION PLAN

The City has provided to the Contractor an approved installation plan for construction. Deviations from the approved installation plan during construction shall require approval from the Engineer prior to implementation and shall be noted on the field drawings. The Contractor shall not jack, tunnel, or bore ANY conduit within the limits of this project unless specifically requested by the Engineer.

## 3. PERFORMANCE INSPECTION

The City will be conducting ongoing performance inspections for the duration of the project.

## 3. PAYMENT

The quantity as provided shall be paid for at the applicable contract price per unit of measurement, which price and payment shall be full compensation for all materials, labor, equipment, tools, and incidentals necessary to complete the work required by this section of the specifications.

### **D-33 CONNECTIONS TO EXISTING UTILITIES**

1. Prior to the installation of proposed connections to existing facilities the contractor shall locate and confirm the existing line and grade at the connection matches the proposed plan elevations. Any deviation from plan elevations or other plan revisions shall be approved by the Engineer prior to connection installation.
2. Prior to the installation of proposed connections the contractor shall confirm clearances to the adjacent underground utilities. A conflict requiring a plan revision shall be approved by the Engineer prior to connection installation.
3. Payment for these operations described in these specifications shall be included in the contract bid price for the pertinent ODOT Item 611 conduits.

### **D-34 CATCH BASINS (ODOT ITEM 611)**

1. This work performed under this item shall consist of the construction of catch basins as specified on the plans and as per the City of Cleveland Standard details.

2. The contract bid item cost for the replacement of an existing catch basin with a new catch basin shall include the removal and disposal cost of said existing catch basin unless a separate pay item for the removal of the catch basin is included in the contract.
3. The construction shall be in accordance with City standards and ODOT Item 611.
4. Project catch basins and connections shall be free of all debris before final acceptance, under this section, at no additional cost to the City.
5. Payment will be based on as per each basis of completed and accepted catch basins.

**D-35 CLEAN CATCH BASINS AND CONNECTIONS  
(ODOT ITEM 611, SPECIAL)**

1. The work performed under this item of these specifications shall include cleaning the catch basin trap, and catch basin connection to the main sewer.
2. The work shall be performed by the use of equipment and methods intended for the purpose of cleaning catch basins and their appurtenances.
3. Prior to accepting this project the Engineer reserves the right to test catch basins which have been cleaned. This test shall use the flow from a three inch (3") or larger fire hose as directed by the Engineer. The cost associated with performing said test shall be included in the bid price for cleaning catch basins.
4. The Contractor shall be paid at the price bid for each catch basin/manhole cleaned under ODOT Item 611 - Clean Catch Basin.

**D-36 PRE-CONSTRUCTION AUDIO-VIDEO (ITEM SPECIAL)**

The Contractor shall perform pre-construction audio-video recording of the site work zone and all areas potentially affected by the contract work prior to the delivery of materials or supplies or the beginning of any construction work.

The work shall include, but not be limited to, recording existing surface conditions such as sidewalks, building flash points, utility infrastructure, ADA ramps, driveways and aprons, and all project work zone boundaries with private facilities/properties.

A minimum of two passes in each direction of the work is required to complete this work, with one pass focusing on existing right-of-way conditions and the

other on private property conditions.

The preconstruction video shall be performed by an independent company experienced in the work, and the company credentials shall be submitted for review and approval by the Engineer prior to the work being performed.

A DVD disc shall be used to record the televised inspection in either Apple QuickTime or Windows Media format. Two copies of the DVD to the City and one copy for the Contractor's records are required. The DVD shall be considered an integral part of the service and shall not be deleted from the Contractor's record until project close-out.

The cost for this item shall include the furnishing of all labor, materials, equipment, and all other appurtenances to perform the audio-video recording as described in these specifications. Payment shall be made at the lump sum bid price for preconstruction audio-video.

**D-37 CLEAN AND TELEWISE SEWER (SPECIAL)**

Televised inspection of sewers shall consist of obtaining an internal color photographic record of sewers as required in the contract. Sewers forty-eight inches (48") in diameter and larger, in addition to televising, shall be visually inspected.

A DVD disc shall be used to record the televised inspection in either Apple QuickTime or Windows Media format. The report, including the DVD, shall be considered an integral part of the service and shall not be deleted from the record. Three copies of the DVD and report are required.

The sewer shall be cleaned of all debris, including roots and other obstructions, prior to inspection by water jetting the sewer.

The length of the sewer to be televised and paid for will be actual linear feet measured along the center line of the sewer with no deductions being made for manholes or junction chambers. The accepted quantity for sewer line televised and cleaned, regardless of size of the sewer, will be paid for at the bid unit price per linear foot. The item shall be paid under the Bid Item "Clean and Telewise Sewer".

This item shall only be performed as directed by the Engineer.

**D-38 CATCH BASIN RECONSTRUCTED TO GRADE (ODOT ITEM 611)**

This item of work shall be performed as per ODOT Item 611-Manholes and Catch Basins except as modified herein:

1. The concrete used for this item of work shall conform to the concrete design mix section of these specifications.

2. The catch basin backplate shall be replaced if missing.
3. The casting is to be reinstalled if in reusable condition.
4. The casting, once removed and the reconstruction work completed, shall be reset at the elevation necessary for repaving.
5. Payment for the work shall be under ODOT Item 611 - Catch Basin Reconstructed to Grade.

**D-39 ADJUSTING STREET CASTINGS (ODOT ITEM 611)**

All manholes, catch basins, water meter manholes, valve boxes and Cleveland Public Power castings shall be brought to proper grade by the contractor by adjusting said castings with mortar, brick, or stone masonry as may be directed by the Engineer. No adjusting rings or bands will be permitted.

The Contractor shall use extreme care in the removal and adjustment of the castings. The Contractor shall remove existing pavement as required to adjust the casting and shall replace same with Cleveland MS or FS concrete as directed by the Engineer.

Unless otherwise directed by the Engineer, all castings shall be brought to grade after the binder or leveling course is placed and before the wearing course is placed.

Castings belonging to private utilities shall be adjusted to grade by utility owner and do not constitute a part of the Contractor's obligations. However, the Contractor is responsible to coordinate this work.

The price paid for bringing each street casting to line and grade shall be the Contractor's bid unit price for each and shall include all labor and material necessary for this work.

Care shall be exercised in moving the castings so as not to damage the casting or the structure. Damaged castings or structures shall be repaired or replaced at the Contractor's expense.

Items outlined shall be paid for under ODOT Item 611-Adjusting Street Castings to Grade.

**D-40 MONUMENT ASSEMBLIES (ODOT ITEM 623)**

Any person, Contractor, utility, or governmental agency, herein referred to as the Contractor, disturbing, removing and/or replacing pavement in the City of Cleveland's public right-of-way shall provide information as to the type of work

and the limits of the work to the City of Cleveland Chief Surveyor prior to performing such work. The Chief Surveyor will determine which monuments, if any will be affected by the work.

The Contractor shall furnish new monument assemblies as detailed on the City of Cleveland's monument box as per the following: one (1) Cleveland Monument Box as detailed on City of Cleveland Standard Drawings MB-1C and one (1) one inch diameter epoxy steel deformed reinforcing bar thirty-six inches (36") long, flat on top with a round pointed end.

The Contractor shall use competent personnel and suitable equipment for the work required by this Detail Specification and shall provide that it be done under the supervision of a Professional Surveyor, licensed to practice in the State of Ohio. The said competent personnel and Professional Surveyor, licensed to practice in the State of Ohio, shall be hired by the Contractor.

All monuments existing and proposed must be referenced prior to construction. A minimum of 3 points of reference per monument must be used and must be located outside of the construction zone work area.

Care and protective measures shall be employed to preserve existing monuments. All monuments disturbed or destroyed shall be reset per City Standards. All work shall be done under by competent personnel under direct supervision of a registered surveyor licensed to practice in the State of Ohio.

Prior to the beginning of work a copy of all survey and reference notes will be sent to the Attention of the Chief Surveyor at the City of Cleveland, Mayor's Office of Capital Projects, Division of Engineering and Construction, Plats and Survey, Room 518, Cleveland City Hall.

For monuments outside the Contractor's "work area", but near enough to the "work area" that may be disturbed for any reason, the Contractor shall be responsible for the replacement as if the monument were originally inside the "work area" as herein specified.

The Contractor shall perform all other operations necessary to complete this work item, such as pavement removal, excavation, setting the box to grade and pavement replacement.

All work completed and accepted shall be included and paid for at the bid unit price per Monument Assembly.

**D-41 MONUMENT BOX ADJUSTED TO GRADE OR REPLACED**  
**(ODOT ITEM SPECIAL)**

Where monument boxes are both suitable for re-use and conform to City of

Cleveland Standard Drawing No. A-37, they shall be adjusted to grade as required and specified. Such adjustments shall be performed by the Contractor's use of competent personnel and suitable equipment with said work done under the supervision of a Professional Surveyor, licensed to practice in the State of Ohio.

All monuments existing and proposed must be referenced prior to construction. A minimum of 3 points of reference per monument must be used and must be located outside of the construction zone work area.

All monuments must be referenced prior to adjusting box to grade or replacing casting. All monuments adjusted or replaced shall be as per the Cleveland Monument Box as detailed on City of Cleveland Standard Drawings MB-1C, set to proper grade.

In addition to adjusting the casting vertically this pay item shall include centering the casting over the existing iron pin or stone. The entire monument box casting shall be adjusted to grade and no inserts or adjusting rings will be permitted.

Care and protective measures shall be employed by the Contractor to avoid damage or displacement of the existing monument during the monument box adjustment or replacement operations and all other operations in the proximity.

Prior to the beginning of work a copy of all survey and reference notes will be sent to the Attention of the Chief Surveyor at the City of Cleveland, Mayor's Office of Capital Projects, Division of Engineering and Construction, Plans and Survey, Room 518, Cleveland City Hall.

All work completed and accepted shall be included and paid for at the bid unit price per ODOT Item Special - Monument Adjusted to Grade or Monument Replaced and Set to Grade.

**D-42 UNCLASSIFIED PIPE UNDERDRAIN (ODOT ITEM 605)**

In addition to the applicable work and materials described under ODOT Item 605, the unit price bid for this item shall also include the following:

1. It is the intent of this project to install new underdrain in areas where new pavement is proposed. The proposed underdrains shall be constructed to match the location of any existing underdrain to remain so as to assure continuity of flow. This work shall include removal of any existing underdrain which may be encountered in the normal excavation.
2. All labor, equipment, materials, and fuel required to outlet the underdrain into the catch basins. The last 10 feet of underdrain to outlet and connect to catch basins shall be non-perforated conduit, Type F, 706.08 as indicated in the plans.

3. The furnishing of underdrain shall include the installation of a filter wrap (Sock), in conformance with ODOT 605.02.

Payment for all of the above work shall be included in the bid contract unit price for ODOT Item 605 - Unclassified Underdrain.

**D-43 UNDERDRAIN, MISC.: PREFABRICATED EDGE UNDERDRAIN (ITEM SPECIAL)**

1. WORK INCLUDED

The payment for this item shall include all labor, equipment, materials, fuel, and incidentals necessary to furnish, install, and connect the geocomposite edgedrain system, including fittings, as specified therein and in conformance with ODOT 605.05.

2. MATERIAL

- a. The geocomposite edge underdrain shall conform to the requirements of ODOT 712.10
- b. Edge underdrain shall be panel shape pipe, 12” high
- c. Edge underdrain backfill material shall conform to ODOT 605.03 (C)  
Limits of the edge underdrain backfill are as shown on the drawings

Payment for all of the above work shall be included in the bid contract unit price for Prefabricated Edge Underdrain.

**D-44 DRIVEWAY ACCESS (ODOT ITEM 614)**

This work shall be in conjunction with ODOT Item 614 - Maintaining Traffic and all costs incurred for this item shall be included in the lump sum bid for Maintaining Traffic.

No additional payments or reimbursement will be for this work.

Access to all property owners, including residences and businesses, shall be made available at all times during construction.

The Contractor shall make available during the construction, steel plates, bridges or other means approved by the Engineer to bridge across the half width roadway construction, to provide full time (24 hours-7 days a week) access to driveways.

The Contractor shall submit to the Engineer for approval, at the pre-construction meeting, his proposal for providing access to the driveways.

For estimating purposes the number of drive aprons to be maintained should be the number of driveways in each construction phase.

**D-45 FIELD OFFICE (ODOT ITEM 619)**

The Contractor shall provide a field office as per ODOT Item 619 - Field Office Type B or Type C, except as modified in the Project Detailed Supplement Specifications.

Payment for this item of work shall be unit bid price per month for ODOT Item 619 - Field Office (Type B or Type C).

**D-46 COMPUTER EQUIPMENT (ITEM SPECIAL)**

The Contractor shall provide computer equipment for the field office as per this specification except as modified in the Project Detailed Supplement Specifications.

The Contractor shall furnish, install and maintain the computer equipment for the life of the contract. All items furnished shall be for the exclusive use of the Engineer and staff and shall be operable by the first day of work.

The computer equipment shall not experience down time exceeding 48 hours from notification by the Engineer. The Contractor shall replace stolen, vandalized, or units otherwise inoperable within 48 hours after notification by the Engineer.

The Contractor's failure to provide equipment as required may result in the withholding of payment estimates.

Payment for this item of work shall be unit bid price per month for Item Special – Computer Equipment for City Use.

**D-47 CONSTRUCTION LAYOUT STAKES (ODOT ITEM 623)**

This item of work shall be performed as per ODOT Item 623 and as modified below:

1. The Contractor shall be responsible for providing all necessary surveying, calculations and/ or layout not furnished in the bid documents to comply with the Engineer's direction. Contractor shall provide cut sheets, temporary bench marks, and layout (including stationing and hubs) as directed by the Engineer or his representative. All stationing and reference marks shall be maintained as directed by the Engineer or his representative.
2. The Contractor shall use competent personnel and suitable equipment for the

layout work required and shall provide that it be done under the supervision of a Registered Surveyor, licensed to practice in the State of Ohio.

3. Failure to comply with these provisions may incur a penalty of 10% reduction in the total cost for Bid Item 623- Construction Layout Staking per failure to comply. Upon compliance that reduction may be restored by the Engineer.
4. Payment for the above work shall be included in the lump sum bid price of Item 623- Construction Layout Stakes.

**D-48 SIGNAL SUPPORT FOUNDATION, AS PER PLAN (ITEM 632)**

The Contractor shall protect pedestrians and vehicles from exposed anchor bolts at all times until the associated signal support is erected. The method of covering the anchor bolts shall be approved by the engineer.

All costs associated with the procedures as outlined above shall be considered incidental to the cost of the unit price bid (each) for Item 632-Signal Support Foundation, As Per Plan.

**D-49 MAINTENANCE OF TRAFFIC SIGNAL/FLASHER INSTALLATIONS**

The Contractor shall be responsible for maintaining traffic signal installations within the project under the following conditions:

1. New signal installations or devices, installed by the Contractor. The Contractor shall be responsible for maintenance of these from the time of installation until the work is accepted.
2. Existing signal installations or devices installed or modified by the Contractor. The Contractor shall be responsible for maintenance of these from the time of initial installation or modification until the work is accepted.

The Contractor shall correct as quickly as possible all outages or malfunctions. He shall provide the city and the engineer such addresses and phone numbers where his maintenance forces may be contacted. The Contractor shall provide one or more persons to receive all calls and dispatch the necessary maintenance forces to correct outages. Such a person or persons may be used to perform other duties as long as prompt attention is given to these calls and a person is readily available continuously 24 hours a day, 7 days a week. All lamp outages, cable outages, electrical failures, equipment malfunctions and misaligned signal heads shall be corrected to the satisfaction of the Engineer with the signal back to service within eight (8) hours after the Contractor has been notified of the outage.

In the event new signals are damaged prior to acceptance all damaged equipment shall be replaced by the Contractor to the satisfaction of the Engineer. The signal

shall be back in service within eight (8) hours after the Contractor's notification of the outage or malfunction.

If poles and/or control equipment are damaged and must be replaced, the contractor shall make temporary repairs as necessary to bring the signal back into full operation within the allowed 8-hour period, and shall make permanent repairs or replacement as soon thereafter as possible.

None of the above shall be construed as collective or consecutive outage time periods at any one location. That is, where more than one outage occurs at any one location, then the allotted time limit shall be for the worst single outage.

Where outages are the direct result of a vehicle accident, the response of the Contractor shall be as outlined above. The Contractor shall be responsible for collection of any compensation for this work from those parties responsible for the damage.

Where the Contractor has failed to or cannot respond to an outage or signal equipment malfunction at these locations within his or her responsibility, within periods as outlined above, the Engineer may invoke the provisions of section 105.15 and any subsequent billings by the State or the City of Cleveland for police service and/or maintenance services by state and/or City forces shall be deducted from monies due or to become due the Contractor in accordance with provisions of section 105.15.

The Contractor shall provide the maintenance service entirely with his forces or he may choose to enter into a cooperative understanding with the local maintaining agency to provide the maintenance. The Contractor shall inform the Engineer, in writing, of the maintenance method selected.

Any vehicular traffic signal head, either new or existing, which will be out of operation, shall be covered in the manner described in section 632.25.

All cost resulting from the above requirements shall be considered to be included in the lump sum price bid for Item 614-Maintaining Traffic.

#### **D-50 POWER SERVICE (TRAFFIC CONTROL)**

Electric power shall be obtained from Cleveland Public Power (CPP) at the location indicated on the plans. Power supplied shall be 120 volts. All power cables shall be rated for 600 volts and consist of No. 6 AWG copper. All connections of power cable to equipment shall be by means of approved solderless type connectors. The solderless connections are to be taped. Power service shall also include 2" conduit risers where necessary.

The Contractor shall meet on site with CPP three (3) days prior to construction.

The Contractor shall contact CPP to make the necessary arrangements.

**D-51 CONDUIT 2”, 3” OR 4” (ITEM 625)**

All conduit installed under pavement in this project for traffic signals shall be concrete encased. Conduit shall be schedule 40 and conform to Ohio Department of Transportation’s specification 625.12.

**D-52 SIGNALIZATION MISC.: FOUNDATION TEST HOLES**

If underground obstructions are encountered that preclude use of the standard or alternate foundation designs, the Contractor shall provide the Engineer with complete information regarding the obstruction including type (i.e. utility), size, depth and lateral clearances to the sides of the foundation excavation. The foundation hole shall be covered with a steel plate (3/4” plywood in pedestrian accessible areas) until the Engineer determines if a new foundation location will be required. If subsequently directed by the Engineer, the Contractor shall backfill and compact the hole and restore the surface as described in “Restoration of Disturbed Areas.”

The Contractor shall be compensated for each foundation hole that must be abandoned. Payment for all labor, materials, tools, equipment and other incidentals, including back fill compacting and surface restoration shall be at the contract unit price bid for Item “632 – Signalization Misc.: Foundation Test Holes” for the number excavated and backfilled.

**D-53 SIGN LIGHTING MISC.: SIGN LIGHTING CABLE (ITEM 631)**

Cable for overhead sign lighting shall be field determined by the Engineer.

**D-54 LIGHTING MISC.: LUMINAIRE LIGHTING CABLE (ITEM 625)**

Cable for luminaires shall be field determined by the Engineer.

**D-55 POWER CABLE MISC.: POWER FOR SIGN LIGHTING  
POWER CABLE MISC.: POWER FOR LUMINAIRE LIGHTING  
(ITEM 632)**

Power cable for overhead sign lighting and luminaires shall be field determined by the Engineer.

**D-56 POWER CABLE MISC.: PUSHBUTTON CABLE (ITEM 632)**

Cable for pedestrian pushbuttons shall be per manufacturer’s requirements.

**D-57 PULL BOX, MISC.: 13”X 24” AS PER PLAN**  
**PULL BOX, MISC.: 17”X 30” AS PER PLAN**  
**PULL BOX, MISC.: 24”X 36” AS PER PLAN**  
**(ITEM 625)**

1. SIZE: 13” X 24”

- a. The exterior dimensions at the top shall be 13” x 24” (Nominal)
- b. The box shall be 24” deep (Nominal) and shall taper outward from the top to the open bottom
- c. The inside dimensions at the bottom shall be 11-7/8” x 21-3/8” (Minimum)
- d. The box, without cover, shall weigh approximately 64 lbs.
- e. The cover shall be 13-3/4” x 23-1/4” x 2” and shall weigh approximately 34 lbs.

2. SIZE: 17” X 30”

- a. The exterior dimensions at the top shall be 17” x 30” (Nominal)
- b. The box shall be 24” deep (Nominal) and shall taper outward from the top to the open bottom
- c. The inside dimensions at the bottom shall be 15-5/8” x 28-5/8” (Minimum)
- d. The box, without cover, shall weigh approximately 84 lbs.
- e. The cover shall be 17-1/2” x 30-1/2” x 2” and shall weigh approximately 65 lbs.

3. SIZE: 24” X 36”

- a. The exterior dimensions at the top shall be 24” x 36” (Nominal)
- b. The box shall be 24” deep (Nominal) and shall taper outward from the top to the open bottom
- c. The inside dimensions at the bottom shall be 29-13/16” x 41” (Minimum)
- d. The box, without cover, shall weigh approximately 124 lbs.
- e. The cover shall be 24” x 35-5/8” x 3” and shall weigh approximately 137 lbs.

4. LOAD CAPACITY

The box and cover shall be capable of supporting a load of 20,000 lbs. on a 10” x 10” area, tested in accordance with “Western Underground Committee Guide 3.6”. The cover deflection shall not exceed 1/2” at design load. The cover and box shall show no signs of damage after ten (10) cycles at design load.

## 5. MATERIAL AND CONSTRUCTION

The box shall be constructed of fiberglass reinforced polymer (FRP) with isophthalit polyester using the spray-up and roll construction method. The material shall have stabilizers to resist ultraviolet (UV) degradation in accordance with ASTM D-790 and ASTM D-11501-71, Section 6, Procedure B.

The top ring of the box shall be made of polymer concrete using a polyester binder with aggregate fillers and chopped fiberglass with minimum tensile strength of 1900 PSI. The ring shall have the same UV resistance as the FRP material. The threaded inserts for the cover bolts shall be stainless steel.

The cover shall be made with a thick molding compound (TMC) using the compression molding method. The TMC shall consist of a minimum of ten percent (10%) fiberglass in a calcium carbonate and polyester resin matrix. The cover shall be marked with the word "TRAFFIC" in 2 letters, embossed into the TMC and shall have a non-skid surface and the same UV resistance as the FRP material.

The cover shall be secured to the box using two hex head stainless steel bolts and washers which shall attach to threaded inserts in the body of the box.

## 6. CONDUIT OPENINGS

The openings in the side of the pull box, which are required to insert conduit (Into the pull box) shall be drilled or sawn in the field, once these locations have been determined. The openings shall not exceed the outside diameter of the conduit by more than five percent (5%). All openings in the side of the pull box shall be thoroughly grouted with cement mortar after placing the conduit.

NOTE: The exact locations of the pull boxes are to be staked and checked by the engineer prior to placement to verify clearance of underground facilities and any above ground obstructions. If there are any conflicts, these will be adjusted as directed by the Engineer. Payment for this adjustment is incidental to these items.

## 7. PULL BOX DRAIN

Pull boxes are to provided a 4" drain to the nearest storm inlet, under drain, or other suitable outlet from the pull box. Twenty (20) feet of 4" PVC conduit shall be used and included in the price of the pull box. Additional 4" conduit in the amount of 100 L.F. has been included in the bid proposal for use as directed by the engineer.

Failure to install drain conduit shall result in a penalty equal to the price bid for the affected pull boxes. Payment for pull box items shall not be made until pull boxes, including under drain, have been completely installed.

#### 8. PAYMENT

Payment shall be made at the contract unit price bid and shall be full compensation for all labor, materials, tools, equipment, and other incidentals necessary for the actually completed and accepted quantities of:

Item 625, Pull Box, Misc.: 13" X 24", As Per Plan

Item 625, Pull Box, Misc.: 17" X 30", As Per Plan

Item 625, Pull Box, Misc.: 24" X 36", As Per Plan

#### **D-58 GROUND ROD (ITEM 625)**

All ground rods shall be 1" diameter, copper clad steel. All ground rods are to be bonded electrically to the foundation reinforcement. Ground rods shall comply with Ohio Department of Transportation specification 625.09.

#### **D-59 TEMPORARY FACILITIES & CONSTRUCTION IN THE PEDESTRIAN ACCESS ROUTE**

An alternate pedestrian circulation path shall be provided whenever the existing pedestrian access route in the public right-of-way is blocked by construction, alteration and maintenance or other temporary conditions. The alternate pedestrian circulation path shall comply with the Americans with disabilities accessibility guidelines (ADAAG) and signage shall be installed in accordance with the MUTCD.

#### **D-60 CONTROLLER ACTUATED, 8 PHASE SOLID STATE DIGITAL MICROPROCESSOR (ITEM 633)**

##### TRAFFIC SIGNAL CONTROLLER

The purpose of this specification is to define the minimum operating requirement and characteristics for a NEMA TS1-1983 standard, and all adopted revisions, microprocessor based traffic signal controller and cabinet. Exceptions to this specification must be included with the bid. Unacceptable exceptions and/or substitutions by any bidder will result in rejection of that bidder's bid. Failure to comply with this provision may be considered cause for better declaring the contract in default.

## GENERAL REQUIREMENTS

The controller shall meet or exceed all requirements set forth by the institute of transportation engineers, the Manual of Uniform Traffic Control Devices, Latest Edition, and the NEMA TS1-1983 standards and all adopted revisions. All controllers shall be completely compatible with the latest edition of approved closed loop software for the existing city of Cleveland's closed loop system.

All circuit components such as transistors, diodes, integrated circuits, resistors, capacitors, etc., shall be commuter-grade quality. No vacuum tubes, relays or stepping switches shall be permitted. Integrated circuits shall be socket mounted. All components shall be identified with manufactures' part number for availability. No custom components, except for software and programmable chips, shall be permitted.

Overlaps shall be internally generated. Overlaps shall be user selectable using a standard NEMA program overlap card and wire jumper straps located within the controller unit in accordance with NEMA TS1-1983, Figure 14.3-6 or through internal programming. If internal programming is anticipated, the manufacturer shall still provide the NEMA overlap card with jumpers.

There shall be complete phase skip capability of any phase without a valid detector call.

The controller shall be capable of accepting a call from any standard vehicle or pedestrian detector without the use of special external isolation devices.

All timing shall be based on the 60 HZ frequency. All components on printed circuit boards shall have their identification permanently labeled on the circuit board in a manner so as not to be obscured by component mounting.

All required programming parameters required by this specification shall be user entered by means of front panel keyboard(s).

Programming of the controller shall be according to standard NEMA sequence charts, unless otherwise stated by the bid document.

The controller shall be designed to operate in standard traffic control cabinet without the need for environmental control devices other than a standard cabinet fan and ventilation vents in the controller housing cabinet.

All user entered data shall be stored in EEPROM devices which shall preclude the need for any battery or battery operated devices. Only the real-time clock for the time-based coordination shall utilize a battery. All user-entered data stored in the EEPROM shall be permanently stored in the devices. Loss of controller operation power shall not alter the values of EEPROM.

EEPROM shall be provided in addition to any other type of memory device or chip.

The following front panel indicators shall be provided:

1. Phase in service (per phase)
2. Phase next (per phase)
3. Detector call (Per phase)
4. Pedestrian call (per phase)
5. Gap termination (per phase)
6. Max green termination (per ring)
7. Max green two in effect (per ring)
8. Termination by force off (per ring)
9. Det lock/non lock (per ring)
10. Hold (per ring)

There shall be means for user entry of the following via front panel switches on the keyboard:

Per phase selection of:

1. Minimum recall
2. Maximum recall
3. Pedestrian recall
4. Phase non-actuated
5. Detector lock/non lock

Timer display shall be a quality back light liquid crystal.

### COORDINATION

Unless otherwise specified in the plans and/or bid documents, controllers shall be furnished with coordination capability contained internally within the controller unit.

The coordination capabilities shall provide as a minimum three (3) cycles, three (3) offsets, and three (3) splits.

Force-off and begin/end yield points shall be programmable by the user with respect to the local or system cycle as appropriate. There shall be a minimum of two permissive yield periods available.

The phases which are to be the coordinated phases shall be programmable by the user and are to be independently selectable in each ring.

The external coordination inputs which shall be accepted by the controlled unit

through the addition of a fourth or “D” connector shall be as follows:

1. Cycle 2
2. Cycle 3
3. Offset 1
4. Offset 2
5. Offset 3
6. Split 2
7. Split 3

The coordination cable for the fourth or “D” connector on the controller unit shall be terminated on a termination panel containing the required number of barrier terminal strips. This panel shall be mounted on the right sidewall of the cabinets. All terminals shall be clearly numbered.

Communication/coordination harness and panel shall be provided with each cabinet and shall be located in the lower sidewall of controller cabinet. Surge protection devices shall be provided.

#### CABINET

The cabinet shall be weather-tight construction fabricated from sheet aluminum (0.125”). All welds on fabricated cabinets shall be internal and continuous; spot welding is not acceptable. The cabinets shall be white inside and bronze (brown) on the outside.

The cabinet shall be equipped with properly rated circuit breaker(s) conforming to the national electrical code to accept No. 6 AWG wire.

There shall be two properly rated circuit breaker(s) conforming to the national electrical code to accept No. 6 AWG wire.

There shall be two properly rated circuit breakers for the following:

1. One breaker shall provide service for the controller, conflict monitor, load switches, fan and other controller appurtenances.
2. One breaker shall provide service for the cabinet light, convenience outlet and fan.

The cabinet shall be of suitable size to allow access to all cabinet terminals for installation and maintenance with shelf space for all provided equipment and one detector amplifier per phase.

The cabinet shall have a field test panel equipped with the following switches:

1. Per phase detector simulation for momentary call.

2. Per phase pedestrian call for momentary call.
3. Stop timing per controller. When in stop timing, shall apply stop timing to both rings of the controller.
4. Cabinet light on/off.
5. Flash switch. When in position, will put intersection to flash and controller will continue to cycle.
6. 110 VAC convenience outlet.

The cabinet shall have a police sub-panel equipped as follows:

1. An auto/flash switch shall provide for normal controller operation when in auto position. When placed in flash position, will place intersection on flash and apply stop timing to controller.
2. A signal on/off switch.

The cabinet shall be wired for vehicle and pedestrian NEMA LED indication load switches. Eight-phase controller shall be wired for eight vehicle movements and four pedestrian phases. Twelve NEMA load switches and positions shall be provided, eight for vehicle phases and four for pedestrian use. It shall be possible to change the pedestrian load switch position to overlap use by changing the appropriate cabinet wiring at the terminal strips.

The load switches shall have input indicators mounted on the front panel of the switch. The load switches shall be the replaceable cube type. Load switches made from discrete components shall not be acceptable.

The cabinet shall be provided with a minimum of two 12- position copper ground strips to accept #10 AWG wire.

All cabinet wiring shall be neatly routed, laced, and permanently secured.

All inputs to and outputs from the controller and conflict monitor and other equipment, whether used or not, shall be terminated in barrier type terminal strips. All terminal strips and wires shall be clearly marked with fade resistant terminals.

All barrier terminal connections shall utilize spade-type connectors. No “feed-through” terminal blocks shall be acceptable.

Also to be provided with each cabinet shall be one lot each of 50 cable straps (4” x 0.10” Tyton T-18R or equal), 50 circular waterproof cable tags, and two each capacitors, MMWA 6WLK IMFD plus 10%, 600 VDC CDET.

The cabinet shall be equipped with all necessary terminals, harnesses, and wiring to connect power, signals, detectors, controller monitor, and coordination inputs. Interconnect cable lightning protection devices, sufficient in quantity for cable protection, shall be provided with each cabinet.

The cabinet shall be wired for and include a NEMA flasher mounted on the back panel. All controllers shall have two circuit flashers. The flashers shall have output indicators mounted on the front of the flasher case.

The cabinet flash select sequence shall be accomplished via jumper straps or wires. It shall be possible to program flash select from the front of the load bay and any changes in the flashing program will be done without having to remove or lower the main panel assembly.

All relays external to the controller or appurtenances shall meet the following requirements.

1. Flash transfer relays shall be AEMCO #136-4962, Midland Ross # 136-62T3A1 or approved equal, 10 amp contacts, 8-pin cinch jones base.
2. Other control relays shall be potter brumfield KRP, Midland Ross 159 series, or approved equal, 5 amp contacts, 8-pin octal base.

Cabinet shall have a doorstop self-latching mechanism, which will provide a positive retention of door when open. This will be located at the bottom of the cabinet, and have a minimum of two locked positions, 90 and 120 degrees.

A three-point locking mechanism shall be provided to secure the door at three points: top, center and bottom.

All cabinets shall be provided with a minimum of two shelves, fabricated with the same material as the cabinet. They shall be adjustable vertically, and be mounted to the cabinet wall with mounting strips with spring-retained nuts and machine screws.

Panels will be located in cabinet as described below:

1. Communications/coordination-lower left wall
2. Detectors-lower left wall
3. AC power-lower right side of main panel
4. Police switches-door
5. Load bay-back wall
6. Test switches-rear of main door

A wiring diagram shall be provided for each cabinet supplied and shall be approved by the Engineer before final acceptance of material.

#### EXTERIOR CABINET PAINTING

Powder coating – color: dark bronze

Surface preparation – the exterior steel surface shall be blasé cleaned to steel structures painting council surface preparation specification No. 6 (SSPC-SP6) requirements utilizing cast steel abrasives conforming to the Society of Automotive Engineers (SAE) recommended practice J827. The blast method used is a recirculating, closed cycle centrifugal wheel system with abrasive conforming to SAE shot number S280.

Interior coating – interior surfaces (pole shafts only) at the base end for a length of approximately 2.0 feet shall be mechanically cleaned and coated with a zinc rich epoxy powder. The coating shall be electrostatically applied and cured in a gas fired convection oven by heating the steel substrate to a minimum of 350 degrees Fahrenheit and a maximum of 400 degrees Fahrenheit.

Exterior coating – all the exterior surfaces shall be coated with a urethane or triglycidyl isocyanurate (TGIC) polyester powder to a minimum film thickness of 2.0 mils (0.002”). The coating shall be electrostatically applied and cured in a gas fired convection oven by heating the steel substrate to a minimum of 350 degrees Fahrenheit. The thermosetting powder resin shall provide both intercoat as well as substrate fusion adhesion that meets 5A or 5B classifications of ASTM D3359.

Combination coating galvanized-powder top coat color: Dark Bronze

Surface preparation – prior to being incorporated into an assembled product, steel plates  $\frac{3}{4}$  inches or more in thickness shall be blast cleaned when required to remove rolled-in mill scale, impurities and non-metallic foreign materials. After assembly, all weld flux shall be mechanically removed. The iron or steel product shall be degreased by immersion in an agitated 4.5% - 6.0% concentrated caustic solution elevated to a temperature ranging from 150 degrees Fahrenheit to 190 degrees Fahrenheit. It shall next be rinsed clean from any residual effects of the caustic or acid solutions by immersion in a circulating fresh water bath. Final preparation shall be accomplished by immersion in concentrated zinc ammonium chloride flux solution heated to 130 degrees Fahrenheit. The solution's acidity content shall be maintained between 4.5 – 5.0pH. The assembly shall be air-dried to remove any moisture remaining in the flux coat and/or trapped within the product.

Zinc coating – the product shall be hot-dip galvanized to the requirements of either ASTM A123 (fabricated products) or ASTM A153 (hardware items) by immersion in a molten bath of prime western grade zinc maintained between 810 degrees Fahrenheit and 850 degrees Fahrenheit. The entire product shall be totally immersed with no part of it protruding out of the zinc (no double dipping). This is to limit a risk of trapped contaminates containing chlorides and reduce the risk of bare spots (bare spots can occur when flux on the steel surface is burned away by heat of the first dip). Maximum aluminum content of the bath shall be 0.01%. Flux ash shall be skimmed from the bath surface prior to immersion and extraction of the product to assure a debris free zinc coating.

Exterior coating – all galvanized exterior surfaces shall be coated with a urethane or triglycidyl isocyanurate (TGIC) polyester powder to a minimum film thickness of 2.0 mils (0.002”). Prior to application, the surfaces to be powder coated shall be mechanically etched by brush blasting (ref. SSPC-SP7) and the zinc coated substrate preheated to 450 degrees Fahrenheit for a minimum of one hour in a gas fired convection oven. The coating shall be electrostatically applied and cured in a gas fire convection oven by heating the zinc coated substrate to a minimum of 350 degrees Fahrenheit and a maximum of 400 degrees Fahrenheit. The thermosetting powder resin shall provide both intercoat as well as substrate fusion adhesion that meets 5A or 5B classification of ASTM D3559.

#### **BASE MOUNTED CABINETS**

The controller shall be provided in a base-mounted control cabinet.

All necessary installation hardware and templates shall be provided.

Minimum outside dimensions of cabinet shall be 25 inches (width) by 16 inches (depth) by 48 inches (height).

A telephone modem shall be completely wired in each cabinet in order to report cabinet failures, detector failures and traffic counts. The controller shall be completely compatible with the latest edition of the City of Cleveland’s closed loop system software.

The items supplied shall be in conformance with the above reference specification and shall be supplemented with the latest edition of the State of Ohio Department of Transportation, Construction and Material Specifications. Payment for accepted materials will be made at the unit bid price of each item installed and accepted.

#### **D-61 PLASTIC CAUTION TAPE (ITEM 625 SPECIAL)**

The location of the conduit in the trench shall be marked by the use of a continuous identifying tape buried in that trench above the line. The identifying tape shall be an inert material approximately 6” wide composed of polyethylene plastic and shall be highly resistant to alkalis, acids or other chemical components likely to be encountered in soils. The type shall be red with the words “electric line buried below” printed in black letters on one side only. It shall be supplied in continuous rolls with the identifying letters repeated for the full length of the tape. The contractor shall bury the tape in the trench with one strip placed approximately down the centerline and 8” to 12” below the final grade. It shall be placed in the trench with the printed side up and shall be essentially parallel to the finished surface. The contractor shall take any necessary precautions to insure that the tape is not pulled, distorted or otherwise misplaced in completing the

trench backfilling. The tape shall be “Terra Tape”, “Allen System’s” or an equal as approved by the Engineer in advance.

**D-62 REMOVAL OF TRAFFIC SIGNAL INSTALLATION (ITEM 632)**

Traffic signal installation, including signal heads, cable, messenger wire, strain poles, pedestrian poles, luminaires, cabinet, controller, pullboxes, etc., shall be removed in accordance with 632.26.

Removed items shall be delivered to the City. Contact Traffic Engineering at (216) 664-3194. Items to be delivered shall include traffic signal heads, controller, pedestrian pushbuttons, pedestrian signal heads and cabinets, pedestrian poles and luminaires.

**D-63 SIGN HANGER ASSEMBLY, MAST ARM, AS PER PLAN (ITEM 630)**

Signs mounted on proposed traffic signal mast arms shall be rigidly attached to the arm and centered vertically on the arm. The contractor may use the method of attachment shown in standard construction drawing TC-16.20 or another method of rigid attachment as approved by the engineer.

The contractor shall insure the sign face is mounted perpendicular (90 degrees) to the direction of traffic.

Payment for Item 630 – Sign Hanger Assembly, Mast Arm, As Per Plan shall be made at the contract unit price bid for each. Payment shall be full compensation for all materials, labor, tools, equipment and all parts necessary to erect one individual sign.

**D-64 COMBINATION SIGNAL SUPPORT (BY TYPE AND DESIGN) & SIGNALIZATION MISC.: SIGNAL, OVERHEAD SIGN AND LIGHT POLE SUPPORT, AS PER PLAN (ITEM 632)**

In addition to the requirements of specification 632, signal supports shall be painted in accordance with the following:

Powder coating – color: dark bronze

Surface preparation – the exterior steel surface shall be blasé cleaned to steel structures painting council surface preparation specification No. 6 (SSPC-SP6) requirements utilizing cast steel abrasives conforming to the Society of Automotive Engineers (SAE) recommended practice J827. The blast method used is a recirculating, closed cycle centrifugal wheel system with abrasive conforming to SAE shot number S280.

Interior coating – interior surfaces (pole shafts only) at the base end for a length

of approximately 2.0 feet shall be mechanically cleaned and coated with a zinc rich epoxy powder. The coating shall be electrostatically applied and cured in a gas fired convection oven by heating the steel substrate to a minimum of 350 degrees Fahrenheit and a maximum of 400 degrees Fahrenheit.

Exterior coating – all the exterior surfaces shall be coated with a urethane or triglycidyl isocyanurate (TGIC) polyester powder to a minimum film thickness of 2.0 mils (0.002”). The coating shall be electrostatically applied and cured in a gas fired convection oven by heating the steel substrate to a minimum of 350 degrees Fahrenheit. The thermosetting powder resin shall provide both intercoat as well as substrate fusion adhesion that meets 5A or 5B classifications of ASTM D3359.

Combination coating galvanized-powder top coat color: Dark Bronze.

Surface preparation – prior to being incorporated into an assembled product, steel plates  $\frac{3}{4}$  inches or more in thickness shall be blast cleaned when required to remove rolled-in mill scale, impurities and non-metallic foreign materials. After assembly, all weld flux shall be mechanically removed. The iron or steel product shall be degreased by immersion in an agitated 4.5% - 6.0% concentrated caustic solution elevated to a temperature ranging from 150 degrees Fahrenheit to 190 degrees Fahrenheit. It shall next be rinsed clean from any residual effects of the caustic or acid solutions by immersion in a circulating fresh water bath. Final preparation shall be accomplished by immersion in concentrated zinc ammonium chloride flux solution heated to 130 degrees Fahrenheit. The solution's acidity content shall be maintained between 4.5 – 5.0pH. The assembly shall be air-dried to remove any moisture remaining in the flux coat and/or trapped within the product.

Zinc coating – the product shall be hot-dip galvanized to the requirements of either ASTM A123 (fabricated products) or ASTM A153 (hardware items) by immersion in a molten bath of prime western grade zinc maintained between 810 degrees Fahrenheit and 850 degrees Fahrenheit. The entire product shall be totally immersed with no part of it protruding out of the zinc (no double dipping). This is to limit a risk of trapped contaminants containing chlorides and reduce the risk of bare spots (bare spots can occur when flux on the steel surface is burned away by heat of the first dip). Maximum aluminum content of the bath shall be 0.01%. Flux ash shall be skimmed from the bath surface prior to immersion and extraction of the product to assure a debris free zinc coating.

Exterior coating – all galvanized exterior surfaces shall be coated with a urethane or triglycidyl isocyanurate (TGIC) polyester powder to a minimum film thickness of 2.0 mils (0.002”). Prior to application, the surfaces to be powder coated shall be mechanically etched by brush blasting (ref. SSPC-SP7) and the zinc coated substrate preheated to 450 degrees Fahrenheit for a minimum of one hour in a gas fired convection oven. The coating shall be electrostatically applied and cured in a gas fire convection oven by heating the zinc coated substrate to a minimum of

350 degrees Fahrenheit and a maximum of 400 degrees Fahrenheit. The thermosetting powder resin shall provide both intercoat as well as substrate fusion adhesion that meets 5A or 5B classification of ASTM D3559.

The City of Cleveland, Division of Traffic Engineering requires that the contractor meet with a Traffic Department representative prior to foundation installations to verify locations and for final pole orientations. Contact Andrew Cross, Traffic Engineer at (216) 664-3194, 48 hours prior to commencing work.

Orders for signal poles and mast arms shall be placed systematically after the respective foundations have been constructed. In the event that utility or other conflict requires that a signal support be constructed in a location other than as indicated on the plan, the engineer shall determine whether the specified arm length is appropriate. If a longer or shorter arm is required, the City shall provide the engineer with design information for the revised pole and arm. Changes in pole and/or arm size, strength and/or length due to revised foundation locations shall not receive additional compensation beyond the contract unit price for the item(s) actually furnished.

#### **D-65 WATER WORK DETAILS**

All of the work specified in Division of Water Part D or Part E of these specifications and/or indicated on the Contract Drawings shall be considered as Required Work. Work not specifically indicated in Part D or Part E nor shown on the Contract Drawings shall be considered Additional Work.

The Contractor shall perform Additional Work items only after receiving prior written approval from the City and shall be paid for this work at the bid unit prices submitted for each item.

#### **FIRE HYDRANT REPLACEMENT**

1. Where determined by the City that an existing hydrant is to be replaced, the Contractor shall furnish all hydrants, materials, labor, tools and equipment for removing an existing hydrant and installing a new six (6) inch hydrant assembly complete. Hydrant replacements shall include the removal and replacement of the hydrant tee, the hydrant branch, the branch valve, and all appurtenances from the hydrant to the main.
2. The six (6) inch hydrant shall be City of Cleveland Standard and shall conform to the Division of Water's specifications and approved hydrant drawings on file with the Division of Water at the Public Utilities Building, 1201 Lakeside Ave., Cleveland, Ohio 44114.
3. The Contractor shall be paid at the bid unit price submitted for each fire hydrant replaced which shall include: the removal and furnishing of hydrants,

testing, painting, the excavation, sheeting and shoring, backfilling, seeding and sodding, ductile iron pipe and fittings, concrete piers or thrust blocks; and shall include the furnishing of all labor, materials, and tools necessary to complete the work as specified or as shown or as directed.

### WATER SERVICE CONNECTION REPLACEMENT

Where determined by the City, the Contractor shall furnish all materials and provide all labor and equipment necessary to replace (2" and less) service connections as required in accordance with the general requirements as specified by Division of Water specifications. The requirements shall include, but not limited to the followings:

Contractor shall provide City with list of connections replaced including Station number, address and connection number.

#### 1" Service connection on Ductile / Cast Iron Water Mains

- 1 1" Corporation stop-copper to iron
- 1 1" Curb stop valve-copper to iron
- 1 Curb stop valve box top
- 1 Curb stop valve box bottom
- X Ft 1" Type K, ASTM B88, copper tubing

#### OR

- 1 1" Compression corporation stop
- 1 1" Oriseal compression valve
- 1 1" Oriseal Compression valve
- X Ft 1" Type K, ASTM B88, copper tubing

#### 1-1/2" Service connection on Ductile / Cast Iron Water Mains

- 1 SOM x 1-1/2" Bronze double strap tapping saddle
- 1 1-1/2" Corporation stop - copper to iron
- 1 1-1/2" x 12" long Bronze Nipple
- 1 1-1/2" Bronze square head gate valve (one valve at Main, 2<sup>nd</sup> valve used as curb valve)
- 2 1-1/2" Streamline unions - copper to copper, Male
- 2 1-1/2" Compression three (3) part unions-copper to iron, Male
- X Ft 1-1/2" Type K, ASTM B88, copper tubing
- 2 Valve box covers
- 2 Valve box tops
- 2 Valve box bottoms
- X Ft 1" Type K, ASTM B88, copper tubing

#### OR

1	SOM x 1-1/2" Bronze double strap tapping saddle
1	1-1/2" Oriseal valve
1	1-1/2" x 6" long Bronze Nipple
2	1-1/2" Streamline unions - copper to copper, Male
2	1-1/2" Compression three (3) part unions - copper to iron, Male
X Ft	1-1/2" Type K, ASTM B88, copper tubing
2	Valve box covers
2	Valve box tops
2	Valve box bottoms
2	Stationary rods for Oriseal valve

Note: No splices between curb valve and corporation.

The contractor shall be paid at the unit bid price for each water service connection replaced.

PLUGGING WATER SERVICE CONNECTION, 2" OR LESS. IN ALL PLUGGING SCENARIOS.

Where directed by the City, the contractor shall provide all labor, equipment, and materials necessary to plug service connections per City standards. The following work methods will be used for plugging the specified service conditions:

1. Ferrule connections - Remove ferrule, install repair clamp or tap saddle with plug.
2. 1" connection with Corporation valves - If corporation is leaking or the City Inspector determines that replacement is necessary, the Contractor shall remove the corp. and install a repair clamp at tap or tap saddle with plug. Otherwise, if corp. is sound, connection could be plugged by shutting corp. valve and cutting and crimping the service connection just after corp. valve.
3. 1-1/2" and 2" saddles and corps- Cut service connection pipe and crimp at corporation, remove saddle, install double full-circle repair clamp.
4. The curb valve must be shut prior to performing any plugging activities.
5. The Contractor shall be paid at the unit bid price for plugging service connection.
6. The Contractor shall provide City with a list of connections plugged including Station number, address and connection number.

**D-66 SEEDING AND MULCHING (ODOT ITEM 659)**

This item shall conform to ODOT Item No. 659 with the following exception:

1. The Contractor shall seed and mulch all grass areas within the right-of-way and utility easements as well as all existing grass areas disturbed by the Contractor. All areas shall be seeded with the following high quality seed mixture:
  - a. 30 Percent Kentucky Bluegrass
  - b. 30 Percent Creeping Red Fescue
  - c. 20 Percent Annual Ryegrass
  - d. 20 Percent Perennial Ryegrass, turf type
2. Mowing operations shall be done at the direction of the Engineer. The first mowing shall be as soon as grass top growth reaches a 3” height and is to be cut back to 2” in height. After the second mowing and two days later the Contractor shall apply Triaiminic Plus or approved equal to eliminate weeds in the seeded and restored areas. The third cutting, as directed by the Engineer, is the final mowing required.
3. Contractor is responsible for repairing seeded and restored areas until final cutting at no additional cost to the City.
4. The cost for this work shall be included in the unit bid price per square yard for ODOT Item 659 - Seeding and Mulching.

**D-67 WATER FOR SEEDING (ODOT ITEM 659)**

This item shall conform to ODOT Item 659.

Payment shall be made at the unit price bid per thousand (M) gallons for Water for Seeding.

**D-68 COMMERCIAL FERTILIZER (ODOT ITEM 659)**

This item shall conform to ODOT Item 659 with the following exceptions:

1. Fertilizer shall be 12-12-12 and applied at the rate of 20 pounds per 1,000 square feet and shall be distributed in an even pattern, then thoroughly raked into the soil to a depth of not less than one inch (1”).
2. The Contractor shall fertilize all areas to be seeded.

3. Payment shall be made at the contract unit price bid per ton for ODOT Item 659 Commercial Fertilizer.

**D-69 TREE PRUNING (ODOT ITEM 666)**

The following information and instruction as per ODOT Item 666, are subject to the direction of the City Forester or Urban Forestry Representative.

In general, trees are to be pruned in accordance with accepted arboriculture practice, by the Contractor or subcontractor approved by Urban Forestry.

Under the “No Fee” permit, which the Contractor must obtain from the City Forester 72 hours in advance of starting construction, the contractor shall prune every tree to be saved to forestall damage by construction equipment. The Contractor shall also remove all trash and debris resulting from the pruning, which has accumulated within the area’s limits.

No tree shall be pruned except as directed by Urban Forestry.

The types of pruning generally used are: Crown Cleaning, Crown Thinning, Crown Raising, Crown Restoration and Utility Pruning. The above listing is not intended to be a complete representation of the International Society of Arboriculture standards. For complete specifications refer to Tree-Pruning Guidelines, an official publication of the International Society of Arboriculture 1995.

The Contractor shall carefully protect against damage to all existing vegetation and other features designated to remain. The Contractor shall be liable for any and all damage to such vegetation, features and other real property and vehicles, caused by their work. The Contractor shall be responsible for restoring or replacing to their original condition, and to the satisfaction of the Urban Forestry representative, any and all of these items damaged during the performance for this work.

Prior to starting construction of the project the contractor shall prune every tree within the project site as needed. All cuts shall be made sufficiently close to the parent stem and according to NAA pruning standards to facilitate natural healing processes. All limbs one inch in diameter and over must be pre-cut to prevent splitting. All pruning shall be done to a lateral branch (drop crotch pruning). All pruning shall be guaranteed for a period of one year. Do not leave stubs and do not flush cut.

Branches shall be removed to a height sufficient to permit free passage of both pedestrian and vehicular traffic. In lifting the bottom branches of trees to provide clearance, care should be given to overall appearance, and cuts shall not be made that will prevent normal sap flow.

All trees, which require corrective pruning and maintenance due to root and trunk damage in the course of proximal excavation, shall have such corrective pruning and maintenance, performed within fifteen calendar days of said damage.

When pruning within City right of ways, all pruned material and all other debris shall be removed from the site within twenty-four hours and disposed of properly.

#### **D-70 TREE REMOVAL (ITEM SPECIAL)**

Tree removal shall be done only under the direction of the Engineer or as shown on the plans. The Contractor shall apply for and receive a Tree Removal Permit from the Urban Forester, Division of Park Maintenance and Properties, prior to the removal of any tree in the City right-of-way.

##### **1. DEFINITIONS**

- a. Tree diameter is defined as the tape measurement of the tree from a height of 54 inches above the ground.
- b. Brush is defined as trees up to and including 3 inches in diameter.

##### **2. SCHEDULE OF SIZES**

Trees scheduled for removal shall be measured with the following schedule:

- a. Over 3 inches to 12 inches equals 9-inch size each.
- b. Over 12 inches to 24 inches equals 15-inch size each.
- c. Over 24 inches to 36 inches equals 30-inch each.
- d. Over 36 inches to 60 inches equals 48-inch each.
- e. Over 60 inches equals 60-inch each.

##### **3. STUMPS**

Existing stumps partially or completely inside the area of excavation for sidewalks, handicap ramps, driveways, or curbs shall be partially or completely removed as part of the excavation requirements.

No additional payment shall be made for removing these stumps.

#### **D-71 ROOT PRUNING (ITEM SPECIAL)**

Root pruning should be prohibited when construction alternatives exist that make root pruning unnecessary. Some of these alternatives include re-alignment or narrowing of the sidewalk blocks around the trees to eliminate the need to prune or cut major roots. Curb construction should be performed using a slip form

paving machine and a model that has zero clearance and requires minimum excavation. Installing curb drain under the curb instead of next to it should also be a construction requirement. See City of Cleveland Standard Drawing CD-1 Sheet 1/3 for underdrain detail.

The contractor will hire a Registered Consulting Arborist (RCA) to act as the Project Arborist (PA). The PA will assess the health and structural integrity of the trees prior to the start of construction. The PA will provide the City of Cleveland Urban Forestry Manager (UFM) with daily updates as they relate to trees impacted by the project. During sidewalk replacement, the PA will inspect the roots after the sidewalk panels are lifted. During this assessment, the PA will make recommendations about root pruning. The UFM will review the recommendations and give final approval.

After the UFM agrees that root pruning will be necessary, all root pruning operations will be subject to inspection, supervision, and approval by the PA working under the auspices of the Urban Forestry Section. All root pruning should be performed by a certified arborist. The cost of hiring the PA shall be included in the unit price bid for tree pruning.

Root pruning will not be performed on private trees by City personnel or by contractors working under the auspices of the City of Cleveland. The property owner who is responsible for the tree shall contract a qualified tree company, at their expense, and remove any offensive roots, before the sidewalk area can be repaired. Trees growing in the public right-of-way are the property of the City of Cleveland and their care and protection are governed by the Commissioner of Park Maintenance and Properties.

The PA will perform an initial on-site inspection of all tree sidewalk conflicts approved by the UFM and will prepare either a pre-construction tree assessment or a tree assessment at time of sidewalk removal. Said report must address both the condition of each tree and the sidewalk conflict from roots and or the trunk itself. Recommendations must be made as to whether roots can be cut, tree removal is advisable, or an alternative can be done to protect the tree. The City's main concern is the preservation of all healthy and safe trees whether in the tree lawn or on private property and still allow pedestrian and wheelchair use of the sidewalks. If root removal is recommended the PA will direct both the contractor performing the cement repair and the contractor performing the root grinding, on sidewalk adjustment/change in design and the amount of root removal needed. A final inspection of the area may also be required, after the root grinding, on sidewalk adjustment/change in design and the amount of root removal needed. A final inspection of the area may also be required, after the root grinding has been completed and before any backfill has been added, to re-evaluate the condition of the tree and on the performance of the root removal operation.

The PA must advise the sidewalk repair contractor of proper root pruning techniques prior to or at the start of construction. Upon removal of the old pavement, the contractor is advised to inspect and probe for additional roots before excavating soil. If more roots are to be cut than anticipated and those roots are in excess of two inches in diameter at the point of cutting, then the PA must be notified before any root cutting shall take place. The PA may need to inspect the exposed roots. Notes will be required and photographs are advisable.

Caution is advised that ripping old roots may damage both public and private property. Root cutting performed with the use of hand tools may be done by non-arboriculture employees of the sidewalk repair contractor only after a briefing and instruction by the PA. Root grinding by machine must be done by either a qualified tree worker or an equipment operator experienced in root cutting for sidewalk repair, but only after adequate instruction by the PA. A qualified tree worker is a person who has 3+ years of experience working with trees and has an understanding of tree biology and physiology. This person should be an ISA certified arborist.

All roots should be removed by severing them cleanly with a sharp axe, power saw or by grinding them off using a root grinding machine. Roots may not be torn off or removed using power equipment such as backhoes, steerskid loaders, or front end loaders.

Disruption of soil and roots should be kept to a minimum whenever possible. Root pruning or soil excavation shall not occur closer than three feet from the outer portion of the trunk, on trees that are 12" in diameter or less. For trees larger than 12" in diameter, soil excavation and root pruning shall not occur closer than the distance measured by the circumference of the tree. If there is an inability to perform the work necessary, following the distance guidelines outlined above, a representative of Urban Forestry section shall be called to the tree site to make an inspection and recommendation pertaining to the need to remove the tree.

Soil excavation work is permitted closer than the distance parameters established under the above categories, provided that all excavation is accomplished using hand tools and no roots greater than two inches in diameter are severed. Roots under sidewalk areas should be removed to a depth of 6.5" below the top of the finished walk only. The subgrade material under the sidewalk should have acceptable pore space to allow for root aeration.

Whenever appropriate a bio-barrier root control system should be installed along the length of the work area, on sidewalk side only. Bio-barrier root control systems for 18"x24" panels shall be included in the unit price bid for tree root pruning. Installation of this barrier should be done using the manufactures specifications and as directed and approved by the Chief of the Bureau of Sidewalks.

Exposed roots should be kept moist by applying water and adding an organic layer over the exposed area, until the site can be returned to a pre-construction condition. The contractor shall include all cost in the unit price bid for tree root pruning for moisture control and placement of organic matter as determined by loss of ignition of samples oven dried to a constant weight at 212 degrees Fahrenheit.

Clean up shall be completed within two hours after debris has been ground out around each site where root removal operations are taking place. The work site shall be left in a manner that is equal or cleaner than pre-work conditions. It shall be the responsibility of the contractor to remove and dispose of any wood debris (Chips, roots, limbs, etc.) in a proper and acceptable manner.

The contractor must have in their possession or available to them by formal agreement trucks, stump grinders, hand tools, and other equipment and supplies which are necessary to perform the outlined work as specified.

The contractor performing the root removal is responsible for contacting the necessary utility agencies any time work is being performed around overhead or underground utility installations. The contractor shall protect all utilities from damage, shall immediately contact the appropriate utility should damage occur, and shall be responsible for all claims of damage due to the operation.

The contractor shall perform the work with due care, taking precautions against injury to persons and damage to property and against interference with traffic or abutting property. These precautions include erecting barricades, display lights or signs, give warnings and other measures as necessary or required by the governing authorities and this shall be done at the contractor's expense.

Traffic control is the total responsibility of the contractor and shall be accomplished in conformance with state, county, and local highway construction codes. The contractor is solely responsible for pedestrian and vehicular safety control within the work site and shall provide the necessary warning devices.

Damage by the contractor to any person or property, public or private, is the total responsibility of the contractor and will be repaired or compensated by the contractor to the satisfaction of both injured party and the Division of Park Maintenance and Properties at no cost to the City.

Tree damage caused by the contractor shall be immediately repaired at no additional expense to the City of Cleveland. Trees damaged as judged by the UFM are appraised to determine the value of damage. If the City determines that the damage warrants removal, it shall be done by the contractor at no cost to the City. The appraised cost of the damage may either be paid to the Division of Park Maintenance and Properties or deducted from monies owed by the contractor. If the damage resulted in the removal of the tree, the City may accept replacement

trees at the combined diameters of the tree or trees to be removed. All replacement trees shall be balled and burlapped and of a species to be determined by the Division of Park Maintenance and Properties.

All equipment to be used and all work to be performed must be in full compliance with the most current version of the American National Standards Institute (ANSI) Standard Z-133-1 "Safety Requirements for Pruning, Trimming, Repairing, Maintaining, Removing Trees and for Cutting Brush." ANSI Standards are made part of this contract by this reference.

**D-72 MISCELLANEOUS METAL (ITEM SPECIAL)**

This item shall be used to replace missing, damaged, or broken City of Cleveland castings by the Contractor. The Engineer shall determine which of the castings, if any, shall be replaced under this item prior to removal of same. New casting shall be set to line and grade and paid for as adjusting the respective casting, in addition to the payment for miscellaneous metal furnished. Locations shall be logged on Contractors daily reports approved by city inspector and submitted with invoicing for payment.

The contractor shall remove, transport and deposit all existing ferrous metal including but not limited to existing catch basin frame and grate, manhole frame, manhole cover, valve cover and boxes into the 30 cubic yard container at 2300 East 67<sup>th</sup> Central Avenue, Cleveland, Ohio 44104. Contractor shall notify the Bureau of Bridges and Docks at 216-432-6040 of date of delivery. Stockpiled ferrous metal shall not obstruct pedestrian or vehicular access.

Dray slips shall be submitted for each separate part of each casting and shall be used to determine the actual weight of miscellaneous metal to be paid for, in pounds (lbs.). An estimated quantity of miscellaneous metal has been included in the Schedule of Items to perform this work. This quantity is used for estimating purposes only. Items meeting this specification shall be paid under Item Special-Miscellaneous Metal.

Locations shall be logged on contractors daily reports, approved by city inspector, and submitted with invoicing for payment. Payment will not be processed for Miscellaneous Metal without accompanying documentation.

Payment shall be made at the bid unit price per pound (lb) under Item Special-Miscellaneous Metal.

Payment will not be processed for Miscellaneous Metal without accompanying documentation.

## **D-73 TESTING OF CONSTRUCTION MATERIALS (ITEM SPECIAL)**

The contractor shall perform all work under this section of the specifications. The contractor shall hire a Private Laboratory to perform tests on construction materials. The testing laboratory shall be subject to the review and prior approval of the Administration Bureau Manager and shall not be changed without the approval of the Board of Control.

Inspection and review of the laboratory by the Cement and Concrete Reference Laboratory of the National Bureau of Standards, in affiliation with the American Council of Independent Laboratories is required.

Accreditation by the Department of Commerce's National Voluntary Laboratory Accreditation Program or other similar organization is not mandatory, but furnishing proof of such compliance would weigh heavily upon the acceptance of that laboratory to perform services under this contract.

The laboratory or laboratories performing services under this contract shall be able to verify its independence from the construction contractor and subcontractor, if any, for the contract work being tested.

Listed below is list of these tests and the respective American Society of Testing and Materials (ASTM) 2004 specifications. The tests described below shall be performed only as requested and directed by the Administration Bureau Manager or his designee. Each test shall conform to the specifications indicated. The unit price bid for each type of field test shall include all costs for the test described; including traffic control, mileage and the furnishing of the required reports.

Two (2) copies of each test report plus original are required.

All tests requiring coring shall be subject to the following two (2) additional requirements. The first is the cored hole shall be filled with material approved by the Administration Bureau Manager. The second is that the performance of these tests may be observed by a representative of the Administration Bureau Manager.

Test reports must include the name of the individual requesting the test and the date of the request. All reports should be sent to:

Division of Engineering & Construction  
Cleveland City Hall, Room 518  
Cleveland, OH 44114

### **1. ASPHALT DENSITY TEST**

- a. Test shall conform to ASTM D-2950 (Density of Bituminous Concrete in Place by Nuclear Method).

- b. All tests shall be made at the time of placement of the asphalt at locations furnished by the Engineer.

## 2. ASPHALT EXTRACTION TEST

- a. Test shall conform to ASTM D-2172 (Quantitative Extraction of Bitumen from Bituminous Paving Mixtures) and as herein modified.
- b. The first modification is that the sample taken in the field shall be used for a Marshall Stability Test as per ASTM D-1559 (Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus).
- c. The second modification is that, after performing the ASTM D-2172 test, all the sample aggregate shall be subjected to a sieve analysis as per ASTM C-136 (Sieve Analysis of Fine Course Aggregates).
- d. The test report shall include all the results, including test method used, for all three (3) ASTM tests.

## 3. THICKNESS OF COMPACTED ASPHALT TEST

- a. Test shall conform to ASTM D-3549 (Thickness or Height of Compacted Bituminous Paving Mixture Specimens).
- b. Cores shall be drilled in a random pattern along the pavement of each lane as directed by the Engineer.

## 4. CONCRETE COMPRESSION, SLUMP, AIR CONTENT, AND TEMPERATURE CHECK TESTS (FIELD)

This item includes making and curing cylinders in the field and testing them in the laboratory. These tests shall conform to ASTM C-31 (Making and Curing Concrete Test Specimens in the Field) and ASTM C-39 (Compressive Strength of Cylindrical Concrete Specimens) and as herein modified. All samples shall be obtained as stated in ASTM C-172 (Sampling Fresh Concrete).

Each Concrete Compression Test shall be composed of a set of four (4) concrete test specimens made in conformity with ASTM C-31 (Making and Curing Concrete Test Specimens in the Field) at locations as specified by the engineer.

At the time of pouring, a slump test conforming to ASTM C-143 (Slump of Portland Cement Concrete) and an air entrainment test conforming to ASTM C-231 (Air Content of Freshly Mixed Concrete by the Pressure Method) shall be performed. The concrete temperature shall also be taken and recorded as per ASTM C-1064 (Test Method for Temperature of Freshly Mixed

Concrete).

One (1) cylinder from each set of four (4) shall be compression tested at seven (7) days and a written report, including results of slump and air entrainment tests and the concrete temperature, shall be forwarded to the Administration Bureau Manager within twenty-four (24) hours of the test completion.

The three (3) remaining cylinders shall be compression tested at twenty-eight (28) days and a written report of each individual cylinder test and their average shall be forwarded to the Administration Bureau Manager within twenty-four (24) hours of the test completion. The cost of picking up test cylinders, whether on a holiday, weekend or at night shall be included in the unit price bid for each set tested.

The testing laboratory shall notify the Administration Bureau Manager of the Division of Engineering and Construction, by telephone at (216) 664-2390, immediately on the occurrence of any of the following four (4) conditions:

- a. Any or all of the concrete test specimens of any set are lost or damaged in the field.
- b. Any or all of the concrete test specimens of any set are lost or damaged by the testing laboratory.
- c. The result of the seven (7) day test result is below 3200 psi for Type C concrete or 3400 psi for Type S concrete.
- d. The average of the twenty-eight (28) day test of any set is below 4000 psi for Type C concrete or 4500 psi for Type S concrete.

All telephone calls made, as required above, shall be included in the test report and include the name of the person called, the time and date, and the reason for the call.

Included in the report should be the exact location of each set of cylinders tested. Reports which do not include this will be rejected. Additionally, no payment will be made for any set which includes less than four (4) cylinders.

The unit price bid for this item shall include making the four (4) cylinders (one set) in the field, curing, testing and the report.

5. CONCRETE COMPRESSION, SLUMP, AIR CONTENT, AND TEMPERATURE CHECK TESTS (LAB)

This item includes making, curing and testing cylinders in the laboratory.

These tests shall conform to:

- a. ASTM C-192 (Making and Curing Test Specimens in the Laboratory)
- b. ASTM C-143 (Slump of Portland Cement Concrete)
- c. ASTM C-231 Air Content of Freshly Mixed Concrete by the Pressure Method
- d. ASTM C-1064 (Test Method for Temperature of Freshly Mixed Concrete)
- e. ASTM C-39 (Compressive Strength of Cylindrical Concrete Specimens).

The testing laboratory shall submit a certified test report, within twenty-four (24) hours, to those designated by the Administration Bureau Manager.

6. CONCRETE CORE SAMPLES FOR THE DETERMINATION OF CONCRETE COMPRESSIVE STRENGTH

These samples shall be obtained and compression tested as per ASTM C-42 (Obtaining and Testing Drilled Cores and Sawed Beams of Concrete) and ASTM C-39 (Compressive Strength of Cylindrical Concrete Specimen).

The concrete to be cored ranges from four (4) to twelve (12) inches in thickness.

The unit price bid to obtain the cores in the field shall include coring, transportation, storage, traffic maintenance, and all necessary preparation work for same.

7. ANALYSIS OF AGGREGATES

This item covers sampling and testing aggregates used in subbase courses, bituminous paving mixes and concrete mixes.

The sample of the aggregate shall be taken as per ASTM D-75 (Sampling Aggregate) and reduced to the proper test size.

The sample shall be tested as per:

- a. ASTM C-136 (Sieve Analysis of Fine and Course Aggregates)
- b. ASTM C-117 (Test Method for Materials Finer Than 75- $\mu$ m (No. 200) Sieve in Mineral Aggregates by Washing)

- c. ASTM C-88 (Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate)

8. SOIL TEST CHECK

This item covers the determination of the soil density and percent compaction.

The density of the soil or soil aggregate shall be taken as per either:

- a. ASTM D-2922 (Density of Soil and Soil Aggregate in Place by Nuclear Methods (Shallow Depth))
- b. ASTM D-1556 (Density of Soil in Place by the Sand-Cone Method)
- c. ASTM D-2167 (Density and Unit Weight of Soil in Place by the Rubber Balloon Method)
- d. Any combination of these tests as required and directed by the Administration Bureau Manager

This density shall be compared to the maximum density as determined by the Moisture-Density Test as per ASTM D-698 (Moisture-Density Relations of Soils and Soil-Aggregate Mixtures using 5.5 lbs. (2.49 kg) Rammer and 12 in. (305 mm) Drop).

**D-74 ASPHALT REJUVENATING AGENT (ITEM SPECIAL)**

1. SCOPE OF WORK

- a. This work shall consist of furnishing all labor, material, and equipment necessary to perform all operations for the application of asphalt rejuvenating agent for an asphalt concrete surface course.
- b. The rejuvenation of surface courses shall be by spray application of a cationic rejuvenating agent composed of petroleum oils and resins emulsified with water.
- c. All work shall be in accordance with the specifications, the applicable drawings, and subject to the terms and conditions of this contract.

## 2. MATERIAL SPECIFICATIONS

The asphalt rejuvenating agent shall be emulsion composed of petroleum resins oil base uniformly emulsified with water. The Contractor must submit to the Engineer a certified statement and manufacturer's certification from the asphalt rejuvenator manufacturer demonstrating that the asphalt rejuvenating emulsion conforms to the following physical and chemical requirements:

<u>TESTS</u>	<u>ASTM</u>	<u>AASHTO</u>	<u>REQUIREMENTS</u>	
			Min.	Max.
<i>Test on Emulsion:</i>				
Viscosity, @ 25 C,S.F.S	D 244	T-59	15	40
Residue, % W	D 244 (Mod.)	T-59 (Mod.)	60	65
Miscibility test	D 244 (Mod.)	T-59 (Mod.)	No Coagulation	
Sieve test, % W	D 244 (Mod.)	T-59 (Mod.)	-	0.1
Particle Charge Test	D 244	Positive		
Percent Light	GB	GB	-	30
Transmittance				
<i>Test on Residue from Distillation:</i>				
Flash Point, COC, C	D-92	T-48	196	-
Viscosity @ 60 C, cSt	D 445	-	100	200
Asphaltness, % w	D 2006-70	-	0.3	1.00
Maltenes Dist. Ratio:	D 2006-70	-	0.6	0.6
<u>PC+A</u>				
S + A				
PC/S Ration	D 2006-70	-	0.5	-
Saturated Hydrocarbons, S	D 2006-70	-	21	28

ASTM D-244 Modified Evaporation Test for percent of residue is made by heating 50 gram sample to 149°C (300F) until foaming ceases, then cool immediately and calculate results.

Test procedure identical with ASTM D-244-60 except that .02 Normal Calcium Chloride solution shall be used in place of distilled water.

Test procedure identical with ASTM D-244 except that distilled water shall be used in place of two percent sodium oleate solution.

Chemical composition by ASTM Method D-2006-70:

PC=Polar Compounds                      A=First Acidaffins

S=Saturated Hydrocarbons              A=Second Acidaffins

### 3. MATERIAL PERFORMANCE

Satisfactory service shall be based on the capability of the material to decrease the viscosity and increase the penetration value of the asphalt binder as follows:

- a. Viscosity shall be reduced by a minimum of 45 percent
- b. Penetration value shall be increased by 25 percent

Testing shall be performed on extracted asphalt cement from a pavement to a depth of three eight's inch (3/8"). In addition, the pavement shall be in-depth sealed to the intrusion of air and water.

The Contractor must submit to the Engineer a certified statement and manufacturer's certification from the asphalt rejuvenator manufacturer demonstrating that the asphalt rejuvenating emulsion has been used successfully for a period of five years by government agencies such as Cities, Counties, etc.; and that the asphalt rejuvenating agent has been proven to perform, as heretofore required, through filed testing by government agencies as to the required change in the asphalt binder viscosity and penetration number.

Testing data shall be submitted indicating such product performance on a sufficient number of projects, each being tested for minimum period of three years to insure reasonable longevity of the treatment, as well as product consistency.

### 4. APPLICATOR EXPERIENCE

The asphalt rejuvenating agent shall be applied by an experienced laborer with a minimum of three years experience applying the product proposed for use and overseen by a project superintendent knowledgeable and experienced in application of the asphalt rejuvenating agent.

### 5. TEMPERATURE/WEATHER LIMITATIONS

- a. The temperature of the asphalt rejuvenating emulsion, at the time of application shall be as recommended by the manufacturer.
- b. The asphalt rejuvenating agent shall be applied only when the existing surface to be treated is thoroughly dry and when it is not threatening to rain.
- c. The asphalt rejuvenating agent shall not be applied when the ambient temperature is below 40 F.

## 6. HANDLING OF ASPHALT REJUVENATING AGENT

- a. Contents in tank cars or storage tanks shall be circulated at least forty five minutes before withdrawing any material for application.
- b. When loading the distributor, the asphalt rejuvenating agent concentrate shall be loaded first and then the required amount of water shall be added.
- c. The water shall be added into the distributor with enough force to cause agitation and through mixing of the two materials.
- d. To prevent foaming, the discharge end of the water hose or pipe shall be kept below the surface of the material in the distributor which shall be used as a spreader.
- e. The distributor truck will be cleaned of all of its asphalt materials, and washed out to the extent that no discoloration of the emulsion may be perceptible.
- f. Cleanliness of the spreading equipment shall be subject to the approval and satisfaction of the Engineer.

## 7. APPLICATION EQUIPMENT

The distributor for spreading the emulsion shall be self-propelled, and shall have pneumatic tires. The distributor shall be designed and equipped to distribute the asphalt rejuvenating agent uniformly on variable widths of surface at readily determined and controlled rates from 0.05 to 0.5 gallons per square yard of surface, and with an allowable variation from any specified rate not to exceed 5 percent of the specified rate.

Distributor equipment shall include full circulation spray bars, pump tachometer, volume measuring device and hand hose attachment suitable for application of the emulsion manually to cover areas inaccessible to agitate the emulsion within the tank.

A check of distributor equipment as well as application rate accuracy and uniformly distributed onto the pavement. The spreader shall be able to apply ½ pound to 3 pounds of sand per square yard in a single pass. The spreader shall be adjustable so as not to broadcast sand onto driveways or treelawns.

The sand to be used shall be free flowing, without any leaves, dirt, stones, etc. Any wet sand shall be rejected from the job site.

Any equipment which is not maintained in full working order, or is proven inadequate to obtain the results prescribed, shall be repaired or replaced at the direction of the Engineer.

#### 8. APPLICATION OF REJUVENATING AGENT

The asphalt rejuvenating agent shall be applied by a distributor truck at the temperature recommended by the manufacturer and at the pressure required for the proper distribution. The emulsion shall be so applied that uniform distribution is obtained at all points of the area to be treated. Distribution shall be commenced with a running start to insure full rate of spread over the entire area to be treated. Areas inadvertently missed shall receive additional treatment as may be required by hand sprayer application.

Application of asphalt rejuvenating agent shall be on one-half width of the pavement at a time. When the second half of the surface is treated, the distributor nozzle nearest the center of the road shall overlap the previous application by at least one-half of the width of the nozzle spray. In any event the centerline construction joint of pavement shall be treated in both application passes of the distributor truck.

Before spreading, the asphalt rejuvenating agent shall be blended with water at the rate of two (2) parts rejuvenating agent to one (1) part water, by volume or as specified by the manufacturer. The combined mixture of asphalt rejuvenating agent and water shall be spread at the rate of 0.05 to 0.10 gallons per square yard, or as approved by the Engineer following field testing.

Where more than one application is to be made, succeeding application shall be made as soon as penetration of the preceding application has been completed and approval is granted for additional applications by the Engineer.

Grades or super elevations of surface that may cause excessive runoff, in the opinion of the Engineer, shall have required amounts applied in two or more applications as directed.

After the street has been treated, the area within one foot of the curb line on both sides of the road shall receive an additional treatment of asphalt rejuvenating emulsion. Said treatment shall be uniformly applied by a method acceptable to the Engineer.

After the rejuvenating emulsion has penetrated, a coating of dry sand shall be applied to the surface in sufficient amount to protect the traveling public as required by the Engineer.

The Contractor shall furnish a quality inspection report showing the source, manufacturer, and date shipped, for each load of asphalt rejuvenating agent.

When directed by the Engineer, the Contractor shall take representative samples of material for testing.

#### 9. STREET SWEEPING

The Contractor shall be responsible for sweeping and cleaning of the streets prior to, and after treatment.

Prior to treatment, the street will be cleaned of all standing water, dirt, leaves, foreign materials, etc. This work shall be accomplished by hand brooming, power blowing or other approved methods. If, in the opinion of the Engineer, the hand cleaning is not sufficient then a self-propelled street sweeper shall be used.

All sand used during the treatment must be removed no later than 48 hours after treatment of the street. This shall be accomplished by a combination of hand and mechanical sweeping. All turnouts, cul-de-sacs, etc. must be cleaned of any material to the satisfaction of the Engineer. Street sweeping will be included in the price bid per square yard for asphalt rejuvenating agent.

If, in the opinion of the Engineer, after sand is swept and a hazardous condition exists on the roadway, the Contractor must apply additional sand and sweep same no later than 24 hours following reapplication. No additional compensation will be allowed for reapplication and removal of sand.

#### 10. TRAFFIC CONTROL

The Contractor shall schedule his operation and carry out the work in a manner to cause the least disturbance and/or interference with the normal flow of traffic over the area to be treated. Treated portions of the pavement surfaces shall be kept closed and free from traffic until penetration, in the opinion of the Engineer, has become complete and the area is suitable for traffic.

When, in the opinion of the Engineer, traffic must be maintained at all times on a particular street, then the Contractor shall apply asphalt rejuvenating agent to one lane at a time. Traffic shall be maintained in the untreated lane until the traffic may be switched to the completed lane.

The Contractor shall be responsible for all traffic control and signing required to permit safe travel.

The Contractor shall notify the police and fire departments as to the streets that are to be treated each day.

If, in the opinion of the Engineer, proper signing is not being used, the Contractor shall stop all operations until safe signing and barricading is achieved.

Payment for maintaining traffic shall be included in this unit bid price for this item of work.

#### 11. METHOD OF MEASUREMENT

Asphalt rejuvenating agent will be measured by the square yard as provided for in the contract schedule of items.

#### 12. PAYMENT

The quantity as provided above shall be paid for at the applicable bid price per unit of measurement, which price and payment shall be full compensation for all materials, labor, equipment, tools, and incidentals necessary to complete the work required by this section of the specifications.

#### **D-75 ADA CURB RAMP, AS PER PLAN (ODOT ITEM 608)**

Under this pay item, the Contractor shall be responsible for laying out Americans with Disabilities Act (ADA) compliant curb ramps and landings that conform to City of Cleveland Curb Ramps Standard Drawings, and Special Provisions. Contractor shall be responsible for verifying type of curb ramp proposed in the plans. In situations where a different type of curb ramp or a modification is needed, the Contractor shall install that ramp, with the approval of the engineer at no additional costs.

City of Cleveland Standard Drawings Curb Ramp Type 1 through Type 11 shall be used as a base for construction of the curb ramp. Any curb ramp not meeting ADA requirements will be removed and replaced by the Contractor, at his/her cost, to the satisfaction of the City.

The pay item is "Item Special, Curb Ramp, As Per Plan". Payment shall be per each corner at conventional intersections, per each corner at T-intersections (each corner at the leg, and the independent ramp opposite the leg which shall be considered a corner), and per each ramp at mid-block locations. Payment shall include all labor, equipment, and materials for construction layout costs, installation of 8" walk, within the ramp areas, curb, tile, sawcutting and work as specified elsewhere in the plans, specifications, and City of Cleveland Standard Curb Ramp Details.

Sidewalk outside of the ramp areas shall be paid for under Item 608 for concrete walk and sidewalk removal shall be paid for under Item 202 for walk removed.

## CURB RAMP AND LANDING THICKNESSES

Sidewalk = 6" thick

Curb Ramp = 8" thick

### **D-76 ADA, SIDEWALK, AND DRIVEWAY SUBBASE (ODOT ITEM 304)**

All concrete for ADA curb ramps, sidewalks, and driveways will have 2" compacted #10 limestone screenings installed as part of the subbase below the concrete.

The item shall be paid for as an incidental to the subgrade compaction for each the pertinent Item for ADA ramps, sidewalks, or driveway construction and no additional compensation will be granted towards the furnishing and installation of this material.

### **D-77 AS-BUILT RECORD PLAN SET**

#### 1. GENERAL

Contractor shall maintain and provide the City with record drawings as specified herein. Record drawings shall include complete documentation of field revisions to the Contract Documents.

#### 2. FILING

- a. The Contractor shall maintain in his field office and in clean, dry, legible condition the following: contract drawings, specifications, addenda, shop drawings, change orders, other modifications of contract, test records, survey data and all other documents pertinent to the Contractor's work
- b. The Contractor shall provide files and racks for proper storage and easy access. Filing shall be established in a format acceptable to the City
- c. The Contractor shall make documents available at all times for inspection by the City or their representatives
- d. Record drawings shall not be used for any other purpose and shall not be removed from their filed location without the City's approval

#### 3. RECORDING

- a. The Contractor shall keep all record drawings current
- b. The Contractor shall not permanently conceal any work until required information has been recorded

- c. Contract Drawings shall be legibly marked to record actual construction including:
  - i. Depths of various elements of foundation in relation to datum
  - ii. Horizontal and vertical locations of underground utilities and appurtenances referenced to permanent surface improvements
  - iii. Field changes of dimension and detail
  - iv. Changes made by Change Order or Field Order
  - v. Details not on original Contract Drawings
- d. Contract Drawings shall be legibly marked to record actual construction including:
  - i. Manufacturer, trade name, catalog number and supplier of each product and item of equipment actually installed
  - ii. Changes made by Change Order or Field Order
  - iii. Other matters not originally specified
  - iv. Highlight changes with clouds on the record plan set in red ink.

#### 4. MAINTENANCE

- a. The Contractor shall maintain the project during the course of the construction including the period of the as-built certification shall notify the engineer a minimum of 2 weeks prior to completion
- b. The Contractor shall maintain the integrity of the project until final acceptance of the record drawings and a determination by the Engineer that no errors or omissions have been made by the Contractor during the course of construction
- c. The Engineer shall notify the Contractor as to the acceptability or rejection of the construction of the project
- d. The Contractor shall correct any errors/omissions prior to final acceptance of the record drawings for the project
- e. The Contractor shall maintain shop drawings and legibly annotate changes made after review

5. SUBMITTALS

- a. At the completion of the City administered project, the Contractor shall deliver the complete set of field mark-up drawings to the Engineer.
- b. At the completion of the private development projects, the developer shall deliver a copy of the original As-Built record drawing plan set and one (1) electronic copy in Adobe PDF, or approved equal, to the City.
- c. Provide transmittal letter containing the following information:
  - i. Date
  - ii. Project title and project number
  - iii. Contractor's name and address
  - iv. Certification that each document as submitted is complete and accurate.
  - v. Signature of Contractor or his authorized representative

6. PAYMENT

Payment for all the above for City administered projects shall be lump sum upon the proper execution of all the work of this item as determined by the Engineer.