Technical Specifications

F Ave. & 28th St. Watermain

City of Kalamazoo

April 2025

APPROVED BY:

05/01/2025

DEPARTMENT OF PUBLIC SERVICES
SENIOR CIVIL ENGINEER

STATE OF MICHIGAN
TYLER
KINDLE
ENGINEER
No.
6201068203
LICENSED PROFESSIONAL ENGINEER

04/21/2025

Jones & Henry
ENGINEERS, LTD.

4791 Campus Drive
Kalamazoo, MI 49008
269.353.9650

TABLE OF CONTENTS

STATE OF MICHIGAN
TYLER
KINDLE
ENGINEER
No.
6201068203
LICENSED PROFESSIONAL ENGINEER

04/21/2025

NOTES:

The *City of Kalamazoo – Standard Specifications for Water Main and Service Installation 2021* shall supersede these Technical Specifications where conflicting information occurs.

IF ANY OF THE PAGES LISTED ABOVE ARE NOT INCLUDED IN THESE CONTRACT DOCUMENTS, PLEASE ADVISE.

END OF SECTION

SECTION 01010
DEFINITION OF CONTRACT ITEMS

PART 1 GENERAL

1.01 FOREWORD

A. This Section describes the various Contract Items listed in the Bid.

1.02 WORK INCLUDED

A. Under each Item the Contractor shall furnish all labor, materials, tools, equipment, supplies, maintenance of equipment, heating, lighting and power, insurance and bonds, coordination, and all Work and in accordance with the Specifications Divisions 1 through 16 and the City of Kalamazoo *Standard Specifications for Water Main and Service Installation 2021* necessary to complete the Work in accordance with the obvious or expressed intent of the Contract Documents.

1.03 WORKMANSHIP AND MATERIALS

A. The quality of workmanship and materials entering into any and all of the Items and the Work included shall conform to pertinent sections, paragraphs, sentences, and clauses, both directly and indirectly applicable thereto, contained in the Contract Documents, whether or not direct reference to such occurs under each Item in this Section.

1.04 PAYMENT

A. The lump sum and unit prices stated in the Bid shall be payment in full for the completion of all Work specified and described or required to be included in the Contract, complete, and ready for use.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

PART 4 SPECIAL PROVISIONS

4.01 CONTRACT ITEMS

A. The contract items are defined on the following pages.

ITEM 1
GENERAL CONDITIONS/MOBILIZATION

1.01 DESCRIPTION

A. This Item is intended to pay non-recurring cost to the Contractor not recovered under other pay Items of the Contract.

B. This Item shall include, but not be limited to, the cost for moving equipment in and out, performance and payment bonds, insurance, permits, utility connection cost, EPMS, and other expenses associated with preparation for construction in accordance with the requirements of the Contract Documents.

1.02 WORK NOT INCLUDED

A. Any Work specifically included under other Bid Items.

1.03 DEFINITION OF ITEM

A. Item 1 - Includes General Conditions/Mobilization.

1.04 MEASUREMENT

A. The lump sum stated in the Bid shall be full compensation for all Work required under Item 1.

B. Mobilization for Contractor and any tier of subcontractor(s) shall be considered collectively and shall not exceed 10 percent of the Contract Price.

C. Mobilization shall be those costs associated with the initiation of the project and site work, including but not limited to, transporting of personnel, equipment, materials, supplies, incidental items; establishment of the field offices, temporary facilities necessary for the project, bonds and insurances, submittal requirements, permits, field supervision, final cleanup and demobilization. Mobilization does not include items such as contract negotiations and bid preparation.

1.05 PAYMENT

A. General Conditions/Mobilization shall be those costs associated with the initiation of the project and site work, including but not limited to, transporting of personnel, equipment, materials, supplies, incidental items; establishment of the field offices, temporary facilities necessary for the project, bonds and insurances, submittal requirements, permits, field supervision, final cleanup and demobilization.

B. The Engineer may reduce the amount to be paid under Item 1 if the percentage requested is not represented by the actual amount performed.

ITEM 2
TRAFFIC CONTROL

2.01 DESCRIPTION

A. Under this Item, the Contractor shall provide, mobilize, and temporarily install all traffic signage and equipment necessary to complete the project as described in the specifications and plans.

B. The Contractor shall provide a traffic control plan and obtain all permits as necessary and required by all local governing agencies with appropriate jurisdiction.

2.02 WORK NOT INCLUDED

A. Any Work specifically included under other Bid Items.

2.03 DEFINITION OF ITEMS

A. Item 2 – Includes Traffic Control.

2.04 MEASUREMENT

A. The lump sum stated in the Bid shall be full compensation for all Work required under Item 2.

2.05 PAYMENT

A. The lump sum unit price stated in the Bid shall be full compensation for traffic control as required.

ITEM 3
VIDEO RECORDING

3.01 DESCRIPTION

A. Under this item, the Contractor shall produce and deliver to the Owner color video recordings of existing topography within the zone of influence along all water main and areas of pavement work as specified and directed.

3.02 WORK NOT INCLUDED

A. Any Work specifically included under other Bid Items.

3.03 DEFINITION OF ITEMS

A. Item 3 – Audio/Video Recording includes audio-video recording of the Zone of Influence (Construction Limits).

3.04 MEASUREMENT

A. The lump sum stated in the Bid shall be full compensation for all Work required under Item 3.

3.05 PAYMENT

A. The lump sum unit price stated in the Bid for Item 3 shall be full compensation for audio-video recording production as specified and required.

ITEM 4
CLEARING

4.01 DESCRIPTION

A. This Item shall include all clearing and grubbing of lands required to complete the Work as specified, shown in the Contract Documents, and as directed by the Engineer. This Work shall include, but not be limited to, the complete removal of all vegetation including plants, shrubs, sod, agricultural crop residue, trimming and cutting of trees with trunk diameter less than 6-inches, removal of tree cuttings and stumps unless otherwise specified, scalping and the removal and disposal of all debris generated by the clearing and grubbing operation as specified and shown on the Drawings.

4.02 WORK NOT INCLUDED

A. Any Work specifically included under other Bid Items.

4.03 DEFINITION OF ITEMS

A. Item 4 - Clearing, includes the complete removal of all vegetation including plants, shrubs, sod, agricultural crop residue, removal of existing stumps, scalping, and the removal of all debris generated by the clearing and grubbing operation.

1. Tree removal of trees with trunk diameter of 6-inch and less shall be considered part of clearing and grubbing operations.

2. Stump removal of stumps with trunk diameter of 12-inches and less shall be considered part of clearing and grubbing operations.

4.04 MEASUREMENT

A. The lump sum stated in the Bid shall be full compensation for all Work required under Item 4 - Clearing and Grubbing.

4.05 PAYMENT

A. The lump sum unit price stated in the Bid for Item 4 - Clearing and Grubbing shall be made in the amount of a percent of the lump sum Bid price for Item 4 - Clearing and Grubbing consistent with the percentage of Work completed.

ITEMS 5-8
TREE & STUMP REMOVAL

5.01 DESCRIPTION

A. Under this Item, the Contractor shall perform all Work necessary for the removal of trees with trunk diameter 6 inches and greater and stumps with diameter greater than 12 inches, removal of tree cuttings and stumps, and the removal and disposal of all debris generated by tree cutting operations as specified and shown on the Drawings.

5.02 WORK NOT INCLUDED

A. Any work specifically included under other Bid Items.

5.03 DEFINITION OF ITEMS

A. Item 5 - Tree, Rem, 6-inch to 18-inch, shall be the cutting of trees with trunk diameter 6 inches to 18 inches, removal of tree cuttings and stumps.

B. Item 6 - Tree, Rem, 19-inch to 36-inch, shall be the cutting of trees with trunk diameter 19 inches to 36 inches, removal of tree cuttings and stumps.

C. Item 7 – Stump, Rem, 19 inch to 36 inch, shall be the removal of stumps with trunk diameter 19 inches to 36 inches.

D. Item 8 - Tree, Rem, 36-inch and larger, shall be the cutting of trees with trunk diameter larger than 36 inches, removal of tree cuttings and stumps.

5.04 MEASUREMENT

A. The quantities to be paid for under Items 5, 6, & 8 - Tree Removal shall be measured by the quantity of trees with trunk of specified diameter measured 4 feet above ground height removed.

B. The quantity to be paid for under item 7 – Stump Removal shall be measured by the removed quantity of stumps of specified diameter measured to the nearest full inch at the top of the stump.

5.05 PAYMENT

A. The unit price stated in the bid for Item 5 - Tree, Rem, 6-inch to 18-inch shall be full compensation for each tree removed and disposed of as specified and required.

B. The unit price stated in the bid for Item 6 - Tree, Rem, 19-inch to 36-inch shall be full compensation for each tree removed and disposed of as specified and required.

C. The unit price stated in the bid for Item 7 – Stump, Rem, 19 inch to 36 inch, shall be full compensation for each stump removed and disposed of as specified and required.

D. The unit price stated in the bid for Item 8 - Tree, Rem, 36-inch and larger shall be full compensation for each tree removed and disposed of as specified and required.

ITEM 9
CULVERT REMOVAL

9.01 DESCRIPTION

A. Under this item, the Contractor shall remove culverts.

9.02 WORK NOT INCLUDED

A. Culverts damaged or destroyed beyond the specified limits shall be replaced at the Contractor's expense.

B. Any Work specifically included under other Bid Items.

9.03 DEFINITION OF ITEMS

A. Item 9 – Culv, Rem, Less than 24 inch, includes culvert removal.

9.04 MEASURMENT

A. Quantities to be paid for under this item shall be the actual linear footage quantity removed, measured in place within the limits as scheduled on the Drawings, unless otherwise authorized by the Engineer, in which case measurement will be made to the authorized limits.

9.05 PAYMENT

A. The unit price stated in the Bid for Item 9 shall be for each linear foot of culvert removed within the prescribed limits as specified, so measured.

ITEM 10
DRAINAGE STRUCTURE REMOVAL

10.01 DESCRIPTION

A. Under this item, the Contractor shall remove entire drainage structures, as shown on the plans.

10.02 WORK NOT INCLUDED

A. Drainage structures damaged or destroyed beyond the specified limits shall be replaced at the Contractor's expense.

B. Any Work specifically included under other Bid Items.

10.03 DEFINITION OF ITEMS

A. Item 10 – Dr Structure, Rem, includes drainage structure removal.

10.04 MEASURMENT

A. Quantities to be paid for under this item shall be the actual quantity removed, measured in place within the limits as scheduled on the Drawings, unless otherwise authorized by the Engineer, in which case measurement will be made to the authorized limits.

10.05 PAYMENT

A. The unit price stated in the Bid for Item 10 shall be for each drainage structure removed within the prescribed limits as specified, so measured.

ITEMS 11 & 12
CURB & GUTTER

11.01 DESCRIPTION

A. Under this Item, the Contractor shall remove and construct concrete curb and gutter.

11.02 WORK NOT INCLUDED

A. Curb and gutter damaged or destroyed beyond the specified limits shall be replaced at the Contractor’s expense.

B. Any Work specifically included under other Bid Items.

11.03 DEFINITION OF ITEMS

A. Item 11 – Includes removal of curb and gutter, as specified on the plans.

B. Item 12 - Includes construction of Curb and Gutter matching previous and/or adjacent curb and gutter type, per RCKC standards.

11.04 MEASUREMENT

A. Quantities to be paid for under Item 11 and 12 shall be the actual quantity constructed, measured in place by linear length at the back of the curb, within the limits as scheduled and shown on the Drawings, unless otherwise authorized by the Engineer, in which case measurement will be made to the authorized limits.

11.05 PAYMENT

A. The unit price stated in the bid for Item 11 and 12 shall be full compensation for each linear foot of Curb and Gutter removed or installed in accordance with the Specifications and Drawings.

ITEM 13
PAVEMENT REMOVAL

13.01 DESCRIPTION

A. Under this Item, the Contractor shall remove pavement, including the aggregate base as scheduled, shown on the Drawings, and specified herein.

13.02 WORK NOT INCLUDED

A. Pavement removal required beyond specified construction limits and items included for payment under other items.

B. Pavement and curb and gutters damaged or destroyed beyond specified pay limits shall be replaced at the Contractor's expense.

C. Any work specifically included under other Bid Items.

13.03 DEFINITION OF ITEMS

A. Item 13 - Pavt, Rem, Mod includes complete pavement removal including the aggregate base.

13.04 MEASUREMENT

A. Quantities to be paid for under this item shall be the actual square yardage quantity removed, measured in place within the limits as scheduled on the Drawings, unless

otherwise authorized by the Engineer, in which case measurement will be made to the authorized limits.

13.05 PAYMENT

A. The unit price stated in the Bid for Item 13 shall be full compensation for each square yard of pavement removed within the prescribed limits as specified, so measured.

ITEM 14 AND 15
ASPHALT REMOVAL

14.01 DESCRIPTION

A. Under these Items the Contractor shall perform cold milling of the roadway surface or removal of asphaltic surfaces, as shown on the Drawings.

14.02 WORK NOT INCLUDED

A. Milling and removal required beyond specified construction limits and items included for payment under other items.

B. Pavement and curb and gutters damaged or destroyed beyond specified pay limits shall be replaced at the Contractor's expense.

C. Any work specifically included under other Bid Items.

14.03 DEFINITION OF ITEMS

A. Item 14 – Cold Milling HMA Surface includes the milling of 2 inches of asphalt adjacent to open trench cuts, per RCKC standards.

B. Item 15 – HMA Surface, Rem includes the full removal of asphalt inside open trench cuts, per RCKC standards.

14.04 MEASUREMENT

A. Quantities to be paid for under Item 14 and 15 shall be the actual square yardage quantity removed, measured in place within the limits as scheduled on the Drawings, unless otherwise authorized by the Engineer, in which case measurement will be made to the authorized limits.

14.05 PAYMENT

A. The unit price stated in the Bid for Item 14 and 15 shall be full compensation for each square yard of bituminous pavement removed within the prescribed limits as specified, so measured.

ITEM 16
SUBBASE, CIP 24" MDOT CLASS III

16.01 DESCRIPTION

A. Under this Item, the Contractor shall construct a granular subbase on a surface approved by the Engineer and according to RCKC standards. This Item includes providing, hauling, placing, compacting, and shaping the material.

16.02 WORK NOT INCLUDED

A. Subbase required beyond specified construction limits and items included for payment under other Items.

16.03 DEFINITION OF ITEMS

A. Item 16 - Includes Subbase, CIP 24" MDOT Class III.

16.04 MEASURMENT

A. Quantities to be paid for under this Item shall be the actual quantity constructed, measured in place within the limits as defined below, and/or scheduled on the Drawings, unless otherwise authorized by the Engineer, in which case measurement will be made to the authorized limits. When uniform courses are specified, the volume to be paid for shall not exceed the quantity calculated from plan lines and dimensions.

B. Pay Limits:

1. Depth - As specified, scheduled, or ordered.
2. Length - The actual length ordered.
3. Width - The actual width ordered.

16.05 PAYMENT

A. The unit price stated in the Bid for Item 16 shall be full compensation for each square yard of Subbase, CIP 24" MDOT Class III placed within the prescribed limits as specified, so measured.

ITEMS 17-19
AGGREGATE BASE, _ INCH

17.01 DESCRIPTION

A. Under this Item, the Contractor shall construct aggregate base for new pavement and driveways as scheduled, shown on the Drawings and specified herein.

B. No additional payment will be made for the following:

1. Aggregate used for adjusting roadway shoulders and driveways to match new roadway surfaces.

2. Machine grading

a. Machine grading shall be incidental to this item.

17.02 WORK NOT INCLUDED

A. Aggregate required beyond specified construction limits and items included for payment under other Items.

17.03 DEFINITION OF ITEMS

A. Item 14 – Includes Aggregate Base, 4 inch.

B. Item 15 - Includes Aggregate Base, 6 inch.

C. Item 16 – Includes Aggregate Base, 8 inch.

17.04 MEASURMENT

A. Quantities to be paid for under this Item shall be the actual quantity constructed, measured in place within the limits as defined below, and/or scheduled on the Drawings, unless otherwise authorized by the Engineer; in which case, measurement will be made to the authorized limits. When uniform courses are specified, the volume to be paid for shall not exceed the quantity calculated from plan lines and dimensions.

B. Pay Limits:

1. Depth - As specified, scheduled, or ordered.

2. Length - The actual length ordered.

3. Width - The actual width ordered.

17.05 PAYMENT

A. The unit price stated in the Bid for Items 14, 15 and 16 shall be full compensation for each square yard of aggregate base placed within the prescribed limits as specified, so measured.

ITEMS 20-23
HMA MDOT 13A

20.01 DESCRIPTION

A. Under Items 20, 21, 22, and 23 the Contractor shall construct pavement courses as scheduled, shown on the Drawings and specified herein.

B. Under Item 23, the Contractor shall adjust existing structure castings as required to set flush with new grades and casting adjustments shall be incidental to this Item.

20.02 WORK NOT INCLUDED

A. Pavement replacement required beyond specified construction limits and items included for payment under other Items.

B. Pavement damaged or destroyed beyond specified pay limits shall be replaced at the Contractor's expense.

C. No additional payment will be made for the following:

1. Asphalt surface course used for adjusting driveways to match new roadway surfaces.

20.03 DEFINITION OF ITEMS

A. Item 20 – Includes HMA Approach which shall be used for the replacement of HMA driveways.

B. Item 21 - Includes HMA MDOT 13A - 2” Base Course.

C. Item 22 - Includes HMA MDOT 13A - 2” Leveling Course.

D. Item 23 - Includes HMA MDOT 13A - 2” Wearing Course.

20.04 MEASURMENT

A. Quantities to be paid for under Items 20, 21, 22 & 23 shall be the actual quantity constructed, measured in place within the limits as defined below, and/or scheduled on the Drawings, unless otherwise authorized by the Engineer; in which case, measurement will be made to the authorized limits. When uniform courses are specified, the volume to be paid for shall not exceed the quantity calculated from plan lines and dimensions.

B. Pay Limits:

1. Depth - As specified, scheduled, or ordered.
2. Length - The actual length ordered.
3. Width - The actual width ordered.

20.05 PAYMENT

A. The unit price stated in the Bid for Item 20 shall be full compensation for each square yard of asphalt placed within the prescribed limits, with the prescribed depth, as specified, so measured.

B. The unit prices stated in the Bid for Items 21, 22, & 23 shall be full compensation for each ton of pavement placed within the prescribed limits as specified, so measured.

ITEM 24
CONCRETE DRIVEWAY REPLACEMENT

24.01 DESCRIPTION

A. Under this Item, the Contractor shall place 6-inch thick concrete pavement and 4-inch aggregate base to replace existing driveways as required, as scheduled, shown on the Drawings and specified herein.

24.02 WORK NOT INCLUDED

A. Pavement replacement required beyond specified construction limits and items included for payment under other Items.

B. Pavement damaged or destroyed beyond specified pay limits shall be replaced at the Contractor's expense.

24.03 DEFINITION OF ITEMS

A. Item 24 - Includes Driveway, Nonreinf Conc, 6 inch.

24.04 MEASUREMENT

A. Quantities to be paid for under this Item shall be the actual quantity constructed, measured in place within the limits as scheduled and shown on the Drawings, unless otherwise authorized by the Engineer; in which case, measurement will be made to the authorized limits.

24.05 PAYMENT

A. The unit price stated in the Bid for Item 24 shall be full compensation for each square yard of concrete placed within the prescribed limits as specified, so measured.

ITEM 25
SAWCUTTING

25.01 DESCRIPTION

A. Under this Item, the Contractor shall perform all sawcutting of pavement as necessary to facilitate pavement removal and provide a clean edge adjacent to pavement scheduled to remain.

25.02 WORK NOT INCLUDED

A. Sawcutting performed beyond specified construction limits and items included for payment under other items.

B. Pavement replacement required beyond specified construction limits.

C. Pavement and curb and gutters damaged or destroyed beyond specified pay limits shall be replaced at the Contractor's expense.

25.03 DEFINITION OF ITEMS

A. Item 25 – Includes Sawcutting.

25.04 MEASUREMENT

A. Quantities to be paid for under this item shall be the actual linear footage quantity of sawcutting, measured in place within the limits as scheduled on the Drawings, unless otherwise authorized by the Engineer; in which case, measurement will be made to the authorized limits.

25.05 PAYMENT

A. The unit price stated in the Bid for Item 25 shall be for each linear foot of sawcutting within the prescribed limits as specified, so measured.

ITEMS 26
STORM SEWER

26.01 DECRIPTION

A. Under these Items, the Contractor shall furnish and perform all Work necessary for the installation of the storm sewer as scheduled, shown on the Drawings and specified, in conformance with relevant sections of the Specifications.

B. These Items shall include all Work to install the storm sewer, including but not limited to the following: excavation, backfill, compaction, bedding, pipe materials, fittings, maintenance of trenches, temporary pavement, and related Work and materials as

shown on the Drawings and specified in conformance with relevant Sections of the Specifications.

C. These Items also shall include all Work under the Contract unless specifically included for payment under other Items.

D. All repairs of existing utilities damaged, as a result of construction, are included under these Items.

E. Restoration of landscape surface improvements including seeding, mulching, and fertilizing all disturbed lawn areas shall be included under these Items, unless specifically included under other items.

26.02 WORK NOT INCLUDED

A. Pavement replacement within the Contract limits is included under other Items.

B. Any Work specifically included under other Bid Items.

26.03 DEFINITION OF ITEMS

A. Item 26 – Includes Culv, Cl A, 12 inch

26.04 MEASUREMENT

A. The quantity to be paid under Item 26 shall be the horizontal length of 12-inch storm sewer measured parallel to the axis of the line along the surface of the ground.

26.05 PAYMENT

A. The unit prices stated in the Bid for Items 26 shall be full compensation for linear foot of sewer placed, furnished and installed as specified and required.

ITEM 27
DRAINAGE STRUCTURES

27.01 DESCRIPTION

A. Under these Items, the Contractor shall construct drainage structures in locations and of the type shown and scheduled on the Drawings and in accordance with the Contract Documents.

B. Work beyond the specified pay limits for the pipe trench, but necessary for the placement of the manholes, shall be included under this Item. Such Work shall include excavation of any material encountered, special backfill material, and pavement replacement.

C. The temporary support of utilities as required to complete the Work shall be included under these Items.

D. Restoration of landscape surface improvements including seeding, mulching, and fertilizing all disturbed lawn areas beyond the scope of other items, shall be included under these Items.

27.02 WORK NOT INCLUDED

A. Replacement of existing manholes or catch basins removed or damaged for Contractor convenience of construction and which were not planned to be removed, shall be done at the Contractor's expense.

27.03 DEFINITION OF ITEMS

A. Item 27 - Includes Dr Structure, 48 inch dia.

27.04 MEASURMENT

A. The quantities to be paid under Item 27 shall be for each drainage structure furnished and installed in accordance with the Specifications and Drawings.

27.05 PAYMENT

A. The unit price stated in the Bid for Item 27 shall be full compensation for each drainage structure, so measured, as specified and required.

ITEM 28
AIR RELEASE MANHOLES

28.01 DESCRIPTION

A. Under these Items, the Contractor shall construct air release manholes in locations and of the type shown and scheduled on the Drawings and in accordance with the Contract Documents.

B. Work beyond the specified pay limits for the pipe trench, but necessary for the placement of the manholes, shall be included under this Item. Such Work shall include excavation of any material encountered, special backfill material, and pavement replacement.

C. The temporary support of utilities as required to complete the Work shall be included under these Items.

D. Restoration of landscape surface improvements including seeding, mulching, and fertilizing all disturbed lawn areas beyond the scope of other items, shall be included under these Items.

28.02 WORK NOT INCLUDED

A. Replacement of existing manholes or catch basins removed or damaged for Contractor convenience of construction and which were not planned to be removed, shall be done at the Contractor's expense.

28.03 DEFINITION OF ITEMS

A. Item 28 - Includes Water Main, Air Release Manhole.

28.04 MEASURMENT

A. The quantities to be paid under Item 28 shall be for each air release manhole furnished and installed in accordance with the Specifications and Drawings.

28.05 PAYMENT

A. The unit price stated in the Bid for Item 28 shall be full compensation for each air release manhole, so measured, as specified and required.

ITEMS 29-32
DUCTILE IRON WATER MAIN & VALVES

29.01 DESCRIPTION

A. Under these Items, the Contractor shall furnish and perform all Work necessary for the installation of the water mains as scheduled, shown on the Drawings and specified, in conformance with relevant sections of the Specifications.

B. These Items shall include all Work to install the water mains, including but not limited to the following: excavation, backfill, compaction, bedding, pipe materials, fittings, maintenance of trenches, temporary pavement, connections to existing water mains, and related Work and materials such as blow offs to perform disinfection, flushing, performing pressure and bacteriological tests as shown on the Drawings and specified in conformance with relevant Sections of the Specifications.

C. These Items also shall include all Work under the Contract unless specifically included for payment under other Items.

D. Connections of new water lines to new and existing water lines shall be included under these Items, unless specifically included under other items. Temporary supporting of existing utilities, locating of existing utilities, exploratory excavation and backfill required by the utility owner for existing utilities encountered during construction, is included under these Items.

E. The removal or abandonment of existing water mains, including existing fittings, valves, backfill, bedding, structures and other associated appurtenances, shall be included under these items.

F. These Items shall include all water main fittings, accessories and appurtenances not included in other pay items. Fittings, including those not shown on the plans required to avoid existing utilities, shall be included under these Items.

G. All repairs of existing utilities damaged, as a result of construction, are included under these Items.

H. Restoration of landscape surface improvements including seeding, mulching, and fertilizing all disturbed lawn areas shall be included under these Items, unless specifically included under other items.

29.02 WORK NOT INCLUDED

A. Pavement replacement within the Contract limits is included under other Items.

B. Hydrant assemblies including associated 6-inch water main piping and gate valve are included under other items.

C. Any Work specifically included under other Bid Items.

29.03 DEFINITION OF ITEMS

A. Item 29 - Includes Butterfly Valve and Box, 16 inch.

B. Item 30 – Includes Water Main, DI, 12 inch, Tr Det B.

C. Item 31 - Includes Water Main, DI, 16 inch, Tr Det B.

D. Item 32 - Includes Water Main, DI, 16 inch, HDD.

29.04 MEASUREMENT

A. The quantity to be paid under Item 29 shall be the measured quantity of each 16-inch butterfly valve and box installed as specified, shown on the drawings, and so measured.

B. The quantities to be paid for under Item 30 shall be the horizontal length of 12-inch D.I.P. watermain measured parallel to the axis of the line along the surface of the ground, with no deduction for laying length of fittings and valves. Vertical portions of the water main shall not be measured for payment.

C. The quantities to be paid for under Item 31 shall be the horizontal length of 16-inch D.I.P. watermain measured parallel to the axis of the line along the surface of the ground, with no deduction for laying length of fittings and valves. Vertical portions of the water main shall not be measured for payment.

D. The quantities to be paid for under Item 32 shall be the horizontal length of 16-inch D.I.P. watermain measured parallel to the axis of the line along the surface of the ground, with no deduction for laying length of fittings and valves. Vertical portions of the water main shall not be measured for payment.

29.05 PAYMENT

A. The unit prices stated in the Bid for Item 29 shall be full compensation for each item, furnished and installed as specified and required.

B. The unit price stated in the Bid for Items 30 through 32 shall be full compensation for each linear foot, furnished and installed as specified, and so measured.

1. Four dollars per linear foot will be withheld from the unit price of Items 28 through 30 as stated in the Bid, for acceptance testing, in accordance with the Contract Documents. This amount shall not be considered part of retainage and shall not be released until testing has been satisfactorily completed.

ITEM 33
POLYETHYLENE ENCASEMENT

33.01 DESCRIPTION

A. Under these Items, the Contractor shall provide all Work necessary to install polyethylene encasement around the watermain as required by the City of Kalamazoo Standard Specifications for Water Main and Service Installation.

33.02 WORK NOT INCLUDED

A. Any Work specifically included under other Bid Items.

33.03 DEFINITION OF ITEMS

A. Item 33 - Includes Polyethylene Encasement.

33.04 MEASUREMENT

A. The quantity to be paid under Item 33 shall be the measured quantity of each linear foot of watermain encased in polyethylene as specified, shown on the drawings, and so measured.

33.05 PAYMENT

A. The unit price stated in the Bid for Item 33 shall be full compensation for each linear foot installed as specified and so measured.

ITEM 35 AND 36
FIRE HYDRANT ASSEMBLIES

35.01 DESCRIPTION

A. Under this Item, the Contractor shall furnish and perform all Work necessary for the installation of the fire hydrant assemblies shown on the Drawings and specified, in conformance with relevant sections of the Specifications.

B. This Item shall include all Work to install the fire hydrant assemblies, including but not limited to the following: excavation, pavement removal, saw-cutting, concrete drive, curb and walk removal, hauling excess spoil material from Site, backfill, compaction, bedding, pipe materials, fittings, connections to water lines, construction maintenance and removal of temporary access to the Work area, and related Work such as performing material testing, unless included under other items.

C. If a new hydrant is not replacing an existing hydrant, a new sign will be furnished and installed according to the Drawings.

D. If a fire hydrant sign is damaged, stolen, lost, or otherwise rendered unusable, the Contractor will be responsible to furnish and install a replacement sign.

E. Tee fittings at the main line shall be incidental to this Item.

35.02 WORK NOT INCLUDED

A. Pavement replacement within Contract limits is included for payment under other items.

35.03 DEFINITION OF ITEMS

A. Item 35 - Includes Fire Hydrant Assembly

B. Item 36 – Includes Fire Hydrant, Rem

35.04 MEASUREMENT

A. The quantity to be paid under Item 35 shall be the measured quantity of each fire hydrant assembly completed as specified, shown on the drawings, and so measured.

B. The quantity to be paid under Item 36 shall be the measured quantity of each fire hydrant assembly removed as specified, shown on the drawings, and so measured.

35.05 PAYMENT

A. The unit price stated in the Bid for Item 35 shall be full compensation for each hydrant assembly so measured, as specified and required.

B. The unit price stated in the Bid for Item 36 shall be full compensation for each hydrant assembly removed, so measured, as specified and required.

ITEM 37
LINE STOPS

37.01 DESCRIPTION

A. Under this Item, the Contractor shall furnish and perform all Work necessary for the installation of line stops as shown on the Drawings and specified, in conformance with relevant sections of the Specifications.

B. This Item shall include all Work to install the line stop, including but not limited to the following: excavation, pavement removal, saw-cutting, concrete drive, curb and walk removal, hauling excess spoil material from Site, backfill, compaction, bedding, pipe materials, fittings, connections to water lines, construction maintenance and removal of temporary access to the Work area, and related Work such as performing material testing, unless included under other items.

37.02 WORK NOT INCLUDED

A. Pavement replacement within Contract limits is included for payment under other items.

37.03 DEFINITION OF ITEMS

A. Item 37 - Includes Water Main, Line Stop

37.04 MEASUREMENT

A. The quantity to be paid under Item 37 shall be the measured quantity of each line stop utilized as specified, shown on the drawings, and so measured.

37.05 PAYMENT

A. The unit price stated in the Bid for Item 37 shall be full compensation for each line stop so measured, as specified and required.

ITEM 38
RESTORATION

38.01 DESCRIPTION

A. Under this item, the Contractor shall restore landscape appurtenances affected by the work including fencing, mailboxes, and signage within the defined construction limits, as shown on the Drawings and specified.

B. Under this Item, the Contractor shall restore landscape surface improvements including topsoil, seeding, mulching, and fertilizing all disturbed lawn areas within the defined construction limits as shown on the Drawings and specified.

38.02 WORK NOT INCLUDED

A. All other landscape surface improvements disturbed or damaged by the Contractor without prior approval from the Engineer shall be repaired or replaced at the Contractor's expense.

38.03 DEFINITION OF ITEMS

A. Item 38 - Includes Restoration.

38.04 MEASUREMENT

A. The lump sum price stated in the Bid for Item 38 shall be full compensation for all Work required under Item 38 - Restoration.

38.05 PAYMENT

A. The lump sum unit price stated in the Bid for Items 38 shall be full compensation for restoration as specified and required.

ITEM 39
SOIL EROSION AND SEDIMENTATION CONTROL

39.01 DESCRIPTION

A. Under this Item, the Contractor shall provide an allowance for the installation and maintenance of any and all Soil Erosion and Sedimentation Control (SESC) plans and measures. The Contractor shall coordinate with the Engineer and Client to ensure all SESC requirements are met and maintained during construction.

39.02 WORK NOT INCLUDED

A. Any Work specifically included under other Bid Items.

39.03 DEFINITION OF ITEMS

A. Item 39 - Includes Soil Erosion and Sedimentation Control

39.04 MEASUREMENT

B. The lump sum price stated in the Bid for Item 40 shall be full compensation for all Work required under Item 39 – Soil Erosion and Sedimentation Control.

39.05 PAYMENT

B. The lump sum unit price stated in the Bid for Items 39 shall be full compensation for SESC controls as specified and required.

ITEM 40
CONSTRUCTION STAKING

40.01 DESCRIPTION

A. Under this Item, the Contractor shall coordinate with a licensed Surveyor to provide construction staking as specified. The Surveyor shall coordinate the layout and staking for the project with the Engineer.

40.02 WORK NOT INCLUDED

A. Any Work specifically included under other Bid Items.

40.03 DEFINITION OF ITEMS

A. Item 40 - Includes Construction Staking.

40.04 MEASUREMENT

A. The lump sum stated in the Bid shall be full compensation for all Work required under Item 40.

40.05 PAYMENT

A. The lump sum unit price stated in the Bid for Item 40 shall be full compensation for construction staking as specified and required.

END OF SECTION

This page was intentionally left blank.

SECTION 01043
COORDINATION AND CONTROL OF THE WORK

PART 1 GENERAL

1.01 SCOPE

A. This section includes coordination and control of the Work.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Information for the Record:

a. Haul routes to and from Site.

b. Plan and procedures for any utility shutdowns.

1.03 LINES AND GRADES

A. All Work under this Contract shall be built in accordance with the lines and grades shown on the Drawings or as altered or modified by authority of the Owner or Engineer.

1.04 EXISTING STRUCTURES SHOWN ON DRAWINGS

A. Where underground and surface structures are shown on the Drawings, the location, depth, and dimensions of such structures are believed to be reasonably correct but are not guaranteed.

B. Such structures are shown for the information of the Contractor, but information so given is not to be construed as a representation that such structures will in all cases be found or encountered just where shown, or that they represent all the structures which may be encountered.

1.05 COOPERATION OF CONTRACTOR

A. The Contractor shall conduct his operations so as to interfere as little as possible with those of the Owner, other contractors, utilities, or any public authority on or near the Work.

B. The Owner reserves the right to perform other Work by contract or otherwise, and to permit other public bodies, public utility companies, and others to do Work on or near the project during progress of the Work. If a conflict arises, the Owner will determine when and how the Work shall proceed.

C. Claims for delay or inconvenience due to operations of such other parties on Work specified, shown on the Drawings, as directed or which can be reasonably expected to be encountered by the nature and location of the Work, will not be considered.

D. Operations entailing the use of construction equipment and lights outside the hours of 8:00 am and 5:00 pm, or outside the hours allowed for construction by local ordinances or regulations, is prohibited unless otherwise authorized by the Owner or Engineer.

E. Closing off clear access to any public alley, street, road, avenue or boulevard without the prior consent of municipal officials and the Engineer is prohibited.

1.06 MAINTENANCE OF SANITARY SYSTEM DURING CONSTRUCTION

A. All construction which requires interruption of existing sanitary system flow shall be executed during periods designated by the Owner.

B. Bypassing of untreated sanitary wastewater to any stream or body of water is prohibited.

1.07 PERMANENT PAVEMENT AND FINAL RESTORATION

A. When pipeline construction is being done between April 15 and November 1, the final pavement restoration work shall be complete by November 1.

B. Pavement restoration shall include, but not be limited to, replacement of pavement, driveways, and sidewalks.

C. The fine grading, topsoil, and seeding operation shall occur in a reasonable time period after flushing/testing.

D. If at any time the pavement restoration and the fine grading, topsoil, and seeding operation does not meet the above conditions, no further mainline pipe laying will be permitted until the Contractor is in compliance.

E. In order to comply with the above conditions, the Contractor shall complete the pipeline and all appurtenances including, but not limited to, testing, in order to begin final pavement restoration and the fine grading, topsoil, and seeding operation.

F. When pipeline construction is being done between November 15 and April 15, the Contractor shall install the main pipeline and all appurtenances and complete the testing. On April 15, final pavement restoration and the fine grading, topsoil, and seeding operation shall begin. Two months later on June 15, the final pavement restoration shall be no more than 1500 lineal feet behind the mainline pipe laying operation and the fine grading, topsoil, and seeding operation shall be no more than 2700 lineal feet behind the pavement restoration. Mainline pipe laying shall be stopped until these conditions have been met.

1.08 TEMPORARY PAVEMENT RESTORATION

A. The Contractor shall provide and maintain temporary pavement for all roads in which construction occurs. Temporary pavement shall be in accordance with Section 01565.

1.09 TEMPORARY PARKING FACILITIES

A. Parking spaces for the Contractor's personnel shall be provided and maintained in usable condition by the Contractor at all times. Provisions shall be made so that sediment is not tracked onto paved roadways from the vehicles operated by the Contractor's personnel. The parking areas shall consist of temporary parking areas or new permanent parking areas as shown on the Drawings. Temporary parking areas are to be located in the area designated by the Owner and Engineer. At the completion of the project, temporary parking areas shall be removed and the surface restored as specified, shown on the Drawings, as directed, or to its original condition.

B. The Contractor's personnel shall not utilize existing permanent parking areas unless specifically noted on the Drawings.

1.10 RESERVED

1.11 DISPOSAL OF DEBRIS

A. All debris resulting from construction operations, i.e., packaging, waste materials, damaged equipment, etc., shall be trucked from the Site by the Contractor and disposed of at spoil sites.

B. The Contractor shall police the hauling of debris to ensure that all spillage from haul trucks is promptly and completely removed from public or private rights-of-way.

C. All debris shall be disposed of in accordance with Federal, State, and Local laws and regulations.

1.12 CONTROL OF NOISE

A. The Contractor shall eliminate noise to as great an extent as possible at all times. Air compressors shall be equipped with silencers, and the exhaust of all gasoline motors and other power equipment shall be provided with mufflers. In the vicinity of hospitals, libraries, and schools, precautions shall be taken to avoid noise and other nuisance, and the Contractor shall require strict observances of all pertinent ordinances and regulations. Any blasting permitted in such locations shall be done with reduced charges.

1.13 SMOKE PREVENTION

A. Strict compliance with all ordinances regulating the production and emission of smoke will be required, and the Contractor shall accept full responsibility for all damage that may occur to property as a result of negligence in providing required control.

1.14 DEBRIS AND DUST CONTROL

A. Contractor shall perform debris and dust control in accordance with Section 01568.

1.15 SANITARY REGULATIONS

A. The Contractor shall provide all necessary housing accommodations for the workers for changing clothes and for protection during inclement weather. Toilet accommodations shall also be maintained for the use of the employees on the Work. The accommodations shall be in approved locations, properly screened from public observance and shall be maintained in a strictly sanitary manner. The Contractor shall obey and enforce all other sanitary regulations and orders, shall take precautions against infectious diseases and the spread of same, and shall maintain at all times satisfactory sanitary conditions around all shanties, tool and supply houses, and on all other parts of the Work.

1.16 USE OF EXPLOSIVES

A. The use of explosives is prohibited.

1.17 EMERGENCY MAINTENANCE SUPERVISOR

A. The Contractor shall submit to the Engineer the names, addresses, and telephone numbers of two employees responsible for performing emergency maintenance and repairs when the Contractor is not working. These employees shall each be designated in writing by the Contractor to act as his representative and shall have full authority to act on his behalf.

B. Contractor shall post the emergency numbers for the project at the job site in a conspicuous location.

C. Contractor shall be responsible for contacting the local fire, police, and emergency response personnel and organizations in advance of the Work. The Contractor shall be responsible for the coordination and compliance with emergency response plans, whether developed by the governing agency, laws, or the Contractor for the project.

D. At least one of the designated employees shall be available for a telephone call any time an emergency arises.

1.18 PUBLIC SERVICE STRUCTURES

A. Public service structures shall be understood to include all poles, tracks, pipes, wires, conduits, house-service connections, vaults, manholes, and other appurtenances used to supply the public with transportation, heating, electric, telephone, gas, water, sewer, or other services, whether owned or controlled by the Owner, by other public bodies, or by privately-owned corporations.

B. At least a week in advance of breaking ground, the Contractor shall notify the registered underground protection service, all public bodies, and other owners of such facilities of the proposed location of his operations, advising them that their property may be affected and that such measures as they may deem necessary, promptly should be taken to protect, adjust, remove, or build them.

C. In developed residential and commercial areas, the Contractor shall assume each building and dwelling has water and sewer services and that they shall be protected and repaired as needed as part of the pipeline installation. No additional payment will be made for Work associated with supporting or repairs of such services.

D. Three conditions which may be encountered will be dealt with as follows:

1. Structures which are adjacent to but not included within the limits of an excavation required for performance of the Work shall be protected, supported, and maintained in service by the Contractor at his expense.

2. Structures within the limits of the Work which can be satisfactorily supported and maintained in service and which do not require removal and rebuilding in the judgment of the Engineer, shall thus be supported by the Contractor at his expense, including cost of repair of damage incident to his operations.

    a. Supports for water and gas mains, sewers, conduits, and similar structures shall be constructed of timber or other acceptable materials; shall be supported from undisturbed foundations; and, shall be sufficiently substantial to ensure against settlement when pipe trenches or other excavations are backfilled. In all cases where permits or inspection fees are required by utilities in connection with changes to, or temporary support of their conduits, the Contractor shall secure such permits and pay all permit and inspection fees.

    b. The Contractor shall assume full responsibility for maintaining all public service structures in service, and shall support and protect, or remove and rebuild them at his own expense. Such services shall not be interrupted without permission of the owner of the public service structure.

3. In case relocation of pipelines or other utility structures is required because of direct interference with the installation of the Work, as determined jointly by the Owner, Engineer, and Contractor, the Contractor shall notify the owners of the utility or utility structure involved.

    a. The Contractor will not be reimbursed for the cost of the relocation if the interference is shown on the Drawings, described in the Specifications, apparent on visual inspection, or specifically included in the Work to be performed by the Contractor.

    b. The Contractor will not be paid for time lost because of such direct interference. Where it is the policy of any utility owner to perform such Work with his own forces, the Contractor shall cooperate to the fullest extent with such utility owner.

1.19 UNAUTHORIZED OR PROHIBITED WORK

A. Work done beyond the lines shown on the Drawings or ordered, Work done without required inspection, except as herein provided, or any extra work done without authority will be considered unauthorized and will not be paid for under the provisions of the Contract. Work considered unauthorized may be ordered removed at the Contractor's expense. Work done without lines and grades being given shall be considered unauthorized and subject to rejection.

B. Disposing of excess or unsuitable materials, including but not limited to excavated material, demolition debris, clearing and grubbing debris, in wetlands or flood plains is prohibited.

C. Locating stockpiles in environmentally sensitive areas is prohibited.

D. Pumping of sediment-laden water from trenches or excavations directly into any surface waters, stream, wetlands, or sewers is prohibited. Pumped water shall be properly filtered and desilted prior to discharge.

E. Open burning without a permit is prohibited.

F. Discharging injurious silica dust concentrations into the atmosphere within 200 feet of any residential, commercial, public or private places of human occupancy is prohibited.

1.20 RESERVED

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

PART 4 SPECIAL PROVISIONS

4.01 MAINTAINING FLOW IN EXISTING SEWERS

A. Flow in existing storm, sanitary and private sewers shall be maintained at all times during construction of this project. The Contractor shall furnish and install all necessary temporary facilities required to maintain the flow in existing sewers including bulkheads, plugs, stop planks, flumes, coffer dams, pumping equipment, valves, etc.

4.02 REQUIRED SAFETY DOCUMENTATION TO BE SUBMITTED

A. On all projects that require the Contractor's or subcontractor's personnel to occupy permitted confined spaces and/or hazardous atmospheres on the Site, the Contractor shall submit to the Owner, a written proposed safety program. The safety program shall comply with all Federal, State, and Local requirements. If the Owner has a safety plan that is more stringent than the Federal and State requirements, it will be made available to the Contractor for review. The submittal of the proposed safety program to the Owner shall be made well in advance of the start of construction at the Site. The submittal shall include a written Safety Management Plan including Confined Space Entry procedures. The Contractor shall be responsible to maintain documentation stating that anyone employed by the Contractor, subcontractors, or suppliers of any tier to the Contractor occupying such hazardous locations, has received the appropriate confined space entry training and other applicable training. The Contractor also is responsible to maintain completed confined space entry permits.

4.03 MAINTAINING CRITICAL OPERATIONS

A. The Contractor shall closely coordinate any needed equipment or roadway shutdowns with the Owner and Engineer.

4.04 SEQUENCING

A. Watermain work shall begin with the existing dead end watermain found along E F Avenue, outside and east of E F Avenue's intersection with N 27th Street. Watermain construction operations shall move east along E F Avenue to its intersection with N 28th Street and proceed south, following the old configuration of N 28th Street. Watermain work will finish with a connection to the existing watermain found outside the south shoulder of Gull Rd.

1. Upon completion of each 2,000 linear feet of watermain, the contractor shall pressure test and disinfect per standards and place newly constructed watermain into service. Coordinate with the Engineer to determine actual section lengths to coincide with valve locations.

2. The Contractor shall provide a temporary auto-flusher, connected to the hydrant nearest the southern end of the completed 16-inch watermain. The auto-flusher will flush the new watermain for 15 minutes daily. Upon

completion of the subsequent 2,000 feet, the Contractor shall relocate the auto-flusher as required.

END OF SECTION

SECTION 01090
REFERENCE STANDARDS

PART 1 GENERAL

1.01 SCOPE

A. This Section includes reference standards.

1.02 DESIGNATION OF ASSOCIATIONS, INSTITUTIONS, SOCIETIES AND STANDARDS

A. Whenever within these Specifications reference is made to Associations, Institutions, Societies, or Standards, they will be designated as follows:

AA	-	Aluminum Association
AAMA	-	Architectural Aluminum Manufacturers Association
AASHTO	-	American Association of State Highway and Transportation Officials
ACI	-	American Concrete Institute
ADAAG	-	Americans with Disabilities Act Accessibility Guidelines
AFBMA	-	Anti-Friction Bearing Manufacturers Association
AFI	-	Air Filter Institute
AGA	-	American Gas Association
AGMA	-	American Gear Manufacturers Association
AIHA	-	American Industrial Hygiene Association
AISC	-	American Institute of Steel Construction
AISI	-	American Iron & Steel Institute
AITC	-	American Institute of Timber Construction
AMCA	-	Air Moving and Conditioning Association
ANSI	-	American National Standards Institute
API	-	American Petroleum Institute
ARI	-	Air Conditioning and Refrigeration Institute
ASA	-	American Standards Association
ASHRAE	-	American Society of Heating, Refrigerating, and Air Conditioning Engineers
ASME	-	American Society of Mechanical Engineers
ASTM	-	American Society for Testing Materials
AWPB	-	American Wood Preservers Bureau
AWS	-	American Welding Society
AWWA	-	American Water Works Association
BLS	-	Bureau of Labor Standards
CISPI	-	Cast Iron Soil Pipe Institute
FM	-	Factory Mutual
FS	-	Federal Specifications

IBR	-	Institute of Boiler and Radiator Manufacturers
IEEE	-	Institute of Electrical and Electronic Engineers
INETA	-	International Electrical Testing Association
ISA	-	Instrument Society of America
JIC	-	Joint Industrial Council
MDOT	-	Michigan Department of Transportation
NBS	-	National Bureau of Standards
NEC	-	National Electrical Code
NEMA	-	National Electrical Manufacturers Association
NFPA	-	National Fire Protection Association
NICET	-	National Institute for Certification in Engineering Technologies
NSF	-	National Sanitation Foundation
NRTL	-	Nationally Recognized Testing Laboratory
OSHA	-	Occupational Safety and Health Act
SMACNA	-	Sheet Metal and Air Conditioning Contractors National Association, Inc.
SSPC	-	Steel Structures Painting Council
MBC	-	Michigan Building Code
IBC	-	International Building Code
UBC	-	Uniform Building Code
UL	-	Underwriters Laboratories, Inc.
USBM	-	United States Bureau of Mines

B. Wherever specific standard numbers are indicated, i.e., ASTM C150, it shall be understood to mean the latest revision thereof.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

PART 4 SPECIAL PROVISIONS

Not used.

END OF SECTION

SECTION 01300
SUBMITTALS

PART 1 GENERAL

1.01 SCOPE

A. This Section includes requirements for submittals.

B. Contractor shall adhere to the submittal schedule as submitted under the provisions of the General Conditions. Contractor shall modify the schedule as required to allow sufficient time for submittal review based on current construction schedule.

C. Owner, Contractor and Engineer shall utilize the Electronic Project Management System (EPMS) as specified in Section 01320 for the central repository of project related documents including but not limited to submittals, information for the record and Operation and maintenance manuals.

1.02 COORDINATION OF SUBMITTALS

A. The Contractor shall be responsible for the coordination of submittals and field verifications as required for the various parts of the Work.

B. All submittals to the Engineer, unless otherwise specified, shall be made only by the Contractor. Direct submittals from subcontractors or suppliers will not be accepted.

C. Each submittal shall reference the Specification item that it covers, the Contractor's name, the Contract title and location, and the date of submission. Submittal also shall indicate whether the information is for the Engineer's review and approval, for record purposes, or for the fulfillment of the operation and maintenance requirements.

PART 2 PRODUCTS

2.01 GENERAL

A. Two categories of information are normally required:

1. Shop Drawings for review.
2. Information for the Record:
    a. Operation and maintenance manuals.

2.02 SHOP DRAWINGS FOR REVIEW

A. Shop Drawings:

1. The Contractor shall submit Shop Drawings in accordance with the General Conditions, as required by individual Sections, as shown on the Drawings or as directed.

2. The Contractor shall indicate all variances from the requirements of the Contract Documents in accordance with the General Conditions.

3. The Contractor shall clearly indicate quantities and the exact intended use of the equipment or material contained in the submittal.

4. All Submittals shall be tailored to the project by highlighting (in a color other than red) appropriate information and deleting or crossing out nonapplicable information. Where applicable the Contractor shall provide a data sheet with all necessary information to correctly identify the applicable Sections of the manuals for the actual material or equipment furnished. All options furnished shall be indicated.

    a. Markups of shop drawings in the color red shall be reserved for the Engineer. Shop drawing markups and highlights from the Contractor shall be in a color other than red.

5. Color charts or samples shall be included for all submittals where a color selection by the Owner is required. Original Color Charts (not Color Copies) and samples shall be delivered to the Site, Engineer's RPR or to the Owner as required. The Engineer shall be copied on the transmittal letter for record purposes.

B. Samples shall be provided as required in the individual Sections. Samples shall be of the precise material proposed to be furnished. The number of samples and sample size shall be the industry standard unless otherwise stated in the individual Sections.

2.03 INFORMATION FOR RECORD

A. Material certificates shall be submitted for materials as indicated in the individual Sections. Each certificate shall state that the products have been sampled and tested in accordance with the proper industrial and governmental standards and meet the requirements of the Specifications. Certificates shall be signed by an authorized agent of the manufacturer.

B. Licenses and Permits - The Contractor shall submit copies of all licenses and permits required by Local, State, and Federal laws.

C. Installation and calibration certificates shall be submitted for equipment as indicated in the individual Sections. These certificates shall indicate manufacturer's satisfaction with the installation, the accuracy of calibration and alignment, and the operation of the

equipment. Such certificates must be signed by an authorized agent of the manufacturer.

D. Progress Schedules shall be submitted in accordance with the General Conditions and Section 01310.

E. Schedule of Shop Drawings and Sample Submittals shall be submitted in accordance with the General Conditions.

F. Schedule of Values shall be submitted in accordance with the General Conditions.

G. Copy of programming for all PLC's and computers on the project shall be submitted.

2.04 OPERATION AND MAINTENANCE INFORMATION

A. Operation and maintenance manuals shall be submitted as information for the record.

B. Operation and maintenance manuals shall be submitted as electronic documents prior to the printing of the record copy.

1. Contractor shall provide one electronic copy of the manuals for preliminary review.

2. The final accepted manuals shall be provided as one electronic copy of the manual and one printed copy, as specified below.

C. Electronic manuals shall be in Portable Document Format (PDF) as generated by Adobe Professional Version 7.0 or newer. The PDF file shall be fully indexed using the table of contents, searchable with thumbnails generated. PDF documents shall have a bookmark created in the navigation frame for each major entry (Section, Chapter, Tab) in the table of contents. PDF images shall be at a readable resolution typically 300 dpi or higher. Optical Character Recognition (OCR) capture shall be performed on these images so text can be searched, selected and copied from the PDF file.

1. The opening view of each PDF document shall be the bookmarks to the left and cover page or table of contents.

2. The PDF file name shall include the Name of Owner, Project Title, Contract Number, and Specification Section. Commonly used abbreviations acceptable to the Owner may be used to minimize length of file name.

3. The Contractor's Name shall be the electronic "Author" of the PDF document.

D. This information will be reviewed only if properly identified with Specification Section numbers and only after revised, where necessary, to conform to the Engineer's notes on previous submittals that have been marked "Make Corrections Noted." Manuals shall be tailored to suit the specific equipment provided.

E. Submittals shall include but not be limited to the following:

1. Descriptive literature, bulletins, or other data covering equipment or system.

2. Complete list of equipment and appurtenances included with system, complete with manufacturer serial number and model number.
3. Utility requirements.
4. General arrangement drawing.
5. Sectional assembly.
6. Dimension print.
7. Materials of construction.
8. Certified performance curve.
9. Parts list with assembly drawings.
10. Recommended spare parts list with part and catalog number.
11. Lubrication recommendations and instructions.
12. Schematic wiring diagrams.
13. Schematic piping diagrams.
14. Description of associated instrumentation.
15. Drive dimensions and data.
16. Operating instructions.
17. Maintenance instructions including trouble-shooting guidelines, lubrication, and preventive maintenance instructions with task schedule.
18. Special tools and equipment required for operation and maintenance.
19. Description of equipment controls.
20. Pump seal data.
21. Assembly, installation, alignment, adjustment, and checking instructions.
22. Confirmation of all corrections noted on Shop Drawings marked “Make Corrections Noted.”
23. Manufacturer’s name, address, and telephone number along with manufacturer’s job number and Purchase Order number.
24. Manufacturer’s local sales representative, address, and telephone number.
25. All installation instructions that were provided to Contractor for use in installing equipment.

F. All manuals shall be tailored to the project by highlighting appropriate information and deleting or crossing out nonapplicable information, or the Contractor shall provide a data sheet with all necessary information to correctly identify the applicable Sections of the manuals for the actual equipment furnished. All options furnished shall be indicated.

G. Manuals shall be printed on 8-1/2-inch by 11-inch size with standard three-hole punching. Large manuals shall be submitted in three-ring binders. Small manuals shall be submitted in folders with metal fasteners. Index tabs shall be furnished for all manuals containing data for three or more items of equipment. All manuals shall have a title label on the cover stating the specification item number and item name. A table of contents shall be included in all manuals.

H. Drawings shall be reduced to 8-1/2-inch by 11-inch or 11-inch by 17-inch. Where reduction is not possible, larger drawings shall be folded separately and placed in envelopes which are bound into the manual.

I. Equipment installations shall not be considered substantially complete until all associated operation and maintenance manual submittals are accepted by the Engineer.

J. Field modifications to equipment during installation shall be included in the manual so that the manual reflects as-built conditions. Revisions to the manual may be submitted for incorporation into the manual where appropriate; however, the Engineer reserves the right to return all six manuals for revision to reflect as-built conditions.

PART 3 EXECUTION

3.01 RESERVED

3.02 IDENTIFICATION OF SUBMITTALS

A. All submittals shall have a Submittal Identification & Approval cover sheet attached. A sample of the submittal cover sheet is attached for reference. The form will be provided by the Engineer and coordinated with the Contractor.

B. All submittals shall be given a consecutive number when they are entered into the Electronic Project Management System (EPMS), See Section 01320.

C. Resubmittals shall be entered into EPMS as resubmittals.

D. Submittals to satisfy the operation and maintenance information requirements shall be entered into the EPMS as a submittal. The description shall have the prefix “OM”.

3.03 PRINTING AND DISTRIBUTION

A. Contractor shall provide one (1) printed copy of the approved operation and maintenance manual and one (1) electronic copy on portable electronic media device to the Owner.

PART 4 SPECIAL PROVISIONS

Not used.

END OF SECTION

Submittal Identification & Approval

Date: **Spec Section**

Submittal No. **Drawing Sheet No.**

Description:

Manufacturer(s)

Contractor Comments/Deviations/Measurements

Contractor

Contractor Name

☐ Approved
☐ Forwarded
☐ Checked

By: _____ Date: _____

Engineer

SHOP DRAWING REVIEW
SUBJECT TO CONTRACT REQUIREMENTS

Jones & Henry Engineers, Ltd.

☐ Approved
☐ Approved—Make Corrections Noted
☐ Amend & Resubmit
☐ Rejected—See Remarks
☐ Distribute for Information

REVIEW IS FOR GENERAL COMPLIANCE WITH CONTRACT DOCUMENTS. NO RESPONSIBILITY IS ASSUMED FOR CORRECTNESS OF DIMENSIONS OR DETAILS

Approval in no way relieves the Contractor of any responsibility for capacities, performance, functions, compliance with Federal, State, and Local Codes; accuracy of dimensions and details; or continuity and completeness of the Project nor does approval constitute or imply any increase in Contract Price.

By: _____

Review Comments

SECTION 01310
CONSTRUCTION SCHEDULES AND DOCUMENTATION

PART 1 GENERAL

1.01 SCOPE

A. This Section includes the requirements for construction schedules and construction sequences.

B. This Section includes the requirements for the tracking and documentation of the progress and activities driving the completion of the Work as specified, shown on the Drawings and as directed.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Information for the Record:

a. Preliminary Construction Schedule.

b. Contractor's Construction Schedule and monthly updates.

c. Road/Lane Closure Schedule

B. Contractor shall submit three copies of the 22-inch by 34-inch construction schedule, unless approved otherwise by the Engineer.

1.03 QUALITY ASSURANCE

A. Scheduling conference shall be held prior to the commencement of the construction to discuss the following, including but not limited to:

1. Construction sequencing.

2. Contractor's coordination of subcontractors.

3. Coordination with the Owner's operations.

4. Coordination with other contractors or other work.

5. Project milestones.

6. Owner's partial utilization.

PART 2 PRODUCTS

2.01 PRELIMINARY CONSTRUCTION SCHEDULE

A. Preliminary construction schedule shall be completed in accordance with the General Conditions and prior to the scheduling conference.

B. The preliminary schedule shall outline the Contractor's sequencing of tasks, activities, milestones, and all critical path items within the contract time.

2.02 CONSTRUCTION SCHEDULE

A. The Contractor's submission of the construction schedule will not change the contract completion date, whether reviewed by the Owner and Engineer or not. The Contractor shall incorporate all approved change orders that have resulted in a contract time extension.

B. The Contractor shall require all subcontractors engaged in the Work to submit to the Contractor construction schedules, as specified herein, for incorporation into the Contractor's construction schedule.

C. The construction schedule shall include but not be limited to the following dates:

1. Notice to Proceed.
2. Substantial Completion and Final Completion.
3. Commencement of on-site operations.
4. Milestones as specified, shown on the Drawings, and as directed.
5. Ordering, submittals, fabrication, delivery, startup, and training time for major equipment items.
6. Submittal schedule per the General Conditions.

D. The Contractor shall incorporate into the construction schedule all constraints and work restrictions specified or otherwise required by the Contractor's operations, including but not limited to the following:

1. Construction sequencing.
2. Contractor's coordination of subcontractors.
3. Coordination with the Owner's operations.
4. Coordination with other contractors or other work.
5. Project milestones.
6. Owner's partial utilization.

2.03 UPDATING CONSTRUCTION SCHEDULE

A. The Contractor shall keep the construction schedule current to the progress of the Work continually through closeout of the project. The construction schedule shall be submitted monthly for the Engineer's review.

2.04 WEEKLY CONSTRUCTION SCHEDULE

A. The Contractor shall submit a schedule of his work for each week. This schedule shall identify the foreman of each work crew and the location and type of work the crew will be doing each day. It shall be delivered to the Engineer's office no later than 4:00 p.m. of the next to last workday of the preceding week.

PART 3 EXECUTION

3.01 COORDINATION

A. All phases of the Work requiring interference with normal operations of the existing facilities shall be scheduled in accordance with agreements among the Contractor, the Owner, and the Engineer. The Contractor shall notify the Owner at least one week before such Work is to begin.

B. Contractor shall begin the work with installation of the valve vault at Station 39. Upon completion of the valve vault, watermain work shall begin at the E. G Avenue intersection and proceed south.

PART 4 SPECIAL PROVISIONS

4.01 SCHEDULED NON-WORK DAYS

A. The Contractor shall restrict Work to 8:00 a.m. to 5:00 p.m. Monday through Friday unless otherwise authorized by the Owner and Engineer. Contractor shall consider the following list of holidays as mandatory non-work days, all of which shall be incorporated into the construction schedule:

1. New Year's Day.
2. Martin Luther King Day.
3. Presidents' Day.
4. Good Friday.
5. Memorial Day.
6. Fourth of July.
7. Labor Day.
8. Columbus Day.
9. Veterans' Day.

10. Thanksgiving Day.
11. Day after Thanksgiving Day.
12. Christmas Eve Day.
13. Christmas Day.

END OF SECTION

SECTION 01320
ELECTRONIC PROJECT MANAGEMENT SYSTEM (EPMS)

PART 1 GENERAL

1.01 SCOPE

A. This section describes the requirements for the Electronic Project Management System (EPMS) which will be required on this project. The EPMS shall be provided through eCommunication by Eastern Engineering, 866-884-4115; www.easternengineering.com .

B. The Contractor shall be responsible for including the cost to the EPMS; the pricing shall be the pricing factor of __0.000864_ times the Contractor's Bid. The Contractor shall be responsible for paying the cost as a onetime payment to Eastern Engineering within 30 days of the Notice to Proceed and will be considered part of the project mobilization on the schedule of values.

C. Engineer will implement an internet/web site based Electronic Project Management System (EPMS) for the administration of the Contract on this project. Owner, Contractors and Engineer shall be responsible to interface with EPMS and to collaborate via the EPMS on this project. The EPMS is intended to supplement the Contract Documents, and the provisions of the Contract Documents shall not be superseded by the EPMS.

1. The EPMS is intended to provide a mode of communication which is electronic and to reduce the reliance upon printed documents. Printed documents transmitted will not be reviewed, and electronic documents emailed outside of the EPMS will not be reviewed. The Owner, Contractor and Engineer will collaborate on unique situations or circumstances in order to preserve the project electronic records.

D. The Owner, Contractor and Engineer shall be required to provide project-related information/documents via EPMS. In general, the EPMS will receive information via uploaded documents as PDF documents, in their native format (when permitted or required), or other electronic formats designated or required for functionality. The EPMS shall be a central repository for information to all project team members. The EPMS will provide viewing, printing, up/downloading of various information/documents.

E. In general, the following is a partial list of information/documents which shall be tracked through the EPMS:

1. Drawings, Specifications, and Addenda (included revisions as necessary).
2. Insurance.
3. General Project Communication, Emails, Letters, Correspondence and Collaboration or any other document any participant wishes to make part of the project records.

4. Request for Information (RFI).
5. Submittals (Shop Drawings, Operation and maintenance manuals, color selections etc.)
6. Work Change Directives, Change Requests, and Change Orders.
7. Schedule of Values, Pay Requests and Certified Payroll Reports.
8. Reports and Photos (daily, monthly, etc.).
9. Schedules (project, weekly and monthly).
10. Meeting Agendas and Minutes.
11. Permits and Special Inspections Reports.
12. Laboratory Services (testing and reporting).
13. Closeout procedures (deficiency list, warranty, substantial completion).
14. Record Drawings.

F. In an effort to protect proprietary information and prohibit unauthorized use or modifications, levels of access security will be assigned in order to provide safe and secure access to information with respects to involvement and responsibility on the project. The Owner, Contractor and Engineer shall establish the levels of access and rights which are appropriate for this project.

G. Owner, Contractor and Engineer shall utilize the mark-up tool integral within the EPMS or have a PDF review software that includes the ability to mark up and apply electronic stamps (such as Adobe Acrobat, or Bluebeam PDF Revu).

H. A high-speed internet connection is required.

I. The EPMS will provide notifications regarding new or updated documents through an existing Email account outside of the EPMS.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01 CONTRACT REQUIREMENTS

A. All provisions of the Contract Documents are in full effect and enforcement. The submittal procedures specified in the Contract Documents are applicable with the understanding that they will be electronic documents and submitted via the EPMS.

3.02 PRINTING, REPRODUCTION AND DISTRIBUTION

A. The Engineer will not be responsible for printing reproduction or preparation of any hard copy documents, or for the cost of doing so.

B. Contractor shall produce printed copies of all submittals as required in Section 01300 and in the Contract Documents.

3.03 TRAINING

A. One training session by the Engineer and Eastern Engineering, Inc. will be provided to the team members at the beginning of the EPMS implementation. Training will be coordinated with the Preconstruction meeting and held at the same location. There are many tutorials, help features and technical support options located on the Eastern Engineering website.

B. Engineer will provide project-related support as needed within their ability to provide it. Technical support will be available to all project team members from Eastern Engineering, Inc.

3.04 OPERATION

A. Contractor and all Subcontractors shall maintain a Windows-based computer system including high-speed internet access and ability to create/mark-up documents using Adobe Acrobat (PDF) and to scan documents.

B. Engineer will facilitate the implementation and overall operation of the EPMS with Eastern Engineering. Eastern Engineering will provide and maintain the EPMS server and will back up the information.

3.05 ARCHIVE PROJECT CLOSEOUT

A. All files on the EPMS website will be archived at the end of the project. These archives will be made available to the Owner, Contractors and Engineer for download over the internet, at the end of the warranty period.

3.06 ELECTRONIC SUBMITTAL FILE NAMING CONVENTION

A. The Contractor shall utilize the following file name convention for PDF files submitted through eComm:

1. Spec Section - Number of Submittal from Section - Number of Times Submitted.

   a. Example: 02552-01-03.

2. The example represents the first submittal from Specification Section 02552 and the third time this Submittal has been submitted.

PART 4 SPECIAL PROVISIONS

Not used.

END OF SECTION

This page was intentionally left blank.

SECTION 01350
COMMON PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SCOPE

A. This Section includes general requirements for all materials, equipment and systems furnished or installed under this project.

B. Additional specific requirements included under a particular Section shall take precedence.

C. This Section includes, but is not limited to, the following procedural and administrative requirements:

1. Product Delivery Storage and Handling.
2. Warranties.
3. Quality Assurance and Control.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and related specification sections.

B. The specification sections and Drawings contain the specific submittal requirements.

1.03 QUALITY ASSURANCE

A. Where Contractor is required to provide design services or certification of the design, the specified product, equipment or system shall comply with the specified criteria.

1. Contractor shall submit a written request for clarification when specified criteria is incomplete or insufficient.

B. Manufacturer's name, make, model number and other designations provided in the contract documents are to establish the significant characteristics, including but not limited to, type, function, dimensions and physical properties, performance, and appearance for the purpose of evaluating comparable products. Contractor shall verify that product, equipment or system proposed meets or exceeds the requirements as specified or shown on the Drawings.

1.04 PROJECT HANDLING

A. Schedule delivery to minimize the time goods are kept in storage.

B. Deliver goods to Site in manufacturer's original packaging.

C. Inspect the goods to determine if there is visible damage to the packaging.

1. The packaging shall be removed in a manner that will allow resealing for storage.

2. If packaging cannot be removed and reused, the goods shall be repackaged per the manufacturer's recommendations.

D. Goods that are susceptible to damage by the environment or the project conditions, including but not limited to, switchgear, motor control centers, panelboards, instrument control panels, and fixtures shall be stored in a controlled environment per the manufacturer's recommendations. If no such area is available at the time such equipment is received, such space shall be provided by the Contractor at no expense to the Owner.

E. Where construction is in roads or streets, that portion of the right-of-way not required for public travel may be used for temporary storage purposes unless otherwise prohibited. Materials shall not be stored in areas where such storage creates a hazard. Any other additional space required for construction or storage of materials and equipment shall be obtained by the Contractor at his expense.

F. The Contractor shall confine his equipment, the storage of materials and equipment, and the operations of his workers to areas permitted by law, ordinances, permits, and the requirements of the Contract Documents, and shall not unreasonably encumber the premises with materials or equipment.

1.05 GUARANTEE

A. Manufacturer's warranty, extending beyond one-year after substantial completion for the specified product, equipment or system shall be provided to the Owner and endorsed by the Manufacturer.

B. Requirements for warranties extending beyond one-year after substantial completion are described in individual Sections of these specifications.

C. Manufacturer's limitations and disclaimers shall not relieve the Contractor from warranty obligations under the Contract Documents.

PART 2 PRODUCTS

2.01 SHOP PAINTING

A. Non-galvanized ferrous surface shall be painted.

B. Shop painting of ferrous surfaces shall be as follows:

1. Surfaces shall be thoroughly cleaned of dirt, grease, oil, rust, scale, or other foreign substances. All metal surfaces shall, as a minimum, be abrasive blasted in accordance with SSPC-SP6, Commercial Blast Cleaning.

2. Surfaces shall receive a shop coat of a primer compatible with the finish coating to be used by the Contractor.

2.02 GALVANIZING

A. Where galvanized metal is indicated, unless otherwise specified, galvanizing shall conform to ASTM A123 (Hot Dip Galvanized). Threaded parts and hardware shall be galvanized in conformance with ASTM A153.

2.03 REGULATORY REQUIREMENTS

A. Materials, equipment, coatings, and chemicals in contact with potable water, or water being treated for potable water use, shall comply with the applicable NSF Standards.

PART 3 EXECUTION

3.01 INSTALLATION

A. Products shall be installed in accordance with the manufacturer's instructions and the Contract Documents.

B. Required appurtenances, including but not limited to, anchors, grout, and leveling shims, shall be provided.

PART 4 SPECIAL PROVISIONS

Not used.

END OF SECTION

This page was intentionally left blank.

SECTION 01410
LABORATORY SERVICES

PART 1 GENERAL

1.01 SCOPE

A. The Owner shall retain an independent laboratory.

1. The Owner shall perform the required testing on water mains, with coordination from the Contractor, prior to placing new mains into service.

2. The Owner has retained SME Engineering to perform required density testing, concrete testing, and asphalt testing.

B. Testing, inspection(s) and quality control are required to certify compliance with the Contract Documents.

1. The laboratory services do not relieve the Contractor from the responsibility of compliance with the Contract Documents.

2. Any test required by the Owner shall not relieve the Contractor from the responsibility of compliance with the Contract Documents.

3. Any test required by the Owner shall not relieve the Contractor from the responsibility of supplying certificates from manufacturers or suppliers to demonstrate compliance with the Specifications.

C. Specific testing, inspection(s) and quality control requirements are specified in the individual Sections of the specifications.

D. Specific testing, inspection(s) and quality control requirements of any Federal, State or Local authorities are specified in the related sections of Work.

E. Testing of materials or equipment for compliance with various national or technical society standards and ordinarily performed by manufacturers, and shop and field tests of equipment, are not included under this Section but shall be performed by the Contractor or his supplier as specified elsewhere.

F. Contractor may conduct material or field test(s), inspection(s) and quality control as he deems necessary.

1. Should the Contractor, at any time, desire the Owner to consider the results of such testing, inspection(s), and quality control, such results shall be certified by an independent testing laboratory acceptable to the Owner. Any testing of this nature shall be conducted at the Contractor’s expense.

1.02 SUBMITTALS

A. Submittals of all required field and laboratory test results shall be made by the independent laboratory as soon as they are available to the Owner and Engineer directly.

1. Statement of Compliance per 1.03

1.03 QUALITY ASSURANCE

1. The laboratory shall be a recognized and independent commercial laboratory with experience in conducting the required tests.

2. Laboratory shall certify compliance with ASTM E548, ASTM E329, and ASTM C1093 when masonry construction is part of the project scope. In lieu of ASTM certification, the laboratory may submit written documentation demonstrating experience and training relevant to the inspections to be performed. The documentation shall demonstrate experience with projects of similar complexity and quantity of inspections as the project herein.

3. Testing, inspection(s) and quality control shall be certified by a professional engineer specialized in the related field and in the state where the Site is located.

PART 2 PRODUCTS

2.01 TESTS

A. Aggregates, Bedding Material, and Special Backfill - For each type of material, the laboratory shall perform an ASTM C136 sieve and screen analysis to determine compliance with the contract documents.

1. Retests shall be performed until the Specifications are met.

2. Retest shall be performed each time the source of material is changed.

B. Selected Backfill - At the discretion of the Engineer, but in no case more than one test for each 1,000 cubic yards or portion thereof, the laboratory shall perform an ASTM C136 sieve and screen analysis to determine whether the material is suitable for backfilling purposes.

C. Mix Designs:

1. For each type of controlled density fill, concrete, and asphalt, the laboratory shall review, perform test(s).

2. The Engineer shall review, perform test(s) and approve any change in source of materials.

3. The asphalt design shall be made in accordance with ASTM D1559, the Marshall Method of Mix Design and as specified.

4. Approved mix designs shall include sieve analyses and suppliers' certificates for materials incorporated in the mix.

D. Compaction Tests:

1. For each type of backfill material, the laboratory shall determine the moisture-density curve according to ASTM D698.

2. Using ASTM D2922 test methods, the laboratory shall determine the density of placed backfill.

3. Retests shall be performed if the compaction requirements stated in the individual Sections are not met.

4. The Engineer may at his discretion require the sand cone (ASTM D1556) or the balloon (ASTM D2167) tests for density and compaction to verify questionable results of the ASTM D2922 tests.

E. The independent testing laboratory shall test and report the soil bearing capacity under all foundations and slabs on grade. The testing shall be conducted at regular intervals in all directions. The independent testing laboratory shall immediately notify both the Contractor and the Engineer of any such test not meeting the presumed soil bearing capacity contained in the Structural Design Data on the Drawings.

F. Asphalt and Concrete Quality Control Testing - Perform tests as indicated in Sections 02600 and 03300.

G. Miscellaneous Tests - Perform all other tests requested in the individual Sections of the Specifications.

2.02 PLANT INSPECTIONS

A. Inspect and certify asphalt as indicated in Sections 02600 and concrete plants as required by the City of Kalamazoo.

2.03 EQUIPMENT

A. Provide all necessary equipment to extract and store samples and perform the required tests.

PART 3 EXECUTION

3.01 COORDINATION

A. The Contractor shall provide the source of all materials requiring testing and shall arrange access for the independent laboratory to obtain representative samples and perform required tests at the material source. The information shall be supplied in advance to allow time for testing and reporting. Concrete information shall be supplied at least 45 days prior to the first concrete placement.

B. Contractor shall coordinate activities to accommodate the required quality assurance/control.

1. Contractor shall not compromise the requirement for quality assurance/control in order to maintain the schedule.

C. The laboratory shall conduct tests on materials and in locations as directed by the Resident Project Representative.

D. All tests shall be performed in accordance with the proper test methods mentioned above and in the individual Sections. Results shall be compared to the required values included in the individual Sections.

3.02 PREPARATION

A. Contractor shall prepare all Work to be tested in accordance with the testing procedures as directed and required by independent laboratory, regulatory agency, Owner or Owner's representative.

3.03 PROTECTION

A. Contractor shall at the completion of testing, repair damage to construction in accordance with these specifications.

B. Contractor shall be responsible for the protection, regardless of the responsibility for quality assurance/control.

PART 4 SPECIAL PROVISIONS

Not used.

END OF SECTION

SECTION 01500
MAINTAINING TRAFFIC

PART 1 GENERAL

1.01 SCOPE

A. This Section includes the furnishing of all labor, materials, equipment and services necessary for maintaining and protecting vehicular and pedestrian traffic.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Information for the Record:

a. The Contractor shall submit the name, address, and telephone number of a local individual who will be responsible for maintaining traffic facilities when the Contractor is not working.

b. Traffic control or maintenance plans with governing authority(s) approval shall be submitted.

c. Detour routes with governing authority(s) approval shall be submitted.

d. Delivery and haul routes for Contractor's activities outside the zone of influence shall be submitted.

1.03 QUALITY ASSURANCE

A. The installation, maintenance, and operation of all traffic controls and traffic control devices shall conform to the requirements of the State Department of Transportation Manual of Uniform Traffic Control Devices for Streets and Highways, hereinafter called the MUTCD.

B. If, in the opinion of the authority having jurisdiction over traffic in the affected thoroughfares, proper maintenance of traffic facilities and proper provisions for traffic control are not being provided by the Contractor, they may take the necessary steps to place them in proper condition, and the cost of such services will be deducted from any money which may be due or become due the Contractor.

C. A traffic control conference, attended by Owner, Engineer, Contractor and governing authority, shall be held no later than 14 days prior to any traffic maintenance, placement of traffic control devices, lane closures, detouring of traffic or other activity that impedes the normal flow of traffic.

PART 2 PRODUCTS

2.01 TRAFFIC CONTROL DEVICES

A. Traffic control devices shall be provided with suitable supports of sufficient strength and stability.

B. Faces of orange construction signs, barricades, vertical panels and drum bands shall be suitably reflectorized with sheeting.

C. Traffic cones shall be a highly visible orange color.

D. Pavement markings for traffic maintenance shall conform to the requirements of MDOT, the local authority and the MUTCD.

2.02 TEMPORARY TRAFFIC SIGNALS

A. The Contractor shall furnish, erect, maintain, and subsequently remove signal and signal controller equipment of a proper type and capacity to provide the required operation, and shall meet the general requirements of MDOT and the MUTCD.

1. Any malfunctions or failures shall be corrected without delay. Temporary traffic signals not in use shall be covered or removed.

B. The Contractor shall be responsible for the procurement of and payment for electric power for temporary traffic signals.

PART 3 EXECUTION

3.01 COORDINATION

A. The Contractor shall provide and maintain in safe condition such temporary facilities for vehicular and pedestrian traffic as may be necessary to provide safe vehicular and pedestrian ingress and egress for all property adjacent to the improvements. Such access shall be provided at all times unless workers or machinery are in the immediate area. Access shall be provided to all properties at the end of the Work day.

B. When the street or highway under construction is being used by vehicular traffic, including periods of suspension of the Work, the Contractor shall maintain that portion of the street or highway being used to ensure that it is smooth, free from holes, ruts, ridges, bumps, and dust.

C. The Owner will enter upon that portion of a project where the Contractor is responsible for maintaining through traffic on part or the entire project, to place abrasives at its own expense, as may be considered advisable.

1. The Contractor shall be responsible for the removal of abrasives placed and for which no claim for additional compensation shall be allowed; nor shall the Contractor be relieved in any way of his obligation for maintenance of traffic.

D. The Owner will provide for the necessary maintenance of public streets or highways which are used as detour beyond the Work limits of the contract.

3.02 TRAFFIC CONTROL

A. Barricades, vertical panels, and cones shall be protected by adequate advance warning construction signs.

B. Equipment and material stored on the highway shall be marked at all times. At night, any such material or equipment stored within rights-of-way and easement(s) shall be clearly outlined with dependable lighted devices.

C. Contractor shall provide any other lights, barricades, etc., that may be needed for the protection of pedestrian traffic in all areas where materials are stored.

D. Road Closed - When a highway has been permitted to be closed to traffic, the Contractor shall provide, erect, maintain, and subsequently remove approved traffic control devices, barricades, and suitable and sufficient red or yellow lights.

3.03 TRAFFIC MAINTAINED

A. Where the street or highway under construction is being used by vehicular traffic, including periods of suspension of the Work, the Contractor shall furnish and maintain pavement markings, lights, warning signs, road construction traffic maintained signs, and end construction signs, barricades, temporary guardrail, and such other traffic control devices, and flaggers as may be necessary to maintain safe traffic conditions within the Work limits.

B. Existing signs and traffic control devices within the Work limits shall remain in use during the construction period. If the Contractor needs to relocate or modify permanent signs and other traffic control devices as a consequence of his work, he shall provide suitable supports and may modify the devices with prior approval of the Engineer and with the concurrence of the maintaining agency. Routine maintenance of permanent traffic control devices will remain the responsibility of the maintaining agency.

C. The function of existing Stop or Yield signs shall be retained at all times although their position may be adjusted. Existing signs that must be relocated laterally shall be placed in accordance with the MUTCD.

D. When an existing signal operation must be interrupted for a period, the Contractor shall provide a temporary traffic control method.

E. The Contractor shall obtain the approval of the Owner and Engineer before closing a traffic lane or establishing a one-way traffic operation.

F. Flaggers:

1. Whenever one-way traffic is established, at least two flaggers shall be used and signs, cones, barricades, and other traffic control devices shall be erected by the Contractor in accordance with the MUTCD. The Contractor shall maintain

positive and quick means of communication between the flaggers at the opposite ends of the restricted area.

2. Flaggers shall be equipped according to the standards for flagging traffic contained in the MUTCD. At night, flaggers' stations shall be adequately illuminated.

3. The Contractor may, in lieu of flaggers or supplementing them, furnish, install, and operate a temporary traffic signal or signals for the purpose of regulating traffic.

3.04 SNOW AND ICE REMOVAL

A. The State and Local authority responsible for snow and ice removal will be responsible for removals during the construction provided the following:

1. The project area is open to public access.

2. In the opinion of the State and Local authority, the project area is accessible with their equipment.

3. In the opinion of the State and Local authority, the street surface will not cause damage to their equipment, nor will their equipment cause damage to the street.

B. The Contractor shall be responsible for snow and ice removal during construction when:

1. The project area is closed to public access.

2. When limited access is provided for local traffic but area is closed to through traffic.

3. The project area pavement has been removed or damaged to the extent that the State and Local authority's equipment will no longer effectively remove snow and ice or will cause damage to the project area.

PART 4 SPECIAL PROVISIONS

4.01 SPECIAL REQUIREMENTS

A. Contractor shall coordinate traffic control with the Road Commission of Kalamazoo County.

4.02 RESTORATION OF PAVEMENT SURFACES OUTSIDE THE ZONE OF INFLUENCE

A. Contractor shall restore all damaged pavement surfaces in streets used by the Contractor for moving materials and equipment to and from the construction area and streets used for bypassing or detouring traffic around the construction area.

B. Materials used in replacing damaged areas of the road shall be as specified in Section 02600 of these Specifications.

C. The pavement shall be restored with pavement of the same type and thickness as the existing pavement, in accordance with Section 02600 of these Specifications.

END OF SECTION

This page was intentionally left blank.

SECTION 01565
TEMPORARY RESTORATION AND MAINTENANCE OF PAVEMENTS, CURBS, AND WALKWAYS

PART 1 GENERAL

1.01 SCOPE

A. This Section includes temporary restoration and maintenance of pavements, curbs, and walkways.

B. Restoration - The Contractor shall promptly restore as herein specified all curbs, walks, driveways, and roadways affected by the Work done under this Contract as soon as any sufficient portion thereof has been completed. Such temporary restoration shall be maintained in satisfactory condition until the permanent restoration work replaces the temporary section.

C. Maintenance:

1. All temporary pavement, sidewalks, and other pavements affected by the Contractor's operations shall be maintained by the Contractor at his expense in a suitable and safe condition for traffic until permanent replacement is to be made.

2. This Section includes maintenance in or along streets in which construction is taking place, streets used for moving materials and construction equipment to and from the construction area, and streets used for bypassing or detouring traffic around the construction area.

PART 2 PRODUCTS

2.01 BASE AND SURFACE MATERIALS

A. Base and surface materials shall be in conformance with Section 02600 of these Specifications unless otherwise shown on the Drawings.

PART 3 EXECUTION

3.01 CONSTRUCTION OF TEMPORARY PAVEMENT, CURBS, AND WALKS

A. Preparation of Subbase - Before laying any pavements, sidewalks, or curbs, the trenches shall be compacted and all resulting holes and depressions shall be filled and tamped solid.

B. Curbs - All curbs required to be reset temporarily shall be placed in their original position or as directed, but the Contractor will not be required to set them in concrete.

C. Sidewalks - All sidewalks disturbed shall be temporarily restored immediately upon the placing of the backfill either by relaying the old sidewalk pavement, placing 4 inches of aggregate base, laying a pavement of 2-inch-thick wooden planks, suitably fastened and flush with the adjacent sidewalk, or as otherwise directed. Permanent sidewalks shall be replaced as soon as possible.

D. Pavement - Temporary pavement shall consist of aggregate base course and bituminous surface treatment as specified below:

1. Subgrade - The subgrade for the temporary pavement shall be thoroughly rolled or rammed and brought to the required grade and cross section to receive the pavement. The subgrade for pavements over trench openings large enough to be compacted with a roller shall be rolled to a firm unyielding surface with an approved power roller weighing not less than 10 tons. For smaller trench openings, the subgrade shall be thoroughly rammed.

2. Aggregate Base Course - The aggregate base course shall be 8-inch-thick and shall conform with all requirements of MDOT Section 302 (21AA).

3. Chip Seal Coat - After the aggregate base course has been prepared, a bituminous seal coat consisting of a prime coat and one application each of bituminous material and coarse aggregate shall be applied. All Work and materials shall conform to MDOT Section 505 Chip Seals.

3.02 SEASONAL LIMITATIONS FOR TEMPORARY PAVEMENT CONSTRUCTION

A. Weather limitations for placing chip seal coat shall conform to MDOT 505.03C. Between paving seasons, the Contractor shall place 8 inches of aggregate base and maintain it until seal coat can be applied.

B. When time restrictions are not in effect, the Contractor shall prepare the base and immediately place temporary or permanent pavement surface.

3.03 MAINTENANCE – EXISTING AND TEMPORARY PAVEMENTS

A. All existing temporary pavement and sidewalk shall be maintained, by the Contractor at his own cost and expense, in a suitable and safe condition for traffic until permanent replacement is to be made or the Work finally accepted. Any depressions which develop shall be acceptably repaved when directed. Spots in the pavements which show signs of deficient bitumen or raveling shall be repaired by hand; and if deemed necessary, pavement shall be reconstructed in part or in whole as directed.

3.04 SEASONAL LIMITATIONS FOR MAINTENANCE OF BITUMINOUS PAVEMENTS

A. During that time of year when asphalt concrete cannot be placed in conformance with MDOT Specifications, the Contractor shall remove loose material from holes and fill depressions in the pavement with cold patch material as required to maintain the road surface in a condition acceptable to the Owner.

B. As soon as weather conditions permit, the Contractor shall remove the cold patch and place bituminous concrete in accordance with Section 02600.

3.05 PERFORMANCE

A. If, in the opinion of the Engineer, proper maintenance of traffic facilities and proper provisions for traffic control are not being provided by the Contractor, the Engineer may take the necessary steps to place them in proper condition, and the cost of such services will be deducted from any money which may be due or become due the Contractor.

PART 4 SPECIAL PROVISIONS

Not used.

END OF SECTION

This page was intentionally left blank.

SECTION 01568
POLLUTION CONTROL

PART 1 GENERAL

1.01 SCOPE

A. This Section includes the requirements for pollution control.

PART 2 PRODUCTS

2.01 GENERAL

A. Dust palliatives shall conform to MDOT Item 922.12.

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. The Contractor is responsible to obtain and pay for NPDES Permit for storm water discharge.

B. The Contractor is responsible for following an erosion control plan in accordance with permits required under Act 451, Part 91, as amended (Soil Erosion and Sedimentation Control), Part 303 (Wetland Protection, formerly Act 203), Part 301 (Inland Lakes and Streams, formerly Act 346), Part 31, (Water Resources Protection, Floodplain Regulatory Authority, formerly Act 245 as amended by Act 167), and Part 31 (Water Resources Protection), National Pollutant Discharge Elimination System (NPDES). Secure Federal Section 404, Clean Water Act of 1972, permits, if required. Provide temporary and permanent erosion and sedimentation controls according to the permits.

C. It shall be the responsibility of the Contractor to prevent or limit pollution of air and water resulting from his operations.

D. The Contractor shall perform Work required to prevent soil from eroding or otherwise entering onto all paved areas and into natural watercourses, ditches, and public sewer systems, and to prevent dust attributable to his operations from entering the atmosphere.

E. Water containing suspended material from any part of the Contractor's operations shall be clarified before discharging to drains or streams.

F. No fill, topsoil, or heavy equipment shall be stored within 200-feet of a stream bank or within the drip line of a treed area.

G. Excess soil that is stockpiled shall be removed or regraded within 15 days of the completion of construction.

3.02 STREETS, SIDEWALKS AND DRIVEWAYS

A. Streets, haul roads, and detours and bypass roads shall be swept by automatic self-contained sweepers.

B. Excessive dirt on pavements shall be removed by means of hand shoveling or appropriate mechanical equipment and the area swept as directed above.

C. Sidewalks and driveways shall be cleaned by means of shovels and hand brooms or appropriate mechanical equipment.

D. Dust on unsurfaced streets or parking areas and any remaining dust on surfaced streets shall be controlled with calcium chloride dust palliative.

E. The Contractor shall comply with the above requirements on a daily basis. If the Contractor fails to perform the above Work in a satisfactory manner, all Work, except cleanup operations, shall be stopped until the Contractor has complied with the above requirement.

3.03 EROSION AND SEDIMENT CONTROL

A. The Contractor shall initiate appropriate vegetative practices on all disturbed areas to remain dormant (undisturbed) for more than 45 days within seven days.

1. Such practices may include: temporary seeding, permanent seeding, mulching, matting sod stabilization, vegetative buffer strips, phasing and protection of trees.

B. Permanent or temporary soil stabilization shall be applied to disturbed areas within seven (7) days after final grade is reached on any portion of the Site.

C. When seasonal conditions prohibit the application of temporary or permanent seeding, non-vegetative soil stabilization practices, such as mulching and matting, shall be used.

D. A stabilization construction entrance shall be provided to reduce vehicle tracking of sediment. The paved street adjacent to the Site entrance shall be swept a minimum of daily, or as needed, to remove any excess mud, dirt, or rock being tracked from the Site.

1. Dust and sediment along any street due to construction on this Site is to be swept a minimum of once at the end of the day or as necessary to prevent a build-up of dust and soil on the pavement surface.

E. Dump trucks hauling from the construction site shall be covered with a tarpaulin.

F. No more than 200-feet of trench shall be open at any given time. Trench opening, laying of pipe, and backfilling should occur so as to minimize the amount of disturbed area.

G. The Contractor shall minimize the width of his work area.

H. Existing trees, shrubs, and other ground cover vegetation shall be preserved where possible. Tree removal will be limited to that necessary for construction and will be

limited further to the permanent easement wherever possible. No tree removal will be permitted outside the temporary easement.

I. Storm water runoff and natural stream flow shall be intercepted or diverted when originating upgrade away from the construction site so as to minimize the amount of flow over the construction site.

J. All dewatering flows are to be settled in siltation basins or directed through filters before discharge to stabilized sites, such as stream or storm sewers, and not onto exposed soils, stream banks, or any other sites where the flow could cause erosion.

K. When construction occurs near storm sewer inlets, erosion control measures such as inlet filters or hay bales shall be used to prevent silt from entering the storm sewers.

L. The clean-up and disposal of excess excavated material shall be done as soon as practical after laying of the pipe. However, clean-up work shall not fall behind the pipe laying more than 2,000-feet. Should the Contractor not keep his clean-up within the aforementioned distance, Work shall stop until the clean-up work is accomplished.

3.04 SEDIMENT CONTROL

A. Contractor shall control erosion and trap sediment from all sites remaining disturbed for more than 14 days. Such practices shall include among others, sediment traps, sediment basins, silt fences, and storm drain inlet protection. Silt Fence Fabric shall be in accordance with MDOT Item 910.04 Silt Fence Geotextile.

B. Timing - Sediment control structures shall be functional throughout earth-disturbing activity. Sediment ponds and perimeter sediment barriers shall be implemented as the first step of grading and within seven days from the start of grubbing. They shall continue to function until the upslope development area is restabilized.

C. Settling Ponds - Concentrated storm water runoff from disturbed areas flowing at rates which exceed the design capacity of sediment barriers shall pass through a sediment settling pond. The facility's storage capacity shall be 67 cubic yards per acre of drainage area.

D. Sediment Barriers - Sheet flow from runoff from denuded area shall be intercepted by sediment barriers. Sediment barriers, such as sediment fences or diversions directing runoff to settling facilities, shall protect adjacent properties and water resources from sediment transported by sheet flow.

E. Other erosion and sediment control practices shall prevent sediment-laden water from entering drain systems. Unless the storm drain system drains to a settling pond. These practices shall divert runoff from distributed areas and steep slopes where practicable and stabilize channels and outfalls from erosive flows.

3.05 CONSTRUCTION OF SLOPES

A. The Contractor shall comply with the following requirements when working on slopes exceeding 4:1.

1. The pipeline shall be constructed during dry weather, low flow periods as determined by the Engineer. The construction time for this Work shall be limited to the shortest time possible in order to minimize environmental impacts.

2. Construction equipment shall be limited to trenching equipment or rubber-tired backhoes in order to prevent soil erosion and maintain slope stabilization.

3. Biodegradable mesh shall be used for slope stabilization. The mesh shall cover the entire width of disturbed ground.

4. The trench shall be backfilled immediately after installation of the pipe. The disturbed areas shall be graded, seeded, and mulched within 24 hours after backfilling. The Contractor shall maintain all seeded and mulched areas in accordance with the specifications until final acceptance of the Work.

5. The Contractor shall place straw or hay bales at the base of the slopes for sedimentation control. The bales shall be placed prior to construction of the pipeline and shall remain until final seeding has germinated and become established.

3.06 RESERVED

3.07 PROHIBITED CONSTRUCTION ACTIVITIES

A. Disposing of excess or unsuitable excavated material in wetlands or floodplains, even with the permission of the property owner.

B. Locating stockpile storage areas in environmentally sensitive areas.

C. Indiscriminate, arbitrary, or capricious operation of equipment in any stream corridors, any wetlands, any surface waters, or outside the easement limits.

D. Pumping of sediment-laden water from trenches or other excavations directly into any surface waters, any stream corridors, any wetlands, or storm sewers; all such water will be properly filtered or settled to remove silt prior to release.

E. Discharging pollutants such as chemicals, fuels, lubricants, bituminous materials, raw sewage and other harmful waste into or alongside of rivers, streams, impoundments, or into natural or man-made channels leading thereto.

F. Permanent or unspecified alteration of the flow line of any stream.

G. Damaging vegetation outside of the construction area.

H. Disposal of trees, brush, and other debris in any stream corridors, any wetlands, any surface waters, or at unspecified locations.

I. Open burning of project debris without a permit.

J. Discharging injurious silica dust concentrations into the atmosphere resulting from breaking, cutting, chipping, drilling, buffing, grinding, polishing, shaping or surfacing closer than 200 feet to places of residences or places of human occupation.

K. Storing construction equipment and vehicles and/or stockpiling construction materials on property, public or private, not previously specified on the Drawings or not authorized by the Owner or Engineer for such purpose.

L. Running well point or pump discharge lines through private property or public property and rights-of-way without the written permission of the property owner and the consent of the Engineer.

PART 4 SPECIAL PROVISIONS

4.01 STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

A. The Contractor shall be responsible for having a SWPPP prepared for the Work. The SWPPP shall be prepared by an Engineer licensed in the state of Michigan.

B. The Drawings show recommendations for pollution prevention measures to be provided. The measures shown on the Drawings shall be considered the minimum level of pollution prevention.

C. The Contractor shall adhere to the SWPPP in accordance with EGLE Guidelines.

D. The SWPPP shall be updated and maintained throughout the Work.

E. A copy of the SWPPP shall be available at the Site's construction office.

F. The Owner has submitted the Notice of Coverage (NOC) for the Work. The Contractor shall apply for coverage as a co-permittee.

END OF SECTION

This page was intentionally left blank.

SECTION 01800
CONSTRUCTION SURVEY WORK

PART 1 GENERAL

1.01 SCOPE

A. This Section includes the furnishing of all labor, materials, equipment, and services necessary for the completion of Construction Survey Work in accordance with the Contract Documents.

B. This Work consists of the layout of all lines and grades shown on the Drawings or as altered or modified by the Engineer, control survey, and of miscellaneous survey work related to construction of the project.

1.02 PROTECTION

A. The Contractor shall protect and preserve the established reference points and monuments.

B. Whenever monuments are encountered in the line of Work, whether shown on the Drawings or not, the Contractor shall notify the Engineer in writing at least 24 hours in advance of moving same, and under no circumstances is such a stone or other monument to be removed or disturbed by the Contractor or by any of his men without a written order of the Engineer and only when a registered surveyor representative of the Owner is present.

1.03 REPLACEMENT OF LOST SURVEY POINTS

A. Whenever a reference point or monument is lost or destroyed or requires relocation, the Contractor shall, at his own expense, accurately relocate and replace all such points so lost, destroyed, or moved.

1.04 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Information for the Record:

a. Layout Sheets including, but not limited to, Benchmarks both temporary and permanent and Pipeline layout staking.

b. Field Notes and survey log.

c. Profile over Proposed Tunneled, Jacked, or Bored Pipe.

d. Certified Survey of Tunneled, Jacked, or Bored Pipe.

B. Contractor shall provide the Engineer and Resident Project Representative, no later than five working days after installation, all Logs, reports, field notes, drawings and documentation as specified, shown on the Drawings, or directed.

C. No Pipeline or related Work shall be considered for payment until all logs, reports field notes, drawings, and documentation as specified, shown on the Drawings, or directed, have been submitted to the Engineer or Engineer's Representative.

PART 2 PRODUCTS

2.01 CONSTRUCTION STAKING

A. All construction points shall be marked with a wooden hub and nail or a PK nail in concrete, asphalt pavements and walks.

B. All points located in areas of heavy underbrush, inaccessible or limited site distance shall be identified with a wood lath extending a minimum of 3 feet above the ground.

C. All points located in paved surfaces shall be clearly marked with paint. Contractor shall obtain written permission from Owner to use paint for marking.

PART 3 EXECUTION

3.01 COORDINATION

A. The Contractor shall provide field forces necessary to lay out the location, alignment, elevation, and grade of the Work shown on the Drawings and in conformance with the control points and benchmarks shown on the Drawings.

B. The Contractor shall use competent personnel and suitable equipment for the layout of the Work required. If the layout Work involves more than some simple distances and elevations from established reference points, the Contractor shall employ a Registered Surveyor to supervise the layout Work.

C. Contractor shall furnish the necessary labor to assist the Engineer in checking the installation, if required.

3.02 EXISTING CONNECTION POINTS

A. The Contractor shall verify critical elevation points of the existing utilities prior to commencing installation of Work. Critical points shall include all points where new Work connects to existing utilities and existing utilities that could conflict with the Work. All data shall be provided to the Engineer before commencing Work.

3.03 RIGHTS-OF-WAY AND EASEMENTS

A. Rights-of-way or easement(s) shall be staked at points along the boundaries so that at least two stakes can be seen distinctly from any point along the boundary line. The

staking shall not exceed 200 feet in any direction. All points of change in width or direction of the rights-of-way or easement(s) boundary line shall be staked.

B. When the Contractor performs construction and the zone of influence is within 10 feet of any right-of-way or easement(s) boundary line, they shall place stakes properly identifying points of change in width or direction of the boundary line and at points along the boundary line not to exceed 25 feet.

3.04 PAVEMENT

A. The Contractor shall establish a layout for location and grade on both sides of the road and 5 feet off the edge of the pavement or back of curb. Layout line shall consist of stakes set at station intervals necessary for the topography and environment to assure conformance to planned line and grade. Stakes shall be set at a minimum every 50 feet, at all vertical and horizontal points of curvature and points of tangent, and at all vertical high or low points.

B. Stakes for line and grade of pavement and curb shall be set at station intervals necessary for the topography and environment, not to exceed 50 feet, and at low and high points of vertical curves to assure conformance to planned line and grade.

3.05 PIPE IN OPEN CUT

A. The Contractor shall utilize a laser beam for establishing line and grade when installing pipeline in open-cut construction. In order to maintain control during pipeline installation and to obtain the required field data for the record documents, the Contractor shall establish construction and layout stakes. These stakes shall be based on the Contract Documents and the survey control data as provided by the Engineer.

B. The construction staking shall be placed along the pipeline route and at the location of new manholes, valves, deflections both vertical and horizontal and as specified, shown on the Drawings, or as directed. All construction layout stakes shall be offset at a minimum of 10 feet and at a right angle to the pipeline route. Layout shall be referenced to the downstream manhole or valve; in addition it may reference survey of baseline stationing.

C. Contractor shall provide to the Engineer, no later than five working days prior to the installation of the pipeline, all information of the completed construction layout staking. This information shall include but not be limited to stationing, elevations, control points, project coordinates, offset direction and distance for all deflections both horizontal and vertical, manholes, and all other points as specified, shown on the Drawings and directed by the Engineer.

D. The grade of pipe in open-cut, whether placed by laser beam or other approved methods, shall be checked using surveying equipment. The Contractor shall have a surveyor's level and level rod on the Site at all times when pipeline and appurtenances are being installed. The level rod shall be equipped with an attached "shoe" extension on the bottom for placing on the pipe invert. The pipe invert elevation shall be checked

at a maximum of 50-foot intervals, or more often, as directed by the Engineer. Checks will be performed by the Contractor, and results, including the layout station, shall be recorded in the Contractor's field log.

E. The Contractor shall furnish all equipment and labor and check his alignment from the offset stakes. Contractor shall record all information in the log.

F. Any inspection or checking of the Contractor's layout by the Engineer shall not relieve the Contractor of his responsibility to secure the proper dimensions, grades, and elevations of the Work.

3.06 RESERVED

3.07 RESERVED

3.08 LOCATION OF STRUCTURES AND UNDERGROUND PIPING

A. The location of new structures and underground utilities shall be based on the dimensions, coordinates, and requirements shown on the Drawings or specified.

B. If it is stated on the Drawings or specified that the location and/or elevation of the new structure or underground piping shall depend on the location of existing underground or otherwise hidden facilities, those existing underground or hidden facilities shall be located by the Contractor prior to his determination of the location and/or elevation of the new facilities. This requirement shall override any other specific location dimensions or coordinates shown on the Drawings for that structure or piping.

C. If the location or elevation determined by the Contractor, in accordance with the above requirements, appears to cause conflicts with existing structures or utilities or appears to potentially cause functional issues with either the existing or new structures or utilities, the Contractor shall notify the Engineer immediately.

D. In no case, shall coordinates or other location information be extracted or interpolated from the electronic CAD files that may be provided to the Contractor by the Owner or the Engineer without the specific approval of the Engineer.

3.09 CURB AND GUTTER ELEVATIONS

A. In locations where the existing curb and gutter shall be removed as part of the Work, the Contractor shall be responsible for reconstructing the existing curb and gutter to match existing alignment, elevations and grades. The Contractor shall be responsible for collecting existing curb and gutter elevation information prior to commencing the Work.

3.10 BENCHMARKS/VERTICAL CONTROL

A. Benchmarks have been set for survey and construction reference purposes.

B. The Contractor shall protect and transfer these benchmarks as needed to complete the Work.

3.11 HORIZONTAL CONTROL

A. The centerline stationing provided is not based upon physical control points found or established as part of the design.

B. The Contractor shall establish horizontal control as necessary.

PART 4 SPECIAL PROVISIONS

4.01 REGISTERED SURVEYOR

A. The Contractor shall employ the services of a Registered Surveyor for the initial layout and staking of the project. The Registered Surveyor shall be utilized at any time when reestablishing control points, elevations, and on any redesign or extension of the Work. All survey Work shall be as specified, shown on the Drawings, or as directed.

END OF SECTION

This page was intentionally left blank.

SECTION 01810
VIDEO RECORDING

PART 1 GENERAL

1.01 SCOPE

A. Under this Section the Contractor shall furnish all personnel, transportation, recording equipment, power, and materials to produce color video records of existing topography along all pipeline routes and designated haul roads, in designated residences, and as directed.

1.02 SCHEDULE OF WORK

A. Unless otherwise directed in writing by the Engineer, video recording shall be scheduled in conformance with the following:

1. No recording shall be started on any portion of the Work until that portion of the Work is under Contract unless otherwise directed by the Owner.

2. Recording shall not precede excavation for construction by more than three months.

3. Video recording shall be performed only when foliage is visible on trees, except as authorized by the Engineer.

4. Video recording shall not be performed when more than 10% of the ground is covered with snow or leaves, unless authorized by the Owner.

B. Before proceeding with the Work, the video recording Contractor shall consult with the Engineer concerning the following:

1. Scheduling recording to precede construction.

C. All recording shall be completed on a section of Contract before the Contractor starts excavation or places material or equipment in that section.

D. In areas where public utilities are to be relocated or replaced, a second video recording shall be made after the public utility has concluded their work but before the Contractor commences operations.

E. The Owner shall obtain permission for the recording crew to enter private property not included in an easement. The Contractor shall give the Owner sufficient prior notice to obtain the permission.

1.03 DEFINITIONS

A. Video Recording - Zone of Influence - Shall include producing video records as specified herein for the zone of influence. The zone of influence shall be defined as all surface

area within street rights-of-way or easements in which project is to be installed or within areas 50 feet on each side of a proposed utility centerline, whichever is greater, and additional features in contiguous areas as specified or directed.

B. Video Recording of Buildings - Entering - Shall include moving video equipment into buildings or residences (including attached or separate garages) designated by the Engineer for the purpose of recording existing conditions therein.

C. Video Recording of Building - Panels - Shall include video recording of designated panels of buildings. Panel as used herein shall mean the full surface of a room wall, ceiling, or floor or the outer side of a building not viewable in any zone of influence recording.

1.04 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop Drawings for Review:

a. Provide a minimum of four copies of the video.

PART 2 PRODUCTS

2.01 VIDEO RECORDING

A. Displays - All video shall, by electronic means, display (visible on the playback viewer) continuously and simultaneously generated transparent digital information which shall include the date and time of recording, as well as the corresponding planned station numbers. The date information shall contain the month, day, and year. The time information shall consist of hours, minutes, and seconds, separated by punctuation marks. Below the stationing, periodic transparent alpha/numeric information shall appear. The information shall consist of the name of the project, name of area covered, direction of travel, viewing side, and any other pertinent data.

2.02 VIDEO OUTPUTTING

A. Video recording shall be a digital file format such as MPEG, MP3, MP4, Wave or WMV or other current standard file formats as approved by Engineer.

B. The electronic file organization shall reasonably match the project stationing with file names including the station number and street names.

C. The electronic files shall be stored on a single solid-state memory device, such as a DVD disc or jump/thumb drive, external hard drive. Solid state memory devices shall have a USB for connection to a computer. The memory volume on the storage device shall be adequate to store the electronic video files in an unzipped capacity along with any associated or embedded data files.

2.03 AUXILIARY LIGHTING

A. Auxiliary lighting shall be used wherever necessary to ensure clarity of picture.

PART 3 EXECUTION

3.01 PERSONNEL

A. The Work shall be performed by competent personnel with knowledge of the procedures and methods to produce satisfactory records as specified herein.

3.02 PRODUCTION

A. Recording shall be composed in such a manner that filming shall, in general, proceed in the direction of the project stationing.

B. Recorded Contents:

1. All houses or buildings and other readily recognizable objects as required shall be identified visually in such a manner that they can be referenced to the stationing of the project. Objects selected shall be at intervals not exceeding 100 lineal feet and shall include all houses and buildings identified by house numbers.
2. Within the zone of influence, the recording shall include but not be limited to all sidewalks, driveways, ditches, parkways, lawns, inlets, culvert pipe ends, trees, shrubs, fences, houses, and buildings that could conceivably be affected by the Contractor's operations. The video shall call attention to existing cracks or uneven areas in walks and driveways, damaged lawns, trees or shrubbery, broken or missing inlet castings, deteriorated fences, and, where feasible, broken or plugged culvert pipes.
3. Within street rights-of-way, the recording shall include but not be limited to all pavement, curbs and inlets, mailboxes, traffic signs, and street signs. The video shall call attention to damaged mailboxes, signs, curbs and inlet castings. Damaged areas in pavements over proposed project or in pavements scheduled for resurfacing need not be referred to in the video.
4. Video recording for designated residences shall include documentation of surface conditions inside and outside of the building prior to starting project construction.

C. Control of Picture Quality - The camera carrier shall travel at a low speed to ensure against blur or distortion of the recorded pictures. A maximum rate of 48-feet per minute is recommended.

3.03 OWNER REVIEW

A. As the video recording work progresses, the Contractor shall deliver completed sections to the Owner and Engineer. The Owner and Engineer will review the recordings and determine if they are acceptable for clarity and coverage. The recording may be rejected if the picture is of poor quality (i.e., blurred, distorted, too light, too dark, improper color), insufficient coverage, or does not meet specified requirements.

B. The area of rejected recording shall be rerecorded by the Contractor and reinserted in the electronic file in the proper sequence.

PART 4 SPECIAL PROVISIONS

Not used.

END OF SECTION

SECTION 02100
CLEARING AND GRUBBING

PART 1 GENERAL

1.01 SCOPE

A. This Section includes grubbing, scalping, and otherwise clearing of the construction site in accordance with the Drawings and as specified herein or ordered.

B. This Work includes the removing and disposing of all trees, stumps, vegetation, and debris as necessary to accommodate new construction or to recontour the Site, and the preservation of all vegetation and other objects designated to remain.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Information for the Record:

a. Spoil Site Permit - When the material and debris resulting from the clearing and grubbing operations are disposed of at locations off the project, the Contractor shall obtain and submit as specified, written permission from the owner of the property upon which the material and debris are to be placed.

PART 2 PRODUCTS

2.01 MATERIALS

A. Paint required for cut or scarred surfaces of trees or shrubs designated to remain shall be a suitable asphaltum base paint.

PART 3 EXECUTION

3.01 COORDINATION

A. Clearing and grubbing shall be performed only after the Site has been surveyed and staked as required and in accordance with Section 01800.

3.02 PREPARATION

A. The Contractor shall protect and preserve all land survey monuments or property corners along the line of his work.

1. Where monuments, irons, or property corners are disturbed or removed due to operations under this Contract, the Contractor, at his own expense, shall employ the services of a registered land surveyor to establish, reset or replace such monuments, irons, or property corners.

B. The Contractor shall not damage or destroy trees or shrubs nor remove or cut them without authorization by the Owner. All trees and shrubs except those ordered to be removed shall be adequately protected by the Contractor. No excavated material shall be placed so as to damage such trees and shrubs.

1. Trees and shrubs damaged by the Contractor shall be replaced with new stock of similar size and age, or with other stock of size and age satisfactory to the Owner, at the proper season, and at the sole expense of the Contractor. Scarred surfaces shall be treated as indicated in Part 2.

C. When or where any direct or indirect damage is done to public or private property resulting from the Contractor's operations, such property shall be restored by the Contractor, at his expense, to a condition equal to or better than that existing before such damage was done, or the Contractor shall make good on such damage in manner acceptable to the owner of the property.

D. Prior to clearing and grubbing operations, the Owner, Contractor, and Engineer shall walk the site to designate the trees to be removed or to be protected. Trees shall be marked with paint and a universally accepted designation.

3.03 CLEARING AND GRUBBING

A. Only those trees and shrubs shall be removed that are in actual interference with excavation or grading work and such removal shall be subject to approval by the Owner. The Owner reserves the right to order additional trees or shrubs removed at no additional cost if, in his opinion, they cannot be maintained or have been damaged by the Contractor's operations.

B. All trees, stumps, vegetation, and debris within the Zone of Influence not designated to remain shall be cleared and/or grubbed.

C. In locations to be seeded, stumps, roots, and other protruding obstructions shall be removed to a minimum of 6 inches below the final ground surface.

D. At all times, the Contractor shall remain within the property lines and/or easement areas.

E. Except in areas to be excavated, all holes resulting from the clearing and grubbing operations shall be backfilled and compacted in accordance with Section 02200.

3.04 SCALPING

A. Areas of excavation or embankment shall be scalped of brush, roots, sod, grass, crop residue, decayed vegetable matters, and other organic materials.

B. Scalping depth shall be only as required to remove the above. Scalping of topsoil is not included under this Section.

3.05 DISPOSAL OF DEBRIS

A. Debris resulting from the clearing and grubbing operations shall be disposed of at designated spoil sites in a legal manner, in full compliance with applicable Codes and Ordinances.

3.06 TREE AND VEGITATION REPAIR

A. The Contractor shall employ a Certified Arborist where necessary for the repair and protection of a tree and vegetation.

B. Contractor shall repair injuries to bark, trunks, limbs, and roots of remaining vegetation by properly dressing, cutting, pruning, bracing and painting utilizing tree surgery methods, tools, and materials recommended by the Arborist.

PART 4 SPECIAL PROVISIONS

4.01 TREE REMOVAL

A. A tree is defined as a live, dying or dead plant with a minimum diameter of 6 inches with snags at 4 feet above the ground surface and a minimum height of 12 feet above the ground surface.

END OF SECTION

This page was intentionally left blank.

SECTION 02110
REMOVAL OF STRUCTURES AND OBSTRUCTIONS

PART 1 GENERAL

1.01 SCOPE

A. This Section includes demolition of existing structures and removal of pavement, piping, and equipment necessary to clear space for new construction and/or to rehabilitate existing construction.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Information for the Record. The Contractor shall submit the following:

a. A copy of a signed permit from the owner of the property upon which the debris, removed under this Section, will be disposed as specified.

b. Dust and noise control measures.

c. Record documents, in accordance with the General Conditions, and photograph or video recording indicating the location of, but not limited to, the following existing, new, and abandoned:

1) Utilities.

2) Mechanical.

3) Electrical.

4) Structural.

5) Any embedded items.

d. Inventory and documentation list for removed and salvaged materials for the Owner.

1.03 QUALITY ASSURANCE

A. Contractor shall execute the Work in compliance with all federal, state, and local codes. Any removal or demolition shall not leave the Owner in violation of any such regulations or codes unless approved by the Owner and Engineer.

1.04 PROTECTION

A. Structures shall be removed in such a manner as not to damage any portions of the existing structure which are to remain in place.

PART 2 PRODUCTS

2.01 FILL MATERIAL

A. Fill material shall be in accordance with Section 02200.

PART 3 EXECUTION

3.01 COORDINATION

A. Demolition work extending beyond the limits as specified, shown on the Drawings, or as required, will be considered unauthorized. The Contractor, at no additional cost to the Owner, shall repair said damage to a condition equal to or better than that which existed prior to commencement of the Work.

B. Existing structures and equipment which are damaged in appearance or function by performance of demolition work shall be replaced or repaired, at the Owner's discretion and to an approved condition, by the Contractor at no increase in Contract Price.

3.02 PAVEMENTS, SIDEWALKS, CURBING AND SIMILAR STRUCTURES

A. Removal of existing pavements, sidewalks, curbing, and similar structures shall end at an existing joint or a sawed joint. Sawed joints shall be straight, neat, and free from chipped or damaged edges.

B. For removal of non-reinforced concrete, the minimum depth of saw cut shall be 3 inches.

C. For removal of reinforced concrete, the depth of saw cut shall be sufficient to cut the steel unless specified otherwise.

D. If the concrete is coated with a bituminous surface or other material, the depth shall be sufficient to cut into the concrete, not including the coating depth, as specified above.

3.03 EXCAVATION OF RIGID PAVEMENT

A. The Contractor shall excavate rigid pavement, consisting of concrete or concrete base with a wearing surface of brick or bituminous concrete, wherever such excavation is required for the purposes of this Contract.

B. Pavement shall be excavated to neat lines and, unless otherwise specified in Part 4 of this Section, only to widths required for trenches for pipe laying and for construction of structures. Adequate provision shall be made to prevent settlement and breakage of pavement beyond the approved limits of excavation. Concrete pavement and subbase shall be cut with a concrete saw in conformance with Subsection 3.02.

3.04 MANHOLES, CATCH BASINS, INLETS AND SIMILAR STRUCTURES

A. Existing manholes, catch basins, inlets, and similar structures designated to be removed shall be completely removed.

B. Manholes, catch basins, inlets, and similar structures designated to be abandoned shall be removed to an elevation of at least 3 feet below the finished subgrade or ground surface. The remaining void shall be filled with special backfill material compacted to 100% optimum density per ASTM D698 or controlled density fill, CDF if permitted by the Engineer. All sewer openings in manholes located on sewer lines that are not to be filled, shall be plugged with 8-inch minimum thickness masonry plug.

C. Sewers designated to remain in service and connected to structures indicated to be removed or abandoned shall be rebuilt through the area with new pipe. Sewer flow shall be maintained between removal and replacement operations. Abandoned sewers shall be sealed and made watertight with approved precast stoppers or masonry bulkheads.

D. All castings or hydrants salvaged from abandoned or removed structures shall remain the property of the Owner, if requested by the Owner, and shall be cleaned and transported by the Contractor to a site designated by the Owner or incorporated into the Work where called for on the Drawings, scheduled, or so directed. If the Owner decides salvaged materials are not wanted, the Contractor shall dispose of them at no additional cost to the Owner.

3.05 RESERVED

3.06 GUARDRAIL AND FENCE

A. Where so required by the Drawings, existing guardrail and fence shall be carefully dismantled and stored for reuse or for salvage by the Owner.

B. Wood posts and other materials not considered salvageable by the Owner shall be disposed of by the Contractor.

3.07 RESERVED

3.08 RESERVED

3.09 PRIVATE SIGNS

A. Private and commercial signs shall be carefully removed and relocated as directed by the Owner.

3.10 DISPOSAL OF DEBRIS

A. All debris resulting from demolition operations; i.e., broken concrete, masonry, pipe, miscellaneous metal, trees and brush, equipment, etc., shall be trucked from the Work site by the Contractor and disposed of at spoil sites in a legal manner, in full compliance with applicable Codes and Ordinances.

B. The Contractor shall police the hauling of debris to ensure that all spillage from haul trucks is promptly and completely cleaned up.

3.11 BACKFILLING

A. All trenches, holes, and pits resulting from the removal and abandonment of any structure or obstruction shall be backfilled and compacted in accordance with the requirements of Section 02200.

3.12 RESERVED

3.13 USE OF EXPLOSIVES

A. The use of explosives for the Work of removal of structures and obstructions is PROHIBITED.

3.14 PIPING REMOVAL

A. At the location where pipe removal stops, the remaining pipe end shall be capped. The cap must be pressure tight and restrained from movement due to pressures inside the pipe.

B. Piping removal includes, but is not limited to, all hangers, stands, and anchoring devices.

3.15 RESERVED

3.16 RESERVED

3.17 RESERVED

3.18 RESERVED

3.19 RESERVED

PART 4 SPECIAL PROVISIONS

4.01 SCHEDULE OF REMOVALS

A. The following list of items once removed shall remain the property of the Owner and shall be delivered to the Owner-designated location.

1. None.

4.02 BURIED SANITARY SEWER AND WATER MAIN REMOVAL

A. As shown on the Drawings, existing water main or sanitary sewer main piping, accessories, and appurtenances shall be removed within limits shown on the Drawings or as specified.

B. The removal shall include removal and disposal of aggregate backfill, pipe bedding and control density backfill.

C. Existing pipe removed shall become the property of the Contractor and shall be properly disposed of in accordance with the requirements of this Section.

D. At locations where the pipe removal is terminated, a water-tight sewer plug shall be placed on the end of the pipe to remain.

E. Manholes shall be removed to a minimum of 6 feet.

4.03 VALVES, BOXES AND VALVE STRUCTURES ABANDONED

A. Manholes and valve box castings to be abandoned in place shall be removed to 18 inches below final grade and filled with low-strength mortar backfill in accordance with the bottom of the pavement typical section or to 12 inches below final grade in non-paved areas. The pavement section shall be removed and replaced with an additional 18 inches horizontally outside of the casting area. The void created by the removal of the casting, structure, and valve box shall be backfilled to match the surrounding pavement section or as specified for non-pavement areas.

B. Valve boxes shown on the plans may also have existing manhole castings, frames, and manhole structures around the existing valves. The abandonment of valves shall include the removal of all existing manhole castings, frames, and structure walls to the specified depths as associated with that particular valve.

C. Valve shall be abandoned in the off position when possible.

4.04 VALVES AND STRUCTURES REMOVED

A. Valves, boxes and structures to be removed shall be removed in their entirety or as approved otherwise by the Engineer.

B. All hydrant valves and boxes shall be removed as part of Hydrants Specified for Removal.

END OF SECTION

SECTION 02200
EXCAVATION AND BACKFILL

PART 1 GENERAL

1.01 SCOPE

A. This Section includes all excavations and related Work for the construction of the designated structures, pipelines, and other incidental Work.

B. Excavation includes the Work of making all necessary excavations for the construction of all Contract Work; of furnishing, placing, and the use of sheeting, shoring, and sheet piling necessary in excavating for and protecting the Work and workers; of doing all pumping and fluming necessary to keep the excavation free from water; of providing for uninterrupted flow of existing streams, treatment plant processes, drains and sewers; of damming and cofferdamming where necessary; of supporting and protecting existing structures, pipes, conduits, sewers, culverts of all types of materials of construction; of supporting and protecting railroad tracks, posts, poles, wires, fences, buildings, and other public and private property adjacent to the Work; of removing and replacing existing sewers, culverts, pipelines, and bulkheads where necessary; of removing after completion of the Work all sheeting and shoring not necessary to support the sides of excavations; of removing and disposing of all surplus excavated material or material under structures that does not meet the soil design bearing capacities; of doing all backfilling, of compacting backfill to limits specified or ordered by the Engineer; and of restoring all property damaged as a result of the Work involved in this Contract.

C. The Work includes obtaining and transporting suitable fill material from offsite when on-site material is not available.

D. The Work includes transporting surplus excavated material not needed for backfill at the location where the excavation is made, to other parts of the Work where filling is required, or the disposal of all surplus material on other sites selected by the Owner.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop Drawings for Review:

a. Sieve Analysis (ASTM C136) - One test for each material source.

b. Submit a moisture density curve (ASTM D698) for each type of material used for backfill. Test shall be referenced to appropriate sieve analysis test. The maximum dry weight and optimum moisture content shall be indicated.

c. Controlled Density Fill Material - Design Mix and Certified Test Results.

d. Test results for conformance with specified "Compaction Requirements":

1) Retests shall be referenced to the corresponding failing test.

e. Stripped soil and topsoil test per MDOT 917.

2. Information for the Record:

a. When excess excavated material is disposed of at locations off the Site, the Contractor shall obtain and submit written permission from the Owner of the property upon which the material is to be placed.

b. Submit details of the proposed method of installation and construction of dewatering wells.

c. Submit a schedule of the proposed sequence of dewatering well construction.

d. Submit dewatering logs.

e. Submit method for abandoning dewatering well.

PART 2 PRODUCTS

2.01 TOPSOIL

A. Soil stripped from the Site shall consist of loose, friable, loamy topsoil without admixture of subsoil or refuse. It shall be reasonably free from peat, muck, roots, hard clay, coarse gravel, stones, weeds, tall grass, brush, sticks, litter, ground debris and wood products. The stockpiled soil shall be subject to the approval of the Engineer.

B. Topsoil provided shall be in accordance with MDOT 917 and be loose, friable, loamy soil without admixture of subsoil or refuse. In order for the topsoil to be considered loamy, the fraction of topsoil passing a No. 10 sieve shall contain not more than 40% clay. Topsoil shall contain not less than four percent nor more than 20% organic matter as determined by loss on ignition of oven-dried samples to constant weight at 212 degrees F.

C. Excess material shall be removed from Site, unless directed otherwise by the Owner or the Engineer.

2.02 SELECTED BACKFILL

A. Selected backfill shall be clean excavated soil. It shall be free of rock and foreign debris of any kind and shall be tested in accordance with ASTM C136 sieve screen analysis and ASTM D2487 soil classification. The material's use as selected backfill shall be approved by the Engineer.

B. Engineer may waive material testing of selected backfill. Such waiver shall apply only to the designated location and the source of the selected backfill. Such waiver shall not apply to excavated soil from locations not so designated.

2.03 SPECIAL BACKFILL MATERIAL

A. Special backfill material shall conform to MDOT 902.07 and shall meet the grading requirements of Table 902-3 Class II.

2.04 AGGREGATE BEDDING MATERIAL

A. Aggregate bedding material shall be well-graded durable crushed gravel, crushed stone, or meet the graduation requirements of MDOT Table 902-1, Class 17A. Bedding material containing a greater percentage of larger-sized aggregate shall be furnished at the direction of the Engineer.

B. Fine aggregate bedding material shall be natural sand or manufactured sand bedding material meeting the requirements of MDOT Table 902-4, 2NS.

1. Natural sand material excavated from Site may be utilized for pipe bedding provided it meets the requirements specified herein and is approved by both the Independent Laboratory and the Engineer.

2.05 CONTROLLED DENSITY FILL (CDF) MATERIAL

A. Controlled density fill material shall be a cement base fill material that can be deposited in a fluid state. It shall be composed of portland cement and approved filler material, sand and water. The mixture and shall have a compressive strength of 100 psi minimum and 500 psi maximum.

B. Filler material shall consist of mineral aggregates, slag, or fly ash. Metals, soil, or organic material will not be permitted.

2.06 SLOPE AND CHANNEL PROTECTION

A. Riprap, plain or heavy, shall be in accordance with MDOT 813.

PART 3 EXECUTION

3.01 COORDINATION

A. Construction Through Highways:

1. Permits - The Owner will obtain permits required for open cut construction through highways. Contractor shall be responsible for compliance with and furnishing any item required by permit such as Bond Security.

2. Notification - The Contractor shall give written notice to appropriate officials of the affected Department of Transportation, City, or County at least five days in

advance, not including weekends and holidays, before starting construction under highways and as required under other roadways.

3. Contractor shall comply with standard permit conditions of controlling authority and special provisions noted in Part 4 of this Section.

B. Test Pits:

1. The Contractor shall perform exploratory test pits as may be necessary or ordered by the Engineer in advance of excavation to determine the exact location and elevation of subsurface structures, pipelines, and conduits which are likely to be encountered and shall make acceptable provision for their protection, support, and maintenance in operation. Vacuum excavation (potholing) may be used if adequate information can be obtained by such method. No additional payment shall be made for test pits.

2. Conflicts with existing utilities not located, as specified, far enough in advance of construction, shall not be considered as a basis for delay claims or additional payment.

3.02 REMOVING AND REPLACING TOPSOIL

A. Removal

1. Excavation for trenches in which pipelines, sewers, conduits and other utilities are to be installed: The Contractor may elect to strip soil and stockpile unless the Contract Documents direct stripping and stockpiling prior to excavation.

2. General excavation, other than trench excavation: The Contractor shall remove, and stockpile the top 12 inches of the existing soils from all areas of construction including, but not limited to, excavation and embankment areas, stockpile sites, construction yard, storage areas, etc.

B. Replacing stockpiled soil and topsoil

1. Trench excavation areas disturbed as a result of trenching operations and which are to be restored with grass or other plantings shall be free of peat, muck, roots, hard clay, coarse gravel, stones, weeks, tall grass, brush, sticks, litter, ground debris and wood products. The surface shall be mechanically conditioned after removal of debris. After surface is prepared, it shall be covered with topsoil or stockpiled soil material to a minimum depth of 4 inches. Topsoils and stockpiled soil material shall meet the requirements specified herein and be tested.

2. General excavation areas which are to be restored with grass or other plantings shall be free of peat, muck, roots, hard clay, coarse gravel, stones, weeks, tall grass, brush, sticks, litter, ground debris, wood products and construction debris including loose stone. The surface shall be mechanically conditioned after removal of debris. After surface is prepared, it shall be covered with stockpiled soil and then have a minimum of 4 inches of topsoil placed.

C. The Work shall be in accordance with applicable portions of MDOT Sections 205.03 A.1 and 816.03 A.

3.03 GENERAL EXCAVATION

A. All necessary excavation shall be performed to accommodate the completion of all Contract Work.

B. The Drawings show the horizontal and the lower limits of structures, pipelines, sewers and other utilities. The methods and equipment used by the Contractor when approaching the bottom limits of excavation and when trimming the bottom of the excavation to a smooth surface shall be selected to prevent disturbing the soil below the bottom limits of excavation.

C. Excavation which is carried below the bottom limits shall be classified as Unauthorized Excavation, unless said excavation has been authorized by the Engineer prior to each occurrence.

D. Unauthorized excavation shall be filled with CDF material to the bottom limits. Under circumstances where structural integrity is not a factor, the Engineer may allow the filling of unauthorized excavation with pipe bedding material or special backfill material compacted to 100% density, as specified under compaction requirements.

E. Sheeting, Shoring, and Bracing:

1. The Contractor shall furnish and install adequate sheeting, shoring, and bracing to maintain safe working conditions and to protect newly built work and all existing adjacent and neighboring structures and utilities from damage by settlement.

2. Sheeting, shoring and bracing shall be arranged so as not to place a strain on portions of completed Work until the construction has proceeded far enough to provide ample strength. Sheeting and bracing may be withdrawn and removed at the time of backfilling, but the Contractor shall be responsible for all damage to newly built Work and to adjacent and neighboring structures and utilities.

3. Sheeting, shoring and bracing shall be removed or cut-off at the time of backfilling to avoid problems with finish grade or future excavation.

F. Construction Sheeting Left in Place:

1. The Contractor shall furnish, install, and leave in place, construction sheeting and bracing when specified or when indicated or shown on the Drawings.

2. Construction sheeting and bracing, placed by the Contractor to protect adjacent and neighboring structures and utilities, may be left in place if desired by the Contractor. All such sheeting and bracing left in place, shall be included in the cost for excavation.

3. Any construction sheeting and bracing which the Contractor has placed to facilitate his work may be ordered, in writing by the Engineer, to be left in place.

The right of the Engineer to order sheeting and bracing left in place shall not be construed as creating an obligation on his part to issue such orders. Failure of the Engineer to order sheeting and bracing left in place shall not relieve the Contractor of his responsibility under the Contract.

G. Removal of Water:

1. The Contractor shall, at all times during construction, provide and maintain ample means and devices with which to remove promptly and dispose of properly all water entering the excavations or other parts of the Work and shall keep said excavations dry until the structures to be built or pipelines to be placed therein have been completed. No water shall be allowed to rise over or come in contact with concrete or masonry until the concrete and mortar has attained a satisfactory set, except in cases where the concrete has been tremied into place with the approval of the Engineer. Water shall not be allowed to rise above the bottom of the bedding stone prior to placing pipe. In water-bearing sand, well points and/or sheeting shall be supplied, together with pumps and other appurtenances of ample capacity to keep the excavation free of water and in compliance with government regulations.

2. The Contractor shall dispose of water from the Work in a suitable manner without damage to adjacent property or structures and in compliance with all regulations.

3.04 TRENCH EXCAVATION

A. Excavation for trenches in which pipelines, sewers, conduits and other utilities are to be installed shall provide adequate space for workers to place and joint the pipe properly. The trench shall be kept to a minimum width. The width of trench at the top of the pipe shall comply with the limits specified or shown on the Drawings.

B. Excavation shall be to the depth necessary for placing aggregate bedding material under the pipeline, sewer, conduits and other utilities as shown on the Drawings. If over excavation occurs, the trench bottom shall be filled to grade with compacted aggregate bedding material.

C. The amount of trench open at any one time in advance of completed Work shall be limited to the minimum necessary for conducting laying operations.

D. In general, backfilling shall begin as soon as the pipeline, sewer, conduits and other utilities are in a condition to receive it and shall be carried to completion as rapidly as possible. New trenching shall not be started when earlier trenches need backfilling or the surfaces of streets or other areas need to be restored to a safe condition.

3.05 EXCAVATION OF UNSUITABLE MATERIAL

A. Unsuitable materials existing below the Contract bottom limits for excavation shall be removed as required by the Engineer. The Engineer may rely upon the Independent

Laboratory retained on this Project when determining unsuitable soil conditions, removal and backfill. Such excavation shall be conducted at a time when the Engineer and Independent Laboratory are present and shall not exceed the vertical and lateral limits prescribed by both.

B. The voids left by removal of unsuitable material shall be filled with special backfill, pipe bedding material, or CDF material as listed in Part 4 or as prescribed by the Independent Laboratory and as approved and ordered by the Engineer. Special backfill or pipe bedding shall be installed as described in this Section and in general shall be compacted to 100% density as specified under compaction requirements.

3.06 DISPOSAL OF UNSUITABLE AND SURPLUS MATERIAL

A. All excavated materials which are unsuitable for use in backfilling trenches or around structures, and materials excavated that are in excess of that required for backfilling and for constructing fills and embankments as shown on the Drawings, shall be disposed of by the Contractor at his expense and at sites provided by him as may be required, except that the Owner reserves the right to require the Contractor to deposit such surplus at locations designated by the Owner within a five-mile radius of the Work.

B. No surplus excavated material of any class shall be deposited in any stream or watercourse or be dumped on public property without the consent of the Owner. All spoil areas shall be left smooth, level, with drainage to a water course and with proper erosion and runoff control.

3.07 BACKFILL AND COMPACTION

A. Pipe and Conduit Bedding - Unless otherwise directed, pipe, conduits and other utilities shall be installed in specified aggregate bedding material as shown on the Drawings and as specified.

B. Backfilling Under Existing Pipeline, Sewer, Conduits and Other Utilities - Where it is necessary to undercut or replace existing utility conduits and/or service lines, the excavation beneath such lines shall be backfilled the entire length with aggregate bedding material tamped in place in 6-inch layers to the required density. The aggregate bedding shall extend outward from the spring line of the conduit a distance of 2 feet on all sides and thence downward at its natural slope.

C. Backfilling with Selected Backfill - Unless otherwise specified or directed, material excavated in connection with the Work may be used for backfilling and other filling purposes, if it meets all requirements given elsewhere in this specification for selected backfill. No material shall be used for backfilling that contains stones, rock, or pieces of masonry greater than 12 inches, frozen earth, debris, earth with an exceptionally high void content, organic material, or marl. No large pieces of rock or masonry shall be deposited closer than 24 inches from the completed outside surface of any structure or pipe.

D. Backfill Immediately - All trenches and excavations shall be backfilled immediately after completion of construction therein, unless otherwise directed by the Engineer. Under no circumstances shall water be permitted to rise in unbackfilled excavation during construction or after pipe has been placed.

E. Backfilling around and over structures, pipelines, conduits and other utilities comprising the Work shall be carefully done by hand and tamped with suitable tools of approved weight when within two feet of structures, pipeline, conduit and other utilities. Selected backfill shall be used in this area unless special backfill is specified, shown on the Drawings, or required by the Engineer. The material shall be placed in uniform layers not exceeding 6 inches in depth up each side. Each layer shall be placed, then carefully and uniformly tamped to the specified density so as to eliminate the possibility of lateral displacement of the pipe or structure.

F. Backfilling may be done by machinery after the backfill has been placed and compacted beyond two feet horizontally of structures, pipelines, conduits and other utilities and to a minimum depth of one foot above the tops of any buried structures, pipelines, conduits, and other utilities. The backfill material shall be deposited in horizontal layers, not thicker than one foot, and each layer shall be thoroughly compacted to the specified density by approved methods before a succeeding layer is placed. In no case will backfill material from a bucket be allowed to fall directly on a structure or pipe, and in all cases the bucket must be lowered so that the shock of the falling material will not cause damage.

G. Backfilling Under Pavement and Walks - Where existing or new pavement, driveway, parking lot, curb and gutter, or walk is over an excavation, special backfill material shall be used to backfill the entire excavation from the bedding to the surface. The material shall be placed and compacted to the required density in accordance with one of the following methods:

1. The backfill material shall be deposited in 6-inch horizontal layers and each layer shall be thoroughly compacted to the proper density by approved compaction method before a succeeding layer is placed.

2. No method of compaction which alters the gradation of the special backfill material or prevents compaction testing by standard testing methods shall be used.

H. Backfilling with Controlled Density Fill Material (CDF) - Where called for on the Drawings, specified, or ordered, CDF material shall be used in lieu of special backfill or bedding material specified herein. Before placing CDF material, the Contractor shall take required measures to protect the Work against flotation.

I. Backfilling Under Structures - Where structural slabs, mats or footings are to be placed on a backfilled area, special backfill material shall be used unless otherwise noted on the Drawings. The backfill material shall be placed in 6-inch horizontal layers and each layer shall be thoroughly compacted to the specified density by approved methods before a succeeding layer is placed. Where backfill is to be placed on undisturbed side slopes

steeper than one vertical to six horizontal, steps shall be formed into the slope before each layer of the backfill is placed. These steps shall be cut vertically at no more than 2-foot intervals and shall have a horizontal dimension of not less than 3 feet.

J. Prior to backfilling under structures, the natural subgrade shall be evaluated at regular intervals in each direction by the independent testing laboratory to determine that the subgrade can obtain the design bearing capacity given by the "Structural Design Data" table on the Drawings. If the subgrade cannot obtain the design bearing capacity, then the testing laboratory shall submit a remedy to the Engineer for approval and for the Contractor to perform.

K. Clay Trench Bulkheads - Where trenches are dug through areas of lateral groundwater seepage or in areas below the groundwater table, the Contractor shall, if required by the Drawings, construct bulkheads within the trench at ordered intervals. Bulkheads shall consist of native clay soil or other fines.

3.08 COMPACTION REQUIREMENTS

A. In areas to be filled after the top 12-inches of soil has been stripped, the undisturbed subgrade shall be compacted to not less than 100% of maximum dry density per ASTM D698 (Standard Proctor) prior to placing of fill.

B. Backfill placed under areas receiving concrete slabs, mats, footings, or within the interior of buildings shall be compacted to not less than 100% of maximum dry density per ASTM D698.

C. Backfill placed around structures where other structures, pipelines, or slabs are to be constructed shall be compacted to not less than 100% of maximum dry density per ASTM D698.

D. The material used to construct embankments and fills in locations other than under pavements, walks, structures, or slabs and around and over pipelines, shall be compacted to not less than 95% of maximum dry density per ASTM D698.

E. All other backfill, including backfill around and over pipelines, and backfill around structures not covered in Paragraphs B. and C. above, shall be compacted to not less than 95% of maximum dry density per ASTM D698.

F. The bottom of excavations upon which concrete slabs or structures are to be placed shall be compacted to obtain 100% maximum dry density per ASTM D698 in the top 12 inches.

G. All soil subgrade which will provide bearing support for pavements or curbs, shall be compacted to a width of 6 inches beyond the back of curb and to a depth of 12 inches below the bottom of excavation to a density of not less than 100% of maximum dry density per ASTM D698. All fill below the subgrade shall be compacted to not less than 98% of maximum dry density, unless specified otherwise.

H. Subgrade under the driveways and walks shall be compacted to a depth of 6 inches below the subgrade surface to density of not less than 100% of the maximum dry density determined by ASTM D698.

I. Subgrade under structures shall be compacted to a depth of 12 inches below bottom of excavation surface to a density of not less than 100% of the maximum dry density determined by ASTM D698.

3.09 COMPACTION TESTS

A. Trenches and excavation around structures shall be backfilled and consolidated in layers, as specified, to the existing ground surface. Initial test series for each type of backfill material shall be continued until the method of consolidation employed has proven to attain the required compaction. Any change in the proven method of consolidations will require additional testing and field verification of compaction.

B. Subgrade below pavements, curbs, sidewalks, and structures shall be consolidated as specified. Compaction tests shall be performed to verify specified consolidation.

C. Subsequent tests or series of tests shall be in locations and at depths ordered by the Engineer.

3.10 RESERVED

3.11 RESERVED

3.12 RESERVED

PART 4 SPECIAL PROVISIONS

4.01 FIELD TESTING (MINIMUM REQUIREMENTS)

A. The laboratory shall perform the following field tests:

1. Trench Backfill - One test for every 200 cubic yards of backfill material.
2. Subgrade Compaction - One test for every 300 square yards of subgrade.
3. If directed by the Engineer, additional tests shall be performed for any of the above.

4.02 RESERVED

END OF SECTION

SECTION 02552
PRECAST CONCRETE MANHOLES

PART 1 GENERAL

1.01 SCOPE

A. This Section includes furnishing and installing precast concrete manholes, including drops and manhole stacks of types and at locations shown on the Drawings and scheduled.

B. This Section includes removing existing structures, additional excavation to widen and deepen trenches for manhole construction, furnishing and installing concrete of classes called for, portland cement mortar, reinforcing steel, precast concrete pipe integral base sections, bottom riser sections, transition sections, and riser sections, eccentric cones, flat slab tops and grade rings, flexible manhole connections, pipe for drop connections, manhole steps, manhole frames and covers, plugging lifting holes, pointing joints, joint wrap installing, forming channels through manhole bottoms, making watertight connections to new and existing sewers, and other work incidental to manhole construction and testing.

C. Additional product requirements are specified in Section 01350.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop Drawings for Review:

a. Manufacturer's Shop Drawings indicating physical dimensions, pipe openings, precast section arrangement, adjusting rings, castings, and joint details for each size and type of manhole component furnished for the project. Shop Drawing shall incorporate the planned elevations and details.

b. Manufacturer's Certification indicating that the manhole components and joints meet specifications for each production run for each size and type furnished.

2. Information for the Record:

a. The Engineer may request test results to verify Certification. Certification documents shall be according to the Source Quality Control of this Section.

PART 2 PRODUCTS

2.01 MATERIALS

A. Type of Manhole Sections:

1. Type I Manholes - Type I manholes shall mean 4-feet diameter manholes with precast integral base sections for sanitary sewers and either precast integral base sections or precast bottoms for storm sewers. Pipe connections to manholes shall be made with flexible water tight joints. Type I manholes are intended for installation of pipes 18-inch diameter and smaller unless noted otherwise.

2. Type II Manholes - Type II manholes shall mean manholes with 5-feet diameter precast integral base sections. Pipe connections to manholes shall be made with flexible water tight joints. Type II manholes are intended for installation of 21-inch through 30-inch diameter pipes unless noted otherwise.

3. Type S Manholes - S following manhole type shall mean the designated type manhole constructed with a precast flat slab top in lieu of a precast cone.

B. Precast concrete pipe manhole sections, integral base sections, transition sections, eccentric cones, flat slab tops, and adjusting rings shall conform to ASTM C 478. Reinforcing in transition sections shall be equal to that specified for wall sections of the larger diameter.

C. Joints shall be tongue and groove type with a gasketed seal type conforming to ASTM C443.

D. The standard length of riser sections shall be 48-inch. Lengths of 32-inch or 16-inch shall be used to meet required dimensions and as specified.

E. Openings for connecting pipes in riser sections, bottom riser sections, integral base sections, and for access in flat slabs, shall be pre-formed or cored by the manufacturer. All cored openings for sewer pipe connections shall have flexible joints.

F. Precast integral base sections shall be of monolithic construction. Base flat slab floors or integral floors shall have a minimum thickness of 6-inches for risers up to and including 48-inch in diameter, and 8-inches for larger diameters. A layer of reinforcement shall be placed above the midpoint and shall have a minimum area of 0.12 square inch/linear feet in both directions.

G. Manhole sections shall be constructed with no pipe connection within 6 inches of a joint in the structure.

H. Manhole sections shall be clearly marked and identified with the manhole number, section placement order, casting date, trademark, name of the manufacturer, and location of the production plant.

2.02 ACCESSORIES

A. Manhole Steps - Manhole steps shall be of polypropylene plastic reinforced with a 1/2-inch No. 60 grade reinforcing rod. Steps shall be M. A. Industries Model PS-1, or equal.

1. Specified manhole steps shall be factory installed to provide a continuous ladder of 16-inch Center-to-Center rung spacing. Steps shall be placed in the forms and cast in pipe wall or placed immediately after the pipe has been removed from casting and carefully mortared in place with non-shrinking mortar to ensure a watertight joint. Manhole step installation shall be in compliance with OSHA regulations. If the outer surface of the pipe wall is pierced, the patch shall be completely covered with a bituminous sealer.

B. Manhole frames and covers shall be as shown on the Drawings and in conformance with requirements of Section 05540.

1. Where pressure tight manhole frames and covers are called for, threaded inserts shall be cast in eccentric cones or flat slab tops and holes formed or cored in adjusting rings to match bolt size and spacing specified for manhole casting.

C. Mortar:

1. Mortar used for the structures herein specified shall conform to ASTM C270 Type S, containing no masonry cement. The mortar shall be composed of one part portland cement to two parts sand by volume.

2. Non-shrinking Mortar - Materials for non-shrinking mortar shall be Sauereisen F-100, Five-Star, or equal.

D. Cast-in-Place Concrete:

1. All cast-in-place concrete used for concrete bases and for forming channels in manhole bottoms shall be Class A as specified in Section 03305.

2. All concrete used for supporting precast concrete manhole bases shall be Class B as specified in Section 03305.

E. Flexible Joints - Joints for precast pipe openings shall be “A-LOK X-CEL” as manufactured by A-LOK Products, Inc., “Kor-n-seal” as manufactured by National Pollution Control Systems, Inc., or equal in accordance with ASTM C923.

F. Joint Wrap - Polyolefin backed exterior joint wrap used to cover the exterior side of joints shall be ConSeal CS212; Riser Wrap by Pipeline Seal & Insulator, Inc. or equal. Minimum width shall be 12 inches. Joint wrap shall include the use of brush or roller applied adhesive surface primer formulated for use with joint wrap. Seal shall meet the requirements of ASTM E1745, C-877, and ASTM C990.

PART 3 EXECUTION

3.01 COORDINATION

A. Location and type of manholes installed shall be as shown on the Drawings or directed.

B. Construction shall be in conformance with details shown on the Drawings and as specified.

C. Excavation for manhole construction shall be prepared as directed in applicable paragraphs of Section 02200.

3.02 INSTALLATION OF INTEGRAL BASE SECTIONS

A. The manhole base may be placed on 6 inches compacted granular bedding material.

3.03 RESERVED

3.04 RESERVED

3.05 RESERVED

3.06 INSTALLATION OF MANHOLE FRAMES

A. Manhole frames and covers shall be installed to grades shown on the Drawings or as directed.

B. Adjustment of manhole castings shall be made using specified precast grade rings and portland cement mortar joints or preferred bitumen seals.

C. Each manhole casting shall be anchored in place using four 5/8-inch stainless steel bolts with nuts as detailed on the Drawings or directed.

D. The maximum depth of adjustment below any manhole casting shall be 16 inches and the minimum depth of adjustment shall be 4 inches.

E. In concrete pavement, separate frame from pavement with 1/2-inch thick premolded mastic joint material extending from the base of the frame to the top of the frame.

F. Manhole castings located in pavement areas shall be installed with the top of the casting 1/4 inch below the finished grade of the adjacent pavement surface.

3.07 RESERVED

3.08 RESERVED

PART 4 SPECIAL PROVISIONS

None.

END OF SECTION

This page was intentionally left blank.

SECTION 02600
PAVEMENTS, CURBING AND WALKS

PART 1 GENERAL

1.01 SCOPE

A. This Section includes the construction of sidewalks, curbing pavements, and berms of various designated types as shown or scheduled on the Drawings, specified or directed.

B. This Section includes preparation of the base and subgrade construction of walks, curbs, pavements and base courses, adjustment of manhole castings, and valve boxes to conform to new pavement courses, and other work and materials incidental to the construction of pavements, curbing and walks.

C. Existing curbs and walks of stone or concrete shall be replaced using concrete.

D. This Section includes temporary and restoration of permanent pavement markings as they exist at the time of bidding unless otherwise shown on the Drawings, specified or directed.

1.02 OWNER'S STANDARDS AND SPECIFICATIONS

A. Sidewalks, curbs, driveways, parking areas, and street pavement and berms disturbed by construction shall be restored in accordance with the Owner's present standards and specifications.

1.03 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop Drawings for Review:

a. Manufacturers' and suppliers' material certificates.

b. A sieve analysis (ASTM C136) shall be furnished for each material source.

2. Information for the Record:

a. Delivery tickets from the asphalt and aggregate suppliers shall be given to the inspector at the unloading site. Tickets shall include (as a minimum) name of source, date, type of material, and weight.

b. Test results and certificates.

PART 2 PRODUCTS

2.01 AGGREGATE BASE AND SURFACE

A. The aggregate shall be crushed limestone meeting the requirements of MDOT Table 902-1, Class 21AA or 22A.

2.02 CHIP SEAL

A. Chip seal shall meet the requirements of MDOT Section 505.

B. Chip seal shall be placed in two applications with materials and rates of application in accordance with MDOT 505.03E. The initial application shall use Class 25A aggregate and the second application, Class 29A aggregate. Asphaltic material used with each application shall be HFRS-2 or CRS-2 meeting the requirements of MDOT Table 904-5 or 904-6.

2.03 ASPHALT EMULSIONS

A. The bond coat material shall be SS-1h or CSS-1h, and shall meet the requirements of MDOT Table 904-5 and 904-6.

B. The prime coat material, if required, shall be MS-Op and shall meet the requirements of MDOT Table 904-5.

2.04 BITUMINOUS AGGREGATE BASE AND ASPHALT CONCRETE

A. Bituminous Material - The asphalt cement shall be PG 58-28 performance grade (Design Temperature) and shall meet the requirements of MDOT Table 904-1.

B. Design Mix - Refer to MDOT Section 501.

1. The base course shall meet the requirements of RCKC 13A Mod.
2. The leveling course shall meet the requirements of RCKC 13A Mod.
3. The wearing course shall meet the requirements of RCKC 13A Mod.

2.05 CONCRETE (CAST-IN-PLACE)

A. All concrete used shall be Class “A” as specified in Section 03305.

B. Concrete reinforcement shall be in accordance with Section 03200.

C. Other materials required for placing concrete shall be as follows:

1. Joint Sealer:
    a. Hot Applied Sealer - MDOT Section 914.04A.
    b. Backer Rod - MDOT Section 914.04B.

2. Preformed Fiber Joint Filler - MDOT Section 914.03.

3. Curing Materials:

   a. Burlap Cloth - AASHTO M182, Class 2.

   b. Sheet Materials - ASTM C171.

   c. White Membrane Curing Compound - MDOT Section 903.06A.

   d. Transparent Membrane Curing Compound - MDOT Section 903.06B.

2.06 PAVEMENT MARKING

A. Contractor shall provide temporary and permanent pavement markings equal to those markings that are removed from existing paved surfaces prior to commencement of the Work unless scheduled on the drawings, specified, or as directed.

B. Pavement markings shall be in accordance with the requirements of MDOT Item 811.

C. Pavement markings shall match existing or adjoining pavement markings.

D. Pavement markings partially disturbed by construction shall be replaced entirely.

PART 3 EXECUTION

3.01 COORDINATION

A. All soil subgrade under pavements, driveways, curbs, curb and gutter, and walks shall be compacted in accordance with Section 02200.

B. All service boxes, manholes, inlets and other structures shall be adjusted or reconstructed to the required grades in both new and resurfacing pavement areas.

3.02 PAVEMENT INSTALLATION

A. All construction shall be in conformance with applicable portions of MDOT Specifications, except as otherwise specified or called for herein.

B. Unless otherwise directed by Engineer all aggregate bases which are to receive bituminous courses shall be primed as specified.

C. A tack coat at a rate as specified shall be applied to all existing pavements which are to be overlaid, and between subsequent courses when directed by the Engineer.

3.03 TRANSITION JOINTS FOR BITUMINOUS CONCRETE PAVEMENT OVERLAY

A. Types of Transition Joints:

1. Transition joints shall be either butt type or feathered type as directed by the Engineer.

2. Butt joints shall be used on State and Federal roads and main thoroughfares and feathered joints used elsewhere unless otherwise specified.

3. Butt Joints:

   a. When a butt joint is called for on the Drawings or specified, the old surface shall be cut back for at least 3 feet to a depth of at least 1 inch for the full width of the joint and pavement installed.

   b. A bituminous seal shall be placed on the finished surface at the junction of the new and old pavements.

4. Feathered Joint:

   a. Feathered joints shall be constructed by manually raking the paving material to a smooth transition from the full depth material to the existing pavement surface.

   b. Existing pavement surface shall be bond-coated to include the transition area.

   c. Feathering shall be done by a workman skilled in the operation and shall be approved by the Resident Project Representative.

3.04 CURBING

A. Curbing shall be constructed in conformance with applicable portions of MDOT Section 802 and the MDOT Standard Construction Drawings.

B. Place 1-inch dowelled expansion joints at inlets and at spring lines of street and driveway returns. If intersecting streets and driveways are more than 300-feet apart, place expansion joints at 300-feet intervals.

C. Contraction joints shall be placed at approximately 10-feet intervals.

3.05 RESERVED

3.06 CONCRETE DRIVEWAYS

A. Concrete driveways shall be constructed in conformance with applicable portions of MDOT Section 801.

B. Dowelled contraction joints shall be placed at a maximum spacing of 20-feet. Lesser spacing shall be used on irregular areas as directed by the Engineer.

C. Expansion joint filler 1/2-inch thick shall be installed at intervals of 24-feet maximum. One-inch expansion joint filler shall be installed between the driveway and any fixed structure.

3.07 BITUMINOUS AND AGGREGATE DRIVEWAYS

A. Bituminous driveways and parking lots shall be constructed as shown on the Drawings and indicated in Part 4 using materials specified for asphalt concrete pavements. Placement shall be in accordance with MDOT Section 501.

B. Aggregate driveways and parking lots shall be constructed as shown on the Drawings using base aggregate meeting the requirements of MDOT Section 302.

C. Replacement of bituminous or aggregate driveways and parking lots shall conform to Section 01565 and this Section but in no case, be inferior to that being replaced.

3.08 RESERVED

3.09 INSPECTION

A. Laboratory services shall be in accordance with the requirements of Section 01410 and shall include:

1. A compaction test on the subgrade, aggregate base, and each layer of asphalt shall be performed for every 300 square yards of material placed.

2. Asphalt Concrete:

a. Plant Certification - The laboratory shall certify or furnish recent certification (within one year) from January 1, 2025 that the plant meets State requirements.

b. Plant Inspection - For the first day of production and for every day when more than 100 cubic yards of material is being delivered to the project, the laboratory shall provide a representative at the plant who will inspect the plant, make mix design adjustments, check the temperature, and take the required samples.

c. Quality Control Testing - A sample of the mix shall be taken for each 200-cubic yard of bituminous material or fraction thereof delivered to the project. An extraction test AASHTO T164-70 and a mechanical analysis AASHTO T30-70 shall be performed on the mix samples.

d. Bituminous Material - Provide a satisfactory certificate furnished by the manufacturer stating that the materials conform to MDOT Specifications, Table 904-2, 904-3, or 904-4 as required.

e. Aggregate - A sieve analysis (ASTM C136) shall be performed on each aggregate to be used in the plant mix design.

f. Mix Designs - The supplier shall design the plant mixes in accordance with the Marshall Method of Mix Design (ASTM D1559) and shall make all mix design adjustments.

3. Cast-in-Place Concrete:

a. Concrete shall be tested in accordance with Section 03305, Cast-in-Place Concrete.

3.10 PROTECTION

A. No heavy construction vehicle shall operate on any pavement, curbing or walk after it has been installed.

B. Traffic shall be prohibited on newly installed asphalt pavement until it has cooled sufficiently to avoid marking.

C. Asphalt Pavements:

1. Bituminous mixtures shall be transported and placed in accordance with MDOT Section 501.03.

D. Concrete Pavements, Curbing and Walks:

1. Concrete shall be mixed, transported, placed, and finished only within the temperature limitations specified in MDOT Table 1001-1 and 602.03T.

2. No concrete shall be mixed, transported, placed, or finished when the temperature of the base, subgrade, or air is below 40 degrees F or whenever, in the opinion of the Engineer, the temperature may fall below 40 degrees F within 24 hours after the concrete has been placed.

3. The Contractor shall take such precautions as are necessary to protect the concrete from rain.

4. The Contractor shall protect the concrete from freezing for no less than seven days or until such time that specimen beams have attained a modulus of rupture of at least 600 psi.

PART 4 SPECIAL PROVISIONS

None.

END OF SECTION

SECTION 02800
SEEDING AND MULCHING

PART 1 GENERAL

1.01 SCOPE

A. This Section includes fine grading, placing sod, and seeding and mulching areas designated on the Drawings, specified, or ordered.

B. The Work consists of fine grading, furnishing, and placing topsoil; sod, seed, mulching material, and fertilizer; and, watering seeded or sodded areas until growth is established.

C. The Contractor shall restore all grass areas damaged by his operations.

D. Unless otherwise specified herein or directed, Work shall be in conformance with MDOT Section 816, Turf Establishment.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop Drawings for Review:

a. Manufacturer's Project Information for materials.

2. Information for the Record:

a. Submit to Resident Project Representative:

1) Invoices indicating the weight, brand, and composite analysis of fertilizer used on the project.

2) Bag tickets indicating weight and composition of all seed used on the project.

PART 2 PRODUCTS

2.01 RESERVED

2.02 SEED

A. Seed mixtures shall be in conformance with the requirements of MDOT Tables 816-1 and 917-1, Mixture TUF, unless otherwise specified in Part 4.

2.03 FERTILIZER

A. Commercial fertilizers shall be from a dealer or manufacturer whose brands and grades are registered or licensed by the State of Michigan, Department of Agriculture. The content of nutrients shall be 12-12-12, unless otherwise approved by the Engineer.

2.04 MULCHING MATERIAL

A. Mulching material shall be straw, wood fiber or compost reasonably free of weed seed, and other foreign materials, conforming to MDOT Section 917.14A.

2.05 MATTING MATERIAL

A. Matting material shall be in conformance with the requirements of MDOT Section 917.14B, unless otherwise specified in the Special Provisions.

2.06 TOPSOIL

A. Topsoil furnished by the Contractor shall be as specified in Section 02200.

PART 3 EXECUTION

3.01 FURNISHING AND PLACING TOPSOIL

A. Areas from which the top layer of soil has been removed or disturbed shall be recovered with a minimum of 4 inches of recompacted topsoil placed in conformance with Section 02200.

3.02 PREPARATION

A. The operating of finish grading and sowing shall not be performed when the ground is frozen or muddy.

B. Areas to be Seeded:

1. Unless otherwise shown on the Drawings or specified in Part 4, all areas of disturbed soil on the Site shall be seeded.
2. The area to be seeded shall be prepared in accordance with Section 02200.
3. Fertilizer shall be applied at a rate which will provide 240 pounds per acre of chemical fertilizer nutrients in equal proportions of Nitrogen, Phosphoric Acid, and Potash. Either dry or liquid fertilizer may be used and shall be distributed in an even pattern over the specified area; then it shall be thoroughly disked, harrowed, or raked into the soil to a depth of not less than 1 inch.

3.03 INSTALLATION

A. Seeding:

1. The seed shall be mixed thoroughly and sown evenly at a rate specified by MDOT. The seed mixture may be sown dry or hydraulically unless directed otherwise in Part 4 of this Section 02800.

2. The seed mixture shall be applied when the soil is in a workable condition and shall be raked into a depth of approximately 1/4 inch.

3. Seed shall be sown only between the dates of May 1 and October 15, unless otherwise permitted by the Engineer.

B. Mulching:

1. Within 24 hours after an area has been seeded, it shall be mulched in conformance with one of the following specified methods as designated in Part 4:

2. Mulch:

a. Mulching with hay or straw shall be in conformance with mulching requirements of MDOT Sections 816.03E, F, and G except that in front of residences the mulching material shall be kept in place by an approved non-tracking adhesive or other approved method in lieu of the specified asphalt emulsion.

b. Matting shall be used on all slopes greater than 10:1. Matting used for mulching shall be placed in conformance with MDOT Section 816.03G.

C. Seeded and sodded areas shall be watered and maintained as specified below until they are established.

1. The seed bed shall be thoroughly watered, as soon as the seed is covered.

2. Water shall be applied by a hydro-seeder or water tank under pressure with a nozzle producing a spray that will not dislodge the mulching material.

3. Water applications shall be made at least once a week, provided significant rainfall has not occurred within the weekly period.

4. The rate of application shall be 240 gallons per 1,000 square feet

5. Mulch and matting areas shall be maintained until all Work on the Contract has been completed and accepted.

6. The seeded area shall be mowed once at an approximate height of 6 inch as directed by the Engineer to control excess growth, including weeds.

7. Maintenance shall consist of the repair of areas damaged by erosion, wind, fire, or other causes. The soil in these damaged seeded areas shall be restored to the condition and grade existing prior to application of mulch or matting; and,

restored areas shall be relimed, refertilized, and reseeded. Where necessary, the mulch or matting shall be completely replaced.

PART 4 SPECIAL PROVISIONS

None.

END OF SECTION

SECTION 02810
TREES

PART 1 GENERAL

1.01 SCOPE

A. This Section includes protection, removal, disposal, and replacement of trees encountered in construction of the Project as specified herein and directed.

B. Trees in easements shall be included in this Section, except as otherwise stated in the Easement Agreement.

PART 2 PRODUCTS

2.01 MATERIALS

A. Trees shall be replaced at the direction of the Owner and the Engineer. Quantities, sizes, species shall be as indicated in Section 01021.

B. The Contractor may remove, preserve, and replant existing trees in lieu of installing replacement trees.

PART 3 EXECUTION

3.01 COORDINATION

A. The Engineer/Owner will designate, mark, and record the location, size, species, and variety of trees that must be protected or removed and replaced, within the Work limits.

B. The Contractor shall retain a Horticulturist to accompany the Engineer/Owner as required to identify the species and variety of trees.

C. Where authorized by the Owner, the Contractor will not be required to replace designated trees removed for construction of the Project.

D. Trees designated for removal and replacement shall be removed, preserved, and replanted or replaced by the Contractor after construction has been completed.

E. Any tree not included in the above, damaged by the Contractor's operations to the extent that it must be removed, shall be removed and replaced at the Contractor's expense.

3.02 INSTALLATION

A. Planting shall be in accordance with the applicable portions of MDOT Section 815 and performed under the supervision of a Licensed Arborist.

3.03 PROTECTION

A. The cutting of roots or branches shall be held to a minimum.

B. Cables shall not be wrapped around trees, nor shall trees be used for deadman purposes.

C. If necessary construction work will cause excessive damage to trees involved, the Contractor shall contact the Engineer before proceeding with the Work.

D. Should any of the newly planted trees die after final acceptance of the Work and during the one-year maintenance bond period, such trees shall be replaced in kind and size at the Contractor's expense.

PART 4 SPECIAL PROVISIONS

Not used.

END OF SECTION

SECTION 03305
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SCOPE

A. This Section includes cast-in-place concrete along with formwork, waterstops, joint systems, stair nosings, reinforcing, mix design, placement procedures, and finishes as indicated on the Drawings and as specified herein.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop Drawings for Review:
    a. Concrete mix designs including substantiating data and test records.
    b. Product literature for admixtures, curing compounds, and miscellaneous materials.
    c. Locations of construction and control joints not shown on Drawings, and proposed changes in locations.
    d. Material certifications.
    e. Aggregate gradation and percentages of deleterious substances.
    f. Batch plant certification.
    g. Placing drawings shall indicate:
        1) Construction joints, splice locations, and splice lengths.
        2) Bending schedules.
        3) Accessories.
2. Information for the Record:
    a. Manufacturer's application instructions for miscellaneous materials.
    b. Quality control test reports.
    c. Slab profile report.

B. Copy of concrete delivery ticket shall be presented to Resident Project Representative for each batch. Delivery ticket shall indicate:

1. Name of ready-mixed company and plant designation.
2. Truck number.

3. Concrete class.
4. Quantity of concrete.
5. Date.
6. Time when batch was loaded.
7. Type and name of admixtures.
8. Actual batch weights of cement, fly ash, aggregates, and water.
9. Location of pour and time of unloading shall be added to the ticket at Site.

1.03 QUALITY ASSURANCE

A. Concrete work shall comply with provisions of the current editions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified.

1. ACI American Concrete Institute.
2. CRSI “Manual of Standard Practice”.
3. AWS “Code for Welding in Building Construction”.

B. Concrete Manufacturer Qualifications - Manufacturer of ready-mixed concrete products complying with ASTM C94 requirements for production facilities and equipment.

C. Concrete Testing Service - A qualified independent testing agency shall perform material evaluation tests and shall design concrete mixes.

D. Maintain adequate supervision and control of dewatering operation to ensure that stability of excavated and constructed slopes are not adversely affected by water, erosion is controlled, and flooding of excavation or damage to structures does not occur.

E. Batch Plant:

1. Batch Plant shall be central batch plant with automatic or semi-automatic control. Concrete may be mixed using either central-mixed, shrink-mixed, or truck-mixed methods. If concrete is shrink-mixed or truck-mixed, the truck and concrete producer shall conform to ASTM C94.
2. Batch plant shall be certified by the Department of Transportation, National Ready Mixed Concrete Association (NRMCA) or an independent certification using NRMCA “Check list for Certification of Ready Mixed Concrete Production Facilities” executed and certified by independent Professional Engineer registered in state of Site. Evidence of current certification shall be submitted.

F. Pre-Installation Conferences:

1. Before beginning concrete work, Contractor shall hold a meeting to review detailed requirements for preparing concrete mix designs and to determine proper procedures for concrete construction.

2. A representative of Contractor, testing laboratory, concrete producer, and Engineer shall be in attendance.

1.04 DELIVERY AND HANDLING

A. Concrete shall be delivered in accordance with ASTM C94, except concrete shall be completely discharged within one hour after introduction of mixing water to cement.

B. Concrete shall be delivered in agitating trucks or in mixing trucks operating at agitating speed.

PART 2 PRODUCTS

2.01 MATERIALS - Materials used in concrete construction shall meet all the requirements of applicable ASTM and other industry standards.

A. Portland cement - ASTM C150, Type I or II unless indicated otherwise.

B. Air-entraining Agent - ASTM C260, chloride ion free.

C. Chemical Admixtures (Water Reducing Agents, Superplasticizers, Accelerator) - ASTM C494, chloride ion free.

D. Pozzolan (Fly ASN) (Fly Ash) (GGBF Slag) - ASTM C618, Class F. ASTM C989 grade 100 or low and shall contain less than 12% alumina (C34).

E. Aggregates - ASTM C33.

F. Reinforcing Steel - ASTM A615, Grade 60, deformed.

G. Welded Wire Fabric; Plain - ASTM A185, (undeformed wires) with weld intersections not exceeding 12 inches.

H. Water - ASTM C94, clean and potable.

I. Membrane Curing Compound - ASTM C309, minimum 30% solids content, non-yellowing, moisture loss not to exceed .039 grams per square cm in 72 hours when applied at a coverage rate of 250 square feet per gallon, VOC compliant, water-based acrylic polymer resin. “Safe Cure & Seal – 30% by Dayton Superior or equal.

J. Sheet Curing Compound - ASTM C171.

K. Formwork - ACI 301 and ACI 347R.

L. Form Coating - Non-staining.

M. Preformed Expansion Joint Filler:

1. Exterior Walks and Pavements - “Fibre Expansion Joint” by W. R. Meadows or equal; asphalt impregnated cellular fibers securely bonded together in conformance with ASTM D1751.

2. Other Location - “Sealtight Self-Expanding Cork” by W. R. Meadows or equal: self-expanding cork type expansion joint filler in conformance to ASTM D1752, Type III.

3. Isolation Joints - “Ceramar Flexible Foam” by W. R. Meadows or equal; flexible foam expansion joint filler.

N. Joint Sealer, Vertical - ASTM C920, Type M, Cass 25, Grade NS, Dymeric 240, by Tremco or Sikaflex-2c NS by Sika Corp. or equal.

O. Joint Sealer, Horizontal - ASTM C920: THC-900 by Tremco or “Sikaflex - 2C SL” by Sika Corp. or equal.

P. Vapor Barrier - ASTM D2103 - 6 mil polyethylene.

Q. Waterstop:

1. Type A waterstop shall be 9 inches wide by 3/8-inch nominal thickness ribbed waterstop with a 1/2 inch inside diameter center bulb, Greenstreak, Inc. No. 735, or equal. Type A water stop with split flange shall be Greenstreak No. 727, or equal.

2. Type B waterstop shall be 6 inches wide by 3/8-inch nominal thickness ribbed waterstop without center bulb, Greenstreak No. 679, or equal. Type B water stop with split flange shall be Greenstreak No. 724, or equal.

3. Type C Waterstop-bentonite/butyl rubber compound coiled strips with minimum bentonite content of 75%. For slabs and walls greater than 8 inches thick, waterstop strip shall be 1-1/4 inch by 1/2-inch trapezoidal shape with reinforcing scrim equal to American Colloid Company “Volclay” RX 101 T. For slabs or walls 8 inches thick or less but at least 5 inches thick, waterstop strip shall be 3/4 inch by 3/8-inch half circle shape equal to American Colloid Company “Volclay” RX 102.

R. Miscellaneous Metals - ASTM A36.

S. Anchor Bolts - ASTM A307.

T. Expansion Bolts - Hilti Kwik Bolt 3 or equal.

U. Anchor Bolt Sleeves - Sinco Products, Inc. or equal; high density polyethylene

V. Stair Nosing - Alumogrit Type 116 by Wooster Products, Inc., or equal; abrasive cast aluminum with concealed integral steel anchors.

W. Bonding Agent for New to Existing Concrete - “Sika Armatec 110 Epocem” by Sika or equal. (Epoxy modified cementitious product.)

X. Dry Shake, Non-Metallic - “Surflex” by Euclid or “MasterTop 100” by Master Builders, or equal.

Y. Galvanizing - ASTM A123 or A153.

Z. Epoxy Adhesive for Embedding Dowels into Existing Structures – 100% solids, 100% reactive epoxy conforming to ASTM C881, Type IV, Grade 3, Class B and C. The minimum bond strength per ASTM C882 shall be 1800 psi at 7 days. The adhesive shall be formulated to withstand the maximum allowable published loads permanently without creep or failure. The adhesive shall be Hilti “HIT-RE 500 V3” or equal. Power/Rawl “Power-Fast” epoxy with “Fast Set” formulation shall not be used.

AA. Epoxy Coating for Protection of Exposed Reinforcing Steel Bars at Concrete Saw Cut and Removal Locations - MasterEmaco P124 by Master Builders, or equal. “Sika Armatec 110 Epocem” by Sika Corp. or equal.

BB. Joint Dowel Bars - Plain steel bars, ASTM A615, Grade 60. Cut bars true to length with ends square and free of burrs.

CC. Include spacers, chairs, bolsters, ties, and other devices that conform to CRSI specifications necessary for properly placing, supporting and fastening reinforcement in place. Metal accessories shall be plastic coated, galvanized or stainless steel where legs will be exposed in finished concrete surfaces. For slabs-on-grade, use supports with sand plates or horizontal runners for any areas where the base material will not support chair legs. For exposed-to-view concrete surfaces where legs of supports are in contact with forms, provide supports with legs that are protected by plastic (CRSI, Class 1) or stainless steel (CRSI, Class 2).

DD. Use one brand of cement throughout the entire project, unless otherwise approved by the Engineer.

2.02 CONCRETE MIX DESIGN

A. Concrete used for pavement, curbing, driveways, and sidewalks shall be as specified in Section 02600.

B. Mixture proportioning for concrete structures shall be in accordance with ACI 301, 318, and 211.1 but subject to the following requirements.

C. Two normal weight concrete mixes are generally required; Class A and Class B. Concrete mixes shall be as follows. Batch in accordance with ASTM C94 and the following:

	Class A	Class B
Type of Portland Cement:	I	I
28 Day Compressive Strength (psi):	4500	3000
Slump (inches) +/- 1 inch:	2-4	2-4
Air Content (%) +/- 1%:	6.0	(Not req’d)
Minimum Aggregate Size (inches):	1 (size #57)	1 (size #57)
Water Reducing Agent:	Yes	(Not req’d)

	Class A	Class B
Minimum Cementitious Content (lbs) (Cement and Fly Ash):	550	480
Minimum Portland Cement Content	80% by weight of total Cementitious material.	
Maximum Fly Ash Content:	20% by weight of total cementitious material	
Maximum GGBF Slag Content	20% by weight of local cementitious material.	
Maximum Water/Cementitious Ratio:	0.44	0.66

D. Contractor shall design and be responsible for the performance of all concrete mixes of specified quality, consistency, and workability to permit concrete to be worked readily into forms and around reinforcement without segregation or excessive bleeding. Hardened concrete shall develop all characteristics required by contract documents.

E. Concrete mixes shall be proportioned to maximize durability and water tightness and to minimize shrinkage. To this end, total water content shall be kept to the lowest possible amount consistent with placing and consolidation methods. Water reducing and high range water reducing admixtures shall be used as required to maintain workability. Specified water/cementitious ratio shall not be exceeded.

F. Concrete proportions shall be established on the basis of previous field experience, or laboratory trial batches in accordance with ACI 301, ACI 211.1 and ACI 318. Proposed mix design shall be accompanied by complete standard deviation analysis or trial mixture test data.

G. Concrete proportions shall be subject to Engineer's approval. Substantiating data and test records shall be submitted.

PART 3 EXECUTION

3.01 COORDINATION

A. Reinforcement, sleeves, inserts, anchors, waterstops, and other embedded items shall be accurately placed, supported, and tied prior to concrete placement. Other trades and contractors required to furnish embedded items shall be given ample notice of concrete placement. Reinforcement and embedded items shall be subject to review of Resident Project Representative prior to placing concrete.

B. Contractor shall notify Resident Project Representative a minimum of 48 hours before placing concrete, excluding nonworking days.

C. Concrete shall be placed only between hours of 8:00 a.m. and 6:00 p.m., unless otherwise permitted. Concreting shall not be placed after 12:00 noon on the last working day of the week.

3.02 PREPARATION

A. Unless adequate protection is provided, concrete shall not be placed during rain, sleet, or snow, or when inclement weather is imminent.

B. Cold Weather - When the average temperature of surrounding air is expected to be below 40 degrees F during placing or within 24 hours thereafter, cold weather concreting in accordance with ACI 306R "Standard Specification for Cold Weather Concreting" shall apply.

C. Concrete shall be protected from extremes in temperature as specified. During periods not defined as cold weather, but when freezing outdoor temperatures are foreseen or occur, concrete surfaces shall be protected against freezing for the first 24 hours, minimum, after placement.

D. Hot Weather- When the ambient temperature is 90 degrees F. or above, or when conditions of concrete temperature, air temperature, wind velocity, and relative humidity combine to cause flash set, excessively low slump, cold joints, plastic shrinkage cracking, or otherwise impair the quality of concrete, hot weather concreting procedures in accordance with "Hot Weather Concreting - ACI 305R," shall apply.

E. When the evaporation rates of bleed water exceed 0.1 pounds per square feet per hour, steps shall be taken to prevent plastic shrinkage cracking. Evaporation rate shall be determined by method shown in "Hot Weather Concreting - ACI 305R."

3.03 INSPECTION, STARTUP, AND TESTING

A. Notify Engineer 48 hours prior to placement of concrete.

B. Engineer's approval is required for subgrade, formwork, and reinforcing prior to starting each placement.

C. Submit proposed concrete mix design to Engineer for review prior to commencement of any Work. Do not begin concrete production until the proposed mix design has been approved by the Engineer.

D. The following tests shall be performed by an independent testing laboratory acceptable to the Engineer during progress of the Work:

1. Compression Tests Cylinders - Strength test shall consist of three cylinders molded and cured. Cast three cylinders for each 50 cubic yards, or fraction thereof, for each class of concrete placed on any one day, but at least three for each day. Test one cylinder at seven days and two at 28 days in accordance with ASTM C39.

2. Slump Tests - ASTM C143. Slump shall be measured for first batch of each concrete class delivered in morning and afternoon, for each strength test, and whenever consistency of concrete appears to vary.

3. Air Entrainment - ASTM C173 or C231. Perform one test for every second ready-mix truck load.

4. Temperature ASTM C1064. Perform with each slump test.

E. If the measured slump or air content fall outside the specified limits, make an additional test immediately and on each successive batch until the specified requirements are met by two consecutive batches.

F. Materials and installed Work may require testing and retesting at any time during progress of Work. Tests, including retesting of rejected materials for installed work shall be done at Contractor's expense.

G. Test Reports:

1. The testing laboratory shall submit test reports directly to the Contractor, the concrete supplier, and Engineer. Reports shall be identified by the project name and number, and the portion of the structure represented. Reports shall include the dates of casting and testing, air and concrete temperatures, specified strength and mix design, actual strength and mix design, slump, air content, and the name of individual making the test.

2. The testing laboratory shall notify the Engineer immediately by telephone when a low strength break occurs or specifications are not met.

3.04 FORMWORK

A. Formwork shall conform to ACI 347R.

B. Formwork shall be designed to safely support vertical and lateral loads, until such loads can be safely supported by concrete structure. Loads shall be carried to ground by formwork and in-place construction of adequate strength.

C. Formwork shall be designed for dead and live loads, weight of concrete, wind, construction loads including impact, and other loads which act or might act on formwork.

D. Formwork shall be designed for pressure of concrete giving due consideration to rate of concrete placement, methods of placement, method of consolidation, concrete mix design, temperature, and other factors pertinent to formwork design.

E. Forms shall have sufficient strength and rigidity to maintain specified tolerances.

F. Formwork shall be securely braced and anchored against deflection and displacement.

G. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood insets shall be used for forming keyways, reglets, recesses, and the like for easy removal.

H. Form ties shall be adjustable in length to permit tightening of the forms and so made that no metal remains nearer than 1-1/2 inch to the concrete surface after the ends are removed. Spreader devices shall leave holes no greater than 7/8 inch in diameter.

Washers or buttons leaving shallow depressions in the surface will not be permitted. Twist type ties may be used only for unexposed concrete.

I. Provide holes in the form for insertion of vibrators to properly consolidate concrete.

J. Provide temporary openings for clean-outs and inspections where interior area of formwork is inaccessible before and during concrete placement. Securely brace temporary openings and set tightly to forms to prevent losing concrete mortar. Locate temporary openings in forms at inconspicuous locations.

K. Chamfer exposed corners and edges using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

L. The maximum allowable tolerance in either the horizontal or vertical planes shall be 1/4 inch in 10 feet.

M. Provisions for Other Trades - Provide openings in concrete formwork to accommodate Work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.

N. Oil temporary forms with non-staining form oil.

O. Cleaning and Tightening - Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before placing concrete. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

3.05 DOWELING TO EXISTING STRUCTURE

A. Dowels shall be embedded into existing concrete where shown on Drawings. Unsound concrete shall be reported to Engineer.

B. Adhesive dowels shall be placed in holes larger than the reinforcement diameter using a rotary percussion hammer and carbide bit. Hole diameters shall be as recommended by manufacturer for each specific reinforcing diameter.

1. Unless indicated otherwise, adhesive dowels shall be embedded as follows:

Stud Diameter	Minimum Embedment
#3	3-1/4 inches
#4	4-3/8 inches
#5	5-3/4 inches
#6	6 inches
#7	7-1/4 inches
#8	8-7/8 inches

C. Hole shall be cleaned of dust and residue by blowing the hole with dry and oil-free compressed air. Air nozzle shall be inserted to bottom of hole. The holes should also be brushed using a nylon brush to remove dust and other debris which may have been pressed into the walls of the hole.

D. Standing water and frost shall be removed immediately prior to injecting adhesive.

E. Adhesive shall be injected from bulk-loading caulking gun, disposable caulking tubes, or pneumatic dispenser. Adhesive shall be injected using extension on nozzle to reach bottom of hole. Adhesive shall be injected to pre-determined depth which will cause hole to be completely filled after bar is inserted.

F. Bar shall be inserted and slightly rotated to ensure adhesive completely surrounds bar.

G. Adhesive displaced from hole shall be removed immediately.

H. The manufacturer's installation guidelines for the specific adhesive chosen shall be strictly followed.

3.06 REINFORCEMENT

A. Place reinforcing to ACI recommended tolerances.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as approved by the Engineer.

D. Unless shown otherwise in drawings, place reinforcement to maintain minimum coverages conforming to ACI standard practice for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

E. Welding of reinforcement shall conform to AWS D1.4.

F. Unless otherwise specified on Drawings, reinforcing steel splices shall be lapped conforming to ACI 318, Class B splices.

G. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh plus 2 inches and lace splices with 16-gauge wire. Do not make end laps between supporting beams. Offset end laps in adjacent widths to prevent continuous laps in either direction.

3.07 INSERTS

A. Metal inserts such as anchor bolts, sleeves, embedded metals, etc. shall be free of scale, loose rust, oil, grease and other coatings. Remove protective film from cast iron with flame.

B. Ensure that items are accurately positioned and rigidly supported against displacement before placing concrete.

C. The location of anchor and foundation bolts must not vary from the dimensions shown on the Contract Drawings by more than the following:

1. 1/8-inch center to center of any two bolts within an anchor bolt group, where such group is defined as the set of anchor bolts which receives a single fabricated steel shipping piece.

2. 1/4-inch center to center of adjacent bolt groups.

D. Split rib types of waterstops are acceptable at construction joints and isolation (expansion) joints.

E. Secure waterstops in place by wire ties to hog rings. Hog rings to be installed between last rib and edge and spaced at 12 inches on center.

F. Field weld joints in waterstops using indirect heating element.

3.08 JOINTS

A. Joints not shown on Drawings shall be made at locations that will least impair strength of structure, and shall be approved by the Engineer prior to construction.

B. Construction Joints:

1. Keyways at least 1-1/2-inch-deep by width, which is equal to 1/3-member thickness, shall be provided in all construction joints in walls, supported slabs, and between walls and foundation systems.

2. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints. Do not continue reinforcement through sides of strip placements.

3. Concrete slabs on grade shall be poured in strip pattern shown on the Drawings.

4. Roughen surfaces of set concrete at all joints. Clean surfaces of laitance, coatings, loose particles, and foreign matter. Roughen surfaces in a manner to expose bonded aggregate uniformly. Apply approved bonding adhesive or cement grout. Bonding cement grout shall be evenly spread and shall consist of 1-part cement and two parts fine aggregate. Fresh concrete shall be placed before grout or bonding adhesive has obtained initial set. Grout shall be approximately 2-inch-thick in walls.

C. Unless otherwise shown, provide isolation joints in slabs on grade at all points of contact between slabs on ground and vertical surfaces, such as column pedestals, foundation walls, grade beams, equipment bases and elsewhere as indicated.

D. Expansion Joints:

1. Provide preformed expansion joints as shown on Drawings or otherwise required.

2. Expansion joint material shall be 1/2 inch in thickness, unless otherwise indicated.

3. Concrete edges at expansion joints subject to vehicular traffic shall be tooled to a 1/8-inch radius.

4. When sealed expansion joints are called for on the Drawings, pourable approved joint sealants shall be placed along top edges of expansion joints per manufacturer's instructions.

E. Control Joints for Slabs:

1. Control joints shall be located and constructed as shown on the Drawings.

2. Within 24 hours of finishing concrete, cut joints to a depth of 1/4 slab thickness when it is firm enough to resist raveling, tearing, or dislodging of aggregates.

F. Clean joints thoroughly with compressed air, wire brushing, or sandblasting.

G. Fill joints with specified joint filler.

3.09 CONCRETE SCHEDULES

A. Unless indicated otherwise, concrete shall be furnished as follows:

Class A: For all structures not defined under Class B concrete.

Class B: For pipe saddle supports, Pipe pier supports, buried electrical duck banks, equipment pads, housekeeping pads and mudmats, unless noted otherwise. The above items shall not be exposed to weather and shall not be submerged in liquids; otherwise, they shall be of Class A concrete as specified above.

3.10 PLACING CONCRETE

A. General - Comply with ACI 304, "Guide for Measuring, Mixing, Transporting, and Placing Concrete," and as specified.

B. Do not place concrete on frozen ground, mud, or debris. Dampen subgrade prior to placing concrete slabs on grade where vapor barrier is not required.

C. Inspection - Before placing concrete, inspect, and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Where necessary, notify other trades to permit installation of their work.

D. Convey concrete from the mixer to the place of final deposit by methods which will prevent the loss or separation of the materials:

1. When concrete placing is interrupted for more than 1/2 hour, place a construction joint.

E. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened sufficiently to cause seams or planes of

weakness. If a section cannot be placed continuously, provide construction joints as specified. Avoid unplanned cold joints. Alternate equipment shall be immediately available for use in the event that primary placing equipment or system breaks down.

F. Use internal vibration to consolidate. Size at least one vibrator to work around closely spaced reinforcing. Provide a standby vibrator whenever working less than three vibrators in the pour. All equipment and procedures used to consolidate concrete shall comply with ACI 309R.

G. Concrete shall be thoroughly consolidated by vibrating, spading, rodding, or forking so that concrete is thoroughly worked around reinforcement and embedded items, and into corners, angles of forms, eliminating air and stone pockets.

H. Hot Weather Concreting – Follow recommendations of ACI 305R for preparation, placing, protection and curing during hot weather.

I. Cold Weather Concreting – Follow recommendations of ACI 306R for preparation, placing, protection and curing during cold weather.

J. Contractor shall keep good thermometer at Site for monitoring air or concrete surface temperature.

K. Where saw cutting and removal of existing concrete walls, slabs, etc. exposes the ends of reinforcing steel bars, the Contractor shall coat the exposed concrete surface with the specified epoxy coating.

1. Prior to application of the epoxy coating, the concrete surface to be coated shall be roughened and cleaned of all loose materials and dust.

2. Epoxy coating shall be water based rebar coating agent, moisture insensitive, 3-component, epoxy-modified cementitious product.

3. Application methods and thickness of coating shall be as recommended by the manufacturer.

L. Apply the specified bonding agent per the manufacturer's instructions at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

1. Prior to application of the bonding agent, the existing concrete surfaces to be coated shall be roughened and cleaned of all loose materials and dust, thus exposing the aggregate to provide a mechanical bond in addition to the chemical bond provided by the bonding agent.

2. Screed paved surfaces with a straightedge and strike off. Use bull floats or darbies to form a smooth surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces prior to beginning finishing operations.

3.11 DEFECTIVE CONCRETE

A. Defective concrete is defined as concrete in place which does not conform to specified design strength, required percent air, shapes, alignments and elevations, as shown on the Drawings and/or which presents faulty surface areas. Evaluation and acceptance of concrete shall conform to ACI 318, ACI 301, and ACI 350 as applicable.

B. All defective concrete shall be removed and replaced in a manner meeting with the Engineer's approval, or should surface imperfections only occur, may be patched at the discretion of, and in a manner satisfactory to the Engineer; however, permission to patch the Work shall not be considered as a waiver of the Engineer's right to require complete removal and replacement of such defective Work should the patching fail to satisfactorily restore the required quality and appearance of the Work. All such Work shall be performed at the Contractor's expense, without extension of time.

C. If for any reason, in the opinion of the Engineer, the testing of any section of the completed structure is necessary, a superimposed load shall be applied by the Contractor and the test conducted in accordance with the current Building Code at the Contractor's expense irrespective of the results of the tests. In cases where failure is declared, the Engineer shall have the authority to order the defective construction removed. All expense of removing such defective construction and substituting new construction, including expense of removing and replacing the Work of others, or protecting and repairing the Work of others, shall be borne by the Contractor.

3.12 CURING

A. General - Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather protect concrete from rapid moisture loss before and during finishing operations.

B. Begin curing after finishing concrete but not before free water has disappeared from concrete surface in accordance with ACI 308 "Standard Practice for Curing Concrete" subject to the requirements specified herein.

C. Cure concrete at least five days at concrete temperatures above 70 degrees F or at least seven days at concrete temperatures between 50 degrees F and 70 degrees F. Maintain concrete temperature above 50 degrees F during the curing period. Tanks and other liquid retaining structures shall be cured for a minimum of 10 days.

D. For exposed surfaces, utilize one of the following methods:

1. Membrane Curing Compound - Apply in two coats at right angles to each other upon completion of the Work - each one in accordance with the manufacturer's instructions. Compounds must not be used on surfaces when surface treatments, such as tile, additional concrete, paint, liquid hardeners, and adhesive coatings are specified unless the compound is known not to interfere with adhesion.

2. Sheet Curing Materials - Place materials upon completion of the finishing work. Lap edges 6 inches and seal to create a moisture barrier that must remain intact for the duration of the curing period.

3. Sprinkling, Soaking, or Ponding - Maintain surfaces continuously wet for the duration of the curing period as described above.

E. If formed surface is exposed during the curing period, treat the surface as an exposed surface for the remaining duration of the curing period.

3.13 FINISHING SURFACES

A. Formed Surfaces - Finishing of formed surfaces shall be in accordance with the requirements of Section 5, ACI 301 subject to the following provisions specified herein:

1. Do not remove forms and shoring until the concrete has cured sufficiently to carry its own weight and remain in place without deformation. Remove forms with care to prevent spalling. Reshore concrete carrying superimposed load until the concrete has attained design strength.

2. Inspect honeycombed areas. Replace areas as directed by the Engineer.

3. On exposed vertical unpainted surfaces, building interior, and to 6 inches below grade on building exterior, remove fins and projections, fill holes, and produce smooth-rubbed finish per ACI 301 by wetting and rubbing surfaces with carborundum brick or other abrasive until uniform color and texture are produced.

4. Horizontal surfaces, such as at tops of walls, pedestals, horizontal offsets and similar unformed surfaces occurring adjacent to formed surfaces, shall be struck off smooth and finished with a texture matching the adjacent formed surfaces.

B. Slabs and Horizontal Surfaces - Finishing of unformed surfaces shall be done in accordance with the requirements of Section 5 of ACI 301 and Chapter 8 of ACI 302:

1. All slabs, whether receiving additional finishes or not, shall receive a float finish when concrete has stiffened sufficiently to permit the operation of a power drive float and all surface water has disappeared. Check and level slab surface to obtain a Class A finishing tolerance per ACI 117.

2. Interior slabs not receiving tile shall be given a hard trowel finish as follows:

a. Follow initial finishing with a steel trowel worked flat to produce a fine, non-slip, sandy texture.

b. Follow the first steel troweling with a second steel troweling to produce a dense, smooth surface after the surface has become hard enough to give a ringing sound from the trowel.

c. Retool joints and edges as required.

3. Exterior slabs and concrete stair treads shall be given a non-slip broom finish with scored texture perpendicular to main traffic route. Retool joints and edges.

C. Roadway Repairs and Walkways:

1. Float Finish - Begin floating when bleed water sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Finish surfaces to true planes within a tolerance of 1/4 inch in 10 feet as determined by a 10-foot-long straightedge placed anywhere on the surface in any direction. Cut down high spots and fill low spots. Refloat surface immediately to a uniform granular texture.

2. Final Tooling - Tool edges of paving and joints formed in fresh concrete with a jointing tool to a radius of 1/4-inch Repeat tooling of edges and joints after applying surface finishes. Eliminate tool marks on concrete surfaces.

D. Tanks and Other Liquid Retaining Structures: Finishing for exposed surface shall be in accordance with the requirements of ACI 350, ACI 301 and ACI 302 subject to the following requirements:

1. Slabs - Floated finish.

2. Interior Formed Surfaces - Grout-cleaned finish.

3. Exterior Formed Surfaces - Grout-cleaned finish to 6 inches below grade.

4. Other Formed Surfaces - As-cast finish.

3.14 REMOVING FORMS

A. General - Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the Work, may be removed after curing at not less than 50 degrees F for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form-removal operations, and provided curing and protection operations are maintained.

B. Formwork supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements, may not be removed in less than 14 days or until concrete has attained at least 80% of design minimum compressive strength at 28 days. Determine potential compressive strength of in-place concrete by testing field-cured specimen's representative of concrete location or members. Construction loads shall not exceed 80% of design live load until 28 days after concrete placement.

C. Form-facing material may be removed four days after placement only if shores and other vertical supports have been arranged to permit removal of form-facing material without loosening or disturbing shores and supports.

3.15 REUSING FORMS

A. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.

B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces except as acceptable to the Engineer.

3.16 CONCRETE REPAIRS AND REPLACEMENT

A. Remove and replace, at Contractor's expense, any concrete that was part of the Work and that is broken, damaged, or defective, or does not meet the requirements of this Section.

B. Protect concrete from damage. Exclude traffic from slabs-on-grade and roadway/walkway paving for at least 14 days after placement. When construction traffic is permitted, maintain slabs and paving as clean as possible by removing surface stains and spillage of materials as they occur.

C. Patching Defective Areas - Repair and patch defective areas with cement mortar immediately after removing forms, when acceptable to the Engineer.

D. Mix dry-pack mortar, consisting of one-part portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing.

1. Cut out honeycombs, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts down to solid concrete but in no case to a depth less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with bonding agent. Place patching mortar before bonding agent has dried.

2. For surfaces exposed to view, blend white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Provide test areas at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

E. Repaired Formed Surfaces - Remove and replace concrete having defective surfaces if defects cannot be repaired to the satisfaction of the Engineer. Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes and fill with dry-pack mortar or precast cement cone plugs secured in place with bonding agent.

1. Repair concealed formed surfaces containing defects that affect the concrete's durability. If defects cannot be repaired, remove and replace the concrete.

F. Repairing Unformed Surfaces - The Contractor shall test unformed surfaces such as monolithic slabs, for smoothness and verify surface tolerances specified for each surface and finish. Correct low and high areas as specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having the required slope.

1. Repair finished unformed surfaces containing defects that affect the concrete's durability. Surface defects include crazing and cracks in excess of 0.01-inch-wide or that penetrate to the reinforcement or completely through nonreinforced sections regardless of width, spalling, popouts, honeycombs, rock pockets, and other objectionable conditions.

2. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days.

3. Correct low areas in unformed surfaces during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.

4. Repair defective areas, except random cracks and single holes not exceeding 1 inch in diameter by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose reinforcing steel with at least 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

G. Repair isolated random cracks and single holes 1 inch or less in diameter by dry-pack method. Groove top of cracks and cut out holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Place dry-pack before bonding agent has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

3.17 RESERVED

3.18 RESERVED

PART 4 SPECIAL PROVISIONS

None.

END OF SECTION

SECTION 05540
IRON CASTINGS

PART 1 GENERAL

1.01 SCOPE

A. This Section includes manhole covers and frames, and other iron castings shown on Drawings.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop Drawings for Review:

a. Product literature that shall be included: General Specifications, Surface Coating, Anchor Bolts, Machine Bearing Surface.

b. Independent Shop Drawings shall be submitted for the frame and the cover.

c. A submittal of a casting schedule shall be included that clearly notates either the structure number or in what circumstances the casting is intended to be installed, i.e., roadway.

d. All dimensions for both the frame and the cover/grate shall be included.

2. Information for the Record:

a. Material certification.

b. Proof-load test data.

c. Manufacturer's installation instructions.

d. Manufacturing Capabilities and Quality Control Measures.

1.03 PRODUCT HANDLING

A. Castings shall be delivered in sufficient time to permit proper placement in pavement and slabs.

B. Castings shall be stored in such a way as to prevent warping prior to installation.

C. Additional product handling requirements are specified in Section 01350.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Castings shall be manufactured by East Jordan Iron Works, Inc., or Engineer approved equal.

2.02 MANHOLE COVER AND FRAME

A. Castings located in roadways, driveways, or other areas subject to vehicular traffic shall be suitable for heavy-duty service. Other castings shall be suitable for light-duty service.

B. Unless otherwise indicated, sewer manhole shall have a minimum access opening of 24 inches.

C. Unless otherwise indicated, heavy duty manhole cover and frame shall be East Jordan No. 1045, Product 00104510.

2.03 INLET GRATE AND FRAME

A. Castings shall be suitable for heavy duty service.

B. Unless otherwise indicated, inlet grate and frame shall be East Jordan No. 7045.

2.04 RESERVED

2.05 PERFORMANCE REQUIREMENTS

A. Castings shall be gray iron conforming to ASTM A48, Class 35.

2.06 FABRICATION

A. Castings shall be free from pouring faults, sponginess, cracks, blowholes, blisters, shrinkage strains, and other defects. Plugging of defective castings is not permitted.

B. Castings shall be true to pattern in form and dimension. Weight of castings shall not vary by more than 5% from published weight. Contractor shall submit invoices showing actual weight of casting as certified by Manufacturer.

C. Castings shall have machined bearing surfaces.

D. All castings shall be coated with a non-toxic, nonflammable, water-based, asphalt paint.

E. Lettering shall be cast on covers. Unless indicated otherwise, the Manufacturer’s name shall be cast in cover.

F. Covers for water line manholes shall be solid lids and labeled “WATER”.

G. Covers for sanitary sewer manholes shall be solid lids and labeled “SANITARY”.

H. Covers for storm sewer manholes shall be solid lids and labeled “STORM”.

I. Covers shall be furnished with bolts, locks, hinges, perforations, lifting rings, and pick holes as specified, shown on Drawings, or as directed.

PART 3 EXECUTION

3.01 PREPARATION

A. Contractor shall examine surfaces to receive castings and shall report unacceptable conditions to Engineer before proceeding with the Work.

3.02 ERECTION AND INSTALLATION

A. Castings shall be accurately set, aligned, and anchored as shown on Drawings.

B. Castings shall be installed in accordance with Manufacturer's instructions or shown on the drawings. If any discrepancies exist, then the more stringent requirements shall take precedence.

C. Stop plank grooves shall be square, set plumb, and securely anchored as shown. Grooves that are buckled, twisted, or otherwise prevent free insertion of stop plank shall be removed and replaced.

PART 4 SPECIAL PROVISIONS

None

END OF SECTION

This page was intentionally left blank.