

CITY OF DETROIT  
SPECIAL PROVISION  
FOR  
EXCAVATION, EARTH, MODIFIED

1 of 1

DET:UP

Revised: 07-24-14

**Description.** This work consists of excavating materials not otherwise included into other pay items. This work will be done in accordance with Section 205 of the 2012 Michigan Department of Transportation (MDOT) Standard Specifications for Construction, except excavation and disposal of debris and non hazardous material when encountered, shall not be paid for separately. Experience has shown that most or all of earth excavation may be debris and may require hauling to special disposal sites which will accept this type of material.

**Measurement and Payment.** "Excavation, Earth, Modified" will be measured per cubic yards. The contract unit price will be payment in full for furnishing all labor, equipment, and materials necessary to excavate and dispose of the material. Where masonry and concrete structures and heavy foundations are encountered, their removal will be paid for as specified for these items.

<u>Pay Item</u>	<u>Pay Unit</u>
Excavation, Earth, Modified	Cubic Yard

CITY OF DETROIT  
SPECIAL PROVISION  
FOR  
HMA CONCRETE PAVEMENT  
SEQUENCE OF OPERATIONS

1 of 1

DET: UP

Revised: 07-24-14

Once work on a street has begun, the Contractor shall maintain a continuous operation. HMA top course shall be placed only after all base repairs, concrete curb removals and replacement, structure adjustments and repairs are completed. All milled pavement surfaces shall be completely resurfaced with leveling and top courses before the seasonal shutdown for the winter. All milled surfaces shall be completely resurfaced with leveling course as soon as possible but not to exceed 48 hours from the milling unless specifically approved otherwise by the Engineer. Contractor shall provide temporary wedges at driveways and at raised structure covers until HMA top course is completed at no additional or separate cost to the project. Cost of such task shall be considered included in HMA pay items and/or Maintenance of Traffic. If the contractor fails to provide such temporary wedges, then the Project Engineer can have it done by other means available and entire cost including time any administrative cost shall be charged back to the Contractor and deducted from any payment due to the Contractor.

**CITY OF DETROIT  
SPECIAL PROVISIONS  
FOR  
COLD MILLING HMA SURFACE, MODIFIED  
1 of 1**

DET: UP

Revised: 07-24-14

**Description** This work shall consist of removing HMA pavement or surface by use of cold-milling equipment to prepare the foundation for HMA overlays per section 501.03 of the 2012 Michigan Department of Transportation (MDOT) Standard Specifications for Construction and as specified herein.

The cost of exploration for the existing street car rails when encountered during cold milling shall be included in the work of cold milling HMA surface. Extra payment for cost of actual removal and disposal of any street car rail will be made per section 103.02

The Contractor shall schedule the cold-milling operation so that entire lane width of the roadway is cold milled between road terminus limit before switching over to other lane/side. This is required to avoid having a vehicle travel over milled surface on one side and normal pavement surface other side.

At the end of the day, the Contractor shall place a wedge, a minimum of 6 feet wide, the full length of all transverse and longitudinal joints at intersections where milling is greater than 2 inches in depth, to provide a smooth transition onto and off of the milled surface.

**It is the Contractor's responsibility to establish the finish (final) grade on all streets and to ensure proper (positive) drainage at all locations. This work shall be included in the cold milling and HMA paving pay items. No separate payments will be made for this work.**

**Measurement and Payment** The completed work as measured for "Cold Milling HMA Surface, Modified" will be paid for at the contract unit price for the following contract pay item.

Cold milling of existing concrete patches, and establishing finish (final) grade to ensure proper drainage, the cost of exploration for an existing street car rail when encountered during cold milling and wedging for longitudinal and transverse transition when required is included in the work of "Cold Milling HMA Surface, Modified".

The price shall be payment in full for removing the HMA material to the depth specified on the typical cross section sheet, and for transportation and disposal of the material.

Pay Item

Pay Unit

Cold Milling HMA Surface, Modified

Square Yard

**CITY OF DETROIT**  
**SPECIAL PROVISION**  
**FOR**  
**HMA APPLICATION ESTIMATE**

1 of 1

DET: UP

Revised: 05-12-12

The HMA Top Surfacing Mixture 5E3 shall have a yield of 165 pounds per square yard with an estimated thickness of 1.5 inches.

The HMA Leveling Surfacing Mixture 4E3 shall have a yield of 220 pounds per square yard with an estimated thickness of 2 inches.

Performance Grade; PG 64-22

The Material for HMA Approach, Modified shall be HMA Mixture 1.5 inches of 5E3 and 2 inches of 4E3, having a yield of 385 pounds per square yard.

The Material for Hand Patching shall be 3 inches minimum of HMA Mixture 5E3, having a yield of 330 pounds per square yard (or as directed by the Engineer).

HMA Shoulder, Modified shall be HMA Mixture 3 inches of 5E3, having a yield of 330 pounds per square yard. The material shall be placed in two lifts of approximately 1.5 inches.

HMA Prime Coat and HMA Bond Coat shall be included in the HMA pay item and shall meet the requirements specified in Section 904 of the 2012 MDOT Standard Specifications for construction.

The aggregate wear index shall be 260.

CITY OF DETROIT  
SPECIAL PROVISION  
FOR  
CONDITIONING EXISTING PAVEMENT, MODIFIED  
1 of 1

DET:

Revised: 02-09-12

**Description.** This work shall be in accordance with Subsection 501.03.C of the 2012 Michigan Department of Transportation Standard Specifications for Construction except the Removing HMA Patches, Joint and Crack, Cleanout, and Pavement Joint and Crack Repair, Detail 7 shall not be separate pay items but shall be included in the work of "Conditioning Existing Pavement, Modified" and will be done as directed by the Engineer.

**Measurement and Payment.** "Conditioning Existing Pavement, Modified" will be measured and paid for by the ton of HMA material placed. The contract price per ton will be payment in full for furnishing all labor, material and equipment required to remove deteriorated or unstable material to clean the pavement surface and apply any bonding material needed and to furnish, place and compact the HMA mixture to prepare the existing pavement for surfacing. HMA Patch, Remove; Joint and Crack, Cleanout; and Pavement Joint and Crack, Repair, Detail Z will not be paid for separately but are included in the item of work "Conditioning Existing Pavement, Modified".

Full depth Pavement Joint and Crack Repair, Detail 8 is not included in the item of "Conditioning Existing Pavement, Modified".

Pay Item  
Conditioning Existing Pavement, Modified

Pay Unit  
Ton

CITY OF DETROIT  
SPECIAL PROVISIONS  
FOR  
HMA APPROACH, MODIFIED

1 of 1

DET: UP

Revised: 07-24-14

**Description.** "HMA Approach, Modified" shall conform to the requirements of Section 501 of the 2012 Michigan Department of Transportation Standard Specifications for Construction. The work shall include the construction of Butt Joints when meeting existing pavements and will not be paid for separately. The depth of the Butt Joints shall be as directed by the Engineer.

**Materials.** The HMA mixture for the HMA Approach shall be that specified in the Special Provision for HMA Application Estimate. The HMA mixture to be used for the Butt Joint shall be that used for the leveling HMA mixture as specified in the Special Provision for HMA Application Estimate.

**Measurement and Payment.** "HMA Approach, Modified" will be measured per ton. The contract unit price shall include all labor, material and equipment necessary to furnish, place and compact the HMA Approach, Modified as shown on the plans or as directed by the Engineer.

Pay Item

Pay Unit

HMA Approach, Modified

Ton

CITY OF DETROIT  
SPECIAL PROVISIONS  
FOR  
HMA SHOULDER, MODIFIED

1 of 1

DET: UP

Revised: 02-14-2014

**Description.** The work shall include the removal of the existing surface required to place the shoulder or driveway as directed by the Engineer as well as furnishing and compacting the HMA shoulder or driveway material.

"HMA Shoulder, Modified" shall conform to the requirements of Section 501 of the 2012 Michigan Department of Transportation (MDOT) Standard Specifications for Construction.

**Measurement and Payment.** "HMA Shoulder, Modified" will be measured in ton. The contract unit price shall include all labor, material and equipment necessary to remove the existing surface and furnish, place, and compact the HMA shoulder or driveway as shown on the plans or as directed by the Engineer.

Pay Item

Pay Unit

HMA Shoulder, Modified

Ton

MICHIGAN  
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION  
FOR  
ACCEPTANCE OF HMA MIXTURE ON LOCAL AGENCY PROJECTS

C&amp;T:JWB

1 of 2

C&T:APPR:JWB:JAR:07-27-04  
FHWA:CON. APPR:06-06-11

**a. Description.** This special provision provides acceptance testing requirements for use on local agency projects that do not include the quality control/quality assurance special provision. The HMA mixture provided must meet the requirements of the standard specifications, except where modified herein.

**b. Materials.** Provide a mixture of aggregates, mineral filler (if required), and asphalt binder proportioned to be within the master gradation limits shown in the project documents, and meeting the uniformity tolerances listed in Table 1. The master gradation range is to be used for establishing mix design only. Topsoil, clay, or loam can not be added to aggregates which are to be used in plant mixed HMA mixtures.

**c. Construction.** After the job-mix-formula (JMF) is established, the aggregate gradation and the binder content of the HMA mixture furnished for the work must be maintained within the Range 1 uniformity tolerance limits permitted for the JMF specified in Table 1. However, if deviations are predominantly either below or above the JMF, the Engineer may order alterations in the plant to bring the mixture to the JMF. If two consecutive aggregate gradations on one sieve, or binder contents as determined by the field tests, are outside Range 1 but within Range 2 tolerance limits, the Contractor must suspend all operations. Contract time will continue during these times when the plant is down. Before resuming any production, the Contractor must propose, for the Engineer's approval, all necessary alterations to the materials or plant so that the JMF can be maintained. The Engineer will evaluate the alterations for their effects on AWI and mix design properties and will approve or disapprove the alterations.

The Engineer will perform acceptance sampling and testing. Each day of production, a minimum of two samples will be obtained for each mix type. Acceptance testing will be performed at the frequency specified by the Engineer. No less than three samples will be obtained for each mix type. Quality control measures to insure job control are the responsibility of the Contractor.

The crushed particle content of the aggregate used in the HMA mixture must not be more than 10 percentage points above or below the crushed particle content used in the JMF nor less than the minimum specified for the aggregate in the contract.

Establish a rolling pattern that will achieve the required in place density. The Engineer will measure pavement density with a Nuclear Density Gauge using the Gmm from the JMF for the density control target. The required in place density of the HMA mixture must be 92.0 to 96.0 percent of the density control target.

Table 1: Uniformity Tolerance Limits for HMA Mixtures

PARAMETER	TOP & LEVELING COURSE		BASE COURSE	
	Range 1(a)	Range 2	Range 1(a)	Range 2
Binder Content	± 0.40	± 0.50	± 0.40	± 0.50
% Passing # 8 and Larger Sieves	± 5.0	± 8.0	± 7.0	± 9.0
% Passing # 30 Sieve	± 4.0	± 6.0	± 6.0	± 9.0
% Passing # 200 Sieve	± 1.0	± 2.0	± 2.0	± 3.0
a. This range allows for normal mixture and testing variations. The mixture must be proportioned to test as closely as possible to the Job-Mix-Formula.				

**d. Rejected Mixtures.** If for any one mixture, two consecutive aggregate gradations on one sieve or binder contents as determined by field tests exceed the uniformity tolerance of Range 2 under Table 1, or do not meet the minimum requirements for crushed particle content specified in the project documents, the mixture will be rejected. If such mixtures are placed in a pavement, the remaining portions of the failing field samples (split sample) will be sent to the MDOT Central Laboratory to confirm the field test results. If the Laboratory's results do not confirm the field test results and there are no price adjustments required due to test failures on the asphalt binder, then no price adjustments will be made for the mixture involved. If the Laboratory's results confirm the field test results and if, in the Engineer's judgment, the defective mixture can remain in place and there are no price adjustments required due to test failures on the asphalt binder, the contract unit price for the defective mixture involved, as determined from field tests, will be decreased on the following basis:

The contract unit price for material outside of Range 2 or with a crushed particle content below that specified in the project documents will be decreased 25 percent.

If three consecutive aggregate gradations on one sieve, or bitumen contents as determined by field tests are outside Range 1 but within Range 2 tolerance limits, the mixture produced from the time the third sample was taken until the gradation, or bitumen content is corrected back into Range 1 will be decreased in contract unit price by 10 percent. Field tests indicating that mixtures are subject to the 10 percent penalty will be confirmed in the same manner as mixtures subject to the 25 percent penalty as described herein.

CITY OF DETROIT  
SPECIAL PROVISION  
FOR  
CURB, REM, MODIFIED

1 of 1

DET: UP

Revised: 02-14-2014

**Description.** The work shall be done in accordance with the applicable provisions of Section 204 of the 2012 MDOT Standard Specifications for Construction except as modified herein.

This work consists of removing curb, whether separate or integral with the pavement where the adjoining pavement remains. Where the curb is integral with the pavement, saw cutting of the existing pavement 2 feet from face of curb will be required. Saw cutting and removal of pavement integral with the curb that is required to be removed, are included into the curb removal and will not be paid for separately. Removing curb shall also include earth excavation required for removing the existing curb.

When an existing stone curb is removed, the removal shall also include the concrete backing located behind the curb and/or the concrete base on which the stone curb rests. Removal of this concrete is included in the curb removal and will not be paid for separately.

Backfill base material removed with the concrete curb with Granular Material, Class II to level necessary for new curb. Any Pavement area removed shall be back fill with aggregate to level necessary for new pavement. Backfill other area around curb with Sound Earth or material excavated from site only if approved by the Engineer. Place backfill in no more than 6 inches layer and compact to at least 95 percent of maximum unit weight. The cost of all backfill material, Granular Material Class II, Aggregate or Sound Earth or any other approved material is included in the unit price of related pay items for new curb new and will not be paid separately.

Selected excavated material, suitable for backfill, will be free from rubbish or debris, organic matter, large stones, concrete fragments, or other road material, lumber, tree roots, or branches. In general, selected excavated material to be suitable for backfill will be restricted to sand or crumbly clay. Blue clay is not considered a suitable backfill material. If there is not sufficient selected excavated material on the project, the contractor shall provide the needed fill material and no additional payment will be made for providing this backfill.

Lawn Sprinkler Systems, if encountered, shall be protected by the Contractor at no extra cost. If lawn sprinkler system is broken or cut, the contractor shall stake the end of the lawn sprinkler pipe.

**Measurement and Payment.** The completed work as measured for "Curb, Rem, Modified" will be paid for at the contract unit price for the following item

<u>Pay Item</u>	<u>Unit</u>
Curb, Rem, Modified	Foot

**CITY OF DETROIT**  
**SPECIAL PROVISION**  
**FOR**  
**INTEGRAL CURB AND SIDEWALK, 2 FEET, REM, MODIFIED**

1 of 1

DET: UP

Revised: 05-12-12

The work shall be done in accordance with Section 204 of the 2012 Michigan Department of Transportation Standard Specifications for construction and as specified herein.

This work shall consist of removing existing curb that has integral sidewalk as part of the curb structure. Saw cut existing sidewalk at 2 feet distance from the curb if there does not exist any joint within approximate five(5) distance from curb to remove curb and integral sidewalk. Any additional sidewalk to be removed will be paid for as Sidewalk, Rem.

The cost for any saw cutting is considered included in the pay item of this work and no additional payment for it will be made.

**Measurement and Payment.** Integral Curb and Sidewalk, 2 Feet, Rem, Modified will be measured and paid for at the contract unit price per foot.

Pay Item

Pay Unit

Integral Curb and Sidewalk, 2 Feet, Rem, Modified

Foot

The cost for any saw cutting is considered included in the pay item of this work and no additional payment for it will be made.

**CITY OF DETROIT  
SPECIAL PROVISION  
FOR  
CURB, CONC, DETAIL CD, MODIFIED and  
1 of 1**

DET: UP

Revised: 07-24-14

**Description.** The work consists of constructing curb in accordance with Section 802 of the 2012 Michigan Department of Transportation Standard Specifications for Construction except as modified herein.

**Construction.**

1. Construct a separate type curb per MDOT Standard Plan R-30, Detail E when the existing curb is not integral with sidewalk except that match existing curb depth, top curve radius (usually 1"R), batter (usually 1") and no lane ties are required, and

Restore areas disturbed, to their original condition. Existing berm areas shall be restored with like replacement. No separate payment will be made for such restoration but is considered part of work item.

Protect lawn sprinkler systems, if encountered. All costs associated with the lawn sprinkler protection, restoration and repair, if damaged, will be borne by the Contractor and no separate payment will be made.

Any excavation and backfill necessary for this work shall be included in the cost for this Item of work and no separate payment shall be made.

**Measurement and Payment.** The completed work as described herein for concrete curb, which includes a separate curb or a curb with integral sidewalk, will be measured by the foot. The contract unit price will be payment in full for furnishing all materials, labor and equipment necessary to construct the curb. Any excavation and backfill necessary for this work shall be included in the cost for this Item of work and no separate payment shall be made.

Pay Item  
Curb, Conc, Detail CD, Modified

Pay Unit  
Foot

CITY OF DETROIT  
SPECIAL PROVISION  
FOR  
INTEGRAL CURB AND SIDEWALK, 2 FEET, MODIFIED

1 of 1

DET: UP

Revised: 03-14-2013

**DESCRIPTION:**

This work shall consist of the construction of an Integral Curb and Sidewalk in accordance with details shown on the plans or as directed by the Engineer, and shall conform to the requirements of Section 803 of the 2012 Michigan Department of Transportation Standard Specifications for Construction.

The work shall include all labor, material, and equipment necessary to construct the Integral Curb and Sidewalk, 2 Feet, Modified. Earth Excavation, backfill with granular material, an expansion joint and other items which may be required shall be considered included in the construction of Integral Curb and Sidewalk, 2 Feet, Modified. Removal of the existing curb and sidewalk and/or existing integral curb and sidewalk will be paid separately.

Where there is a stepped curb, the Integral Curb and Sidewalk, 2 Feet, Modified shall be constructed to meet the face of the step curb. The exact height of the curb face and the width of the Integral Curb and Sidewalk will vary depending upon the field conditions and shall be constructed as directed by the Engineer. Where the difference between the sidewalk and gutter elevations is less than 7 inches, the Integral Curb and Sidewalk shall be constructed to eliminate the step.

**METHOD OF MEASUREMENT AND BASIS OF PAYMENT:**

"Integral Curb and Sidewalk, 2 Feet, Modified" will be measured and paid for per lineal foot.

<u>Pay Item</u>	<u>Pay Unit</u>
Integral Curb and Sidewalk, 2 Feet, Modified	Foot

CITY OF DETROIT  
SPECIAL PROVISION  
FOR  
SIDEWALK, CONC, \_\_ INCH, MODIFIED

1 of 2

DET-UP

Revised: 01-04-2012

**Description.** The work consists of constructing concrete sidewalk of the thickness specified, in accordance with Section 803 of the 2012 Michigan Department of Transportation Standard Specifications for Construction, Special Detail R-29 series and this special provision.

**Construction.** Construct all sidewalks with a normal cross slope of 2.00 % (1/4 inch per foot) sloping down towards the street but not less than 1.00 % minimum when existing conditions prevent from having normal slope.

Construct concrete sidewalk to a minimum 4-inch thickness at all locations called for, with the following exceptions:

Construct 6-inch thick concrete sidewalk for residential driveway area, the first flags of sidewalk adjacent to commercial driveways and alley pavements;

Construct 6-inch thick concrete sidewalk for a 3 feet minimum width from the face of curb at street returns. The Engineer will determine the limit of this item so that unusual jointing with the adjacent 4-inch thick sidewalk does not occur.

Restore area disturbed beyond actual sidewalk repair limits to its original conditions. Existing berm area shall be restored with like replacement. No separate payment will be made for such restoration but is considered part of work item.

Any excavation or granular backfill 4 inches or less required to construct the walk shall be included in this item of work and will not be paid for separately.

**Sidewalk Joints**

All sidewalk joints shall be constructed in accordance with the applicable provisions of Subsection 803.03 D of the 2012 MDOT Standard Specifications and Special Detail R-29 series except as modified herein.

Where hydrants or utility pole are located within the sidewalk area, a 3-foot knockout squared centered on hydrant or utility pole shall be constructed with full depth 1/2-inch expansion paper and a 30-pound felt paper shall be wrapped around the hydrant or utility pole at contact with concrete.

CITY OF DETROIT  
SPECIAL PROVISION  
FOR  
SIDEWALK, CONC, \_\_ INCH, MODIFIED

2 of 2

DET-UP

Revised: 07-24-14

**Measurement and Payment.** The completed work for "**Sidewalk, Conc, \_\_Inch, Modified**" of the thickness specified will be measured and paid for at the contract unit price for the following items. Any excavation or granular backfill 4 inches or less required to construct the walk shall be included in this item of work and will not be paid for separately.

**Pay Item**

**Pay Unit**

Sidewalk, Conc, 4 inch, Modified  
Sidewalk, Conc, 6 inch, Modified

Square Foot  
Square Foot

**CITY OF DETROIT**  
**SPECIAL PROVISION**  
**FOR**  
**SIDEWALK, CONC WITH TREE ROOTS, 4 INCH**  
**SIDEWALK, CONC WITH TREE ROOTS, 6 INCH**

1 of 1

DET: MCS/up

05-12-12

**Description** "Sidewalk, Conc with Tree Roots, 4 inch" or "Sidewalk, Conc with Tree Roots, 6 inch" is designated for the sidewalk replacement which has been raised by tree roots and requires trimming of the tree roots in conjunction with the sidewalk replacement, as directed by the Engineer.

This item of work includes: Cutting and removing tree roots, removing wood chips and all debris material properly disposed of off site; backfilling, compacting, and grading of the removal area; and construction of concrete sidewalk.

Concrete sidewalk of the thickness specified shall be constructed in accordance with Section 803 of the 2012 Michigan Department of Transportation Standard Specifications for Construction and the City of Detroit Special Provision for Sidewalk, Conc, \_\_\_inch, Modified. Sidewalk cross slopes shall be between 1% and 2% sloping down towards the street.

**Method of Measurement and Basis of Payment.** "Sidewalk, Conc with Tree Roots, 4 inch" of the type specified shall be measured in square foot.

Payment shall be for the entire flag or flags of sidewalk affected by tree roots. The contract unit price "Sidewalk, Conc with Tree Roots, 4 Inch" is full compensation for all work required to complete this pay item, including all labor, equipment and material.

Pay Item

Pay Unit

Sidewalk, Conc with Tree Roots, 4 inch  
Sidewalk, Conc with Tree Roots, 6 inch

Square Foot  
Square Foot

CITY OF DETROIT  
SPECIAL PROVISION  
FOR  
SIDEWALK RAMP, ADA, MODIFIED and  
DETECTABLE WARNING SURFACE TILE, MODIFIED

1 OF 2

DET-UP

Revised: 01-04-2012

**Description:** This special provision covers construction of sidewalk ramp with detectable warning surface and or Retrofitting existing sidewalk or sidewalk ramp with detectable warning surfaces.

The work consist of constructing sidewalk ramp and/or retrofitting ramp with detectable warning surface in accordance with the applicable provisions of Section 803 of the 2012 MDOT Standard Specifications for Construction and the current MDOT Standard Plan R-28 Series except as modified herein.

Complete this work in conformance with the American with Disability Act (ADA) provisions as applicable.

**Material:** The Detectable Warning Surface color shall be will be brick red, federal color number 22144, unless otherwise approved by the Engineer. The color shall be homogeneous throughout the tile

**Construction:** Construct sidewalk ramp(s), landings and flares six inches in thickness. Install detectable warning surface according to the manufacturer's instructions and the current MDOT Standard Plan R-28 Series.

The curb and gutter section at the bottom of the ramp (ramp opening) shall be a full depth curb and have a minimum depth of 12 inches.

It is also the Contractor's responsibility to incorporate any changes made to the ADA accessibility requirements that may take effect prior to the start date of actual construction. If the Contractor determines that any changes significantly alter the original bid cost, the Contractor may submit a written request to the Engineer or his representative for approval and compensation. Include a cost comparison between the original bid cost and the cost of the ADA required changes in the request.

The contractor shall stamp all concrete with a legible stamp bearing the name of the company and the year of construction. No sidewalk or ramp construction shall commence without a Contractor's stamp on site.

CITY OF DETROIT

SPECIAL PROVISION  
FOR SIDEWALK RAMP, ADA, MODIFIED and  
DETECTABLE WARNING SURFACE TILE, MODIFIED  
2 OF 2

DET-UP

Revised: 01-04-2012

**Measurement and Payment:** The completed work as described herein for Sidewalk Ramp, ADA, Modified which includes Detectable Warning Surface Tile, Modified will be measured by as square feet and feet respectively. The contract unit price will be payment in full for furnishing all materials, labor and equipment necessary to construct the curb

Pay Item

Sidewalk Ramp, ADA, Modified  
Detectable Warning Surface Tile, Modified

Pay Unit

Square Foot  
Foot

**Sidewalk Ramp, ADA, Modified** will be measured by the area of the ramp, flares, and monolithic rolled curbs along the longitudinal edges of the ramp, and the curb or the curb integral with pavement at the bottom of the ramp.

The landing shall be paid as 4 inch or 6 in regular sidewalk.

Payment includes all labor, materials, and equipment required to construct the sidewalk ramp pavement including the landing, flares, and monolithic rolled curbs along the longitudinal edges of the ramp, and the curb or the curb integral with pavement, at the bottom of the ramp. Any excavation or granular backfill required to construct sidewalk ramps will be included in this item of work and will not be paid for separately.

Restore berm areas disturbed beyond sidewalk ramp repair limits to its original conditions. No separate payment will be made for such restoration but is considered part of work item.

Replacement of all sidewalk, curb, or curb integral with pavement outside the area measured for "Sidewalk Ramp, ADA, Modified" will be paid for separately.

**Detectable Warning Surface Tile, Modified** will be measured in feet.. Payment includes the detectable warning surface tile(s) and all labor, materials, and equipment to install the detectable warning surface for a Sidewalk Ramp, ADA, Modified.

If the Contractor elects to remove the existing concrete sidewalk or sidewalk ramp in conjunction with retrofitting a Detectable Warning Surface Tile, Modified, the unit price for a **Detectable Warning Surface Tile, Modified** will include the cost of removing sidewalk, sidewalk ramp and restoration.

Any constructed ramps that do not meet the current MDOT Sidewalk Ramp Standard Plans and the latest ADA accessibility requirements will be removed and replaced by the Contractor, as directed by the Engineer or his representative, at the Contractor's expense

CITY OF DETROIT  
SPECIAL PROVISION  
FOR  
PAVT REPR, REM, MODIFIED  
PAVT REPT NONREINF CONC MODIFIED  
CONCRETE PAVEMENT, MODIFIED  
AND CONCRETE BASE PAVEMENT, MODIFIED

1 of 1

DET: UP

Revised: 07-14-2014

**Description** This work shall consist of constructing and or restoring a concrete pavement or a concrete base pavement, with or without reinforcement and with or without an integral curb in accordance with section 602 or 603 of the 2012 Michigan Department of Transportation (MDOT) Standard Specifications for Construction as applicable and as specified/modified herein.

ALL JOINTS, Expansion Joints; Contraction Joints; Tied Joints; Longitudinal Pavement Joints and Transverse Pavement Joints including any Lane Ties, Dowels, or any other Reinforcement, Load Transfer Assemblies, sawing, sealing Joints with Hot-Poured Rubber to finish the Pavement Construction and or restoration shall be included in the item of work. No separate payments will be made for these works.

**Pavement Repair, Removal-Modified** Shall be the removal of pavement sections without disturbing the base, as shown on the plans. The unit price for Pavt Repr, Rem-Modified includes the cost of the following:

1. Moving from repair to repair;
2. Saw cutting;
3. Removing adjacent concrete shoulders, curb, curb and gutter, and valley gutter
4. Removing part-depth or full-depth HMA patches;
5. Lifting the repair section without disturbing the base;
6. Loading, hauling, and disposing of the removed material; and
7. Placing HMA mixture, as necessary, to restore the shoulders to the existing line and grade.

**Measurement and Payment** All Pavt Repr, Conc. Base Pavt, Conc Pavt and Conc Pavt Misc, of the thickness specified, with or without reinforcement and with or without Integral Curb, will be measured by area in square yards, including the area occupied by the curbs.

ALL JOINTS, Expansion Joints; Contraction Joints; Tied Joints; Longitudinal Pavement Joints and Transverse Pavement Joints including any Lane Ties, Dowels, or any other Reinforcement, Load Transfer Assemblies, sawing, sealing Joints with Hot-Poured Rubber to finish the Pavement Construction and or restoration shall be included in the item of work. No separate payments will be made for these works.

DET: UP

Revised: 02-15-12

<u>Pay Item</u>	<u>Pay Unit</u>
Conc Base Pavt, ___ inch, Modified	Square Yard
Conc Base Pavt with Integral Curb, Reinf, ___ inch, Modified	Square Yard
Conc Base Pavt with Integral Curb, Nonreinf, ___ inch, Modified	Square Yard
Conc Pavt with Integral Curb, Nonreinf, ___ inch, Modified	Square Yard
Conc Pavt with Integral Curb, Reinf, ___ inch, Modified	Square Yard
Conc Pavt, Misc, Nonreinf, 6 inch, Modified	Square Yard
Conc Pavt, Misc, Nonreinf, 8 inch, Modified	Square Yard
Conc Pavt, Misc, 8 inch, Reinf, Modified	Square Yard
Conc Pavt, Misc, 9 inch, Reinf, Modified	Square Yard
Conc Pavt, Misc, 10 inch, Reinf, Modified	Square Yard
Driveway, Conc, 8 inch, Reinf, Modified	Square Yard
Pavt Repr, Rem, Modified	Square Yard
Pavt Repr, Nonreinf Conc, 10 inch, Modified	Square Yard

CITY OF DETROIT  
SPECIAL PROVISION  
FOR  
DR STRUCTURE COVER, ADJ, CASE \_\_,MODIFIED and  
RECONSTRUCT DR STRUCTURE, CASE \_\_,MODIFIED  
WATER SHUTOFF, ADJ, MODIFIED  
1 of 2

DET: UP

Revised: 07-14-2014

**Description.** The work consists of Adjusting Drainage Structure Covers in accordance with the applicable provisions of Section 403 of the 2012 MDOT Standard Specifications for Construction except as modified herein.

Drainage Structure Cover Adjustment will include all Public Lighting Department manholes, all water main gate wells, sewer manholes and catch basins whose covers are raised or lowered to meet the required elevations. Water Shutoff Adjustment will include water shutoff boxes or stop boxes, Public Lighting Department hand holes being raised or lowered to meet required elevations.

Before starting this work the Contractor and the Engineer, or his designate, shall jointly inspect each structure to evaluate its interior conditions. Access to structures will be provided by the Contractor. The Engineer, or his designate, shall determine whether the structure is to be adjusted or reconstructed. The Engineer shall also determine if any structure cleaning is necessary to remove existing debris. The Contractor shall remove all debris from the structure resulting from the contractor's operation.

The existing frame and cover shall be carefully removed and the upper portion of the existing manhole structure repaired as necessary and raised or lowered as required. The frame and cover shall then be reset on the adjusted structure so as to fit the required grade and cross section.

Where the structure is in need of repair, as determined by the Engineer, within the limits provided for under these items, it will be broken down and rebuilt with new materials to the required elevation.

Payment for "**Dr Structure Cover, Adj, Case \_\_, Modified**" shall include all labor, material and equipment necessary to raise or lower existing structure rim involving adjustment (addition and/or removal), repair or replacement of less than five (5) layers of bricks or three (3) layers of concrete blocks, both including mortar, regardless of whether or not it is necessary to remove cone section to accommodate the rim adjustment.

Payment for "**Reconstruct Dr Structure, Case \_\_, Modified**" shall include all labor, material and equipment necessary to raise or lower existing structure rim involving adjustment (addition and/or removal), repair or replacement of more than five (5) layers of bricks or three (3) layers of concrete blocks, both including mortar, and may include removal of cone section to accommodate the rim adjustment.

**Construction.** Where called for on the plans or authorized by the Engineer, existing structures cover shall be adjusted to the proper elevation in accordance with Section 403 of the 2012 MDOT Standard Specifications for Construction except as modified herein.

Remove adjacent pavement, curb, curb and Gutter or sidewalk as necessary to adjust the castings. Remove an opening at least a 5 feet x 5 feet opening in conjunction with adjusting the

CITY OF DETROIT  
SPECIAL PROVISION  
FOR  
DR STRUCTURE COVER, ADJUSTMENT, MODIFIED and  
RECONSTRUCTING DR STRUCTURE, MODIFIED  
WATER SHUTOFF, ADJ, MODIFIED  
2 of 2

DET: UP

Revised: 07-14-2014

casting. Sawcut the existing pavement, curb and curb and gutter for removal. Saw cut the existing pavement full depth around the opening. Raise the covers to the proper elevation by supporting it on brick masonry, so constructed as to hold them firmly in place, or lowered to the proper elevation and reset on full mortar bed. Replace adjacent pavement, curb, or curb and gutter to match existing grades or to the required new elevation.

Non-ferrous handhole covers used by Public Lighting Department and other City Utilities are made of fiberglass, copolymer propylene or similar material. These covers shall be adjusted by a qualified electrical contractor. The removal of concrete around the perimeter of a non-ferrous handhole shall be done with light chipping hammers to insure that no damage is done to the cover, handhole or any conduit or other utility that may feed the structure. Any damage to structures, conduits, cable, and etcetera shall be repaired by the Contractor at no cost to the City.

For HMA pavement sections, immediately before placing the HMA top course or overlay, make final adjustments to drainage structure covers. Equipment will not be permitted to operate over adjusted structures any sooner than 24 hours after their completion, unless otherwise approved by the Engineer.

**Measurement and Payment.** The completed work as described for Adjusting Drainage Structure Covers will be measured as units and will be paid for at the contract unit price as follow, which price will be payment in full for furnishing all materials and labor, fittings; pavement, curb, curb and gutter, and sidewalk removal and replacement, excavation, backfilling, disposal of surplus material, removal of all debris and foreign material from the structure (including the sump); and adjusting the structure cover to the required elevation, with the existing or new cover, and providing access to all structures for inspection, as directed by the Engineer.

Structure damage, due to contractor operations shall be repaired at the Contractors expense. A finish concrete collar shall be placed around any structures adjusted within 5 feet of the Detroit Thermal (formerly Detroit Edison) steam lines, as directed by the Engineer. The cost of this shall be paid separately as Concrete Repr, Nonreinf Conc, 10 inch , Modified measured surface area of the concrete collar.

<u>Pay Item</u>	<u>Pay Unit</u>
Dr Structure Cover, Adj, Case 1, Modified	Each
Dr Structure Cover, Adj, Case 2, Modified	Each
Reconstructing Dr Structure, Case 1, Modified	Each
Reconstructing Dr Structure, Case 2, Modified	Each
Water Shutoff, Adj, Modified	Each
Concrete Repr, Nonreinf Conc, 10 inch , Modified	Syd.

CITY OF DETROIT  
SPECIAL PROVISION  
FOR  
DR STRUCTURE COVER, MODIFIED

1 of 2

DET: A.A.

Revised: 2/20/14  
3/12/12

**a. Description.** Existing catch basins, manholes, handholes, gate valve wells and other similar structures, which are located within the area of the proposed pavement or existing pavement which is to be retained, that have defective or worn frames and covers, on structures which are to remain in service, shall have new frames and covers supplied and installed by the Contractor.

**b. Materials.** Catch basin and manhole frames and covers shall be gray iron casting, A.S.T.M. A48, Class No. 30B. Castings shall be sound, true to form and thickness, clean and neatly finished. The seating face on covers and grates and the corresponding seat on the frame shall be machine finished so that there will be even bearing at all points with no rocking or tilting. The frame and its cover or grate shall constitute one unit. Each unit shall conform to the detailed requirement of the respective Standard Drawings.

The castings for catch basins shall be as follows:

East Jordan 5000 Assembly or Approved Equal  
Product Number. 00500063B01;      Weight. 219 Lb  
Product Number. 00500063B02;      Weight. 241 Lb

The castings for drainage manholes shall be as specified in the Material Section of the Special Provision for Drainage Structures and the Standard Plan for Manhole Frame and Cover.

East Jordan Assembly: 00104051L01 or Approved Equal

The castings for gate valve wells shall be as specified in the Standard Plan for Gate Well Frame and the Cover Standard.

East Jordan Assembly 0014050L01 or Approved Equal

The castings for Public Lighting Commission (PLC) manholes shall be as specified in the Standard Plan for P.L.C. Pattern No. 2A Street Type Cover.

Public Lighting Department (PLD) handhole and manhole frames and covers shall be labeled "Public Lighting Department" and sized as shown in the revised Standard Drawings attached.

Shop drawings for the catch basin frames detailing all dimensions shall be submitted to the Engineer for approval. No frames except those manufactured in conformance with the approved shop plans will be permitted to be used on the project.

DET: A.A.

Revised: 2/20/14  
3/12/12

**c. Construction.** Catch basin and manhole frames and covers shall be set in a full bed of mortar on the top of the existing structure wall at such elevation that when the structure cover is set in place the complete unit of frame and cover will be at the required finish or final surface grade. The cover shall so fit the frame that no rattling occurs under traffic loadings. If rattling does occur, the frame and/or cover shall be machined so as to eliminate the rattling.

**d. Measurement and Payment.** Catch basin and manhole frames and covers will be measured as "Dr Structure Cover, Modified" and paid for per Pound. The Contract Unit Price shall be payment in full for furnishing and installing the required frames, covers and fittings complete.

The additional labor, material, and equipment required to install the frames and covers shall not be paid for separately.

<u>Pay Item</u>	<u>Pay Unit</u>
Dr Structure Cover, Modified	Pound

**CITY OF DETROIT**  
**SPECIAL PROVISION**  
**FOR**  
**DR STRUCTURE CLEANING, MODIFIED AND SEWER CLEANOUT, MODIFIED**

1 of 1

DET:

Revised: 02-20-14

**Description.** The work of Dr Structure Cleaning, Modified consists of cleaning existing catch basin and manhole in the area of the project where directed by the Engineer. The work of sewer cleanout consists of cleaning cross-pipes between catch basins or manholes.

Some of the catch basins, manholes and sewers may be completely filled. The Engineer shall determine actual condition and necessity for cleaning prior to cleanout. Cleaning shall restore 90% of the pipe's carrying capacity.

**Construction.** When necessary and as directed by the Engineer, the catch basin nearest to the trunk sewer shall be cleaned first and a temporary bulkhead placed in order that the trunk sewer not be infiltrated. Upstream catch basins or manholes and cross-pipes may then be cleaned.

Cleaning shall be by high velocity hydro-cleaning (jetting). Mechanical cleaning shall only be used when authorized by the Engineer. Contractor shall take precautions to protect the sewer lines from damage.

No debris shall be accumulated on site except in totally enclosed containers approved by the Engineer. All material deposits shall be removed from site and disposed of at an approved location.

**Measurement and Payment.** "Dr Structure Cleaning, Modified" will consist of cleaning catch basins or manholes. "Dr Structure Cleaning, Modified" will be paid for at the contract unit price each, and will include all equipment and labor necessary to clean each catch basin or manhole.

"Sewer Cleanout, Modified" consists of cleaning sewers between catch basins or between catch basins and manholes. "Sewer Cleanout, Modified" will be paid for at the contract unit price per foot which will include payment for furnishing all equipment and labor to clean sewers and hauling away any waste and debris generated. Temporary bulkhead will be included in the cost of "Sewer Cleanout, Modified".

<u>Pay Item</u>	<u>Pay Unit</u>
Dr Structure Cleaning, Modified	Each
Sewer Cleanout, Modified	Foot

CITY OF DETROIT  
SPECIAL PROVISION  
FOR  
DRAINAGE STRUCTURES, MODIFIED

1 of 8

DET:A.A.

Revised: 2/20/14  
2/06/12

**Descripton.** This work consists of constructing all manholes, and catch basins to the size, type, special design, and type of backfill as shown on the plans. Manholes and catch basins shall be constructed to the line and elevation of final grade or as otherwise shown on the plans. The work includes maintenance of sewer service where manholes are built over existing sewers and shall be in accordance with Section 403 of the 2012 Michigan Department of Transportation Standard Specifications for Construction except as otherwise specified.

**Materials.**

Manhole Frames and Covers - Round:

Round manhole frames and covers shall conform to the Detroit Water and Sewerage Department (DWSD) standard unit, as detailed on the project Drawings. Both the frame and cover shall be castings conforming to the requirements of A.S.T.M. Specification, "Gray Iron Castings," A48, Class 30B.

East Jordan ERGO Assembly or Approved Equal  
Product Numbers 00104050L01 and 00104051L01; Weight 235 Lb

Perforated covers shall be used unless otherwise indicated on the project Drawings.

Castings shall be sound, true to form and thickness, clean and neatly finished. The seating face on the cover and the corresponding seat on the frame shall be machine finished so that there will be even bearing at all points with no rocking or tilting.

When a sufficient supply is available, the frames and covers may be purchased from the Sewer Maintenance and Construction Division of the Detroit Water and Sewerage Department.

Catch Basin Frames and Covers

The physical requirements for Catch Basin Frame and Covers will be in accordance with the requirements for manhole frames and covers. The castings for Catch Basin A and B shall be as follows.

East Jordan 5000 Assembly or Approved equal  
Product Number 00500063B01, Weight 219 Lb  
Product Number 00500063B02; Weight 241 Lb

DET:A.A.

Revised: 2/20/14  
2/06/12

Shop drawings for the Catch Basin Frames and covers detailing all dimensions shall be submitted to the Engineer for approval. No frames except those manufactured in conformance with the approved shop plans will be permitted to be used on the project.

Frames and covers for all other catch basins shall be in accordance with details shown on the plans.

Manhole Steps:

Manhole steps shall be of aluminum alloy conforming to the requirements for "Aluminum Alloy Extruded Bars, Rods, Shapes and Tubes," A.S.T.M. B221, alloy 6061, and temper T6. The shape and dimensions of each step shall conform to the details shown on the drawings at the end of this section.

A certificate by the manufacturer shall be submitted to the Engineer prior to installation of any step, that the materials meet the requirements of the A.S.T.M. Specification.

Brick:

All brick shall be rectangular in shape with reasonably sharp corners and edges. The standard size shall be 2¼ inches to 2½ inches by 3¾ inches by 8 inches. The dimensions of the brick shall not vary over 1/8 inch in either transverse dimensions and ¼ inch in length. All brick shall be frogged or cored, unless otherwise approved.

Brick shall be free from cracks and flaws and otherwise conform to current ASTM Specifications for "Sewer and Manhole Brick," C32 or "Concrete Building Brick," C55 as is applicable.

Brick shall be sampled and tested in accordance with applicable ASTM Specification for "Sampling and Testing Brick," C67 or "Concrete Masonry Units, Sampling and Testing" C140.

MAXIMUM  
ABSORPTION  
(By Weight)

Clay or Shale Brick:	
5 Hour Boiling Test	
Average of 5 Brick	16%
Individual Brick	18%
Concrete Brick:	
24 Hour Immersion	
Average of 5 Brick	8%
Individual Brick	10%

DET:A.A.

Revised: 2/20/14  
2/06/12COMPRESSION  
STRENGTH

All brick shall meet the same compressive strength requirements:

Average of 5 Brick	3,500 p.s.i.
Individual Brick	3,000 p.s.i.

The use of lime, in any form, as a major constituent of brick shall not be permitted.

Concrete Block:

Concrete block, for use in manhole construction, shall conform to the requirements of A.S.T.M. Specification for "Concrete Masonry Units for Construction of Catch Basins and Manhole," C139. The size and shape of the block shall be in accordance with the details on the Drawings.

Precast Concrete Manhole Sections:

Precast reinforced concrete sections for 4 ft. diameter manhole construction shall conform to the requirements of A.S.T.M. Specification, "Precast Reinforced Concrete Manhole Sections," C478 with the following exceptions and additions:

The required manhole steps shall be cast in place with the required spacing and alignment. The top or dome section shall be an eccentric cone with a minimum height of 32 inches. The smaller upper opening shall be designed to accommodate the manhole frame. Where a watertight frame is to be provided, the anchor bolts or stud inserts for the frame shall be cast in place with the required spacing and alignment.

The minimum shell thickness shall be one-twelfth of the internal diameter in inches of the riser or largest cone diameter plus one (1) inch.

No holes for inlet or outlet pipes shall be made in precast units at the site of the work. All necessary openings shall be formed into the precast manhole section as part of the casting operation.

Precast Manhole Bases:

Precast manhole bases for 48-inch diameter manholes shall be reinforced concrete using 3,000 pound concrete. The minimum diameter of the base shall be equivalent to the outside diameter of the manhole. The slab shall be a minimum of 8 inches thick and reinforced two ways with a minimum of 0.14 square inches of steel reinforcing per foot of diameter in each direction placed in the center of the precast circumference of a 48-inch diameter circle shall be provided.

Where the bottom section of the manhole is cast integrally with the base, the base portion shall conform to the requirements stated above.

DET:A.A.

Revised: 2/20/14  
2/06/12Mortar:

Mortar for brick or masonry work shall be mixed by volume in the proportions of one part Portland cement to two parts sand. Mortar shall be highly plastic with high water retentivity. A bag of cement 94 pounds shall be considered one cubic foot.

The cement and sand shall first be mixed dry to a uniform color in a batch mixer or a tight mortar box, and then mixed thoroughly with water which shall be added gradually until the required consistency is obtained. Mortar shall be mixed in batches of such sizes as will be used immediately and any mortar which has set sufficiently to require retempering shall not be used.

Catch Basins A, Catch Basins B and Catch Basins B with Trap

Catch Basins A, B and Catch Basins B with Trap shall be constructed in accordance with details shown on the Plans and/or as directed by the Engineer. The materials for Catch Basins shall be in accordance with the materials for "Manholes."

Catch Basins 18 inch x 12 inch, Special "Y"

Catch Basins 18 inch x 12 inch, Special "Y" shall be constructed of concrete sewer pipe.

The pipe joints shall be on cement mortar complying with the applicable requirements for sewers.

Catch Basin "L"

Catch basin "L" shall be constructed of standard concrete sewer pipe.

**CONSTRUCTION METHODS:****Manholes**

Manholes may be constructed of block or precast reinforced concrete manhole sections, in accordance with the respective details shown on the Drawings, unless a specific type is called for on the Drawings.

Blocks used in manhole construction shall be laid with full mortar joints. All available bearing areas shall be covered with mortar spread in an even layer without splitting or furrowing, and all vertical and interior joints solidly filled with mortar. The courses shall be laid even except where otherwise required. Manholes shall be constructed to be as plumb as is practical.

DET:A.A.

Revised: 2/20/14  
2/06/12

Concrete block, where used, shall be laid in courses of whole blocks only by using units of the proper size. The joints between individual blocks and between courses shall be uniform. Vertical joints in adjacent courses shall be staggered. The upper portion of the manhole as detailed on the Drawings, shall be "domed" by drawing the block courses equally and evenly to the diameter of the opening at the top required to fit the manhole frame opening. Such doming may be by blocks, provided whole units of such sizes are used to evenly effect the doming. Otherwise, brick, as above specified, shall be used for such sections. All interior mortar joints shall be finished flush. A 1/2 inch thick mortar coat shall be applied to the outer surface of the manhole.

Precast reinforced concrete manhole sections, where used, shall be placed in accordance with the details shown on the Drawings. Such manhole sections shall rest on an integral bottom section and base or concrete block masonry laid up from the manhole base slab. Bottom section or masonry units shall be installed to such a height that when whole manhole sections are used, including the upper dome section, the top of the manhole will be at the proper elevation to accommodate the manhole frame and cover at the required finished grade. When the alternate manhole bottom construction is used, the length of the risers and the dome section shall be adjusted so that the top of the manhole will be at proper elevation to accommodate the manhole frame and cover at the required finished grade.

The joints between the pipe sections in the field shall be synthetic rubber gaskets as specified under "Sewers".

Where precast manhole bases or integral bottom sections are used, they shall be placed on a 3-inch layer of sand. After placing the sand, it shall be leveled to provide a uniform bearing surface for the slab and a level foundation on which to start construction of the manhole.

A manhole built over a brick or pipe sewer shall be thoroughly bonded to the sewer barrel and all connections made without projections or voids. Manholes, when completed, shall be cleared of all scaffolds and thoroughly cleaned of surplus mortar, building materials and all foreign matter.

Where a connection of an existing sewer to a proposed manhole is indicated on the plans, the portion of the sewer removed shall be replaced, beyond the limits of the manhole, with an equivalent size of circular pipe and of the strength approved by the Engineer. This work shall be considered as included in the construction of the manhole and will not be paid for separately.

DET:A.A.

Revised: 2/20/14  
2/06/12

Manhole Steps:

Manhole steps shall be firmly embedded in the manhole wall or structure in true vertical alignment, spaced as shown on the Drawings, and shall project uniformly, 6½ inches from the face of the wall to the outside edge of the step.

The portion of the step to be embedded in concrete manhole sections or concrete structures shall be wire brushed or otherwise roughened and then covered with one coat of "Bitumastic Super Service Black", as manufactured by Koppers Company, Tnemcol No. 450 heavy, as manufactured by Tnemco Co., or "Bitumastic Super Service Black", as manufactured by Somay Products Inc.. The coating shall be applied and allowed to dry in accordance with the manufacturer's recommendations.

The coating shall extend beyond the embedment at least one inch.

The steps shall not be 'muddied-in' pipe sections, but shall be inserted in the 'green' concrete prior to initial set of the concrete.

Steps to be placed in existing concrete shall be placed in drilled holes and the void space packed with non-shrink grout, using "Embeco", "Groutex", "Ferrolith-G", or approved equal. The mixing and installation of the non-shrink grout shall follow the procedure recommended by the manufacturer of the grout

Manhole Frame and Cover:

The standard round manhole frame shall be set in a full bed of mortar on the top of the manhole wall at such elevation that when the manhole cover is set in place the complete unit of frame and cover will be at the required finish or final surface grade. The cover shall so fit the frame that no rattling occurs under traffic loadings. If rattling does occur, the frame and/or cover shall be machined so as to eliminate the rattling.

Backfilling Around Manholes:

Backfilling adjacent to manhole walls shall be done in such a manner as to simultaneously raise the level of the fill uniformly on all sides of the manhole, compacted as noted below.

No backfilling shall be done around manhole walls within less than 48 hours after the plaster coat has been applied to the outside of the manhole walls.

During the operation of backfilling of an excavation that is sheeted and braced, earth supports shall not be removed in such a manner as to permit earth bank or adjacent streets to give way. Sheetting and bracing may be left in place during backfilling and pulled when backfilling is completed. Sheetting and bracing impossible to remove may be left in place, provided it is cut off 5 feet below ground surface.

DET:A.A.

Revised: 2/20/14  
2/06/12

Pipes entering a manhole above the bottom of the structure shall be supported with Grade "X" concrete or a masonry pier down to undisturbed earth as indicated on the plans. Grade "X" concrete shall consist of three sacks of cement per cubic yard of concrete and shall be included in the construction of the Manholes.

The backfilling shall be placed and compacted as specified under the City of Detroit Special Provision for Sewers.

Bulkheads:

Brick bulkheads, as required, shall be built of common brick. The surface of contact of the sewer wall with the bulkhead shall be cleaned and then roughened by bush-hammering or chiseling just prior to the bulkhead construction. Such bulkheads shall be vertical, of the thickness shown on the Drawings with alternate header and stretcher courses laid in mortar in the manner specified for "Manholes." The joints shall be 5/8 inch thick and finished flush.

Removal of bulkheads shall be done in a careful manner that will avoid damage to the sewer. The surface of contact of the sewer wall with the bulkhead shall be cleaned of all brick and mortar and the wall surface left as smooth as possible without mortar patching. The materials from the removed bulkhead shall be promptly removed from the sewer and not left to accumulate.

Unless otherwise specified, the building or removing of bulkheads are included in manhole or sewer construction and will not be paid for separately.

Separate payment will be made only for bulkhead built in 18-inch diameter sewers and larger, or the equivalent size in an egg shape sewer.

**Catch Basins A, Catch Basins B and Catch Basins B with Trap**

Catch Basins A, Catch Basins B and Catch Basins B with Trap shall be constructed in accordance with details shown on the Plans and/or as directed by the Engineer. The construction methods for Catch Basins A and B shall be in accordance with the construction methods for "Manholes."

**Catch Basins 18 inch x 12inch, Special "Y"**

Catch Basins 18 inch x 12inch, Special "Y" shall be constructed in accordance with the Plans and/or as directed by the Engineer.

The pipe joints shall be on cement mortar complying with the applicable requirements for sewers.

**Catch Basin "L"**

Catch basin "L" shall be used "only" when directed by the Field Engineer or when called for on drawings instead of the standard "Y" basin. Contractor shall construct a standard half trap if directed to do so by the Field Engineer.

DET:A.A.

Revised: 2/20/14  
2/06/12

**Measurement.** "Manholes" of the size, type and special design called for will be measured as units.

Catch Basins, as detailed on the Plans, will be measured as units, regardless of the depth of the structure.

**Payment.** Manhole of the size, type and special design called for will be paid for at the contract unit price each, which shall be payment in full for furnishing the material including required covers and fittings and constructing the structure complete. The contract unit price shall include the cost of maintaining existing sewer service. Excavation, all backfill and disposal of waste excavated material are included in the manhole items without separate payment therefore.

Pavement, curb, and sidewalk removal and replacement will be paid for separately.

Catch Basin A, Catch Basin B, Catch Basin B with Trap, and Catch Basin 18" X 12" Special "Y", Catch Basin "L", Modified will be paid for at the contract unit price each, which shall be payment in full for furnishing the materials including required frames, covers, fittings, traps and constructing the structure complete. The contract unit price shall include the cost of maintaining existing sewer service. Excavation, all backfill and disposal of waste excavated material are included in the catch basin items without separate payment.

Pavement, curb, sidewalk removal and replacement will be paid for separately.

<u>Pay Item</u>	<u>Pay Unit</u>
Catch Basin L, Modified	Each
Catch Basin A, Modified	Each
Catch Basin B, Modified	Each
Catch Basin BT, Modified	Each
Catch Basin 18 inch x 12 inch, Special 'Y', Modified	Each
Manhole, 4 foot, Standard, Modified	Each

CITY OF DETROIT  
SPECIAL PROVISIONS  
FOR  
TOPSOIL SURFACE, FURN, LM, MODIFIED

1 of 1

Revised: 03-132

**DESCRIPTION:**

"Topsoil Surface, Furn, LM, Modified" shall be in accordance with Section 816 of the 2012 MDOT Standard Specifications for Construction except as herein modified. The depth of topsoil placed shall vary as required to provide a uniform slope after modifying the top of curb elevation. The preparations of the foundation shall be as specified in the 2012 MDOT Standard Specifications for Construction. Lawn sprinkler systems, if encountered, shall be protected by the Contractor at no extra cost.

**METHOD OF MEASUREMENT AND BASIS OF PAYMENT:**

"Topsoil Surface, Furn, LM, Modified" shall be measured and paid for per cubic yard (loose measure). The contract unit price shall be payment in full for furnishing all materials, labor and equipment necessary to complete the work.

Pay Item

Pay Unit

Topsoil Surface, Furn, LM, Modified

Cubic Yard

**SPECIAL PROVISION  
FOR  
HYDROSEEDING, MODIFIED  
1 of 1**

DET: UP

12-18-2012

**DESCRIPTION:** These items of work consist of furnishing and installing mulch and permanent seeding on the prepared topsoil bed using hydroseeding method in accordance with the requirements of Sections 816 and 917 of the 2012 Michigan Department of Transportation (MDOT) Standard Specifications for Construction. The seed mixture, the type of mulch (wood with tackifier), the rates of application, and the guarantee to establish growth shall be as specified herein.

**CONSTRUCTION METHODS:** Seed shall be sown by using hydroseeding method in accordance with the requirements of Subsection 816.03 of the 2012 Michigan Department of Transportation (MDOT) Standard Specifications for Construction. The rate of application of the seed mixture shall be 250 pounds per acre. The rate of application for the mulch shall be 2500 pounds per acre. The application rate for the chemical fertilizer nutrient shall be as stated in the Standard Specifications.

The Contractor shall be responsible to establish growth of lawn areas where the seed mixture is installed.

**MATERIALS:** The seed mixture shall be TUF (Turf Urban Freeway per Table 917-1) The seed and chemical fertilizer nutrient shall meet the requirements specified in Subsections 917.10 and 917.12 of the 2012 Michigan Department of Transportation (MDOT) Standard Specifications for Construction Mulching shall be performed using wood mulch with tackifier approved by the Engineer.

**MEASUREMENT AND PAYMENT:** The completed work of Hydroseeding will be measured in place by area in square yards applied. The contract unit price will be payment in full for furnishing all labor, materials including mulch, seed and chemical fertilizer nutrient and hydro-seeding equipment involved in installing the mulch and seed, including establishing growth.

Pay Item

Pay Unit

Hydroseeding , Modified

Square Yards

City Of Detroit

Special Provision  
for  
RECESSING for PAVEMENT MARKINGS

DPW / TED: JF

1 of 1

12-09-13

**A. Description.** Recessing grooves shall be cut into the roadway to facilitate the protection of pavement marking material from vehicle wear and cleaning equipment such as snow plows. This work shall be performed for the installation of all transverse line markings except where markings are in-laid into fresh hot asphalt. This work shall conform to Section 811 of the Standard Specifications for Construction and the following provisions specified herein.

**B. Construction.**

The groove recesses shall be made on concrete and asphalt road surfaces in a single dry pass cut and the equipment used shall be self-vacuuming and leave the cut groove ready for material installation. The blade tool shall be made of stacked diamond cutting heads or engineer approved flat-tooth design hard alloy material such as tungsten-carbide. The bottom of the groove shall have a fine corduroy finish. The remaining roadway surface shall be solid and intact and not cracked or broken with potentially loose pieces subject to breaking off. If a coarse tooth pattern or cracked road surface results, then the tooling must be changed. Either a) the number of blades is to be increased and the spaces on the cutting head are to be decreased or b) the type of blade is to be changed to a superior material or cutting tool design.

Recess Width:                   Material width +1 inch, + / - 1/8 inch  
Recess Depth:                 As recommended by the manufacturer, + / - 5 mills

**Permanent Marking Material Application:**

The recessing equipment and method used shall comply with the pavement material manufacturer's installation instructions. Recess grooves shall be clean and dry prior to placing any pavement marking material. The entire pavement marking must be placed within the recess and shall be placed in the same day as the recessing work.

**C. Measurement and Payment.** The completed work as described will be paid for at the contract unit price for the following contract pay items:

<u>Contract Item (Pay Item)</u>	<u>Pay Unit</u>
_ Recessing for Pavt Mrkg, 06 inch.....	Foot
_ Recessing for Pavt Mrkg, 12 inch.....	Foot
_ Recessing for Pavt Mrkg, 18 inch.....	Foot
_ Recessing for Pavt Mrkg, 24 inch.....	Foot

The item of **Recessing Pavement Markings** includes all equipment and labor necessary to complete the work. Payment for any temporary paint lines (used as a template) is included in the item **Recessing Pavement Markings**.

MICHIGAN  
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION  
FOR  
QUALITY CONTROL AND ACCEPTANCE OF PORTLAND CEMENT CONCRETE  
(FOR LOCAL AGENCY PROJECTS ONLY)

C&amp;T:JFS

1 of 16

C&T:APPR:JAB:DBP:11-22-11  
FHWA:APPR:11-29-11

a. **Description.** The Contractor must administer quality control (QC) and the Engineer will administer quality assurance (QA) procedures that will be used for acceptance of and payment for all Portland cement concrete (PCC) for the project. Except as explicitly modified by this special provision, all materials, test methods, and PCC mixture requirements of the standard specifications and the contract apply.

Provide the Engineer a minimum 24 hours notification prior to each concrete placement.

1. Terminology.

**Air Content of Fresh Concrete.** The recorded total air content of fresh concrete sampled and tested according to this special provision.

**Air Content Test Results.** The recorded total air content of fresh concrete that is used to mold corresponding strength test specimens for acceptance.

**Alkali-Silica Reactivity (ASR).** A chemical reaction which occurs over time within concrete between high alkaline cement paste and reactive forms of silica found in some aggregates. In the presence of moisture, an expansive ASR gel is formed which can exert pressure within the concrete, causing random cracking and premature deterioration of the concrete. See subsection c.5.A.

**Concrete Mix Design.** The process, by which the concrete mixture performance characteristics are defined, based on selected materials, performance requirements, environmental exposure considerations, placement methods, and other factors that control the plastic and hardened properties of the concrete in efforts to produce an economical and durable product.

**Job Mix Formula (JMF).** The actual batch quantities (mixture proportions) of each constituent included in the concrete mixture, based on adjustments to the target weights from the mix design, necessary to optimize the concrete mixture properties. Submit mix design and JMF on the MDOT Job Mix Formula (JMF) Concrete Field Communication form (MDOT Form Number 1976); include accompanying documentation.

**Production Lot.** A discrete cubic yard quantity of concrete containing the same JMF and used for the same application, as described in subsection d.2.

**Pay Factor (PF).** The factor that is determined according to the formula herein, used to calculate the price adjustment for a discrete quantity of concrete. Pay factor determination

will be in accordance with the requirements in subsection d.3 and can not exceed 1.00. Therefore, there will never be a positive pay adjustment.

**Quality Assurance (QA).** Activities administered by the Engineer dealing with acceptance of the product, including, but not limited to, materials sampling, testing, construction inspection, and review of Contractor QC documentation. All concrete QA sampling and testing will be performed by the Agency. The Agency administered QA is described in section d of this special provision.

**Quality Control (QC).** All activities administered by the Contractor to monitor, assess, and adjust production and placement processes to ensure the final product will meet the specified levels of quality, including, but not limited to, training, materials sampling, testing, project oversight and documentation. Contractor administered QC is described in section c of this special provision.

**QC Action Limits.** A range of values established by the Contractor in the QC plan that, if exceeded, requires that corrective action be taken by the Contractor to restore the continuity and uniformity of the mixture and methods in conformance with specification requirements. The QC action limits must not exceed the QC suspension limits.

**QC Plan.** The project-specific plan developed by the Contractor describing, in detail, all aspects of production and construction for the project to ensure consistent control of quality to meet specification requirements.

**QC Plan Administrator.** An employee of, or consultant engaged by the Contractor, responsible for developing and overseeing all aspects of QC for the project. This includes, but is not limited to preparing the QC plan, managing the Contractor QC personnel, communicating routinely with the production personnel to ensure quality, initiating corrective action and suspending operations when the process is found to be producing non-conforming materials, and preparing and submitting all necessary QC documentation to the Engineer within the specified time period. The QC Plan Administrator must be a certified concrete technician (Michigan Level II), or have direct authority over a certified concrete technician (Michigan Level II) for the project.

**QC Suspension Limits.** A range of values defined in Table 1 that, if exceeded on a single QC test, requires that the Contractor suspend operations and determine, correct, and document the deficiencies before resuming production. The Engineer must approve all changes prior to resuming production. The QC suspension limit must not exceed specification requirement thresholds.

**Sample.** A representative quantity of concrete taken during production which is used to measure the quality characteristics for a respective production lot of concrete.

**Sampling Rate.** The number of times the fresh concrete is sampled by the Engineer for acceptance. The sampling rate will be determined by the Engineer as described in subsection d.2.B.

**Small Incidental Quantity.** A single day's placement of less than 20 cubic yards of concrete used for non-structural or non-pavement related applications, including, but not limited to: curb and gutter, sidewalks and sidewalk ramps (excluding driveways and driveway ramps), installing sign or fence posts, guard rail or cable rail foundations

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(excluding end anchorage foundations), or other contract items where the small quantity of concrete is not paid for separately, as directed by the Engineer. Price adjustment will not be applied to small incidental quantities provided all other provisions are met for the respective contract item. Requirements for small incidental quantity consideration are described in subsections c.5.G and d.2.B. The corresponding weekly QA 28-day compressive strength test results described in subsection d.2.B must meet specification limits defined in Table 2. ASR requirements specified in subsection c.5.A are not required for small incidental quantities.

**Specification Limits.** The threshold values defined in Table 2 assigned to each quality characteristic used to evaluate the quality of the material.

**Strength Sample Test Result.** A strength sample test result consists of the 28-day compressive strength of the 6-inch by 12-inch or 4-inch by 8-inch cylindrical strength test specimens. A strength sample test result is the average of the two companion strength test specimens taken from the same sample of concrete.

**Strength Test Specimen.** A strength test specimen is defined as each individual 6-inch by 12-inch strength test cylinder or 4-inch by 8-inch strength test cylinder molded and cured according to AASHTO T 23/ASTM C 31 and tested according to AASHTO T 22/ASTM C 39. All respective QC or QA strength test specimens must be the same nominal size.

Note: Strength test specimen cylinder size of 4-inch by 8-inch is permitted only if the nominal maximum coarse aggregate particle size, as specified for the coarse aggregate in the concrete mixture, is 1-inch, or less.

b. **Materials.** Mixture requirements must be in accordance with the contract.

c. **Contractor Administered Quality Control (QC).**

1. **Contractor Quality Control Plan (QC Plan).** Prepare, implement, and maintain a QC plan specific to the project for concrete that will provide quality oversight for production, testing, and control of construction processes. The QC plan must identify all procedures used to control production and placement including when to initiate corrective action necessary to maintain the quality and uniformity of the work.

Develop concrete mix designs and JMFs, as specified, and conduct QC sampling, testing, and inspection during all phases of the concrete work at the minimum frequency, or at an increased frequency sufficient to ensure that the work conforms to specification requirements.

Project-specific items and quality characteristics required in the QC plan include, but are not limited to the following:

- A. Organization chart.
- B. QC Plan Administrator and contact information.
- C. The name(s) and credentials of the QC staff.

- D. Methods for interaction between production and QC personnel to engage timely corrective action, including suspension of work.
- E. Coordination of activities.
- F. Documentation, procedures, and submittals.
- G. Project and plant specifics.
- H. Concrete production facilities inspections and certifications.
- I. Current testing equipment calibration documentation including calibration factor.
- J. Testing and initial field curing facilities for QC and QA strength test specimens (AASHTO T 23/ASTM C 31).
- K. Stockpile management plan.
- L. Corrective action plan.
- M. Mixing time and transportation, including time from batching to completion of delivery and batch placement rate (batches per hour), along with the manufacturer's documentation relative to the batching equipment's capabilities in terms of maximum mixing capacity and minimum mixing time.
- N. Placement and consolidation methods including monitoring of vibration, depth checks, and verification of pavement dowel bar alignment.
- O. Process for monitoring stability of air content of fresh concrete during concrete production and placement.
- P. Hot and cold weather protection considerations and methods.
- Q. Control charts with action and suspension limits.
- R. Verification for non-deleterious alkali-silica reactivity (see subsection c.5.A).
- S. Mix design and JMFs.
- T. Proposed location for use of each JMF on the project.
- U. The frequency of sampling and testing.
- V. Handling, protection, initial curing, and transporting of strength test specimens (AASHTO T 23/ASTM C 31).
- W. Methods to monitor construction equipment loading and open-to-traffic strengths.
- X. Finishing and curing procedure.
- Y. Ride quality control.

Submit the QC plan, for the appropriate items of work, to the Engineer for review a minimum of 10 working days before the start of related work. The Engineer will notify the Contractor of any objections relative to the content of the QC plan within 5 working days of receipt of the QC plan. Do not begin concrete placement before acceptance of the QC plan by the Engineer.

2. QC Records. Maintain complete records of all QC tests and inspections. Document what action was taken to correct deficiencies. Include sufficient information to allow the test results to be correlated with the items of work represented.

Furnish one copy of all QC records and test reports to the Engineer within 24 hours after the date covered by the record in a format acceptable to the Engineer. The Engineer will withhold acceptance of the concrete for failure to provide properly documented and timely QC records and reports.

If the Engineer is performing QA sampling and testing at the same time the Contractor is performing QC sampling and testing, all associated QC records must include the appropriate identification number that correlates with the Engineer's QA identification number.

3. Personnel Requirements. The QC Plan Administrator must have full authority and responsibility to take all actions necessary for the successful implementation of the QC plan, including but not limited to, the following:

A. Monitoring and utilizing QC tests, control charts, and other QC practices to ensure that delivered materials and proportioning meets specification requirements.

B. Monitoring materials shipped to the project, prior to their use, to ensure their continued compatibility toward producing consistent quality.

C. Periodically inspecting all equipment utilized in transporting, proportioning, mixing, placing, consolidating, finishing, and curing to ensure proper operation.

D. Monitoring materials stockpile management, concrete batching, mixing, transporting, placement, consolidation, finishing, and curing to ensure conformance with specification requirements.

E. Maintaining and submitting all QC records and reports.

F. Directing the necessary corrective action to ensure continual conformance within the QC action limits.

G. Suspending production for the project when suspension limits are exceeded.

H. Conducting or monitoring adjustments to the JMF.

Individuals performing QC tests must demonstrate that they are proficient and capable of sampling and testing concrete or aggregate, where applicable, in accordance with the associated test procedures and Agency requirements prior to commencement of related

work. Any adjustments to the JMF must be made by a certified concrete technician (Michigan Level II).

4. QC Laboratory Requirements. Laboratories, including field laboratories and all associated testing equipment that prepare concrete mixes or perform QC testing, must demonstrate to the Engineer that they are equipped, staffed, calibrated, and managed so as to be capable of batching, and testing Portland cement concrete in accordance with the applicable test procedures. Mix designs and their accompanying JMFs must include a statement, signed by a certified concrete technician (Michigan Level II), that all applicable standard test methods have been followed in verifying the mix design and JMF.

5. Mix Design and Documentation. Design concrete mixtures meeting the requirements specified in Tables 601-2 and 701-1 of the Standard Specifications for Construction. Provide the grade of concrete for the section number reference application specified in Tables 601-2 and 701-1, or as specified in the contract. Request variance in writing when proposing a mix design and JMF that exhibits temperature, slump or air content other than those specified. Include the proposed mix design, JMF, and associated trial batch verification test data. Do not use a grade of concrete with a minimum specified 28-day compressive strength greater than what is designated for the application. The maximum water/cementitious ratio must not exceed 0.45.

The maximum slump for Grades P1 and P2 concrete is 3 inches or as documented on the approved JMF. All other grades of concrete will be according to Tables 701-1 A and B of the Standard Specifications for Construction

The specified air content of fresh concrete is 5.5 - 8.0 percent. Air content of fresh concrete less than 5.5 percent for concrete that lies in the finished work at least 3 feet below the surface of the ground or entirely under water will not be cause for rejection.

Use aggregates from only geologically natural sources.

Secure prior approval from the Engineer to use concrete intended for early opening to traffic to facilitate driveway gaps or other features necessary for required local access.

Unless specified otherwise, do not exceed 40 percent substitution by volume of the total cementitious materials with slag cement or fly ash. Use the combined weight of all cementitious materials to determine compliance with the maximum water-cementitious ratio and cementitious material content requirements specified above. Include provisions for cold and hot weather protection in the QC plan.

Use admixture dosage as indicated in the Qualified Products List to reduce mixing water. For night casting, where applicable, a water-reducing admixture may be used in lieu of a water-reducing and retarding admixture, provided the concrete can be placed and finished in the sequence specified on the plans prior to initial set, is not subjected to residual vibration, or is not within the areas influenced by dead load deflections as a result of adjacent concrete placement operations.

A. Alkali-Silica Reactivity. Provide documentation to the Engineer that the concrete mixture does not present the potential for excessive expansion caused by alkali-silica reactivity (ASR). Provide a Test Data Certification with the latest test results (valid for 2 years) conforming to the specified criterion for one of the following standard test

methods ASR requirements specified in subsection c.5.A are not required for small incidental quantities.

(1) Method 1. ASTM C 1260. Mortar Bar Test. If the expansion of the mortar bars is less than 0.10 percent at 14 days of immersion, the fine aggregate is considered non-deleterious to ASR reactivity and may be used in the concrete without the need for ASR mitigation.

(2) Method 2. ASTM C 1293. Concrete Prism Test.

- If the expansion of concrete prisms is not greater than 0.040 percent after 1 year, the fine aggregate is considered non-deleterious to ASR reactivity and may be used in the concrete without the need for ASR mitigation.
- If the expansion of concrete prisms is greater than 0.040, but not exceeding 0.120 percent after 1 year, the fine aggregate is considered moderately deleterious to ASR reactivity and mitigation is required, as follows. A Low-Alkali cement with equivalent alkalis ( $\text{Na}_2\text{O} + 0.658 \times \text{percent K}_2\text{O}$ ) not exceeding 0.60 percent may be used in the concrete mixture to mitigate the potential for ASR reactivity provided the total alkali content for the cementitious materials combination does not exceed 3.0 pounds per cubic yard ( $\text{Na}_2\text{O}$  equivalent).

(3) Method 3. ASTM C 1567. Mortar Bar Test. If no previous test data are available for the fine aggregate that shows it is resistant to ASR using either Method 1 or 2, above, replace 25 to 40 percent of the Portland cement in the concrete mixture with Class F fly ash or Slag Cement (Grade 100 minimum). A blended cement meeting the requirements of ASTM C 595 containing Portland cement and slag cement or Class F fly ash may also be used.

Demonstrate the ability of the fly ash or slag cement to control the deleterious expansion caused by ASR by molding and testing mortar bars according to the standard test method described in ASTM C 1567 using the mix proportions for both the aggregates and the cementitious materials proposed for the project. Make at least three test specimens for each cementitious materials-aggregate combination. If the average of three mortar bars for a given cementitious materials-aggregate combination produces an expansion less than 0.10 percent at 14 days of immersion, the JMF associated with that combination will be considered non-deleterious to ASR reactivity. If the average expansion is 0.10 percent or greater, the JMF associated with that combination will be considered not sufficient to control the deleterious expansion caused by ASR and the JMF will be rejected.

If the expansion exceeds the respective threshold limits for the ASTM used, then the Engineer will not approve the use of that concrete mixture.

B. Contractor Provided Mixes. Provide mix design and accompanying JMFs using the methods of verification included in this special provision. Include sufficient information on constituent materials and admixtures along with trial batch verified physical properties of the fresh concrete, mix proportions per cubic yard for all constituents and compressive strength test results necessary to allow the Engineer to fully evaluate the expected performance of the concrete mixture.

(1) Mix Documentation. Prepare mix designs for each grade of concrete required on the project. Submit JMF for each mix design, including all required documentation, to the Engineer for review 10 working days before the anticipated date of placement. The Engineer will notify the Contractor of any objections within 5 working days of receipt of the mix documentation. Number or otherwise identify each JMF and reference all accompanying documentation to this number. Reference each JMF to the appropriate method of verification. Mix design and JMF submittals that do not include all required documentation will be considered incomplete and the Engineer will return them without review.

Provide all supporting mix documentation, including test reports and mix proportion adjustment calculations. All mix designs and accompanying JMFs must be traceable to a laboratory meeting the requirements of this special provision. Include the necessary documentation described in subsection c.5.

Submit mix design and JMF on the MDOT Job Mix Formula (JMF) Concrete Field Communication form (MDOT Form Number 1976); include accompanying documentation. List the source of materials, bulk density (unit weight) of coarse aggregate (rodding procedure or shoveling procedure), absorption of aggregates, relative density (specific gravity) of aggregates, aggregate correction factors, batch weights, and project specific or historical laboratory test data. Include the recorded air content of fresh concrete using the same admixture and cementitious material sources to be used in the production of the concrete for the project. The 28-day compressive strength and air content of fresh concrete for the concrete which is reported as part of the mix documentation submittal must meet the specification limits described in Table 2.

(2) Job Mix Formula (JMF). Select proportions for concrete mixtures according to ACI Standard 211.1. The volume of coarse aggregate per unit volume of concrete must be 65 to 75 percent, inclusive.

Four methods of verification of proposed JMF are acceptable.

(a) Method 1. Trial Batches. Base trial batches on the same materials and proportions proposed for use on the project. Prepare at least one trial batch for each mix design in sufficient time before starting concrete placement to allow for review according to subsection c.5.B.(1). Provide the results of temperature, slump, density (unit weight), air content of fresh concrete, 28-day compressive strength, and age of concrete at the time of strength testing, for a minimum of three independent samples. For JMF trial batch verification purposes only, 7-day compressive strength test results which report at least 70 percent of the specified 28-day minimum design strength will be sufficient documentation in lieu of 28-day compressive strengths. The average of at least two strength test specimens represents one compressive strength sample test result for each independent sample. A JMF will be considered approved for use only if all of the physical properties of the concrete (as described above) are within specification limits. Provide the necessary ASR documentation as described in subsection c.5.A.

(b) Method 2. Same Mix. Verification based on experience with the same mix design, JMF, and the same materials. Provide the results of temperature,

slump, density (unit weight) air content of fresh concrete, 28-day compressive strength, and age of concrete at the time of strength testing, for a minimum of three independent samples. The average of at least two strength test specimens represents one compressive strength sample test result for each independent sample. Do not substitute material types or sources, including admixtures or cementitious materials, nor change mix proportions in the JMF. A JMF will be considered approved for use only if all of the physical properties of the concrete (as described above) are within specification limits. Provide the necessary ASR documentation as described in subsection c.5.A.

(c) Method 3. Similar Mix. Verification based on experience with a mix design and JMF similar to the proposed mix design that used similar coarse aggregate materials. Substitution of coarse aggregate source is permitted only if the new source is of the same geologic type and meets minimum physical properties as the original aggregate and conforms to the specification requirements for the respective application. Verify, prior to batching, that the proposed changes to the JMF will not affect the properties of the fresh concrete (slump, temperature, air content, density (unit weight), workability), nor result in excessive mortar bar expansion as a result of deleterious reactivity between the aggregates and cementitious materials as described in subsection c.5.A.

Provide the supporting laboratory test documentation as for Method 1. Include all material properties for the original and substituted aggregates. Submit calculations showing how the mix proportions in the JMF were adjusted, based on the documented differences in relative density (specific gravity), bulk density (unit weight) and absorption of the substituted aggregate sources, to produce a theoretical yield of 100 percent.

(d) Method 4. Annual Verification. At the Engineer's option, verification may be accepted annually for a concrete plant rather than on a project basis provided the sources and proportions of the constituent materials, including cementitious materials and source and types admixtures, do not change. If the project is the continuation of work in progress during the previous construction season and written certification is submitted to the Engineer that materials from the same source and with the same mixture properties are to be used, the Engineer may waive the requirement for annual renewal verification of the JMF for the project. Provide the necessary ASR documentation as described in subsection c.5.A.

C. Agency Provided Mixes. Unless otherwise specified in the contract, the Engineer will provide the concrete JMF for the following types of concrete regardless of the total quantity for the project.

- Structural concrete patching mixtures, mortar and grout.
- Prestressed concrete.
- Bridge deck overlay concrete mixtures.
- Project-specific concrete mixtures and grades not defined in Tables 601-2 and 701-1 of the Standard Specifications for Construction.

D. Changes in Materials and Proportions. Any changing from one approved JMF to another for the same grade of concrete must have prior approval by the Engineer. Record all changes to JMF in the QC records along with the rationale for the change. Verify, prior to batching, that the proposed changes to the JMF will not affect the properties of the fresh concrete (slump, temperature, air content, density (unit weight), workability), nor result in excessive mortar bar expansion as a result of deleterious reactivity between the aggregates and cementitious materials as described in subsection c.5.A.

E. QC Sampling and Testing. Conduct startup sampling and testing for temperature, slump, density (unit weight), and air content on the first load. Do not place concrete until testing verifies that the fresh concrete properties have not exceeded the QC action and suspension limit thresholds specified in Table 1. Continue testing subsequent loads as described in the QC plan, for each grade of concrete delivered to the work site each day. The QC sampling and testing must be random and independent from the Engineer's QA sampling and testing.

Ensure that the curing facilities are on site and are equipped to provide the proper environment for initial curing of the QC and QA concrete strength test specimens.

Perform QC sampling and testing of the fresh concrete for air content loss at least once during each week of concrete production, or whenever QC tests have shown that QC action limits have been exceeded, whichever is more frequent. Sample and test a representative haul unit of concrete immediately after its discharge but before the paver or pump hopper, where applicable. Sample and test the concrete representing the same haul unit, again, after the paver or after discharge from the pump and after vibration, where applicable. If the difference in measured air content between the two test locations for the same concrete is greater than two percent air by volume of concrete, suspend operations and administer corrective action. Resume concrete placement only after taking the necessary corrective action to reduce the loss in air content of fresh concrete between the two test locations, as approved by the Engineer. Document the corrective action to be taken in the QC records and make the necessary changes to the QC plan, where applicable.

Concrete exceeding the maximum specification limits for slump or temperature must be rejected regardless of the total mixing time or number of mixing revolutions at the time of arrival to the project.

The Engineer may require the Contractor to administer additional QC sampling and testing if the Engineer determines the Contractor's current QC sampling and testing methodology is shown to be insufficient to ensure continual control of the quality of the concrete.

Take the appropriate corrective action, as described in the QC plan, when QC testing shows the QC action limits for any quality characteristic are exceeded. Suspend production if any of the QC suspension limits are exceeded or if the corrective action is not sufficient to restore the quality to acceptable levels.

Resume production only after making all necessary adjustments to bring the mixture into conformance with all applicable specifications and receiving approval to resume work from the Engineer. Document these adjustments in the QC records.

Table 1: Action and Suspension Limits

Quality Characteristic	Action Limits	Suspension Limits
Air Content (percent)	As Defined in the Contractor QC Plan	< 5.5 or > 8.0
Air Content Loss (percent)		Greater than 2.0
Conc. Temp. (Deg. F)		< 45 or > 90 at time of placement
Slump (max.) (inch)		See subsection c.5
Density (unit weight)		N/A

F. Work Progress Test Specimens. Determine the strength of concrete for opening to construction traffic or regular traffic, for removing shoring and forms, or for other similar purposes in accordance with subsections 104.11, 601.03.H and 701.03.D of the Standard Specifications for Construction, and as approved by the Engineer. Cure work progress test specimens in the same manner as the in-situ concrete. Allow the Engineer to witness testing of work progress cylinder or beam specimens and non-destructive testing, including calibration tests.

For pavement repairs described in section 603 of the Standard Specifications for Construction, the maturity method may be used to determine the in-place, opening-to-traffic flexural strength, provided the necessary preliminary flexural strength versus opening-to-traffic time correlations, using the same materials and JMF, are established and approved by the Engineer before placing the concrete.

G. Reduced QC for Small Incidental Quantities. Reduced levels of on-site QC testing for concrete may be considered for small incidental quantities defined in subsection a.1 provided provisions for administering reduced QC testing and oversight are included in the approved QC plan and the following criteria are met.

(1) The small incidental quantity of concrete will be limited to a single day's concrete placement.

(2) The small incidental quantity is not an integral part of a structural load bearing element.

(3) The Engineer received written certification from the Contractor that the concrete supplier has a current QC plan in place and available for review upon request by the Engineer.

(4) The concrete supplier employs a certified concrete technician (Michigan Level II) available at the plant or on call during concrete placement to validate and authorize modifications to the concrete JMF, as necessary.

(5) Prior to the first concreting operation, concrete representing the JMF for the small incidental quantity has been sampled and tested by a certified concrete technician (Michigan Level I or II) to verify that, historically, the JMF produced a concrete mixture meeting the minimum requirements for density (unit weight), slump, air content, and strength. Annual verification may be acceptable provided there are no changes to the material types or sources, including cementitious materials and admixtures.

(6) The Engineer verified that the temperature, slump, and air content conform to specification requirements at the start of the day's concreting operation associated with the small incidental quantity.

(7) The Engineer is notified and provided sufficient opportunity to witness concrete placement.

**d. Agency Administered Quality Assurance (Acceptance).**

1. Agency Quality Assurance Plan (QA plan). The Engineer will be responsible for administering the quality-based acceptance and will institute any actions necessary toward its successful implementation.

Acceptance of concrete for full-depth pavement repairs will be according to section 603 of the Standard Specifications for Construction.

The Engineer will develop and follow a QA plan. The Engineer will provide the QA plan to the QC Plan Administrator a minimum of 7 calendar days prior to the pre-production meeting. The QA plan will be reviewed at the pre-production meeting and any proposed changes will be documented.

The nominal QA strength test specimen size, defined in subsection a.1 will be noted in the QA plan.

A. Personnel Requirements. The personnel responsible for field inspection and for obtaining QA samples will possess the required qualifications to collect QA samples. Sampling will be performed by qualified personnel possessing the current applicable certification through the Michigan Concrete Association (Michigan Level I or II) or through the Michigan Concrete Paving Association (Level I or II) certified concrete technicians, or where applicable, (MCAT) certified aggregate technician.

B. QA Testing Correlation. The testing equipment and associated testing personnel for both the Engineer's QA and Contractor's QC will conduct side by side testing of the same concrete representing the first production placement for the project to verify correlation of both the Engineer's and the Contractor's test results for slump, temperature, and air content of fresh concrete. The temperature measuring devices used for QC and QA must correlate relative to each other within 2 degrees F. The Engineer will request an Independent Assurance Test in the event the air content results of two tests conducted between the Engineer's and the Contractor's testers differ by more than 1.0 percent air by volume of concrete.

C. Laboratory Facilities. The testing laboratory with responsibility for acceptance testing on this project is the Agency testing laboratory, or a qualified facility under the authority of the Engineer.

2. QA Sampling and Testing. The Engineer will conduct QA sampling and testing, monitor the Contractor's adherence to the QC plan, and inspect field placed materials. Initial approval is required prior to concrete placement for, temperature, slump and air content, and is based on the Engineer's observance of QC startup sampling and testing described in subsection c.5.E.

A. Production Lot Size and Make Up. A production lot will be defined as a single day of concrete, or as determined by the Engineer. A production lot will not include more than one grade of concrete, concrete of the same grade having different specified slump or air content, or concrete of the same grade having different material sources, mix designs or JMFs.

B. Sampling. Representative QA sampling and testing will be determined by the Engineer during concrete placement. The sampling rate will be one sample per 50 cubic yards, approximately, plus or minus, based on the anticipated total quantity of concrete to be placed and site conditions, with a minimum of one sampling for each day of production.

At the option of the Engineer, small incidental quantities as defined in subsection a.1 may be accepted (visually inspected and noted on the Inspector's Daily Report) without daily 28-day compressive strength QA test specimens provided there is a current acceptable strength test history of the JMF for the project prior to placement of the small incidental quantity. One set of compressive strength QA test specimens will then be molded for each small incidental quantity JMF at least once per week during production, thereafter, as directed by the Engineer (note the test results or identification number for the corresponding weekly QA compressive strength test result on the Inspector's Daily Report for each small incidental quantity). Quality control testing and daily QA testing for temperature, slump, and air content are still required as described in subsection c.5.G.

Samples will be taken from the concrete at the location as close to its final placement into the forms or on the grade as practical.

Samples for acceptance will not be taken at the concrete production facility (batch plant), nor prior to discharge from a concrete pump (excluding tremie seal placement applications). Mix adjustments (beyond normal QC) to the haul unit selected for QA sampling and testing will not be permitted prior to QA sampling and testing. QA sampling will be random and without prior notification.

C. Testing. The location(s) within the project limits for QA testing of the fresh concrete and placement of curing facilities for initial curing of the 28-day compressive strength QA test cylinders will be determined by the Engineer in conformance with the following criteria:

- (1) The elapsed time between obtaining the first and the final portion of the composite sample must not exceed 15 minutes.
- (2) Testing for slump, temperature, and air content of fresh concrete must begin within 5 minutes after obtaining the final portion of the composite sample.
- (3) Molding of the 28-day compressive strength QA test cylinders must begin within 15 minutes after obtaining the final portion of the composite sample.
- (4) The concrete sample must be protected from the sun, wind, and other sources of rapid evaporation, and from contamination.

The Contractor will provide curing facilities equipped to ensure the proper environment for the Engineer's QA concrete strength test specimens during initial cure. Each initial

cure facility must provide ventilation or insulation, where applicable, to ensure the ambient temperature surrounding the specimens is maintained according to AASHTO T 23. Failure by the Contractor to maintain the proper curing environment during initial cure will not be basis for rejection of QA samples. Each initial curing facility must be capable of being locked, using an Agency provided padlock. The Contractor will ensure that all initial curing facilities are accounted for at all time, and protected against, theft and damage. The Contractor will locate and secure each initial cure facility throughout the project limits in such a manner so as to minimize excessive transport of the test specimens prior to initial cure, as follows:

- Immediately after finishing molded specimens, the Engineer will move the QA concrete strength test specimens to the closest initial cure facility provided by the Contractor.
- Immediately after all QA concrete strength test specimens are placed into the cure facility and the proper initial curing conditions have been established, the Engineer will secure the facility using the Agency provided padlock. Access to the QA concrete strength test specimens, thereafter, must be coordinated with the Engineer and will only be permitted in the presence of the Engineer.
- The Engineer will transport the QA concrete strength test specimens within 48 hours after molding, but not prior to 8 hours after final set of the concrete, from the initial curing facility to the Agency designated testing laboratory for final curing and strength testing. The specimens will be protected with a suitable cushioning material to prevent damage from jarring during transport. The total transportation time must not exceed 4 hours prior to commencement of final curing.

D. QA Stop Production Criteria. The Engineer will issue a Notice of Non-Compliance with Contract Requirements (Form 1165) and concrete production must stop when one or more of the following are observed.

(1) The QA testing shows that one or more of the suspension limits for quality characteristics defined in Table 1 are in non-compliance.

(2) The QC plan is not being followed.

(3) Segregation, excessive slumping of unsupported slipformed edges, or other notable changes in the fresh concrete properties is observed that may prevent proper placement, consolidation and finishing, or compromise the performance or long-term durability of the finished product.

(4) The required curing system is not being applied in a timely manner, as specified by the contract.

(5) If the difference in measured air content between the two testing locations for the same concrete is greater than two percent air by volume of concrete, as follows:

(a) immediately after discharge but before the paver or pump hopper (where applicable), and

(b) after the paver or discharge from the pump (where applicable).

The Engineer will issue a Notice to Resume Work (Form 1165) only after all necessary adjustments are made to restore conformance with all applicable specifications, and the appropriate documentation is made in the QC records.

E. QA Records. The Engineer will maintain a complete record of all QA tests and inspections. The records will contain, as a minimum, signed originals of all QA test results and raw data, and resulting calculations. The QA test results will not be provided to the Contractor until the corresponding QC test results are received by the Engineer.

3. Pay Factor Determination and Price Adjustment. The Engineer's QA test results will be used to determine the pay factor (PF) and price adjustment (ADJ). The Contractor's QC test results will not be used for pay factor and price adjustment analysis. The Engineer will complete pay factor and price adjustment analysis within 7 days after completion of all 28-day compressive strength testing for the representative production lot.

**Table 2: Specification Limits**

Quality Characteristic	Specification Limits
Air Content (percent)	5.5 – 8.0
Conc. Temp. (Deg. F)	45 - 90 at time of placement
Slump (max.) (inch)	See subsection c.5
28-day Compressive Strength	LSL, subsection c.5
Rejection Limit - Lower 28-day Compressive Strength	0.75 x (LSL)

The specification limits for the fresh concrete properties are defined in subsection c.5. Concrete not conforming to the requirements specified in subsection c.5 may be rejectable and subject to further evaluation, as directed by the Engineer.

Use the following formula to calculate the PF and associated price ADJ for each concrete item.

$$PF = \frac{\text{Tested Strength}}{LSL}$$

$$ADJ = (PF-1) (\text{Price})$$

Tested Strength = QA 28-day compressive strength sample test result

LSL = Lower specification limit (Minimum Design Strength, see subsection c.5)

PF = Pay Factor (carried to two decimal places, not to exceed 1.00)

ADJ = Price adjustment to be applied to the quantity represented by the QA test

Price = Contract unit price bid for the pay item

4. Re-evaluation of Rejectable Concrete. If the tested strength does not achieve the lower rejection limit specified in Table 2, the associated concrete will be rejected and the Engineer will require additional evaluation to decide what further action may be warranted. If the Engineer determines that non-destructive testing (NDT) or coring is necessary, this work will be done by the Contractor in the presence of the Engineer within 45 days from

concrete placement. All costs associated with this work will be borne by the Contractor. The Engineer will take custody of all cores intended for re-evaluation immediately after coring. If NDT is used to estimate the in-situ strength, a calibrated relationship between the concrete mixture and the NDT apparatus must have been established prior to NDT testing according to its respective standard test method. Test results from re-evaluation of rejectable concrete using NDT or coring will not be used for pay factor (PF) and price adjustment (ADJ) purposes. If the results from re-evaluation confirm that the lower rejection limit for 28-day compressive strength has been achieved, the represented quantity of concrete will remain in place and a pay factor (PF) of 0.75 will be applied for price adjustment (ADJ) determination. However, if the results from re-evaluation confirm that the lower rejection limit for 28-day compressive strength has not been achieved, as described above, the Engineer will elect to do one of the following.

A. Require removal and replacement of the entire represented quantity of concrete with new initial tests and pay factor and price adjustment analysis procedure conducted.

B. Allow the represented quantity of concrete to remain in place and apply an adjustment of minus 50.00 percent to all concrete items in the lot.

C. Allow the Contractor to submit a plan for corrective action for the Engineer's approval, to address the disposition of the rejectable concrete. If the Engineer does not approve the plan for corrective action, subsection d.4.A or d.4.B will be applied.

**e. Measurement and Payment.** If a price adjustment is made for reasons included in this special provision, that adjustment will be made using the original unit price bid for the specific item. If a contract unit price requires adjustment for other reasons not described in this special provision, the adjustments will be made using the original unit price and the adjustments will be cumulative.

Separate payment will not be made for providing, implementing, and maintaining an effective QC program. All costs associated with this work will be included in the applicable unit prices for the concrete items. Failure by the Contractor to maintain the proper curing environment during initial cure will not be basis for claim against the Agency.

All costs associated with providing, locating, relocating, maintaining, and securing the adequate number of portable curing facilities for the project, necessary to provide sufficient initial curing for the Contractor's QC and Engineer's QA strength test specimens will be included in the applicable unit prices for the concrete items. No additional payment will be permitted. The Contractor is responsible for damage, theft, subsequent replacement, and removal after completion of the work for each curing facility used on the project.