

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 identification. 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.

Mix documentation for the project is required to be verified annually. The Engineer may allow annual mix documentation renewal if it is shown that the material characteristics have not deviated beyond the requirements specified in the contract.

All mix designs and accompanying JMFs must be traceable to a laboratory meeting the requirements of this special provision.

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. A JMF will be approved only if all of the minimum mix design requirements specified in the contract have been met.

(2) Job Mix Formula (JMF). Select proportions for concrete mixtures according to *ACI Standard 211.1*. The volume (oven-dry-rodded) of coarse aggregate per unit volume of concrete must be 65 percent, minimum.

Four methods of verification of proposed JMF are acceptable.

(a) Method 1. Trial Batches. Verification of JMF is based on trial batches with 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) of this special provision. 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. All samples may be taken from a single trial batch for a mix design provided the trial batch is at least four cubic yards in volume. For JMF trial batch verification purposes only, 7-day compressive strength test results which report at least 70 percent of the specified 28-day lower specification limit (LSL) 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. Provide the necessary ASR documentation as described in subsection c.5.A of this special provision.

(b) Method 2. Same Mix. Verification of JMF is based on the concrete producer's 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. Provide the necessary ASR documentation as described in subsection c.5.A of this special provision.

(c) Method 3. Similar Mix. Verification of JMF is based on requirements described in Method 2, in subsection c.5.B.(2).(b) of this special provision. Substitution of coarse aggregate source is permitted if the new source is of the same geologic type as the original aggregate, and conforms to the specification requirements for the application. Substitution of fine aggregate is permitted only if the new source has been tested for ASR. Provide the necessary ASR documentation as described in subsection c.5.A of this special provision.

Provide the supporting laboratory trial batch documentation and accompanying 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 and the required fresh concrete properties.

(d) Method 4. Annual Verification. At the Engineer's option, verification may be accepted annually for a concrete producer 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 of this special provision.

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

- (1) Structural concrete patching mixtures, mortar and grout.
- (2) Bridge deck overlay concrete mixtures.
- (3) Project-specific concrete mixtures and grades not defined in Table 1.

Provide all other mix designs and accompanying JMF's according to subsection c.5.B of this special provision.

The ASR documentation for the fine aggregate described in subsection c.5.A of this

special provision must accompany the Contractor's request for the concrete JMF.

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.

Prior to batching, verify that the proposed JMF changes will not affect the properties of the fresh concrete (slump, temperature, air content, density (unit weight), workability), nor result in deleterious mortar bar expansion as a result of ASR, as described in subsection c.5.A of this special provision.

Record all changes to JMF in the QC records along with the rationale for the change.

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 2 and the testing correlation requirements of subsection d.1.B of this special provision have been met. 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 Agencies QA sampling and testing.

Provide the curing facilities in accordance with subsection d.2.C of this special provision prior to start of concrete production.

Perform QC sampling and testing for air content of fresh concrete that is either slipformed or pumped, as described in the QC plan. Sample and test a representative haul unit of concrete immediately after its discharge but before the slipform paver or pump hopper, where applicable. Sample and test the concrete representing the same haul unit, again, after the slipform paver or after discharge from the pump (without interruption or alteration of the pumping operation), where applicable. If the difference in measured air content between the two test locations for the same concrete is greater than 1.5 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 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 2: QC Action and Suspension Limits

Quality Characteristic	Action Limits	Suspension Limits
Air Content (percent)	See Note Below	< 5.0 or > 9.0
Air Content Loss (percent)	As Defined in the Contractor QC plan	Greater than 1.5
Conc. Temp. (Deg. F)		< 45 or > 90 at time of placement
Slump (max.) (inch)		See Table 1, footnote (g)
Density (unit weight)		N/A
Note: Action limits must be defined in the Contractor QC plan and cannot be < 5.5 or > 8.5. Suspend work if air content is < 5.0 or > 9.0 percent after pump or paver, regardless of the air content loss.		

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 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 test specimens.

The maturity method may be used to determine the in-place, opening-to-traffic flexural strength, provided the necessary preliminary flexural strength versus time-temperature factor correlation, using the same materials and JMF, is established according to Department procedures and approved by the Engineer before placing the concrete.

G. Reduced QC for Small Incidental Quantities. If approved by the Engineer, reduced levels of on-site QC testing for concrete may be considered for small incidental quantities defined in subsection a.1 of this special provision.

Unless approved by the Engineer, multiple small incidental quantities, including ones that are consecutively placed throughout the project on the same day, are not eligible for reduced QC consideration if the total plan quantity of concrete for the item exceeds 100 cubic yards in volume. Include details for reduced QC testing and oversight in the approved QC plan, and in accordance with following:

(1) The small incidental quantity of concrete will be limited to a single day's concrete placement of a maximum 20 cubic yards in volume.

(2) The small incidental quantity of concrete 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 (MCA 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 (MCA 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 the 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. Department Administered Quality Assurance (Acceptance).

1. Department 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 pavement repair mixtures and concrete mixtures not included in Table 1 will be in accordance with the contract.

The Engineer will develop and follow a QA plan. The Engineer will provide the QA plan to the QC Plan Administrator a minimum of 5 working 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 of this special provision 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 a certified concrete technician (MCA Michigan Level I or II) or (MCAT) certified aggregate technician, where applicable.

B. Testing Correlation. Prior to initial concrete placement, the testing personnel for both the Engineer's QA and Contractor's QC will use the equipment they have assigned to the project to conduct side by side correlation testing of the same concrete used on the project to verify correlation of both the Department's and the Contractor's test results for temperature and air content of fresh concrete. Additional side by side correlation testing will be conducted whenever there is a change in QC or QA equipment and/or testing personnel for the project, or as directed by the Engineer. The temperature measuring devices used for QC and QA must correlate with each other within 2 degrees F. If the air content results of the side by side tests conducted by the QC and QA testers and equipment differ by more than 0.8 percent air by volume of concrete, a referee air content test of fresh concrete must be conducted by a third party, designated by the Engineer but independent of the project, prior to commencement or continuation of concrete placement in efforts to resolve issues associated with non-correlation.

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

authority of the Engineer.

2. QA Sampling and Testing. The Engineer will verify the Contractor's daily startup sampling and testing of temperature, slump, and air content of fresh concrete on the first load; conduct QA sampling and testing; monitor Contractor adherence to the QC plan; and inspect field placed materials in such a manner as to ensure that all concrete for the project is represented. The testing correlation requirements of subsection d.1.B of this special provision must be met prior to concrete placement.

The following *ASTM* test methods will apply. The Department's established procedures for sampling and testing are acceptable alternatives.

C 31 Practice for Making and Curing Concrete Test Specimens in the Field

C 39 Test Method for Compressive Strength of Cylindrical Concrete Specimens

C 78 Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)

C 138 Test Method for Density (Unit Weight), Yield and Air Content (Gravimetric) of Concrete

C 143 Test Method for Slump of Hydraulic-Cement Concrete

C 172 Practice for Sampling Freshly Mixed Concrete

C 173 Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method

C 231 Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

C 293 Test Method for Flexural Strength of Concrete (Using Simple Beam with Center-Point Loading)

A. Lot Size and Make Up. 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 mix designs, or JMFs. Lot size and makeup will be determined by the Engineer, based on site conditions. A production lot may consist of a single day's production, individual concrete structural elements (eg. footing, column, pier cap, deck, bridge approach slab), or any combination thereof, provided they are of the same JMF. Each production lot will be divided into sublots of approximately equal size, as determined by the Engineer. The minimum number of sublots will be one per production lot, with the maximum number of sublots based on the anticipated total quantity of concrete to be placed and site conditions. A minimum of one sublot will be required for each day of production.

B. Sampling. QA sampling and testing will be conducted by the Engineer during concrete placement. Where practical, the random number method (as described in the "Random Sampling for Quality Control/Quality Assurance Projects" section of the Materials Quality Assurance Procedures Manual) will be used to determine the sampling locations. The sampling rate will be determined by the Engineer, 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 of this special provision 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 determined 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 of fresh concrete are still required. Reduced QC for small incidental quantities, as described in subsection c.5.G of this special provision, may be considered.

The QA sampling rate and sample location will be based on cubic yard quantities.

Samples for acceptance will be taken at the point of discharge from the haul unit, at approximately the middle one-third of the load. Mix adjustments to the concrete contained within the haul unit selected for QA sampling and testing (beyond normal QC) will not be permitted prior to QA sampling and testing. QA sampling will be random and without prior notification.

The Engineer will perform QA sampling and testing for air content loss of fresh concrete that is either slipformed or pumped, (1) at least once during each day of production, (2) whenever the concrete pump is relocated, where applicable, or (3) whenever there is a significant change in the boom configuration or operation of the concrete pump, or there is a significant change in the characteristics of the paving operation during concrete placement. Concrete will be sampled from a representative haul unit immediately after its discharge but before the slipform paver or pump hopper, where applicable. The concrete representing the same haul unit will then be sampled and tested after the slipform paver or after discharge from the pump (without interruption or alteration of the pumping operation), where applicable. If the difference in measured air content between the two test locations for the same concrete is greater than 1.5 percent air by volume of concrete, the Engineer will issue a Notice of Non-Compliance with Contract Requirements (Form 1165), as described in subsection d.2.D of this special provision. The Contractor may resume concrete placement only after the necessary corrective action is taken to reduce the loss in air content of fresh concrete between the two test locations, as approved by the Engineer. Document the corrective action that was taken by the Contractor.

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.

Two QA concrete strength test specimens per sample will be molded for 28-day compressive strength QA testing.

The Contractor will provide curing facilities equipped to ensure the proper environment for the Agencies 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 T23/ASTM C 31*. Failure by the Contractor to maintain the proper curing environment during initial cure will not be basis for rejection of samples or claims against the Department. Each initial curing facility must be capable of being locked, using an Department 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 place 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:

- (5) 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.

- (6) 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 Department 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.

- (7) 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 Department's 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 2 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 measured air content loss between the two testing locations for the same concrete is greater than 1.5 percent air by volume of concrete as described in subsections c.5.E and d.2.B of this special provision.

(6) If the air content of fresh concrete is less than 5.0 or greater than 9.0 percent after pump or paver, regardless of the recorded QC or QA air content loss through the pump or paver.

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, random numbers used (where applicable) 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. Quality Index Analysis. 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 working days after completion of all 28-day compressive strength testing for the representative production lot or quantity of concrete. The quality index parameter specification limits are defined in Table 3. Unless otherwise specified in the contract, concrete not conforming to the requirements specified in Table 3 is rejectable and subject to further evaluation. All values of PF and OLPF in these formulae are decimal, not percent. All values of PF and OLPF are rounded to two decimal places.

Price adjustment for 28-day compressive strength deficiencies will be based on test results for the corresponding weekly QA test specimens and the pay factor (PFs) calculated according to the formula defined in subsection d.3.A. The price adjustment (ADJ) = (PFs – 1)(Price).

Table 3: Quality Index Parameter Specification Limits

Quality Characteristic	Specification Limits
Air Content of Fresh Concrete (percent)	5.5 – 8.5
Rejection Limit (percent)	<5.0 or >9.0
Conc. Temp. (deg. F)	45 - 90 at time of placement
Slump (max.) (inch)	See Table 1, footnote (g)
28-day Compressive Strength (psi)	For LSL see Table 1
Rejection Limit - 28-day Compressive Strength	See Table 1

A. Pay Factor for 28-Day Compressive Strength (PFs).

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

Where:

PFs = Pay Factor for 28-day compressive strength (not to exceed 1.00)

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

LSL = Lower specification limit (see Table 1)

If the tested strength does not meet the rejection limit specified in Table 1, the Engineer will require additional evaluation as described in subsection d.4 of this special provision.

B. Pay Factor for Air Content of Fresh Concrete (PFac). The pay factor for air content of fresh concrete (PFac) will be according to Table 4.

Table 4: Air Content of Fresh Concrete Pay Factor (PFac)

Air Content of Fresh Concrete (percent)	Pay Factor (PFac)
5.5 – 8.5	1.00
5.0 – 5.4	0.50
Below 5.0	Rejection
8.6 – 9.0	0.75
Above 9.0	Rejection

If the air content of fresh concrete is below 5.0 or above 9.0 percent, the Engineer will elect to do one of the following.

(1) Require removal and replacement of the entire quantity of concrete represented by the test with new testing conducted on the replacement concrete and repeat the evaluation procedure.

(2) Allow submittal of a corrective action plan for the Engineer's approval. If the Engineer does not approve the plan for corrective action, subsection d.3.B.(1) of this special provision will be applied. All costs associated with plan submittal and corrective action under this subsection will be borne by the Contractor.

C. Overall Lot Pay Factor (OLPF). The following formulae are used to calculate the OLPF and ADJ. The OLPF will not exceed 1.00.

$$\text{OLPF} = (0.60 \times \text{PFs}) + (0.40 \times \text{PFac})$$

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

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

Price = Base price established for the pay item

4. Evaluation of Rejectable Concrete. The Engineer will require additional evaluation to decide what further action may be warranted, as described below. Acceptance for air content of fresh concrete will be based on QA test results reported at the time of concrete placement.

If the Engineer determines that non-destructive testing (NDT) is appropriate, this work will be done by the Contractor in the presence of the Engineer within 45 calendar days from concrete placement. All costs associated with this work will be borne by the Contractor. A complete set of non-destructive tests must be conducted (in accordance with the respective standard test method) at a minimum three randomly selected locations. If NDT is used to estimate the in-situ strength, a calibrated relationship between the project JMF under evaluation and the NDT apparatus must have been established prior to NDT testing according to its respective standard test method.

If the 28-day compressive strength QA test results show that the rejection limit (as specified in Table 1) has not been achieved, the quantity of concrete under evaluation will be rejected and the Engineer will require additional evaluation to decide what further action may be warranted.

Propose an evaluation plan and submit it to the Engineer for approval before proceeding. The results from NDT will be used only to decide what further action is required. This determination will be made by the Engineer, as follows:

A. For non-structural concrete. If no test result from non-destructive testing falls below the lower specification (LSL) 28-day compressive strength, the represented quantity of concrete under evaluation will remain in place and a pay factor for 28-day compressive strength (PFs) of 1.00 will be applied for overall lot pay factor (OLPF) and price adjustment (ADJ) determinations according to subsection d.3 of this special provision.

B. For structural concrete (including overhead sign foundations). If no test result from non-destructive testing falls below the lower specification limit 28-day compressive strength, the represented quantity of concrete under evaluation will remain in place and a pay factor for 28-day compressive strength (PFs) of 0.85 will be applied for overall lot pay factor (OLPF) and price adjustment (ADJ) determinations according to subsection d.3 of this special provision.

C. If one or more of the non-destructive test results fall below the lower specification limit (LSL) 28-day compressive strength, the Engineer may elect to do one of the following:

(1) Require removal and replacement of the entire rejected quantity of concrete, including new initial tests for pay factor (PF) determination and price adjustment conducted according to subsection d.3 of this special provision.

(2) Allow the Contractor to submit a plan for corrective action, for the Engineer's approval, to address the disposition of the rejected concrete. If the Engineer does not approve the plan for corrective action, subsection d.4.C.(1) of this special provision will be applied. All costs associated with plan submittal and corrective action under this subsection will be borne by the Contractor.

(3) Allow the in-situ quantity of concrete under evaluation to remain in place and a pay factor (PFs) of 0.50 will be applied for overall lot pay factor (OLPF) and price adjustment (ADJ) determinations according to subsection d.3 of this special provision.

e. Measurement and Payment. If a price adjustment is made for reasons included in this special provision, that adjustment will be made using the base price established 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 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 Department.

All costs associated with providing, locating, relocating, maintaining, and securing the adequate number of portable initial curing facilities for both the QC and 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.

MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
CURB RAMP OPENING, CONCRETE

DES:CAL

1 of 1

APPR:MB:DBP:04-10-17

APPR FHWA:04-17-17

Add the following new subsection 803.03.I, on page 543 of the Standard Specifications for Construction:

I. Curb Ramp Opening. Construct curb ramp openings in accordance with subsection 802.03 of the Standard Specifications for Construction, Standard Plan R-28 Series and as required to conform with the associated sidewalk ramp geometry (counter slope, running slope, cross slope, flares, widths, etc.).

Add the following pay item to the pay item listing in subsection 803.04, on page 544 of the Standard Specifications for Construction:

Curb Ramp Opening, ConcFoot

Delete the second paragraph of subsection 803.04.C, on page 544 of the Standard Specifications for Construction in its entirety and replace with the following:

The unit price for **Sidewalk Ramp, Conc, __ inch** includes the cost of landings, monolithic rolled curbs or side flares along the longitudinal edges of the ramp or landing, and transitions to existing sidewalk.

Add the following new subsection 803.04.G, on page 545 of the Standard Specifications for Construction:

G. Curb Ramp Opening, Conc. The Engineer will measure **Curb Ramp Opening, Conc.** in place along the joint of the curbing with the pavement including transitions to and from adjacent standard full height curb and gutter cross section.

MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
PERMANENT PAVEMENT MARKINGS

PMK:MKB

1 of 2

APPR:MWB:CRB:11-02-15

FHWA:APPR:11-02-15

Add the following to the end of the list of materials in subsection 811.02, on page 588 of the Standard Specifications for Construction:

Modified Urethane Pavement Marking Material920
Preformed Thermoplastic Pavement Marking Material920

Ensure preformed thermoplastic materials have a thickness of 125 mils.

Add the following row to Table 811-1 of subsection 811.03.B, on page 591 of the Standard Specifications for Construction:

Polyurea	20	Binder (gal)	5.5	8.25	11	17	22	33	44	66
		Bead (lb)	As directed by the manufacturer							
Modified Urethane	20	Binder (gal)	5.5	8.25	11	17	22	33	44	66
		Bead (lb)	As directed by the manufacturer							

Add the following subsections after the last paragraph of subsection 811.03.D.7.c, on page 595 of the Standard Specifications for Construction:

8. **Modified Urethane.** Ensure the pavement is free of excess surface and subsurface moisture that may affect bonding. The Engineer will not decide the suitability of specific days for the application of modified urethane.

Surface preparation requirements for special, and longitudinal modified urethane pavement markings depend on surface conditions.

Prepare new HMA surfaces and HMA surfaces open to traffic for 10 days or less with no oil drips, residue, debris, or temporary or permanent markings, by cleaning the marking area with compressed air.

Prepare new PCC surfaces and PCC surfaces free of oil drips, residue, and debris, temporary, or permanent markings, by removing the curing compound from the area required for pavement markings.

Prepare existing HMA or PCC surfaces that do not have existing markings, but may have oil drip areas, debris, or both, by scarifying the marking area using non-milling grinding

teeth or shot blasting. The Engineer will allow the use of water blasting to scarify the marking area on PCC surfaces.

Prepare existing HMA or PCC surfaces with existing pavement markings and that may have oil drip areas, debris, or both, by using the following methods:

- a. For existing liquid pavement markings, scarify the proposed marking area using non-milling grinding teeth or shot blast. Occasionally existing liquid pavement markings will require complete removal, which will be determined by the Engineer.
- b. For existing cold plastic markings, completely remove the existing markings.

9. **Preformed Thermoplastic.** Ensure the pavement is free of excess surface and subsurface moisture that may affect bonding. The Engineer will not decide the suitability of specific days for the application of preformed thermoplastic.

Heat and apply the preformed thermoplastic material as recommended by the manufacturer. Feather all edges of the material with a putty knife while the preformed thermoplastic is still soft.

Add the following rows to Table 811-2 of subsection 811.03.D, on page 596 of the Standard Specifications for Construction:

Modified Urethane	40	40	Apr. 15	Nov. 15
Preformed Thermoplastic	35	35	Apr. 15	Nov. 15

Add the following pay items to the list of pay items in subsection 811.04, on page 598 of the Standard Specifications for Construction:

Pavt Mrkg, Modified Urethane, (symbol).....	Each
Pavt Mrkg, Modified Urethane, (legend)	Each
Pavt Mrkg, Modified Urethane, ___ inch, Crosswalk	Foot
Pavt Mrkg, Modified Urethane, ___ inch, Stop Bar	Foot
Pavt Mrkg, Modified Urethane, ___ inch, Cross Hatching (color)	Foot
Pavt Mrkg, Modified Urethane, ___ inch, (color)	Foot
Pavt Mrkg, Ovly Cold Plastic, ___ inch, Shadow Tape, Black.....	Foot
Pavt Mrkg, Ovly Cold Plastic, ___ inch, Wet Reflective, (color)	Foot
Pavt Mrkg, Preformed Thermoplastic, (symbol)	Each

MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
TYPE III BARRICADES

DES:DBP

1 of 1

APPR:MWB:CRB:08-07-15

FHWA:APPR:08-23-15

Delete the first sentence for the second paragraph in subsection 812.03.D.8 on page 606 of the Standard Specifications for Construction, and replace with the following:

Light Type III barricades with two, Type C or Type D warning lights, fastened to the uprights above the top rail, provided these warning lights each weigh 3.3 pounds or less.

Delete the following pay items from the list in subsection 812.04 on page 622 of the Standard Specifications for Construction.

Barricade, Type III, High Intensity, Furn.....	Each
Barricade, Type III, High Intensity, Oper.....	Each
Barricade, Type III, High Intensity, Double Sided, Furn	Each
Barricade, Type III, High Intensity, Double Sided, Oper.....	Each

Renumber the existing subsection 812.04.A.5 on page 624 of the Standard Specifications for Construction, as follows:

4. The manufacturer's invoiced cost for damaged equipment included in a lump sum pay item for maintaining traffic.

Table 902-6
Superpave Final Aggregate Blend Physical Requirements

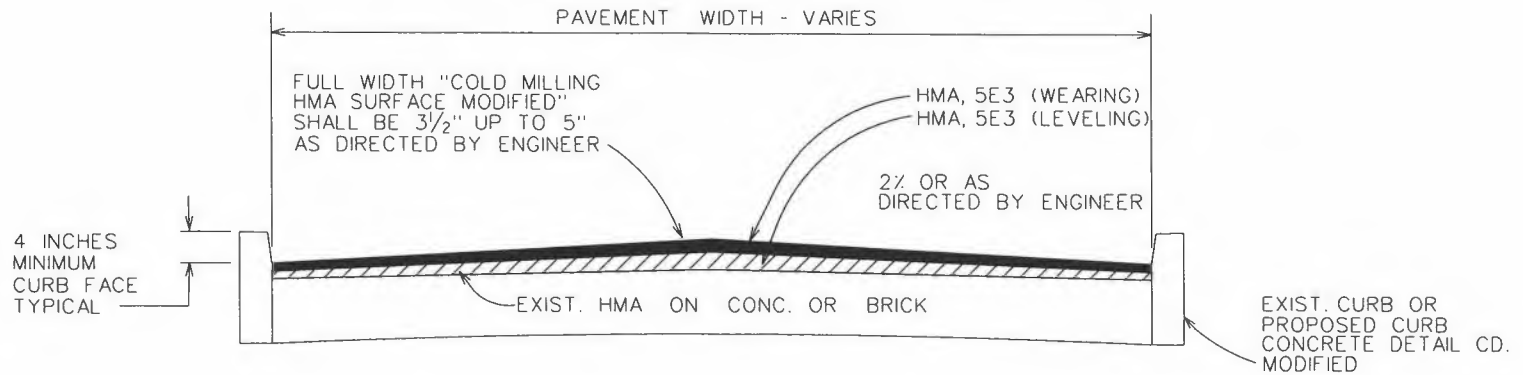
Est. Traffic (million ESAL)	Mix Type	Percent Crushed Minimum Criteria		Fine Aggregate Angularity Minimum Criteria		% Sand Equivalent Minimum Criteria		Los Angeles Abrasion % Loss Maximum Criteria		% Soft Particles Maximum Criteria (a)		% Flat and Elongated Particles Maximum Criteria (b)	
		Top & Leveling Courses	Base Course	Top & Leveling Courses	Base Course	Top & Leveling Courses	Base Course	Top & Leveling Courses	Base Course	Top & Leveling Courses	Base Course	Top & Leveling Courses	Base Course
< 0.3	LVSP	55/—	—	—	—	40	40	45	45	10	10	—	—
< 0.3	E03	55/—	—	—	—	40	40	45	45	10	10	—	—
≥0.3 - <1.0	E1	65/—	—	40	—	40	40	40	45	10	10	—	—
≥1.0 - < 3	E3	75/—	50/—	43	40	40	40	35	40	5	5	10	10
≥3 - <10	E10	85/80	60/—	45	40	45	45	35	40	5	5	10	10
≥10 - <30	E30	95/90	80/75	45	40	45	45	35	35	3	4.5	10	10
≥30 - <100	E50	100/100	95/90	45	45	50	50	35	35	3	4.5	10	10

(a) Soft particles maximum is the sum of the shale, siltstone, ochre, coal, clay-ironstone and particles that are structurally weak or are non-durable in service.

(b) Maximum by weight with a 1 to 5 aspect ratio.

Note: "85/80" denotes that 85 percent of the coarse aggregate has one fractured face and 80 percent has at least two fractured faces.

DATE	APR 2018	APPROVED	SRB
DRAWN BY	WLW	CHECKED	KSM
DESCRIPTION	REVISIONS	DRAWN	CHKD
A		APD	DATE
B			



TYPICAL CROSS SECTION COLD MILLING HMA SURFACE AND RESURFACING

NOTES:

1. THE CONTRACTOR SHALL PLACE ADDITIONAL HMA MIXTURE AT VARIOUS LOCATIONS WHERE NEEDED, IN ORDER TO MAKE A UNIFORM CROSS-SECTION. AN ADDITIONAL 10% OF HMA 5E3 HAS BEEN ESTIMATED TO PROVIDE MATERIAL TO RE-ESTABLISH THE PAVEMENT CROSS-SECTION AND FOR WEDGING AT MILLED STREET INTERSECTIONS.
2. "COLD-MILLING HMA SURFACE MODIFIED" SHALL APPLY ACROSS THE FULL PAVEMENT WIDTH AS SHOWN ON THE PLAN PAVEMENT WIDTH AS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER.
3. IF EXISTING HMA OVERLAY IS LESS THAN $3\frac{1}{2}$ ", COLD MILL THE FULL WIDTH OR AS DIRECTED BY THE ENGINEER.

PROJECT SUMMARY:

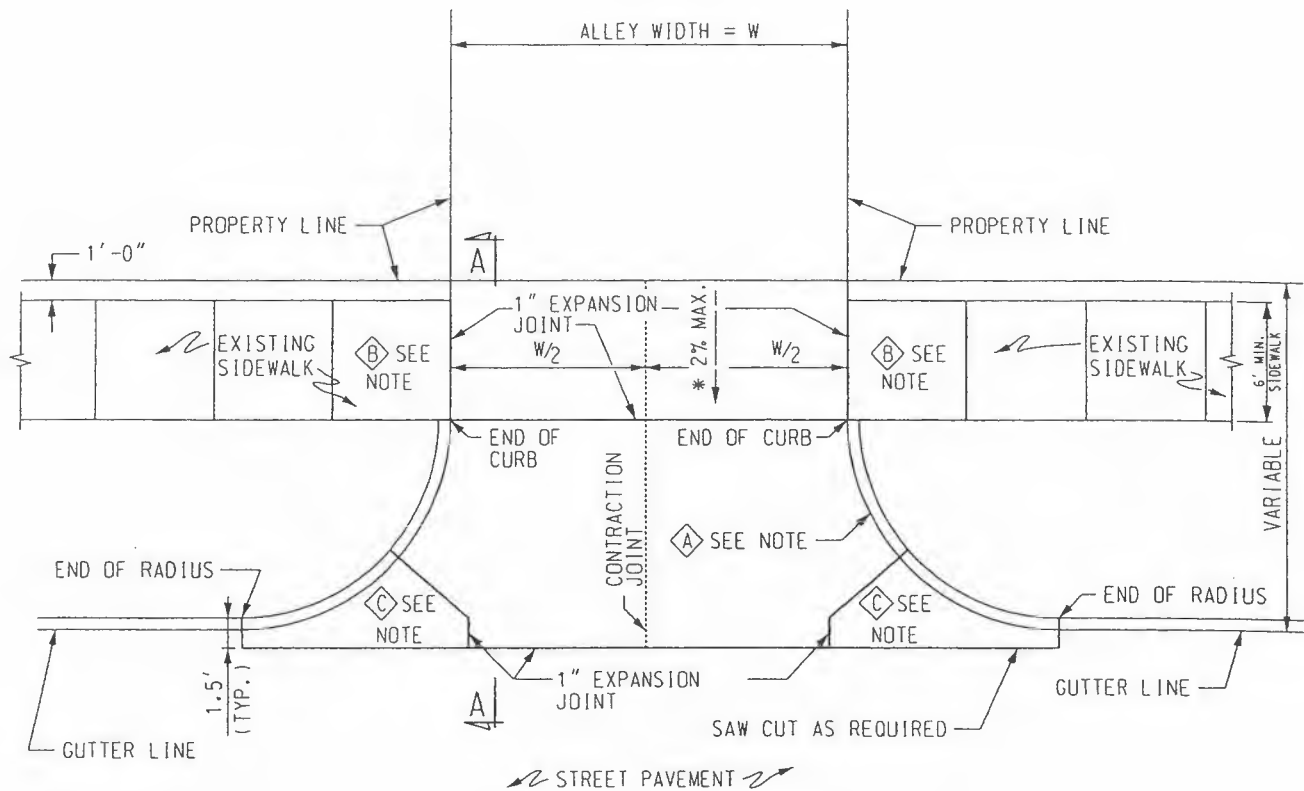
COLD MILL FROM $3\frac{1}{2}$ INCHES UP TO 5 INCHES, AS DIRECTED BY THE ENGINEER OF EXISTING HMA SURFACE AND REPLACED WITH 2 INCHES OF 4E3 HMA LEVELING COURSE MIXTURE WITH A YIELD OF 220 LBS PER SQUARE YARD AND $1\frac{1}{2}$ INCHES OF 5E3 HMA WEARING COURSE MIXTURE WITH A YIELD OF 165 LBS PER SQUARE YARD. THE PROJECT ALSO INCLUDED CONCRETE CURB, SIDEWALK, CURB RAMPS, DRIVEWAY APPROACHES, DRAINAGE STRUCTURES, EXCAVATION, PAVEMENT REMOVAL, LANE TIES, PAVEMENT MARKINGS AND MISCELLANEOUS CONSTRUCTION.

HMA APPLICATION ESTIMATE					
I.D. No.	Item	Rate Per Syd	Est. Thick.	Performance Grade	Remarks
HMA, 5E3	HMA mix. - 5E3	165 LBS	$1\frac{1}{2}$ "	64-22	USE 5E3 FOR WEDGING
HMA, 4E3	HMA mix. - 4E3	220 LBS	2"	64-22	
HAND PATCHING	HMA mix. - 5E3	330 LBS	3"	64-22	IN TWO LIFTS. FOR RATE AND PG
HMA APPROACH, MODIFIED	HMA mix. - 5E3 & 4E3	165 LBS	$1\frac{1}{2}$ "	64-22	SEE HMA APPLICATION ESTIMATE
HMA SHOULDER MODIFIED	HMA mix. - 4E3	220 LBS	2"	64-22	
	HMA mix. - 5E3	330 LBS	3"	64-22	IN TWO LIFTS

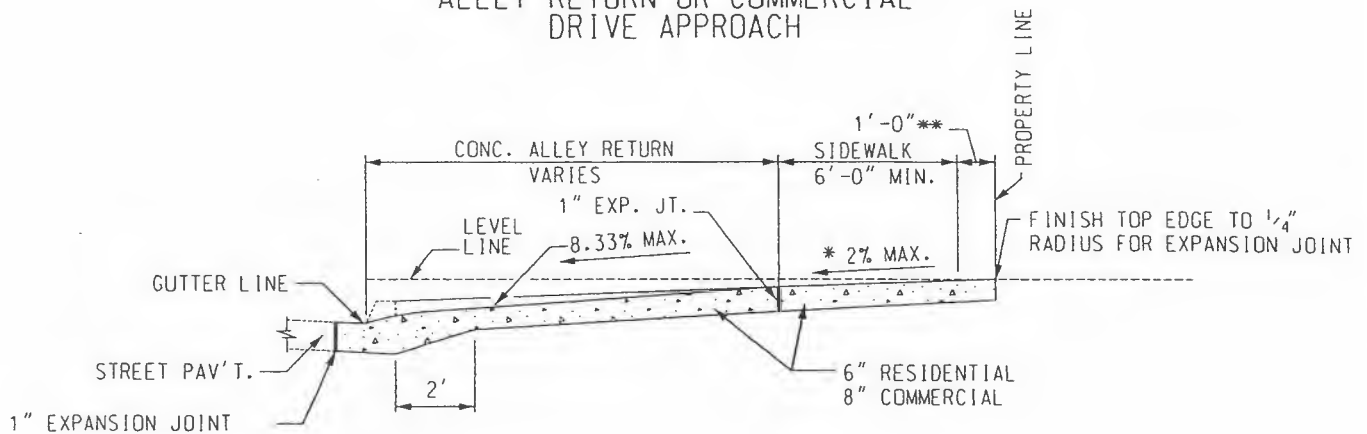
HMA Bond Coat 0.05 to 0.10 Gal./Syd. - Included in the pay item "HMA, 4E3"
Also Applies to Bit. Approaches for Street Intersections

TYPICAL CROSS SECTION
COLD MILLING HMA
SURFACE AND RESURFACE

CITY OF DETROIT CITY ENGINEERING DEPARTMENT SURVEY BUREAU	JOB NO.	DRWG. NO.
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ALLEY RETURN OR COMMERCIAL DRIVE APPROACH



SECTION A-A

C	DESCRIPTION	Drawn	Chkd	Appd	Date
B	* SIDEWALK CROSS SLOPE	KSM	J.J.		2/7/07
A	METRIC TO ENGLISH UNIT SYSTEM	KSM	M.S.	N.H.	12/02

REVISIONS



PREPARED BY
BUREAU OF STREETS
AND HIGHWAYS

K.S.M.

DRAWN BY:

J.J.

CHECKED BY:

APPROVED

Sam Patel

ENGINEER OF STREETS

HEAD ENGINEER

Jerry Jacob
CITY ENGINEER

CITY OF DETROIT
CITY ENGINEERING DIVISION, D.P.W.

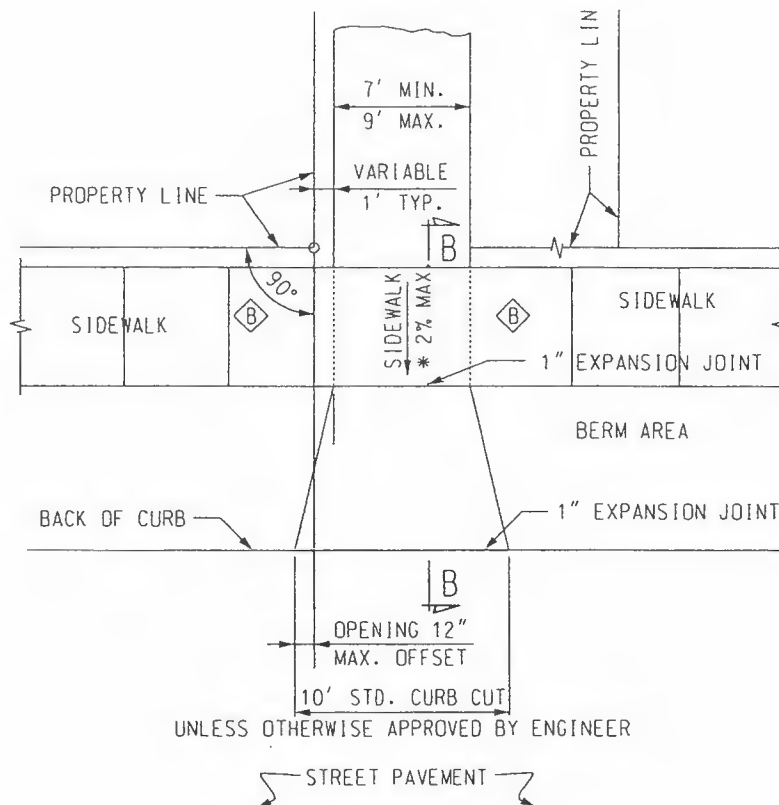
STANDARD PLAN FOR
DETAIL OF ALLEY RETURN
AND DRIVE APPROACH

03/07/98
PLAN DATE

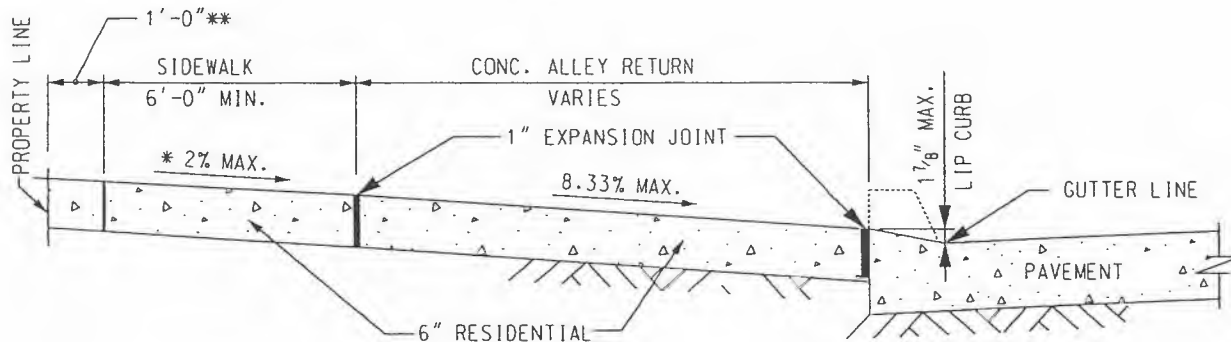
DRAWING NO.
7

DETAIL STANDARD NO.
C-4384

SHEET
1 OF 2



DETAIL OF CURB CUT OPENINGS
FOR RESIDENTIAL DRIVEWAY



SECTION B-B

NOTES:

IF ALLEY IS PAVED, CONSTRUCT RETURN WITH 1" EXPANSION JOINT ON PROPERTY LINE.

- Ⓐ RADIUS TO BE 10' UNLESS OTHERWISE SHOWN ON PAVING PLAN.
- Ⓑ SIDEWALK FLAGS ABUTTING ALLEY SHALL BE 6" THICK. SIDEWALK SHALL BE REPLACED FOR A SMOOTH TRANSITION AND TO ATTAIN A CROSS SLOPE OF 2% MAX. OR AS DIRECTED BY THE ENGINEER.
- Ⓒ KEY JOINT OR "B" JOINT IF REINFORCED PAVEMENT.

ALL DIMENSIONS ARE IN INCHES(") UNLESS OTHERWISE NOTED.

* SIDEWALK CROSS SLOPE SHALL BE 2% MAX. OR AS DIRECTED BY THE ENGINEER.

** THE SLOPE OF THE DRIVEWAY IN THE 1 FT. SPACE ADJACENT TO THE PROPERTY LINE MAY BE ALTERED UP TO 10% TO MEET EXISTING CONDITIONS.

REVISED DATE(METRIC TO ENGLISH UNIT SYSTEM):DEC.2002

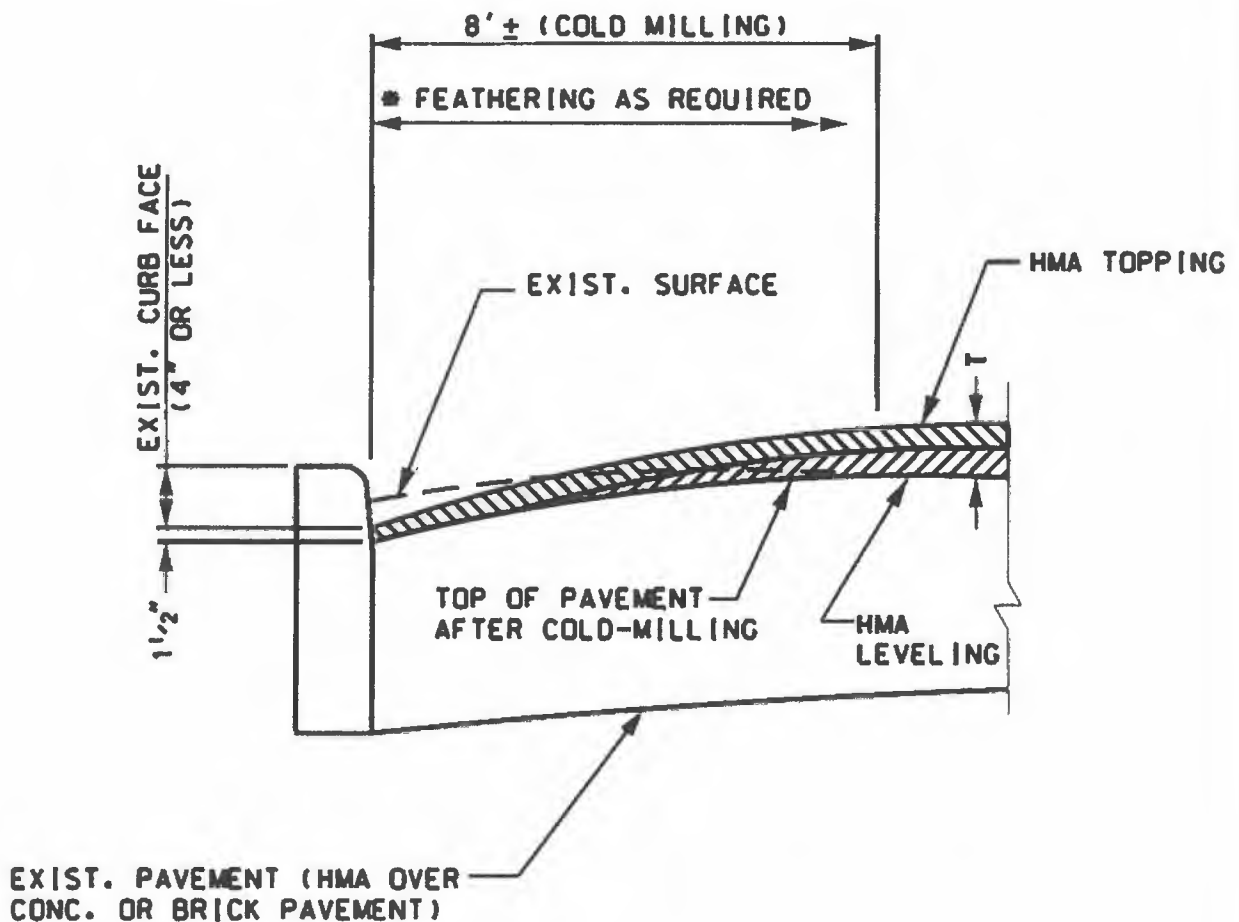
C	DESCRIPTION	Dwn	Chkd	Appd	Date
B	* SIDEWALK CROSS SLOPE	KSM	J.J.		2/7/07
A	Chgd. THICKNESS NOTE	KSM	N.H.	W.T.	10/06

REVISIONS

CITY OF DETROIT
CITY ENGINEERING DIVISION, D.P.W.

STANDARD PLAN FOR
DETAIL OF ALLEY RETURN
AND DRIVE APPROACH

03/07/98 PLAN DATE	DRAWING NO. 7	DETAIL STANDARD NO. C-4384	SHEET 2 OF 2
-----------------------	------------------	-------------------------------	-----------------



*"COLD MILLING HMA SURFACE MODIFIED", SO AS TO GET A 5 1/2" EXPOSED (VERTICAL) FACE OF CURB. FEATHER RESURFACING TO 1 1/2" THICKNESS AT THE CURB LEAVING A MINIMUM OF 4" EXPOSED CURB FACE.

T = THICKNESS OF HMA RESURFACING.

NOTE:

THIS DETAIL SHALL BE USED WHERE DIRECTED BY THE ENGINEER. TO OBTAIN ADDITIONAL CURB FACE EXPOSURE. (CURB FACE EXPOSURE AFTER RESURFACING SHALL BE A MINIMUM OF 4" THIS SHALL APPLY THROUGHOUT THE LENGTH OF THE PROJECT.)

B A					
	DESCRIPTION	Drawn	Check	Appd	Date
REVISIONS					
DRAWN BY	K.S.M.	APPROVED			
TRACED BY		APPROVED			
CHECKED BY	A.A.	APPROVED			

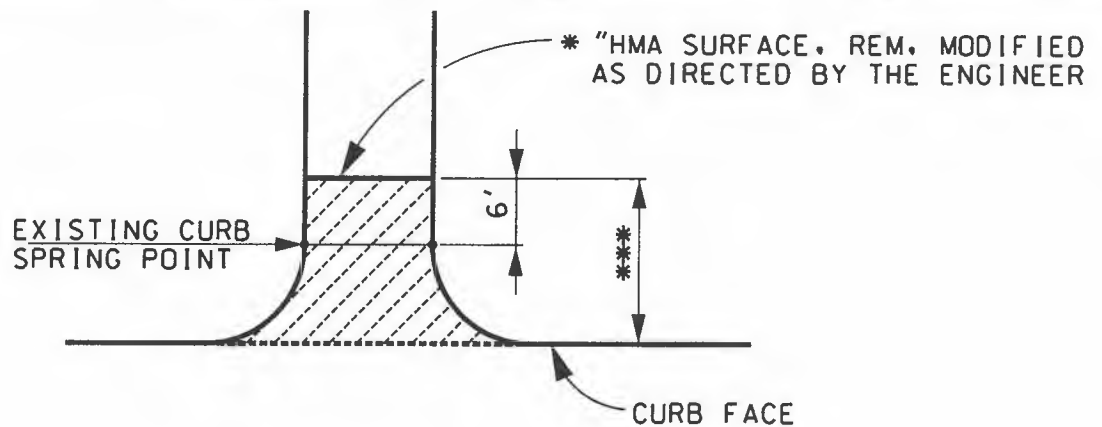
**HMA
FEATHERING
DETAIL**

CITY OF DETROIT
City Engineering
Division

Job No.

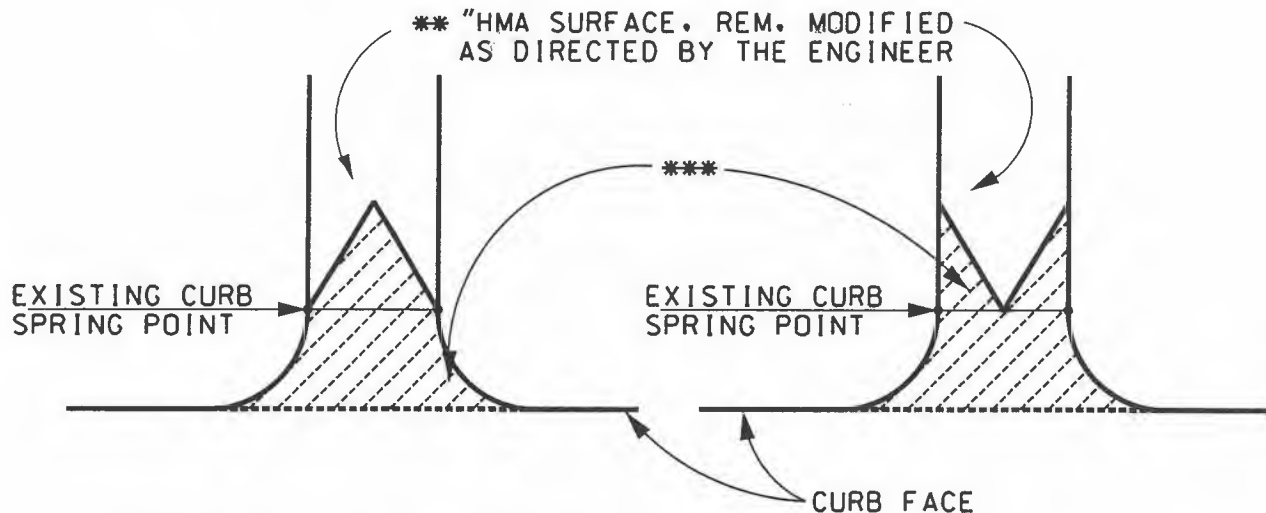
Drwg. No.

Date **JAN. 13**



*** RESURFACING STREET RETURNS SHALL BE PAID FOR AS "HMA APPROACH, MODIFIED"

- * REMOVING HMA SURFACE AREA MAY BE A 6' $\pm$ WIDE STRIP BACK OF THE SPRING POINT (SOLID LINES) OR THE ENTIRE RETURN AREA (SOLID AND DASHED LINES) AS DIRECTED BY THE ENGINEER.



- ** REMOVING HMA SURFACE AREA MAY BE DEFINED BY TRIANGULAR CUTS SHOWN OR MAY OTHERWISE VARY AS DIRECTED BY THE ENGINEER TO SATISFY CROWN TRANSITION OR DRAINAGE CONDITIONS.

(THESE DETAILS SHALL BE USED AT MAJOR CROSS STREETS AND ELWHERE AS DIRECTED BY THE ENGINEER.)

B					
A					
DESCRIPTION		Drawn	Chkd	Appd	Date
REVISIONS					
DRAWN BY	K.S.M.	APPROVED			
TRACED BY		APPROVED			
CHECKED BY	J.J.	APPROVED CITY ENGINEER			

**HMA APPROACH,
MODIFIED**

CITY OF DETROIT
City Engineering
Division

Job No.

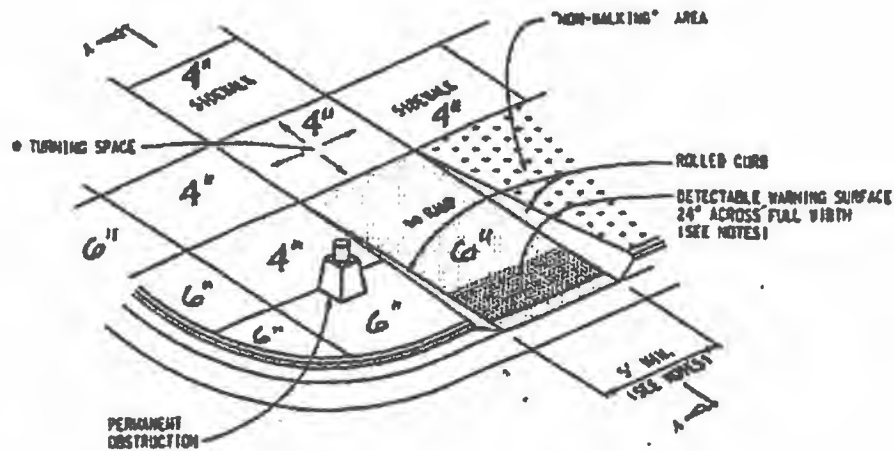
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Date **DEC. 06**

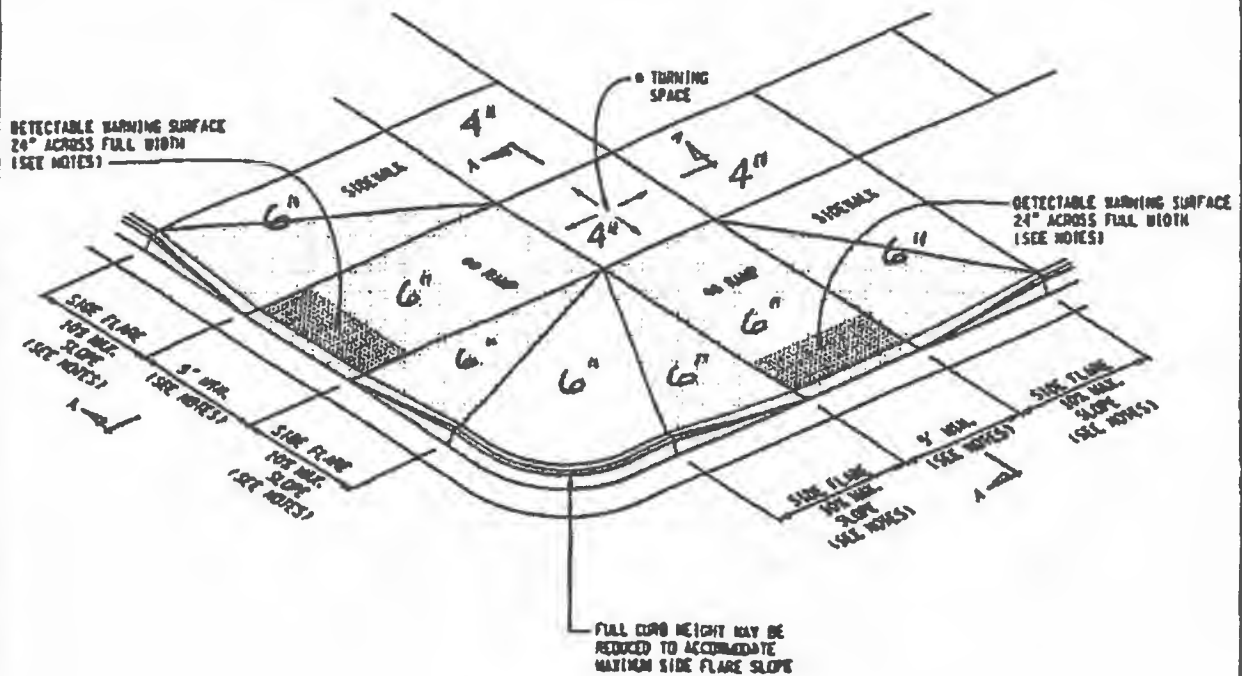
B										CITY OF DETROIT
A										City Engineering Division
DESCRIPTION						Dwn	Chd	Appd	Date	GURB, CONC., DETAIL CD,
REVISION NO.										
DRAWN BY K.S.M.		APPROVED								Job. No.
TRACED BY		APPROVED								Drwg. No.
CHECKED BY N.H.		APPROVED CITY ENGINEER								Date JAN. 06

• MAXIMUM TURNING SPACE SLOPE IS 2.0% IN EACH DIRECTION OF TRAVEL. MINIMUM DIMENSIONS 5' x 5'. SEE NOTES.

• MAXIMUM RAMP CROSS SLOPE IS 2.0%. RUNNING SLOPE 3% - 7% (0.3% MAXIMUM). SEE NOTES.



SIDEWALK RAMP TYPE R
(ROLLED SIDES)



SIDEWALK RAMP TYPE F
(FLARED SIDES, TWO RAMPS SHOWN)



CITY OF DETROIT

DEPARTMENT OF PUBLIC WORKS, CITY ENGINEERING DIVISION

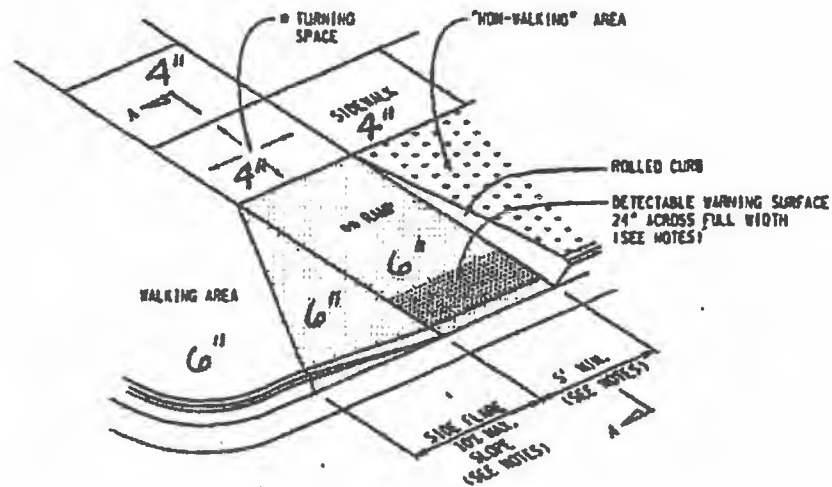
**SIDEWALK RAMP AND
DETECTABLE WARNING DETAILS**
R-28 WITH CITY OF DETROIT
THICKNESS AMENDMENT

4/19/2017

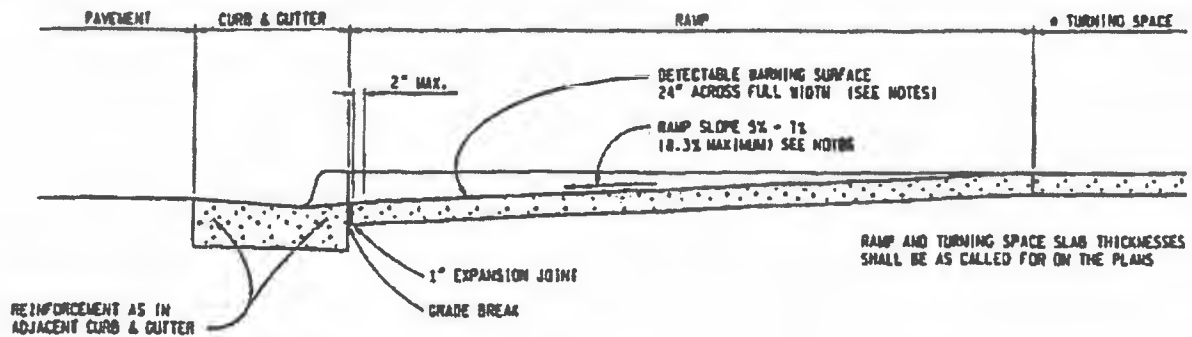
SHEET 1 OF 7

• MAXIMUM TURNING SPACE SLOPE IS 2.0% IN EACH DIRECTION OF TRAVEL. MINIMUM DIMENSIONS 5' x 5'. SEE NOTES.

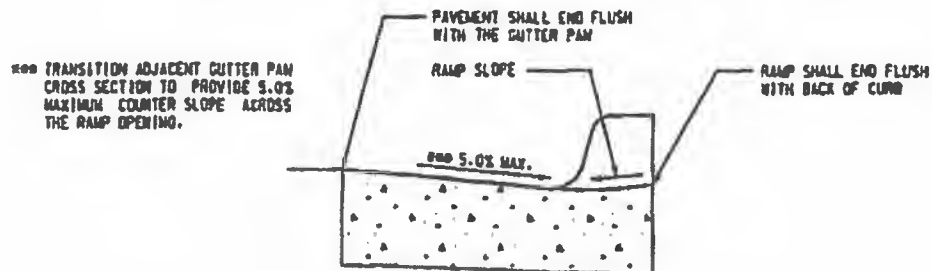
•• MAXIMUM RAMP CROSS SLOPE IS 2.0%. RUNNING SLOPE 5% - 7% (8.3% MAXIMUM). SEE NOTES.



SIDEWALK RAMP TYPE Rf
(ROLLED / FLARED SIDES)



SECTION A-A



SECTION THROUGH CURB CUT
(TYPICAL ALL RAMP TYPES)



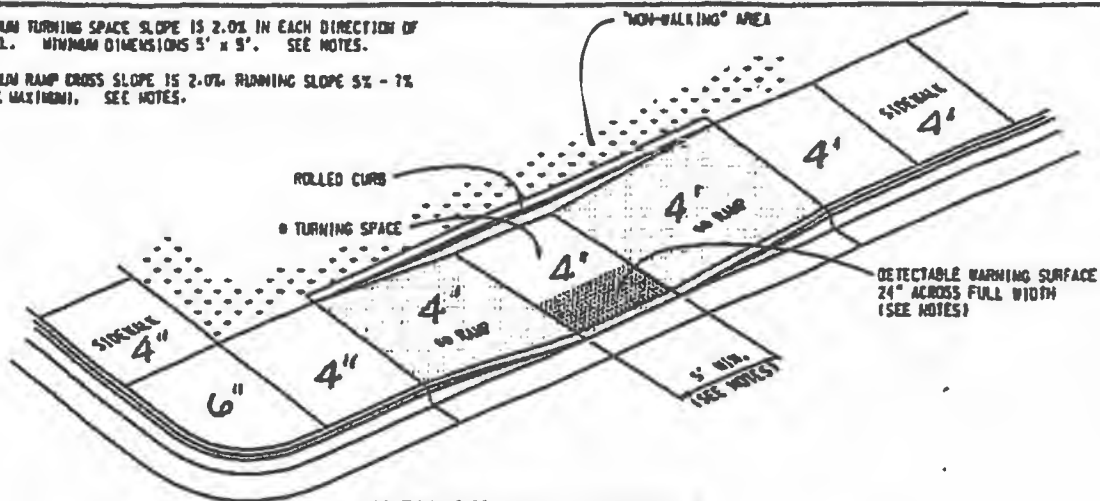
CITY OF DETROIT

DEPARTMENT OF PUBLIC WORKS, CITY ENGINEERING DIVISION
**SIDEWALK RAMP AND
DETECTABLE WARNING DETAILS**
R-28 WITH CITY OF DETROIT
THICKNESS AMENDMENT

4/19/2017

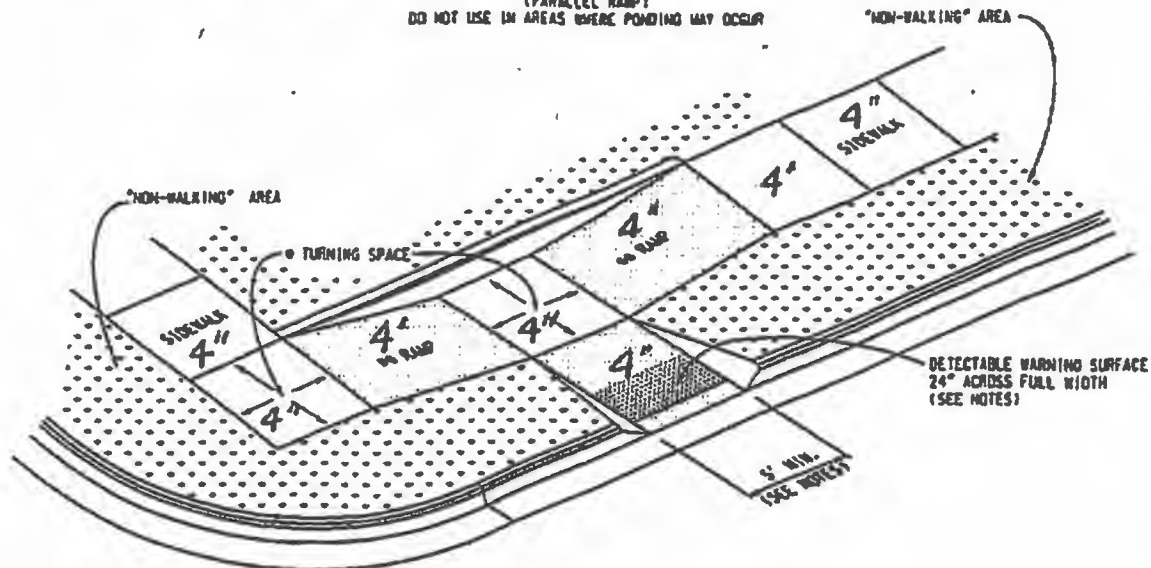
SHEET 2 OF 7

- MAXIMUM TURNING SPACE SLOPE IS 2.0% IN EACH DIRECTION OF TRAVEL. MINIMUM DIMENSIONS 5' x 5'. SEE NOTES.
- MAXIMUM RAMP CROSS SLOPE IS 2.0%. RUNNING SLOPE 5% - 7% (8.3% MAXIMUM). SEE NOTES.



SIDEWALK RAMP TYPE P

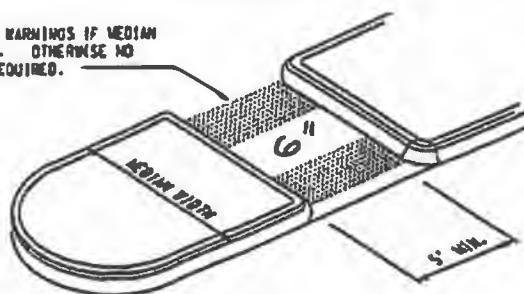
(PARALLEL RAMP)
DO NOT USE IN AREAS WHERE PONDING MAY OCCUR



SIDEWALK RAMP TYPE C

(COMBINATION RAMP)

USE 24" DEEP DETECTABLE WARNINGS IF MEDIAN WIDTH IS AT LEAST 6'-0". OTHERWISE NO DETECTABLE WARNING IS REQUIRED.



SIDEWALK RAMP TYPE M



CITY OF DETROIT

DEPARTMENT OF PUBLIC WORKS, CITY ENGINEERING DIVISION

**SIDEWALK RAMP AND
DETECTABLE WARNING DETAILS**

R-28 WITH CITY OF DETROIT

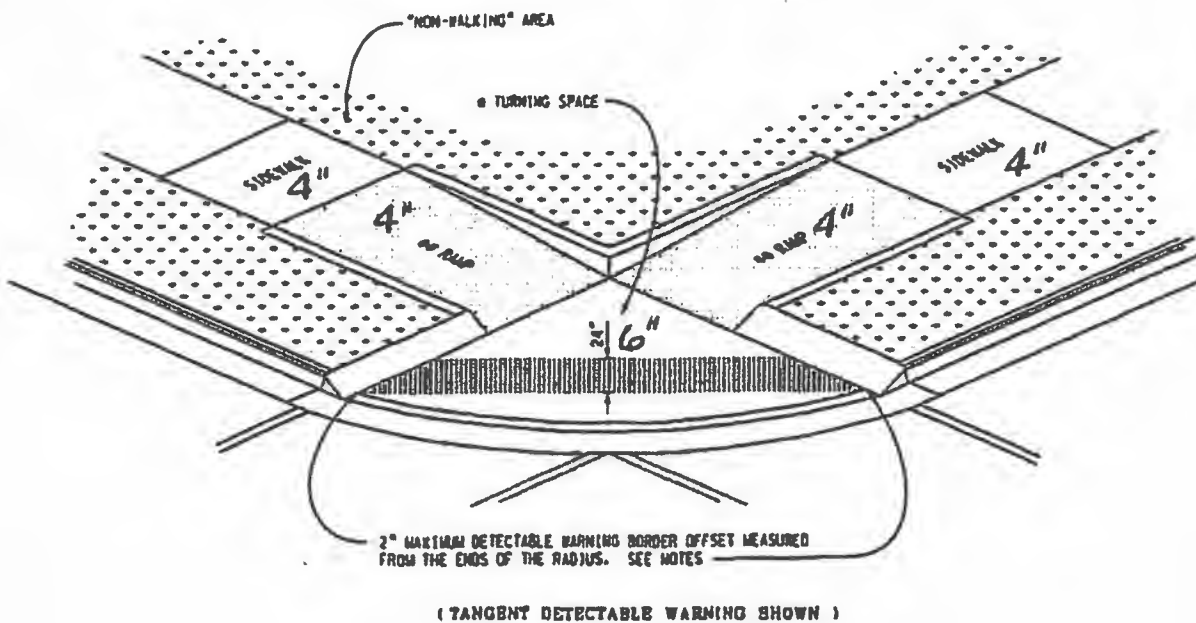
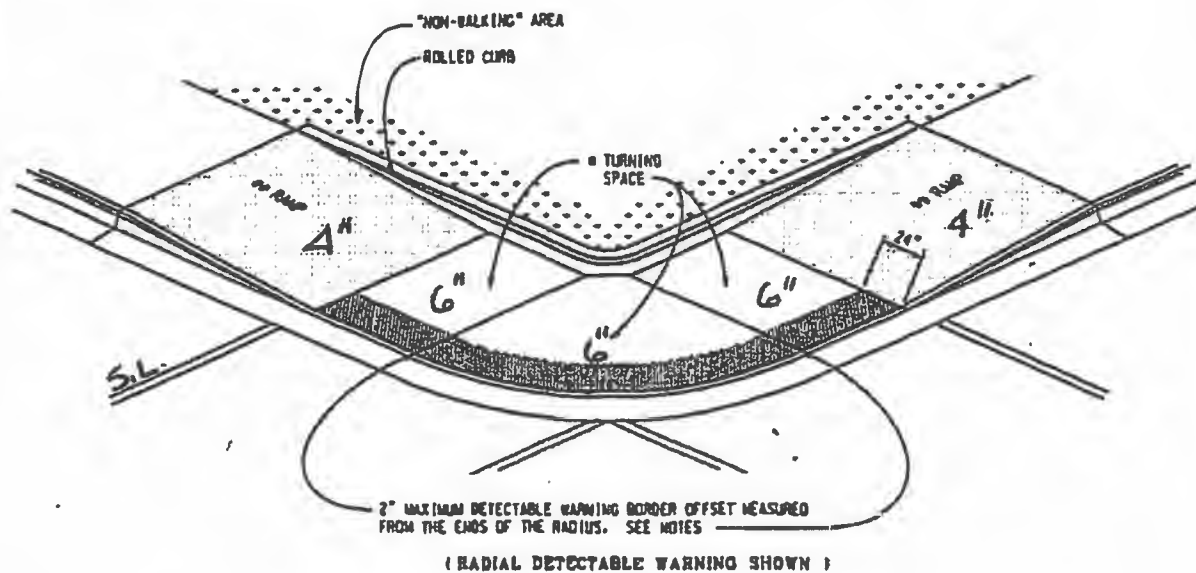
THICKNESS AMENDMENT

4/19/2017

SHEET 3 OF 7

• MAXIMUM TURNING SPACE SLOPE IS 2.0% IN EACH DIRECTION OF TRAVEL. MINIMUM DIMENSIONS 5' x 5'. SEE NOTES.

• MAXIMUM RAMP CROSS SLOPE IS 2.0%. RUNNING SLOPE 5% - 7% (0.3% MAXIMUM). SEE NOTES.



SIDEWALK RAMP TYPE D (DEPRESSED CORNER)



CITY OF DETROIT

DEPARTMENT OF PUBLIC WORKS, CITY ENGINEERING DIVISION

**SIDEWALK RAMP AND
DETECTABLE WARNING DETAILS**

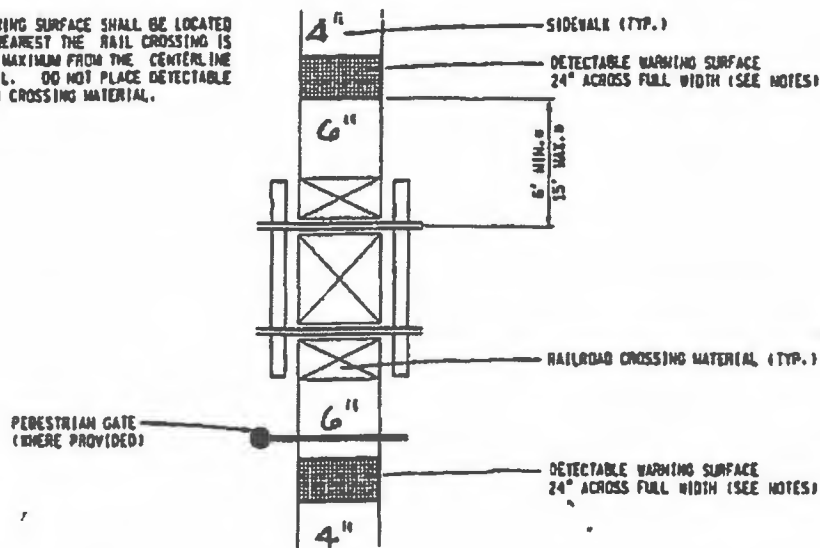
R-28 WITH CITY OF DETROIT

THICKNESS AMENDMENT

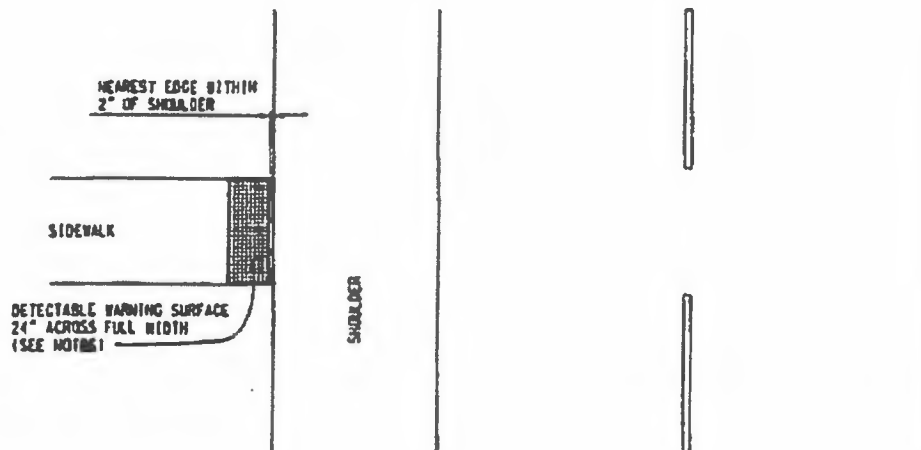
4/19/2017

SHEET 4 OF 7

• THE DETECTABLE WARNING SURFACE SHALL BE LOCATED SO THAT THE EDGE NEAREST THE RAIL CROSSING IS 6' MINIMUM AND 15' MAXIMUM FROM THE CENTERLINE OF THE NEAREST RAIL. DO NOT PLACE DETECTABLE WARNING ON RAILROAD CROSSING MATERIAL.



DETECTABLE WARNING AT RAILROAD CROSSING



DETECTABLE WARNING AT FLUSH SHOULDER OR ROADWAY

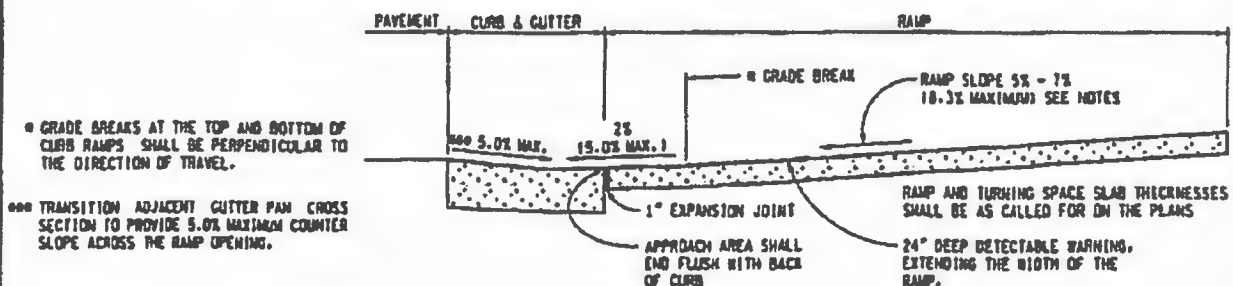
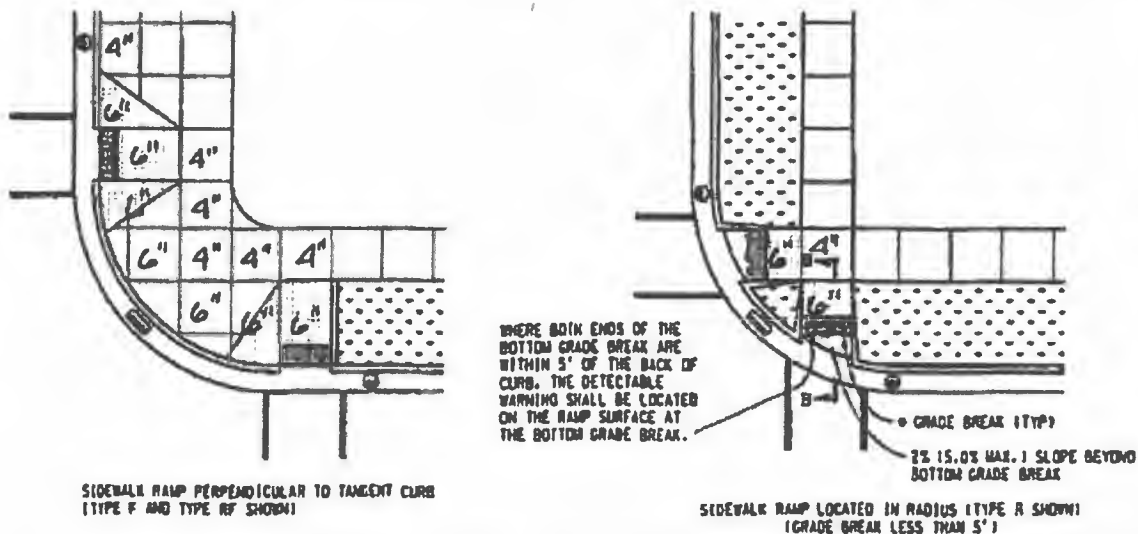
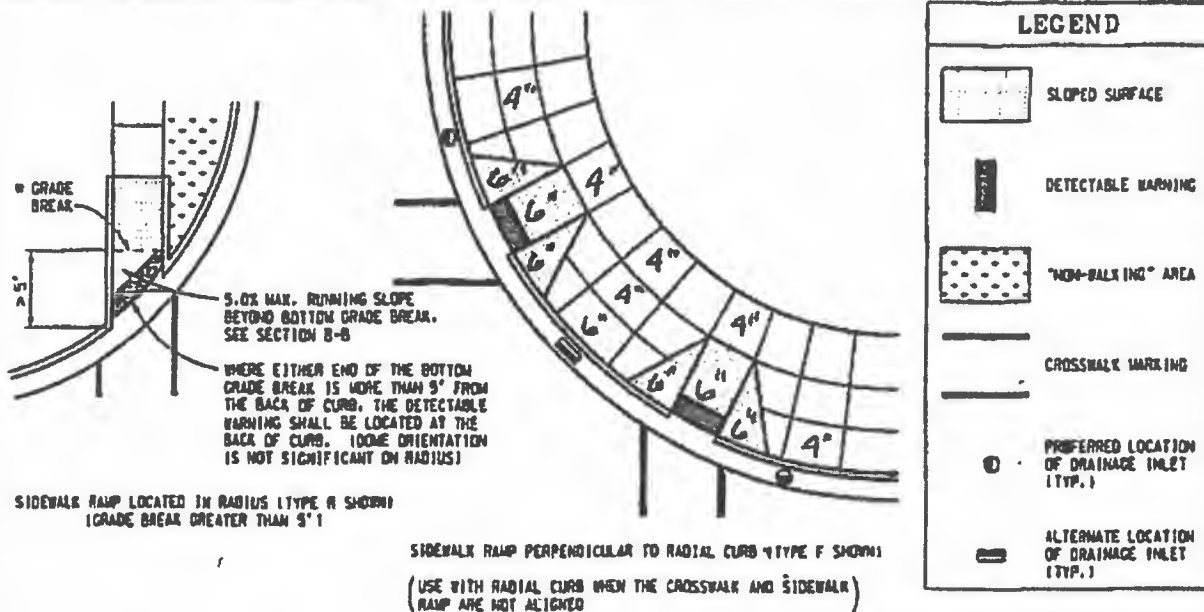


CITY OF DETROIT

DEPARTMENT OF PUBLIC WORKS, CITY ENGINEERING DIVISION
**SIDEWALK RAMP AND
 DETECTABLE WARNING DETAILS**
 R-28 WITH CITY OF DETROIT
 THICKNESS AMENDMENT

4/19/2017

SHEET 5 OF 7



SECTION B-B SIDEWALK RAMP ORIENTATION

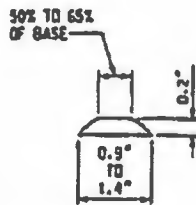


CITY OF DETROIT

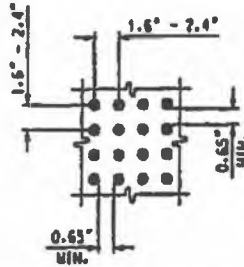
DEPARTMENT OF PUBLIC WORKS, CITY ENGINEERING DIVISION
SIDEWALK RAMP AND
DETECTABLE WARNING DETAILS
R-28 WITH CITY OF DETROIT
THICKNESS AMENDMENT

4/19/2017

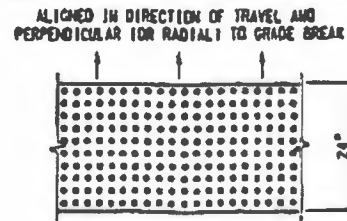
SHEET 6 OF 7



DOME SECTION



DOME SPACING



DOME ALIGNMENT

DETECTABLE WARNING DETAILS

NOTES:

DETAILS SPECIFIED ON THIS PLAN APPLY TO ALL CONSTRUCTION, RECONSTRUCTION, OR ALTERATION OF STREETS, CURBS, OR SIDEWALKS IN THE PUBLIC RIGHT OF WAY.

SIDEWALK RAMPS ARE TO BE LOCATED AS SPECIFIED ON THE PLANS OR AS DIRECTED BY THE ENGINEER.

RAMPS SHALL BE PROVIDED AT ALL CORNERS OF AN INTERSECTION WHERE THERE IS EXISTING OR PROPOSED SIDEWALK AND CURB. RAMPS SHALL ALSO BE PROVIDED AT MARKED AND/OR SIGNALIZED MID-BLOCK CROSSINGS.

SURFACE TEXTURE OF THE RAMP SHALL BE THAT OBTAINED BY A COARSE GRINDING, TRANSVERSE TO THE RUNNING SLOPE.

SIDEWALK SHALL BE RAMPED WHERE THE DRIVEWAY CURB IS EXTENDED ACROSS THE WALK.

CARE SHALL BE TAKEN TO ASSURE A UNIFORM GRADE ON THE RAMP. WHERE CONDITIONS PERMIT, IT IS DESIRABLE THAT THE SLOPE OF THE RAMP BE IN ONLY ONE DIRECTION, PARALLEL TO THE DIRECTION OF TRAVEL.

RAMP WIDTH SHALL BE INCREASED, IF NECESSARY, TO ACCOMMODATE SIDEWALK SHOULDER REMOVAL EQUIPMENT NORMALLY USED BY THE MUNICIPALITY.

PROVIDE TURNING SPACES WHERE PEDESTRIAN TURNING MOVEMENTS ARE REQUIRED.

WHEN 5' MINIMUM WIDTHS ARE NOT FEASIBLE, RAMP WIDTH MAY BE REDUCED TO NOT LESS THAN 4' AND TURNING SPACES TO NOT LESS THAN 4' x 4'.

DETECTABLE WARNING SURFACE COVERAGE IS 24" MINIMUM IN THE DIRECTION OF RAMP/PATH TRAVEL AND THE FULL WIDTH OF THE RAMP/PATH OPENING EXCLUDING CURBED OR FLARED CURB TRANSITION AREAS. A BORDER OFFSET NOT GREATER THAN 2" MEASURED ALONG THE EDGES OF THE DETECTABLE WARNING IS ALLOWABLE. FOR RADIAL CURB THE OFFSET IS MEASURED FROM THE ENDS OF THE RADIUS.

FOR NEW ROADWAY CONSTRUCTION, THE RAMP CROSS SLOPE MAY NOT EXCEED 2.0%. FOR ALTERATIONS TO EXISTING ROADWAYS, THE CROSS SLOPE MAY BE TRANSITIONED TO MEET AN EXISTING ROADWAY GRADE. THE CROSS SLOPE TRANSITION SHALL BE APPLIED UNIFORMLY OVER THE FULL LENGTH OF THE RAMP.

THE MAXIMUM RUNNING SLOPE OF 8.3% IS RELATIVE TO A FLAT 10% REFERENCE. HOWEVER, IT SHALL NOT REQUIRE ANY RAMP OR SERIES OF RAMPS TO EXCEED 15 FEET IN LENGTH.

DRAINAGE STRUCTURES SHOULD NOT BE PLACED IN LINE WITH RAMPS. THE LOCATION OF THE RAMP SHOULD TAKE PRECEDENCE OVER THE LOCATION OF THE DRAINAGE STRUCTURE. WHERE EXISTING DRAINAGE STRUCTURES ARE LOCATED IN THE RAMP PATH OF TRAVEL, USE A MANUFACTURER'S ADA COMPLIANT GRATE. OPENINGS SHALL NOT BE GREATER THAN 1/4". ELONGATED OPENINGS SHALL BE PLACED SO THAT THE LONG DIMENSION IS PERPENDICULAR TO THE DOMINANT DIRECTION OF TRAVEL.

TRANSITION THE GUTTER PAN CROSS SECTION SUCH THAT THE COUNTER SLOPE IN THE DIRECTION OF RAMP TRAVEL IS NOT GREATER THAN 5.0%. MAINTAIN THE NORMAL GUTTER PAN CROSS SECTION ACROSS DRAINAGE STRUCTURES.

THE TOP OF THE JOINT FILLER FOR ALL RAMP TYPES SHALL BE FLUSH WITH THE ADJACENT CONCRETE.

CROSSWALK AND STOP LINE MARKINGS, IF USED, SHALL BE SO LOCATED AS TO STOP TRAFFIC SHORT OF RAMP CROSSINGS. SPECIFIC DETAILS FOR MARKING APPLICATIONS ARE GIVEN IN THE "MICHIGAN MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES".

FLARED SIDES WITH A SLOPE OF 10% MAXIMUM, MEASURED ALONG THE ROADSIDE CURB LINE, SHALL BE PROVIDED WHERE AN UNOBSTRUCTED CIRCULATION PATH LATERALLY CROSSES THE SIDEWALK RAMP. FLARED SIDES ARE NOT REQUIRED WHERE THE RAMP IS BORDERS BY LANDSCAPING, UNPAVED SURFACE OR PERMANENT FIXED OBJECTS. WHERE THEY ARE NOT REQUIRED, FLARED SIDES CAN BE CONSIDERED IN ORDER TO AVOID SHARP CURB RETURNS AT RAMP OPENINGS.

DETECTABLE WARNING PLATES MUST BE INSTALLED USING FABRICATED OR FIELD CUT UNITS CAST AND/OR ANCHORED IN THE PAVEMENT TO RESIST SHIFTING OR HEAVING.

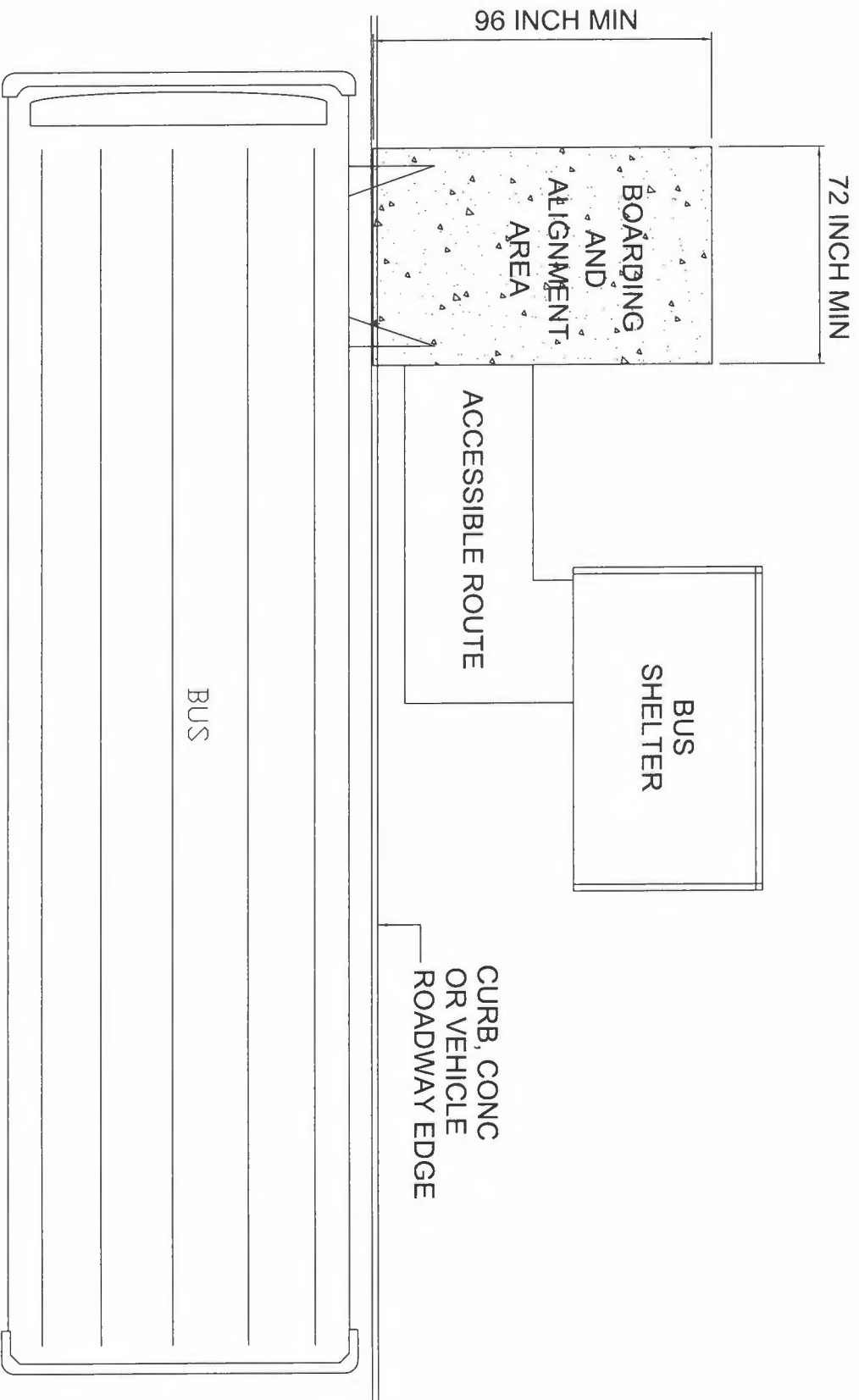


CITY OF DETROIT

DEPARTMENT OF PUBLIC WORKS, CITY ENGINEERING DIVISION
**SIDEWALK RAMP AND
 DETECTABLE WARNING DETAILS**
 R-28 WITH CITY OF DETROIT
 THICKNESS AMENDMENT

4/19/2017

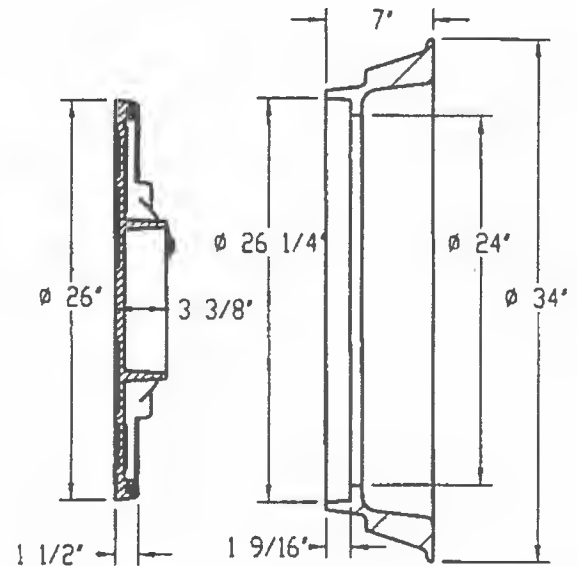
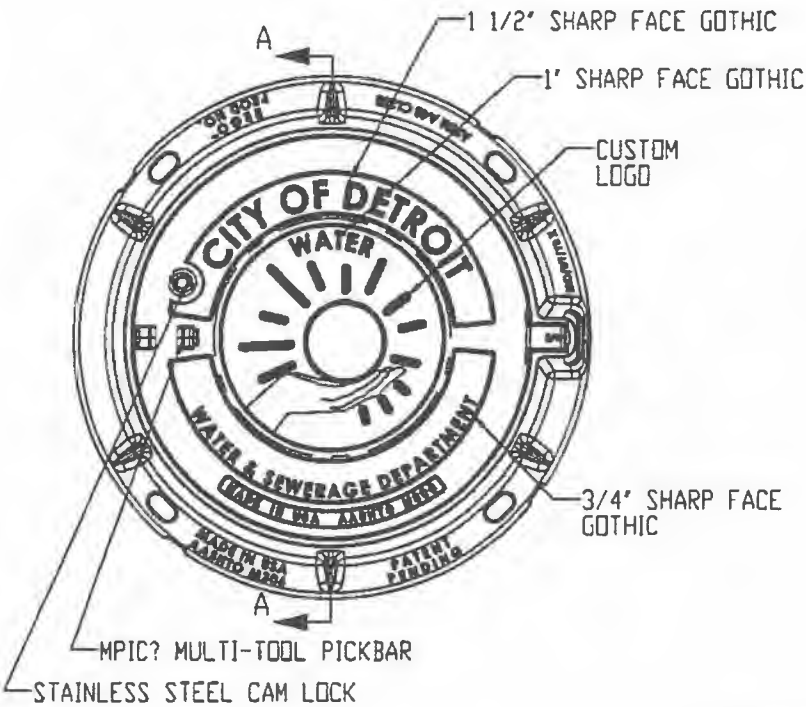
SHEET 7 OF 7



DIMENSIONS OF BUS BOARDING AREA

Assembly Weight 251 lbs.

ERGO Assembly



SECTION A-A

DESIGN FEATURES

-MATERIALS

COVER: DUCTILE IRON (80-55-06)
FRAME: GRAY IRON (CL35)

-DESIGN LOAD: HEAVY DUTY

-OPEN AREA: N/A

-COATING: UNDIPPED

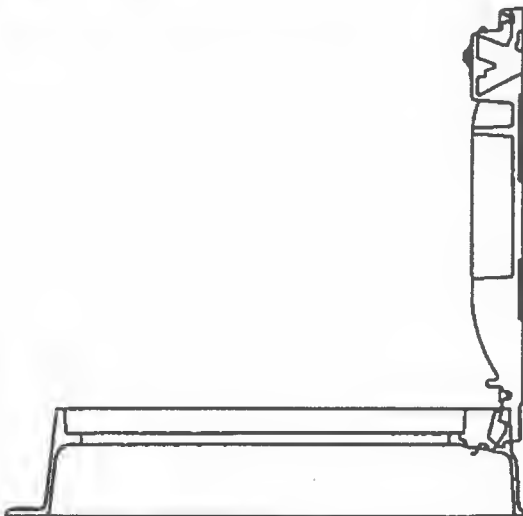
- DESIGNATES MACHINED SURFACE

CERTIFICATION

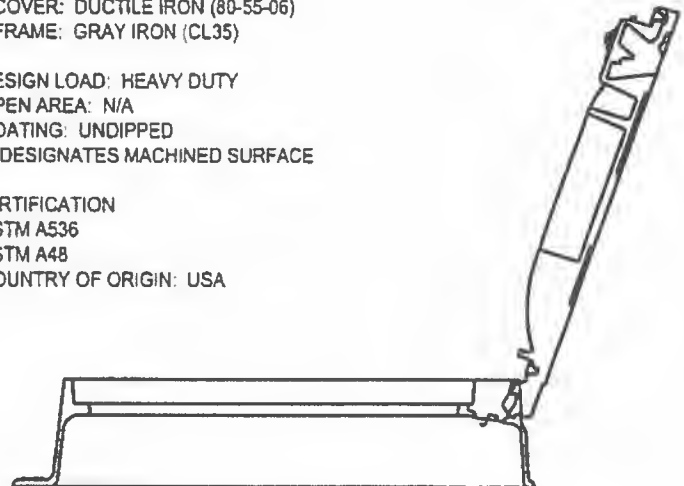
-ASTM A536

-ASTM A48

-COUNTRY OF ORIGIN: USA



SAFETY LOCK @ 90°



FULLY OPENED & REMOVAL POSITION @ 120°

DWSD APPROVAL:

L. Angler

DATE:

04/16/14



CITY OF DETROIT
CITY ENGINEERING DIVISION
DPW

DWSD MANHOLE
ERGO ASSEMBLY

APPROVED:

revised 4/16/14
ENGINEER OF STREETS
4/16/14
CITY ENGINEER

SHEET 1 OF 1

DETAIL STD. No.

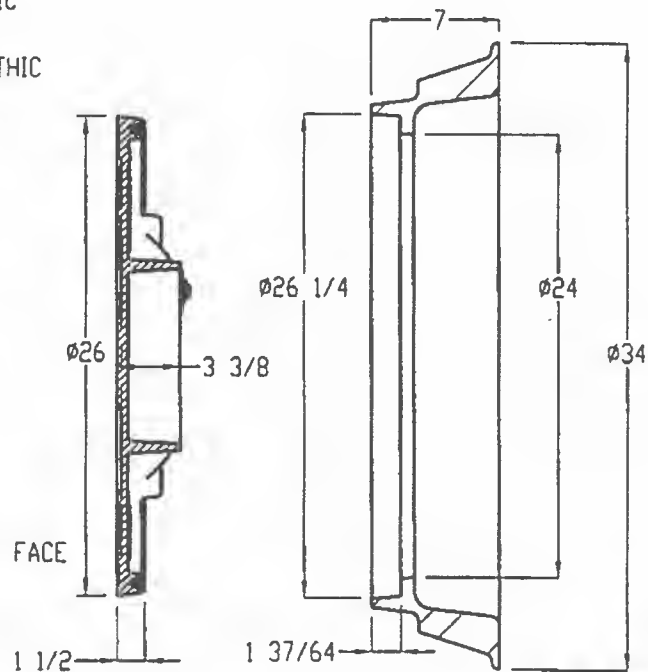
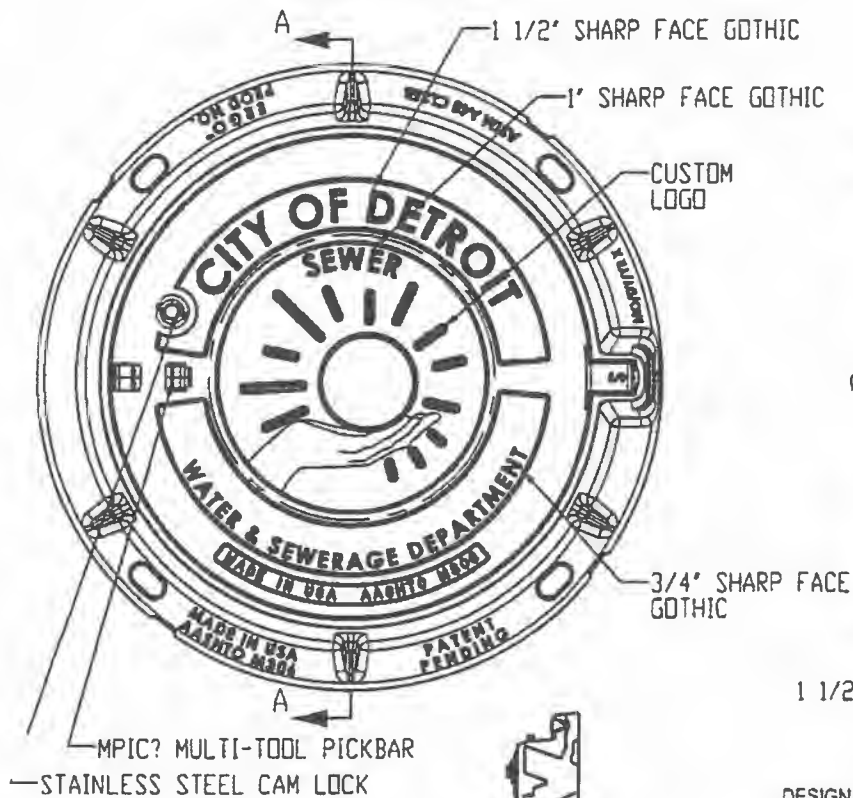
DRAWING No. 101

DRAWN BY: N.Y. SANTOS

DATE: 0/15/2014

ERGO Assembly

Assembly Weight 251 lbs.



SECTION A-A

DESIGN FEATURES

MATERIALS

COVER: DUCTILE IRON (B0-55-06)
FRAME: GRAY IRON (CL35)

-DESIGN LOAD: HEAVY DUTY
-OPEN AREA: N/A
-COATING: UNDIPPED
- DESIGNATES MACHINED SURFACE

CERTIFICATION

-ASTM A536
-ASTM A48
-COUNTRY OF ORIGIN: USA

SAFETY LOCK @ 90°

FULLY OPENED & REMOVAL POSITION @ 120°

DWSD APPROVAL: *N. Single*

DATE: *04/16/14*

Weights (lbs/kg), dimensions (inches/mm)
and drawings provided for your guidance. We
reserve the right to modify specifications without
prior notice.



CITY OF DETROIT
CITY ENGINEERING DIVISION
DPW

DWSD MANHOLE
ERGO ASSEMBLY

APPROVED:

updated 4/15/14
ENGINEER OF STREETS
Lin *4/16/14*
CITY ENGINEER

SHEET 1 OF 1

DETAIL STD No.

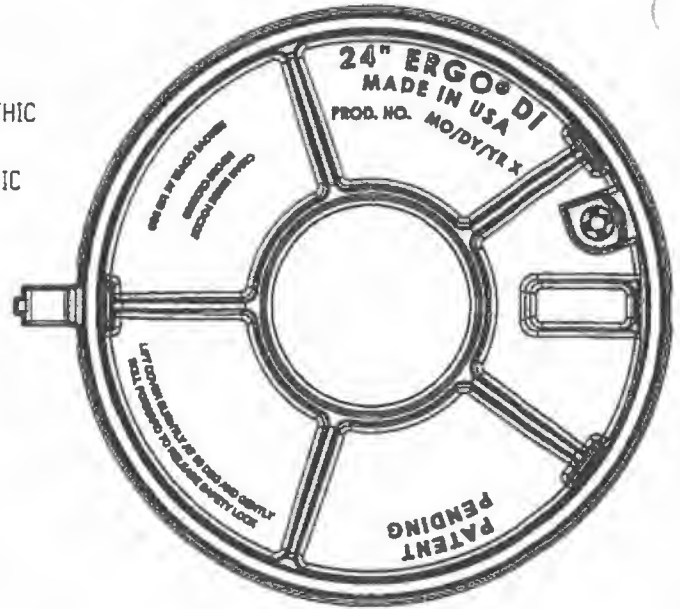
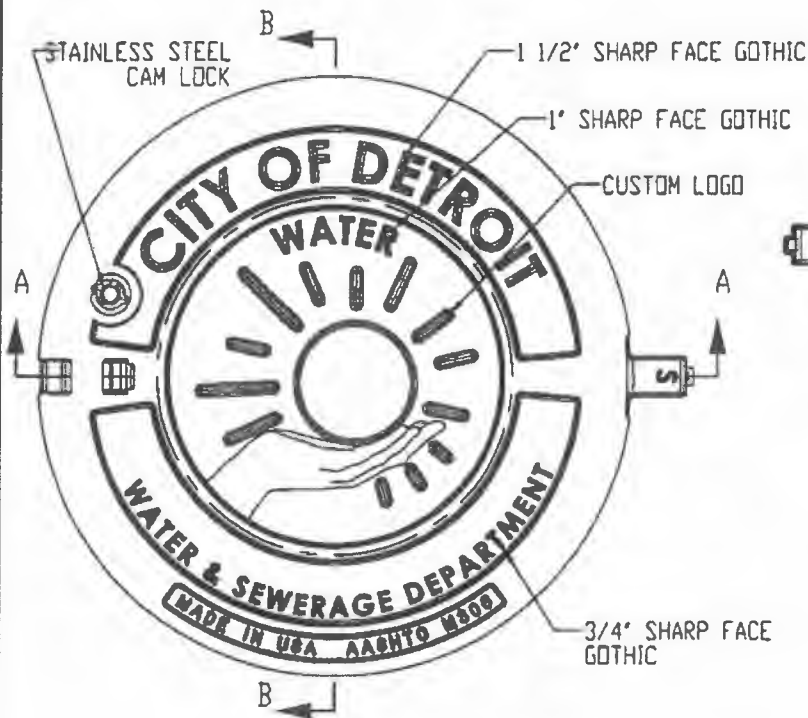
DRAWING No. 102

DRAWN BY: N.Y. SANTOS

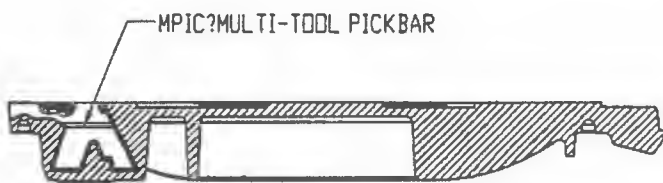
DATE: 01/15/2014

EJ Part Number: LC00104051,
Assembly Weight 108 lbs.

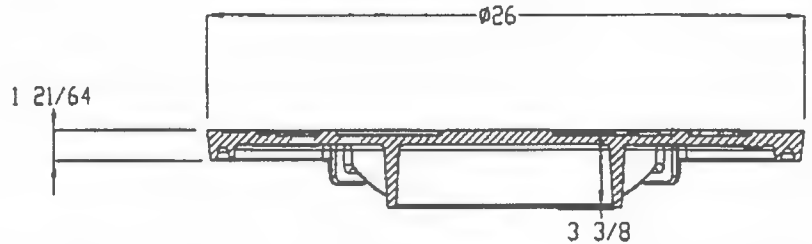
ERGO Cover



BOTTOM VIEW



SECTION A-A



SECTION B-B

DESIGN FEATURES

MATERIALS

COVER: DUCTILE IRON (80-55-06)

-DESIGN LOAD: HEAVY DUTY

-OPEN AREA: N/A

-COATING: UNDIPPED

-✓ DESIGNATES MACHINED SURFACE

CERTIFICATION

-ASTM A536

-COUNTRY OF ORIGIN: USA

DWSD APPROVAL: *D. Singley*

DATE: *04/16/14*



CITY OF DETROIT
CITY ENGINEERING DIVISION
DPW

DWSD MANHOLE
ERGO COVER

APPROVED:

update 4/16/14
ENGINEER OF STREETS
Paul J. 4/16/14
CITY ENGINEER

SHEET 1 OF 1

DETAIL STD. No.

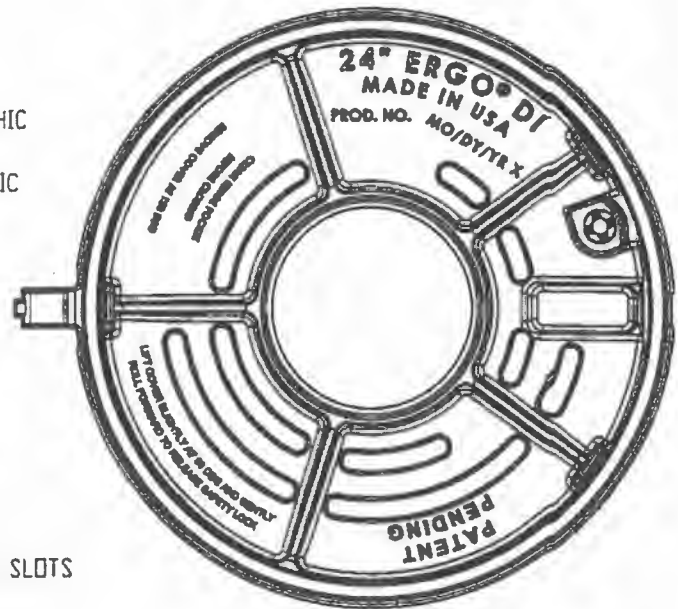
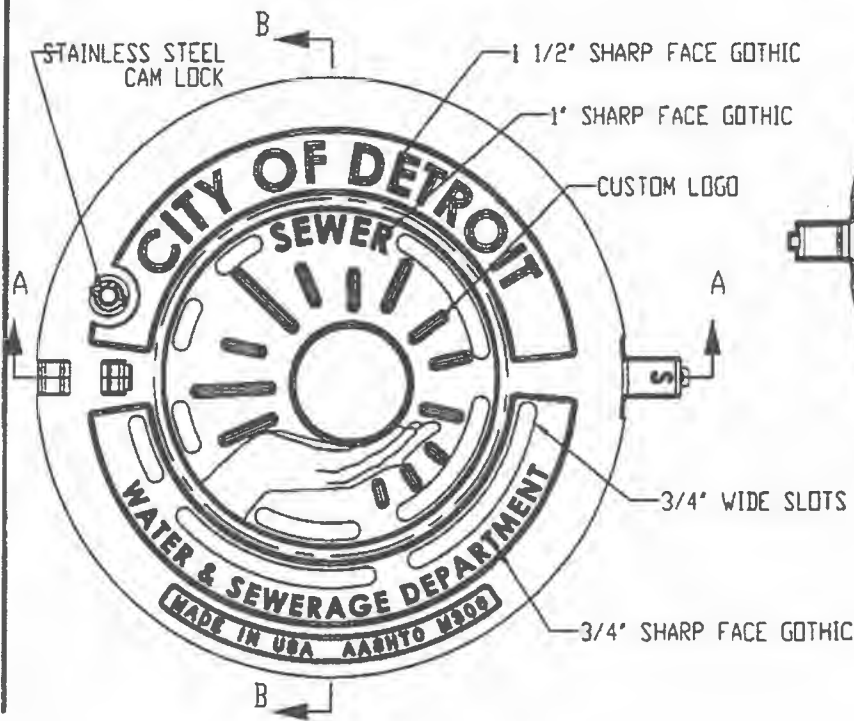
DRAWING No. 111

DRAWN BY: N.Y. SANTOS

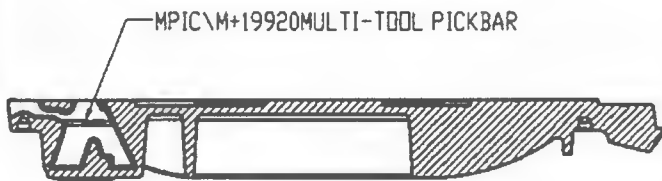
DATE: 0/15/2014

EJ Part Number: LC00104050,
Assembly Weight 108 lbs.

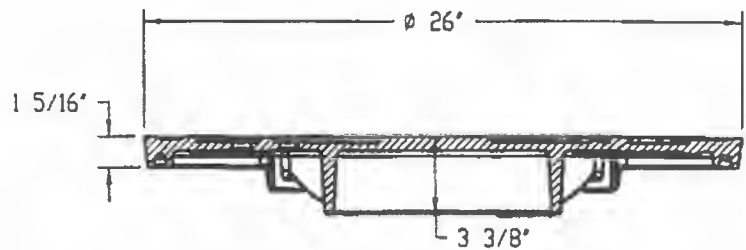
ERGO Cover



BOTTOM VIEW



SECTION A-A



SECTION B-B

DESIGN FEATURES

- MATERIALS
COVER: DUCTILE IRON (80-55-06)
- DESIGN LOAD: HEAVY DUTY
- OPEN AREA: N/A
- GOATING: UNDIPPED
- DESIGNATES MACHINED SURFACE

CERTIFICATION

- ASTM A536
- COUNTRY OF ORIGIN: USA

DWSD APPROVAL: *A. Singley*

DATE: *04/16/14*



CITY OF DETROIT
CITY ENGINEERING DIVISION
DPW

DWSD MANHOLE
ERGO COVER

APPROVED:

updated 4/16/14
ENGINEER OF STREETS
4/16/14
CITY ENGINEER

SHEET 1 OF 1

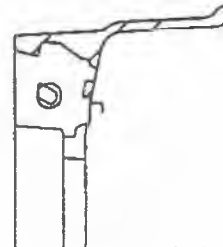
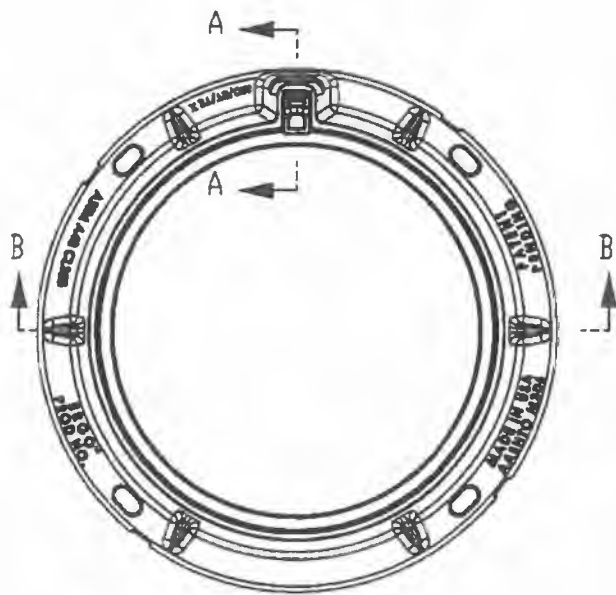
DETAIL STD. No.

DRAWING No. 112

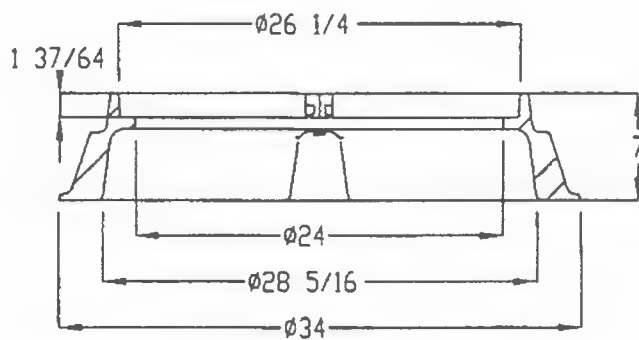
DRAWN BY: N.Y. SANTOS

DATE: 0/15/2014

EJ Part Number: LF240703408,
Assembly Weight 137 lbs.



SECTION A-A
SCALE 1 : 6



SECTION B-B

DESIGN FEATURES

-MATERIALS

FRAME: DUCTILE IRON (70-50-05)

-DESIGN LOAD: HEAVY DUTY

-OPEN AREA: N/A

-COATING: UNDIPPED

-✓ DESIGNATES MACHINED SURFACE

CERTIFICATION

-ASTM A536

-COUNTRY OF ORIGIN: USA

DWSD APPROVAL:

R. Singh

DATE:

04/16/14



CITY OF DETROIT
CITY ENGINEERING DIVISION
DPW

DWSD MANHOLE
FRAME

APPROVED:

updated 4/16/14
R. Singh
CITY ENGINEER

SHEET 1 OF 1

DETAIL STD. No.

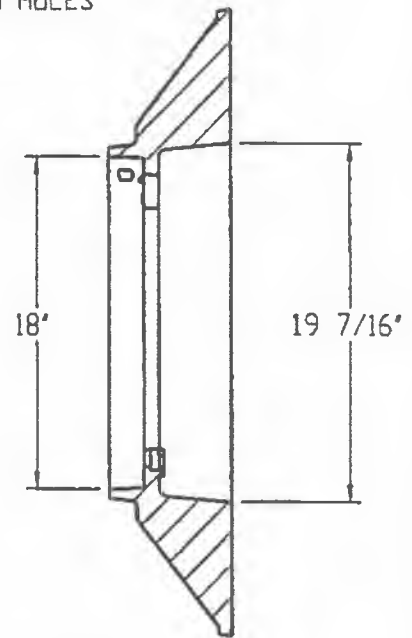
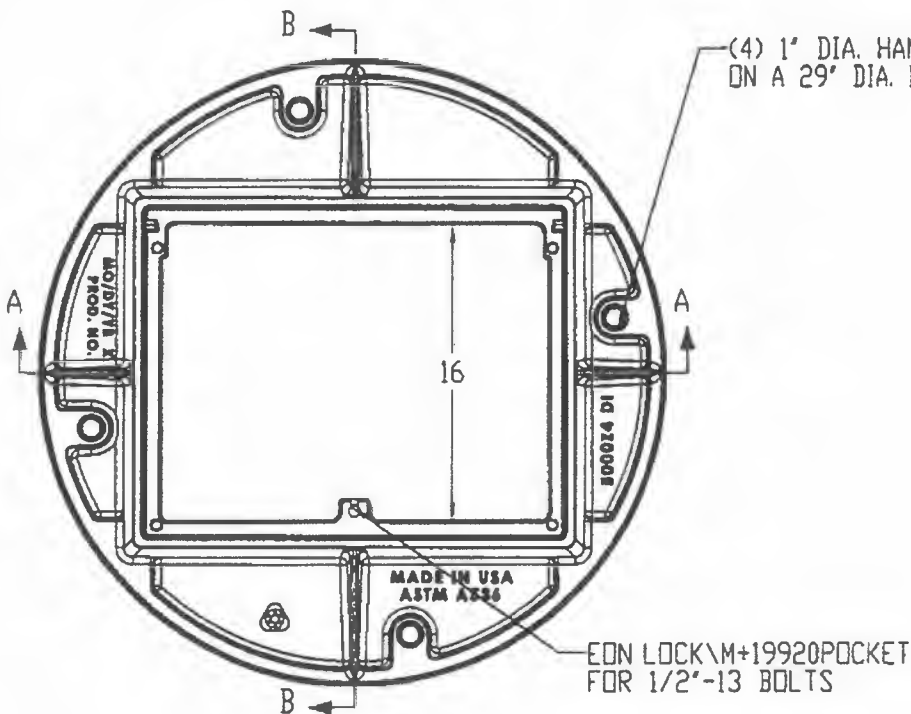
DRAWING No. 113

DRAWN BY: N.Y. SANTOS

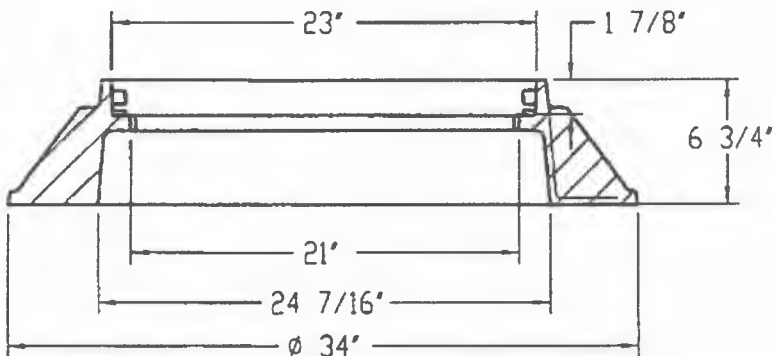
DATE: 0/13/2014

EJ Part Number: 00500017, 156 lbs.

5000 Frame



SECTION B-B



SECTION A-A

DESIGN FEATURES

-MATERIALS

FRAME: DUCTILE IRON (70-50-05)

-DESIGN LOAD: HEAVY DUTY

-COATING: UNDIPPED

- / DESIGNATES MACHINED SURFACE

CERTIFICATION

-ASTM A536

-COUNTRY OF ORIGIN: USA

DWSD APPROVAL:

A. Singel

DATE:

04/16/14



CITY OF DETROIT
CITY ENGINEERING DIVISION
DPW

DWSD MANHOLE
5000 FRAME

APPROVED:

repeated 4/16/14
ENGINEER OF STREETS
David J. ... 4/16/14
CITY ENGINEER

SHEET 1 OF 1

DETAIL STD No

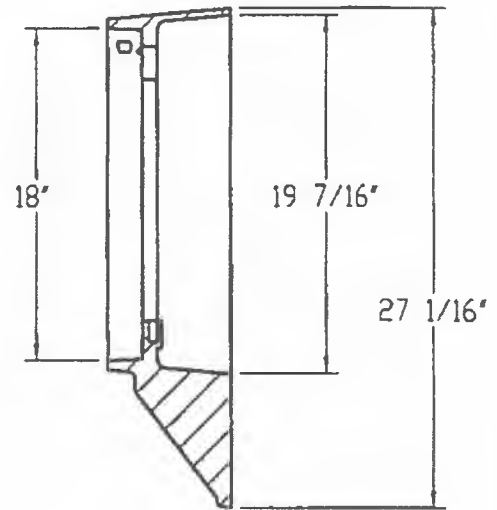
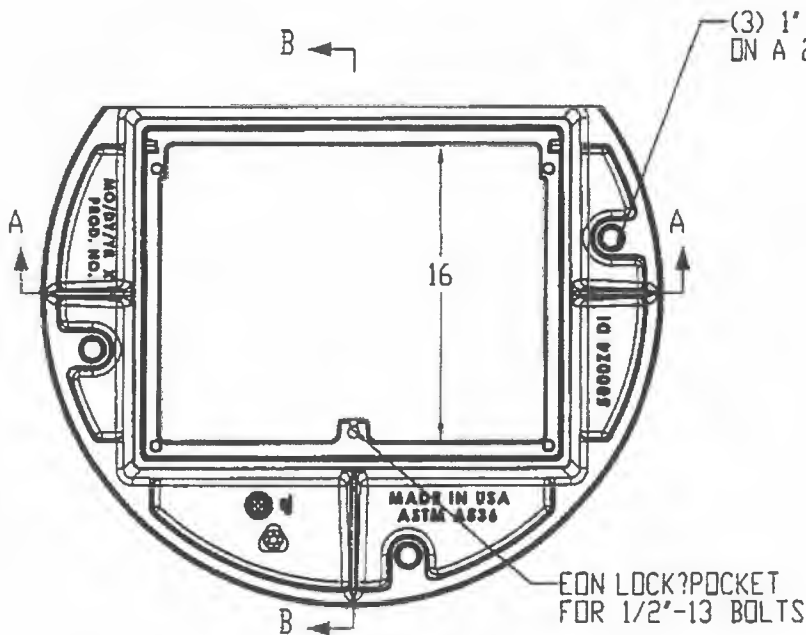
DRAWING No. 103

DRAWN BY: N.Y. SANTOS

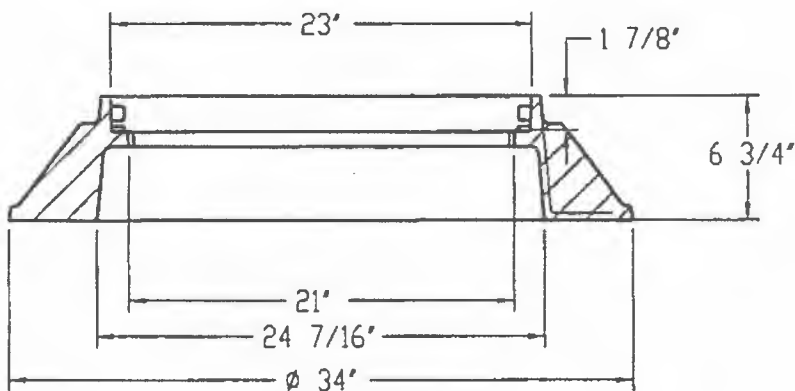
DATE: 01/15/2014

EJ Part Number: 00500019, 134 lbs.

5000 Frame



SECTION B-B



SECTION A-A

DESIGN FEATURES

-MATERIALS

FRAME: DUCTILE IRON (70-50-05)

-DESIGN LOAD: HEAVY DUTY

-COATING: UNDIPPED

-✓ DESIGNATES MACHINED SURFACE

CERTIFICATION

-ASTM A536

-COUNTRY OF ORIGIN: USA

DWSD APPROVAL: *R. Singh*

DATE: 04/16/14



CITY OF DETROIT
CITY ENGINEERING DIVISION
DPW

DWSD MANHOLE
5000 FRAME

APPROVED:

Repatel 4/16/14
ENGINEER OF STREETS
Paul J. 4/16/14
CITY ENGINEER

SHEET 1 OF 1

DETAIL STD. No.

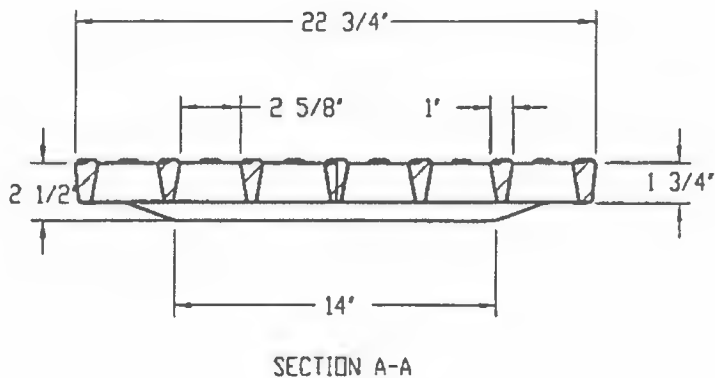
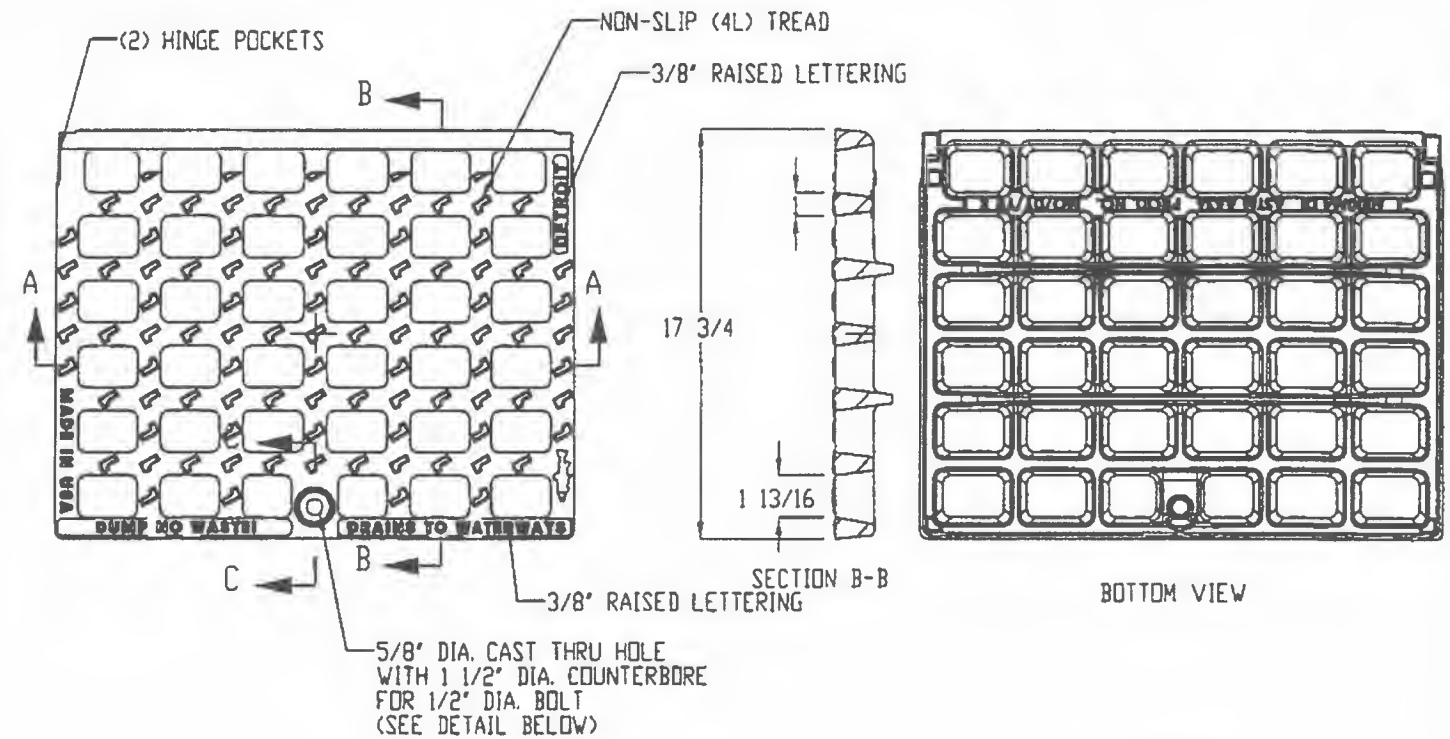
DRAWING No. 104

DRAWN BY: N.Y. SANTOS

DATE: 0/15/2014

EJ Part Number: 00500063, 85 lbs.

5000M4 Grate



- DESIGN FEATURES
- MATERIALS
COVER: DUCTILE IRON (80-55-06)
 - DESIGN LOAD: HEAVY DUTY
 - OPEN AREA: 160 SQ IN
 - COATING: UNDIPPED
 - DESIGNATES MACHINED SURFACE

- CERTIFICATION
- ASTM A536
 - COUNTRY OF ORIGIN: USA

DWSD APPROVAL:

D. Single

DATE:

04/16/14



CITY OF DETROIT
CITY ENGINEERING DIVISION
DPW

CATCH BASIN
5000 M4 GRATE

APPROVED:

4/16/14
ENGINEER OF STREETS
4/16/14
CITY ENGINEER

SHEET 1 OF 1

DETAIL STD. No.

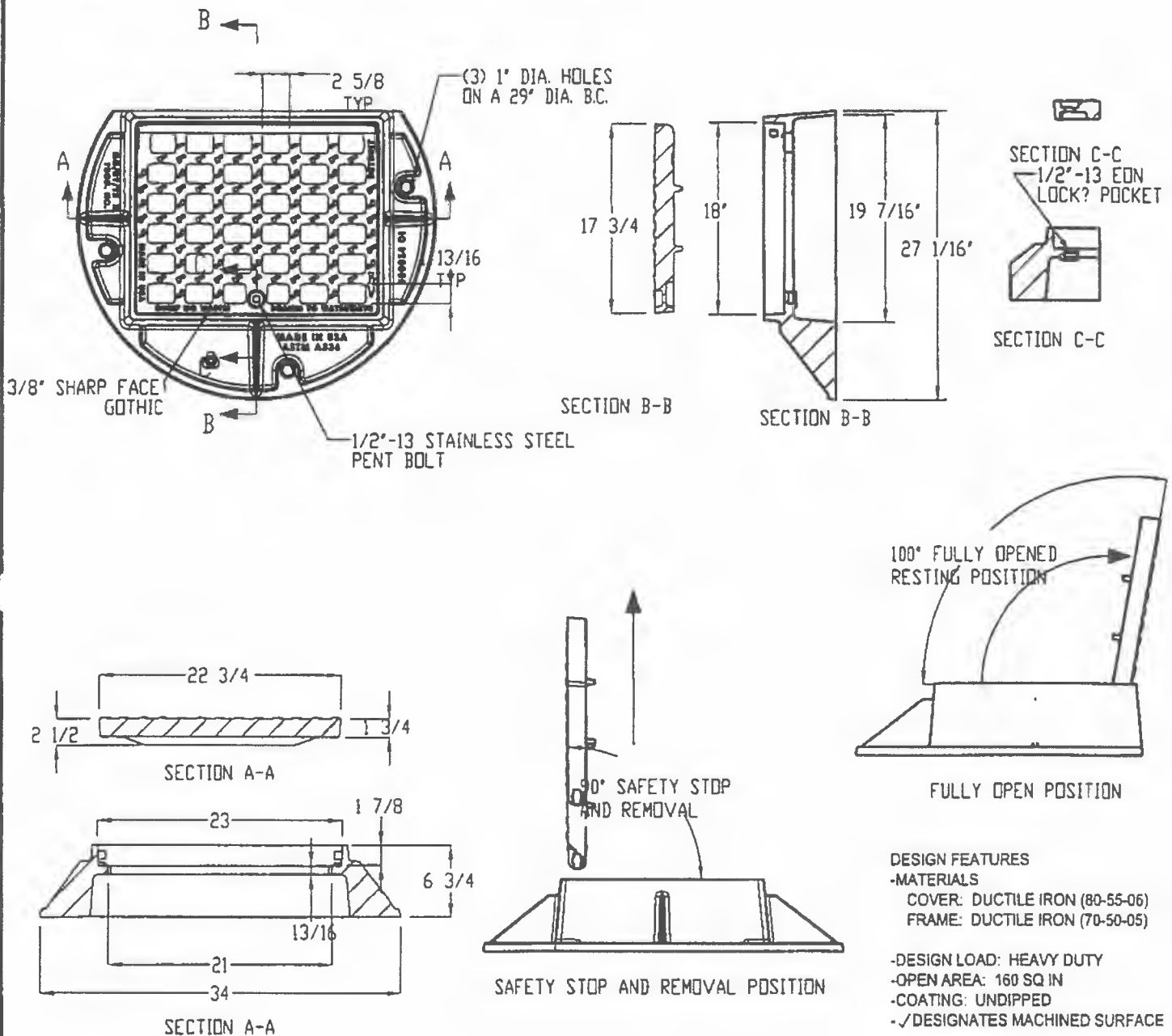
DRAWING No. 105

DRAWN BY: N.Y. SANTOS

DATE: 0/15/2014

5000Z4 5000M4 Assembly

Assembly Weight 219 lbs.



- DESIGN FEATURES**
- MATERIALS
 - COVER: DUCTILE IRON (80-55-06)
 - FRAME: DUCTILE IRON (70-50-05)
 - DESIGN LOAD: HEAVY DUTY
 - OPEN AREA: 160 SQ IN
 - COATING: UNDIPPED
 - ✓ DESIGNATES MACHINED SURFACE

CERTIFICATION

- ASTM A536
- COUNTRY OF ORIGIN: USA

DWSD APPROVAL: *[Signature]*

DATE: 04/16/14

Weights (lbs/kg), dimensions (inches/mm) and drawings provided for your guidance. We reserve the right to modify specifications without prior notice.



CITY OF DETROIT
CITY ENGINEERING DIVISION
DPW

CATCH BASIN
5000Z4 5000M4 ASSEMBLY

APPROVED:

[Signature] 4/16/14
ENGINEER OF STREETS
[Signature] 4/16/14
CITY ENGINEER

SHEET 1 OF 1

DETAIL STD. No.

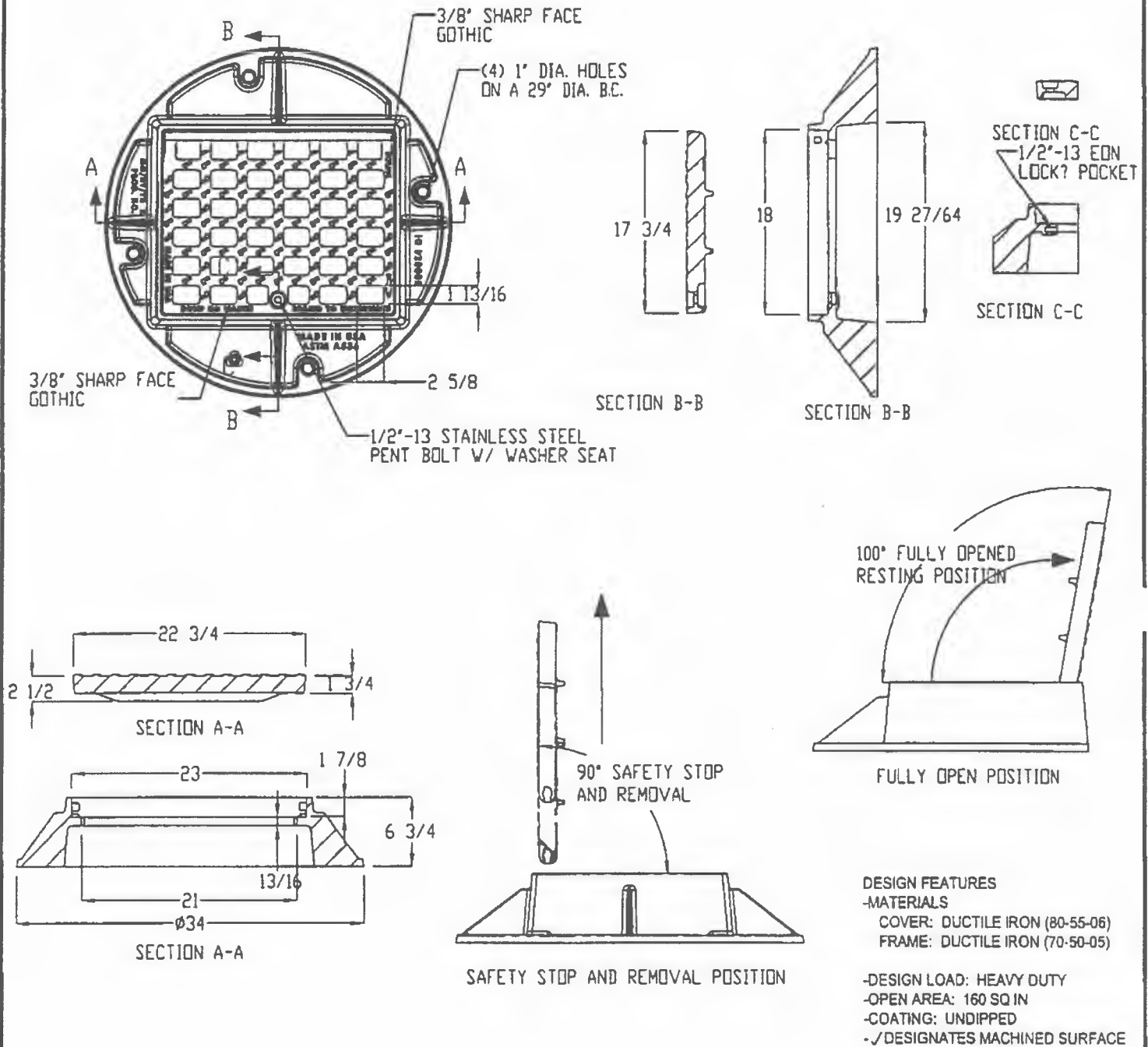
DRAWING No. 108

DRAWN BY: N.Y. SANTOS

DATE: 0/15/2014

Assembly Weight 241 lbs.

5000 Assembly



DWSD APPROVAL:

D. Single

DATE:

04/16/14



CITY OF DETROIT
CITY ENGINEERING DIVISION
DPW

CATCH BASIN
5000 ASSEMBLY

APPROVED:

4/16/14
ENGINEER OF STREETS
2 4/16/14
CITY ENGINEER

SHEET 1 OF 1

DETAR STD No.

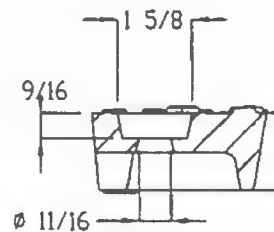
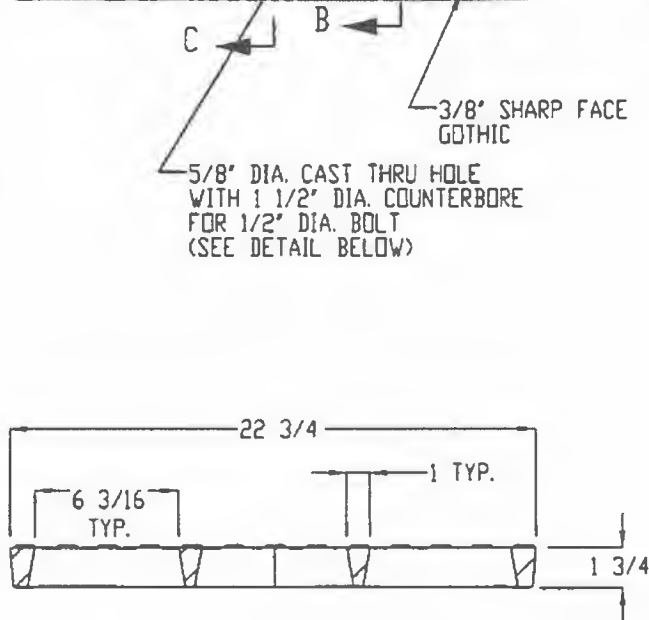
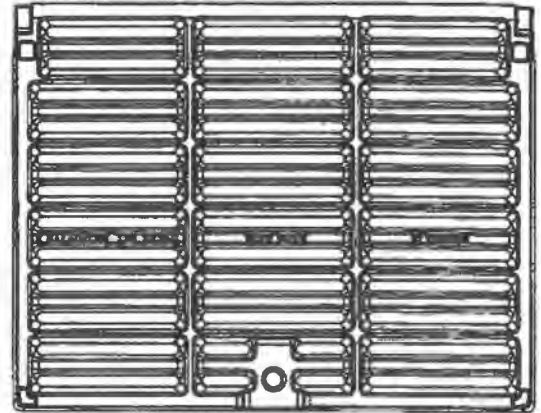
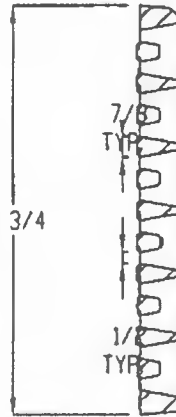
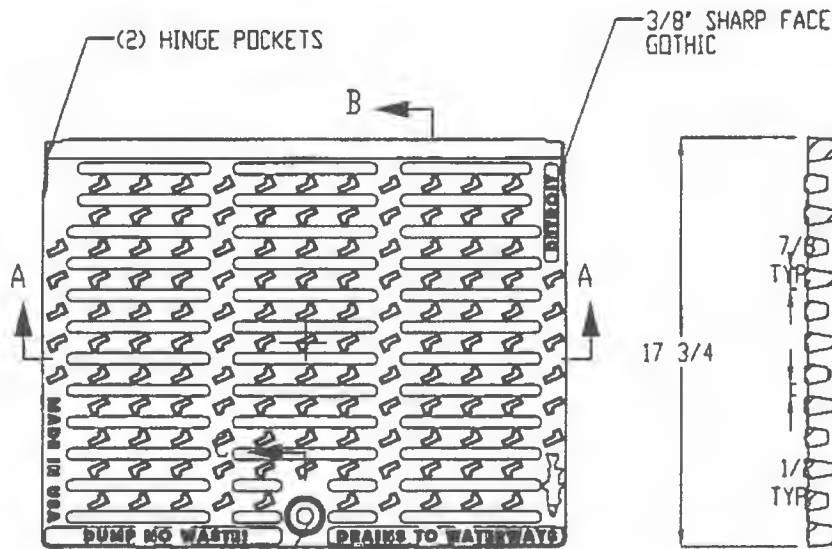
DRAWING No. 107

DRAWN BY: N.Y. SANTOS

DATE: 0/15/2014

EJ Part Number: 00500066, 80 lbs.

5000M5 Grate



- DESIGN FEATURES
- MATERIALS
COVER: DUCTILE IRON (80-55-06)
 - DESIGN LOAD: HEAVY DUTY
 - COATING: UNDIPPED
 - DESIGNATES MACHINED SURFACE

CERTIFICATION

- ASTM A536
- COUNTRY OF ORIGIN: USA

DWSD APPROVAL:

D. Singh

DATE:

04/16/14



CITY OF DETROIT
CITY ENGINEERING DIVISION
DPW

A.D.A. CATCH BASIN
5000M5 GRATE

APPROVED:

4/15/14
ENGINEER OF STREETS
4/16/14
CITY ENGINEER

SHEET 1 OF 1

DETAIL STD. No

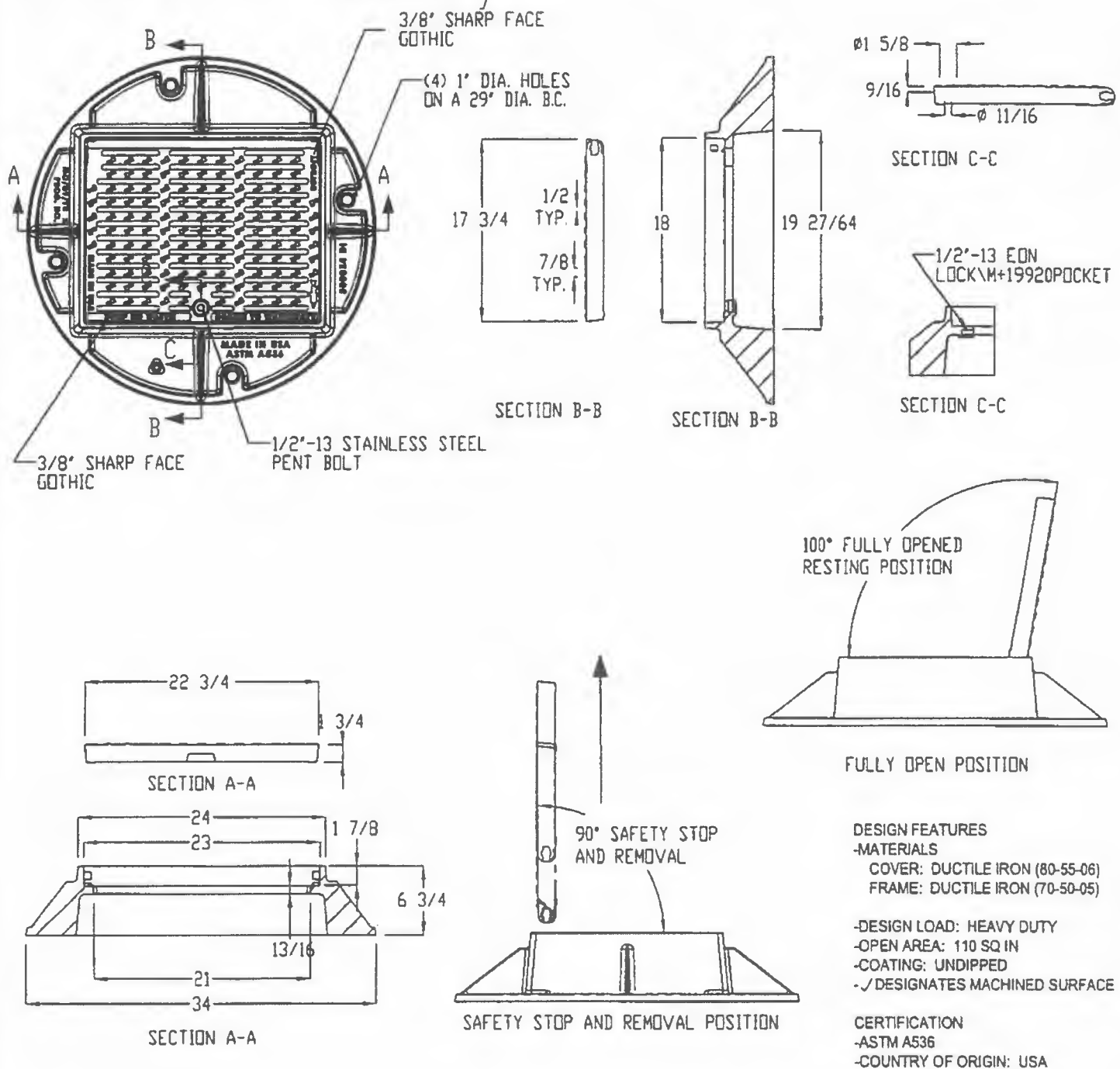
DRAWING No. 108

DRAWN BY: N.Y. SANTOS

DATE: 5/15/2014

EJ Part Number: 00500066B02, 236 lbs.

5000Z4 5000M5 Assembly



DWSD APPROVAL: P. Singleton DATE: 04/16/14

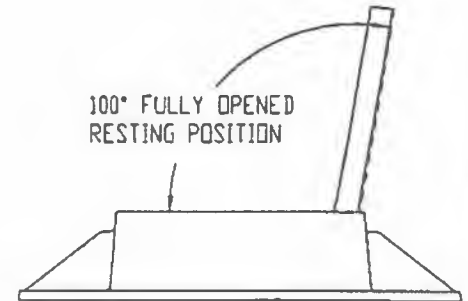
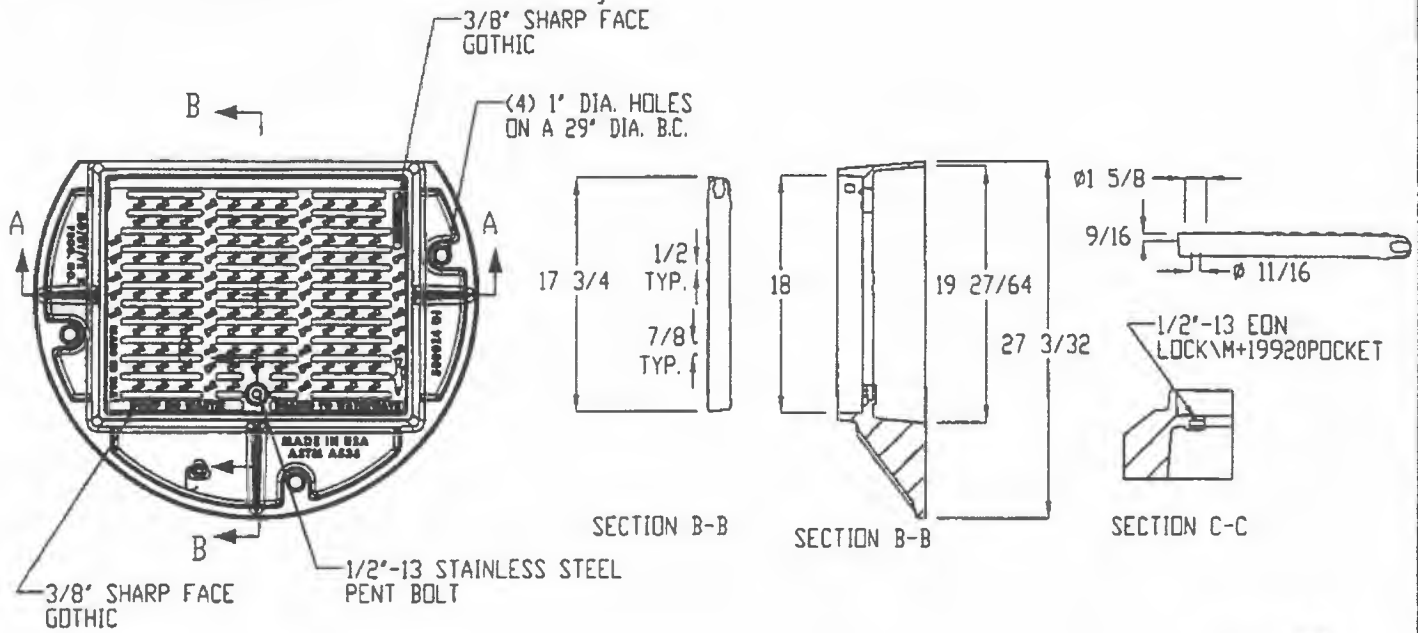
Weights (lbs/kg), dimensions (inches/mm) and drawings provided for your guidance. We reserve the right to modify specifications without prior notice.

 CITY OF DETROIT CITY ENGINEERING DIVISION DPW	A.D.A. CATCH BASIN 5000Z4 5000M5 ASSEMBLY	APPROVED: <u>updated 4/16/14</u> ENGINEER OF STREETS <u>[Signature]</u> 4/16/14 CITY ENGINEER	SHEET <u>1</u> OF <u>1</u> DETAIL STD. No. _____ DRAWING No. 108 DRAWN BY: N.Y. SANTOS DATE: 01/15/2014
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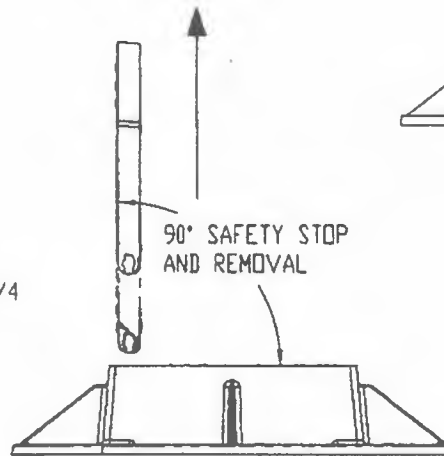
EJ Part Number: 00500066B02, 214 lbs.

5000Z4 5000M5

Assembly



FULLY OPEN POSITION



SAFETY STOP AND REMOVAL POSITION

DESIGN FEATURES

-MATERIALS

COVER: DUCTILE IRON (80-55-06)

FRAME: DUCTILE IRON (70-50-05)

-DESIGN LOAD: HEAVY DUTY

-OPEN AREA: 110 SQ IN

-COATING: UNDIPTED

-✓ DESIGNATES MACHINED SURFACE

CERTIFICATION

-ASTM A536

-COUNTRY OF ORIGIN: USA

DWSD APPROVAL:

[Signature]

DATE:

04/16/14



CITY OF DETROIT
CITY ENGINEERING DIVISION
DPW

A.D.A. CATCH BASIN
5000Z4 5000M5 ASSEMBLY

APPROVED:

[Signature] 4/16/14
ENGINEER OF STREETS

CITY ENGINEER

SHEET 1 OF 1

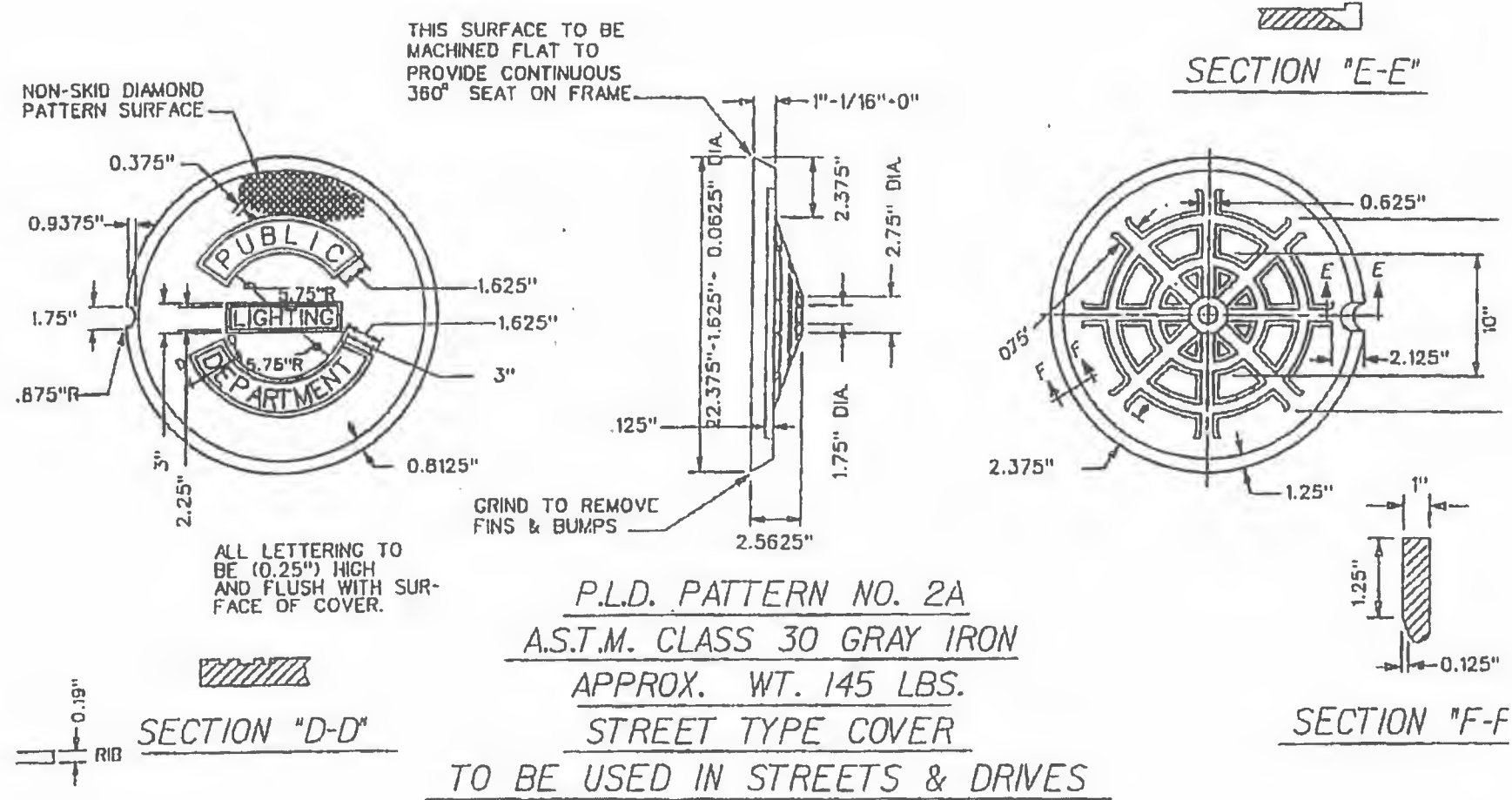
DETAIL STD. No.

DRAWING No. 110

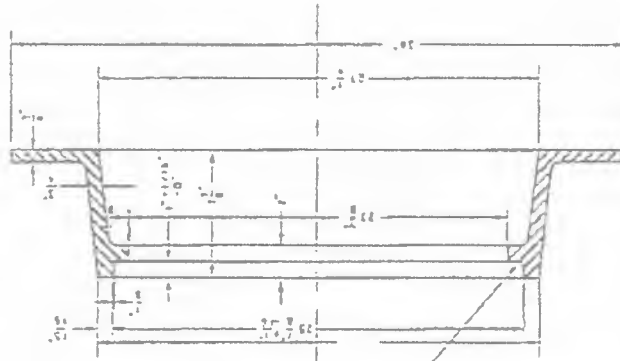
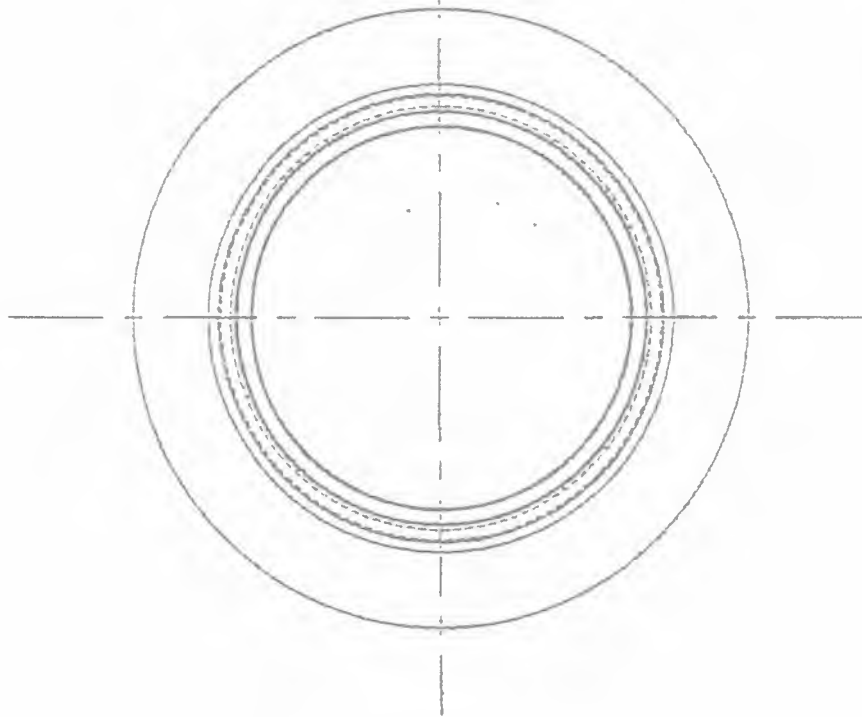
DRAWN BY: N.Y. SANTOS

DATE: 01/15/2014

Cover Weight 142 lbs.



Frame Weight 252 lbs.



1801 1376th 9101

היום יצאנו לדרך בלילה 17:00
בשעה 18:00 נחגוג את יום הולדתו

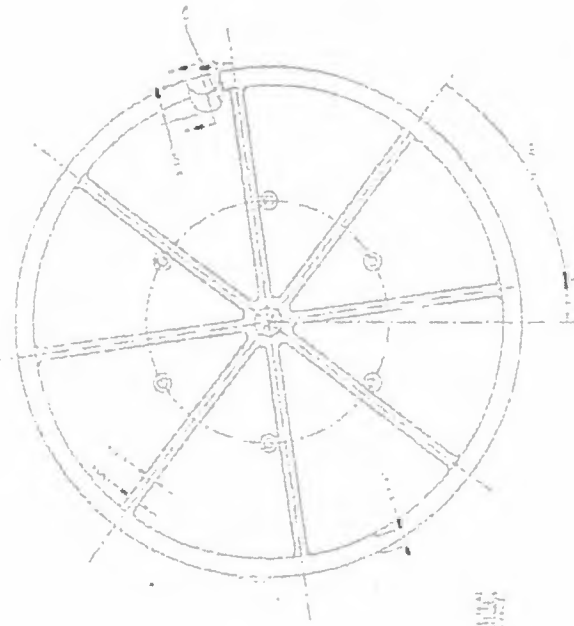
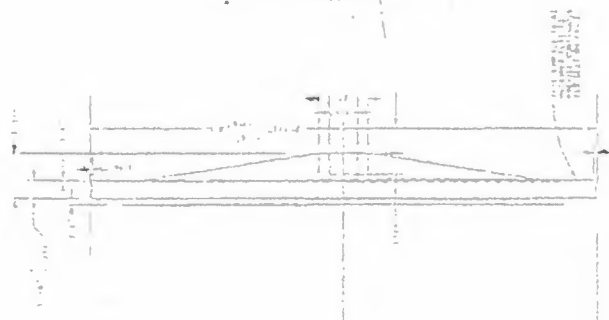
MAINTENAL GRAY IRON - CLASS NO. 20 ON 30
PETERSON NO. 1-A

1434 TCSALE

HANDHOLE FRAME

[illegible]

Cover Weight 257 lbs.



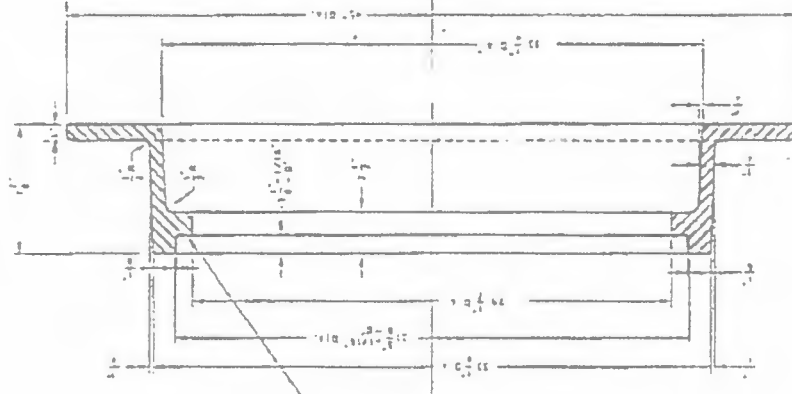
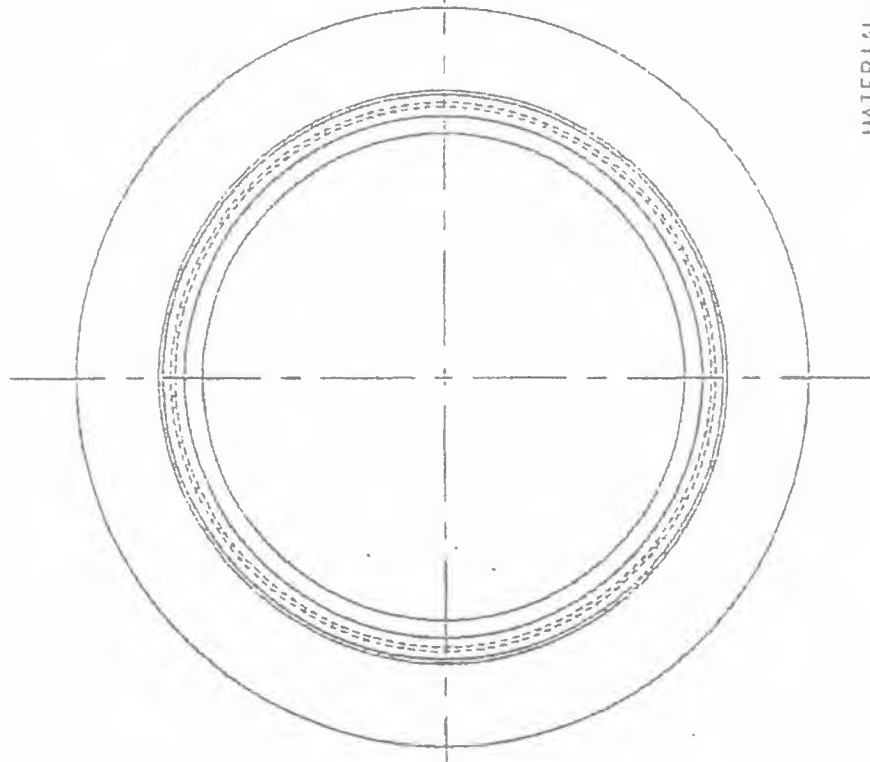
MATERIAL - GRAY IRON CLASS NO. 50
PATTERN NO. 410A

NOT TO SCALE

ALL DIMENSIONS ARE IN INCHES
UNLESS OTHERWISE SPECIFIED
TOLERANCES ARE AS FOLLOWS:
FRACTIONS DECIMALS ANGLES
1/16 0.0625 0.125 0.25 0.5 1.0 1.5 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0 13.0 14.0 15.0 16.0 17.0 18.0 19.0 20.0 21.0 22.0 23.0 24.0 25.0 26.0 27.0 28.0 29.0 30.0 31.0 32.0 33.0 34.0 35.0 36.0 37.0 38.0 39.0 40.0 41.0 42.0 43.0 44.0 45.0 46.0 47.0 48.0 49.0 50.0 51.0 52.0 53.0 54.0 55.0 56.0 57.0 58.0 59.0 60.0 61.0 62.0 63.0 64.0 65.0 66.0 67.0 68.0 69.0 70.0 71.0 72.0 73.0 74.0 75.0 76.0 77.0 78.0 79.0 80.0 81.0 82.0 83.0 84.0 85.0 86.0 87.0 88.0 89.0 90.0 91.0 92.0 93.0 94.0 95.0 96.0 97.0 98.0 99.0 100.0

PUBLIC LIGHTING DEPARTMENT		DATE		BY		CHECKED		APPROVED	
PROJECT NO.		SHEET NO.		SHEET TOTAL		DATE		BY	
MANHOLE COVER		PATTERN NO. 410A		MATERIAL - GRAY IRON CLASS NO. 50		COVER WEIGHT 257 lbs.		NOT TO SCALE	

Frame Weight 442 lbs.





ফুটপাথ প্রতিস্থাপন প্রোগ্রাম



SII
RE
PR

৩ দিনের বিজ্ঞপ্তি

ডেট্রয়েট ডিপার্টমেন্ট অফ পাবলিক ওয়ার্কস, আমাদের ঠিকাদার (গুলি) এর মাধ্যমে শীঘ্রই আপনার বাড়ির সামনে ক্ষতিগ্রস্ত ফুটপাথগুলি প্রতিস্থাপন করবে। সিটি ইন্সপেক্টর সাইডওয়ায় ফ্ল্যাগ পেইন্ট দিয়ে প্রতিস্থাপন যোগ্য ফুটপাথ চিহ্নিত করবেন। আমরা আপনার গাড়িকে আপনার বাড়ির সামনের দিক থেকে সরাতে বলি, যাতে ঠিকাদাররা সহজে ফুটপাথে প্রবেশ করতে পারে। যদি আপনার ড্রাইভওয়ে জুড়ে ফুটপাথে চিহ্নগুলি থাকে তবে আপনাকে কাজ শুরু হওয়ার আগে আপনার গাড়ি আপনার ড্রাইভওয়ে থেকে সরাতে হবে। অন্যথায়, গাড়িটি ড্রাইভওয়েতে ৭ দিনের জন্য আটকে যেতে পারে যখন, কংক্রিট শক্তিশালী করা হয়।

একবার কংক্রিট ঢালা হলে, কংক্রিটের রাস্তা শক্তিশালী হতে প্রায় ৩ দিন এবং ড্রাইভওয়ে জুড়ে ঘন কংক্রিটের শক্তিশালী করার জন্য প্রায় ৭ দিন সময় নেয়। এটি অত্যন্ত গুরুত্বপূর্ণ যে ফুটপাথ শক্ত হয়ে যাওয়ার সময় আপনি এর উপর দিয়ে হাঁটাচলা করা অথবা গাড়ি চালানো, দাগ দেওয়া অথবা অন্যভাবে ক্ষতি করবেন না। এটা কাজের মান প্রভাবিত করবে।

ফুটপাথের প্রতিস্থাপন করার পর, কর্মীরা ফুটপাথের পাশে অবস্থিত এলাকায় পুনরুদ্ধার করতে ফিরে আসবে। ধ্বংসাবশেষ অপসারণ, পথের প্রতিস্থাপন দ্বারা সৃষ্ট ক্ষতির মেরামত, এবং কাজের দ্বারা ক্ষতিগ্রস্ত লেনে মাটি এবং বীজ প্রয়োগ এর অন্তর্ভুক্ত। ফুটপাথ প্রতিস্থাপন করার পর ২ সপ্তাহের মধ্যে পুনর্নির্মাণ সম্পন্ন করা হবে। যদি ঠিকাদার আপনার স্প্রিংকলার সিস্টেম ক্ষতিগ্রস্ত করে, (৩১৩) ২২৪-৩৪৯৪ এ আমাদের সাথে যোগাযোগ করুন। আপনার ঠিকানা

3 DAY N

The Detroit Department of Public Works, will soon be replacing damaged sidewalk(s), will soon be replacing damaged sidewalk(s) with new concrete. A City inspector will mark the areas to be replaced with pink paint. We ask you to move your car from the front of your home, so that the workers can access the sidewalk. If the sidewalk is damaged across your driveway, you will need to move your car from your driveway before work begins. Otherwise, your car may be trapped in the driveway for up to 7 days while the concrete is being strengthened.

Once the concrete has been poured, the sidewalk will be very strong. It is extremely important that you do not drive or otherwise damage the sidewalk during the curing process. The quality of the work.

Following replacement of the sidewalk, the City will restore the areas adjacent to the sidewalk by removing debris, repairing damaged areas, and applying soil and seed. The restoration will be completed after replacement of the sidewalk.



PROGRAMA DE REEMPLAZO DE LAS VEREDAS



ف

NOTIFICACIÓN DE 3 DÍAS

A través de nuestro contratista(s), el Departamento de Obras Públicas de Detroit muy pronto reemplazarán las veredas dañadas en frente a su hogar. Un inspector de la Ciudad marcará las banderas de la vereda a ser reemplazada con pintura. Le pedimos que mueva su vehículo de la parte delantera de su hogar para que el contratista tenga fácil acceso a la vereda. Si las señales incluyen la acera en frente a su entrada, usted necesita mover su vehículo de su entrada antes de que comience el trabajo. De lo contrario, el vehículo se puede quedar atrapado en la entrada hasta 7 días mientras se fortalece el concreto.

Una vez que se haya colocado el concreto, tomará aproximadamente 3 días para que se fortalezcan las paredes y aproximadamente 7 días para que el concreto más espeso se fortalezca en la calzada. Es extremadamente importante que no camine ni conduzca, marque o dañe la vereda mientras se endurece. Eso afectará la calidad del trabajo.

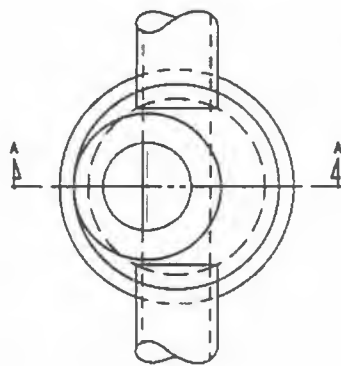
Después del reemplazo de la vereda, el personal regresará a restaurar las áreas adyacentes a las veredas. Esto incluye remover escombros, reparar daños causados por el reemplazo de la vereda, y aplicar tierra y semilla en el césped dañado por el trabajo. La restauración estará completa dentro de 2 semanas después del reemplazo de las veredas. Si el contratista daña su sistema de rociadores, contáctenos al **(313) 224-3494**. Deje un mensaje con su dirección e información de contacto. Notificaremos al contratista

3 أيام

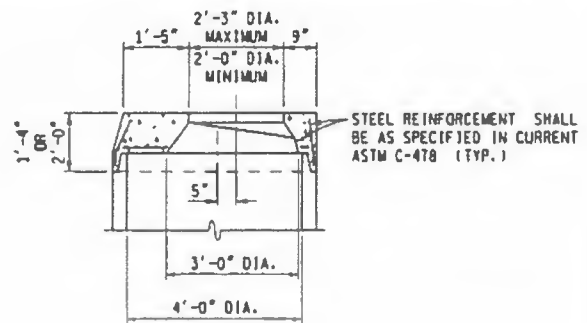
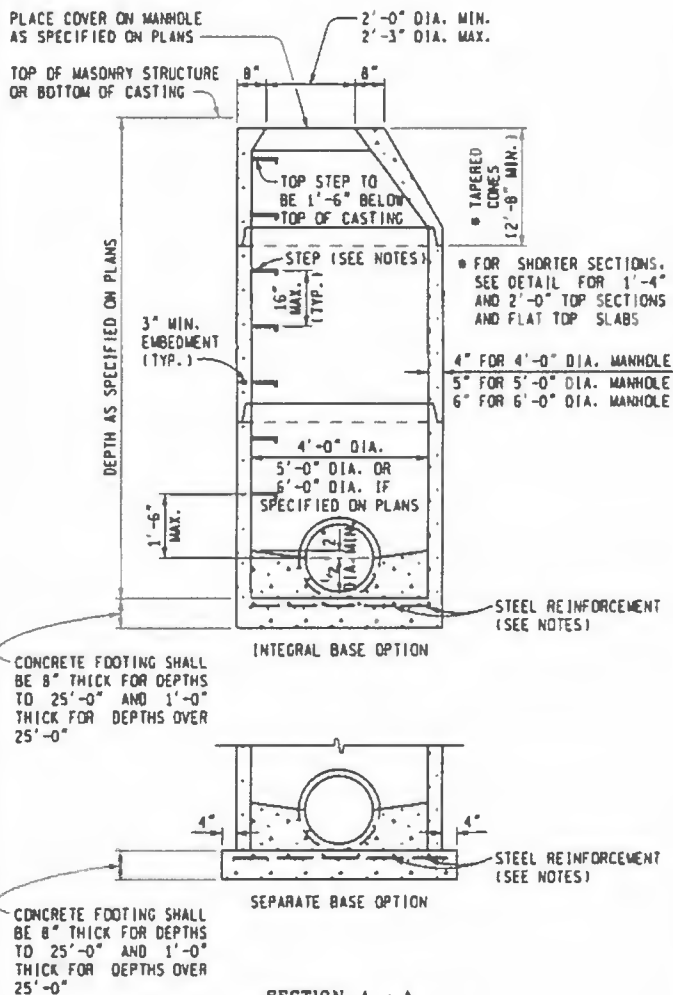
ستستبدل قريباً ، من خلال مقاولنا ،
مفتش المدينة بوضع علامة على
ع. نطلب منك نقل سيارتك من مقدمة
: الوصول إلى الرصيف. إذا كانت
، الخاص ، فستحتاج إلى نقل
لعمل. خلاف ذلك ، يمكن أن تكون
بل إلى 7 أيام ، لحين تتصلب

تغرق الأمر 3 أيام تقريباً للممر
7 أيام لـ للخرسانة الأسمنتية السمكية
ة ألا تمشي أو تسوق عبر الرصيف
ملب. حيث سيؤثر على جودة العمل.

لطواقم لاستعادة المناطق المتاخمة
م ، وإصلاح الأضرار الناجمة عن
والبذور في الحديقة التي تضررت
م في غضون أسبوعين بعد استبدال
م الرش الخاص بك ، فاتصل بنا
رسالة مع عنوانك ومعلومات
بإجراء الإصلاحات اللازمة. سيتم
العمل من قبل مدينة ديترويت. أنت

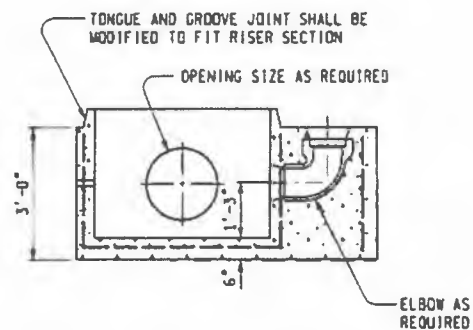
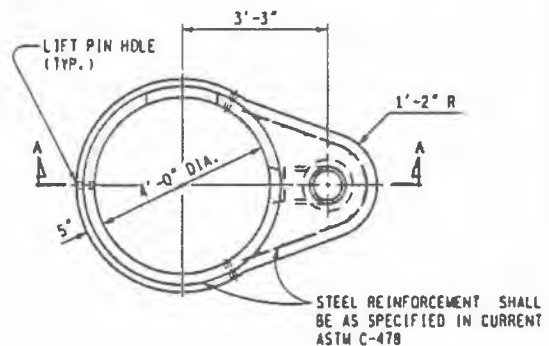


PLAN VIEW



DETAIL FOR
1'-4" & 2'-0" TOP SECTIONS

SHAPE MAY VARY FROM DETAIL SHOWN BUT MUST COMPLY WITH ASTM C-478 AND JOINTS SHALL BE COMPATIBLE WITH THE RISER



SECTION A - A

TYPICAL PRECAST REINFORCED
BOTTOM SECTION FOR DROP MANHOLE



PREPARED
BY
DESIGN DIVISION

DRAWN BY: B.L.T.

CHECKED BY: W.K.P.

DEPARTMENT DIRECTOR
Kirk T. Steudle

APPROVED BY:

Randy V. Pugh
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY:

Paul A. Van Pelt
DIRECTOR, BUREAU OF HIGHWAY DEVELOPMENT

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

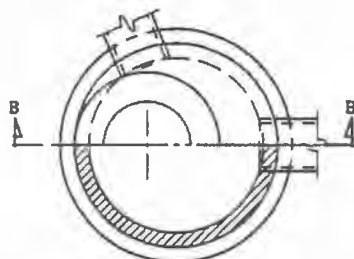
DRAINAGE STRUCTURES

1-27-2015
F.H.W.A. APPROVAL

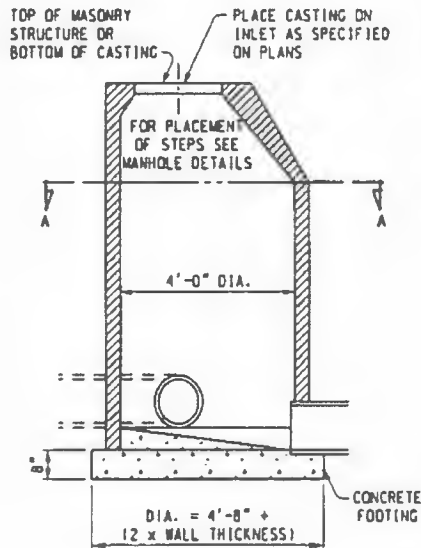
11-17-2014
PLAN DATE

R-1-F

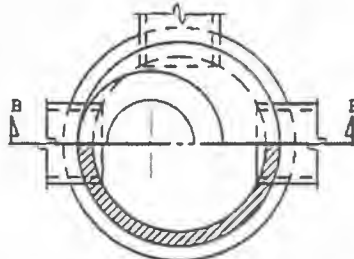
SHEET
1 OF 5



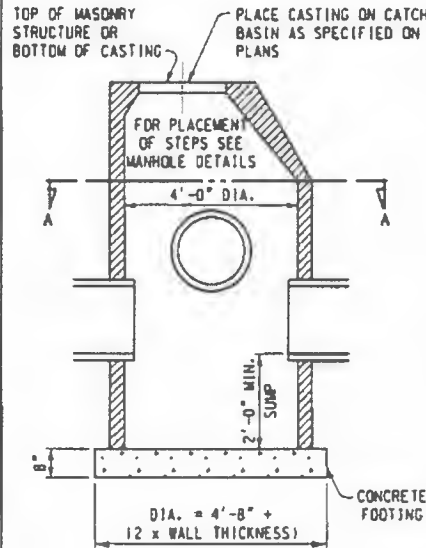
HALF SECTION A - A



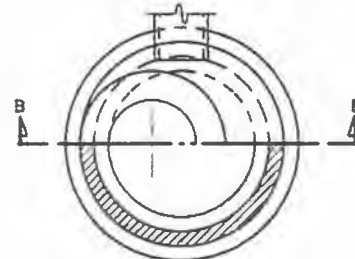
SEE MANHOLE DETAILS FOR BASE OPTIONS
SECTION B - B
INLET



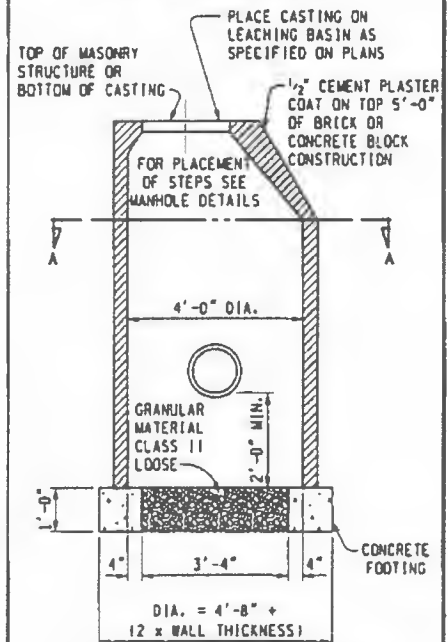
HALF SECTION A - A



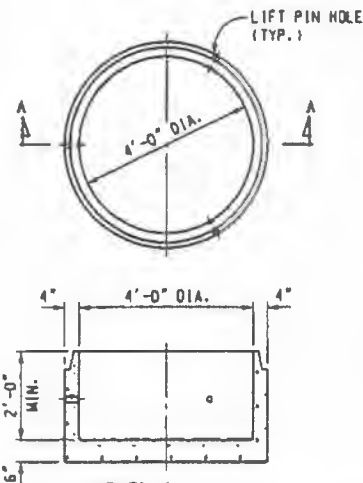
SEE MANHOLE DETAILS FOR BASE OPTIONS
SECTION B - B
CATCH BASIN



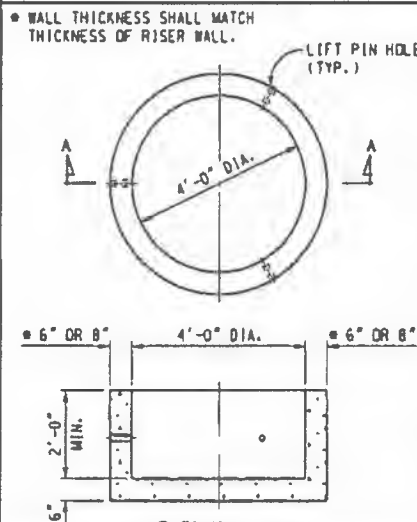
HALF SECTION A - A



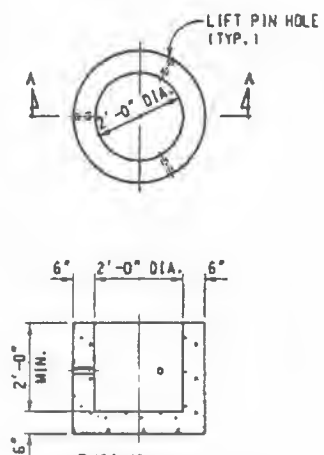
SEE MANHOLE DETAILS FOR BASE OPTIONS
SECTION B - B
LEACHING BASIN



SECTION A - A
**PRECAST SUMP
FOR PRECAST RISERS**



SECTION A - A
**PRECAST SUMP FOR BRICK
OR BLOCK CONSTRUCTION**



SECTION A - A
**PRECAST SUMP FOR
2'-0" DIA. STRUCTURES**

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

DRAINAGE STRUCTURES

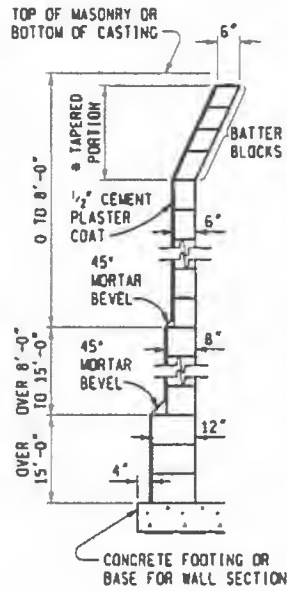
1-27-2015
F.H.W.A. APPROVAL

11-17-2014
PLAN DATE

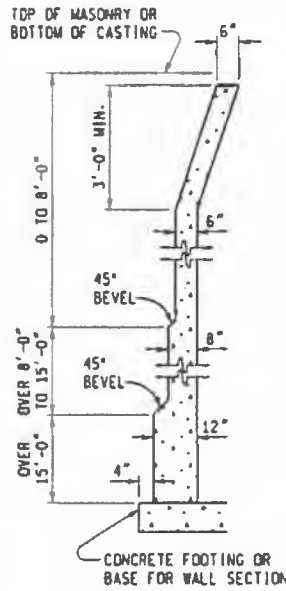
R-1-F

SHEET
2 OF 5

4 BLOCK MIN. FOR 4'-0" DIA. STRUCTURE
6 BLOCK MIN. FOR 5'-0" DIA. STRUCTURE
6 BLOCK MIN. FOR 6'-0" DIA. STRUCTURE

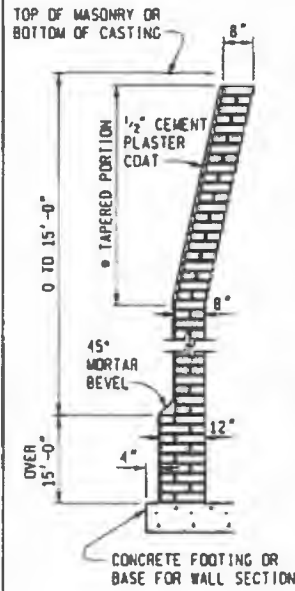


TYPICAL
CONCRETE BLOCK
WALL SECTION

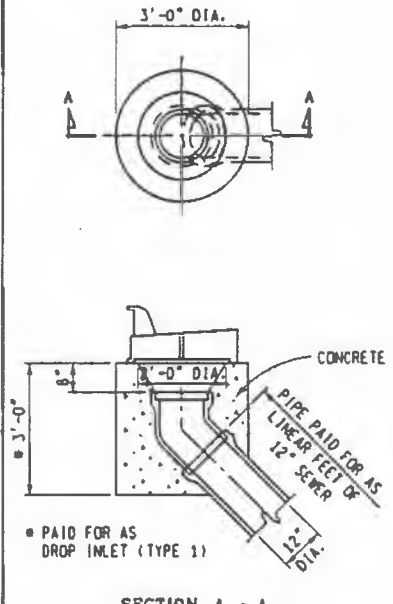


TYPICAL
CAST-IN-PLACE
CONCRETE
WALL SECTION

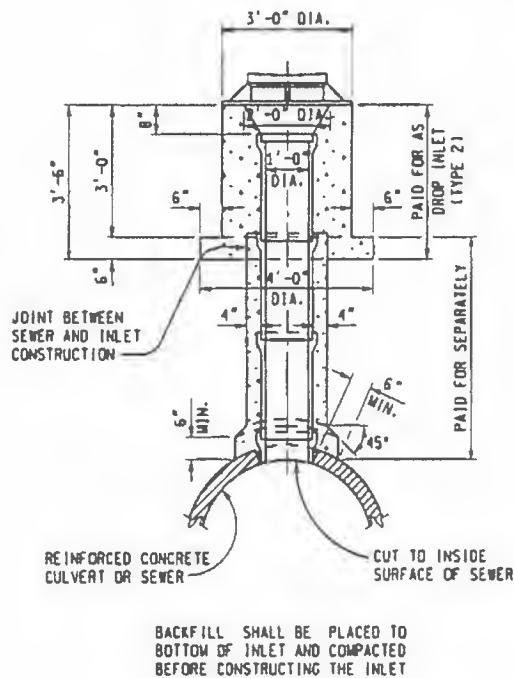
5'-0" MIN. FOR 4'-0" DIA. STRUCTURE
6'-0" MIN. FOR 5'-0" DIA. STRUCTURE
6'-0" MIN. FOR 6'-0" DIA. STRUCTURE



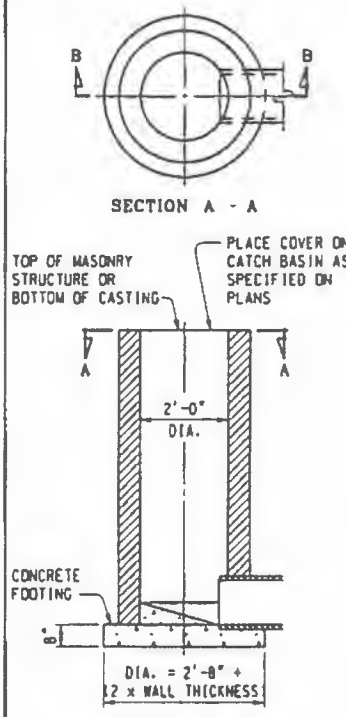
TYPICAL BRICK
WALL SECTION



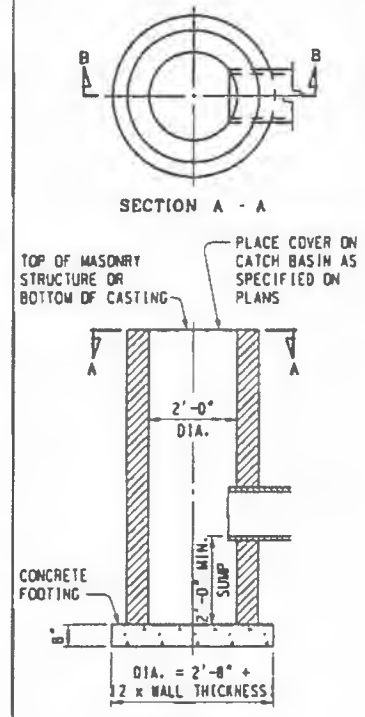
SECTION A - A
DROP INLET (TYPE 1)



DROP INLET (TYPE 2)



SECTION B - B
INLET



SECTION B - B
CATCH BASIN

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

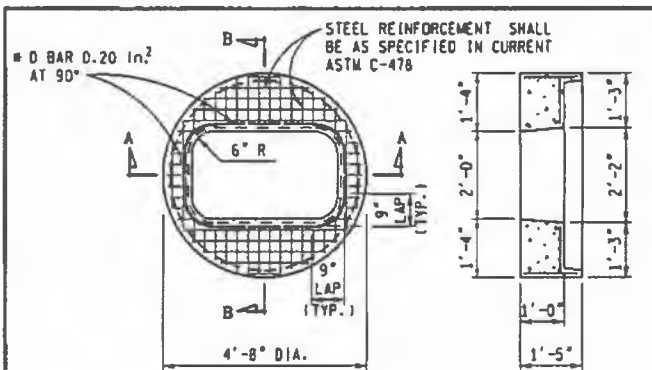
DRAINAGE STRUCTURES

1-27-2015
F.H.W.A. APPROVAL

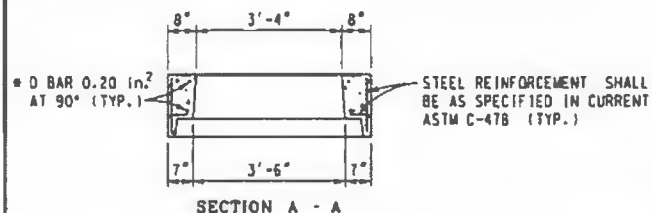
11-17-2014
PLAN DATE

R-1-F

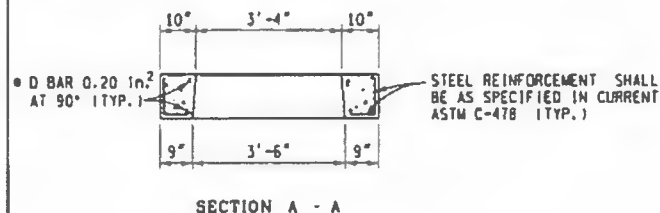
SHEET
3 OF 5



#4 BARS MAY BE BENT AT A SMALLER RADIUS RATHER THAN PARALLELING THE RADIUS IN THE DRAIN OPENING

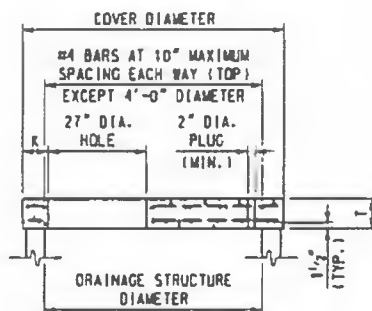
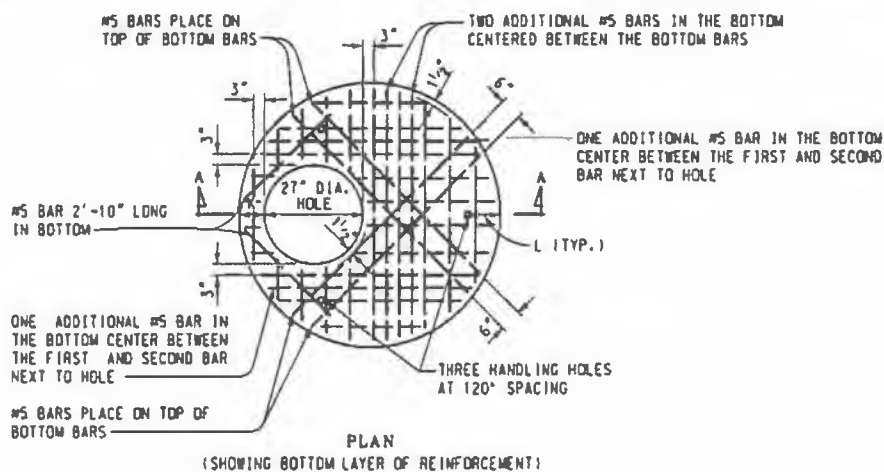


#4 BARS MAY BE BENT AT A SMALLER RADIUS RATHER THAN PARALLELING THE RADIUS IN THE DRAIN OPENING



PRECAST FLAT SLAB TOP FOR PRECAST CONCRETE STRUCTURE, 2' x 4' CASTING

PRECAST FLAT SLAB TOP FOR MASONRY STRUCTURE, 2' x 4' CASTING



PRECAST REINFORCED CONCRETE FLAT SLAB TOP

TABLE OF DIMENSIONS					
STRUCTURE DIAMETER	COVER DIAMETER	T	K	L	#5 BAR MAXIMUM SPACING (BOTTOM EACH WAY)
4'-0"	58"	6"	6"	8"	6"
5'-0"	72"	8"	7"	9"	7"
6'-0"	86"	8"	8"	10"	6"

• ONLY BOTTOM LAYERS OF STEEL NECESSARY

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FORM

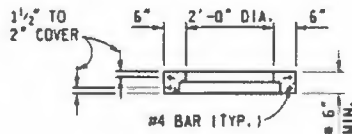
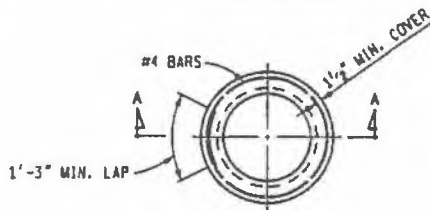
DRAINAGE STRUCTURES

1-27-2015
F.H.W.A. APPROVAL

11-17-2014
PLAN DATE

R-1-F

SHEET
4 OF 5



SECTION A - A

- WHEN RISER TONGUE LENGTH IS GREATER THAN 3", USE 2 TIMES THE TONGUE LENGTH.

NOTE: PRECAST RISER SHALL FULLY ENGAGE THE TONGUE OF THE RISER PIPE.

PRECAST RISER RING (FOR 2'-0" DIAMETER STRUCTURE)

NOTES:

THE DRAINAGE STRUCTURE COVERS ALLOWED FOR USE ON THESE DRAINAGE STRUCTURES ARE SPECIFIED IN SUBSEQUENT STANDARD PLANS AND ARE INTERCHANGEABLE ON ANY STRUCTURE.

THE TOPS OF MASONRY STRUCTURES SHALL BE SUFFICIENTLY LOW TO PERMIT PROPER ADJUSTMENT OF COVER TO GRADE USING MORTAR OR BRICK AS DIRECTED BY THE ENGINEER.

PREMIUM JOINTS ARE REQUIRED ON ALL SANITARY MANHOLES. SEE ASTM DESIGNATION C-923.

GRANULAR MATERIAL CLASS III SHALL BE USED IN BACKFILLING AROUND ALL STRUCTURES THAT FALL WITHIN THE 1:1 INFLUENCE LINES FROM THE EDGE OF PAVEMENT OR BACK OF CURB.

STEPS FOR DRAINAGE STRUCTURES SHALL BE OF AN APPROVED DESIGN AND MADE FROM CAST IRON, ALUMINUM, OR PLASTIC COATED STEEL. RUNGS SHALL BE A MINIMUM OF 10" IN CLEAR LENGTH, DESIGNED TO PREVENT THE FOOT FROM SLIPPING OFF THE END. THE MINIMUM HORIZONTAL PULL OUT LOAD SHALL BE 400 LBS. THE MINIMUM VERTICAL LOAD SHALL BE 800 LBS.

THE BELL SHALL BE REMOVED FOR THE FIRST LENGTH OF OUTLET PIPE PROJECTING THROUGH THE WALL OF THE MANHOLE.

PRECAST CONCRETE SECTIONS, SUMPS, AND FLAT TOP SLABS SHALL BE BUILT ACCORDING TO CURRENT ASTM C-478 AND ACCORDING TO DETAILS SPECIFIED ON THIS PLAN. PRECAST REINFORCED CONCRETE FLAT TOP SLAB SHALL BE MARKED TO SHOW LOCATION OF REINFORCEMENT. THE WALLS OF THE PRECAST UNITS MAY HAVE A SLIGHT TAPER TO ALLOW FOR FORM REMOVAL. PRECAST CONCRETE 2'-0" DIAMETER DRAINAGE STRUCTURES SHALL HAVE A MINIMUM 3" WALL THICKNESS WITH A 6" MINIMUM BEARING SURFACE ON TOP. SEE PRECAST RISER RING FOR 2'-0" DIAMETER STRUCTURE.

THE INSIDE DIAMETER OF PIPES ENTERING OR LEAVING PRECAST DRAINAGE STRUCTURES SHALL BE LESS THAN THE INSIDE DIAMETER OF THE DRAINAGE STRUCTURE MINUS 2'-0". A PIPE LEAVING A 2'-0" DIAMETER DRAINAGE STRUCTURE IS ALLOWED TO HAVE 1'-0" INSIDE DIAMETER OR LESS.

THE NUMBER OF PIPE OPENINGS IN A RISER SHALL BE DETERMINED BY THE DESIGNER. SPACING BETWEEN OPENINGS SHALL BE 1'-0" MINIMUM. OPENINGS MAY BE CONSTRUCTED BY CASTING OR BY DRILLING THE CURED CONCRETE.

PRECAST CONCRETE FOOTINGS OR BASES SHALL BE REINFORCED WITH #4 BARS SPACED AT 1'-0" BOTH WAYS OR WITH TWO LAYERS OF WELDED WIRE FABRIC OF EQUIVALENT CROSS SECTIONAL AREA LAID AT RIGHT ANGLES AND WIRED TOGETHER. REINFORCEMENT SHALL BE PLACED IN TOP OF FOOTING AND SHALL BE MARKED.

PRECAST CONCRETE FOOTINGS SHALL BE SUPPORTED BY A COMPACTED 6" GRANULAR SUBBASE.

THE MINIMUM WALL THICKNESS FOR ALL 2'-0", 4'-0", 5'-0", AND 6'-0" DRAINAGE STRUCTURES USING CONCRETE BLOCK, BRICK, OR CAST-IN-PLACE CONCRETE SHALL BE AS SPECIFIED IN TYPICAL WALL SECTIONS.

THE CONICAL SECTION OF MANHOLES OR CATCH BASINS CONSTRUCTED OF BLOCK OR BRICK SHALL BE SHROUDED WITH GEOTEXTILE FABRIC TO A MINIMUM DEPTH OF 5'-0" OR THROUGH THE FROST ZONE. ENOUGH GEOTEXTILE MATERIAL SHALL BE LEFT ON THE TOP (8" OR MORE) TO ROLL OVER THE TOP OF THE CONE.

PREFORMED HIGH DENSITY POLYSTYRENE FILLER PIECES MAY BE USED TO CHANNEL FLOW IN THE BOTTOM OF MANHOLES PROVIDED THEY HAVE AT LEAST 2" OF CONCRETE COVER. THE USE OF THIS MATERIAL FOR CHANNEL FLOW IS RESTRICTED TO MANHOLES WHERE THE BOTTOM SECTION IS NOT SUBJECT TO FREEZING. THE USE OF THIS MATERIAL MUST BE APPROVED BY THE ENGINEER.

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

DRAINAGE STRUCTURES

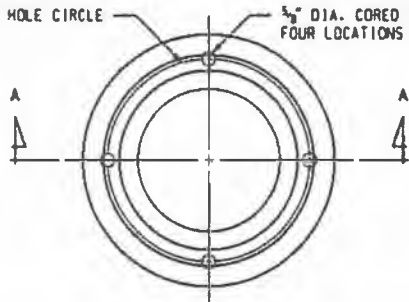
1-27-2015
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PLAN DATE

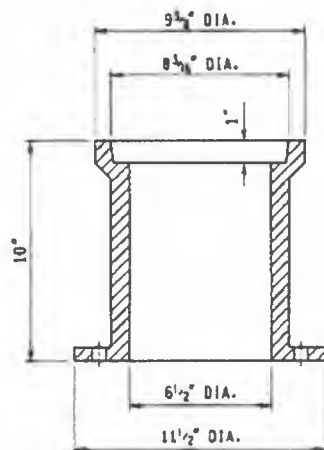
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SHEET
5 OF 5

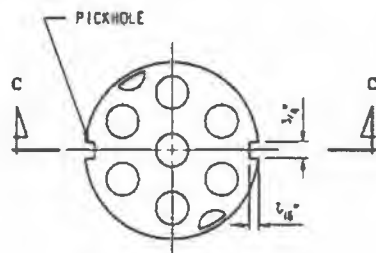
9 1/4" DIA. HOLE CIRCLE
3/8" DIA. CORED HOLE
FOUR LOCATIONS



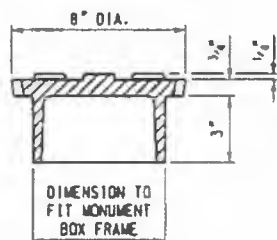
PLAN VIEW



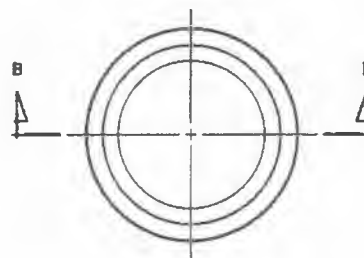
SECTION A - A
MONUMENT BOX FRAME



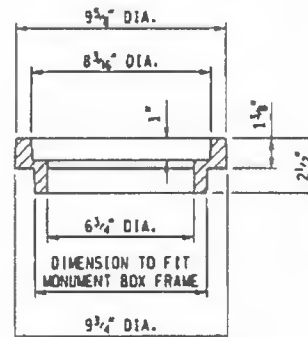
PLAN VIEW



SECTION C - C
MONUMENT BOX COVER



PLAN VIEW



SECTION B - B
MONUMENT BOX RING

NOTES:

ALL MATERIALS AND WORKMANSHIP SHALL BE ACCORDING TO THE CURRENT STANDARD SPECIFICATIONS.

THE CASTINGS SHALL MEET THE REQUIREMENTS OF THE CURRENT STANDARD SPECIFICATIONS FOR GRAY IRON CASTINGS.

ALL CASTINGS SHALL BE CLEANED BY CURRENT APPROVED BLASTING METHODS.

ALL CASTINGS AND THEIR MATCHING SEATS SHALL BE GROUND OR MACHINED SO THAT AN EVEN BEARING IS ATTAINED, THUS PREVENTING ROCKING OR TILTING.

THE CASTING SHALL BE FREE OF POURING FAULTS, BLOW HOLES, CRACKS, AND OTHER IMPERFECTIONS. THEY SHALL BE SOUND, TRUE TO FORM AND THICKNESS, CLEAN AND NEATLY FINISHED, AND SHALL BE COATED WITH COAL TAR PITCH VARNISH.



PREPARED
BY
DESIGN DIVISION

DRAWN BY: B.L.T.

CHECKED BY: W.K.P.

DEPARTMENT DIRECTOR
Kirk T. Stoude

APPROVED BY:

Randy U. Pugh
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY:

Paul A. Van Pelt
DIRECTOR, BUREAU OF HIGHWAY DEVELOPMENT

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

MONUMENT BOXES

9-30-2014

F.H.W.A. APPROVAL

4-16-2014

PLAN DATE

R-11-E

SHEET
1 OF 1



U.S. Department
of Transportation
**Federal Highway
Administration**

Memorandum

Subject: **INFORMATION:** MUTCD – Interim
Approval for Optional Use of Green
Colored Pavement for Bike Lanes (IA-14)

Date: APR 15 2011

From: 
Jeffrey A. Lindley
Associate Administrator for Operations

In Reply Refer To:
HOTO-1

To: Federal Lands Highway Division Engineers
Division Administrators

Purpose: The purpose of this memorandum is to issue an Interim Approval for the optional use of green colored pavement in marked bicycle lanes and in extensions of bicycle lanes through intersections and other traffic conflict areas. Interim Approval allows interim use, pending official rulemaking, of a new traffic control device, a revision to the application or manner of use of an existing traffic control device, or a provision not specifically described in the Manual on Uniform Traffic Control Devices (MUTCD).

Background: Chapter 3G of the 2009 MUTCD contains provisions regarding the use of colored pavements. Paragraph 1 of Section 3G.01 describes colored pavement as consisting of differently colored road paving materials, such as colored asphalt or concrete, or paint or other marking materials applied to the surface of a road or island to simulate a colored pavement.

If colored pavement is used to regulate, warn, or guide traffic, the colored pavement is considered to be a traffic control device. Paragraph 3 of Section 3G.01 limits the use of colored pavement used as a traffic control device to the colors yellow and white. Paragraph 2 of Section 3G.01 discusses the use of colored pavement as a purely aesthetic treatment that is not intended to regulate, warn, or guide traffic and is therefore not considered to be a traffic control device. Part 9, Traffic Control for Bicycle Facilities, of the 2009 MUTCD does not mention colored pavement.

A number of experiments have been conducted in the United States and in other countries around the world to determine the value of designating a particular pavement color to communicate to road users that a portion of the roadway has been set aside for exclusive or preferential use by bicyclists and to enhance the conspicuity of a bicycle lane or a bicycle lane extension. Green, blue, and red are among the colors that have been tested for this purpose. Because these colored pavements are intended to regulate, warn, or guide traffic (motorists and bicyclists) and thus are serving as more than just an aesthetic treatment, they are considered to be traffic control devices.

For the past 10 years in the United States, green has been the only color that has received official FHWA approval for colored pavement experiments on bicycle facilities. Blue colored pavement cannot be designated for exclusive or preferential use in bicycle facilities because it is already the primary color of the international symbol of accessibility parking symbol (see Figure 3B-22 of the 2009 MUTCD) and it is also used for the lines that are adjacent to parking spaces that are reserved for use only by persons with disabilities. The use of red colored pavement has not been approved for any bicycle-related experiments in the United States because it is currently being tested for a different potential use.

Research on Green Colored Pavement for Bike Lanes: Agencies across the United States are showing an increased interest in using colored pavement specifically for bicycle facilities, and many of them have submitted requests to the FHWA to experiment with colored pavement. During the past 10 years, the FHWA has approved experiments with green colored pavement for a variety of State and local governmental agencies, including the following: the Vermont Agency of Transportation; the City of Chicago, IL; the City of New York, NY; the City of St. Petersburg, FL; the City of San Francisco, CA; the City of Portland, OR; the City of Columbia, MO; the City of Long Beach, CA; the City of Austin, TX; the City of Nashville, TN; the City of Missoula, MT; the City of Golden, CO; the Minnesota DOT (for Minneapolis); and the Pennsylvania DOT (for Philadelphia). In these experiments, green colored pavement is being used as a traffic control device to designate locations where bicyclists are expected to operate, and areas where bicyclists and other roadway traffic might have potentially conflicting weaving or crossing movements.

FHWA Evaluation of Results: The Office of Transportation Operations has reviewed the available data and considers the experimental green colored pavement to be satisfactorily successful for the bicycle applications that were tested. Positive operational effects have been noted in the experiments, such as bicyclists positioning themselves more accurately as they travel across intersections and through conflict areas, and no notable negative operational effects have been observed. The research has also shown that bicyclists and motorists both have a positive impression of the effect of the green colored pavement, with bicyclists saying that they feel safer when the green colored pavement is present, and motorists saying that the green colored pavement gives them an increased awareness that bicyclists might be present and where those bicyclists are likely to be positioned within the traveled way.

The design of the experimental green colored pavement is not proprietary and can be used by any jurisdiction that requests and obtains interim approval from the FHWA to use green colored pavement. The FHWA believes that the experimental green colored pavement has a low risk of safety or operational concerns.

This Interim Approval does not create a new mandate compelling the use of green colored pavement, but will allow agencies to install green colored pavement, pending official MUTCD rulemaking, to enhance the conspicuity of a bicycle lane or a bicycle lane extension.

Conditions of Interim Approval: The FHWA will grant Interim Approval for the optional use of green colored pavement in marked bicycle lanes and in extensions of bicycle lanes through intersections and traffic conflict areas to any jurisdiction that submits a written request to the Office of Transportation Operations. A State may request Interim

Approval for all jurisdictions in that State. Jurisdictions using green colored pavement under this Interim Approval must agree to comply with the technical conditions detailed below, to maintain an inventory list of all locations where green colored pavement is installed, and to comply with Item D in Paragraph 18 of Section 1A.10 of the 2009 MUTCD, which requires:

“An agreement to restore the site(s) of the Interim Approval to a condition that complies with the provisions in this Manual within 3 months following the issuance of a Final Rule on this traffic control device; and terminate use of the device or application installed under the interim approval at any time that it determines significant safety concerns are directly or indirectly attributable to the device or application. The FHWA’s Office of Transportation Operations has the right to terminate the interim approval at any time if there is an indication of safety concerns.”

1. General Conditions:

The use of green colored pavement is optional. However, if an agency opts to use green colored pavement under this Interim Approval, the following design and installation requirements shall apply, and shall take precedence over any conflicting provisions of the MUTCD.

2. Allowable Uses:

Green colored pavement may be used within a bicycle lane or within an extension of a bicycle lane to enhance the conspicuity of the bicycle lane or extension.

The use of green colored pavement under this Interim Approval is limited to the following applications:

- a. Green colored pavement may be installed within bicycle lanes as a supplement to the other pavement markings that are required for the designation of a bicycle lane. Green colored pavement shall not be used instead of the longitudinal line required by Paragraph 2 of Section 9C.04 of the 2009 MUTCD or instead of the word, symbol, and arrow pavement markings illustrated in Figure 9C-3 of the 2009 MUTCD and required by Item C in Paragraph 6 of Section 3D.01 of the 2009 MUTCD. The green colored pavement may be installed for the entire length of the bicycle lane or for only a portion (or portions) of the bicycle lane. Green colored pavement may be installed as a rectangular background behind the word, symbol, and arrow pavement markings in a bicycle lane as a means of enhancing the conspicuity of these word, symbol, and arrow pavement markings.
- b. If a pair of dotted lines is used to extend a bicycle lane across an intersection or driveway (see Section 3B.08 of the 2009 MUTCD) or a ramp, green colored pavement may be installed between these lines as a supplement to the lines. Green colored pavement shall not be used instead of these dotted lines to extend a bicycle lane across an intersection, driveway, or ramp. The green colored pavement may be installed for the entire length of the bicycle lane extension or for only a portion (or portions) of the bicycle lane extension. The pattern of the green colored pavement may be dotted in a manner that matches the pattern of the

dotted lines, thus filling in only the areas that are directly between a pair of dotted line segments that are on opposite sides of the bicycle lane extension.

- c. If a pair of dotted lines is used to extend a bicycle lane across the beginning of a turn bay where drivers who desire to turn must cross the bicycle lane when moving out of the through lane in order to turn (see Figures 9C-1, 9C-4, and 9C-5 of the 2009 MUTCD), green colored pavement may be installed between these lines as a supplement to the lines. Green colored pavement shall not be used instead of these dotted lines to extend a bicycle lane across the beginning of a turn bay. The green colored pavement may be installed for the entire length of the bicycle lane extension or for only a portion (or portions) of the bicycle lane extension. The pattern of the green colored pavement may be dotted in a manner that matches the pattern of the dotted lines, thus filling in only the areas that are directly between a pair of dotted line segments that are on opposite sides of the bicycle lane extension.

3. Design of Green Colored Pavement:

- a. The daytime chromaticity coordinates for the color used for green colored pavement shall be as follows:

1		2		3		4	
x	y	x	y	x	y	x	y
0.230	0.754	0.266	0.500	0.367	0.500	0.444	0.555

The daytime luminance factor (Y) shall be at least 7, but no more than 35.

- b. The nighttime chromaticity coordinates for the color used for green colored pavement shall be as follows:

1		2		3		4	
x	y	x	y	x	y	x	y
0.230	0.754	0.336	0.540	0.450	0.500	0.479	0.520

- c. Green colored pavement may be retroreflective, but there is no requirement or recommendation that it be retroreflective.
- d. If green paint or other marking materials applied to the roadway surface are used to simulate a green colored pavement, consideration should be given to selecting pavement marking materials that will minimize loss of traction for bicyclists (see Paragraph 4 of Section 3A.04 of the 2009 MUTCD).

4. Other:

Except as otherwise provided above, all other provisions of the MUTCD that are applicable to colored pavements shall apply to green colored pavement.

Any questions concerning this Interim Approval should be directed to Mr. Bruce Friedman at bruce.friedman@dot.gov.

cc:

Associate Administrators

Chief Counsel

Chief Financial Officer

Directors of Field Services

Director of Technical Services

MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
POLYUREA PAVEMENT MARKINGS

T&S:JGM

1 of 3

C&T:APPR:JAJ:BRZ:10-13-08
FHWA:APPR:10-28-08

a. Description. Prepare pavement surfaces and apply reflectorized white and yellow two-component, 100 percent solids polyurea pavement markings, including lines, legends, symbols, crosswalks, and stop lines. Complete this work according to this special provision, project plans, the Standard Specifications for Construction, and as directed by the Engineer.

b. Materials. Select polyurea pavement marking material from the Qualified Products List (QPL) and use standard glass beads as called for in section 920 of the Standard Specifications for Construction except as noted in this provision.

1. For recessed longitudinal markings. Use a double drop system of large and standard glass beads, a double drop system of ceramic elements and standard glass beads or an alternate approved by the Engineer. The large glass beads have to meet all Federal specifications for a Type 4 designation glass bead. Follow the polyurea manufacturer's recommendations for type, gradation, and loading rates with these systems.

2. For non-recessed longitudinal markings. Use standard glass beads or an alternate approved by the Engineer. Follow the polyurea manufacturer's recommendations for type, gradation, and loading rates of glass beads.

3. For special markings. Follow the polyurea manufacturer's recommendations for type, gradation, and loading rates of standard glass beads.

The material must be shipped to the job site in sturdy containers plainly marked with the manufacturer's name and address, the color of the material, date of manufacture and batch number.

Provide certification to the Engineer from the polyurea manufacturer documenting the Contractor's qualifications to place the polyurea in a manner acceptable to the polyurea manufacturer and in compliance with the provisions of this specification. Provide technical data from the polyurea manufacturer regarding material type and application rate to the Engineer prior to starting work.

c. Construction.

1. Placement. Place polyurea materials and beads according to this specification and the polyurea manufacturer's requirements.

2. Surface Preparation. Surface preparation requirements are dependent on surface conditions. Preparation applies to both special makings and longitudinal markings.

A. New hot mix asphalt (HMA). "New" HMA that has been open to traffic for 10 days or less and has no oil drips, residue, debris, or temporary or permanent markings. Preparation required – Clean marking area with compressed air.

B. New Portland cement concrete (PCC). "New" PCC has no oil drips, residue, and debris, temporary or permanent markings. Preparation required - Remove curing compound; to be paid for separately as Removing Curing Compound.

C. Existing HMA or PCC surface. There may be oil drip areas and/or debris, but no existing markings. Preparation required - Scarify the proposed marking area using non-milling grinding teeth or shot blasting.

D. Existing HMA or PCC surface with existing non-polyurea marking. There may be oil drips and debris. There will be an existing non-polyurea marking. Preparation required - Completely remove non-polyurea markings; to be paid for as Removal of Special Markings or Removal of Longitudinal Lines.

E. Existing surface with existing polyurea marking, HMA or PCC. There may be oil drip areas and/or debris. There will be an existing polyurea marking. Preparation required:

(1) If markings are replaced every 2 years and there are no visible oil drip areas or visible chipping/spalling of the existing marking: Clean marking area with compressed air.

(2) If markings are replaced every 2 years and there are visible oil drip areas, chipping and/or spalling of the existing marking: Scarify the proposed marking area using non-milling grinding teeth or shot blast.

(3) If markings are replaced every 4 years: Complete removal is required. When complete removal is required, it will be paid for as Removal of Special Markings or Removal of Longitudinal Lines.

Conduct grinding, scarifying, sandblasting, shot blasting, or other operations in such a manner that the finished pavement surface is not damaged and does not exhibit a pattern that will mislead or misdirect the motorist. Use vacuum-type equipment or equivalent to collect and contain debris generated by this operation.

When surface preparation is complete, broom the pavement surface, and follow with compressed air cleaning to remove all residue and debris resulting from the preparation work. Control and minimize airborne dust and similar debris generated by surface preparation and cleanup to prevent a hazard to motor vehicle operation or nuisance to adjacent property.

Do not damage transverse and longitudinal joint sealers on HMA and PCC surfaces when performing removal and cleaning work.

3. Temperature Limitations. The ambient air temperature and the pavement surface temperature where the polyurea is to be placed must be at least 40 degrees F and rising during marking operations. Measure and record the pavement surface temperature and air

temperature at the start of each day of marking operation and at any other time deemed necessary by the Engineer.

4. Application rates. The Engineer may check application rates by comparing tallies of materials used to the length of lines placed.

The Engineer may also check application rates at any time using a pre-weighed sheet specifically placed for test purposes for both special markings and longitudinal lines. Drop-on glass beads are not applied for this test.

5. Dry Time. The material must be track-free in less than 10 minutes.

d. Delayed Acceptance. Final acceptance of completed applications of polyurea will be delayed 60 days. During this time, inspections of the markings will be conducted at the Department's discretion. Markings with less than 90 percent of the original application remaining will be considered to have failed and must be replaced. However, pavement markings that have been damaged by snowplowing operations will not be considered as having failed.

A minimum of 90 percent of the deficient marking must be removed. All costs associated with this replacement work, including traffic control to complete the work, will be borne by the Contractor.

e. Measurement and Payment. The completed work as described will be measured and paid for at contract unit prices using the following contract items (pay items):

Contract Item (Pay Item)	Pay Unit
Pavt Mrkg, Polyurea, (symbol)	Each
Pavt Mrkg, Polyurea, (legend).....	Each
Pavt Mrkg, Polyurea , ____ inch, Crosswalk	Foot
Pavt Mrkg, Polyurea , ____ inch, Stop Bar	Foot
Pavt Mrkg, Polyurea , ____ inch, Cross Hatching (color).....	Foot
Pavt Mrkg, Polyurea , ____ inch, (color)	Foot

The contract unit price for each of these items includes all labor, material, equipment, and traffic control. Payment also includes the costs associated with corrective action as described in subsection (d) of this special provision. Removing curing compound or existing pavement markings will be paid for separately as described in subsection c.2 of this special provision.

City Of Detroit
Special Provision
for
APPLICATION OF POLYUREA MARKINGS

DPW / TED: AMF

1 of 1

01-14-2016

a. Description. This work shall be in conformance with Section 811 of the Standard Specifications for Construction 2012 and the following provisions specified herein.

b. Measurement and Payment. The completed work as described in Section 811 of the Standard Specifications for Construction 2012 will be measured and paid for at the contract unit price using the following contract items (pay items):

<u>Contract Item (Pay Item)</u>	<u>Pay Unit</u>
Pavt Mrkg, Polyurea, No Left Turn Legend	Each
Pavt Mrkg, Polyurea, V Shaped Ramp Sym	Each

CITY OF DETROIT
SPECIAL PROVISION
FOR
DELINEATOR POST

DET: GWE/JF

1 of 2

Revised: 12-06-2019

Description. This work consists of furnishing and installing delineator posts as shown on the plans and as directed by the Engineer. Complete this work in accordance to the applicable sections of the standard specifications and this special provision. Follow industry standards and conform to the details as shown on the plans.

Materials. Furnish tools and equipment as recommended by the manufacturer and as approved by the Engineer. Use equipment and materials from a single manufacturer throughout the entire project.

Design - The delineator post shall consist of a modified T-shaped tubular post a minimum of 3.00 inches wide by 2.00 inches deep, with 0.125 inch (min.) walls, comprised of flat front and curved rear surfaces and sides to create areas of opposing compression stresses on the inner and outer walls when impacted resulting in superior rebound. All delineator posts shall be capable of sustaining a minimum of twenty five (25) direct wheel-over impacts at 60 MPH (100 km/h) without damage to the post or the reflective sheeting applied to the post. All posts shall be easily replaceable. All posts shall be constructed of UV-stabilized thermo-plastic polyurethane (TPU) for superior durability, conforming to the following material specifications:

Property	ASTM Test	Results
Specific Gravity (min.)	D 792	1.10
Hardness (min.)	D 2240	80 A
Tear Strength (min PSI)	D 624, Die C	600
Tensile Strength @ yield, (min PSI)	D 412	4,000
Tensile Elongation @ break (min. %)	D 412	600
Cold Temp. Impact Test (-7° F)	FL/DOT	Pass

Bases - Delineator posts shall mount to a base unit with two (2) plastic locking pins. For highest visibility and durability, posts shall be mounted to bases of the same color as the post and curb and the corresponding lane line (yellow & yellow, white & white, etc.) and shall be 1.5 # in weight. All bases shall be constructed of a high-impact thermo-plastic styrenic alloy conforming to the following material specifications:

Property	ASTM Test	Results
Specific Gravity (min.)	D 792	1.02
Gardner Impact (min.)	N/A	160
Flexural Strength (min.)	D 790	5,500

Florescent and Standard Colors - Delineator posts and bases shall be constructed of UV-stabilized polymers and colors. The color shall be solid throughout and stabilized to resist UV degradation. In construction work zone areas where orange devices are used, all materials shall be Florescent Orange to improve visibility in low light conditions.

Locking Pins - The delineator posts shall be secured to the base units with rust-proof black plastic locking pins conforming to the same material specifications as the base units to prevent dislocation when posts are impacted and to ease replacement of old posts.

Reflective Sheeting - All posts shall have retro-reflective sheeting applied. The minimum reflective sheeting shall be two (2) 4-inch wide wraps of sheeting, one (1) inch down from the top of the post with a two (2) inch gap between wraps. The sheeting shall be Reflexite® AR 1000 cube-corner micro-prismatic reflective sheeting for superior brightness, scratch resistance and durability. The sheeting color shall be as specified in the construction plans.

Lengths - 16 to 48 inches, as specified in the construction plans or procurement details.

NCHRP 350 Acceptance - The posts shall be fully crash-tested on the AASHTO's NTPEP Test Deck and meet requirements for Category 1 devices as specified in NCHRP Report # 350. All posts shall have the acceptance of the U.S. Department of Transportation, Federal Highway Administration. Certifications of acceptance to these standards must be supplied by the manufacturer upon request.

Construction. Delineator posts shall be secured to the roadway with removable and reusable one-piece anchor bolts with a finished hex head, integral washer, dual lead threads and chamfered tip. One-piece bolts shall be used to eliminate improper assembly; dual-thread bolts shall be used to prevent bolts spinning in holes when tightened. All delineator posts shall be completely removable with standard power tools. On bridges, posts shall be adhered to the roadway with approved bituminous adhesive or pressure-sensitive synthetic butyl rubber pads, min. 0.125" thick.

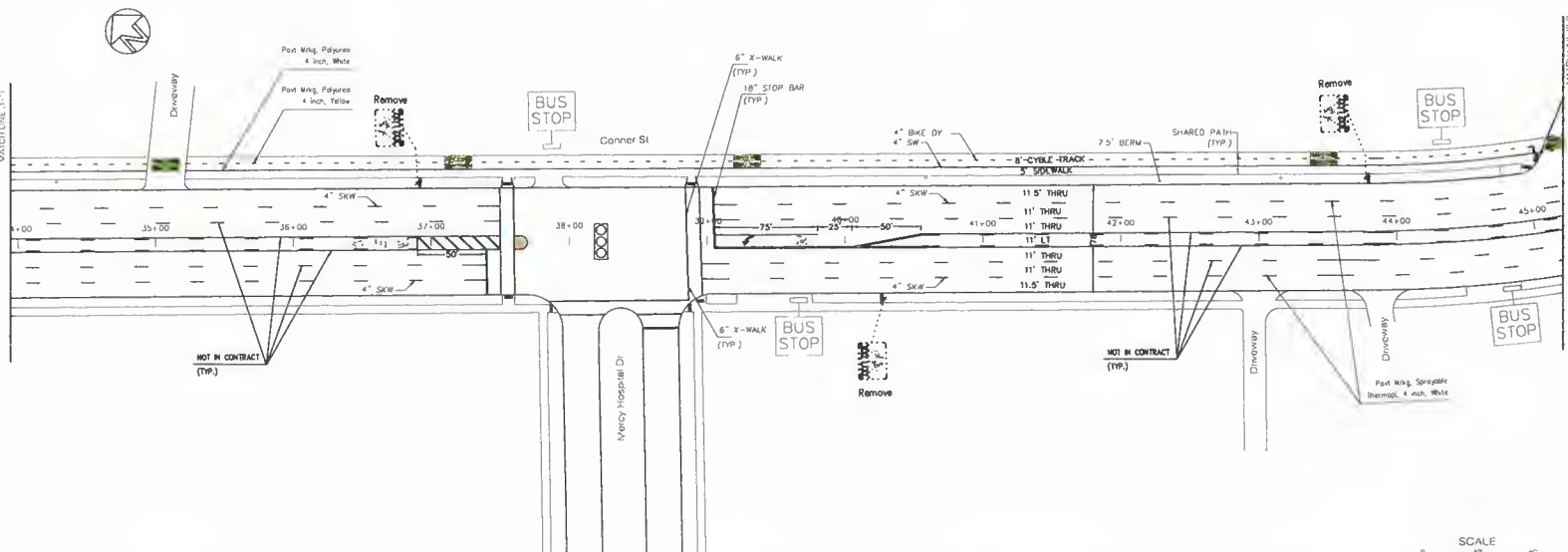
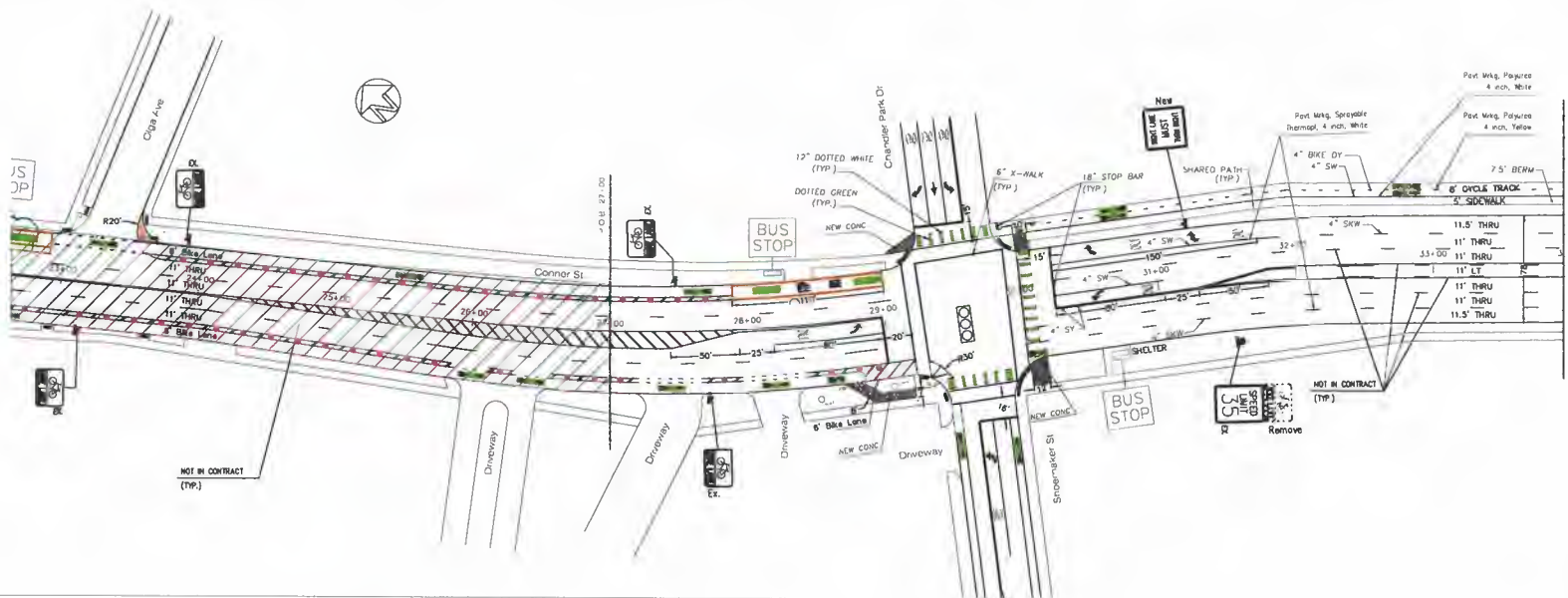
Salvage. The contractor shall carefully remove and store existing delineators and re-install them; maintaining their condition. The work shall cover replacement of any adhesive, bolts or hardware that are missing or damaged.

Removal. The contractor shall carefully remove and store existing delineators and deliver them to the City of Detroit DPW (Street Maintenance Yard) located at 2633 Michigan Ave, Detroit, MI.

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

Pay Item	Pay Unit
Delineator Post, 36 inch, White.....	Each
Delineator Post, 36 inch, Salvage.....	Each
Delineator Post, 36 inch, Rem.....	Each

Delineator Post will be measured and paid for at the contract unit price per each unit installed. The unit price shall be payment in full for furnishing all labor, equipment and material to furnish and install posts as shown on the plans or as directed by the Engineer.



NOTES:
SIGNS AND PAVEMENT MARKING EXACT LOCATIONS TO BE MARKED BY THE FIELD ENGINEER (INSPECTOR).

THEREFORE CONTRACTOR MUST CONTACT PROJECT ENGINEER AT LEAST THREE BUSINESS DAYS PRIOR TO ANY SIGN INSTALLATION.

PAVEMENT MARKING LEGEND

SW	SOLID WHITE
SY	SOLID YELLOW
DSY	DOUBLE SOLID YELLOW
SKW	SKIP WHITE (10 ft Solid + 30 ft Gap)
SKY	SKIP YELLOW (10 ft Solid + 30 ft Gap)
DW	12\" DOTTED WHITE (2 ft Solid + 6 ft Gap)
DY	DOTTED YELLOW (3 ft Solid + 9 ft Gap)
SB	STOP BAR

ALL SIGNS AND PAVEMENT MARKING PLAN SHOWN ARE PROPOSED

1	08/14/20	FINAL SUBMITTAL	P.N.
2	08/14/20	DRAFT SUBMITTAL	P.N.
REV	DATE	DESCRIPTION	APP



CITY OF DETROIT
DEPARTMENT OF PUBLIC WORKS
TRAFFIC ENGINEERING DIVISION

PROJECT
CONNER BIKE LANES PROJECT

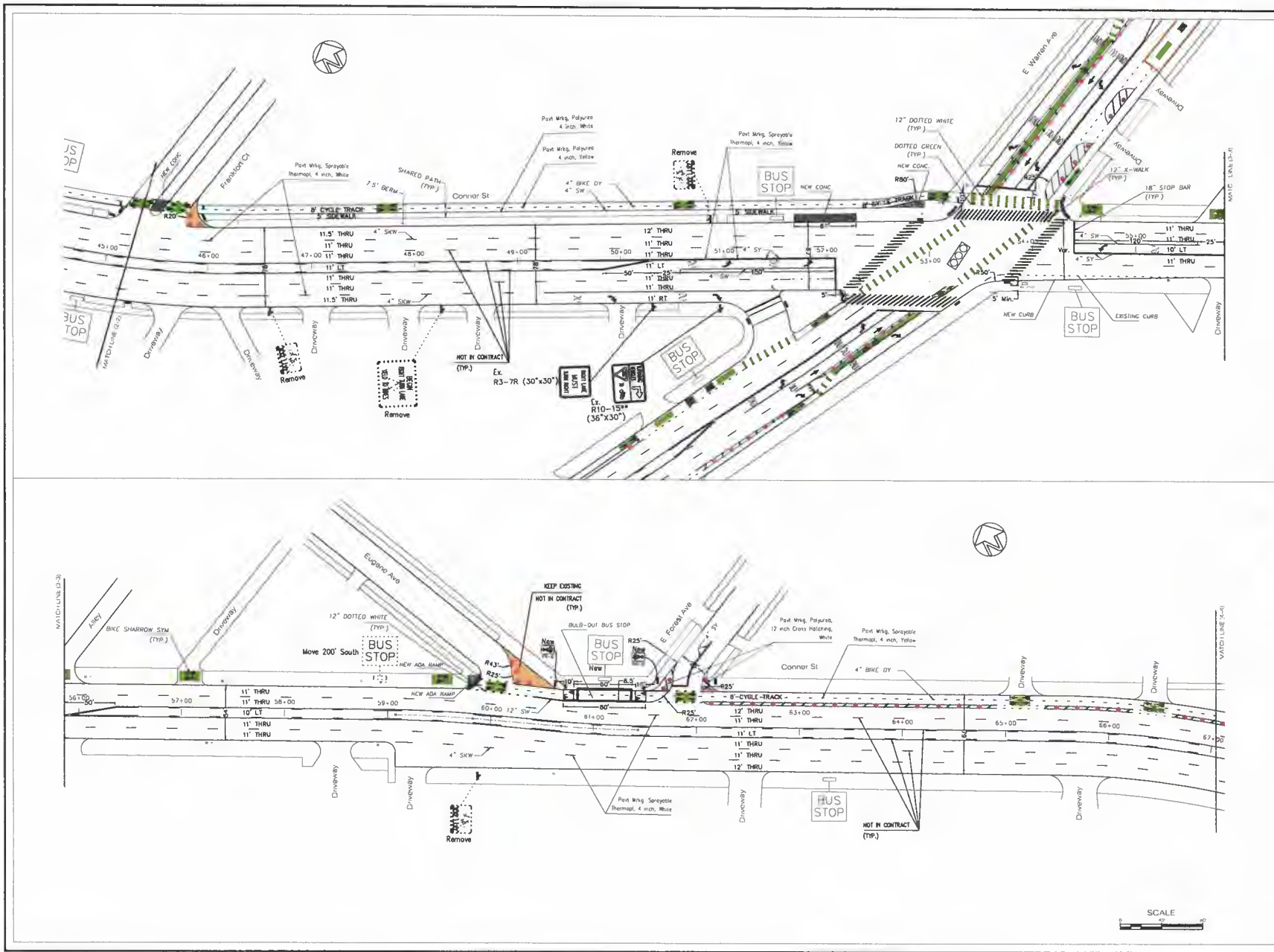
CORRIDOR
CONNER ST
SHOEMAKER ST TO
JEFFERSON AVE

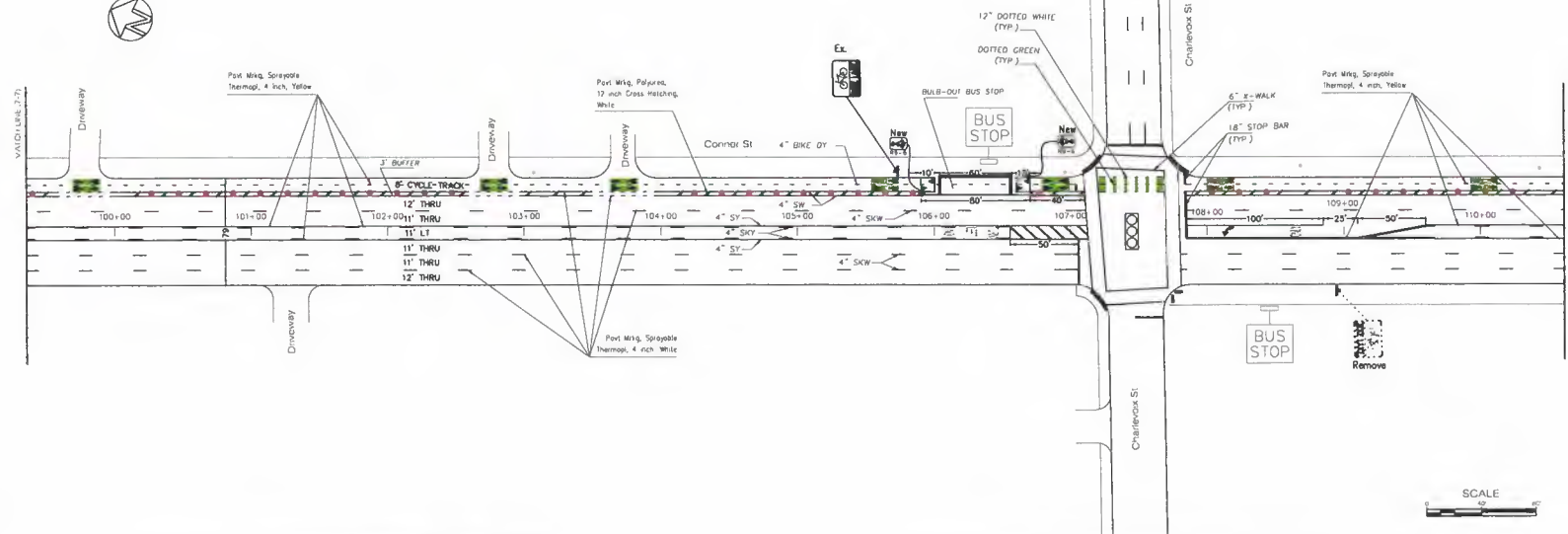
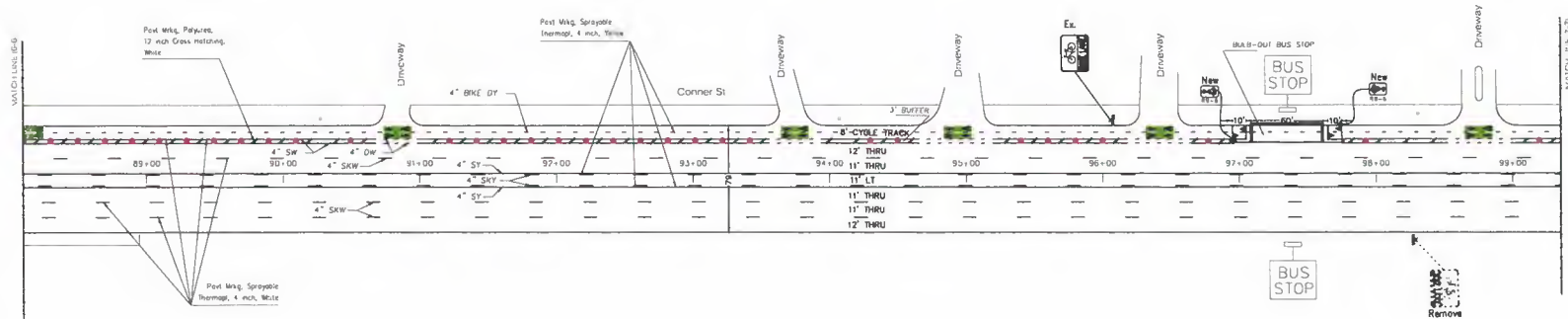
TITLE
PROPOSED SIGNING, PAVEMENT
MARKING, CONCRETE WORK AND
MISCELLANEOUS PLAN

DRAWN	DUC DUONG	CHECKED	AHMAD M. FAWAZ
DESIGNED	DUC DUONG	APPROVED	P. NANNAPANENI
SCALE	1"=90'	DATE	08/14/2020

FROM STA.: 27+00 TO STA.: 45+20

SHEET 01 OF 08





NOTES:
SIGNS AND PAVEMENT MARKING EXACT LOCATIONS TO BE MARKED BY THE FIELD ENGINEER (INSPECTOR);

THEREFORE CONTRACTOR MUST CONTACT PROJECT ENGINEER AT LEAST THREE BUSINESS DAYS PRIOR TO ANY SIGN INSTALLATION.

PAVEMENT MARKING LEGEND

SW	SOLID WHITE
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DW	12\" DOTTED WHITE (2 ft Solid + 6 ft Gap)
DY	DOTTED YELLOW (3 ft Solid + 9 ft Gap)
SB	STOP BAR

ALL SIGNS AND PAVEMENT MARKING PLAN SHOWN ARE PROPOSED

1	06/14/20	FINAL SUBMITTAL	P.A.
0	02/27/20	DRAFT SUBMITTAL	P.A.
REV	DATE	DESCRIPTION	APP



CITY OF DETROIT
DEPARTMENT OF PUBLIC WORKS
TRAFFIC ENGINEERING DIVISION

PROJECT
CONNER BIKE LANES PROJECT

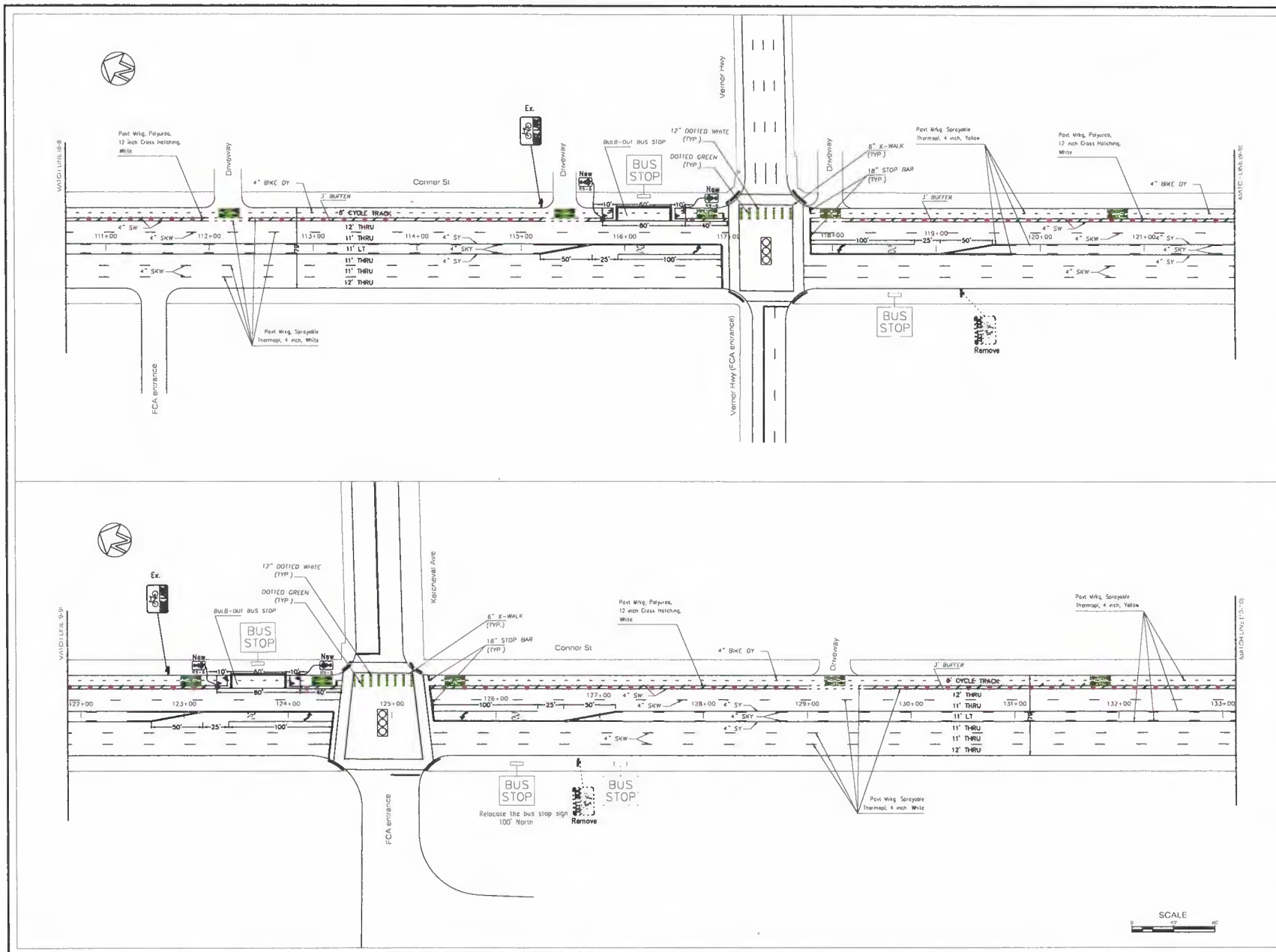
CORRIDOR
CONNER ST
SHOEMAKER ST TO
JEFFERSON AVE

TITLE
PROPOSED SIGNING, PAVEMENT
MARKING, CONCRETE WORK AND
MISCELLANEOUS PLAN

DRAWN	DUC DUONG	CHECKED	AHMAD M FAWAZ
DESIGNED	DUC DUONG	APPROVED	P. NANNAPANENI
SCALE	1"=90'	DATE	08/14/2020

FROM STA. 88+00 TO STA.: 110+60

SHEET 04 OF 08



NOTES:
SIGNS AND PAVEMENT MARKING EXACT LOCATIONS TO BE MARKED BY THE FIELD ENGINEER (INSPECTOR).

THEREFORE CONTRACTOR MUST CONTACT PROJECT ENGINEER AT LEAST THREE BUSINESS DAYS PRIOR TO ANY SIGN INSTALLATION.

PAVEMENT MARKING LEGEND

SW	SOLID WHITE
SY	SOLID YELLOW
DSY	DOUBLE SOLID YELLOW
SKW	SKIP WHITE (10 ft Solid + 30 ft Gap)
SKY	SKIP YELLOW (10 ft Solid + 30 ft Gap)
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DY	DOTTED YELLOW (3 ft Solid + 9 ft Gap)
SB	STOP BAR

ALL SIGNS AND PAVEMENT MARKING PLAN SHOWN ARE PROPOSED

1	08/14/20	FINAL SUBMITTAL	P.N.
0	02/27/20	DRAFT SUBMITTAL	P.N.
REV	DATE	DESCRIPTION	APP.



CITY OF DETROIT
DEPARTMENT OF PUBLIC WORKS
TRAFFIC ENGINEERING DIVISION

PROJECT
CONNER BIKE LANES PROJECT

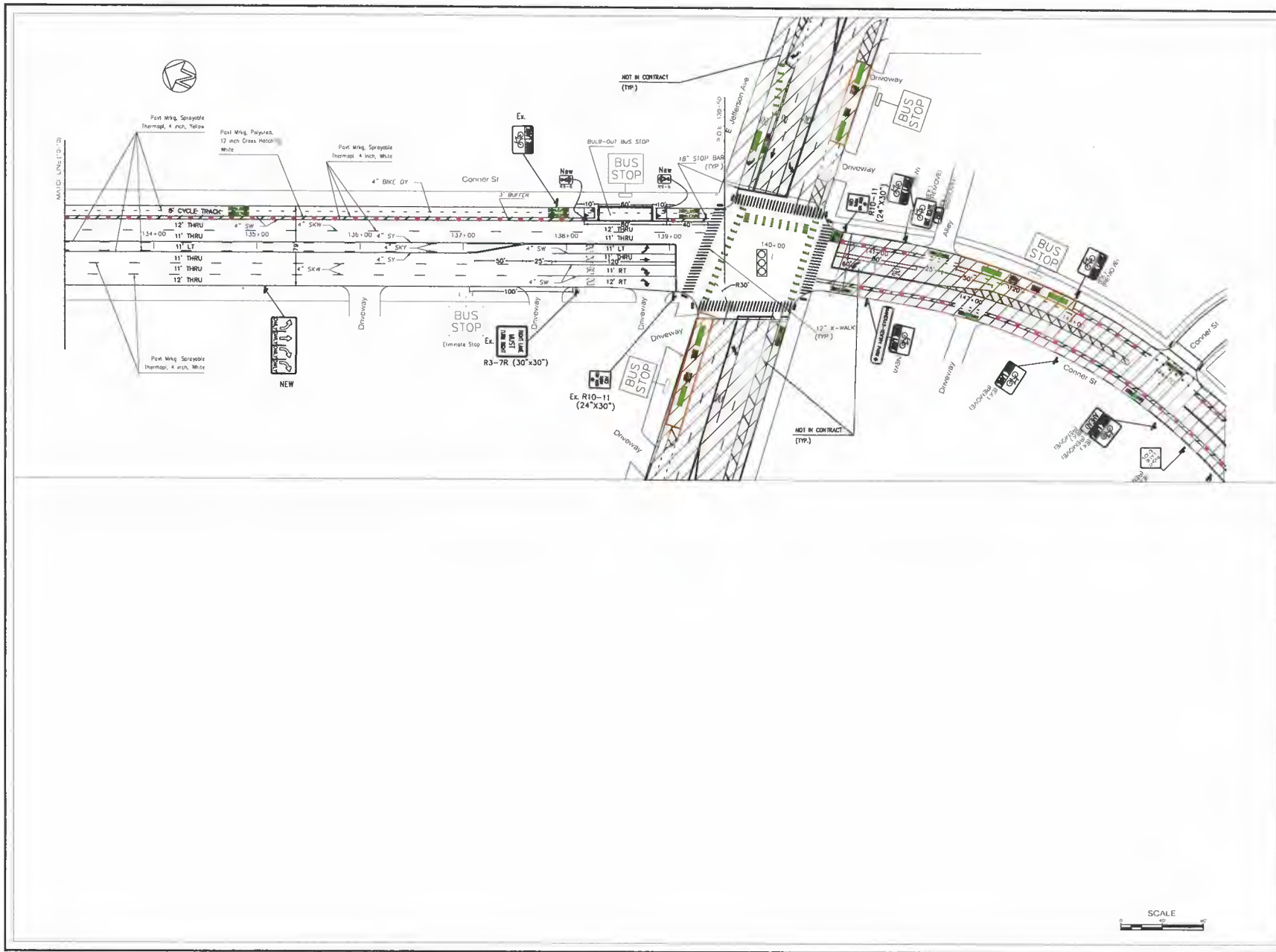
CORRIDOR
CONNER ST
SHOEMAKER ST TO
JEFFERSON AVE

TITLE
PROPOSED SIGNING, PAVEMENT
MARKING, CONCRETE WORK AND
MISCELLANEOUS PLAN

DRAWN	DUC DUONG	CHECKED	AHMAD M. FAWAZ
DESIGNED	DUC DUONG	APPROVED	P. NANNAPANENI
SCALE	1"=90'	DATE	08/14/2020

FROM STA.: 110+60 TO STA.: 133+05

SHEET 05 OF 08



NOTES:
 SIGNS AND PAVEMENT MARKING EXACT LOCATIONS TO BE MARKED BY THE FIELD ENGINEER (INSPECTOR).

THEREFORE CONTRACTOR MUST CONTACT PROJECT ENGINEER AT LEAST THREE BUSINESS DAYS PRIOR TO ANY SIGN INSTALLATION.

PAVEMENT MARKING LEGEND

SW	SOLID WHITE
SY	SOLID YELLOW
DSY	DOUBLE SOLID YELLOW
SKW	SKIP WHITE (10 ft Solid + 30 ft Gap)
SKY	SKIP YELLOW (10 ft Solid + 30 ft Gap)
DW	12" DOTTED WHITE (2 ft Solid + 6 ft Gap)
DY	DOTTED YELLOW (3 ft Solid + 9 ft Gap)
SB	STOP BAR

ALL SIGNS AND PAVEMENT MARKING PLAN SHOWN ARE PROPOSED

1	08/14/20	FINAL SUBMITTAL	Pk
2	02/11/20	DRAFT SUBMITTAL	Pk
REV	DATE	DESCRIPTION	APP



CITY OF DETROIT
 DEPARTMENT OF PUBLIC WORKS
 TRAFFIC ENGINEERING DIVISION

PROJECT
 CONNER BIKE LANES PROJECT

CORRIDOR
 CONNER ST
 SHOEMAKER ST TO
 JEFFERSON AVE

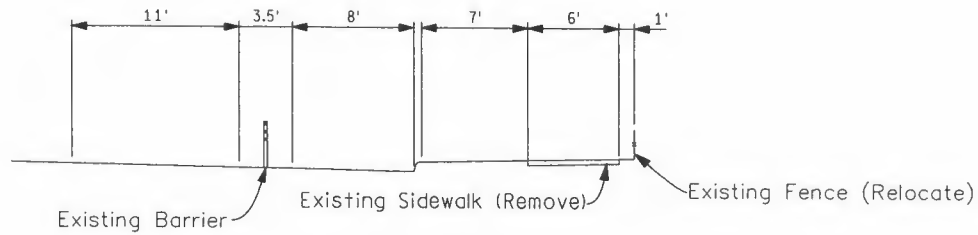
TITLE
 PROPOSED SIGNING, PAVEMENT
 MARKING, CONCRETE WORK AND
 MISCELLANEOUS PLAN

DRAWN	DUC DUONG	CHECKED	AHMAD N. FAWAZ
DESIGNED	DUC DUONG	APPROVED	P. NANNAPANENI
SCALE	1"=90'	DATE	08/14/2020

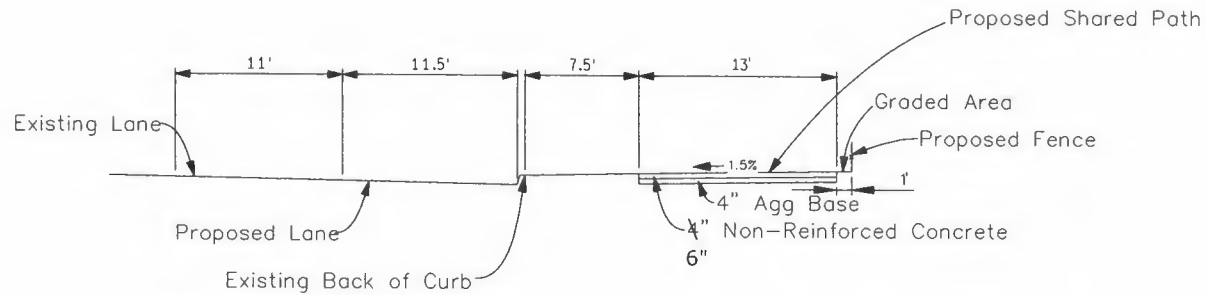
FROM STA.: 133+05 TO STA.: 139+50

SHEET 06 OF 08

NON-REINFORCED CONCRETE



NB CONNER EXISTING ROADSIDE BETWEEN WARREN AND CHANDLER PARK



NB CONNER PROPOSED SHARED PATH BETWEEN WARREN AND CHANDLER PARK

1	08/14/20	FINAL SUBMITTAL	SR
0	02/23/20	DRAFT SUBMITTAL	SR
HV	DATE	DESCRIPTION	APP



CITY OF DETROIT
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TRAFFIC ENGINEERING DIVISION

PROJECT
CONNER BIKE LANES PROJECT

CORRIDOR
CONNER ST
SHOEMAKER ST TO
JEFFERSON AVE

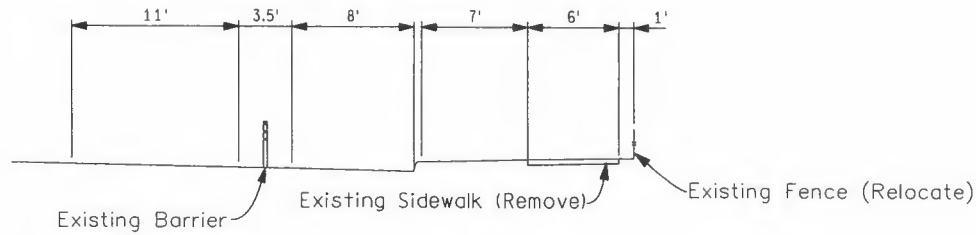
TITLE
PROPOSED NON-REINFORCED
CONCRETE SHARED PATH CROSS
SECTION

DRAWN	ABUL ALAM	CHECKED	ABDUL SIDDIQUE
DESIGNED	ABUL ALAM	APPROVED	STEVE BANNASCH
SCALE	NOT TO SCALE	DATE	08/14/2020

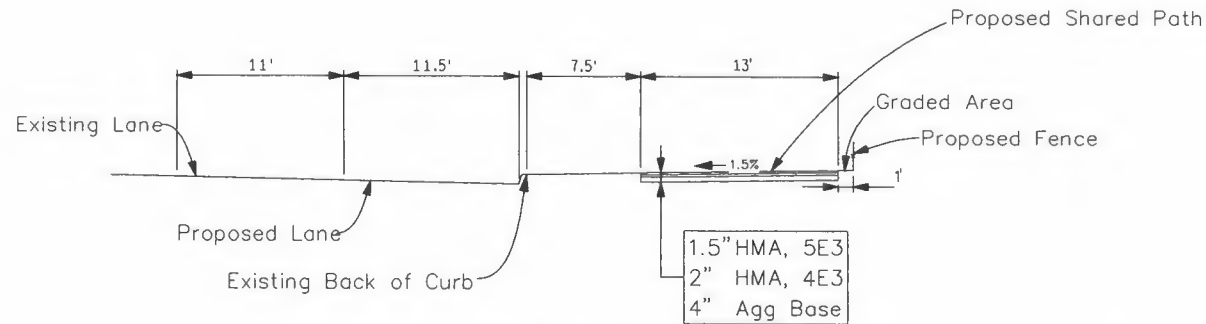
FROM STA.: 29+00 TO STA.: 53+50

SHEET 07 OF 08

HOT MIX ASPHALT (HMA)



NB CONNER EXISTING ROADSIDE BETWEEN WARREN AND CHANDLER PARK



NB CONNER PROPOSED SHARED PATH BETWEEN WARREN AND CHANDLER PARK

1	08/14/20	FINAL SUBMITTAL	S.R.
0	02/27/20	DRAFT SUBMITTAL	S.R.
REV	DATE	DESCRIPTION	APP



CITY OF DETROIT
DEPARTMENT OF PUBLIC WORKS
TRAFFIC ENGINEERING DIVISION

PROJECT
CONNER BIKE LANES PROJECT

CORRIDOR
CONNER ST
SHOEMAKER ST TO
JEFFERSON AVE

TITLE
PROPOSED HOT MIX
ASPHALT (HMA) SHARED
PATH CROSS SECTION

DRAWN	ABUL ALAM	CHECKED	ABDUL SIDDIQUE
DESIGNED	ABUL ALAM	APPROVED	STEVE BANNASCH
SCALE	NOT TO SCALE	DATE	08/14/2020

FROM STA.: 29+00 TO STA.: 53+50

SHEET 08 OF 08