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INVITATION TO BID

ITB: #itb-fh-23-24-2432

ITEM: Heritage Hills and Wedgwood Commons Subdivision Rehabilitation Program Phase IV

DEADLINE: Friday, February 9, 2024, 10:00 a.m., E.S.T.

OUESTIONS: For questions about the project, please email Mirandi Alexander, Civil Engineer I,

malexander2@fhgov.com. For general questions, please email Michelle Aranowski, Director, at

maranowski@fhgov.com.

1. SUBMISSION AND RECEIPT OF BID

Bids to receive consideration shall be received prior to the specified time of opening as designated on the bid form. NO LATE BIDS WILL BE ACCEPTED. The City of Farmington Hills reserves the right to postpone the opening for its own convenience. Bidders shall use the bid documents furnished as none other may be accepted. Bids are considered received when in the possession of the Farmington Hills City Clerk. All bids shall be labeled with the ITB number, item, as well as the aforementioned deadline date/time and the vendor name and address on the outside of the envelope. Bids shall be sealed when submitted. Separate bids shall be submitted on each bid number and shall be typewritten or written in ink and legibly prepared. Bids having any erasures or corrections thereon may be rejected unless explained or initialed by the bidder. If you are submitting a "No Bid", do not follow the above directions but send a letter to the Purchasing Division indicating a "No Bid". Bids shall be mailed or delivered to City of Farmington Hills, City Clerk's Office, 31555 Eleven Mile Road, Farmington Hills, MI 48336-1165 before the stated deadline. No faxed or emailed bids will be accepted.

2. RESPONSIVE BIDS

All pages and the information requested herein shall be furnished completely in compliance with instructions. The manner and format of submission is essential to permit prompt evaluation of all bids on a fair and uniform basis. Unless otherwise specified, the City of Farmington Hills reserves the right to accept any item in the bid. Bidders may submit bids on any item or group of items, provided however, that the unit prices are shown as required. Accordingly, the City of Farmington Hills reserves the right to declare as non-responsive, and reject any incomplete bid if material information requested is not furnished, or where indirect or incomplete answers or information is provided. Alterations to the written requirements will negate any response. The City of Farmington Hills promotes "green" technologies and the reduction of waste. When possible, your response should be double sided to reduce paper usage. Other factors including source of supply may be used in award recommendations.

3. OFFICIAL DOCUMENTS

The City of Farmington Hills shall accept NO CHANGES to the bid document made by the Vendor unless those changes are set out in the "Exceptions" provision of the Authorized Version of the bid document. It is Vendor's responsibility to acquire knowledge of any change, modifications or additions to the Authorized Version of the bid document. Any Vendor who submits a bid and later claims it had no knowledge of any change, modifications or additions made by the City of Farmington Hills to the Authorized Version of the bid document, shall be bound by the bid, including any changes, modifications or additions to the Authorized Version. If a bid is awarded to a Vendor who claims that it had no knowledge of changes, modifications or additions made by the City of Farmington Hills to the Authorized Version of the bid, and that Vendor fails to accept the award, the City of Farmington Hills may pursue costs and expenses to re-bid the item from that Vendor. The Authorized Version of the bid document shall be that document appearing on the MITN with amendments and updates.

The City of Farmington Hills officially distributes bid documents from the Purchasing Division or through the Michigan Intergovernmental Trade Network (MITN). Copies of documents obtained from any other source

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are <u>not</u> considered official copies. Only those vendors who obtain documents from either the Purchasing Division or the MITN system is guaranteed access to receive addendum information, if such information is issued. If you obtained this document from a source other than MITN, it is recommended that you register on the MITN site, www.mitn.info and obtain an official copy and any addenda.

4. INTERPRETATION OF BID AND/OR CONTRACT DOCUMENTS

Any interpretation to a bidder regarding the Bid and/or Contract Documents or any part thereof is valid only if given by the City's Purchasing Division staff. Any information given by departmental contacts is unofficial. Interpretations may or may not be given orally (may be written) dependent upon the nature of the inquiry. Interpretations that could affect other bidders will be in writing and issued by the Purchasing Division. All inquiries shall be made within reasonable time prior to the stated deadline in order that a written response in the form of an addendum, if required, can be processed before bids are opened. Inquires received that are not made in a timely fashion may or may not be considered.

5. CHANGES AND ADDENDA TO BID DOCUMENTS

Each change or addendum issued in relation to this bid will be on file in the Purchasing Division. It shall be the bidder's responsibility to make inquiry as to the changes or addenda issued. All such changes or addenda shall become part of the contract and all bidders shall be bound by such changes or addenda.

6. SPECIFICATIONS

Unless otherwise stated by bidder, the bid will be considered as being in strict accordance with the City's applicable standard specifications, and any special specifications outlined in the document. Reference to a particular trade name, manufacturer's catalogue, or model number are made for descriptive purposes to guide the bidder in interpreting the requirements of the City, and should not be construed as excluding bids on other types or materials, equipment and supplies unless otherwise stated. However, the bidder, if awarded the contract, will be required to furnish the particular item referred to in the specifications or description unless departure or substitution is clearly noted and described in the bid. The City reserves the right to determine if equipment/product or service being bid is equal to the specified equipment/product or service requested.

7. ALTERNATES

Bidders are cautioned that any alternate bid, unless requested by Purchasing, or any changes, insertions, or omissions to the terms and conditions, specifications, or any other requirements or this bid, may be considered non-responsive, and at the opinion of the City, may result in rejection of the bid.

8. PRICING

Prices shall be stated in units of quantity specified in the Document. In case of a discrepancy in computing the amount of the bid, the unit price will govern.

9. TAXES, TERMS AND CONDITIONS

The City of Farmington Hills & all agencies listed in this request are exempt from Federal Excise and State Sales Tax. Please review The State of Michigan's REVENUE ADMINISTRATIVE BULLETIN 1999 – 2 for clarification http://www.treas.state.mi.us/lawrules/rabs/1999/rab9902.htm The City's tax number is 38-6006902. General payment terms are Net 30 days upon receipt of goods (unless otherwise stated below). Cooperative members will provide their tax-exempt status as required by the awarded vendor

10. QUANTITIES

All quantities stated, unless indicated otherwise are estimates and the City reserves the right to increase or decrease the quantity at the unit price bid as best fits its needs.

11. DELIVERY

Bids shall include all charges for delivery, packing, crating, etc., unless otherwise stated in the bid document. All deliveries will be FOB: Delivered. General delivery hours are 8:30 a.m. to 3 p.m. Monday-Friday.

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12. AWARD

- A. To be considered your company must specialize in and have provided the services listed herein as indicated in the specification section. Submit one (1) original & Two (2) copies (PAGES 13-21) of the bid in one sealed envelope or box.
- **B.** The bid will be awarded to that responsible, responsive bidder whose bid, conforming to this solicitation, will be most advantageous to the City, price and other factors considered.
- **C.** If within the past ten (10) years, the vendor or any of its proposed subcontractors has sued the City of Farmington Hills, or has been sued by the City of Farmington Hills, with respect to project related claim or issue, the vendor shall not be eligible for consideration.
- **D.** Unless otherwise specified in the document the City reserves the right to accept any item in the bid on an individual basis. Bidders may submit bids on any item or groups of items provided unit prices are clearly shown and a notation is made on the document clearly indicating Bidder's intent.
- **E.** The City of Farmington Hills reserves the right, in their sole and exclusive discretion, to reject any or all bids for any or no reason at all, to not award this contract to any of the bidders for any or no reason, to waive irregularities and/or informalities, and to make the award that in the opinion of the City Council is in the best interest and to the best advantage of the City of Farmington Hills.

13. WITHDRAWL OF BID

Bids may be withdrawn in person by a bidder, or authorized representative, provided their identity is made known and a receipt is signed for the bid, but <u>only</u> if the withdrawal is made prior to the stated bid deadline. No bid may be withdrawn for at least 90 days after bid opening except the successful company whose prices shall remain firm for the entire contract period. In case of error by the bidder in making up a bid, the Purchasing Division staff may, by discretion, reject such a bid upon presentation of a letter by the Bidder which sets forth the error, the cause thereof, and sufficient evidence to substantiate the claim.

14. DEFAULT CONDITIONS

In case of default by the contractor, the City of Farmington Hills may procure the articles or services from other sources and hold the bidder responsible for any excess cost occasioned thereby. In case of error by the bidder relating to a Contract, the Purchasing Division may, by discretion, upon presentation of a written explanation by the bidder substantiating the error, reject the Contract and award to the next qualified bidder; such error may be subject to default conditions.

15. INFRINGEMENTS AND INDEMNIFICATIONS

The bidder, if awarded a contract, agrees to protect, defend, and save the City and the cooperative members listed herein, its officials, employees, departments and agents harmless against; any demand for payment for the use of any patented material, process, or device that may enter into the manufacture, construction, or from a part of the work covered by either order or contract; and from suits or a charge of every nature and description brought against if for, or on account of, any injuries or damages received or sustained by the parties by or from any of the facts of the contractor, the contractor's employees, or agents; from all liability claims, demands, judgments and expenses to persons or property occasioned, wholly, or in part, by the acts or omissions of the bidder, contractor, agents or employee.

16. SAMPLES

Generally, when required, samples will be specifically requested in the Request for Bids. Samples, when required, are to be furnished free of charge. Except for those samples destroyed or mutilated in testing, samples will be returned at an offeror request, transportation collect.

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17. PATENTS, COPYRIGHTS, ETC.

The Contractor shall release, indemnify and hold the Buyer, its officers, agents and employees harmless from liability of any kind or nature, including the Contractor's use of any copyrighted or un-copyrighted composition, secret process, patented or unpatented invention, article or appliance furnished or used in the performance of this contract.

18. NON-COLLUSION

By signing the bid the offeror certifies that the bid submitted, has been arrived at independently and has been submitted without collusion with, and without any agreement, understanding or planned common course of action with, any other vendor of materials, supplies, equipment or services described in the Invitation to Bid, designed to limit independent bidding or competition.

19. CANCELLATION

Unless otherwise stated within this Invitation to Bid, any Contract entered into in response to this Invitation to Bid, including any extension or amendment of a Contract, may be terminated at any time, with or without cause, with 30 days written notice by the City. The City shall not be responsible to make any further payments for work performed after the effective date of such termination, and shall be responsible only for such work as has been completed and is eligible for payment under the terms of this Contract through the date of such termination. Termination shall not relieve Contractor of its obligation to provide City with all of the plans and product generated under this Contract through the effective date of termination. Prior to the effective date of any termination or prior to the completion of the work (including any extension of the timing for completion), whichever is the first to occur, Contractor shall deliver to the City all reports, opinions, compilations, research work, studies, data, materials, artifacts, samples, documents, plans, drawings, specifications, correspondence, ledgers, permits, applications, manuals, contracts, accountings, schedules, maps, Jogs, invoices, billings, photographs, videotapes and other materials in its possession or control that is gathered or generated in the course of performing the work or that relates to the work in any way; provided that Contractor may retain a copy of such materials for its files.

20. DEFAULT AND REMEDIES

Any of the following events shall constitute cause for the City of Farmington Hills to declare Contractor in default of the contract: A. Nonperformance of contractual requirements or B. A material breach of any term or condition of this contract. Please note, The City of Farmington Hills shall issue a written notice of default providing a period in which Contractor shall have an opportunity to cure. Time allowed for cure shall not diminish or eliminate Contractor's liability for liquidated or other damages. If the default remains, after Contractor has been provided the opportunity to cure, the City of Farmington Hills may do one or more of the following: A. Exercise any remedy provided by law; B. Terminate this contract and any related contracts or portions thereof; 4. Impose liquidated damages; or D. Suspend contractor from receiving future bid solicitations.

21. LAWS AND REGULATIONS

Any and all supplies, services and equipment offered and furnished shall comply fully with all applicable Federal and State laws and regulations.

22. GOVERNING LAW

This procurement and the resulting agreement shall be governed by and construed in accordance with the laws of the State of Michigan. The construction and effect of any Participating Addendum or order against the contract(s) shall be governed by and construed in accordance with the laws of the participating entity's State. Venue for any claim, dispute or action concerning an order placed against the contract(s) or the effect of a Participating Addendum shall be in the participating entity's State.

23. ASSIGNMENT/SUBCONTRACT

Contractor shall not assign, sell, transfer, subcontract or sublet rights, or delegate responsibilities under this contract, in whole or in part, without the prior written approval of the City of Farmington Hills.

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24. NONDISCRIMINATION

The offeror agrees to abide by the provisions of Title VI and Title VII of the Civil Rights Act of 1964 (42 USC 2000e), which prohibit discrimination against any employee or applicant for employment, or any applicant or recipient of services, on the basis of race, religion, color, or national origin; and further agrees to abide by Executive Order No. 11246, as amended, which prohibits discrimination on basis of sex; 45 CFR 90 which prohibits discrimination on the basis of age, and Section 504 of the Rehabilitation Act of 1973, or the Americans with Disabilities Act of 1990 which prohibits discrimination on the basis of disabilities. The offeror further agrees to furnish information and reports to requesting agencies, upon request, for the purpose of determining compliance with these statutes. Offeror agrees to comply with each individual agency's certification requirements, if any, as stated in the additional terms and conditions listed in the solicitation. This contract may be canceled if the offeror fails to comply with the provisions of these laws and regulations. The offeror must include this provision in every subcontract relating to purchases by the agencies to insure that subcontractors and vendors are bound by this provision.

25. SEVERABILITY

If any provision of this contract is declared by a court to be illegal or in conflict with any law, the validity of the remaining terms and provisions shall not be affected; and the rights and obligations of the parties shall be construed and enforced as if the contract did not contain the particular provision held to be invalid.

26. FORCE MAJEURE

Neither party to this contract shall be held responsible for delay or default caused by fire, riot, acts of God and/or war which is beyond that party's reasonable control. The City of Farmington Hills may terminate this contract after determining such delay or default will reasonably prevent successful performance of the contract.

27. BID PREPARATION COSTS

The City of Farmington Hills is not liable for any costs incurred by the offeror in bid preparation.

28. CONFLICT OF INTEREST

The City of Farmington Hills Code of Ethics prohibits City officials and employees from using their official position to unreasonably secure, request, or grant any privileges, exemptions, advantages, contracts or preferential treatment for themselves or others, and further, requires the reporting of certain financial or other interests held by themselves or their family members in any organization that does business with the City. Consistent with the principles of the City of Farmington Hills Code of Ethics, and in accordance with applicable federal regulations, no employee, officer or agent of the City shall be permitted to participate in the selection, the award, or the administration of a contract if the employee, officer or agent of the City, or his or her immediate family member or members, or his or her business partner or partners, works for, or has any financial or other interest in any company bidding for the contract.

In order to determine whether your company presents any potential conflict of interest with respect to the award of the subject contract, on a separate piece of paper, please disclose any familial or business relationships you have with any current or former employee, agent, consultant, officer or elected or appointed official of the City of Farmington Hills, or others who are or have been within the past year, in a decision making position with the City of Farmington Hills, and who may be able to grant favorable treatment with respect to being awarded this contract. Please disclose the full nature and extent of your relationship.

The City will review the relationship for conflict of interest. If a determination is made that the relationship is contrary to Federal Regulations 24 CFR 570.611 your company will be removed from the bid process. Requests for exceptions will be reviewed by the HUD Detroit Field Office in accordance with the standards set forth in 24 CFR 570.611(d).

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Violation of the City's Code of Ethics as the result of non-disclosure will be reviewed in accordance with Section 5 of the City of Farmington Hills Code of Ethics and may result in disciplinary action, and/or termination of the subject contract.

29. INDEPENDENT CONTRACTOR

The contractor shall be an independent contractor, and as such shall have no authorization, express or implied to bind the City of Farmington Hills or the respective agencies to any agreements, settlements, liability or understanding whatsoever, and agrees not to perform any acts as agent for the City of Farmington Hills or participating agencies, except as expressly set forth herein.

30. THIRD PARTY BENEFICIARIES

There are no third party beneficiaries to this Agreement, and nothing expressed or referred to in this Agreement will be construed to give any person or entity other than the parties to this Agreement any legal or equitable right, remedy, or claim under or with respect to this Agreement or any provision of this Agreement. This Agreement and all of its provisions and conditions are for the sole and exclusive benefit of the parties named.

31. CITY POLICY ON SMOKING

The bidder, if awarded a contract, agrees to follow the City of Farmington Hills Smoking Policy which states: "The City of Farmington Hills is dedicated to providing a healthy, smoke free work place for employees, residents and visitors." To that end; smoking is prohibited in all municipal buildings, in all municipal owned, leased or rented vehicles and within twenty five (25) feet from any municipal building entrance, outdoor air intakes and operable windows. Smoking is permitted in outside designated smoking areas or in personal vehicles. Smokers are responsible for properly disposing of all smoking related litter, which includes cigarette and cigar butts, tobacco, etc. Disposal of any smoking litter is not permitted on City property except in the provided receptacles.

32. NON-IRAN LINKED BUSINESSES

By signing below, I certify and agree on behalf of myself and the company submitting this bid the following: (1) that I am duly authorized to legally bind the company submitting this bid; and (2) that the company submitting this bid is not an "Iran linked business," as that term is defined in Section 2(e) of the Iran Economic Sanctions Act, being Michigan Public Act No. 517 of 2012; and (3) That I and the company submitting this bid will immediately comply with any further certifications or information submissions requested by the City in this regard.

33. COVID-19 MANAGMENT ADHERANCE

As a result of the Covid-19 pandemic, in the event of the issuance of any order by federal, state or local health authorities, which requires the suspension of any or all activities for any time period, all Vendors are hereby on notice that in the event that certain types of public works projects, including but not limited to the Project set forth in this Invitation to Bid, are at any time determined by the City or other governmental authorities, to be required to be suspended, in accordance with the applicable order, this project may be delayed or terminated, as set forth in Section 26 of this Invitation to Bid, and/or Article II of this Agreement. The City shall not be responsible for additional costs relating to delay of the Project, and the Project schedule may be revised to reflect requirements of the order.

34. REASONABLE CARE

All contractors or any of their subcontractors for construction, maintenance and repair of roads, utilities & public rights-of way shall exercise reasonable care in performing work. In providing services for the City, Contractor shall perform consistent with the level of skill and care ordinarily used by other reputable members of Contractors profession.

35. INSURANCE (REQUIRED FOR WORK ON OR WITHIN CITY PROPERTY/FACILITIES)

The contractor, or any of their subcontractors, shall not commence work under this contract until they have obtained the insurance required under this paragraph, and shall keep such insurance in force during the entire life

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of this contract. All coverage shall be with insurance companies licensed and admitted to do business in the State of Michigan and acceptable to The City of Farmington Hills. The requirements below should not be interpreted to limit the liability of the Contractor. All deductibles and SIR's are the responsibility of the Contractor.

The Contractor shall procure and maintain the following insurance coverage:

- **A.** Worker's Compensation Insurance including Employers' Liability Coverage, in accordance with all applicable statutes of the State of Michigan.
- **B.** Commercial General Liability Insurance on an "Occurrence Basis" with limits of liability not less than \$3,000,000.00 per occurrence and aggregate. Coverage shall include, but not limited to, the following: (A) Contractual Liability; (B) Products and Completed Operations; (C) Independent Contractors Coverage; (D) Broad Form General Liability Extensions or equivalent; (E) Explosion, Collapse, and Underground, if applicable.
- **C.** Automobile Liability including Michigan No-Fault Coverages, with limits of liability not less than \$3,000,000. per occurrence combined single limit for Bodily Injury, and Property Damage. Coverage shall include all owned vehicles, all non-owned vehicles, and all hired vehicles.
- **D.** Additional Insured: Policy(ies) and coverages as described above, excluding Workers' Compensation Insurance, shall include an endorsement stating the following shall be Additional Insureds: The City of Farmington Hills, all elected and appointed officials, all employees and volunteers, agents, all boards, commissions, and/or authorities and board members, including employees and volunteers thereof. It is understood and agreed by naming the City of Farmington Hills as additional insured, coverage afforded is considered to be primary and any other insurance the City of Farmington Hills may have in effect shall be considered secondary and/or excess.
- **E.** Cancellation Notice: Policy(ies), as described above, shall be endorsed to state the following: It is understood and agreed Thirty (30) days, Ten (10) days for non-payment of premium, Advance Written Notice of Cancellation, Non-Renewal, Reduction, and/or Material Change shall be sent to: City of Farmington Hills, Attention: Mr. Thomas Skrobola, 31555 West Eleven Mile Road, Farmington Hills, Michigan 48336.
- **F.** Proof of Insurance Coverage: The Contractor shall provide the City of Farmington Hills at the time the contracts are returned by him/her for execution a Certificate of Insurance **as well as the required endorsements**. In lieu of required endorsements, a copy of the policy sections, where coverage is provided for additional insured and cancellation notice, may be acceptable. Copies of all policies mentioned above shall be furnished, if so requested.
- **G.** Required liability limits may be obtained by using an Excess/Umbrella Liability policy in addition to the primary liability policy(ies). If coverage limits are satisfied by an Excess and/or Umbrella policy, coverage must follow form of the primary liability policy(ies).
- **H.** If any of the above coverages expire during the term of this contract, the Contractor shall deliver renewal certificates, endorsements, and/or policies to City of Farmington Hills at least ten (10) days prior to the expiration date.

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INSTRUCTIONS TO BIDDER INDEX

101	Name, Address and Legal Status of the Bidder
102	Soil Conditions
103	Bond Requirements
104	Order of Work
105	Sunday and Holiday Work
106	Liquidated Damages



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INSTRUCTIONS TO BIDDER

101.0 Name, Address, and Legal Status of the Bidder

The name and legal status of the bidder, whether corporation, partnership, or individual, shall be stated in the Proposal. A corporation bidder shall give the state in which incorporated, a partnership bidder shall give all the names of the partners. Partnership and individual bidders will be required to state in the Proposal the names of all persons interested therein. The place of residence of each bidder, or the office address in the case of a firm or company, with county and state must be given after his signature.

Authorized Corporate Officer of company, with title, to sign in front of two witnesses and have signatures notarized. The Bid Form/Contract Document shall be signed by the Bidder, as follows:

- A. Sole Proprietorship: Signature of sole proprietor in the presence of a witness who will also sign. Insert the words "Sole Proprietor" under the signature.
- B. Partnership: Signature of all partners in the presence of a witness who will also sign. Insert the word "Partner" under each signature.
- C. Corporation: Signature of a duly authorized signing officer(s) in their normal signatures. Insert the officer's capacity in which the signing officer acts, under each signature. If the Bid is signed by officials other than the President and Secretary of the company, or the President/Secretary/Treasurer of the company, a copy of the by-law or resolution of the Board of Directors authorizing them to do so must also be submitted with the Bid Form in the Bid envelope.

102.0 Soil Conditions

- The Contractor, as such and as Bidder, shall make his own determination as to soil conditions and shall assume all risk and responsibility and shall complete the work in whatever material and under whatever conditions he may encounter or create, without extra cost to the City. This shall apply whether or not borings are shown on the drawings or in the contract documents.
- A small number of borings may have been made and locations thereof are shown on the drawings. These borings have been made by a disinterested drilling contractor and the driller's reports are available in the office of the City, and such report is also appended to these Contract Documents. This information is offered to the bidder as evidence of pavement thickness and ground conditions at only certain locations and the bidder himself shall assume the entire responsibility for any conclusions which he may draw from it. The City does not guarantee, however, the ground encountered during construction will conform with these borings and the bidders should secure such other information as they consider necessary to check and supplement the above data.

103.0 Bond Requirements

103.01 Bid Security

Each bid must be accompanied by cash, certified check of the bidder, or a bid bond duly executed by the bidder as principal and having as surety thereon a surety company approved by the City, in the amount of 5% of the bid as a guarantee on the part of the bidder that he will, if called upon to do so, enter into contract in the attached form, to do the work covered by such Proposal and at the price stated therein and to furnish acceptable surety for its faithful and entire fulfillment. Such cash, checks or bid bonds will be returned to all except the three lowest bidders within a reasonable time after the accuracy of all the bids have been determined, and the remaining cash, checks or bid bonds will be returned promptly after the City and the accepted bidder have executed the Contract, or if no award has been made within ninety (90) days after the

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date of the opening of bids, upon demand of the bidder at any time thereafter, so long as he has not been notified of the acceptance of his bid. If said bidder shall neglect or refuse to execute a contract, including all required bonds & insurance documents, within fifteen (15) days after written notice by the Owner, the amount of the bid deposit or bond shall be forfeited to the Owner as liquidated damages for such refusal or neglect.

1. 103.02 Labor & Material Bond

The successful bidder shall be required to furnish a Labor and Material Bond in an amount at least equal to 100% of the contract sum as security for payment of all persons performing labor, furnishing materials and equipment rental in connection with this Contract.

103.03 Performance Bond

The bids shall be accompanied by a letter from a surety company satisfactory to the City stating that the necessary bonds will be furnished by it to the Contractor bidding in the event he is successful. The Bidder shall furnish a surety bond in an amount at least equal to 100% of the contract as security for faithful performance of this Contract.

103.04 Maintenance & Guarantee Bond

The successful bidder shall be required to furnish a Maintenance and Guarantee Bond, equal to 25% of the contract sum, for a period of two (2) years from the date of approval of Final Estimate, to keep in good order and repair any defect in all the work done under this contract, either by the principal or his subcontractors.

104.0 Order of Work

The right to prescribe the order in which the work called for under this Contract is to be done will be retained by the City.

105.0 Sunday and Holiday Work

There shall be no construction, regardless of the noise levels, on Sundays and legal holidays. When it is determined that special circumstances exist, or it is in the best interest of the City, allowances may be made to allow construction only in non-residential areas or where there is a threat to public health, safety or welfare. Permission must be given in writing and authorized by the City Manager or the Director of Public Services. A copy of the written authorization shall be forwarded to the Police Department. The contractor/builder receiving the authorization shall keep a copy of the authorization at the construction site.

106.0 Liquidated Damages

It is expressly covenanted and agreed that time is and shall be considered of the essence of the contract. In the event that the contractor shall fail to perform the entire work agreed to by or at the times herein mentioned or referred to in the Proposal, or within some other certain date subsequent to this to which the time limit for the completion of the work may have been advanced, the contractor shall pay unto the Owner as and for liquidated damage and not as a penalty, the sum of Five hundred dollars (\$500.00) for each and every calendar day that the contractor shall be in default. Said sum of Five hundred dollars (\$500.00) per day, in view of the difficulty of estimating such damages with exactness, is hereby expressly fixed and agreed upon as the damages which will be suffered by the Owner for reason of such defaults. It is also understood and agreed that the liquidated damages hereinbefore mentioned are in lieu of the actual damages arising from such breaches of this contract which said sums the Owner shall have the right to deduct from any monies in his hands otherwise due or to become due to the contractor or to sue for and recover compensation for damages for non-performance of this contract at the time stipulated herein and provided.

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CITY OF FARMINGTON HILLS 31555 ELEVEN Mile Road Farmington Hills, Michigan 48336

PROPOSAL FOR PROJECT:

HERITAGE HILLS AND WEDGWOOD COMMONS SUBDIVISION REHABILITATION PROGRAM PHASE IV

BIDS WILL BE OPENED AT 10:00 AM, FRIDAY, FEBRUARY 9, 2024, AT THE CITY OF FARMINGTON HILLS CLERK'S OFFICE, 31555 ELEVEN MILE ROAD, FARMINGTON HILLS MICHIGAN 48336. ALL BIDS MUST BE DEPOSITED WITH THE CLERK OF THE CITY OF FARMINGTON HILLS BY 10:00 A.M. ON FRIDAY, FEBRUARY 9, 2024.

To the Board of Council Members of the City of Farmington Hills

The undersigned has examined the plans, specifications and the location of the work described herein and is fully informed as to the nature of the work and the conditions relating to its performance and understands that the quantities shown are approximate only and are subject to either increase or decrease.

The undersigned hereby proposes to furnish all necessary machinery, tools, apparatus and other means of construction, do all the work, furnish all the materials, except as otherwise specified herein, and for the unit prices named in the itemized bid, to complete the work herein described in strict accordance with the plans and in strict conformity with the requirements of the City of Farmington Hills, and such other special provisions and supplemental specifications as may be a part of this proposal.

The undersigned further proposes to do such extra work as may be authorized by the City Council of Farmington Hills. Prices for which are not included in the itemized bids, compensation shall be made on the basis agreed upon before such extra work is begun.

The undersigned enclosed a certified or cashier's check on an open, solvent bank or a bid bond duly executed by the bidder as principal and having as surety thereon a surety company approved by the Owner, in the amount off not less than 5% of the bid, payable to the City Treasurer as a guarantee of good faith. If the undersigned is the successful bidder and fails to enter into a contract or to furnish satisfactory bonds to the City of Farmington Hills, within 15 days after being furnished with the necessary contract and bond forms, said check shall be forfeited to the City of Farmington Hills as liquidated damages. It is understood that the check of the three lowest bidders will not be returned until the contract has been executed. The proposal guarantees of all except the three lowest bidders will be returned within a reasonable time after the accuracy of all the bids have been determined.

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Check as you Read



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CHECKLIST FOR BIDDERS

MISTAKES OR OMMISSIONS CAN RESULT IN THE REJECTION OF YOUR BID

All information required by the terms of the bid documents must be furnished. Important items for you to check are included in, but not limited to, those listed below. This checklist is furnished only to assist you in submitting a proper bid.

•	
	Is the required bid bond or bid deposit included with your bid?
	Where required, have you entered a unit price or lump sum for each bid item?
	Are decimals in the unit or lump sum prices in their proper place? Are your figures legible?
	Is your bid properly signed?
	Have you reviewed all Appendices that were issued as part of this contract, A - D?
	Have you included one (1) ORIGINAL & two (2) COPIES of all required pages (PAGES 13 thru 21) in the envelope?
	Did you check the MITN website for any addendums which may have been posted? Addendums may be posted at any time.

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CITY OF FARMINGTON HILLS BIDDER'S GENERAL QUESTIONNAIRE

Please give the following information regarding your proposal for this bid:

List below or attach a list of the number and	types of equipment to be used if awarded this bid:
	
	ted with for this type of work during the past three (
Name of your bank and other financial refere	ences:
Comments:	
SIGNED:	
TITLE:	
	or Type)
NAME AND ADDRESS OF FIRM: (Print	
NAME AND ADDRESS OF FIRM: (Print	011,500
NAME AND ADDRESS OF FIRM: (Print	
NAME AND ADDRESS OF FIRM: (Print	
NAME AND ADDRESS OF FIRM: (Print	Zip:

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LEGAL STATUS BIDDER

Fill out the appropriate section below for your company and strike out the other three. Provide additional sheets if more space is needed for your responses.

State and County in which incorporated:
Official title of person signing proposal:
Address of signer:
Full names, addresses and titles of all the corporation's directors and officers:
Partnership: State and County in which established:
Official title of person signing proposal:
Address of signer:
Full names, addresses and titles of all partners:
Limited Liability Company (LLC):
State and County in which established:
Official title of person signing proposal:
Address of signer:
Full names, addresses and titles of all members and managers of the LLC:

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NON-IRAN LINKED BUSINESS CERTIFICATION

Pursuant to Michigan law before accepting any bid or proposal or entering into any contract for goods & services with any prospective firm, the firm must certify that it is not an "Iran Linked Business".

By signing below, I certify and agree on behalf of myself and the firm submitting this proposal the following: (1) that I am duly authorized to legally bind the firm submitting this proposal; and (2) that the firm submitting this proposal is not an "Iran Linked Business," and that term is defined in section 2€ of the Iran Economic Sanctions Act, being Michigan Public Act No.517 of 2012; and (3) That I and the firm submitting this proposal will immediately comply with any further certifications or information submissions requested by the City in this regard.

Company Name:
Authorized Representative Signature:
Printed:
Date:

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PHONE 248-871-2435

SUBCONTRACTORS

The contractor shall not sublet, assign or transfer the contract or any portion of any payment due the contractor hereunder, without the written consent of the City. If it is the intention of the bidder to use subcontractor(s) for any of the work called for herein, the bidder shall provide the information required for each subcontractor, below. If subcontractors will not be used, please strike out this page.

Name of Firm:		
Contact Person:	Title:	
Address:		
Phone:	-	
Work to be performed for general contractor:		
_Name of Firm:		
Contact Person:	Title:	
Address:		
Phone:		
Work to be performed for general contractor:		
Name of Firm:		
Contact Person:	Title:	
Address:		
Phone:		
Work to be performed for general contractor:		



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CITY OF FARMINGTON HILLS – ENGINEERING DIVISION HERITAGE HILLS AND WEDGWOOD COMMONS SUBDIVISION REHABILITATION PROGRAM PHASE IV

ITEMIZED BID

-		MIZED B	ιν		
NO.	DESCRIPTION	UNIT	QTY	UNIT PRICE	AMOUNT
1	Clearing	Acre	0.05		
2	Tree and Stump, Rem, 19 inch to 36 inch, Special	Ea	6		
3	Tree and Stump, Rem, 6 inch to 18 inch, Special	Ea	10		
4	Stump, Rem, 6 inch to 18 inch, Special	Ea	1		
5	Tree Trimming, Special	Ea	22		
6	Dr Structure, Rem	Ea	30		
7	Sewer, Rem, Less than 24 inch	Ft	519		
8	Masonry and Conc Structure, Rem	Cyd	1		
9	Exploratory Investigation, Vertical	Ft	100		
10	Pavt, Rem, Special	Syd	37287		
11	Sidewalk, Rem	Syd	365		
12	Station Grading, Special	Sta	101.4		
13	Subgrade Undercutting, 1 x 3, Special	Cyd	4500		
14	Erosion Control, Inlet Protection, Fabric Drop	Ea	60		
15	Erosion Control, Silt Fence	Ft	200		
16	Project Cleanup, Special	Lsum	1		
17	Aggregate Base, 4 inch, 21AA, Special	Syd	3905		
18	Aggregate Base, 8 inch, 21AA, Special	Syd	37844		
19	1" x 3" Crushed Concrete, 12 inch, Special	Syd	37844		
20	Maintenance Gravel	Ton	1000		
21	Pedestrian Path, Temp, Special	Syd	4000		
22	Geotextile, Stabilization	Syd	13435		
23	Road Grade Biaxial Geogrid	Syd	2500		
24	Cured-In-Place Pipe Lining, 12 inch, Special	Ft	56		
25	Cured-In-Place Pipe Lining, 15 inch, Special	Ft	44		
26	Sewer, Cl IV, 12 inch, Tr Det B	Ft	669		
27	Sewer, Cl IV, 15 inch, Tr Det B	Ft	22		
28	Sewer Tap, 12 inch	Ft	9		
29	Sewer Tap, 15 inch	Ft	1		
30	Video Taping Sewer and Culv Pipe	Ft	691		



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ITEMIZED BID - CONTINUED

i	TIEWIZE	D BID - CO	<u>ONTINUED</u>		
NO.	DESCRIPTION	UNIT	QTY	UNIT PRICE	AMOUNT
31	Dr Structure Cover, Adj, Case 1	Ea	25		
32	Dr Structure Cover, Adj, Case 2	Ea	6		
33	Dr Structure Cover, Type B	Ea	7		
34	Dr Structure Cover, Type D	Ea	36		
35	Dr Structure Cover, Type G	Ea	1		
36	Dr Structure Cover, Type K	Ea	20		
37	Dr Structure Lead, Cleaning, 12 inch	Ft	441		
38	Dr Structure Lead, Cleaning, 15 inch	Ft	25		
39	Dr Structure Lead, Cleaning, 18 inch	Ft	25		
40	Dr Structure Lead, Cleaning, 24 inch	Ft	25		
41	Dr Structure, 24 inch dia	Ea	17		
42	Dr Structure, 48 inch dia	Ea	16		
43	Dr Structure, Adj, Add Depth	Ft	20		
44	Dr Structure, Cleaning	Ea	31		
45	Dr Structure, Tap, 6 inch	Ea	44		
46	Dr Structure, Tap, 12 inch	Ea	10		
47	Dr Structure, Tap, 15 inch	Ea	2		
48	DPW Structure Cover, Adj, Case 1	Ea	5		
49	DPW Structure Cover, Adj, Case 2	Ea	14		
50	DPW Structure Cover	Ea	19		
51	DPW Structure Cover, Adj, Add Depth	Ft	20		
52	Sump Connection, Special	Ea	95		
53	Underdrain, Subgrade, Open-Graded, 6 inch, Special	Ft	19137		
54	Point Drainage Structure with Hydrophobic Grout, Special	Ea	32		
55	HMA Approach	Ton	346		
56	Conc Pavt with Integral Curb, Nonreinf, 6 inch	Syd	43		
57	Conc Pavt with Integral Curb, Nonreinf 7 inch	Syd	34099		
58	Joint, Expansion, E3	Ft	1750		
59	Joint, Plane-of-Weakness, W	Sft	23100		



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ITEMIZED BID - CONTINUED

		D BID - CO	DNTINUED	Г Г	
NO	DESCRIPTION	TINITE	OTV	UNIT	AMOUNT
NO.	DESCRIPTION	UNIT	QTY	PRICE	AMOUNT
60	Driveway, Nonreinf Conc, 6 inch	Syd	2757		
61	Sidewalk, Conc, 6 inch, Special	Sft	3794		
62	Remove and Replace Driveway, Special	Syd	15		
63	Mailbox, New	Ea	31		
64	Mailbox, Remove and Reinstall	Ea	141		
65	Post, Mailbox, Special	Ea	142		
66	Post, Steel, 3 pound	Ft	364		
67	Sign, Type III, Erect, Salv	Ea	54		
68	Sign, Type III, Rem, Salv	Ea	54		
69	Ground Mtd Sign Support, Rem	Ea	35		
70	Street Sign Post, Special	Ea	9		
71	Post, Flexible, Delineator, Special	Ea	100		
72	Barricade, Type III, High Intensity, Double Sided, Lighted, Furn	Ea	30		
73	Barricade, Type III, High Intensity, Double Sided, Lighted, Oper	Ea	30		
74	Dust Palliative, Applied	Ton	100		
75	Minor Traf Devices	Lsum	1		
76	Sign Cover	Ea	25		
77	Sign, Type B, Temp, Prismatic, Furn	Sft	1000		
78	Sign, Type B, Temp, Prismatic, Oper	Sft	1000		
79	Sign, Type B, Temp, Prismatic, Special, Furn	Sft	400		
80	Sign, Type B, Temp, Prismatic, Special, Oper	Sft	400		
81	Traf Regulator Control	Lsum	1		
82	Plastic Drum, Fluorescent, Furn	Ea	350		
83	Plastic Drum, Fluorescent, Oper	Ea	350		
84	Channelizing Device, 42 inch, Fluorescent, Furn	Ea	350		
85	Channelizing Device, 42 inch, Fluorescent, Oper	Ea	350		
86	Riprap, Plain, Special	Syd	50		

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ITEMIZED BID - CONTINUED

NO.	DESCRIPTION	UNIT	QTY	UNIT PRICE	AMOUNT
87	Turf Establishment	Syd	23165		
88	Sprinkler Relocate	Ea	500		
89	Reimbursed Permit Fees	Dlr	5000		
90	Inspection Crew Days, Special	Wday		\$1,100/DAY	
	PROJECT TOTAL (Items 1-90)				

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FIRM PRICE GUARANTEE

ACKNOWLEDGEMENT OF OFFICIAL DOCUMENTS

The price stated in this proposal is guaranteed for a period of no less than 90 days from the date hereon, and if authorized within that period, we agree to complete the work at said price.

bid and that the bid proposal documents con-	at I have read section 3 (Official Documents) of the invitation to tained herein were obtained directly from the City of Farmington Hills n.info and is an official copy of the authorized version.
SIGNATURE OF AUTHORIZED COMPA	NY REPRESENTATIVE
AUTHORIZATION OF SPECIFICATIONS	<u>S</u>
accordance with the Contract Documents. In su	and agrees to enter into an agreement with the City of Farmington Hills in abmitting this completed and signed proposal, it is understood that the right eject any or all bids and to make such award that, in the opinion of the City mington Hills.
NAME OF BIDDER:	
BUSINESS ADDRESS OF BIDDER:	
BUSINESS PHONE NO:	FAX NO
WEBSITE	EMAIL
AUTHORIZED SIGNATURE:	TITLE OF SIGNER:
PRINTED SIGNATURE NAME:	DATE:

NOTE: All items set forth herein shall be bid in full accordance with these bidding and/or contract documents and accompanying plans, complete.

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THE AGREEMENT (TO BE COMPLETED ONLY AFTER AWARD)

THIS AGREEMENT, made and entered into this _	day of	2024, by and between the City
of Farmington Hills, Oakland County, Michigan, Party of th	he First Part, herei	nafter called OWNER, and Party of the Second
Part,	hereinafter ca	lled the CONTRACTOR.

WITNESSETH, that the Contractor and the Owner, for the consideration hereinafter named agree as follows:

ARTICLE I - THE WORK

It is agreed that the Contractor shall furnish all the labor, materials and equipment and perform all the work shown and called for on the drawings and described in the Specifications entitled

HERITAGE HILLS AND WEDGWOOD COMMONS SUBDIVISION REHABILITATION PROGRAM PHASE IV

prepared by the City of Farmington Hills, Department of Public Services, Oakland County, Michigan, acting as, and in these Contract Documents entitled, the Engineer, and shall do everything required by the Contract Documents, the Contract Documents being hereby defined to include the Agreement, Bonds, Drawings, Advertisement, Instruction to Bidders, Specifications, General Conditions, and any supplements hereto agreed to by both parties.

ARTICLE II - THE TIME

It is agreed that the all work required under this Contract shall be completed **by the dates identified in the Progress Clause**, except as such time limits may be advanced in accordance with provisions herein. Time is of the essence in this Contract. The Owner shall issue the **NOTICE OF CONTRACT AWARD** at any time as referenced in the Instructions to Bidders. The Notice of Contract Award, Rate of Progress, and Date of Completion are considered essential elements of the Contract.

It is agreed that if the Contractor shall be unavoidably delayed in beginning of fulfilling this contract by reason of excessive storm or floods or by acts of Providence, strikes, or by court injunction, or by stopping of the work by the Owner because of any emergency or public necessity, or reason of alterations ordered by the Owner, the Contractor shall have no valid claim for damage on account of any cause or delay; but he shall in such case be entitled to such an extension of the above time limit herein as the Engineer shall adjudge to be just and reasonable; provided, however, that formal claim for such extension shall be made in writing by the Contractor within a week after the date upon which such alleged cause or delay shall have occurred.

ARTICLE III - OWNER'S RIGHT TO COMPLETE

It is agreed that if at any time the Contractor should abandon this work; or if he should be adjudged a bankrupt, or if his performance of this Contract is being unnecessarily or unreasonably delayed; or if he should make a general assignment for the benefit of his creditors; or if a receiver should be appointed on account of his insolvency; or if he should persistently or repeatedly fail to supply enough properly skilled workmen or sufficient suitable materials for the work; or if he should habitually fail to make prompt payment to subcontractors or to pay promptly for materials and labor; or if he should persistently disregard laws or ordinances or the directions of the Engineer; or if he should willfully violate any of the substantial provisions of this Agreement; then in such case the Owner, after giving the Contractor and his sureties written notice thereof, may order him to discontinue all work under this contract, or any part thereof, and shall cease to have any right to the possession of the ground. The Owner shall have the right to finish the work, or part thereof, by contract or otherwise as he may elect, and for that purpose to take possession and make use of such materials, tools, building appliances and equipment as may be found upon the work, and to charge the cost and expense of such completion to the Contractor. The Contractor shall not be entitled to receive any further payment until the work is finished. If the unpaid balance of the Contract price shall exceed the expense of finishing the work, including compensation for additional managerial and

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administrative services, the amount of such excess shall be paid to the Contractor; and if such expense shall exceed such unpaid balance, the Contractor shall pay the Owner the amount of such excess.

It is expressly stipulated and agreed that from and after the date of the order to discontinue work, and until such work shall have been finally completed by the Owner, neither the Contractor nor any of his agents or employees shall remove, or make any effort directly or indirectly to remove, any of the above mentioned materials, tools, building appliances or equipment from the points at which they were located on the date of said order, except upon the written consent of the Owner to do so.

It is further understood and agreed that the foregoing provisions of this article are without prejudice to any other right or remedy which the Owner may have under this Agreement.

ARTICLE IV - ASSIGNMENT OF CONTRACT

It is agreed that the Contractor shall not assign or transfer this Contract or sublet any part of the work embraced in it, except with the written consent of the Owner to do so.

It is further agreed that all parts of the work which may be performed by a sub-contractor shall be done in conformity with and be subject to all the provisions of the Contract Documents exactly as if performed by the Contractor and his immediate employees and workmen. No subletting of the work shall in any way diminish or weaken the responsibility of the Contractor for all parts of the work or less his obligations and liabilities under this Agreement.

It is likewise agreed that the Contractor shall not assign, either legally or equitably, any of the monies payable to him under this Agreement, or his claim thereto, except with the written consent of the Owner.

ARTICLE V-THIRD PARTY BENEFICIARIES

There are no third party beneficiaries to this Agreement, and nothing expressed or referred to in this Agreement will be construed to give any person or entity other than the parties to this Agreement any legal or equitable right, remedy, or claim under or with respect to this Agreement or any provision of this Agreement. This Agreement and all of its provisions and conditions are for the sole and exclusive benefit of the parties named.

ARTICLE VI - THE CONTRACT SUM

And it is agreed that, in consideration of the faithful and entire performance by the Contractor of his obligations under this contract, the Owner shall pay to him at the time and in the manner hereinafter stipulated, an amount as determined by the measured quantities and the respective unit prices herein named:

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CONTRACT SUM

i	CON	TRACT S	UIVI	-	
NO.	DESCRIPTION	UNIT	QTY	UNIT PRICE	AMOUNT
1	Clearing	Acre	0.05		
2	Tree and Stump, Rem, 19 inch to 36 inch, Special	Ea	6		
3	Tree and Stump, Rem, 6 inch to 18 inch, Special	Ea	10		
4	Stump, Rem, 6 inch to 18 inch, Special	Ea	1		
5	Tree Trimming, Special	Ea	22		
6	Dr Structure, Rem	Ea	30		
7	Sewer, Rem, Less than 24 inch	Ft	519		
8	Masonry and Conc Structure, Rem	Cyd	1		
9	Exploratory Investigation, Vertical	Ft	100		
10	Pavt, Rem, Special	Syd	37287		
11	Sidewalk, Rem	Syd	365		
12	Station Grading, Special	Sta	101.4		
13	Subgrade Undercutting, 1 x 3, Special	Cyd	4500		
14	Erosion Control, Inlet Protection, Fabric Drop	Ea	60		
15	Erosion Control, Silt Fence	Ft	200		
16	Project Cleanup, Special	Lsum	1		
17	Aggregate Base, 4 inch, 21AA, Special	Syd	3905		
18	Aggregate Base, 8 inch, 21AA, Special	Syd	37844		
19	1" x 3" Crushed Concrete, 12 inch, Special	Syd	37844		
20	Maintenance Gravel	Ton	1000		
21	Pedestrian Path, Temp, Special	Syd	4000		
22	Geotextile, Stabilization	Syd	13435		
23	Road Grade Biaxial Geogrid	Syd	2500		
24	Cured-In-Place Pipe Lining, 12 inch, Special	Ft	56		
25	Cured-In-Place Pipe Lining, 15 inch, Special	Ft	44		
26	Sewer, Cl IV, 12 inch, Tr Det B	Ft	669		
27	Sewer, Cl IV, 15 inch, Tr Det B	Ft	22		
28	Sewer Tap, 12 inch	Ft	9		
29	Sewer Tap, 15 inch	Ft	1		
30	Video Taping Sewer and Culv Pipe	Ft	691		



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CONTRACT SUM - CONTINUED

	CONTRACT SUM - CONTINUED					
NO.	DESCRIPTION	UNIT	QTY	UNIT PRICE	AMOUNT	
31	Dr Structure Cover, Adj, Case 1	Ea	25			
32	Dr Structure Cover, Adj, Case 2	Ea	6			
33	Dr Structure Cover, Type B	Ea	7			
34	Dr Structure Cover, Type D	Ea	36			
35	Dr Structure Cover, Type G	Ea	1			
36	Dr Structure Cover, Type K	Ea	20			
37	Dr Structure Lead, Cleaning, 12 inch	Ft	441			
38	Dr Structure Lead, Cleaning, 15 inch	Ft	25			
39	Dr Structure Lead, Cleaning, 18 inch	Ft	25			
40	Dr Structure Lead, Cleaning, 24 inch	Ft	25			
41	Dr Structure, 24 inch dia	Ea	17			
42	Dr Structure, 48 inch dia	Ea	16			
43	Dr Structure, Adj, Add Depth	Ft	20			
44	Dr Structure, Cleaning	Ea	31			
45	Dr Structure, Tap, 6 inch	Ea	44			
46	Dr Structure, Tap, 12 inch	Ea	10			
47	Dr Structure, Tap, 15 inch	Ea	2			
48	DPW Structure Cover, Adj, Case 1	Ea	5			
49	DPW Structure Cover, Adj, Case 2	Ea	14			
50	DPW Structure Cover	Ea	19			
51	DPW Structure Cover, Adj, Add Depth	Ft	20			
52	Sump Connection, Special	Ea	95			
53	Underdrain, Subgrade, Open-Graded, 6 inch, Special	Ft	19137			
54	Point Drainage Structure with Hydrophobic Grout, Special	Ea	32			
55	HMA Approach	Ton	346			
56	Conc Pavt with Integral Curb, Nonreinf, 6 inch	Syd	43			
57	Conc Pavt with Integral Curb, Nonreinf 7 inch	Syd	34099			
58	Joint, Expansion, E3	Ft	1750			
59	Joint, Plane-of-Weakness, W	Sft	23100			

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CONTRACT SUM - CONTINUED

	CONTRAC	T SUM - C	CONTINUE	<u>, </u>	
			O. Privi	UNIT	4.2.5.0.X.X.W
NO.	DESCRIPTION	UNIT	QTY	PRICE	AMOUNT
60	Driveway, Nonreinf Conc, 6 inch	Syd	2757		
61	Sidewalk, Conc, 6 inch, Special	Sft	3794		
62	Remove and Replace Driveway, Special	Syd	15		
63	Mailbox, New	Ea	31		
64	Mailbox, Remove and Reinstall	Ea	141		
65	Post, Mailbox, Special	Ea	142		
66	Post, Steel, 3 pound	Ft	364		
67	Sign, Type III, Erect, Salv	Ea	54		
68	Sign, Type III, Rem, Salv	Ea	54		
69	Ground Mtd Sign Support, Rem	Ea	35		
70	Street Sign Post, Special	Ea	9		
71	Post, Flexible, Delineator, Special	Ea	100		
72	Barricade, Type III, High Intensity, Double Sided, Lighted, Furn	Ea	30		
73	Barricade, Type III, High Intensity, Double Sided, Lighted, Oper	Ea	30		
74	Dust Palliative, Applied	Ton	100		
75	Minor Traf Devices	Lsum	1		
76	Sign Cover	Ea	25		
77	Sign, Type B, Temp, Prismatic, Furn	Sft	1000		
78	Sign, Type B, Temp, Prismatic, Oper	Sft	1000		
79	Sign, Type B, Temp, Prismatic, Special, Furn	Sft	400		
80	Sign, Type B, Temp, Prismatic, Special, Oper	Sft	400		
81	Traf Regulator Control	Lsum	1		
82	Plastic Drum, Fluorescent, Furn	Ea	350		
83	Plastic Drum, Fluorescent, Oper	Ea	350		
84	Channelizing Device, 42 inch, Fluorescent, Furn	Ea	350		
85	Channelizing Device, 42 inch, Fluorescent, Oper	Ea	350		
86	Riprap, Plain, Special	Syd	50		

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CONTRACT SUM - CONTINUED

NO.	DESCRIPTION	UNIT	QTY	UNIT PRICE	AMOUNT		
0.5		~ 1	221.5				
87	Turf Establishment	Syd	23165				
88	Sprinkler Relocate	Ea	500				
89	Reimbursed Permit Fees	Dlr	5000				
90	Inspection Crew Days, Special						
	PROJECT TOTAL (Items 1-90)						

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At about the close of each month during which satisfactory progress has been made toward the final completion of the work, the Engineer will make an estimate of the amount and value of the work, which has been done under this contract during that month, or since the date of the last preceding estimate. Such estimate shall not be required to be made by strict measurement or with exactness, but may be made either wholly or in part by appraisement or estimation or by a consideration of accounts for labor and materials, and it shall be sufficient if it is approximate only. Any error or inaccuracy which may occur in any such progress estimate may be allowed for or corrected in any subsequent estimate.

It is agreed that before the Contractor shall demand partial estimates or payments, he shall furnish to the Owner, if and when requested to do so, supported if requested, by sworn statements, satisfactory evidence that all persons who have supplied labor, materials, or equipment for the work embraced under this contract have been fully paid for the same; and that in case such evidence be not furnished as aforesaid, such sums as the Owner may deem necessary to meet the lawful claims of such persons may be retained by the Owner from any monies that may be due or become due to the Contractor under this Agreement until such liabilities shall be fully discharged and the evidence thereof be furnished to the Owner.

As soon as practicable after such estimate is made up and certified and upon its approval by the Owner, the Owner shall pay to the Contractor on account, a sum equal to ninety percent (90%) of the amount of such estimate; except that the Owner may deduct and retain out of any such partial payment a sum sufficient to meet any undischarged obligations of the Contractor for labor, materials, or equipment furnished for the work, as well as all other obligations due to claims arising from the performance of said Contract. To insure the proper performance of this Contract, the Owner shall retain ten percent (10%) of the amount of each estimate until final completion and acceptance of all work covered by this Contract. However, the Owner at any time after fifty percent (50%) of the work has been completed, may with the consent from the Surety, make any of the remaining progress payments in full, provided the work has been prosecuted in a satisfactory manner.

All "retainage" withheld from a progress payment to a Contractor, per the preceding paragraph, shall be deposited in an interest bearing account per the provisions of the State of Michigan Act No. 524 of 1980. Said retainage, along with all interest earned on such retainage, shall be released to the Contractor, together with the final progress payment.

Disputes regarding retainage may be submitted to the decision of an agent at the option of the Owner per the provisions of Public Act No. 524 of 1980.

The person representing the Contractor who will submit written requests for progress payments is designated as _______. The person representing the Owner to whom requests for progress payments are to be submitted shall be designated by the City Engineer.

The progress estimates and payment thus provided for will include all alterations which may be done under the provisions of Section 24 of General Conditions on the same basis as other work is included. All such work is regarded herein as essentially a part of the Contract and not merely an addition to it.

In the case of equipment or other building material, but not including sewer pipe or water main and appurtenances associated therewith, properly stored and protected on the site, the Engineer may take allowance in the estimate of seventy-five percent (75%) of the value of such items.

No progress estimate made or certified by the Engineer and no partial payment made to the Contractor by the Owner shall be deemed or construed as an acceptance of any part of the work under this contract.

As soon as practicable, after the satisfactory completion of all work covered by this Agreement, the Engineer will make a final inspection of the work as a whole and will make up a final estimate of the total amount due the Contractor under the terms of the Agreement. Upon the acceptance of the completed work, the Owner will pay to the Contractor the entire amount of such final estimate, necessary to meet the undischarged obligations of the Contractor. The Contractor shall file with the Owner a sworn statement that all claims for amounts due for labor, materials and equipment furnished for this work have been paid in full, or he shall so file in lieu thereof, a sworn statement showing in detail the nature and amount of all unpaid claims for said labor, materials and equipment.

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IN WITNESS WHEREOF, the parties have caused these presents to be signed personally or by their duly authorized officers or agents and their seals affixed and duly attested the day and year first written above for the Project HERITAGE HILLS AND WEDGWOOD COMMONS SUBDIVISION REHABILITATION PROGRAM PHASE IV.

	CITY OF FARMINGTON HILLS – Municipality	
WITNESSES		
	BY:	
	Gary Mekjian, City Manager/Date	
	BY:	
	Carly Lindahl Interim City Clerk/Date	

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CONTRACTOR WITNESSES BY:

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LABOR AND MATERIAL BOND

KNOW	ALL	MEN	BY	THESE	PRESENT	ΓS, tha	ıt v	we									
					0	of the											
												, h	ereina	after	called	the :	Surety
and held	d and fir	mly bou	nd unto	the CIT	Y OF FAR	MINGTO	N F	HILLS	S, O	aklan	d Co	ounty	, Mi	chiga	an in	the s	sum o
								Do	llars								
\$			to	the payme	ent whereof,	well and	truly	to be	mac	le, we	bin	d our	selve	s, ou	r heirs	, exe	cutors
administ	rators, su	accessors.	, and as	signs, join	tly and sever	ally, firm	ly by	these	e pre	sents	. Sea	aled '	with o	our se	eals an	ıd dat	ted this
	d	lay of			, 2024	•											
This sec	tion will be f	filled out by t	he City of	Farmington Hi	ills												
WHE	EREAS, t	he above	-named	Principal	has entered i	into a cert	ain c	ontra	ct w	ith the	e Cit	y of	Farm	ingto	n Hills	s,	
herei	nafter cal	lled the O	wner, c	lated the _	day (of			,	2024	, for	the l	HER	ITA	GE		
HILI	LS AND	WEDGV	WOOD	COMMO	ONS SUBDI	IVISION	RE	HABI	LIT	ATI	ON I	PRO	GRA	M P	HASI	E	
IV , (1	nereinafte	er called t	the Con	tract) which	ch the contra	ct and spe	ecific	ations	s for	said	worł	c sha	ll be	deem	ed a p	art	
there	of, as full	ly as if se	t out he	rein.													

AND WHEREAS, this bond is given in compliance with and is subject to all the provisions and conditions of P.A. No. 213, 1963, as amended, being M.S.A. 5.2321 (1) to 5.2321 (11), inclusive.

NOW THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH that if the above-named Principal, legal representatives, or successors shall pay or cause to be paid to all claimants, subcontractors, persons, firms and corporations, as the same may become due and payable, all indebtedness which may arise from said Principal to a claimant, a subcontractor or party performing labor for furnishing materials, or a subcontractor to any claimant, person, firm or corporation on account of any labor performed or materials furnished in connection with the contract construction, and work herein referred to, then this obligation shall be void; otherwise to remain in full force and effect.

This bond is given upon the express conditions that any changes, alterations, or modifications that may be hereafter recorded or made in the construction and complete installation of the work herein referred to, or the lacing of an inspector or superintendent thereon by the Owner shall not operate to discharge or release the sureties thereon.

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Surety

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(SEAL)

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PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS	, that	
, Contractor, a	as principal, and	
		as surety, are
held and firmly bound unto the CITY OF	F FARMINGTON HILLS, Oaklan	d County, Michigan, Owner, in the
sum of	dolla	rs,
\$, to be 1	paid to the Owner for which paymen	nt well and truly to be made we jointly
and severally bind ourselves, our heirs, execu	ntors, administrators, and assigns firm	mly by these presents.
This section will be filled out by the City of Farmington Hills		
THE CONDITIONS OF THE ABOVE OF	BLIGATIONS are such, WHEREAS	s, the said
, did, on t	he day of	2024 by Articles that date enter
into a Contract with the said HERITAGE	HILLS AND WEDGWOOD CON	MMONS SUBDIVISION
REHABILITATION PROGRAM PHAS	SE IV.	
NOW, THEREFORE, if the public liability and damages of every described the said contract according to all the plans, should harmless the said Owner from and against this obligation shall be void and of no effect extend the time for the completion of said provisions thereof, such extension of time this bond.	specifications and terms therein corninst all liens and claims of every day; otherwise, this bond to remain in all work or otherwise modify elements.	ntained in all respects, and shall save and description in connection therewith, then full force and effect. Should the Owner ents of the contract in accordance with
WITNESS our hands and seals this	day of	2024.
WITNESSES:		(SEAL)
		(SEAL)
	PRINCIPAL	(SEAL)

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MAINTENANCE AND GUARANTEE BOND

KNOW ALL MEN BY THESE PRESENTS, THAT	as Principal,
andas	Surety, are held and firmly bound unto the City of
Farmington Hills, Oakland County, Michigan in the sum of _	Dollars \$
good and lawful money of the Unite	d States of America, to be paid to said City of Farmington
Hills, its legal representatives, and assigns, for which payment	well and truly to be made, we bind ourselves, our heirs,
executors, administrators, successors, and assigns, and each ar	nd everyone of them jointly and severally firmly by these
presents.	
Sealed with our seals and dated thisday	of, 2024.
This section will be filled out by the City of Farmington Hills	
WHEREAS, the above named principal has entered into a	certain written contract with the City of Farmington Hills,
dated theday of, 2024, for t	he HERITAGE HILLS AND WEDGWOOD
COMMONS SUBDIVISION REHABILITATION PRO	OGRAM PHASE IV, wherein the said principal
covenanted and agreed as follows:	
<u>l'</u>	

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necessary for the purpose, and to undertake, do and make such repairs, and charge the expense thereof to, and receive same from said principal or surety.

If any repair is necessary to be made at once to protect life and property, then and in that case, the said City may take immediate steps to repair or barricade such defects without notice to the contractor. In such accounting, the said City shall not be held to obtain the lowest figures for the doing of the work, or any part thereof, but all sums actually paid therefore shall be charged to the principal or surety. In this principal for a period of two (2) years from the date of approval of Final Estimate shall keep said work so constructed under said contract in good order and repair, excepting only such part or parts of said work which may have been disturbed without the consent or approval of said principal after the final acceptance of same and shall, whenever notice is given as herein before specified, at once proceed to make repair as in said notice directed, or shall reimburse said City for any expense incurred by making such repairs, should the principal or surety fail to do as herein before specified, and shall fully indemnify, defend and save harmless the said City form all suits and actions for damages of every name and description brought or claimed against it for or on account of any injury or damage to person or property received or sustained by any party or parties by or from any of the acts or omissions or through the negligence of said principal, servants, agents, or employees, in the prosecution of the work included in said contract, then the above obligation shall be void, otherwise to remain in full force and effect.

IN WITNESS WHEREOF, the parties heret	to have caused this instrument to be executed by their respective
authorized officer thisday of	, 2024.
Signed, Sealed and Delivered in the Presence of:	
	L.S.
	1.0

^{*} Amount equal to 25% of the Contract Sum.

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GENERAL CONDITIONS OF CONTRACT

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GENERAL CONDITIONS

1. **DEFINITIONS**

The following terms used in this contract shall be construed and defined as follows:

"Board" - "Owner" - The persons, firm, corporation, or governmental agency for whom the work is

being done.

"Engineer" - The Engineer appointed by the Board or Owner, acting personally or by any of

its authorized agents.

"Contractor"- The person or firm contracting to perform the work.

"Subcontractor" - The person or firm employed by the Contractor to furnish materials or service

whether or not he employs labor at the site of the work.

"Work"- All labor, materials, equipment, transportation, construction equipment and other

facilities necessary to be done or furnished by the Contractor to complete the

contract.

"Written Notice" shall be deemed to have been "duly served" when such notice shall have been given or mailed to the Contractor of his superintendent at the site of the work or the address set forth herein, or when such notice shall have been given or mailed to the Owner at the address set forth herein.

2. EXECUTION, CORRELATION AND INTENT OF DOCUMENTS

The original and two counterparts of the Contract shall be signed by the Owner and the Contractor.

The work under this Contract shall consist of the items listed in the proposal, including all incidentals necessary to fully complete the project in accordance with the Contract Documents.

3. CONTRACT DRAWINGS AND SPECIFICATIONS

The work to be done is shown on the accompanying set of original drawings, Specifications and General Conditions prepared by the City of Farmington Hills, and are hereby made a part of this Contract, it being mutually understood and agreed that when taken together, the plans and contract documents, including the Specifications and General Conditions, are complimentary, and what is called for by any one shall be binding as if called for by all. The intent of the Contract Documents is to include in the contract price the cost of all labor and materials, water, fuel, tools, plant, equipment, light, transportation and all other expenses as may be necessary for the proper execution and completion of the work.

These original drawings may be supplemented by other drawings furnished by the Contractor and approved by the Engineer or supplied to the Contractor by the Engineer during the progress of the work as he may deem to be necessary or expedient. All such supplementary contract drawings or instructions are intended to be consistent with the Contract Documents, true developments thereof and reasonably inferable there from. Therefore, no extra charge will be allowed on a claim that particular supplemental contract drawings or instructions differed from the Contract Documents, incurring extra work, unless the Contractor has first brought the matter, in writing to the Engineer's attention for proper adjustment before starting on the work covered by such and has received from the Engineer an order in writing to so proceed.

These original and supplementary drawings constitute the drawings according to which the work is to be done. The Contractor shall keep at the site of the work an approved or conformed copy of all drawings and specifications and shall at all times give the Engineer or Owner access thereto.

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If any inconsistency, omission or conflict shall be discovered in either specifications or drawings, or if in any place the meaning of either or both shall be obscure, or uncertain, or in dispute, the Engineer shall decide as to the true intent of the documents, and said Engineering decision shall be final and conclusive and binding on all of the parties in interest.

4. SHOP DRAWINGS

Where called for in the specifications, the Contractor shall submit to the Engineer for approval in not less than two copies, details, specifications, cuts, and drawings of such equipment and structural work as may be required. The Contractor shall make any changes or alterations required by the Engineer and re-submit same without delay. The approval of the Engineer shall not relieve the Contractor or responsibility for errors in the drawings as the Engineer's checking is intended to cover compliance with the drawings and specifications and not to enter into every detail of the shop work. No work shall be undertaken until the Engineer has approved the shop drawings.

5. GUARANTEE

The Contractor, as a condition precedent to final payment, shall execute an approved guarantee through a Maintenance and Guarantee Bond furnished by the same company furnishing Labor and Material and Performance Bonds for the particular improvement and in the amount of the Contract to the Owner warranting for a period of two years from the date of final payment to keep in good order and repair any defect in all the work done under the contract, either by the Contractor or his subcontractors, or the material suppliers, that may develop during said period for any reason due to improper materials, defective equipment, workmanship, or arrangements, and any other work affected in making good such imperfections shall also be made good, all without expense to the Owner.

6. INFORMATION BY THE CONTRACTOR

The Contractor shall submit to the Engineer, full information as to the materials, equipment and arrangements which the Contractor proposes to furnish. This information shall be complete to the extent that the Engineer may intelligently judge if the proposed materials, equipment and arrangements conform to the requirements of the contract.

The approval of information covering materials, equipment and arrangements by the Engineer shall in no way release the Contractor from his responsibility for the proper design, installation and performance of any material, equipment or arrangement, or from his liability to replace same, should it prove defective.

7. GENERAL REQUIREMENTS FOR MATERIALS AND WORKMANSHIP

In the specifications where a particular material or piece of equipment is specified by reference to some particular make, type, or equal, it is not the intent to limit competition but to set up by such reference a standard of quality most easily understood and defined. If materials or equipment of other make or type than that specified by name are offered by the Contractor, they will be given full consideration by the Engineer and the Engineer's decision will be final and binding on all the parties in interest as to whether the materials or equipment offered are equal to those specified.

Unless otherwise stipulated in the specifications, all equipment, materials and articles incorporated in the work covered by this contract are to be new and of the best grade of their respective kinds for the purpose. The Contractor shall if required, furnish such evidence as to kinds and quality of materials as the Engineer may require.

The Contractor shall furnish suitable tools and building appliances and employ competent labor to perform the work to be done, and any labor or tools or appliances that shall not in the judgment of the Engineer be suitable or competent to produce this result, may be ordered from the work by him and such labor or tools or appliances shall be substituted therefore by the Contractor as will meet with the approval of the Engineer, provided however, that this approval by the Engineer shall not render said Engineer in any way liable for any claims of any nature because of this approval.

If not otherwise provided, material or work called for in this contract shall be furnished and performed in accordance with well known established practices and standards recognized by Architects, Engineers and the trades.

8. PROGRESS OF WORK AND REGULAR CLEANUP

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The intent of these specifications is to provide qualitative guidelines for the orderly execution of the contract requirements. Insofar as the Contractor make satisfactory progress and maintains an effective cleanup crew following the construction operations, the direction of the work force shall be solely his responsibility. If, however, in the judgment of the Owner, adequate cleanup and site restoration efforts are not being expended, including but not limited to; roadway, driveway and drainage maintenance, removal of surplus materials, restoration of signs, mailboxes and like items, further construction shall be halted and work forces directed to the restoration activity until proper order is restored. This shall not be construed as cause for additional compensation.

9. TESTING AND SAMPLING

Where called for in the specifications, samples of materials in the quantity named shall be submitted to the Engineer for approval. Where tests are required, they shall be made at the expense of the Contractor, except as otherwise called for in the Specifications. For materials covered by ASTM or Federal Specifications, unless otherwise stipulated, the required tests are to be made by the manufacturer and his certificates, therefore submitted to the Engineer.

10. LINE AND GRADE

The Engineer will set suitable stakes and marks showing the locations and elevations of the various parts of the work, but the Contractor shall provide such special stakes, labor and assistance as the Engineer may require in setting the same. No work shall be undertaken until such stakes and marks shall have been set by the Engineer. The Contractor shall take due and proper precautions for the preservation of these stakes and marks, and shall see to it that the work at all times proceeds in accordance therewith.

For tunnel work, the Contractor shall accurately locate the work from the reference points established by the Engineer and shall be responsible for the proper setting of the model, both as to line and grade. He shall use such methods and means as are necessary to properly do this work. The Engineer will carry line and grade down to the bottom of each shaft. The Contractor will start and carry on the work from the points thus established. As the work progresses and the tunnel masonry is completed, the Engineer will carry forward along the completed work, reference points both as to line and grade, from which points the Contractor shall set the models and carry forward the work. It is the intent that such points will be maintained up to distances not greater than 120 feet behind the open heading. The Contractor shall furnish and set proper wood blocks where requested so as to facilitate the establishing of the reference points.

11. PATENTS AND ROYALTIES

The Contractor shall indemnify, keep and save harmless the Owner from all liabilities, judgments, costs, damages and expenses which may in any way come against the Owner by reason of the use of any patented materials, machinery, devices, equipment or processes furnished or used in the performance of the work under this contract or by reason of the use of patented design furnished by the Contractor and accepted by the Owner. Such liability of the Contractor shall apply in the case of a patented process only when said process is used by the Contractor and of his own volition. In the event of any claim, suit or action at law or inequity of any kind, whatsoever, is made or brought against the Owner involving any such patents, then the Owner shall have the right to retain from the money due and to become due the Contractor, such sufficient sum to protect itself against loss as shall be considered necessary by the Owner and such sum may be retained by the Owner until such suit or claim shall have been settled and evidence to that effect shall have been furnished to the satisfaction of the Owner.

12. PERMITS AND REGULATIONS

The Contractor shall secure all permits, inspections and licenses necessary for the prosecution of the work. There is no fee for the permits issued by the City of Farmington Hills, Building Division. All other permits and licenses shall be obtained from the appropriate agencies in accordance with their fee schedules. The Contractor shall keep himself fully informed of all laws, ordinances and regulations in any manner affecting those engaged or employed in the work, or the materials used in the work, or in any way affecting the conduct of the work and of all orders and decrees of bodies or tribunals having any jurisdiction or authority over the same. He shall at all times observe and comply with, and shall cause all his agents and employees to observe and comply with all existing and future laws, ordinances, regulations, orders and decrees. Provided, that if the drawings and specifications are at variance therewith, the Contractor shall promptly notify the Engineer in writing and any necessary changes shall be adjusted as provided in the agreement.

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13. PROTECTION OF WORK AND PROPERTY

The Contractor shall continuously maintain adequate protection of all his work from damage and shall protect all public property and private abutting property from injury or loss arising in connection with this Contract. He shall, without delay, make good any such damage, injury or loss, and shall defend and save the Owner harmless from all such damages or injuries occurring because of his work. He shall furnish and maintain all passageways, barricades, guard fences, lights and danger signals, provide watchmen and other facilities for protection required by public authority or by local conditions, at no additional cost to the Owner.

In an emergency affecting the safety of life or of the work or of adjoining property, the Contractor, without special instruction or authorization from the Owner, shall take such action as may be necessary to prevent such threatened damage, injury, or loss.

The Contractor shall assume full responsibility of loss or damage to the work during the entire construction period resulting from caving earth and from storms, floods, frosts and other adverse weather conditions, and from all other causes whatsoever not directly due to the acts or neglect of the Owner and shall turn the finished work over to the Owner in good condition and repair at the time of the final estimate. This responsibility of the Contractor shall cover all those elements included as alterations under this contract in exactly the same manner as the regular work is covered.

14. RESPONSIBILITY FOR ADJOINING STRUCTURES

The Contractor shall assume full responsibility for the protection of all pavements, curbs, bridges, railroads, poles and any other surface structures and all water mains, sewers, telephone lines, gas mains and any other underground services and structures along and near the work which may be affected by his operations, and shall indemnify, defend, and save harmless the Owner against all damages or alleged damages to any such structure arising out of his work. The Contractor shall bear the cost of repair or replacement of any such structure damaged as a result of his operations.

The Engineer has endeavored to show on the plans the locations of all existing structures, including improved roadways and utilities, both on surface and underground. Should it be necessary to remove such structures to install the new work, the Contractor shall include the cost of removing and replacing in his bid price, unless otherwise specified.

No trees or shrubbery of any kind shall be removed or destroyed by the Contractor without the consent of the Owner. Ample precautions shall be taken by the Contractor to protect such trees and shrubs as are to remain in place by surrounding them with fences or other protection before construction work begins. Shrubbery that has to be removed shall be preserved in a manner acceptable to the Owner. Details concerning removal and/or replacement of trees and shrubs are specified in General Specifications.

15. MAINTENANCE OF SERVICE

At the completion of the working day, all road and driveway crossings shall be maintained with a slag surface throughout the contract, or until the surface is restored to its final approved condition. All drainage must be open and flowing freely at the end of each day where existing conditions presently permit ditch flow or where this can be accomplished with minimal ditching. Maintenance, as described herein, shall be considered incidental to the completion of the project.

During the construction period, it is mandatory that all standard services be diligently maintained. This encompasses the regular garbage removal, ensuring an uninterrupted mail and package delivery service, and upholding the school bus routes. The contractor shall be responsible for ensuring these essential services continue to operate smoothly without disruption, thus ensuring minimal inconvenience to the residents and business owners involved. Failure to maintain these services may result in penalties as outlined in the contract terms.

Drainage through existing sewers, drains, ditches and other water courses shall be maintained at all times during construction and all nearby gutters and drainage systems shall be kept open for drainage. Where existing sewers are

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encountered in the line of the work which interfere with the construction, the flow in the sewers, including both dry weather flow and storm flow, shall be maintained by constructing a satisfactory flume, or by pumping, or by both.

All detours shown on the Drawings or required because of the Contractor's operation shall be built and maintained at the Contractor's expense. All mailboxes disrupted, removed, or disturbed during the course of construction shall be temporarily relocated and reset to a serviceable location, as directed by the Engineer. This temporary relocation shall occur immediately after the disruption, removal or disturbance of such mailbox in order that mail service may be continuously maintained. When the project has been completed and accepted, the mailboxes shall be reset by the Contractor in accordance with local postal regulations, as well as in accordance with all other state and local statues, which can be obtained from the Post Office at no cost to the owner or the City. Any mailboxes or posts damaged by the Contractor shall be replaced with mailboxes and/or posts equivalent to those existing at the expense of the Contractor and at no cost to the owner or the City.

Safety precautions shall be followed at all street openings. Substantial barricades shall be erected as deemed necessary to prevent accidents to vehicular or pedestrian traffic and red flags by day, yellow lights by night, shall be diligently posted by the Contractor at all points of possible danger. In case detours or other traffic instructions are necessary, suitable warning or direction signs shall be erected and maintained by the Contractor.

16. STORAGE OF MATERIALS

Materials and equipment distributed, stored and placed upon or near the site of the work shall at all times be so disposed as not to interfere with work being prosecuted by other Contractors in the employ of the Owner, or with street drainage, or with fire hydrants or with access thereto, and not to hinder any more than may be necessary the ordinary traffic of the street.

17. ENGINEER'S STATUS

Construction review of the work shall be done by the Engineer. Such review shall mean the authority to reject all work and materials which do not conform to the plans and/or technical construction specifications being part of the total Contract; to direct and determine the sequence of operations in order to expedite the work in an orderly and workmanlike manner, not in situations or under conditions of an emergency nature which may develop on site; and to decide engineering questions which may arise resulting from interpretation of the intent of the plans and technical specifications to properly execute the work. To enforce this construction review, the Engineer has the authority to stop the work until the particular problem has been corrected.

In accordance with generally accepted construction practices, the Contractor will be solely and completely responsible for conditions of the job site, including safety of all persons and property during performance of the work. This requirement will apply continuously and not be limited to normal working hours. The duty of the Engineer to conduct construction review of the Contractor's performance is not intended to include review of the adequacy of the Contractor's safety measures, in, on, or near the construction site.

18. FACILITIES FOR INSPECTION

The Owner, the Engineer and their employees shall at all times have the right to enter upon the premises upon which work is being done, or upon which material is stored for the work under this contract and to inspect the work and materials, and to ascertain whether or not the construction is carried out in accordance with this contract, and the Contractor shall furnish all reasonable facilities, and give ample time for such inspection. All materials shall be subject to mill and shop inspection, as provided in the specifications. The Contractor shall promptly remove from the premises all materials rejected by the Engineer as failing to meet contract requirements, whether incorporated in the work or not, and the Contractor shall replace and re-execute his own work in accordance with the contract and without expense to the Owner and shall bear the expense of making good all work of other contractors destroyed or damaged by such removal or replacement.

If the Contractor does not remove such rejected work and materials promptly after written notice, the Owner may remove them and store the material at the expense of the Contractor.

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19. CONTRACTOR'S RESPONSIBILITY

The Contractor shall assume full responsibility for the work and take all precautions for preventing injuries to persons and property on or about the work, shall bear all losses resulting to him on account of the amount or character of the work, or because the conditions under which the work is done are different from what was estimated or expected, or on account of the weather, floods, elements, or other causes and he shall assume the defense and save harmless the Owner and its individual officers and agents from all claims relating to labor provided and materials furnished for the work; to inventions, patents and patent rights used in doing the work; to injuries to any persons or property received or sustained by or from the Contractor, his agents or employees in doing the work or arising out of the work performed or to be performed; and to any act, or neglect of the Contractor, his agents or employees.

The mention of any specific duty or liability of the Contractor in this or in any part of the Contract Documents shall not be construed as a limitation or restriction upon any general liability or duty imposed on the Contractor by the Contract Documents.

20. CONTRACTOR'S SUPERVISION AND ORGANIZATION

The work under this contract shall be under the direct charge and direction of the Contractor. The Contractor shall give efficient superintendence to the work, using his best skill and attention. The Contractor shall at all times keep on the site of the work, during its progress, a competent superintendent and any and all necessary foremen and assistants. The superintendent shall represent and have full authority to act for the Contractor in the latter's absence, and all directions given to him shall be as binding as if given to the Contractor. On written request in each case, all such directions will be confirmed in writing to the Contractor. The Contractor shall employ only competent, efficient workmen and shall not use on the work any unfit person or one not skilled in the work assigned to him, and shall at all times enforce strict discipline and good order among his employees. Whenever the Engineer shall notify the Contractor, in writing, that any man on the work is in the opinion of the Engineer, careless, incompetent, disorderly, or otherwise unsatisfactory; such man shall be discharged from the work and shall not again be employed on it, except with the written consent of the Engineer.

The Contractor shall establish and maintain an office on the site of the work, or at some convenient point adjacent thereto, during the continuance of this Contract and shall have at all times during working hours, a representative authorized to receive and execute any and all orders, when given by the Engineer; and such order, when given out and received by said representative, shall be deemed to have been given to and received by the Contractor. Copies of the drawings and specifications shall at all times be kept on file by the Contractor at readily accessible points near the work.

21. SUB-CONTRACTS

The Contractor shall not sublet, assign, or transfer this contract or any portion thereof or any payment due him thereunder, without the written consent of the Owner.

Assignment or subletting the whole or any portion of this contract shall not operate to release the Contractor or his bondsmen hereunder from any of the contract obligations.

The Contractor shall, as soon as practicable after the signing of the contract, notify the Engineer in writing of the names and subcontractors proposed for the work and shall not employ any that the Engineer may object to as incompetent or unfit.

If the Contractor shall cause any part of the work under this Contract to be performed by a subcontractor, the provisions of this Contract shall apply to such subcontractor and his officers and employees in all respects as if he and they are employees of the Contractor and the Contractor shall not be in any manner thereby relieved from his obligation and liability; and the work and materials furnished by the subcontractor shall be subject to the same provisions as if furnished by the Contractor.

22. ERRORS AND CORRECTIONS IN DRAWINGS AND SPECIFICATIONS

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The Contractor shall examine and check all drawings and specifications furnished by the Owner for dimensions, quantities, and coordination with other parts of the work on this or related contract and shall notify, in writing, the Engineer of any and all errors, omissions, or discrepancies he may discover by examining and checking of same. The Contractor shall not be allowed to take advantage of such error, omission, or discrepancy, as full instructions will be furnished by the Engineer, and the Contractor shall carry out such instructions as if originally specified. In no case shall the Contractor proceed with the work in uncertainty, and any work done by the Contractor after the discovery of any error, omission, or discrepancy, until authorized, will be at the Contractor's risk and responsibility. The work is to be made complete and to the satisfaction of the Engineer, notwithstanding any minor omissions in the specifications or plans.

23. CHANGES IN THE WORK

The Owner shall have the right to require, by written order, changes in addition to, or deductions from the work required by the Contract Documents; provided that if changes, additions, or deductions are made, the general character of the work as a whole is not changed thereby. Adjustments in the Contract price, if any, because of any change, addition, or deduction in the work shall be determined as hereinafter provided, and any claim for extension of time for completion shall be adjusted at the time of ordering the change, addition, or deduction. No claim for change, addition, or deduction, or adjustment of price, or extension of time for completion thereof, shall be made or allowed unless done in pursuance of a written order from the Owner specifically authorizing such change, addition, or deduction. Drawings without a written order shall not be considered such authority. Written notice of such claims shall be made to the Engineer before the commencement of the work. Where the written order diminished the quantity of work to be done, this shall not constitute a basis for a claim for damages or anticipated profits on the work that may be dispensed with.

Under circumstances, which in the judgment of the Engineer, so necessitates the Engineer shall have authority to require, by written order, changes, in addition to, or deductions from the work. Such written order by the Engineer shall be subject to later confirmation by the Owner when the extent and costs have been established.

It is understood and agreed that in case any change in, addition, to, or deduction from the work is required, said change shall in no way invalidate the Contract and shall not affect or discharge the bonds furnished by the Contractor.

The Contractor, without extra charge, shall make such slight alterations as may be necessary to make adjustable parts fit to fixed parts, leaving all complete and in proper shape when done.

24. BASIS FOR DETERMINING COST OF CHANGES IN THE WORK

Adjustments, if any, in the contract price by reason of change in the work shall be limited to the amount specified in the written order authorizing the change in the work. Adjustments shall be determined by one or more of the following methods, the Owner reserving the right to select the method or methods at the time a written order is issued.

- (a) An acceptable lump sum proposal: To facilitate checking and acceptance, the proposal shall be itemized with quantities and prices given for the various items.
- (b) Unit prices: The unit prices may be the "Unit Price" set in the Agreement, or fixed by subsequent agreement between the Owner and the Contractor.
- (c) On a cost-plus limited-basis: Not to exceed a specified maximum limit of cost.

"COST" as herein used shall be the actual and necessary costs incurred by the Contractor by reasons of the change in the work for:

- (1) Labor
- (2) Materials
- (3) Equipment rental
- (4) Insurance premiums

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- (1) **Labor Costs** shall be the amount shown on the Contractor's payrolls with payroll taxes added when such taxes can be shown to have been incurred. In no case shall the rates charged for labor exceed the rates paid by the Contractor for the same class of labor employed by him to perform work under the regular items of the contract.
- (2) **Material Costs** shall be the net price paid for material delivered to the site of the work. If any material previously required is omitted by the written order of the Owner after it has been delivered to or partially worked on by the Contractor and consequently will not retain its full value for other uses, the Contractor shall be allowed the actual cost of the omitted material less a fair market value of the material as determined by the Owner.
- (3) **Equipment Rental** shall be the actual additional cost incurred for necessary equipment. Costs shall not be allowed in excess of usual rentals charged in the Detroit district for similar equipment of like size and condition, including the costs of necessary supplies and repairs for operating the equipment. No cost, however, shall be allowed for the use of equipment on the site in connection with other work unless its use incurs actual and additional costs to the Contractor. If equipment not on the site is required for the change in the work only, the cost of transporting such equipment to and from the site shall be allowed.
- (4) **Insurance Premiums** shall be limited to those based on labor payroll and to the types of insurance required by the Contract. The amount allowed shall be limited to the net cost incurred as determined from the labor payroll covering the work. The Contractor shall, upon request of the Owner, submit verification of the applicable insurance rates and premium computations.

"PLUS" as herein used is defined as a percentage to be added to the items of "COST" to cover superintendence, use of ordinary tools, bonds, overhead expense and profit. The percentage shall not exceed 15 percent on work done entirely by the Contractor and shall not exceed an aggregate total of 20 percent on work done by a subcontractor.

"SPECIFIED MAXIMUM LIMIT OF COST" is the amount stated in the written order of the Owner authorizing the change in the work. The amount to be allowed the Contractor shall be the "Cost" and "Plus" the percentage or the specified maximum, whichever is the lesser amount.

The Contractor shall keep complete, accurate, daily record of the net actual cost of charges in the work and shall present such information in such form and at such times as the Owner may direct.

25. USE OF COMPLETED PORTIONS OF THE WORK

The Owner may, at any time during the progress of the work after written notice to the Contractor, take over and place in service any completed portions of the work which are ready for service, although the entire work of the Contract is not fully completed, and notwithstanding the time for completion of the entire work or such portions that may not have expired. In such event, the Contractor will be relieved of further work on or maintenance of said portion, except as covered by his guarantee of same.

26. PAYMENT WITHHELD

The Owner may withhold or, on account of subsequently discovered evidence, nullify the whole or a part of any certificate for progress payment to such extent as may be necessary to protect itself from loss on account of:

- a) Defective work not remedied.
- b) Claims filed or reasonable evidence indicating probable filing of claims.
- c) Failure of the Contractor to make payments properly to subcontractors or for material or labor.
- d) A reasonable doubt that the Contract can be completed for the balance then unpaid.
- e) Damage to another Contractor.

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When the above grounds are moved, payment shall be made for amounts withheld because of them.

27. CONTRACTOR'S RIGHT TO STOP WORK

If the work should be stopped under an order of any court or other public authority for a period of three months, through no act or fault of the Contractor or of anyone employed by him; or if the Owner should fail to pay to the Contractor within sixty days of its maturity and presentation any sum certified by the Engineer, provided no appeal is taken, the Contractor may, upon seven days written notice to the Owner and the Engineer, stop work or terminate this Contract and shall receive from the Owner payment in full for all work executed, as determined from the prices contained in the approved detailed estimate as computed by the Engineer, but no claim for extra compensation or damages shall be made or allowed because of such termination of the Contract.

28. "OR EQUAL CLAUSE"

Whenever in any of the Contract Documents an article, material, or equipment is defined by describing a proprietary product, or by using the name of a manufacturer or vendor, the term, "or equal", if not inserted, shall be implied. The specific article, material or equipment mentioned shall be understood as indicating the type, function, minimum standard of design, efficiency and quality desired and shall not be construed in such a manner as to exclude manufacturers' products of comparable quality, design and efficiency. The Contractor shall comply with the requirements of the Contract Documents relative to an Owner's approval of materials and equipment before they are incorporated in the work.

29. CLEANING-UP

The Contractor shall, as directed by the Engineer, remove at his own expense from the Owner's property and from all public and private property all temporary structures, rubbish and waste materials resulting from his operations. This requirement shall not apply to property used for permanent disposal of rubbish or waste materials in accordance with permission of such disposal granted to the Contractor by the Owner thereof.

30. SAFETY

All construction procedure shall comply with the Safety Code of the State of Michigan and appropriate portions of the Occupational Safety and Health Act, 1970.

31. EMERGENCY REPAIR

When the Contractor is not actively performing work on a particular construction site, but where delayed construction operations, testing and/or surface restoration work yet remains to be completed to meet the requirements of the specifications, situations arise of an emergency nature as a result of such uncompleted work which may affect directly or indirectly, public and/or private property, or which may ultimately, either indirectly or directly, affect the health, safety and welfare of individuals or the general public. Since it is the continued delay in the correction of these deficiencies which has long been a source of concern, trouble and inconvenience to the Owner, the Contractor and the public, the intent of this article is to provide a procedure to eliminate these problems as they may occur. While these problem situations can and do readily develop as emergencies, the Engineer shall direct field related operations and require immediate efforts by the Contractor to remedy the deficiency in a method of his choosing because of his expertise in the field, time being of the essence. The correction of the "emergency" which may arise when no activity exists on the construction site shall be handled in the following manner:

- 1. The Engineer shall inspect the site, take any necessary photographs and/or prepare any necessary sketches of conditions at the site to determine that the situation constitutes an emergency.
- 2. The Engineer then has three alternative sources of manpower and equipment to be selected to remedy the emergency situation in the following order:
 - a) The Contractor under contract with the Owner to perform all work on the site location in question;
 - b) The City's Division of Public Works; or
 - c) An independent contractor designated by the Owner.

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Since the nature and extent of most unfinished work on a particular construction site is well known by both the Engineer's authorized agent and the contractor at the time of declaring such an "emergency situation" as set forth hereinbefore; the Contractor under contract to the Owner for the particular project, would be the first party notified and would be expected to respond immediately with necessary manpower and equipment to remedy the problem.

If a reasonable time to respond to the emergency notification is not evident, in the best judgment of the Engineer, then the Contractor shall be judged to have waived his rights to physically correct the problem, but not his obligations to pay for such physical correction or damages resulting there from. The Engineer shall then contact the City's Division of Public Works for their assistance in correcting the "emergency situation". Where existing commitments by the Division of Public Works prohibit their immediate response to the request by the Engineer, the Engineer shall finally direct that corrective measures be performed by the independent contractor previously contacted with by the Owner to perform such emergency work when so directed.

Since the cost for all remedial work undertaken by the Contractor on this project shall be borne by the Contractor and it is necessary to engage the services of the Division of Public Works or an independent contractor, then all costs incurred would be deducted from monies due and payable to the contractor on the particular project as set forth on any ensuing regular job estimates.

Typical costs which will be deducted from contract monies due would be as set forth hereafter:

- 1. Payroll wages, benefits and taxes.
- 2. Material bills.
- 3. Equipment rental (Detroit area rates) and moving costs.
- 4. 15% profit and overhead for independent contractor.
- 5. 10% Administrative costs.
- 6. Inspection costs.

32. RELATION TO OTHER CONTRACTORS

The Contractor shall so conduct his operations as not to interfere with or injure the work of other contractors or workmen employed on adjoining or related work, and he shall promptly make good any injury or damage which may be done to such work by him or his employees or agent. Should a contract for adjoining work be awarded to another contractor, and should the work of one of these contracts interfere with that of the other, the Inspector shall decide which contractor shall cease work for the time being and which shall continue or whether the work in both contracts shall continue at the same time and in what manner.

33. NOTIFY MISS DIG

The Contractor is responsible to notify Miss Dig for all sites within this contract. 3 days advance notice must be given. No work shall be performed unless sights are properly staked.

CALL MISS DIG AT 800-482-7171 or 811

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NOTE: All items listed under General Specifications are incidental to the construction of this project, unless otherwise specified in the Supplemental Specifications.



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GENERAL SPECIFICATIONS

1. RIGHTS-OF-WAY

The necessary rights-of-way for construction of drains, water mains and other structures across or under private properties have been or will be obtained by the Owner. In carrying out the work on private rights-of-way, the Contractor shall take due and proper precautions against any injury to adjacent structures and shall hold himself strictly within the rights obtained by the Owner. Should the Contractor desire additional space on private property, he may obtain such space on privately owned property at his own expense by agreement with the Owner thereof.

The Owner will make necessary arrangements with the Governmental Units, State Highway Department and the County Road Commission for permits to occupy their rights-of-way. The Contractor, however, shall make the necessary applications to the Governmental Units, State Highway Department and the County Road Commission for permits to construct within said rights-of-way and the Contractor shall also furnish any bonds and pay for any permits and inspection fees which may be required. The Contractor shall comply with all requirements of the permit, including backfill and pavement repair and replacement and construction specifications of said authorities.

2. MONUMENTS

Monuments or other recognized property boundary markers at street intersection corners, acreage or lot corners, and right-of-way lines shall be preserved. Where such monuments or markers must be removed during construction, the Engineer shall be notified and the Contractor shall make all necessary arrangements for resetting of the monument or marker and bear the cost thereof.

3. SANITARY REGULATIONS

The Contractor shall provide at convenient points, properly secluded from observation, a sufficient number of toilets for the use of employees and shall maintain them strictly without nuisance and without offense to the public or to residents in the vicinity of the work. The number, location, character and condition of maintenance of the utilities must at all times be such as will meet all health regulations.

4. UTILITIES FOR PROSECUTING THE WORK

Unless otherwise provided in these specifications, the Contractor shall make his own arrangements for items such as electricity, gas, water and sewer services for his use in field offices and for construction of the work, including temporary power installation for use in completing his contract, and shall pay all costs therefore.

5. SPECIFICATIONS BY REFERENCE

Where reference is made in specifications or standards of any technical society, association, governmental agency, etc., it is understood and agreed that such specifications or standards are a part of the Specifications as though fully repeated therein.

The following listed letters or abbreviations shall be interpreted as indicated:

"A.S.T.M." shall mean the American Society for Testing Materials.

"A.W.W.A." shall mean the American Water Works Association.

"A.S.A." shall mean the American Standards Association.

"A.I.S.I." shall mean the American Iron and Steel Institute

"M.D.O.T." shall mean the Michigan Department of Transportation.

6. WORKING SPACE

In his operations, the Contractor shall interfere as little as possible with traffic, and in all cases shall confine his operations to the minimum space possible.

Stockpiling of construction material and equipment will be permitted as necessary, but in no case shall traveled ways, driveways, or entrances be unduly obstructed.

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Should the Contractor desire additional space on private property, he may obtain such space on privately owned property at his own expense, by agreement with the Owner thereof.

7. CLEANLINESS AND PROGRESS OF THE WORK

The Contractor shall keep the work and all property occupied by him in a neat and orderly condition at all times. Waste materials, rubbish and debris shall not be allowed to accumulate. Contractor's equipment, temporary buildings, and excess materials shall be promptly removed as they become no longer needed for the progress of the work. At the completion of the work, the premises shall be left raked clean. The newly constructed drains, concrete chambers, flumes, manholes and other structures shall be cleared of all scaffolding, centering and debris of all sorts.

The intent of these specifications is to provide qualitative guidelines for the orderly execution of the contract requirements. Insofar as the Contractor make satisfactory progress and maintains an effective cleanup crew following the construction operations, the direction of the work force shall be solely his responsibility. If, however, in the judgment of the Owner, adequate cleanup and site restoration efforts are not being expended, including but not limited to; roadway, driveway and drainage maintenance, removal of surplus materials, restoration of signs, mailboxes and like items, further construction shall be halted and work forces directed to the restoration activity until proper order is restored. This shall not be construed as cause for additional compensation.

8. STREET CLEANLINESS

The Contractor shall clean and keep clean the streets, the work and public or private property occupied by him, from waste materials or refuse resulting from his operations. Trucks hauling excavated materials, cement, sand, stone or other loose materials from or to the site shall be tight so that no spillage will occur on adjacent streets. Before trucks start away from the site, their loads shall be trimmed. Should the Contractor be negligent of his duties in maintaining the proper street cleanliness, the Owner will take necessary steps to perform such cleaning and shall charge the Contractor for all the costs.

9. DUST CONTROL

Dust control shall be a continuous responsibility of the contractor until final road treatment is completed and the roads have been accepted by the City for maintenance. Failure by the Contractor to provide adequate dust control shall be sufficient reason for the City to cause such necessary dust control measures to be taken and back-charge all costs for same against monies due the Contractor.

The Contractor shall thoroughly water or treat the roadway with other dust control measures as determined necessary by the Engineer throughout this project at such times and locations and in such amounts as may be required by the Engineer. The cost of this item shall be incidental to the contract.

10. MAINTENANCE OF TRAFFIC

During the progress of the work, the Contractor shall accommodate both vehicular and pedestrian traffic as provided in these specifications and as indicated on the drawings. In the absence of specific requirements, the Contractor shall maintain such traffic. However, the Contractor shall provide for the following:

a) General Traffic Control:

All construction signing and traffic control shall be in accordance with the guidelines and provisions of the Michigan Manual of Uniform Traffic Control Device. The Contractor shall provide barricades and advance warning signs as specified on the Signing Diagrams, or as directed by the Engineer, and provide any signs and barricades within the project area necessary to protect traffic. The Contractor shall not begin any operation on the project until all of the specified/necessary signs have been installed and approved by the Engineer. The Contractor shall provide, attach, and maintain three yellow battery operated flasher lights on each Type III barricade, including those barricades on detour routes, if designated, and one yellow battery operated flasher light on each barricade and channelizing device furnished by the Contractor. There shall be two yellow battery operated flasher lights on each advance warning sign specified on the plans.

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b) Existing Warning and Regulatory Signs:

Existing traffic control signs and street name signs shall be removed, temporarily reset and maintained by the Contractor. Upon completion of the project, traffic control signs and street name signs will be reset in their proper position in accordance with the City's sign inventory or at the direction of the Engineer. All existing permanent signs on this project are to be preserved and maintained as incidental to the project. All signs which are damaged during the course of construction will be charged to the contractor. The City will inventory all signs at the beginning of a project, and upon project completion, before final acceptance is made.

c) Provision for Local Traffic:

The Engineer may direct the Contractor to use Aggregates for maintaining traffic in various locations for maintaining local or through traffic. Aggregates for maintaining traffic shall consist of 21AA limestone. Aggregate placed to maintain traffic shall be removed and incorporated into the project, where specified by the Engineer, as incidental to the project. Surplus Aggregate, which cannot be incorporated into the project, shall be disposed of by the Contractor as incidental to the project.

d) Maintaining Traffic Over or Along the Project:

Lighted warning devices, when required or necessary, shall be staggered along the edge of the pavement abutting the work area with a maximum spacing between barricades of 100 feet on straight portions of the roadway and 50 feet on curved roadway sections or in tapers. When provided for on the plans, temporary widening of the existing pavement shall be constructed with base aggregate for temporary roadway and bituminous surfacing. The base aggregate for temporary roadway shall consist of 21AA limestone.

The Contractor shall provide adequate temporary lane delineation/pavement markings on roadways that have existing pavement markings or where pavement markings are proposed. Bituminous surfaces shall be marked during or at the end of each day's paving. Concrete surfaces shall be marked prior to opening the pavement to traffic. Temporary pavement markings shall be placed as shown on the plans or as directed by the Engineer. The lane delineation shall include the placement of 4" wide markings, a minimum 3 foot length of tape (type NR or type R) per 50 feet of roadway. Markings shall either be white or yellow in accordance with the Michigan Manual of Uniform Traffic Control Devices. Placement of temporary markings shall be incidental to the project.

e) Utility Access and Governing Traffic Ordinance:

Access to fire hydrants, water and gas valves shall always be maintained. In addition, the Contractor's vehicle and equipment operations on public streets shall be governed by all local traffic ordinances and regulations of the Fire and Police Department and Department of Public Services.

f) Construction Openings:

Working sites at manholes, alignment holes, and other minor openings in streets need not be fenced, but they shall not be larger than necessary and shall be well protected by lighted barricades and shall not be occupied longer than necessary. Small openings in street shall be covered with strong steel plates anchored in place when they are not required to be open for construction purposes.

Shaft locations shall be selected at points where they will interfere with traffic as little as possible and their working site arrangements shall meet the approval of the Engineer. Detouring of traffic shall be done in accordance with the requirements of the local department having jurisdiction and the guidelines of the

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Michigan Manual of Uniform Traffic Control Devices and the M.D.O.T.'s Standard Construction Specifications.

g) Partial Street and Access Obstructions:

Where streets are partially obstructed, the Contractor shall place and maintain temporary driveways, ramps, bridges and crossings that are necessary to accommodate the public. In the event of the Contractor's failure to comply with the foregoing provisions, the Owner may, with or without notice, cause the same to be done and deduct the cost of such work from any monies due or to become due the Contractor under this contract; but the performance of such work by the Owner, or at his insistence, shall serve in no way to release the Contractor from his liability for the safety of the traveling public.

h) Advance Notice:

The Contractor shall inform the local fire and police departments in advance of his program of street obstruction and detours, so that these departments can set up plans for servicing the area in case of an emergency. He shall also notify the Department of Public Services at least one week prior to obstructing any street.

i) Flag Control:

The Contractor shall direct traffic using flag control in accordance with the specifications of the Michigan Manual of Uniform Traffic Control Devices and the M.D.O.T. 2020 Standard Specifications for Construction. The Contractor shall use flag control for all construction operations that interfere with normal traffic flow and where specified by the Engineer. All advanced signing and equipment shall be incidental to the project or included in the specified flag control pay item.

j) Miscellaneous:

Along with the above, the Contractor shall provide flagmen, warning signs and barricades as necessary to direct and protect vehicular and pedestrian traffic, as determined necessary by the Owner.

11. SIGNS

a) Information:

Advertising signs of any kind shall not be erected or displayed on the site. The Contractor shall at the discretion of the Engineer, provide an information sign constructed of wood in a location to be directed by the Engineer. The sign shall be 4 feet by 8 feet in size mounted on suitable supports and shall carry the following approximate lettering in dark paint on a light painted background.

Title of Project	
Contract No.	
Cost \$	
Owner	
Contractor	

Details and sizes of lettering, border and general arrangement shall be approved by the Engineer.

b) Instruction:

Job instruction signs, such as "Danger", "Keep-Off", "Soft Shoulders", Etc. shall be furnished, erected and maintained by the Contractor as may be required to safely conduct the work. Such signs shall be neat appearing, kept in good condition and promptly removed when their usefulness has expired.

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12. PUMPING AND DRAINING

The Contractor shall provide and maintain adequate pumping and drainage facilities for removal and disposal of water from drains, sewers, trenches, or other excavations. He shall also provide pumping and drainage facilities for bulkheaded drain and sewer sections, and shall operate same as may be necessary until bulkheads have been removed or construction completed if bulkheads are to be left in place. Where the work is in ground containing an excessive amount of water and where soil characteristics are suitable, the Contractor shall provide, install, maintain and operate an adequate well point system. Where soil characteristics are not suitable for the use of well points, the Contractor shall provide other means to insure proper construction of the work.

Drainage or discharge lines shall be connected to adjacent public storm water drains or extended to nearby water courses, wherever possible. In any event, all pumping and drainage shall be done without damage to any highway or other property, public or private, and without interference with the rights of the public or private property owners, and then the Contractor shall assume full responsibility for any damages incurred there from.

The Contractor shall receive no extra compensation for providing, maintaining, or operating any dewatering or drainage facilities. The Contractor shall not attempt to place any part of any structure until water has been removed and foundations have been properly prepared. Any damage to structures resulting from ineffective maintenance and operation of pumping equipment or other devices necessary for protecting the work from damage by water prior to final acceptance of the work, shall be completely repaired by the Contractor without delay and without additional cost to the Owner.

13. SHEETING, SHORING AND BRACING

Where necessary in order to construct the work called for by the contract, to insure the safety of the men, or to protect other things of value, the Contractor shall use and if necessary, leave in place such sheeting, shoring, and bracing as is needed to carry out the work or to adequately insure the stability of such work, or to insure the safety of the men and/or to protect adjoining things of value.

14. DISPOSAL OF EXCAVATED MATERIAL

Excavated material permitted to be used for backfill may be deposited along line of work where working room permits. All materials in excess of the quantity permitted for backfilling and all materials unsuitable for backfilling shall be hauled away by the Contractor. Where the surplus excavated material is wanted by the Owner, it shall be disposed of within the incorporated limits of the Governmental Agency at locations which are designated by the Owner or his representative, all at the Contractor's expense. Material not wanted by the Owner shall be disposed of by the Contractor at sites obtained by him, at his expense. He shall provide all labor and equipment for spreading such materials at the place of dumping and shall leave such areas in a neat and generally level condition.

15. FINAL CLEANUP AND GRADING

Upon completion of construction and before final payment is due, the Contractor shall restore his working area to as clean a condition as existed before his operations were started. He shall go over the entire line of work and refill any places that may have settled. He shall then regrade and put in shape all backfilled trenches, all fills he may have made from excess excavated materials, and all other areas that may have been disturbed through his operations. For final inspection, the Contractor, on request of the Engineer, shall supply assistance and tools and other equipment necessary for making a complete inspection.

16. PUBLIC AND PRIVATE UTILITIES

The Engineer has endeavored to show all existing subsurface and surface utility facilities, both public and private, on the plans. However, there is no guarantee that all such facilities are shown and there is no guarantee that the locations designed and the elevations shown are correct. It is understood that the Contractor shall contact all utility companies, public or private prior to starting construction to verify all locations and elevations.

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Where any utilities, public or private, such as water, sewer (storm or sanitary), gas, telephone, electric, sprinkler systems or any other are encountered, the Contractor must provide adequate protection for them and he will be held responsible for any damages to such utilities arising from his operations. When it is apparent that construction operations may endanger the foundation of any such utility conduit, cable, or the support of any utility structure or appurtenance, the Contractor shall notify the utility owner of this possibility and he shall take such steps as may be required to provide temporary bracing or support. When it is necessary in order to carry out the work that a pole, electric or telephone, structure, or any other conduit or cable be moved to a new location, or moved and replaced after construction, the Contractor shall arrange with the Owner of the utility, public or private, for the removing of such pole or poles, or other conduit or cable, and shall pay all costs therefore.

Where it is the policy of any utility owner to make his own repairs to damaged conduit or other structures, the Contractor shall cooperate to the fullest extent with the utility and he shall see that his operations interfere as little as possible with those operations and shall bear all costs therefore.

17. BULKHEADS AND CONNECTIONS

The Contractor shall build and remove such bulkheads and connections to new or existing sewers and water mains where shown on the drawings, where necessary to protect the work under this contract or contiguous contracts, where necessary to provide adequate control in setting up infiltration tests and where new sewers connect to existing until the new sewers are inspected and approved for use. Bulkheads shall not interfere with the operation of existing drains or sewers.

18. HOURS OF WORK

City ordinances require that construction activity is allowed only between the hours of 7:00 a.m. and 7:00 p.m., Monday through Saturday. When it is determined that special circumstances exist or it is in the best interest of the City, allowances may be made to allow construction only in non-residential areas or where there is a threat to public health, safety, or welfare. Permission must be given in writing and authorized by the City Manager or the Director of Public Services. A copy of the written authorization shall be forwarded to the Police Department. The contractor/subcontractor/builder receiving the authorization shall keep a copy of the authorization at the construction site at all times.

19. GAS

If the Contractor or his forces must work in existing sewers, open excavations or new sewer not yet approved and accepted by the Owner in which gas may be present, the sewer or open excavations shall be checked for the presence of gas before entering. If gas detected cannot be removed by natural ventilation, or by the removal of manhole covers on existing sewer appurtenances, the Contractor or his forces shall maintain forced draft or such other gas control or removal process as may be necessary to render the sewers or open excavation safe, as determined by gas detection instruments and shall pay all costs therefore. Neither the Owner or Engineer shall be responsible or liable for any damages arising out of or resulting from gas, either directly or indirectly.

20. CONTRACTOR'S INFORMATION

Information to be submitted by the Contractor, relative to materials, equipment and arrangements, shall be in the form and presented in the manner herein specified. The Engineer shall determine the form in which the various information is to be submitted, whether by drawings, specifications, lists, cuts, samples or otherwise.

In general, drawings shall be required to show shop and field fabrication, assembly, or erection, and to show arrangements. Specifications shall supplement the drawings whenever in the opinion of the Engineer such are required, and shall be used when drawings are not required.

For such materials, equipment, or arrangements which are standard or stock catalog items, the Engineer may waive the requirement for drawings or specifications. In such cases, the Contractor shall furnish full information in the way of lists, cuts, samples, or otherwise, which the Engineer determines as adequate and sufficient to clearly show what the Contractor proposes to furnish.

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The size, general character and arrangement of the Contractor's information shall be subject to the approval of the Engineer. The Contractor, if requested, shall confer with the Engineer regarding same before commencing its preparation.

Any information prepared by other than the Contractor for submission to the Engineer, shall first be sent directly to the Contractor, who shall keep adequate records of such information and be responsible for submitting it to the Engineer at the proper time so as to prevent delays in the work. The Contractor shall thoroughly check all information to be submitted as regards measurements, sizes, materials, and details, to satisfy himself that it conforms to the contract requirements. Information found to be incorrect, incomplete, or otherwise in error, shall be returned to its original source for correction before submission to the Engineer. After the information has been approved by the Contractor, he shall place thereon the date of his approval and the signature of the checker and submit the information to the Engineer.

If any of the information, (duplicate copies are originally required) submitted by the Contractor is found by the Engineer to not meet the contract requirements, one copy of such information shall be returned to the Contractor by the Engineer, marked with the notation, corrections or changes that are required. Returned unapproved information shall be revised or corrected by the Contractor and resubmitted as before.

After the work has been completed, information previously approved shall be corrected to correspond to the work as actually installed, in case there is any difference, and submitted to the Engineer in duplicate as a prerequisite to final payment.

21. SAMPLES FOR TEST

The Contractor shall furnish all samples of materials necessary for tests as determined by the Engineer. All samples taken for analysis and tests shall be taken in such manner as to be truly representative of the entire lot under test. The Contractor shall furnish such assistance and facilities as the Engineer may require for collecting, storing and curing samples. He shall also pay the cost of delivering the testing.

22. SOURCE OF MATERIALS AND EQUIPMENT

The Contractor shall be free to secure the approved materials and equipment from sources of his own selection. However, if the Engineer finds that the work will be delayed or adversely affected in any way because a selected source of supply cannot furnish a uniform product in sufficient quantity, or the product is not suitable for the work, the Engineer shall have the right to require the original source of supply be changed by the Contractor. The Contractor shall have no claim for damage for additional compensation because of this requirement.

23. MATERIALS, DELIVERY, STORAGE AND HANDLING

All material shall be so delivered, stored and handled as to prevent the inclusion of foreign materials and the damage of materials by water or breakage. Packaged materials shall be delivered in original, unopened packages and stored until ready for use. Package of materials showing evidence of damage shall be rejected.

All materials that have been stored shall be subject to re-test and must meet the requirements of their respective specifications at the time they are used in the work.

24. WATER

All water used in connection with the work shall be from the local water department. The Contractor shall secure the required permit from the local Department of Water Supply for water used and shall bear all expenses of such permit and for the water used. Please note that fire hydrant usage will not be allowed.

Where water is not available from a local water department, the Contractor shall obtain his own source of supply, the quality of which shall be subject to the approval of the Engineer.

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25. EXISTING STRUCTURES

The Contractor shall assume full responsibility for the protection of all buildings or other structures and their foundations, as well as other improvements such as pavement, roadways, sidewalks or railroad tracks which might be affected by his operations. Should settlement or lateral movement of adjacent structures or surface features occur, such conditions shall be rectified by the Contractor at his expense.

26. CONTROL SURVEYS

The Engineer shall survey lines and grades as may be necessary for the proper control of the work, but this shall not relieve the Contractor of responsibility for making careful and accurate measurements and for constructing the work to the lines shown on the drawings.

The Contractor shall furnish and place all necessary lumber and other material and give assistance at the site for staking out the work. The Contractor's working operations which interfere with the Engineer's surveying activities shall be temporarily suspended for such reasonable time as the Engineer may deem necessary. The Contractor shall receive no extra compensation for any materials or services furnished by him incidental to these operations of the Engineer. The Contractor shall carefully preserve the points furnished by the Engineer and any points destroyed on the part of the Contractor shall be re-established by the Engineer at the expense of the Contractor.

27. EXPLOSIVES AND BLASTING

No explosives shall be stored on the site, nor shall any blasting be done without the prior approval of the Engineer, which approval shall in no way make the Engineer responsible or liable for any damages resulting from such storage or blasting. Should blasting be permitted on the site, the handling, transportation, storage and use of the explosives and detonators shall be done in accordance with the provisions of local ordinances. Firing shall be done by electric exploders and/or battery.

28. BACKFILL

For purposes of these specifications, <u>backfill</u> shall be considered as that material placed in open cut excavations above an elevation 12 inches over the outside top of the utility or installation.

- a) Backfill for all trenches in public rights-of-way when whole or any portions thereof lie under, cross or run within 5.0 feet of an parallel to proposed or existing concrete, asphalt or aggregate surfaced roadways, or combinations thereof, driveways, parking areas or walkways, shall be porous material as defined hereafter and mechanically compacted in place in one (1) foot layers or less to a minimum compaction of 95%.
- b) Unless specified elsewhere, all trenches under road shoulders defined as the area from the edge of pavement, whether concrete or asphalt to the adjacent road ditch or the area within eight (8) feet of said pavement edge, whichever is the lesser, shall be backfilled as described under (a) above. Aggregate surfaced roadways with parallel ditches shall not be considered to have a shoulder area so that backfill of all trenches between top of banks of parallel road ditches adjacent to the traveled aggregate roadway shall be as described in (a) above.
- c) Backfill for all trenches not included in limitations described under (a) and (b) above or in permanent easements adjacent thereto or permanent easement across graded and improved sites, all unless specified elsewhere may be selected excavated material (excluding blue clay) mechanically compacted in place to produce a minimum 90% compaction.
- d) When select excavated material is permitted to be used for backfill, this material shall be free of rocks, rubble, roots, stumps, refuse, organic materials, blue clay, and other materials which would not, in the opinion of the Engineer, facilitate compaction or assume proper settlement or which would damage or displace the utility or installation.

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- e) Specified compaction means not less than the percentage required based on the maximum unit weight at optimum moisture content when tested in accordance with AASHTO Specification T-180 or ASTM D-1557-64T. If the excavated material is not suitable to obtain the minimum compaction required, the Contractor shall at his expense, remove unsuitable material or add porous materials, or both, to obtain the compaction specified. Compaction tests will be made by a representative of the Owner and paid for by the Owner, unless otherwise specified.
- f) Whatever type of backfilling is required, its costs shall be included in the price bid per lineal foot of installing the utility or installation.
- g) Porous backfill material shall meet the following gradation specifications where specified on the plans, or elsewhere in the contract.
 - 1. Gravel, stone or slag meeting gradation requirements of M.D.O.T. Specification designation 21A or 22A.
 - 2. Gradation requirements of M.D.O.T. Specification for Porous Material Grade "A", approved by the Engineer.
 - 3. Gradation requirements of M.D.O.T. Specification for Porous Material Grade "B", approved by the Engineer.
 - 4. Approved bank-run sand or sand-gravel uniformly graded that will contain less than 10% clay or loam and pass a 3/4 inch mesh screen respectively, approved by the Engineer.
 - 5. Class II sand or gravel backfill shall conform to Section 902 of the M.D.O.T. 2020 Standard Specifications for construction.
- h) No backfilling shall be done prior to inspection of the pipe and after this inspection, the sand required to a point one foot above the pipe shall be placed. The entire backfilling operation shall proceed along with the laying of the pipe and at no time shall more than 50 feet of trench be open between the point of pipe laying and the backfill.

If the required trench compaction is not being met within 300 feet of the pipe laying operation, the Contractor shall cease further construction until the compaction requirements are met and can be maintained.

29. MORTAR FOR BRICK WORK AND PIPE JOINTS

Mortar for brick work or block work in sewers or appurtenances and for pipe joints shall be mixed by volume in the proportions of one part Portland Cement to two parts sand. A bag of cement shall be considered one cubic foot. The cement and sand shall be first mixed dry to a uniform color in a batch mixer or a tight mortar box, and then mixed thoroughly with water which shall be added gradually to the required consistency. Mortar shall be mixed in batches of such sizes as will be used within one hour. Any mortar which has set sufficiently to require retempering shall not be used.

The amount of material in the sand removable by decantation shall not exceed 2% by weight. Not less than 90% of the material shall pass a No. 8 sieve and at least 95% shall be retained on a 100 sieve.

30. CONCRETE GRADING

Different grades of concrete shall meet compressive strength as follows:

Grade AA	4000 lbs	28 days
Oraue AA	4000 108	20 uays

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Grade A	3500 lbs	28 days
Grade B	3000 lbs	28 days
	2500 lbs	•

31. FINAL TRIM AND CLEANUP

The following items shall constitute Final Trim and Cleanup, the damage, repair, or replacement of which shall be the responsibility of the Contractor. The cost of this work shall incidental to the cost of the project, unless otherwise specified elsewhere in this proposal.

a) All concrete pavement, gravel roadways, with or without asphalt surfacing driveways or service drives and approaches to same, either concrete, gravel or asphalt surfaced and all sidewalks or housewalks disturbed by the Contractor shall be replaced. All necessary removal and replacement shall meet the current specifications of the governmental unit or agency having jurisdiction.

When the utility as proposed for construction will be located under an existing concrete pavement, and when the residual pavement is five feet or more in width, it may be left in place. However, if the residual pavement is less than five feet from a pavement joint or from the face of the curb, it shall be removed and replaced. If the residual pavement to be removed is adjacent to the curb, the curb shall be removed and a new curb poured integral with the pavement. All concrete pavement which is not removed to a joint shall be saw cut to a depth equal to 2/3 thickness prior to removal. All concrete pavement replaced shall be to a thickness with or without reinforcing mesh and with or without hook bolts as required by the Governmental Agency having jurisdiction thereof. All damaged or undermined pavement shall be removed and replaced.

All concrete pavement and/or driveway approaches under the jurisdiction of the City of Farmington Hills shall meet the specifications for Grade A, 3500 lb. concrete, with air-entrained cement, course aggregate gradation equal to City pavement standards and properly cured with white membrane curing compound.

If the pavement removed has an asphaltic concrete surface, the surface shall be removed to a distance one foot beyond the limits of the removed concrete pavement. The butt joint in asphaltic concrete removal shall be prepared by sawing through the total depth of asphaltic concrete. The surface shall be replaced with a nominal thickness of asphaltic concrete meeting the requirements of the Agency having jurisdiction both as to materials and method of replacement.

All asphalt replacement under the jurisdiction of the City of Farmington Hills shall be M.D.O.T. Div. 4, No. 11 bituminous mixture modified with 20AA aggregate, minimum 50% crushed, with asphalt penetration 85-100.

When the utility as proposed for construction will be located under an existing gravel pavement, an equivalency of 8" of 22A roadside gravel shall be placed over approved compacted sand backfill, as stated in Item 28 of these General Specifications. It shall be maintained at this thickness and blended in to provide a smooth, continuous, uniform grade.

- b) All necessary grading shall be done to fit adjoining ground elevations.

 Where existing drainage ditches are disturbed or destroyed, they shall be restored to the original cross-section by the Contractor. Where there are no existing drainage ditches within the limits of the contract, drainage ditches shall be installed to the standard cross-section for ditches or as directed by the Engineer.
- c) Established lawn areas disturbed by the Contractor shall be restored in the following manner:
 - 1) All lawn areas damaged during the work shall be graded and seeded as described in this section. Sod shall be required instead of seeding at locations indicated on the Drawings or when ordered

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by the Engineer. Where sodding is required, the Contractor shall restore the existing lawn areas with Class A sod, as specified in Section 816 "Turf Establishment" of the M.D.O.T. 2020 Standard Specifications for Construction. All sod shall be placed on a two-inch bed of topsoil. This topsoil shall be rich black earth, free from sod, stones, weed stalks, or debris.

When seeding is required, the Contractor shall rebuild the existing lawn areas with THM seed, as specified in Section 816 "Turf Establishment" of the M.D.O.T. 2020 Standard Specifications for Construction, except that THM seed shall be sown at a rate of 220 lbs/acre and will not be paid for until satisfactory germination has been accepted. The top four inches (4") of trench backfill shall be made with selected topsoil preserved or secured elsewhere for this purpose.

This topsoil shall be Ricky black earth, free from sod, stones, weed stalks, or debris. The trench surface shall be carefully raked to an even level with all stones, sticks, and other debris removed. The lawn seed mixture shall be distributed in an amount not less than twenty pounds of 10-6-4 commercial fertilizer per one thousand square feet into the area. Seed shall not be sown between June 15 and August 15, nor between October 15 and April 15, nor at any time when the soil has insufficient moisture to insure proper germination. After sowing, the surface shall be lightly raked with a steel garden rake or equivalent, and rolled with a light lawn roller. Seeded areas shall receive a proper mulch of clean wheat or oat straw, chopped to a maximum length of three inches. All lawn repair, whether seeding or sodding shall be incidental to laying the pipe unless listed as a separate bid item on the proposal. Contractor shall be responsible for the watering of the lawn areas for a period of 14 calendar days after seeding and sodding.

- 3) Shrubs, small trees and other planting which may be damaged during any phase of the work shall, with the permission of the owner, be replanted as directed, or removed to an area provided by the Contractor and "heeled in" until such time as they can be replanted in their original location. The work shall be done in an acceptable manner and the Contractor shall be required to replace any shrubs or trees that fail to survive.
- d) Private ornamental gas or electric lights, fences, shrubs, rip-rap material, small out buildings and similar items placed or installed in street rights-of-way or public or private utility easements by the property owner shall be carefully removed and placed on the adjacent property at the location designated by the property owner.
- e) Items under "d" above where damaged or disturbed in construction easements, or private property adjacent thereto, shall be repaired and/or restored to original condition.

32. EROSION AND SEDIMENT CONTROL

In compliance with the Soil Erosion and Sedimentation Control Act (P.A. 347 of 1973), the City of Farmington Hills has adopted by reference the latest rules promulgated by the Michigan Department of Natural Resources relative to said Act.

In general, the Contractor shall take necessary precautions to positively prevent erosion and resultant sediment run-off into existing open or enclosed drains, because all such run-off eventually reaches natural streams. To accomplish such control, it may be necessary to build various types of gravel filters, sand bag traps, straw bale traps or barriers or other approved means to filter sediment or combinations of same. For these S.A.D. projects, we suggest the consideration of utilizing the following types of sediment control, either singly or in combination, or other means which may prove equally effective. (See Detail Sheet)

- 1. Stone outlet filter within a straw bale berm;
- 2. Stone outlet filter within an earth berm;
- 3. Straw bale diversion berm:

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4. Ditch sediment trap.

In each case, the purpose is to settle out and/or filter out the sediment being carried away in storm flow as a result of removing natural vegetation (or hard surface areas) and exposing subsoil's during construction operations. It will be necessary to construct such erosion control systems during construction, so they will be functional at any and at all times. It is absolutely necessary to inspect operational erosion control installation after each storm and perform any needed repairs, cleaning of filter media or other adjustments as may be required.

The erosion and sediment control systems must remain in operable condition until final site restoration has been accomplished, to-wit:

- a) All areas to receive sod are properly sodded.
- b) All areas to receive seed and mulch are so treated and the new grass reaches acceptable growth and density.
- c) All areas to be resurfaced (drives, walks, roadways) are paved; and
- d) In general, all surplus earth has been removed and no areas disturbed during construction remain vulnerable to further erosion as a direct result of the construction activity.

All costs for this work, installation, materials, labor, and maintenance shall be considered incidental to the project.

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SUPPLEMENTAL SPECIFICATION FOR STORM SEWER

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1. GENERAL

These specifications are a part of the contract documents herewith attached and are intended to technically describe the nature of the materials, equipment and workmanship required to complete in a workmanlike manner the sewers and appurtenances shown on the accompanying plans. The requirements hereinafter specified supersede any possible contradictory requirements with the General Conditions or General Specifications.

Methods of construction will generally be left to the discretion of the Contractor so long as satisfactory progress is made and good workmanship is produced.

No agent of the First Party shall have power to in any way change the requirements of the specifications without the formal authorization to do so, conferred by the contract, or by ordinance, resolution or other official action of the Owner.

Sewers shall be considered to mean the pipes or conduits between extreme ends of this project, including branch lines, but excluding special structures, as indicated on the Drawings.

All labor, tools and all materials necessary to excavate for, lay, join, backfill, and finish the sewer shall be considered as part of the sewer construction.

Unless otherwise allowed under specific specifications for a particular type of sewer or unless permitted by the Engineer, construction shall begin at the outlet end of sewer and proceed upgrade.

2. HANDLING PIPE

Pipe shall be distributed at the site by the Contractor as required and care shall be exercised to prevent damage to the pipe in handling. Proper tools and implements satisfactory to the Engineer and in accordance with manufacturer recommendations for safely handling the pipe and other materials shall be provided by the Contractor.

The Contractor shall place the pipe so as to cause the least amount of interference to abutting property owners and traffic using the street. Barricades and lighting shall be provided at intersections and other locations where the pipe will interfere with pedestrian or vehicular traffic. All damage caused by storage of the pipe on the construction site shall be repaired by the Contractor, including but not limited to, sidewalks, driveways, lawns and shrubbery. No pipe shall be allowed to be restored longer than three days prior to beginning construction on the section of sewer. Joint material shall be applied to the pipe on the day the pipe is placed in the trench. Joint materials shall be stored in closed containers when unattended. All costs associated with **Handling Pipe** shall be considered incidental to the project.

3. EXCAVATION

Excavation shall include clearing of the site, removal and disposal of all materials necessary to be removed in the construction of all work under the contract.

Trenches shall not be excavated for a distance greater than 50 feet in advance of completed sewer without permission of the Engineer.

Excavation shall be of sufficient widths and depths to provide adequate room for the construction and installation of the work to the lines, grades, and dimensions called for on the drawings, except the width of a trench from the invert to a height twelve inches (12") above the top of the sewer barrel shall not be greater than as follows:

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1. Pipe Size	2. Trench	3. <u>Pipe Size</u>	4. Trench
	Width		<u>Width</u>
4" – 12"	30"	72"	108"
15"	32"	78"	116"
18"	36"	84"	124"
21"	40"	90"	131"
24"	44"	96"	138"
27"	48"	102"	145"
30"	52"	108"	152"
36"	60"	114"	158"
42"	68"	120"	166"
48"	76"	132"	178"
54"	84"	144"	192"
60"	92"	156"	206"
66"	100"	168" & larger	O.D.+ 24"

If the maximum trench width is exceeded, unless specified otherwise, the Contractor shall install, at his own expense, such concrete cradling or other bedding, as is approved by the Engineer, to support the added load of the backfill.

Where, through the Contractor's construction procedure, or because of poor existing ground conditions, it is impossible to maintain alignment and grade properly, the Contractor shall, at this own expense, excavate below grade and replace with large size aggregate or slag in order to insure that the pipe, when laid, will maintain correct alignment and grade.

Excavated materials shall be removed from the site, or transferred to the trench backfill, or temporarily stored in a manner that will not cause damage to trees, shrubs, fences, or other property, nor that will endanger the bank of the trench by imposing too great a load thereon.

Open cut shaft and tunnel excavations shall be adequately braced as necessary to enable the work to be prosecuted with safety to the men, the work, and neighboring structures and conduits. All excavations shall be completely dewatered prior to construction of the sewer or other structures; adequate provisions shall be made to prevent water from flowing through or over newly placed concrete or brickwork. Drainage shall be carried to sumps from which the water may be pumped.

4. LAYING OF CONCRETE AND CORRUGATED STEEL PIPE

All pipe shall be laid to the line and grade called for on the drawings. Each pipe, as laid, shall be checked by the Contractor with line and grade pole or laser beam to insure that this result is obtained. If the Contractor is installing more than 40 linear feet of storm sewer, laser beam is required for installation. The finished work shall be straight and shall be sighted through between manholes. Alignment of laser beams shall be checked with sufficient frequency to assure compliance with the plans.

Each pipe shall be inspected for defects prior to being lowered into the trench. Inside of pipe and outside of spigot shall be cleaned of any dirt or foreign matter.

Construction shall begin at the outlet end and proceed upgrade with the spigot ends pointing in the direction of flow. All pipe shall be laid on a cushion of sand, gravel or slag in accordance with requirements of the standard detail sheet of the plans. Concrete or additional bedding shall be installed where called for on the drawings. For pipe with raised bells or collars, bell holes shall be carefully formed at proper intervals so that no part of the load is supported by the bells.

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Work executed during winter months shall receive exceptional attention to avoid excessive backfill load on the pipe. If the sides of the trench are frozen, the amount of selected material tamped above the pipe shall be increased to at least two feet. No frozen backfill material shall be placed in the trench.

If, through carelessness, poor existing ground conditions, or to provide an under drain for dewatering to pump sumps, the Subgrade is undercut so that refilling is necessary to bring the pipe to grade, the Contractor shall, at no extra cost to the Owner, refill with gravel or slag thoroughly tamped in place to insure that the pipe, when laid, will maintain correct alignment and grade.

The pipes shall be centered in the bells or grooves and pushed tight together to form a smooth and continuous invert. After laying of pipe, care should be taken so as not to disturb its line and grade. Any pipe found off grade or out of line shall be re-laid properly by the Contractor.

Where pipe is laid in wet trenches or trenches with running sand, the Contractor shall provide and use mechanical means for pulling the pipe home in making up the joint and for holding the pipe joint tight until completion of the line. Mechanical means shall consist of a cable placed inside of the pipe with suitable winch, jack, or come-along for pulling the pipe home and holding the pipe in position.

Mechanical means shall be used for pulling home all rubber gasketed pipe regardless of trench condition where manual means will not result in pushing and holding the pipe home.

Completion of the pipe bedding and backfilling the remainder of the trench shall follow closely behind the laying of the pipe.

Concrete pipe 36" and larger shall have all joints inside cement pointed, with cement mortar compound of one (1) part of cement and two (2) parts of sand. Mastic compound or any foreign material within ¾ inch below inside finish of pipe shall be thoroughly removed before cement grout is applied.

5. BEDDING & BACKFILL

After each section of pipe is laid and the joint made, the space between the pipe and the trench sides shall be filled to the pipe spring line with the specified bedding well tamped. Such initial backfill operations shall be maintained within ten (10) feet of the end of the last pipe laid, with care taken to protect both the pipe and joints from disturbances. No backfilling shall be done prior to inspection of the pipe.

All pipes shall be installed with Class "B" Bedding or the alternative bedding as described herein and shown on the detail sheets, except as otherwise noted on the plans. Cost of furnishing and placing bedding shall be included in the unit price for the sewer.

In open cut work, the bottom of the excavation shall be shaped as nearly as practicable to conform to the lower portion of the sewer. In addition, the trench shall be excavated at least 4 inches below the elevation established for the bottom of the pipe and this excess depth, plus the excavated area around and to a height of 12 inches over the outside top of the pipe to be refilled with backfill material in accordance with the detail sheet, thoroughly compacted in place, except where concrete cradle is required. (Details shown on plans). Structures shall not be placed under conditions which may be expected to result in defective work. If the soil at the established grade is not sufficiently stable to properly support structures, the Contractor, at his own expense, shall excavate up to 24 inches below grade and refill the trench to the proper grade with compacted crushed aggregate or slag. If stable support cannot be established in this manner, the work shall be discontinued until plans for change in construction have been submitted by the Contractor to the Engineer for approval and approval has been granted.

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Any excess trench excavation made below the pipe shall be refilled with crushed stone, sand or concrete as directed by the Engineer. Under all conditions, sewer pipe shall have a firm bearing which will insure permanent grade and alignment and proper support against crushing load.

Width of trench at top of pipe shall be within the limit described on the Detail Sheet when the pipe is properly aligned and in the center of the trench. Excavation producing trench widths at the top of pipe is excess of those shown on the detail sheet may require a change in bedding requirements and/or pipe classifications, as determined by the Engineer, at no additional cost to the Owner.

A.) Class "B" Bedding

Class "B" Bedding as shown on the Detail Sheet, consists of 4-inch layer of pea-gravel material shaped to fit the lower half of the pipe (Spring line). The remainder of the fill up to a depth of 12 inches above the top of pipe shall consist of M.D.O.T. Specifications, Class II Sand and shall be placed in 6-inch layers, mechanically compacted to 95% of its maximum density and optimum moisture content. A substitution for Class II sand will not be permitted, unless approved by the Engineer.

B.) Alternative Bedding

As an alternative, all sewers 30 inch and smaller may be placed using sand, gravel, or slag bedding of the type shown on the detail sheet or approved by the Engineer. All pipes shall be laid on a minimum 4-inch cushion of sand, gravel, or slag, which shall be carefully prepared so that at last the bottom ¼ of the pipe will bear against the cushion. Bell holes shall be excavated so that the full length of the barrel will bear uniformly on the Subgrade. Gravel or slag shall be within the size ranges of the following M.D.O.T. Classes: 6A, 9A, and 17A, per standard specifications. Sand shall conform to M.D.O.T. specifications, Class II, or as approved by the Engineer. A substitution for Class II sand will not be permitted, unless approved by the Engineer. Sand, gravel or slag shall be thoroughly tamped to spring line with a T-bar or other approved means. The material shall then be power tamped in 6-inch layers to 12 inches over top of pipe.

6. CONCRETE CRADLE FOR PIPE

Where called for on the drawings, or otherwise required, pipe shall be installed with a concrete cradle of Grade "C" concrete in accordance with the Specifications Concrete" included herein.

Each pipe shall rest on a 6" minimum thickness bed of dry mix concrete, shaped to fit the bottom of the pipe. The dry mix concrete shall be Grade "C" concrete and shall be machine mixed. After setting the pipe, the space between the outside of the pipe and the undisturbed trench bank shall be filled to a level equal to a point 1/3 of the diameter above the pipe invert with Grade "C" concrete, having a 5" slump and mechanically vibrated to insure complete filling of the annular space between the excavated face of the original ground and the outside face of the pipe.

The cost of concrete cradle for pipe shall be included in the contract unit price bid per lineal foot of sewer.

7. MANHOLES, INLETS AND CATCH BASINS

Manholes, inlets and catch basins shall be constructed of the type and in accordance with the details sheets at the locations shown on the drawings and unless otherwise specifically called for on the drawings, shall consist of brick masonry on a concrete base, solid concrete block on a concrete base or precast sections on a concrete base. The base can be cast in place or precast slab. In the case of 48" or larger sewers, manholes shall be poured in place structures or precast manhole tees. All structures and accessories, including steps, frames and

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covers, etc. shall be done in accordance with the details shown on the standard detail sheets.

Connections to manholes shall be properly supported and braced where not resting on original ground so that any settlement will not disturb the connection.

Excavation shall be carried to the depth required to permit the construction of the specified depth of base in accordance with the requirements of the Standard Details. The excavation shall be sufficiently wide to allow for shoring, bracing, or form work, should any or all be necessary. Also, this is to allow for accessibility in plastering the exterior of all brick masonry. The bottom of the excavation shall be trimmed to a uniform horizontal bed to receive the concrete base. The excavated section shall be completely dewatered before any concrete is placed therein. Concrete shall be Grade "A", 3500 pounds per square inch compressive strength and shall be in accordance with the "Design and Classifications" section of "Specifications-Concrete" included herein.

All brick shall be wetted immediately before being laid. Broken or chipped brick shall not be used in the face of the structure. The brick shall be laid radially in courses in a full bed of mortar with interior joints not more than ¼" in width. Whole bricks only shall be used, except to effect closures and to filling the outside portion of the radial joints. Each seventh course shall be laid in "stretchers", the intervening courses being composed of "headers". Adjoining courses shall break joints by one half the width of a brick as nearly as practicable. All joints shall be true and smooth. The upper section of the manhole shall be domed, as indicated on the drawings, to such diameter as will fit the iron casting.

All precast sections shall bear the stamp of an approved testing laboratory as having been tested and delivered from tested stock of the manufacturer, at the expense of the Contractor.

Tops shall be set in a full bed of mortar or otherwise secured, as shown on the drawings, and to the required finished elevations.

All structures without sumps shall have channeled bottoms. For sewers 15" in diameter or less, the channel shall be one-half depth of pipe. For sewers larger than 15" diameter, the channel shall be a minimum of 9" deep.

Backfill around all structures shall be sand or gravel, placed uniformly around the structure in one foot lifts, and compacted in place. No backfill shall be placed about structures for 24 hours if an outside plaster coat has been applied.

Catch basin and inlet connections shall include, but not be limited to, cleaning of the existing catch basin or inlet, providing necessary connections, providing required bulkheads, and providing all repairs necessary.

Cast iron manhole steps shall be castings meeting the requirements of A.S.T.M. Specifications for "Gray Iron Castings", A 48, Class No. 35B. The steps shall be approximately 10 x 10 x 3 inches and shall be East Jordan Iron Works No. 8500 (No. 8503 for block construction) or approved equal. Steps in precast manhole sections shall be cast in place at the plant.

Manhole covers shall have the words "Farmington Hills Storm Sewer" spaced in from the periphery of the cover.

When completed, structures shall be cleared of scaffolds and cleaned of surplus mortar or other foreign materials. The interior joints shall be pointed and the entire exterior surface of brick and block manholes completely plastered with mortar.

8. CONNECTIONS, BULKHEADS AND MISCELLANEOUS ITEMS OF WORK

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The Contractor shall furnish all materials and labor and shall install and/or construct the connections, bulkheads, and miscellaneous items of work called for on the plans and/or specifications. The cost of this work shall be included in the unit price bids for manholes and/or sewers, unless specifically listed in the proposal as a bid item.

When tapping existing precast manholes or sewer pipe, drill holes at 4 inch centers with a star drill around the periphery of the opening to create a plane of weakness, before breaking out.

Where called for on the drawings, existing sewers shall be connected in strict conformance with the plans, with all work done with special care and in a workmanlike manner.

Unless otherwise noted on the drawings, bulkheads shall consist of watertight brick and cement mortar 8 inches thick.

When connections are made with sewers carrying sewage or water, special care must be taken that no part of the work is built under water; a flume or dam must be installed and pumping maintained if necessary and the new work kept dry until completed and all concrete or mortar has set up.

9. TUNNELING

The Contractor may at this option (and with the approval of the Owner), construct the work in tunnel, where it crosses existing roadways, public and private utilities, walks or other structures. The work shall be constructed in tunnel where noted on the drawings, or as may be required under road permits. Should requirements of a construction permit issued by a governmental authority backfill material other than the type specified herein, the requirements of the permit shall be met, both as to kind of backfill and method of placement.

A.) Jacked-in-Place Pipe Sewers

Jacked-in-place pipe tunnel sewers shall be constructed of reinforced concrete pipe, A.S.T.M. C-76 Class IV, or Class V, with 2 rings of circular reinforcement extending into the bell and into the spigot ends of the pipe. Elliptical reinforcement will not be allowed. In such construction, excavation shall not proceed ahead of the cutting edge of the pipe. Voids shall be filled by means of pressure grouting with 1:3 cement-sand mortar.

Joints for concrete pipe shall be made with bituminous compound of the type specified in the Material Specifications. Other type joints shall be constructed as specified on the plans or with the approval of the Engineer and shall be in strict accordance with the manufacturer's recommendations.

All joints shall have inside cement pointing with cement mortar compound of one (1) part of cement and two (2) parts of sand.

B.) Pre-Tunneled Pipe Sewers

Pre-tunneled pipe sewer shall be constructed of reinforced concrete pipe and joints as specified under Article "A" above.

In such construction, the excavated tunnel shall be braced as necessary. Pipe shall be carefully set to line and grade. Voids shall be filled with tamped 1:10 cement-sand backfill. Facilities shall be provided for insuring that space in tunnel outside pipe is completely filled with this material.

C.) Monolithic Concrete Tunnel



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Monolithic concrete tunnel sewers shall be constructed as detailed on the Drawings.

All voids shall be filled by means of pressure grouting with 1:3 cement sand mortar.

Shaft locations shall be subject to the approval of the Owner and the Contractor shall submit a schedule of desired locations of shafts for approval.

The method of constructing the shafts and the type of support are at the option of the Contractor, but subject to approval by the Engineer. The size of the shaft and method of support shall be such that plumb lines hanging freely from the surface on the centerline of the tunnel shall have not less than six feet (6') between them.

The Contractor will receive no extra compensation for constructing, maintaining, or removing shafts, but the cost of same shall be included in the prices bid for the sewers.

10. MATERIAL SPECIFICATIONS, OPEN CUT SEWER PIPE

One or more types of sewer pipe and joints have been shown on the plans. Unless otherwise specified, any of the type of sewer pipe or joints listed below may be used upon approval of the Owner, provided the pipe (external load supporting) strength is equal to or exceeds that of the pipe shown on the plans.

10.1 TYPES OF SEWER PIPE AND JOINTS

- A) Reinforced Concrete Pipe (Current A.S.T.M. C-76)
 - 1.) Modified groove tongue joint with approved rubber gasket (current A.D.T.M. C443, except as such specifications relate to infiltration limitations).
 - 2.) Plain tongue and groove with approved cold mastic joint.
- B) Reinforced Concrete Elliptical Culvert Storm Drain and Sewer Pipe, A.S.T.M. Designation C-507-72, Class HE-1, HE-IV, as called for on the drawings.
 - 1.) Tongue and groove bituminous (DeWitt #10) joint with inside cement pointing.
- C) Reinforced Concrete Low-Head Pressure Pipe, A.S.T.M. Designation C-3610-72a or A.W.W.A. Designation C-302-64, meeting strength requirements of A.S.T.M. C-76-72a Class 1-5, as called for on the drawings.
 - 1.) Steel joint rings and rubber joint with inside and outside pointing.
 - 2.) Lubricant, as supplied by the pipe manufacturer, shall be used on the groove and on the tongue in making up joints. The joints shall be coupled in accordance with the pipe manufacturer's requirements.
- D) Plain Concrete Pipe (Current A.S.T.M. C14 or Concrete Pipe Association of Michigan Designation C14 XM)
 - 1.) Modified groove tongue with approved rubber gasket (current A.S.T.M. C443, except as such specifications relate to infiltration limitations.
 - 2.) Lubricant, as supplied by the pipe manufacturer, shall be used on the groove and on the tongue in making up joints. The joints shall be coupled in accordance with the pipe manufacturer's requirements.



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E) Corrugated Steel Pipe – Use only locations specified on the plans. Corrugated steel pipe shall conform to the current requirements of A.A.S.H.T.O. M-36 for galvanized pipe and A.A.S.H.T.O. M-196 for Aluminum Alloy Pipe.

1.) Galvanized Steel Bands, a minimum of five (5) corrugations wide.

10.2 JOINT MATERIALS AND METHODS

All joint materials shall be approved by the Engineer prior to use. Only one type or brand shall be used throughout the work for similar conditions, unless the change is specifically authorized or directed by the Engineer.

A.) Cold Mastic

Cold bituminous mastic material, for plain tongue and groove pipe, shall be a proven-by-use product specifically made for buttering on sewer pipe in the field, and shall be a type which remains plastic at normal seasonal air temperatures, such as DeWitt Compound No.10, Carey's "Sewertite", or Atlas Mineral Products Company "Atlastic 77".

The cold mastic material shall be buttered on the re-entrant angle of the joint for the complete circumference of the pipe with an amount that will completely fill the annular space between the pipes when the connecting pipe is pushed home. The inside of the joint shall be wiped clean and smooth.

For plain tongue and groove pipe 36 inches and larger in diameter, the inside joints shall be completely filled by pointing up with a cement mortar consisting of one part Portland Cement and two parts mortar sand, mixed with sufficient water to a consistency that permits the annular space of the pipe joint to be completely filled.

B.) Rubber Gasket

Rubber Gaskets shall be of the type that provides a complete circle of live rubber when placed on the tongue of the pipe on which it is to be used. The gasket shall be so designed and arranged that, when the joint is completed, all the rubber will be under compression. The rubber shall be ductile and capable of standing all deformation stresses during and after the pipe laying. The rubber gasket may be of the ribbed band type, cemented to the tongue end of the pipe by the manufacturer, so that when the pipe is inserted in the grooved end of the adjoining pipe, the ribs are rolled over and compressed into a tight joint. The gasket may consist of a solid ring which is slipped over the tongue of the pipe into a recess just before being inserted into the groove of the adjoining pipe and which gasket is compressed as the joint is completed. The gaskets shall comply with the applicable requirements of A.S.T.M. Specifications C-443.

The rubber gasket joint shall be made in accordance with the manufacturer's printed instructions. If the pre-cemented ribbed band type is used, it shall be clean and undamaged around the entire perimeter. If field installed pipe, the rubber ring shall be slipped over the tongue of one pipe. The pipes shall be shoved tightly together, compressing the rubber ribs, or the ring uniformly around the entire circumference. The remaining annular space in the joints of 36-inch diameter pipe and larger shall be completely filled on the inside with cement mortar consisting of one part Portland Cement to two parts mortar sand, mixed with sufficient water to a consistency that permit the annular space of the pipe joint to be completely filled.

C.) Corrugated Steel (For Corrugated Steel Pipe Only)

Corrugated steel bands shall be used and installed according to the manufacturer's recommendations and specifications.



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10.3 MANHOLE, CATCH BASIN AND INLET BLOCK AND BRICK

Brick shall be made of clay or shale, and shall be whole, thoroughly and evenly burned, of close and uniform texture, free from cracks and warps, with true even faces and uniform in shape and size. Brick shall show a minimum average compressive strength of 2,000 pounds per square inch and an average absorption water in twenty-four (24) hours of not more than 22% of the dry weight.

Concrete brick shall conform to the current requirements for concrete building brick of A.S.T.M. C-55-75, Grade N-1.

Concrete block for manholes, catch basins, and inlets shall conform to current A.S.T.M. C139-73, with the following exceptions.

A.) Shape

The blocks shall be solid curved blocks with the inside and outside surfaces curved to the required radii. The blocks shall have tongue and groove or other approved type of joint at the ends so that the units interlock to form a strong, rigid structure. Curved blocks shall have the inside and outside surfaces parallel.

B.) Size

The nominal dimensions of the block shall be 18 inches maximum for length, 8" maximum for depth (height), and 6 or 8 inches minimum for width (thickness) as specified on the detail sheet. The length shall be measured along the chord on the convex face of the block. The tolerances of A.S.T.M. C139-73 shall apply. Where the specified wall thickness on the standard plans is 12 inches, a multiple block wall of two 6-inch wide blocks is permitted. All blocks in one structure shall be of the same height dimension. The blocks shall be designed for lengths so that the only full length or half-length blocks are required to lay the circular wall of any one course.

Blocks intended for use in the cones or tops of manholes or other structures shall have such shape as may be required to form the structure as shown on the plans with inside and outside joints not to exceed 1/4 inch in thickness.

The mortar shall be composed of one (1) part of combination of Portland Cement and hydrated lime and three (3) parts of fine aggregate, by volume. The combination of cement and lime shall consist of 90% of Portland Cement and 10% of hydrated lime, by volume. In lieu of the above combination of cement and lime, a standard brick mortar cement may be used if approved by the Engineer.

10.4 PRECAST MANHOLES:

All precast manhole sections and bases shall be 4000 pounds per square inch concrete, as determined by core test or cylinders.

Unless otherwise noted on the drawings or in the supplemental specifications, precast reinforced concrete manhole sections shall meet the requirements of current A.S.T.M.C-478.

Precast manhole tees for 48" and larger sewers shall be the same class pipe as that specified on the plans, but shall be a minimum A.S.T.M. C-76 Class IV. The manhole riser shall meet the requirements of current A.S.T.M. C-478.

The top section shall be an eccentric cone with one straight side (with manhole steps installed in straight side at factory), having a top face a minimum of 8 inches wide. The top section shall be

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set at an elevation to provide for 3 courses of brick between the top face and the manhole frame when set to grade, unless a watertight bolted frame and cover are required. When specifically called for, precast manhole sections shall have a modified grooved tongue with rubber gasket. All other precast manholes shall be standard tongue and groove using mastic joint material equal to DeWitt No. 10. All interior joints shall be pointed with mortar and all visible leaks must be stopped.

10.5 TEST OF PIPE:

A test certificate from an independent testing laboratory showing strength of pipe when tested in accordance with current A.S.T.M. Standards shall be submitted to the Engineer before pipe is delivered to work. One Certificate shall be furnished for each size of pipe. The Engineer may require additional tests of pipe stored at the plan or delivered to the job, should he have reason to believe that inferior pipe is being delivered on the work site. The cost of such test shall be borne by the Contractor. Pipe supplier shall also furnish certificate stating that all pipe supplied was manufactured from substantially the same material and in the same manner as pipe tested and all pipe delivered to site shall have the test stamp of the testing laboratory making such tests.

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SPECIAL PROVISION FOR INSPECTION CREW DAYS

It shall be the responsibility of the bidder to extend as a bid item in his proposal, when called for, the number of inspection crew days he requires for the completion of the project, times the unit price for inspection. The basis of computing crew days shall be as follows:

Crew days shall be defined as on construction inspector working 8 hours, and shall be billed in 4-hour increments rounded to the next half day as defined below:

Total Hours Worked	Crew Days Charged
When an inspector reports to the project and the Contractor decides not to work, or does not appear for work, weather permitting.	-One-half (1/2) crew day
Under 4 hours	-One-half (1/2) crew day
4 hours to under 8 hours	-One (1) crew day
Over 8 hours through 12 hours	-One and one-half (1-1/2) crew days
Over 12 hours	-2 crew days

If the Contractor cancels work for any given scheduled work day and the Contractor does not provide notice to the Engineer before 5:00pm the day prior to the work stoppage, 0.25 crew days (2 hours) shall be accrued against the Crew Day bid item. It is the Contractor's sole responsibility to assure that any cancellation notification has been received.

The above listed hours are only for the usual working days of Monday through Friday.

All Saturday work shall multiply the number of crew days by a factor of 1.5. All Sunday work shall multiply the number of crew days by a factor of 2.0.

All Holiday work shall multiply the number of crew days by a factor of 2.0. Holiday work shall include all legal holidays, national, state, county, and City election days and any other day when the City Hall of the City of Farmington Hills is officially closed.

The amount bid shall be included in comparative evaluation of the bids. **OMISSION OF THIS ITEM, WHEN CALLED FOR, SHALL BE CAUSE FOR REJECTION OF THE BID.**

If the number of crew days exceeds that amount bid by the Contractor, the City shall subtract the amount of excess from the Contractor's payments. In the event that the number of crew days required is less than the amount bid, the excess shall be paid to the Contractor.

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> On pay estimates, the actual number of crew days performed will be entered as a line item under estimated quantities. This is a deduct item when the number of crew days exceed the Contract amount and resulting item price will be deducted from the monies due. This amount will be retained by the City for inspection services performed.

If the quantity of work under the Contract varies from that stated in the Proposal, the number of "crew days" allowed under the bid item shall be increased or decreased, in proportion to changes in the total value of work under the Contract. This revision in the number of crew days shall be agreed upon at the time the Contract quantities are revised.

The Contractor shall give the City Engineer at least 48 hours notice, exclusive of Saturdays, Sundays, or holidays, when the project requires an increase or decrease in the number of inspectors. Failure to observe this requirement will either necessitate the charging one-half a crew day if the inspector appears on the project or the halting of all additional operations until an inspector is available. Unless the inspector is notified in advance, crew days will be charged when an inspector appears on a project and the Contractor decides not to work. A separate crew day or a partial crew day shall be charged for each and every Engineering Aide or Engineer employed on a project for inspection purposes.

The number of Engineering Aides or Engineers required for the complete inspection of any project shall be as determined by the City Engineer.

One Engineering Aide or Engineer shall be assigned to each construction crew or each operation listed under "Operations to Which Crew Days shall be Charged".

OPERATIONS TO WHICH CREW DAYS SHALL BE CHARGED

- General a)
 - 1. Material Testing (not the operations done by a testing laboratory).
 - 2. Checking barricades and lighting.
 - 3. Checking maintenance of traffic.
 - 4. Emergency conditions as determined by the Engineer.

b) Cleanup and Complaints

- Replacement of driveways, sidewalks, pavement, etc.
- 2. Checking restoration and answering complaints.

With cooperation from the contractor, one Inspector or Engineering Aide can check ditching, seeding, sodding, and general cleanup in one location.

c) Water Mains and Appurtenances

- Excavation. 1.
- 2. Laying of mains.
- 3. Installing valves and hydrants.
- Tunneling, jacking or boring of water mains. 4.
- 5. Backfilling of trenches.
- 6. Restoration of existing conditions.
- 7. Cleanup.
- 8. Pressure testing.
- 9. Cleansing and Disinfecting.
- Checking final installation for conformance to specifications 10.

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prior to releasing for connections to be made.

The same Inspector may inspect the installation of hydrants, thrust blocks, gate wells, etc. in the proximity of the pipe laying operation, provided the Contractor cooperates to the extent that no portion of the work is covered prior to inspection.

d) <u>Concrete Pavement</u>

- 1. Excavation and preparation of the site.
- 2. Mucking and filling ditches.
- 3. Pavement removal.
- 4. Sub grade preparation and fine grading.
- 5. Adjusting and reconstructing existing structures.
- 6. Sub base construction.
- 7. Checking form alignment and grade.
- 8. Placing of concrete.
- 9. Constructing compression cylinders.
- 10. Finishing of concrete.
- 11. Placing of cold weather protection.
- 12. Sawing and sealing.
- 13. Finish grading.
- 14. Coring finished pavement (1 crew day will be charged for each 12 cores taken).

NOTE: Periodic inspection of the batch plant will be made, but no crew days will be charged.

- 15. Adjusting existing driveways and sidewalks.
- 16. Seeding and mulching.
- 17. Restoration.
- 18. Site cleanup.
- 19. Checking of final pavement prior to final acceptance for conformance to specifications.

e) <u>Sanitary and Storm Sewers and Appurtenances</u>

- 1. Excavation and preparation of the site.
- 2. Checking sewer pipe.
- 3. Installing pipe bedding.
- 4. Laying pipe.
- 5. Installing house leads.
- 6. Checking relocation of sanitary house leads.
- 7. Tunneling, jacking or boring of sewer.
 - i) Mining operation
 - ii) Placement of concrete.
 - One inspector in tunnel.
 - One inspector top side.
- 8. Constructing manholes, catch basins and inlets.
- 9. Backfilling.
- 10. Restoration.
- 11. Infiltration or ex-filtration tests.
- 12. Site cleanup.
- 13. Final checking of sewers prior to releasing for connections to be made or placing in service.

PURCHASING DIVISION
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The same inspector may inspect the installation of manholes, catch basins, inlets, etc. in the proximity of the pipe laying operation, provided the Contractor cooperates to the extent that no portion of the work is covered prior to inspection.

f) Reinforced Concrete Structures

- 1. Excavation for structure.
- 2. Sheeting.
- 3. Checking forms and re-steel.
- 4. Placing of concrete.
- 5. Backfilling around structures.
- 6. Checking installation of equipment.

g) Asphalt Paving and Pavement Resurfacing

- 1. Excavation.
- 2. Preparation of sub grade.
- 3. Construction of base.
- 4. Preparation of existing pavement.
- 5. Priming base course.
- 6. Construction of bituminous concrete pavement or surface.
- 7. Checking of materials.
- 8. Checking of asphalt plants.
- 9. Checking of final pavement for conformance to specifications.
- 10. Restoration.
- 11. Site cleanup.

h) <u>Inspection Rates</u>

 $1/4 \, day = \$275.00$

1/2 day = \$550.00

1 day = \$1,100.00

i) Operations to Which Crew Days shall be Charged

All items and operations in the proceeding specifications that are necessary for the completion of the project.

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CITY OF FARMINGTON HILLS

CLAIM FOR EXTRA COMPENSATION OR EXTENSION OF TIME

The Contractor must sign and submit a claim for extra compensation or time extension to the City/Engineer, whether on behalf of the Contractor or any subcontractor. If the Contractor fails to submit a claim in accordance with this Special Provision, the Contractor waives its rights to compensation or an extension of time for the claim. The Contractor shall use the following procedure for claims:

- A. **Notice of Claim.** The Contractor must sign all notices of intent to file a claim and ensure that the written notices include a concise description of the claim and identifies the contract requirement in dispute. If seeking extra compensation for any reason not specifically covered elsewhere in the contract, the Contractor must notify the Engineer in writing in accordance with the following time requirements:
 - 1. Before beginning the work or upon encountering the circumstance that is the basis of the claim.
 - 2. Within 7 calendar days after the beginning of a delay, for which the Contractor intends to seek compensation or request for extension of time.

If the Contractor fails to provide written notice, the Contractor waives all rights to a claim for compensation or an extension of time. If the Contractor fails to provide written notice for extra compensation or if the Contractor fails to allow the Engineer to record accounts of actual costs, the City's claims process decision regarding extra compensation will be considered final and binding.

The City/Engineer will not consider the Contractor's refusal to sign a written contract modification or work order, or the Contractor's signing of a contract modification or work order, as the required written notice.

- B. **Keeping Records.** If submitting a written notice of intent to file a claim, the Contractor must:
 - 1. Keep accurate records of the costs of the work or delay
 - 2. Allow the Engineer every facility for keeping records regarding the costs of the work or delay related to the project specific delay
 - 3. Compare records with the Engineer and bring them into agreement at the end of each day
- C. **Timing for Filing of Claim.** The Contractor must file a claim with the Engineer no later than 14 calendar days after the work involved in the claim is completed, or delay, loss of productivity, or similar event is terminated.
- D. **Claim Content.** The Contractor's and Subcontractor's claims must include the following information as applicable:
 - 1. A detailed statement of the claim providing necessary dates, location and items of work related to and included in the claim.
 - 2. The date or dates on which actions resulting in the claim occurred or conditions resulting in the claim became evident.
 - 3. Project specific documentation substantiating the Contractor's claim.
 - 4. Identification of the provisions in the contract that support the claim and a statement of the reasons these provisions support the claim.
 - 5. A detailed compilation and a breakdown of the amount of additional compensation including:
 - a. Documented additional labor costs
 - b. Documented additional material costs

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- c. List of additional equipment costs, including each piece of equipment and the rental rate claimed for each
- d. Markups for items a through c
- e. Other additional direct project costs or damages and associated supporting documentation
- 6. For a claim related to an extension of time, a detailed compilation of the specific dates and the exact number of calendar days sought for the extension of time, the basis for entitlement to time for each day, all documentation of the delay, and all impacts of the delay to the progress schedule and critical path.
- E. Extension of Time Due Material Shortage. In the event the Contractor files an extension of time request, due to an industry wide material shortage or supply issue, the Contractor must notify the Engineer in writing the intent to file a claim within 7 calendar days from the date the Contractor was made aware of the industry wide material shortage or supply issue. When the claim is filed, the Contractor must include industry specific documentation supporting that there is an industry wide material shortage or supply issue impacting the project and all other supporting information as noted in this Special Provision. If the claim is determined to be caused by an industry wide material shortage or supply issue, the City is amenable to grant the extension of time waiving any liquidated damages that would be assessed, assuming the Contractor is willing to forego all entitlements to additional compensation or costs related to the material shortage or supply issue.

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NOTICE TO BIDDERS MDOT SPECIFICATION REFERENCES

Specifications and Contract Pay Items

Construction of this project shall be in accordance with the Michigan Department of Transportation 2020 Standard Specifications for Construction except as noted in the special provisions, specifications and conditions.

All contract pay items found in the proposal shall be constructed based on the Michigan Department of Transportation 2020 Standard Specifications for Construction. This shall apply at all times, unless the pay item is designated with a "Special". If this designation is present, there has been a special provision written for that pay item. This special provision can be found in the contract specification book under the section "Special Provisions".

Frequently Used Special Provisions, Notice to Bidders and Supplemental Specifications

All references to the "Department" in the Michigan Department of Transportation 'Notice to Bidders', 'Frequently Used Special Provisions' and 'Supplemental Specifications', which are referenced in these specifications, shall indicate a reference to the City of Farmington Hills.

The following MDOT Special Provisions, Notice to Bidders, and Supplemental Specifications apply and should be considered included in these Contract Documents:

Notice to Bidders

• 20NB03

Supplemental Specifications

• 20SS-001A-14

Frequently Used Special Provisions

- 20SP-107A-01
- 20SP-204B-01
- 20SP-208A-01

- 20SP-208B-01
- 20SP-302A-01

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NOTICE TO BIDDERS MOBILIZATION

DESCRIPTION

Mobilization shall follow Section 110 of the 2020 Michigan Department of Transportation Standard Specifications and as specified herein.

MEASUREMENT AND PAYMENT

The cost of Mobilization as part of this contract shall be included in and incidental to all pay items that are part of this contract and will not be paid separately.

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NOTICE TO BIDDERS **DUST CONTROL**

DESCRIPTION

Dust control shall follow Section 922.12 of the 2020 Michigan Department of Transportation Standard Specifications and City of Farmington Hills Standards, and/or as specified herein.

MATERIALS AND CONSTRUCTION

Water shall be used as the primary agent for dust control. When calcium chloride is used to control dust, materials shall be as described in Section 922.12 of 2020 Michigan Department of Transportation Standard Specifications, as deemed necessary by the Engineer.

When required by the Engineer, each occurrence shall include dust control, regardless of type, for the entire length of the project of two-lane road.

Upon receipt of a dust control request from the City Inspector or agent, the Contractor shall have four (4) hours to provide dust control. Following the four (4) hour time frame the City will consider using the services of a private dust control contractor or City forces and deduct the cost of their services from the project payment total.

MEASUREMENT AND PAYMENT

The cost of dust control as part of this contract shall be included as incidental to other pay items in this contract and will not be paid separately.

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NOTICE TO BIDDERS WATER USAGE

All water used in connection with the project shall be obtained from the local water department or water source approved by the Engineer. The Contractor shall secure all necessary permits and shall bear all expenses of such permit for the water used. Any costs associated with this work shall be incidental to the project and will not be reimbursed. Please note that fire hydrant usage will not be allowed. The Contractor may obtain water from one of the following:

- A. Contractor shall apply for a Temporary Water Use Permit from the Oakland Water Resources Commissioners Office (WRC) with the option of :
 - 1. Make a temporary connection within an existing gate well.
 - 2. Have WRC representative make a temporary tap to the existing water main.
- B. Contractor shall apply for a Water Hauling Permit from the Oakland Water Resources Commissioners Office (WRC) and fill up his water tanker at the City of Farmington Hills water hauling station located at the DPW yard (27245 Halsted Road). Please note that the water hauling station has limited days and times of operation.
- C. Where water is not available from a local water department, the Contractor shall obtain his own source of supply, the source and quality of which shall be subject to the approval of the Engineer.

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PROGRESS CLAUSE

a. General

Submit a complete, detailed and signed, Progress Schedule, to the Engineer. The Engineer for this project is as follows:

Jim Cubera, P.E. City of Farmington Hills 31555 W. Eleven Mile Rd Farmington Hills, Michigan 48336 248-871-2569 jcubera@fhgov.com

The progress schedule submittal must include, as a minimum, the controlling work items for the completion of the project and the planned dates (or work days for a work day project) that the work items will be the controlling operations. All contract dates including open to traffic, project completion, interim completion and any other controlling dates in the contract must be included in the progress schedule.

After receiving Notice of Award, start work on a date agreed upon with the Engineer. In no case, may any work be commenced prior to receipt of formal notice of award by the City.

The pre-construction meeting will be arranged by the Engineer. The named subcontractor(s) for Specialty and/or Designated items (if such items are designated in the proposal), which materially affect the work schedule, shall also be present at the scheduled meeting. The meeting will be conducted after project award and may be rescheduled if there are delays in the award of the project.

No extensions of time will be allowed for increases in contract quantities or extra work, until it can be shown that such increases or extras affect the critical item of work.

No extension of time will be granted for labor disputes, unless it can be shown that such disputes are industry wide and that the delay affects the critical item of work.

No extension of time will be granted as a result of work stoppages ordered by the City for Contractor non-compliance.

No extension of time will be granted for delays in delivery of critical materials, unless the delay can be shown to be industry wide and the delay affects the critical item of work.

The Contractor shall be expected to mobilize sufficient labor and equipment to complete the project within the specified time frames.

Failure on the part of the Contractor to carry out the provisions of the Progress Schedule, as established, may be considered sufficient cause to prevent bidding future projects until a satisfactory rate of progress is again established.

The Contractor shall attend regular bi-weekly construction progress meetings throughout the duration of construction and shall provide updates to the Engineer that shall include work completed to date, a two-week outlook for upcoming work, and any necessary updates regarding the Milestone dates identified herein.

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The Contractor may be required to meet with City representatives for a post-construction review meeting, as directed by the Engineer. The Engineer will schedule the meeting.

The Contractor must comply with all local ordinances (noise, etc.) as described in the Special Provision for Maintaining Traffic

b. Milestones

1. Approved for Traffic:

All contract work must be complete including the placement of restoration items and the road designated Approved for Traffic **186 calendar days from start of construction or by October 18, 2024**, whichever is sooner. This shall include HMA or concrete paving, curb and gutter, storm sewer, restoration, and permanent signs.

2. Substantial Completion

Other than the delayed acceptance requirements for Turf Establishment, the entire project, including punch list items and placement of permanent soil erosion control items shall be completed **207 calendar days from start of construction or by November 8, 2024, whichever is sooner.** Punchlist items shall be completed within 3 weeks of procurement by the Engineer.

3. Contract Completion

All contract work shall be complete, including the delayed acceptance requirements for Turf Establishment **424 calendar days from start of construction or by June 13, 2025, whichever is sooner,** excluding normal seasonal shutdown period between November 15, 2024 and April 15, 2025.

c. Liquidated damages for failure to meet milestones

Failure on the part of the Contractor to meet each of the above milestones by the date or duration specified shall result in the assessment of Liquidated Damages against the Contractor as provided in Section 108.10, Liquidated Damages, of the MDOT 2020 Standard Specifications for Construction.

Liquidated Damages will continue to be assessed for each calendar day or portion of a day that this work remains incomplete even if these days extend beyond the normal seasonal shutdown date of November 15, 2024.

d. Work day, hour, and other work restrictions imposed by local communities

The work hours described may be modified or changed by the Engineer due to Holidays, Special Events, or Traffic Volumes.

- 1. Contractors operations shall be limited by local municipality work time, noise, and dust ordinance unless approved by the local municipality and the Engineer in writing.
 - City of Farmington Hills: The Contractor is required to prosecute work under this contract during the hours of daylight. In accordance with the City of Farmington Hills ordinance, working hours in which noise can be made are 7:00 am to 7:00 pm, Monday thru Saturday. When it is determined that special circumstances exist or it is in the best interest of the City, allowances may be made to allow construction in non-residential areas only, or where there is a threat to public health, safety, or welfare outside the designated hours of work. For this to occur, permission must be given in writing and authorized by the City Manager or Director of Public Services prior to the start of construction. A copy of the written authorization shall be forwarded to the Police Department. The contractor/subcontractor/builder receiving the authorization shall keep a copy of the authorization at the construction site at all times.

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2. No work unless approved by the Engineer, shall be performed during the follow holiday periods:

2024

- Memorial Day Monday, 5/27/2024 at 7 am to Tuesday, 5/28/2024 at 7am
- July Fourth Thursday, 7/4/2024 at 7 am to Friday, 7/5/2024 at 7 am
- Labor Day Monday, 9/2/2024 at 7 am to Tuesday, 9/3/2024 at 7 am

2025

• Memorial Day – Monday, 5/26/2025 at 7 am to Tuesday, 5/27/2025 at 7am

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PROJECT COORDINATION

The Contractor is hereby notified that there may be other construction projects, not associated with this project, scheduled for construction during the same timeframe as this project within the local vicinity.

The follow is a listing of known road construction projects within the local vicinity that may have an impact on this project. Please note that this listing may not be complete, and the Contractor shall verify any other projects within the local vicinity that may impact this project.

No known projects within the area.

The Contractor shall coordinate its work on this project with that by the Contractor on other projects, as directed by the Engineer. No additional compensation will be allowed for costs incurred by the Contractor due to coordinating with or delays caused by other projects.

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CITY OF FARMINGTON HILLS

SPECIAL PROVISION FOR PERMITS

a. Description

The Contractor shall observe and follow all permit(s) required for project construction in accordance with Section 107.02, Permits and Licenses, of the 2020 Standard Specifications for Construction. The City of Farmington Hills (Owner) has applied for the following permit(s) which shall be obtained by the Contractor.

In addition, the Contractor shall adhere to the specifications in this proposal and details included in the plans, as required by the permit(s).

b. Materials

All work must be in accordance with the contract documents.

c. Construction

Refer to Table 1 on page 2.

d. Measurement and Payment

Permit and inspection fees assessed by the respective agencies from Table 1 shall be paid for by the following pay item.

Pay Item	Pay Unit
Reimbursed Permit Fees	Dollar

The completed work as measured for **Reimbursed Permit Fees** shall include actual permit and/or inspection fees only as assessed by the permit issuer. The Contractor is required to submit receipts to the Engineer for reimbursement.

The Contractor shall comply with the requirements of the Soil Erosion and Sedimentation Control Act of the State of Michigan, Act 347 of P.A. of 1973 and with all requirements, rules, and standards of the County of Oakland and the City of Farmington Hills. Soil Erosion Controls shall be provided as shown on the plans and as directed by the City Representative. Note that in order to be paid for this item, specific soil erosion and sedimentation control measures must be in place and maintained throughout the duration of the project.

Permit fees will be reimbursed once applicable receipts are received by the Engineer. This pay item will not pay for refundable construction bonds nor will it pay for refundable inspection escrows necessary to facilitate any permit. The Contractor shall consider any bonding or escrows necessary incidental to the project. Furthermore, the Owner shall be held harmless from any loss of construction bond or inspection escrow.

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Table 1: Permits and Fees

Further action required by Contractor	Reference Number	Issuing Agency	Permit and Work Type	Bond	Insurance	Fees	Notes
No	PSESC230063	City of Farmington Hills	SESC	See Permit	See Permit	None	See permit for Conditions
See Permit	0228-2023	Oakland County Water Recourses Commission (OCWRC)	Manhole Structure Adjustments	See Permit	See Permit	\$2000	See permit for Conditions
See Permit	TBD	Road Commission for Oakland County (RCOC)	ROW – Constructio n Signing	See Permit	See Permit	TBD	See permit for Conditions

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SPECIAL PROVISION FOR MAINTAINING TRAFFIC

a. Description.

This project is located in the Heritage Hills and Wedgwood Commons subdivision south of 14 Mile Road between Drake Road and Farmington Road in the City of Farmington Hills.

The project area will be constructed under road closure and provide access for local traffic only.

The project area, except for North Park Drive (STA 77+50 to POE), will be constructed under full width road closure in eight (8) stages. North Park Drive (STA 77+50 to POE) shall be constructed under part width road closure. The Contractor shall accommodate both vehicular and pedestrian traffic as provided in these specifications, as indicated on the plans, and as directed by the Engineer.

b. General

Detours shall be maintained by the Contractor throughout the project as shown on the plans, attachments, and in accordance with Subsections 104.07, 104.11 and Section 812 of the Michigan Department of Transportation 2020 Standard Specifications for Construction, including any supplemental Specifications, and any special provisions in this proposal. All traffic devices and their usage shall conform to the Michigan Manual on Uniform Traffic Control Devices (MMUTCD), 2011 edition, as amended.

- 1. **Notice of Traffic Control** The Contractor shall notify the Engineer, City of Farmington Hills, and the local police and emergency agencies, transit bus agencies, school bus agencies and cities a minimum of five business days prior to implementation of any detours, ramp closures, lane closures or major traffic shifts.
- 2. Coordination of Work The Contractor shall coordinate this work with other Contractors, other Contractors performing work within or adjacent to the Construction Influence Area (CIA), to avoid conflicts in the maintenance of traffic, construction signing, and to provide for the orderly progress of contract work. Refer to the Special Provision for Project Coordination located elsewhere in this proposal for more information regarding area projects, if any.
- 3. **Road Maintenance** Farmington Hills or contract maintenance agencies may perform maintenance work within or adjacent to the Construction Influence Area (CIA). These agencies will coordinate their operations with the Engineer to minimize the interference to the Contractor. No additional payment will be made to the Contractor for the joint use of the traffic control items or for delays and/or inefficiencies resulting from maintenance activities.
- 4. To maintain the mobility of traffic and pedestrians, every attempt should be made to follow the maintaining traffic plans, maintaining traffic typicals, and specifications provided. Any change of, or variation from the maintaining traffic plan shall be approved by the Engineer prior to implementation.
- 5. The Contractor shall maintain all garbage/refuse/recycling pickup. This may require the Contractor to move all containers, bins, and/or bags as required to the other side of the road or outside the road closure limits, as well as moving containers and bins back to their original location for residents to retrieve them. This will not be paid for separately but shall be included in other items of work.
- 6. All mailboxes disrupted, removed, or disturbed during the course of construction shall be temporarily relocated and reset to a serviceable location as agreed to by the USPS mail carrier and as directed by the Engineer. This temporary relocation shall occur immediately after the disruption, removal or disturbance of

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such mailbox in order that mail service may be continuously maintained. This will not be paid for separately but shall be included in other items of work.

c. Construction Influence Area.

In addition to the definition in the MDOT Standard Specification for Construction, the Construction Influence Area (CIA) shall include the area within the road right-of-way, including intersecting roadways or ramps, to the limits of advanced construction signing, or any other signs that pertain to this location. In addition, the CIA includes the right-of-way of any designated detour route, intersecting road or ramp adjacent to the work zone as far as the construction detour signing extends.

d. Traffic Restrictions

The road shall be closed to through traffic with local traffic maintained with a physical closure implemented where vehicular traffic cannot pass. The Contractors operations shall be limited by local municipality time and noise ordinances as stated in the progress clause.

- 1. Access to Private Property
 - A. During Construction, access shall be maintained to all business and residential driveways at all times as defined by the Engineer.
- 2. Working within Intersections
 - A. Use flag control for cross street traffic as directed by the Engineer. Additional flaggers used at unsignalized intersections and driveways, as directed by the Engineer, shall be included with the Traffic Regulator Control pay item. Only uniformed police officers may override active traffic signals.
- 3. Construction Traffic
 - A. Construction traffic shall utilize Drake Road, 14 Mile Road, Regency Lane, Spring Hill Road, and Claymore Road only to access all stages.

e. Construction Staging/Phasing

Complete work for the each roadway as detailed below. Each road shall be constructed separately unless directed by the Engineer. Access to all driveways shall be maintained at all times throughout the project and staging operations.

General Notes:

- 1. The contractor shall perform work from pavement removal through placement of aggregate base (21AA) in a train-like manner. The contractor shall not leave more than 800 feet of grade without new aggregate base (21AA) or existing pavement each evening. Aggregate base (21AA) hard closures, with type III barricades, will be placed at each end of the open limit by the contractor. Fresh concrete shall be placed such that any property within the placement limits shall be no more than 800 feet from any end of placement on a through street (ingress/egress).
- 2. Construction traffic shall utilize Drake Road, 14 Mile Road, Regency Lane, Spring Hill Road, and Claymore Road only to access all stages.
- 3. Once the roadway is paved, no construction traffic is allowed on that paved road.
- 4. Maintenance aggregate shall be used for resident access as directed by the Engineer or inspector.
- 5. In areas that are considered by the Engineer as untraversable for pedestrians, the contractor will need to provide a temporary pedestrian path. Locations for this temporary pedestrian path will be shown on the plans and/or asdirected by the Engineer in the field.
- 6. The portion of North Park Drive in Stage 5 from Verona Street (STA 77+50) to POE shall be constructed part width.

Sequence of Construction Notes:

1. Work is to be done in a train-like manner to limit the amount of untraversable roadway. Removals, base work, and paving is to be done at full width.

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- 2. For all stages, paving shall commence within 7 days of completion of initial placement of aggregate base (excluding sweetening and final trimming/grading) for that stage, or as approved by the engineer.
- 3. Stages shall be sequential. A stage shall be completed as defined in 'Activity 1' below before starting the next stage (i.e. Stage 1 shall be completed before start of Stage 2), unless otherwise directed by the Engineer. For the purposes of this project, 'completed' is defined as finishing 'Activity 1' in the 'sequence of construction' listed below for an entire stage. the City retains the right to modify staging at any time during construction in order to maintain residential access.
- 4. Restoration shall be completed sequential (Stage 1 shall be completed before moving on to Stage 2). Restoration work shall begin within 7 days of driveway paving being completed.

Sequence of Construction Activities per Stage

- 1. Pavement removal, excavation, sewer, underdrain, geotextile (if applicable), 1x3 stone, and 21AA aggregate for 800-foot work area or as-directed by the Engineer (following placement of aggregate base, residents shall be provided access to their driveways using maintenance gravel).
- 2. Repeat 'Activity 1' in 800-foot work area increments until stage is complete.
- 3. Pave (within 7 days of completion of initial aggregate base placement, excluding sweetening or final trimming/grading) for that stage. Pave full width including integral curb. Pave driveways and install restoration after concrete has achieved strength (2,800 psi).

Project Staging Plan

Stage 1:

- Quaker Way (POB to POE)
- Mirlon Drive (POB to POE)

Stage 2:

- High Valley Road (POB to POE)
- Old Timber Road (Spring Hill Road to POE)

Stage 3:

- Spring Hill Road (Eyebrow to POE)
- Old Timber Road (POB to Spring Hill Road)
- North Park (POB to Verona Street)

Stage 4:

• Spring Hill Road (POB to Eyebrow)

Stage 5:

- Regency Lane (Westwood Road to POE)
- North Park Drive (Verona Street to POE) Constructed part width)

Stage 6:

- Regency Lane (Claymore Road to Westwood Road)
- Westwood Road (POB to POE)

Stage 7:

- Regency Lane (Squire Road to Westwood Road)
- Claymore Road (POB to POE)

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Stage 8:

- Regency Lane (Claymore Road to Westwood Road)
- Squire Lane (POB to POE)

Any additional traffic control devices required as a result of contractor requesting to conduct work operations different from the above schedule will be at the Contractors expense. Payment for the staging will be paid for using Contractor-provided *Traffic Regulator Control, Minor Traf Devices, Sign, Type B, Temp, Prismatic, Furn, Sign, Type B, Temp, Prismatic, Oper and Plastic Drums* as directed by the Engineer.

f. Pedestrian Access

- 1. Pedestrian access shall be maintained throughout the project and detoured where access is prohibited.
- 2. For areas that are determined to be "untraversable" by pedestrian traffic during each phase, a temporary pathway will be constructed in locations as shown on the plans and built to the specifications included in the project details as directed by the Engineer.

g. Traffic Control Devices

- 1. General
 - A. All traffic control devices moved to facilitate the Contractor's operation shall be reset by the end of the work day. The Contractor shall routinely maintain all traffic Control devices. Routine Maintenance includes, but not limited to, maintaining proper placement, replacing damaged devices and cleaning. The Contractor shall be responsible for reviewing the adequacy and maintenance of all traffic control devices at least once per day every day for the duration of this project. Weekly Service Reports shall be made available to the Engineer upon request for review and payment.
 - B. All traffic control devices, except Portable Changeable Message Signs (PCMS) and lighted arrows, must be approved by FHWA and MDOT as meeting NCHRP 350 crashworthy requirements and meet acceptable criteria as defined in the current American Traffic Safety Service Association (ATSSA) publication entitled, Quality Guidelines for Traffic Control Devices and Features.
 - C. The Contractor shall notify the Engineer at least 72 hours in advance of erection or removal of signs.

2. Signs

- A. All diamond signs shall be 48 in x 48 in, unless otherwise noted.
- B. Mount all temporary signs, regardless of size, that will be in place for more than 14 days on driven posts. Place ground driven sign systems as described in MDOT plan WZD-100 Series. Temporary signs less than or equal to a 20 square foot sign area that will be in place for less than or equal to 14 days may be mounted on driven posts or on portable systems with bases adequately sandbagged against overturning.
- C. Distances shown between construction warning, regulatory and guide signs shown on the plans, or any typicals referred to by the plans, are approximate and may require field adjustment, as directed by the Engineer. Contact the Engineer, to be present or have a representative present as temporary signs are placed or installed to assure proper placement. Signs improperly placed or installed by the Contractor without the Engineer's representative present shall be relocated and reinstalled by the Contractor as directed by the Engineer without extra compensation.
- D. The location and placement of the permanent signing shall be marked in the field by the Engineer. The contractor shall notify the Engineer a minimum of two weeks in advance of when permanent signing will be needed. In the event that the Engineer is unable to layout the signs, the Contractor will layout Permanent signing locations for review and approval of the Engineer.

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3. Pavement Markings

A. All temporary and permanent pavement markings shall be placed by the Contractor but shall be laid out in the field by the Engineer. The contractor shall notify the Engineer a minimum of one week in advance. Before placing markings, the contractor shall broom clean all pavements to be marked with any costs included in the pavement marking pay items.

5. Channelizing Devices

A. Channelizing Devices, 42 inch may be utilized where lane widths may narrow to under 10 ft during construction.

h. Contractor Responsibilities – Construction signing (Lead-in, Detour Route, Work Zone, and Signal Staging)

- 1. All related construction signing, including lead-in or advanced warning signing, shall be provided, erected, and maintained by the Contractor. The contractor will be responsible for providing and erecting all signs including lane closure devices/signing for maintaining traffic.
- 2. Coverings: The Contractor shall uncover and cover signs which need covering at any time as directed by the Engineer, paid as Sign Cover (Ea).
- 3. Sandbags: The Contractor shall place a minimum of eight sandbags on any and all signs and devices not inserted into the ground to prevent movement.
- 4. Lights: Attach and maintain two (2) steady burn amber lights (type "C") on each Type III barricade, if any are indicated on Construction Signing Diagram.
- 5. Maintenance of Signs: The Contractor shall maintain all signs and devices as directed by the Engineer (including but not limited to cleaning, re-erecting fallen signs and devices, replacing damaged or dead lamps, moving non-ground-inserted signs and devices, etc.). The Contractor shall reimburse the City for the cost of any and all temporary and or permanent traffic signs and or devices the Contractor may damage. All City-supplied signs and devices shall remain the property of the City and will be removed from the project by the City upon completion as directed by the Engineer.
- 6. City Signs and Devices: Temporarily reset existing traffic control and street-name signs as directed by the Engineer. Upon completion of the work that required the temporary relocation, replace or reset all such signs in their original locations as directed by the Engineer upon construction completion. The Contractor shall reimburse the City for the cost of any/all permanent traffic signs and/or City-owned devices the Contractor may damage.

i. Contract Adjustment - Signs and Traffic Devices.

- 1. Multiple mobilizations for both existing and temporary construction sign removals will be required and are included in the respective pay items.
- 2. Any temporary construction signs, traffic devices, and related appurtenances pertaining and only relevant to a stage that has been completed must be removed on the day of the switch to the subsequent stage. This includes detour and road closure signs that no longer apply due to "opening to traffic". Failure to do so will result in the Contractor being assessed a negative adjustment of \$500 per calendar day for each day that those signs and/or devices remain. These removals will not be paid for separately, but are included in the original items of work.
- 3. All temporary construction signs, traffic devices, and related appurtenances must be removed from the project no later than the date identified in the Progress Clause for the completion of the placement of final restoration items and/or when remaining items of work are minor and can be completed by the Contractor by daily construction zone signing, as determined by the Engineer. Failure to do so will result in the Contractor being assessed a negative adjustment of \$500 per calendar day for each day that those signs and/or devices remain. These removals will not be paid for separately, but are included in the original items of work.

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- 4. Any permanent signs and related appurtenances designated by the Engineer as inappropriate for a stage will be removed on the day of the switch to that stage. Failure to do so will result in the Contractor being assessed a negative adjustment of \$500 per calendar day for each day that those signs remain. This work will be paid for as Sign, Type _, Rem and Sign, Type _, Erect, Salvage.
- 5. If the Engineer invokes corrective action by others, the Contractor will be charged accordingly any costs incurred to complete the required corrective action by the City including labor, equipment, and material costs.

j. Measurement and Payment.

The estimate of quantities for maintaining traffic on this project is based on the suggested sequence of operations. Payment shall be in accordance with Sub-Section 812.04 of the 2020 Standard Specifications for Construction and any supplemental specifications unless otherwise specified.

- 1. Temporary traffic control devices must be removed within 10 calendar days of receiving written notice from the Engineer. The City reserves the right to remove the devices after 10 days with any associated costs being the Contractor's responsibility
- 2. Payment for quantities used to maintain traffic will be based on the maximum number of units required by the Engineer at any one time for the entire project and have been estimated based on the attached typicals.
- 3. Delays in construction and coordination of the operations due to traffic maintenance conflicts with other construction projects will be considered as a basis for an extension of contract time, but will not be considered a basis for extra compensation for suspensions of work, idled equipment, or labor.
- 4. Any signs desired by the Contractor that are approved by the Engineer but not required by the Engineer may be placed and removed by the Contractor at the Contractor's expense.
- 5. Other traffic control items shown on the plans to be provided by Contractor plus setting up and removing and/or moving these items to the side traveled way as necessary per plan each workday shall be paid for at the contract unit price for that item.
- 6. Additional special signs may be necessary; therefore, the quantity for Sign, Type B, Temp, Prismatic, Furn, Special (Sft); Sign, Type B, Temp, Prismatic, Oper, Special (Sft) has been increased for use as directed by the Engineer. Any unused quantity will not be paid for.
- 7. The cost of signs and other devices shown on plans to be provided by Contractor plus setting up and removing these signs as necessary per plan each workday is included in the contract unit prices for Sign, Type B, Temp, Prismatic, Furn, Special (Sft); Sign, Type B, Temp, Prismatic, Oper, Special (Sft); and Minor Traf Devices (Lsum).
- 8. Additional quantities of Type III Barricades have been included for use at the discretion of the Engineer. Any unused quantity will not be paid for.
- 9. Any additional plastic drums required by the Engineer will be measured and paid for at the unit prices for Plastic Drum, Fluorescent, Furn, Special (Ea); Plastic Drum, Fluorescent, Oper, Special (Ea); Channelizing Device, Fluorescent, 42 inch, Furn, Special (Ea); Channelizing Devices, 42 inch, Fluorescent, Oper, Special (Ea).
- 10. Contractor provided sign covering and uncovering, and other work specified above on signs shall be included in the contract unit price for Sign Cover (Ea).
- 11. Minor Traf Devices (Lsum) is part of this contract and includes any traffic cones, lights, signs, sandbags, orange safety fencing, and/or channelizing devices other than plastic drums required by the Engineer.

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CITY OF FARMIGNTON HILLS

NOTICE TO BIDDERS UTILITY COORDINATION

a. Description

The Contractor shall cooperate and coordinate construction activities with the owners of utilities as stated in Section 104.08, Cooperation by the Contractor, of the Michigan Department of Transportation 2020 Standard Specifications for Construction. In addition, for protection of underground utilities, the Contractor shall follow the requirements in Section 107.12, Contractor's Responsibility for Utility Property and Services. Contractor delay claims, resulting from a utility, will be determined based upon Section 109.05, Payment for Contract Revisions and Section 108.09, Request For Time Extensions .

The location of all public utilities shown on these plans is taken from the best available data. The City of Farmington Hills and Hubbell, Roth & Clark, Inc. will not be responsible for any omission or variations from the locations shown. Pursuant to Act 174 of the PA of 2013 as a condition of this contract, notice shall be given to Miss Dig prior to underground work to be performed in accordance with this contract. Phone (800) 482-7171, (248) 647-7344, or 811.

b. Public Utilities

The Special Notes/General Notes in the plans shows a list of utility companies that have facilities located within the Right-of-Way.

The owners of existing service facilities that are within grading or structure limits will move them to locations designated by the Engineer or will remove them entirely from the highway Right-of- Way. Utilities may be relocating or replacing facilities which may or may not be shown on the plans in conjunction with the proposed roadwork.

Owners of Public Utilities will not be required by the City to move additional poles or structures in order to facilitate the operation of construction equipment unless it is determined by the Engineer that such poles or structures constitute a hazard to the public or are extraordinarily dangerous to the Contractor's operations.

c. Known Utility Conflicts

A utility conflict is where a road or storm sewer structure shares the same exact space as the utility and cannot be built unless the utility relocates. Utility conflicts are listed below by each facility owner, if any.

No known Locations

d. Special Conditions

<u>DTE</u>

There are existing DTE crossings throughout the project limits. Proposed storm sewer is either crossing or in close proximity to these facilities. care should be taken when excavating at the following locations:

- Spring Hill Road STA. 222+72, 11.9' LT
- Spring Hill Road STA. 222+72, 11.9' RT

Consumers Energy

Consumers Energy has an existing 1 ¼" P-MP, 1 ¼" S-MP, 2" P-MP, 2" S-MP, and 4" S-MP gas main running throughout Phase IV. Proposed storm sewer is either crossing or in close proximity to these facilities. care should be taken when excavating at the following locations:

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- Claymore Road Sta 40+39, 23.4' RT
- Westwood Road Sta 16+30, 11.5' LT
- Westwood Road Sta 16+29, 12.4' RT
- Regency Lane Sta 55+07, 26.9' LT
- North Park Drive Sta 76+51, 10.9' LT
- Old Timber Road Sta 266+78, 29.4' R
- Old Timber Road Sta 269+21, 18.1' LT
- Spring hill Road Sta 225+99, 25' LT
- Spring hill Road Sta 233+58, 11.5' LT
- Spring hill Road Sta 233+58, 9.9' RT

Beginning in Spring of 2024, Consumer's Energy will begin removing and replacing all existing metallic leads. The Contractor will need to coordinate all work with this schedule. Daily communication with Consumer's Energy and/or their Sub-Contractor will be required.

Oakland County Water Resources Commissioner (OCWRC

OCWRC has existing 8" AC and 12" AC water main running throughout Phase IV. Proposed storm sewer is either crossing or in close proximity to these facilities. care should be taken when excavating at the following locations:

- Regency Lane Sta 55+05, 22.2' LT
- Old Timber Road Sta 266+76, 27.2' RT
- Old Timber Road Sta 269+15, 15.3' LT
- Old Timber Road Sta 269+18, 15.2' RT
- Spring Hill Road Sta 225+98, 21' LT
- Spring Hill Road Sta 226+26, 36.1' RT

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CITY OF FARMIGNTON HILLS

SPECIAL PROVISION FOR TREE AND STUMP REMOVAL

a. Description

This work shall consist of removing trees, stumps, and roots at locations in the plans and as directed by the Engineer. This work shall be completed in accordance with Sections 201 and 202 of the 2020 MDOT Standard Specifications for Construction, except as specified herein.

b. Materials and Construction

The Contractor shall verify all tree removals with the Engineer prior to removal. This may require multiple field meetings and shall be included in the pay items.

Trees, stumps, roots, and resulting debris shall be removed and disposed by the Contractor.

All stumps shall be ground or chipped down to a minimum depth of 12 inches below the finished ground surface.

The Contractor shall provide and place any necessary backfill. Backfill shall meet requirements for Granular Class III in accordance with Section 902 of the 2020 MDOT Standard Specification for Construction.

The measurement for tree and stump diameter sizes shall be in accordance with Section 202 of the 2020 MDOT Standard Specifications for Construction.

c. Measurement and Payment

The completed work will be measured and paid for at the contract unit prices for the following contract items (pay items):

Pay Item	<u>Unit</u>
Tree and Stump, Rem, 6 inch to 18 inch, Special	Each
Tree and Stump, Rem, 19 inch to 36 inch, Special	Each
Stump, Rem, 6 inch to 18 inch, Special	Each
Stump, Rem, 19 inch to 36 inch, Special	

Tree and Stump, Rem pay items shall be measured and paid for by each tree removed based the diameter size. **Tree and Stump, Rem pay items** shall include removal of the whole tree and its respective stump; grinding or chipping of stumps to a minimum depth of 12 inches below the finished ground surface; removal and disposal of any logs, roots, wood chips from stump grinding/chipping, or debris; and providing and placing any necessary backfill. **Tree and Stump, Rem pay items** shall include all labor, equipment, and materials necessary to facilitate the work as described above including any field meetings required with the Engineer prior to removal.

Stump, Rem pay items shall be measured and paid for by each stump removal based on diameter size. Stump, Rem pay items shall include all labor, equipment, and materials necessary to facilitate the work as described above.

The removal of trees and stumps with a diameter less than 6 inches will not be paid for separately but will be included in Station Grading, Special as specified in the Special Provision for Station Grading.

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CITY OF FARMIGNTON HILLS

SPECIAL PROVISION FOR TREE TRIMMING

a. Description

This work shall consist of trimming trees at locations in the plans and as directed by the Engineer. This work shall be completed in accordance with Sections 201 and 202 of the 2020 MDOT Standard Specifications for Construction, except as specified herein.

b. Materials and Construction

The Contractor shall verify all tree trimming locations with the Engineer prior to any trimming operations. This may require multiple field meetings and shall be included in the pay items.

Limbs, branches and resulting debris shall be removed and disposed by the Contractor.

c. Measurement and Payment

The completed work will be measured and paid for at the contract unit prices for the following contract items (pay items):

Pay Item	<u>Unit</u>
Tree Trimming, Special	Each

Tree Trimming, Special shall be measured and paid for by each tree trimmed regardless of diameter size. **Tree Trimming, Special** shall include trimming back overhanging branches that may obstruct construction operations and/or crown pruning as-directed by the Engineer; removal and disposal of any limbs, branches, wood chips from chipping, or debris. **Tree Trimming, Special** shall include all labor, equipment, and materials necessary to facilitate the work as described above including any field meetings required with the Engineer prior to removal.

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CITY OF FARMIGNTON HILLS

SPECIAL PROVISION FOR PAVEMENT REMOVE, SPECIAL

a. Construction

This work shall consist of furnishing all labor, material, and equipment to remove pavement in accordance with Section 204 of the Michigan Department of Transportation 2020 Standard Specifications for Construction with the exceptions stated herein. This item of work shall include all pavement removal regardless of the thickness, number of layers of pavement material, or pavement material type.

b. Materials

Materials required to perform this work shall be in accordance with Section 204 of the MDOT 2020 Standard Specifications for Construction, unless otherwise directed by the Engineer.

c. Construction

Construction shall conform to Section 204 of the MDOT 2020 Standard Specifications for Construction.

c. Measurement and Payment

The completed work will be measured and paid for at the contract unit prices for the following contract items (pay items):

Pay Item	<u>Unit</u>
Pavt, Rem, Special	Square Yard

Pavt, Rem, Special will be measured in place by the square yard and paid for at unit price per square yard, which shall be payment in full for all labor, equipment, and material needed to remove and dispose of all pavement materials off-site, including full depth saw cutting as required or directed by the Engineer. The contractor shall sawcut in full depth at all driveways at the limits shown on the plans, and at the road intersections as shown on the plans. Sawing shall be done prior to the removal of pavement and shall be included in the cost of **Pavt, Rem, Special** and not paid for separately. Any damage to the existing pavement to remain in place by the Contractor's operations shall be repaired by the Contractor at the sole expense of the Contractor.

Pavt, Rem, Special shall include the removal of multiple layers of pavement material, removal of pavement material regardless of depth, and removal of pavement regardless of material (HMA or concrete).

Pavt, Rem, Special shall include the removal of concrete curb or curb and gutter or HMA curb adjacent to concrete or HMA pavement.

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CITY OF FARMIGNTON HILLS

SPECIAL PROVISION FOR STATION GRADING

a. Description

This work shall consist of all earthwork necessary to grade the roadway to the line, elevation and cross section shown in the plans. This includes removal, shaping and/or grading of the earth and cross-section material as shown in the typical sections, for all areas of the project. This work shall also include any necessary blading off of high shoulder areas to provide drainage away from the roadway in accordance with City of Farmington Hills Specifications and/or as specified herein. This pay item does not include any additional subgrade undercutting and accompanying backfill as-directed by the Engineer.

b. Materials and Construction

All materials and construction shall be in accordance with Section 205 of the 2020 MDOT Standard Specifications for Construction and as modified herein.

Any necessary removal of soil, cement stabilized base, and/or aggregate to construct the cross-section shown in the plans shall be included in Station Grading, Special. This will include the cost to remove and dispose excavated material off-site. Removal of existing HMA and/or concrete roadway, including curb and gutter, shall be paid for separately.

Station Grading, Special shall be utilized to provide the grade and line as shown in the proposed typical sections and details for the subgrade and aggregate base as well as compacting the existing subgrade to 95%.

The subgrade shall be proof-rolled after it has been graded to the specified cross slope to verify suitability for the proposed pavement section. If the subgrade is found deficient by the Engineer, additional soil shall be removed and replaced in accordance with the subgrade undercutting special provision, as directed in the field. The cost for the additional excavation and backfill material shall be included in the subgrade undercutting pay item.

Station Grading, Special shall include tying the proposed roadway and shoulder and/or shoulder back into the existing ground, as shown in the typicals. All necessary earthwork required for the construction of driveways, sidewalks and intersections is also included in Station Grading, Special.

High shoulder areas that restrict the water from leaving the roadway shall be cut down to provide positive drainage away from the roadway as a part of this pay item.

The station grading pay item shall include grading around all obstacles including, but not limited to storm sewers, private utilities, utility poles, sprinkler lines, etc.

Station grading shall include moving and/or removing decorative stones (and placing at the property line), wood posts, and any other obstacles encountered except those labeled on the plans as remaining.

Station Grading, Special shall include removing any shrubs, plantings, landscaping materials, and any trees with a diameter less than 6 inches as called out for removal on the plans or as directed by the Engineer for removal.

It shall also include any excavation and/or embankment necessary to provide positive drainage away from the roadway, including constructing new ditches to grades per the typicals, details, and elevations provided in the plans.

Turf Establishment to be paid for separately.

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Earthwork required for underground construction shall not be paid for separately but shall be included in the respective items of work.

c. Measurement and Payment

The completed work, as measured for Station Grading, Special will be paid for at the contract unit price for the following contract item (pay item):

Pay Item Unit

Station Grading, Special Station

Station Grading, Special shall include but is not limited to removing soil and aggregate, hauling off-site, grading to match proposed typicals, etc. This pay item shall include all labor, equipment, and materials necessary to facilitate the work as described above. **Station Grading, Special** shall be measured along the centerline of the proposed roadway, cul-de-sac, and/or courts with 100-feet equaling one station and includes the grading along both sides of the centerline.

The quantities provided below are approximate and are for information only. The City reserves the right to increase/reduce the quantity or eliminate the item from the project completely as it sees fit.

Excavation, Earth = 21,460 Cyd Embankment, CIP = 2,325 Cyd

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CITY OF FARMIGNTON HILLS

SPECIAL PROVISION FOR SUBGRADE UNDERCUT

a. Description

This work shall be done in accordance with Section 205 of the Michigan Department of Transportation 2020 Standard Specifications for Construction, except as provided herein.

This work shall consist of excavating existing subgrade in unsound areas at locations determined by the Engineer in the field, installing a layer of geogrid, if determined necessary, and furnishing, installing, and compacting 1 x 3 or 21AA for the purpose of improving the bearing capacity of the underlying, compressive materials.

b. Materials

The following materials shall be used when indicated:

- 1. Coarse Aggregate, 1 x 3 as specified in Special Provision for 1" x 3" Crushed Concrete.
- 2. Dense Graded Aggregate, 21AA as specified in Special Provision for Aggregate Base Course.
- 3. Geogrid, as specified in Special Provision for Geotextile Stabilization, City Provided.

c. Construction

Subgrade undercutting shall be performed where unsuitable subgrade soil is encountered at the bottom of the roadway cross section, as determined and directed by the Engineer. The vertical and horizontal limits shall be determined in the field by the Engineer. Do not undercut beyond a depth of one (1) foot without approval of the Engineer.

1" x 3" material shall be back dumped from trucks riding on top of compacted subgrade and bladed onto the geogrid (if necessary) in the direction of the overlap in such a manner that the material rolls onto the geogrid ahead (e.g., while gradually raising the dozer blade while moving forward). If ruts are created in the material due to construction traffic, they shall be filled with additional material, rather than blading adjacent material into the rut.

Finish the subgrade surface to the line, grade, and cross section as shown on the plans within a tolerance of $\pm 1/2$ inch.

Provide a finished subgrade surface, smooth and uniform in appearance that is free of loose aggregates, holes, depressions, ruts and ridges.

d. Measurement and Payment

The completed work will be paid for at the contract unit price for the following contract pay items:

Pay Item	Pay Unit
Subgrade Undercutting, 1 x 3, Special	Cubic Yard
Subgrade Undercutting, 21AA, Special	Cubic Yard

Payment for **Subgrade Undercutting**, 1 x 3, **Special** shall include all labor, equipment, and materials required to complete the work described and will only be paid when directed and approved by the Engineer. It shall include the removal and disposal of the unsuitable materials as well as the cost and installation of the Coarse Aggregate, 1 x 3 fill material.

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Payment for **Subgrade Undercutting**, **21AA**, **Special** shall include all labor, equipment, and materials required to complete the work described and will only be paid when directed and approved by the Engineer. It shall include the removal and disposal of the unsuitable materials as well as the cost and installation of the Dense Graded 21AA fill material.

When required by the Engineer, geogrid will be paid for separately, as specified in the Special Provision for Geogrid.

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CITY OF FARMIGNTON HILLS

SPECIAL PROVISION FOR PROJECT CLEANUP

a. Description

Project Cleanup shall follow Section 209 of the 2020 Michigan Department of Transportation Standard Specifications and City of Farmington Hills Standards and/or as specified herein.

b. Construction

Decorative stones, boulders, etc. disturbed during construction shall be removed and placed at the right-of-way line, or as close as possible. Any items damaged during removal, transporting, storing or reinstalling shall be replaced at the contractor's expense.

All street/traffic signs and posts are considered to not be within the limits of construction, or considered to be able to be worked around, and therefore shall not be disrupted. If an existing sign cannot be avoided by the construction, the sign and post shall be removed from the ground and/or foundation. The removed sign and post shall be temporarily stored at a location where it is not impacted by construction activity or damaged. After construction has been completed, the salvaged existing sign and post shall be reinstalled at the original location or at a location identified by the City Representative. Any sign or post that is damaged during removal, transporting, storing or erection shall be replaced at the contractor's expense. This sign and/or post shall match the existing one in kind. All work related to the removal, storage, reinstallation and/or replacement of the existing sign/post shall be considered included in "Project Cleanup, Special".

This pay item is generally for the cleanup of all items disturbed by construction including removal of any miscellaneous items encountered during construction.

c. Measurement and Payment

The completed work, as measured, will be paid for at the contract unit price for the following contract item (pay item):

<u>Pay Item</u>	<u>Unit</u>	
Project Cleanup, Special	Lump Sum	

Project Cleanup, Special will be paid out in 2 payments. The first payment (50% of the amount bid) will be made upon the completion of the cleanup operation and the second payment (remaining amount bid) will be paid after substantial project completion as defined in the Progress Clause. The lump sum bid shall include all labor, materials, and equipment necessary to complete the work as described above.

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CITY OF FARMIGNTON HILLS

SPECIAL PROVISION FOR AGGREGATE BASE

a. Description

The aggregate base to be used under the proposed pavement shall be manufactured from crushed limestone as described in this special provision on a suitable subgrade as determined by the Engineer.

b. Materials

The crushed limestone aggregate base shall be graded to meet MDOT Specification 21AA per Section 302 of the 2020 Michigan Department of Transportation Standard Specifications for Construction.

The crushed aggregate base shall be compacted to a minimum of 95% under concrete pavement or 98% under HMA pavement of its Maximum Unit Weight, as determined by the One-Point Michigan Cone Test - described in the MDOT Density Testing and Inspection Manual, and to the cross-section indicated in the Proposal and on the Plans.

Crushed concrete will not be allowed.

c. Construction

Do not use Sodium Chloride to aid in placing and compacting of aggregate base.

Construction shall be completed in accordance with Section 302 of the 2020 Michigan Department of Transportation Standard Specifications for Construction.

For "Aggregate Base, __inch, 21AA, Special – Syd that overlies 1" x 3", the contractor shall expect some migration of the aggregate base into the 1" x 3" crushed concrete layer. This material shall be included in the unit price bid for the pay item and payment will be for a final compacted total depth above the 1" x 3" material. Any aggregate loss into the 1" x 3" shall be included in the unit price bid.

d. Measurement and Payment

The crushed aggregate base will be paid for at the Contract unit price per square yard for the thickness specified which includes all work indicated in this Special Provision and related Contract References.

Pay Item		<u>Pay Unit</u>
Aggregate Base, _	_ inch, 21AA, Special	Square Yard

Payment for **Aggregate Base**, _inch, 21AA, Special shall include all labor, equipment, and materials required to complete the work described, to a final compacted total depth as specified on plans, including areas where the aggregate base overlies 1" x 3" crushed concrete layer, for the roadway work. Any aggregate loss through migration will not be paid for separately but shall be included in the pay item.

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CITY OF FARMIGNTON HILLS

SPECIAL PROVISION FOR 1"x3" CRUSHED CONCRETE

a. Description

The work covered by this specification consists of furnishing all labor, equipment, and materials, for the installation of 1" x 3" crushed concrete to the locations, lines, elevations, and cross-sections as provided for in the Drawings, specifications, and special provisions of the Contract.

This work shall be done in accordance with MDOT Specifications, except as herein specified.

b. Materials

The 1"x3" material shall be per Section 916.01.B of the Michigan Department of Transportation 2020 Standard Specifications for Construction. This material must conform to commercially graded material with particle sizes ranging from 3/4" to 3" and be produced by crushing natural aggregate or Portland Cement Concrete.

c. Construction

Construction shall be completed in accordance with Section 302.03 of the 2020 Michigan Department of Transportation Standard Specifications for Construction.

Installation:

- A. Back dump 1" x 3" material from trucks riding atop compacted subgrade.
- B. Blade 1" x 3" material onto the subgrade (or geogrid) in such a manner that the material rolls onto the grade ahead while the dozer blade gradually raises as it moves forward.
- C. Compact 1" x 3" material with a steel drum roller to consolidate material and minimize voids.
- D. Finish the surface of the 1" x 3" material to the line, grade and cross-section as shown on the Drawings to within a tolerance of $\pm 1/2$ inch.
- E. Fill ruts in the material due to construction traffic with additional material, do not blade adjacent material into the ruts

d. Measurement and Payment

The completed work will be paid for at the contract unit price for the following contract pay items:

Pay Item		Pay Unit
1"x3" Crushed Concrete,	inch, Special	Square Yard

Payment for 1"x3" Crushed Concrete, _ inch, Special shall include all labor, equipment, and materials required to complete the work described. Payment for Geotextile Stabilization, City Provided; Geotextile, Stabilization; or Road Grade Biaxial Geogrid, will be paid for separately.

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CITY OF FARMIGNTON HILLS

SPECIAL PROVISION FOR CURED-IN-PLACE PIPE LINER

a. Description

Provide all labor, equipment, materials and incidentals for the installation of cured-in-place pipe liner into storm sewers and culvert pipes at the locations shown on the plans and as directed by the Engineer.

- 1. The manufacturer of the liner system shall provide the design, installation and inspection of the liner and shall have an authorized representative on site during installation.
- 2. The installation shall be accomplished such that flow capacity is equal to or greater than 100% of the original pipe flow capacity when new.
- 3. Provide TV inspection as needed to complete the work. After completion of pipe lining, provide post-rehabilitation TV inspection, videotaping and documentation in accordance with the 2020 MDOT Standard Specifications for Construction Section 402.03.J with cost associated included in this special provision.

b. Materials

The tube and resin material must meet the requirements of ASTM F 1216 and ASTM F 1743, as applicable.

- 1. Design the liner for HS-20 live loading. Design the required cured-in-place liner wall thickness in accordance with the guidelines in appendix X1 of ASTM F 1216. Use the formulas assuming a fully deteriorated pipe condition and the water table at the ground surface.
- 2. Provide documentation indicating the proposed design liner thickness for each run of pipe, all component materials and that the liner meets the minimum chemical resistance requirements listed in appendix X2 of ASTM F 1216 prior to installation. In particular, the finished C.I.P.P. shall be fabricated from materials which when cured will be chemically resistant to withstand internal exposure to domestic sewage. All design calculations must be signed and sealed by a Registered Professional Engineer.
- 3. The tube must consist of one or more layers of flexible needled felt or equivalent woven or nonwoven material capable of carrying resin and withstanding installation pressures and curing temperatures. The tube material must be fabricated to the proper size that when installed will neatly fit the internal circumference of the existing conduit, including irregular culvert or sewer sections. The outside layer of the tube must be plastic coated with a material that is compatible with the resin system used. Fabricate the tube to the required size to fit the inside diameter for the designated length of the existing sewer when cured. Make allowance for circumferential stretch during the hydrostatic inversion method and for longitudinal stretch during the direct pulled-in-place method. The Contractor shall verify the existing size of conduits scheduled for rehabilitation prior to fabrication of lining. The Contractor shall be responsible for designing the wall thickness of the pipe within a pipe. The wall thickness design shall take into consideration the condition of the existing pipe, water table elevation above the existing pipe (hydrostatic head), depth of line, ovality, traffic loading and soil conditions. Should the pre-lining video inspection show the sewers to be in substantially different conditions than those in the design considerations, the Contractor shall request such changes in Fabric Lining thickness, supporting such request with design data.
- 4. The minimum length shall be that deemed necessary by the Contractor to effectively span the distance from the inlet to the outlet of the respective manholes unless otherwise specified. The Contractor shall verify the lengths in the field before impregnation. Individual inversion runs can be made over one or more manhole sections as determined in the field by the Contractor and approved by the Owner.
- 5. Unless otherwise specified, the Contractor shall furnish a corrosion resistant, unsaturated, isophailic polyester resin and catalyst system compatible with the process that provides cured physical strengths specified herein. The pipe within-a-pipe, when cured, shall be chemically resistant to withstand internal exposure to sewage gases containing hydrogen sulfide, carbon monoxide and dioxide, methane gas, dilute sulfuric acid, and

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external exposure to soil bacteria and chemical attack which may be due to materials in the surrounding ground or sewage within.

6. The color of the interior liner surface shall be light reflective and pre-approved by the Engineer, to allow for adequate post installation inspection by closed circuit television.

c. Construction

- 1. Maintain flow around the run of pipe designated for lining as necessary. The bypass pumping system must provide adequate capacity to handle the existing flow plus any additional flow that may occur during periods of rainfall. Submit a bypass pumping plan containing all necessary details to the Engineer for approval a minimum of 10 workdays prior to conducting the work. Continuously monitor all pumps and equipment. Follow local noise ordinances if pumping is required on a 24-hour basis.
- 2. Inspection of pipelines shall be performed by experienced personnel trained in locating breaks, obstacles and service connections by closed circuit television. The interior of the pipeline shall be carefully inspected to determine the location of any conditions which may prevent proper installation of the fabric lining into the pipelines, and it shall be noted so that these conditions can be corrected. A video tape and suitable log of the post-inversion inspection shall be kept for later reference by the Engineer.
- 3. Install the cured-in-place liner in accordance with the manufacturer's guidelines and ASTM F 1216 or ASTM F 1743, as applicable.
 - 4. Methods
 - A. Hydrostatic Inversion
 - B. Vertical Inversion Standpipe and Hydrostatic Head
 - C. Direct Pulled-In-Place Method
- 5. The Contractor shall designate a location where the uncured resin in the original containers and the unimpregnated tube will be vacuum impregnated prior to installation. The Contractor shall allow the Owner to inspect the materials and "wet out" procedure. A resin and catalyst system compatible with requirements of the installation method shall be used.
- 6. Curing shall be accomplished by circulating hot water or other approved method to cure the resin into a hard-impermeable lining. The liner must be cured-in-place such that the finished installation will be continuous, provide structural support and be tight fitting to the existing pipe.
- 7. The heat source shall be fitted with suitable monitors to gauge the temperature of the incoming and outgoing water supply. Another such gauge shall be placed within the impregnated tube and the pipe invert at the remote manhole to determine the temperature at that location during cure. Water temperature in the line during the cure period shall be recommended by the resin manufacturer.
- 8. Handle process water and flow control measures in accordance with the Standard Specifications for construction and local regulations and permit requirements.
- 9. Initial cure shall be deemed to be completed when the exposed portions of the lining appear to be hard and sound and the remote temperature sensor indicates that the temperature is of a magnitude to realize an exotherm. The cure period shall be of a duration recommended by the resin manufacturer, as modified for the process, during which time the recirculation of the water and cycling of the heat exchanger to maintain the temperature continues.
- 10. The finished liner shall be continuous over the length installed and must be free from visual defects such as foreign inclusions, dry spots, pinholes, lifts and delamination. Wrinkles or other flaws in the cured liner that reduce the hydraulic capacity of the pipe are unacceptable. These deficiencies must be corrected at the Contractor's expense utilizing a method approved by the Engineer.
- 11. The Contractor shall seal the manhole walls, at all manhole inverts using a resin mixture compatible with the C.I.P.P.
 - 12. Storm Connections
 - A. After the C.I.P.P. has been installed, the Contractor shall reconnect any existing active storm lead connections. This shall be generally done without excavation, and in the case of non-man entry pipes,

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from the interior of the pipeline by means of a television camera and a cutting device that re-establishes them to 100% of original capacity.

- B. Contractor shall provide two complete robotic cutter units plus extra key components to ensure all storm taps are reconnected without delay.
- C. All taps must be reconnected within 12 hours. No storm taps shall remain out of service for more than 12 hours. If a storm connection problem occurs where a storm tap will remain out of service, the Contractor will provide emergency service at his cost.
- D. Costs for reopening of active storm sewer connections shall be included in the unit cost bid for this special provision.
- E. If service leads to individual properties will be affected (out of service during lining process), proper notification of the property owner will be required.
- 13. Provide an affidavit sealed by a Professional Engineer licensed in the State of Michigan, verifying that the lining system has been designed, manufactured and installed in accordance with the applicable ASTM standards and this special provision.
 - 14. Testing and Inspection
 - A. The contractor shall prepare and test samples for each lined run of pipe using either method described in ASTM F 1216, section 8.1
 - B. The water tightness of the C.I.P.P. shall be gauged while curing and under a positive head.
 - C. If inspection pits are required for proper inspection of C.I.P.P. or repair of leads, all costs for restoration shall be incidental to the project.
 - D. After the work is completed, the Contractor will provide the Owner with a post inspection video tape showing the completed work including the restored conditions. Post inspection videotaping is included in the unit price bid for the respective CIPP liner. Services shall be viewed with a radial view T.V. camera.
 - 15. Warranty
 - A. The Contractor shall warranty the installed product for a period of <u>two (2) years</u>. If the owner finds evidence of reverse curvature, shortening of the ends or constriction in house leads, the contractor shall return and restore service and end seals promptly, as part of warranty work.
 - B. Due to the concern for Longitudinal shrinkage in Cured-In-Place-Pipe, the owner reserves the right to re-inspect the C.I.P.P. following installation to determine if openings cut for service connections remain properly aligned. The event that service connection openings shift from original location, the contractor shall be responsible for all costs associated with corrective measures for re-alignment and repair of lead openings.
 - C. During the warranty period any defects which will affect the integrity or strength of the C.I.P.P. shall be repaired at the Contractor's expense, in a manner mutually agreed by the Owner and the Contractor.

d. Measurement and Payment

The completed work as described will be measured and paid for at the contract unit price using the following contract items (pay items):

Contract Items (Pay Items)		Pay Unit
Cured-In-Place Pipe Lining, _	_ inch, Special	Foot

Measurement shall be from center of structure to center of structure for full run pipe lining or the length of the liner as installed for spot lining.

Any necessary Pre-Rehabilitation Cleaning, Inspection and/or Grouting of Joints shall be considered included in the cost of the lining and will not be paid for separately.

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SPECIAL PROVISION FOR ADJUSTMENT AND RECONSTRUCTION OF DPW STRUCTURES

b. Description

This work shall be done in accordance with Section 403 of the Michigan Department of Transportation 2020 Standard Specifications for Construction, except as herein provided:

1. Scope

This work shall consist of adjusting, reconstructing and/or installing new waterproof covers on sanitary sewer structures and Watergate manhole structures that are either under the jurisdiction of the Oakland County Water Resource Commission (OCWRC), or any local governing agency and its Department of Public Works (DPW).

2. Purpose

The intent of this specification is to maintain the integrity of these structures and to keep infiltration to an absolute minimum in accordance with the requirements of the OCWRC.

b. Materials

Materials shall be as specified under subsection 403.02 of the MDOT standard specifications except that DPW Structure Covers, if called for, shall be as specified on the DPW Governing Agency's details in the plans with the DPW governing agency's name cast in the lid as shown. Materials used in the "adjustment" or "reconstruction" of manholes shall be the same as those used in the initial construction unless otherwise approved by the Oakland County Water Resource Commissioner (OCWRC).

c. Construction

- 1. Requirements for Changing the Elevation of Manhole Covers
 - A. Adjusting Drainage Structure "Adjustment"

Adjusting a manhole cover applies when the elevation is changed up or down 6 inches or less while within the limits as follows.

- (1) To increase the rim elevation of a manhole cover between the limits of 0" and 18", measured from the top of the cone or corbel section to the bottom of the cover frame, shall be done with concrete adjustment rings, or in the case of older brick-type manholes, with brickwork. In no case shall the adjusting rings or total brickwork (including existing brick) exceed 18".
- (2) To decrease the rim elevation of a manhole cover within the limits of existing adjusting rings or brickwork, remove the adjusting ring(s) or brick.
- B. Additional Depth of Adjusting Structure "Reconstruction"

Reconstruction of a manhole cover applies when the elevation is changed up or down more than 6 inches or any change that is outside of the limits of "adjustment"

To decrease the rim elevation of a manhole cover beyond the limits of existing brick or adjusting rings, or increase the rim elevation of a manhole cover beyond the limits of an "adjustment", change the elevation of the cone or tapered section.

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- (1) Pre-cast manholes are reconstructed by removing cone and/or straight section(s) and replacing with a section(s) of such length that the manhole cover will be at the correct elevation, or can be raised to the correct elevation by the addition of adjusting rings. In the case of older brick-type top sections, replace with brickwork. The maximum height of the chimney shall be 18 inches as measured between the top of the corbel section to the underside of the frame.
- (2) Brick manholes are reconstructed by removing all the brick courses that make up the cone or tapered section. By increasing or decreasing the height of the brickwork in the straight section of the manhole, the rebuilt brick cone section will position the manhole cover at the correct elevation or it can be raised to a maximum height of 18" by adjusting brickwork placed on the cone.

Plaster all reconstructed exterior masonry surfaces with MDOT Type R2 cement mortar, 0.5 inch thick to assure complete water tightness. When reconstructing manhole maintain 16 inch step spacing.

- 2. Criteria for Determining the Elevation of a Manhole Cover
 - A. Covers of manholes located in the pavement shall be placed at the proposed pavement grade.
 - B. Covers of manholes located in the gravel shoulder of a roadway shall be placed at an elevation of at least 6 inches below the top of the edge of the shoulder. Place shoulder material over structure cover.
 - C. Covers of manholes located in shoulders that are to be sodded or grassed, shall be placed at the finished earth grade of the grassed shoulder.
 - D. Covers of manholes located outside of the road and ditch area shall be at the existing earth grade and readily visible at all times. The OCWRC or the Engineer shall approve the final elevation in the field.
 - E. Covers in flood-prone areas shall be at an elevation 12" above the highest known level of standing water.
 - F. Final adjustment of DPW structures shall be made prior to placing the top course of pavement.
- 3. Backfill of Structures

All structures within the roadway shall be backfilled with granular material class II up to the subgrade elevation, or to an elevation determined by the Engineer.

4. Inspection and Workmanship

The contractor must inform the OCWRC and the City of Farmington Hills a minimum of 48 hours in advance of the proposed work. Representatives of the OCWRC, the Engineer and the contractor shall meet and collectively inspect each structure prior to beginning work and make a determination as to the type of treatment that is necessary.

5. Permit and Financial Requirements

Prior to beginning work on any structures under the jurisdiction of the OCWRC, the contractor will be required to pick up the previously approved permit from the OCWRC. One Public Works Drive, Waterford, Michigan 48328 (248) 858-1110. See permits section for additional information.

d. Measurement and Payment

The completed work will be paid for at the contract unit price for the following contract pay items:

Pay Item

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DPW Structure Cover, Adj, Case 2	Each
DPW Structure Cover, Adj, Add Depth	Foot
DPW Structure Cover.	

The adjustment of DPW structure covers will be measured by the each and paid for as **DPW Structure Cover**, **Adj**, **Case 1 or Case 2**. Elevation adjustment up to 6 inches between the top of the existing brickwork/casting to the underside of the casting is included with these items.

Adjustment of DPW structure covers greater than 18 inches will be paid for as **DPW Structure Cover**, **Adj**, **Add Depth**.

For structures within the pavement surface area, the contractor will be required to remove the frame and cover and temporarily plate the top of structures when the structure frame will conflict with the proposed surface crown of gravel base. The placing and removing of the plates will not be paid for separately, but shall be included in the unit price.

New frames and covers, if required, shall be supplied and installed by the Contractor and shall meet the requirements of the OCWRC. Elastomeric Seal Easy Stik all-weather trowelable butyl or approved equal shall be used around the inside and outside of the proposed structure adjustment.

Existing structure covers that have been replaced are to be disposed of in a legal manner off the project by the Contractor included in the DPW Structure adjustment pay items.

When a new cover is required on an existing structure that does not require adjustment or reconstruction, **DPW Structure Cover** will be paid for.

Payment for the replacement of curb and gutter or pavement adjacent to drainage structures which are reconstructed or adjusted, will be paid for separately.

DPW Structure Cover, Adj, Case 2 will only apply to an existing structure located outside the existing pavement, curb, or curb and gutter.

Payment for **DPW Structure Cover**, **Adj**, **Case 1 and Case** 2 and **DPW Structure Cover**, **Adj**, **Add Depth** includes equipment, labor and materials to complete this item.

The unit price for **DPW Structure Cover**, **Adj**, **Case 1** includes the cost of: sawcutting existing pavement, curb, and curb and gutter; adjusting the cover up or down, no greater than 6 inches; removing and replacing pavement adjacent to the adjusted cover; and salvaging and reusing existing cover and frame as directed by the Engineer. Removing and replacing curb and cutter adjacent to the adjusted structure will be paid for separately.

The unit price for **DPW Structure Cover**, **Adj**, **Case 2** includes the cost of salvaging and reusing existing cover and frame as directed by the Engineer.

The unit price for **DPW Structure Cover** includes the cost of obtaining a frame and cover that meets the specifications of the Engineer and public utility owner and the details as shown in the plans.

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CITY OF FARMIGNTON HILLS

SPECIAL PROVISION FOR POINT CATCH BASIN/MANHOLE WITH HYDROPHOBIC GROUT

a. Description

All work shall be completed in accordance with the 2020 Michigan Department of Transportation Standard Specifications for Construction, and as specified herein.

Provide all labor, equipment, materials and incidentals for pointing catch basin or manhole with Hydrophobic Grout as directed by the Engineer. The work shall include all costs for cleaning and preparing the structure sufficient for grout application, application of the grout material, removal of excess grout from structure as required and restoration of any lawn or landscape areas.

b. Materials

Materials shall be completed in accordance with the 2020 Michigan Department of Transportation Standard Specifications for Construction, and as specified herein.

The Hydrophobic grout shall meet requirements of ASTM C-273, D-1621, D-1622, D-1623 and D-2127 as applicable.

1. The following materials shall be used or approved equal: Aqua Seal by Sealing Systems, Inc., Seal Guard II or DuraSeal.

c. Construction

Construction shall be completed in accordance with the 2020 Michigan Department of Transportation Standard Specifications for Construction, and as specified herein.

- 2. Maintain sewer flow throughout the duration of the pointing construction operation.
- 3. Voids in existing joints and active leaks (cracks/joint issues within the structure) shall be sealed with Hydrophobic grout.
- 4. Installation shall be completed only by a manufacturer authorized contractor having demonstrated requisite skill and training to properly apply their product.
- 5. Where catch basin/manhole rehabilitation is conducted in an established lawn area, restoration shall be according to the Special Provision for Turf Establishment included in this contract.

d. Measurement and Payment

The completed work will be paid for at the contract unit price for the following contract pay item:

Pay Item	Pay Unit
Point Drainage Structure with Hydrophobic Grout, Special	Each

Include all costs for cleaning and preparing structure sufficient for grout application, grout material, application, removal of excess grout and restoration in lawn areas. Pavement restoration will be paid for according to the road construction bid items included in this contract.

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Pay Unit

CITY OF FARMIGNTON HILLS

SPECIAL PROVISION FOR SUMP CONNECTION

a. Description

The work covered by this specification consists of furnishing all labor, equipment, and materials for the connection of existing home sump pump lead, within 10 feet of the back of curb, into the underdrain pipe that is proposed for the project. The intent of this pay item is to connect any existing leads that are currently connected to an existing underdrain or drainage structure in the ROW. It also includes connection of any residential leads as directed by the Engineer, limited to within 10 feet from the back of curb, or those discovered during the construction of the project.

b. Materials and Construction

Materials shall be in accordance with Section 404 of the 2020 Michigan Department of Transportation Standard Specifications for Construction and the City of Farmington Hills Standards and Specifications, and as specified herein.

Pipe materials shall match the proposed underdrain pipe at the point of connection to the roadway underdrain system and shall include a tee or tap connection. A Fernco adapter shall be utilized to transition from the underdrain material to match the existing material of the residential sump outlet. The connection to the residential outlet shall also include a Fernco Adapter. The extension of the residential pipe lead or the underdrain to connect is included in this item but shall be limited to leads within 10 feet from the back of curb.

c. Measurement and Payment

Pay Item

The completed work will be paid for at the contract unit price for the following contract pay items:

	
Sump Connection, Special	Each

Payment for **Sump Connection**, **Special** shall include all labor, equipment, and materials required to complete the work described.

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CITY OF FARMIGNTON HILLS

SPECIAL PROVISION FOR UNDERDRAINS

a. Description

This work shall be done in accordance with Section 404 of the 2020 Michigan Department of Transportation Standard Specifications for Construction, except as herein provided:

b. Materials

Geotextile liner shall be used to line the underdrain trench as shown on the detail in the plans. The minimum overlap of the geotextile fabric shall be 2 feet. The geotextile liner shall meet requirements in per Section 910.03B of the 2020 MDOT Standard Specifications for Construction.

The underdrain pipe shall be 6" diameter corrugated, perforated, polyethylene (PE) conforming to Section 909.07B of the 2020 MDOT Standard Specifications for Construction (AASHTO M252).

The underdrain trench shall be backfilled with MDOT 34R open-graded aggregate and be in accordance with Section 902 of the 2020 Michigan Department of Transportation Standard Specifications for Construction.

c. Construction

Construct per the detail shown on the plans or as directed by the Engineer.

d. Measurement and Payment

Pay Item	Pay Unit
Underdrain, Subgrade, Open-Graded, 6 inch, Special	Foot

Payment for **Underdrain, Subgrade, Open-Graded, 6 inch, Special** includes equipment, labor and materials to construct this item in accordance with the details shown on the plans and this special provision.

Payment for underdrain pipe, aggregate, and geotextile fabric required around the underdrain trench shall be included in the contract unit price for underdrain. No allowance will be made for extra material in laps.

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CITY OF FARMIGNTON HILLS

SPECIAL PROVISION FOR HMA PAVEMENT

PART 1 – GENERAL

1.1 Description

This specification shall include all work, materials, labor, and equipment necessary to furnish and install Hot Mix Asphalt (HMA) on a prepared base to the line, grade, thickness and cross-section in accordance with these specifications and drawings.

1.2 References

- A. Abbreviations and Acronyms
 - 1. ASTM American Society for Testing Materials
 - 2. HMA Hot Mix Asphalt
 - 3. MDOT Michigan Department of Transportation
 - 4. MIOSHA Michigan Occupational Safety and Health Act
 - 5. MMUTCD Michigan Manual of Uniform Traffic Control Devices
 - 6. JMF Approved Job Mix Formula

B. Definitions

- 1. Subgrade Portion of the earth grade upon which the pavement structure is placed.
- 2. Subbase Layer of granular material placed on the subgrade as a part of the pavement structure.
- 3. Open Graded Drainage Course Layer of specified open-graded aggregate material placed on the subgrade as part of the pavement structure.
- 4. Aggregate Base Layer of dense graded aggregate material placed on a subgrade, subbase or open graded drainage course as part of the pavement structure.
- 5. HMA base course Layer below the leveling course for pavements in which there are three specified layers.
- 6. HMA leveling course Layer below the top course for pavements in which there are two or three specified layers.
- 7. HMA top course Layer that forms the pavement surface.
- 8. HMA patch an HMA repair of a small, localized defect in the pavement surface either as planned or as created by defective material that needs to be removed or replaced.
- C. Where referenced, "MDOT Specifications" is a general term that shall include the current version of the MDOT Standard Specifications for Construction and all Supplemental Specifications, Special Provisions, and Errata existing at the time of the award of the Contract.
- D. MDOT manuals that are referenced specifically by name shall be the current versions of said manuals existing at the time of the award of the Contract.

1.3 Preproduction Meeting

- A. The Owner reserves the right to schedule a pre-production meeting. The pre-production meeting will be held a minimum of 7 calendar days prior to the start of HMA production and placement. The Owner will provide written notification to all parties a minimum of 14 calendar days prior to the meeting. Items of discussion shall include, but not be limited to:
 - 1. Project safety.

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- 2. Project mixture and testing Special Provisions.
- 3. Job Mix Formula.
- 4. HMA sampling and testing requirements and procedures.
- 5. Sequence of operations.
- 6. HMA placement methods.
- 7. The Contractor's HMA-QC Plan.
- 8. The roles and responsibilities of all parties involved in the work.
- 9. HMA acceptance criteria.
- 10. Project documentation.

1.4 Submittals

- A. Submit Bond Coat supplier and manufacturer data that includes test results for the properties indicated in the Tables titled "Anionic (Cationic) Emulsified Asphalts" in the MDOT Specifications.
- B. Submit documentation of Plant Certification for the current year per Table 1-1.
- C. Submit HMA Plant Scale Calibration Certificate for the current year.
- D. Submit JMF for all HMA mixtures for review by the Owner prior to construction.
 - 1. Submit the JMF on an MDOT Form 1911 that has been signed by an MDOT Traveling Bituminous Inspector for the current year and has been modified for this project or submit JMF on suppliers form (s) with the information listed per Table 1 1.
 - 2. Submit performance graded binder test results from the current year if requested by the Owner.

1.5 Quality Control

- A. Quality control of all materials used on the project and methods of installation shall be the responsibility of the Contractor. The Owner retains the right to perform random independent testing for the Owner's assurance the project is compliant at his tested locations however contract compliance remains the responsibility of the Contractor.
- B. It shall be the responsibility of the Contractor to correct or suspend operations, if necessary, when the work is not in compliance with these specifications.

1.6 Quality Assurance

- A. The Owner will inspect, sample, test and evaluate the HMA for compliance to these specifications for the following:
 - 1. Delivery and Placement Temperature
 - a. The Owner will make periodic checks for temperature using a calibrated thermometer or temperature gun at locations within the truck, paver hopper or within the mat at the discretion of the Owner.
 - b.Refer to Section 3.5.A and Table 3-1 for allowable temperature ranges.

c.

- 2. Layer Thickness and Yield
 - a. The Owner will conduct periodic mat thickness depth checks and yield calculations during placement of the HMA material.
 - b.Lower layers of HMA base course are to be constructed to a tolerance of $\pm \frac{3}{4}$ inch and final layers of base course constructed to a tolerance of $\pm \frac{3}{8}$ inch.
 - c. HMA leveling course is to be constructed to a tolerance of $\pm \frac{1}{4}$ inch.
 - d.HMA top course is to be constructed to a tolerance of $\pm 1/8$ inch.
 - e. The cumulative pavement thickness shall be at least the planned thickness and not be more than

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1/4 inch greater than the planned thickness.

- f. The pavement thickness of a single course pavement shall be at least the planned thickness and not be more than ¼ inch greater than the planned thickness.
- 3. Joint Quality: The Owner shall visually inspect the joint configuration and placement for tightness, smoothness and alignment to evaluate conformance to the requirements stated in Sections 3.5 C.5 and 3.5 D.
- 4. Surface Texture (segregation)
 - a. The Owner shall visually inspect the surface texture to evaluate conformance to the requirements of Section 3.5 C.6.
 - b. Areas that visually appear to be segregated shall be evaluated by the Owner by taking a set of 6 to 15 tests with a nuclear density gauge in both the visually segregated area and in an adjacent non-segregated area with the mean value of density of the two areas compared using the MDOT BITSEG2 computer program.
 - c. HMA that generates an output from the MDOT BITSEG2 program of "Remove and Replace, take corrective action" or "take corrective action" shall be considered to be segregated.
- 5. Surface Smoothness: The Owner shall visually inspect and make measurements to evaluate conformance to the requirements of Section 3.5 C.6.
- 6. Density
 - a. HMA base, leveling and top course placed for both main line and hand patching shall be compacted to a minimum of 92.0% and a maximum of 98.0% of the density calculated from the theoretical maximum specific gravity (Gmm) indicated on the approved JMF for the mixture.
 - b. The compaction percentage shall be determined by a calibrated nuclear density gauge.
 - c. The compaction percentage may be determined by 6 inch diameter cores (using dried back weights) at the discretion of the Owner.
- 7. Longitudinal Joint Density
 - a. Longitudinal Joints in HMA base, leveling and top course shall be constructed so that the density of the joint is a minimum of 84.0% of the density calculated from the theoretical maximum specific gravity (Gmm) indicated on the approved JMF for the mixture.
 - b. The compaction percentage shall be determined by a calibrated nuclear density gauge centered on the line where the joint between the two adjacent lifts abut at the surface.
 - c. Cores will not be permitted to establish the density and compaction % of longitudinal joints in HMA base, leveling or top course.
- 8. Mixture Properties
 - a. The Owner shall obtain samples of the hot mixture from the plant and test the mixture to evaluate compliance to the JMF.
 - i. A single sample shall be obtained from each day's placement for each mixture type being placed that is under 100 tons.
 - ii. Two samples shall be obtained from each day's placement for each mixture type being placed that exceeds 100 tons.
 - b. The tested mixture properties shall be within the following tolerances during construction:
 - i. Gradation of aggregate blend
 - a) Each sieve shall be within the Uniformity Tolerance indicated in Table 3-3.
 - ii. Binder content
 - a) Shall be within $\pm 0.5\%$ of that indicated on the JMF
 - iii. Air Voids.
 - a) Shall be within ± 1.0 % of the JMF value
 - iv. Voids in Mineral Aggregate (VMA)
 - a) Shall be within ± 2.0 % of the JMF value

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- B. Testing Agencies: The Owner may employ an independent testing agency to do testing for in place density and mixture properties as directed by the Owner.
- C. Destructive Testing: Destructive testing may be necessary during the term of the Contract to ensure that results as performed during the construction is deficient and warrants additional testing. The contractor shall be solely responsible for all costs incurred to perform destructive testing, including but not limited to the costs related to the testing of the areas suspected of failing to meet the contract requirements in a means approved by the Owner, to retain experts to direct the method of testing, oversee the testing, and assist in the resolution of the deficient areas solely at the contractors expense. Should the destructive testing results provide supplemental information that the areas being tested were in compliance with the Contract requirements; the Contractor shall be compensated for the costs incurred in a method mutually selected by the Owner and the Contractor from the General Conditions.

PART 2 PRODUCTS

2.1 Bond Coat

A. Shall meet the requirements of type SS-1h as specified in the table Titled "Anionic Emulsified Asphalts" or type CSS-1h as specified in the table Titled "Cationic Emulsified Asphalts" in the current version of the MDOT Specifications.

2.2 HMA Mixtures

- A. Mixing Plants
 - 1. Submit documentation of plant certification by MDOT. If certification cannot be provided, the Owner may request samples of the materials to be used to be provided and tested to verify the properties of the submitted JMF prior to HMA being placed. See Table 1-1.
 - 2. Scales for weighing HMA mixtures must meet requirements of the section titled "Measuring Weight on Scales" of the MDOT Specifications.

B. Composition of Mixture

- 1. Provide the HMA mix type and the performance grade of asphalt binder as shown on the project plans and as described on the approved JMF.
- 2. Aggregates
 - a. Shall be natural aggregates, iron blast furnace slag, reverbatory blast furnace slag or steel furnace slag.
 - b. Gradation shall be within the range for each sieve size as indicated Table 2-1.
 - c. Physical Requirements shall be as indicated in Table 2-2.
 - d. The minimum Aggregate Wear Index (AWI) for aggregates used in HMA Top Course mixtures shall be 220, unless otherwise specified.
 - e. The Owner reserves the right to request test results for and/or sample and test aggregates used in HMA Mixtures to establish compliance to these requirements prior to or during the production of HMA mixtures.

3. Binder

- a. Shall comply with the requirements indicated in Table 2-3.
- b. Shall be from a supplier listed on the MDOT "Asphalt Binder Suppliers List" existing at the time of the contract award:
- c. The Owner reserves the right to request test results for and/or sample and test binders used in HMA Mixtures to establish compliance to these requirements prior to or during production of HMA mixtures.

4. Mineral Filler

a. Shall be 3MF mineral filler consisting of limestone dust, dolomite dust, fly ash collected by an

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electrostatic precipitation method, slag, or hydrated lime.

- b. Shall have a gradation with 100 percent passing the No. 30 sieve and 75 to 100 percent passing the No. 200 sieve.
- c. Free carbon content of the fly ash sample shall not exceed 12 percent by weight as measured by the loss on ignition tests in accordance with ASTM C311.
- C. Mix Design Criteria and Volumetric Properties shall meet the requirements indicated in Table 2-4.
- D. Reclaimed Asphalt Pavement (RAP) Substitution
 - 1. Is limited to a maximum of 15% of the total mixture in HMA top course.
 - 2. Is limited to a maximum of 30% of the total mixture in HMA leveling and base course.
 - 3. Is limited to a maximum of 17% RAP binder by weight of the total binder in HMA mixtures where polymer modified binders are specified (designated P).
 - 4. No adjustment shall be permitted for the binder grade selection.

2.3 Paving Equipment

- A. Paving equipment shall be in good working order and capable of constructing HMA pavement in accordance with the specifications. Should the HMA paving indicate that an equipment problem is causing the construction to be out of specification, the Owner has the right to request the equipment be repaired or replaced.
- B. If maintaining traffic in the work area during construction, all self-propelled equipment within the construction influence area shall be with all safety devices as required by MIOSHA, MMUTCD, MDOT, or the local any governmental agencies within the construction influence area.

PART 3 EXECUTION

3.1 Examinations

- A. Each layer of HMA shall not be placed until the surface upon which it is to be placed has been inspected by the Contractor immediately prior to continuing construction.
- B. The Owner provides independent testing at random locations to assist in determining the conditions at the point the test is performed, but the Contractor shall remain solely responsible for compliance to the contract provisions throughout the entire project area.

3.2 Preparation of Surfaces

- A. Subgrade
 - 1. Prepare subgrade in accordance with plans and specifications.
 - 2. Grade subgrade to within one-half inch in ten feet of the design grade.
 - 3. Compact the subgrade, to a depth of not less than nine inches, to not less than 95% of the maximum unit weight as determined by the method described in the MDOT Density Testing and Inspection Manual appropriate for the subgrade material. The Owner may require the maximum unit weight to be determined by ASTM D1557 or by other methods.
 - 4. Proof roll all subgrade using rubber-tired equipment of sufficient size and weight, as determined by the Engineer, to identify any soft or yielding soils that require undercutting.
 - 5. Undercut and replace soft or yielding soils in the subgrade using the specified materials and to the limits as directed by the Engineer.

B. Existing Pavement Surfaces

1. An existing pavement surface may include a newly placed layer of pavement, the surface of an existing pavement without modification, or the existing pavement that has been removed in part with the use of a cold milling machine or by other approved means.

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- 2. Adjust all structures to finished grade prior to placement of HMA top course, matching both the design longitudinal and transverse cross slopes. Utilization of ductile iron frame adjustment rings for placement of
 - HMA top course not be allowed unless otherwise approved by the Engineer.
- 3. Remove existing cold patch.
- 4. Remove existing joint sealants to a depth of up to one inch, vegetation, or such dirt and debris from transverse and longitudinal joints and from cracks by mechanical or hand methods.
- 5. Thoroughly clean the surface of the pavement and paved shoulders of all dirt and debris. All cracks and joints shall be blown with compressed air to remove any loose material. A self-contained vacuum sweeper shall be used to pick up all loose material.
- 6. Full Depth Patch Removal: Remove full depth existing patches, when directed by the Owner, by providing a full depth saw cut around the area to be removed and remove existing materials and dispose of off-site.
- 7. Hand Patching
 - a. Fill in holes and depression and replace full depth existing patches and joint repairs when directed by the Owner using the HMA mixture specified in the contract documents. Compact the full depth hand patching material in layers no greater than 3 inches to the adjacent pavement grade by the use of an approved roller or by vibratory plate compactors or other means approved by the Owner for areas not accessible to a roller.
 - b. The Contractor shall use an Owner approved HMA top course material. HMA mixtures 2C, 11A, and 700B shall not be permitted for hand patching.
- C. Other Surfaces: Where included in the design pavement cross-section on the Contract Drawings, HMA pavement may be placed on other surfaces for certain road rehabilitation projects, which may include cold milling, and pulverized or rubblized HMA or concrete pavement. For these projects, special provisions or specifications are included in the Contract Documents detailing the requirements for preparation of those surfaces.

3.3 Bond Coat

- A. Uniformly apply bond coat to the surfaces against which new HMA is to be placed with a pressure distributor.
- B. The surfaces against which new HMA is to be placed shall be clean and dry. Contact surfaces that have become coated with dust, sand, or other objectionable material shall be cleaned by brushing, blowing with compressed air, or cut back with an approved power saw or other mechanical means to achieve a smooth clean edge, as directed by the Owner.
- C. The bond coat shall be applied far enough in advance of placement of the fresh mixture to insure adequate curing. Reapplication of the bond coat may be required at the direction of the Engineer if it becomes contaminated prior to placement of the HMA mixture.
- D. At no time shall bond coat be applied to the vertical face of concrete curb and gutter or monolithically poured face curb.

3.4 Transportation of Mixtures

- A. Each load of HMA mixture delivered to the project shall be weighed to the nearest 20 pounds on a certified scale having an automatic print out system.
- B. Trucks used for hauling HMA mixtures shall have tight, clean, smooth beds and shall be adequately covered to protect from the weather and foreign objects.
- C. Trucks used to haul HMA mixtures when the air temperature is below 50 degrees F° shall be insulated. The

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insulation shall be continuous along the bottom and four sidewalls.

D. A release agent, as permitted by the Owner shall be applied to the hauling units with atomizing spray equipment. Excessive use of release agent will be cause for rejection of the load.

3.5 Installation

- A. HMA Delivery at Site
 - 1. The temperature of the HMA mixture discharged from the hauling unit shall be within the ranges indicated in Table 3-1 unless otherwise approved by the Owner or they may be rejected.
 - 2. Where there is no range specified in Table 3-1 for surface temperature and layer thickness, placement shall not be permitted unless approved by the Owner.
 - 3. Any load having a temperature below 250 degrees or above 350 degrees in the hauling unit will be rejected.
- B. Temperature of Surfaces Prior to Placement See Table 3-1

C. Placing HMA Mixtures

- 1. Pavers
 - a. HMA shall be placed by an approved self-propelled mechanical paver to such a depth that when compacted it will have the thickness specified or as directed by the Engineer. The mixture shall be dumped into the center of the hopper and care shall be exercised to avoid overloading the paver and spilling the mixture.
 - b. Pavers will be required to have an automatically controlled and activated screed and strike off assembly except when placing HMA mixtures for:
 - i. Variable width sections.
 - ii. The first course of an HMA base course mixture on a subgrade, subbase or aggregate base.
 - iii. HMA base course mixtures for shoulders and widening less than 10.5 feet in width or as directed by the Owner.
- 2. HMA Shoulders: Shoulder widths within the tolerance of the equipment shall be placed with the main line HMA Top Course mixture. Shoulder widths exceeding the capabilities of the equipment shall be placed with an acceptable paver as directed by the Owner.
- 3. HMA Wedging
 - a. When necessary to take out irregularities in the existing road surface, wedging with HMA mixture shall be done by placing several layers with the paver.
 - b. The nominal maximum aggregate size for the material used shall not exceed ¾ inch and the maximum lift thickness shall be 2 inches. HMA Mixtures 2C, 11A and 700B will not be permitted for wedging.
 - c. Any corrections made by wedging with HMA mixture shall be placed, compacted, and allowed to cool prior to placing leveling, or top course mixtures. If the surface temperature of the wedging material falls below 150° F then a bond coat shall be applied prior to placement of the next layer of pavement.

4. HMA Lift Thickness

- a. HMA base course shall not be placed in lifts exceeding 3 inches, compacted, unless otherwise approved by the Owner. Approval to place lifts in excess of 3 inches will be based on the ability of the Contractor to place and compact the HMA base course mixture to the required density, cross section, and within the specified tolerances
- b. When the lift thickness exceeds 2 inches for HMA top course mixtures and 2 ½ inches for HMA leveling course mixtures, the pavement shall be constructed in two or more courses, unless otherwise specified in the contract documents.
- 5. HMA Joints

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- a. When placing the HMA top course, or the top 2 courses of multi-level pavement on the traveled portion of the roadway, the paving operation shall be conducted in a combination of widths which
 - will cause the final course longitudinal joint lines to coincide with the proposed painted lane lines.
- b. In placing HMA mixture adjacent to all joints, hand raking or brooming will be required to provide a dense smooth connection.
- c. All joints shall have the same texture and smoothness as other sections of the layer.
- d. The interface between the HMA mixture and concrete surfaces shall be full depth saw cut to a minimum width of ¼ inch and sealed with a hot poured rubber sealant.
- e. Transverse Joints
 - i. The roller shall pass over the unprotected end of freshly placed mixture only when placing of the layer is discontinued or when delivery of the HMA mixture is interrupted.
 - ii. In all cases, the edge of the previously placed layer shall be cut back to expose a clean, even, vertical surface for its full thickness.
 - iii. In continuing placement of a strip, the mechanical hot mixture will be spread to obtain a joint after rolling which conforms to the required density and smoothness specified.
- f. Longitudinal Joints
 - i. Longitudinal joints shall be vertically aligned to be within 1 inch of the underlying course and aligned with the final pavement markings.
 - ii. Inclusion of pay item for "HMA Longitudinal Joint ft" indicates that longitudinal joints in the HMA top course shall be saw cut and sealed with hot poured rubber sealant, as shown in the project plans.
 - iii. Edges of previously placed strips that have cooled or are irregular, honeycombed, poorly compacted, damaged, or otherwise defective, and unsatisfactory sections of the joint shall be cut back to expose a clean, sound, vertical surface for the full thickness of the course as directed by the Owner.
 - iv. When placing HMA over a concrete pavement, the longitudinal joints shall align with the joints in the concrete pavement. It shall be the responsibility of the contractor to provide the precise location of the existing longitudinal joints prior to placement of the HMA. In no case shall the variance between the underlying longitudinal joints and the HMA longitudinal joints exceed 1 inch. The longitudinal joints in the HMA shall be saw cut and sealed with hot poured rubber sealant.
- g. When the temperature of the previously placed HMA mixture mat falls below 170 degrees F°. The edges of the previously placed HMA mixture mat shall be coated with bond coat material before the new HMA mixture is placed on the adjacent section.

6. HMA Surface.

- a. A sufficient number of experienced shovelers and rakers shall follow the machine, adding hot HMA mixture and raking the HMA mixture as required to produce a course that, when completed, will conform to all requirements specified herein. Broadcasting or fanning of HMA mixture over areas being compacted will be permitted for HMA base and leveling course but shall not be permitted for HMA top course.
- b. In areas where the use of machine spreading is impractical, the HMA mixture shall be spread in a manner to prevent segregation.

D. Rolling and Compaction of HMA Mixtures

- 1. Rollers and Rolling General
 - a. Use roller type indicated in Table 3-2 for the appropriate application.
 - b. The Contractor shall provide an adequate number of rollers so as to achieve the minimum required density and finish, adjusting the speed of the paving operation as needed.

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- c. Pneumatic-tired rollers shall not mark or rut the surface or displace the pavement edges. The pneumatic tired roller shall be ballasted to obtain the required ground contact pressures as directed by the Owner. In order to obtain a uniformly textured mat and the desired in place density, the
 - Owner may direct the Contractor to correct any deficiencies that arise at any time during the rolling operations. The roller operations shall be conducted in such a manner as to prevent scuffing or chatter marks in the pavement surface.
- d. Steel rollers wheels shall be kept properly moistened with water but usage of an excess is prohibited. Pneumatic tired rollers shall be inspected and be verified to be clean.
- e. Rolling of the HMA mixture shall begin as soon after placing as it will bear the roller without undue displacement, picking up the mat or cracking. Rolling can start longitudinally at the extreme sides of the lanes and proceed toward the center of the pavement, overlapping on successive trips by at least half the width of the drive wheel of the roller. Alternate passes of the roller shall be of slightly different lengths. The maximum roller speed shall not exceed the manufacturer's recommended speed for the type of mixture or thickness of layer being placed. At no time shall the roller finish perpendicular to the direction of travel.
- 2. Rolling and Compacting Unsupported Edges: When placing the HMA Mixture at an unsupported edge, the drum on the first pass at an unsupported edge shall be 3 inches to 6 inches inside the unsupported edge. On the second pass at an unsupported edge the drum shall extend over the unsupported edge by approximately 6 inches. The drum shall not run on the edge or directly inside the unsupported edge.
- 3. Rolling and Compacting Joints: When placing the HMA mixture in a lane adjoining a previously placed lane (longitudinal joint), the mixture shall be placed such that it uniformly overlaps the first lane by a maximum of two inches and is placed at a height above the cold mat equal to the breakdown roller depression on the hot mat. Compact the longitudinal joint by rolling from the hot side, keeping the edge of the roller approximately 6 inches to 8 inches inside the cold joint for the first pass. For the second pass of the roller, compact the joint from the hot side while overlapping the cold side by 6 inches to 8 inches.
- 4. Rolling and Compacting Areas of Limited Accessibility: In all places not accessible to the roller and less than 3 feet in width, the hot HMA mixture shall be compacted by vibratory plate compactors or by other means approved by the Engineer. Skin patching on an area that has been rolled will not be permitted.
- 5. HMA Surfaces
 - a. After final rolling, the surface may be tested by the Owner using a 10 foot straight edge supported on equal size blocks 1 inch or greater in thickness at each end at selected locations. The variation of the surface from the testing edge of the straight edge between any two contacts with the surface shall at no point exceed:
 - i. Three-eighths inch for HMA base course.
 - ii. One-quarter inch for HMA leveling course.
 - iii. One-eighth inch for HMA top course.
 - b. Finish rolling on the top course shall continue until all roller marks are eliminated.
 - c. No traffic shall be allowed on the surface being placed until rolling has been completed and the surface has cooled sufficiently to prevent damage from traffic.

3.6 Non-Conforming Work

A. If it is determined by the Owner that the work is outside acceptable tolerances or to be non-conforming work per these specifications, the Contractor will be notified and allowed to make any necessary corrections to their operations. Should the Contractor fail to make the necessary corrections as requested, the Owner will determine the best course of action to correct which could include reducing final payment or hiring outside forces, at the Contractor's expense, to correct. The Contractor shall submit to the Owner for review the means and methods to make deficient areas compliant. Corrections shall be made based on these as directed by the Owner.

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- B. Non-Conforming Work Identified during construction.
 - 1. Temperature: HMA shall be rejected per Section 3.5A. If the HMA is placed it shall be either removed or replaced or if acceptable to be left in place by the Owner, a 25% reduction in payment will be assessed.
 - Layer Thickness shall meet contract documents. Additional layers shall not be placed until resolved. Resolution may require removal and replacement, adjustments in placement of the next layer or grinding.
 - 3. Yield: Additional course shall not be placed until resolved.
 - 4. Joint Quality: If found to be deficient, the Contractor may be required to saw cut and seal the joint with hot poured rubber sealant or may be required to remove and replace the full width of pavement in the affected
 - 5. Surface Texture (Segregation): Remove and replace to the full lane width in the affected area.
 - 6. Surface Smoothness: Remove and replace to the full lane width in the affected area.
 - 7. Density

areas.

- a. Remove and replace to the full lane width in the affected area.
- b. If in lower courses do not place additional courses until resolved
- 8. Longitudinal Joint Density
 - a. Remove and replace to the full width of the pavement in the affected area.
- 9. Mixture Properties: Test second sample, if obtained, for mixture. If second sample tests do not concur with first sample for the properties that are out of specification, no action is required. If second sample test results concur with first sample for the properties that are out of specification either remove and replace the affected HMA or if acceptable to be left in place by the Owner, a 25% reduction in payment will be assessed.

C. Non-Conforming Work

- 1. Joint Quality: Saw cut and seal the joint with hot poured rubber sealant or remove and replace the full width of pavement in the affected areas.
- 2. Surface Texture (Segregation): Remove and replace the full lane width in the affected area.
- 3. Rutting and/or Flushing: Remove and replace the full lane width in the affected area.
- 4. Cracks
 - a. For transverse cracks, either route and seal the crack with hot poured rubber sealant or remove and replace with a patch wide enough to accommodate the equipment needed to achieve the required density.
 - b. For random cracks remove and replace to the full lane width of the pavement in the affected area
 - c. For edge cracks remove and replace to a width of at least three feet along the affected area

4.1 Measurement and Payment

A. HMA, (type) - Ton

The Owner will pay for the amount of HMA specified based on the weight placed, as supported by the weigh tickets supplied by the Contractor, and by the quality assurance yield calculations and mat thickness depth checks conducted by the Owner. **HMA**, (**type**) will be paid for at the contract unit price per ton bid as called for in the Contract Documents.

B. HMA, (type), inch - Square Yard

The Owner will pay for the amount of HMA specified based on the area placed, as measured in square yards. The quantity of HMA will be measured in place by the Owner after placement, compaction, and depth have been verified by the Owner. **HMA**, (**type**), ___inch will be paid for at the contract unit price per square yard bid as called for in the Contact Documents.

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C. Hand Patching – Ton

The Owner will pay for the amount of hand patching based on the weight placed in tons, and as supported by the weight tickets supplied by the Contractor. The Contractor shall use an Owner-approved HMA top course material for hand patching material. **Hand Patching** will be paid for at the contract unit price per ton bid as called for in the contract documents.

D. HMA Approach - Ton

The Owner will pay for the amount of HMA specified based on the weight placed, as supported by the weigh tickets supplied by the Contractor, and by the quality assurance yield calculations and mat thickness depth checks conducted by the Owner. **HMA Approach** will be paid for at the contract unit price per ton bid as called for in the Contract Documents.

E. HMA, Temp Pavt (type) - Ton

The Owner will pay for the amount of HMA specified based on the weight placed, as supported by the weigh tickets supplied by the Contractor, and by the quality assurance yield calculations and mat thickness depth checks conducted by the Owner. **HMA**, **Temp Pavt** (**type**) will be paid for at the contract unit price per ton bid as called for in the Contract Documents.

F. HMA Longitudinal Joint - Foot

HMA Longitudinal Joint will be paid for at the contract unit price per foot as called for in the contract documents. The unit price bid shall include all labor, materials, and equipment necessary to sawcut and seal with hot poured rubber sealant the HMA top course.

- G. Bond coat payment shall be included in the payment of HMA, Ton or HMA, Square Yard.
- H. Reductions to final pay amounts can be made for non-conforming work and HMA installation outside acceptable tolerances, as provided for in Section 3.6.

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Table 1-1. Requirements for HMA Mixture Submittals

Job Name, HMA Supplier, and HMA Mixture Type Plant No. and Plant Location MDOT Form 1911for plant with Traveling Mix Inspector signature and Plant Certification Date for current year.

Aggregate Pit No., Type and Blend %
Aggregate Gradation -Each and Combined
Aggregate Crushed %
Aggregate Soft Particle%
Aggregate Angularity Index
Aggregate L.A. Abrasion
Specific Gravity of Combined Aggregate, Gsb
Aggregate Wear Index

Binder Supplier and MDOT Certifier Number Binder Virgin Grade and Final Grade Binder Specific Gravity % Binder from RAP % New Binder Added

Mix Properties at Test Points 4 (minimum) and Optimum Binder Content

Binder Content, %
Bulk Specific Gravity, compacted
Theoretical Maximum Specific Gravity
Air Voids, %
Voids in Mineral Aggregate, % (VMA)
Voids Filled with Asphalt, % (VFA)
Stability (LBS)
Flow (.01 In)

Worksheets Theoretical Maximum Specific Gravity Worksheet

Regression Analysis for Marshall Mix Design Bulk Specific Gravity Worksheet – Marshall Specimens

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Table 1-1. Requirements for HMA Mixture Submittals – Superpave Mixtures

Job Name, HMA Supplier and HMA Mixture Type Plant No. and Plant Location

Aggregate Pit No., Type and Blend %
Aggregate Gradation -each and combined
Fine Aggregate Angularity
Aggregate % Sand Equivalent
Aggregate L.A. Abrasion
Aggregate Soft Particle%
Aggregate % Flat and Elongated Particles
Specific Gravity of Combined Aggregate, Gsb
Aggregate Wear Index

Binder Supplier and MDOT Certifier Number Binder Virgin Grade and Final Grade Binder Specific Gravity % Binder from RAP % New Binder Added

Mix Properties at Test Points 4 (minimum), Optimum Binder Content, and Verification Test Results at N MAX

Binder Content, %
Bulk Specific Gravity at N DES and at N MAX
Theoretical Maximum Specific Gravity
Air Voids % (VMA) at N DES
Voids in Mineral Aggregate (VMA) @ N DES
Voids Filled with Asphalt (VFA) @ N DES
% Gmm @ N INT, N DES and N MAX
Fines /EFF Asphalt Ratio

Worksheets

Regression Analysis for Superpave Mix Design Bulk Specific Gravity – Gyratory Specimens Theoretical Maximum Specific Gravity Coarse and Fine Aggregate Bulk Specific Gravity Tensile Strength Ratio



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Table 2-1. Master Gradation Ranges for Aggregate Blend for HMA Mixtures

HMA Mixture	2C	11A	3C	4C MOD	13A MOD	36A MOD
% Passing 1 ½ inch	100	100				
% Passing 1 inch	91-100	90-100	100			
% Passing ¾ inch	90 max	70-95	91-100	100	100	
% Passing ½ inch	78 max	55-85	90 max	91-100	75-95	100
% Passing 3/8 inch	70 max	40-80	77 max	90 max	60-90	92-100
% Passing No. 4	52 max	25-65	57 max	67 max	45-80	65-90
% Passing No. 8	15-40	15-50	15-45	15-52	30-65	55-75
% Passing No. 16	30 max	10-40	33 max	37 max	20-50	
% Passing No. 30	22 max	7-32	25 max	27 max	15-40	25-45
% Passing No. 50	17 max	5-20	19 max	20 max	10-25	
% Passing No. 100	15 max	4-12	15 max	15 max	5-15	
% Passing No. 200	3-6	3-6	3-6	3-6	3-6	3-10

Note: RAP for HMA Mixture 4C MOD is limited to 15% of the total mixture

RAP for HMA Mixtures 13A MOD and 36A MOD is limited to 15% of the total mixture when used for HMA top course (Section 2.2.D).

Table 2-1. Master Gradation Ranges for Aggregate Blend for HMA Mixtures

HMA Mixture	700B MOD	1100L MOD	1100T MOD	1300L MOD 1300T MOD	1500L MOD 1500T MOD
% Passing 1½ inch	100				
% Passing 1 inch	80-100				
% Passing ¾ inch		100	100	100	
% Passing ½ inch		90-100	90-100	90-100	100
% Passing 3/8 inch	55-90	65-95	65-95	65-95	92-100
% Passing No. 4				55-75	65-90
% Passing No. 8	30-55	45-70	45-70	45-70	55-75
% Passing No. 16					
% Passing No. 30	15-40	20-45	20-45	20-45	25-50
% Passing No. 50					
% Passing No. 100					
% Passing No. 200	3-10	3-10	3-10	3-10	4-10

Note: RAP for HMA Mixtures 1100T MOD, 1300T MOD and 1500T MOD is limited to 15% of the total mixture (Section 2.2.D).



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<u>Table 2-1. Master Gradation Ranges for Aggregate Blend for HMA Mixtures – Superpave Mixtures</u>

	HMA Superpave Mix Number								
Standard Sieve	5 MOD	4 MOD	3 Leveling Course	3 Base Course	2				
		% Passing	Criteria (Cont	rol Points)	T				
1 ½ inch					100				
1 inch			100	100	90-100				
¾ inch		100	90-100	90-100	90 max				
½ inch	100	90-100	90 max	90 max					
3/8 inch	90-100	90 max							
No. 4	90 max								
No. 8	47-67	39-58	35-52	23-52	19-45				
No. 16									
No. 30									
No. 50	·	·	·						
No. 100		·	-						
No. 200	2.0-10.0	2.0-10.0	2.0-8.0	2.0-8.0	1.0-7.0				

Notes: RAP for HMA Superpave Mixture Number 5 MOD is limited to 15% of the total mixture (Section 2.2.D). RAP for HMA Superpave Mixture Number 4 MOD is limited to 15% of the total mixture when used for HMA top course (Section 2.2.D.).



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Table 2-2. Physical Requirements for Aggregates for HMA mixtures

HMA Mixture	2C	11A	3C	4C	13A MOD	36A
				MOD		MOD
Crushed, %, min, MTM 117	90	90	90	90	90	90
Soft Particle, %, max, MTM 110 (a)	12.0	12.0	12.0	8.0	12.0/8.0	8.0
					(b)	
Fine Aggregate Angularity, min, MTM 118	4.0	2.5	4.0	4.0	2.5	3.0
(c)						
L.A. Abrasion, % loss, max, MTM 102, (d)	40	40	40	40	40	40
Sand Ratio, max (e)	-	-	-	-	50	50

- (a) Soft particles maximum is the sum of the shale, siltstone, friable sandstone, ochre, coal, clay-ironstone and any particles that are structurally weak or are non-durable in service.
- (b) When HMA mixture is used for HMA leveling or base course /HMA top course
- (c) The angularity index of the blended aggregate must meet the minimum requirement. In mixtures containing RAP, the required minimum angularity index must be met by the virgin material.
- (d) For the composite mixture. Each individual aggregate must be less than 50.
- (e) Percent of material passing the No. 4 sieve as a percent of the percent of material passing the No. 30 Sieve.

Note: RAP for HMA Mixture 4C MOD is limited to 15% of the total mixture

RAP for HMA Mixtures 13A MOD and 36A MOD is limited to 15% of the total mixture when used for HMA top course (Section 2.2.D).

Table 2-2. Physical Requirements for Aggregates for HMA mixtures

	700B	1100L	1100T	1300L	1500L
IIMA Mintuno	MOD	MOD	MOD	MOD	MOD
HMA Mixture				1300T	1500T
				MOD	MOD
Crushed, %, min, MTM 117	25	40	90	90	90
Soft Particle, %, max, MTM 110 (a)	12.0	12.0/8.0 (b)	12.0/8.0 (b)	12.0/8.0 (b)	12.0/8.0 (b)
L.A. Abrasion, % loss, max, MTM	40	40	40	40	40
102 (c)					

- (a) Soft particles maximum is the sum of the shale, siltstone, friable sandstone, ochre, coal, clay-ironstone and any particles that are structurally weak or are non-durable in service.
- (b) When HMA mixture is used for HMA base or leveling course /HMA top course
- (c) For the composite mixture. Each individual aggregate must be less than 50.

Note: RAP for HMA Mixtures



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Table 2-2. Physical Requirements for Aggregates for HMA mixtures – Superpave Mixtures

Mix Type (a)	Percent Crushed Minimum Criteria (b)		Fine Aggregate Angularity, Min		Equiva	% Sand Equivalent, Min		Los Angeles Abrasion % Loss Max, MTM 102 (c)		Abrasion % Soft % Loss Particles Max, Max, MTM MTM 102 110 (d)		ticles MTM	% Fla Elong Parti Max	gated cles,
	Top and Level	Bas e	Top and Leve l	Bas e	Top and Leve l	Bas e	Top and Leve l	Bas e	Top and Leve l	Base	Top and Leve l	Bas e		
EL	55/-	-	-	-	40	40	45	45	10	10	-	1		
EM L	75/-	50/-	43	40	40	40	35	40	5	5	10	10		
EM H	90/85	80/7 5	45	40	45	45	35	35	3	4.5	10	10		
ЕН	100/10 0	95/9 0	45	45	50	50	35	35	3	4.5	10	10		

(a) EL = ≤ 0.3 ESAL (Equivalent Single Axle Load)

 $EML = > 0.3 - \le 3.0 ESAL$

 $EMH = > 3.0 - \le 30 ESAL$

 $EH = > 30 - \le 100 ESAL$

- (b) "XX/YY" denotes that XX percent of the coarse aggregate has one fractured face and YY percent has at least two fractured faces
- (c) If a blend of different aggregate sources, the abrasion value applies to each source
- (d) Soft particles maximum is the sum of the shale, siltstone, ochre, coal, clay-ironstone, and any particles that are structurally weak or non-durable in service.
- (e) Maximum by mass with a 1:5 aspect ratio.

Note: RAP for HMA Superpave Mixtures is limited to 15% of the total mixture when used for HMA top course (See Section 2.2 D)



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Table 2-3. Specifications for Performance Graded Binder

	PG 52		PG 58		PG	64	PG	70
Specification	-28	-22	-28	-34	-22	-28	-22	-28
Pavement Design Temperature								
Average 7-day Max. Pavement Design Temp, °C	52	52 58 64		7	70			
Minimum Pavement Design Temp, °C	-28	-22	-28	-34	-22	-28	-22	-28
Original Binder								
Flash Point Temp, T48/D92 Min, °C	230	230	230	230	230	230	230	230
Viscosity, T316/D4402: Max 3 Pa•s, Test Temp, °C	135	135	135	135	135	135	135	135
Dynamic Shear, T315/D7175: G*/sin θ, Min 1.00 kPa, Test Temp, °C at 10 rad/s (a) (b)	52	58	58	58	64	64	70	70
Rolling Thin Film Oven (T24	0/D2872)		1			1	ı	
Mass Loss, Max, %	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Dynamic Shear, T315/D7175: G*/sin θ, Min 2.20 kPa, Test Temp, °C at 10 rad/s (b)	52	58	58	58	64	64	70	70
Pressure Aging Vessel (PAV)	Residue (R28/D652	21)					
PAV Aging Temp, °C (c)	90		100		10	00	100	(110)
Dynamic Shear, T315/D7175: G*sin θ, Max 5000 kPa, Test Temp, °C at 10 rad/s (b)	16	22	19	16	25	22	28	25
Physical Hardening (d)	Report	Report		Report		Rej	ort	
Creep Stiffness T315/D6648 S Max, 300 MPa M-value, Min 0.300 Test Temp, °C at 60 s	-18	-12	-18	-24	-12	-18	-12	-18

- (a) For quality control (QC) of unmodified asphalt cement production, measurement of the viscosity of the original asphalt cement may be used or supplement dynamic shear measurements of $G^*/\sin\theta$, at test temperatures where the asphalt is a Newtonian fluid. The Contractor may use a standard means of viscosity measurement, including capillary (T201/D2170 or T202/D2171) or rotational viscometer (T316/D4402)
- (b) $G^*/\sin \theta = \text{high temperature stiffness and } G^*\sin \theta = \text{intermediate temperature stiffness.}$
- (c) The PAV aging temperature is based on simulated climatic conditions and is one of the three temperatures: 90°C, 100°C, or 110°C. The PAV aging temperature is 100°C for PG 58- and above, except in desert climates, where it is 110°C
- (d) Physical hardening T313/D6648 is performed on a set of asphalt beams according to ASTM D6648, Section 13.1, except the conditioning time is extended to 24 hours \pm 10 minutes at 10° C above the minimum performance temperature. The 24-hour stiffness and m-value are reported for information purposes only.

Notes: Test reference designations TXXX or RXX/DXXXX refer to the AASHTO/ASTM standards existing at the time of the award of the contract.

For specified binders not listed in this table, refer to the MDOT Standard Specifications for Construction existing at the time of the award of the contract.



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Table 2-4. Mix Design Criteria and Volumetric Properties

HMA Mixture	2C	11A	3C	4C	13A MOD	36A MOD
				MOD		
Target Air Void, %	3.00	3.00	4.00	4.00	4.00/3.00	4.00/3.00
					(a)	(a)
VMA, min, (based on G _{sb})	11.00	11.00	13.00	14.00	14.00	15.00
VFA	65-78	65-78	65-78	65-78	65-78	65-78
Fines to Binder Ratio, max (b)	1.2	1.2	1.2	1.2	1.2	1.2
Flow (.001 inch)	8-16	8-16	8-16	8-16	8-16	8-16
Stability, lbs, min	1200	1200	1200	1200	1200	1200

- (a) Target Air Void may be reduced to 3.00% for low volume roads for HMA mixture 13A and 36A if designated in the contract documents.
- (b) Ratio of aggregate passing the No. 200 sieve to total asphalt binder content by weight including fines and binder content contributed by RAP

Note: RAP for HMA Mixture 4C MOD is limited to 15% of the total mixture

RAP for HMA Mixtures 13A MOD and 36A MOD is limited to 15% of the total mixture when used for HMA top course (Section 2.2.D).

Table 2-4. Mix Design Criteria and Volumetric Properties

HMA Mixture	700B MOD	1100L MOD	1100T MOD	1300L MOD 1300T MOD	1500L MOD 1500T MOD
Target Air Void, %	4.00	3.00	3.00	3.00	3.00
VMA, min (based on G _{sb})	13.00	13.50	13.50	14.00	14.00
VFA	65-78	65-78	65-78	65-78	65-78
Fines to Binder Ratio, max (a)	1.2	1.2	1.2	1.2	1.2
Flow (.001 inch)	8-16	8-16	8-16	8-16	8-16
Stability, lbs, min	700	1100	1100	1300	1500

⁽a) Ratio of aggregate passing the No. 200 sieve to total asphalt binder content by weight including fines and binder content contributed by RAP

Notes:

Measure and/or calculate volumetric properties from specimens made using a 50 blow Marshall Hammer per the Asphalt Institute Manual MS-2.

Measure the density of the Marshall specimens per ASTM D 2726.

Measure the Maximum Specific Gravity per ASTM D 6857.

Measure Flow and Stability of Marshall specimens per ASTM D 5581.

RAP is limited to 15% of the total mixture for HMA Mixtures 1100T MOD, 1300T MOD and 1500T MOD (Section 2.2.D).



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Table 2-4. Mix Design Criteria and Volumetric Properties – Superpave mixtures

HMA Superpave Mixture Number	5 MOD	4 MOD	3	2
%G _{mm} at the design Number of Gyrations (N _d)	96.0 (a)			
% G _{mm} at the initial Number of Gyrations (N _i)		See Tab	le below	
% G _{mm} at the maximum number of Gyrations (N _m)	≤ 98.0			
VMA Min % at N _d (based on G _{sb})	See Table below (b)			
VFA at N _d	15.00	14.00	13.00	12.00
Fines to effective asphalt binder ratio (P _n 200/P _{be})	0.6 - 1.2			
Tensile Strength ratio (TSR)	80% min			

- (a) Design all mixtures to 96.0% of the G_{mm} at the design number of gyration (N_d). During field production increase the % G_{mm} at N_d to 97.0%. Use liquid asphalt cement for regression of mixes unless otherwise noted.
- (b) For regressed mixtures, the maximum criteria limits do not apply.

Notes: RAP for HMA Superpave Mixture Number 5 MOD is limited to 15% of the total mixture (Section 2.2.D). RAP for HMA Superpave Mixture Number 4 MOD is limited to 15% of the total mixture when used for HMA top course (Section 2.2.D.).

	HMA		Number of Gyrations (a)		VFA	VFA	
Estimated Traffic (million ESAL)	Superpave Mixture Type	% G _{mm} at N _i	N _i	N_{d}	$N_{\rm m}$	Min-Max Top and Level, %	Min-Max Base, %
≤ 0.3	EL	91.5% max	7	50	75	70-80	70-80
$> 0.3 - \le 3.0$	EML	90.5% max	7	75	115	65-78	65-78
> 3.0 - \le 30	EMH	89.0% max	8	100	160	65-78 (b)	65-75
> 30 - ≤ 100	EH	89.0% max	9	125	205	65-78 (b)	65-75

⁽a) Compact mix specimens fabricated in the Superpave gyratory compactor (SGC) to N_d . Use height data provided by the SGC to calculate volumetric properties at N_i . Compact Mix Specimens at optimum Pb (percent asphalt binder content) to verify N_m for mix design specimens only.

(b) 73 to 76% for Mix Number 5

Notes: Measure and/or calculate volumetric properties from specimens made using a Gyratory Compactor per the MDOT HMA Production Manual existing at the time of the contract award.

Measure the density of the Gyratory Compactor specimens per ASTM D 2726.

Measure the Maximum Specific Gravity per ASTM D 6857.

RAP for HMA Superpave Mixture Number 5 MOD is limited to 15% of the total mixture (Section 2.2.D).

RAP for HMA Superpave Mixture Number 4 MOD is limited to 15% of the total mixture when used for HMA top course (Section 2.2.D.).



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Table 3-1. HMA Mixture Placement Temperatures

Temperature of Surface Being Overlaid, Deg F	Layer Thickness				
	1 inch and under 1 inch to 2 inches Over 2 inches				
	Target Placement Temperature Deg F				
35-39			310 - 350		
40-49		310 - 350	295 - 335		
50-59	310 - 350	295 - 335	280 - 320		
60-69	295 - 335	280 - 320	265 - 305		
70-79	280 - 320	265 - 305	250 - 290		
80-89	265 - 305	250 - 290	250 - 290		
90 and over	250 - 290	250 - 290	250 - 290		

Air temperature must be 40 deg F° and rising for the placement of HMA.



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Table 3-2. Roller Type Application Chart

Roller Type	HMA base course	HMA leveling course	HMA top course	Pinching Joints
	Initial	Initial		
Pneumatic-tired	Compaction	Compaction	No	No
	only	only		
Tandem Steel	Initial	Initial	Initial	
Wheeled -	Compaction	Compaction	Compaction	No
Vibratory mode	only	only	only	
Tandem Steel	Initial and/or	Initial and/or	Initial and/or	Initial and/or
Wheeled –	Final	Final	Final	Final
Static mode	Compaction	Compaction	Compaction	Compaction

Table 3-3. Uniformity Tolerance Limits for Aggregate Blends

Parameter	Top and Leveling Courses	Base Course
% Passing # 8 and Larger Sieves	± 8.0	± 9.0
% Passing # 30 sieves	± 6.0	± 9.0
% Passing #200 Sieve	± 2.0	± 3.0



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CITY OF FARMINGTON HILLS

SPECIAL PROVISION FOR

QUALITY ASSURANCE AND QUALITY CONTROL OF PORTLAND CEMENT CONCRETE

PART 1 GENERAL

1.1 SUMMARY

- A. This special provision establishes guidelines for the Quality Assurance (QA) and Quality Control (QC) testing of concrete for the project.
- B. The Owner will be responsible for the acceptance of the concrete material based on representative samples obtained and tested by the Owner as described herein (QA testing).
- C. Owner Quality Assurance Testing is not a substitute for Contractor QC.
- D. The Contractor will be responsible for all QC activities and QC testing needed to monitor, assess and adjust production and placement processes to ensure the final product will meet the specified levels of quality.
- E. If the Contractor does not perform QC testing, they may utilize the results of the Owner QA Testing under the following conditions;
 - 1. It is understood that Owner QA testing is comprised of randomly selected representative samples.
 - 2. The results of Owner QA testing or rejection of non-conforming materials cannot be used as a basis for claims for additional compensation, delays or extensions of time.

F. Related Requirements

- 1. Special Provision for Concrete Paving Materials
- 2. Special Provision for Concrete Roadway Paving

1.2 MEASUREMENT AND PAYMENT

- A. The Owner will pay for all QA testing of the concrete as specified herein.
- B. All costs for Contractor QC Testing shall be included in the cost for all pay items in which concrete is a material, unless otherwise indicated.

1.3 REFERENCES

- A. Abbreviations and Acronyms
 - 1. ACI American Concrete Institute
 - 2. ASTM American Society for Testing Materials
 - 3. MDOT Michigan Department of Transportation.

B. Definitions

1. Air Content - The recorded total air content of fresh concrete tested to this specification per ASTM Method C 231 or C 173.

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- 2. Concrete Mix Design The actual batch quantities (mixture proportions) of each constituent included in the concrete mixture with supporting test data for each component and for the mix itself.
- 3. Non-Conforming Work Work not in accordance with these specifications.
- 4. Quality Assurance (QA) Activities administered by the Owner dealing with acceptance of the product, including, but not limited to, materials sampling, testing, construction inspection, and review of Contractor QC documentation
- 5. Quality Control (QC) All activities administered by the Contractor to monitor, assess and adjust production and placement processes to ensure the final product will meet the specified levels of quality, including, but not limited to, training, materials sampling, testing, project oversight and documentation.
- 6. QC Plan The project-specific plan developed by the Contractor describing, in detail, all aspects of production and construction for the project to ensure consistent control of quality to meet specification requirements.
- 7. QC Plan Administrator- An employee of or consultant engaged by the Contractor, responsible for developing and overseeing all aspects of QC for the project.
- 8. Slump The recorded slump of fresh concrete tested to this specification per ASTM C 143.
- 9. Start-Up Testing Testing performed by QC and QA staff on the initial batch of concrete, performed either at the batch plant or at the site, to establish the compliance to the specifications prior to starting the placement.
- 10. Temperature The recorded temperature of fresh concrete tested to this specification per ASTM C 1064.
- 11. Owner The Owner or their duly appointed representative.
- 12. SCM Supplementary Cementitious Materials
- C. Where referenced, "MDOT Specifications" is a general term that shall include the current version of the MDOT Standard Specifications for Construction and all Supplemental Specifications, Special Provisions, and Errata existing at the time of the award of the Contract.
- D. MDOT manuals that are referenced specifically by name shall be the current versions of said manuals existing at the time of the award of the Contract.

1.4 SUBMITTALS

- A. Concrete Mix Design(s) per the Special Provision for Concrete Paving Materials.
- B. Contractor QC Plan

b.

- 1. The Contractor shall provide a QC Plan, for the Owners review:
 - a. At least ten (10) days prior to a Pre-Production Meeting if one is scheduled by the Owner
 - b. At least ten (10) days prior to the first placement of concrete.
- 2. The Quality Control Plan must identify, at least, the following:
 - a. The intention of the Contractor to perform QC testing

Coordination of activities Personnel, including the QC Plan Administrator

Equipment and Facilities

Testing and initial field curing facilities for QC specimens.

- Hot and Cold Weather protection considerations and methods.
- c. Mixing time and transportation, including time from batching to completion of delivery.



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- d. Process for monitoring stability of air content of fresh concrete during concrete production and placement
- e. Placement and consolidation methods including monitoring of vibration.
- f. Depth checks
- g. Verification of pavement dowel bar alignment.
- h. Finishing and Curing procedures
- i. Non-Conforming Work

C. QC Plan Administrator and Staff

- 1. The QC Plan Administrator must have full authority and responsibility to take all actions necessary for the successful implementation of the QC plan.
- 2. The QC Staff must be certified concrete technicians through a program certified by the Michigan Concrete Association (Michigan Level I or II).

1.5 QUALITY CONTROL

- A. The Contractor is expected to perform Start-Up testing daily at the point of placement.
 - 1. The Owner will do side by side air content tests with the Contractors QC personnel to verify that the air meters are in working order as a part of the Start Up Testing
 - a. If the differences are more that 0.8%, steps will be taken to determine which of the air meters is reading incorrectly as facilitated by the Owner.
 - 2. Do not begin concrete placement until testing has verified that the concrete meets specifications.
- B The Contractor is expected to establish, daily, air losses through either the paving equipment or pump, if used, to establish a correction factor to apply to subsequent tests made on concrete directly from the delivery unit.
 - 1. Paving operations will be suspended when losses through the paver are found to exceed 1.5% until such time that losses can be demonstrated to be below 1.5%.
- C. Work found to be out of specification will be rejected and not paid for until the work is brought back into specification. The Owner reserves the right to request a stoppage in production for concrete that is consistently out of specification.

1.6 QUALITY ASSURANCE

- A. Acceptance base on Placement Time
 - 1. The maximum interval between charging of the mixer and placing of concrete shall be as follows:

Conqueta Tompoueture

Type of Unit	Below 60°F	60° F to 85°F	Above 85°F
Open Top Trucks	60 minutes	45 minutes	30 minutes
Open Top Agitating Units	60 minutes	60 minutes	30 minutes
Closed Top Agitating Units	90 minutes	60 minutes	45 minutes
Truck Mixers 90 minutes	60 minutes	45 minutes	

2. For Concrete Mixtures that contain Water-Reducing Admixtures:

Concrete Temperature



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Type of Unit	Below 60°F	60° F to 85°F	Above 85°F
Open Top Agitating Units	60 minutes	60 minutes	30 minutes
Closed Top Agitating Units	120 minutes	90 minutes	75 minutes
Truck Mixers	120 minutes	90 minutes	70 minutes

- 3. For placements made using a slip form or form riding paver, the concrete is considered to have been placed when it passes through the paver.
- 4. For placements made using a pump, the concrete is considered to have been placed when it is discharged from the pump and appropriately finished.

B. Sampling at the Point of Placement

- 1. Shall be per ASTM C 172 from the middle third of the delivery unit.
 - a. For single unit placements, sampling from the initial discharge of the delivery unit is permitted for informational testing only.
 - b. The sampling frequency during concrete placement for testing for temperature, slump and air content will be:
 - 1) On the first load of the day (Start-up Testing)
 - 2) At regular intervals, thereafter or at any time the material may appear to outside of these specifications.
- 2. Testing and Acceptance at the Point of Placement
 - a. Temperature
 - 1) The temperature of the concrete, measured at the point of placement must be between 45 degrees and 90 degrees, Fahrenheit.
 - b. Air Content
 - 1) The tested air content shall be at least 5.5 percent and shall not exceed 8.5 % for the in-place concrete.
 - a) For placements made using a slip form paver or a pump, the air content sample shall be obtained at the point of placement after the concrete has passed through the paver or pump.
 - b) The Contractor is responsible for the determination of losses of air through the paver or pump.
 - (1) This shall be determined daily.
 - (2) Operations will be suspended when losses through the paver are found to exceed 1.5% until such time that the losses can be demonstrated to be below 1.5%.
 - (3) Once an air loss is established for the day, samples can be obtained from the delivery unit and an air loss correction applied to determine compliance.
 - c) The Contractor is responsible for repair of the concrete needed from taking a sample from pavement.

c. Slump

- 1) The target slump and tolerances will be as stated on the Owner approved Mix Design. If no range is given the following tolerances shall apply:
 - a) If the target slump is written as a "maximum" or not to exceed" the production tolerances are:
 - (1) Plus 0, minus 1 ½ inch for target slump 3" and less
 - (2) Plus 0, minus 2 ½ inch for target slump over 3"
 - b) If the target slump is not written as a "maximum" or "not to exceed" the production tolerances are:
 - (1) Plus, or minus $\frac{1}{2}$ inch for slump 2 inches and less

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- (2) Plus, or minus 1 inch for slump over 2 but less than 4 inches
- (3) Plus, or minus 1 ½ inch for slump over 4 inches
- d. Addition of Water at the Site
 - 1) A one-time addition of water at the site will be permitted to adjust the slump
 - 2) The adjusted slump must remain within the tolerances stated on the Owner approved Concrete Mix Design or to the tolerances as stated herein.
 - 3) The water to cement ratio indicated on the Mix Design for the concrete mixture cannot be exceeded.
- e. Casting of Cylinders
 - 1) For each day of production, the Owner will cast 4 x 8 or 6 x 12 test cylinders per ASTM C31 for the purposes of determining:
 - a) The in-place concrete strength for evaluation of imparting loads on it.
 - b) The 28-day strength of the concrete for evaluation of compliance to the design strength.
 - 2) Samples obtained for casting cylinders will also have temperature, slump and air tests made from the sample.
 - 3) The Cylinders will be cured and tested per ASTM C 31 and ASTM C 39.
 - 4) The Owner will determine the number of sets of cylinders to be taken for each mix type.
 - a) Up to five (5) test cylinders will be made by the Owner per set.
 - (1) Three (3) of these are to be reserved for curing at the testing facility to be tested at ages 7 days and 28 days.
 - (2) The remaining cylinders are to be cured in a similar manner to the in-place concrete and tested at an age when imparting loads to concrete is desired.
 - (a) The Owner may elect to use the Maturity Method (ASTM C1074), as an alternate to field cured cylinders for this purpose.
 - b) Additional cylinders can be made at the Contractors request to facilitate completion of the work
 - (1) The Contractor may request additional cylinders, to be tested at the contractors requested timing
 - (2) Delays caused by failure of the Contractor to request additional cylinders shall be the Contractor's sole responsibility.

1.7 NON-CONFORMING WORK

A. Placement Time

- 1. When the age of a load of concrete reaches the placement time limits in Article f. (after paver or after pumping) placement of the concrete from that truck shall stop.
- 2. If less than 2/3 of the concrete has been placed, then no more concrete from that truck shall be placed
- 3. If more than 2/3 of the concrete in the truck has been placed, the Owner may accept the remaining concrete in the truck if when tested at that time, the temperature, slump and air content of the concrete are within the specifications herein.

B. Temperature

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- 1. When the temperature of a load of concrete is above the maximum or below the minimum temperatures stated herein, placement of the concrete from that truck shall stop and the remaining concrete in the truck shall not be placed.
- 2. Concrete placed from the truck prior to the temperature test will be rejected, removed and replaced or subjected to a payment reduction at the discretion of the Owner.
- 3. The next available truck shall be tested for temperature prior to any concrete being placed. If the temperature is still out of specification production shall stop for the day.

C. Air Content

- 1. When a load of concrete, at the point of placement, is below 6.0% or greater than 8.0 % as specified herein, placement of the concrete from that truck shall stop and the remaining concrete in the truck shall not be placed.
- 2. The concrete placed from the truck prior to the air content test being made will be rejected, removed and replaced, or subjected to a payment reduction at the discretion of the Owner.
- 3. The next available truck shall be tested for air content prior to any concrete being placed. If the air is still out of specification production shall stop for the day or until such time that QC testing at the plant verifies the air to be in specification.
- 4. For placements made by a paving machine, adjustments must be made to the pavement machine and /or paving operation when the air content is out of specification prior to the resumption of paving.

D. Slump

- 1. When the slump of a load of concrete is outside of the tolerances indicated herein placement of the concrete from that truck shall stop and the remaining concrete in the truck shall not be placed
- 2. The next available truck shall be tested for slump prior to any concrete being placed. If the slump is still out of specification production shall stop for the day or until such time that QC testing at the plant verifies the slump to be in specification.
- 3. The concrete placed from the truck prior to the slump test being made will be rejected, removed and replaced, or subjected to a payment reduction at the discretion of the Owner.

E. Addition of Water at Site

- 1. If, after the one-time addition of water at the site permitted herein, the slump is outside of the tolerance indicated herein, the protocol of Article g.D. shall be followed
- 2. No further concrete shall be placed from a truck to which a second addition of water is made at the site.

F Compressive Strength

- 1. When the 28-day Compressive strength of concrete is more than 500 psi below the design strength, the representative concrete will be rejected, removed and replaced.
- 2. When the 28-day compressive strength is within 500 psi of the design strength, the placement may be accepted using the statistical criteria of ACI 307.
- 3. The Contractor may request and be given the option to evaluate the placement by testing core samples drilled from the placement at their expense.
 - a. At least three cores, selected at random locations shall be cut and tested to evaluate the placement
 - b. The cores are to be cut and conditioned per ASTM C 42, tested per ASTM C 42 and ASTM C39.
 - c. The criteria of ACI 318 shall be used to evaluate the core test results

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CITY OF FARMINGTON HILLS

SPECIAL PROVISION FOR CONCRETE PAVING

PART 1 GENERAL

1.1 SUMMARY

- A. This Special Provision shall include all labor, materials, equipment, tools, transportation, and necessary supplies to install concrete pavement to the line, grade, thickness, and cross sections in accordance with these specifications and drawings.
- B. Related Requirements
 Special Provision for Concrete Paving Materials
 Special Provision for Quality Assurance and Quality Control of Portland Cement Concrete

1.2 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	<u>Unit</u>
Conc Pavt with Integral Curb, Nonreinf, 7 inch	Syd

All of the requirements within the Special Provision shall not be considered for additional payment and shall be included as part of the contract unit price. All costs for furnishing, preparation for installation (drilling, grouting), placement of dowels/lane ties, and any handwork/forming required to fit the drainage structure cover castings in proposed curb/gutter line shall be included in the bid unit price for "Conc Pavt with Integral Curb, Nonreinf, 7 inch."

All of the requirements within the Special Provision shall not be considered for additional payment and shall be included as part of the contract unit price. All costs for furnishing, preparation for installation (drilling, grouting), placement of dowels/lane ties, and any handwork/forming required to fit the drainage structure cover castings in proposed curb/gutter line shall be included in the bid unit price for "Conc Pavt with Integral Curb, Nonreinf, 6 inch."

All of the requirements within the Special Provision shall not be considered for additional payment and shall be included as part of the contract unit price. All costs for furnishing, preparation for installation (drilling, grouting), placement of dowels/lane ties, and any handwork/forming required to fit the drainage structure cover castings in proposed curb/gutter line shall be included in the bid unit price for "**Driveway, Nonreinf Conc, 6 inch.**"

1.3 PAYMENT REDUCTIONS

A. Reductions to final pay amounts shall be made for Non-Conforming Work and concrete installation outside acceptable tolerances as provided in Section 3.11, "*Non-Conforming Work*".

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1.4 REFERENCES

- A. Abbreviations and Acronyms
 - 1. ACI American Concrete Institute
 - 2. ASR Alkali-Silica Reactivity
 - 3. ASTM American Society for Testing Materials
 - 4. CIP Compacted in Place
 - 5. MDOT Michigan Department of Transportation.
 - 6. MIOSHA Michigan Occupational Safety and Health Act
 - 7. NRMCA National Ready-Mix Concrete Association
 - 8. SCM Supplemental Cementitious Materials

B. Definitions

- 1. Aggregate Base Layer of dense graded aggregate material placed on a subgrade, subbase or open graded drainage course as part of the pavement structure.
- 2. Construction (Bulkhead or End of Pour) Joint The formed joint, either of longitudinal, transverse or other orientation, between two adjacent concrete slabs, created when one slab is cast up against another already hardened slab.
- 3. Crack A visible fissure or surface discontinuity that may or may not extend through the entire thickness of the concrete. Cracks may be singular or in multiple patterns. Crack types are:
 - a. Transverse A crack or cracks that are oriented primarily in the transverse direction versus the longitudinal direction. That is, the angle between the overall crack line and the center line is less than 45 degrees. It can exist anywhere in the panel.
 - b. Longitudinal A crack or cracks that are oriented primarily in the longitudinal direction versus the transverse direction. That is, the angle between the overall crack line and the center line is greater than 45 degrees. It can exist anywhere in the panel.
 - c. Corner A crack of general diagonal orientation that is located near a panel corner.
 - d. Map Interconnecting, variable spaced cracks in a random orientation and pattern.
- 4. Delivery Ticket Sequentially numbered receipts of materials delivered to site for the sole use on the specified project.
- 5. Expansion Joint Joints of Longitudinal, Transverse or other orientation placed to allow movement of pavement without damaging adjacent pavements, intersecting streets, drainage structures, or other fixed objects.
- 6. Lane Tie Joint A joint that provides load transfer between adjacent sections of concrete either created by a plane of weakness joint or by the conclusion of a placement.
- 7. Longitudinal Parallel, or nearly parallel to the centerline of the roadway.
- 8. Multiple Surface Voids Areas within a panel where several surface void(s) are clustered in a relatively concentrated area(s).
- 9. Non-Conforming Work Any work outside of acceptable tolerances for the item of work identified within these specifications.
- 10. Open Graded Drainage Course Layer of specified open-graded aggregate material placed on the subgrade as part of the pavement structure.
- 11. Optimized Gradation Combination of aggregates for a concrete mixture that produce an aggregate blend of specified particle sizes, coarseness factor, and workability factor.
- 12. Owner The Owner or their duly appointed representative.
- 13. Plane-of-Weakness (Contraction) Joint A simple joint either formed or cut in a concrete surface running in a longitudinal, a transverse or other direction to reduce the cross-sectional area and encourage any cracking to occur along the joint rather than randomly.

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- 14. Quality Assurance (QA) Activities administered by the Owner dealing with acceptance of the product, including, but not limited to, materials sampling, testing, construction inspection, and review of Contractor OC documentation.
- 15. Quality Control (QC) Activities administered by the Contractor to monitor, assess and adjust production and placement processes to ensure the final product will meet the specified levels of quality, including, but not limited to, training, materials sampling, testing, project oversight and documentation.
- 16. Scaling and Mortar Flaking The concrete surface has a visible, exposed, rough texture from a loss of either aggregate or mortar.
- 17. Slab A section of concrete bounded by, a longitudinal saw cut joint or cold joint, a transverse saw cut joint, a curb or an unsupported edge.
- 18. Spall Broken or missing piece of concrete contiguous with the perimeter edge of a panel with a surface area exceeding two square inches.
- 19. Subgrade Portion of the earth grade upon which the pavement structure is placed.
- 20. Subbase Layer of granular material placed on the subgrade as a part of the pavement structure.
- 21. Supplementary Cementitious Material (SCM) Industrial by-products such as fly ash, GGBFS, and silica fume with cementitious properties that are used as a partial replacement for cement in concrete.
- 22. Surface Void A void in the pavement surface with a lateral dimension in excess of 1" in any direction and a depth in excess of 3/8" at any location within the area of the void.
- 23. Transverse Perpendicular or nearly perpendicular to the centerline of the roadway.
- 24. Tied Joint A joint between an existing concrete pavement and a full depth concrete pavement repair, in which the existing pavement is drilled and tied to the pavement repair with grouted epoxy coated deformed bars.

C. Reference Standards

- 1. ASTM A 615 Standard Specification for Plain Carbon-Steel Bars for Concrete Reinforcement
- 2. ASTM A 775 Standard Specification for Epoxy Coated Reinforcing Steel Bars
- 3. ASTM C 94 Standard Specification for Ready Mix Concrete
- 4. ASTM C 309 Standard Specification for Liquid Membrane Forming Compounds for Curing Concrete
- 5. ASTM D 994 Standard Specification for Preformed Expansion Joint Material for Concrete (Bituminous Type)
- 6. ASTM D 1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft. lbf/ft3 (2,700Kn-m/m3))
- 7. ASTM D 1751 Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-Extruding and Resilient Bituminous Types)
- 8. ASTM D 2995 Standard Specification for Membrane Sprayer for Curing Compound
- 9. ASTM D 5249 Standard Specification for Backer Material for Use with Cols and Hot Applied Joint Sealants in Portland Cement Concrete and Asphalt Joints
- 10. ASTM D 6690 Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
- D. Where referenced, "MDOT Specifications" is a general term that shall include the current version of the MDOT Standard Specifications for Construction and all Supplemental

Specifications, Special Provisions, and Errata existing at the time of the award of the Contract.



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E. MDOT manuals that are referenced specifically by name shall be the current versions of said manuals existing at the time of the award of the Contract.

1.5 PREPRODUCTION MEETING

- A. The Owner reserves the right to schedule a pre-production meeting.
 - 1. The pre-production meeting will be held a minimum of 7 calendar days prior to the start of concrete production and placement.
 - 2. The Owner will provide written notification to all parties a minimum of 14 calendar days prior to the meeting.
 - 3. The Contractor QC Plan and all Concrete Mix designs shall be submitted for review at least 7 calendar days prior to the Pre-Production Meeting
 - 4. Items of discussion shall include, but not be limited to:
 - a. Project safety.
 - b. Roles and responsibilities
 - c. Pour Schedule
 - d. Submittals
 - 1) Contractor QC Plan and Owner QA Plan
 - 2) Concrete Mix Designs (ASR, Optimized Gradation etc.)
 - 3) Jointing Plan
 - 4) Jointing Materials
 - e. Weather Management (Cold Weather, Hot Weather, Evaporation Rate, etc.)
 - f. Delivery (Placement Time, Concrete Temperature etc.)
 - g. Plant Sampling and Testing (Start-Up Testing, QC and QA)
 - h. Field sampling and testing (Start-Up Testing, Air loss behind paver and through pump, etc.)
 - i. Concrete Field Testing / Suspension of Production (Non-Conforming Work)
 - j. Cylinders (Size, frequency, work in progress etc.).
 - k. Strength Acceptance Criteria (28 Day, Opening to traffic, etc.)
 - 1. Pavement Thickness Tolerances
 - m. Finishing and Curing
 - n. Joint Quality
 - o. Protection of Work
 - p Non-Conforming Work
 - q. Records

1.6 SUBMITTALS

- A. Concrete Mix Design (s) Refer to the Special Provision for Concrete Paving Materials.
- B. Contractor QC Plan Refer to the Special Provision for Quality Assurance and Quality Control of Portland Cement Concrete
- C. Paving Jointing Plan The Contractor will provide a detailed pavement jointing plan to the Owner for review and approval ten (10) calendar days prior to the work occurring.
- D. Dowel Bars for Transverse Expansion and Contraction Joints Provide documentation that the material:
 - 1. Meets the requirements of Article 2.1.B.

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- 2. Is supplied by a manufacturer on the Approved Manufacturers List in the MDOT Materials Source Guide.
- E. Lane Ties for Longitudinal Pavement Joints Provide documentation that the material:
 - 1. Meets the requirements of Article 2.1.C.
 - 2. Is supplied by a manufacturer on the Approved Manufacturers List in the MDOT Materials Source Guide.
- F. Epoxy Coating and Repair Coating for Dowel Bars Provide documentation that the material:
 - 1. Mets the requirements of Article 2.1.D.
 - 2. Is supplied by a manufacturer on the Approved Manufacturers List in the MDOT Materials Source Guide.
 - 3. Is listed on the Qualified Products List in the MDOT Materials Source Guide.
- G. Bond Release Agent for Epoxy Coated Dowel Bars Provide documentation that the material:
 - 1. Meets the requirements of Article 2.1.E.
 - 2. Is listed on the Qualified Products List in the MDOT Materials Source Guide.
- H. Fiber Joint Filler Provide:
 - 1. Documentation that the material meets the requirements of Article 2.1.H.
 - 2. Test results for density, water absorption, and asphalt content to compare with ASTM D 1751.
- I. Joint Sealant Provide documentation that the material:
 - 1. Meets the requirements of Article 2.1.I.
 - 2. Is listed on the Tested Stock List of the MDOT Materials Source Guide.
- J. Backer Rods
 - 1. Provide documentation that the material meets the requirements of Article 2.1 J.
- K. Curing Compound Provide:
 - 1. Documentation that the material meets the requirements of Article 2.1.K
 - 2. Test results for water retention, reflectance properties and drying time to compare with ASTM C 309.

1.7 QUALITY CONTROL

- A. Quality Control of all materials used on the project shall be the responsibility of the Contractor.
- B. The appropriate documentation per Article 1.6 must be submitted and approved by the Owner prior to staring the work.
- C. The Contractor shall follow the QC Plan submitted per the Special Provision for Quality Assurance and Quality Control of Portland Cement Concrete
- D. The Contractor will monitor the suitability of the substrate for placement of concrete per Articles 3.1 and 3.2.

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- E. The Contractor will monitor the weather conditions and advise the Owner as to suitability for placement per Article 1.9
- F. The Contractor is expected to monitor the production of concrete at the manufacturing facility to ensure that the product is within specification.
- G. For concrete mixes with Optimized Gradations, the Contractor is expected to sample and test the aggregate blends for maintenance of the Coarseness and Workability Factors as defined in the Special Provision for Concrete Mix Design.
- H. The Contractor is expected to sample and test the concrete upon delivery to the jobsite per the Contractor Quality Control Plan.
- I. If the Contractor does not perform Quality Control testing, they may utilize the results of the Owner Quality Assurance Testing under the following conditions;
 - 1. It is understood that Owner Quality Assurance testing is comprised of randomly selected representative samples.
 - 2. The results of Owner Quality Assurance testing or rejection of non-conforming materials cannot be used as a basis for claims for additional compensation, delays or extensions of time.

1.8 QUALITY ASSURANCE

- A. Owner Quality Assurance Testing is not a substitute for Contractor Quality Control.
- B. The Owner will check to see that the mixtures delivered to the site are those that have been approved by the Owner per the Special Provision for Concrete Mix Design. The Owner will check for this based on the Delivery Tickets that come with the concrete.
- C. The Owner will inspect, sample, test and evaluate the concrete for compliance to these specifications per the Special Provision for Quality Assurance and Quality Control of Portland Cement Concrete at the plant, if so desired, and at the site.
 - 1. The Contractor will accommodate Owner Quality Assurance Testing.
 - 2. The Contractor will repair any damage to the placed concrete caused by Owner Quality Assurance Testing at no additional cost to the Owner
- D. The Owner will evaluate the Quality Control Testing of aggregates for concrete mixes with Optimized Gradations and test the aggregates at periodic intervals.
- E. The Owner will conduct periodic pavement thickness depth checks during placement to check that the thickness is within 0.2 inches of that shown on the Project Plans per Article 3.5.
- F. Finishing Article 3.6
 - 1. The Owner will evaluate the use of water to facilitate finishing of the concrete.
 - 2. The Owner will monitor the adequacy of the finishing techniques and the final finished product.
 - a. The Owner will check the plastic concrete using a ten-foot straightedge for high and low spots that exceed 1/8 inch over ten feet.
 - b. The Owner will check the hardened concrete with a ten-foot straightedge for deviations which exceed ½ inch over 10 feet or 3/4" over 50 feet.

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- c. The Owner will check that the burlap drag and transverse broom finish texture is acceptable.
- 3. When a slip form paver is used, the Owner will check for edge settlement of the plastic concrete that exceeds ¼ inch over ten feet.

G. Curing - Article 3.7

- 1. The Owner will check that two coats of curing compound are applied.
- 2. The Owner will check that the sides of the pavement are coated with curing compound after form removal.

H. Jointing – Article 3.8

- 1. The Owner will visually inspect the joint configuration and placement for conformance to the standard joint details shown or referenced on the Project Plans and to the requirements of Article 3.8.
- 2. The Owner will perform pull-out resistance tests on a representative number of Longitudinal Lane Tie Joints, Construction (Bulkhead or End of Pour) Joints and Tied Joints with deformed bars to check to the requirements of Article 3.8.
- 3. The Owner will monitor sawed joints for spalling and cracking due to miss-timed saw cutting.
- I. Protection of the Work: The Owner will visually inspect the work for damage due to lack of protection of the work both before and after the placement as per Section 3.9
- J. The Owner will advise the Contactor as to the time when the concrete reaches the strength required to open the pavement to traffic per Article 3.10.
- K. Surface Defects: The Owner will visually inspect the final concrete surface for spalling, scaling, cracks and physical damage.
- L. The Owner will check the Joint Sealant for proper adhesion to the concrete.

1.9 WEATHER (AMBIENT CONDITIONS)

A. Protection of Work: Refer to Article 3.9

B. Cold Weather

- 1. Cold Weather is defined as being when the air temperature is at or below 35 degrees Fahrenheit at any time during placement and during the first three days of concrete curing.
- 2. No concrete shall be placed unless the temperature of the air in the shade and away from artificial heat is at least 20 degrees F. and rising, unless specifically approved by the Owner.

3. Hot Weather

- 1. Hot Weather is defined as being when the weather conditions are such that the rate of evaporation is equal to or greater than 0.20 pounds per square foot (psf) per hour at any time during placement and the first three days of concrete curing.
- 2. Paving at night or outside of the normal working hours may be approved if requested to assist in meeting these criteria and to assist the Contractor at the sole discretion of the Owner and at the Contactors sole expense.
- D. Placement of concrete when the rate of evaporation exceeds 0.20 psf per hour as calculated using the NRMCA formula is prohibited:



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Evaporation Rate = $(\text{Tc }^2.5 - \text{r*Ta }^2.5) * (1+0.4\text{V}) * (1 \times 10^{6}).$

Tc = Temperature of the concrete, degrees F.

r = Relative Humidity, % near the placement (as a decimal)

Ta= Ambient Temperature near the placement, Degrees F

V = Wind Velocity, mph

B. Precipitation

- 1. Schedule activities to avoid precipitation.
- 2. Placement of concrete in the rain or snow shall be prohibited.

1.10 POST-CONSTRUCTION INSPECTION

- A. Maintenance and Guarantee Bond
 - 1. A two (2) year Maintenance and Guarantee Bond is being provided with this Contract.
 - 2. This Bond takes effect after the Owner's approval of the Final Estimate.
- B. Preliminary Post-Construction Inspection
 - 1. The Owner shall perform an inspection of the pavement prior to July 31 of the year succeeding the final payment of the work.
 - a. The Contractor shall be notified of the date and be permitted to participate.
 - b. Non-Conforming Work will be identified and the Contractor notified in writing.
 - c. Non-Conforming work will be corrected before August 31 of the year succeeding the final payment of the work at no cost to the Owner.
- C. Secondary Post-Construction Inspection
 - 1. The Owner shall perform a second inspection at least 60 days before the expiration of the Maintenance and Guarantee Bond.
 - a. The Contractor shall be notified of the date and be permitted to participate.
 - b. Non-Conforming Work will be identified and the Contractor notified in writing.
 - c. The Contractor is required to respond within the time frame stated in the notification as to their intention and schedule to correct the Non-Conforming Work.
 - d. Correction of the Non-Conforming Work will be at no cost to the Owner.

PART 2 PRODUCTS

2.1 MATERIALS.

- A. Concrete shall comply with the Special Provision for Concrete Paving Materials
- B. Dowel Bars for Transverse Expansion and Contraction Joints:
 - 1. Must be straight, smooth, round bars with dimensions shown on the Project Plans.
 - 2. Must have a minimum yield strength of at least 40,000 psi
 - 3. Must have a minimum tensile strength of at least 70,000 psi.
 - 4. If welded to a dowel basket, must meet these strength requirements after being welded.
 - 5. Must have the ends saw cut or sheared and free of burrs without distortion of the ends.
 - 6. Must be coated with Epoxy Coating as described in Article 2.1.D
- C. Lane Ties for Longitudinal Lane Tie Joints
 - 1. Straight Tie Bars for Plane of Weakness Joints
 - a. Must be at least No.5 steel deformed bars at least 24 inches long.

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- b. Must be made of steel meeting the requirements of ASTM A 615, A 996 or A 706.
- c. Must be coated with Epoxy Coating as described in Article 2.1.E to within 4 inches of each end of the bar
- 2. Bent Tie Bars for Construction (Bulkhead or End of Pour) Joints
 - a. Must be at least No.5 steel deformed bars at least 24 inches long as measured around the outside of the bend.
 - b. Must have a yield strength of at least 40,000 psi.
 - c. Must be capable of withstanding bending to a 90-degree angle, re-straightening and then withstanding the pull-out requirements of Article 3.8.
 - d. Must be coated with Epoxy Coating as described in Article 2.1.D to within 4 inches of each end of the bar
- 3. Devices for Transverse Construction (Bulkhead or End of Pour) Joints
 - a. Must be straight steel tie bar devices
 - b. Must be at least No.5 steel deformed bars at least 30 inches long.
 - c. Must be made of steel meeting the requirements of ASTM A 615, A 996 or A 706.
 - d. Must be coated with Epoxy Coating as described in Article 2.1.D to within 4 inches of each end of the bar

D. Epoxy Coatings for Dowel Bars

- Must have an average coating thickness of 0.010 inch, nor more than 0.014 inch on any bar with individual determinations on a single bar within a tolerance of ± 0.004 inches of the average.
- 2. Epoxy Repair Coating must:
 - a. Be compatible with original coating system.
 - b. Have a minimum DFT of 8 mils on patched areas with 2-inch overlap of existing coating.

E. Bond Release Agent for Epoxy Coated Dowel Bars

- 1. Must be an asphalt material meeting the requirements of MC-70 or RC-250 or
- 2. Must be such to provide pullout shear bond stress of 60 psi for initial and final movement of the dowel from the concrete specimen.
 - a. The supplier must provide certification attesting to this.
- 3. Bond Release agent may be applied by the Contractor or the supplier.

F. Sleeves for Dowel Bars

- 1. Must be at least 0.01-inch-thick and made of 300 series stainless steel.
- 2. Must cover the bar to within 3 inches on the bar end that will be fixed.
- 3. Must wrap around the dowel bar and not move in relation to the bar.
- 4. Must be fastened to the bar with a continuous weld.
- 5. Must contact the entire bar without gaps.

G. Expansion Caps for Dowel Bars

- 1. Must be metal or plastic as shown on the Project Plans
 - a. Steel Caps must be at least 28-guage stainless steel.
 - b. Plastic Caps must be one piece with a uniform thickness of at least 1/16 inch and entirely closed on the end.
- 2. Must have a uniform diameter for a length of at least 4 inches
- 3. Must include a stop to ensure the end of the cap remains at least 1 inch away from the end of the dowel bar during concrete placement.



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H. Preformed Joint Fillers:

- 1. Fiber Joint Filler must:
 - a. Conform to the requirements of ASTM D 1751
 - b. Not deform or break due to twisting bending of handling
 - c. Be cut to the rectangular shape and width shown on the Project Plans with holes punched for load transfer bars.

I. Joint Sealant

- 1. Must be a hot poured rubber sealing compound conforming to ASTM D 6690 except:
 - a. The bond sealant is to be tested at -20 degrees F for three complete cycles at 100 % extension
 - b. Penetration must be 130±20 dmm at 77 degrees F.
 - c. Penetration must be as least 40 dmm at 0 degrees F
 - 1) Prepare and test two specimens after 24 hours at 0 degrees F
 - 2) Complete test within 20 seconds after removal form freezer
 - d. Use MDOT 2NS sand in the concrete mixture for the bond blocks

J. Backer Rod for use with Hot Poured Joint Sealant

- 1. Must be solid, round, heat resistant, closed-cell, cross-linked, polyethylene foam.
- 2. Must satisfy the requirements of ASTM D 5249, Type I

K. Concrete Curing Materials

- 1. White pigmented membrane forming compound meeting the requirements of ASTM C 309 Type 2, Class B.
- 2. Must be packaged in clean containers

2.2 EQUIPMENT

- A. Paving equipment shall be in good working order and capable of constructing the pavement in accordance with the specifications. Should the paving indicate that an equipment problem is causing the construction to be out of specification, the Owner has the right to request the equipment be repaired or replaced.
- B. If maintaining traffic in the work area during construction, all self-propelled equipment within the construction influence area shall be with all safety devices as required by MIOSHA, MMUTCD, MDOT, or the local any governmental agencies within the construction influence area.

C. General

- 1. Any equipment operating entirely or partially on adjacent pavement shall be equipped with rubber-tired wheels.
- 2. Self-propelled equipment used in the paving train shall be equipped with approved guards for the protection of personnel. Form scrapers will be required on all screeding equipment.
- 3. If the pavement is to be constructed by the slip-form method, the equipment requirements given herein shall be modified to achieve the required results without the use of fixed side form.

D. Forms:

- 1. Unless special provision is made for or required herein all side forms for this work shall be of metal.
- 2. Forms shall be of a depth, at least equal to the edge thickness of the work prescribed, except as hereinafter specified for pavement with integral curb.

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- 3. The form sections shall have a length of at least ten (10) feet to result in a continuous smooth curve without segment.
- 4. Each 10-foot section of form shall
 - a. Have at least three stake pockets.
 - b. Be straight, free from bents, twists or other distortions, and when tested with a 10-foot straightedge shall:
 - 1) Show no vertical variation greater than 1/8 of an inch in 10 foot lengths from the true plane surface on the top of the form
 - 2) Show no lateral variation greater than 1/4 of an inch from the true plane surface on the vertical face of the form.
- 5. The width of the base in direct bearing on the soil shall be not less than 3/4 of the form depth except that a width of less than 8" will not be permitted.
- 6. The width of the wooden base shall be equal to or greater than the base width of the metal form, except that a nominal depth and width of less than 2 inches by 10 inches will not be permitted for the final plank in direct bearing on the soil.
- 7. The substrate may be a maximum of one inch lower than the bottom of the built-up forms.

E. Flexible Forms:

- 1. Flexible steel or wood forms are required on curves with a radius less than 250-foot radius to result in a continuous smooth curve without segment.
- 2. The top of the form when tested with a 10-foot straightedge shall show no lateral deflection of the edge thickness of the work prescribed.

F. Mixing and Transporting Equipment:

- 1. Concrete may be mixed at the site of construction or at a central point or when approved, wholly or in part in truck mixers.
 - a. Each mixer shall have attached prominently a manufacturer's plate showing; serial number, maximum mixing capacity in volume of mixed concrete, mixing speed of the drum, maximum agitating capacity in volume of mixed concrete, or on truck mixers and agitators, the agitating speed of the drum or blades.
 - b. Each mixer shall be capable of mixing the entire volume of batch material in one operation and be able to discharge the mixture without segregation.
 - c. Mixers and agitators shall be operated within the limits of capacity and speed of rotation designated by the manufacturer of the equipment.

2. Truck mixers shall:

- a. Be capable of discharging the concrete with a satisfactory degree of uniformity and without segregation of the concrete mix.
- b. Be equipped with counters indicating the number of revolutions at the manufacturer's recommended speed for mixing.
- c. Truck mixers used for mixing and hauling concrete shall conform to the requirements of ASTM C94.
- 3. Truck agitators used for hauling central mixed concrete shall conform to the requirements of ASTM C94.
- 4. Bodies of non-agitating hauling equipment for concrete shall be smooth, mortar-tight metal containers capable of discharging the concrete at a satisfactorily controlled rate without segregation. Covers shall be provided when needed for protection.

G. Finishing Equipment:

1. The Contractor shall provide a self-propelled mechanical finisher on standard width paving.

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- a. It shall be designed to strike-off the pavement as well as to consolidate and compact it to the required cross section.
- b. The finishing equipment, either singly or in combination with strike-off and floating equipment shall provide a minimum of two (2) oscillating screeds.
- 3. When pavement is placed by the slip-form method, the equipment shall spread, consolidate, screed, and mechanically float the freshly placed concrete in such a manner that only a minimum of hand finishing will be necessary.
 - a. The machine shall be equipped to vibrate the concrete for the full width and depth of the pavement.
- 4. An approved hand-propelled vibratory screed shall be provided for use in areas where the pavement width will not permit the use of a finishing machine.
 - a. It shall consist of a steel-shod strike board having a gasoline engine capable of producing at least 5,000 vibrations per minute.
 - b. Other vibratory screeds may be approved by the Engineer.
- 5. An approved steel-shod strike board with suitable handles for its operation shall be provided for use in areas where it is not feasible to use either a finishing machine or a vibratory screed.

H. Dowel Bar and Tie Bar Inserter(s):

- 1. When not placed on approved chairs, dowel bars and tie bars shall be installed by use of a mechanical device capable of placing bars to specified tolerances.
- 2. Insert dowel bars in two-lift paving with the paving machine used to place the top lift.

I Vibrators:

- 1. The optimum frequency and vibration to be used with the project concrete mixture shall be determined by the Contractor.
- 2. Use internal immersed tube or multiple spud gang vibrators for full width and depth consolidation of slip-formed concrete pavement.
 - a. Space internal vibrators no greater than 18 inches apart.
 - b. Position vibrators 4 to 6 inches below the finished surface, positioned at an angle of 5 to 10 degrees from vertical.
- 3. Consolidate concrete that is adjacent to forms, joints, or fixtures, and to augment vibrating screeds with internal vibration for placements over 5-inches deep using single spud type internal vibrators.

J Bulkheads:

- 1. Bulkheads for Construction (Bulkhead or End-of-Pour) Joints shall be of adequate thickness, and so designated as to permit bars to extend through the joint.
- 2. Slots shall be cut in the header board so it can be adjusted up or down as required.

K. Concrete Saw:

- 1. Self-propelled, capable of cutting new and hardened concrete neatly to a depth as specified on the plans and/or details.
- 2. Equipped with a suitable blade guard and guides or devices to control alignment and depth.
- 3. The equipment shall comply with all regulations pertaining to silica dust generation.

L Joint Sealing Equipment:

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- 1. Indirect heating or the double boiler type of heating kettle required and equipped with;
 - a. Thermostatically controlled heat
 - b. Built-in agitator
 - c. Thermometers to indicate the temperature of the sealing material.
- 2. Pouring equipment shall produce a controlled application rate such that it will force the sealing material to the bottom of the joint and completely fill it to the surface for the pavement without spilling material onto the surface of the pavement.

M. Membrane Sprayer:

- 1. Power-driven spray equipment is required.
- 2. Pressure sprayer shall be capable of applying a continuous uniform film at the specified rate and coverage.
- 3. Spray equipment shall be calibrated in accordance with ASTM D 2995 Method A.
- 4. Spray nozzles and windshields shall be used during spraying to prevent wind-blown loss of curing compound.

N Other Equipment:

1. Furnish all other equipment, small tools and supplies which are necessary to the proper prosecution of the work.

PART 3 EXECUTION

3.1 EXAMINATIONS

- A. Immediately prior to beginning concrete paving, verify that the existing substrate surface is in a suitable condition, in compliance with these specifications and is ready for paving.
- B. Verify that the gradients and elevations of the substrate surface are correct, and that the limits of the substrate preparation follow these specifications.

3.2 PREPARATION OF SURFACES

A. Remove loose, frozen, or otherwise unsuitable substrate material. Backfill with materials as appropriate for the type of substrate, and compact as specified.

B. Subgrade

- 1. Grade subgrade to within one-half inch in ten feet of the design grade.
- 2. Compact the subgrade to not less than 95% of the maximum unit weight as determined by the method described in the MDOT Density Testing and Inspection Manual appropriate for the subgrade material. The Owner may require the maximum unit weight to be determined by ASTM D1557 or by other methods.
- 3. Proof roll all subgrade using rubber-tired equipment of sufficient size and weight, as determined by the Engineer, to identify any soft or yielding soils that require undercutting.
- 4. Undercut and replace soft or yielding soils in the subgrade using the specified materials and to the limits as directed by the Engineer.

C. Subbase

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- 1. Grade the subbase to within three-eighths of an inch in ten feet of the design grade.
- 2. Compact the subbase to not less than 95% of the maximum unit weight as determined by the method in the MDOT Density Testing and Inspection Manual appropriate for the subbase material. The Owner may require the maximum unit weight to be determined by ASTM D1557 or by other methods.

D. Open Graded Drainage Course

- 1. Grade the open graded drainage course to within three-eighths of an inch in ten feet of the design grade.
- 2. Compact the open graded drainage course so that the finish surface is smooth and uniform in appearance without depressions, ruts or ridges.

E. Aggregate Base

- 1. Grade the aggregate base to within three-eighths of an inch in ten feet of the design grade.
- 2. Compact the aggregate base to not less than 95% of the maximum unit weight as determined by the method in the MDOT Density Testing and Inspection Manual appropriate for the aggregate base material. The Owner may require the maximum unit weight to be determined by ASTM D 1557 or by other methods.

F. Slab/Patch Repairs

- 1. Saw-cut to full depth around the area to be removed as marked by the Owner.
- 2. Remove existing pavement materials and dispose of off-site.
- 3. Prepare existing Subgrade, Subbase or Aggregate Base in accordance with Article 3.2.B as appropriate.
- G. Adjust all structures to finished grade, matching both the design longitudinal and transverse cross slopes.

3.3 TRANSPORTATION OF MATERIALS

A. Only Concrete with a Mix Design approved by the Owner shall be transported to the job.

B. Delivery of Concrete

- 1. Each truck shall be accompanied with a sequentially numbered Delivery Ticket which shall contain the following information:
 - a. Serial Number of Delivery Ticket
 - b. Date
 - c. Truck Number
 - d. Name of Purchaser
 - e. Project name
 - f. Mix Design ID
 - g. Batch Time
 - h. Amount of water added by Purchaser and at what time
 - i. Quantity, in cubic yards
 - j. Batch quantities for cement, SCM, aggregates, water, admixtures, fiber reinforcement and/or color additives if any

C. Placement Time

1. The maximum interval between charging of the mixer (batch time) and placing of concrete shall be as follows:



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Type of Unit	Concrete	Concrete	Concrete
	Temperature	Temperature	Temperature
	Below 60°F	<u>60°F to 85°F</u>	Above 85°F
Open Top Trucks	60 minutes	45 minutes	30 minutes
Open Top Agitating Units	60 minutes	60 minutes	30 minutes
Closed Top Agitating Units	90 minutes	60 minutes	45 minutes
Truck Mixers	90 minutes	60 minutes	45 minutes

2. For Concrete Mixes that contain Water Reducing-Retarding Admixtures:

Type of Unit	Concrete	Concrete	Concrete	
	Temperature	Temperature	Temperature	
	Below 60°F	<u>60°F to 85°F</u>	Above 85°F	
Open Top Trucks	60 minutes	45 minutes	30 minutes	
Open Top Agitating Units	60 minutes	60 minutes	30 minutes	
Closed Top Agitating Units	120 minutes	90 minutes	70 minutes	
Truck Mixers	120 minutes	90 minutes	70 minutes	

- 3. For placements made using a mechanical paver or hand propelled vibrating screed, the concrete is considered to have been placed when it passes through the paver or screed.
- 4. For placements made using a pump, the concrete is considered to have been placed when it is discharged from the pump.

3.4 FORMING

- A. All forms shall be:
 - 1. Uniform for entire project.
 - 2. Cleaned and coated with a release agent each time they are used.
 - 3. Of such cross-section and strength and so secured as to resist the pressure of the concrete when placed and the impact and vibration of any equipment which they support, without springing or settlement.
 - 4. Be built to the correct alignment with tight joints
- B. The wooden planking supporting the forms shall be capable of carrying the loads imposed and shall be approved by the Owner prior to fastening to the forms.
- C. The supply of forms shall be sufficient to permit their remaining in place for twenty-four (24) hours after the concrete has been placed.
- D. Form installation shall include that:
 - 1. The forms are to be set to the true cross-section.
 - 2. The correct alignment and grade elevations of the forms are checked immediately before placing the concrete.
 - 3. Forms that have been disturbed are reset and rechecked
 - 4. Grade that has become unstable has been corrected.
- E. When set to grade and staked in place the method of connection between sections shall be such that the joint formed shall be tight, with no visible gaps, and stable without movement in any direction.
- F. Removing Forms

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- 1. The forms shall not be removed prior to 24 hours from time of placement
- 2. The forms shall be removed without damaging the concrete pavement.
- 3. Excessive honeycombing shall be corrected at the direction of the Owner
- G. When the Slip Form method is used for radii under 250 feet ensure that flexible forms are used as described in these specifications.

3.5 PLACING

- A. Moisten the Subbase or Aggregate Base if needed before placing concrete however do not place concrete on a frozen base, an unstable base caused by excessive moisture or on a base from which excessive water can be absorbed up into the concrete.
- B. Place only concrete with a Mix Design approved by the Owner and:
 - 1. Within the Placement Time ranges in accordance Article 3.3
 - 2. Within the Temperature limits and within the Slump and Air Content ranges per the Special Provision for Quality Assurance and Quality Control of Portland Cement Concrete.
- C. Avoid segregation during concrete placement or spreading.
 - a. Complete any necessary hand spreading with shovels or trowels
 - b. Do not use rakes.
- D. Place concrete continuously between transverse joints without using intermediate bulkheads.
- E. Deposit concrete as near to the expansion joints, if there are any, as possible without disturbing the expansion joint assemblies. Do not deposit concrete directly onto the expansion joint assemblies.
- F. For fixed-form construction:
 - 1. Construct forms in accordance with Article 3.4
 - 2. Thoroughly consolidate concrete against and along the faces of all forms, and along the full length and on both sides of all joint assemblies.
 - 3. Do not permit vibrators to come in contact with a joint assembly, the grade, or a side form.
 - 4. Never operate the vibrator for longer than 15 seconds in any one location.
- G. For slip-form construction:
 - 1. The track paths shall be maintained to an accurate profile.
 - 2. Shovel off any concrete deposited on the grade ahead of the paver that sloughs onto the track path.
 - 3. When a control guide wire is used, it shall be carefully checked for line and grade and shall be taught, free from any obstructions, and with no measurable sag between supports.
 - 4. Control the rate of progress so that the forward movement of the paver will be as nearly continuous as practicable.
 - 5. Immediately stop the vibrator and tamping elements if it is necessary to stop the forward movement of the paver.
- H. Integral curbs shall be required along the edged of all street pavement where shown on the plans and shall be formed to the cross section in accordance with the plans.
 Construct integral curbs simultaneously with the pavement with extrusion equipment

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- I. The thickness of the pavement shall be within 0.2 inches from that shown on the Project Plans provided that the yield calculations result in the specified cross-section.
- J. Workers walking in the freshly placed concrete with boots or shoes coated with earth or other foreign substances are prohibited.

3.6 FINISHING

- A. In general, adding water to the surface of the concrete to assist in finishing operations will not be permitted. If it is permitted, it shall be applied as a fog spray with approved spray equipment.
- B The sequence of finishing operations shall be the strike-off and consolidation, floating, if necessary, straight-edging, and final surface finish.
- C. Strike off pavement and consolidate with a mechanical finishing machine.
 - 1. Vibrator strike board, or hand-finishing methods for irregular pours may be used when approved by the Owner.
 - 2. After the pavement has been struck off and consolidated, float with a straightedge, minimum 10 feet long, equipped with a handle to permit operation from the edge of the pavement.
 - 3. The use of long-handled wood floats shall be confined to a minimum.
 - 4. For main line paving operations, including miscellaneous pours, the equipment shall shape, screen, and float the concrete to form a dense, homogeneous pavement, requiring only minimal hand finishing.
 - D. Remove any excess water and laitance from the surface of the pavement prior to finishing the surface.
 - 1. Operate the straightedge parallel to the centerline of the pavement and move forward one-half its length after each pass.
 - 2. Correct irregularities by adding or removing concrete while still plastic.
 - 3. Straight-edge all disturbed places again.
- E. Carefully finish the edges of the slab and curb with an edger of the radius shown on the plans prior to final finishing is completed and before the concrete has taken its initial set.
- F. Check the plastic concrete using a ten-foot straight edge for high and low spots over ten feet for high and low spots and suspend paving if these exceed 1/8 inch over ten feet.
 - 1. Correct these areas.
 - 2. Correct finishing techniques and obtain the Owners approval before resuming the paving operation.
- G For pavement constructed by the slip-form method, determine the edge settlement as soon as practical after paving operations begin.
 - 1. Correct any edge settlement more than 1/4 inch over ten (10) feet before the concrete has hardened.
 - 2. Suspend paving when edge settlements more than 1/8 inch over ten (10) inch persist.
 - 3. Operational corrections shall be made prior to the Owner permitting the resumption of paving.
 - 4. Discontinue the use of slip-form methods if the Contractor consistently fails to construct pavement within these tolerances and place pavement by means of conventional forms.
- H. Use a transverse broom finish for final finishing.
 - 1. Use a burlap drag just prior to finishing with transverse broom.

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- 2. Lay the drag on the pavement surface and drag in the direction in which the pavement is being placed.
 - a. Drag shall be at least 3 feet long.
 - b. Drag shall be wide enough to cover the entire width.
- I. The final surface of the concrete pavement shall have a uniform gritty texture true to the grades and cross-section shown on the plans.
 - 1. The Engineer may require changes in the final finishing procedure to produce the desired final surface texture.
- J Check the drainage of the gutter while the concrete is still plastic by pouring water onto a piece of burlap at the gutter summit and observing its flow to the nearest inlet.
 - Make necessary corrections at this time, and give the curb a burlap-textured finish to match the pavement.
- K. Protect the finished surface against precipitation per Article 3.9 and the Contractor QC Plan.

3.8 CURING

- A. Protect in place concrete against loss of moisture and rapid temperature change.
- B. Apply two (2) coats of curing compound over the entire surface of newly placed concrete:
 - 1. Power spray curing compound in a continuous application according to manufacturer's written instructions.
 - 2. Apply curing compound at a minimum rate of 200 square feet per gallon per coat.
- C. Apply first coat of curing compound;
 - 1. After finishing or texturing concrete but not before all the free water has disappeared from the concrete surface.
 - 2. No longer than 30 min from the completion of texturing operations
- D. Apply second coat of curing compound;
 - 1. After first coat has dried
 - 2. No longer than two (2) hours from the completion of the first coat.
 - 3. At a right angle to spray direction of first coat.
- E. Maintain continuity in the coating and protect concrete surface from damage for at least seven (7) days after placement.
 - 1. Recoat marred surfaces
 - 2. Repair damaged surfaces
 - 3. If surfaces damaged by rainfall, recoat within three hours
- F. If fixed forms are used, coat the sides of the pavement with 2 coats of curing compound immediately after removing the forms or after repairs for honeycombing, if needed, are made.
- G. If blankets are needed for protection during cold weather, place the curing compound per this Article prior to covering the concrete with the blankets.

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3.8 JOINTING

- A. Joint configuration and details shall be in accordance with the current MDOT Standard Plan Series R-39 for Transverse Joints and R-41 for Longitudinal Joints.
- B. Load Transfer Assemblies shall be in accordance with the current MDOT Standard Plan R-40 Series.
- C. Jointing for pavement repairs shall be in accordance with the current MDOT Standard Plan R-44 Series.
- D. Place joints in accordance with the approved Pavement Jointing Plan per Article 1.6
 - 1. Place joints in line with like joints on adjacent slabs, curbs or sidewalks.
 - 2. Joint configurations and placement that are not in accordance to the standard joint details will be corrected prior to placement of any concrete.
- E. Longitudinal (Lane Tie) Contraction Joints:
 - 1. Place tie bars at the required depth at right angles to the joint at spacing as shown on the project plans.
 - 2. Install using chairs or mechanical devices, do not install by hand.
 - 3. If using a Dowel Bar Inserter (DBI):
 - a. Space per MDOT Standard Plan R-40 Series.
 - b. Place and consolidate the pavement full-depth before inserting the bars.
 - 4. Saw and seal per Articles 3.8 N and O.
- F. Longitudinal (Lane Tie) Construction (Bulkhead) Joints
 - 6. Place epoxy coated bent bars at right angles to the edge of the pavement at spacing as shown on the plans.
 - 7. Straighten bent tie bars after the concrete has gained the required strength.
 - 8. Space and install to meet the pull-out resistance per the following table:

Distance from Joint Being	Average Pull-out		
Constructed to Nearest Free	Resistance Per Foot of		
Edge of Completed Pavement	Joint (lb. Minimum)		
12 feet or less	2,200		
over 12 feet through 17 feet	3,200		
over 17 feet through 24 feet	4,500		
over 24 feet through 28 feet	5,200		
over 28 feet through 36 feet	6,800		
36 feet or greater	As directed by the		
-	Owner		

- a. Pull out shear bond stress testing shall not be performed until the concrete has attained a flexural strength of 550 psi or a compressive strength of 2800 psi.
- b. Slippage must not exceed 1/16 inch during the testing.

C. Transverse Contraction Joints

- 1. Install straight tie bars at right angles to the joint.
- 2. Install using load transfer assemblies per the MDOT Standard Plan R-40 Series.
- 3. Saw and seal per Articles 3.8 N. and O.



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D. Transverse Expansion Joints

- 1. Install the preformed non-extruding joint filler at right angles to the joint extending full-depth through the slab to the base material.
- 2. Hold the filler accurately in place during placement and finishing of the concrete by using a bulkhead, metal channel cap, or other approved method.
- 3. Do not place concrete over the joint filler.
- 4. Install load transfer assemblies where called for.
- 5. Saw and seal per Articles 3.8 N. and O.

E. Transverse Construction (End of Pour or Bulkhead) Joints

- 1. Shall be placed:
 - a. At the end of a day's pour.
 - b. Whenever the placing of concrete is suspended for more than 30 minutes.
- 1. Install deformed tie bars at right angles to the joint.
- 2. Install at spacing as shown on the project plans.
- 3. When placing the second slab, concrete must not be left overhanging the lip formed in the first slab.

F. Plane-of-Weakness Joints (Longitudinal, Transverse, other Orientation and Contraction)

1. Saw and seal per Articles 3.8 N. and O.

G. Tied Joints (To existing concrete or for pavement repairs)

- 1. Drill holes to the required diameter and depth plus ½ inch, midway between the top and bottom surfaces of the pavement.
- 2. Clean the drill holes with a blast of oil free air with at least 90 psi.
- 3. Fill the holes with grout to their full length to ensure that the grout covers the embedment length of the dowels or deformed bars.
- 4. Coat the portions of the dowels that extend beyond the face of the existing pavement with a bond breaking coating.
- 5. Install an expansion cap at the end of each dowel bar for Expansion Joints.

L. Bond Release Agent for Epoxy Coated Dowel Bars

- 1. Epoxy coated dowels must be coated with a Bond Release Agent to prevent bonding.
- 2. The Bond Release Agent may be applied to the dowel bar and basket assembly by the Contractor or the supplier.

M. Sawing Joints (Plane of Weakness and Contraction Joints)

- 1. It is the responsibly of the Contractor to establish the timing for sawing joints.
- 2. Immediately stop sawing operation if sawing causes Raveling or Spalling. Continue to monitor the concrete hardness before resuming the sawing operation.
- 3. Do not drive the water supply truck for the concrete saw or other heavy equipment on the new pavement.
- 4. The handling and creation of silica dust shall be performed in accordance with all regulations existing at the award of the Contract.
- 5. Refer to Article 3.12 for cracking that may be attributable to mistimed saw cutting.

N. Sealing Joints

1. Do not seal joints when the ambient temperature is below that recommended by the sealant manufacturer for their particular product.



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- 2. Seal all joints in the new pavement in accordance with the standard joint details as shown on the project plans.
- 3. Seal joints as soon as practicable after completion of the curing period and before opening to traffic
- 4. Just before sealing, thoroughly clean the joint of all foreign material, including membrane curing compound, by sand blasting and blowing-out with compressed air.
- 5. The joint must be surface-dry when the sealant is applied
- 6. Apply joint sealant, taking care to not to overfill joints or spill onto finished surfaces of the concrete. Immediately clean excess or spilled joint sealant material.

3.9 PROTECTION OF THE WORK

A. Cold Weather

- 1. Follow the Contractor QC Plan for Cold Weather Protection when these conditions are anticipated or have occurred within 7 calendar days of anticipated concrete placement.
- 2. Provide Cold Weather Protection until the concrete has reach an in place compressive strength of 1000 psi as determined by either field cured cylinders or the Maturity Method (ASTM C 1074)
- 3. Protect concrete against freezing after placement per the Contractor QC Plan.

B. Hot Weather

- 1. The Owner will advise the Contractor of these conditions per Article 1.9.
- 2. Follow the Contractor QC Plan for Hot Weather when these conditions are anticipated.
- 3. Limit the casting of concrete during Hot Weather by the temperature of the concrete at the time of placing per the Special Provision for Quality assurance and Quality Control of Portland Cement Concrete and weather conditions per Article 1.9.

C. Precipitation

- 1. Protect in-place concrete from damage from precipitation using materials such as burlap, cotton mats, curing paper, or plastic sheeting or whatever means are deemed required to protect the new payement surface.
- 2. Follow the Contractor QC Plan when precipitation is anticipated or has occurred within 2 calendar days of anticipated concrete placement.
- 3. The finished surface of the concrete shall conform to the criteria in Article 3.6.
- D. Damaged work due to lack of protection may be cause for rejection per Article 3.11

E. Physical Damage

1. Install barriers as necessary to protect the in-place concrete.

3.10 OPENING TO TRAFFIC

A. The following shall be used for guidance in the consideration of opening a pavement to traffic:

In Place Compressive Strength	Maximum Total Gross
of Concrete Pavement	Vehicle Weight or
	Maximum Allowable
	Number of Axles

2100 psi 30,000 lbs. 2345 psi 37,500 lbs.

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2625 psi 5 axles 2800 psi No limit on axle number

In Place Flexural Strength of Concrete Pavement

Substituting Total Gross Vehicle Weight or maximum Allowable

Number of Axles

390 psi
30,000 lbs.

440 psi
37,500 lbs.
490 psi
5 axles

No limit on axle number

- B. The project, or any section thereof, shall not be opened to traffic until so directed or authorized by the Owner.
 - 1. Whenever any section of the project is in suitable condition for travel, it may be opened for traffic before completion of the whole project, when so directed by the Owner.
 - 2. Such direction shall not constitute partial or final acceptance of the work or any part of it, or a waiver of any of the provisions of the Contract; provided, however, that on such sections of the project as are opened for traffic, the Contractor shall not be required to assume any expense entailed in maintaining the pavement as a result of ordinary wear and tear.
- C. If the Contractor does not open to traffic a section of the project as specified in the project schedule, then the Owner has the right to open this section to traffic.
 - 1. Any work remaining shall be performed by the Contractor at the unit bid prices for the items of work.
 - 2. No additional compensation will be made due to inconvenience to the Contractor, additional travel to conform to new traffic patterns, or additional flagging or maintenance of traffic costs incurred by the Contractor due to missing contractual dates.
- D. Before opening any portion of the payment to traffic, it shall be swept clean by the Contractor.
- E. Whenever the entire project or any section of it has been opened for traffic prior to acceptance and final payment the Contractor shall conduct the remaining construction operations to cause the least obstruction to traffic.

3.11 FIELD QUALITY CONTROL

- A. Quality Control of all installed products and installation methods on the project is the responsibility of the Contractor.
- B. The Contractor is expected to provide the following documentation of the concrete pavement installation:
 - 1. Beginning and end pour times for each day concrete pavement is placed.
 - 2. Beginning and end pour locations/stations that coincide with the placement times.
 - 3. Beginning and end locations, timing and rate of application of curing compound.
 - 4. Date, time, and locations of saw cuts.
 - 5. Date, time, location, and load verification weights for joint sealing compound.
 - 6. Failure to provide adequate documentation of the above-listed items may be cause for work to be considered to be Non-Conforming.

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3.12 NON-CONFORMING WORK

- A. If it is determined by the Owner that the work is Non-Conforming Work, per these specifications:
 - 1. The Contractor will be notified and allowed to make any necessary corrections to their operations within the requested time frame.
 - 2. The Contractor shall submit to the Owner for review the means and methods to make deficient areas compliant. Corrections shall be made based on these as directed by the Owner.
 - 3. Should the Contractor fail to make the necessary corrections as requested within the time frame noted, the Owner will determine the best course of action to correct which could include reducing final payment or hiring outside forces, at the Contractor's expense, to correct.
- B. Non-Conforming Work Identified during construction.
 - Weather Conditions
 - a. Placements that are made by the Contractor during either Hot Weather or Cold Weather conditions as determined by the Owner, or without sufficient protection as described in the approved Contractor QC Plan will be rejected unless the Owner has provided a written waiver of hot or cold weather placement.
 - b. Concrete placed under such conditions will either be rejected, removed and replaced, or subject to a pay reduction at the discretion of the Owner.
 - 2. Suitably of Substrate for Placement Article 3.2
 - a. Concrete placed on a substrate that has been determined by the Owner to have been unsuitable or became unsuitable during placement and was not corrected by the Contractor will be subjected to a payment reduction at the discretion of the Owner.
 - 3. Concrete Mixes
 - a. If a concrete mix is delivered to the site that is found to be one that is not approved by the Owner, the concrete shall not be placed.
 - b. If a concrete mix that was not approved for the project is placed and the Owner later finds the mixture to be unacceptable per the Special Provision for Concrete Mix Design then the concrete placed shall be removed and replaced.
 - 4. Forms
 - a. Forms not meeting the requirements of Article 2.2 or Article 3.4 shall be replaced prior to placing concrete.
 - b. When built-up forms do not provide the necessary stability against movement along their vertical face, as determined by the Owner, the forms shall be replaced with forms capable of sustaining the loads imposed thereon.
 - c. Excessive honey combing or bug holes that are evident after the removal of the forms shall be patched as Directed by the Owner
 - 5. Placement Time
 - a. Refer to the Special Provision for Quality Assurance and Quality Control of Portland Cement Concrete
 - 6. Concrete Mixes with Optimized Aggregate Gradations
 - a. If a Quality Control or Quality Assurance Testing indicates the Coarseness or Workability Factors to be outside the ranges indicated in Special Provision for Concrete Mix Design then production for the day shall cease.
 - b. Concrete placed up to the point of stoppage will be rejected, removed and replaced, or subjected to a payment reduction at the discretion of the Owner.
 - 7. Concrete Testing
 - a. Refer to the Special Provision for Quality Assurance and Quality Control of Portland Cement Concrete for:



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- 1) Placement Temperature
- 2) Air Content
- 3) Slump
- 4) Addition of Water at Site
- 8. Compressive Strength
 - a. Refer to the Special Provision for Quality Assurance and Quality Control of Portland Cement Concrete
- 9. Pavement Thickness: Panels with pavement thicknesses that are found not to be within the 0.2-inch tolerance, in consideration of the average yield calculations, per Article 3.5 shall either be, at the discretion of the Owner:
 - a. Removed and replaced.
 - b. Subjected to a payment reduction as follows:

Deficiency in Thickness ,	Payment
<u>Inches</u>	Reduction
> 0.2 to 0.3	5%
0.4	15%
0.5	25%
0.6-1.0	50%
>= 1.1	100%

- 10. Pavement Finish
 - a. For hardened concrete that is found to have high and low spots that exceed ½ inch over ten feet or 3/4 inch over 50 feet:
 - 1) The Owner will evaluate.
 - 2) The concrete will be rejected, removed and replaced or subjected to a payment reduction at the discretion of the Owner.
 - b. Areas of the pavement that are found to have water ponding or that do not have sufficient grades for drainage will be rejected, removed and replaced. Surface grinding of such areas may be permitted at the discretion of the Owner.
- 11. Pavement Curing
 - a. Pavement surfaces in which the curing compound was not applied in a timely manner or with adequate coverage shall be noted and evaluated during the Maintenance and Guarantee walkthrough described in Article 1.10.
- 12. Joints
 - a. When deformed bars for Longitudinal Lane Tie and Construction (Bulkhead or End of Pour) Joints or Tied Joints do not meet the pullout resistance indicated in Article 3.8, additional epoxy anchored lane ties will be required as directed by the Owner.
 - b. Joints with spalling will be patched as Directed by the Owner
 - c. Panels with cracking due to miss-timed saw cutting will be removed and replaced in their entirety.
- 13. Joint Sealant
 - a. Joint sealant that does not properly adhere to the concrete will be removed and replaced at the direction of the Owner.
- 14. Protection of the Work
 - a. Physically damaged concrete will be replaced at the Owner's discretion.
 - 1) Concrete damaged as a result of inadequate protection will be removed and replaced at no additional cost to the Owner.

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2) Concrete damaged by means outside of the Contractor's control will be removed and replaced at the direction of the Owner and at cost negotiated in conformance with the Conditions of the Contract.

15. Opening to Traffic

- a. Sections of pavement opened to traffic, construction or otherwise, prior to notification by the Owner that the concrete has reached the desired compressive strength will be monitored by the Owner.
- b. Sections of pavement thus opened that show any defects as described herein will be removed and replaced at the direction of the Owner.
- 16. Surface Defects:
 - a. Areas where spalling, scaling or other defects, other than cracking, of the pavement is evident will be:
 - 1) Evaluated by the Owner.
 - 2) Patched or removed and replaced as directed by the Owner.
 - b. Panels with any type of cracking will be removed and replaced in their entirety.
- C. Non-Conforming Work Identified during the Maintenance and Guarantee period.
 - 1. This work will be identified:
 - a. During the inspections as described in Article 1.10.
 - b. During any other inspection (s) by the Owner.
 - 2. The Contractor and/or the Owner reserve the right to perform additional investigation of the items identified.
 - 3. If during such investigation, the pavement thickness is found to be found more than 0.2 inches less that the plan thickness then the entire panel in which the investigation was performed shall be removed and replaced.
 - 4. Joint Quality
 - a. Sealant that has popped out or that does not completely seal the joint shall be replaced and /or removed and replaced.
 - 5. Surface Quality:
 - a. Multiple Surface Voids:
 - 1) If covering less than 15% of the area of a Slab: Repair with epoxy or cement mortar.
 - 2) If covering 15% or greater of the area of a Slab area: remove and replace the entire Slab.
 - b. Spalling:
 - 1) If covering less than 30% of the perimeter of a Slab: Repair with materials approved by the Owner (epoxy or cement mortar).
 - 2) If covering 30% or greater of the perimeter of a Slab: remove and replace the entire Slab.
 - c. Scaling and Mortar Flaking:
 - 1) If covering less than 15% of a Slab, no repair is required.
 - 2) If covering 15% or more of a Slab, remove and replace the entire Slab.
 - 6. Cracking:
 - a. Transverse and Longitudinal Cracks within a Slab.
 - 1) Single crack: Retrofit load transfer, route & seal
 - 2) Two or more cracks: Remove and replace the entire Slab.
 - a) If one crack intersects another, they will be considered two separate cracks.
 - b. Map Cracking within a Slab:

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- 1) If covering less than 10% of the area of a Slab, remove and replace, to the full depth of the concrete, an area large enough to accommodate doweling into the adjacent concrete.
- 2) If covering 10% or greater of the area: Remove and replace the entire Slab
- c. Corner Cracking within a Slab:
 - 1) Single cracks: Full-depth, tied concrete patch repair as directed by the Owner.
 - 2) Two or more cracks: Remove and replace the entire Slab.
- 7. Multiple Defects
 - a. If a Slab has any two of the conditions identified in Article 3.12, C.5 or C.6, regardless of magnitude, remove and replace the entire Slab.



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CITY OF FARMINGTON HILLS

SPECIAL PROVISION FOR CONCRETE PAVING MATERIALS

PART 1GENERAL

1.1 SUMMARY

- A. This Special Provision provides the parameters for the design of concrete mixes to be used for concrete pavements, drive, curb and gutter and sidewalks.
- B. Related Requirements
 - 1. Special Provision for Concrete Roadway Paving
 - 2. Special Provision for Quality Assurance and Quality Control of Portland Cement Concrete
- C. In cases where this Special Provision conflicts with a referenced specification or document, this Special Provision prevails.

1.2 MEASUREMENT AND PAYMENT

A. All costs for the design and production of concrete mixtures to the requirements stated herein will be included in the coat for all pay items in which the concrete is a material.

1.3 REFERENCES

- A. Abbreviations and Acronyms
 - 1. ASR Alkali-Silica Reactivity
 - 2. ASTM American Society for Testing Materials
 - 3. MDOT Michigan Department of Transportation.

B. Definitions

- 1. Concrete Mix Design The actual batch quantities (mixture proportions) of each constituent included in the concrete mixture with supporting test data for each component and for the mix itself.
- 2. Owner The Owner or their duly appointed representative.
- 3. SCM Supplementary Cementitious Materials
- C. Where referenced, "MDOT Specifications" is a general term that shall include the current version of the MDOT Standard Specifications for Construction and all Supplemental Specifications, Special Provisions, and Errata existing at the time of the award of the Contract.
- D. MDOT manuals that are referenced specifically by name shall be the current versions of said manuals existing at the time of the award of the Contract.

1.4 SUBMITTALS

A. Concrete Mix Design(s) shall be submitted for review and approval by the Engineer at least fourteen (14) days prior to any placement of the concrete.



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B. Refer to Table 1-1 for the documentation required for submittals.

1.5 QUALITY CONTROL

- A. Quality Control of all materials used on the project shall be the responsibility of the Contractor.
- B. Quality assurance is not a substitute for Quality Control.

1.6 QUALITY ASSURANCE

A. The Owner will review the submitted Concrete Mix Design(s) for compliance to these specifications.

PART 2 PRODUCTS

2.1 MATERIALS.

- A. Concrete Mixtures
 - 1. MDOT P1 (P1)
 - a. For use in sidewalks not running through driveways and curb (Slip Form and Handwork)
 - 2. MDOT P1 Mod (P1M)
 - a. For use in pavements, approaches, driveways and sidewalks running through driveways (Slip Form and Handwork)
 - b. MDOT P1 Mod mixes will have an Optimized Aggregate Gradation as indicated herein.

B. Concrete Mixture Materials

- 1. Cement shall meet ASTM C150 Type I or Type II
- 2. Ground Granulated Blast Furnace Slag (GGBFS) shall meet ASTM C 989 Grade 100 or 200.
- 3. Fly Ash, Class C or Class F shall meet ASTM C 618
- 4. Coarse Aggregate shall meet MDOT 6AA for MDOT P1 (P1)
- 5. Fine Aggregate shall meet MDOT 2NS.
- 6. Optimized Aggregate Gradation shall meet the requirements of Section 4.13 of the MDOT Quality Assurance Procedures Manual (substitute the "City of Farmington Hills" for all references to "the Department") for MDOT P1 Mod (P1M):

C. Concrete Mix Design Parameters

- Alkali Silica Reaction (ASR)
 - a. All mixes must be shown to be resistant to deleterious ASR by at least one of the following:
 - 1) Aggregates are shown to be non-reactive per ASTM C1260 (expansion less than 0.10%).
 - 2) Alkalis as Na₂0 in cement are shown to be less than 0.60 % by a recent mill test report (Low Alkali).
 - 3) An ASTM C1260 Test is provided that shows an expansion of less than 0.10% for a potentially expansive aggregate at the proposed replacement of cement with GGFBS.
 - 4) An ASTM C 1567 test is provided that shows an expansion of less than 0.10% for the specific combination of materials and proportions used for a mixture.

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- b. An ASTM C 1293 test alone will not be sufficient to show that an aggregate is non-reactive.
- 2. Total Cementitious Content (cement + SCM) shall be a maximum of 564 lbs./cu. yd. (6.0 Sack)
- 3. Water to Cement Ratio shall be a maximum of 0.43
- 4. Compressive Strength shall be a minimum of 3500 psi at 28 days (cylinders cast, cured and tested per ASTM C31 and C39)

Table 1-1. Requirements for Concrete Mixture Submittals

Plant No. and Plant Location Current National Ready Mix Concrete Association (NRMA) Certificate of Conformance Scale Calibration/Test sheet from current year

Mix Design/Proportions Sheet including:

- Project Name and Location
- Concrete Supplier
- Plant Location and Number
- Mix ID
- Mix Description and Use
- Anticipated 28-day Strength

Mix Design Data including:

- Sources for Materials
 - o Aggregate
 - Designation, Supplier ID or MDOT ASI Number
 - Cement
 - Type, Supplier and Location
 - Supplementary Cemetitious Materials
 - Type, Supplier and Location
- Specific Gravities for Materials
- Batch Weights for Materials
- Unit Weight for Mixture
- Design Yield for Mixture
- Design Water to Cement Ratio for Mixture
- Admixture Identification
- Admixture Dosage Rates (oz/cwt) or Ranges (oz/cwt)
- Volumetric Proportions for Materials
- Target Air Content and Tolerance Range
- Design Slump and Tolerance Range

Supplemental Information including:

- Aggregate Test Data
 - Gradation
 - Individual Aggregates
 - Optimized Aggregate Gradation (if applicable)
 - Physical Properties

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- o Reactivity Data pertaining to ASR, dated within the last two calendar years
 - ASTM C 1260
- Mill Test Reports dated within the current calendar year for:
 - Cement
 - Supplementary Cementitious Materials
- Admixture Data Sheets
- Reactivity Data pertaining to ASR for the combinations of aggregates and cementitious materials used for the mixture
 - o ASTM C 1260
 - o ASTM C 1567
- Test Data for Mixture, dated within the past two calendar years for:
 - o 7 and 28 Day Strength, Slump, Air, Concrete Temperature (30 sets minimum)
 - o Average 7 and 28 Day Strengths
 - Standard Deviation for 28 Day Strength Tests
 - o Coefficient of Variation for 28 Day Strength Tests
 - With Test Standard Deviation for 28 Day Strength Tests
 - With Test Coefficient of Variation for 28 Day Strength Tests
 - o Batch to Batch Standard Deviation for 28 Day Strength Tests
 - o Batch to Batch Coefficient of Variation for 28 Day Strength Tests
 - o F_{cr} for Standard Deviation Unit
 - o F_{cr} for two standard Deviation Units

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CITY OF FARMINGTON HILLS

SPECIAL PROVISION FOR REMOVE AND REPLACE DRIVEWAY, SPECIAL

a. Description

This work shall be performed in accordance with all applicable sections of the 2020 Michigan Department of Transportation Standard Specifications for Construction, and as herein provided.

This work shall involve the removal and installation of special driveways located throughout the subdivisions. These special driveways are considered driveways that have colored concrete, stamped concrete, exposed aggregate concrete, brick pavers, or as noted in the field.

Removal of these special driveways must be done with care such that any existing materials that are taken out can be reinstalled, where applicable.

Replacement of these special driveways must be done so that the proposed driveway matches the appearance of the existing driveway, prior to it being replaced.

The Engineer and Contractor shall review each individual driveway condition prior to the start of construction. This coordination shall be the responsibility of the Contractor.

b. Materials

Materials shall be completed in accordance with the 2020 Michigan Department of Transportation Standard Specifications for Construction, and as herein provided.

Stamped and/or Colored Concrete

1. Concrete:

 Shall be per section 801 of the 2020 Michigan Department of Transportation Standard Specifications for Construction

2. Coloring Agent:

- The color for the proposed concrete shall match existing driveway.
- ASTM C 979, synthetic mineral oxide pigments or colored water reducing admixtures: color stable, non-fading, and resistant to lime and other alkalis shall be used. Coloring agent to mix according to manufacturer's written instructions.
- Contractor must provide samples to the Owner/Engineer and secure their approval on the final color to be used in the driveway prior to beginning construction.

3. Stamping Forms:

- Contractor must provide pattern samples to the Owner/Engineer and secure their approval on the final pattern to be used in the driveway prior to beginning construction.
- Furnish tools and stamping equipment as recommended by the stamping system manufacturer and as approved by the Engineer. Use stamping equipment and materials from a single manufacturer throughout the entire project.



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Brick Pavers

Shall comply with the 2020 MDOT Standard Specifications for Construction and as herein provided. Store granular materials in a well-drained area on a solid surface to prevent mixing with foreign materials. Do not use frozen materials or materials mixed or coated with ice or frost.

- 1. Brick Pavers Contractor shall remove and salvage existing paving units in a safe and secure location. The pavers shall be palletized, stored on site and protected until such time they are reinstalled. Existing pavers which are broken at time of removal shall be replaced. Any new pavers required shall match the existing materials.
 - A. Provide only sound units free of defects that could interfere with proper installation or reduce the service life of the finished work. Minor cracks and minor chipping incidental to methods of manufacture or handling are subject to visual inspection and the Engineer's acceptance. Excessive cracks and chips will be cause for rejection.
 - B. There must be no efflorescence evident upon visual inspection of the pavers at the project site.
- 2. Base Material As specified in the Special Provision Aggregate Base, as detailed on the plans, or as directed by the Engineer.
- 3. Bedding and Leveling Material Use 2NS or 2SS meeting section 902.08 of the 2020 MDOT Standard Specifications for Construction or blast furnace slag sand meeting gradation shown in Table 1 (commercially known as 30A Blast Furnace Slag):

Table 1: Grading Requirements for 30A Blast Furnace Slag

			9 9				-	
SIEVE ANALYSIS (ASTM C136) TOTAL PERCENT PASSING								
U.S. Sieve	3/8"	#4	#8	#16	#30	#50	#100	#2 00
% Passing	100	95- 100	70- 95	45- 75	25- 55	15- 35	0-20	-

4. Paver Joint Filler - Use 2MS meeting section 902.08 of the 2020 MDOT Standard Specifications for Construction.

c. Construction

Materials shall be completed in accordance with the 2020 Michigan Department of Transportation Standard Specifications for Construction, and as herein provided.

Stamped and/or Colored Concrete

Construction methods shall conform to Section 602 of the MDOT 2020 Standard Specifications for Construction and as specified herein.

Construct a test section, consisting of at least 25 square feet, for approval by the Engineer for color, texture, and workmanship. Seal the surface of the test section and include one saw-cut and sealed joint.

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Keep the approved test section at the worksite as a standard for judging the completed work. Any portion of the completed work that does not match the workmanship of the approved test section must be removed and replaced. All costs associated with this removal and replacement will be borne by the Contractor.

- 1. Forms: Secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grade and elevations.
- 2. Joints: Locate and install expansion joints as indicated.
- 3. Concrete Placement to comply with recommendations in ACI 304R for measuring, mixing, transporting and placing concrete. Place concrete in a continuous operation within planned joints or sections. Pour only the amount of area that can be finished and stamped while concrete is in a workable state. Moisten sub-base to provide a uniform dampened condition at time concrete is placed. Consolidate concrete by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping according to recommendations in ACI 309R. PLACEMENT OF THE PROPOSED CONCRETE CANNOT TAKE PLACE WHEN THE AMBIENT TEMPERATURE IS ABOVE 85 DEGREES FAREHNHEIT.

Screed and initial – float concrete surfaces with darby or bull float before excess moisture or bleed water appears on the surface. Protect concrete from cold or hot weather during mixing, placing and curing.

- 4. Float Finish: Begin the second floating operation when bleed water sheen has disappeared and the concrete surface has stiffened to permit operations. Float surfaces to true planes with gaps below 10' long unleveled straightedge not to exceed 1/4". Cut down high spots and fill low spots. Re-float surface immediately to uniform, fine-line texture. If finish calls for light broom or other type of finish, apply at this time.
- 5. Supplementary Color: If color specified calls for a range of colors sprinkle pigments on surface before stamping according to manufacturer's directions.
- 6. Stamped Concrete: Stamp concrete in an orderly fashion, to full joint depth per the manufacturers specifications. Cure concrete per the color pigment manufacturer's instructions. Use curing compounds only if allowed with this integral color system.
- 7. Concrete edge: Pull forms on vertical face and stamp or tool vertical joints while concrete is still workable.
- 9. Maintain concrete: Keep concrete free of stains, discoloration, dirt and other foreign material. Sweep stamped concrete pavement not more than two days before date scheduled for substantial Completion.

Brick Pavers

Restrict pedestrian and vehicular traffic in the area during installation of pavers. Do not build on frozen, wet, saturated or muddy sub-grade. Protect partially completed paving against weather damage when work is not in progress. Remove and replace completed work damaged by frost or freezing.

- Base Course Place base course materials only on an approved surface. Spread base course material in layers
 which when compacted will not exceed 4 inches. Compact each layer to 95% of maximum unit weight.
 Screed, level, and shape base course surface to required grade and cross section within a tolerance of 1/4 inch.
- 2. Brick Pavers Correct any unsatisfactory substrate or installation conditions prior to placing any paver units. Use full pavers wherever possible. Where cutting is required, use the largest size pavers possible. Cut pavers to provide required pattern and to neatly fit adjoining work. Cut pavers with block splitter or other equipment

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designed to cut masonry with clean, sharp unchipped edges. Ragged cuts will not be accepted. Cut through the full thickness of the pavers. Do not cut more than 1 inch of the 4-inch dimension of a soldier course.

Lay paver units in the pattern shown on the plans. Set all pavers flush to existing adjacent concrete curbs and adjoining work. Maintain uniform 1/16-inch to 1/8-inch joints between pavers.

Vibrate pavers to final grade with three or more passes of a vibrating plate compactor. After the first pass, brush joint filler material over the surface and vibrate into the joints with additional passes. Completely fill joints. After final vibrating, the surface must be true to grade and not vary by more than 1/4 inch when tested with a 10-foot straightedge at any location on the surface.

Remove and replace pavers that are broken, chipped, stained, or otherwise damaged. Provide new matching units, install as specified and to minimize evidence of replacement.

Clean pavers during installation and upon completion of the work. Repair damage to adjacent areas resulting from paver installation operations, as directed by the Engineer.

Remove and properly dispose of all unused materials, cutting remnants and other debris upon completion of the installation.

d. Measurement and Payment

The completed work, as measured will be paid for at the contract unit price for the following contract item (pay item):

Pay Item Pay Unit

Payment for **Remove and Replace Driveway, Special** shall include all labor, equipment, and materials required to complete the work described herein.

The Engineer and Contractor shall review each individual driveway condition prior to the start of construction. This coordination shall be the responsibility of the Contractor.

The quantities provided are for information only. The City reserves the right to increase/reduce the quantity or eliminate the item from the project completely as it sees fit.

Below is a list of the addresses where these driveways are located. The City of Farmington Hills will not be responsible for any omissions or variations from the locations below and the Contractor shall verify in field:

31238 Claymore Road

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CITY OF FARMINGTON HILLS

SPECIAL PROVISION FOR CONCRETE SIDEWALK

a. Description

This work shall consist of furnishing and installing sidewalk and sidewalk ramps with detectable warnings at intersections in accordance with the Michigan Department of Transportation (MDOT) Standard Plans and the 2020 MDOT Standard Specifications for Construction except as modified, herein.

b. Materials and Construction

Sidewalk, Conc, _ inch, Modified and Curb Ramp, Conc, 6 inch, Modified shall be constructed in accordance with Section 803 of the 2020 MDOT Standard Specifications for Construction and Special Detail R-28-Series, Sidewalk Ramp Details with the following exception:

Sidewalk ramps, including the level landing, shall be constructed with 6-inch thick concrete throughout the sidewalk ramp area. If no level landing exists, the first 15 linear feet of sidewalk, starting from the back of curb shall be constructed and paid for as Sidewalk Ramp, Conc, 6 inch, Special.

A 4" minimum sand base shall be constructed for all sidewalks compacted to 95% of maximum unit weight. Sand base shall be MDOT Class II granular material.

Provide brick red (Federal #22144) detectable warning inlays installed, according to the manufacturer's instructions and Special Detail R-28 Series.

Prior to beginning construction, the Contractor shall submit the name and plant location of the proposed concrete supplier for the project.

Prior to beginning construction, the Contractor shall submit mix designs for the proposed concrete mixtures proposed for use on the project for the Engineer to review.

c. Measurement and Payment

The completed work, as measured will be paid for at the contract unit price(s) for the following contract (pay) item(s):

Pay Items	<u>Pay Unit</u>
Curb Ramp, Conc, 6 inch, Special	Square Foot
Sidewalk, Conc, _ inch, Special	Square Foot
Detectable Warning Surface, Special	Foot

Sidewalk, Conc, _ inch, Special of the type called for on the plans, will be measured in place by area in square foot. The width shall be as shown on the plans and the length of the sidewalk shall be measured sidewalk joint to joint. Payment for the 4" minimum sand base shall be included. The contract unit price for sidewalk includes compensation for excavation of subbase regardless of amount; preparation of the furnishing, placing and curing concrete; furnishing and placing expansion joints; furnishing and placing backfill regardless of amount; and cleanup. All grading required to meet ADA standards shall be included in the items listed above. All labor, equipment, and materials necessary to protect the concrete sidewalk from weather damage and/or vandalism shall be considered included in the pay items above.

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Curb Ramp, Conc, 6 inch, Special will be measured in place by area in square foot. The width shall be as shown on the plans and the length of the sidewalk shall be measured from the back of the curb to the back of the level landing, including the level landing. Payment for the 4" minimum sand base shall be included. The contract unit price for curb ramps includes compensation for excavation of subbase regardless of amount; preparation of the furnishing, placing and curing concrete; furnishing and placing expansion joints; furnishing and placing backfill regardless of amount; and cleanup. All grading required to meet ADA standards shall be included in the items listed above. All labor, equipment, and materials necessary to protect the concrete sidewalk from weather damage and/or vandalism shall be considered included in the pay items above.

Detectable Warning Surface, Special will be measured in place by the foot. Payment includes all labor, materials, and equipment necessary to install detectable warning surface.

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CITY OF FARMINGTON HILLS

SPECIAL PROVISION FOR POST, MAILBOX, SPECIAL

a. Description

This work shall be performed according to Section 807 of the 2020 Michigan Department of Transportation Standard Specifications for Construction, City of Farmington Hills Specifications, U.S. Postal Requirements and/or as specified herein:

b. Materials

The existing mailboxes, regardless of type, shall be removed, placed on the homeowner's property for temporary storage during construction, and ultimately reinstalled along the proposed roadway in accordance with USPS standards.

Mailboxes that cannot be reinstalled on the existing post shall be installed on a new wood post, as necessary, and paid for as Post, Mailbox, Special – Ea. Posts shall be 8-ft in length, 4" x 4" pressure treated wood or as approved by the Engineer. The removal and reinstallation of the existing mailbox on either the existing post or a new wood post will be included in the unit price for Mailbox, Remove and Reinstall - Ea. Any new wood post installed shall be paid for as Post, Mailbox, Special – Ea.

The Contractor shall exercise care in removing existing mailboxes and posts to be reinstalled. Mailboxes requiring new posts shall be only as directed by the Engineer. Mailboxes and posts damaged due to the Contractor's operations shall be replaced in kind at the Contractor's expense.

Each mailbox removal and reinstallation will be paid for separately, regardless if multiple mailboxes are attached to the same post. Newspaper boxes will not be paid for separately but shall be included in the cost of the mailbox pay item.

When a decorative or brick mailbox is encountered, it shall be permanently removed and neatly stacked at the right of way line for the homeowner to dispose of. If the homeowner does not want it, the contractor shall properly dispose of it offsite. A new post and mailbox shall be installed at those locations and paid for as Post, Mailbox and Mailbox, New. The new mailbox shall be one of the following:

- Rubbermaid Model # GC1M0000 in (Green, front and back door, paper slot)
- Step 2, Mailmaster Plus Model No. 5402000 (Spruce Green, front and back, paper slot)
- or Approved Equal

c. Construction

Construction shall conform to Section 807 of the 2020 Michigan Department of Transportation Standard Specifications for Construction.

Temporary gang boxes shall be provided for each individual project phase at a location acceptable to the USPS outside the limits of the current phase of construction operations. All mailboxes shall be reinstalled immediately following the completion of the base asphalt in each individual construction phase in order to minimize mail service disruptions. The cost to set up the temporary gang boxes will be considered incidental to the cost of the project. In lieu of temporary gang boxes, the Contractor may provide temporary mailboxes affixed to the construction barrels. This approach is meant to allow each homeowner to maintain their mailbox in front of their house while the road is under construction and allows the Contractor flexibility to move the mailbox easily. The cost for any temporary

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mailboxes or connections to the construction barrels is considered incidental to the project and will not be paid for separately. The construction barrels will be paid for utilizing the standard pay item.

d. Measurement and Payment

The completed work of installing flexible delineator posts, including all labor, equipment and material will be measured and paid for at the contract unit price(s) for the following pay item(s):

Pay Items	Pay Unit
Post, Mailbox, Special	Each
Mailbox, Remove and Reinstall	Each
Mailbox, New	Each

Mailbox, Remove and Reinstall shall include all labor, equipment, and materials necessary to remove, salvage, and place existing mailbox on homeowner's property for temporary storage during construction, reinstall existing mailbox on the existing or new post and connections per USPS, City of Farmington Hills, and all other postal codes.

Post, Mailbox, Special shall include all labor, equipment, and materials necessary to provide and install a new wood post per USPS, City of Farmington Hills, and all other postal codes.

Mailbox, New shall include all labor, equipment, and materials necessary to provide and install a new mailbox per USPS, City of Farmington Hills, and all other postal codes. This item shall be as directed by the Engineer.

The quantities are for information only. The City reserves the right to increase/reduce the quantity or eliminate the item(s) from the project completely as it sees fit.

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CITY OF FARMINGTON HILLS

SPECIAL PROVISION FOR POST, FLEXIBLE, DELINEATOR, SPECIAL

a. Description

This work consists of supplying and installing Flexible Delineator Posts as shown on the plans and shall be done in accordance with section 810 of the 2020 Michigan Department of Transportation (MDOT) Standard Specifications for Construction except as follows.

b. Materials

Reflective sheeting shall be white, ASTM Type IV and shall be supplied from a manufacturer listed on the MDOT qualified products list, or as approved equal by the Engineer. The size of the reflective sheeting must be at least 3 inches by 9 inches, or 27 square inches.

c. Construction

1. Curb Endings

Flexible delineator posts with reflective sheeting attached shall be installed at all curb endings, as shown on the plans, or directed by the Engineer. Once installed the bottom of the reflective sheeting must be 4 feet above the edge of pavement.

2. Pipe Culvert and Storm Sewer Endings

Drainage Marker posts are to be placed at inlets and outlets of storm sewers and culvert pipes on the approaching traffic side as shown on the plans.

d. Measurement and Payment

The completed work of installing flexible delineator posts, including all labor, equipment and material will be measured and paid for at the contract unit price for the following pay item:

<u>Pay Items</u>	Pay Unit
Post, Flexible, Delineator, Special	Each

The contract unit price for Post, Flexible, Delineator, Special will be paid for each flexible delineator post installed including the required reflective sheeting. Install at locations as shown on the plans or as directed by the Engineer.

The quantities provided are for information only. The City reserves the right to increase/reduce the quantity or eliminate the item from the project completely as it sees fit.

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CITY OF FARMINGTON HILLS

SPECIAL PROVISION FOR STREET SIGN POST

a. Description

This Special Provision describes the installation and material requirements for street name sign blades mounted on round posts. This work shall be performed according to Section 810 of the 2020 Michigan Department of Transportation Standard Specifications for Construction, City of Farmington Hills Specifications, and as specified herein:

b. Materials

- 1. Round Posts
 - 2-3/8" outside diameter, 12 foot long
 - Galvanized, 2.89 lb per foot
- 2. Street Sign Brackets
 - Round pole brackets for 2-3/8" outside diameter
 - Aluminum alloy with stainless steel allen set screws bracket
- 3. Street Name Signs
 - Salvage and reinstall existing street name sign

The finished posts shall meet the requirements for the length and cross section specified herein. The posts shall be straight and shall have a smooth uniform finish, free from cracks, flaws, injurious seams, laps, blister, ragged or other defects affecting their strength, durability or appearance. All bolt holes shall be free from burrs.

c. Construction

Proper installation of street sign blades and round post is required for this pay item, Street Sign Post, Special – Ea. Height from ground to the bottom of the lowest sign blade shall be 7 feet. Use street sign brackets to attach the signs to the posts. The brackets shall have a 5-1/2" slot for extruded signs up to 42" in length and a 12" slot for extruded signs over 42" in length.

d. Measurement and Payment

The completed work, as described will be measured and paid for at the contract unit price for the following contract item (pay item):

Pay Item	<u>Unit</u>
Street Sign Post, Special	Each

The contract unit price for **Street Sign Post, Special** will be paid for each completed street sign installation. Payment includes all labor, equipment and materials required for installation of street sign posts. Also, all labor, equipment and hardware required for sign blade installation including street sign brackets. Install at locations as shown on the plans or as directed by the Engineer. Reinstalling the salvaged street name signs will be paid for separately using the pay item: Sign, Type III, Erect, Salv - Ea.

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SPECIAL PROVISION FOR TEMPORARY PEDESTRIAN PATH, SPECIAL

a. Description

This work consists of furnishing, installing, maintaining, and removing a temporary pedestrian path as identified in the proposal or on the plans. Temporary pedestrian paths, or segments thereof, will be repaired or replaced as directed by the Engineer.

b. Materials

Provide materials to construct a temporary pedestrian path in accordance with the contract, the Public Right of Way Accessibility Guidelines (PROWAG), the MMUTCD, as directed by the Engineer, and the following requirements:

- 1. Ensure the materials used to construct the temporary pedestrian path yields a continuous hard surface that is firm, stable and skid resistant. Ensure the path does not warp, buckle or otherwise become uneven, and materials support the weight of pedestrians as well as motorized scooters and wheelchairs. Suitable materials to construct the path include asphalt materials, aggregate (minimum 6-inches in depth), Oriented Strand Board (OSB), plywood, dimensional lumber, reclaimed, or other as approved by the Engineer. Compacted soils and sand are prohibited.
- 2. If asphalt materials are not used to construct the path, provide an antiskid coating, or surface treatment as directed by the Engineer.

c. Construction

Construct the temporary pedestrian path in accordance with PROWAG, the MMUTCD, the contract, the direction of the Engineer, and the following:

- 1. The useable surface of the path must be a minimum of 48 inches wide, additional width may be provided to preclude the use of Temporary Pedestrian Passing Spaces (paid for separately). A minimum width of 60 inches is required if Temporary Pedestrian Passing Spaces are not provided as part of the temporary facility. The maximum cross slope for the path is 2 percent. The path, including transitions to the adjacent surface at both ends, must be free of vertical discontinuities greater than 1/4 inch. Eliminate any vertical discontinuities greater than 1/4 inch up to 1/2 inch or bevel with a slope not steeper than 1:2. If a vertical discontinuity greater than 1/2 inch or a running slope greater than 1:20 occurs on the project, a Temporary Pedestrian Ramp (paid for separately) is required.
 - A. Ensure an anti-skid surface treatment is applied to the surface of the path, if not constructed with asphalt materials, as directed by the Engineer.
 - B. If the surface of the path is constructed from OSB, plywood, or dimensional lumber securely connect all sections with appropriate fasteners to ensure a continuous, uniform, and flat surface.
- 2. Ensure all debris and construction materials is cleared from the path throughout its use. Ensure snow and ice is removed; the use of an approved de-icing agent may be required.
- 3. Repair or replace the path, or segments thereof, if it becomes uneven, unstable, or displaces due to weather events, construction activities, or other causes as directed by the Engineer.
- 4. Quantities shown on the plans for the temporary path are subject to change and will be as-directed by the Engineer as required.

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5. Following the use of the temporary path, the Contractor must remove and dispose all materials used to construct the path, and restore the area as directed by the Engineer.

d. Measurement and Payment

The completed work as described, including all labor, equipment and material will be measured and paid for at the contract unit price for the following pay item:

Pay ItemsPay UnitPedestrian Path, Temp, SpecialSquare Yard

Pedestrian Path, Temp, Special will be measured to account for the total surface area of the path. **Pedestrian Path, Temp, Special** includes all costs related to installation, maintenance, restoration, and removal of the path and disposal of all associated materials throughout the life of the contract.

The quantities provided are for information only. The City reserves the right to increase/reduce the quantity or eliminate the item from the project completely as it sees fit.

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SPECIAL PROVISION FOR RIPRAP, PLAIN, SPECIAL

a. Description

The work to place the riprap shall follow Section 813 of the 2020 Michigan Department of Transportation Standard Specifications for Construction and City of Farmington Hills Standards, and/or as specified herein.

b. Materials

The contractor shall use only natural unbroken round stone. The stone used for riprap, plain shall be between 6-inches and 8-inches in diameter. No broken or crushed concrete, pavement, limestone, etc. will be permitted.

The riprap should be placed at a minimum depth of 18-inches.

A geotextile liner shall be placed beneath the proposed riprap and shall be considered included in the cost of the riprap.

c. Construction

Riprap will be permanent unless specified as temporary on the plans or as directed by the Engineer.

Riprap shall be placed in a manner with the least amount of disturbance to the watercourse and shall not cloud or pollute the water.

Riprap must be placed on geotextile liner that is anchored to side slope and toe into the toe of bank. Overlap geotextile seams by at least 2 feet.

The minimum layer thickness of the riprap shall be 18-inches.

d. Measurement and Payment

The completed work of installing flexible delineator posts, including all labor, equipment and material will be measured and paid for at the contract unit price for the following pay item:

Pay Items
Riprap, Plain, Special Squared Yard

All costs associated with the placement of the riprap and geotextile liner including, but not limited to: labor, materials, equipment, trucking, etc. shall be included in the pay item **Riprap**, **Plain**, **Special** and shall not be paid for separately. This pay item shall include all measures necessary to accomplish the item as described above and shown in the plans.

The quantities provided are for information only. The City reserves the right to reduce the quantity or eliminate the item from the project completely as it sees fit.

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CITY OF FARMINGTON HILLS

SPECIAL PROVISION FOR TURF ESTABLISHMENT

a. Description

Section 208 and 816 of the 2020 Standard Specification for Construction is supplemented by this Special Provision. The Contractor is responsible for the performance and quality of turf growth in the areas indicated on the plans and as identified by the Engineer. Comply with all local, state and federal laws when completing this work. It is expected that the turf growth to be turf fully established for final acceptance. Established growth shall be defined as growing seed rooted to the prepared earth bed with a minimum rooted coverage of 90 percent or greater, in a manner approved by the Engineer. The growth must be established before acceptance by the Engineer and final payment for restoration will be allowed.

Establish a durable, permanent, weed-free, mature, perennial turf. The work consists of fundamental turf work, including but not limited to top soiling, seeding, mulching, erosion control, maintenance, watering and repair of turf as described herein during the life of the contract.

Choose and implement proven turf establishment industry practices; provide all necessary labor and equipment; select and provide all turf establishment materials; and control erosion and any subsequent sedimentation at all times, or until the turf establishment is accepted.

Perform a site analysis, interpret the results and implement a turf establishment program to ensure compliance with this specification. The site analysis must take into consideration topsoil needs, fertilizer and pH requirements, seed mix, existing and future soil moisture levels, slopes and grades, required erosion control items and devices, maintenance requirements, local highway snow removal and deicing practices, and any other characteristics that influence and affect turf establishment.

b. Materials

Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable and according to MDOT requirements.

Testing and certifications of materials must be in accordance to contract documents and the MDOT Material Source Guide.

Provide topsoil, seed, mulch, pesticide, herbicide, mulch blankets and any other unique erosion control materials as necessary to fulfill this specification, as detailed in the plans. Use additional materials, as necessary, to meet the standards set forth for turf establishment in this special provision. The use of sod will not be allowed for this project.

Selection of all materials is the responsibility of the Contractor with the following minimum conditions. The following are recommendations for turf establishment materials, but the contractor may submit alternate materials. The contractor shall submit, for review and approval, the entire restoration/maintenance plan with materials prior to starting work.

Alternate proposals/materials will be considered with written references from MDOT or public agencies with successful use within 3 years of proposed alternate. Provide 5 successful examples of MDOT projects.

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1. Soil. Topsoil shall be placed at least 4 inches deep.

Provide furnished topsoil that will support vigorous growth. Topsoil is a material that consists of natural loam, sandy loam, silty loam, or clay loam humus bearing soils adapted to sustenance of plant life.

Material shall be from an offsite topsoil screening plant, and be loose and black in color. The material shall be free from sod, stones or rocks greater than 0.25 inches, roots, plants, clay lumps, weed stalks, clods, debris or other contaminants as determined by the engineer. The manufactured topsoil shall be a homogeneously blend of mineral soils or sand with stabilized organic soil amendments to produce topsoil. The topsoil shall be obtained from the upper layer of existing fertile soil and be in nutrients with negligible clay content.

Topsoil shall be in accordance with ASTM Standard D5268, 2007, "Standard Specification for Topsoil Used for Landscaping Purposes," ASTM International, West Conshohocken, PA, 2007, DOI: 10.1520/D5268-07, www.astm.org. The contractor shall test topsoil according to ASTM D5268 and the results submitted to the Engineer.

Contractor shall also test for pH content and percent organic content. Contractor shall make recommendations using these and any additional testing required. Provide Test Data Certification according to the Materials Source Guide.

- (1) The pH range shall be from 6.0 to 7.5. Topsoil outside of this range shall be amended by the addition of pH adjusters as approved by the Engineer.
- (2) The organic matter content shall range between 2% and 6% (by dry sample weight).

Topsoil removed from the roadway shall not be used within the project and must be removed from the right of way before project completion. The removed topsoil may be salvaged for use on other projects at the Contractors' expense. All stripped, salvaged, and/or removed topsoil is the property of the contractor.

Temporary topsoil stockpiles shall be located away from drainage courses and wetlands and shall be located outside of the drip line of preserved trees. Temporary stockpile locations outside of the limits of construction shall be restored in accordance with 816 of the 2020 MDOT Standard Specifications for Construction, at the Contractors' expense. If temporarily stockpiling topsoil outside the right-of-way, obtain and provide the engineer written permission from the owner of the property where the material will be placed. Temporary topsoil stockpiles shall be protected from soil erosion with silt fence and tarps, at the contractor's expense, for any exposed stockpiles left untouched over five calendar days. In lieu of tarps, the Contractor may use a Cereal Rye seeding mixture, provided it grows.

No stripping, salvaging, and/or removing of topsoil is permitted outside of the roadway. Roadway is as defined in Section 101.03 of the 2020 MDOT Standard Specifications for Construction.

Topsoil shall be placed on a prepared earth bed in accordance with Section 816.03A of the 2020 MDOT Standard Specifications for Construction. The existing earth bed shall be graded such that the placement of topsoil will meet the final plan grades. Trim and grade the finished slope (MDOT Class A) in accordance with Section 205.03.N of the 2020 MDOT Standard Specifications for Construction.

2. Seed

For Turf Establishment pay item, select a seed that is suitable for its application from the following:

A. THM Seed Mix (Turf Loamy to Heavy)

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For areas that are described as residential and business turf, use seed mixture MDOT THM mix at a minimum rate of 220 lb/acre. These areas are well maintained, mowed about once a week during its established growing season. This seed mix is aesthetically pleasing, and is preferred to adjacent land owners who maintain their frontage.

B. TUF Seed Mix (Turf Urban Freeway)

For all other areas, described as rural turf, use seed mixture is MDOT TUF mix at a minimum rate of 220 lb/acre. These areas are unmaintained, never mowed, or only cut once or twice a year during its established growing season. This seed mix is requires less maintenance and is preferred to adjacent land owners who do not maintain the frontage.

For the Turf Establishment, (Type) Seed pay items, the following seed mixes are to be used as shown on the plans and pay items.

A. ES Seed Mix (Environmental Seed)

The ES seeding mix will be utilized to restore roadside embankment slopes adjacent to wetland areas with mature Michigan meadow vegetation (grasses & wildflowers) and contain the proportions of grasses and forbs as shown in Table 1. The mixture proportion of the seed mixture shall be accomplished by using MCIA certified seed from local origin. The seed must not be mixed together but must be packaged individually according to species. The Engineer will inspect seed before individual packages are opened.

This seed mix is suitable for forested wetland, emergent wetlands, berm and uplands.

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Table 1: ES Seed Mixture Proportions

Common Name	Scientific Name	Minimum Purity (%)	Germination (%)	Grass, Sedges, Rushes Weight lbs (Oz)/Acre	Forbs Weight Lbs (Oz)/Acre	Total ES Seed Mix Lbs (Oz)/Acre
Big Bluestem Grass	Andropogon gerardii			3.5 (56)		
Canada Wild Rye	Elymus canadensis			4 (64)		
Switch Grass	Panicum virgatum			1.5 (24)		
Little Bluestem	Schizachyrium scoparius			2.5 (40)		
Indian Grass	Sorghastrum nutans			4.5 (72)		
Wild Bergamot	Monarda fistulosa				0.15625 (2.5)	
Yellow Coneflower	Ratibida pinnata	90	85		0.375 (6)	
Black-eyed Susan	Rudbeckia hirta				0.1875 (3)	
Smooth Aster	Aster laevis				0.125 (2)	
Showy Goldenrod	Solidago speciosa				0.09375 (1.5)	
Butterfly Milkweed	Asclepias tuberosa				0.5 (8)	
		7	otals:	16 (256)	1.4375 (23)	17.4375 (279)

B. BS Seed Mix (Bio-swale Seed)

The BS seeding mix will be utilized in bio-swales or grassy swales as shown on the plans. The seed must not be mixed together but must be packaged individually according to species. The Engineer will inspect seed before individual packages are opened.

Seed shall be installed in accordance with the seasonal limitations that are described in 2020 MDOT Standard Specifications of Construction and contract documents. Provide testing of seed per MDOT Material Source Guide.

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Table 2: BS Seed Mixture

Common Name	Scientific Name	Permanent Grasses/Sedges PLS Lbs (Oz)/Acre	Temporary Cover PLS Lbs (Oz)/Acre	Forbs PLS Lbs (Oz)/Acre	Total BS Seed Mix PLS Lbs (Oz)/Acre
Big Bluestem	Andropogon gerardii	0.75 (12)			
Bristly Sedge	Carex comosa	0.125 (2)			
Crested Oval Sedge	Carex cristatella	0.0625 (1)			
Bottlebrush Sedge Prairie Sedge Mix	Carex lurida Carex spp.	0.15625 (2.5) 0.125 (2)			
Brown Fox Sedge	Carex vulpinoidea	0.123 (2)			
Virginia Wild Rye	^	0.23 (4)			
Fowl Manna Grass	Elymus virginicus	0.30 (8)			
	Glyceria striata				
Switch Grass	Panicum virgatum	0.125 (2)			
Dark Green Rush	Scirpus atrovirens	0.125 (2)			
Wool Grass	Scirpus cyperinus	0.03125 (0.5)			
Prairie Cord Grass	Spartina pectinata	0.1875 (3)			
Common Oat	Avena sativa		22.5 (360)		
Annual Rye	Lolium multiflorum		6.25 (100)		
Water Plantain (Various)	Alisma spp.			0.0625 (1)	
Swamp Milkweed	Asclepias incarnata			0.125 (2)	
New England Aster	Aster novae- angliae			0.03125 (0.5)	
Tall Coreopsis	Coreopsis tripteris			0.0625 (1)	
Spotted Joe-Pye Weed	Eupatorium maculatum			0.015625 (0.25)	
Blue Flag	Iris virginica			0.25 (4)	
Marsh Blazing Star	Liatris spicata			0.0625 (1)	

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	Total:	2.5 (40)	28.75 (460)	0.921875 (14.75)	32.421875 (518.75)
Golden Alexanders	Zizia aurea			0.046875 (0.75)	
Blue Vervain	Verbena hastata			0.09375 (1.5)	
Prairie Dock	Silphium terebinthinaceum			0.0625 (1)	
Common Arrowhead	Sagittaria latifolia			0.046875 (0.75)	
Common Water Horehou	Lycopus americanus			0.015625 (0.25)	
Great Blue Lobelia	Lobelia siphilitica			0.03125 (0.5)	
Cardinal Flower	Lobelia cardinalis			0.015625 (0.25)	

Alternate seeding mixes that may be submitted by the contractor (approval of alternate mixes shall solely be decided by the Engineer):

- A. Use a seeding mixture that is composed of four or more species of perennial grass. Use only species and their cultivars or varieties, which are guaranteed hardy for Michigan.
- B. Recommended species of perennial grasses include: Kentucky Bluegrass, Perennial Ryegrass, Hard Fescue, Creeping Red Fescue, Chewings Fescue, Turf-type Tall Fescue, Buffalo grass, and Alkaligrass-Fults Puccinellia distans. Select cultivars or varieties of grasses that are disease and insect resistant and of good color. Ensure that no one species in the mix is less than 5 percent, or more than 25 percent, of the mixture by weight. Do not select grass species considered noxious or objectionable, such as Quack Grass, Smooth Brome, Orchard Grass, Reed Canary Grass and others.
- C. The seed must be legally saleable in Michigan. The seed product must not contain more than 10 percent inert materials. The seed source must be from an MDOT approved certified vender.
- D. The site use, and to the soils, moisture and local climate. Site use may include, but is not limited to, detention pond, wildlife habitat, playground, wetlands, forested wetland, rural roadside, urban roadside and highly maintained front yard.
- E. At least two of the species in the mixture proposed to be planted within 15 feet behind the curb or the shoulder must be salt tolerant.
- 4. Mulch. Mulch blanket or high velocity mulch blanket according to the 2020 MDOT Standard Specifications for Construction Section 816.03 G.

Mulch blanket seeded areas with the appropriate materials for the site conditions to promote germination and growth of seed and to mitigate soil erosion and sedimentation.

Mulching, Mulch Anchoring, or Mulching Netting shall not be permitted.

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A. Special Mulch

Coir Fiber Erosion Control Blanket:

The coir fiber blanket shall be a 100% organic coir (coconut) fiber blanket woven between two natural fiber nettings into a continuous matrix for temporary erosion protection (North American Green C125 or approved equal). The blankets shall be of consistent thickness with the coconut fiber evenly distributed over the entire area of the mat and a minimum mass per unit area of 0.50 lb/yd2. The blanket shall be sewn to a natural jute fiber netting on the top and bottom sides with degradable thread on 1.5-2 inch centers. The top netting shall consist of machine directional strands formed from two intertwined yarns with cross directional strands interwoven through the twisted machine strands (Leno weave) to form a net opening size of approximate ½ x 1 inch mesh. Blankets with cross-lay weaves on top are not allowed. Photo-degradable polypropylene or other synthetic nettings are not allowed unless specifically indicated on the Project Plans or pre-approved by the Engineer. Products shall meet the specifications of ECTC and FHWA FP-03 Category Type 4. The following products meet the specifications for coir fiber ECB lines:

Material Properties:

Mass/Unit Area ASTM D6475 8.83 oz/yd2 (300 g/m2)

Min. Tensile Strength ASTM D4595 125 lb/ft
Min. Permissible Shear Stress ASTM D6460 2.25 lb/ft2

4. Herbicides. Comply with all federal, state and local laws. As part of the MDA weed control application, the Contractor is required to make proper notifications and/or postings as per label and MDA requirements for all locations that will be sprayed. Notify the Engineer 48 hours prior to any applications being made. Furnish and apply herbicide(s) as needed. It is the Contractor's responsibility to select the herbicide(s) and the rate at which it is used. Obtain the Engineer's approval of work methods and herbicide(s) selected prior to the application of the herbicide(s). Complete a spray log and submit to the Engineer each day an application is made.

Do not draw water from any waterway (i.e. river, ditch, creek, lake, etc.) located on state, county or municipal right-of-way, for mixing with herbicides.

Weed control is not a pay item and is included in other items of work. It is the responsibility of the Contractor to control weeds as directed by the Engineer until all restoration related pay items are accepted.

5. Fertilizers. Fertilizer shall meet the following minimum requirements: MDOT Class A, 228 Ibs./acre. Fertilizer shall be placed in accordance with Section 816.03B of the 2020 MDOT Standard Specifications for Construction.

Furnish and apply fertilizer(s) as needed. It is the Contractor's responsibility to select the fertilizer(s) and the rate at which it is used. Phosphorus is allowed for use only at the time of planting and when required by soil conditions. Obtain the Engineer's approval of work methods and fertilizer(s) prior to the application of the fertilizer(s).

6. Water. Furnish and apply water from an approved source at a rate to promote healthy growth. Watering seed until vigorous turf growth is accepted shall be considered included in the surface restoration work.

a. Construction

The Contractor is responsible for all work and all construction methods used in completing this work. Implementation of any part of MDOT Standard Specifications for Construction or Standard Plans by the Contractor does not relieve the Contractor of responsibility for acceptability of the construction methods or for the quality of the work.

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1. Contractor Turf Establishment Experience Requirements. Weed control must be done by a commercial herbicide applicator, licensed by the State of Michigan and certified by the Michigan Department of Agriculture (MDA) in the appropriate category to apply herbicides. Use application procedures and materials according to federal, state and local regulations. Use of restricted use chemicals is prohibited. The Contractor must provide appropriate documentation and secure approval from the Engineer before application of herbicides. Submit information to engineer.

At least 10 work days prior to start of turf establishment, submit documentation to the Engineer, from the Contractor performing the turf establishment work, that they meet one or both of the following requirements.

- a) At least one person employed by the Contractor performing the turf establishment work and assigned to the job site has a degree or certificate in Turf Management, Horticulture or related field.
- b) At least one person employed by the Contractor performing the turf establishment work and assigned to the job site has at least 5 years of experience in roadside turf establishment.

Contractor's Field Supervision: The Installer shall maintain an experienced full-time supervisor on Project site when work is in progress.

- 2. Planting Restrictions: Plant according to season limitations in Section 816 of the 2020 MDOT Standard Specifications for Construction. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of planting completion.
- 3. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

4. Examination

Examine areas to be planted for compliance with requirements and other conditions affecting performance.

- a) Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
- b) Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
- c) Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
- d) Uniformly moisten excessively dry soil that is not workable and which is too dusty.

5. Preparation

- a) Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, 100-year floodplain, wetlands, and plantings from damage caused by planting operations.
- b) Protect grade stakes set by others until directed to remove them. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- c) Slopes shall be class A slopes as defined in the MDOT Standard Specifications for Construction. These slopes shall be maintained during the entire turf establishment period. Any settlement will be the responsibility of the contractor to repair at no additional cost to the contract.
- d) Preparation of Earth Bed. According to 816.03 A.1.

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6. Seeding

- a) Seeding shall be sown in accordance with Section 816.03C of the 2020 MDOT Standard Specifications for Construction. The application rate for the seeding shall be as specified in the Products section.
- b) Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
- c) Do not use wet seed or seed that is moldy or otherwise damaged.
- d) Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.
- e) Rake seed lightly into top 1/8-inch of soil, roll lightly, and water with fine spray.

The above requirements do not apply to wetland seeding and is part of other contract documents.

7. Turf Maintenance

- a) It is the responsibility of the Contractor to regularly water new seed in order to establish a dense lawn of permanent grasses that is free from mounds and depressions. Any portion of a seeded area that fails to show a uniform germination shall be re-seeded. Such re-seeding shall be at the Contractor's expense and shall continue until a dense lawn is established.
- b) Watering seed shall be considered as included in the turf establishment work.
- c) Maintain and establish grass by watering, fertilizing, weeding, mowing, trimming, replanting, core aeration, and performing other operations as required to re-mulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.
- d) Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
- e) In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
- f) Watering: Maintain temporary turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches.
- g) Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Layout temporary watering system to avoid walking over muddy or newly planted areas.
- h) Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.
- i) All prepared restoration areas of the entire project limits are the responsibly of the Contractor until final acceptance by the Engineer.

8. Cleanup and Protection

- a) Promptly remove soil and debris created by restoration work from paved areas.
- Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- b) Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.
- c) Remove non-degradable erosion-control measures after grass establishment period.
- 9. Inspection of the Work. The Contractor is responsible for all weekly inspection of turf establishment work.

The contractor shall also notify the engineer 24 hours before performing any work.

If requested by the Engineer, use a Contractor's Weekly Report, to be approved by the Engineer, to report inspections made and to document turf establishment work performed on this project.

• Complete and submit a Contractor's Weekly Report to the Engineer when any work performed under this special provision is in progress. Submit report within 24 hours of performing work

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- Include all necessary materials documentation including tests slips, certifications, bag tags, etc. with the associated Contractor's Weekly Report.
- The Engineer will determine the acceptability of the Contractor's Weekly Report in terms of their completeness and accuracy. The Engineer reserves the right to verify all submitted measurements and computations. Failure by the Contractor to submit acceptable and timely reports to the Engineer may result in withholding of progress pay estimates on turf-related items until such time as reports are submitted and deemed acceptable.

The Engineer reserves the right to inspect the project for any reason in accordance with subsection 104.01 of the 2020 MDOT Standard Specifications for Construction, including the fulfillment of other inspection requirements such as Soil Erosion and Sedimentation Control, NPDES, etc. Inspections made by the Engineer do not relieve the Contractor of the responsibility for inspections required by this special provision or the Contractor's responsibilities for erosion control and turf establishment.

10. Erosion Control. Erosion must be controlled at all times according to section 208 of the Standard Specifications for Construction. Control of soil erosion is the responsibility of the Contractor. However, sedimentation controls must be placed as indicated on the plans or as directed by the Engineer. The site must be continuously monitored by the Contractor for needed erosion repair from any cause as addressed in the contract documents. All eroded areas must be returned to original grade as detailed in the contract documents.

If sedimentation occurs in drainage structures or any watercourse or water containment area, corrective action must be taken immediately and all disturbed areas contributing to this sedimentation must be stabilized within 24 hours after the erosion occurrence. Sediment deposited as a result of the Contractor's inability to control the soil erosion must be removed at the Contractor's expense.

The Contractor must reimburse for any costs levied against the , such as fines, environmental costs, costs for remedies required, or any other costs as a result of the Contractor's failure to comply with this special provision and with federal, state and local laws.

11. Erosion Repair. The Contractor is responsible for all repairs and liable for all consequences (legal, monetary or other) associated with erosion or sedimentation damage to finished or unfinished work.

All erosion occurrences and the repairs made by the Contractor must be reported to the Engineer in the format and at the frequency required by the Engineer. Any erosion, displacement or disturbance to ongoing or completed work by any cause must be repaired by the Contractor at no additional cost to the contract unless otherwise noted herein.

The Contractor is responsible and liable for all traffic control and safety measures required to repair and protect damaged turf areas. Any eroded area that may affect the support of the roadbed or safety of the public must be repaired within 24 hours of the erosion occurrence.

Protective devices such as barriers, directional signs/signals, temporary fence, or any other safety measures must be placed by the Contractor immediately after any erosion damage occurs that has the potential of endangering the public. In these instances, the Contractor must, within 24 hours of the occurrence of the damage, provide the Engineer with a written summary of the immediate action taken describing the repairs made and the safety measures taken. These protective devices are at the Contractors expense.

Shoulders, slopes, and other areas damaged by erosion prior to final acceptance of the project shall be fully repaired as directed by the Engineer at the Contractor's expense. To fully repair damaged areas the Contractor may be required to perform the following work. Fill and/or regrade rills and gullies with topsoil; fill and/or re-grade shoulder with gravel as specified on plans; re-seed, fertilize, and mulch with anchoring or mulch mats whichever was originally used to restore the area.

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All corrective action erosion repairs shall be made according to contract documents and shall be made within 24 hours if sedimentation has occurred into a watercourse or public safety may be compromised. Otherwise, corrective action shall be made within 5 calendar days.

Due to any erosion as part of restoration, the Contractor shall be responsible for cleaning out all drainage structures, culverts, and ditches that are located within the area of construction. All ditches shall be restored such that drainage will flow freely. The cost of this work shall be considered as included in the pay items for restoration work.

- 12. Mowing and Weeding. Turf must be maintained to a visually appealing level, and not more than 8 inches in height at any time, prior to acceptance. Weeds must be always controlled to less than 1 percent of the Turf Establishment area during construction.
- 13. Contractor maintenance plan during establishment period

Contractor shall submit plan for review/approval. The plan may be revised based on inadequate field results.

14. Establishment Period

Contractor is responsible for growth according to Special Provision. Engineer determines acceptance after the Contractor's written request for final inspection of turf. Acceptance will only be considered after 60 calendar days of placement. The days do not include the seasonal limitations between October 10 and April 15.

If the contractor does not establish growth before seasonal limitations, the contractor is responsible for all SESC measures. At a minimum, this includes temporary mulch blanket. The cost for this work is paid for separately.

15. Submittals

The following is a general list of submittals for this special provision:

- a) Documentation showing that Contractor meets Turf Establishment Experience Requirements.
- b) Alternate materials (seed, fertilizer, etc.), if contractor requests
- c) Topsoil test results
- d) Herbicide spray log
- e) Contractor's Weekly Report of inspections
- f) Contractor maintenance plan
- g) Certifications according to MDOT Material Source Guide
- h) Any other documents to meet this Special Provision and Contract Documents.

16. Final Acceptance

A. Final Acceptance Parameters. Before final acceptance of the turf establishment work, all of the following minimum parameters must be met throughout all exposed areas of the project designated on the plans or identified by the Engineer as turf establishment areas:

- 1) Meet all requirements of this Special Provision
- 2) No exposed bare soil and the turf must be fully germinated
- 3) Dark green in color and in a vigorous growing condition
- 4) Healthy, uniform, erosion free, weed free, disease free
- 5) Free of surface irregularities
- 6) 90% of the restoration areas must have established growth.

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The Engineer will notify the Contractor of the dates and times of all acceptance inspections. The Contractor may accompany the Engineer during these inspections. If the Contractor does not agree with the decision made by the Engineer, the Contractor may request an inspection by a mutually agreed upon third party (Michigan State University Extension service or other). A joint inspection, to include the Engineer, the Contractor, and the third party, will be scheduled by the Engineer. All expert fees and expenses charged by the third party must be paid by the Contractor.

Progress of Final Restoration: If in the judgment of the Owner, adequate site restoration efforts are not being expended, then the Owner will take the necessary steps to perform such restoration and shall charge the Contractor for all of the costs until proper order is restored. The Owner may also charge damages or reduce the amount of payment.

b. Measurement and Payment

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

Pay ItemPay UnitTurf EstablishmentSquare YardTurf Establishment, (Type) SeedSquare Yard

Turf Establishment and Turf Establishment, (Type) Seed will be measured in place by area in square yards, with a maximum 10-ft from back of curb unless specifically called out differently on plans. All materials, labor and equipment required or selected by the Contractor to install, maintain, inspect, repair and meet the acceptance parameters for turf establishment specified in this special provision, including preparation, updating and submittal of the Contractor's Weekly Reports, are included in the contract unit price bid for Turf Establishment.

All of the above requirements within the Special Provision shall not be considered for additional payment and shall be included as part of the contract unit price for Turf Establishment until the turf is accepted.

Repairs made to damaged turf establishment areas as a result of any storm event shall be included in the pay item Turf Establishment and Turf Establishment, (Type) Seed.

The following schedule of payment applies to work performed according to this special provision. Upon completion of mulch blanket stage, 50 percent of the authorized amount for Turf Establishment will be paid to the Contractor. The remaining 50 percent of the authorized amount will be paid upon completion of all other work necessary to comply with this special provision and to meet all final acceptance parameters for Turf Establishment.

If the construction schedule is modified or there are extensions of times, the contractor shall adjust the turf establishment plan at no additional cost to the contract.

The Turf Establishment pay item includes all testing by the contractor.

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CITY OF FARMINGTON HILLS

SPECIAL PROVISION FOR SPRINKLER RELOCATION

a. Description.

This work consists of sprinkler relocation, repair, or replacement that is required for any impacted irrigation systems along the edge of the roadway / curb.

b. Construction.

Relocate, repair, or replace sprinkler lines and heads disturbed as a result of construction as necessary to meet local and MDOT standards for irrigation system materials and construction, or to meet existing materials as requested by the property owner. Replace any sprinkler lines or heads damaged during construction at the Contractor's expense.

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

Pay Item	Pay Unit
Sprinkler Relocate	Each

Sprinkler Relocate will be paid for at the contract unit price for each sprinkler head relocated. Payment includes any sprinkler lines, fittings, attachments, material, and labor required to complete the sprinkler head relocation.

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APPENDIX A MDOT SPECIAL PROVISIONS

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20NB03

MICHIGAN DEPARTMENT OF TRANSPORTATION

NOTICE TO BIDDERS FOR FRAUD AND ABUSE HOTLINE

CSD:LS 1 of 1 APPR:MAS:02-09-21

The Michigan Department of Transportation (MDOT) has established a Fraud and Abuse Hotline for employees, contractors, consultants, and others to report suspected fraud or abuse, such as: prevailing wage non-compliance, theft, kickbacks, wrongful claims, contract fraud, use of materials that do not comply with specifications, unapproved substitution of materials, commodities, or test samples, or failure to follow contract procedures.

Anyone with knowledge of any activity involving the potential for fraud or abuse is requested to call the Hotline at (toll free) **1-866-460-6368** or **517-241-2256**.

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20SP-107A-01

MICHIGAN DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION FOR SWEEPING

DES:DBP 1 of 1

APPR:MRB:JJG:03-31-20 FHWA:APPR:04-03-20

- **a. Description.** This work consists of sweeping pavements in the construction area, including service roads and cross streets, as directed by the Engineer.
- **b. Equipment.** Provide a self-propelled or towed street sweeper equipped with pickup attachments and curb brushes.
 - c. Sweeping. Sweep paved surfaces as often as necessary as directed by the Engineer.

Ensure paved roadbeds are given a final cleaning within 5 working days prior to opening the pavement surface to traffic or notification by the Contractor that the work is completed, whichever occurs first.

d. Measurement and Payment. The work of sweeping will not be paid for separately, but payment will be considered as having been included in other pay items in the contract.

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Construction.



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20SP-204B-01

MICHIGAN DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION FOR VERTICAL EXPLORATORY INVESTIGATION FOR RELOCATION

COS:MRB 1 of 2 APPR:DMG:NAL:04-30-20

FHWA:APPR:05-06-20

a. Description. When proposed work must be relocated as directed by the Engineer, this special provision is used to compensate the Contractor to locate and expose underground infrastructure and obstructions, such as culverts, sewers and utilities. Perform this work only when conflicts are found in the planned work location. This special provision is not to compensate for the Contractor's responsibilities in subsection 107.12 of the Standard Specifications for

- **b. Materials.** Use Granular Material Class III in accordance with section 902 of the Standard Specifications for Construction for backfill. Use material removed during exploratory investigation for backfill only if approved by the Engineer.
- **c.** Construction. The owner of any sewer or utility to be exposed will not take the facilities out of service during the exploratory investigation. Contact utility owners in accordance with subsection 107.12 of the Standard Specifications for Construction.

Advance the exploratory excavation using vacuum excavation, hand digging, conventional machine excavation, or a combination thereof subject to approval of the Engineer. Allow the Engineer access to document the necessary information. If the technique used to advance the excavation causes any damage to the existing facilities, immediately contact the utility owner and cease all work until an alternate method is approved by the Engineer.

Take care to protect the exposed culvert, sewer or utility from damage during construction. The Contractor is responsible for all costs associated with the repair work and out of service time of all broken or damaged existing culverts, sewers or utilities as a result of any action by the Contractor. If the exploratory investigation results in damage to utilities, contact the owner of such utility to coordinate the repair. Repair or replace culvert, sewer or utility, damaged during exploratory excavation, in accordance with the standard specifications and as approved by the Engineer.

Obtain the Engineer's approval before backfilling the excavation. Complete backfilling no later than 24 hours after approval has been given. Backfill in accordance with subsection 204.03.C of the Standard Specifications for Construction. Dispose of excess material in accordance with the standard specifications.

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

Pay Item	Pay Unit
Exploratory Investigation, Vert	icalFoot

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Exploratory Investigation, Vertical will be measured by the foot from top of existing grade vertically to the bottom of the excavation for up to a 4-foot maximum diameter hole, or as approved by the Engineer. The excavated depth of each 4-foot maximum diameter hole will be measured separately for payment.

Exploratory Investigation, Vertical includes all costs associated with repair or replacement resulting from the Contractor's activities. Providing necessary lane, shoulder and/or sidewalk closures required to perform work will be paid for by other associated items in the contract. Restoration work will be paid for by other associated items.

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20SP-208A-01

MICHIGAN DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION FOR

NON-COMPLIANCE WITH SOIL EROSION AND SEDIMENTATION CONTROL REQUIREMENTS

COS:DMG 1 of 2

APPR:TWK:HLZ:02-26-20 FHWA:APPR:03-02-20

a. Description. This special provision establishes negative adjustments related to the failure to properly install and maintain soil erosion and sedimentation control (SESC) measures and the conditions under which these adjustments will be determined and applied. Nothing in this special provision modifies section 107 of the Standard Specifications for Construction.

Delays to the project as a result of the Contractor conducting corrective actions for SESC measures do not constitute a valid reason for an extension of time.

Ensure deficiencies with SESC measures are corrected in the time frame stated herein. For those deficiencies not corrected within the stated time frame, the Engineer will make a negative adjustment to the contract as stated herein.

- b. Materials. None specified.
- **c. Construction.** Install all temporary erosion control measures identified on the plans and as directed by the Engineer for an impacted area of the project prior to the start of any earth disturbance including, but not limited to, clearing, grading and excavation in that area. The Engineer will inspect these measures every 7 days and within 24 hours after a precipitation event that results in a discharge from the site. Deficiencies will be documented on the National Pollutant Discharge Elimination System and SESC Inspection Report (MDOT Form 1126).

If at any time during the project, including the time during the seasonal suspension, the Engineer documents deficient SESC measures, the Engineer will provide written notification with instructions for corrective action to the Contractor. The time frame for completion of these corrective actions will be specified in the notification and will be discussed with the Contractor as necessary.

Deficiencies are defined as one or more of the following:

- Failure to install or construct SESC measures shown on the plans or as directed by the Engineer;
 - 2. Failure to maintain the measures;
- 3. Failure to conduct earth change activities in a manner consistent with all applicable environmental permit requirements;
- 4. Failure to comply with the area limitations or the time limitations stated in subsections 208.03.A and 208.03.B, respectively, of the Standard Specifications for Construction.

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SESC deficiencies are either emergency or non-emergency and the time frame for corrective action is determined accordingly. Sediment leaving the right-of-way or entering a drainage structure, waters of the state, or loss of support of the roadbed impacting public safety constitutes an emergency and corrective actions must be completed within 24 hours of notification, including weekends or holidays regardless of whether the Contractor is working or not. Non-emergency deficiencies must be corrected within 5 calendar days of notification.

For those emergency corrective actions not completed within 24 hours of notification, the Contractor will be assessed \$100.00 per hour for every hour the deficiency remains uncorrected after the initial 24 hours of notification. For those non-emergency corrective actions not completed within 5 calendar days, the Contractor will be assessed \$500.00 per day for every day, or part thereof, the deficiency remains uncorrected after the initial 5 days of notification.

If it is not practicable to complete the non-emergency corrective actions within 5 calendar days, the Contractor must document the reasons and propose a corrective action plan to the Engineer within 5 days of notification. The corrective action plan must contain the Contractor's course of action and a time frame for completion. If the reasons and the corrective action plan are acceptable to the Engineer, the Contractor will be allowed to proceed with the plan as proposed without incurring a negative adjustment. If the approved corrective action plan is not completed as proposed, the Contractor will be assessed \$1000.00 per calendar day for every day, or part thereof, the deficiency remains uncorrected after the time frame is exceeded in the approved corrective action plan.

Correct, in the timeframe stated herein, all other emergency or non-emergency SESC deficiencies documented anywhere else on the project during completion of the approved corrective action plan.

d. Measurement and Payment. The Engineer will make the necessary monetary adjustment to the contract amount based on the length of time the Contractor allows the deficiencies to remain uncorrected after the time allowance stated herein and as described to cover any costs incurred by the Department as a result of SESC violations.

All costs associated with corrective actions required due to the Contractor's failure to properly install or maintain SESC measures on this project will be borne by the Contractor.

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MICHIGAN DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION FOR EROSION CONTROL, INLET PROTECTION, FABRIC DROP

COS:DMG 1 of 2

APPR:TWK:CP:03-11-20 FHWA:APPR:03-13-20

a. Description. This work consists of furnishing and installing acceptable alternatives to inlet protection devices (devices) listed in the *Soil Erosion and Sedimentation Control Manual* when the pay item Erosion Control, Inlet Protection, Fabric Drop is included in the contract.

This work consists of furnishing, installing, maintaining, disposing of collected material and removing devices at the locations shown on the plans or as directed by the Engineer.

- b. Materials. The following devices are approved for use as acceptable alternatives:
 - 1. Siltsack Type B, Regular Flow, by ACF Environmental, Inc.
- 2. Inlet Pro Sediment Bag, Standard Flow, with optional foam deflector by Hanes Geo Components.
- 3. Dandy Curb Bag, Dandy Bag, Dandy Curb Sack, Dandy Sack, or Dandy Pop by Dandy Products, Inc.
 - 4. Basin Bag, Regular Flow by CSI Geoturf.
- 5. Flexstorm Catch-It and Flexstorm Pure used with filter bag types FX, FX+, FXO, PC, PC+ or IL.

Ensure provided devices are sized appropriately for the drainage structures in which they will be installed.

c. Construction. Install, maintain and remove the devices in accordance with the manufacturer's guidelines. Remove material collected by the devices in accordance with the manufacturer's guidelines or as directed by the Engineer.

Dispose of collected material in accordance with subsection 205.03.P of the Standard Specifications for Construction. Those devices that are no longer needed and have been removed may be reused elsewhere on the project as approved by the Engineer.

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

Pay Item	Pay Unit
Erosion Control, Inlet Protection,	Fabric DropEach

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Erosion Control, Inlet Protection, Fabric Drop will be paid for as one each for each time the alternate device listed herein is installed, maintained, and removed at a separate location within the project limits.

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20SP-302A-01

MICHIGAN DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION FOR AGGREGATE BASE COURSE

CFS:SAG 1 of 1

APPR:TEB:JFS:02-19-20 FHWA:APPR:02-19-20

- **a. Description.** This provision modifies the layer thickness requirements for placing and compacting aggregate base course. Delete the 6-inch maximum layer restriction in section 302 of the Standard Specifications for Construction and replace with the following:
 - b. Materials. None specified.
- **c.** Construction. Construct a test strip at the start of base work. Compact all layers to a uniform depth of not more than 10 inches (+3/4 inch). If the total plan base thickness exceeds 10 inches, construct the base in layers of equal thickness. Secure the Engineer's approval for the method of placement and compaction before continuing.

If the accepted method is subsequently modified, the Engineer may require another test strip to confirm compliance with the specification. The Engineer may remove a portion of a layer when conducting density testing to assure the compaction requirements are being met full depth.

d. Measurement and Payment. All additional costs associated with constructing aggregate base course in accordance with this special provision will be included in the related Aggregate Base pay item.

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MICHIGAN DEPARTMENT OF TRANSPORTATION

SUPPLEMENTAL SPECIFICATION **FOR ERRATA TO THE 2020 STANDARD SPECIFICATIONS**

1 of 10 06-30-23

Page	Subsection	Errata
1-06	101.02	Delete the second abbreviation of the list on this page reading: "IESIlluminating Engineering Society
1-06	101.02	Add the abbreviation to the list on this page reading: "IESNA Illuminating Engineering Society of North America
1-83	108.05.A.2	In the first paragraph of this subsection change the language "MDOT Form 1130" to read "MDOT Form 1130A".
1-88	108.08.D	Move the last paragraph of this subsection to the left one indent to align with the first paragraph of the subsection and not with the subsection 108.08.D.3.
2-29	205.03.P.1	Delete the first sentence of this subsection and replace with the following: "Do not dispose of material, temporarily or permanently, beyond the normal plan fill slope across wetlands or floodplains."
2-30	205.03.P.2	Delete the first sentence of this subsection and replace with the following: "Do not dispose of material, temporarily or permanently, in wetlands or floodplains."
2-30	205.03.P.3	Delete the second paragraph of this subsection and replace with the following: "Contact the appropriate regulatory agencies to determine whether an area is a regulated wetland or floodplain before disposing of surplus or unsuitable material in areas outside the right-of-way and not shown on the plans as disposal sites."
2-30	205.03.P.3	Delete the first sentence of the third paragraph of this subsection and replace with the following: "Immediately move to an upland site any surplus or unsuitable material that was disposed of in portions of wetlands or floodplains not shown on the plans as disposal sites, at no additional cost to the Department."
2-30	205.03.P.4	Delete the first sentence of this subsection and replace with the following:

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		2 01 10
		"The Department will notify the applicable regulatory agencies if the Department becomes aware that the Contractor disposed of surplus or unsuitable material in portions of a wetland or floodplain not shown on the plans."
3-31	308.04.D	Change the subsection title from "D. General ." to read "A. General ."
4-7	401.03.E	Delete the third sentence of the second paragraph of this subsection and replace with the following: "Use precast or cast-in-place footings for precast end sections as required."
4-8	401.03.E	Delete the first sentence of this subsection and replace with the following: "When discharging stormwater directly to waters of the state, permanently label all end sections or other piped points of stormwater entry with "MDOT" or the local agency's name in a conspicuous location that will remain visible after construction.
4-11	401.04	Change the eighth pay item from the bottom of the list on this page to read as follows: Culv End Sect inch, GrateEach
4-12	401.04.C.4	Change this subsection to read: "The Engineer will measure Culv End Sect inch, Grate by each as shown on the plans for the size of grate required."
4-21	402.03	Add a new subsection to the end of subsection 402.03 on this page reading as follows: "K. Outfall Labeling. Label all stormwater outfalls directly discharging to waters of the state in accordance with subsection 401.03.E.
4-39	406.02	Change the third line in the list of materials to read: Coarse Aggregate 6A, 6AA, 17A902
4-41	406.03.A.3	Delete the third paragraph of this subsection and replace with the following: "Design joints between adjacent box culvert sections in accordance with Section 9 of ASTM C1577 and to accommodate the joint sealing material in accordance with section 914 as applicable."
4-50	406.03.G.3	Change the first sentence of the first paragraph to read: "Unless otherwise shown on the plans, construct culvert bedding for box culverts by placing a 9-inch-thick layer of 46G aggregate, covered with a 3-inch-thick layer of 34G, 34R aggregate, or approved equal."
4-51	406.03.G.3	Add the following sentence to the end of the second paragraph of this subsection:

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11 2	completely cover the external

		"The cold applied joint sealer must completely cover the external rubber gasket with the placement limits matching the width of the geotextile blanket."
4-52	406.04.B	In the second paragraph of this subsection delete the first sentence and replace with the following: "The Department will pay separately for cast-in-place concrete, other than for culvert segments, headwalls, wingwalls, aprons, and curtain walls."
5-26	502.02	Delete the first sentence of the subsection and the listed materials in this subsection.
5-26	502.02.A	Add the following to the end of the first sentence in this subsection: "(914.04A)"
5-26	502.02.B	Add the following to the end of the first sentence in this subsection: "(502.02B)"
5-35	503.04	Change the first paragraph to read: "The unit price for Paver-Placed Surface Seal , of the type required, includes the cost of preparing the surface, and placing a membrane and paver placed surface seal course for full-width coverage, except that the Department will pay separately for removing pavement markings in accordance with subsection 812.04"
5-46	504.04.A	Change the first paragraph to read: "A. General . The unit prices for Micro-Surface , regardless of the type required, include cleaning existing pavement, applying a bond coat, stationing, corrective action, and traffic control to complete corrective action."
6-20	602.04	Delete the fifteenth pay item of the list on this page reading: "Shoulder, Reinf ConcSquare Yard
6-20	602.04	Change the sixteenth thru the eighteenth pay items on this page to read as follows: Shld, Nonreinf Conc
6-21	602.04.B.1	Delete this subsection and replace with the following: "Shld, Nonreinf Conc; and Shld, Nonreinf Conc, High Performance. The Engineer will measure, and the Department will pay for, Shld, Nonreinf Conc; and Shld, Nonreinf Conc, High Performance by area, based on plan quantities in accordance with subsection 109.01."
6-21	602.04.B.2	Delete this subsection and replace with the following: "Shld, Freeway. The Engineer will measure, and the Department will pay for, Shld, Freeway based on plan quantities in accordance

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		20SS-001A-14 4 of 10 06-30-23
		with subsection 109.01. If the Contractor uses concrete for the shoulder, the unit price for Shld , Freeway includes the cost of the transverse joints in the shoulder and the external longitudinal pavement joints."
6-23	602.04.F	Add the following sentence to the end of the first paragraph of this subsection: Temporary concrete pavement, pavement within 4 feet of an obstruction, pavement areas less than 300 square yards, or pavement less than 3 feet wide will not be cored.
6-23	602.04.F	Delete the following language from this subsection on this page: "The Engineer will not core the following:
		1. Temporary concrete pavement;
		2. Pavement within 4 feet of an obstruction;
		3. Pavement areas less than 300 square yards; or
		4. Pavement less than 3 feet wide."
6-24	602.04	Rename the following subsections as follows: "1. Initial Core.
6-24 6-24 6-25 6-26	602.04 602.04 602.04 602.04	 Additional Cores. Price Adjustment for Thickness. Price Adjustments for Steel Locations within the Pavement. Remove and Replace."
7-107	709.04	Change the Pay Unit on the second pay item from the top of the list on this page to read as follows: Thousand Board Foot
8-12	804.03.B.2	Change the first sentence in this subsection to read: "Cast in place light standard and sign support foundations using fixed forms in accordance with the MDOT Standard Plan R-50 series."
8-27		Change the last pay item at the bottom of this page to read as follows: Guardrail Anch, Bridge, Det, CurvedEach
8-44	810.03.J.9	Add a period to the end of the third sentence in this subsection.
8-53	810.03.V	Add a period to the end of the second sentence of the first paragraph of this subsection.
8-53	810.04	Change the fourth pay item from the top of the list on this page to read as follows: Post, Steel, poundFoot

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8-53	810.04	Change the last four pay items at the follows: Fdn, Truss Sign Structure Type, _ Fdn, Truss Sign Structure Type, _ Fdn, Cantilever Sign Structure Type _ Fdn, Cantilever Sign Structure Type _	_ inch dia, CasedFoot _ inch dia, UncasedFoot _, inch dia, CasedFoot
8-55	810.04.B.1	Delete the second paragraph of this the following: "The unit prices for Fdn, Truss Sign dia, Cased and Fdn, Cantilever Sigr dia, Cased include the cost of concre permanent casings, anchor bolts, excavated material."	Structure Type, inch n Structure Type, inch te, slurry, steel reinforcement,
8-55	810.04.B.2	Delete this subsection and replace wi "Foundation, Truss Sign Structure, Cantilever Sign Structure, Uncase Truss Sign Structure Type, i Cantilever Sign Structure Type, the cost of concrete, slurry, steel reinfound anchor bolts, excavation, and disposa	, Uncased and Foundation, ed. The unit prices for Fdn, nch dia, Uncased and Fdn, inch dia, Uncased include procement, temporary casings,
8-57	810.04.I	Delete the first paragraph of this subfollowing: "The unit price for Sign , Rem of the tyof removing signs from supports and	/pe required includes the cost
8-57	810.04.I	Delete the second paragraph of this the following: "The unit prices for Ground Mtd Sign Rem and Truss, Rem include the cost sign supports, cantilever or truss supp	Supports, Rem; Cantilever, tof removing ground mounted
8-57	810.04.L	Change this subsection to read: "The unit price for Sign, Erect, Salv erecting the salvaged sign on a new support, as shown on the plans, hardware, including brackets."	sign support or existing sign
8-58	810.04.N	Delete this subsection in its entirety.	
8-110	812.04	Change the fifth and sixth pay item for page to read as follows: Sign, Type B, Temp, Prismatic, Spec, Sign, Type B, Temp, Prismatic, Spec,	Furn Square Foot
8-141	815.04.C.1.b	Delete this subsection in its entirety.	
8-141	815.04.C.1.c	Rename and change this subsection	as follows:

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		6 of 10 06-30-23
		"b. Removal and disposal of unacceptable plants including the root ball.
8-141	815.04.C.1.d	Delete this subsection in its entirety.
8-142	815.04.C.2.d	Change this subsection to read: "During the first watering of the second growing season, remove and dispose of the guying material, identification tags, and inspection tags."
8-144	816.03.A	Change the third sentence in this subsection to read: "Use topsoil from within the project limits; or from off-site sources meeting the requirements in subsection 917.06."
8-167	818.04	Add the pay item to the bottom of the list on this page as follows: Power Company (Estimated Cost to Contractor)
8-170	818.04.G	Delete this subsection in its entirety.
8-170	818.04	Rename the following subsections as follows: "G. Handholes (Hh).
8-171	818.04	H. Service Disconnect.
8-171	818.04	I. Metered Service.
8-171	818.04	J. Unmetered Service.
8-172	818.04	K. Wood Pole.
8-172 8-172		
	818.04	L. Concrete Pole, Fit Up.
8-172	818.04	M. Steel Pole, Fit Up. N. Bracket Arm."
8-172	818.04	N. Bracket Arm.
8-171	818.04.J	Delete the second paragraph of this subsection and replace with the following: "The pay item, Power Company (Estimated Cost to Contractor) , establishes a budgeted amount in the contract to cover the cost of reimbursing the Contractor for payments made to the power company for providing electrical power at the locations shown on the plans. The Department will estimate the reimbursement costs
		to the Contractor and establish a budgeted amount as shown on the plans. The Department will pay the Contractor for power company invoices paid, as submitted to the Engineer."
8-176	819.03.B.5.b	In the second paragraph of this subsection delete the first sentence and replace with the following: "Tighten bolts connecting the pole to the frangible base to a snug tight condition in accordance with subsection 707.03.E.6.c."
8-185	820.01.B	Add a period to the end of the first sentence of this subsection.
8-187	820.02	Change the first line in the list of materials on this page to read: Conduit Material918

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8-196	820.03.O	In the fourth paragraph of this subsection delete the last sentence and replace with the following: "Use smooth wall, Schedule 80, rigid PVC conduit, or coilable, Schedule 80 PE conduit in accordance with section 818."
8-199	820.04	Add the pay item to the list on this page: TS, (number) Way (type) Mtd (LED) Optic
8-200	820.04	Change the second pay item from the top of the list on this page to read as follows: TS Head, TempEach
8-200	820.04	Change the eleventh pay item from the top of the list on this page to read as follows: TS, Lens, Pedestrian Sym (LED)Each
8-200	820.04	Delete the following pay items from the list: Strain Pole, Steel, 6 bolt, foot
8-200	820.04	Change the eleventh pay item from the bottom of the list on this page to read as follows: Mast Arm, RemEach
8-201	820.04	Delete the following pay item from the list: Power Co. (Est Cost to Contractor)
8-202	820.04	Add the following pay item to the list: Bracket, Truss, SalvEach
8-204	820.04.C	Delete the last paragraph of this subsection in its entirety.
8-204	820.04.D	Delete the first paragraph of this subsection in its entirety.
9-9	902.03.C.1.b	Delete the first sentence in this subsection and replace with the following: "The physical requirements for the coarse aggregate are as specified in Table 902-2 and as follows:"
9-16	Table 902-2	Delete the superscript footnote in the first through fourth rows under the header row that reads "(m)" in the column Loss, $\%$ max, LA Abrasion (MTM 102).
9-16	Table 902-2	Add the superscript footnote in the header row that reads "(m)" in the column Loss, $\%$ max, LA Abrasion (MTM 102).
9-15	Table 902-2	Delete the footnote (d) in one location in the table.
9-17	Table 902-2	Delete the footnote (d) in one location in the table.

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		8 of 10	20SS-001A-14 06-30-23
9-21	Table 902-6	Delete the footnote (b) in two locations in the tab	le.
9-21	Table 902-6	Change the footnote (c) to read (b) in two location	ns in the table.
9-21	Table 902-6	Change the footnote (d) to read (c) in two location	ns in the table.
9-70	909.05.D	Change the first sentence in this subsection to re "Provide steel pipe for jacking in place meeting the ASTM A53/A53M for Type E or Type S, Gra A139/A139M for Grade B."	ne requirements of
9-94	Table 910-01	Change the value in the fifth row under the h Permittivity (min) (per second) column from 0.5 to "0.05"	
9-94	Table 910-01	Change the value in the seveth row under the Permittivity (min.) (per second) column from 0.5 to "0.05"	
9-95	Table 910-2	Change the second row under the Ultimate streng "CMD ^(c) 1950 lb/ft"	th section to read:
9-119	913.06	Change this subsection to read: Circular precast concrete units with circular adjusting rings, tops, risers, and sump bases for basins, and inlets must meet the requirements and the following additions and exceptions:	r manholes, catch
9-133	917.03	Rename the four subsections following the first page as follows: D. Deciduous Shade Trees. E. Small Trees, Ornamentals, and Shrubs. F. Evergreen Trees. G. Vines, Ground Cover, and Herbaceous Ornamentals	
9-149	918.08	In the first paragraph of this subsection delete the and replace with the following: "Provide light standards designed in accordanc LRFD Specifications for Structural Supports fo Luminaires, and Traffic Signals."	e with AASHTO's
9-150	918.10	In the first paragraph of this subsection delete the replace with the following: "Provide tower lighting units designed in AASHTO's LRFD Specifications for Structul Highway Signs, Luminaires, and Traffic Signals."	accordance with ral Supports for
9-164	919.04.B	In the first paragraph of this subsection delete the replace with the following: "Provide square tubular steel sign supports mee mechanical, and geometric properties of material	ting the chemical,

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		9 of 10	20SS-001A-14 06-30-23
		tests referenced in AASHTO's LRFD Specifi Supports for Highway Signs, Luminaires, and	
9-170	920.02.C	Change the reference to Table 920-2 to real locations.	d Table 920-3 in two
9-222	922.10.A.3	Delete this subsection and replace with the for "Conform to the wind load requirements specifications for Structural Supports Luminaires, and Traffic Signals with all equiport the need for additional ballast;"	ecified by AASHTO's for Highway Signs,
10-23	1003.03.B	Delete the last sentence of this subsection following: "Aggregate sampling for concrete will be per certified Aggregate Technician Level II."	•
10-43	Table 1006-02	Replace Table 1006-02 with the Table 1006-0	02 below.

1A - 20A Pay Item Index Replace the Pay Item Index in its entirety.

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Table 1006-2: **Overlay Mixtures**

						Mixture Proportions Ib/yd3, dry weight						
Mixture Type	Aggregate	Slump (inch)	Air Content	Admixture Required	Cement ^(a)	Dry Densified Silica Fume ^(b)		Fine Agg	Coarse Agg	Latex Admixture		
SFMC	2NS and 26A(c)	4–6	6.5 ±1.5%	(d),(e),(f)	618	40	273 ^(g)	1273	1601	_		
LMC	2NS and 26A ^(c)	(h)	4.5 ±1.5%	_	658	_	(h)	1490 ^{(i).(j)}	1300 ^{(i),(j)}	206		

- (a) Use only Type I Portland cement.
 (b) For SFMC mixtures, the Contractor may use a blended silica fume Portland cement. However, if the silica fume content of the blended material is greater than 8% of the total cementitious material, submit to the Engineer modified mix proportions with Type I Portland cement added to the blended material to achieve the equivalent individual cementitious material mixture proportions.
- (c) Provide coarse aggregate, 95% minimum crushed materials in accordance with Michigan Test Method (MTM) 117, with an absorption no greater than 2.5%, in accordance with ASTM C127.
- (d) Water-reducing high-range admixture or water-reducing high-range and retarding admixture.
- (e) Virgin polypropylene collated fibers at 2 lb/yd3.
- (f) Air-entraining admixture.
- (g) Provide a net water to cementitious material ratio of 0.41 (cementitious material includes cement and silica fume).
- (h) Add water in addition to water in the latex admixture to control slump to within 3 to 5 inches. Measure slump from 4 to 5 minutes after discharge from the mixer. During the waiting period, deposit concrete on the deck and do not disturb. If placing mixtures on sections within superelevated curves, the Contractor may need to use the lower allowable range of the slump requirement, as determined by the Engineer. Do not exceed water-cement ratio, by weight, of 0.30 including water contained in the latex emulsion.
- (i) Aggregate proportions are approximate; due to gradation changes, the Contractor may increase proportions by no greater than 5% by weight of total aggregate if reducing coarse aggregate by an equivalent volume.
- Aggregate weights specified in the table are based on a dry bulk specific gravity of 2.65 for gravel and stone. Adjust the weights if the specific gravity of the materials used varies by more than 0.02 from the specified values.

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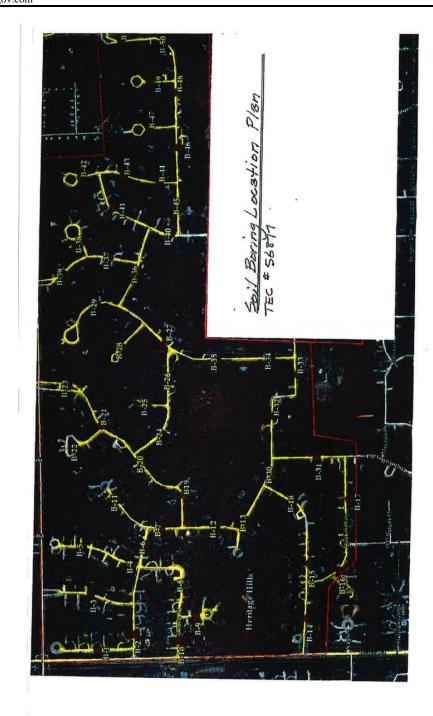
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APPENDIX B
SOIL DATA



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Boring No.: 1

Job No.: 56877

Project: Local Road Improvements, Phase 2, Heritage Hills

Client: City of Farmington Hills

Location: Farmington Hills, Michigan

Type of Rig: Truck

Drilled By: R. Favor

Drilling Method: Solid Stem Augers

Started: 6/28/2016

Ground Surface Elevation:

(ft)	Sample Type	N	Strata Change	Soil Classification	w	đ	qu
2.5	LS	4 2 5	.63 1.63 2,5	CONCRETE (7 1/2") Moist Brown Sandy Clay With Some Silt & Trace Of Gravel-FILL (12")	10.8	123	
5.0-	LS	3 5 8	5	Plastic Moist Brown Sandy CLAY With Some Silt & Trace Of Gravel	11.6	135	321
7.5				Firm Moist Brown Sandy CLAY With Some Silt & Trace Of Gravel Bottom of Borehole at 5'			
10.0							
12.5							
15.0							
17.5							
1579							
20.0							

ST - Shelby Tube Sample AS - Auger Sample

DP - Direct Push RC - Rock Core

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Boring No.: 2 Job No.: 56877 Client: City of Farmington Hills Type of Rig: Truck Drilling Method: Solid Stem Augers **Ground Surface Elevation:**

Project: Local Road Improvements, Phase 2, Heritage Hills

Location: Farmington Hills, Michigan

Drilled By: R. Favor Started: 6/28/2016 Completed: 6/28/2016

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
	LS	3 3 4	.75 1.75	CONCRETE (9")	19.2	123	
2.5-			3	Moist Brown Sandy Clay With Some Silt & Trace Of Gravel-Fill (12")	-	405	5770
5.0	LS	7 7 6	5	Plastic Moist Brown Sandy Clay With Some Silt, Trace Of Gravel & Some Crushed Asphalt-FILL	17,3	135	577
				Stiff Moist Brown Sandy CLAY With Some Silt & Trace Of Gravel			
7.5				Bottom of Borehole at 5'			
10.0							
12.5-							
15.0							
17.5-							
20.0-							
22.5							
					1		ı

"N" - Standard Penetration Resistance SS - 2") D, Spit Spoon Sample LS - Soctional Liner Sample ST - Shelby Tube Sample AS - Auger Sample

w - H2O, % of dry weight d - Bulk Density, pcf qu - Unconfined Compression, psf DP - Direct Push RC - Rock Core

Water Encountered: None

At Completion: None



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Project: Local Road Improvements, Phase 2, Heritage Hills Boring No.: 3 Job No.: 56877 Client: City of Farmington Hills Location: Farmington Hills, Michigan Type of Rig: Truck Drilled By: R. Favor Drilling Method: Solid Stem Augers Started: 6/29/2016 Ground Surface Elevation: Completed: 6/29/2016 Sample Type Strata Depth Soil Classification qu Change .63 CONCRETE (7 1/2") 1.38 8.9 101 Moist Brown Sandy Clay With Some Silt & Trace Of Gravel-FILL (9") 2.5-3 135 3960 11.1 LS Loose Moist Brown Silty Clayey Fine SAND With Trace Of 5 5.0-Firm Moist Brown Sandy CLAY With Some Silt & Trace Of Gravel 7.5-Bottom of Borehole at 5' 10.0 12.5 15.0 17.5 20.0-22.5-"N" - Standard Penetration Rosistance SS - 2", D, Spit Spoon Sample LS - Sectional Liner Sample ST - Shelby Tube Sample AS - Auger Sample w - H2O, % of dry weight d - Bulk Densily, pcf qu - Unconfined Compression, psf DP - Direct Push RC - Rock Core Water Encountered: None At Completion: None

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Boring No.: 4

Job No.: 56877

Project: Local Road Improvements, Phase 2, Heritage Hills

Client: City of Farmington Hills

Location: Farmington Hills, Michigan

Type of Rig: Truck Drilling Method: Solid Stem Augers

Drilled By: R. Favor

Started: 6/28/2016

Ground Surface Elevation:

Completed: 6/28/2016

epth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
2,5-	LS	3 3 3	.54 1.29	CONCRETE (6 1/2") Moist Brown Fine Sand With Trace Of Gravel-FILL (9")	15.2	134	
5.0	LS	2 2 3	5	Plastic Moist Brown CLAY With Some Silt & Trace Of Gravel Plastic Moist Brown Sandy CLAY With Some Silt & Trace Of Gravel	20.2	128	1570
7.5				Bottorn of Borehole at 5'			
10.0				8			
12,5-				,			
15.0							
17.5-							
20.0							
22.5							
	fard Penetralion			% of dry weight Water Enco			

At Completion: None



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	No.: 5 City of Far	mington	Job No.: 56 Hills	Project: Local Road I Hills	mprovemer	nts, Ph	ase 2, Her	itage
Туре о	of Rig: Truc	k		Location: Farmington	Hills, Mich	igan		
Drilling	g Method: S	Solid Ste	m Augers	Drilled By: R. Favor				
Ground	d Surface E	Elevation	1:	Started: 6/28/2016				
				Completed: 6/28/201	6			
Depth (ft)	Sample Type	N	Strata Change	Soll Classification	700	w	d	qu
77.00		-	.58	1		-		
-	LS	3	1.58	CONCRETE (7")		12.6	136	
2.5-		3	3	Moist Brown Sandy Clay With Some Silt & Trace Of	/			
-	LS	5		Gravel-FILL (12")	$-'\Pi$	10.2	141	
5.0-		6	5	Plastic Moist Brown Sandy CLAY With Some Silt & Trace (Gravel	Of /	10.2	141	
1		Ü		1	-I			
-				Firm Moist Brown Sandy CLAY With Some Silt & Trace Of Gravel				
7.5			1 1	Bottom of Borehole at 5'				
1				Bottom of Borenole at 5				
10.0			1 1					
7					- 1			
			1 1					
2.5-			1 1		- 1			
3			1 1					
15.0					1			
1			1 1		- 1			
17.5					- 1			
-					1			
1			1 1		- 1			
20.0								
1								
22.5								
4								
7								
" - Standa	ard Penetration Split Spoon S	Resistance	e w - H2O, % d - Bulk De	of dry weight Wat	er Encount	ered:	None	
S - Section T - Shelby	nai Liner Samp y Tube Sample	olo	qu - Unconfi DP - Direct I	ined Compression, psf Push At C	ompletion:	None		
S - Auger	Sample		RC - Rock C	Bori	ng No. 5			



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Boring No.: 6

Job No.: 56877

Project: Local Road Improvements, Phase 2, Heritage

Client: City of Farmington Hills

Type of Rig: Truck

Location: Farmington Hills, Michigan

Drilling Method: Solid Stem Augers

Drilled By: R. Favor Started: 6/29/2016

Ground Surface Elevation:

Completed: 6/29/2016

Strata Depth (ft) Sample Soil Classification d qu Type Change .71 CONCRETE (8 1/2") LS 12.2 139 2970 1.71 4 Moist Brown Sandy Clay With Some Silt & Trace Of Gravel 2.5-10.3 3380 LS 140 Firm Moist Brown Sandy CLAY With Some Silt & Trace Of 5 5.0-Bottom of Borehole at 5' 7.5-10.0-12.5-15.0-17.5 20.0-22.5 Water Encountered: None

At Completion: None

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Boring No.: 7

Job No.: 56877

Project: Local Road Improvements, Phase 2, Heritage Hills

Client: City of Farmington Hills

Type of Rig: Truck

Location: Farmington Hills, Michigan

Drilling Method: Solid Stem Augers

Drilled By: R. Favor Started: 6/29/2016

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
2.5	LS	2 2 2	.67 1.67 3	CONCRETE (8") Moist Brown Sandy Clay With Some Silt & Trace Of Gravel-FILL (12")	12.8	117	
7.5 10.0 12.5	LS	2 4 5 5	5	Soft Moist Brown Sandy CLAY With Some Silt & Trace Of Gravel Firm Moist Brown Sandy CLAY With Some Silt & Trace Of Gravel Bottom of Borehole at 5'	14.3	136	2311
20.0							



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Boring No.: 11

Type of Rig: Truck

Job No.: 56877

Project: Local Road Improvements, Phase 2, Heritage Hills

Client: City of Farmington Hills

Location: Farmington Hills, Michigan

Drilling Method: Solid Stem Augers

Drilled By: R. Favor

Ground Surface Elevation:

Started: 6/29/2016 Completed: 6/29/2016

Sample Soil Classification d qu w Type Change .83 ASPHALT (2") 3 4 4 LS 11.7 139 4120 1,83 CONCRETE (8") 2.5 3 Moist Brown Sandy CLAY With Some Silt & Trace Of Gravel 567 LS 9.1 140 1650 5 5,0 Stiff Moist Brown Sandy CLAY With Some Silt & Trace Of 7,5 Plastic Moist Brown Sandy CLAY With Some Silt & Trace Of Gravel Bottom of Borehole at 5' 10.0 12.5 15.0 17.5 20.0 22.5 Water Encountered: None

Boring No. 11

At Completion: None

[&]quot;N" - Standard Penetration Resistance SS - 2"), D, Split Spoon Sample LS - Sectional Liner Sample ST - Shelby Tube Sample AS - Auger Sample

w - H2O, % of dry weight d - Bulk Density, pcf qu - Unconfined Compression, psf DP - Direct Push RC - Rock Core

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PHONE 248-871-2435 FAX 248-871-2431

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Testing Engineers & Consultants, Inc. 1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249 (248) 588-6200 or (313) T-E-S-T-I-N-G Fax (248) 588-6232

Boring No.: 12

Job No.: 56877

Project: Local Road Improvements, Phase 2, Heritage Hills

Client: City of Farmington Hills

Type of Rig: Truck

Location: Farmington Hills, Michigan

Drilling Method: Solid Stem Augers

Drilled By: R. Favor Started: 7/1/2016

Ground Surface Elevation:

Completed: 7/1/2016

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
2.5-	LS	4 9 10	.63 1,55 2.5	CONCRETE (7 1/2") Moist Brown Sandy Clay With Some Silt & Trace Of Gravel-FILL (12")	13.0	126	3710
5.0- 7.5- 10.0- 12.5-		7 4 7	5	Firm Moist Brown Sandy CLAY With Some Silt & Trace Of Gravel Plastic Moist Variegated CLAY With Some Silt & Trace Of Gravel Bottom of Borehole at 5'	11.1	132	1810
17.5							
20.0							
22,5							
				Water	countered	t None	

Standard Penetration Resistance
 -2").D. Split Spoon Sample
 Sectional Liner Sample
 Shelby Tube Sample
 Auger Sample

w - H2O, % of dry weight d - Bulk Density, pcl qu - Unconfined Compression, psf DP - Direct Push RC - Rock Core

At Completion: None

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Boring No.: 13

Job No.: 56877

Project: Local Road Improvements, Phase 2, Heritage

Client: City of Farmington Hills

Location: Farmington Hills, Michigan

Type of Rig: Truck Drilling Method: Solid Stern Augers

Drilled By: R. Favor

Ground Surface Elevation:

Started: 7/1/2016

Completed: 7/1/2016

Depth Sample Strata d qu Soil Classification w N Туре Change .63 CONCRETE (7 1/2") 1.55 9.6 140 LS Moist Brown Fine Sand With Some Silt & Trace Of 2.5 10 6,8 140 LS Medium Compact Moist Brown Fine SAND With Trace Of 5 5.0 Bottom of Borehole at 5' 7.5 10.0 12.5 15.0 17.5 20.0 22.5 Water Encountered: None "N" - Standard Penetration Resistance SS - 2"), D, Split Spoon Sample LS - Sectional Liner Sample ST - Shorby Tubo Sample AS - Auger Sample w - H2O, % of dry weight d - Bulk Deneily, pcf qu - Unconfined Compression, psf DP - Direct Push RC - Rock Core

At Completion: None

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Boring No.: 14

Job No.: 56877

Project: Local Road Improvements, Phase 2, Heritage Hills

Client: City of Farmington Hills

Ground Surface Elevation:

Drilling Method: Solid Stem Augers

Type of Rig: Truck

Location: Farmington Hills, Michigan

Drilled By: R. Favor

Started: 7/1/2016

Completed: 7/1/2016

d qu Depth (ft) Sample Strata Soll Classification W N Type Change .75 1.25 CONCRETE (9") 134 14.2 LS Moist Brown Fine Sand With Some Silt & Trace Of 5 2.5 3 Gravel-FILL (6") 2970 21.8 131 LS Loose Moist Brown Fine SAND With Trace Of Gravel 5 5.0 Loose Moist Brown Clayey Fine SAND With Silt Layers Bottom of Borehole at 5' 7.5 10.0-12.5-15.0 17.5 20.0-22.5 w - H2O, % of dry weight d - Bulk Density, pcf qu - Unconfined Compression, psf DP - Direct Push RC - Rock Core Water Encountered: None "N" - Standard Penetration Resistance SS - 2"),D. Spik Spoon Sample LS - Sectional Liner Sample ST - Shelby Tube Sample AS - Auger Sample

At Completion: None



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Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 15

Job No.: 56877

Project: Local Road Improvements, Phase 2, Heritage Hills

Client: City of Farmington Hills Type of Rig: Truck

Location: Farmington Hills, Michigan

Drilling Method: Solid Stem Augers

Drilled By: R. Favor

Ground Surface Elevation:

Started: 7/1/2016

Completed: 7/1/2016 Depth Sample N Soil Classification Type w d Change qu .67 CONCRETE (8") 1.42 LS 234 22.8 123 1900 2,5-Moist Brown Sandy Clay With Some Silt & Trace Of Gravel-F[LL (9") 3,5 LS 21.3 119 3210 Loose Moist Brown Clayey Fine SAND With Trace Of Gravel 58 6 5.0-Firm Moist Brown SILT With Clay Layers Bottom of Borehole at 5' 7.5-10.0-12.5 15.0 17.5-20.0-22,5 w - H2O, % of dry weight d - Bulk Density, pcf qu - Unconfined Compression, psf DP - Direct Push RC - Rock Core

Water Encountered: None

At Completion: None



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Boring No.: 16

Type of Rig: Truck

Job No.: 56877

Project: Local Road Improvements, Phase 2, Heritage Hills

Client: City of Farmington Hills

Location: Farmington Hills, Michigan

Drilling Method: Solid Stem Augers

Drilled By: R. Favor

Started: 7/5/2016

Ground Surface Elevation:

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
2.5	LS	5 10 11	,77 1,94	CONCRETE (9 1/4") Moist Brown Sandy Clay With Some Silt & Trace Of Gravel-FILL (14")	9,0		
5.0 – 7.5 – 10.0 – 12.5 – 15.0 – 17.5	LS	4 4 6	5	Medium Compact Moist Brown Fine SAND With Trace Of Gravel Firm Moist Brown Sandy CLAY With Some Silt & Trace Of Gravel Bottom of Borehole at 5'	11.5	137	580
20.0							

LS - Sectional Liner Sample ST - Shelby Tube Sample AS - Auger Sample

d - Bulk Density, pcf qu - Unconfined Compression, psf DP - Direct Push RC - Rock Core

At Completion: None

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Boring No.: 17

Job No.: 56877

Project: Local Road Improvements, Phase 2, Heritage Hills

Client: City of Farmington Hills

Type of Rig: Truck

Location: Farmington Hills, Michigan

Drilling Method: Solid Stem Augers

Drilled By: R. Favor

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
2.5 5.0 7.5 12.5	LS	5 7 9 5 4 4	.75 1.75 3	Moist Brown Sandy Clay With Some Silt & Trace Of Gravel-FiLL (12") Medium Compact Moist Brown Fine SAND With Trace Of Gravel Loose Moist Brown Medium SAND With Some Silt, Clay Layers & Trace Of Gravel Bottom of Borehole at 5'	9.1	127	2880
20.0							

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(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 30

Job No.: 56877

Project: Local Road Improvements, Phase 2, Heritage Hills

Client: City of Farmington Hills

Location: Farmington Hills, Michigan

Type of Rig: Truck

Drilled By: R. Favor

Drilling Method: Solid Stem Augers

Started: 7/5/2016

Ground Surface Elevation:

Completed: 7/5/2016

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
-	LS	3	,63	CONCRETE (7 1/2")	14.9		14.
2.5		3 4 2	2.5	Loose Moist Brown Fine Sand With Some Gravel, Silt & Clay-FILL	4		
5.0	LS	4 5 7	5	Medium Compact Moist Brown Clayey Fine SAND	13.4	126	990
				Bottom of Borehole at 5'			
7.5							
10.0-							
12.5-							
15.0-							
17,5-							
20.0-							
1				×			
22.5							
				The second secon	ncountered:		

Standard Penetration Resistance
 2"),D. Split Spoon Sample
 Sectional Liner Sample
 Shelby Tube Sample
 Auger Sample

Water Encountered: None At Completion: None



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Boring No.: 31

Job No.: 56877

Project: Local Road Improvements, Phase 2, Heritage Hills

Client: City of Farmington Hills

Location: Farmington Hills, Michigan

Type of Rig: Truck

Drilled By: R. Favor

Drilling Method: Solid Stem Augers

Started: 7/5/2016

Ground Surface Elevation:

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
2.5	LS	6 7 12	.79 1.54 3	CONCRETE (9 1/2") Moist Brown Sandy CLAY With Some Silt & Trace Of Gravel (9")	16.4	135	5600
7.5- 10.0-		6 7 8	5	Medium Compact Discolored Clayey Fine SAND With Trace Of Gravel Stiff Moist Brown CLAY With Some Silt & Trace Of Gravel Bottom of Borehole at 5'	12.0	139	4290
17.5							
20.0							
22,5							
	-			Water En	countered	t None	

LS - Sectional Liner Sample ST - Shelby Tube Sample AS - Auger Sample

DP - Direct Push RC - Rock Core

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APPENDIX C PERMITS

31555 W. ELEVEN MILE ROAD FARMINGTON HILLS, MI 48336-1165 www.fhgov.com



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EXPIRATION DATE:

PERMIT NO.:

PSESC230063

PERMIT EXTENSION IF APPLICABLE.:

(All extensions good for one year from the date of the extension)

APPLICATION AND PERMIT (WHEN APPROVED)
SOIL EROSION AND SEDIMENTATION CONTROL PERMIT
PUBLIC ACT 451 OF 1994
CITY OF FARMINGTON HILLS
31555 ELEVEN MILE ROAD
FARMINGTON HILLS, MI 48336
(248) 871-2560
FAX (248) 871-2561

COMMERCIAL, INDUSTRIAL & MULTI-FAMILY (EXCEEDING ONE ACRE IN SIZE OR LOCATED WITHIN 500 FEET OF A LAKE OR STREAM**)

APPLICATIONS NOT FULLY COMPLETED WILL BE RETURNED

GENERAL INFORMATION (sections a, b,	c, and d <u>must</u> be complete)
a. Builder's Name: N/A	
b. Section No. 4 Sidw	ell No. Right-of-Way
c. Legal Description: 32-33-0	14-476-0214
d. Subdivision Name: Heritage Hills & \	Wedgwood Commons Lot No.
NAME, ADDRESSES AND PHONE NUMBERS	
Property Owner of Record	Applicant
Name: City of Farmington Hills	Name: Hubbell, Roth & Clark, Inc.
Address: 31555 W. Eleven Mile Rd	Address: 555 Hulet Drive
City: Famington Hills	City: Bloomfield Hills
State: MI Zip Code: 48336	State: MI Zip Code: 48302
Phone No. 248-871-2560	Phone No. 248-392-1703
Erosion Control Plan By: Hubbell, Roth & Clark, Inc.	Project Contact
Name: Johnny Elias	Name: Johnny Elias
	Company Hubbell, Roth & Clark, Inc.
Address: 555 Hulet Drive	Address: 555 Hulet Drive
City: Bloomfield Hills	City: Bloomfield Hills
State: MI Zip Code: 48302	State: MI Zip Code: 48302
2	Phone No: 248-392-1703
1.37	Project contact e-mail address: jelias@hrcengr.com

^{**}A stream shall be interpreted to include any watercourse and/or storm sewer discharging into the stream (City Code, Chapter 24, Article III, Section 24-53).

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3.	PROJ	ROJECT INFORMATION					
	a.	Type of Development: Phase IV subdivision road reconstruction.					
	b.	Total area of parcel (acres)*:					
	*NOTE: Parcels over 5.0 acres in size require N.P.D.E.S. Permit						
	c. Total area of earth disruption (acres): 3.3						
	d.	Anticipated earthwork starting date (month/					
	e.	Anticipated ending date (month/year): Se					
	f.	type of soil (s) on site: 10B, 11B, 60B,					
	g.	Description of proposed earth change (berm Excavation and fill for road recor	n, building construction, excavation, etc.) Instruction an drainage improvements.				
4.	HYDR	ROLOGIC CHARACTERISTICS OF SITE	,				
	a.	Type of "ULTIMATE" drainage outlet (s)	Distance to Outlet: Varies				
	Feet						
		X County Drain	Name of Drain:				
		Lake/Pond	Name of Lake/Pond:				
		River/Stream	Name of River/Stream:				
		Enclosed Drain	Name of Drain:				
		Detention Basin	Retention Basin (no outlet)				
		Wetland					
		Open Ditch					
		Overland Flow					
		Other					
	b.	Will project include any work within the 10	0-year flood plain? 🗌 Yes 🛛 No				
	c.	Will project include any work within a lake	or stream? Yes X No				
	Indicate Michigan Department of Environmental Quality Permit NoOr Indicate Michigan Department of Environmental Quality "Permit Not Required" letter date:						
5.	PERM	IIT FEE					
		TOTA	AL PERMIT REVIEW FEE= \$ 150.00				
6.	INSPE	ECTION DEPOSIT					
		I	INSPECTION DEPOSIT= \$ 3,000.00				

(Note: Additional funds may be required and must be deposited as directed)

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7. SECURITY BOND

Cash, certified check, or irrevocable bank letter of credit from an approved financial institution. (equal in amount to the estimate of cost of the soil erosion and sedimentation control measures to be installed)

SECURITY BOND= \$	SECURITY	BOND=\$		
-------------------	----------	---------	--	--

8. PERMIT APPLICATION INSTRUCTIONS

- a. Complete Permit Application (type or print clearly in ink)
- b. The required Security Bond will be calculated by the Engineering Division after the plan has been

reviewed.

- c. Submit Soil Erosion and Sedimentation Control Plan, which must include all of the following:
 - 1. Location map, north arrow
 - 2. Topographic map showing existing natural drainage patterns
 - 3. Drainage arrows for proposed on-site drainage
 - 4. All lakes, streams, wetlands, drains, etc. shown
 - 5. Identify ultimate drainage outlet
 - 6. Sequence of construction operations (include temporary and permanent SESC measures)
 - Graphic location of soil erosion and sedimentation control temporary and permanent

measures

- 8. Limits of earth disruption and construction
- Construction/installation details of soil erosion and sedimentation temporary and permanent control measures
- Provisions for proper maintenance of soil erosion and sedimentation temporary and permanent control measures
- Name of organization that will be responsible for maintenance of permanent soil erosion and sedimentation control measures
- 12. Legal description of site
- Name/address and seal of engineer/architect who prepared this plan
- Date plans were prepared
- 15. Predominate land features (trees, open fields, buildings, etc.)
- On site soil types
- d. Submit applications, plans, fees, bond, and deposits to the Building Division.

Note: The City of Farmington Hills reserves the right to require modifications to the approved soil erosion and sedimentation control plans as conditions warrant.

9. APPLICANT SIGNATURE

I have read the application instructions and completed the permit application. I understand that applications not fully completed will be returned, resulting in a delay. I understand that this permit will expire within one (1) year from the DATE OF ISSUANCE. Projects not completed within that year may be renewed for an additional year upon written request by the property owner. I understand that regular inspections will be constructed by the City of Farmington Hills or its representatives and that should any soil erosion and sedimentation control measure fall into disrepair, be missing or require maintenance, the City shall have the right to enter upon said property, take appropriate corrective action and bill me for such or deduct the cost from the Security Bond.

PRINT NAME:	Johnny Elias	
SIGN NAME:	Johnny flors	DATE: 11-14-2023

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10. PROPERTY OWNER SIGNATURE (required for sites over 5.0 acres)

I am the current property owner of the property identified in this permit and will ensure that all requirements and conditions of this permit will be complied with. I understand that regular inspections of the site will be conducted by the City of Farmington Hills or its representatives and that should any soil erosion and sedimentation control measure fall into disrepair, be missing or require maintenance, the City shall have the right to enter upon said property, take appropriate corrective action and bill me for such or deduct the cost from the Security Bond.

SIGN NAME:	DATE:
PERMIT REVIEW STATUS	
Permit Approved	
Returned for Revisions Permit Denied	
Termit Denied	
Ву:	U. Alexander
Date of Issuance:	11/20/2083

PRIOR TO ISSUANCE OF BUILDING A PERMIT. CONSTRUCTION OR WORK COMMENCING, THE CONTRACTOR SHALL HAVE ALL APPLICABLE SOIL EROSION AD SEDIMENTATION CONTROL MEASURES INSTALLED. 48 HOURS PRIOR TO WORK COMMENCING THE CONTRACTOR SHALL CONTACT THE DIVISION OF ENGINEERING AT (248) 871-2560 TO SCHEDULE AN INSPECTION OF THE SOIL EROSION AND SEDIMENTATION CONTROL MEASURES.

THIS PERMIT AND APPROVED PLAN MUST BE ONSITE AND AVAILABLE FOR ALL INSPECTIONS.



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COMMERCIAL EXAMPLE SITE PLAN

SEQUENCE OF CONSTRUCTION

- Relocate roadside ditch, install culvert and temporary gravel driveway. Sod relocated ditch and temporary mulch remaining entrance area.
- 2. Install all perimeter soil erosion and sedimentation control measures.
- Contact City of Farmington Hills Office of Engineering at (248) 871-2560 to schedule inspection of soil erosion and sedimentation control measures.
- 4. Rough grade site, stockpile topsoil and begin building construction.
- 5. Install remaining underground utilities.
- Maintain soil erosion and sedimentation control measures, as necessary.
- 7. Finish grade, redistribute topsoil, seed and mulch all disturbed areas.
- 8. Remove all temporary soil erosion and sedimentation control measures.
- 9. Complete construction of building.

GENERAL NOTES

- 1. The soil for this site is classified as a well-drained loam. Therefore, the type of seed to be used will be a mixture of 50% Creeping Red Fescue and 50% Kentucky Blue Grass. The rate this seed mixture should be applied is one pound per 1,000 square feet.
- Immediately after seeding, mulch all seeded areas with unweathered small grain straw (preferably wheat) or hay spread uniformly at the rate of 1 ½ to 2 tons per acre or 100 pounds (2 to 3 bales) per 1,000 square feet. This mulch should be anchored with a disctype mulch anchoring tool.
- 3. Any disturbed area not paved, seeded and mulched, sodded or built upon by November 15, is to be mulched in the manner specified in General Notes #2 above, in order to provide soil erosion protection during the Winter and early Spring.
- All soil erosion and sedimentation control prevention procedures and structures are to comply with the Michigan Department of Environmental Quality, Surface Water Quality Division "GUIDEBOOK OF BEST MANAGEMENT PRACTICES FOR MICHIGAN WATERSHEDS."

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GENERAL CONDITIONS

In accordance with Rule 1709 promulgated under the authority of Part 91, Soil Erosion and Sedimentation Control, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, and in addition to the information on the attached plan(s) and special conditions, the following general conditions apply to the earth change authorized by this permit:

- Design, construct, and complete the earth change in a manner that limits the exposed area
 of disturbed land for the shortest period of time.
- Remove sediment caused by accelerated soil erosion from runoff water before it leaves the site of the earth change.
- Temporary or permanent control measures shall be designed and installed to convey water around, through, or from the earth change at a non-erosive velocity.
- Install temporary soil erosion and sedimentation control measures before or upon
 commencement of the earth change activity and maintain the measures on a daily basis.
 Remove temporary soil erosion and sedimentation control measures after permanent soil
 erosion measures are in place and the area is stabilized. ("Stabilized" means the
 establishment of vegetation or the proper placement, grading, or covering of soil to
 ensure its resistance to soil erosion, sliding or other earth movement.)
- Complete permanent soil erosion control measures for the earth change within five
 calendar days after final grading or upon completion of the final earth change. If it is not
 possible to permanently stabilize the earth change, then maintain temporary soil erosion
 and sedimentation control measures until permanent soil erosion control measures are in
 place and the area is stabilized.
- The permitted activity shall be completed in accordance with the approval plans and specifications, and the attached general and specific conditions
- This permit does not waive the necessity for obtaining all other required federal, state, or local permits.
- Permittee shall notify the permitting agency within one week after completing the permitted activity or one week prior to the permit expiration date, whichever comes first.

SPECIFIC CONDITIONS						
	F 17 15 17 10 10 10 10 10 10 10 10 10 10 10 10 10					
			,			



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December 1, 2023

Mr. Johnny Elias Hubbell, Roth & Clark, Inc. 555 Hulet Drive Bloomfield Hills, MI 48302

Reference: Energov/Permit #0228-2023

OCWRC Job No. A23-0228

Heritage Hills and Wedgwood Commons Subdivision Rehab-Phase IV

Part of the NW 1/4 of Section 4, City of Farmington Hills

Dear Mr. Elias:

This office has received a set of plans for the above-referenced project.

We have reviewed the plans and approve of the following structure adjustments:

- Nineteen (19) sanitary manhole adjustments and one (1) water gate well adjustment.
- All adjustments will occur within the Heritage Hills and Wedgwood Commons Subdivisions, located at the southeast corner of Drake Road and Fourteen Mile Road.

Our approval is granted under the following conditions:

- That the contractor shall notify the WRC Inspection Department at 248-858-1105 at least 48 hours prior to adjusting said county structures.
- That this office shall witness the adjustment of said structures to ensure the adjustments meet WRC standards prior to back filling and/or paving.
- 3. That the structure adjustment permit shall be obtained by the contractor/developer from the office of the Water Resources Commissioner before the start of construction. A \$2000 permit fee is due. To obtain your permit, please contact our Permitting Unit at 248-858-0958 or by email at wrcpermitting@oakgov.com. Office hours are 8:00 am to 4:30 pm, Monday through Friday.
- 4. That the proposed adjustments are carried out in accordance with the Water Resources Commissioner's Sanitary Sewer and Water Notes and Details Sheets, and that said Details Sheets are incorporated as part of the approved plans.
- 5. That an application is submitted to the City of Farmington Hills for the required soil erosion





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permit.

- That this final conditional approval will not relieve the applicant and or their contractor of the
 responsibility of obtaining permits, approvals or clearances as may be required from federal,
 state or local authorities, the public utilities and private property owners.
- Before any construction affecting the aforementioned County Structures begins, a WRC bonded contractor must obtain an Oakland County Structure Adjustment Inspection Permit.

The following are new bonding requirements of the Oakland County Water Resources Commissioner's Office for all County Drain permit work:

- \$5000 surety bond on WRC form DC-443 available online at" https://www.oakgov.com/water/resources/permit-app-form/Pages/default.aspx
- \$500 cash bond posted at WRC (refundable)
- 3) Liability insurance naming WRC as additional insured

If you have any questions or concerns, please contact Dan Butkus at 248-897-2744.

Sincerely,

Brian Bennett, P.E. Assistant Chief Engineer

C: Jim Cubera, P.E. – City of Farmington Hills Andrea Pike, P.E. – Hubbell, Roth & Clark, Inc. Charles Hart, P.E. – Hubbell, Roth & Clark, Inc.





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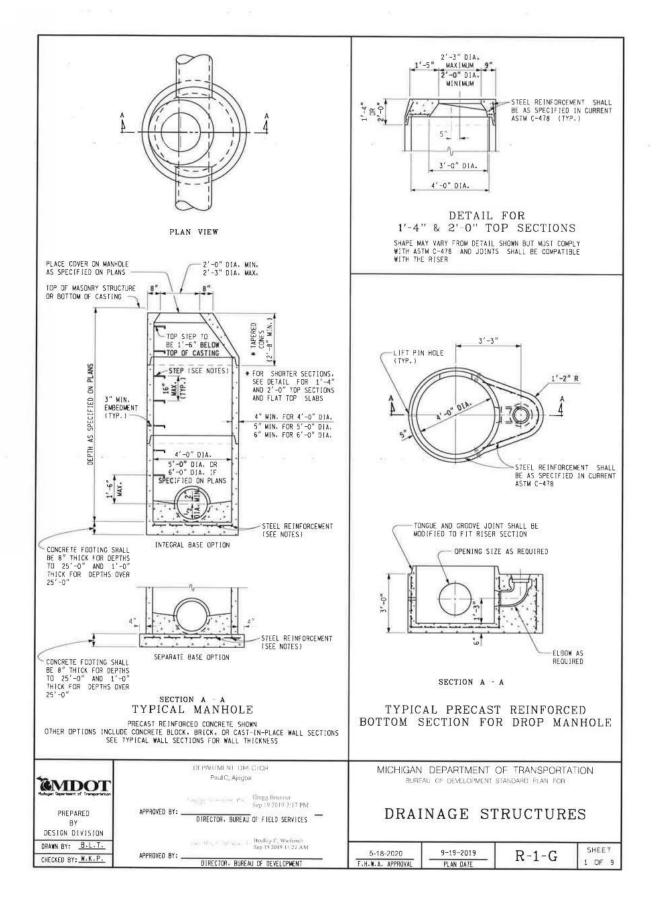
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APPENDIX D MDOT STANDARD PLANS



PHONE 248-871-2435 FAX 248-871-2431

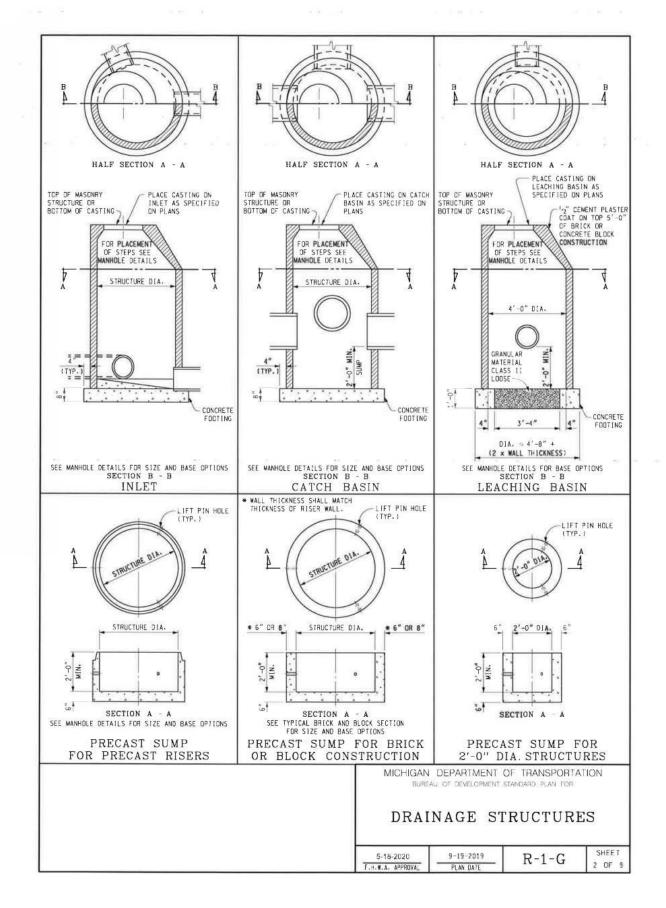
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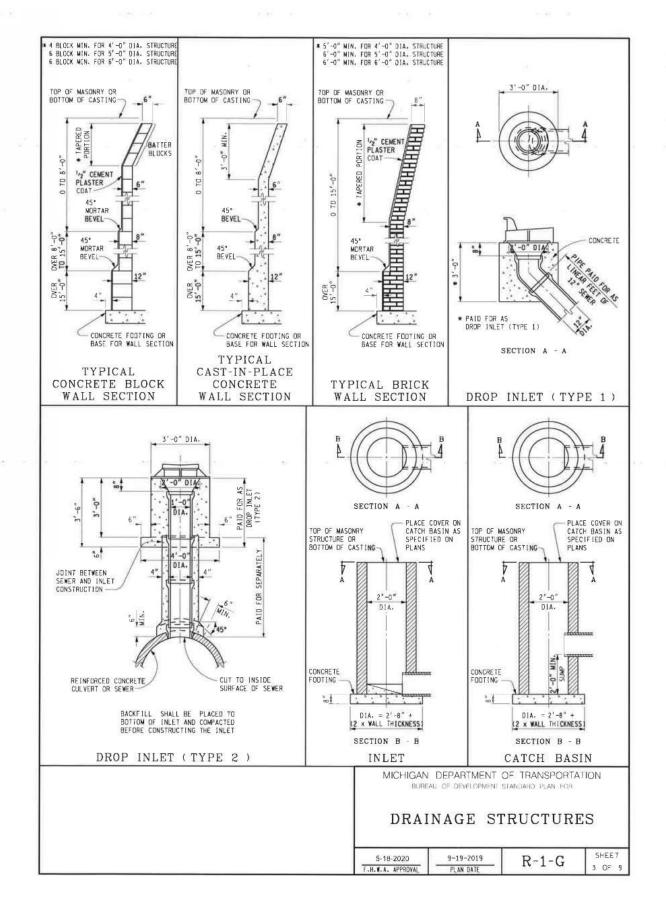
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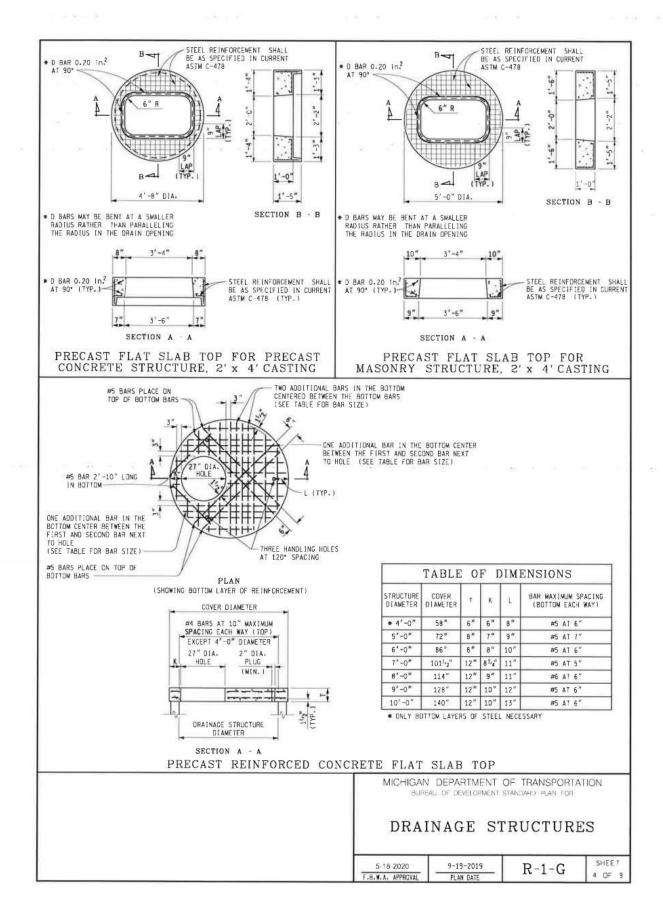
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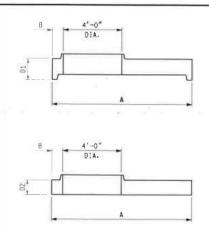
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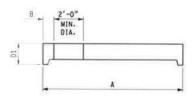
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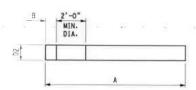
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REDUCER CAP DIMENSIONS						
STRUCTURE DIAMETER	CAP DIAMETER "A"	. В	CAP DEPTH "D1"	CAP DEPTH "D2"		
7"-0"	1011/2"	83/4"	1'-5"	12"		
8'-0"	114"	9"	1'-5"	12"		
9'-0"	128"	10"	1'-5"	12"		
10'-0"	140"	10"	1'-6"	12"		

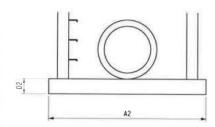


PRECAST REDUCER CAP



FLAT SLAB TOP DIMENSIONS						
STRUCTURE DIAMETER	COVER DIAMETER "A"	В	COVER DEPTH "D1"	COVER DEPTH "D2"		
7'-0"	1011/2"	83,4"	1'-5"	12"		
8"-0"	114"	9"	1'-5"	12"		
9"-0"	128"	10"	1'-5"	12"		
10'-0"	140"	10"	1'-6"	12"		

PRECAST	ET A T	CIAD	TOD
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SEPARATE BASE OPTION

	BASE	AND RIS	ER DIMEN	SIONS	
STRUCTURE DIAMETER	BASE DIAMETER "A1"	BASE DIAMETER "A2"	MIN. WALL THICKNESS	BASE DEPTH "D1"	BASE DEPTH "D2"
7'-0"	1011/2"	108"	7"	В"	12"
8'-0"	114"	128"	8"	6**	12"
9'-0"	128"	140"	9"	B.**	12"
10'-0"	140"	154"	10"	8*	12"

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT STANDARD PLAN FOR

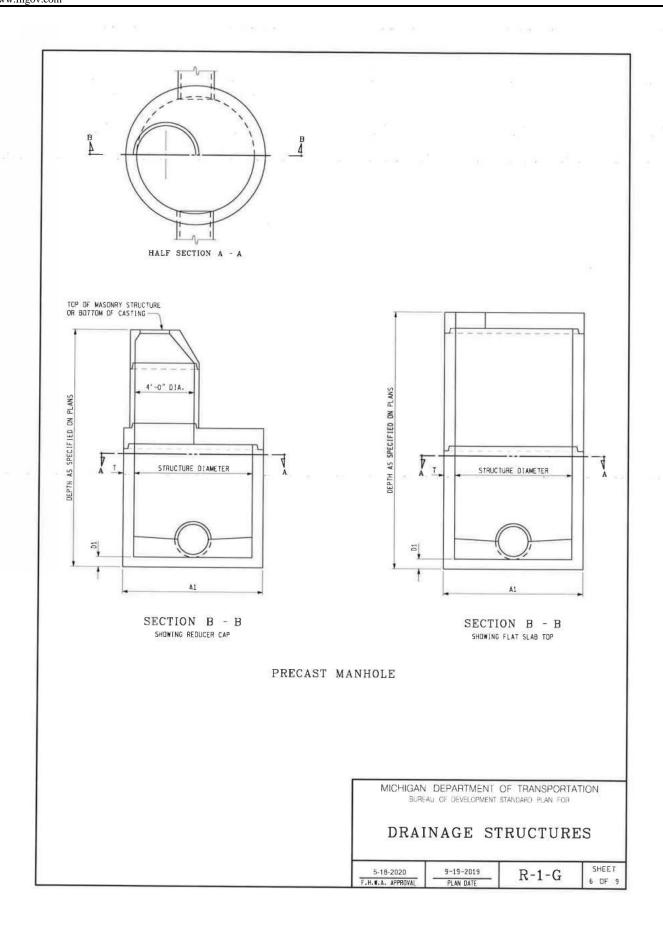
DRAINAGE STRUCTURES

5-18-2020	9-19-2019	R-1-G	SHEE 7
F.H.W.A. APPROVAL	PLAN DATE	K-1-G	5 OF 9



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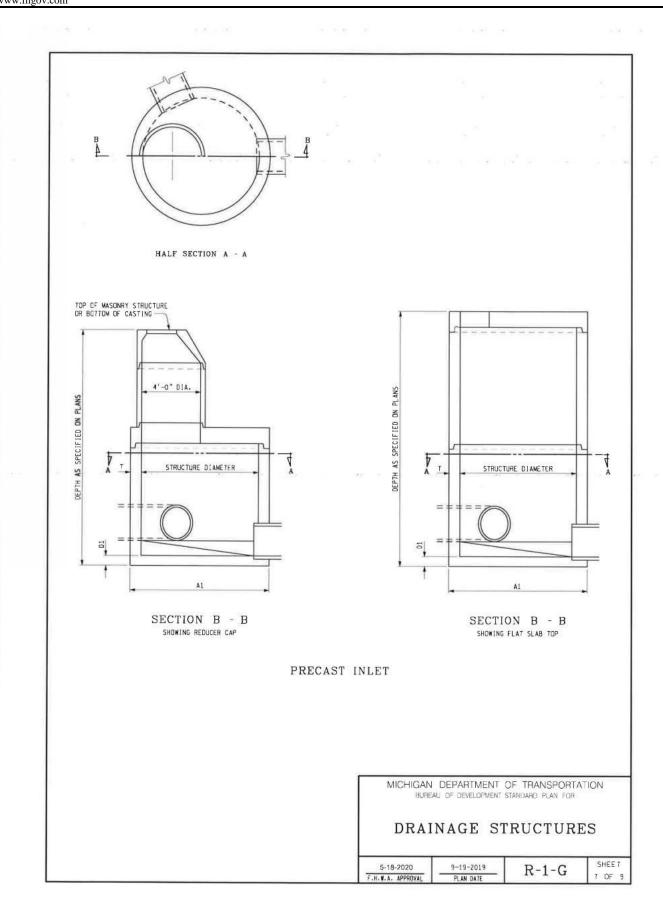
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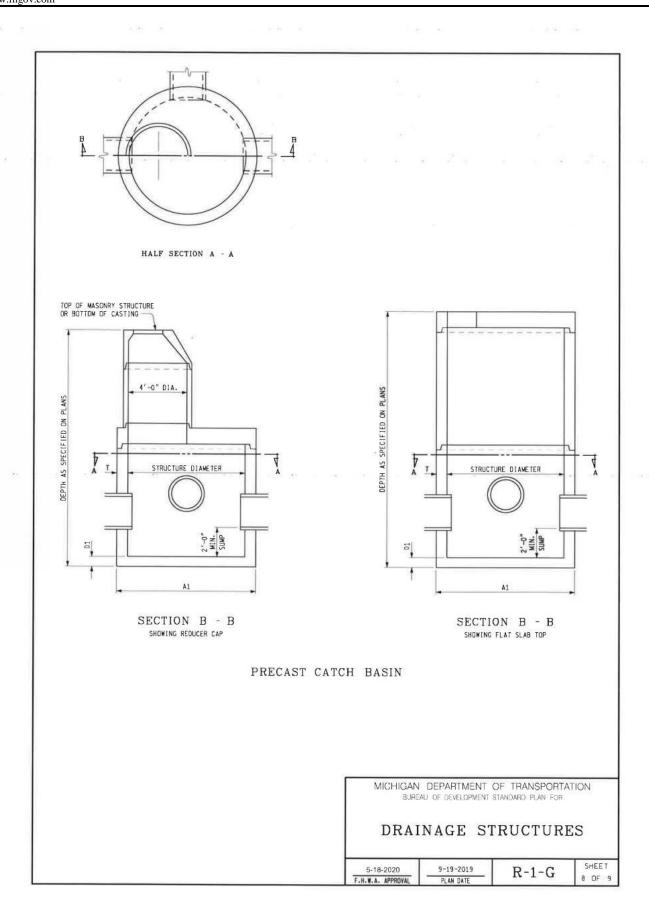
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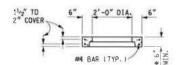


1'-3" MIN. LAP

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A A A A



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 STRUCTURES ARE SPECIFIED IN SUBSECUENT 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 [II 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 DUT LOAD SHALL BE 400 LBS. THE MINIMUM VEHTICAL LOAD SHALL BE 800 LBS.

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

PRECAST CONCRETE SECTIONS, SUMPS. BASE SECTIONS, 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 REMDVAL. 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 MAXIMUM INSIDE DIAMETER OF PIPES ENTERING OR LEAVING PRECAST DRAINAGE STRUCTURES SHALL BE 2^{\prime} -0° LESS THAN THE INSIDE DIAMETER OF THE DRAINAGE STRUCTURE. A PIPE LEAVING A 2^{\prime} -0° JUNETER DRAINAGE STRUCTURE IS ALLOWED TO HAVE 1^{\prime} -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 SCRIBING IN PRECAST STRUCTURES DURING FABRICATION OR BY CORING 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^+ O" OR THROUGH THE FROST ZONE. ENOUGH GEOTEXTILE MATERIAL SHALL BE LEFT ON THE TOP (8" OR MORE) TO ROLL OVER THE TOP OF THE

PREFORMED HIGH DENSITY POLYSTYRENE FILLER PIECES MAY BE USED TO CHANNEL FLOW IN THE BOTTOM OF MANHOLES PROVIDED THEY HAVE AT LEAST 2" DF 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 DEVELOPMENT STANDARD PLAN FOR

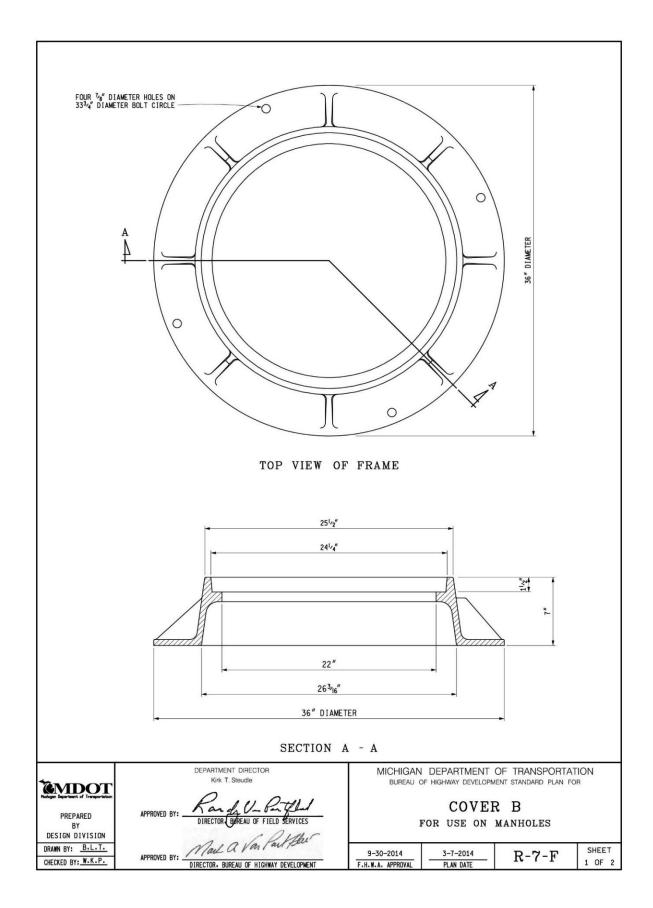
DRAINAGE STRUCTURES

5-18-2020	9-19-2019	R-1-G	SHEET
F.H.W.A. APPROVAL	PLAN DATE	10 1 0	9 OF 9



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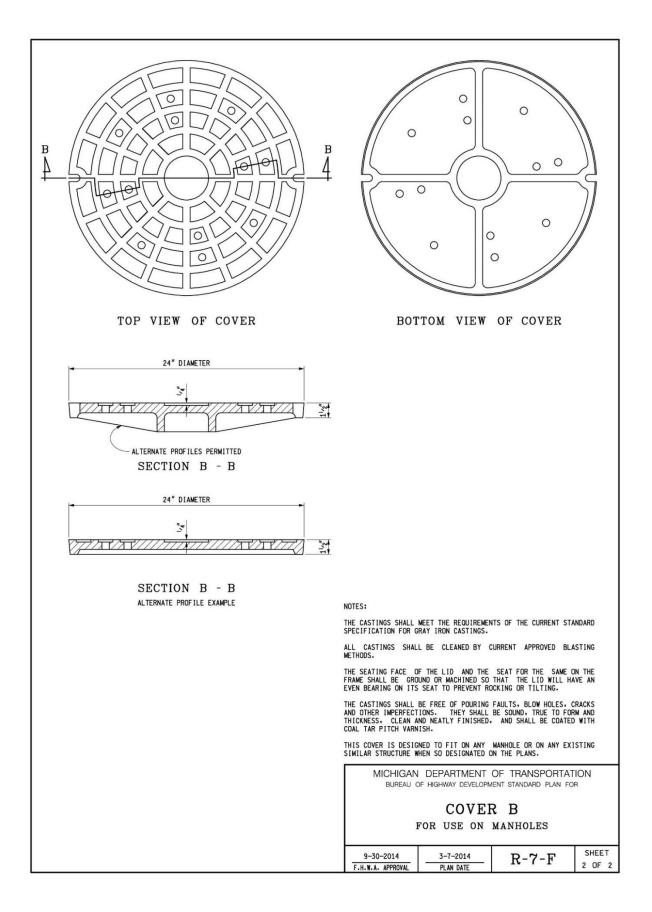
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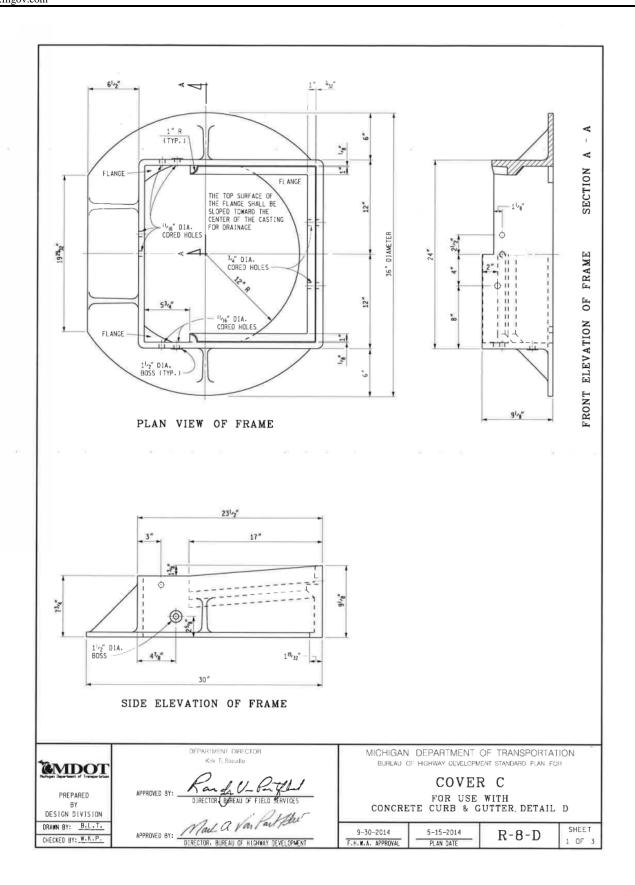
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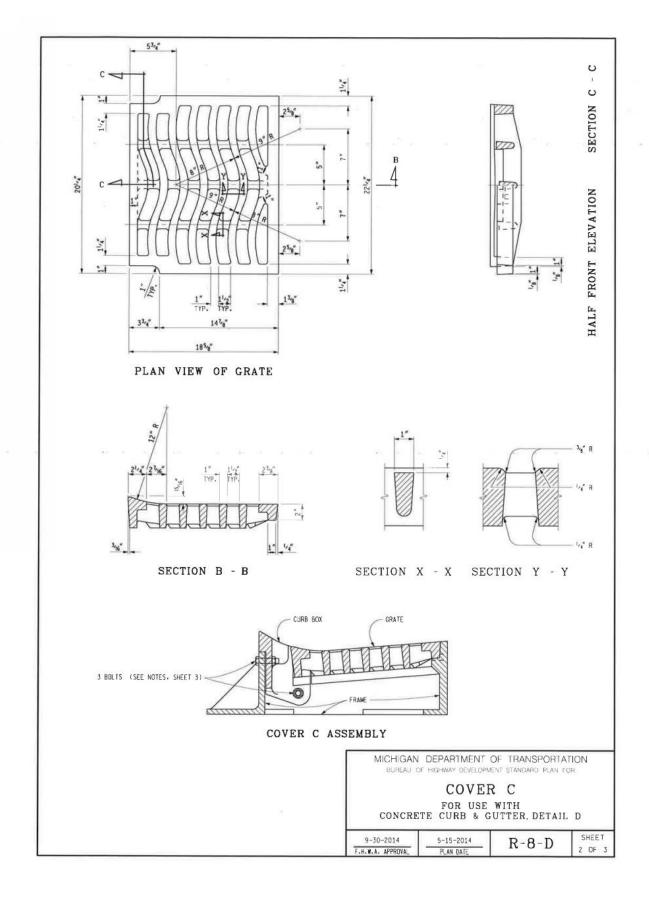
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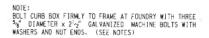
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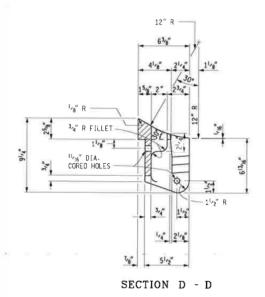




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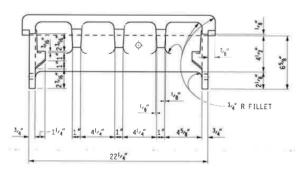
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PLAN VIEW OF CURB BOX



FRONT ELEVATION OF CURB BOX

NOTES:

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

ALL CASTINGS SHALL BE CLEANED BY CURRENT APPROVED BLASTING METHODS.

THE SEATING FACE OF THE GRATE AND THE SEAT FOR THE SAME ON THE FRAME AND THE CURB BOX SHALL BE GROUND SO THAT THE GRATE WILL HAVE AN EVEN BEARING ON ITS SEAT TO PREVENT ROCKING OR TILTING.

THE CASTINGS 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 YARNISH.

THE BEARING SURFACES BETWEEN CURB BOX AND FRAME SHALL BE GROUND AND SEATED SO AS TO PROVIDE AN EVEN BEARING THROUGHOUT. THE CURB BOX SHALL BE FIRMLY BOLTED IN PLACE ON THE FRAME BEFORE FINISHING OF THE GRATE SEATS IS DONE. GALVANIZED IRON WASHERS AND SHIMS SHALL BE PLACED BETWEEN FRAME AND ENDS OF CURB BOX SO AS BREAKING OF CURB BOX WHEN THESE BOLTS ARE TIGHTENED.

THE CURB BOX AND BOTH SECTIONS SHALL BE SHIPPED ASSEMBLED.

THIS COVER IS DESIGNED TO FIT ON ANY INLET. CATCH BASIN OR ON ANY EXISTING SIMILAR STRUCTURE WHEN SO DESIGNATED ON THE PLANS.

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

COVER C

FOR USE WITH CONCRETE CURB & GUTTER, DETAIL D

9-30-2014 F.H.W.A. APPROVAL 5-15-2014 PLAN DATE

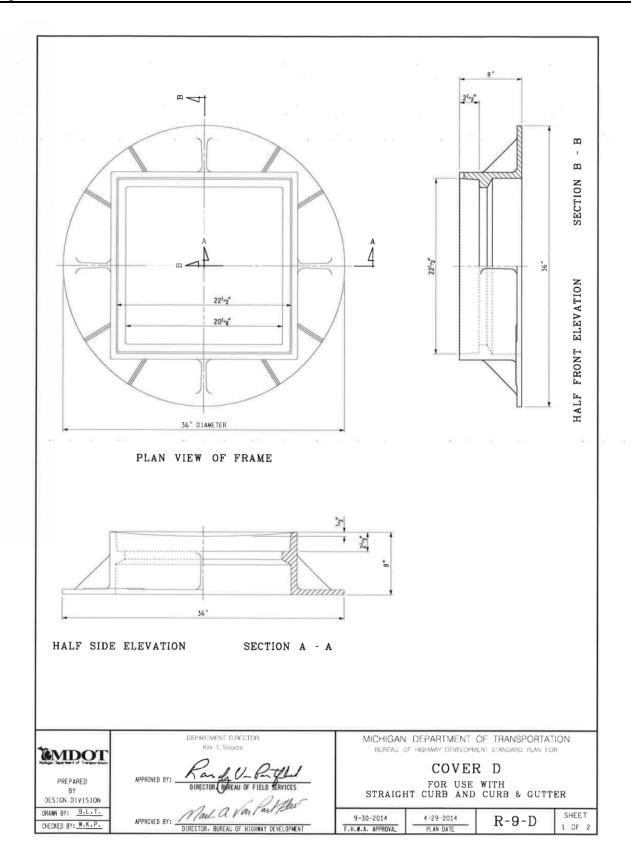
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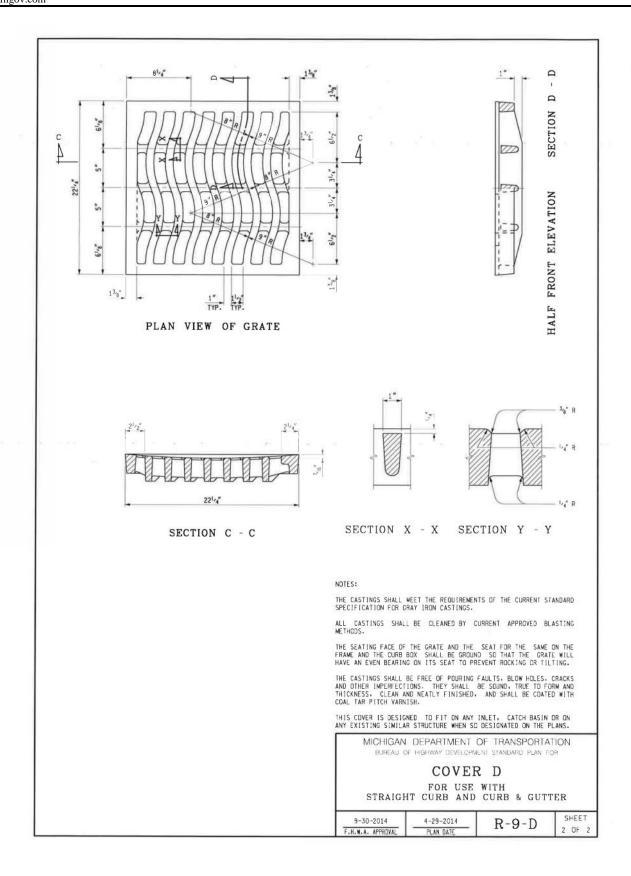
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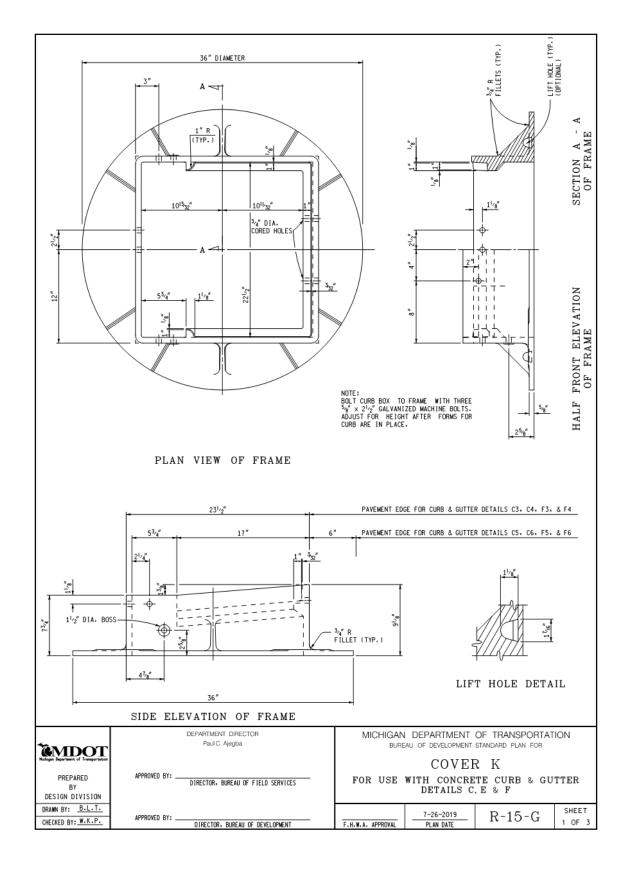
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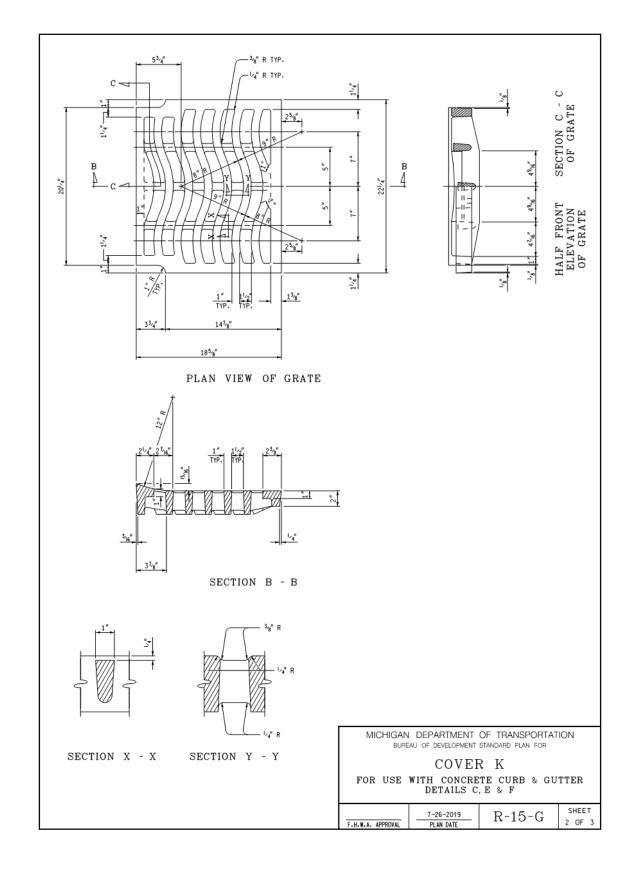
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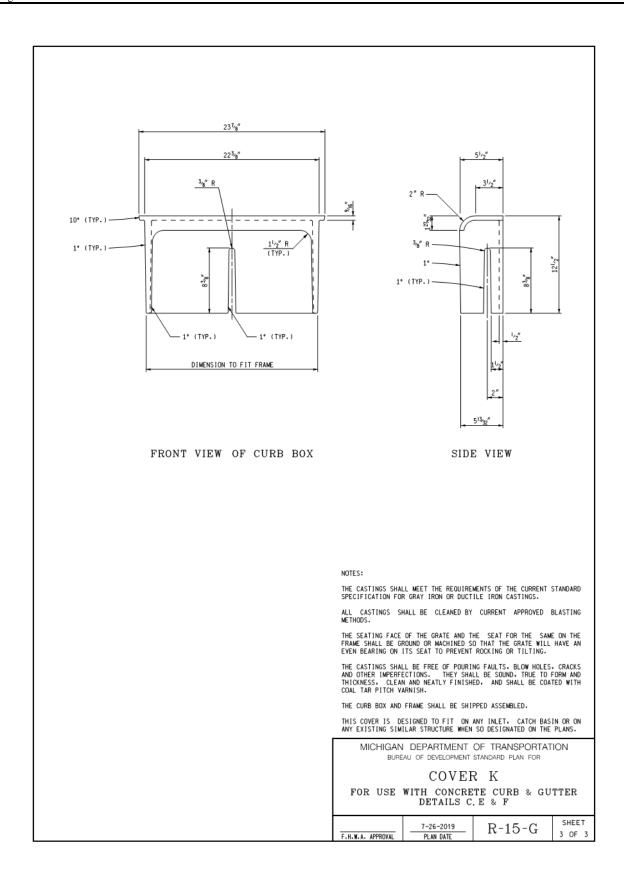
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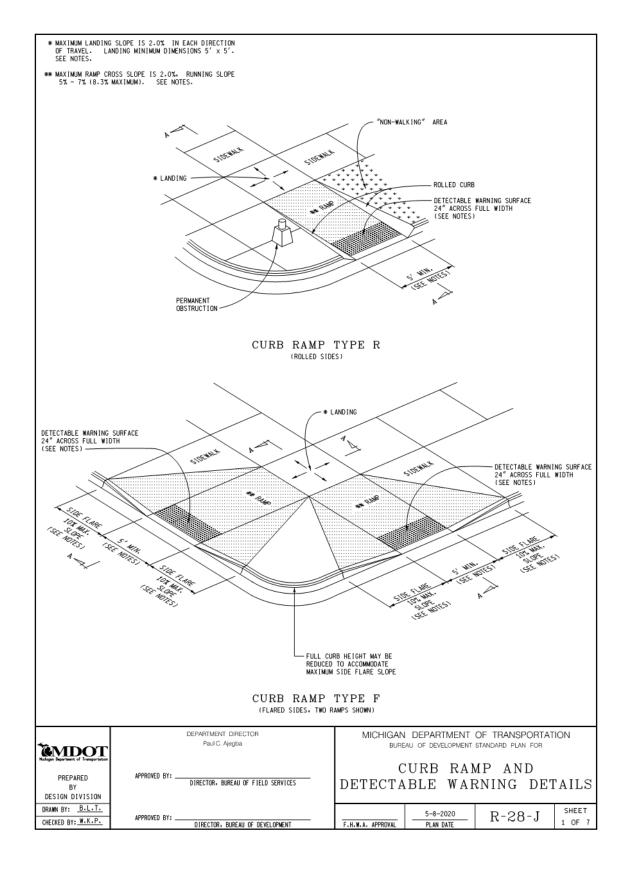
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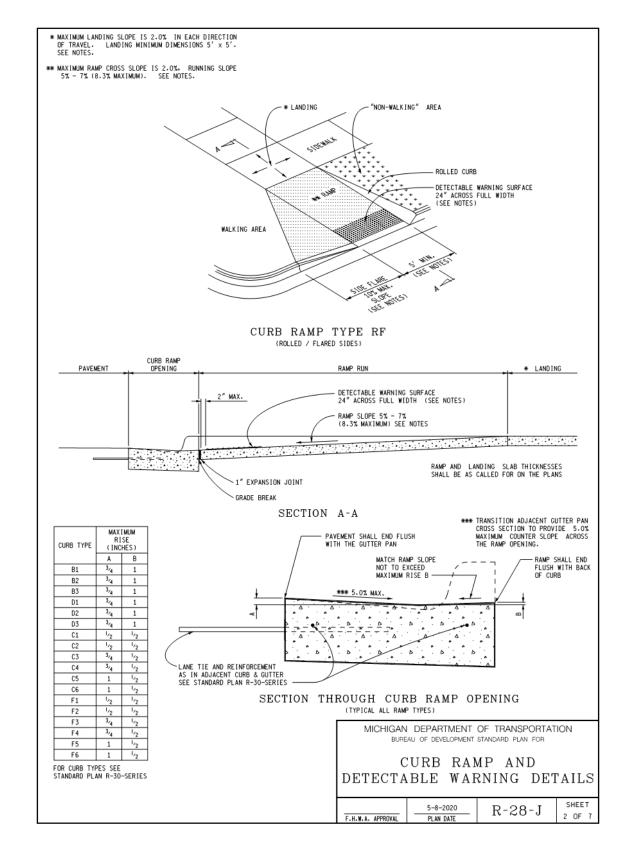
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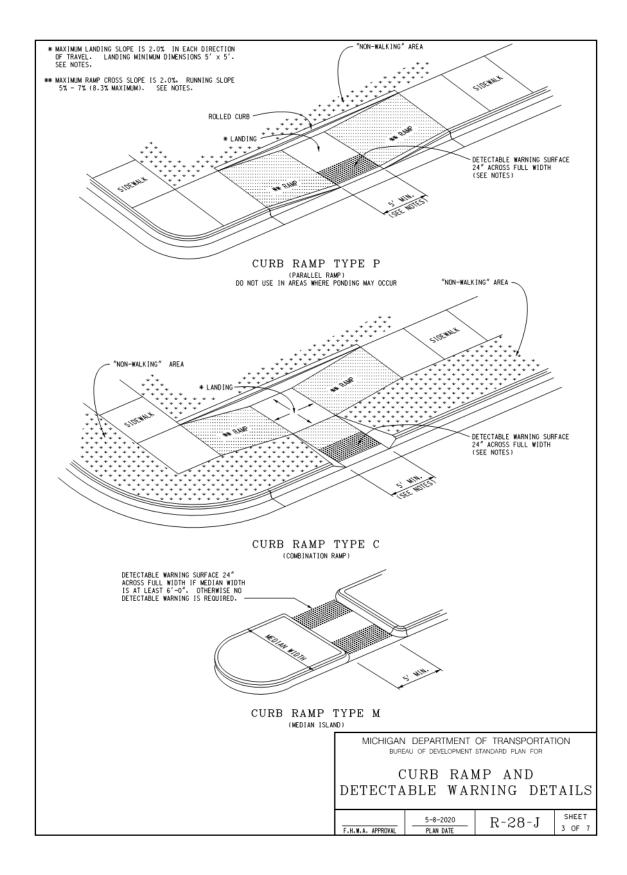
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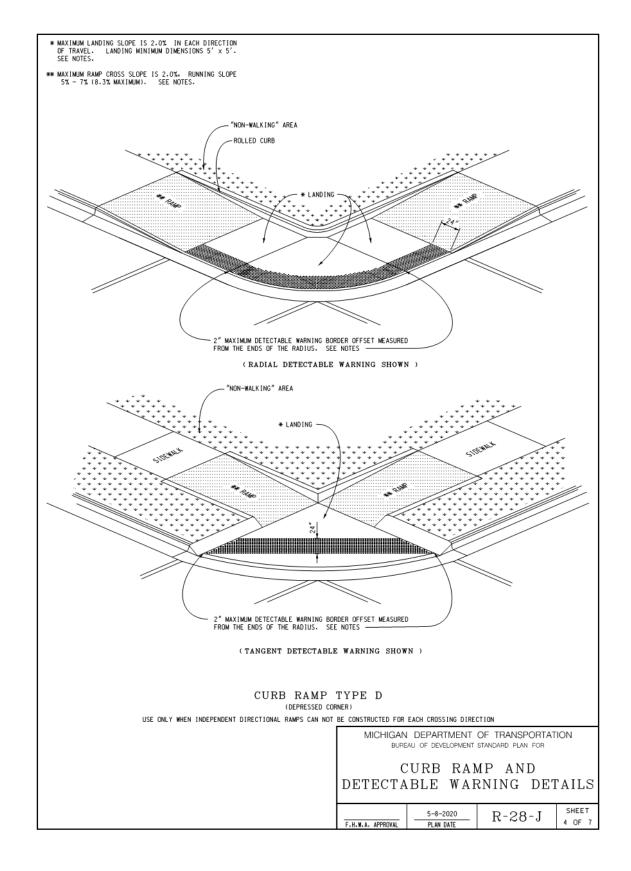
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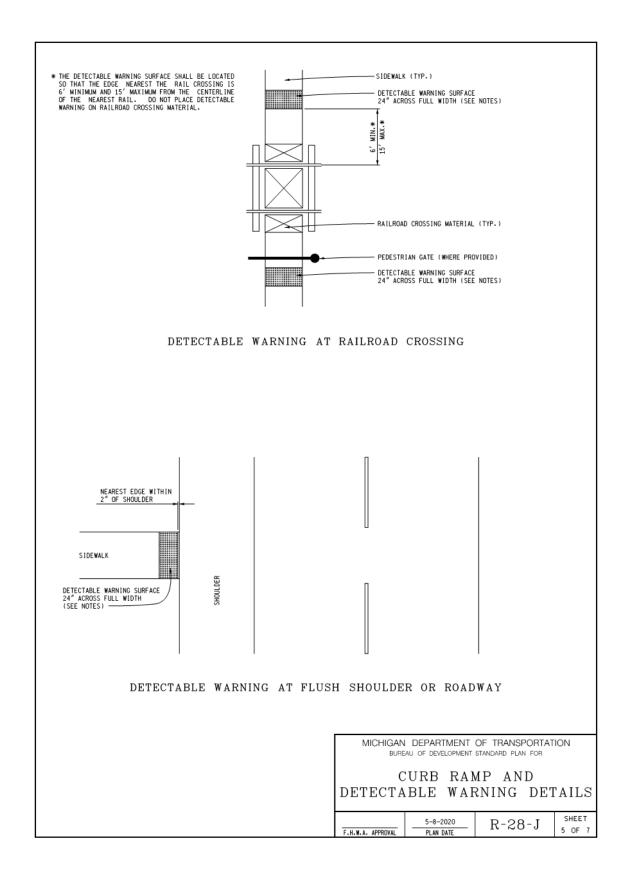
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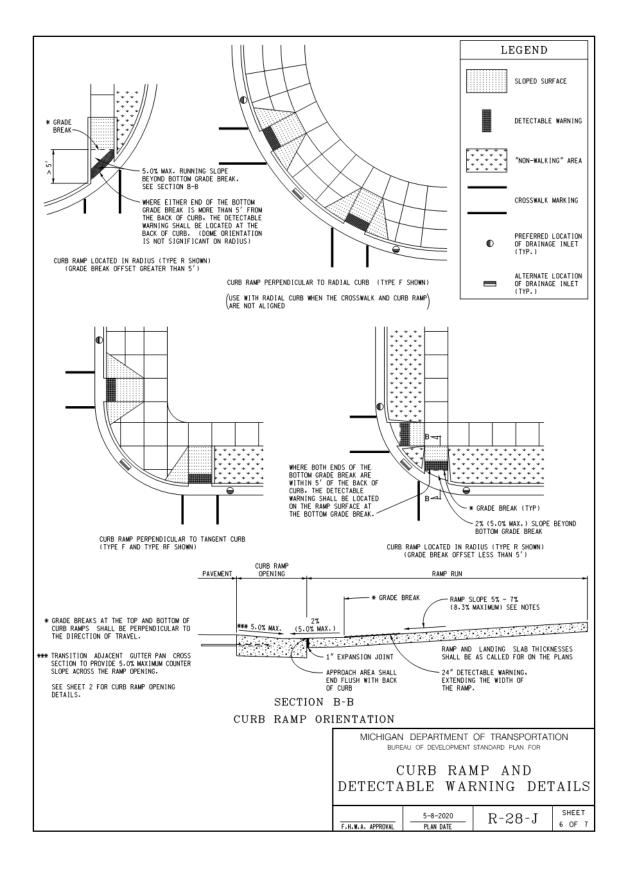
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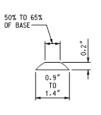
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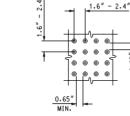


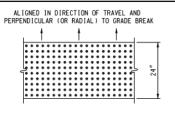
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DOME SECTION

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.

CURB 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

SURFACE TEXTURE OF THE RAMP SHALL BE THAT OBTAINED BY A COARSE BROOMING, 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

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

WHEN 5' MINIMUM WIDTHS ARE NOT PRACTICABLE. RAMP WIDTH MAY BE REDUCED TO NOT LESS THAN 4' AND LANDINGS TO NOT LESS THAN 4' \times 4'.

CURB RAMPS WITH A RUNNING SLOPE ≤5% DO NOT REQUIRE A TOP LANDING. HOWEVER, ANY CONTINUOUS SIDEWALK OR PEDESTRIAN ROUTE CROSSING THROUGH OR INTERSECTING THE CURB RAMP MUST INDEPENDENTLY MAINTAIN A CROSS SLOPE NOT GREATER THAN 2% PERPENDICULAR TO ITS OWN DIRECTION(S) OF TRAVEL.

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 CUBB 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 (0%) REFERENCE. HOWEVER, IT SHALL NOT REQUIRE ANY RAMP OR SERIES OF RAMPS TO EXCEED 15 FEET IN LENGTH NOT INCLUDING LANDINGS OR TRANSITIONS.

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 REFERED THAN 1/2". ELONGATED OPENINGS SHALL BE PLACED SO THAT THE LONG DIMENSION IS PERPENDICULAR TO THE DOMINANT DIRECTION

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 ON UNIFORM TRAFFIC CONTROL DEVICES".

FLARED SIDES WITH A SLOPE OF 10% MAXIMUM. MEASURED ALONG THE ROADSIDE CURB LINE. SHALL BE PROVIDED WHERE AN UNDOSTRUCTED CIRCULATION PATH LATERALLY CROSSES THE CURB RAMP. FLARED SIDES ARE NOT REQUIRED WHERE THE RAMP IS BORDERED BY LANDSCAPING. UNPAVED SUBFACE OR PERMANENT FIXED OBJECTS. WHERE THEY ARE NOT REQUIRED. FLARED SIDES CAN DE 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.

> MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT STANDARD PLAN FOR

CURB RAMP AND DETECTABLE WARNING DETAILS

	5-8-2020	R-28-J	SHEET
F.H.W.A. APPROVAL	PLAN DATE	10 20 0	7 OF 7

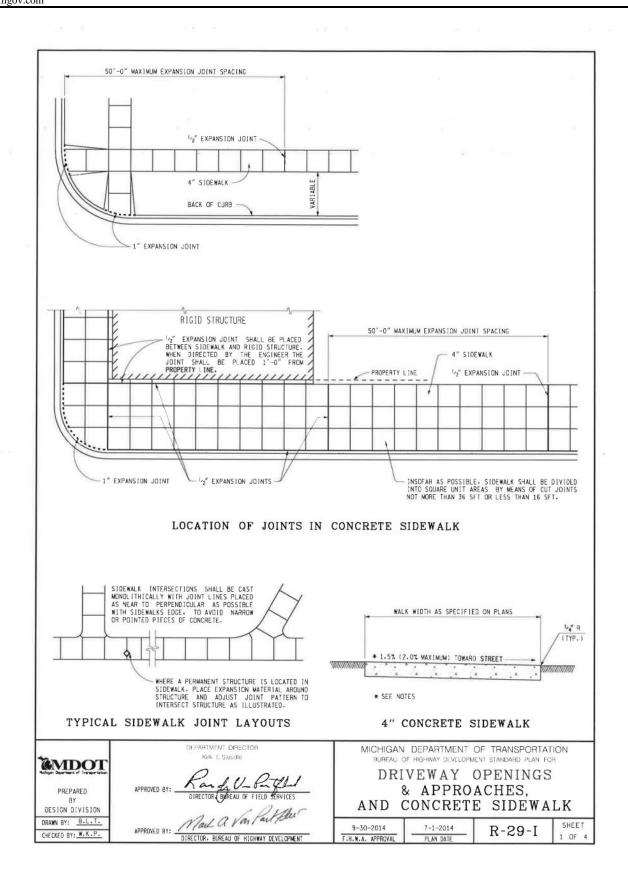
CITY OF FARMINGTON HILLS DEPARTMENT OF CENTRAL SERVICES PURCHASING DIVISION

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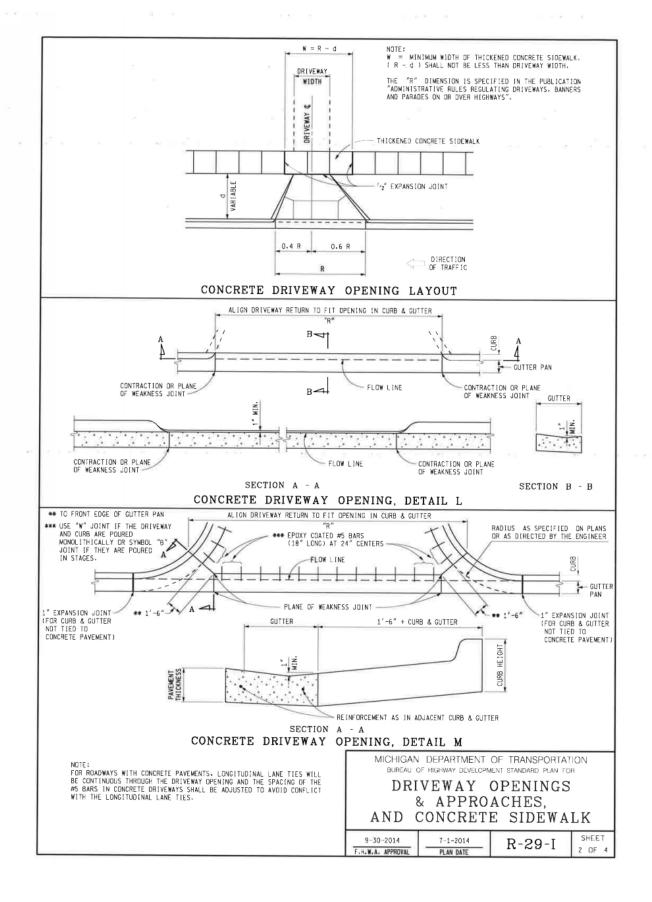
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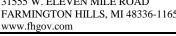


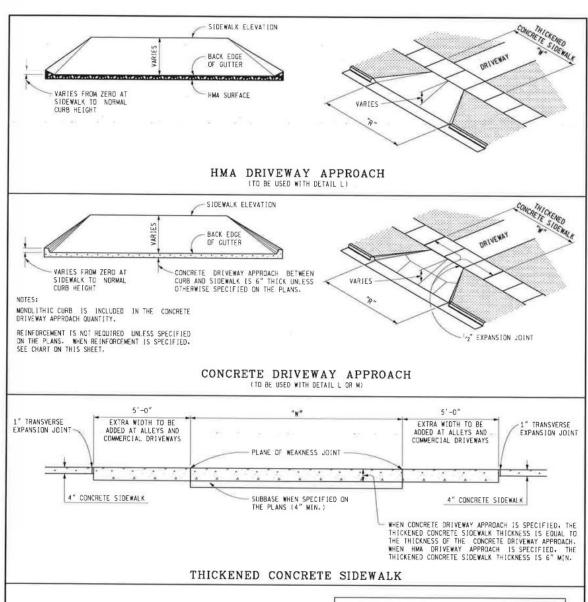
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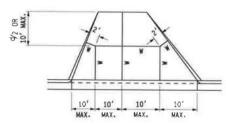


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ADJUST DRIVEWAY JOINTS AS NEEDED TO ALIGN WITH ANY COINCIDING TRANSVERSE PAVEMENT JOINTS.

JOINT LAYOUT IS AS INDICATED OR AS DIRECTED BY THE ENGINEER.

INTERMEDIATE DRIVEWAY JOINT DETAILS

CONCRETE ORIVEWAY THICKNESS	WIRE SIZE (6" x 6" MESH)	AVERAGE WEIGHT (LBS/100 SFT)
LESS THAN 8"	W1.4	21
LESS THAN 0	W2.9	42

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

DRIVEWAY OPENINGS & APPROACHES, AND CONCRETE SIDEWALK

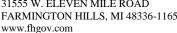
9-30-2014	7-1-2014	R-29-I	SHEET
F.H.W.A. APPROVAL	PLAN DATE	10 20 1	3 OF 4

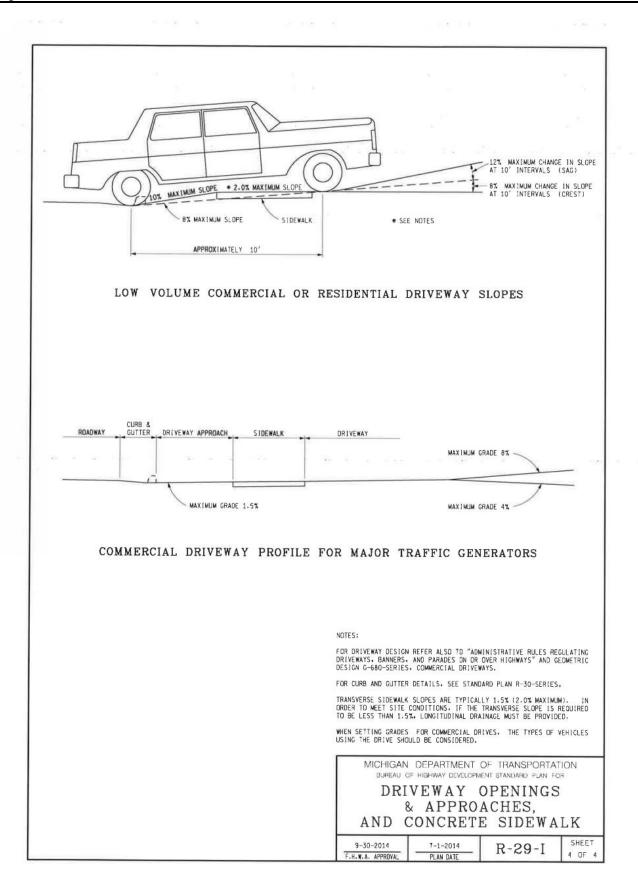
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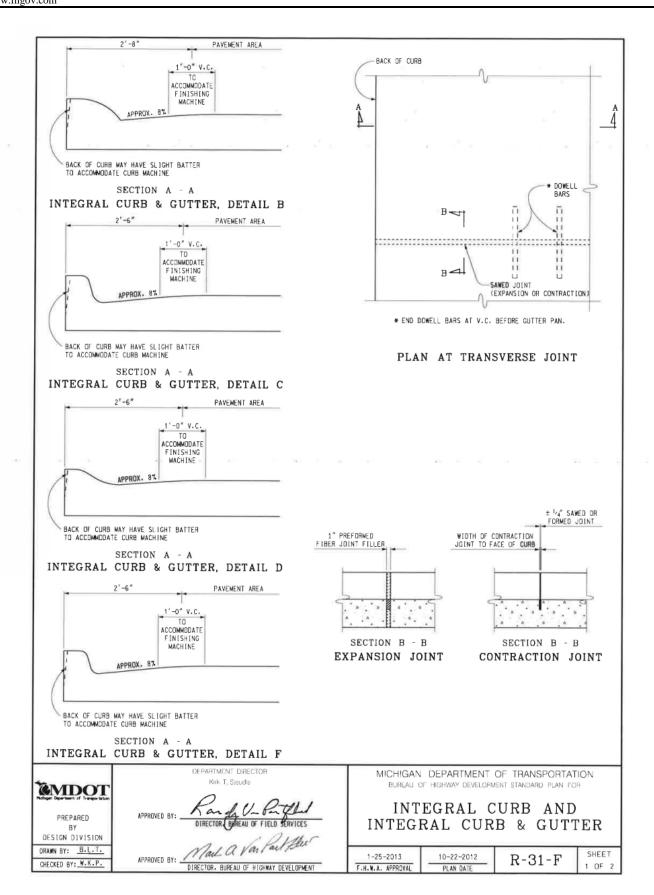






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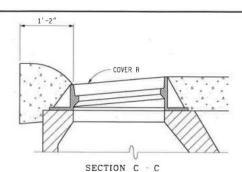
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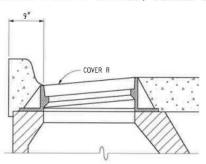


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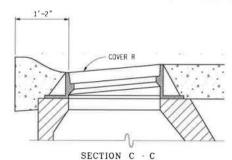
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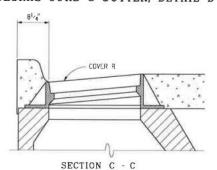
INTEGRAL CURB & GUTTER, DETAIL B



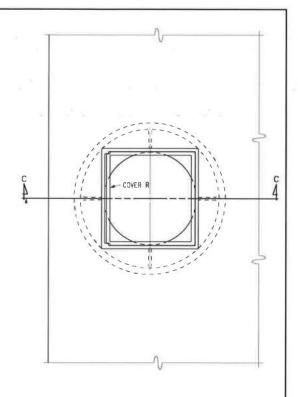
SECTION C - C
INTEGRAL CURB & GUTTER, DETAIL C



INTEGRAL CURB & GUTTER, DETAIL D



INTEGRAL CURB & GUTTER, DETAIL F



PLAN IN CATCH BASIN AREA
SEE STANDARD PLAN R-37-SERIES FOR REINFORCING DETAILS

NOTES:

DETAILS OF CURB FACES ARE SPECIFIED ON STANDARD PLAN R-30-SERIES.

WHEN THE CURB PORTION IS POURED SEPARATE FROM THE INTEGRAL PAVEMENT AND GUITTER. AND DELAY EXCEEDS 30 MINUTES. EPOXY COATED #4 VERTICAL BARS SPACED AT 1'-0" CENTER TO CENTER SHALL BE USED TO TIE CURB AND UNDERLYING CONCRETE.

AGGREGATE BASE, WHEN SPECIFIED ON TYPICAL CROSS SECTIONS, SHALL EXTEND 2'-O" BEYOND THE BACK OF INTEGRAL CURB AND GUTTER, EVEN IF THE CRADING SECTION MUST BE WICHOED TO DO SO. NO PAYMENT WILL BE MADE FOR THE ADDITIONAL AGGREGATE BASE THAT IS REQUIRED TO CONSTRUCT THE INTEGRAL CURB AND GUTTER ALTERNATE.

TRANSVERSE JOINTS IN THE INTEGRAL CURB SHALL BE AS SPECIFIED ON THIS STANDARD PLAN.

FIBER FILLER USED FOR PAVEMENT EXPANSION JOINTS SHALL EXTEND TO BACK OF CURB.

CATCH BASIN "COVER R" OR OTHER APPROVED COVERS SHALL BE SUBSTITUTED FOR COVERS SPECIFIED ON THE PLANS DNLY WHEN THE INTEGRAL CURB AND GUTTER ALTERNATE IS USED.

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

INTEGRAL CURB AND INTEGRAL CURB & GUTTER

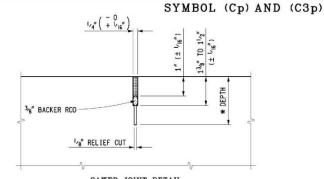
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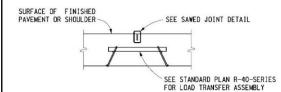


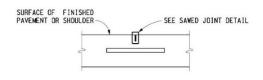
SYMBOL LOAD TRANSFER JOINT USE PAVEMENT (Cp) YES (C3p) NO SHOULDER

SAWED JOINT DETAIL

SAWED JOINT SEALED WITH LOW MODULUS HOT-POURED RUBBER-ASPHALT TYPE JOINT SEALING COMPOUND.

* DEPTH OF RELIEF CUT FOR JOINT (Cp) AND (C3p) SHALL BE $^{1/}4$ THE SLAB THICKNESS FOR PAVEMENTS LESS THAN OR EQUAL TO 7" IN THICKNESS AND $^{1/}3$ THE SLAB THICKNESS FOR PAVEMENTS GREATER THAN 7" THICK.



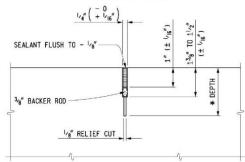


LOAD TRANSFER ASSEMBLY METHOD

DOWEL BAR INSERTER METHOD

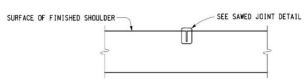
TRANSVERSE CONTRACTION JOINT

SYMBOL (W)



SAWED JOINT DETAIL
SAWED JOINT SEALED WITH LOW MODULUS HOT-POURED RUBBER-ASPHALT TYPE JOINT SEALING COMPOUND.

* DEPTH OF RELIEF CUT FOR JOINT 1/4 THE SLAB THICKNESS.



DEPARTMENT DIRECTOR

Kirk T. Steudle

TRANSVERSE AND INTERSECTION PLANE OF WEAKNESS JOINTS

EMDOT PREPARED BY

Kimberly Avery enables of winds of the control of t APPROVED BY: . DIRECTOR. BUREAU OF FIELD SERVICES DESIGN DIVISION Bradley C. Wieferich Bradley C. Wieferich Jan 23 2018 4:05 PM DRAWN BY: B.L.T. APPROVED BY: . CHECKED BY: W.K.P. DIRECTOR, BUREAU OF DEVELOPMENT

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT STANDARD PLAN FOR

TRANSVERSE PAVEMENT JOINTS (PLAIN CONCRETE PAVEMENT)

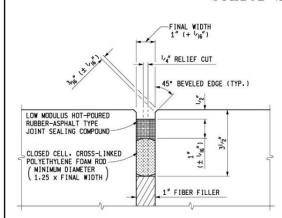
SHEET 9-25-2017 2-21-2018 R-39-K 1 OF 5 F.H.W.A. APPROVAL PLAN DATE



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SYMBOL (E2) AND (E4)



SAWED JOINT DETAIL

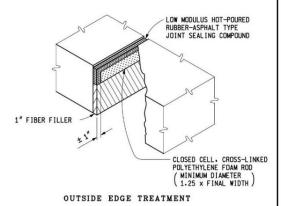
SURFACE OF FINISHED PAVEMENT OR SHOULDER-

SAWED JOINT SEALED WITH LOW MODULUS HOT-POURED RUBBER-ASPHALT TYPE JOINT SEALING COMPOUND.

NOTE:

THE FINAL WIDTH OF THE GROOVE SHALL BE 1" + ν_{16} " PLUS ANY INCREASE OR MINUS ANY DECREASE IN THE WIDTH OF THE RELIEF CUT. THE FINAL SAW CUT SHALL BE TO THE TOP OF THE FIBER FILLER WITH A MINIMUM DEPTH AS SHOWN AND SHALL BE CENTERED OVER THE FIBER FILLER WITH A HORIZONTAL TOLERANCE OF ν_4 . FIBER FILLER FOR EXPANSION JOINTS IN CONCRETE SHOULDERS SHALL BE FREE OF HOLES OR OTHER DEFECTS AND TRIMMED TO FIT SHOULDER CONFIGURATIONS.

SYMBOL	LOAD TRANSFER ASSEMBLY	JOINT USE
(E2)	YES	PAVEMENT
(E4)	NO	SHOULDER



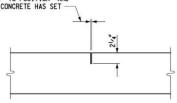
TRANSVERSE EXPANSION JOINT

SYMBOL (U)

V₈" SAWED JOINT OR A FORMED JOINT MADE BY PLACING V₄" HARDBOARD OR OTHER APPROVED MATERIAL FLUSH WITH THE SURFACE OF THE CONCRETE BASE COURSE AND TRUE TO POSITION AND LINE BEFORE THE CONCRETE HAS SET

SEE SAWED JOINT DETAIL

SEE STANDARD PLAN R-40-SERIES FOR LOAD TRANSFER ASSEMBLY



TRANSVERSE PLANE OF WEAKNESS JOINTS IN CONCRETE BASE COURSE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

TRANSVERSE PAVEMENT JOINTS
(PLAIN CONCRETE PAVEMENT)

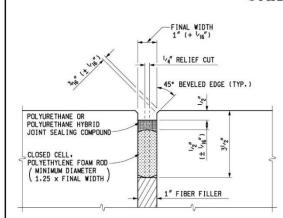
2-21-2018	9-25-2017	R-39-K	SHEET
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SYMBOL (E3)

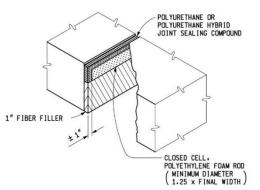


SAWED JOINT DETAIL SAWED JOINT SEALED WITH POLYURETHANE OR POLYURETHANE HYBRID JOINT SEALING COMPOUND.

NOTE:

THE FINAL WIDTH OF THE GROOVE SHALL BE 1" + ν_{16} " PLUS ANY INCREASE OR MINUS ANY DECREASE IN THE WIDTH OF THE RELIEF CUT. THE FINAL SAW CUT SHALL BE TO THE TOP OF THE FIBER FILLER WITH A MINIMUM DEPTH AS SHOWN AND SHALL BE CENTERED OVER THE FIBER FILLER WITH A HORIZONTAL TOLERANCE OF ν_{4} ". FIBER FILLER FOR EXPANSION JOINTS IN CONCRETE SHOULDERS SHALL BE FREE OF HOLES OR OTHER DEFECTS AND TRIMMED TO FIT SHOULDER CONFIGURATIONS.

SYMBOL	LOAD TRANSFER ASSEMBLY	JOINT USE
(E3)	NO	PAVEMENT & SHOULDER



OUTSIDE EDGE TREATMENT

TRANSVERSE EXPANSION JOINT

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT STANDARD PLAN FOR

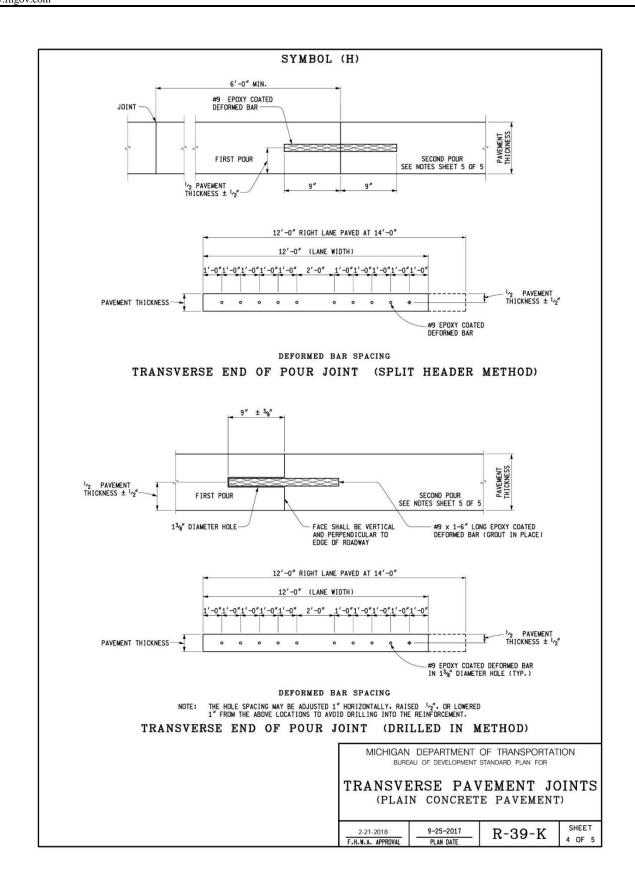
TRANSVERSE PAVEMENT JOINTS
(PLAIN CONCRETE PAVEMENT)

2-21-2018	9-25-2017	R-39-K	SHEET
F.H.W.A. APPROVAL	PLAN DATE	I CO II	3 OF 5



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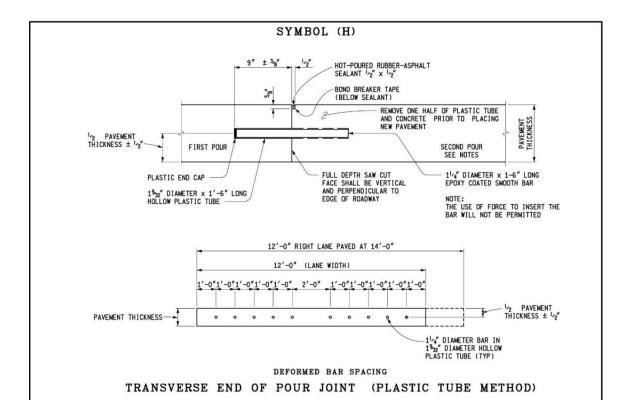


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LOAD TRANSFER ASSEMBLIES ARE DETAILED ON THE CURRENT STANDARD PLAN R-40-SERIES

TRANSVERSE JOINTS SHALL BE SPACED ACCORDING TO THE CURRENT STANDARD PLAN R-43-SERIES.

A TRANSVERSE END OF POUR JOINT (DRILLED IN METHOD) SYMBOL (H). SHALL BE CONSTRUCTED WHEN IT IS ANTICIPATED THAT THE SECOND POUR WILL BE DELAYED 7 DAYS OR LONGER.

A TRANSVERSE END OF POUR JOINT (SPLIT HEADER METHOD) DR (PLASTIC TUBE METHOD) SHALL BE USED AT THE END OF THE DAY'S POUR OR WHEN THERE IS AN UNAVOIDABLE INTERRUPTION OF THE WORK FOR WORE THAN ONE-HALF HOUR AND LESS THAN 7 DAYS. THE JOINT SHALL BE CONSTRUCTED ACCORDING TO TRANSVERSE END OF POUR JOINT (SPLIT HEADER METHOD) OR (PLASTIC TUBE METHOD), SYMBOL (H).

THE EXPANSION JOINT MATERIAL IN THE SHOULDERS SHALL BE SUPPORTED BY ONE OF THE FOLLOWING METHODS:

- 1. A CONTINUOUS SUPPORT WIRE. AS SPECIFIED FOR EXPANSION LOAD TRANSFERS ASSEMBLIES, AS DETAILED ON STANDARD PLAN R-40-SERIES, SHALL BE USED ON EACH SIDE OF EXPANSION MATERIAL. THIS WIRE SHALL BE EQUIPPED WITH STAKES AND STAKE POCKETS TO RIGIDLY HOLD THE EXPANSION MATERIAL IN PLACE DURING CONCRETE PLACEMENT. STAKES SHALL BE AS SPECIFIED ON STANDARD PLAN R-40-SERIES, SPACED NOT MORE THAN 2'-0" APART.
- 2. "U" OR "J" SHAPE STAPLES OF W8 WIRE (0.319" NOMINAL DIAMETER)
 SHALL BE SPACED ON 2'-O" CENTERS EACH SIDE OF THE EXPANSION
 MATERIAL. EACH VERTICAL LEG OF THE STAPLE SHALL BE AT LEAST
- 3. OTHER EQUIVALENT METHODS MAY BE USED WHEN APPROVED BY THE

JOINTS SHALL NOT BE SEALED IN CONCRETE BASE COURSE.

WHEN CONCRETE SHOULDERS ARE CAST SEPARATELY FROM MAINLINE CONCRETE PAVEMENT. A KEYWAY MAY BE USED TO FACILITATE THE PLACING OF LANE TIES. WHEN A KEYWAY GROOVE IS USED. IT SHALL BE CONTINUOUS AND UNIFORM.

THE LOCATION OF TRANSVERSE JOINTS IN CONCRETE SHOULDERS SHALL MATCH THE LOCATION OF ADJACENT TRANSVERSE PAVEMENT JOINTS. CORRESPONDING TRANSVERSE CONCRETE SHOULDER AND PAVEMENT JOINTS SHALL BE (C3p) SHOULDER WITH (Cp) PAVEMENT, (E4) SHOULDER WITH (E2) PAVEMENT, AND (E3) BEING THE SAME IN BOTH SHOULDER AND PAVEMENT.

DEFORMED BARS FOR TRANSVERSE END OF POUR JOINTS (DRILLED IN METHOD) SHALL BE GROUTED INTO EXISTING PAVEMENT WITH A GROUT SELECTED FROM THE PREDUALIFIED MATERIALS. LISTED IN THE DEPARTMENT'S "MATERIALS SOURCE GUIDE" UNDER ADHESIVE SYSTEMS FOR GROUTING DOWEL BARS AND TIE BARS FOR FULL-DEPTH PAVEMENT REPAIRS.

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT STANDARD PLAN FOR

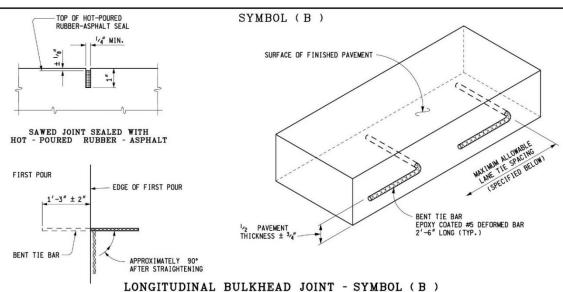
TRANSVERSE PAVEMENT JOINTS (PLAIN CONCRETE PAVEMENT)

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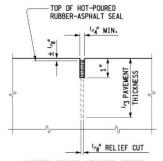
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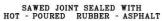
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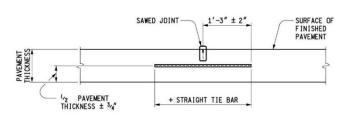


ALL SYMBOL (B) JOINTS SHALL BE SAWED AND SEALED EXCEPT JOINTS WITHOUT LANE TIES AND JOINTS ADJACENT TO VERTICAL FACES WHICH WOULD PROHIBIT SAWING.

SYMBOL (D) AND (S)







+ EPOXY COATED #5 DEFORMED BAR 2'-6" LONG FOR SYMBOL (D) EPOXY COATED #5 SMOOTH BAR 2'-6" LONG FOR SYMBOL (S) (MAXIMUM ALLOWABLE LANE TIE SPACING SPECIFIED BELOW)

LONGITUDINAL LANE TIE JOINT - SYMBOL (D) LONGITUDINAL SMOOTH LANE TIE JOINT - SYMBOL (S)

SYMBOL (D) AND SYMBOL (S) TIE BARS SHALL BE PLACED AT THE PROPER SPACING LONGITUDINALLY, AND TRANSVERSELY AT 90° WITH THE JOINT.

MAXIMUM ALLOWABLE LANE TIE SPACING SYMBOLS (B), (D), (L2), AND (S)		* TOTAL DISTANCE OF TIED JOINT FROM NEAREST FREE EDGE	
(B) GRADE 40	(D), (L2), AND (S) GRADE 60		
2'-10"	3'-7"	12' OR LESS	
1'-11"	2'-7"	OVER 12' THROUGH 17'	
1'-5"	1'-11"	OVER 17' THROUGH 24'	
1'-2"	1'-9"	OVER 24' THROUGH 28'	
1'-2"	1'-4"	OVER 28' THROUGH 36'	
1'-1"	1'-1"	36' OR GREATER **	

- * INCLUDES ANY TIED COMBINATION OF LANE WIDTH, VALLEY GUTTER, CURB & GUTTER, OR SHOULDER
- FOR WIDTHS GREATER THAN 48' USE #6 DEFORMED BARS AT 1'-2" SPACING.

MAXIMUM ALLOWABLE LANE TIE SPACING

EMDOT PREPARED DESIGN DIVISION DRAWN BY: B.L.T. CHECKED BY: W.K.P.

Kirk T. Steudle APPROVED BY:

Mark a Van Part fler APPROVED BY: _ DIRECTOR. BUREAU OF HIGHWAY DEVELOPMENT

DEPARTMENT DIRECTOR

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

LONGITUDINAL PAVEMENT JOINTS

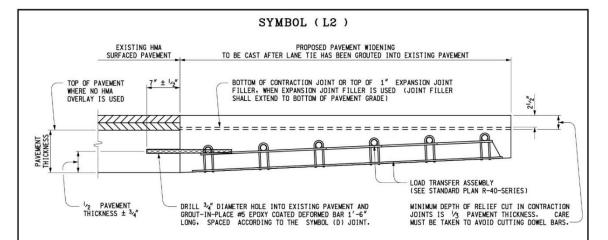
SHEET 9-30-2014 4-22-2013 R-41-H 1 OF 2 F.H.W.A. APPROVAL PLAN DATE

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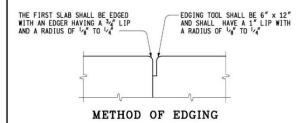
SYMBOL (L2) JOINT USED FOR WIDENING CONCRETE PAVEMENTS WITHOUT HMA OVERLAYS SHALL BE SAWED AND SEALED ACCORDING TO THE SYMBOL (B) JOINT.

THE LONGITUDINAL JOINT USED FOR WIDENING EXISTING CONCRETE BASE COURSE OR CONCRETE PAVEMENT HAVING A HMA SURFACE SHALL HAVE EPOXY ANCHORED LANE TIES PLACED AS SPECIFIED.

TAPERED PAVEMENT THICKNESS OVER THE DISTANCE OF PAVEMENT WIDENING OR IN ONE LANE WIDTH WHEN WIDENING IS FOR TWO OR MORE LANES.

LONGITUDINAL BULKHEAD JOINT

FOR WIDENING EXISTING CONCRETE PAYEMENT OR CONCRETE BASE COURSE (USING EPOXY ANCHORED LANE TIES)



NOTES:

ALL LANE TIE BARS SHALL BE DEFORMED EXCEPT SYMBOL (S) WHICH WILL BE

THE EPOXY COATED S BARS ARE TO BE FACTORY COATED WITH AN APPROVED BOND RELEASE AGENT. UNIFORMLY APPLIED BY DIPPING AND WITHOUT EXCESSIVE DRIPS OR THICKNESS.

THE INSTALLATION OF LANE TIE BARS AND THE SAWING OF LONGITUDINAL JOINTS WILL NOT BE REQUIRED FOR TEMPORARY CONCRETE PAVEMENT UNLESS SPECIFIED ON PLANS OR IN THE PROPOSAL. THE EDGING OF TEMPORARY CONCRETE PAVEMENT WILL NOT BE REQUIRED.

FOR JOINT LAYOUT DETAILS, SEE STANDARD PLAN R-42-SERIES.

SAWING PROCEDURES AND RELATED OPERATIONS ARE DESCRIBED IN THE CURRENT STANDARD SPECIFICATIONS.

NO SAWED OR SEALED JOINT SHALL BE CONSTRUCTED BETWEEN THE PAVEMENT AND CURB OR PAVEMENT AND CURB AND GUTTER, WHERE THESE ITEMS ARE CAST INTEGRALLY.

WHEN JOINTED PLAIN CONCRETE IS SPECIFIED AT INTERSECTIONS SYMBOL (S) JOINTS ARE TO BE USED FOR THE LONGITUDINAL JOINT BETWEEN THE THE E2 JOINT AT THE SPRINGPOINT OF THE SIDE STREET AND THE THROUGH LANE GUTTER PAN LINE. WHEN THE E2 JOINT IS MOVED TO THE THROUGH LANE GUTTER PAN LINE USE SYMBOL (D) JOINT AS NORMALLLY REQUIRED.

ALL STRAIGHT TIE BARS SHALL BE EPOXY COATED ACCORDING TO THE CURRENT STANDARD SPECIFICATIONS FOR EPOXY COATED STEEL REINFORCEMENT FOR

WHEN LANE TIES ARE GROUTED INTO AN EXISTING PAVEMENT. THE GROUT SHALL BE SELECTED FROM THE PREQUALIFIED MATERIALS LISTED IN THE DEPARTMENT'S "MATERIALS SAMPLING GUIDE" FOR LANE TIES.

IN ORDER TO AVOID CONFLICT WITH THE LOAD TRANSFER ASSEMBLY, THE PLACEMENT OF THE END LANE TIE ADJACENT TO ANY TRANSVERSE JOINT SHALL BE AS FOLLOWS:

- WHEN MAXIMUM ALLOWABLE LANE TIE SPACING EXCEEDS 3'-4", PLACE FIRST AND LAST LANE TIE HALF THE MAXIMUM ALLOWABLE LANE TIE SPACING FROM JOINT.
- 2. WHEN MAXIMUM ALLOWABLE LANE TIE SPACING IS LESS THAN 3'-4". PLACE FIRST AND LAST LANE TIE A MINIMUM OF 1'-8" FROM JOINT.

IT MAY BE NECESSARY TO ADJUST THE LAST THREE LANE TIE SPACINGS TO ENSURE UNIFORM LOADING RESISTANCE ALONG THE LONGITUDINAL JOINT.

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

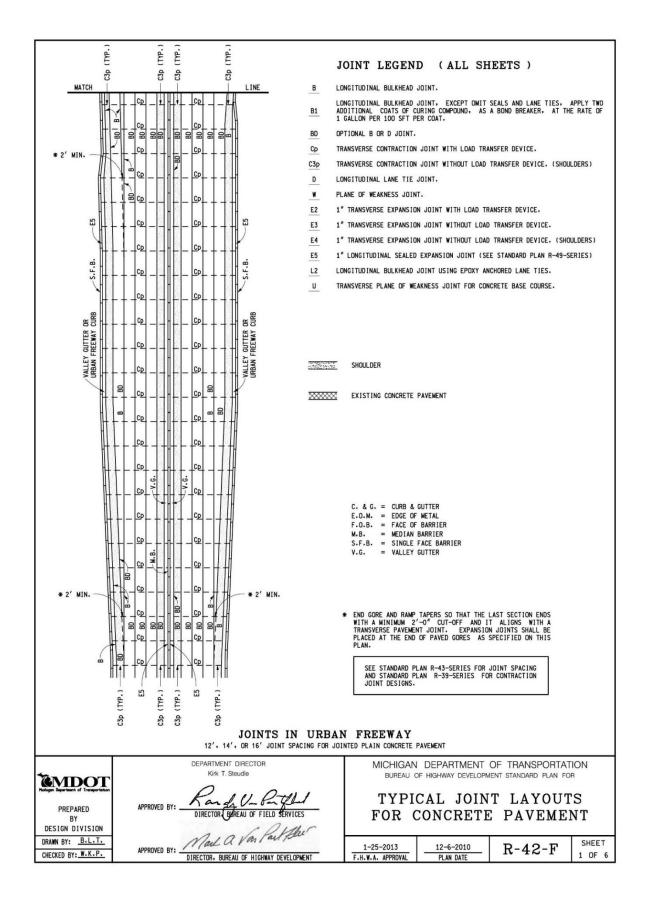
LONGITUDINAL PAVEMENT JOINTS

9-30-2014	4-22-2013	R-41-H	SHEET
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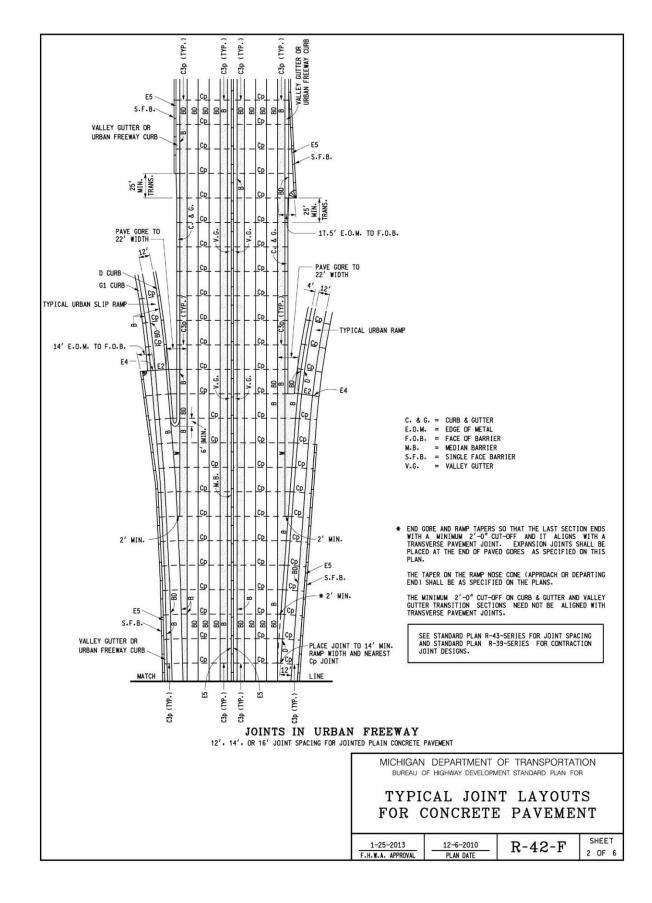
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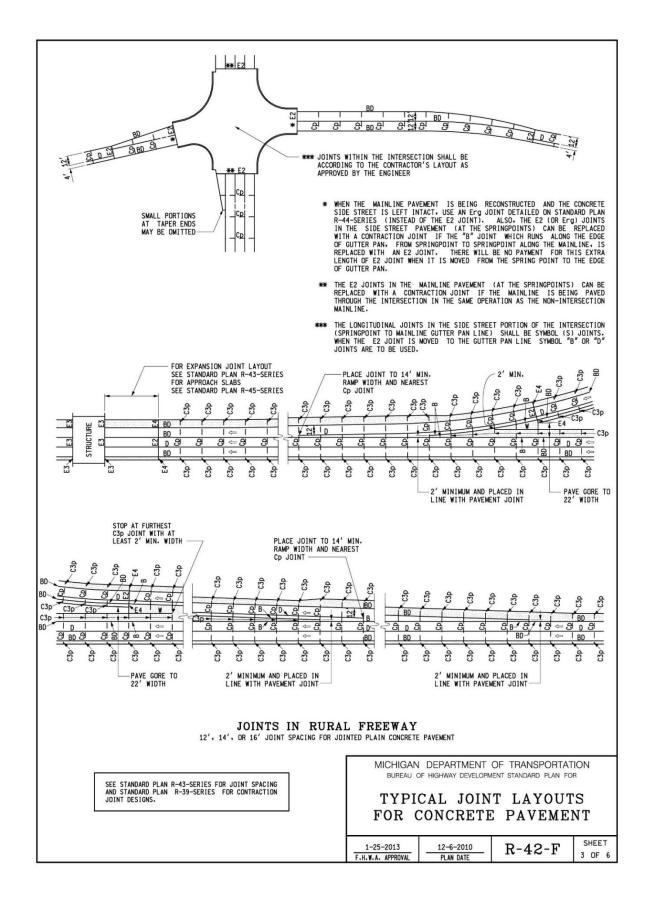
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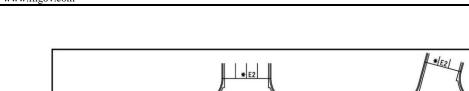
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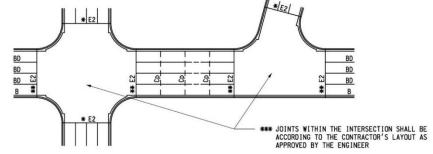




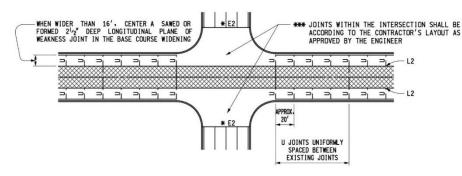
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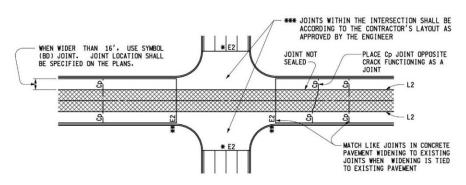




JOINTS AT INTERSECTIONS



JOINTS FOR CONCRETE BASE COURSE WIDENING



JOINTS FOR CONCRETE PAVEMENT WIDENING

- * WHEN THE MAINLINE PAVEMENT IS BEING RECONSTRUCTED AND THE CONCRETE SIDE STREET IS LEFT INTACT. USE AN Erg JOINT DETAILED ON STANDARD PLAN R-44-SERIES (INSTEAD OF THE E2 JOINT). ALSO, THE E2 (OR Erg) JOINTS IN THE SIDE STREET PAVEMENT (AT THE SPRINGPOINTS). CAN BE REPLACED WITH A CONTRACTION JOINT IF THE "B" JOINT WHICH RUNS ALONG THE EDGE OF GUTTER PAN. FROM SPRINGPOINT TO SPRINGPOINT ALONG THE MAINLINE, IS REPLACED WITH AN E2 JOINT. THERE WILL BE NO PAYMENT FOR THIS EXTRA LENGTH OF E2 JOINT WHEN IT IS MOVED FROM THE SPRING POINT TO THE EDGE OF GUTTER PAN.
- *** THE E2 JOINTS IN THE MAINLINE PAVEMENT (AT THE SPRINGPOINTS) CAN BE REPLACED WITH A CONTRACTION JOINT IF THE MAINLINE IS BEING PAVED THROUGH THE INTERSECTION IN THE SAME OPERATION AS THE NON-INTERSECTION MAINLINE.
- *** THE LONGITUDINAL JOINTS IN THE SIDE STREET PORTION OF THE INTERSECTION (SPRINGPOINT TO MAINLINE GUTTER PAN LINE) SHALL BE SYMBOL (S) JOINTS. WHEN THE E2 JOINT IS MOVED TO THE GUTTER PAN LINE SYMBOL "B" OR "D" JOINTS ARE TO BE USED.

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

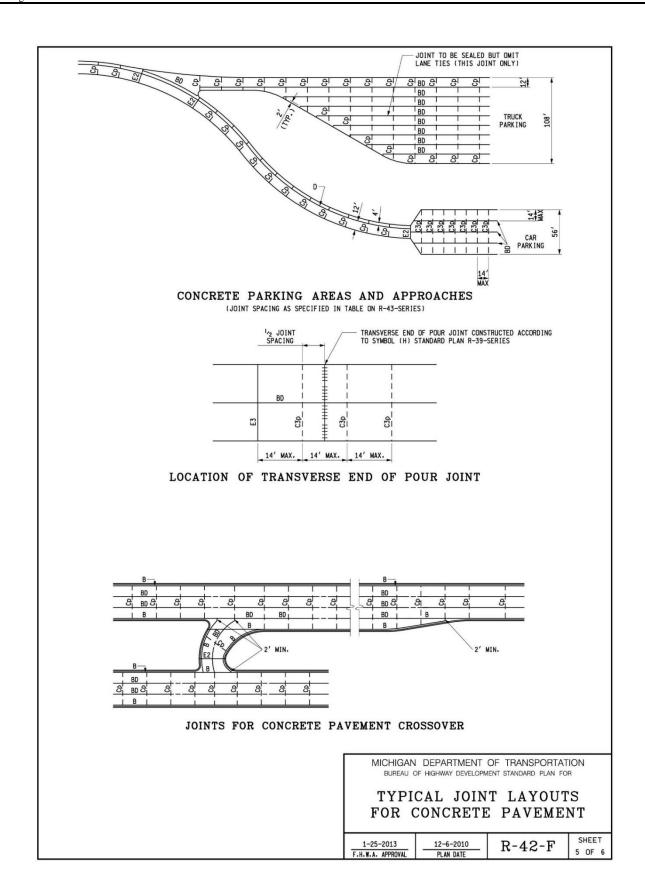
TYPICAL JOINT LAYOUTS FOR CONCRETE PAVEMENT

1-25-2013	12-6-2010	R-42-F	SHEET
F.H.W.A. APPROVAL	PLAN DATE	10 10 1	4 OF 6



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NOTES:

TRANSVERSE JOINT SPACING IN CONCRETE PAVEMENT AND CONCRETE SHOULDERS SHALL BE AS SPECIFIED IN THE PROPOSAL OR ON THE PLANS AND CONSTRUCTED ACCORDING TO STANDARD PLAN R-43-SERIES AND THIS PLAN. OR AS DIRECTED BY THE ENGINEER. THE PLACEMENT OF JOINTS IN CURB. CURB AND GUTTER OR VALLEY GUTTER SHALL BE PLACED AS SPECIFIED ON STANDARD PLAN R-30-SERIES AND R-33-SERIES. PAVEMENTS ON TOAST INTEGRALLY WITH CURB. CURB AND GUTTER. VALLEY GUTTER OR CONCRETE SHOULDER SHALL BE CONNECTED WITH A LONGITUDINAL SYMBOL (BB. JOINT). (B) JOINT.

JOINTS SHALL BE CONSTRUCTED ACCORDING TO CURRENT STANDARD PLANS R-39-SERIES AND R-41-SERIES.

RAMP JOINTS SHALL BE ORIENTED 90 DEGREES TO THE ALIGNMENT EDGE OF THE RAMP UNTIL THE 2' POINT OF THE GORE. THEN, AS THE RAMP MERGES WITH THE MAINLINE, THE JOINTS SHALL BE ALIGNED 90 DEGREES TO THE MAINLINE.

BASE COURSES SHALL BE NONREINFORCED UNLESS OTHERWISE SPECIFIED ON THE PLANS.

THE LOCATION OF SYMBOLS (E2), (E3) OR (Cp) JOINTS SHALL BE ADJUSTED TO AVOID CONFLICTS WITH MANHOLES, CATCH BASINS, MONUMENT BOXES, WATER SHUT-OFFS, OR OTHER RIGID STRUCTURES. EITHER THE JOINT SHALL BE LOCATED TO INTERSECT AT THE MID POINT OF THE STRUCTURE OR THE STRUCTURE SHALL BE LOCATED IN THE CENTER OF THE PAVEMENT SLAB. SEE R-37-SERIES FOR ISOLATION JOINT DETAILS.

THE CONCRETE PAYEMENT IN THE TRUCK AND PASSENGER CAR PARKING AREAS OF REST AREAS SHALL BE TEXTURED ACCORDING TO THE CURRENT STANDARD SPECIFICATIONS FOR CONSTRUCTION.

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

TYPICAL JOINT LAYOUTS FOR CONCRETE PAVEMENT

6 OF 6

SHEET 1-25-2013 12-6-2010 R-42-F

PLAN DATE

F.H.W.A. APPROVAL

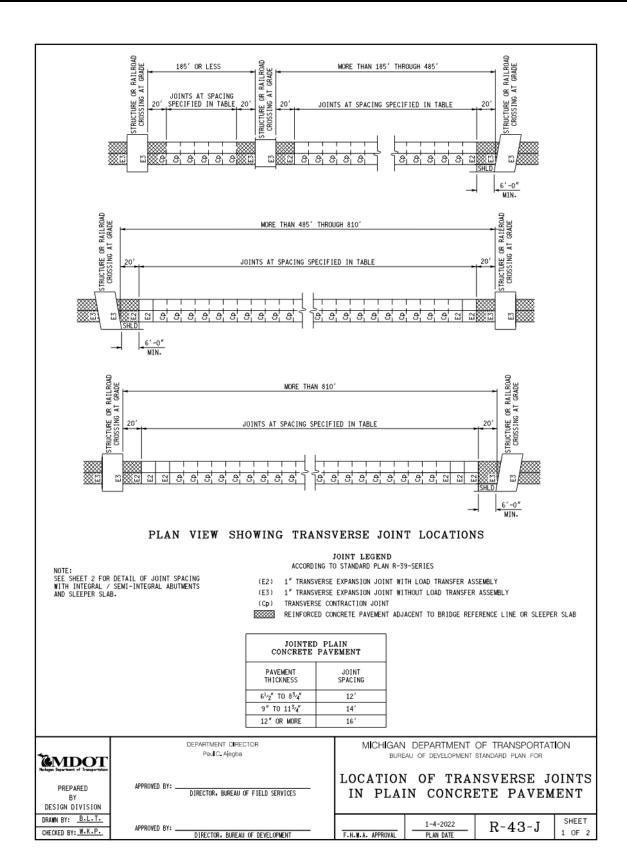
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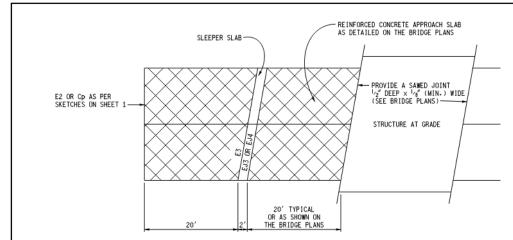






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JOINT SPACING WITH INTEGRAL / SEMI-INTEGRAL ABUTMENTS AND SLEEPER SLABS

NOTES:

UNLESS OTHERWISE SPECIFIED ON THE PLANS OR DIRECTED BY THE ENGINEER, TRANSVERSE JOINTS SHALL BE PLACED AS SPECIFIED ON THIS STANDARD PLAN AND ON CURRENT STANDARD PLAN R-42-SERIES.

MAXIMUM JOINT SPACING SHALL NOT EXCEED THE DISTANCE SPECIFIED. WHEN A JOINT SPACING ADJUSTMENT IS REQUIRED, IT SHALL BE MADE BETWEEN CONTRACTION JOINTS WITH THE ADJUSTED SPACE BEING NOT LESS THAN 6^{+} - 6^{+} .

EXPANSION JOINTS SHALL ONLY BE PLACED AT STRUCTURES. INTERSECTIONS AND SPECIFIED LOCATIONS.

JOINTS ABUTTING RAILROAD TRACKS SHALL BE AS SPECIFIED ON CURRENT STANDARD PLAN R-121-SERIES.

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT STANDARD PLAN FOR

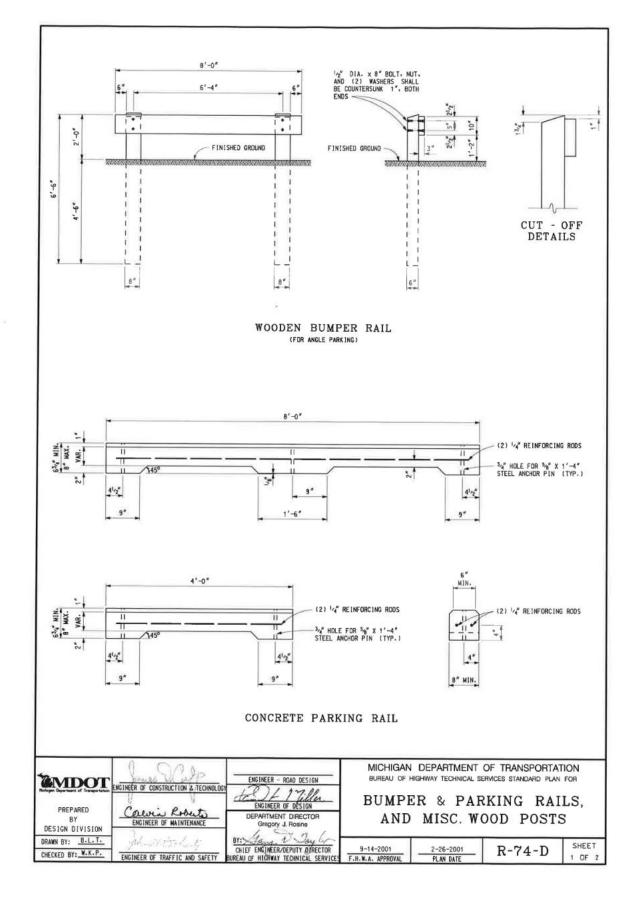
LOCATION OF TRANSVERSE JOINTS IN PLAIN CONCRETE PAVEMENT

	1-4-2022	R-43-J	SHEET
F.H.W.A. APPROVAL	PLAN DATE	1. 45 0	2 OF 2



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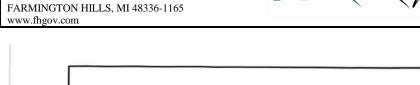
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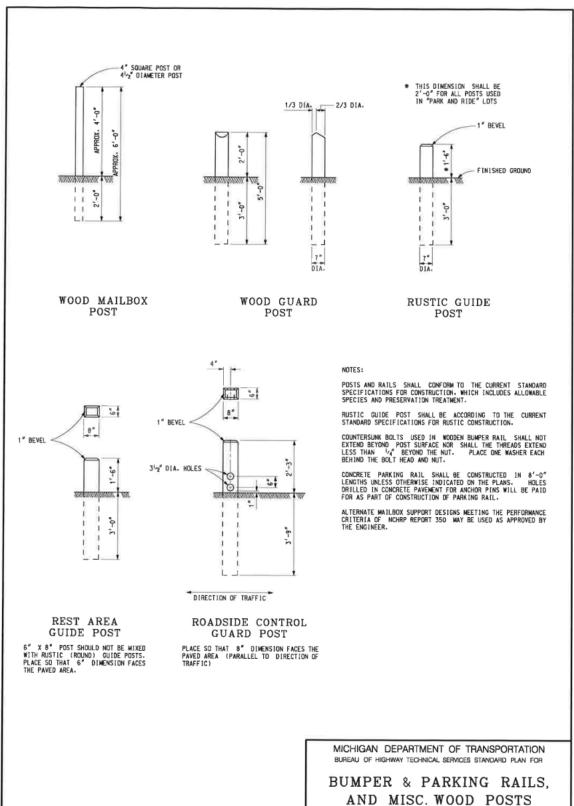
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R-74-D





9-14-2001

F.H.W.A. APPROVAL

2-26-2001

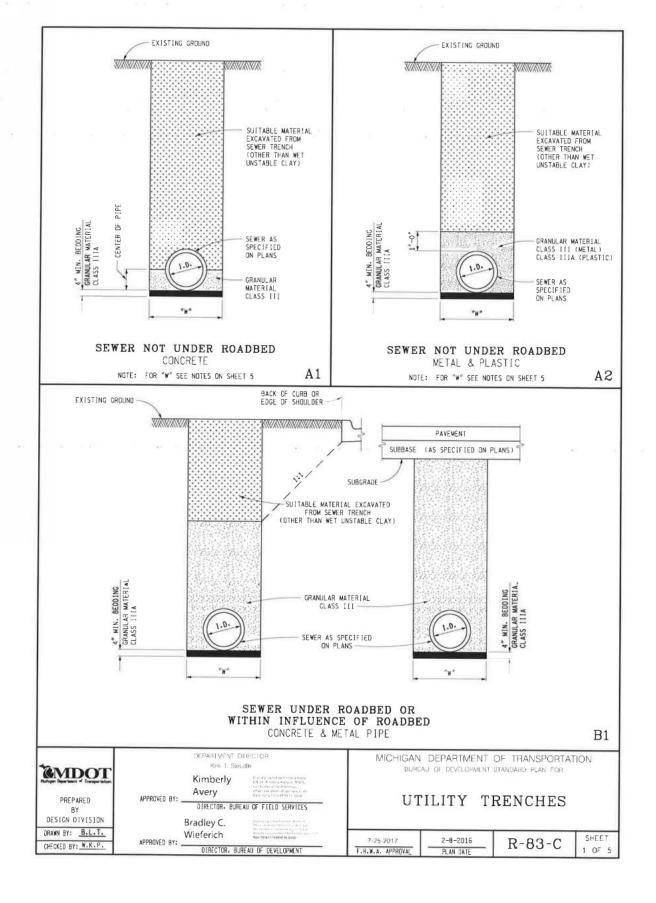
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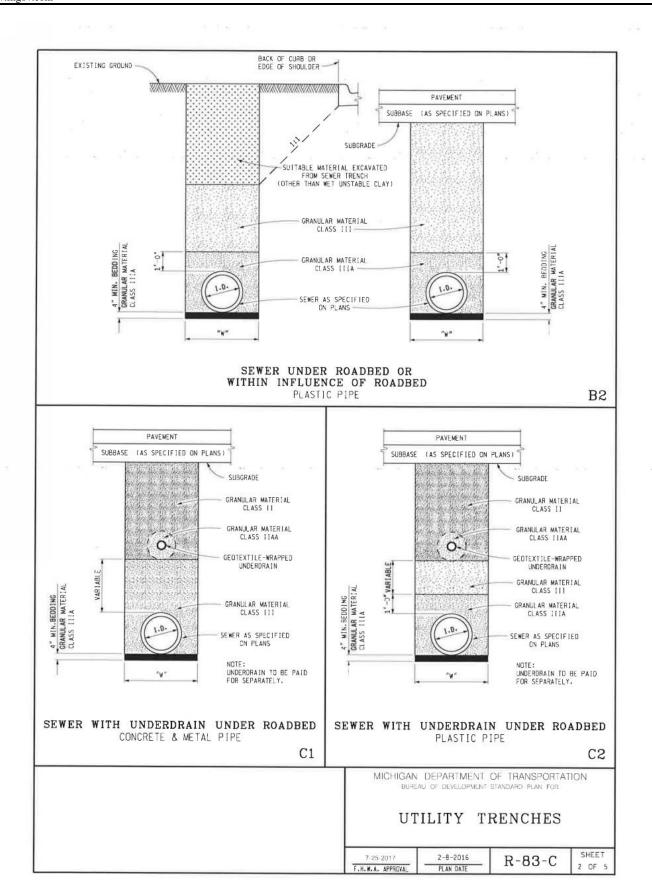


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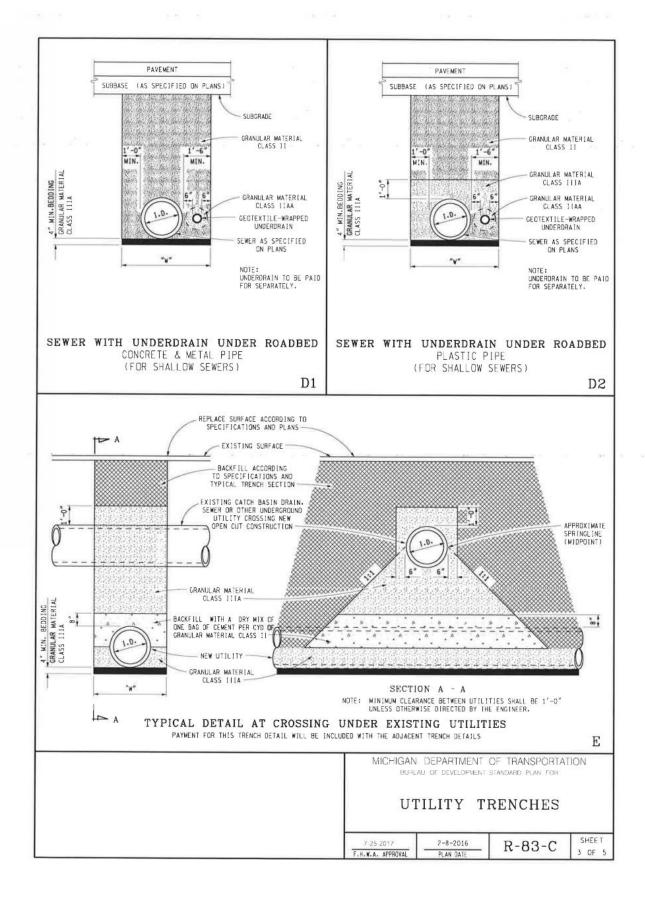


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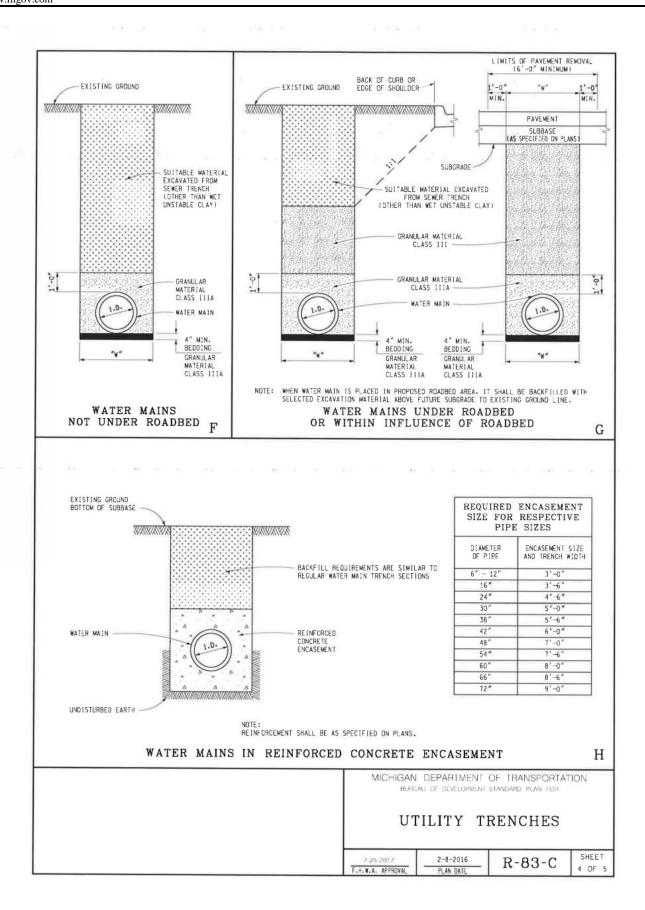
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NOTES:

BACKFILLING SHALL BE ACCORDING TO THE STANDARD SPECIFICATION.

SUFFICIENT TRENCH WIDTH SHALL BE PROVIDED TO ALLOW FREE WORKING SPACE AND TO PERMIT COMPACTING THE BACKFILL AROUND THE PIPE.

THE FOLLOWING ARE MINIMUM TRENCH WIDTHS:

I.D. PIPE SIZE (INCHES)		THAN 8	21	24	30	36
"w" TRENCH WIDTH (FEET)	3	.0	3.5	4.0	5.0	6.0
I.D. PIPE SIZE (INCHES)	42	48	54	60	66	72
"w" TRENCH WIDTH (FEET)	7.0	8.0	9.5	10.0	10.5	11.0
I.D. PIPE SIZE (INCHES)	78	84	90	96	102	108
TRENCH WIDTH	11.5	12.0	12.5	13.0	13.5	14.0

ESTIMATED PAVEMENT REMOVAL WIDTH 1S TO BE TRENCH WIDTH "W" PLUS 1'-0" EACH SIDE OF THE TRENCH (6'-0" MINIMUM).

MICHIGAN DEPARTMENT OF TRANSPORTATION
BURSAU OF DEVELOPMENT STANDARD PLAN FOR

UTILITY TRENCHES

7.25-2017 2-8-2016 R-83-C SHEET 5 OF 5



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APPLICABLE SOIL EROSION AND SEDIMENTATION CONTROL MEASURES (COMPREHENSIVE DETAILS ARE LOCATED IN SECTION 6 OF THE SOIL EROSION & SEDIMENTATION CONTROL MANUAL)

A = SLOPES

B = STREAMS AND WATERWAYS

C = SURFACE DRAINAGEWAYS

D = ENCLOSED DRAINAGE (INLET & OUTFALL CONTROL)

E = LARGE FLAT SURFACE AREAS

F = BORROW AND STOCKPILE AREAS

KEY	DEMATE									1
	DETAIL	CHARACTERISTICS	A	1	В	С	D	E	F	G
1	<u> </u>	A Turbidity Curtain is used when slack water are to isolate construction activities from the waterco water area contains the sediments within the con-	ourse. The still		•					
	TURBIDITY CURTAIN									
2	GRUBBING OMITTED	Retains existing root mat which assists in stabilia Assists in the revegetation process by providing Reduces sheet flow velocities preventing rilling a Discourages off-road vehicle use.	sprout growth.					•		
3		Inexpensive but effective erosion control measurable flat areas and mild slopes. Permits runoff to infiltrate soil, reducing runoff vor Proper preparation of the seed bed, fertilizing, matering is critical to its success.	olumes.			•		•		
	PERMANENT/TEMPORARY SE	The state of the s		1	_					L
4	00-0	Dust control can be accomplished by watering, and/or applying calcium chloride. The disturbed areas should be kept to a minimum. PERMANENT/TEMPORARY SEEDING (KEY 3) should be applied as soon as possible.						•	•	
	DUST CONTROL									
5	Provides immediate vegetative cover such as at spillways and ditch bottoms. Proper preparation of the topsoil, placement of the sod, and watering is critical to its success.							•	•	
	SODDING									
6	Reduces sheet flow velocities preventing rilling and gullying. Assists in the collection of sediments by filtering runoff. Assists in the establishment of a permanent vegetative cover.							•		
	VEGETATED BUFFER STR	-a		1	- 1					1

PREPARED
BY
DESIGN DIVISION

DRAWN BY: B.L.T.

CHECKED BY: W.K.P.

APPROVED BY:

STORY C. Friendle

APPROVED BY:

STORY OF DELIVERY

ENGINEER OF DELIVERY

APPROVED BY: Mal a Van Part Plent
ENGINEER OF DEVELOPMENT

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

SOIL EROSION & SEDIMENTATION CONTROL MEASURES

9-10-2010 6-3-2010 R-96-E SHEET 1 OF 6



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KEY	DETAIL	CHARACTERISTICS	A	В	С	D	E	F	G
7	RIPRAP	Used where vegetation cannot be established. Very effective in protecting against high velocity flows. Should be placed over a geotextile liner.			•	•			•
8	AGGREGATE COVER	Can be used in any area where a stable condition is needed for construction operations, equipment storage or in heavy traffic areas. Reduces potential soil erosion and fugitive dust by stabilizing raw areas.					•	•	
9	BENCHES	Reduces sheet flow velocities preventing rilling and gullying. Assists in the collection and filtering of sediments. Provides access for stabilizing slopes.	•					•	
10	DIVERSION DIKE	Assists in the diversion of runoff to a stable outlet or sediment control device. Reduces sheet flow velocities preventing rilling and gullying. Collects and diverts runoff to properly stabilized drainage ways. Works well with INTERCEPTING DITCH (KEY 11)	•				•	•	
11	INTERCEPTING DITCH	Assists in the diversion of runoff to a stable outlet or sediment control device. Reduces sheet flow velocities preventing rilling and gullying. Works well with DIVERSION DIKE (KEY 10)	•				•	•	
12	INTERCEPTING DITCH AND DIVERSION DIKE	Assists in the diversion of runoff to a stable outlet or sediment control device. Reduces sheet flow velocities preventing rilling and gullying.					•	•	
13	GRAVEL FILTER BERM	Useful in filtering flow prior to its reentry into a lake, stream or wetland. Works well with SEDIMENT TRAP (KEY 20) and TEMPORARY BYPASS CHANNEL (KEY 35). Not to be used in lieu of a CHECK DAM (KEY 37) in a ditch.			•			•	
14	GRAVEL ACCESS APPROACH	Provides a stable access to roadways minimizing fugitive dust and tracking of materials onto public streets and highways.					•	•	
		MICHIGAN DEPARTMENT OF BUREAU OF HIGHWAY DEVELOPMENT SOIL EROSION & SE CONTROL MEA	STANI DI AS	M]	EN RE:	TAS	AT	10	
<u></u>		9-10-2010 6-3-2010 F.H. W. A. APPROVAL PLAN DATE	R-	96	-F	<u> </u>		OF.	



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KEY	DETAIL	CHARACTERISTICS	A	В	С	D	E	F	G
15	SLOPE DRAIN SURFACE	Excellent device for carrying water down slopes without creating an erosive condition. Generally used in conjunction with DIVERSION DIKE (KEY 10), INTERCEPTING DITCH (KEY 11) and INTERCEPTING DITCH AND DIVERSION DIKE (KEY 12) to direct flow to a stable discharge area or SEDIMENT TRAP (KEY 20).			•				
16	TREES, SHRUBS AND PERENNIALS	Trees, shrubs and perennials can provide low maintenance long term erosion protection. These plants may be particularly useful where site aesthetics are important along the roadside slopes.					•		
17	PIPE DROP	Effective way to allow water to drop in elevation very rapidly without causing an erosive condition. Also works as a sediment collector device. May be left in place as a permanent erosion control device.							
18		It may be necessary to dewater from behind a cofferdam or construction dam to create a dry work site. Discharged water must be pumped to a filter bag. A GRAVEL FILTER BERM (KEY 13) may be placed downslope of the filter bag to provide additional filtration prior to entering any stream or wetland.							•
19	DEWATERING WITH FILTER BAG	A device to prevent the erosive force of water from eroding soils. Used at outlets of culverts, drainage pipes or other conduits to reduce the velocity of the water. Prevents structure scouring and undermining.				•			
20	ENERGY DISSIPATORS SEDIMENT TRAP	Used to intercept concentrated flows and prevent sediments from being transported off site or into a watercourse or wetland. The size of a Sediment Trap is 5 cubic yards or less. Works well when used with CHECK DAM (KEY 37).	•		•	•			
21	SEDIMENT BASIN	A Sediment Basin is used to trap sediments from an upstream construction site. Requires periodic inspections, repairs, and maintenance. Where practical, sediments should be contained on site. A Sediment Basin should be the last choice of sediment control. The size of a Sediment Basin is greater than 5 cubic yards.							•
22	VEGETATIVE BUFFER AT WATERCOURSE	This practice is used to maintain a vegetative buffer adjacent to a watercourse. When utilized with SILT FENCE (KEY 26) it will, under normal circumstances, prevent sediment from leaving the construction site.			•		•	•	
		MICHIGAN DEPARTMENT OF BUREAU OF HIGHWAY DEVELOPMENT SOIL EROSION & SE CONTROL MEA	STANI	M]	PLA EN	T	R		N
		9-10-2010 6-3-2010 F.H.W.A. APPROVAL PLAN DATE	R-	96	- F	C		OF	



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KEY	DETAIL	CHARACTERISTICS	A	В	С	D	E	F	G
23	STREAM RELOCATION	A detail depicting the proper procedures for stream relocation. Maintains same width, depth, and flow velocity as the natural stream. Revegetate banks with PERMANENT/TEMPORARY SEEDING (KEY 3), MULCHING AND MULCH ANCHORING (KEY 28), MULCH BLANKETS AND HIGH VELOCITY MULCH BLANKETS (KEY 33) and woody plants to shade the stream.							•
24	SAND AND STONE BAGS	Sand and stone bags are a useful tool in the prevention of erosion. Can be used to divert water around a construction site by creating a DIVERSION DIKE (KEY 10). Works well for creating a CONSTRUCTION DAM (KEY 36) and temporary culvert end fill.	•	•	•	•	•	•	•
25	SAND FENCE AND DUNE STABILIZATION	A Sand Fence traps blowing sand by reducing wind velocities. Can be used to prevent sand from blowing onto roads. Must be maintained until sand source is stabilized.	•				•	•	
26	SILT FENCE	A permeable barrier erected below disturbed areas to capture sediments from sheet flow. Can be used to divert small volumes of water to stable outlets. Ineffective as a filter and should never be placed across streams or ditches where flow is concentrated.	•				•	•	
27	PLASTIC SHEETS OR GEOTEXTILE COVER	Plastic Sheets can be used to create a liner in temporary channels. Can also be used to create a temporary cover to prevent erosion of stockpiled materials.	•	•	•			•	
28	MULCHING AND MULCH ANCHORING	Anchored mulch provides erosion protection against rain and wind. Mulch must be used on seeded areas to promote water retention and growth. Should be inspected after every rainstorm and repaired as necessary until vegetation is well established.	•		•		•	•	
29	INLET PROTECTION FABRIC DROP	Provides settling and filtering of silt laden water prior to its entry into the drainage system. Can be used in median and side ditches where vegetation will be disturbed. Allows for early use of drainage systems prior to project completion.			•		•		
30	INLET PROTECTION GEOTEXTILE AND STONE	Provides settling and filtering of silt laden water prior to its entry into the drainage system. Should be used in paved areas where drainage structures are existing or proposed. Allows for early use of drainage systems prior to project completion.			•		•		
		MICHIGAN DEPARTMENT OF BUREAU OF HIGHWAY DEVELOPMENT SOIL EROSION & SE CONTROL MEA	DI	M]	pla EN	N FC	R		N
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KEY	DETAIL	CHARACTERISTICS	A	В	С	D	E	F	G
31		An Inlet Protection Sediment Trap is a temporary device that can be used in areas where medium flows are anticipated. Effective in trapping small quantities of sediments prior to water entering the drainage system. Can be used in areas such as median and side ditches.			•		•		
	INLET PROTECTION SEDIMENT TRAP								
32	A simple and economical way to reduce soil erosion by wind and water. Can be accomplished by harrowing with a disk, back blading, or tracking with a dozer perpendicular to the slope. SLOPE ROUGHENING AND SCARIFICATION		•				•	•	
33	MULCH BLANKETS AND HIGH VELOCITY MULCH BLANKETS	Mulch blankets provide an immediate and effective cover over raw erodible slopes affording excellent protection against rain and wind erosion. High velocity mulch blankets work well for stabilizing the bottom of ditches in waterways.	•		•		•	•	
34	Used to create a dry construction area and protect the stream from raw erodible areas. Must be pumped dry or dewatered according to DEWATERING WITH FILTER BAG (KEY 18).			•					•
35	TEMPORARY BYPASS CHANNEL	Utilized when a dry construction area is needed. Isolates stream flows from raw erodible areas minimizing erosion and subsequent siltation. Can incorporate SEDIMENT BASIN (KEY 21), CHECK DAM (KEY 37), and GRAVEL FILTER BERM (KEY 13) to remove sediments from water. Construction sequence of events may be necessary.		•					•
36	CONSTRUCTION DAM	Used to create a dry or slack water area for construction. Isolates the stream from raw erodible areas. Can be created out of any non-erodible materials such as SAND AND STONE BAGS (KEY 24), a gravel dike with clay core or plastic liner, steel plates or plywood.		•					•
37		Can be constructed across ditches or any area of concentrated flow. Protects vegetation in early stages of growth. A Check Dam is intended to reduce water velocities and capture sediment. A Check Dam is not a filtering device.	•		•			•	
	CHECK DAM								L

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

SOIL EROSION & SEDIMENTATION CONTROL MEASURES

9-10-2010	6-3-2010	R-96-E	SHEET
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NOTE

THIS STANDARD PLAN WILL SERVE AS A KEY IN THE SELECTION OF THE APPROPRIATE SOIL EROSION AND SEDIMENTATION CONTROL DETAILS. THIS PLAN ALSO PROVIDES THE KEY TO THE NUMBERED EROSION CONTROL ITEMS SPECIFIED ON THE CONSTRUCTION PLANS. REFER TO THE MODT SOIL EROSION & SEDIMENTATION CONTROL MANUAL. SECTION 6 FOR SPECIFIC DETAILS. CONTRACT ITEMS (PAY ITEMS). AND PAY UNITS.

COLLECTED SILT AND SEDIMENT SHALL BE REMOVED PERIODICALLY TO MAINTAIN THE EFFECTIVENESS OF THE SEDIMENT TRAP. SEDIMENT BASIN. AND SILT FENCE. AGGREGATES PLACED IN STREAMS SHOULD CONTAIN A MINIMUM OF FINES.

TEMPORARY EROSION AND SEDIMENTATION CONTROL PROVISIONS SHALL BE COORDINATED WITH THE PERMANENT CONTROL MEASURES TO ASSURE EFFECTIVE CONTROL OF SEDIMENTS DURING CONSTRUCTION OF THE PROJECT.

ALL TEMPORARY EROSION CONTROL DEVICES SHALL BE REMOVED AFTER VEGETATION ESTABLISHMENT OR AT THE DISCRETION OF THE ENGINEER. CARE SHALL BE TAKEN DURING REMOVAL TO MINIMIZE SILTATION IN NEARBY DRAINAGE COURSES.

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

SOIL EROSION & SEDIMENTATION CONTROL MEASURES

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SIGN MATERIAL SELECTION TABLE

0		SIGN MATERIAL T	YPE
SIGN SIZE	TYPE I	TYPE II	TYPE III
≤ 36" X 36"		X	Х
>36" X 36" ≤ 96" TO WIDE		Х	
> 96" WIDE TO 144" WIDE	Х	Х	
> 144" WIDE	X		

TYPE II TYPE III ALUMINUM EXTRUSION PLYWOOD ALUMINUM SHEET

ROUNDING OF CORNERS IS NOT REQUIRED FOR TYPE IOR IISIGNS.
VERTICAL JOINTS ARE NOT PERMITTED.
HORIZONTIAL JOINTS THROUGH SIGN LEGEND OR SYMBOLS ARE NOT PERMITTED.

POST SIZE REQUIREMENTS TABLE

		POST TYPE	
SIGN AREA	U-CHANNEL STEEL	SQUARE TUBULAR STEEL	WOOD
≤9	1 - 3 lb/ft*	1 - 2" 12 or 14 GA*	N/A
9 ≤ 20	2 - 3 lb/ft	2 - 2" 12 or 14 GA	1 - 4" X 6"*
> 20 ≤ 30	N/A	N/A	2 - 4" X 6"
> 30 ≤ 60	N/A	N/A	2 - 6" X 8"
> 60 ≤ 84	N/A	N/A	3 - 6" X 8"

*SIGNS 4 FEET AND GREATER IN WIDTH REQUIRE 2 POSTS.

SIGNS GREATER THAN 8 FEET IN WIDTH REQUIRE 2 OR 3 WOOD POSTS DEPENDING ON AREA OF SIGN.

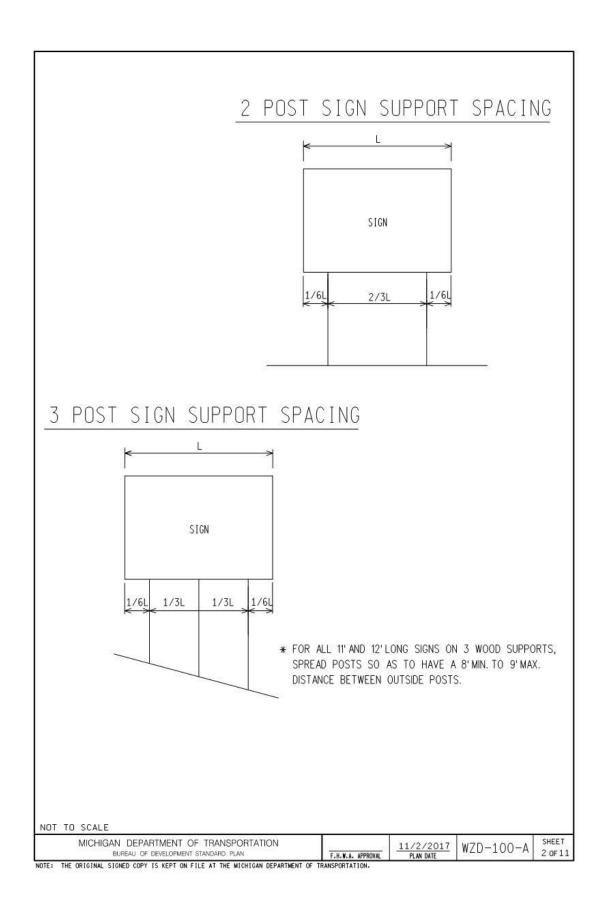
A MAXIMUM OF 2 POSTS WITHIN A 7'PATH IS PERMITTED.

&MDOT	DEPARTMENT DIRECTOR Kirk T. Steudle	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT STANDARD PLAN FOR
PREPARED BY DESIGN DIVISION	APPROVED BY: DIRECTOR, BUREAU OF FIELD SERVICES	GROUND DRIVEN SIGN SUPPORTS FOR TEMP SIGNS
DRAWN BY: CON/ECH	APPROVED BY:	11/2/2017 WZD-100-A SHEET
CHECKED BY: AUG	DIRECTOR, BUREAU OF DEVELOPMENT	F.H.W.A. APPROVAL PLAN DATE WZU 100 A 1 OF 1



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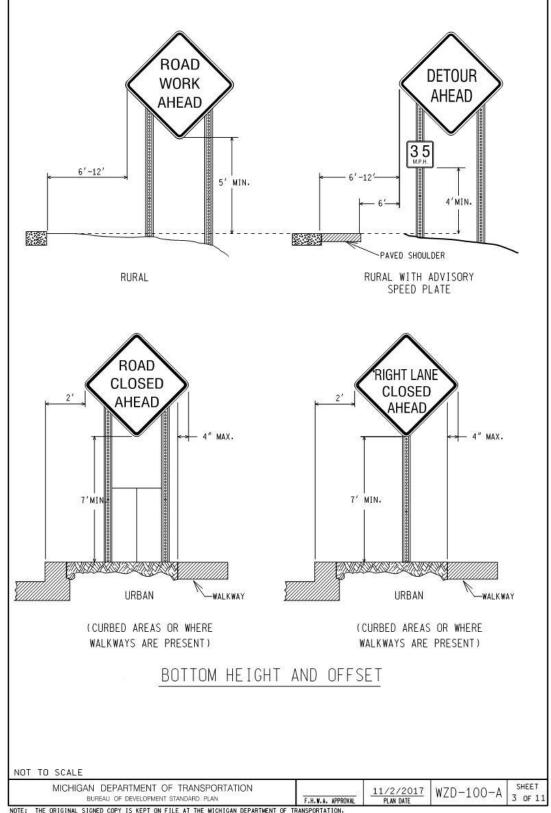
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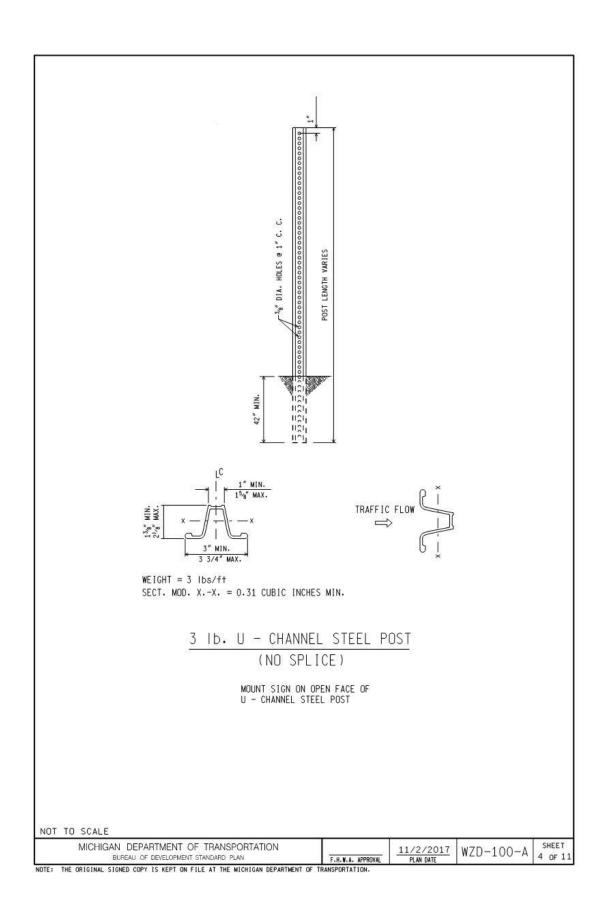


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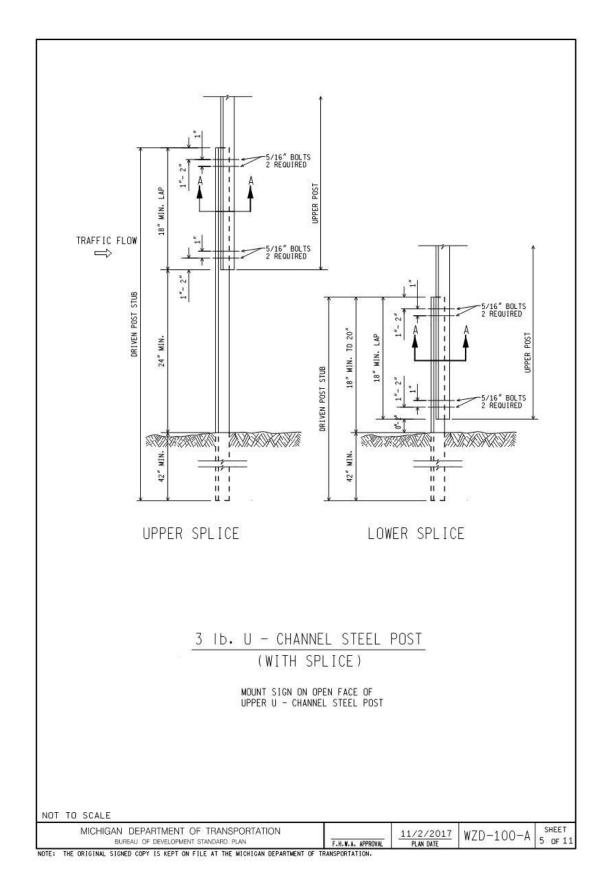
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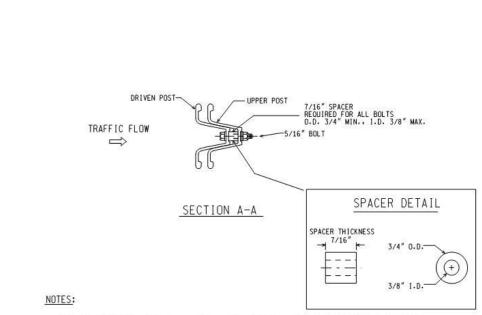
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- THE SPACER THICKNESS SHALL BE 1/16" LESS THAN THE GAP BETWEEN THE POST WHEN POSITIONED IN THE UNBOLTED CONFIGURATION.
- THE EXTERIOR BOLT (CLOSEST TO LAP), SPACER, WASHER, AND NUT SHALL BE INSTALLED IN A PREPUNCHED HOLE 1" to 2" FROM THE END OF THE LAP.
- THE INTERIOR BOLT (FARTHEST FROM LAP), SPACER, WASHER, AND NUT SHALL BE INSTALLED IN THE NEXT PREPUNCHED HOLE.
- 4. THE DRIVEN POST SHALL ALWAYS BE MOUNTED IN FRONT OF THE UPPER POST WITH RESPECT TO THE ADJACENT ONCOMING TRAFFIC, REGARDLESS OF THE DIRECTION THE SIGN IS FACING.
- 5. THE SPLICE LAP SHALL BE FASTENED BY FOUR-5/16" DIA. GALVANIZED A449 BOLTS (SAE J429 GRADE 5) OR GALVANIZED A325 BOLTS.

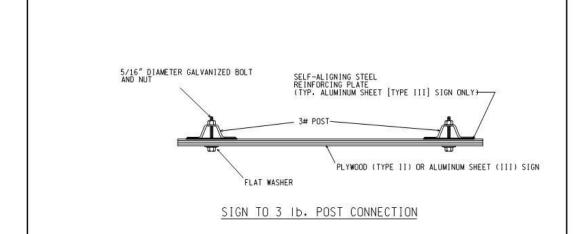
3 Ib. U - CHANNEL STEEL POST (WITH SPLICE)

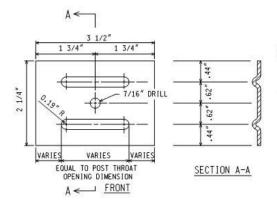
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NOTES: (FOR STEEL SIGN REINF' PLATE)

- 1. MATERIAL: 12 GAUGE CARBON STEEL.
- 2. TOLERANCE ON ALL DIMENSIONS ± 0.0625"
- 3. FINISH-AFTER STAMPING AND PUNCHING, GALVANIZE ACCORDING TO CURRENT SPECIFICATIONS FOR ZINC (HOT GALVANIZE) COATINGS ON PRODUCTS FABRICATED FROM PLATES OR STRIPS

STEEL SIGN REINFORCING PLATE
REQUIRED FOR TYPE III SIGNS ONLY

3 lb. U - CHANNEL STEEL POST SIGN CONNECTION

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BUREAU OF DEVELOPMENT STANDARD PLAN

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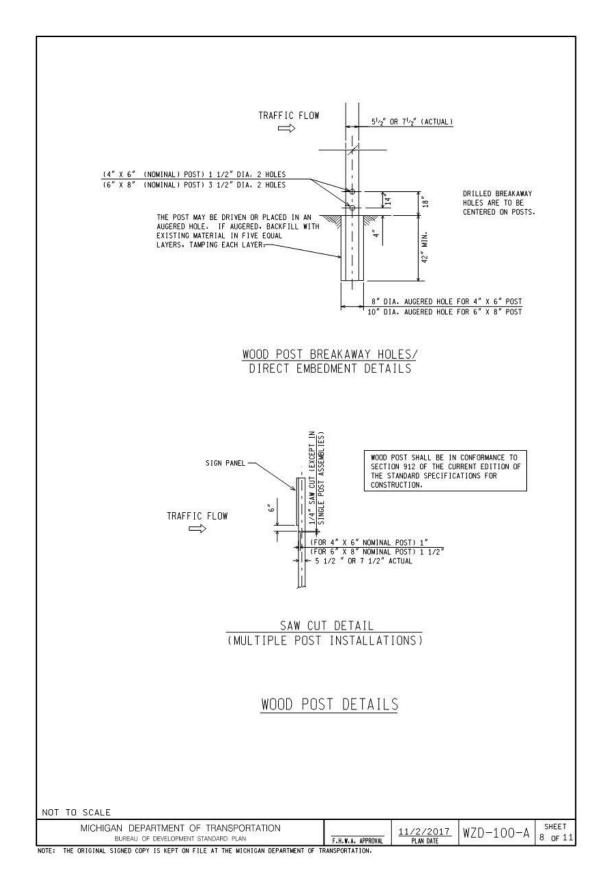
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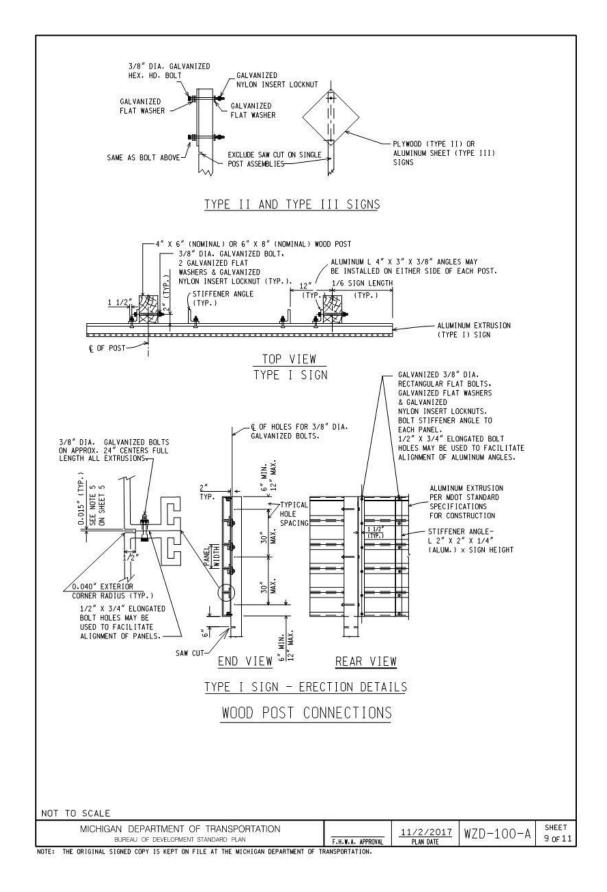
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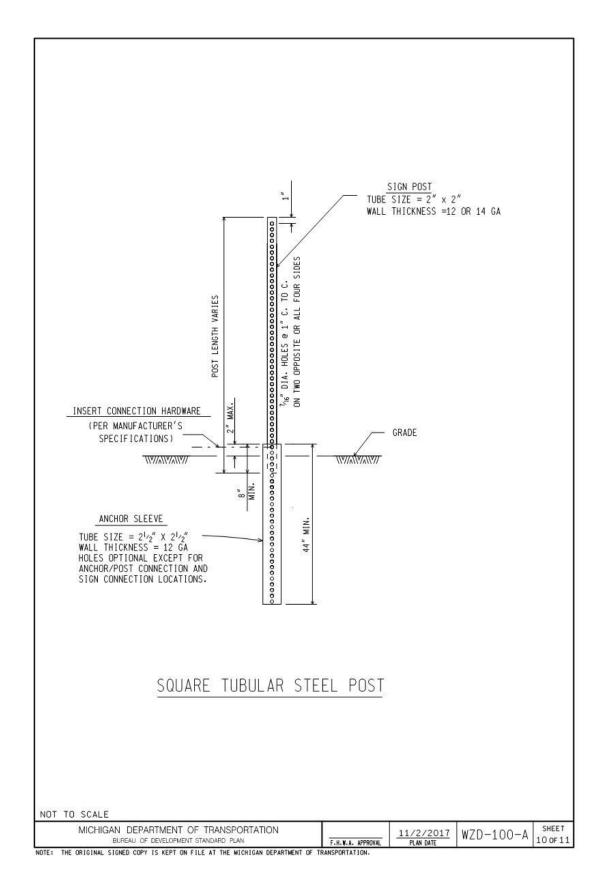
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GENERAL NOTES:

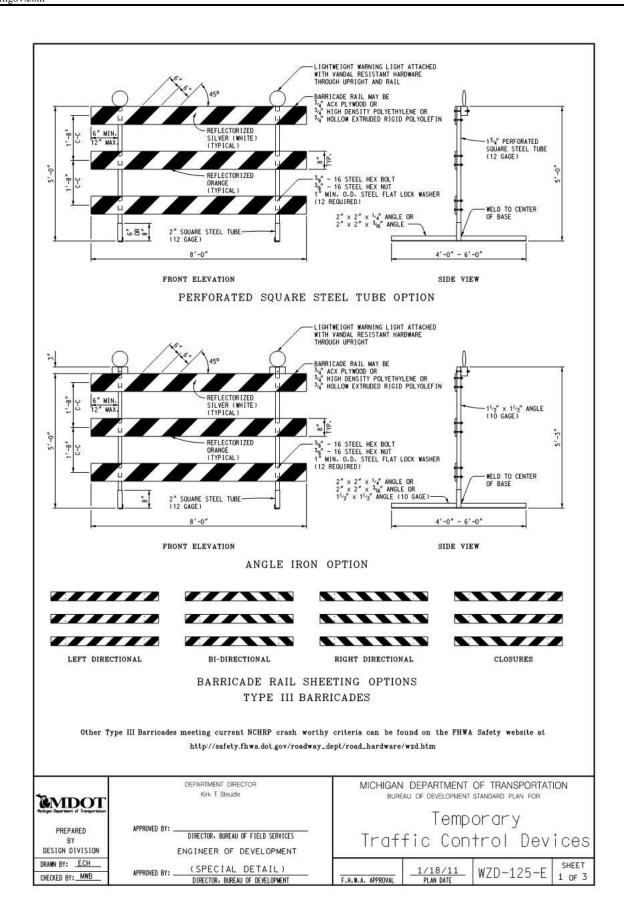
- 1. A MAXIMUM OF TWO POSTS WITHIN A 7 FOOT PATH IS PERMITTED.
- 2. ALL SIGN POSTS SHALL COMPLY WITH NCHRP 350.
- 3. ALL POSTS SHALL BE EMBEDDED A MINIMUM OF 42".
- 4. BRACING OF POST IS NOT PERMITTED.
- 5. SIGN SHALL BE LEVEL, AND UPRIGHT FOR THE DURATION OF INSTALLATION.
- 6. ERECT POSTS SO THE SIGN FACE AND SUPPORTS DO NOT VARY FROM PLUMB BY MORE THAN 3/16" IN 3'. PROVIDE A CENTER-TO-CENTER DISTANCE BETWEEN POSTS WITHIN 2 PERCENT OF PLAN DISTANCE.
- 7. NO MORE THAN ONE SPLICE PER POST, AS SHOWN, WILL BE PERMITTED.
- 8. POST TYPES SHALL NOT BE MIXED WITHIN A SIGN SUPPORT INSTALLATION.
- 9. NO VERTICAL JOINTS ARE PERMITTED IN SIGN. NO HORIZONTIAL JOINTS THROUGH SIGN LEGEND OR SYMBOLS ARE PERMITTED IN SIGN
- 10. REMOVE SIGN POSTS AND/OR POST STUBS IN THEIR ENTIRETY WHEN NO LONGER REQUIRED.
- 11. ALL LABOR, MATERIALS, AND EQUIPMENT, INCLUDING TEMPORARY SUPPORTS
 REQUIRED TO INSTALL, MAINTAIN, RELOCATE, AND/OR REMOVE THE TEMPORARY
 SIGN, INCLUDING SUPPORTS, ARE CONSIDERED TO BE INCLUDED IN THE COST
 OF THE TEMPORARY SIGN.
- 12. SAW CUTS IN WOOD POSTS ARE TO BE PARALLEL TO THE BOTTOM OF THE SIGN.
- 13. POSTS SHALL NOT EXTEND MORE THAN 4" ABOVE TOP OF SIGN.
- 14. TEMPORARY WOOD SUPPORTS DO NOT REQUIRE PRESERVATIVE TREATMENT.

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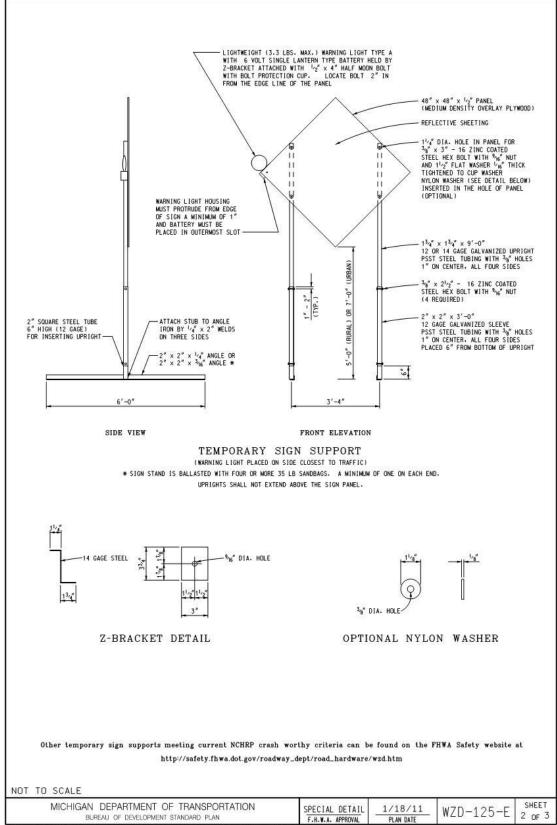
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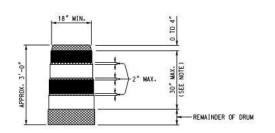
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PLASTIC DRUM

PROPOSED TYPE III BARRICADE

△ △ △ EXISTING TYPE III BARRICADE

SYMBOLS TO BE USED ON PLANS



REFLECTORIZED ORANGE

REFLECTORIZED WHITE

NON REFLECTORIZED ORANGE

NOTE:
STRIPES 12 ORANGE AND 2 WHITE) OF 6" UNIFORM WIDTH.
ALTERNATING IN COLOR WITH THE TOPMOST REFLECTORIZED
STRIPES BEING GRANGE. NON REFLECTORIZED SPACES BETWEEN
THE HORIZONTAL REFLECTORIZED OF AND WITH THE TOPMOST REFLECTORIZED
STRIPE BEING GRANGE. NON REFLECTORIZED SPACES BETWEEN
THE HORIZONTAL REFLECTORIZED ORANGE AND WHITE STRIPES
SHALL BE ORANGE IN COLOR AND EQUAL IN WIDTH.

PLASTIC DRUM

NOTES:

2" PERFORATED SQUARE STEEL TUBES MAY BE USED TO FABRICATE THE HORIZONTAL BASE OF THE TYPE III BARICADE.

WARNING LIGHTS SHALL BE PLACED ACCORDING TO THE CURRENT STANDARD SPECIFICATIONS FOR CONSTRUCTION AND ALL OTHER PROVISIONS IN THE CONTRACT ON TYPE III BARRICADES.

SEE ROAD STANDARD PLANS R-113-SERIES FOR TEMPORARY CROSSOVERS FOR DIVIDED ROADWAY, AND R-126-SERIES FOR TYPICAL LOCATION AND SPACING OF PLASTIC DRUMS FOR PLACEMENT OF TEMORARY CONCRETE BARRIER.

SIGNS, BARRICADES, AND PLASTIC DRUMS SHALL BE FACED WITH PRESSURE-SENSITIVE REFLECTIVE SHEETING ACCORDING TO THE CURRENT STANDARD SPECIFICATIONS FOR CONSTRUCTION.

SANDBAGS SHALL BE USED WHEN SUPPLEMENTAL WEIGHTS ARE REQUIRED TO ACHIEVE STABILITY OF THE BARRICADE. THE SANDBAGS SHALL BE PLACED SO THEY WILL NOT COVER OR OBSTRUCT ANY REFLECTIVE PORTION OF THE TRAFFIC CONTROL DEVICE.

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MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT STANDARD PLAN

(SPECIAL DETAIL) F.H.W.A. APPROVAL

1/18/11 PLAN DATE

SHEET WZD-125-E