CONTRACT DOCUMENTS AND SPECIFICATIONS FOR CITY OF SOUTHFIELD FIRE STATION #4 & FIRE STATION #5 PAVING IMPROVEMENTS

APRIL 1, 2024

Prepared for the
CITY OF SOUTHFIELD
Fire Department

By

OHM Advisors
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SOUTHFIELD FIRE STATION #4 AND #5 PAVING IMPROVEMENTS

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Appendix D – Construction Contracts with Certain Public Agencies

ADVERTISEMENT FOR BIDS
SOUTHFIELD FIRE STATION #4 AND #5 PAVING IMPROVEMENTS
IN THE CITY OF SOUTHFIELD, OAKLAND COUNTY, MICHIGAN

ADVERTISEMENT OF PROJECT: **APRIL 2, 2024**
BIDS DUE: **APRIL 19, 2024** **11:00 A.M., LOCAL TIME**

The City of Southfield, Oakland County, Michigan, will receive bids electronically to the office of the City Clerk, 26000 Evergreen Road, Southfield, Michigan, 48076 up to **11:00 A.M.**, Local Time on **Friday, April 19, 2024** for the **Southfield Fire Station #4 and #5 Paving Improvements.**

The project includes the following approximate quantities:

Pavement, Rem	6,200	SYD
Conc Pavt, Nonreinf, with or without curb, 7 inch	376	SYD
Conc Pavt, Nonreinf, with or without curb, 10 inch	4,791	SYD
HMA, 5EML	68	TON
HMA, 4EML	68	TON
Aggregate Base, 21AA, 8 inch	6,800	SYD
Sewer, Conc, Cl IV, 12 inch	461	FT
Sewer, Conc, Cl IV, 15 inch	36	FT
Sewer, Conc, Cl IV, 18 inch	33	FT
Dr Structure, 48 inch	3	EA
Dr Structure, 24 inch	2	EA
ADS Mechanical Treatment Device	1	EA
ADS Underground Stormwater Detention Basin	1	EA
Parking Lot Lighting	1	LSUM

The Drawings and Specifications under which work is to be done may be obtained through through the Michigan Intergovernmental Trade Network (MITN) at www.mitn.info on or after March 29, 2024. **All vendors, including Minority (MBE), Women (WBE) and Disadvantaged (DBE) Business Enterprise contractors, subcontractors, and material suppliers are encouraged to bid on this City of Southfield construction project.**

A certified check, cash or surety bid bond payable to the City of Southfield for a sum not less than five (5%) percent of the amount of the Proposal shall be required with each Proposal. The successful bidder will be required to furnish satisfactory performance, labor and material, and maintenance and guarantee bonds in the amount of 100% of the project.

The City reserves the right to reject any and all bids and to waive any irregularities in the proposals. No bids may be withdrawn after the above date and time for receiving bids for a period of sixty (60) calendar days.

An optional pre-bid meeting will be held on **Thursday, April 4, 2024 at 1:30 pm** at 24477 Lahser Road, Southfield, MI 48033**.**

Proposals are to be electronically delivered to the Purchasing Agent, in care of the City Clerk on or before **11:00 A.M.** Local Time on **April 19, 2024.** The proposal must be submitted electronically through the BIDNET.com website. Instructions for bidding will be included on the posting; additional information can be found in the Instructions to Bidder.
Janet Jackson, City Clerk
CITY OF SOUTHFIELD
OAKLAND COUNTY, MICHIGAN

INSTRUCTIONS TO BIDDER

SCOPE OF WORK

The work under this Contract includes the furnishing of all labor, materials, equipment and construction equipment necessary for performing the work described in the Advertisement, all complete and in accordance with the Drawings and Specifications.

DEFINITIONS

The following terms used in this Contract will be construed and defined as follows:

"Board" - "Owner"	The governmental agency for whom the work is being done.
"Engineer"	The City of Southfield Engineer, acting personally or by any of its authorized agents.
"Contractor"	The person(s) or firm contracting to perform the work.
"Subcontractor"	The person(s) 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 or 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.

CONTRACT DOCUMENTS

It is understood and agreed that the Advertisement, Instructions to Bidder, Proposal, Agreement, Bonds, Specifications, Drawings, Addenda and Change Orders issued by the Owner or the Engineer, and specifications and engineering data furnished by the Contractor and approved by the Engineer, are each included in this Contract and the work shall be done in accordance therewith.

SUBSURFACE CONDITIONS

If borings have been made logs thereof are in Appendix A of the Specifications. These borings have been made by a disinterested drilling contractor. This information is offered to the bidder as evidence and the bidder himself shall assume the entire responsibility for any conclusions which he may draw from it. The Owner does not guarantee, however, that 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. No additional compensation shall be payable if dewatering is required.

CONSTRUCTION CONDITIONS

It is required that each bidder will examine the Contract Documents for this work and make a personal examination of the site of the proposed work and its surroundings. It is also expected that the bidder will obtain first-hand information concerning the available facilities for receiving, transporting, handling and storing construction equipment and materials and concerning other local conditions that may affect the bidder's work.

BID DEPOSITS

Each Proposal must be accompanied by a bid deposit. This shall be in the form of a certified check or bidder's bond, for a sum not less than five percent (5%) of the amount of the Proposal drawn upon some bank in good standing or issued by a surety company authorized to do business in Michigan. This is a guarantee on the part of the bidder that he will, if called upon to do so, enter into a contract, in the attached form, to do the work covered by such Proposal at the prices stated therein and to furnish acceptable surety for its faithful and entire fulfillment. Such certified check or bidder's bond shall be made out to the Owner and shall be subject to the conditions specified in the Proposal.

RETURN OF BID DEPOSITS

The bid deposits of all except the two lowest bidders will be returned within three days after the opening of bids. The bid deposits of the two lowest bidders will be returned within 48 hours after the executed Contract and the required bonds have been fully approved by the Owner or after rejection of all bids.

FORM OF PROPOSAL

All Proposals must be a digital copy and signed by the bidder. A Proposal includes the following items: Supplemental Bid Sheet (SBS-1 to SBS-3), Bid Deposit, Non-Collusion Affidavit (NCA-1), and applicable Acknowledgement of Receipt of Addendum. A complete Supplemental Bid Sheet may include the base bid only; the alternate bid may be left blank by the bidder if desired.

All prices stated in the Proposal must be plainly written in legible words and/or figures using black ink or typed. Illegibility of any work and/or figure in the Proposal may be sufficient cause for rejection of the Proposal by the Owner. All spaces shall be filled in on the Proposal form.

Supplemental statements by the Contractor written into the Proposal form or by letter modifying the terms of the base Proposal will be considered as irregular and may make the Proposal subject to rejection by the Owner.

Each Proposal must be submitted electronically and labeled as follows:

Submitted Electronically to:	Labeled as:
Office of the City Clerk jjackson@cityofsouthfield.com Purchasing Department: Purchasingdept@cityofsouthfield.com	**Southfield Fire Station #4 & #5** **Paving Improvements**

BASIS OF PROPOSAL

Proposals are solicited on the basis of unit prices for certain items of work and lump sum prices for certain items of work, all as provided in the Proposal form.

The preliminary estimates of quantities indicated, although given with as much accuracy as is practicable, are to be regarded as approximate only, being given for the general guidance of the bidders as a basis upon which the different Proposals may be compared. The Owner reserves the right to increase or diminish any or all of these quantities within reasonable limits and the Contractor shall be paid for the actual amount of work completed by him and accepted by the Owner at the prices stated in his proposal.

PROPOSAL DATA

Where equipment manufacturers are required to be listed, the bidders must bid on equipment from the list of suggested manufacturers contained in the Specifications.

INTERPRETATION OF CONTRACT DOCUMENTS

Neither the Owner nor Engineer will give verbal answers to any inquiries regarding the meaning of Drawings and Specifications, or verbal instructions prior to the award of the Contract. Any verbal statement regarding same by any persons, prior to award, shall be unauthoritative.

Any explanation desired by bidders must be requested of the Engineer in writing not less than five (5) days prior to the bidding date and, if explanation is necessary, a reply will be made in the form of an Addendum. A copy of the Addendum will be forwarded to each prospective bidder who has received a set of the Contract Documents and to such other interested parties as have requested that they be furnished with a copy of each Addendum.

All Addenda issued to bidders prior to date of receipt of bids shall become a part of the Contract Documents and all bids are to include the work therein described. Each Proposal submitted shall list all Addenda by numbers which have been received prior to time scheduled for receipt of bids.

BONDS AND INSURANCE

The successful bidder will be required to execute three bonds with sureties acceptable to the Owner; the **Performance Bond** to be executed to the Owner, to be in the amount of one hundred percent (100%) of the full Contract price and to be conditioned for the faithful fulfillment of the Contract and to include the protection of the Owner from all liens and damages arising out of the work; the **Labor and Material Bond** to be executed to the people of the state, to be in the amount of one hundred percent (100%) of the full Contract price and to be conditioned for the payment of all labor and materials used in the work and for the protection of the Owner from all liens and damages arising there from; and the **Maintenance and Guarantee Bond**, to be in the amount of one hundred percent (100%) of the Contract price.

The Worker's Compensation Insurance, Public Liability and Property Damage Insurance and Owner's Protective Public Liability Insurance in the amounts specified in the Agreement must be carried by the Contractor.

Each Proposal shall include the premium and all other charges, if any, for the Bonds and

Insurance herein described.

RIGHT TO ACCEPT, TO REJECT AND TO WAIVE DEFECTS

The Owner reserves the right to accept any Proposal, to reject any or all Proposals, and to waive defects or irregularities in any Proposal. In particular, any alteration, erasure or interlineation of the contract documents and of the form of Proposal shall render the accompanying Proposal irregular and subject to rejection by the Owner unless initialed by the signatory prior to receipt of the Proposal.

WITHDRAWAL OF BIDS

Any bidder who has submitted a Proposal to the Owner may withdraw his bid at any time prior to the scheduled time for the receipt of bids. No bidder may withdraw his bid after the time stated in the Advertisement for receiving bids, and his bid shall be firm and shall remain firm for a period of sixty (60) days thereafter.

TAXES

The Contractor shall pay all use and other taxes that are lawfully assessed against the Contractor in connection with the work included in this Contract.

AWARD AND EXECUTION OF CONTRACT

Contract shall be awarded to the lowest responsive and responsible bidder on the basis of the lowest total sum of the extended unit prices for items of work included in the Proposal. The contract shall be deemed as having been awarded when formal notice of award shall have been duly served by the Owner upon the bidder.

TIME OF COMPLETION

The Owner and the individual citizens of the municipality affected by this project are vitally concerned with the prompt completion of the construction together with the cleanup and restoration of roads and lawns within the time allowed in the proposal.

The Contractor shall use sufficient labor and equipment to complete and place in service all of the work being constructed within this contract within the time specified in the proposal. The surface cleanup shall follow closely behind construction with earth spoil removed from lawns and roads and any trenches neatly finished by the end of each work day. **Failure of the Contractor to comply with this type of workmanlike job will result in the suspension of all contract operations until the cleanup is effected**.

If the Contractor shall be unavoidably delayed in beginning or fulfilling this contract by reason of excessive storm or floods, or by acts of Providence, or by general strikes, or by court injunction, or by stopping of the work by Owner because of any emergency or public necessity or by reason of alterations ordered by Owner, the Contractor shall have no valid claim for damages on account of any cause of 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.

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 in Article II and Article III of The Agreement, or within some other certain date subsequent to this to which the time limit for the completion of the work may have been advanced under the provisions of Article II of The Agreement, the Contractor shall pay unto the Owner as and for liquidated damages and not as a penalty, the sum of **Five Hundred Fifty Dollars ($550.00)** for each and every calendar day that the Contractor shall be in default. Said sum of **Five Hundred Fifty Dollars ($550.00)** 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 herein before 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 hand otherwise due or to become due to the Contractor or to sue for and recover compensation for damages for nonperformance of this contract at the time stipulated herein and provided.

EXECUTION OF CONTRACT AND BOND FORMS

The bidder to whom the contract shall have been awarded will be required to execute the Contract in the form attached hereto and to furnish surety and insurance certificates all as required within **ten (10) calendar days** from the date when notice of award is delivered to the bidder. The notice of award shall be accompanied by the necessary contract and bond forms as required by the General Supplementary Conditions. The notice to proceed shall be issued following the execution of the Contract by the Owner.

SOIL EROSION AND SEDIMENTATION CONTROL

The Contractor shall make himself thoroughly familiar with the requirements of the Specifications in connection with prevention of soil erosion and sedimentation control.

The Contractor will be responsible for erosion control during the life of the Contract.

The Contractor shall designate a person who shall be responsible for soil erosion and sedimentation control during the life of the Contract.

MAINTAINING TRAFFIC

The Contractor shall be responsible for maintaining traffic during the life of the Contract as required by the Specifications or as directed by the Engineer.

PROGRESS PAYMENTS

Progress payments to the Contractor will be made in accordance with State Act 524, Public Acts of 1980, a copy of which is included in the appendix.

NON-COLLUSION AFFIDAVIT

Bidders do not need to have the Non-Collusion Affidavit notarized but it must be submitted in order for a bid to be declared responsive.

SUPPLEMENTAL INSTRUCTIONS TO BIDDER

RECEIPT OF BIDS: No bids will be accepted after the time specified for the bid opening. Bids will be available for examination immediately thereafter.

DEPOSITS: If a deposit is required, it must be a company certified check or bank cashier's check or bank money order (payable to Treasurer of the City of Southfield) or cash or a Michigan-licensed surety's bid bond. Should a bidder fail to furnish the required deposit with his bid, the bid will not be read and will not receive further consideration by the Owner.

ADDITIONAL BIDS - QUANTITY INCREASE: If a slight increase in quantity results in a reduction of bid item unit cost, an additional bid on that basis may be submitted. Such additional bids must be made separately from the original bid and are subject to the same terms and conditions of the original bid.

ADDITIONAL BIDS - ALTERNATIVE PRODUCTS: If a bidder has more than one product meeting the specifications, he is privileged to offer additional bids. Such additional bids must be made separately from the original bid and are subject to the same terms and conditions of the original bid. Product brand names, if used herein, are intended to describe quality rather than preference.

WITHDRAWAL: No bid shall be withdrawn for 60 days following the bid opening date. A Bidder may reduce this period if he so states in his proposal; however, the Owner reserves the right to declare such a bid non-responsive to the specifications.

RIGHT TO REJECT: The Owner reserves the right to waive any and all irregularities in the bids, to split the award by items or lots (unless otherwise stipulated in the specifications) or to award to other than the low bidder, should any of the foregoing be deemed in its best interests.

CHANGE IN SPECIFICATIONS: If a bidder wishes to request a revision in the specifications or an interpretation of the specifications, the request may receive consideration if presented to the Owner sufficiently in advance of the bid opening date. If a change in specifications is then made, the Owner will notify all bidders by registered mail and shall postpone the bid opening date, if necessary.

SURETIES: An approved surety bond to the Owner in an amount deemed adequate by the Owner may be required to guarantee performance. In certain cases described by state law, Act No. 213 of 1963, an additional bond to the State of Michigan is mandatory.

FAILURE TO ENTER INTO CONTRACT: If a bidder fails to formally acknowledge, accept, and execute the contract within **ten (10) calendar days** after delivery of the notice of award, the bid deposit shall be forfeited to the Owner.

DEFAULT: In the event of the Contractor's failure to deliver or perform in accordance with the contract, the Owner may consider the Contractor in default and take certain steps to protect its interests. The Owner may, without impairing its other rights and benefits, purchase all or part of the contract goods or services on the open market and charge all additional costs to the Contractor or his surety.

DELIVERY: F.O.B. City of Southfield, Michigan, designated location, freight prepaid.

CONTAINER: Packing, reels, etc., if chargeable, must be shown as separate items. Return freight must be paid by Contractor. Bids incorporating charge for returnable containers, etc., will be considered an agreement to reimburse the Owner by check immediately on their return, regardless of other outstanding charges against the Owner, unless the charge is carried on a memo billing by the seller.

WORKMANSHIP: All materials furnished must be new or latest model and standard first grade quality, of best workmanship and design, unless otherwise expressly specified. Contractor shall if required, furnish satisfactory evidence of quality of materials. Offers of experimental or unproved equipment may not be considered.

INSPECTION: All costs arising from inspection, tests, and handling of materials failing to meet the specifications shall be the sole responsibility of the Contractor.

PATENTS: The Contractor shall protect and indemnify the Owner against all suits, costs, and damages which may result due to the use of any patented device, process, apparatus, material or invention during the performance of the work.

NON-COLLUSION CLAUSE: In signing and submitting this proposal, the bidder states that his bid is genuine and not collusive or a sham; such bidder has not colluded, conspired, connived, or agreed, directly or indirectly, with any bidder or person, to put in a sham bid, or that such other person shall refrain from bidding and has not in any manner, directly or indirectly, colluded, conspired, connived, or agreed, with any person, to fix the bid price of affiant or any other bidder, or to fix any overhead, profit or cost element of said bid price. Contractor shall be responsible for completing and submitting the Non-Collusion Affidavit included in the contract documents (page NCA-1).

NON-DISCRIMINATION CLAUSE: By signing and submitting this proposal for consideration by the Owner, the Contractor covenants not to discriminate against an employee or applicant for employment with respect to hire, tenure, terms, conditions or privileges of employment or a matter directly or indirectly related to employment, because of race, color, religion, national origin, age, sex, height, weight, marital status or a handicap that is unrelated to the individual's ability to perform the duties of a particular job or position. Breach of this covenant may be regarded as a material breach of the contract.

Permits: The following permits will be required for construction. The Contractor is required to comply with all terms and conditions of the permit as incidental to the unit prices bid and no extra compensation will be allowed.

- City of Southfield Engineering Department
    - Soil Erosion and Sedimentation Control Permit
    - Engineering Permit
- City of Southfield Building Department
    - Building Permits (for each station)
    - Demolition Permit
    - Electrical Permit
- Oakland County Road Commission Right-of-way permit

Unless otherwise indicated, the Contractor must secure the permits prior to the start of construction and shall be responsible for all associated fees, deposits, bonds, proof of insurance, etc. The Contractor shall also be responsible for arranging for inspection by the governing agencies. Work cannot proceed until all permits are obtained.

ORDINANCE NO. 1478

AN ORDINANCE TO AMEND THE CODE OF THE CITY OF SOUTHFIELD BY ADDING A NEW CHAPTER, WHICH NEW CHAPTER SHALL BE DESIGNATED AS CHAPTER 14, LIVING WAGE REQUIREMENTS, OF TITLE I, ADMINISTRATION, OF SAID CODE.

THE CITY OF SOUTHFIELD ORDAINS:

SECTION 1.

The Code of the City of Southfield is hereby amended by adding a new Chapter 14, Living Wage Requirements, to Title I, Administration, which shall read as follows:

Chapter 14: LIVING WAGE REQUIREMENTS.

Section 1.600. Purpose.

The purpose of this Ordinance is to improve the lives of working people and their families by requiring covered employers that provide contractual services to the City or that receive a tax abatement from the City to pay their covered employees a wage sufficient to meet basic subsistence needs, defined herein as a living wage.

Section 1.601. Definitions.

For purposes of this Chapter, the following definitions shall apply:

(1.) *Covered employer* means a person that either:

(a.) Enters into a contract or contracts with the City primarily for the furnishing of services where the total amount of the contract or contracts, including related subcontracts, exceeds Fifty Thousand Dollars ($50,000.00) for any twelve (12) month period. Covered employer includes a related subcontractor, but does not include a person that has a contract or subcontract primarily for the purchase or lease of goods or property by the City; or

(b.) Receives a tax abatement from the City.

(2.) *Covered employee* means a person employed full-time by a covered employer to perform services in connection with the covered employer's contract or contracts with the City, including related subcontracts, or a person employed full-time by a covered employer at an office or facility which either has been granted a tax abatement or where personal property which has been granted a tax abatement is located.

(3.) *Federal poverty guideline* shall mean the official poverty guideline issued annually by the United States Department of Health and Human Services for a family of four (4).

(4.) *Health care benefits* shall mean comprehensive, medical coverage for the covered employee fully paid for by the covered employer, whether provided on an insured or self-funded basis. Health care benefits may include membership in a health maintenance organization (HMO) or similar entity, if the membership or subscription fee is fully paid for by the covered employer.

(5.) *Living wage* shall mean an hourly rate which, on an annual basis (based on forty [40] hours per week, fifty [50] weeks per year), is equivalent to either of the following:

(a.) One hundred and twenty-five percent (125%) of the federal poverty guideline, or

(b.) One hundred percent (100%) of the federal poverty guideline, if health care benefits are provided to the covered employee.

(6.) *Person* shall mean any individual, firm, joint venture, partnership, corporation, club, and all associations or organizations of natural persons, either incorporated or unincorporated, however operating or named, and whether acting by themselves or by a servant, agent, or fiduciary, and includes all legal representatives, heirs, successors, and assigns thereof.

(7.) *Tax Abatement* means a tax abatement approved by the City, pursuant to the Plant Rehabilitation and Industrial Development District Act, Public Act 198 of 1974, MCL 207.551, *et seq*.

Section 1.602. Living Wage Required.

(1.) Every covered employer shall pay its covered employees and at least ninety percent (90%) of all the employees working on behalf of a covered employer in connection with a contract with the City no less than a living wage.

(2.) In order to qualify to pay the living wage rate for covered employers providing employee health care benefits under Subsection 1.601(5)(b), a covered employer shall furnish proof of the health care benefits to the City.

(3.) All City contracts covered by this Chapter shall provide that a violation of this Chapter shall be a material breach of the contract resulting in its termination.

(4.) Any tax abatement covered by this Chapter shall be granted upon the condition that a violation of this Chapter shall result in its revocation.

Section 1.603. Monitoring of Compliance with this Chapter.

The City Purchasing Agent shall monitor compliance with the requirements of this Chapter, and shall notify all covered employers of any adjustment in the federal poverty level by March 1st of each year. If the living wage has increased, the covered employer shall begin paying the increased wage rate no later than April 1st of that year. The Purchasing Agent shall require all

covered employers to annually certify compliance with the requirements contained in Section 1.602 and all other provisions of this Chapter. In addition, any covered employer who is required to pay a living wage under Section 1.602 shall post a notice of such requirement in a conspicuous place in any work place where a covered employee is employed. The notice shall also state that, if the covered employer has failed to comply with the requirement of Section 1.602, a covered employee may file a notice of non-compliance with the Purchasing Agent. All City departments shall be provided with standard notices which set forth the requirements of this Chapter for inclusion in the solicitation of proposals, bids, or applications for City contracts. Departments shall include said notices in their RFP's, RFQ's, specifications, and notices inviting bids or any other solicitations for contracts.

Section 1.604. Notice of Non-Compliance.

Any covered employee of a covered employer, who believes the covered employer has failed to comply with this Chapter, may file a notice with the Purchasing Agent. The Purchasing Agent, based on such notice or on his or her own initiative if a possible violation of this Chapter is discovered by other means, shall forward a notice to the covered employer by first class mail describing the violation; requesting the submission of proof of compliance within thirty (30) days of mailing, and indicating that failure to do so shall result in the termination of its contract or tax abatement. This Chapter shall not be construed to limit a covered employee's right to bring legal action for violation of any other minimum compensation or wage and hour law.

Section 1.605. Non-Compliance.

In the event the Purchasing Director determines that a covered employer has failed to comply with the provisions of this Chapter and the covered employer has failed to rectify the non-compliance within thirty (30) days of the mailing of the notice provided for in Section 1.604, the City shall take appropriate action to terminate its contract or tax abatement.

Section 1.606. Exemptions from Application of this Chapter.

The following exemptions from compliance with this Chapter shall apply:

(1.) The provisions of this Chapter shall not apply to a contract with another unit of government.

(2.) The provisions of this Chapter shall not apply to a covered employee who is:

(a.) younger than eighteen (18) years of age;

(b.) employed during summer months in a student or youth employment program;

(c.) engaged in any training program, not to exceed a time period of ninety (90) days, that qualifies the person either to begin employment with the covered employer or to receive an employment promotion within the covered employer; or

(d.) engaged or participating in a bona fide, student internship program.

(3.) The provisions of this Chapter shall not apply where a covered employee is subject to the terms of a collective bargaining agreement.

(4.) The provisions of this Chapter shall not apply where federal or state law requires the payment of a prevailing wage.

(5.) A non-profit covered employer, which is recognized by the Internal Revenue Service as tax exempt under the Internal Revenue Code, shall be exempt from the provisions of this Chapter, provided that this exemption shall only apply to a non-profit, covered employer if it employs ten (10) or fewer employees on a continuous basis. A continuous basis is defined as employing ten (10) or fewer employees on each working day in each of twenty (20) or more calendar weeks in the current or preceding year.

(6.) The provisions of this Chapter shall not apply to contracts entered into or tax abatements approved prior to the effective date of this Chapter.

Section 1.607. Exemptions determined by City Council.

The City Council may grant a partial or complete exemption from the requirements of this Chapter if it determines one (1) of the following:

(1.) The application of this Chapter would violate federal, state, or local law(s); or

(2.) The application of this Chapter to a non-profit, covered employer, recognized as tax exempt under the Internal Revenue Code, would not be in the best interest of the City.

Section 1.608. Change in Status of Employees.

No affected covered employer shall reduce the compensation, wages, fringe benefits, or leave available to any covered employee or other employee in order to pay the living wage required by this Chapter.

Section 1.609. Annual Report.

The City Administrator shall submit an annual report to the City Council and the Mayor with regard to the operation of this Chapter. The report shall contain a listing and the status of all contracts and tax abatements to which this Chapter applies, including the term; dollar amount; the services performed or assistance provided; a summary of all violations of this Chapter; adjustments to the living wage, if any; a description of any administrative problems encountered; and recommendations for more efficient and effective administration of the provisions of this Chapter.

Section 1.610. Penalty.

(1.) A violation of any provision of this Chapter is a civil infraction punishable by a fine of not more than Five Hundred Dollars ($500.00), plus all costs of the action. The Court may issue and enforce any judgment, writ, or order necessary to enforce this

Chapter, including payment to the affected covered employee or employees of the difference between wages actually paid and the living wage that should have been paid, interest, and other relief deemed appropriate.

(2.) Each day, upon which a violation occurs, shall constitute a separate violation.

SECTION 2.

Should any section, clause, or paragraph of this Ordinance be declared by a court of competent jurisdiction to be invalid, the same will not affect the validity of the Ordinance as a whole or part thereof other than the part declared to be invalid.

SECTION 3.

All ordinances, parts of ordinances, or codes in conflict herewith are hereby repealed only to the extent necessary to give this Ordinance full force and effect.

SECTION 4.

This Ordinance shall become effective on September 8, 2002.

KENSON J. SIVER, Mayor

SHERIKIA L. HAWKINS, City Clerk

Introduced: 07-22-02

Enacted: 08-26-02

Published: 09-08-02

NOTICE OF EMPLOYERS OBLIGATION
TO COMPLY WITH LIVING WAGE ORDINANCE
OF THE CITY OF SOUTHFIELD

This Employer is required to pay a “living wage” under Section 1.602 of the Southfield City Code to “covered employees” performing services in connection with a contract between the Employer and the City of Southfield.

If any covered employee believes this Employer has failed to comply with Section 1.602 of the Southfield City Code, he or she may file a notice of non-compliance with the City of Southfield Purchasing Agent (248-796-5250).

The Employer shall not reduce the compensation, wages, fringe benefits, or leave available to any covered employee or other employee in order to pay the living wage required by the Ordinance.

The Living Wage Ordinance does not limit a covered employee’s right to bring legal action for violation of any other minimum compensation or wage and hour law.

Supplemental Specification:
City of Southfield Living Wage Ordinance

The Contractor shall comply with the terms of the City of Southfield "Living Wage Ordinance", Chapter 14 of Title I, of the Code of the City of Southfield (the "Ordinance").

The Contractor shall pay its "covered employees" (a person employed full-time to perform services in connection with the Contractor's contract(s) with the City, including related subcontracts) and at least 90% of all the employees working on behalf of the Contractor in connection with a contract with the City, no less than a "Living Wage".

A "Living Wage" means an hourly rate which, on an annual basis (based on forty hours per week, fifty weeks per year) is equivalent to either of the following:

a) One Hundred Twenty-Five percent (125%) of the federal poverty guideline, or

b) One Hundred percent (100%) of the federal poverty guideline if Health Care Benefits are provided to the covered employee - ("Health Care Benefits" means comprehensive, medical coverage for the covered employee fully paid for by the Contractor, whether provided on an insured or self-funded basis. "Health Care Benefits" may include membership in a health maintenance organization (HMO) or similar entity, if the membership or subscription fee is fully paid by the Contractor).

The Contractor shall be required to certify both at the commencement of the Contract and upon request for final contract payment that it is in compliance with the requirements of the Living Wage Ordinance.

The Contractor shall post a notice of its obligation to comply with the Living Wage Ordinance in a conspicuous place in any work place where a covered employee is employed. The notice shall also state that if the Contractor has failed to pay a living wage to a covered employee, such employee may file a notice of non-compliance with the City of Southfield Purchasing Agent. The Purchasing Agent, based on such notice, or, on his or her own initiative if a possible violation of the Ordinance is discovered by other means, shall forward a notice to the Contractor by first class mail describing the violation, requesting the submission of proof of compliance within thirty (30) days of mailing. Failure by the Contractor to submit proof of compliance within such thirty (30) day period shall result in termination of the Contract.

In addition, a violation of the Ordinance is a civil infraction, punishable by a fine of not more than $500.00 plus all costs of the action. The Court may issue and enforce any judgment, writ, or order necessary to enforce the Ordinance, including payment to the affected covered employee or employees of the difference between wages actually paid and the living wage that should have been paid, plus interest, and other relief deemed appropriate.

The Contractor shall not reduce the compensation, wages, fringe benefits, or leaves available to any covered employee or other employee in order to pay the living wage required by the Ordinance.

The following exemptions from compliance with the Ordinance shall apply:

1. The provisions of the Ordinance shall not apply to a contract with another unit of government.

2. The provisions of the Ordinance shall not apply to a covered employee who is:

   (a) younger than (18) years of age;

   (b) employed during summer months in a student or youth employment program;

   (c) engaged in any training program, not to exceed a time period of ninety (90) days, that qualifies the person either to begin employment with the covered employer or to receive an employment promotion within the covered employer; or

   (d) engaged or participating in a bona fide, student internship program.

3. The provisions of the Ordinance shall not apply where a covered employee is subject to the terms of a collective bargaining agreement.

4. The provisions of the Ordinance shall not apply where federal or state law requires the payment of a prevailing wage.

5. A non-profit covered employer, which is recognized by the Internal Revenue Service as tax exempt under the Internal Revenue Code, shall be exempt from the provisions of the Ordinance, provided that this exemption shall only apply to non-profit, covered employer if it employs ten (10) or fewer employees on a continuous basis. A continuous basis is defined as employing ten (10) or fewer employees on each working day in each twenty (20) or more calendar weeks in the current or preceding year.

6. The provisions of the Ordinance shall not apply to contracts entered into prior to the effective date of this Chapter.

2024 Applicable Living Wage Rates

For employees <u>not</u> covered under health care benefits	**$18.75/hour**
For employees covered under health care benefits	**$15.00/hour**

CITY OF SOUTHFIELD

SUPPLEMENTAL BID SHEET

SOUTHFIELD FIRE STATION #4 AND #5 PAVING IMPROVEMENTS

The undersigned, having familiarized himself with the local conditions affecting the cost of the work and with the Contract Documents for the designated project, hereby proposes to perform all work and furnish all labor, tools, equipment, and materials, including utility and transportation services, necessary to perform and complete in a workmanlike manner the construction itemized below in the City of Southfield, all in accordance with the Drawings, Specifications and other Contract Documents at the unit prices hereinafter set forth.

Item	Description	Qty	Unit	Unit Price	Amount
1	Mobilization, Max 5%	1	LSUM	$	$
2	Pavement, Rem	6200	Syd	$	$
3	Structure Removal, Less than 72" Dia	5	Ea	$	$
4	Sewer, Rem, Less than 24 inch	202	Lf	$	$
5	Sewer Bulkhead	2	Ea	$	$
6	Water Main, Rem	28	Ft	$	$
7	Fence, Rem	23	Ft	$	$
8	Sidewalk, Rem	107	Syd	$	$
9	Earth Excavation	345	Cyd	$	$
10	Water Appurtenance, Remove	3	Ea	$	$
11	Soil Erosion Control	1	LSUM	$	$
12	Site Earthwork, Fire Station #4	1	LSUM	$	$
13	Site Earthwork, Fire Station #5	1	LSUM	$	$
14	Existing Tower, Remove	1	LSUM	$	$
15	Storage Tank, Abandon	1	Ea	$	$
16	Structure Cover, Adj, Case 1	7	Ea	$	$
17	Tree, Rem, 6 inch to 18 inch Diameter	2	Ea	$	$
18	Curb and Gutter, Rem	368	Ft	$	$
19	Gate, Wood Screened, 96 inch	1	Ea	$	$
20	Fence, Wood Screened, 96 inch	30	Ft	$	$
21	Concrete Sidewalk, 4 inch with or without curb	710	Sft	$	$
22	Concrete Sidewalk, 6 inch	40	Sft	$	$

23	Concrete Sidewalk, 10 inch	890	Sft	$	$
24	Sidewalk Ramp, ADA	90	Sft	$	$
25	Driveway Opening, Conc, Det M	370	Ft	$	$
26	Curb Ramp Opening, Conc	14	Ft	$	$
27	Curb and Gutter, Conc, Det B2	20	Ft	$	$
28	Conc Pavt, Nonreinf, with or without curb, 7 inch	376	Syd	$	$
29	Conc Pavt, Nonreinf, with or without curb, 10 inch	4791	Syd	$	$
30	HMA, 5EML	68	Ton	$	$
31	HMA, 4EML	68	Ton	$	$
32	Aggregate Base, 21AA, 4 inch	800	Syd	$	$
33	Aggregate Base, 21AA, 8 inch	6800	Syd	$	$
34	Underdrain, Subgrade, 6-inch	520	Ft	$	$
35	Sewer, Conc, Cl IV, 12 inch	461	Ft	$	$
36	Sewer, Conc, Cl IV, 15 inch	36	Ft	$	$
37	Sewer, Conc, Cl IV, 18 inch	33	Ft	$	$
38	Dr Structure, 24 inch	2	Ea	$	$
39	Dr Structure, 48 inch	3	Ea	$	$
40	Manhole Cover, Type Q	1	Ea	$	$
41	ADS Mechanical Treatment Device	1	Ea	$	$
42	Outlet Control Structure	1	Ea	$	$
43	ADS Underground Stormwater Detention Basin	1	Ea	$	$
44	Surface Restoration	700	Syd	$	$
45	Bike Hoop, Furnish and Install	2	Ea	$	$
46	Parking Lot Lighting	1	LSUM	$	$
47	Pavement Markings	1	LSUM	$	$
48	Traffic Maintenance and Control	1	LSUM	$	$
49	Southfield Building Permit Allowance	1	LSUM	$ 2,000.00	$ 2,000.00
	BID TOTAL (Items 1-42)			$	$

BID TOTAL (Items 1-51)	$	$

The undersigned attaches hereto a (certified check/bidder's bond) in the sum of $_____ ($_____) as required in the Instructions to Bidder and the undersigned agrees that, in case he shall fail to fulfill his obligations under the foregoing Proposal and Agreement, the said Owner may, at its option, determine that the undersigned has abandoned his rights and interests in such Proposal and that the certified check or bidder's bond accompanying his Proposal has been forfeited to the said Owner; but otherwise, the said certified check or bidder's bond shall be returned to the undersigned upon the execution of the contract and the acceptance of his bonds or upon the rejection of his Proposal.

It is agreed that this bid may not be withdrawn for a period of sixty (60) days after the opening date.

In submitting this bid, it is understood that the right is reserved by the Owner to reject any or all bids, to accept other than the low bid, and to waive any defect or irregularity in any bid or to split award unless otherwise stipulated, should it be deemed to be in the best interest of the Owner to do so.

The Bidder is required to identify his subcontractors that will be utilized for this project in the following areas:

WORK OR SERVICE PERFORMED	COMPANY NAME	OWNERSHIP (MBE/WBE)
Earthwork/Removals		
Underground Utilities		
Bituminous Pavement		
Concrete Pavement		
Restoration of Lawn Areas		
Electrical Work		
Landscaping		

SUBSTITUTIONS OF SUBCONTRACTORS WILL REQUIRE APPROVAL OF THE OWNER, AS SUBCONTRACTORS WILL BE A CONSIDERATION OF THE AWARD OF THE PROJECT.

Dated and signed at _____, State of Michigan,

this _____ day of _____, 20_____.

_____
Company Name

_____
Signature of Bidder

_____
Title

_____
Business Address

_____
City, State, Zip Code

_____
Telephone Number

_____
FAX Number

Seal if bid is by a Corporation.

HAZARD COMMUNICATION PROGRAM - CONTRACTOR'S POLICY STATEMENT

The City of Southfield complies with the Michigan Right to Know Law (MIOSHA). The City's written Hazard Communication Program is available upon request in the Office of Management and Budget as is our master Material Safety Data Sheets (MSDS) binder. The City Policy and master MSDS binder may be viewed at any time by both contractors and their employees performing work on City owned or operated premises.

NOTE: Time required by contractors (and their employees) to review the City Policy or Material Safety Data Sheets is **NOT** chargeable to the City of Southfield.

In addition, the successful bidder must comply with Public Act 4111 Hazard Communications (Employee Right to Know) Act by providing material safety data sheets (MSDS) to the City of Southfield prior to commencing any work.

_____ _____

NAME OF BIDDER AUTHORIZED SIGNATURE

CITY OF SOUTHFIELD

NON-COLLUSION AFFIDAVIT

)
SS:
County)

_____being first duly Sworn,
deposes and says that he is the _____
(Individual, Partner, Corporate Officer)

making the foregoing proposals or bids; that such bids are genuine and not collusive or sham; such bidder has not colluded, conspired, connived, or agreed, directly or indirectly, with any bidder or person, to put in a sham bid, or that such other person shall refrain from bidding and has not in any manner, directly with any person, to fix the bid price of affiant or any other bidder, or to fix any overhead, profit or cost element of said bid price, or of that of any other bidder, or to secure any advantage against the City of Southfield or any person or persons interested in the proposed bids; and that all statements contained in said proposal are true; and further, that such bidder has not, directly or indirectly submitted this bid, or the contents thereof, or divulged information or data relative thereto to any association or to any member or agent thereof.

Affiant

Sworn to and subscribed before me this _____ day of _____, 20____.

_____
Notary Public

_____
My Commission Expires:

LEGAL STATUS OF BIDDER

A corporation duly organized and doing business under the laws of the State of _____for whom _____ ,bearing the official title of _____, whose signature is affixed to this Proposal, is duly authorized to execute contracts.

A partnership all of the members of which, with addresses, are:

_____

_____

_____

_____

_____

An individual, whose signature is affixed to this Proposal.

(The BIDDER shall fill out the appropriate form and strike out the other two.)

AGREEMENT

THIS AGREEMENT, made and entered into this _____day of _____, 20 ____ by and between the **City of Southfield,** party of the First Part, hereinafter called the OWNER and _____, party of the Second Part, hereinafter called THE CONTRACTOR.

WITNESSETH, that the CONTRACTOR and OWNER, for the consideration hereinafter named agree as follows:

ARTICLE I - WORK

It is agreed that the CONTRACTOR shall furnish all the labor, materials, and equipment to perform all the work shown and called for on the Drawings and described in the Contract Documents entitled **Southfield Fire Station #4 & #5 Paving Improvements** prepared by **Orchard Hiltz & McCliment, Inc.,** 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, Instructions to Bidders, Specifications and any Supplements thereto agreed to by both parties.

If applicable, it is further agreed that the work shall be done using the following named materials and types of construction offered either in the base proposal or alternate thereto.

ARTICLE II - TIME

It is agreed that the CONTRACTOR shall begin work under this Contract within **10 days** of receipt of written notice to proceed and shall prosecute it in such manner that the entire work of this contract shall be complete by October 31, 2024, except as such time limits may be advanced in accordance with the provisions herein. The time of beginning, 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 or fulfilling this contract by reason of excessive storm or floods, or by acts of Providence, or by general strikes, or by court injunction, or by stopping of the work by OWNER because of any emergency or public necessity or by reason of alterations ordered by OWNER, the CONTRACTOR shall have no valid claim for damages on account of any cause of 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 - 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 as referenced to in Article II, or within some other certain date subsequent to this to which the time limit for the completion of the work may have been advanced under the provision of Article II, the CONTRACTOR shall pay unto the OWNER as and for Liquidated Damages and not as a penalty, the sum of **Five hundred and fifty Dollars ($550.00)** for each and every calendar day that the CONTRACTOR shall be in default. Said sum of **Five**

hundred fifty Dollars ($550.00) 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 herein before 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 hand otherwise due or to become due to the CONTRACTOR or to sue for and recover compensation for damages for nonperformance of this contract at the time stipulated herein and provided. Provided, however, it is 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 - 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 as 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 as shall be determined by the OWNER; 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 administrative services, the amount of such excess shall be paid to the CONTRACTOR; and if such expense shall exceed such unpaid balance, the CONTRACTOR and/or his surety 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 work without 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 V - 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 SUBCONTRACTOR 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 lessen 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 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:

NET TOTAL BID AMOUNT: $_____

Such an amount shall be modified by such sums for alterations as may have been determined under the provisions of Article XI herein and diminished by such sums as the OWNER may lawfully deduct and retain under the provisions of Article III and Article IV of this Agreement.

ARTICLE VII - NO ESTOPPEL

The OWNER shall not, nor shall any agent thereof, be precluded or stopped by any progress estimate for payment or certificate, made or given by the ENGINEER, or other agent, under the provisions of this agreement, at any time (either before or after the final completion and acceptance of the work and payment made thereof pursuant to any such progress estimate for payment or certificate showing the true and correct amount of any money due therefore, notwithstanding any such progress estimate for payment or certificate, or any payment made in accordance therewith) from demanding and receiving from the CONTRACTOR or his Sureties, separately or collectively, such sums as may have been improperly paid said CONTRACTOR by reason of any such progress estimate for payment or certificate which has been untruly or incorrectly compiled.

ARTICLE VIII - PAYMENT TO CONTRACTOR

A. Contract Value Less than $30,000.00 or Contract with Provision for 3 or Fewer Payments or Contract for Private Work

After the close of each month during which satisfactory progress has been made toward the final completion of the work, or when a specified time or phase of the work has been completed according to previous agreement or contract specifications, the ENGINEER will make an estimate of the amount and value of the work which has been done under this contract during that month, time period 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 by estimation, 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 receive payment, he shall furnish to the OWNER, if so requested, satisfactory evidence that all persons who have supplied labor, material, or equipment for the work embraced under this Contract have been fully paid for the same; and that in case such evidence is not furnished, 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 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 practical, but not longer than 30 days, after such estimate is certified to the OWNER by the ENGINEER, the OWNER shall pay to the CONTRACTOR 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 when such lawful claims are made known to the OWNER.
The progress estimate and payment thus provided for will include all alterations which may be done under the provisions of Article XI 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 make allowance in the estimate of 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, less the sums previously paid, and less such sums as the OWNER may deem to be necessary to meet the undischarged obligations of the CONTRACTOR. The CONTRACTOR shall file with the OWNER (1) a sworn statement that all claims for amounts due for labor have been paid in full, and (2) a sworn statement that all claims for amounts due for materials and equipment for this work have been paid in full, or he shall so file in lieu thereof, a sworn statement and waiver of lien showing in detail the nature and amount of all unpaid claims for said labor, materials and equipment.

B. <u>Contract Value Greater than $30,000.00 and Not Limited to 3 or Fewer Payments</u>

Payment for contracts meeting the above criteria shall be regulated by P.A. No. 524 of 1980, effective January 1, 1983, and the following reference(s) to Section(s) and subsection(s) refer to this act.

_____ is hereby designated as the
(Print or Type Name)

person representing the CONTRACTOR who will submit written requests for progress payments;

_____ is hereby designated as the
(Print or Type Name)

person representing the public agency (OWNER) to whom requests for progress payments are to be submitted.

Written requests for progress payments shall be submitted after the close of each month during which satisfactory progress has been made toward the final completion of the work. Requests for payment shall conform to the established practices of the OWNER and shall be made on standard forms prepared and/or furnished by the OWNER. Progress payments shall be processed within the guidelines and applicable time limits set forth in Section 2.

Retention of a portion of payment otherwise due, when deemed appropriate by the OWNER, shall not exceed the limits set forth in Section 3 (2); all such retainage to be maintained in separate financial accounts for each contract, deposited in interest bearing accounts in regulated financial institutions, when appropriate and as specified in Section 3 (3). Retainage and interest earned shall be released to the CONTRACTOR as set forth in Section 3 (4) and 3 (5), with exceptions as provided.

The progress payments thus provided for will include all alterations which may be done under the provisions of Article XI 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 materials, but not including sewer pipe or water main and appurtenances associated therewith, properly stored and protected on the site, the ENGINEER may make allowance in the estimate of 75% of the value of such items.

No progress payment 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.

It is agreed that the OWNER may submit matters of dispute regarding a delay, for reasons that were within the control of the CONTRACTOR, or which have been caused, continued or aggravated by actions of the CONTRACTOR, to an agent who has background, training and experience in construction of similar facilities for resolution, as set forth in Section 4. The OWNER and the CONTRACTOR shall be bound by the guidelines established for the resolution of disputes therein defined and by the subsequent guidelines established for the completion of the contract by a SUBCONTRACTOR selected by the OWNER for occasions arising from the specified disputes.

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. The CONTRACTOR shall submit a written request for final progress payment to the OWNER and the OWNER will pay to the CONTRACTOR the entire amount of such final estimate including retainage and interest earned on retainage, less the sums previously paid, and less such sums as the OWNER may rightfully retain as provided for in Section 4 (7) and 4 (8). The CONTRACTOR shall file with the OWNER (1) a sworn statement that all claims for amounts due for labor have been paid in full, and (2) a sworn statement that all claims for amounts due for 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.

ARTICLE IX - INDEMNITY & RELEASE

The CONTRACTOR hereby releases and covenants not to sue the City of Southfield, Michigan, its agents, employees and officers, and shall indemnify and hold harmless the City of Southfield, Michigan, its officers, employees and agents from and against any and all liability, causes of action, claims, demands, judgments, losses, damages and/or expenses, of whatsoever kind or nature, including attorney's fees and expert witness fees, and including claims for injury, mental or physical, or death to any person and/or damage to or destruction or loss of any property, real or personal, materials or equipment, (including, without limitation, damage to or destruction or loss of the City's property, materials or equipment) resulting, directly or indirectly, from or in connection with the CONTRACTOR's, or its agents', officials' or employees', performance of the Contract work, including, but not limited to:

a.) Any negligent or tortious act, error or omission of the CONTRACTOR or any of its personnel, employees, SUBCONTRACTORs, or agents;
b.) Any claim for any infringement upon any patent, copyright, trade secret, or trademark resulting from the performance of the Contract;
c.) Any failure by the CONTRACTOR or any of its personnel, employees, consultants, or SUBCONTRACTORs to perform its obligations either expressed or implied under this Contract.

In the event that any action or proceeding shall be brought against the City of Southfield, and/or its agents, officials, or employees, by reason of any claim covered hereunder, the CONTRACTOR will, at its sole cost and expense, resist or defend the same.

This Article shall survive the expiration or termination of the Contract.

The CONTRACTOR expressly agrees that this indemnification and release provision is intended to be as broad and inclusive as is permitted by law and that if any portion thereof is held invalid, it is agreed that the balance shall; notwithstanding, continue in full legal force and effect.

ARTICLE X - AMENDMENTS

The parties to this Contract may, from time to time, consider it in their best interest to change, modify or extend a term, condition or covenant of this Contract or require changes in the scope of the services to be performed by the CONTRACTOR. Any such change, addition, deletion, extension or modification, including any increase or decrease in the amount of the CONTRACTOR's compensation, which are mutually agreed upon by and between OWNER and the CONTRACTOR shall be incorporated in written amendments (herein called "Amendments") to this Contract. Such Amendments shall not invalidate this Contract, nor relieve or release the CONTRACTOR of any of its obligations under this Contract unless expressly stated therein.

No Amendment to this Contract shall be effective and binding upon the parties hereto, unless it expressly makes reference to this Contract, is in writing and is signed and acknowledged by duly authorized representatives of both parties.

ARTICLE XI - ALTERATIONS

It is agreed that the CONTRACTOR shall make alterations to the work under this Contract as OWNER may especially order in writing. Such alterations shall be paid for at prices mutually agreed upon at the time by OWNER and the CONTRACTOR or using one or more of the methods

set forth in Section 22 of the General Conditions.

In the case of additions only, where a price cannot be agreed upon in advance, then the OWNER will pay and the CONTRACTOR shall accept, as full compensation for such work, an amount equal to the actual and necessary net cost in money for the CONTRACTOR for labor, materials and equipment (in addition to that available at the site) actually used therein or expended thereon, plus thirty percent (30%) of the total labor cost, plus ten percent (10%) of the actual net material cost, plus sales tax, plus ten percent (10%) of the actual net cost of any subcontract work for supervision, power, the use of tools and facilities available at the site, taxes, insurance, bond premium and all overhead and incidental expenses.

During the progress of any extra work which is to be paid for on the basis of net cost plus stipulated percentage, the CONTRACTOR shall furnish to OWNER, at the end of each day, suitable time slips showing the name and the number of hours worked by each worker employed thereon, the nature of the work performed by such worker, and his rate of pay together with suitable and adequate memoranda of the materials used therein showing the character and amount of each such material, the sources from which it was purchased, and the price paid or to be paid therefore.

The OWNER, at his discretion, may furnish to the CONTRACTOR any materials or supplies or transportation required for extra work. The CONTRACTOR shall not be entitled to any allowance for percentage on account of materials or supplies or transportation so furnished.

It is agreed that all work that may be ordered by the OWNER and performed under the provisions of this Article shall be done by the CONTRACTOR in an effective and workmanlike manner and shall be subject to the same restrictions and liabilities as those which apply to the general work of this Contract; and the CONTRACTOR will be responsible for the maintenance and protection of such work until the time of the final acceptance of the entire job by the OWNER.

It is further agreed that no claim against the OWNER on account of alterations shall be valid unless such work has been previously ordered in writing, and unless such claim has been presented for payment as soon as practicable after the completion of such work and before the making up of the final estimate.

ARTICLE XII - CONFLICT OF INTEREST

The CONTRACTOR hereby warrants that it will not and has not, employed any employee of the OWNER to solicit or secure this Contract upon any agreement or arrangement for payment of a commission, percentage, brokerage, or contingent fee, either directly or indirectly and that if this warranty is breached, the OWNER at his election may terminate this Contract without penalty, liability or obligation, or may at his election, deduct from any amount owed to the CONTRACTOR hereunder the amounts of such commission, percentage, brokerage or contingent fee.

ARTICLE XIII - COMPLIANCE WITH APPLICABLE LAWS

The CONTRACTOR shall comply with all applicable laws, ordinances, regulations and codes of the federal, state and local governments during the term of this Contract. However, if any applicable law, ordinance, regulation or code changes during this Contract that substantially alters the obligation of the CONTRACTOR, the CONTRACTOR shall be compensated for additional obligations. The CONTRACTOR shall likewise save the OWNER harmless with respect to any damages arising from any violation of the same by it.

ARTICLE XIV - NOTICES

All formal notices, consents, approvals, requests and other communications (herein called "notices") required to be in writing under this Contract shall be mailed by registered or certified first-class mail, postage pre-paid, and addressed as follows:

If to the OWNER:

Ronald Ballerini, Captain
City of Southfield Fire Department
24477 Lahser Road
Southfield, Michigan 48033

If to the CONTRACTOR:

All other communications in writing may be mailed first-class mail, postage pre-paid to the above address.

All notices shall be deemed given on the day of the mailing. Either party to this Contract may change its address for the receipt of the notices at any time by giving notice thereof to the other as herein provided. Any notice by a party hereunder must be signed by an authorized representative of such party.

ARTICLE XV - FAIR EMPLOYMENT PRACTICES

In accordance with the United States Constitution and all federal legislation and regulations governing fair employment practices and equal employment opportunity, including but not limited to Title VI of the Civil Rights Act of 1964 (P.L. 88-352, 78 STAT. 252), and United States Department of Justice Regulations (28 C.F.R. Part 42) issued pursuant to the Title, and in accordance with the Michigan Constitution and all state laws and regulations governing fair employment opportunity, including but not limited to the Michigan Civil Rights Act (P.A. 1976 No. 453) and the Michigan Handicappers Civil Rights Act (P.A. 1976 No. 220) the CONTRACTOR agrees that he will not discriminate against any person, employee, consultant or applicant for employment with respect to his(her) hire, tenure, terms, conditions or privileges of employment or hire because of his(her) religion, race, color, national origin, age, sex, height, weight, marital status, or handicap that is unrelated to the individual's ability to perform the duties of a particular job or position. The CONTRACTOR recognizes the right to the United States and the State of Michigan to seek judicial enforcement of the foregoing covenants against discrimination against itself or its SUBCONTRACTORs.

ARTICLE XVI - TERMINATION

The OWNER may terminate this Contract for cause on twenty-four (24) hour notice. Any breach of the covenants and terms contained in this Contract may constitute grounds for termination for cause as determined by the OWNER. The CONTRACTOR shall remain liable to the OWNER for

any damages sustained by the OWNER by virtue of the CONTRACTOR's breach or any reasonable costs the OWNER incurs enforcing or attempting to enforce this Contract. The OWNER may withhold any payment(s) to the CONTRACTOR for purposes of set-off until such time as the exact amount of damages due the OWNER from the CONTRACTOR has been determined by law or equity. It is expressly understood that the CONTRACTOR will remain liable for any damages the OWNER may sustain in excess of any set-off. Should the OWNER or his designee undertake any part of the services which are to be performed by the CONTRACTOR, the CONTRACTOR shall not be entitled to any compensation for the services so performed.

The City may terminate this Contract without cause for any reason at any time by giving written notice to the CONTRACTOR of such termination specifying the effective date thereof, at least fifteen (15) days prior to the effective date of such termination. If the Contract is so terminated, the City will pay the CONTRACTOR only for the services rendered prior to termination, which payment shall constitute full and complete payment and satisfaction under the Contract.

ARTICLE XVII - MISCELLANEOUS

No failure by the OWNER to insist upon strict performance of any covenant, agreement, term or condition of this Contract or to exercise any right, term or remedy consequent upon a breach thereof shall constitute a waiver of any such breach or of such covenant, agreement, term or condition. No waiver of any breach shall affect or alter this Contract, but each and every covenant, agreement, term and condition of this Contract shall continue in full force and effect with respect to any other existing or subsequent breach thereof.

If any provision of this Contract or application thereof to any person or circumstance shall, to any extent, become invalid or unenforceable, the remainder of the Contract, or the application of such provisions to persons or circumstances other than those as to which it is invalid or unenforceable shall not be affected thereby, and each provision of this Contract shall be valid and enforceable to the fullest extent permitted by law.

The headings and sections of this Contract are for convenience only and shall not be used to construe or interpret the scope of intent of this Contract or in any way affect the same.

The rights and remedies set forth herein are not exclusive and are in addition to any of the rights and remedies provided by law or equity. The Contract shall be governed by, and be subject to, and construed according to the laws of the State of Michigan.

This Agreement may be executed in any number of counterparts. All such counterparts shall be deemed to be originals and together shall constitute one and the same instrument.

This Agreement shall bind and the rights, benefits and advantages shall insure to the successors of the City of Southfield.

This Contract shall not become effective until approved by the OWNER and executed by the authorized officials thereof.

IN WITNESS WHEREOF the OWNER and the CONTRACTOR, by and through their duly authorized representatives, have executed this Agreement as of the year and date first written above.

WITNESS:

OWNER: CITY OF SOUTHFIELD (A MICHIGAN MUNICIPAL CORPORATION)

_____ By: _____
Kenson J. Siver, Mayor

_____ By: _____
Janet Jackson, City Clerk

CONTRACTOR:

_____ By: _____

ACKNOWLEDGEMENT OF AUTHORITY

NOTE: An officer of the firm ***other*** than the officer signing the contract on page A-10 must complete, date and sign this form. The purpose of this form is to verify that the person signing on page A-10 has the legal authority to enter your firm into a contract with the City of Southfield. Full and proper completion of this form is required by the City's Legal Department in order for your contract to be approved.

I, _____ as _____ of
(Type or Print Your Name) (Your Office or Position)

_____ do hereby certify that _____
(Name of Firm) (Name of Person Signing Contract)

is _____ of _____ and that he
(Office or Position) (Name of Firm)

is authorized to execute, guarantee and commit _____ to the
(Name of Firm)

conditions, obligations and undertakings contained in this Contract or Agreement.

IN WITNESS THEREOF, I have set my hand this _____ day of_____ , 20_____.

_____
(Your Signature)

INSTRUCTIONS FOR EXECUTING AGREEMENT

If the CONTRACTOR be a corporation, the following certificate should be executed.

I, _____, certify that I am the

_____ Secretary of the Corporation named as CONTRACTOR

hereinabove; _____, who signed the foregoing Agreement on behalf of the CONTRACTOR, was then

_____ of said Corporation; that said Agreement was duly signed for and in behalf of said Corporation by authority of its governing body, and is within the scope of its corporate powers.

_____
(Corporate Seal)

If the Agreement be signed by the secretary of the corporation, the above certificate should be executed by some other officer of the corporation, under the corporate seal. In lieu of the foregoing certificate there may be attached to the Agreement copies of so much of the records of the corporation as will show the official character and authority of the officers signing, duly certified by the secretary or assistant secretary under the corporate seal, to be true copies.

The full name and business address of the CONTRACTOR should be inserted and the Agreement should be signed with his official signature. Please have the name of the signing party or parties typewritten or printed in black ink under all signatures to the Agreement.

If the CONTRACTOR should be operating as a partnership, each partner should sign the Agreement. If the Agreement be not signed by each partner there should be attached to the Agreement a duly authenticated power of attorney evidencing the signer's (signers') authority to sign such Agreement for and in behalf of the partnership.

If the CONTRACTOR be an individual, the trade name (if the CONTRACTOR be operating under a trade name) should be indicated in the Agreement and the Agreement should be signed by such individual. If signed by one other than the CONTRACTOR there should be attached to the Agreement a duly authenticated power of attorney evidencing the signer's authority to execute such Agreement for and in behalf of the CONTRACTOR.

ORDER OF PREFERENCE

The specifications in this book shall be taken in the following order of preference. The number one specification supersedes all specifications below it if there is a conflict between the specifications.

1. Special Provisions

2. Project Plans and Drawings

3. Supplemental Project Notes

4. Supplemental Specifications

5. General Conditions and General Specifications
   (In section 11 of the General Conditions the testing shall only apply as directed in a special provision.)

6. 2020 Michigan Department of Transportation Standard Specifications for Construction
   (The most current Errata to the 2020 Standard Specifications for Construction shall apply.)

This order shall hold throughout these specifications and shall be considered as part of the Contract Documents.

GENERAL CONDITIONS
TABLE OF CONTENTS

1. CONTRACT DOCUMENTS

The original and three counterparts of the Contract shall be signed by the Owner and the Contractor, unless otherwise required.

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. The Contract Documents shall consist of the Advertisement, Instructions to Bidders, Proposal, Specifications, General Conditions, General Supplementary Conditions, Contract, Bonds and Contract Drawings.

2. CONTRACT DRAWINGS AND SPECIFICATIONS

The work to be done is shown on the accompanying set of original drawings prepared or contracted by City of Southfield Engineering Department, Southfield, Michigan, and are hereby made a part of this Contract, it being mutually understood and agreed that when taken together, the drawings and contract documents, including the specifications and the 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 Owner or supplied to the Contractor by the Owner 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 therefrom. 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 Owner or Owner's Representative'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.

In case 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 and his decision shall be final and binding.

3. OWNER'S STATUS

The Owner retains all rights to enforce all provisions of the Contract Documents, if administrating the contract solely or if the Owner elects to retain an Owner's Representative, to work through the Owner's Representative to enforce all provisions of the Contract Documents.

4. OWNER'S REPRESENTATIVE'S STATUS

The Owner's Representative and his Field Representative have authority to stop the work whenever such stoppage may be necessary to insure that the finished work will be in accordance with the Contract Document. They shall also have authority to reject all work and material which does not conform to the drawings and specifications.

5. OWNER'S FIELD REPRESENTATIVE'S STATUS

The Owner may appoint on the job a Field Representative or use a City employee who shall be under the direction of the Owner's Representative. The Field Representative on the work will inform the Owner's Representative as to the progress of the work, the manner in which it is being done, and the quality of the materials being used. The Field Representative will call to the attention of the Contractor any failure to follow the drawings and specifications that he may observe. The Field Representative shall have the authority to reject materials or suspend the work until any questions on the performance of the work can be referred to and decided by the Owner or Owner's Representative. The Field Representative shall have no authority to direct the Contractor's work or workmen, to supervise the Contractor's operations or to change the contract drawings or specifications.

In no instance shall any action or omission on the part of the Field Representative release the Contractor of the responsibility of completing the work in accordance with the drawings and specifications.

6. 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, or because the nature of the ground in which the work is done is 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.

7. PERMITS AND REGULATIONS

The Contractor shall secure, at no cost to the Owner, all permits and licenses necessary for the prosecution of the work. 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 Contract Documents.

8. SUBCONTRACTS

The Contractor shall not sublet, assign, or transfer this Contract or any portion thereof or any payments 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 free from any of the contract obligations.

The Contractor shall, as soon as practicable after the signing of the Contract, notify the Owner in writing of the names of subcontractors proposed for the work and shall not employ any that the Owner 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 were employees of the Contractor, and the Contractor shall not be in any manner thereby relieved from his obligation and liabilities; and the work and materials furnished by the subcontractor shall be subject to the same provisions as if furnished by the Contractor.

9. 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 will meet the contract requirements.

Prior to the approval of materials, equipment, and arrangements by the Engineer based on the information submitted by the Contractor, any work done by the Contractor shall be at his own risk.

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.

10. GENERAL REQUIREMENTS FOR MATERIALS & WORKMANSHIP

In the specifications where a particular material or piece of equipment is specified by reference to some particular make or 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 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 therefor by the Contractor as will meet with the approval of the Engineer.

If not otherwise provided, material or work called for in this contract shall be furnished and performed in accordance with well known established practice and standards recognized by architects, engineers and the trade.

11. 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 certificate therefor submitted to the Engineer.

12. LINES AND GRADES

Principal reference lines or points and benchmarks shall be given by the Engineer at such time as he may deem necessary; or if the Contractor shall be in need of such reference lines or benchmarks, he shall notify the Engineer forty-eight (48) hours in advance, excluding Saturdays, Sundays and holidays.

The Engineer will set suitable stakes and marks showing the locations and elevations of the various parts of the work and will furnish the Contractor with "cut sheets" referred to the reference points. 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 and shall provide all labor and material to set required batter boards and locate the work accurately with reference to the above points.

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.

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, all 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, including fire, vandalism and malicious mischief, and shall turn the finished work over to the Owner in good condition and repair, at the time of the final estimate.

14. RESPONSIBILITY FOR ADJOINING STRUCTURES & TREES

The Contractor shall assume full responsibilities for the protection of all pavements, curbs, bridges, railroads, poles and any other surface structures and all water mains, sewers, telephone, gas mains, and 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.

No trees or shrubbery of any kind shall be removed or destroyed by the Contractor without the written permission of the Owner, and the Contractor will be held fully responsible for any damages caused by his work to adjoining trees and shrubs. 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 and replaced in a manner acceptable to the Owner.

15. MAINTENANCE OF SERVICE

Drainage through existing sewers and drains shall be maintained at all times during construction and all nearby gutters shall be kept open for drainage. Where existing sewers are 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.

All detours shown on the drawings or required because of the Contractor’s operations shall be built and maintained at the Contractor’s expense.

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 and red 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.

During the progress of the work, the

Contractor shall accommodate both vehicular and foot traffic and shall provide free access to fire hydrants, water and gas valves. Except as otherwise specified herein or as noted on the drawings, street intersections may be blocked but one-half at a time, and the Contractor shall lay and maintain temporary driveways, bridges and crossings, such as in the opinion of the Owner are necessary to reasonably accommodate the public.

In the event of the Contractor's failure to comply with these provisions, the Owner may with or without notice, cause the same to be done; and will deduct the cost of such work from any money due or to become due the Contractor under this Contract, but the performance of such work by the Owner or at his instance, shall serve in no way to release the Contractor from his general or particular liability for the safety of the public or the work.

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. 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 his 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 Owner 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.

18. CONTRACTOR'S SUPERVISION AND ORIGINATION

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 he shall at all times enforce strict discipline and good order among his employees. Whenever the Owner shall notify the Contractor, in writing, that any man on the work is, in the opinion of the Owner, careless, incompetent, disorderly, or otherwise unsatisfactory, such man shall be discharged from work and shall not again be employed on it except with the written consent of the Owner.

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.

19. 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 given 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 promptly 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.

The Engineer has the right to have removed by the Contractor such portion of the work as he may deem necessary for the discovery of improper work or material, and the Contractor must restore such work at his own expense if improperly done and at the expense of the party of the first part if found to be in proper condition. Any work which, during its progress and before its final acceptance, may become damaged from any cause, shall be removed and replaced by good, satisfactory work at the Contractor's expense.

20. SHOP DRAWINGS

Where called for in the specifications, the Contractor shall submit to the Engineer for approval, not less than five copies of 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 of 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.

21. ERRORS AND CORRECTIONS IN DRAWINGS AND SPECIFICATIONS

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 contracts 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 any 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, not withstanding any minor omissions in the specifications or drawings.

22. CHANGES IN THE WORK

The Owner shall have the right to require, by written order, changes in, additions 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 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 deleted.

Under circumstances which, in the judgment of the Engineer, so necessitate, the Engineer shall have authority to require, by written order, changes in, additions 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.

23. 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 the 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

1) Labor Costs shall be the amount shown on the Contractor's payroll 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 costs incurred for necessary equipment. Costs shall not be allowed in excess of usual rental charged in the area for similar equipment of like size and condition, including the costs of necessary supplies and repairs for operating the equipment. No costs, 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 costs 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 changes in the work, and shall present such information in such form and at such times as the Owner may request.

24. PATENTS

The Contractor shall pay all royalties and license fees and shall hold and save the Owner and his agent harmless from all liability of any nature or kind, including cost and expenses, for, or on account of, any patented or unpatented invention, process, article, or appliance manufactured or used in the performance of the Contract, including its use by the owner, unless otherwise specifically stipulated in the Contract Documents. In this respect the Contractor shall defend all suits or claims for infringement of any patent or license right.

In the event that any claim, suit, or action at law or in equity of any kind, whatsoever, is brought against the Owner, involving any such patents or license rights, then the Owner shall have the right to, and may, retain from any money due or to become due to the Contractor, such sufficient sum as is considered necessary to be retained by the Owner until such claim or suit shall have been settled and satisfactory evidence to that effect shall have been furnished the Owner.

25. "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 manufacturer's products of comparable quality, design and efficiency. The

Contractor shall comply with the requirements of the Contract Documents relative to the Owner's approval of materials and equipment before they are incorporated in the work.

26. CLEANING UP

The Contractor shall 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.

27. USE OF COMPLETE PORTIONS OF THE WORK

The Owner may, at any time during 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 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.

28. 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 filling 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.

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

29. 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 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.

30. FAIR EMPLOYMENT PRACTICES ACT

The Contractor agrees that neither he nor his subcontractor will discriminate against any employee or applicant for employment, to be employed in the performance of this Contract, with respect to his hire, tenure, terms, conditions, or privileges of employment, or any matter directly or indirectly related to employment, because of his race, color, religion, national origin or ancestry. Breach of this covenant may be regarded as a material breach of this Contract.

31. AUTHORITY

No agent of the Owner shall have power to revoke, alter, enlarge, or relax the stipulation or requirements of these specifications, except insofar as such authority may be specifically conferred by the specifications themselves, without the formal authorization to do so, conferred by the

Contract of which the specifications are a part, or by ordinance, resolution, or other usual official action by the Owner.

32. STARTING WORK

Material shall be ordered and work shall begin on the ground within thirty (30) days after the Contract is signed, unless otherwise stated.

33. SANITARY REGULATIONS

Necessary sanitary conveniences for the use of laborers on the work, properly secluded from public observation, shall be constructed and maintained in sanitary condition by the Contractor, and their use shall be strictly enforced.

34. SUNDAY AND NIGHT WORK

The Contractor is required to prosecute work done under this Contract during the hours of daylight, and no work will be permitted at night or on Sundays, except to save property or life or as specifically authorized or directed by the Owner. Tunnel work may be prosecuted at night except on Sundays.

35. PROGRESS OF WORK

The work shall be prosecuted regularly and uninterruptedly, unless the Owner shall otherwise specifically direct, with such force and at such points as to insure its full completion within the time herein stated.

If, in the opinion of the Owner, it is necessary or advisable that certain portions of the work be done immediately, the Contractor, upon written order, shall proceed with such work without delay. Should he fail to so proceed, the Owner may do or cause to be done, such work, and the cost of the same will be deducted from any money due or to become due the Contractor under this Contract.

36. TIME OF COMPLETION

The time allowed for completion of the work contemplated in this Contract shall be as stated in the proposal or specifications.

37. EXTENSION OF TIME

All days in which work is suspended by order of the Engineer, or in accordance with these specifications, shall automatically extend the time for completion an equal number of days.

38. TIME IS ESSENCE OF CONTRACT

It is distinctly understood and agreed to by the parties hereto that the time specified for the completion of the work is the essence of this Contract, and the Contractor shall not be entitled to claim performance of this agreement unless the work is satisfactorily completed, in every respect, within the time herein specified.

39. ESTIMATED QUANTITIES

The quantities of the various classes of work to be done and materials to be furnished under this Contract, which have been estimated as stated elsewhere herein, are approximate and only for the purpose of comparing, on a uniform basis, the bids offered for the work under this Contract; and neither the Owner nor his agents is to be held responsible should any of the said estimated quantities be found incorrect during the construction of the work; and the Contractor shall make no claim for anticipated profit, nor for loss of profit, because of a difference between the quantities of the various classes of work actually done or materials actually delivered and the estimated quantities as herein stated.

40. FORFEITURE OF CONTRACT

If the work to be done under the Contract shall be abandoned by the Contractor, or if at any time in the judgment of the Owner, the Contractor shall fail to prosecute the work at

a reasonable rate of progress, or to comply with all or any of the terms and requirements herein set forth, then the Owner shall have the right to take possession of the work, including Contractor's plant, supplies, and materials, at any time after having notified the Contractor in writing to discontinue the work under this Contract for said cause or causes, and such action shall not affect the right of the Owner to recover damages resulting from such failure. Upon receiving such notice, the Contractor shall and will, upon demand, immediately give the Owner safe and peaceable possession of the work, including the plant, and shall then cease to have control over any portion thereof or the men employed thereon.

The Owner may then proceed to complete the work herein specified, by contract or otherwise; and the entire cost of the same shall be charged to the Contractor and deducted from any sum or sums due or to become due under the Contract; the excess cost, if any, to be paid by the Contractor or his sureties, to said Owner.

41. NO WAIVER OF CONTRACT

Neither the acceptance of the whole or any part of the work by the Owner or his Engineer, or any of its agents, nor any order, measurements, or certificate by the Engineer, nor any order by the Owner for the payment of money, nor any payment for the whole or any part of the work by the Owner, nor any extension of time, nor any possession taken by the Owner or its agents, shall operate as a waiver for any portion of the Contract or any power therein provided; nor shall any waiver of any breach of the Contract be held to be a waiver of any other or subsequent breach.

42. PAYMENT NOT TO BE STOPPED

The Owner shall not, nor shall any officer thereof, be precluded or estopped by any return or certificate made or given by the Engineer, or other officer, agent or appointee, under the provisions of this agreement, at any time (either before or after the final completion and acceptance of the work and payment made therefor pursuant to any such return or certificates showing the true and correct amount of money due therefor, notwithstanding any such return or certificate, or any payment made in accordance therewith) from demanding and receiving from the Contractor or his sureties, separately or collectively, such sums as may have been improperly paid said Contractor by reason of any such return or certificate which has been untruly or incorrectly compiled.

43. GUARANTEE

The Contractor, as a condition precedent to final payment, shall execute a guarantee 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 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, and the Contractor shall execute, in favor of the Owner, the attached Maintenance and Guarantee Bond.

When the specifications call for a guarantee period greater than two years, the Contractor shall provide such longer guarantee period.

44. ESTIMATES AND PAYMENTS

The Owner shall pay and the Contractor receive the prices bid in the proposal, or agreed upon, less any deduction for any uncompleted portion, based upon measurements made by the Engineer or as otherwise herein stipulated, and such measurements shall be final and conclusive.

As an aid to the Owner in preparing estimates for progress payments, the

Contractor may be required to submit to the Owner for approval a breakdown of some or all contract unit prices into their essential component parts. The sum of component parts shall not exceed the total contract price per unit and the breakdown shall not overrule the contract price per unit.

The Contractor shall submit to the Owner a written request for each payment and a Contractor's Declaration declaring that he has not performed any work, furnished any material, sustained any loss, damage or delay, for any reasons, including soil conditions encountered or created, or otherwise done anything for which he will ask, demand, sue for, or claim compensation from the Owner other than, as indicated on the Contractor's Declaration. When requested by the Owner, the Contractor shall submit receipts or other vouchers showing his payments for materials and labor, including payments to subcontractors.

Payments based on progress estimates will be made on a monthly basis for work completed during the preceding month or since the date of the last preceding progress payment. Payments will be in accordance with the provisions of Act 524 of the Michigan Public Acts of 1980 and in accordance with the terms of this Contract. No allowance will be made for materials furnished which are not incorporated in the finished work, unless otherwise stated.

Pursuant to Act 524, Michigan Public Acts of 1980, the Owner shall designate a person representing it to whom written requests for payments shall be submitted. The Contractor shall designate a person who shall submit written requests for payment to the Owner.

In the event a dispute arises over an avoidable or unacceptable delay in the performance of the work as described in Section 4(3) of Act 524 of Michigan Public Acts of 1980 [MCLA125.1564(3)], the dispute may, at the option of the Owner, be submitted for resolution in accordance with the provisions of Section 4 of Act 524 of the Michigan Public Acts of 1980 to an agent designated pursuant to Section 4(2) of the Act. The dispute resolution process described above shall be used only for the purpose of determining the rights of the parties to retained funds and interest earned on retained funds.

The Owner may withhold the payment of any estimate or portion of estimate until the Contractor shall have furnished satisfactory evidence that he has paid all claims of every nature.

No payment shall be considered as acceptance of the work or any portion thereof prior to the final completion of the work, and the payment of the final estimate.

Within thirty (30) days after the completion of the work under this Contract to the satisfaction of the Owner and the Engineer, in accordance with all and singular terms and stipulations herein contained, the Owner shall make final payment, from a final estimate made by the Engineer. Before final payment is made, the Contractor shall, as directed by the Owner, furnish a Contractor's Affidavit that he has paid or satisfactorily secured all claims of every nature. Also, the Contractor shall furnish a release from the surety or sureties and permit agencies as applicable, approving payment of final estimate by the Owner. The final payment, when made, shall be considered as final approval and acceptance of the completed work herein specified.

The acceptance by the Contractor of the final payment aforesaid shall operate as, and shall be, a release to the Owner and his agents, from all claim and liability to the Contractor for anything done or furnished for, relating to the work, or for any act or neglect of the Owner or of any person relating to or affecting the work.

CONTRACTOR'S DECLARATION

I hereby declare that I have not, during the period _____

to _____ A.D., 20_____, performed any work, furnished any material, sustained any loss, damage or delay for any reason, including soil conditions encountered or created, or otherwise done anything for which I shall ask, demand, sue for, or claim compensation from _____ the Owner, or his agents, in addition to the regular items set forth in the contract numbered and
dated _____ A.D., 20_____ for _____

_____

_____

executed between myself and the Owner, and in the Change Orders for work issued by the Owner in writing as provided thereunder, except as I hereby make claim for additional compensation and/or extension of time as set forth on the itemized statement attached hereto.

There (is) (is not) an itemized statement attached.

Date: _____

Company: _____

By: _____

Position: _____

CONTRACTOR'S AFFIDAVIT

STATE OF MICHIGAN.....)
ss
County of)

The undersigned _____
hereby represents that on

he (it) was awarded a contract by _____

hereinafter called the Owner, to _____ ,

in accordance with the terms and conditions of Contract No. _____; and the undersigned

further represents that the subject work has now been accomplished and the said contract has

now been completed.

The undersigned hereby warrants and certifies that all of his (its) indebtedness arising by reason of the said contract has been fully paid or satisfactorily secured; and that all claims from subcontractors and others for labor and material used in accomplishing the said project, as well as all other claims arising from the performance of the said contract, have been fully paid or satisfactorily settled. The undersigned further agrees that if any such claim should hereafter arise, he (it) shall assume responsibility for the same immediately upon request to do so by the Owner.

The undersigned, for a valuable consideration, the receipt of which is hereby acknowledged, does further hereby waive, release and relinquish any and all claims or right of lien which the undersigned now has or may hereafter acquire upon the subject premises for labor and material used in accomplishing said project owned by the Owner.

This affidavit is freely and voluntarily given with full knowledge of the facts, on this _____ day

of _____, 20_____.

Company: _____

By: _____

Title: _____

Subscribed and sworn to before me, a Notary Public in and for _____ County,

Michigan, on this _____ day of _____, 20_____.

_____ Notary Public

My Commission Expires _____

GENERAL SUPPLEMENTARY CONDITIONS - INSURANCE AND BONDS

INSURANCE

Insurance Required of the Contractor

Prior to commencement of the work, the Contractor shall purchase and maintain during the term of the project such insurance as will protect him, the Owner, and the Engineer from claims arising out of the work described in this contract and performed by the Contractor, Subcontractor(s) or Sub-Subcontractor(s) consisting of:

Workers' Compensation insurance including Employer's Liability to cover employee injuries or disease compensable under the Workers' Compensation Statutes of the states in which work is conducted under this contract; disability benefit laws, if any; or Federal compensation acts such as U.S. Longshoremen or Harbor Workers', Maritime Employment, or Railroad Compensation Act(s), if applicable. Self-insurance plans approved by the regulatory authorities in the state in which work on this project is performed are acceptable.

A Comprehensive General Liability policy to cover bodily injury to persons other than employees and for damage to tangible property, including loss of use thereof, including the following exposures:

a. All premises and operations.
b. Explosion, collapse and underground damage.
c. Contractor's Protective coverage for independent contractors or subcontractors employed by him.
d. Contractual Liability for the obligation assumed in the Indemnification or Hold Harmless agreement found hereinafter.
e. The usual Personal Injury Liability endorsement with no exclusions pertaining to employment.
f. Products and Completed Operations coverage. This coverage shall extend through the contract guarantee period.

A Comprehensive Automobile Liability policy to cover bodily injury and property damage arising out of the ownership, maintenance or use of any motor vehicle, including owned, non-owned and hired vehicles and including Michigan "No Fault" coverages. In light of standard policy provisions concerning (a.) loading and unloading and (b.) definitions pertaining to motor vehicles licensed for road use vs unlicensed or self-propelled construction equipment, it is strongly recommended that the Comprehensive General Liability and the Comprehensive Auto Liability be written by the same insurance carrier, though not necessarily in one policy.

Where such an exposure exists, the Contractor shall purchase for the Owner an Owner's Protective Liability policy to protect the Owner, the Engineer, their consultants, agents, employees and such public corporations in whose jurisdiction the work is located for their contingent liability for work performed by the Contractor, the Subcontractor(s) or the Sub-Subcontractor(s) under this contract.

The Contractor shall purchase a Builder's Risk-Installation Floater in a form acceptable to the Owner covering property of the project for the full cost of replacement as of the time of any loss which shall include, as named insureds, (a.) the Contractor, (b.) all Subcontractors, (c.) all Sub-Subcontractors, (d.) the Owner, and the Engineer, as their respective interests may prove to be at the time of loss, covering insurable property which is the subject of this contract, whether in place, stored at the job site, stored elsewhere, or in transit at the risk of the insured(s). Coverage shall be effected on an "All Risk" form including, but not limited to,

the perils of fire, wind, vandalism, collapse, theft and earthquake, with exclusions normal to the cover. The Contractor may arrange for such deductibles as he deems to be within his ability to self-assume, but he will be held solely responsible for the amount of such deductible and for any coinsurance penalties. Any insured loss shall be adjusted with the Owner and the Contractor and paid to the Owner and Contractor as trustee for the other insureds.

Umbrella or Excess Liability

The Contractor is granted the option of arranging coverage under a single policy for the full limit required or by a combination of underlying policies with the balance provided by an Excess or Umbrella Liability policy equal to the total limit(s) requested. Umbrella or Excess policy wording shall be at least as broad as the primary or underlying policy(ies) and shall apply both to the Contractor's general liability and to his automobile liability insurance.

Railroad Protective Liability

Where such an exposure exists, the Contractor will provide coverage in the name of each railroad company having jurisdiction over rights-of-way across which work under the contract is to be performed. See Additional Named Assured.

Limits of Liability

The required limits of liability for insurance coverages shall be not less than the following:

Workers Compensation
Coverage A - Compensation Statutory
Coverage B - Employers Liability
$ 100,000
Comprehensive General Liability
Bodily Injury - Each Occurrence

$ 500,000
Bodily Injury - Aggregate
(Completed Operations)
$ 500,000
Property Damage - Each Occurrence
$ 100,000
Property Damage - Aggregate
$ 500,000 or combined single limit
$ 1,000,000
Comprehensive Automobile Liability
Bodily Injury
$ 500,000
Property Damage
$ 200,000
or combined single limit
$ 1,000,000
Owner's Protective - See GCS/3

Umbrella or Excess Liability See GCS/3

Insurance - Other Requirements

Notice of Cancellation or Intent Not to Renew - Policies will be endorsed to provide that at least 30 days written notice shall be given to the Owner and to the Engineer of cancellation or of intent not to renew. See Additional Named Assured.

Evidence of Coverage

Prior to commencement of the work, the Contractor shall furnish to the Owner, Certificates of Insurance in force on the Owner's Form of Certificate provided. Other forms of Certificate are acceptable only if (1) they include all of the items prescribed in the Owner's Form of Certificate, including agreement to cancellation provisions outlined herein, and (2) they have written approval of the Owner and the Engineer. The Owner reserves the right to request complete copies of polices if deemed necessary to ascertain details of coverage not provided by certificates. Such policy copies shall be "Originally Signed Copies," and so designated.

A. Insurance Required for the Contractor.

1. Worker's Compensation and Employers' Liability Comprehensive General Liability - including:

    a. All premises and operations.
    b. Explosion, collapse and underground damage.
    c. Contractors' Protective
    d. Contractual Liability for obligations assumed in the Indemnification - Hold Harmless agreement of this contract.
    e. Personal Injury Liability
    f. Products and Completed Operations

2. Comprehensive Automobile Liability - including owned, non-owned and hired vehicles, and Michigan "No Fault" coverages.
3. Umbrella or Excess Liability

B. Insurance Required for the Owner

    Owners' Protective Liability which names as insured(s) the Owner, the Engineer, their consultants, agents, employees and such public corporations in whose jurisdiction the work is located. (See Additional Named Assured hereinafter).

Qualification of Insurers

In order to determine financial strength and reputation of insurance carriers, all companies providing the coverages required shall be licensed or approved by the Insurance Bureau of the State of Michigan and shall have a financial rating no lower than XI and a policyholder's service rating no lower than B+ as listed in A.M. Best's Key Rating Guide, current edition. Companies with ratings lower than B+; XI will be acceptable only upon written consent of the Owner.

BONDS

Contract Security

If the Owner is a public entity, the Contractor shall furnish a surety bond (form attached) in an amount at least equal to 100 percent of the contract price as security for the faithful performance of this contract. The Contractor shall furnish, also, a separate surety bond (form attached) in an amount at least equal to 100 percent of the contract price as security for the payment of all persons performing labor on the project under this contract, and furnishing materials in connection with this contract. The surety on each such bond shall be a duly authorized surety company satisfactory to the Owner.

Regardless of whether the Owner is or is not a public entity, the Contractor shall furnish a Maintenance and Guarantee Bond (form attached) covering all work under this contract. The guarantee is to cover a period of two (2) years subsequent to the date of the final estimate, unless otherwise specified.

Indemnification

The contractor agrees to indemnify, defend, and save harmless the Owner and the Engineer, their consultants, agents, and employees, from and against all loss or expense (including costs and attorney's fees) by reason of liability imposed by law upon the Owner and the Engineer, their consultants, agents, and employees for damages because of bodily injury, including death at any time resulting therefrom, sustained by any person or persons or on account of damage to property, including loss of use thereof, arising out of or in consequence of the performance of this work, whether such injuries to persons or damage to property is due, or claimed to be due, to the negligence of the contractor, his subcontractors, the Owner, the Engineer, and their consultants, agents, and employees, except only such injury or

damage as shall have been occasioned by the sole negligence of the Owner, the Engineer, and their agents and/or consultants.

Limits of Liability

Umbrella or Excess Liability Limit
$ 1,000,000
Owner's Protective
Bodily Injury - Each Occurrence
$ 1,000,000
Property Damage - Each Occurrence
$ 250,000
Property Damage - Aggregate
$ 500,000
Or Combined Single Limit
$ 1,500,000

Additional Named Insured *

The "Engineer"

The City of Southfield

Road Commission for Oakland County

*On all policies other than Workers Compensation.

Advance Notice of Cancellation or Intent Not to Renew is to be furnished the Owner at the following address:

Attention: Purchasing Department
P.O. Box 2055
Southfield, MI 48037-2055

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS, That we, the undersigned _____

_____

_____

_____ as Principal,

and_____

_____

_____

of _____ as Sureties,

are hereby held and firmly bound unto the _____

_____

_____

_____

in the full and just sum of _____

_____ Dollars

($ _____)for the payment of which well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns.

Signed and sealed this_____ day of _____, 20 _____ .

The condition of the above obligation is such that if said _____

_____

_____

shall well and faithfully do and perform the things agreed by _____

to be done and performed by the annexed contract, according to the terms thereof, then this obligation shall be void; otherwise, the same shall remain in full force and effect.

It is mutually understood and agreed that in cases where changes are required, either by order of the Engineer, or Owner, or by mutual agreement, such change or changes shall not modify, discharge or release this bond.

_____ (Seal)

_____

_____ (Seal)
Principal

_____

_____ (Seal)

_____

_____ (Seal)
Surety

Signed, Sealed and Delivered
in the Presence of:

_____

_____

_____

LABOR AND MATERIAL BOND

KNOW ALL MEN BY THESE PRESENTS, That we _____

_____

_____

_____

of _____ , hereinafter called the Principal,

and_____

_____

of _____ , hereinafter called the Surety,

are held and firmly bound unto the People of the State of Michigan, in the sum of _____

_____

_____

_____Dollars ($ _____) to the payment whereof,

well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

Sealed with our seals and dated this _____ day of _____ , A.D., 20_____ .

WHEREAS, The above named Principal has entered into a contract with the _____

_____

_____

dated the _____day of _____ , A.D., 20 _____ wherein said

Principal has covenanted and agreed as follows, to-wit:

To furnish all the labor and material _____

_____

_____

_____

AND WHEREAS, This bond is given in compliance with and subject to the provisions of Act No. 213 of the Public Acts of Michigan, for the year 1963, and as may be amended by other Public Acts of Michigan.

NOW, THEREFORE, The condition of this obligation is such that if payment shall be made by the Principal to any Subcontractor or by him or any Subcontractor as the same may become due and payable of all indebtedness which may arise from him to a Subcontractor or party performing labor or furnishing materials or supplies or any Subcontractor to any person, firm, or corporation on account of any labor performed or materials or supplies furnished in the performance of said contract, then this obligation shall be void; otherwise, the same shall be in full force and effect.

AND PROVIDED, That any alterations which may be made in the items of said contract, or in the work to be done under it, or the giving by the party of the first part to said contract, of any extension of time for the performance of said contract, or any other forbearance on the part of either party to the other, shall not in any way release the Principal and the Surety, or either of them, their heirs, executors, administrators, successors or assigns from any liability hereunder, notice to the Surety of any such alteration, extension, or forbearance being hereby waived.

_____

_____

_____

_____

Principal

_____

_____

_____

_____

Surety

Signed, Sealed and Delivered
in the Presence of:

_____

_____

_____

MAINTENANCE AND GUARANTEE BOND

BOND NO. _____

KNOW ALL MEN BY THESE PRESENTS, That _____

Address: _____, as Principal,

and _____

Address: _____ ,as Surety,

are held and firmly bound unto the City of Southfield, Oakland County, Michigan, in the sum of ___

_____ Dollars ($ _____) good and lawful money of the United States of America, to be paid to said City of Southfield, Michigan, its legal representatives, successors and assigns, for which payment well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, and each and every one of them jointly and severally, firmly by these presents.

Sealed with our seals and dated this _____day of _____ , A.D., 20 __ .

WHEREAS, the above named principal has entered into a certain written contract (the "Contract") with _____

dated this_____ day of _____, A.D., 20_____wherein said Principal covenanted and agreed as follows, to wit:

_____

_____

_____

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH that by and under said contract, the above named Principal has agreed with _____

_____

that for a period of two years from the date of final acceptance by the City of Southfield of all Project work identified in the Contract to keep in good order and repair any defect in all the work done under said contract either by the Principal or his Subcontractors, or his material suppliers, that may develop during said period 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 City of Southfield, Michigan, by notice served in writing, either personally or by mail,

on the Principal at (address) _____

_____

OR their legal representatives, or successors, or on the surety at (address)_____

_____

WILL PROCEED at once to make such repairs as directed by said City of Southfield, Michigan, and in case of failure so to do within one week from the date of service of such notice, or within a reasonable time not less than one week, as shall be fixed in said notice, then the said City of Southfield, Michigan, shall have the right to purchase such materials and employ such labor and equipment as may be 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 of Southfield, Michigan, may take immediate steps to repair or barricade such defects without notice to the contractor. In such accounting the said City of Southfield, Michigan, shall not be held to obtain the lowest figures for the doing of the work, or any part thereof, but all sums actually paid therefor shall be charged to the Principal or Surety. In this connection the judgment of the City of Southfield, Michigan, is final and conclusive. If the said Principal for a period of two years from the date of final acceptance by the City of Southfield of all Project work identified in the Contract shall keep work so constructed under said contract in good order and repair, 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 of Southfield, Michigan, from 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 of servants, agents, or employees, in the prosecution of the work included in said contract, and from any and all claims arising under the Workman's Compensation Act, so called, of the State of Michigan, then the above obligation shall be void, otherwise to remain in full force and effect.

IN WITNESS WHEREOF, the parties hereto have cause this instrument to be executed by their respective authorized officers this _____day of_____ , A.D., 20 ____ .

Signed, Sealed and Delivered
in the Presence of:

_____ By: _____
(LS)

_____ _____
(LS)

_____ _____
(LS)

Southfield Updated 12/96

EQUIPMENT QUESTIONNAIRE

Within **forty-eight (48) hours** after the receipt of bids, **the two low bidders** shall furnish the Engineer in the spaces provided the names of the manufacturers of equipment which he proposes to furnish. Upon award of a contract, the named equipment shall be furnished. Substitutions will be permitted only if named equipment does not meet the specifications or the manufacturer is unable to meet delivery requirements of the construction schedule.

Preliminary acceptance of equipment listed by manufacturer's name shall not in any way constitute a waiver of the specifications covering such equipment; final acceptance will be based on full conformity with the specifications covering the equipment.

Section	Equipment Item	Manufacturer

CITY OF SOUTHFIELD
NOTICE TO PROCEED

TO: _____ DATE: _____

_____ PROJECT: _____

_____ _____

_____ _____

_____ _____

CITY JOB No.: _____

You are hereby notified to commence WORK in accordance with the Agreement dated, ____ ,

_____, on or before _____, and you are to complete the WORK WITHIN

_____consecutive calendar days thereafter.

The date of completion of all WORK is therefore _____ ,_____ .

By: _____

Title: _____

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO PROCEED is hereby acknowledged by:

_____

this the _____ day of _____ , 20 ____.

By: _____

Title: _____

GENERAL SPECIFICATIONS

Southfield Fire Station #4 and #5 Paving Improvements

SUPPLEMENTAL PROJECT NOTES

1. GENERAL

These specifications form a part of the Specifications and Contract Documents for the **Southfield Fire Station #4 & #5 Paving Improvements** with the requirements herein specified supplementing and/or superseding those contained in the balance of the Specifications and Contract documents.

2. EXISTING CONDITIONS

Each bidder shall personally visit the sites of the projects and pay particular attention to the existing conditions and the salient features of the projects in order to assure himself / herself of the amount of equipment, materials, and work required to satisfy the requirements of the projects.

3. CONNECTIONS

Connecting underdrain and sewer to existing or proposed sewer or manholes where preformed openings have not been cast as an integral part shall be tapped by drilling holes at 6-inch center to center around periphery of opening to create a plane of weakness before breaking out section. Non-shrink grout shall be used to seal the opening and a concrete collar shall be poured 12 inches thick around the pipe and extended 12 inches beyond the opening. Pipe connecting to pipe or structure walls shall be cut at the end to conform with the shape of the inside of the wall and shall be flush therewith. Any existing pipe broken or cracked while making the connection shall be replaced incidental to making the connection.

4. COOPERATION WITH OTHER CONTRACTORS

The Contractor shall make every effort to cooperate and coordinate with all other contractors working in the area at the time of construction.

5. DISPOSAL OF REMOVED MASONRY

All materials removed; with the exception of clean fill dirt where required for fill areas indicated on the plans, shall be disposed of off-site. No exceptions will be considered, and all costs associated with transporting, disposing, etc., shall be considered as included in the appropriate bid items. When no specific bid item exists, the costs associated with compliance of this provision shall be considered incidental to the project.

6. WATER

If the Contractor desires to use City water for construction, he shall obtain the required permit from the City. A hydrant connection will then be issued to him by the Water Department. The Contractor must deposit the required fee as charged by the Water Department for the use of the hydrant connection. The unused portion of the deposited fee will be refunded to the Contractor upon the return of the connection. The use of privately owned hydrant connections is prohibited. When connections are made to hydrants, the Contractor shall promptly notify the City of Southfield Fire Department.

7. CLEANING OF STRUCTURES

The Contractor shall protect catch basins and manholes. All materials that enter the structures as a result of the Contractor's operations shall be removed immediately. Prior to final acceptance of this project, all existing and proposed structures within the area disturbed by this construction shall be thoroughly cleaned of all debris regardless if it is preexisting or caused by the construction process.

8. REMOVING PAVEMENT

The unit price bid for removing and replacing pavement shall include disposal offsite of all materials removed. No additional compensation will be considered for part width construction in order to facilitate and maintain traffic.

9. SOIL EROSION AND SEDIMENTATION CONTROL

If included as specific bid items, the unit bid prices for soil erosion and sedimentation control items shall be paid in full for all costs incurred including geotextile wrap of all drainage structures within the proposed project limits, and maintenance of said soil erosion and sedimentation control devices through the construction period. At the time of completion of the project, it will be the responsibility of the Contractor to remove those devices. If a specific bid item is not included, all soil erosion and sedimentation control costs, which may be incurred, shall be incidental.

10. MAINTAINING TRAFFIC

Access to all private drives shall be maintained at all times. When it is necessary to cut drives, a temporary repair of 2" thick cold patch asphalt shall be made immediately upon completion of backfilling. All costs associated with complying with this requirement shall be incidental to this project.

During the course of construction, provisions must be made to maintain access for the United States Postal Service mail delivery vehicles and emergency vehicles at all times. Where possible, and when directed by the Engineer, all streets must be left open to traffic at the end of each working day.

The Contractor shall maintain use of regulatory signs thought out the project. Existing regulatory signs may not be removed at any time unless authorized by the Engineer.

The Contractor shall be responsible for maintaining traffic to the fire station during construction. At any given time during the construction at Fire Station #5, at least one of the fire station wells shall be open to traffic and accessible from Lahser. If for any reason, access cannot be maintained to the fire station, written notice shall be given to the Owner and the Engineer, a week in advance of the restricted access. Part width construction and coordination required to maintain access shall be considered incidental to the construction and shall not result in any additional costs to the project.

11. MAINTAINING SOLID WASTE (RUBBISH) SERVICES

Rubbish collection shall not be interfered with by the Contractor's operations. If access to certain areas is blocked by the Contractor's operations, he shall transport the rubbish himself

to a location accessible to the collection crews, incidental to the project.

12. HOURS OF OPERATION

The City of Southfield permits construction between the hours of 7:00 A.M. and 6:00 P.M., Monday through Saturday, unless otherwise authorized by the City. The Contractor shall complete an after-hours work permit through the City of Southfield's website, Department of Building and Safety Engineering, and submit for approval for work beyond the permitted hours.

The form can be found in the building department category at the following link: https://www.cityofsouthfield.com/departments/city-services/forms-applications

13. INSURANCE FOR GRASS GROWTH

This contract will not receive final acceptance by the City until all work is completed and all disturbed landscape is restored to the same approximate condition as existed prior to construction. Grass restoration shall be per the specifications.

To insure a dense growth of grass along all landscaped areas, a minimum amount of $10,000.00 may be withheld from payment to the Contractor. Upon satisfactory grass growth, the City will promptly make payment to the Contractor.

14. TURF RESTORATION

All turf restoration work shall be as specified in the Special Provision for Surface Restoration and will be paid for at the contract unit price bid listed on the Supplemental Bid Sheet. All disturbed lawn areas shall be restored unless directed otherwise by the Engineer.

Turf restoration at each individual work location shall be completed no later than two weeks after the completion of paving, sidewalk or utility work at that particular location. If necessary, the Contractor shall perform grass restoration work on a street-by-street or location-by-location basis in order to comply with this requirement. **Failure of the Contractor to perform grass restoration work in a prompt and timely fashion will result in the suspension of all other contract operations until the grass restoration has been completed in a satisfactory manner as directed by the Engineer.**

15. AGGREGATE BASE

The unit price bid per ton or per square yard of the thickness specified for **Aggregate Base, 4 inch,** and **Aggregate Base, 8 inch** shall be payment in full for all costs incurred in excavating and disposing of existing base and furnishing crushed limestone or crushed concrete base in accordance with the Michigan Department of Transportation 2020 Standard Specifications For Construction Section 302, compacted to required density as outlined in the special provisions.

16. PORTABLE LAVATORIES

The Contractor shall provide, upon the direction of the Field Engineer, one or more portable field lavatories such as the "Porta-John" or equivalent. Portable lavatories and their proper

maintenance by the Contractor for the duration of the project shall not be paid for separately but shall be considered incidental to the project. Portable lavatories shall be moved from the construction site within five days of completing the project.

17. REMOVAL OF CASTINGS

Existing castings, which are replaced or removed from the project, will become the property of the City of Southfield if the City so chooses. If this occurs, the Contractor will be directed to deliver and place the castings at a location and manner as directed by the Owner. If the Owner wishes not to retain the removed castings, the Contractor shall dispose of the castings offsite. Removal and/or disposal will be incidental to the project.

18. WATER STOP BOX AND GAS VALVE ADJUSTMENTS

All water stop boxes and gas valve adjustments necessary shall be incidental to this project. The Contractor shall be responsible for adjusting water stop boxes. The gas company shall be responsible for adjusting gas valves.

19. CONCRETE TESTING

Contractor QC testing for Portland Cement Concrete shall not be required. The Engineer will sample and test concrete as part of the QA testing procedure in accordance with applicable special provisions and Section 1003 and the 2020 Michigan Department of Transportation Standard Specifications for Construction.

20. PERMITS

Contractor is responsible to submit and acquire the necessary Southfield Building Permit and the Oakland County Road Commission ROW Permit. Obtaining and maintaining these items will be the responsibility of the Contractor and will be required before work can begin. All fees associated will be included in the appropriate pay items and no additional costs for these permits will be charged to the project.

GENERAL SPECIFICATIONS

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1. 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 roadways, driveways, or entrances be unduly obstructed.

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

2. WORK WITHIN PUBLIC STREETS OR LAND

Where the centerline of the proposed improvement is within the public street or land, the Contractor shall confine his operations to within the public street or land unless easements have been acquired (See Article 3 “Easements”). It shall be the Contractor’s responsibility to use such methods and/or materials, including sheeting, so as to prevent the bank top of the excavation from encroaching on private property. This shall not preclude the Contractor from obtaining the right to encroach on private land in accord with the foregoing article “Working Space”. All signing and barricading shall be done in accordance with the Michigan Uniform Traffic Manual.

3. EASEMENTS

In certain instances the Owner may have acquired certain permanent easements and construction easements for the Contractor’s

use in constructing the work. The Contractor shall confine his operations to these easements except as noted under the foregoing article “Working Space”.

4. LOCATING WORK

The Contractor shall accurately locate the work from reference points established by the Engineer along the surface of the ground and the line of work. For sewers, “cut sheets” will be furnished by the Engineer. Reference points shall be protected and preserved by the Contractor.

5. SOIL CONDITIONS

The Contractor, as such and as bidder, shall make his own determination as to soil and/or rock conditions and he shall complete the work in whatever material and under whatever conditions he may encounter or create, without extra cost to the Owner. This shall apply whether or not borings are shown on the drawings.

The Owner does not guarantee that the ground encountered during construction will conform with any boring information furnished herein.

The Owner and Engineer may have been involved in the design, inspection, and/or construction of other underground projects in the area of the proposed construction. The inspection reports, soil reports, and any soil information connected with these projects are available for inspection and review by the prospective bidders.

6. SURVEY MONUMENTS

Monuments or other recognized property boundary markers at street intersections, section corners, acreage or lot corners, and right-of-way lines shall be preserved and protected. Where such monuments or markers must be removed during construction, the Engineer shall be notified and the Contractor shall make all necessary arrangements, at his own expense, with a land surveyor registered in the State of Michigan to have these monuments or markers properly witnessed prior to disturbance or removal and later reset by the registered land surveyor.

7. BACKFILL

The Contractor shall refer to the MDOT 2020 Standard Specifications for Construction for backfill requirements.

8. ROAD PERMITS

The Contractor shall obtain any necessary construction permits required of Contractors for work within public streets, highways, roads, or alleys. He shall pay for same at his own expense as well as for any inspection fees that may be required in connection with such permits and shall conduct his construction operations in accordance with provisions of such permits, including tunneling of pavements where required. He shall also furnish any required bonds and pay the cost of same.

9. ROAD DETOURS

The Contractor shall provide and maintain all temporary roadways as required due to his operations or as required under “Road Permits” or otherwise specified or shown on the drawings at no extra cost to the Owner.

10. PROTECTION OF THE PUBLIC

The Contractor shall provide sufficient barricades, guardrailings, fencing, advance construction signing, coverings or other means to protect the public from injury due to his work or operations, including completed or uncompleted work, at all times until acceptance of the work by the Owner at no extra cost to the Owner.

11. BARRICADES AND PROTECTION

The Contractor shall provide and maintain in good repair, all barricades, guardrailings, etc., as required for the protection of his workmen and the Owner’s employees in strict compliance with state and local

requirements. All exposed material shall be smoothly dressed.

At dangerous points throughout the work, provide and maintain guardrails and colored lights, also flags; all possible precautions shall be taken to protect the workmen from injury at no extra cost to the Owner.

12. 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, he shall maintain such traffic. Access to fire hydrants and water valves shall always be maintained. The Contractor's truck and equipment operations on public streets shall be governed by County regulations, all local traffic ordinances, and regulations of the Fire and Police Department.

Small street openings necessary for manholes, alignment holes, sewer connections, etc. will be permitted. Such holes shall not be open longer than necessary and shall be protected and any traffic detouring necessary shall be done to the satisfaction of the Owner. Wherever possible, small openings shall be covered with steel plates at pavement level secured in place at time that work is not being performed at no extra cost to the Owner.

Where streets are partially obstructed, the Contractor shall place and maintain temporary driveways, ramps, bridges and crossings which in the opinion of the Owner are necessary to accommodate the public at no extra cost to the Owner. 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.

The Contractor shall provide flagmen, warning lights, signs, fencing and barricades necessary to direct and protect vehicular and pedestrian traffic at no extra cost to the Owner.

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

13. PRESERVATION OF TREES

The Contractor shall protect and preserve all trees along the line of work, and he will be held responsible for any damage to trees. Where necessary to preserve a tree and its main roots, the Contractor shall tunnel under such tree. Where specifically called for on the drawings, the Contractor shall remove trees completely, including stumps and main roots.

Where tunneling is not required for trees close to the trench and root trimming is necessary, the Contractor shall hand trench ahead of the machine digging and cut all roots cleanly to minimize damage to the roots.

Tree branches shall be tied back to protect them from the Contractor's machinery.

When a tree is removed by the Contractor for his convenience and with the permission of the Owner and the adjacent property owner (where required), the Contractor shall furnish one three (3) inch dia. tree for every six (6) inches of diameter of the tree removed.

The species shall be as directed by the Owner. All trees installed shall be guaranteed to grow for a period of one (1) year.

The Contractor will receive no extra compensation for preservation of trees or for their removal and replacement where called for, and the cost of all work involved shall be included in the unit price bid or at no extra cost to the Owner.

14. REPLACEMENT OF SHRUBBERY

The Contractor shall protect and/or replace all shrubbery damaged or destroyed by operations under this contract at no extra cost to the Owner.

15. EXISTING STRUCTURES AND UTILITIES

Certain underground structures and utilities have been shown as an aid to the Contractor, but the Owner does not guarantee their location or that other underground structures or utilities may not be encountered.

16. PUBLIC AND PRIVATE UTILITIES

a) Utilities - Where any utilities, water, sewer, gas, telephone or any other, either public or private, 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 foundations of any utility conduit, or the support of any structure, the Contractor shall notify the utility owner of this possibility and he shall take steps as may be required to provide temporary bracing or support of conduit or structures.

In all cases where permits or inspection fees are required by utilities in connection with changes to or temporary support of their conduits, the Contractor shall secure such permits and pay all inspection fees.

Where it is necessary in order to carry out the work that a pole, electric or telephone, be moved to a new location, or moved and replaced after construction, the Contractor shall arrange for the moving of such pole or poles, and the lines thereof, and shall pay any charges therefor.

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. The Contractor shall pay any charges for these repairs.

b) Existing Sewer Facilities - In instances, existing sewers or drains will be encountered along the line of work. In all such cases, the Contractor shall perform his operations in such a manner that sewer service will not be interrupted; and shall at his own expense, make all temporary provisions to maintain sewer service.

Unless otherwise indicated on the drawings, the Contractor shall replace any disturbed sewer or drain, or relay same at a new grade and/or locations to be established by the engineer such that sufficient clearance for the sewer will be provided.

The Contractor will receive no extra compensation for replacement or relocation or sewers or drains encountered, or for relaying at a new grade where called for by the drawings unless a separate bid item has been included in the proposal.

c) Existing Water Facilities - Where existing water mains are encountered in the work they shall be maintained in operation. If necessary, they shall be relaid using cast iron or ductile iron pipe of the type and with joints as specified within the current water main specifications of the governmental agency controlling said utility.

The Contractor will receive no extra compensation for the relaying and/or lowering or raising of water mains or water service leads, except where a separate bid

item has been included in the proposal.

d) Existing Gas Facilities - Where existing gas mains and services are encountered, the Contractor shall arrange with the gas company for any necessary relaying, and shall pay for the cost of such work.

17. PUMPING, BAILING AND DRAINING

The Contractor shall provide and maintain adequate pumping and drainage facilities for removal and disposal of water from trenches or other excavations.

Where the work is in ground containing an excessive amount of water, the Contractor shall provide, install, maintain, and operate suitable well points, connecting manifolds and reliable pumping equipment to operate same to insure proper construction of the work, or at the Contractor's option he may in lieu of or in addition to well points, excavate to a depth greater than the 6 inches for cushion specified under Laying Pipe (OCS-4) and backfill to the required trench grade with porous material, gravel or slag to provide for dewatering to pump sumps.

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.

The Contractor shall receive no extra compensation for providing, maintaining or operating any dewatering or drainage facilities.

18. 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. The Contractor will receive no extra compensation for sheeting, shoring, or bracing, whether removed or left in place.

19. DISPOSAL OF EXCAVATED MATERIAL

With the exception of an amount of excavated materials sufficient for backfilling and construction of fills, as called for on the drawings, all broken concrete, stone, and excess excavated materials shall be disposed of by the Contractor. The Contractor will be required to obtain his own disposal ground, and will receive no extra compensation for disposing of any of the excess materials.

20. DISPOSAL OF WASTE MATERIALS

Unless otherwise directed by the Owner, all waste materials and debris resulting from the construction work shall be removed from the premises at no extra cost to the Owner.

The Contractor shall, at all times, keep the premises free from accumulations of waste material or debris caused by his employees or work, and shall remove same when necessary or required by the Owner.

21. TUNNELING

The Contractor shall construct the work in tunnel where shown on the drawings or required by permits, and at other locations may, at his option, construct the work in tunnel where it crosses existing roadways, public and private utilities, walks or other structures. Tunnel work shall be constructed in accordance with the drawings and specifications, "Road Permits" requirements, or as otherwise noted on the drawings at no extra cost to the Owner.

22. COMPRESSED AIR

The Contractor shall provide compressed air as required for the work at no extra cost to the Owner.

23. EXPLOSIVES

Explosives may be brought or used on the premises only with the written consent of the Owner.

If explosives are used, the Contractor shall comply with all laws, rules, and regulations governing their use. The Contractor shall be fully responsible for the safety of all persons and property and any approval by the Owner shall not relieve the Contractor of such responsibility.

All fees and assessments in connection therewith shall be paid for by the Contractor, the cost of which shall be included in the proposal. The Contractor shall be responsible for furnishing sufficient, properly qualified safety inspectors as required by the state and local governing bodies. The cost of providing for and meeting the requirements for handling explosives shall be at no extra cost to the Owner.

24. INSPECTION OF PREMISES

The bidder shall visit the premises and thoroughly acquaint himself with the conditions to be encountered in the installation of the work shown on the drawings and described in the specifications, as no extras will be allowed to cover work which he has not included in his tender due to his failure to inspect the premises.

25. SCHEDULE OF OPERATIONS

The Contractor shall submit, for the Owner's review and approval, a schedule of his proposed operations. The Contractor's schedule shall be complete and shall show in detail the manner in which he proposes to complete the work under this contract.

26. ORDINANCES AND CODES

All work shall be executed and inspected in accordance with all local and state rules and regulations and all established codes applicable thereto and shall conform in all respects to the requirements of all competent authorities having jurisdiction there over.

Should any change in the drawings and specifications be required to comply with local regulations, the Contractor shall notify the Owner at the time of submitting his bid. After entering into contract, the Contractor will be held to complete all work necessary to meet the local requirements without extra expense to the Owner.

Where the work required by the drawings and specifications is above the standard required, it shall be done as shown or specified.

27. REQUIREMENTS PERTAINING TO WORK WITHIN RAILROAD RIGHTS-OF-WAY

Where the contract drawings call for work within railroad rights-of-way or where the work crosses under railroad tracks, the Contractor shall secure the approval of the railroad company of his method and schedule of operations and shall carry out his work in strict accordance therewith, all to the satisfaction of the railroad company and at no extra cost to the Owner.

The Owner will pay the cost of all inspectors and flagmen required and furnished by the railroad company during the construction operations.

The additional named assured under General Supplementary Conditions for "Owner and Contractor's Protective Public Liability and Property Damage Insurance" shall include the name of the railroad company.

28. TRAFFIC CONTROL

During construction the Contractor shall control traffic in accordance with the Michigan Manual of Uniform Traffic Control Devices, Latest Edition by the Michigan Department of State Highways.

29. DUST CONTROL

The Contractor shall provide adequate measures to control dust caused by his operation. The methods employed, and frequency of application shall be as approved by the Engineer.

30. INCONVENIENCES

The Contractor shall at all times be aware of inconveniences caused to the abutting property owners and general public. Where undue inconveniences are not remedied by the Contractor, the municipality, upon four hours notice, reserves the right to perform the necessary work and to have the Owner deduct the cost thereof from the money due or to become due to the Contractor.

31. INSPECTION OF MATERIAL AND WORK TO BE PERFORMED (ESTIMATED QUANTITY OF INSPECTION)

Each bidder shall enter, as the "Estimated Quantity of Inspection" (when called for in the Proposal), the number of "Inspector Days" he will require for completion of the project. This number shall then be multiplied by the unit price noted, and the extension entered as the item price for this work.

The basis of computing Inspector Days shall be as follows:

Through 4 hours
- ½ inspector day

Over 4 hours through 6 hours
- 3/4 inspector day

Over 6 hours through 8 hours
- 1 inspector day

Over 8 hours
- 1/4 inspector day for each two hours or part thereof

The Contractor shall notify the Engineer 48 hours in advance of any work to be performed on the project.

Inspector days as referred to above shall be computed for any one operation that requires full time inspection. The number of inspection personnel required shall be as determined by the Engineer. Construction operations requiring full time inspection are generally defined as follows:

A. General

1. Check for required permits.
2. Construction of appurtenances - such work can be observed by the same individual performing the inspection for the primary construction (main or tunneling, etc.) provided that (a.) they are located within 1,000 feet of the primary construction, (b.) the Contractor cooperates to the extent that the inspector is informed of the construction of appurtenances, and (c.) no work is covered prior to inspection.
3. Batch-plant operations (when required by the Owner).
4. Operations at the plants of manufacturers and/or suppliers (when required by the Owner).

B. Streets and Roads

1. Check for required permits.
2. Excavation and preparation of the site:
   a) Salvage of gravel or base material.
   b) Construction of compacted fills.
3. Subbase construction.
4. Base construction.
5. Placement of forms.
6. Placement of wearing course (concrete, asphalt, gravel, seal coat,

etc.).
7. Sawing and sealing of pavement joints.

C. Water Mains

1. Check for required permits.
2. Excavation, bedding and backfill.
3. Tunneling, jacking and boring.
4. Installation of materials.
5. Construction of all appurtenances (See General).
6. Pressure testing and disinfecting.

D. Sewers and Drains

1. Check for required permits.
2. Excavation, bedding and backfill.
3. Tunneling, jacking and boring.
    a) Shaft construction
    b) Mining
    c) Forming
    d) Placement of concrete

NOTE: A minimum of two inspectors are required to be present at each tunnel site; one in the tunnel and one top side.

4. Installation of materials.
5. Construction of all appurtenances (See General).
6. Infiltration (or exfiltrating) testing of sanitary sewers.

E. Structures

1. Check for required permits.
2. Excavation
3. Shaft construction
4. Form construction
5. Placement of reinforcing steel
6. Placement of concrete
7. Backfilling
8. Installation of equipment

F. Miscellaneous Work

1. Check for required permits.
2. Restoration of conditions existing prior to construction. This can be done by one inspector with the cooperation of the Contractor.
    a) Drives, sidewalks, fences, landscaping, etc.
    b) Final cleanup

On pay estimates, the actual number of "Inspector Days" of inspection provided will be entered and extended. The resulting amount will be deducted from the estimate and retained by the Owner as payment for such inspection.

If the Contractor completes the work using fewer "Inspector Days" of inspection than the number stated in his proposal, his final payment shall include (in addition to the balance due him for the pay items of work completed) the unit price stated in his proposal for each unused "Inspector Day".

If the work under the contract is incomplete when the Contractor has expended the number of "Inspector Days" stated in his proposal, subsequent payments to the Contractor shall include a deduction item equal to the unit price stated in his proposal for each excess "Inspector Day" of inspection used during the period covered by payment.

If by change order the work under the contract varies significantly from that stated in the proposal, the number of "Inspector Days" will be increased or decreased, as appropriate, in said change order. If the change order contains no increase or decreases in the number of "Inspector Days" then no adjustment is to be made in the number of "Inspector Days" stated in the proposal.

SITE PREPARATION & EARTHWORK

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1. EXCAVATION

Excavation shall consist of all work required to construct the earth grade and its appurtenances true to the lines, grades and cross sections called for on the plans and in accordance with these specifications. Excavation shall consist of the following items, any and all of which may be included and incidental to it: clearing and grubbing; removing trees, stumps, hedge, old culverts and miscellaneous structures; roadway excavation, including salvaging and stock-piling topsoil; excavation for structures; trimming and finishing earth grade; fine grading and cleanup; fine grading; final trimming and cleaning up; and cleaning up roadsides.

Soil notations when shown on the plans are for general information purposes only and shall not relieve the Contractor of his responsibility in investigating all local conditions affecting the work.

2. CLEARING AND GRUBBING

This work shall consist of clearing and/or clearing and grubbing of all areas within the right of way which interfere with excavation, embankment, or clear vision.

Clearing shall consist of cutting, removing and disposing of all trees, stumps, brush, shrubs and other vegetation from the above designated areas.

Clearing and grubbing shall consist of all items of work enumerated above for clearing and shall also include removing from the ground all roots, logs, brush, matted roots and debris of any nature within the areas designated above and the subsequent disposal of all spoil materials from the project.

Grading operations shall not be started in any area until the clearing and grubbing within the area affected has been completed.

All trees, shrubs and other plants not designated on the plans or by the Engineer to be removed shall be carefully protected.

Clearing

All trees, stumps, brush, shrubs, and other vegetation occurring between lines 2 feet outside of grading which are not designated on the plans or by the Engineer to be saved, and all such material occurring outside of such limits which are shown on the plans to be removed, shall be cut off flush with the ground and disposed of.

Clearing and Grubbing

All trees, stumps, brush, shrubs, roots, logs, matted roots, other vegetation and debris occurring between lines 2 feet outside of the grading limits as specified above under “Clearing” shall be completely removed from the ground surface and disposed of off site. Within excavation areas, the trees, stumps and roots shall be removed to a depth of not less than 12 inches below the subgrade elevation of the roadway, or 12 inches below the finished surface outside of the roadway areas. In embankment areas, where the top of road metal is 5 feet or less in height above

the existing ground, the trees, stumps and roots shall be removed to a depth of not less than 12 inches below the existing ground surface. Where the top of road metal is more than 5 feet in height above the existing road, the trees and stumps shall be cut off flush with the existing ground surface. The removal of stumps and roots may be accomplished by the use of a "Shredding Machine" meeting the approval of the Engineer.

All holes remaining after the grubbing operation in embankment areas shall have the sides broken down or leveled, and shall be refilled with acceptable material, moistened and properly compacted in layers by tampers or rollers to the density required under Roadway Excavation. The same construction procedure shall be applied to all holes remaining in excavation areas where the depth of holes exceeds the depth of the proposed excavation.

If the contract includes a separate item for "Clearing" or "Clearing and Grubbing", the contract unit price per acre or per station shall be payment in full for performing all work as herein specified.

If the contract does not include a separate item for "Clearing" or "Clearing and Grubbing", these items will be considered as incidental to the work of Earth Excavation.

3. REMOVING TREES AND STUMPS

This work shall consist of removing trees or stumps where called for on the plans, or directed by the Engineer which occur within the right of way outside of areas estimated for clearing and grubbing, and shall include cutting such trees, removing their stumps from the ground and properly disposing of the material.

The size of trees will be determined by the average diameter of the tree trunk taken at a point 4 feet above the ground. The diameter will be measured to the nearest full inch. Trees having major limbs lower than 4 feet from the ground shall be measured at the smallest diameter below such limbs.

Stumps shown on the plans or authorized by the Engineer to be removed will be measured as the average diameter across the top of the stump. Measurement will be to the nearest full inch.

Where more than one tree grows from a common source below ground, each tree or stump therefrom will be measured as a separate tree or stump.

If the contract contains a separate item for "Removing Trees" or "Removing Stumps", the contract unit price each shall be payment in full for removing such trees or stumps, which are outside the areas estimated for clearing and grubbing, backfilling of all holes after removal of trees or stumps, and disposing of materials, in accordance with the following schedule of sizes:

	Diameter
Removing Trees	6-18 inches
Removing Trees	19-36 inches
Removing Trees	37 inches or larger
Removing Stumps	Same diameters as trees

Removing trees or stumps less than 6 inches in diameter shall be considered as incidental to work of Earth Excavation unless the contract contains an item of work covering such removal. Trees and stumps less than 6 inches in diameter will not be shown on the plans unless their removal is covered by a contract item.

If the contract does not include a separate item for Removing Trees or Removing Stumps above 6 inches in diameter, then all work specified in this section, as shown on the plans, shall be considered as incidental to construction of the project.

4. REMOVING MISCELLANEOUS STRUCTURES

This work shall consist of removing old pavement, surface and base course, integral and separate curb, curb and gutter, sidewalk, masonry, railway track, fence, poles, safety zones, guardrail, manholes, catch basins, inlets, sewers and any other structures which are not suitable to be left in the roadway; and salvaging and disposing of the resulting materials and backfilling the resulting trenches, holes and pits.

Breaking Down and Removing

All old structures, with all attached parts and connections, shown on the plans to be removed, or that which interferes with the new construction, shall be entirely removed within the limits shown, unless otherwise provided.

In removing separate curb or separate curb and gutter, sidewalk, crosswalk, and similar structures, where portions of the existing structure are to be left in the surface of the finished work, the old structure shall be removed to an existing joint, unless otherwise directed by the Engineer. Where integral curb is to be removed flush with the existing concrete pavement, the operation shall be performed by mechanical means so as to leave a reasonably neat and flush cleavage plane, without damage to the underlying pavement. When pavement which includes integral curb is to be removed, the removal shall be as herein specified for concrete pavement. In removing an old pavement or concrete base with a bituminous surface, the old concrete shall be removed to an existing joint or cut to a true line with a vertical face at the locations called for on the plans, or as directed by the Engineer. The cutting of old pavement or base course shall be accomplished by line drilling a sufficient number of times such that removal of the old concrete will not in any manner disturb or damage the sections of pavement or base course which are to remain in place. In addition to line drilling, all finished pavement shall be cut to a depth of at least 3 inches with a power-driven concrete saw so as to eliminate all traces of the drilling. In removing a concrete base course, where part of the existing bituminous surface is to remain in place, the bituminous surface shall be cut the full depth by the use of a power driven saw along a line parallel to and at least 1 foot from either side of the base course removal. The removal of the bituminous surface as provided above, together with removal of the concrete base, will be paid for as “Removing Old Pavement”. Any concrete or bituminous surface damaged beyond the removal called for shall be removed and replaced at the Contractor’s expense.

When a concrete or brick pavement is encountered under the existing pavement, the item of “Removing Old Pavement” will be allowed for each pavement removed, except old pavement with a concrete cap will be considered as only one pavement, whether or not there is a separation layer of earth or bituminous material between the old pavement and the concrete cap. The removal of a flexible pavement such as aggregate or macadam that is encountered in the excavation, at any elevation will not be paid for separately, but shall be included as a part of Earth Excavation.

Small quantities of earth may incidentally be removed when removing old pavement. Any earth so removed shall be replaced by backfilling with suitable material meeting the approval of the Engineer to the elevation of the proposed subgrade at the Contractor’s expense.

The item of Removing Asphalt Surface shall consist of removing an asphalt or tar surface from a rigid base, such as concrete or brick, or from a flexible base, such as macadam or aggregate, and disposing of the material removed. The removal of an asphalt surface and the underlying aggregate or macadam base will be paid for as Earth Excavation. The removal of an asphalt surface and the concrete or brick base will be paid for as Removing Old Pavement. Where part of the existing asphalt surface is to remain in place exposed, it shall be cut the full depth by the

use of a power-driven saw before starting to remove the adjacent surface. Where part of the existing asphalt surface is to remain in place and is to be resurfaced with asphalt, it shall be cut to a true line with equipment approved by the Engineer.

All masonry structures within the area of the roadbed shall be removed entirely or broken down to an elevation of at least 2 feet below the proposed earth grade, and elsewhere to an elevation of at least 1 foot below the proposed earth grade.

In the removal of railway track, all rails, paving, ties, tracks, encasement, concrete foundations and other appurtenances shall be removed. Rails shall be separated into single rail lengths not greater than 33 feet. Crushed stone or gravel ballast shall be left in place unless otherwise provided.

In the removal of manholes, catch basins and inlets, any live sewers connected with them shall be rebuilt and properly connected, and satisfactory by-pass service shall be maintained during such construction operations.

If the plans call for abandoning manholes, catch basins or inlets, the castings shall be carefully removed and the masonry broken down to an elevation at least 2 feet below the proposed earth grade within the area of the roadbed, and elsewhere to an elevation at least 1 foot below the proposed earth grade. The abandoned structures shall be backfilled with a concrete mixture composed of 1 part Portland cement to not over 10 parts of fine aggregate. Existing live sewer connections shall be rebuilt and properly reconnected and satisfactory by-pass service shall be maintained during such construction operations. The removed castings shall remain the property of the Owner.

All open ends of abandoned sewers encountered in removing or abandoning drainage structures shall be plugged with brick masonry or concrete.

All sewers that are to be abandoned, the tops of which come within 3 feet below the proposed earth grade within the area of the roadbed and elsewhere to an elevation within 2 feet below the proposed earth grade, shall be removed. Sewers at lower elevation, if in good condition in the judgment of the Engineer, may be properly plugged and left in place as provided above.

When a portion of the existing structure is to be retained, care shall be taken not to impair the value of the retained portion during construction operation.

All operations necessary for the removal of any structure which might endanger the new construction shall be completed prior to construction of the new work.

Disposing of Materials

Materials salvaged during construction of the project shall become the property of the Contractor unless otherwise shown on the plans or in the proposal. Materials reserved for use by the Owner shall be removed without damage to the material and stored outside the limits of construction at the location and in the manner approved by the Engineer. Materials that become the property of the Contractor shall be removed from the project.

Suitable pieces of concrete or masonry removed during construction of the project may be used in the construction of riprap, tree wells, and similar structures, or may be used otherwise as approved by the Engineer.

All concrete, stone, brick and such material that cannot be used as above specified, all broken concrete which is matted together by steel reinforcement, and all other waste material, shall be properly disposed of by the Contractor at no cost to the Owner.

Backfilling

All trenches, holes and pits resulting from the

breaking down or removal of miscellaneous structures shall be filled with suitable excavated material, or porous backfill of the grade specified as follows:

1. Backfilling of the entire trench, hole or pit excavation under road surfaces, pavement, sidewalk, curb, driveways and where the edge of the excavation is within 3 feet of the pavement shall be made with Granular Material, Class II. The material shall be placed by means having the approval of the Engineer and is to be compacted to 95 percent of maximum unit weight. If the above operation will result in a non-draining pocket, the backfill method and materials shall be as directed by the Engineer.

2. Backfilling of all other excavations beyond the areas noted above shall be made with selected excavated material placed in one-foot layers with each layer being thoroughly compacted by means having the approval of the Engineer, to a density equivalent to the undisturbed adjacent soil.

Unless otherwise provided, this work will be measured in the original position of the structures to be removed, as follows:

Removing Old Pavement, surface course and concrete or brick base course will be measured by area in square yards. Unless otherwise provided, Removing Old Pavement shall include surface course and base course. Where removing old curb or curb and gutter is required in conjunction with Removing Old Pavement, surface or base course, these structures will be classed as Removing Old Pavement, surface course or base course and will be measured by area in square yards. Concrete driveways to be removed will be measured as Removing Old pavement unless otherwise provided.

Removing Curb, Curb and Gutter, Gutter, or Integral Curb flush with existing concrete pavement, in cases where these structures are not adjacent to old pavement or base course which is to be removed, will be measured by length along the base of the curb face or along the flow-line of the gutter in lineal feet.

Removing Asphalt Surface will be measured by area in square yards.

Removing Sidewalk will be measured by area in square yards.

Removing masonry structures will be measured by volume in cubic yards.

Removing guardrail will be considered as incidental to Earth Excavation or new guardrail construction.

Removing Railway Tracks will be measured by length in lineal feet of rail. Removing the paving and track foundations between the rails and on each side of the track will be measured separately by volume in cubic yard as Removing Track Encasement.

Removing Fence will be measured by length in feet.

Removing Sewers of the diameter specified will be measured by length in feet.

Removing Utility Poles, Pole Stubs, Manholes, Catch Basins, Inlets and Safety Zones will be measured as units, including all attached parts and connections.

Granular Material, Class II, will not be measured or paid for separately, but will be considered as incidental to the removal item, unless otherwise provided for in the proposal.

The contract unit price shall be payment in full for sawing, where specified herein, breaking down, removing, backfilling and disposing of materials.

The bulkheading of all open ends of abandoned sewers encountered in removing or abandoning drainage structures and sewers, as herein specified, or in the

construction of new sewers, shall be considered as incidental to the removal or abandonment of the structure or sewer, or the item of new construction.

The removal of any sewer, manhole, catch basin or inlet which is shown on the plans, and which is necessary to permit the construction of a new item of work, shall be incidental to the item of work.

If the contract does not include a separate item for removing any of the miscellaneous structures listed herein, removing such structure or structures, as herein specified and as shown on the plans, including sawing, shall be considered as incidental to the proposed construction.

5. ROADWAY EXCAVATION

This work shall consist of the removal and disposal of all materials necessary for construction of the earth grade, including salvaging and stockpiling topsoil; preparing roadway foundation; picking up and disposing of stones, boulders and broken rock; grading the roadway, intersections and entrances; constructing ditches; construction embankments; borrow excavation; disposing of surplus and unsuitable materials; and maintaining the work in a finished condition until acceptable.

All excavated materials which are not covered by separate items in the contract will be considered as Earth Excavation and shall include all the work listed under the general heading of Excavation.

Earth Excavation may be designated as Borrow Excavation, Unsuitable Subgrade Excavation or Ditch Excavation, if so provided.

Salvaging and Stockpiling Topsoil

Topsoil, within the grading limits for cuts, and where the fill is less than 5 feet in height to the top of road metal, shall be removed to a depth and width specified on the plans or as directed by the Engineer. Topsoil from berm ditches and inlet and outlet ditches shall be removed within construction limits, if required on the plans or in the proposal. Topsoil from peat and muck areas shall not be removed. All vegetation shall be cut to a height of approximately 6 inches and all such vegetation, brush, stone, rocks, and any other objectionable litter or foreign material shall be removed before the ground is broken for removal of topsoil. All vegetation shall be disposed of as specified under Clearing and Grubbing.

Equipment and methods of operations shall be such as to avoid the lifting of subsoil.

The topsoil from the roadway shall be stockpiled in an approved location within the limits of the highway, or placed in the slopes as directed by the Engineer. Upon completion of the work, all stockpile areas shall be restored to a neat and satisfactory condition as directed by the Engineer.

When the fill is to be 5 feet or less to plan grade, the topsoil shall be stripped from the entire fill area.

Where embankments are to be constructed on existing slopes steeper than 1 vertical to 6 horizontal, consecutive steps with a horizontal dimension of not less than 3 feet shall be formed in the slope before any of the embankment material is placed.

Old road surfacing of gravel, crushed stone, or other non-rigid type, occurring within the area of the roadbed and underlying proposed embankment less than 1 foot in depth shall be broken up and removed.

Unsuitable Subgrade Excavation

Unsuitable Subgrade Excavation shall be the operation of removing unsuitable soils below the level of the ground after topsoil has been stripped in fill areas where the embankment is to be 5 feet or less in height to plan grade, and the removal of unsuitable soils, below the subgrade elevation, as determined by the

Engineer in cut areas after the subgrade has been established.

Unsuitable Subgrade Elevation shall be accomplished within the limits as established by the Engineer. All such excavated material shall be disposed of as shown on the plans or as directed by the Engineer.

The areas excavated of unsuitable material shall be backfilled with non-frost heaving material similar to the adjacent soil, except that when directed by the Engineer for areas where free water due to seepage is present, the excavation shall be backfilled with Granular Material, Class II and drainage shall be provided. The backfill shall be compacted to not less than 95 percent of the maximum unit weight, unless otherwise specified.

Disposing of Stones, Broken Rock and Boulders

All stones and boulders, occurring within construction limits that are not required for the construction of riprap or like structures may be placed in embankments, insofar as feasible. The stones and boulders shall be placed in layers and all voids shall be completely filled with sound earth, thoroughly compacted, but no layer of such material shall be placed within 12 inches of the surface of the earth grade between the outside edges of the shoulders.

Boulders in excess of 1/8 cubic yard in volume that cannot be placed in embankments shall be disposed of in a manner that will not detract from the appearance of the roadside.

All stones, broken rock and boulders less than 1/8 cubic yard in volume that cannot be placed in embankment or otherwise incorporated in the work shall, unless otherwise specified, be disposed of by the Contractor at his own expense. If buried, the top of the stones, broken rock and boulders shall be not less than 12 inches below the natural ground level.

Grading the Roadway, Intersections and Entrances

All suitable materials removed from the excavation shall be used in the construction of the earth grade, as far as practicable, and at such other places as shown on the plans or as approved by the Engineer.

The roadbed and ditches shall be maintained in such condition that the work will be well drained at all times. If it is necessary, in the prosecution of the work, to interrupt existing surface drainage, sewers or underdrainage, then temporary drainage facilities shall be provided until the permanent drainage work is completed. The construction of all temporary drainage facilities shall be considered as incidental to the construction of the project.

The grading shall be so conducted as to avoid removing or loosening any material outside of the required slopes and any such material which may be removed or loosened shall be replaced and thoroughly compacted to the required cross section. All intersecting roads, approaches, entrances and driveways shall be graded as shown on the plans or as directed by the Engineer.

Constructing Ditches

All suitable materials excavated from inlet, outlet, berm and intercepting ditches shall be used in the construction of the roadway, as far as practicable, or shall be otherwise disposed of as shown on the plans or as directed by the Engineer. No waste or surplus excavation shall be left within 3 feet from the edge of the ditch. Any such surplus or waste material shall be spread in a thin, uniform layer. All roots, stumps, trees, and other objectionable materials in the slopes and bottom of the ditch shall be removed and the holes backfilled with suitable material. All ditches constructed on the project shall be maintained to the required cross section and shall be kept free from debris until final acceptance.

When the contract contains a separate item and unit price for inlet, outlet, berm or intercepting ditch excavation, it shall include the removal and disposal of all materials encountered, as provided above, for the construction of such new ditches, or the trimming, straightening, widening, deepening and relocating of existing ditches at the locations shown on the plans.

All temporary and abandoned ditches within the proposed roadway limits shall be backfilled with suitable material meeting the approval of the Engineer and compacted to 95 percent of maximum unit weight. Temporary and abandoned ditches beyond the limits of the roadway shall be backfilled with suitable material to the elevation of the surface of the adjacent ground or, as required, to form the desired contour. This portion of the backfill shall be uniformly compacted to form a stable surface.

Constructing Embankments

Embankments shall be constructed with sound earth. The materials shall be deposited and compacted by either the Twelve-Inch Layer Method, or the Controlled Density Method. The Controlled Density Method will be required unless some other method is specifically called for on the plans or authorized.

Where stones are prevalent, the material shall be carefully placed so that all large stones will be well distributed and the interstices completely filled with smaller stones, earth, sand or gravel so as to form a solid embankment. Any rock or fragmental material of such size as would prohibit it from being placed in layers of the specified depth shall be placed in the embankment only where and as directed by the Engineer. In no case shall stones over 3 inches in diameter be placed within 12 inches of the surface of the earth grade within the areas between lines 2 feet outside of the edges of proposed road metal.

Frozen material shall not be placed in the embankment nor shall embankment be placed upon frozen material.

Where filling in layers of the specified thickness is not feasible, as in the case of filling in water or filling over slopes too steep for the operation of equipment, the embankment may be constructed in one layer of sand or sandy gravel to the minimum elevation at which the equipment can be operated as determined by the Engineer. The fill material placed in this manner shall be thoroughly compacted by rolling or tamping, by use of approved compacting equipment, by thorough saturation with water, by vibration, or by a combination of these or other approved methods capable of producing a uniform and well consolidated roadway foundation. Above this elevation the embankment shall be constructed in layers of the specified thickness, unless otherwise provided on the plans or authorized.

Portions of the embankment adjacent to any structure shall be constructed as specified under Excavation and Backfill for Structures.

The construction requirements for the two methods of placing and compacting embankments are as follows:

1. **Twelve-Inch Layer Method**. The material shall be deposited and spread in layers not more than 12 inches in depth, loose measure, parallel to the finished grade and extending to the full width of the embankment. The material shall be deposited by operating and conveying equipment over the layer being placed, insofar as feasible. Each layer shall be compacted to not less than 95 percent of the maximum unit weight as determined at the existing moisture content. The maximum unit weight will be determined as specified under the Controlled Density Method, except the test shall be modified to comply with the existing moisture content of the material at the time of placing. The operations of compacting

shall be continued until each layer is compacted to the required density for its full width.

2. **Controlled Density Method**. The material for the embankment shall be deposited and spread in layers not more than 9 inches in depth, loose measure, and extending to the full width of the embankment.

   The material for embankments of 4 feet or less and the bottom 4 feet of embankments of more than 4 feet above the surface of the ground upon which the embankment is to be constructed shall have not more than the optimum moisture content at the time of compaction.

   The material for that part of the embankment more than 4 feet above the surface of the ground upon which the embankment is to be constructed shall have a moisture content of not greater than 2 percent above optimum at the time of compaction.

   If the material contains an excess of moisture, it shall be dried to the required moisture content before being compacted.

   Each layer of material containing the required amount of moisture shall be compacted to not less than 95 percent of the maximum unit weight, unless otherwise specified on the plans, in the proposal or authorized, before the succeeding layer is started.

When the original ground, upon which the embankment is being placed, or any section of compacted embankment, or the soil in cut sections becomes rutted or distorted by the Contractor's equipment, the method of operation shall be changed to eliminate this condition. The Contractor shall reshape and recompact any areas so rutted or distorted at his own expense. This shall be done before any succeeding layers are placed.

Where the embankment is to be 5 feet or less in height to the plan grade, the topsoil shall be stripped from the entire fill area. The depth of the topsoil to be removed shall be as shown on the plans or as directed by the Engineer. After the topsoil is removed, the entire area upon which the embankment is to be constructed shall be compacted to not less than 90 percent of the maximum unit weight, to a depth of 9 inches.

Where the embankment is to be more than 5 feet in height to the plan grade, the original ground over the entire area upon which the embankment is to be constructed shall be compacted to not less than 90 percent of the maximum unit weight, to a depth of 9 inches.

Disposing of Surplus and Unsuitable Material

All suitable surplus excavated material may be used to uniformly widen embankments, to flatten slopes and to fill low places in the right of way, as approved by the Engineer. All unsuitable material shall be disposed of as shown on the plans or deposited in low places within the right of way as approved by the Engineer. All surplus and unsuitable material that cannot be used as above specified shall be disposed of by the Contractor at his expense. Removal and disposal of all unsuitable material shall be completed before surfacing operations are started.

Public and private roads used by the Contractor between the project and disposal locations shall be maintained by the Contractor at his expense, including repairs of any damage caused by his operations, and including the application of a dust palliative, when necessary as determined by the Engineer.

"Earth Excavation" will be paid for at the contract unit price per cubic yard, which price shall be payment in full for all work specified under the general heading of Excavation, for which no separate unit price is included in the contract. Disposal of all excavated materials together with the stockpiling of topsoil will be considered incidental to Earth Excavation.

Unsuitable Subgrade Excavation will be paid for at the contract unit price per cubic yard for Earth Excavation, which price shall be payment in full for excavating the material below the subgrade elevation in cut sections, or below the elevation of the stripped embankment area in fill sections, and disposing of the material as shown on the plans or as directed by the Engineer. There will be no item of Overhaul, and all haul costs thereof shall be incidental to this item of Unsuitable Subgrade Excavation.

Backfilling of areas created by the item of Unsuitable Subgrade Excavation with suitable materials excavated from the project will be paid for as Earth Excavation. The quantity to be paid for shall be equal to the amount of unsuitable material excavated below the earth grade in cut areas or below the existing ground elevation after topsoil removal in fill areas as measured in cubic yards of volume in its original position.

If special backfill is required in the areas of Unsuitable Subgrade Excavation, the contract unit price per cubic yard or per ton shall be payment in full for furnishing, backfilling and compacting this material.

If the contract includes a separate item for “Ditch Excavation”, the contract unit price per lineal foot shall be payment in full for all the work of excavation, trimming and disposing of all encountered materials as herein provided. Stump and tree removal within the ditch excavation will not be paid for separately.

Unless otherwise provided in the proposal, no payment will be made separately or directly for haul or any part of the work. All haul will be considered a necessary and incidental part of the work and the cost thereof shall be included in the contract unit price for the pay item of work involved.

Compaction of the embankment will not be paid for separately, but shall be considered as incidental to the work of Earth Excavation and shall include all the work of manipulating the soil to dry it or adding water, as required, to obtain the specified densities. No claim for additional compensation will be allowed for any delay required to obtain the specified moisture content or the specified density.

6. EXCAVATION AND BACKFILL FOR STRUCTURES

This work shall consist of the removal and disposal of all materials necessary for the construction of structures including cofferdams, channel excavation, placing and compacting the backfill, disposing of surplus material and cleaning up the site. This work shall include all necessary clearing, and grubbing and removing old structures or parts thereof, as required, except where the contract includes a separate item or items for such work.

Foundation excavation will be classified as unclassified excavation, and shall include all materials of whatever nature encountered, including rock excavation and portions of the existing structure which are within the foundation excavation limits as shown on the plans and which are to be removed.

Foundation Excavation

Foundation excavation shall be made of sufficient size to permit construction of the foundation units and to provide for adequate drainage. When masonry is to rest on an excavated surface other than rock, special care shall be taken not to disturb the bottom of the excavation, and the final removal of the material to grade shall not be made until just before the masonry is to be placed. Concrete shall not be placed until the depth of excavation has been checked and the suitability of foundation material has been approved. The elevations for the bottom of footings shall be subject to such changes as are necessary to insure a satisfactory foundation if so provided by authorization.

The surface of all rock or other hard material upon which masonry is to be placed shall be

freed from all loose fragments, cleaned and cut to a firm surface. The surface shall be level, stepped, or serrated, as directed by the Engineer.

For structures other than bridges, footing excavation may be trimmed to the exact size of the footing and the footing forms omitted, where soil conditions permit and when approved by the Engineer. In this case, adequate forms to establish the grade and alignments for the top of the footing and to support the reinforcing steel in proper position will be required.

All unsound material underlying proposed structures other than bridges shall be removed and replaced with bank run gravel or coarse aggregate, in layers not exceeding 6 inches in depth, and each layer shall be thoroughly compacted by tamping or vibrating, or both. The foundation shall be otherwise corrected if so provided.

The Contractor shall furnish, place and maintain at all times such sheeting and bracing as may be required to support the sides of the excavation and to support and protect from damage all structures, including pavement, curbs, sidewalks, pipe lines and conduits adjacent to or crossing the trench, and such sheeting as may be required for the safety of vehicular and pedestrian traffic. Sheeting and bracing, not required by the plans or authorized by the Engineer to be left in place, shall be removed as the trench is backfilled. Supports for pipes, conduits, etc., crossing the trench shall conform to the requirements of the owners of such facilities, and, if so ordered by the Engineer, shall be left in place.

Cofferdams

The interior dimensions of cofferdams shall be such as to give sufficient clearance for the construction of forms and the inspection of their exteriors, and to permit pumping outside of the forms. Cofferdams or cribs which are tilted or moved laterally during the process of sinking shall be righted or enlarged so as to provide the necessary clearance. Cofferdams shall not be braced to substructure forms. They shall be constructed so as to protect the work in place against damage from high water and to prevent injury to the foundation by erosion. No timber bracing shall extend into or remain in the finished masonry.

Pumping shall be done from a sump located outside the forms in such manner as to avoid injury to the concrete. When called for on the plans or provided by authorization, a tremie concrete seal shall be placed.

Cofferdams shall be removed in such a manner as not to disturb or mar the finished masonry.

The Engineer will order that sheet piling for cofferdams remain in place in case its removal might induce movements in the completed structure or otherwise jeopardize the completed work.

Channel Excavation

Channel excavation shall consist of the removal and disposal of all materials of whatever nature encountered necessary for the purpose of bank trimming, straightening, widening, deepening or relocating the channel or the stream or watercourse. Channel excavation shall include all clearing, and grubbing and tree removal within and adjacent to the channel for a distance of 3 feet from either side of the top of bank.

Channel excavation shall be made to the grades and cross section as called for on the plans or as otherwise ordered by the Engineer, and the resulting material shall be used in the construction of approach fills or disposed of as shown on the plans or as approved by the Engineer. No waste or surplus excavation shall be left within 3 feet of the edge of the channel and any surplus shall be spread and uniformly sloped to provide drainage to the channel.

All temporary and abandoned channels

within the proposed roadway limits shall be backfilled with suitable material meeting the approval of the Engineer and compacted to 95 percent of maximum unit weight. Temporary and abandoned channels beyond the limits of the roadway shall be backfilled with suitable material to the elevation of the surface of the adjacent ground, or, as required, to form the desired contour. This portion of the backfill shall be uniformly compacted to form a stable surface.

Backfill

Backfill shall not be placed against any portion of the structure until the structure has been approved by the Engineer for backfilling. The required curing, surface finishing and waterproofing of the work to be covered by backfill shall be completed and all concrete shall have attained at least 75 percent of its design strength as determined by cylinder or beam tests, before the backfill is made. The cylinders and beams shall be cured at the same temperature as the structure concrete. All spaces excavated and not occupied by the new structure or by special porous backfill shall be backfilled with sound earth or other approved material from the excavation. After the backfill has been placed and compacted to the flow lines elevation of the weep holes, the back end of each weep hole shall be covered with not less than 2 cubic feet of coarse aggregate, as incidental to construction of the structure. Where underdrains are called for in lieu of weep holes, the types and limits of porous backfill material required around the underdrains shall be as called for on the plans. All stones, boulders, and broken rock, placed in the backfill shall be uniformly distributed in layers except that no such material shall be placed within 12 inches of any pipe, conduit or other structure that might be subject to breakage. All voids therein shall be carried up the surface of the adjacent ground or to the elevation for proposed earth grade and its top surface shall be neatly graded. Prior to placing backfill on existing slopes which are steeper than 1 vertical to 6 horizontal, steps shall be formed in the slopes. Backfill around abutments, piers and other structures shall be deposited on opposite sides at the same time to equalize the loading. Fills around all structures shall be trimmed to the lines shown on the plans.

Unless otherwise specified on the plans or required, the space for a distance of at least 18 inches from the back of abutments, wings, and retaining walls and from the bottom of weep holes or other drainage devices to the elevation of earth grade shall be backfilled with Granular Material, Class II in such a manner as to provide drainage.

Disposal of Surplus and Unsuitable Material

Surplus and unsuitable material shall be disposed of as specified under Roadway Excavation or as otherwise shown on the plans or approved by the Engineer.

Unless otherwise specified, foundation excavation will be measured by volume in cubic yards in its original position in the space bounded by the existing ground surface or exposed portion of the existing substructures, the elevation of the bottom of the foundation and the vertical planes indicating the excavation limits, as shown on the plans.

When the contract contains a separate item for Cofferdams, all cofferdams for the structure will be grouped as a unit and measured as such unless otherwise provided on the plans or authorized.

Channel Excavation will be measured by volume in cubic yards in its original position and will be exclusive of any material indicated above as foundation excavation.

Granular Backfill of the grades specified will be measured by volume in cubic yards, loose measure or compacted in place, as provided on the plans. Material placed outside of the maximum pay limits of porous backfill as shown on the plans will not be included in the

pay quantity.

"Unclassified Excavation" will be paid for at the contract unit price per cubic yard, which price shall be payment in full for the work specified.

If the contract contains a separate item for "Cofferdams", the contract lump sum price shall be payment in full for the work of constructing, maintaining and removing all cofferdams, including pumping. No payment will be made for this item before work has progressed to a point where the cofferdams are no longer needed. If the contract does not include a separate item for cofferdams, no payment will be made to the Contractor for cofferdams as such but the cost thereof shall be included in the contract unit price for substructure concrete.

Temporary sheet piling left in place by order of the Engineer, which is not specified on the plans or in the proposal to be left in place, will be paid for on the basis of the salvage value of the material placed.

"Channel Excavation" will be paid for at the contract unit price per cubic yard, which price shall be payment in full for the work specified.

Backfill, except granular backfill, will not be paid for as such but payment for all work in connection with its handling shall be included in the price paid for foundation or channel excavation.

"Granular Backfill" of the grades specified will be paid for at the contract unit price per cubic yard, which price shall be payment in full for furnishing the material, hauling and compacting the material in place. When such backfill is made with excavated materials from the project, it will not be paid for as such, but will be incidental to excavation, unless otherwise provided.

No payment will be made separately or directly for haul on any part of the work. All haul will be considered a necessary and incidental part of the work and the cost thereof shall be included in the contract unit price for the pay items of work involved.

7. SUBBASE

This work shall consist of placing a subbase of Granular Material, Class II on the prepared subgrade.

The subgrade shall be constructed to the alignment, grade, and cross section shown on the plans, and the surface shall be trimmed as described under Fine Grading, Preparing Subgrade when a concrete pavement or concrete base course or when a non-rigid surface or base course is to be placed.

Should the subgrade at any time prior to or during the placing of subbase become soft or unstable to the extent that rutting occurs in the subgrade, or to the extent that subgrade material is forced up into the subbase material, the operation of hauling and placing subbase shall be immediately discontinued. Where subgrade material has become mixed with the subbase material, the mixed material shall be removed and disposed of. After the subgrade has been corrected as directed by the Engineer, new subbase material shall be placed and compacted as specified above. The removal, disposal, and replacement of the subbase shall be at the Contractor's expense.

Subbase (compacted in place) will be measured by volume in cubic yards based on the neat lines called for on the plans.

Subbase (compacted in place) will be paid for at the contract unit price per cubic yard, which price shall be payment in full for all the work specified, including furnishing, hauling, placing and compacting the material.

Water used for compacting the subbase will not be paid for separately, but shall be considered as incidental to the construction of the subbase.

8. FINE GRADING

This work shall consist of trenching, when required, preparing the subgrade, and constructing shoulders, and shall apply to the area between the outside lines of the finished shoulders or between the outside edges of curb or curb and gutter where such structures are called for.

Trenching

Trenching will not be required unless it is shown on the plans. When trenching is required, it shall consist of grading to the approximate elevation and cross section for subgrade plus a sufficient distance on the shoulders outside of the excavated area or elsewhere in its intended final position.

All stones and rocks over 3 inches in diameter encountered in trenching shall be removed and disposed of as specified under Roadway Excavation and this work shall be considered as incidental to the item of Fine Grading.

Preparing Subgrade

The Subgrade shall be smoothed, trimmed and completed to required line, grade and cross section shown on the plans. The subgrade between lines at least 1 foot on either side of the proposed metal shall be compacted to not less than 95 percent of the maximum unit weight for a depth of 9 inches. All soft and yielding materials encountered which become unstable under the compaction effort, and all other unsuitable materials shall be removed and replaced with suitable materials as directed by the Engineer.

The surface of the subgrade shall be finished in the manner described herein, depending on the type of surface or base course to be placed.

Concrete Pavement and Concrete Base Course.

When a concrete pavement or concrete base course is to be placed directly on the prepared subgrade, and no subbase is to be placed, the earth subgrade shall be constructed at or slightly above the required elevation so that the placing of forms, and the operation of the subgrade planer on the forms, shall involve a cutting and removal of previously compacted material. The preparation of the subgrade shall be completed ahead of placing forms a distance equivalent to that covered normally in one day's paving operation.

After the pavement forms have been set true to line and grade, a subgrade planer operating on the forms shall be used to plane off the high grade. If any low areas are encountered they shall be filled with suitable material and compacted to the density of the adjacent soil and this area replaned. A self-propelled 5-ton roller shall be used behind the subgrade planer prior to placing concrete.

Non-Rigid Surface and Base Courses.

When a non-rigid surface or a base course is to be placed on the prepared subgrade, the earth subgrade shall be constructed to the alignment, grade, and cross section shown on the plans, except that a tolerance of 1/10 foot above or below the established grade will be permitted. The grade shall be that obtainable from machine operations, and the 1/10 foot tolerance shall be a permitted variation, and not a uniform difference from the plan grade. The preparation of the subgrade shall be completed ahead of placing the aggregate surface or base course a distance equivalent to that covered normally in one day's operation of placing aggregate surface or base course.

When a flexible pavement or base course is being constructed, unless the subgrade is composed of sand or other freely self-draining material, positive subgrade drainage during the placing

and compacting of the road metal shall be obtained by cutting and maintaining trenches through the shoulders approximately 150 feet apart, staggered alternately each side of the centerline, with one or more placed at right angles opposite low points in the grade. These drainage trenches shall be at least 1 foot in width at the bottom and at such depth and grade as to give positive drainage from the subgrade. The trenches shall be filled with Granular Material, Class II, unless otherwise directed by the Engineer.

The subgrade as formed shall be maintained in a smooth and compacted condition until the non-rigid surface or base course has been placed. Should the subgrade at any time prior to or during the placing of the concrete pavement, non-rigid surface, or subbase become soft or unstable to the extent that rutting occurs, the subgrade will be corrected as directed by the Engineer at the Contractor's expense.

No subbase, base course, surfacing, curb or curb and gutter shall be placed on the subgrade until it has been approved by the Engineer.

Constructing Shoulders

Earth shoulders shall be constructed of sound earth or other approved material to the required grade and thoroughly compacted by rolling with pneumatic-tired compacting equipment. The use of steel tread tractors for compacting the shoulders along pavements will not be permitted. The equipment shall be operated in such manner as to provide satisfactory compaction without damaging the pavement. The shoulders shall be constructed in a proper sequence with the surfacing operation. In the construction of gravel and other non-rigid type surfaces, the shoulders shall be constructed during the preparation of the subgrade to a height not less than the edge thickness of each course of road metal before compaction.

Aggregate shoulders of the type specified shall be constructed according to the requirements specified for the particular type of shoulder material required.

If the contract does not include a separate item for "Fine Grading", this work will be considered as incidental to construction of the project.

9. FINAL TRIMMING AND CLEANING UP

Final trimming and cleaning up shall include removing weeds and other objectionable vegetation on those portions of the construction site outside of the finished shoulder lines or outer edges of the curbs.

All irregularities shall be made smooth, washouts shall be filled, all backslopes rounded and the entire areas compacted and completed to the required lines, grade and cross sections.

All weeds shall be cut and all rubbish and debris removed from the project, and disposed of as provided for under Clearing and Grubbing.

If the contract does not include a separate item for "Final Trimming and Cleaning Up", this work will be considered as incidental to the construction of the project.

EARTHWORK

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GENERAL

1. SCOPE OF WORK

This work shall be subject to the General Conditions and the General Specifications. The work shall include furnishing of labor, materials, tools, equipment, accessories and services necessary for completing the excavation and backfilling for the items as shown on the contract drawings and/or as herein required. This also includes trenching, trench or subgrade undercutting, roadway earthwork, complete and continual drainage of excavation, sheeting, bracing and shoring of sides of the excavation, backfilling around structures and over pipelines, and the disposal of excess excavated material.

2. MDOT

References to Michigan Department of Transportation (MDOT) Specifications shall pertain to the 2020 Standard Specifications for Construction.

MATERIALS

3. BEDDING

A. Sand shall be a sharp, clean sand free of lumps of clay or debris with 100 percent passing a 3/8-inch sieve and less than 10 percent loss by wash.

B. Granular material shall meet the requirements of Section 902.07 of the MDOT Standard Specifications for Construction for Granular Material Class II and Class III.

C. Pea gravel shall be unwashed and shall be from ¼-inch to 5/8-inch in size.

D. Bedding material shall be provided from offsite unless the trench passes through a well-defined strata of sand or gravel. Bedding material shall be subject to the approval of the ENGINEER.

E. Stone material shall meet the requirements of Section 902.03 of the MDOT Standard Specifications for

Construction for 6A crushed Coarse Aggregate or approved equal.

4. BACKFILL

A. Job Excavated Backfill

Job excavated backfill shall be defined as material excavated from the site that is free from frozen earth, boulders, rocks, stones larger than 3-inch in size, debris, blue and gray clay, and organic material.

B. Granular Backfill

Granular backfill shall be defined as sharp sand, gravel, or crushed stone that is free from lumps of clay and soft or flaky material and shall conform to the latest MDOT Specification for Granular Material Class II or III. Granular backfill shall be used for fill work located under or within the influence of roadway surfaces. The Owner's standard details shall dictate which type of granular material (class II or III) is required for the project.

Material excavated from the trench may be used as granular backfill when, in the opinion of the ENGINEER, it meets the granular backfill grading requirements.

5. STONE REFILL

Stone refill shall consist of natural gravel, slag, or crushed gravel that is equivalent in gradation to MDOT 6A unless otherwise called for in the plan details.

6. EMBANKMENT

Embankment material shall consist of sound earth as described in Section 205.03H of the MDOT Standard Specifications for Construction.

CONSTRUCTION

7. CLEARING

Prior to the start of construction, the CONTRACTOR shall verify the limits of trees and other items that are to be saved. The CONTRACTOR shall then clear the site or trench excavation area of all remaining trees, brush, and other miscellaneous items that are not to be saved.

8. TREE REMOVAL

Where called for on the plans, the CONTRACTOR shall remove trees, including stump and main roots, and dispose of all associated foliage and debris offsite. Trees less than six (6) inch diameter shall be removed where required by the Work as incidental to the Contract. The CONTRACTOR shall abide by any easement agreements regarding the tree removal work and wood ownership.

9. STUMP REMOVAL

Where called for on the plans, the CONTRACTOR shall remove existing stumps, including main roots (two (2) inch diameter and larger), dispose of all associated debris offsite, and backfill the void with suitable material.

10. PAVEMENT CUTS

Where a trench must be cut through pavement, driveway, or sidewalk, particular care shall be taken to avoid unnecessary damage to adjoining areas of the pavement, driveway or sidewalk. All cuts through existing surfaces shall be made full-depth with a concrete saw. Cuts in concrete pavement shall be made parallel with longitudinal and transverse construction or contraction joints.

Saw cuts in concrete pavement shall not be nearer than five feet (5'-0") to a transverse joint, to the centerline of pavement, or to the edge of pavement or curb, i.e., no existing or replacement pavement shall be less than five feet (5'-0") in width. If the damaged pavement or surfacing is nearer than five feet (5'-0") to a joint or centerline of

pavement, or to edge of pavement, surfacing or curb, removal and replacement shall be extended to said joint, centerline, edge of pavement, surfacing, or curb. These same requirements shall apply to the saw cutting and replacement of concrete driveways.

If a square or block of sidewalk is cut, broken, or cracked, the entire square or block shall be removed and replaced.

11. CLASSIFICATION OF EXCAVATION

Earth, as a name for excavated material, shall include all glacial deposits whether cemented or not, except solid boulders one-half cubic yard or more in volume. It shall also include all alluvial deposits and material of every kind that can be excavated with equal facility by the equipment and means typically used for earth excavation.

Peat, as a name for excavated material, shall include all unstable organic soils such as peat, muck, marl, and underlying very soft clay.

Rock, as a name for excavated material, shall include pre-glacial solid ledge rock that can be removed most practically by blasting, barring or wedging, or by some other standard method of quarrying solid rock. It shall also include solid boulders of one-half cubic yard or more in volume as well as existing concrete, masonry with mortar joints, or other existing structural work that can be excavated practically only by methods of quarrying solid rock. It shall not include fragile, friable, or disintegrated materials of any kind that can be excavated by equipment and means used for earth excavation.

12. ROADWAY EARTHWORK

Roadway earthwork shall be performed in accordance with the construction methods that are described in Section 205 of the MDOT Standard Specifications for Construction unless otherwise called for in the plan notes, details, or supplemental specifications.

13. METHODS OF EXCAVATION IN EARTH

All excavation shall be by open cut from the surface, except in special cases where boring/jacking under pavement or structures may be required, or where boring/jacking under the root system will be required for tree root protection. All excavation shall be made in such a manner and to such depth, length, and width as will give ample room for building the structures, bracing, sheeting and supporting the sides of the excavation, pumping and drainage of ground water and sewage which may be encountered, and removal of all materials excavated. Special care shall be taken so that the soil below the bottom of structures to be built shall be left undisturbed so that a firm bed will be provided for construction. Any voids shall be backfilled with suitable granular material and shall be properly compacted.

14. TRENCH EXCAVATION

A. General

Excavation shall be of sufficient width and depth to provide adequate room for construction and installation of the work to the lines, grades and dimensions called for on the plans. Unless otherwise called for on the OWNER's standard details, the width of a trench from the invert to a height twelve (12) inches above the top of the pipe barrel shall be indicated as follows:

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Pipe Size	Maximum Trench Width
4" through 12"	30"
Larger than 12"	O.D. + 24"

If the maximum trench width as specified above is exceeded, unless otherwise shown on the drawings, 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 trench excavation is in granular material, the last six (6) inches of trench depth shall be carefully excavated and trimmed by hand to the exact elevation and contour of pipe. Where trench excavation is in rock or clay soil, the trench bottom shall be undercut a minimum of four (4) inches below the final elevation of pipe. The bedding material as hereinafter specified shall be placed and compacted to the underside of the pipe.

Excavation for structures shall be made to the outside lines and surfaces of such structures wherever it is practicable to build directly against the sides and bottoms of excavations. In such cases, care shall be taken not to disturb the original foundation or backing. Final trimming shall be done by hand just before construction of the structure. If excess excavation is made, or the material becomes disturbed so as to require removal beyond the prescribed limits, the resulting space shall be refilled with bedding, as specified hereinafter, and solidly machine tamped into place to 95 percent of maximum unit weight before the construction work proceeds.

Excavation for structures shall be extended sufficiently beyond the limits of the structure to provide ample room for form construction and other construction methods to be followed, wherever necessary.

B. Bedding

Where the subgrade below the bottom of the pipe is disturbed during the construction, the space shall be refilled with sand or pea gravel bedding material solidly tamped to form a firm foundation for the pipe. Sand or pea gravel bedding material shall be extended to one (1) foot above the pipe, except that the bedding shall be exclusively pea gravel to the springline for pipe 36-inch and greater in diameter.

C. Amount of Trench Opening

Not more than 50 feet of trench shall be open at one time in advance of the pipe unless permitted by the ENGINEER. The length of street that may be occupied by the construction work at any one time shall be subject to the direction of the ENGINEER and will be based on requirements of the use of the street by the public. No more than 600 consecutive feet of street length shall be occupied at one time, and vehicle traffic through the street shall not be entirely stopped without permission of the ENGINEER.

After placement of the utility line, the Contractor shall backfill the trench promptly in order to minimize the length of open trench and avoid any unsafe conditions.

15. TRANSPORT OF NATIVE MATERIALS OFFSITE

If the Contractor encounters good materials (sand, gravel, topsoil, etc.) during the course of construction, he shall not be allowed to transport these materials offsite without the written approval of the Engineer. Wherever possible, suitable native sands and gravels shall be used as backfill rather than transporting them offsite and replacing them with non-native materials of a lesser quality.

16. STONE REFILL FOR TRENCH UNDERCUT

In locations where soil at the bottom of trench is unstable, the CONTRACTOR shall excavate (undercut) below the trench bottom and place stone refill as called for in the Materials Section of this specification.

17. EXCAVATION & TRENCH DEWATERING

The CONTRACTOR shall maintain any excavation or trench free of water during construction of any structures and/or pipelines. Water accumulated due to rainfall or runoff and minor groundwater inflow that

can be controlled through the use of portable trash, submersible or positive displacement pumps shall be considered normally expected and anticipated conditions associated with underground construction. This effort will be considered incidental to the cost of construction and will not be reimbursable at the unit price bid for dewatering in the proposal.

The required use of deep wells and/or well points to lower and maintain a reduction in the groundwater elevation below the trench bottom shall be subject to approval of the ENGINEER and shall constitute a reimbursable expense for trench or excavation dewatering. If a pay item for dewatering is included in the Bid Form, then the CONTRACTOR would receive payment for this work based upon the unit bid price. If there are no provisions in the contract for payment for dewatering (i.e. bid item or incidental to other pay items), then the CONTRACTOR shall submit a detailed estimate of the additional cost. Upon acceptance of the CONTRACTOR's estimate, the ENGINEER shall issue a change order. The CONTRACTOR must demonstrate that a continuous effort is required to control hydrostatic pressure in the construction area in order to claim compensation for dewatering.

The CONTRACTOR shall take adequate precautions to control the discharge of dewatering pumps so as to prevent soil erosion or sedimentation of drainage ditches, structures, storm sewers, culverts, natural drainage courses, ponds, lakes or wetlands.

The CONTRACTOR shall insure that discharge from any dewatering operations has a suitable outlet and that it will not cause any damage to adjacent dwellings or property. Water and discharge hoses shall be placed and/or controlled so as to prevent a hazard to pedestrians or motor vehicles passing in the vicinity of the construction site.

Electric pumps shall have suitable power supply appurtenances meeting NEC requirements and properly fused and grounded to prevent electrical shock hazards to on-site personnel.

Internal combustion engine driven pumps, if operated 24 hours per day, shall have adequate exhaust silencers in good repair to muffle engine noise to an acceptable level for the area where located.

18. DIVERTING EXISTING SEWERS

Where existing sewers or drains are encountered in the Work, adequate provision shall be made for diverting flow in the existing sewers so that the excavation will be kept dry during the progress of the construction work. Upon completion of the construction work, the existing sewers shall be restored or otherwise provided with an adequate outlet as directed by the ENGINEER.

19. SHEETING, BRACING & SHORING

Where required to properly support the surfaces of excavations to protect the construction work, adjacent work or workers, sheeting, bracing and shoring shall be provided. If the ENGINEER is of the opinion that at any point sufficient or proper supports have not been provided, he may order such additional supports at the expense of the CONTRACTOR, but neither the placing of such additional supports by the order of the ENGINEER nor failure of the ENGINEER to order such additional supports placed shall release the CONTRACTOR from his responsibility for the sufficiency of such supports and the integrity of the Work. In removing the sheeting and bracing after the construction has been completed, special care shall be taken to prevent any caving of the sides of the excavation and injury to the completed work or to the adjacent property.

20. SHEETING LEFT IN PLACE

Sheeting, bracing and shoring shall not be left in place after completion of the work except as required by the ENGINEER. Where sheeting, bracing, and shoring must be left in place in order to protect the work, adjacent structures, or property, it shall be cut off or left not less than two (2) feet below the established surface grade. If sheeting, shoring or bracing must be left in place, then it shall be paid for at the contract unit bid price that is shown on the Bid Form. If a pay item was not included on the Bid Form, then a work order shall be negotiated.

21. CROSSING EXISTING STRUCTURES/PIPES

During construction, it may be necessary to cross under certain sewers, drains, culverts, water lines, gas lines, electric conduits and other underground structures. Every effort shall be made to prevent damage to such structures. Wherever such structures are disturbed or broken, they shall be restored to good condition. Specified granular backfill shall be placed as described in Section 23, Backfilling. MDOT Grade S3 concrete shall be utilized where directed by the ENGINEER at no additional cost to the project. Either granular backfill or concrete shall be brought to the spring line of the higher utility.

22. TUNNELING TREES

Trees eight (8) inches in diameter or less will require a minimum tunnel length of eight (8) feet. Trees over eight (8) inches in diameter, measured four (4) feet above the ground surface, will require a minimum tunnel length equal to one foot for each inch of tree diameter.

Trees shall be tunneled whenever any portion of an excavation approaches within a distance equal to one-half the required tunnel length except as otherwise noted on the plans.

Tunneling under trees may be accomplished by one of the following methods:

a. Boring and jacking casing pipe along with placement of a carrier pipe.

b. Boring and jacking sewer pipe or water main without a casing pipe.

c. Jacking sewer pipe or water main without boring and without a casing pipe.

Plan notes or existing field conditions shall indicate which method may be used for the tree tunneling work.

23. BACKFILLING

A. General

Backfilling shall include all work required as hereinafter specified. The placement of various pipe, including bedding and building of structures, shall be completed prior to backfilling.

Where called for on the plans, the CONTRACTOR shall backfill trenches and/or other excavations with suitable excavated material (not including gray or blue clay) replaced into the trench or excavation and compacted to not less than 95 percent of maximum unit weight as determined at existing moisture content during backfilling. Compaction shall be provided by means of suitable mechanical compaction equipment.

If the moisture content of cohesive backfill material exceeds the optimum moisture content for maximum density by more than three percent (3%), the CONTRACTOR shall dry the material to meet the foregoing moisture content limitation or provide, at his own expense, MDOT Granular Material Class III. No sloppy or wet backfill will be allowed.

Maximum unit weight will be determined by current methods of Test for Compaction and Density of Soil, AASHTO Designation T-180 or by the Cone Density Method

developed by MDOT, as the material may require.

The ENGINEER shall make compaction tests at all locations requiring granular backfill.

Any depression resulting from settlement of any backfill prior to the date of final payment for all work under this contract shall be brought to the proper grade and surface and made to match the adjacent surface.

B. Materials

Bedding, excavated backfill, and granular backfill shall conform to the requirements that were previously described in Parts 3 and 4 of this specification.

C. Compaction

Backfill material shall be placed in layers not to exceed 12 inches in thickness unless the contractor can demonstrate to the satisfaction of the Engineer that he can consistently attain the specified density on thicker lifts.

Specified compaction shall be obtained with the use of a bulldozer, sheepsfoot roller, mechanical tamper or other similar and effective equipment. Specified compaction means not less than 95 percent (not average 95 percent) of maximum unit weight when tested in accordance with current MDOT Specifications.

If excavated material is not suitable to obtain 95 percent minimum compaction, the CONTRACTOR shall, at his expense, remove unsuitable materials or add granular materials, or both, to obtain ninety-five percent (95%) minimum compaction as specified.

Compaction tests will be made by a representative of the OWNER and paid for by the OWNER, unless otherwise specified in the Contract Documents.

D. Backfilling Trenches

Bedding

The type of bedding required is shown on the detail drawings.

Bedding shall be worked under the haunches of the pipe to provide firm continuous support.

Bedding placed on the sides of and above the pipe shall be compacted by machine tamping to not less than ninety-five percent (95%) of maximum unit weight in layers not exceeding 12 inches in depth.

Trench or Excavated Area

All trenches in paved streets, shoulders, traveled roadways, parking areas and driveways shall be backfilled with suitable excavated backfill or granular backfill, as shown on the drawings from one (1) foot above top of pipe up to the required subgrade elevation which will allow for placement of the required gravel base and/or pavement surface. The approved excavated backfill or granular backfill shall be placed and thoroughly and uniformly compacted by machine tamping to the specified compaction. With the approval of the ENGINEER, water jetting may be accepted in lieu of tamping for granular backfill only.

Specified compaction shall be required of the entire trench when the edge of trench is within three (3) feet of edge of pavement. On road crossings, specified compaction shall extend ten (10) feet beyond the edge of pavement for paved roadways with gravel shoulders or shall extend three (3) feet beyond the back of curb for roadways with curb.

Trenches under concrete sidewalks and bike paths shall be backfilled from one foot above top of pipe to a level four (4) inches below finished grade of the sidewalk with approved suitable excavated backfill or

granular backfill and compacted to ninety-five percent (95%) maximum density.

Trenches not in paved streets, shoulders, traveled roadways, parking areas, driveways or under sidewalks, shall be backfilled from one (1) foot above the top of the pipe up to the ground surface (except as noted under the Restoration Specification) with suitable excavated backfill and shall require compaction equal to adjacent undisturbed earth.

Wherever gas mains, water mains, sewers, or other utilities are located in the trench area, granular backfill shall be used for backfill from bottom of the trench up to the springline of the pipes. Granular backfill shall be placed across the full trench width and extend far enough either side of the existing pipe to allow specified compaction so as to thoroughly support the pipe within the trench area.

E. Backfilling Around Structures

As soon as practicable after concrete structures have set, forms and debris shall be removed and the surface of the concrete pointed. After the structure has been checked and approved, the excavated area around the structure shall be backfilled up to specified subgrade with granular material or suitable excavated material as called for on the drawings for the adjacent trench. The fill shall be thoroughly compacted by machine tamping. No large boulders or masonry shall be placed in backfill. No backfill will be placed against manhole walls within 48 hours after the plaster coat has been applied to the outside of the walls nor shall backfill be placed about concrete structures until concrete has attained at least 75 percent of its design strength and approval of the ENGINEER has been obtained.

24. PLACING AND COMPACTING EMBANKMENT

Embankment material for fill work shall be placed and compacted in accordance with Section 2.05.03H of the MDOT Standard Specification for Construction.

25. DISPOSAL OF EXCAVATED MATERIAL

After all suitable excavated material has been used on site, the CONTRACTOR shall be responsible for properly removing and disposing of the excess.

The CONTRACTOR shall also be responsible for disposing of all other excavated materials that are unsuitable for use as fill or backfill. Unsuitable materials may include, but are not limited to, broken concrete, asphalt, rock, stone, and other related debris. The CONTRACTOR shall be required to obtain his own disposal areas and permits and shall receive no additional compensation for this disposal work.

Surplus or unsuitable material shall not be disposed of either temporarily or permanently beyond the plan grading limit line or across any wetland or flood plain unless the plans provide for such placement.

Any agreements that the CONTRACTOR makes with local residents concerning the placement of fill on private property shall be the sole responsibility of the CONTRACTOR. The OWNER will not become involved with any such agreements and will not be liable for damages that the CONTRACTOR may cause to private property.

Placement of fill on private property may require that the resident or CONTRACTOR obtain a grading permit or fill permit from the OWNER.

26. FINAL CLEANUP & GRADING

Upon completion of the construction, and before final payment is made, 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 and refill any place that may

have settled. He shall then re-grade 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 all operations.

27. CONTRACTOR SAFETY REQUIREMENTS

The excavation and trenching operations shall be conducted by the CONTRACTOR in a manner that will provide safe working conditions for all persons on the site who may be affected by the Work. The CONTRACTOR shall also conduct his operations in a manner that will protect adjacent property from damage.

Trench sides shall be either cut back to the slope as necessitated by soil and ground water conditions which will provide stable sides, or supporting systems shall be installed that are capable of restraining the earth sides from movement. A qualified employee of the CONTRACTOR shall design the trench supporting systems.

The CONTRACTOR shall employ, at all times at the site of the work, a qualified person who will be responsible for the safety of both the work and workmen, and who will make all the decisions relevant to the stability of trenches, the adequacy of any and all protective devices, proper operation of equipment, and all other matters related to safety.

The CONTRACTOR shall not store, along and adjacent to the trench, excavated material, heavy equipment, backfill materials, sewer pipe, or other construction materials which may impose too great a load on the earth and cause displacement or caving of the earth. The CONTRACTOR shall, at all times, provide a safe means of emergency exit from all trench excavations.

End of Section

RESTORATION

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GENERAL

1. SCOPE OF WORK

This work shall be subject to conditions of the General Conditions, General Specifications and include the furnishing of labor, materials, tools, accessories, equipment and services necessary for restoration of the surfaces shown on the Contract drawings and/or as herein required.

This work shall include replacement of all permanent type roadway surfaces, concrete sidewalks, curb and gutters, driveways, trees, culverts, fences, ditches, and miscellaneous items damaged or removed due to construction. Disposal of excess or unsuitable materials shall be considered as part of the restoration work. All such work shall be in accordance with the best modern practice, the OWNER's standards, and as specified herein.

Prior to performing work under this section, the CONTRACTOR shall submit to the ENGINEER for approval his construction methods and design mixes, sieve analysis and/or certification of compliance with the 2020 Michigan Department of Transportation (MDOT) Standard Specifications for Construction except where otherwise noted. No permanent surface restoration shall be performed until all underground work has been approved.

In the event that these specifications conflict with those of the OWNER or the controlling agency, the more stringent requirements shall govern.

2. SHOP DRAWINGS

When required by the ENGINEER, shop drawings shall be furnished as prescribed under the General Conditions.

Before the CONTRACTOR orders any restoration materials that he is proposing to use as substitutes for specified items, he shall submit details of the substitutes to the ENGINEER for consideration and approval.

3. MDOT STANDARDS

References to the Michigan Department of Transportation (MDOT) Specifications shall pertain to the 2020 Standard Specifications for Construction.

MATERIALS

4. AGGREGATE

a. Gravel Approaches and Roads

Natural aggregate shall be used for gravel appproach (driveways) and road restoration and shall meet the requirements of MDOT 21AA or 22A as shown in Table 902-1 of the MDOT Standard Specifications for Construction.

b. Shoulders

Natural aggregate shall be used for shoulders and shall meet the requirements of MDOT 21AA, 22A, or 23A as shown in Table 902-1 of the MDOT Standard Specifications for Construction.

c. Base Course

Natural aggregate shall be used for base course construction and shall meet the requirements of MDOT 21A, 21AA, or 22A as shown in Tables 902-1 and 902-2 of the MDOT Standard Specifications for Construction.

5. HOT MIX ASPHALT SURFACE, LEVELING, & BASE COURSES

Hot mix asphalt materials used for pavement construction shall meet the requirements of section 501.02 of the MDOT Standard Specifications for Construction or the requirements of the controlling agency as called for on the construction plans.

6. CONCRETE PAVEMENT, SIDEWALKS, CURB & GUTTER

Concrete used for pavement, sidewalk, and curb and gutter construction shall meet the requirements of MDOT grade P1 concrete or the requirements of the controlling agency as called for on the construction plans. MDOT grade P-NC may also be used where circumstances require the use of a high-early strength concrete. Refer to Table 1004-1 of the MDOT Standard Specifications for Construction.

7. TOPSOIL

Topsoil shall be screened and shall consist of loose black-colored soil that is suitable for the growth of grass seed or sod. The topsoil shall be obtained from the upper layer of an existing fertile soil and be free of limbs, twigs, rocks, stones, muck, roots and debris, etc. and containing organic matter rich in nutrients with negligible clay content.

Topsoil shall meet the following requirements:

a. 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.

b. The organic matter content shall range between 2% and 6% (by dry sample weight).

c. The soil texture shall be a sandy loam, silt loam, or loam where the sand, silt, and clay contents (by dry sample weight) fall within the following ranges:

Sand .....40% to 65%
Silt.....25% to 60%
Clay.....5% to 15%

d. The gradation shall be as follows:

Sieve Designation	% Passing
1 inch screen	100
0.25 inch screen	97 - 100
No. 10 U.S.S. mesh sieve	95 - 100
No. 140 U.S.S. mesh sieve	15 - 35

e. The soil salinity as measured by the electrical conductivity of a saturated soil

sample shall not exceed 2dS/m (decisiemens/meter).

f. Topsoil samples may be taken from stockpiles by the ENGINEER for submission to a testing laboratory. Topsoil that does not meet the required specifications shall be removed from the project site by the CONTRACTOR and shall be replaced with suitable topsoil that meets the testing requirements.

8. SEED & FERTILIZER

Seed and fertilizer shall meet the following requirements:

Table R-1

Location	Seeding* Requirement	Fertilizer Requirement
Maintained Lawn Areas	MDOT Type THM Mix (20% Perennial Rye, 30% Kentucky Blue, 50% Red Fescue) applied at 220 lbs./acre	MDOT Class A, 176 lbs./acre
Fields, Slopes & Ditch Banks, Etc.	MDOT Type THV Mix (30% Perennial Rye, 15% Kentucky Blue, 45% Red Fescue, 10% Fults Salt) applied at 220 lbs./acre	MDOT Class B, 120 lbs./acre

* percent mixture proportions by weight

All grass seeding shall meet the requirements for purity and germination as called for in the MDOT Standard Specifications for Construction Table 917-2 for Seed Mixtures. Seed shall be delivered in durable containers which show the manufacturer's name, lot number, weight, contents, purity, and germination. Although Table R-1 lists only two typical seeding mixtures, other seeding mixtures shown in MDOT Tables 816-1 and 917-2 may be used where approved by the Engineer.

9. MULCH & MULCH BLANKETS

Mulch and mulch blankets shall meet the following requirements:

a. Loose Mulch. Mulching material shall consist of any straw or marsh hay in an air-dry condition. Hay in an air-dried condition will be permitted only when straw mulch or marsh hay is unavailable. Mulch materials shall be undamaged, rot free, clean, substantially free of weed seed and other objectionable foreign matter.

b. Mulch Blankets (for moderate runoff condition). Mulch Blankets shall be one of the following or an approved equal:

S1 Erosion Control Blanket – BonTerra America

Contech ERO-MAT - Contech Construction Products

Erosion Control Blanket DS-75 – North American Green

c. High Velocity Mulch Blankets (for medium to heavy runoff condition). High velocity mulch blankets shall be one of the following or an approved equal:

S2 Erosion Control Blanket – BonTerra America

Contech High Velocity ERO-MAT – Contech Construction Products

ECS High Impact Excelsior Blanket – Erosion Control Systems, Inc.

ECS Hich Velocity Straw Mat –
Erosion Control Systems, Inc.

Erosion Control Blanket DS-150 –
North American Green

10. SOD

Sod shall meet the requirements of Section 917.12 of MDOT Standard Specifications for Construction. The Contractor shall keep the sod watered until a vigorous growth is established.

Sod must be an upland mineral soil sod. Sod must be grown on loam soils. Sod grown on peat is not acceptable for use.

11. FENCING

Chain link and woven wire fence materials shall meet the requirements of Section 907 of MDOT Standard Specifications for Construction. Chain link fabric shall be as called for on the construction drawings (aluminum-coated, zinc-coated, or vinyl-coated). Fences made of other materials (wood board, split rail, iron, etc.) shall be replaced in kind or as called for on the construction drawings. In this case, fence materials and construction methods shall meet the applicable standards of ASTM.

12. TREES & SHRUBS

Trees and shrubs shall be quality, nursery-grown stock with adequate root growth (balled and burlapped). Nursery stock shall meet the standards of the current edition of the American Standard for Nursery Stock as published by the American Association of Nurserymen, as well as the standards of Section 917 of the MDOT Standard Specifications for Construction.

13. TIMBER POSTS

Timber used for fence, guide, guard and mailbox posts shall meet the requirements of Section 912.08 of the MDOT Standard Specifications for Construction.

14. TRAFFIC SIGNS & POSTS

Traffic and street signs that are removed or damaged shall be replaced in kind. The materials used for such sign and post replacements shall meet the applicable standards of Section 919 of the MDOT Standard Specifications for Construction.

15. PAVEMENT STRIPING

Pavement striping materials shall meet the requirements shown in Section 920 of the MDOT Standard Specifications for Construction.

CONSTRUCTION

16. PAVEMENT RESTORATION

The aggregate and pavement thicknesses shown in the following sections are intended to be a guideline for minimum thicknesses. Thicker sections may be required depending upon the requirements of the OWNER or the controlling agency. All pavements shall be restored to the elevation and section that existed prior to construction.

a. Gravel Shoulders and Approaches

Gravel shoulders and approaches shall be constructed as described in Section 307.03 of the MDOT Standard Specifications for Construction.

Gravel shoulder restoration shall consist of placement and compaction of MDOT 21AA limestone or MDOT 22A gravel on a suitable subgrade to form a minimum six (6) inch thick section. The 21AA limestone or 22A gravel shall be compacted to a minimum density of ninety-eight (98) percent of the maximum unit weight. The restored shoulder width shall match the existing width.

Restoration of gravel approaches shall consist of placement and compaction of MDOT 21AA limestone or MDOT 22A gravel on a suitable subgrade as called for

on the plans to form a minimum six (6) inch thick section. The 21AA limestone or 22A gravel shall be compacted to a minimum density of ninety-eight (98) percent unit of the maximum unit weight. The restored approach width shall match the existing width.

b. Gravel Roads

Restoration of gravel roads shall consist of placement and compaction of MDOT 21AA limestone, MDOT 22A gravel, or MDOT 23A gravel as called for in the plan details to form a minimum eight (8) inch thick section. The restored road width shall match the existing road width. Gravel roads shall be constructed as described in Section 306.03 of the MDOT Standard Specifications for Construction.

c. Aggregate Base Courses

Aggregate base courses shall be placed and compacted to the thickness and width as called for on the plan details and as described in Section 302.03 of the MDOT Standard Specifications for Construction. Unless otherwise indicated in the Suppplemental Specifications, aggregate base courses shall be compacted to a minimum density of ninety-eight (98) percent of the maximum unit weight.

d. Sawcutting

All pavement, curb and gutter, and sidewalk removals shall be accomplished by sawcutting with a power-driven concrete saw. Sawcutting shall be full depth for all pavements (concrete, bituminous, concrete with bituminous overlay).

In bituminous pavement, sawcut lines shall be parallel with or perpendicular to the direction of vehicle travel.

In concrete pavement, sawcut lines shall be cut parallel with pavement joints. Sawcuts shall not be nearer than five (5) feet to a transverse joint, to the center of pavement, or to the edge of pavement such that no existing or replacement pavement section shall be less than five (5) feet in width. If the proposed sawcut is nearer than five (5) feet to a joint or centerline of a pavement, then removal and replacement shall be extended to said joint or centerline.

If an integral concrete curb is to be removed, then the minimum removal width shall be eighteen (18) inches.

e. Hot Mix Asphalt (HMA) Pavement

Hot mix asphalt pavements shall be constructed in accordance with the plan details and Section 501 of the MDOT Standard Specifications for Construction. Where new asphalt pavement is to adjoin existing asphalt pavement, a two (2) foot wide butt joint shall be constructed. A bond coat shall be applied to the existing pavement surface. Unless otherwise called for in the plan details, the following sections shall apply as a minimum:

Bike paths:	3” HMA over 4” 21AA aggregate base (with soil sterilant application)
Residential driveways:	3” HMA over 6” 21AA aggregate base
Commercial driveways:	4” HMA over 8”21AA aggregate base; or 8” asphalt
Residential streets:	4” HMA over 8” 21AA aggregate base; or 8” asphalt
Collector road:	9” HMA over 6” 21AA aggregate base

The laboratory density of HMA pavement shall be determined by the Marshall Procedure ASTM D-1559 using 50 blows on each of the specimens as the compactive effort. One set of three (3) specimens shall be made on the first day of placement and on subsequent days as determined by the Engineer.

The measurement of field-compacted density shall be done with a nuclear gage. The percent of compaction obtained shall be determined by dividing the field-compacted density by the laboratory density and multiplying the result by 100. Unless otherwise indicated in the plan details or Supplemental Specifications, all HMA pavements shall be compacted to a minimum calculated density of 97%.

Density tests shall be taken on the completed pavement at a frequency of one test every 500 linear feet of paving lane, except for the last unit which will be 500 linear feet, plus any fractional unit less than 250 feet in length, or will be a fractional unit of 250 feet or more in length. Miscellaneous areas such as intersections, crossovers and widening lanes less that 250 feet long will be tested as directed by the Engineer.

f. Concrete Pavement

Concrete pavements shall be constructed in accordance with the plan details as well as Sections 602 and 801 of the MDOT Standard Specifications for Construction. Where new concrete pavement is to be anchored to old pavement, dowel bars and lane ties shall be installed in accordance with MDOT Standard Plans. Joints shall be installed in the new concrete pavement to match existing joint types and locations. Reinforcing steel shall be similar to that in the existing pavement and shall provide the same cross sectional area of reinforcement per foot as the existing pavement. Unless otherwise called for in the plan details, the following sections shall apply as a minimum:

Residential driveways:	6” non-reinforced concrete over 4” sand base
Commercial driveways:	8” non-reinforced concrete over 4” sand base
Residential streets:	8” non-reinforced concrete over 6” sand base
Collector road:	9” non-reinforced concrete over 6” sand base

g. Concrete Sidewalk and Ramps

Concrete sidewalks and ramps shall be constructed in accordance with the plan details and Section 803 of the MDOT Standard Specifications for Construction. Unless otherwise called for in the plan details, the following sections shall apply as a minimum:

Sidewalks:	4” concrete over 4” sand base
Sidewalks (at residential drive crossing):	6” concrete over 4” sand base
Sidewalks (at commercial drive crossing):	8” concrete over 4” sand base
Sidewalk ramps:	4” concrete over 4” sand base

h. Concrete Curb and Gutter

Concrete curb and gutter shall be constructed in accordance with plan details and Section 802 of the MDOT Standard Specifications for Construction.

17. TURF ESTABLISHMENT

The CONTRACTOR shall furnish and place topsoil, seed, or sod, and fertilizer for all areas that were disturbed during construction. Seed and sod shall be installed in accordance with the seasonal limitations that are described in section 816.03 of the MDOT Standard Specificiations for Construction unless directed otherwise by the Engineer.

a. Topsoil

Unless otherwise called for on the plans, a minimum of three (3) inches of topsoil shall be placed for areas that are to be restored with seeding or sodding. Topsoil shall be placed on a prepared earth bed in accordance with Section 816.03A of the MDOT Standard Specifications for Construction.

The existing earth bed shall be graded such that the placement of topsoil and sod will meet the final plan grades.

b. Seed

Seeding shall be sown in accordance with Section 816.03C of the MDOT Standard Specifications for Construction. The application rate for the seeding shall be as shown in the table in part 8 of the Materials Section.

c. Mulch and Mulch Blankets

Mulch and mulch blankets shall be placed over seeded areas as called for in Section 816.03E through G of the MDOT Standard Specifications for Construction. If mulch blankets must be secured to a slope, then biodegradable netting and biodegradable earth staples shall be used.

Mulch anchoring shall be considered as incidental to mulch placement unless a pay item for mulch anchoring has been included in the Bid Form.

d. Sod

Sod shall be placed in accordance with Section 816.03D of the MDOT Standard Specifications for Construction.

A sod cutter shall be used to establish a smooth vertical edge when new sod is to abut existing sod.

e. Fertilizer

Fertilizer shall be placed in accordance with Section 816.03B of the MDOT Standard Specifications for Construction. The application rate for the fertilizer shall be as shown in table in Part 8 of the Materials Section.

f. Watering and Maintenance

It is the responsibility of the CONTRACTOR to regularly water new seed and sod in order to establish a dense lawn of permanent grasses that is free from mounds and depressions. Any portion of a sodded area that "browns-out" or does not firmly knit to the soil base, or any portion of a seeded area that fails to show a uniform germination, shall be resodded or reseeded. Such resodding or reseeding shall be at the CONTRACTOR's expense and shall continue until a dense lawn in established.

Watering seed and sod shall be considered as incidental to the turf establishment work unless a pay item for water has been included in the Bid Form.

18. FENCING

Prior to the start of any fence restoration work, the CONTRACTOR shall verify that the line and grade are correct.

a. Removing and Replacing Existing Fences

Fences shall be removed and replaced or shall be removed as indicated on the Plans or as directed by the ENGINEER. If any of the existing material is damaged or destroyed, the CONTRACTOR shall replace the material at his expense. Replacement fence material shall be of a condition comparable to that which existed prior to construction.

After the fence removal or relocation operations are complete, all surplus material shall be removed and disposed of by the CONTRACTOR at his expense unless

otherwise called for on the Contract Documents.

Any holes or voids resulting from the fence post removal operation shall be backfilled with a suitable material, as approved by the ENGINEER.

b. Placing New Fence

Woven wire and chain link fencing shall be installed in accordance with Sections 808.03B and E of the MDOT Standard Specifications for Construction. If called for on the plans, a top rail shall be used in place of tension wire for the chain link fence construction. Other fence types (timber, boulders, decorative rock, etc.) shall be constructed in accordance with plan details.

19. GUARDRAIL

Guardrail shall be placed in accordance with Section 807 of the MDOT Standard Specifications for Construction. Guardrail design shall be approved by the ENGINEER and shall conform to the current applicable standards of the agency that has jurisdiction of the right-of-way.

Any holes or voids resulting from the guardrail post removal operation shall be backfilled with a suitable material, approved by the ENGINEER.

20. TREE & SHRUB PLANTING

Trees and shrubs shall be planted in accordance with Section 815 of the MDOT Standard Specifications for Construction. Nursery stock shall conform to the standards shown in the American Standard for Nursery Stock (ANSI Z60.1-2014).

Watering and cultivating trees and shrubs during the establishment period shall be considered as incidental to the tree and shrub planting work unless a pay item for watering and cultivating has been included in the Bid Form.

21. MAILBOXES

Where mailbox post replacement is called for on the plans, new mailbox posts shall be furnished and installed in accordance with Section 807 of the MDOT Standard Specifications for Construction and the plan details.

22. TRAFFIC SIGNS & POSTS

Placement of traffic signs and posts shall be done in accordance with the applicable Sections in 810 of the MDOT Standard Specification for Construction, the current edition of the Michigan Manual of Uniform Traffic Control Devices, and the plan details.

23. PERMANENT PAVEMENT STRIPING

Permanent pavement striping shall be placed in accordance with the plan details and Section 811 of the MDOT Standard Specifications for Construction.

24. DRAINAGE STRUCTURES, CULVERTS, & DITCHES

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 incidental to the project.

25. PROGRESS OF FINAL RESTORATION

If in the judgement of the OWNER, adequate site restoration efforts are not being expended, including but not limited to, roadway, driveway and drainage maintenance, removal of surplus materials, restoration of all signs, mail boxes and like items, 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.

End of Section

STORM SEWER CONSTRUCTION

Table of Contents

GENERAL

1. SCOPE OF WORK

This work shall be subject to the requirements of the General Conditions and General Specifications and shall include the furnishing of all labor, materials, tools, equipment, accessories and services necessary for providing and installing the items as shown on the Contract Documents or as herein required.

In the event these Specifications conflict with those of the OWNER's standards, the permit agency, or agency controlling the right-of-way where the sewer is being installed, the more stringent requirements will govern.

2. SHOP DRAWINGS

When required by the ENGINEER, shop drawings shall be furnished as prescribed under the General Conditions.

Before the CONTRACTOR orders any pipe or other appurtenances that he is proposing to use as substitutes for specified items, he shall submit design details of the substitutes to the ENGINEER for consideration and approval.

3. CERTIFICATION & CHECKING

All pipe and precast structures delivered to the job shall be accompanied by certification papers showing they have been tested in accordance with applicable specifications and that they meet the specifications for the project. All pipes and precast structures will be checked upon delivery to the job site. Any cracked, damaged or broken pieces or sections will be immediately removed from the site at the CONTRACTOR's expense.

4. MDOT STANDARDS

References to the Michigan Department of Transportation (MDOT) Specifications shall pertain to the 2020 Standard Specifications for Construction.

MATERIALS

5. SEWER PIPE

Sewer pipe shall be of the type and class designated for the specific locations or intended use shown or noted on the project plans. Any deviation from the type or class of pipe shown on the plans will not be permitted except upon receipt of written approval of the ENGINEER.

Any of the types of storm sewer pipe or joints listed below may be substituted upon approval of the ENGINEER provided that the flow capability and pipe strength (external load supporting) is equal to or exceeds that of the pipe specified on the plans.

Table ST-1
Storm Sewer Pipe Specifications

The intent of this table is to show the standards required for particular types of pipe and joints. The OWNER may not accept all of these types. The CONTRACTOR must refer to the project plans OWNER's standard details and bid forms to determine the type of pipe required for a particular project.

	Type of Pipe	Pipe Specification*	Allowable Type of Joint	Joint Specification *
a.	Extra strength non-reinforced concrete	ASTM C14	Modified grooved tongue with rubber gasket	ASTM C443
b.	Reinforced round concrete (size 12" & larger)	ASTM C76	Modified grooved tongue with rubber gasket	ASTM C443
c.	Reinforced elliptical concrete	ASTM C507	Tongue & grooved bituminous sealed joint with inside cement pointing on 42" equivalent size and larger External Seal (can be added to tongue and grooved bituminous sealed joint)	ASTM C443 ASTM C877
d.	Corrugated and smooth round metal pipe & pipe arch (galvanized steel)	AASHTO M36 ASTM A760	Metal coupling bands	AASHTO M36
e.	Corrugated and smooth round metal pipe & pipe arch (aluminized steel type 2)	AASHTO M36 ASTM A760	Metal coupling bands	AASHTO M36
f.	PVC (corrugated pipe with smooth interior; size 36" & smaller)	ASTM F949	Push on type	ASTM D3212 ASTM F477

	Type of Pipe	Pipe Specification*	Allowable Type of Joint	Joint Specification *
g.	HDPE	AASHTO M294 ASTM F2306	Push on type	ASTM D3212 ASTM F477
h.	PVC underdrain – smooth wall (4" & 6")	AASHTO M278	Push on type	* *
i.	ABS underdrain – smooth wall (4" & 6")	ASTM D2751, SDR 35 (AASHTO M270 for perforations)	Push on type	* *
j.	Polyethylene underdrain – corrugated (4" & 6")	AASHTO M252	Coupling band	AASHTO M252
k.	PVC underdrain – corrugated (4" & 6")	ASTM F949 (AASHTO M252 for perforations)	Coupling band	ASTM F949

* The latest revision of ASTM or AASHTO Specifications shall apply.

* * Joint tightness requirements shall not apply.

ASTM stands for American Society of Testing and Materials
AASHTO stands for American Association of State Highway Transportation Officials

6. CEMENT MORTAR POINTING:

Non-shrink cement mortar shall conform to MDOT Standard Specifications for Construction Type R-2 Mortar.

7. STORM DRAINAGE STRUCTURES

Manholes, catch basins, inlets, and special structures shall be constructed at locations shown on the plans and shall be of the size and type called for on the plans. They shall be constructed of precast reinforced concrete, concrete manhole block, poured-in-place concrete, or combinations of above. Structures shall be constructed to conform to these specifications and in accordance with the plan details. Where references are made to ASTM or AASHTO Specifications, the latest revision shall apply.

a. Precast reinforced concrete manhole sections shall conform to ASTM C478. The minimum wall thickness for four (4) foot diameter manholes shall be five (5) inches.

b. Precast manhole tees for 48-inch and larger storm sewer pipes shall be the same class pipe as that specified on the plans, but shall be a minimum ASTM

C76 Class IV. The manhole riser shall meet the requirements of ASTM C478.

c. Joints on precast reinforced concrete risers, cones, and base sections may be either cold applied bituminous mastic or modified grooved tongue with rubber gasket conforming to ASTM C443.

d. Base slab for structures shall be precast reinforced concrete, ASTM C478. When approved by the ENGINEER, poured in place concrete may be used. Base riser section with integral floor design shall be approved by the ENGINEER prior to manufacture.

e. Manhole steps shall be reinforced polypropylene plastic No. PS2-PFS as manufactured by M.A. Industries, Inc., cast iron No. 8500 as manufactured by East Jordan Iron Works, approved equal, or as specified on the drawings.

f. Concrete manhole block shall conform to ASTM C139 and additional requirements of MDOT Specification 913.05.

g. Brick for use in drainage structures shall conform to MDOT Specifications 913.03 A and C (concrete bricks).

h. Grade rings shall conform to ASTM C478 and shall have minimum thickness of three (3) inches.

i. Mortar for use in drainage structures shall conform to MDOT Specification 1005, Type R-2.

j. Concrete for poured-in-place construction shall conform to plan details, approved shop drawings, and to the requirements of grade S3 concrete as shown in the MDOT Specifications Table 1004-1 Concrete Mixtures.

k. Gray iron castings shall be of the type, size, and weight as specified on the plans. The castings shall conform to MDOT Specification 908.05.

l. The entire outside surface of all brick or concrete block portions of drainage structures shall be plaster coated with one-half (1/2) inch thick mortar.

m. All manholes on storm sewers eighteen (18) inches in diameter and smaller shall have two foot deep sumps unless otherwise called for on the plans

CONSTRUCTION

8. GENERAL

Excavation, bedding, and backfill for sewers and related structures shall be accomplished in accordance with requirements in the Earthwork Section.

Excavations 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 plans.

If the maximum trench width specified in the Earthwork Section is exceeded (unless otherwise shown on the plans), the CONTRACTOR shall install, at his own expense, such concrete cradling or other bedding as approved by the ENGINEER to support the added load of the backfill.

Install pipe, fittings, and appurtenances in strict accordance with the manufacturer's recommendations and these Specifications.

9. LAYING PIPE

a. Handling Pipe & Fittings

All pipes and castings shall be unloaded and distributed along the line of work in such manner and with such care as will effectually avoid damage to any pipe or fitting. Dropping pipe or fittings directly from the truck will not be permitted. Care

must also be taken to prevent abrasion of the pipe.

b. Placement of Pipe

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

Construction shall begin at the outlet end and proceed upgrade with spigot ends pointing in the direction of flow. Pipes shall be laid on a minimum four (4) inch sand bedding. A six (6) inch sand bedding shall be provided if called for on the plan details. If the subgrade has been disturbed so that refilling is necessary to bring the pipe to grade, such refilling shall be done with sand or gravel thoroughly tamped in place. Bell holes shall be excavated so that the full length of the pipe barrel will bear uniformly on the sand bedding.

Pipes shall be centered in bells or grooves and pushed tight together to form a smooth and continuous invert. After laying pipe, care shall 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.

c. Line and Grade

All pipe shall be laid to line and grade called for on the plans. Each pipe, as laid, shall be checked by the CONTRACTOR with line and grade pole or other device to insure this result is obtained. The finished work shall be straight and shall be sighted through the pipe between manholes.

d. Excavation to 18 inches Below Bottom of Pipe

As a result of the CONTRACTOR's construction procedure or where excavation has not uncovered a stable foundation subgrade at a depth of six (6) inches below the bottom of pipe, the CONTRACTOR shall continue to excavate downward to a maximum distance of eighteen (18) inches below the bottom of pipe to reach stable foundation soil. The space resulting from such excavation and the pipe bedding shall be filled and constructed in the same manner and using the same materials specified in the Earthwork Specifications Section. All costs for such construction shall be borne by the CONTRACTOR.

e. Excavation Below Limits Specified in above Paragraph "d"

Where excavation has not uncovered a stable, foundation subgrade at depths eighteen (18) inches below the bottom of pipe, then the CONTRACTOR shall stop further excavation and immediately notify the ENGINEER of the condition and of his intent to make a claim for additional cost. The ENGINEER shall investigate the soil conditions and may direct the CONTRACTOR to continue excavating if it appears that a stable subgrade can be obtained. In this case, the additional excavation beyond eighteen (18) below the bottom of pipe would be measured and paid for as trench undercut and refill. Material for refill of the undercut area shall be as described in the Earthwork Section. In the event that soil conditions are extremely severe, then the ENGINEER and soils consultant shall investigate the site conditions and shall prescribe the appropriate pipe support system to be used. Within ten (10) days after the ENGINEER determines the appropriate pipe support system to be used, the CONTRACTOR shall submit a detailed estimate for additional cost, excluding the costs to be borne by the CONTRACTOR in the above paragraph "d". The estimate shall include only those additional costs necessary to construct the pipe support system as directed by the ENGINEER. It shall not include

construction costs prior to the stoppage of work. Upon acceptance of the CONTRACTOR's estimate, the ENGINEER shall issue a change order.Laying and Bedding of PVC and HDPE Pipe

Bedding of PVC and HDPE Pipe shall be in accordance with current ASTM specifications.

Potential damage can occur to exterior walls of PVC and HDPE Pipe, particularly under cold weather conditions if rocks, frozen material, or large objects strike the pipe. The CONTRACTOR shall carefully avoid dumping any materials other than approved bedding sand or stone on the pipe until a 12-inch cover is placed on it. Pipe walls and joints shall also be protected from abrasion and damage during handling and shall be fully checked just prior to placing in the trench.

Care shall be taken during bedding compaction to avoid distorting the shape of the pipe or damaging its exterior wall.

Cutting of pipe, where required, shall be performed by the use of tools or equipment that will provide a neat, perpendicular cut without damage to the pipe material.

Bowing or warping of pipe can occur with temperature fluctuations. The CONTRACTOR shall store and protect the pipe to minimize bowing. Nominal 12'-6" pipe lengths that have deviations from straight greater than one (1) inch shall not be used.

f. Concrete Cradle for Pipe

Where called for on the drawings, or otherwise required, pipe shall be installed with a concrete cradle of MDOT Grade S3 concrete.

Each pipe shall rest on a 6-inch minimum thickness bed of dry mix concrete that is shaped to fit the bottom of the pipe. The dry mix concrete shall be MDOT Grade S3 or ENGINEER-approved equal.

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 MDOT Grade S3. The concrete shall have a five (5) inch slump and be 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.

g. Jointing

Where pipe is laid in wet trenches, trenches with running sand, or in trench conditions where manual means will not allow pushing the pipe home, the CONTRACTOR shall provide and use mechanical means for pulling the pipe home and holding the pipe joints tight until completion of the line. Mechanical means shall consist of a cable placed inside the pipe with a suitable winch, jack, or come-along for pulling the pipe home and holding the pipe in position.

All joints on elliptical concrete pipe (42-inch equivalent diameter and larger) shall be cement mortar pointed on the inside. On bituminous mastic joints the compound shall be removed to a depth of three-quarters (3/4) of an inch from the inside of the joint before pointing.

h. Backfill

Backfill shall be placed in accordance with the Earthwork Specifications.

10. STORM DRAINAGE STRUCTURES

Construction methods for drainage structures shall conform to MDOT Specification 403.03 except as herein provided.

All precast sections shall bear the stamp of an approved laboratory as having been tested and delivered from tested stock of the

manufacturer, at the expense of the CONTRACTOR.

Precast sections shall be constructed so that no more than fifty (50) percent of the circumference, measured on the inside face, is deleted on any horizontal plane for sewer pipe openings. There shall be no less than twelve (12) inches of residual concrete measured on any horizontal plane between pipe openings.

Excavation shall be carried to the depth required to permit the construction of the base in accordance with the requirements of the Standard Details. The excavation shall be sufficiently wide to allow for shoring, bracing, or formwork, should any or all be necessary. Also, the excavation shall 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.

With the exception of drainage structures having sumps, the bottom of the structures shall be channeled to provide for smooth flow through the manhole. Channels shall be formed using MDOT Grade S3 concrete.

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

11. FINAL GRADE ADJUSTMENTS

a. Final Grade – Existing Structures

Adjustment of drainage structures shall apply to all final vertical changes made on existing structures where the elevation of the cover is not changed by more than six inches. Vertical changes in excess of six (6) inches will be treated as structure reconstruction.

b. Final Grade – New Structures

Final grade adjustment of new structures shall be considered as incidental to the structure construction.

Final grade adjustments may be made using either brick and mortar construction or precast concrete adjustment rings at the option of the CONTRACTOR.

The maximum allowable grade adjustment using grade rings shall be fifteen (15) inches. Final grade adjustment for manholes located in pavements and sidewalks shall be made with brick and mortar. A minimum of three (3) or maximum of six (6) courses of brick shall be placed on top of the precast cone section.

12. STUBS, CONNECTIONS, AND BULKHEADS

The CONTRACTOR shall furnish all material and labor and shall install and/or construct stubs, connections, bulkheads, and related items of work as called for in the Contract Documents.

Existing sewers shall be connected where called for on the plans. Bulkheads shall be placed or removed where called for on the plans.

Unless otherwise noted on the plans, stubs twelve (12) inches or larger in diameter shall consist of one full length of concrete storm sewer pipe, minimum length eight (8) feet, with watertight brick and mortar bulkhead. Unless otherwise noted on the plans, stubs four inches (4-inch) to ten inches (10-inch) in diameter shall consist of one full length of plastic storm sewer pipe, minimum length of eight (8) feet, with an expandable plug or removable cap.

13. CLEANING

All sewers shall be thoroughly cleaned before final acceptance.

14. TESTING

a. General

The CONTRACTOR shall provide all necessary equipment and labor for making the tests and cost of same shall be incidental to the unit price bid for sewer.

b. Deflection Test for Plastic Pipe

The allowable maximum deflection shall be five (5) percent of internal pipe diameter. A Deflection Test Gauge (Go, No-Go) as manufactured by Hurco Technologies, Cherne Industries, or approved equal shall be used to verify that the maximum allowable deflection standard is met. The test gauge must have a minimum of 9 points. Proving rings must be provided to verify the gauge diameter. The gauge must be pulled through manually. Force will not be allowed. Pipe with deflections greater than five (5) percent will be considered unacceptable and shall be replaced by the CONTRACTOR at his own cost.

c. Videotaping

As a means of insuring that pipe laying was properly done and that all joints are in a "home" position, the CONTRACTOR shall provide for videotaping of ten (10) percent of the pipe footage laid (pipe 36" diameter and smaller), with no less than one manhole run being televised on each project. The ENGINEER shall indicate which pipe runs are to be videotaped. The videotaping shall be done no sooner than thirty (30) days after sewer installation is complete. The CONTRACTOR shall provide twenty-four (24) hours notice to both the OWNER and ENGINEER prior to videotaping so that a representative may be present. A satisfactory review of the videotape by the ENGINEER shall be a condition for sewer acceptance by the OWNER. Typical items to be reviewed on the videotape will include pipe deflection, pipe settlement, connections, joints and pipe cleanliness. If the videotape review reveals unsatisfactory conditions, the CONTRACTOR shall correct the conditions at his own cost and shall re-videotape the affected pipe sections for review by the ENGINEER.

End of Section

SECTION 26 05 19 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Copper building wire.
   2. Connectors and splices.

B. Related Requirements:
   1. Section 26 05 23 "Control-Voltage Electrical Power Cables" for control systems communications cables and Classes 1, 2, and 3 control cables.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: Indicate type, use, and location.

PART 2 - PRODUCTS

2.1 COPPER BUILDING WIRE

A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Alpha Wire Company.
   2. Belden Inc.
   3. General Cable Technologies Corporation.
   4. Okonite Company (The).
   5. Southwire Company.

C. Standards:
   1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
   2. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

D. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.

E. Conductor Insulation:
   1. Type RHW-2: Comply with UL 44.
   2. Type TC-ER: Comply with NEMA WC 70/ICEA S-95-658 and UL 1277.
   3. Type THWN-2: Comply with UL 83.
   4. Type XHHW-2: Comply with UL 44.

2.2 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. 3M Electrical Products.
   2. Appleton - O-Z/Gedney; Emerson Electric Co., Automation Solutions.
   3. ILSCO.

C. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc die-cast with set screws, designed to connect conductors specified in this Section.

D. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.
   1. Material: Copper, tin plated .
   2. Type: Two hole with long barrels.
   3. Termination: Compression .

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders:
   1. Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits:
   1. Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

C. ASD Output Circuits Cable: Extra-flexible stranded for all sizes.

D. Power-Limited Fire Alarm and Control: Solid for No. 12 AWG and smaller.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type XHHW-2, single conductors in raceway Type USE, single conductor in raceway .

B. Exposed Feeders: Type XHHW-2, single conductors in raceway .

C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN/THWN-2, single conductors in raceway .

D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type XHHW-2, single conductors in raceway .

E. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway .

F. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type XHHW-2, single conductors in raceway .

3.3 INSTALLATION, GENERAL

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points according to Section 26 05 33 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

F. Support cables according to Section 26 05 29 "Hangers and Supports for Electrical Systems."

3.4 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
   1. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inch of slack.

3.5 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 26 05 53 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

3.7 FIRESTOPPING

A. Apply firestopping to all electrical penetrations to restore original fire-resistance rating of assembly according to Section 07 84 13 "Penetration Firestopping."

END OF SECTION 26 05 19

SECTION 26 05 33 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Type EMT-A and Type EMT-SS raceways and elbows.
2. Type EMT-S raceways and elbows.
3. Type ERMC-S raceways, elbows, couplings, and nipples.
4. Fittings for conduit, tubing, and cable.
5. Surface metal raceways and fittings.
6. Metallic outlet boxes, device boxes, rings, and covers.
7. Cabinets, cutout boxes, junction boxes, pull boxes, and miscellaneous enclosures.

1.2 ACTION SUBMITTALS

A. Product Data: For the following:
1. Raceways and fittings
2. Wireways and auxiliary gutters.
3. Surface raceways.
4. Floor boxes.
5. Cabinets, cutout boxes, and miscellaneous enclosures.

PART 2 - PRODUCTS

2.1 TYPE EMT-S RACEWAYS AND ELBOWS

A. Steel Electrical Metal Tubing (EMT-S) and Elbows:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Atkore International (Allied Tube & Conduit).
b. Atkore International (Calconduit).
c. Emerson Electric Co.
d. Nucor Corporation (Nucor Tubular Products - Republic).
e. Topaz Lighting & Electric.
f. Zekelman Industries (Wheatland Tube).
2. Applicable Standards:
a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
b. General Characteristics:
1) Reference Standards: UL 797 and UL Category Control Number FJMX.
2) Material: Steel.
3) Exterior Coating: Zinc .
c. Options:
1) Minimum Trade Size: 3/4 inch.
2) Colors: As indicated on Drawings.

2.2 TYPE ERMC-S RACEWAYS, ELBOWS, COUPLINGS, AND NIPPLES

A. Galvanized-Steel Electrical Rigid Metal Conduit (ERMC-S-G), Elbows, Couplings, and Nipples:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Atkore International (Allied Tube & Conduit).
b. Atkore International (Calconduit).
c. Eaton (Crouse-Hinds).
d. Killark; Hubbell Incorporated, Construction and Energy.
e. Nucor Corporation (Nucor Tubular Products - Republic).
f. Zekelman Industries (Wheatland Tube).

2. Applicable Standards:
   a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
   b. General Characteristics:
      1) Reference Standards: UL 6 and UL Category Control Number DYIX.
      2) Exterior Coating: Zinc.
      3) Interior Coating: Zinc with organic top coating .
   c. Options:
      1) Minimum Trade Size: 3/4 inch.
      2) Colors: As indicated on Drawings.

2.3 TYPE LFMC RACEWAYS

A. Stainless Steel Liquidtight Flexible Metal Conduit (LFMC-SS):
1. Applicable Standards:
   a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
   b. General Characteristics:
      1) Reference Standard: UL 360 and UL Category Control Number DXHR.
      2) Material: Stainless steel.
   c. Options:
      1) Minimum Trade Size: 3/4 inch.

2.4 FITTINGS FOR CONDUIT, TUBING, AND CABLE

A. Fittings for Type ERMC, Type IMC, Type PVC, Type EPEC, and Type RTRC Raceways:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Appleton - EGS; Emerson Electric Co., Automation Solutions.
   b. Appleton - O-Z/Gedney; Emerson Electric Co., Automation Solutions.
   c. Atkore International (Konkore Fittings).
   d. Eaton (Crouse-Hinds).
2. Applicable Standards:
   a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
   b. General Characteristics:
      1) Reference Standards: UL 514B and UL Category Control Number DWTT.
      2) Material: Iron Alloy.
      3) Coupling Method: Compression coupling or .
   c. Options:
      1) Conduit Fittings for Hazardous (Classified) Locations: UL 1203.
      2) Expansion and Deflection Fittings: UL 651 with flexible external bonding jumper.

B. Fittings for Type EMT Raceways:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Appleton - EGS; Emerson Electric Co., Automation Solutions.
   b. Appleton - O-Z/Gedney; Emerson Electric Co., Automation Solutions.

c. Atkore International (Allied Tube & Conduit).
d. Atkore International (Calconduit).
e. Eaton (Crouse-Hinds).
f. Southwire Company.

2. Applicable Standards:
   a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
   b. General Characteristics:
      1) Reference Standards: UL 514B and UL Category Control Number FKAV.
      2) Material: Steel .
      3) Coupling Method: Compression couplingorRaintight compression coupling with distinctive color gland nut .
   c. Options:
      1) Conduit Fittings for Hazardous (Classified) Locations: UL 1203.
      2) Expansion and Deflection Fittings: UL 651 with flexible external bonding jumper.

C. Fittings for Type LFMC and Type LFNC Raceways:
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
   a. Liquid Tight Connector Co.
2. Applicable Standards:
   a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
   b. General Characteristics:
      1) Reference Standards: UL 514B and UL Category Control Number DXAS.

2.5 METALLIC OUTLET BOXES, DEVICE BOXES, RINGS, AND COVERS

A. Metallic Outlet Boxes:
1. Description: Box having pryout openings, knockouts, threaded entries, or hubs in either the sides of the back, or both, for entrance of conduit, conduit or cable fittings, or cables, Conduit boxes are to box.be steel with provisions for mounting outlet box cover.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Appleton - EGS; Emerson Electric Co., Automation Solutions.
   b. Appleton - O-Z/Gedney; Emerson Electric Co., Automation Solutions.
   c. Eaton (Crouse-Hinds).
   d. Hubbell Premise Wiring; Hubbell Incorporated, Commercial and Industrial.
   e. Killark; Hubbell Incorporated, Construction and Energy.
   f. Pass & Seymour; Legrand North America, LLC.
   g. Wiremold; Legrand North America, LLC.
   h. Wiring Device-Kellems; Hubbell Incorporated, Commercial and Industrial.
3. Applicable Standards:
   a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
   b. General Characteristics:
      1) Reference Standards: UL 514A and UL Category Control Number QCIT.
   c. Options:
      1) Material: Sheet steel Cast metal.
      2) Sheet Metal Depth: Minimum 2.5 inch .
      3) Cast-Metal Depth: Minimum 2.4 inch.
      4) Boxes are to have no unused knockouts.

B. Metallic Conduit Bodies:

1. Description: Means for providing access to interior of conduit or tubing system through one or more removable covers at junction or terminal point. In the United States, conduit bodies are listed in accordance with outlet box requirements.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Appleton - EGS; Emerson Electric Co., Automation Solutions.
    b. Appleton - O-Z/Gedney; Emerson Electric Co., Automation Solutions.
    c. Eaton (Crouse-Hinds).
    d. Killark; Hubbell Incorporated, Construction and Energy.
    e. Pass & Seymour; Legrand North America, LLC.
3. Applicable Standards:
    a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
    b. General Characteristics:
        1) Reference Standards: UL 514A and UL Category Control Number QCIT.

C. Metallic Device Boxes:
1. Description: Box with provisions for mounting wiring device directly to box.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Appleton - EGS; Emerson Electric Co., Automation Solutions.
    b. Appleton - O-Z/Gedney; Emerson Electric Co., Automation Solutions.
    c. Eaton (Crouse-Hinds).
    d. Hubbell Premise Wiring; Hubbell Incorporated, Commercial and Industrial.
    e. Wiring Device-Kellems; Hubbell Incorporated, Commercial and Industrial.
3. Applicable Standards:
    a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
    b. General Characteristics:
        1) Reference Standards: UL 514A and UL Category Control Number QCIT.
    c. Options:
        1) Material: orCast metal.
        2) Cast-Metal Depth: minimum 2.4 inch.
        3) Boxes are to have no unused knockouts.

D. Metallic Extension Rings:
1. Description: Ring intended to extend sides of outlet box or device box to increase box depth, volume, or both.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Appleton - O-Z/Gedney; Emerson Electric Co., Automation Solutions.
    b. Eaton (B-line).
    c. Eaton (Crouse-Hinds).
    d. Pass & Seymour; Legrand North America, LLC.
    e. Wiring Device-Kellems; Hubbell Incorporated, Commercial and Industrial.
3. Applicable Standards:
    a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
    b. General Characteristics:
        1) Reference Standards: UL 514A and UL Category Control Number QCIT.

2.6 CABINETS, CUTOUT BOXES, JUNCTION BOXES, PULL BOXES, AND MISCELLANEOUS ENCLOSURES

A. Indoor Sheet Metal Cabinets:

1. Description: Enclosure provided with frame, mat, or trim in which swinging door or doors are or can be hung.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Eaton (Crouse-Hinds).
    b. Killark; Hubbell Incorporated, Construction and Energy.
    c. Milbank Manufacturing Co.
    d. nVent (Hoffman).
3. Applicable Standards:
    a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
    b. General Characteristics:
        1) Reference Standards: UL Category Control Number CYIV.
            a) Non-Environmental Characteristics: UL 50.
            b) Environmental Characteristics: UL 50E.
    c. Options:
        1) Degree of Protection: Type 12 .
        2) Boxes are to have no unused knockouts.

B. Indoor Sheet Metal Junction and Pull Boxes:
1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Appleton - O-Z/Gedney; Emerson Electric Co., Automation Solutions.
    b. Eaton (B-line).
    c. Milbank Manufacturing Co.
    d. nVent (Hoffman).
    e. Wiring Device-Kellems; Hubbell Incorporated, Commercial and Industrial.
3. Applicable Standards:
    a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
    b. General Characteristics:
        1) Reference Standards: UL Category Control Number BGUZ.
            a) Non-Environmental Characteristics: UL 50.
            b) Environmental Characteristics: UL 50E.
    c. Options:
        1) Degree of Protection: Type 12 .
        2) Boxes are to have no unused knockouts.

C. Outdoor Cast-Metal Junction and Pull Boxes:
1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Appleton - EGS; Emerson Electric Co., Automation Solutions.
    b. Appleton - O-Z/Gedney; Emerson Electric Co., Automation Solutions.
    c. Eaton (Crouse-Hinds).
3. Applicable Standards:
    a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
    b. General Characteristics:
        1) Reference Standards: UL Category Control Number BGUZ.
            a) Non-Environmental Characteristics: UL 50.
            b) Environmental Characteristics: UL 50E.

c. Options:
1) Degree of Protection: Type 4 .

PART 3 - EXECUTION

3.1 SELECTION OF RACEWAYS

A. Unless more stringent requirements are specified in Contract Documents or manufacturers' written instructions, comply with NFPA 70 for selection of raceways. Consult Architect for resolution of conflicting requirements.

B. Outdoors:
1. Exposed Conduit: ERMC .
2. Concealed Conduit, Aboveground: ERMC EMT .
3. Direct-Buried Conduit: ERMC.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC .

C. Indoors or Outdoors:
1. Hazardous Classified Locations: ERMC .
2. Exposed and Subject to Physical Damage: ERMC . Raceway locations include the following:
a. Mechanical rooms.
b. Manufacturing areas .
3. Exposed, Not Subject to Physical Damage: EMT, .
4. Concealed in Ceilings and Interior Walls and Partitions: EMT .
5. Damp or Wet Locations: ERMC .
6. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC .

D. Stub-ups to Above Recessed Ceilings: Provide EMT, IMC, or ERMC for raceways.

E. Raceway Fittings: Select fittings in accordance with NEMA FB 2.10 guidelines.
1. ERMC and IMC: Provide threaded type fittings unless otherwise indicated.

3.2 SELECTION OF BOXES AND ENCLOSURES

A. Unless more stringent requirements are specified in Contract Documents or manufacturers' written instructions, comply with NFPA 70 for selection of boxes and enclosures. Consult Architect for resolution of conflicting requirements.

B. Degree of Protection:
1. Outdoors:
a. Type 4 unless otherwise indicated.
b. Locations Exposed to Hosedown: Type 4 .
c. Locations Subject to Potential Flooding: Type 6P.
d. Locations Aboveground Where Mechanism Must Operate When Ice Covered: Type 3S.
e. Locations in-Ground or Exposed to Corrosive Agents Where Mechanism Must Operate When Ice Covered: Type 3SX.
2. Indoors:
a. Damp or Dusty Locations: Type 12 .
b. Surface Mounted in Kitchens and Other Locations Exposed to Oil or Coolants: Type 12.

c. Flush Mounted in Kitchens and Other Locations Exposed to Oil or Coolants: Type 12 .

d. Locations Exposed to Hosedown: Type 4 .

C. Exposed Boxes Installed Less Than 6.5 ft. Above Floor:
1. Provide cast-metal boxes. Boxes with knockouts or unprotected openings are prohibited.
2. Provide exposed cover. Flat covers with angled mounting slots or knockouts are prohibited.

3.3 INSTALLATION OF RACEWAYS

A. Installation Standards:
1. Unless more stringent requirements are specified in Contract Documents or manufacturers' written instructions, comply with NFPA 70 for installation of raceways. Consult Architect for resolution of conflicting requirements.
2. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
3. Comply with requirements in Section 26 05 29 "Hangers and Supports for Electrical Systems" for hangers and supports.
4. Comply with NECA NEIS 101 for installation of steel raceways.
5. Comply with NECA NEIS 102 for installation of aluminum raceways.
6. Comply with NECA NEIS 111 for installation of nonmetallic raceways.
7. Install raceways square to the enclosure and terminate at enclosures without hubs with locknuts on both sides of enclosure wall. Install locknuts hand tight, plus one-quarter turn more.
8. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4 inch trade size and insulated throat metal bushings on 1-1/2 inch trade size and larger conduits terminated with locknuts..
9. Raceway Terminations at Locations Subject to Moisture or Vibration:
a. Provide insulating bushings to protect conductors, including conductors smaller than No. 4 AWG..

B. General Requirements for Installation of Raceways:
1. Complete raceway installation before starting conductor installation.
2. Provide stub-ups through floors with coupling threaded inside for plugs, set flush with finished floor. Plug coupling until conduit is extended above floor to final destination or a minimum of 2 ft. above finished floor.
3. Install no more than equivalent of three 90-degree bends in conduit run. Support within 12 inch of changes in direction.
4. Make bends in raceway using large-radius preformed ells except for parallel bends. Field bending must be in accordance with NFPA 70 minimum radii requirements. Provide only equipment specifically designed for material and size involved.
5. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
6. Support conduit within 12 inch of enclosures to which attached.
7. Install raceway sealing fittings at accessible locations in accordance with NFPA 70 and fill them with listed sealing compound. For concealed raceways, install fitting in flush steel box with blank cover plate having finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings in accordance with NFPA 70.
8. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal interior of raceways at the following points:
a. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
b. Where an underground service raceway enters a building or structure.

c. Conduit extending from interior to exterior of building.
d. Conduit extending into pressurized duct and equipment.
e. Conduit extending into pressurized zones that are automatically controlled to maintain different pressure set points.
f. Where otherwise required by NFPA 70.

9. Do not install raceways or electrical items on "explosion-relief" walls or rotating equipment.
10. Do not install conduits within 2 inch of the bottom side of a metal deck roof.
11. Keep raceways at least 6 inch away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
12. Cut conduit perpendicular to the length. For conduits 2 inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length. Ream inside of conduit to remove burrs.
13. Install pull wires in empty raceways. Provide polypropylene or monofilament plastic line with not less than 200 lb tensile strength. Leave at least 12 inch of slack at both ends of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

C. Requirements for Installation of Specific Raceway Types:
1. Types ERMC and IMC:
a. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound that maintains electrical conductivity to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
2. Type ERMC-S-PVC:
a. Follow manufacturer's installation instructions for clamping, cutting, threading, bending, and assembly.
b. Provide PVC-coated sealing locknut for exposed male threads transitioning into female NPT threads that do not have sealing sleeves, including transitions from PVC couplings/female adapters to Type ERMC-S-PVC elbows in direct-burial applications. PVC-coated sealing locknuts must not be used in place of conduit hub. PVC-coated sealing locknut must cover exposed threads on Type ERMC-S-PVC raceway.
c. Coat field-cut threads on PVC-coated raceway with manufacturer-approved corrosion-preventing conductive compound prior to assembly.
3. Types FMC, LFMC, and LFNC:
a. Comply with NEMA RV 3. Provide a maximum of 36 inch of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

D. Raceways Embedded in Slabs:
1. Run raceways larger than 1 inch trade size below concrete slab. .
2. Arrange raceways to cross building expansion joints with expansion fittings at right angles to the joint.
3. Arrange raceways to ensure that each is surrounded by a minimum of 1 inch of concrete without voids.
4. Do not embed threadless fittings in concrete unless locations have been specifically approved by Architect.

E. Stub-ups to Above Recessed Ceilings:
1. Provide EMT, IMC, or ERMC for raceways.
2. Provide a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

F. Raceway Fittings: Install fittings in accordance with NEMA FB 2.10 guidelines.

1. ERMC-S-PVC: Provide only fittings listed for use with this type of conduit. Patch and seal joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Provide sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
2. EMT: Provide compression , steel fittings up to 10' A.F.F.. Comply with NEMA FB 2.10.
3. Flexible Conduit: Provide only fittings listed for use with flexible conduit type. Comply with NEMA FB 2.20.

G. Expansion-Joint Fittings:
1. Install in runs of aboveground PVC that are located where environmental temperature change may exceed 30 deg F and that have straight-run length that exceeds 25 ft.. Install in runs of aboveground ERMC and EMT conduit that are located where environmental temperature change may exceed 100 deg F and that have straight-run length that exceeds 100 ft..
2. Install expansion fittings at locations where conduits cross building or structure expansion joints.
3. Install expansion-joint fitting with position, mounting, and piston setting selected in accordance with manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

H. Raceways Penetrating Rooms or Walls with Acoustical Requirements:
1. Seal raceway openings on both sides of rooms or walls with acoustically rated putty or firestopping.

3.4 INSTALLATION OF SURFACE RACEWAYS

A. Install surface raceways only where indicated on Drawings.

B. Install surface raceway with a minimum 2 inch radius control at bend points.

C. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inch and with no less than two supports per straight raceway section. Support surface raceway in accordance with manufacturer's written instructions. Tape and glue are unacceptable support methods.

3.5 INSTALLATION OF BOXES AND ENCLOSURES

A. Provide boxes in wiring and raceway systems wherever required for pulling of wires, making connections, and mounting of devices or fixtures.

B. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

C. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box, whether installed indoors or outdoors.

D. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

E. Locate boxes so that cover or plate will not span different building finishes.

F. Support boxes in recessed ceilings independent of ceiling tiles and ceiling grid.

G. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for purpose.

H. Fasten junction and pull boxes to, or support from, building structure. Do not support boxes by conduits.

I. Set metal floor boxes level and flush with finished floor surface.

J. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

K. Do not install aluminum boxes, enclosures, or fittings in contact with concrete or earth.

L. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to ensure a continuous ground path.

M. Boxes and Enclosures in Areas or Walls with Acoustical Requirements:
   1. Provide gaskets for wallplates and covers.

3.6 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 07 84 13 "Penetration Firestopping."

3.7 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.
   1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
   2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

3.8 CLEANING

A. Boxes: Remove construction dust and debris from device boxes, outlet boxes, and floor-mounted enclosures before installing wallplates, covers, and hoods.

END OF SECTION 26 05 33

SECTION 26 05 43 - UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Metal conduits and fittings, including GRC and PVC-coated steel conduit.
2. Rigid nonmetallic duct.
3. Flexible nonmetallic duct.
4. Duct accessories.
5. Precast concrete handholes.
6. Polymer concrete handholes and boxes with polymer concrete cover.
7. Fiberglass handholes and boxes with polymer concrete cover.
8. Fiberglass handholes and boxes.
9. High-density plastic boxes.
10. Precast manholes.
11. Utility structure accessories.

1.3 DEFINITIONS

A. Direct Buried: Duct or a duct bank that is buried in the ground, without any additional casing materials such as concrete.

B. Duct: A single duct or multiple ducts. Duct may be either installed singly or as component of a duct bank.

C. Duct Bank:
1. Two or more ducts installed in parallel, with or without additional casing materials.
2. Multiple duct banks.

D. GRC: Galvanized rigid (steel) conduit.

E. Trafficways: Locations where vehicular or pedestrian traffic is a normal course of events.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.
1. Include duct-bank materials, including spacers and miscellaneous components.
2. Include duct, conduits, and their accessories, including elbows, end bells, bends, fittings, and solvent cement.
3. Include accessories for manholes, handholes, boxes.
4. Include underground-line warning tape.
5. Include warning planks.

B. Shop Drawings:
1. Precast or Factory-Fabricated Underground Utility Structures:

a. Include plans, elevations, sections, details, attachments to other work, and accessories.
b. Include duct entry provisions, including locations and duct sizes.
c. Include reinforcement details.
d. Include frame and cover design and manhole chimneys.
e. Include ladder details.
f. Include grounding details.
g. Include dimensioned locations of cable rack inserts, pulling-in and lifting irons, and sumps.
h. Include joint details.

1.5 FIELD CONDITIONS

A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions, and then only after arranging to provide temporary electrical service according to requirements indicated:
1. Notify Architect Owner no fewer than 7 days in advance of proposed interruption of electrical service.
2. Do not proceed with interruption of electrical service without Architect's Owner's written permission.

B. Ground Water: Assume ground-water level is 36 inches below ground surface unless a higher water table is noted on Drawings.

PART 2 - PRODUCTS

2.1 RIGID NONMETALLIC DUCT

A. Underground Plastic Utilities Duct: Type EPC-80-PVC and Type EPC-40-PVC RNC, complying with NEMA TC 2 and UL 651, with matching fittings complying with NEMA TC 3 by same manufacturer as duct.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Cantex Inc.
2. Electri-Flex Company.
3. IPEX USA LLC.
4. Opti-Com Manufacturing Network, Inc (OMNI).

C. Listed and labeled as defined in NFPA 70, by a nationally recognized testing laboratory, and marked for intended location and application.

D. Solvents and Adhesives: As recommended by conduit manufacturer.

2.2 FLEXIBLE NONMETALLIC DUCTS

A. HDPE Duct: Type EPEC-40 HDPE , complying with NEMA TC 7 and UL 651A.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. ARNCO Corp.
b. Carlon; a brand of Thomas & Betts Corporation.
c. Opti-Com Manufacturing Network, Inc (OMNI).
2. Listed and labeled as defined in NFPA 70, by a nationally recognized testing laboratory, and marked for intended location and application.

2.3 DUCT ACCESSORIES

A. Underground-Line Warning Tape: Comply with requirements for underground-line warning tape specified in Section 26 05 53 "Identification for Electrical Systems."

2.4 POLYMER CONCRETE HANDHOLES AND BOXES WITH POLYMER CONCRETE COVER

A. Description: Molded of sand and aggregate, bound together with a polymer resin, and reinforced with steel or fiberglass or a combination of the two.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Armorcast Products Company.
   2. Oldcastle Enclosure Solutions.
   3. Quazite; Hubbell Incorporated, Power Systems.

C. Standard: Comply with SCTE 77. Comply with tier requirements in "Underground Enclosure Application" Article.

D. Color: Gray .

E. Configuration: Units shall be designed for flush burial and have integral closed bottom unless otherwise indicated.

F. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure.

G. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.

H. Cover Legend: Molded lettering, as indicated for each service.

I. Duct Entrance Provisions: Duct-terminating fittings shall mate with entering duct for secure, fixed installation in enclosure wall.

J. Handholes 24 inches wide by 24 inches long and larger shall have factory-installed inserts for cable racks and pulling-in irons.

2.5 FIBERGLASS HANDHOLES AND BOXES WITH POLYMER CONCRETE FRAME AND COVER

A. Description: Sheet-molded, fiberglass-reinforced, polyester resin enclosure joined to polymer concrete top ring or frame.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Armorcast Products Company.
   2. Oldcastle Enclosure Solutions.
   3. Quazite; Hubbell Incorporated, Power Systems.

C. Standard: Comply with SCTE 77. Comply with tier requirements in "Underground Enclosure Application" Article.

D. Color: Gray .

E. Configuration: Units shall be designed for flush burial and have open bottom unless otherwise indicated.

F. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure.

G. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.

H. Cover Legend: Molded lettering, as indicated for each service.

I. Duct Entrance Provisions: Duct-terminating fittings shall mate with entering duct for secure, fixed installation in enclosure wall.

J. Handholes 24 inches wide by 24 inches long and larger shall have factory-installed inserts for cable racks and pulling-in irons.

2.6 FIBERGLASS HANDHOLES AND BOXES

A. Description: Molded of fiberglass-reinforced polyester resin, with covers made of fiberglass.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Christy Concrete Products.
2. Nordic Fiberglass, Inc.
3. Oldcastle Enclosure Solutions.
4. Quazite; Hubbell Incorporated, Power Systems.

C. Standard: Comply with SCTE 77. Comply with tier requirements in "Underground Enclosure Application" Article.

D. Color: Gray .

E. Configuration: Units shall be designed for flush burial and have open bottom unless otherwise indicated.

F. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure.

G. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.

H. Cover Legend: Molded lettering, as indicated for each service.

I. Duct Entrance Provisions: Duct-terminating fittings shall mate with entering duct for secure, fixed installation in enclosure wall.

J. Handholes 24"x24" and larger shall have factory-installed inserts for cable racks and pulling-in irons.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate layout and installation of duct, duct bank, manholes, handholes, and boxes with final arrangement of other utilities, site grading, and surface features as determined in the field. Notify

Architect if there is a conflict between areas of excavation and existing structures or archaeological sites to remain.

B. Coordinate elevations of duct and duct-bank entrances into manholes, handholes, and boxes with final locations and profiles of duct and duct banks, as determined by coordination with other utilities, underground obstructions, and surface features. Revise locations and elevations as required to suit field conditions and to ensure that duct and duct bank will drain to manholes and handholes, and as approved by Architect.

C. Clear and grub vegetation to be removed, and protect vegetation to remain according to Section 31 10 00 "Site Clearing." Remove and stockpile topsoil for reapplication according to Section 31 10 00 "Site Clearing."

3.2 UNDERGROUND DUCT APPLICATION

A. Duct for Electrical Feeders 600 V and Less: Type EPC-40-PVC RNC, direct-buried unless otherwise indicated.

B. Duct for Electrical Branch Circuits: Type EPC-40-PVC RNC, direct-buried unless otherwise indicated.

C. Bored Underground Duct: Type EPEC-40-HDPE unless otherwise indicated.

3.3 UNDERGROUND ENCLOSURE APPLICATION

A. Handholes and Boxes for 600 V and Less:
1. Units in Roadways and Other Deliberate Traffic Paths: Precast concrete. AASHTO HB 17, H-20 structural load rating.
2. Units in Driveway, Parking Lot, and Off-Roadway Locations, Subject to Occasional, Nondeliberate Loading by Heavy Vehicles: Polymer concrete, SCTE 77, Tier 15 structural load rating.
3. Units in Sidewalk and Similar Applications with a Safety Factor for Nondeliberate Loading by Vehicles: Polymer Concrete SCTE 77, Tier 15 structural load rating.
4. Units Subject to Light-Duty Pedestrian Traffic Only: Fiberglass-reinforced polyester resin , structurally tested according to SCTE 77 with 3000-lbf vertical loading.
5. Cover design load shall not exceed the design load of the handhole or box.

B. Manholes: Precast concrete.
1. Units Located in Roadways and Other Deliberate Traffic Paths by Heavy or Medium Vehicles: H-20 structural load rating according to AASHTO HB 17.
2. Units Not Located in Deliberate Traffic Paths by Heavy or Medium Vehicles: H-10 load rating according to AASHTO HB 17.

3.4 EARTHWORK

A. Excavation and Backfill: Comply with Section 31 20 00 "Earth Moving," but do not use heavy-duty, hydraulic-operated, compaction equipment.

B. Restoration: Replace area after construction vehicle traffic in immediate area is complete.

C. Restore surface features at areas disturbed by excavation, and re-establish original grades unless otherwise indicated. Replace removed sod immediately after backfilling is completed.

D. Restore areas disturbed by trenching, storing of dirt, cable laying, and other work. Restore vegetation and include necessary topsoiling, fertilizing, liming, seeding, sodding, sprigging, and mulching. Comply with Section 32 92 00 "Turf and Grasses" and Section 32 93 00 "Plants."

E. Cut and patch existing pavement in the path of underground duct, duct bank, and underground structures according to "Cutting and Patching" Article in Section 01 73 00 "Execution."

3.5 DUCT AND DUCT-BANK INSTALLATION

A. Where indicated on Drawings, install duct, spacers, and accessories into the duct-bank configuration shown. Duct installation requirements in this Section also apply to duct bank.

B. Install duct according to NEMA TCB 2.

C. Slope: Pitch duct a minimum slope of 1:300 down toward manholes and handholes and away from buildings and equipment. Slope duct from a high point between two manholes, to drain in both directions.

D. Curves and Bends: Use 5-degree angle couplings for small changes in direction. Use manufactured long sweep bends with a minimum radius of 48 inches , both horizontally and vertically, at other locations unless otherwise indicated.
   1. Duct shall have maximum of two 90 degree bends or the total of all bends shall be no more 180 degrees between pull points.

E. Joints: Use solvent-cemented joints in duct and fittings and make watertight according to manufacturer's written instructions. Stagger couplings so those of adjacent duct do not lie in same plane.

F. Installation Adjacent to High-Temperature Steam Lines: Where duct is installed parallel to underground steam lines, perform calculations showing the duct will not be subject to environmental temperatures above 40 deg C. Where environmental temperatures are calculated to rise above 40 deg C, and anywhere the duct crosses above an underground steam line, install insulation blankets listed for direct burial to isolate the duct bank from the steam line.

G. End Bell Entrances to Manholes and Concrete and Polymer Concrete Handholes: Use end bells, spaced approximately 10 inches o.c. for 5-inch duct, and vary proportionately for other duct sizes.
   1. Begin change from regular spacing to end-bell spacing 10 feet from the end bell, without reducing duct slope and without forming a trap in the line.
   2. Expansion and Deflection Fittings: Install an expansion and deflection fitting in each duct in the area of disturbed earth adjacent to manhole or handhole. Install an expansion fitting near the center of all straight line direct-buried duct with calculated expansion of more than 3/4 inch.
   3. Grout end bells into structure walls from both sides to provide watertight entrances.

H. Terminator Entrances to Manholes and Concrete and Polymer Concrete Handholes: Use manufactured, cast-in-place duct terminators, with entrances into structure spaced approximately 6 inches o.c. for 4-inch duct, and vary proportionately for other duct sizes.
   1. Begin change from regular spacing to terminator spacing 10 feet from the terminator, without reducing duct line slope and without forming a trap in the line.
   2. Expansion and Deflection Fittings: Install an expansion and deflection fitting in each duct in the area of disturbed earth adjacent to manhole or handhole. Install an expansion fitting near the center of all straight line duct with calculated expansion of more than 3/4 inch.

I. Building Wall Penetrations: Make a transition from underground duct to GRC at least 10 feet outside the building wall, without reducing duct line slope away from the building and without forming a trap in the line. Use fittings manufactured for RNC-to-GRC transition. Install GRC penetrations of building walls as specified in Section 26 05 44 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

J. Sealing: Provide temporary closure at terminations of duct with pulled cables. Seal spare duct at terminations. Use sealing compound and plugs to withstand at least 15-psig hydrostatic pressure.

K. Pulling Cord: Install 200-lbf- test nylon cord in empty ducts.

L. Direct-Buried Duct and Duct Bank:
1. Excavate trench bottom to provide firm and uniform support for duct. Comply with requirements in Section 31 20 00 "Earth Moving" for preparation of trench bottoms for pipes less than 6 inches in nominal diameter.
2. Width: Excavate trench 12 inches wider than duct on each side.
3. Width: Excavate trench 3 inches wider than duct on each side.
4. Depth: Install top of duct at least 36 inches below finished grade unless otherwise indicated on plan sheets.
5. Set elevation of bottom of duct bank below frost line.
6. Support ducts on duct spacers coordinated with duct size, duct spacing, and outdoor temperature.
7. Spacer Installation: Place spacers close enough to prevent sagging and deforming of duct, with not less than four spacers per 20 feet of duct. Place spacers within 24 inches of duct ends. Stagger spacers approximately 6 inches between tiers. Secure spacers to earth and to ducts to prevent floating during concreting. Tie entire assembly together using fabric straps; do not use tie wires or reinforcing steel that may form conductive or magnetic loops around ducts or duct groups.
8. Install duct with a minimum of 3 inches between ducts for like services and 6 inches between power and communications duct.
9. Elbows: Install manufactured duct elbows for stub-ups, at building entrances, and at changes of direction in duct direction unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
10. Install manufactured GRC elbows for stub-ups, at building entrances, and at changes of direction in duct.
    a. Couple RNC duct to GRC with adapters designed for this purpose, and encase coupling with 3 inches of concrete.
    b. Stub-ups to Outdoor Equipment: Extend concrete-encased GRC horizontally a minimum of 60 inches from edge of base. Install insulated grounding bushings on terminations at equipment.
        1) Stub-ups shall be flush with finished floor and minimum 3 inchesfrom conduit side to edge of slab.
    c. Stub-ups to Indoor Equipment: Extend concrete-encased GRC horizontally a minimum of 60 inches from edge of wall. Install insulated grounding bushings on terminations at equipment.
        1) Stub-ups shall be flush with finished floor and no less than 3 inchesfrom conduit side to edge of slab.
11. After installing first tier of duct, backfill and compact. Start at tie-in point and work toward end of duct run, leaving ducts at end of run free to move with expansion and contraction as temperature changes during this process. Repeat procedure after placing each tier. After placing last tier, hand place backfill to 4 inches over duct and hand tamp. Firmly tamp backfill around ducts to provide maximum supporting strength. Use hand tamper only. After placing controlled backfill over final tier, make final duct connections at end of run and complete backfilling with normal compaction. Comply with requirements in Section 31 20 00 "Earth Moving" for installation of backfill materials.

a. Place minimum 3 inches of sand as a bed for duct. Place sand to a minimum of 6 inches above top level of duct.
b. Place minimum 6 inches of engineered fill above concrete encasement of duct.

M. Warning Planks: Bury warning planks approximately 12 inches above direct-buried duct, placing them 24 inches o.c. Align planks along the width and along the centerline of duct or duct bank. Provide an additional plank for each 12-inch increment of duct-bank width over a nominal 18 inches. Space additional planks 12 inches apart, horizontally.

N. Underground-Line Warning Tape: Bury conducting underground line specified in Section 26 05 53 "Identification for Electrical Systems" no less than 12 inches above all concrete-encased duct and duct banks and approximately 12 inches below grade. Align tape parallel to and within 3 inches of centerline of duct bank. Provide an additional warning tape for each 12-inch increment of duct-bank width over a nominal 18 inches. Space additional tapes 12 inches apart, horizontally.

3.6 INSTALLATION OF CONCRETE MANHOLES, HANDHOLES, AND BOXES

A. Cast-in-Place Manhole Installation:
1. Finish interior surfaces with a smooth-troweled finish.
2. Knockouts for Future Duct Connections: Form and pour concrete knockout panels 1-1/2 to 2 inches thick, arranged as indicated.
3. Comply with requirements in Section 03 30 00 "Cast-in-Place Concrete" for cast-in-place concrete, formwork, and reinforcement.

B. Precast Concrete Handhole and Manhole Installation:
1. Comply with ASTM C 891 unless otherwise indicated.
2. Install units level and plumb and with orientation and depth coordinated with connecting duct, to minimize bends and deflections required for proper entrances.
3. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.

C. Elevations:
1. Manhole Roof: Install with rooftop at least 15 inches below finished grade.
2. Manhole Frame: In paved areas and trafficways, set frames flush with finished grade. Set other manhole frames 1 inch above finished grade.
3. Install handholes with bottom below frost line, below grade.
4. Handhole Covers: In paved areas and trafficways, set surface flush with finished grade. Set covers of other handholes 1 inch above finished grade.
5. Where indicated, cast handhole cover frame integrally with handhole structure.

D. Drainage: Install drains in bottom of manholes where indicated. Coordinate with drainage provisions indicated.

E. Manhole Access: Circular opening in manhole roof; sized to match cover size.
1. Manholes with Fixed Ladders: Offset access opening from manhole centerlines to align with ladder.

F. Hardware: Install removable hardware, including pulling eyes, cable stanchions, and cable arms, and insulators, as required for installation and support of cables and conductors and as indicated.

G. Fixed Manhole Ladders: Arrange to provide for safe entry with maximum clearance from cables and other items in manholes.

H. Field-Installed Bolting Anchors in Manholes and Concrete Handholes: Do not drill deeper than 3-7/8 inches for manholes and 2 inches for handholes, for anchor bolts installed in the field. Use a minimum of two anchors for each cable stanchion.

3.7 INSTALLATION OF HANDHOLES AND BOXES OTHER THAN PRECAST CONCRETE

A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting duct, to minimize bends and deflections required for proper entrances. Use box extension if required to match depths of duct, and seal joint between box and extension as recommended by manufacturer.

B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.

C. Elevation: In paved areas and trafficways, set cover flush with finished grade. Set covers of other handholes 1 inch above finished grade.

D. Install handholes and boxes with bottom below frost line, below grade.

E. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in enclosure.

F. Field cut openings for duct according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.8 GROUNDING

A. Ground underground ducts and utility structures according to Section 26 05 26 "Grounding and Bonding for Electrical Systems."

3.9 CLEANING

A. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of duct until duct cleaner indicates that duct is clear of dirt and debris. Follow with rubber duct swab for final cleaning and to assist in spreading lubricant throughout ducts.

B. Clean internal surfaces of manholes, including sump.
   1. Sweep floor, removing dirt and debris.
   2. Remove foreign material.

END OF SECTION 26 05 43

SECTION 26 56 19 - LED EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Luminaire types.
   2. Materials.
   3. Finishes.

B. Related Requirements:
   1. Section 26 09 23 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.

1.3 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color rendering index.

C. Fixture: See "Luminaire."

D. IP: International Protection or Ingress Protection Rating.

E. Lumen: Measured output of lamp and luminaire, or both.

F. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of luminaire.
   1. Arrange in order of luminaire designation.
   2. Include data on features, accessories, and finishes.
   3. Include physical description and dimensions of luminaire.
   4. Lamps, include life, output (lumens, CCT, and CRI), and energy-efficiency data.
   5. Wiring diagrams for power, control, and signal wiring.
   6. Means of attaching luminaires to supports and indication that the attachment is suitable for components involved.

B. Shop Drawings: For nonstandard or custom luminaires.
   1. Include plans, elevations, sections, and mounting and attachment details.
   2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
   3. Include diagrams for power, signal, and control wiring.

1.5 QUALITY ASSURANCE

A. Provide luminaires from a single manufacturer for each luminaire type.

B. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering prior to shipping.

1.7 FIELD CONDITIONS

A. Verify existing and proposed utility structures prior to the start of work associated with luminaire installation.

B. Mark locations of exterior luminaires for approval by Architect prior to the start of luminaire installation.

1.8 WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures, including luminaire support components.
      b. Faulty operation of luminaires and accessories.
      c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   2. Warranty Period: 5 year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 LUMINAIRE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. NRTL Compliance: Luminaires shall be listed and labeled for indicated class and division of hazard by an NRTL.

C. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.

D. UL Compliance: Comply with UL 1598 and listed for wet location.

E. CRI of 70 . CCT of 4000 K .

F. L70 lamp life of 100,000 hours.

G. Lamps dimmable from 100 percent to 0 percent of maximum light output.

H. Internal driver.

I. Nominal Operating Voltage: 120 V ac .

J. In-line Fusing: Separate in-line fuse for each luminaire.

K. Lamp Rating: Lamp marked for outdoor use .

L. Source Limitations:
1. Obtain luminaires from single source from a single manufacturer.
2. For luminaires, obtain each color, grade, finish, type, and variety of luminaire from single source with resources to provide products of consistent quality in appearance and physical properties.

2.2 LUMINAIRE TYPES

A. Area and Site:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Cooper Lighting Solutions; Signify North America Corp.
   b. Lithonia Lighting; Acuity Brands Lighting, Inc.
2. Luminaire Shape: Square .
3. Mounting: Building with .
4. Luminaire-Mounting Height: Per Plans .
5. Diffusers and Globes: Clear glass .
6. Housings:
   a. Extruded-aluminum housing and heat sink.
   b. powder-coat finish.

2.3 MATERIALS

A. Metal Parts: Free of burrs and sharp corners and edges.

B. Sheet Metal Components: Corrosion-resistant aluminum . Form and support to prevent warping and sagging.

C. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses.

D. Diffusers and Globes:
1. Acrylic Diffusers: 100 percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
2. Glass: Annealed crystal glass unless otherwise indicated.
3. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.

E. Lens and Refractor Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.

F. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:
1. White Surfaces: 85 percent.
2. Specular Surfaces: 83 percent.
3. Diffusing Specular Surfaces: 75 percent.

G. Housings:
1. Rigidly formed, weather- and light-tight enclosure that will not warp, sag, or deform in use.
2. Provide filter/breather for enclosed luminaires.

H. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
   1. Label shall include the following lamp characteristics:
      a. "USE ONLY" and include specific lamp type.
      b. Lamp diameter, shape, size, wattage and coating.
      c. CCT and CRI for all luminaires.

2.4 FINISHES

A. Variations in Finishes: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

B. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.

C. Factory-Applied Finish for Aluminum Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
   1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
   2. Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20 requirements; and seal aluminum surfaces with clear, hard-coat wax.
   3. Class I, Clear-Anodic Finish: AA-M32C22A41 (Mechanical Finish: Medium satin; Chemical Finish: Etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
   4. Class I, Color-Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: Medium satin; Chemical Finish: Etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker), complying with AAMA 611.

D. Factory-Applied Finish for Steel Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
   1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1 or SSPC-SP 8.
   2. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.
      a. Color:
         1) As selected by Architect from manufacturer's full range.

2.5 LUMINAIRE SUPPORT COMPONENTS

A. Comply with requirements in Section 26 05 29 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for luminaire electrical conduit to verify actual locations of conduit connections before luminaire installation.

C. Examine walls, roofs, overhang ceilings for suitable conditions where luminaires will be installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 TEMPORARY LIGHTING

A. If approved by the Architect, use selected permanent luminaires for temporary lighting. When construction is substantially complete, clean luminaires used for temporary lighting and install new lamps.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Comply with NECA 1.

B. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.

C. Fasten luminaire to structural support.

D. Wall-Mounted Luminaire Support:
1. Attached to structural members in walls .

E. Wiring Method: Install cables in raceways. Conceal raceways and cables.

F. Install luminaires level, plumb, and square with finished grade unless otherwise indicated.

G. Coordinate layout and installation of luminaires with other construction.

H. Comply with requirements in Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables" and Section 26 05 33 "Raceways and Boxes for Electrical Systems" for wiring connections and wiring methods.

3.4 CORROSION PREVENTION

A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.

B. Steel Conduits: Comply with Section 26 05 33 "Raceways and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch- thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

3.5 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems."

3.6 FIELD QUALITY CONTROL

A. Inspect each installed luminaire for damage. Replace damaged luminaires and components.

B. Perform the following tests and inspections:

1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
2. Verify operation of photoelectric controls.

C. Illumination Tests:
1. Measure light intensities at night. Use photometers with calibration referenced to NIST standards. Comply with the following IES testing guide(s):
   a. IES LM-5.
   b. IES LM-50.
   c. IES LM-52.
   d. IES LM-64.
   e. IES LM-72.
2. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.

D. Luminaire will be considered defective if it does not pass tests and inspections.

E. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

3.7 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up to two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.
1. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
2. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
3. Adjust the aim of luminaires in the presence of the Architect.

END OF SECTION 26 56 19

Method of Payment

METHOD OF PAYMENT

GENERAL

A. PRICES AND MEASUREMENT:

Payment for work under this contract will be based on a unit price or lump sum for work actually completed. Final measurements of the work will be taken by the Engineer to determine the amount of work done and thereby determine the total cost. The method of applying the unit prices to measured quantities will be as herein specified. Payment will include the cost of all labor, tools, materials, and equipment necessary to do the work.

Several items may have been included in the bid form but may not be called for on the plans. These items have been included in order to establish a unit price in the event that the item of work is necessary. The Contractor should be aware that these items may increase, decrease, or be zero based on field conditions, or Owner direction.

B. INCIDENTAL ITEMS:

Any items of work indicated as incidental or included shall be considered as part of the project work and shall be completed at no additional expense to the Owner. Incidental or included items shall include labor, materials, and equipment that may not be specifically listed in the Bid Form or in the drawings or specifications, but which are necessary to complete the work.

C. PERMITS:

A number of permits have been applied for by the Owner of this project. The permits must be acquired from the appropriate agency by the Contractor when they are approved. Any permit fees, bonds, and/or permit agency inspection costs will be the responsibility of the Contractor and shall not result in additional cost to the Owner. A list of permits required for this project is shown in the Supplemental Instructions to Bidders section.

MOBILIZATION
(Bid Item 1)

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

Pay Item	Pay Unit
Mobilization, Max. 5%	lump sum

The lump sum price shall be payment in full for all preparatory work and operations which may include, but is not limited to, the following items:

1. The movement of personnel, equipment, supplies, and incidentals to the project site.
2. The establishment of the Contractor's offices, buildings, and other facilities to work on the project.
3. Other work and operations that must be performed.
4. Expenses incurred, prior to beginning work on the various contract items on the project site.
5. Pre-construction costs, exclusive of bidding costs, which are necessary direct costs to the project rather than directly attributable to other pay items under the contract.
6. Permits, bonds, etc.

The pay item will state the maximum amount that can be bid. When the percentage of the original contract amount earned is less than 5 percent, the costs of project specific bonding, insurances, and permits will be reimbursed when a paid invoice is received by the Engineer. The costs of these will then be made in accordance with the Partial Payment Schedule shown below. The original contract amount is the total value of all contract items including the mobilization item. The percentage earned is exclusive of the mobilization item. The total sum of all payments for this item shall not exceed the original contract amount bid for mobilization, regardless of the fact that the Contractor may have, for any reason, shut down his work on the project, moved equipment away from the project and then back again, or for additional quantities or items of work added to the contract.

Partial Payment Schedule

Percentage of Original Contract Amount Earned	**Percentage of Bid Price for Mobilization Allowed**
5	50
10	75
25	100

When a pay item for mobilization is not included in the proposal, payment for any such work is considered to have been included in payments made for other items of work.

PAVEMENT REMOVAL
(Bid Item 2)

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

Pay Item	Pay Unit
Pavement, Rem	square yard

Pavement removal shall be measured in place by area in square yards regardless of the material and thickness. The removal area shall be based upon the average length and width measurements as determined in the field by the Engineer.

The contract unit price shall be payment in full for all labor, material and equipment required to sawcut, remove, and properly dispose of the pavement off site. The contract unit price shall apply to pavement of any thickness (both bituminous, composite and concrete).

SIDEWALK, REMOVE
(Bid Item 8)

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

Pay Item	Pay Unit
Sidewalk, Rem	square yard

Concrete sidewalk removal shall be measured in place by area in square yards. The removal area shall be based upon the average length and width measurements as determined in the field by the Engineer.

The contract unit price shall be payment in full for all labor, material and equipment required to sawcut, remove, and properly dispose of the sidewalk and ramps off site. The contract unit price shall apply to sidewalk of any thickness.

SEWER, REMOVE
(Bid Item 4)

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

Pay Item	Pay Unit
Sewer, Rem, Less than 24 inch	foot

Storm sewer removal shall be measured in place horizontally by linear feet. The length shall be measured along the sewer centerline from center of structure to center of structure or to end of end section.

In the event that the storm sewer is not connected to a structure then the measurement for payment shall be made end-to-end of pipe removed.

The contract unit price shall be payment in full for all labor, materials, and equipment necessary to remove and properly dispose of the existing sewer offsite as well as furnish, place, and compact suitable backfill material in the remaining trench. The contract price shall also include any temporary sheeting, shoring, and bracing that may be necessary for the removal work. Payment for removing storm sewer shall not apply when a new storm sewer is to be constructed in the same trench where the existing storm sewer is being removed. In this case, removal of the existing storm sewer shall be considered as incidental to the new storm sewer construction.

SEWER BULKHEAD
(Bid Item 5)

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

Pay Item	Pay Unit
Sewer Bulkhead	each

Sewer Bulkhead shall be measured by the each for each sewer bulkhead that is constructed in an existing structure or an existing sewer line.

The contract unit price shall be payment in full for all labor, materials, and equipment necessary to properly fill the existing void in the structure using a brick and mortar bulkhead. This contract price shall also include any materials, equipment, and labor necessary to construct and properly seal the bulkhead protecting it from infiltration.

STRUCTURE REMOVAL
(Bid Item 3)

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

Pay Item	Pay Unit
Structure Removal, Less than 72” Dia	each

The contract unit price shall be payment in full for all labor, materials, and equipment necessary for the complete removal of the structure including the casting, adjusting rings, cone, riser sections and base. Storm structures may include manholes, catch basins, and inlets. Proper offsite disposal of the structures as well as furnishing, placing, and compacting suitable backfill in the remaining hole shall also be considered as included in the work. The contract price shall also include any temporary sheeting, shoring, and bracing that may be necessary for the removal work. If the Owner wishes to retain the salvaged castings, then the Contractor shall deliver them to the Owner’s designated site. Otherwise, the Contractor shall dispose of the castings offsite.

WATER MAIN REMOVAL
(Bid Item 6)

The completed work as measured for WATER MAIN REMOVAL will be paid for at the contract unit price for the following contract items (pay items):

Pay Item	Pay Unit

Water Main, Rem	Lump sum

The contract unit price shall be payment in full for all labor, materials, and equipment necessary to remove the water main as called for on the plans.

Water main removal shall be paid for in a lump sum for all water main removed to properly install the proposed work. The payment shall be the same regardless of pipe size or type. The payment shall include removing and disposing of the water main and fittings as well as removing and disposing of curb stops & boxes and water service leads up to the property line.

Where existing thrust blocks will interfere with the placement of new utilities, then the thrust blocks shall be removed. Thrust block removal will be considered as included in the water main removal work.

Excavation as well as furnishing, placing, and compacting suitable backfill shall be considered as included in all of the removal work. Furnishing and placing caps and/or plugs and necessary thrust blocks on the remaining water main ends after the removals are complete shall also be considered as included as part of the removal work unless a separate pay item is included in the Bid Form to cap water main.

FENCE REMOVAL
(Bid Item 7)

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

Pay Item	Pay Unit
Fence, Rem	feet

Fence removal shall be measured in place by linear feet. The length shall be measured along the base of the fence from end to end of the section that is removed. Removing all fence portions including but not limited to gates and posts shall be considered included in the fence removing work. Furnishing, placing, and compacting suitable backfill for the old postholes shall be considered as included in the fence removing work.

WATER APPURTENANCE, REMOVE
(Bid Item 10)

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

Pay Item	Pay Unit
Water Appurtenance, Remove	each

The contract unit price for removal of water appurtenance includes the removal of any existing water valves or other water appurtenances removed for construction of the proposed work. Any necessary excavation as well as furnishing, placing, and compacting suitable backfill shall be considered as included in the gate valve abandonment work. Disposal of the valve box shall be included in this pay item. If the Owner wishes to retain the salvaged gate valve box, then the Contractor shall deliver these items to the Owner's storage yard. Otherwise, the contractor shall be responsible for disposal of the unwanted appurtenances.

SOIL EROSION CONTROL
(Bid Item 11)

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

Pay Item	Pay Unit
Soil Erosion Control	lump sum

The contract lump sum price shall be payment in full for all labor, materials, and equipment necessary to furnish, install, and maintain soil erosion control measures as outlined in the project plans and in compliance with applicable laws and permit requirements. Maintenance work will include removal and replacement of soil erosion control items as directed by the Engineer. Removal of erosion control measures, accumulated sediment, and debris upon completion of the project shall be considered as included as part of the work. Up to 75% of the contract lump sum price will be paid upon satisfactory installation of the soil erosion control measures. The remaining 25% will be paid upon final acceptance of the project. Restoration of disrupted areas shall be paid for separately under the appropriate surface restoration pay items.

SITE EARTHWORK
(Bid Item 9, 12, 13)

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

Pay Item	Pay Unit
Site Earthwork, Fire Station #4	lump sum
Site Earthwork, Fire Station #5	lump sum
Earth Excavation	cyd

The contract lump sum price shall be payment in full for all labor, materials, and equipment necessary to perform the site earthwork and establish the grades as shown on the project plans for each of the Fire Stations, paid separately. This includes excavation to accommodate aggregate base, swales, ditches, berms and other grading necessary to construct improvements as specified on the plans.

Earth Excavation will be paid for the removal of the existing sloped earth in the northwest corner of the Fire Station #5. This pay item includes the removal and disposal of all existing materials to subbase elevation. This item is exclusive to that area and will not be used as reimbursement for removal of material in any other location in the plan set.

The contract unit price shall include the removal and offsite disposal of earth as specified on the plans. The contractor shall provide documentation of an approved offsite location for review and approval by the Engineer.

EXISTING TOWER REMOVE
(Bid Item 14)

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

Pay Item	Pay Unit
Existing Tower, Remove	lump sum

The contract lump sum price shall be payment in full for all labor, materials, and equipment necessary to demolish and dispose of the existing training tower including but not limited to the electrical service disconnection, foundation, demolition, and water service disconnection, necessary backfill placement and compaction required for excavations, and offsite disposal of all related debris. Any pavement removal, earth excavation, subgrade preparation, or material disposal that is required for the tower removal shall be considered as incidental to the work unless separate pay items have been included in the bid form.

STORAGE TANK, ABANDON
(Bid Item 15)

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

Pay Item	Pay Unit
Storage Tank, Abandon	each

The contract unit price for abandoning the existing storage tank shall include removing the existing structure down to 3 feet below grade and drilling drain holes into the existing tank floor. Any necessary excavation as well as furnishing, placing, and compacting Class II sand shall be considered as included in this pay item. The storage tank includes the metal lid, including access ports and concrete structure. Disposal of any material removed material shall be considered as included as part of the work.

STRUCTURE ADJUST
(Bid Item 16)

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

Pay Item	Pay Unit
Structure Cover, Adj, Case 1	each

The work of adjusting structures shall be paid for on a per structure basis and shall apply when the total amount of vertical change of the casting (up or down) is six inches or less. The pay item for adjusting structures shall apply to existing storm manholes, catch basins, inlets, sanitary manholes and gate wells. The adjust structure pay item shall not apply to new structures since final adjustment in this case is included in the contract unit price of the new structure.

The contract unit price shall be payment in full for all labor, material, and equipment necessary to adjust structures in accordance with the plan details so that the castings will match the new finished pavement or landscape surface grades. Excavation, backfill, cleaning the existing casting and disposal of excess or unsuitable materials shall all be considered as included as part of the adjustment work.

Structure Cover, Adj, Case 1 applies to structures that are located inside the paved areas.

TREE, REMOVE
(Bid Item 17)

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

Pay Item	Pay Unit
Tree, Rem, 6 inch to 18 inch Diameter	each

The size of trees will be determined by the average diameter of the tree trunk, measured to the nearest full inch, at a point 4 ½ feet above the base of the tree at the ground line. Trees having major limbs lower than 4 ½ feet from the ground shall be measured at the smallest diameter below such limbs.

The contract unit price shall be payment in full for all labor, material and equipment necessary to completely remove the tree, including all foliage and root systems, backfill the remaining hole, and to properly dispose of the materials off site. When tree removal is called for, the payment shall include removal of the stump. Separate payments for tree and stump removal shall not be made for the same tree. Removal of trees under 6" in diameter as well as logs, debris, brush, shrubs, topsoil, and other vegetation will be considered as included in the pay item for clearing and grubbing.

CURB AND GUTTER, REMOVE
(Bid Item 18)

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

Pay Item	Pay Unit
Curb and Gutter, Rem	foot

Concrete curb and gutter removal shall be measured along the gutter line in linear feet for any curb proposed for removal that is not integral to the pavement.

The contract unit price shall be payment in full for all labor, materials and equipment required to sawcut, remove, and properly dispose of the concrete curb and gutter offsite.

FENCE INSTALLATION
(Bid Item 19, 20)

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

Pay Item	Pay Unit
Fence, Wood Screened, 96 inch	feet
Gate, Wood Screened, 96 inch	each

The contract unit price shall be payment in full for all labor, materials, and equipment necessary to install the fence and gate accordance with the plan notes and details.

Fence, Wood Screened, 96 inch shall be measured in place by linear feet. The length shall be measured along the base of the fence from end to end of the section that is installed with deduction of the clear opening for each gate installed.

Gate, Wood Screened, 96 inch shall be paid for as one complete unit, both sides of the proposed dumpster enclosure gate. This includes all materials, backfill, concrete, etc necessary to furnish and install the proposed gate per the details in the plan set.

CONCRETE SIDEWALK

(Bid Item 21, 22, 23)

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

Pay Item	Pay Unit
Concrete Sidewalk, 10 inch	square feet
Concrete Sidewalk, 6 inch	square feet
Concrete Sidewalk, 4 inch with or without curb	square feet

Concrete sidewalk shall be measured in place and shall be paid for based upon the length and width measurements of the sidewalk area as determined by the Engineer. These pay items include any integral curb proposed as part of the sidewalk as shown on the plan sheets.

The contract unit price shall be payment in full for all labor, materials, and equipment necessary to construct sidewalk of the required thickness in accordance with the plan details. Furnishing, placing, and compacting a 4-inch thick aggregate base shall be considered as incidental to the sidewalk placement Any necessary excavation, backfill, and disposal of excess materials shall also be considered as incidental to the sidewalk construction.

The contractor shall be responsible for all onsite quality control testing as outlined in the project special provisions. All cost associated with onsite testing shall be included in the contract unit price. The contractor shall be responsible for providing the city all correlating documentation.

CONCRETE SIDEWALK RAMP, ADA

(Bid Item 24)

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

Pay Item	Pay Unit
Sidewalk Ramp, ADA	square foot

Concrete sidewalk ramps shall be measured in place and shall be paid for based upon the length and width measurements of the sidewalk ramp area as determined by the Engineer.

The contract unit price shall be payment in full for all labor, materials, and equipment necessary to construct sidewalk of the required thickness in accordance with the plan details. Furnishing, placing, and compacting a 4-inch thick aggregate base shall be considered as incidental to the sidewalk placement.

Any necessary excavation, backfill, and disposal of excess materials shall also be considered as incidental to the sidewalk ramp construction.

The contract unit price shall also include all labor, material, and equipment necessary to construct and place the 24" detectable warning strips as shown in the details, and to construct the ramp in compliance with ADA requirements.

CONCRETE CURB & GUTTER

(Bid Item 25, 26, 27)

The completed work as measured for CONCRETE CURB & GUTTER will be paid for at the contract unit price for the following contract items (pay items):

Pay Item	Pay Unit
Curb and Gutter, Conc, Det B2	foot
Driveway Opening, Conc, Det M	foot
Curb Ramp Opening, Conc	foot

Concrete curb & gutter shall be measured in place by linear feet. The length shall be measured along the gutter line from end of curb to end of curb. Curb endings and curb drops shall all be measured and paid for as part of the adjacent curb pay item. This item shall be for both spill in and spill out curb and gutter.

Curb and Gutter, Conc, Det B2 shall include all materials, grading, disposal of excavated materials, etc. to install proposed rolled curb where called out in the plan documents. This item shall be measured along the gutter line for both spill out and spill in curb and gutter.

Curb Ramp Opening shall include all materials, disposal of excavated materials, fine grading, etc. to construct a curb ramp opening in accordance with subsection 802.03 of the 2020 MDOT Standard Specifications for Construction, the MDOT Standard Plan R-28 series and as required to conform with the curb ramp geometry including but not limited to, slopes, counter slopes, running slopes, cross slopes, flares and widths.

Driveway Opening, Conc, Det M shall be paid for by the linear foot from springline to springline and shall be constructed per the specifications of the 2020 MDOT Standard Specifications for Construction Manual.

The contract price shall be payment in full for all labor, materials, and equipment necessary to construct the concrete curb and gutter in accordance with the plan details. Any excavation, subgrade compaction, backfilling behind the curb, disposal of excess materials, joints, curing compound, and placement of curb drops shall be considered as incidental to the curb and gutter construction.

CONCRETE PAVEMENT

(Bid Item 28, 29)

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

Pay Item	Pay Unit
Conc Pavt, Nonreinf, with or without integral curb, 7 inch	square yard

Conc Pavt, Nonreinf, with or without integral curb, 10 inch	square yard

Concrete pavement shall be measured in place by square yards and the area shall be based upon the pavement length and width measurements as determined by the Engineer. Longitudinal measurements shall be made along the centerline of pavement from end to end. Transverse measurements shall extend from edge of pavement to edge of pavement. If the concrete pavement has an integral curb, then the transverse measurement shall extend to the back of curb so that the integral curb is included in the pavement area calculation.

The contract unit price shall be payment in full for all labor, materials, and equipment necessary to form, place, cure, and protect the concrete pavement in accordance with the plan specifications. Concrete pavement joints and joint sealing shall be considered as included in the pavement construction work unless separate pay items for pavement joints are shown on the Bid Form. Backfilling behind curbs or along pavement edges shall also be considered as incidental to the concrete pavement construction.

HOT MIX ASPHALT (HMA) PAVEMENT

(Bid Item 30, 31)

The completed work as measured for HOT MIX ASPHALT (HMA) PAVEMENT will be paid for at the contract unit price for the following contract items (pay items):

Pay Item	Pay Unit
HMA, 4EML	ton
HMA, 5EML	ton

HMA pavement for the parking lot shall be measured in tons based upon certified weight delivery tickets. The Contractor must provide certified weight delivery tickets to the Construction Observer.

The contract unit price shall be payment in full for all labor, materials, and equipment necessary to construct the HMA pavement in accordance with the plan details. Furnishing and applying bond coats, pavement compaction, and protection of the work shall all be considered as incidental to HMA pavement construction. The application method and coverage rate shall be in accordance with the plans and specifications.

AGGREGATE BASE COURSE

(Bid Item 32, 33)

The completed work as measured for AGGREGATE BASE COURSE will be paid for at the contract unit price for the following contract items (pay items):

Pay Item	Pay Unit
Aggregate Base, 21AA, 4 inch	square yard
Aggregate Base, 21AA, 8 inch	square yard

Aggregate base course shall be measured in place by square yards. The area shall be based upon the average length and width measurements of the aggregate placement area as determined by the Construction Observer. Depth measurements will be taken as necessary in order to verify the aggregate base course thickness.

The contract unit price shall be payment in full for all labor, materials, and equipment necessary to place, grade, and compact the aggregate materials. Any earth excavation, subgrade preparation, or material disposal that is required for the aggregate base course placement shall be considered as incidental to the work unless separate pay items have been included in the bid form for earthwork.

SUBGRADE UNDERDRAIN
(Bid Item 34)

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

Pay Item	Pay Unit
Underdrain, Subgrade, 6 inch	foot

Subgrade underdrain shall be measured in place horizontally by linear feet. The length shall be measured along with the centerline of the pipe from end of pipe to end of pipe or to center of structure.

The contract unit price shall be payment in full for all labor, materials, and equipment necessary to construct the underdrain including all excavation, backfill and fill materials, disposal of excess materials, pipe, joint materials, structure taps, complete cleanup, and all other work required for the proper placement of the underdrain in accordance with the plan details. The geotextile trench wrap and trench aggregate that are called for in the plan detail shall be considered as included in the placement of the underdrain.

STORM SEWER AND CULVERTS
(Bid Item 35,36,37)

The completed work as measured for STORM SEWER AND CULVERTS will be paid for at the contract unit price for the following contract items (pay items):

Pay Item	Pay Unit
Sewer, Conc, Cl IV, 12 inch	foot
Sewer, Conc, Cl IV, 15 inch	foot
Sewer, Conc, Cl IV, 18 inch	foot

Storm sewer shall be measured in place horizontally by linear feet. The length shall be measured along the centerline of the pipe from end of pipe to end of pipe or to center of structure. Radius pipe or bend sections will be measured and paid for as storm sewer.

The contract unit price shall be payment in full for all labor, materials, and equipment necessary to construct the storm sewer. The payment for storm sewer shall include the following (except such items for which separate prices are received on the Bid Form): clearing; excavating; trenching; disposal of items from clearing; disposal of unsuitable or excess excavated materials; temporary sheeting, bracing and shoring of excavations; support, relocation, replacement, connection or reconnection of existing pipe lines, building leads and utilities; furnishing and placing of pipe, jointing materials, fittings, bulkheads, plugs, adaptors; furnishing and placing of required bedding, backfill, and fill materials; complete cleanup and surface restoration. Removal of an existing storm sewer shall be considered as included in the price for the new storm sewer construction if the new storm sewer is being constructed in the same trench as the existing sewer.

Payment for storm sewer shall also include up to 18 inches of trench undercut and refill with compacted MDOT 6A crushed gravel or 6A crushed concrete unless otherwise shown in the plan details. If additional undercut is required beyond 18 inches, then it shall be paid for separately as Trench Undercut and Refill.

The contract unit price shall also include payment in full for dewatering of the excavation as described in the Earthwork section. The contract unit price does not include dewatering by means of deep wells or well points. In the event that dewatering by means of deep wells or well points is required, as determined by the Engineer, then this work shall be paid for separately.

DRAINAGE STRUCTURES (INLETS, CATCH BASINS, MANHOLES)
(Bid Item 38, 39)

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

Pay Item	Pay Unit
Dr Structure, 24 inch	each
Dr Structure, 48 inch	each

The contract unit price shall be payment in full for all labor, materials and equipment necessary to construct the storm structure. Each storm structure shall be complete with base, steps, frames and covers, stubs, pipe opening, channels, and sumps (where appropriate) as called for in the plan details. Payment for storm structures shall include the following (except such items for which separate prices are received on the bid form): excavating; disposal of unsuitable or excess excavated materials; temporary sheeting, bracing and shoring of excavations; support, relocation, replacement, connection or reconnection of existing pipe lines, building leads and utilities; furnishing and placing of structure, jointing materials, fittings, bulkheads, and plugs; cleaning; furnishing and placing of required bedding, backfill and fill materials; final adjustment or reconstruction of casting to finished grade; complete cleanup and surface restoration. Payment will be the same for standard and low head structures of the same diameter. Payment will also be the same for storm manholes of the same diameter both with and without sumps. Removal of an existing storm structure shall be considered as included in the price for the new storm structure construction if the new storm structure is being constructed in the same location as the existing structure.

The following structure covers will be utilized:

- Square Catch Basin covers shall be MDOT 1040M1 covers
- Round Catch Basin covers shall be MDOT type B covers.
- Manhole style drainage structures shall be MDOT type Q covers.

The contract unit price shall also include payment in full for dewatering of the excavation as described in the Earthwork section. The contract unit price does not include dewatering by means of deep wells or well points. In the event that dewatering by means of deep wells or well points is required, as determined by the Engineer, then this work shall be paid for separately.

MANHOLE COVER, TYPE Q
(Bid Item 40)

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

Pay Item	Pay Unit
Manhole Cover, Type Q	each

The contract unit price shall be payment in full for all labor, tools, equipment and materials required to complete the work in accordance with the project details and specifications.

This item shall be paid when the structure involved requires removal of the existing frame and cover and replacement with a new frame and cover. Payment shall include furnishing the new frame and cover and delivery of the existing frame and cover to the OWNER. Adjusting the rim elevation to the proposed rim elevation shall be considered as included in this pay item.

ADS MECHANICAL TREATMENT DEVICE
(Bid Item 41)

The completed work as measured for CONTECH MECHANICAL TREATMENT DEVICE be paid for at the contract unit price for the following contract item (pay item):

Pay Item	Pay Unit
ADS Mechanical Treatment Device	each

The contract unit price shall be payment in full for all labor, materials, and equipment necessary to furnish and install the mechanical treatment device in accordance with the plan details and the manufacturer’s requirements. This includes all backfill and necessary materials to backfill the system per the manufacturer's instructions.

OUTLET CONTROL STRUCTURE
(Bid Item 42)

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

Pay Item	Pay Unit
Outlet Control Structure	each

The contract unit price shall be payment in full for all labor, materials, and equipment necessary to furnish and install the outlet control structure in accordance with the plan details. The outlet control structure will include a precast 6-inch weir wall, steps, outlet control tee, orifices, tee, 4-inch caps, risers, pre-cast cover adjustments, manhole frame and covers and all necessary materials to construct the outlet control structure per the detail provided in the plan set.

ADS UNDERGROUND STORMWATER DETENTION BASIN
(Bid Item 43)

The completed work as measured for CONTECH UNDERGROUND STORMWATER DETENTION BASIN will be paid for at the contract unit price for the following contract item (pay item):

Pay Item	Pay Unit
ADS Underground Stormwater Detention Basin	each

The contract unit price shall be payment in full for all labor, materials, and equipment necessary to furnish and install the Underground Stormwater Detention System in accordance with the plan details and the manufacturer's requirements. This includes all backfill, stone and geofabric and necessary materials to backfill and install the system per the manufacturer's instructions.

SURFACE RESTORATION
(Bid Item 44)

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

Pay Item	Pay Unit
Surface Restoration	square yard

Surface Restoration shall be measured in place by square yards and shall be based upon the average length and width measurements of the restored area as determined by the Construction Observer.

The contract unit price shall be payment in full for all labor, materials, and equipment necessary to furnish and place the topsoil, seed, and mulch or topsoil and sod as called for on the plans and specifications. Watering seed or sod until vigorous turf growth is established shall be considered as incidental to the surface restoration work unless a separate pay item for water is included in the Bid Form.

When Surface Restoration work is completed, including the six (6) week maintenance period, Engineer will, upon request, make a final inspection prior to transferring the responsibility to the City for assuming those areas for completion and watering.

Where inspected Surface Restoration work during the initial six (6) weeks after placement does not comply with requirements, the contractor shall replace rejected work and continue specified six (6) week maintenance until reinspected by Engineer and found acceptable which shall not exceed the six (6) week time frame after placement.

Contractor will be paid 50% of work when the initial seeding is completed and remaining 50% when all provisions of the Surface Restoration special provision is completed.

SITE FURNISHINGS
(Bid Item 45)

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

Pay Item	Pay Unit
Bike Hoop, Furnish and Install	each

The contract unit price shall be payment in full for all labor, materials, and equipment necessary to install in accordance with the manufacturer's recommendations, plan sheets, and details for all site furnishings. Excavation for base and placement of any required foundations shall be considered incidental to the work. Placement of surface concrete such as sidewalk will be paid separately under the corresponding pay item.

PARKING LOT LIGHTING
(Bid Item 46)

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

Pay Item	Pay Unit
Parking Lot Lighting	lump sum

The contract lump sum price shall include all labor, materials, and equipment necessary to furnish and install the proposed lighting including light poles, conduit, switches, etc. in accordance with plan details. The lump sum pay item shall be reimbursed upon completion and once functionality can be proven and accepted by both the Owner and the Building Department.

PAVEMENT MARKINGS
(Bid Item 47)

The completed work as measured for PAVEMENT MARKINGS will be paid for at the contract unit prices for the following contract items:

Pay Item	Pay Unit
Pavement Markings	lump sum

Pavement markings as proposed in the plan documents shall be waterborne pavement markings per the specifications of the MDOT standard specifications for construction and shall be paid for by the lump sum.

The contract unit price shall be payment in full for all labor, materials, and equipment necessary to furnish and install the pavement markings in accordance with the plan details and the manufacturer's instructions. All sweeping and preparatory work as well as traffic control and temporary protection of newly placed markings shall be considered as incidental to the pavement marking work. Removal of any temporary pavement markings shall also be considered as incidental unless the Bid Form already includes pay items for removing temporary markings.

TRAFFIC MAINTENANCE AND CONTROL
(Bid Item 48)

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

Pay Item	Pay Unit
Traffic Maintenance and Control	lump sum

The contract lump sum price shall be payment in full for all labor, materials, and equipment necessary to furnish, install, and maintain all signs, cones, barricades, flagging, etc. as required by the Michigan Manual of Uniform Traffic Control Devices and the Supplemental Specifications. Removal of any temporary signs or other traffic control equipment upon completion of the project shall be considered as incidental to the traffic maintenance and control work.

BUILDING PERMIT

(Bid Item 49)

The completed work as measured for SOUTHFIELD BUILDING PERMIT will be paid for at the contract unit prices for the following contract items:

Pay Item	Pay Unit
Southfield Building Permit Allowance	lump sum

This pay item allowance shall be the payment in full for the fees associated with furnishing the Southfield Building Department permit per the requirements of the permitting agency. This item will be reimbursed to the Contractor upon furnishing the invoice associated with the permit.

MISCELLANEOUS RESTORATION ITEMS

Restoration of miscellaneous items such as, but not limited to, street signs, traffic signs, shrubbery and other ornamental landscape items which are damaged, removed, or destroyed by the Contractor in the course of the work shall be repaired or replaced by the Contractor with new materials of equal quality as existed prior to the start of work. All such items for which specific bid items are not listed in the proposal shall be considered as incidental work and shall be replaced or repaired at the expense of the Contractor.

FINAL CLEAN UP

Final clean up of the job shall be considered as incidental. Items in this category include removal of debris and litter from the site, removal of surplus materials, sweeping, repair of any damages, and clean out of drainage structures located within the work area.

Surface Restoration shall commence immediately upon completion of final grading or as MDOT seasonal limitations dictate.

Appendix A- Report of Geotechnical Investigation

CONSULTING GROUP

Report on Geotechnical Pavement Investigation

Southfield
Fire Station Nos. 4 & 5
Pavement Improvements
25120 W 12 Mile Road &
24477 Lahser Road
Southfield, Michigan

Latitude 42.468126° N
Longitude 83.262047° W

Prepared for:

OHM Advisors
34000 Plymouth Road
Livonia, Michigan 48150

G2 Project No. 230950
January 18, 2024

g2consultinggroup.com

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CONSULTING GROUP

January 18, 2024

Mr. Zach Hampton, P.E.
Project Manager
OHM Advisors
34000 Plymouth Road
Livonia, Michigan 48150

Re: Report on Geotechnical Pavement Investigation
Southfield Fire Station Nos. 4 & 5 Pavement Improvements
25120 W 12 Mile Road & 24477 Lahser Road
Southfield, Michigan
G2 Project No. 230950

Dear Ms. Gushard:

We have completed the geotechnical pavement investigation for the proposed pavement reconstruction for Fire Station Nos. 4 & 5 located at 25120 W 12 Mile Road & 24477 Lahser Road, respectively within the City of Southfield, Michigan. This report presents the results of our observations and analyses and our recommendations for pavement section design and construction as they relate to the geotechnical conditions at the site.

We appreciate the opportunity to be of service to the OHM Advisors on this project and look forward to discussing the recommendations presented. In the meantime, if you have any questions regarding this report or any other matter pertaining to the project, please contact us.

Sincerely,

G2 Consulting Group, LLC

Jeffrey M. Hayball, P.E.
Project Manager

Noel J. Hargrave-Thomas, P.E.
Principal

JMH/NJHT/ljv

Enclosures

EXECUTIVE SUMMARY

The project consists of pavement improvements at Fire Station Nos. 4 & 5 located within the city of Southfield, Michigan. It is our understanding the existing pavements within Fire Station No. 5 will be reconstructed. In addition, stormwater detention system will be constructed in conjunction with the proposed pavement improvements at Fire Station No. 5. However, no information regarding type and size of the stormwater detention system was available upon completion of this proposal. We understand the new system will be constructed using open-cut installation methods at depths ranging from 5 to 7 feet below existing grades. Current plans for the pavement improvements to Fire Station No. 4 consist of reconstructing the pavement surface of the both the fire truck access drive and small parking lot. It is our understanding the pavements will service fire trucks. However, no traffic loading conditions were available upon completion of this report.

The Portland cement concrete ranges in thickness from 6-1/2 to 11 inches at boring PC-1 through PC-7. The bituminous concrete pavement measures 3-3/4 inches thick at boring PC-8. The underlying aggregate base consist of crushed limestone sandy gravel, measuring 2-1/2 to 8-1/2 inches in thickness. Medium compact gravelly sand fill underlies the Portland cement concrete within boring PC-7 and extends to an approximate depth of 3 feet. Stiff to hard silty clay fill with occasional sand seams is present below the pavement section and generally extends to an approximate depth of 8 feet within borings PC-2 and PC-3 and the explored depth of 5 feet within borings PC-1, PC-5, and PC-6. Compact gravelly sand fill underlies the silty clay fill within boring PC-4 and extends to the explored depth of 5 feet. Native stiff to hard silty clay is present below the silty clay fill within borings PC-2 and PC-3, gravelly sand fill within boring PC-7, and pavement section within boring PC-8, and extend to the explored depths of 5 and 10 feet. Groundwater was encountered at an approximate depth of 8 feet within borings PC-2 and PC-3 during drilling operations. Upon completion of drilling operations, no measurable groundwater was observed within borings PC-2 and PC-3. Groundwater was not encountered within the remaining borings during or upon completion of drilling operations.

The existing pavements within Fire Station No. 5 are generally in poor condition. Therefore, we recommend reconstructing the pavements with a new Portland cement concrete pavement section and new aggregate base. Given the existing pavement conditions within Fire Station No. 4, we recommend reconstructing the pavement surfaces at Fire Station No. 4 and leaving the existing aggregate base and gravelly sand fill in place.

Based on the results of our analyses, we recommend a minimum access drive heavy duty pavement design for the proposed pavement reconstruction at Fire Station No. 5 consisting of 10 inches of non-reinforced MDOT 3500HP concrete atop 8 inches of the MDOT 21AA aggregate base course. We recommend the proposed access drive heavy duty pavement surface reconstruction at Fire Station No. 4 consist of 10 inches of non-reinforced MDOT 3500HP concrete atop of the existing aggregate base. We recommend the parking area standard duty pavement section for Fire Station No. 5 consisting of 7 inches of non-reinforced MDOT 3500HP concrete atop 8 inches of the MDOT 21AA aggregate base course. We recommend the Fire Station No. 4 parking area standard duty pavement section consist of 2 inches of MDOT 5EML bituminous concrete wearing course, 2 inches of MDOT 4EML bituminous concrete leveling course, supported on the existing aggregate base.

Temporary unsurcharged trench excavations for any proposed open-cut stormwater sewer installation operations must be sloped back at a minimum of 1H:1V (horizontal: vertical) within the stiff to hard cohesive soils. Where seepage from excavation cuts is observed, the slopes must be flattened sufficiently to achieve stability, but in no case left steeper that 3H:1V at and below the seepage level. We anticipate any groundwater seepage or surface runoff can be controlled within construction excavations with pumping from properly constructed sumps.

Do not consider this summary separate from the entire text of this report, with all the conclusions and qualifications mentioned herein. Details of our analysis and recommendations are discussed in the following sections and in the Appendix of this report.

PROJECT DESCRIPTION

The project consists of pavement improvements at Fire Station Nos. 4 & 5 located within the city of Southfield, Michigan. The pavement areas at Fire Station No. 5 consists of the fire truck loop present on the east, west, and north sides of the building along with an associated parking lot at the southeast corer of the property. It is our understanding the existing pavements within Fire Station No. 5 will be reconstructed. In addition, stormwater detention system will be constructed at Fire Station No. 5 in conjunction with the proposed pavement improvements. However, no information regarding type and size of the stormwater detention system was available upon completion of this proposal. We understand the new system will be constructed using open-cut installation methods at depths ranging from 5 to 7 feet below existing grades.

The pavement areas at Fire Station No. 4 consists of a fire truck access drive on the south and north side of the building, which consist of Portland cement concrete pavement. A bituminous concrete pavement parking lot is present within the northeast corner of the property. Current plans for the pavement improvements consist of reconstructing the pavement surface of the both the fire truck access drive and small parking lot.

The pavements at Fire Station No. 5 were originally constructed prior to 1999 and the pavements at Fire Station No. 4 were originally constructed sometime in 2005. It is our understanding the pavements will service fire trucks. However, no traffic loading conditions were available upon completion of this report.

The purpose of our investigation is to determine and evaluate the general pavement and subsurface conditions within the two Fire Stations and develop general recommendations for the proposed pavement reconstruction and new pavement design.

SCOPE OF SERVICES

The field operations, laboratory testing, and engineering report preparation were performed under the direction and supervision of a licensed professional engineer. Our services were performed according to generally accepted standards and procedures in the practice of geotechnical engineering in this area. Our scope of services for this project consists of the following specific items:

1. We performed a cursory visual identification of the types and relative magnitudes of observable pavement distress.

2. As directed, we drilled a total of eight (8) pavement core/soil borings, PC-1 through PC-8, through the existing pavements. Pavement core/soil borings PC-1, PC-4, and PC-5 were drilled within the fire truck loop at Fire Station No. 5, extending to a depth of 5 feet each. Pavement core/soil borings PC-2 and PC-3 were performed within the fire truck loop at Fire Station No. 5, extending to a depth of 10 feet below grade. Pavement core/soil boring PC-6 was drilled within the parking lot at Fire Station No. 5 and extended to a depth of 5 feet. Pavement core/soil boring PC-7 was performed within the fire truck access drive at Fire Station No. 4, extending to a depth of 5 feet. Pavement core/soil boring PC-8 was drilled within the bituminous concrete parking lot at Fire Station No. 4 and extended to a depth of 5 feet. We measured the existing pavement section materials (Portland cement concrete, bituminous concrete, and aggregate base) and identified the type and condition of subgrade soils.

3. We performed Case Borehole Testing within soil borings PC-2 and PC-3 per Southeast Michigan Council of Governments (SEMCOG) guidelines.
4. We performed laboratory testing on samples obtained from the soil borings. Laboratory testing included visual engineering classification, Atterberg Limits, natural moisture content, and unconfined compressive strength determinations.

5. We prepared this engineering report which includes our evaluation of the subsurface conditions

within the pavement areas of the two fire stations and our recommendations for pavement reconstruction and stormwater detention system construction.

FIELD OPERATIONS

OHM Advisors (OHM) in conjunction with G2 Consulting Group, LLC (G2), selected the number, depth, and location of the soil borings. The soil borings were located in the field by a G2 representative by measuring from existing site features and landmarks using conventional taping methods. The approximate soil boring locations are shown on the Soil Boring Location Plan, Plate Nos. 1 and 2. Ground surface elevations were not available upon completion of this report.

We used a gas powered core rig equipped with a 6-inch diameter diamond-tipped core barrel to core the pavement locations. Pavement cores were drilled through the full depth of the existing pavement structure to obtain an accurate determination of the pavement thickness.

The soil borings were drilled using a truck-mounted rotary drilling rig. Continuous-flight, 2-1/4 inch inside diameter, hollow-stem augers were used to advance the boreholes to the explored depths. Soil samples were obtained at intervals of 2-1/2 feet. These samples were obtained by the Standard Penetration Test Method (ASTM D 1586), which involves driving a 2-inch diameter split-spoon sampler into the soil with a 140-pound weight falling 30 inches. The sampler is generally driven three successive 6-inch increments, with the number of blows for each increment recorded. The number of blows required to advance the sampler the last 12 inches is termed the Standard Penetration Resistance (N). Blow counts for each six-inch increment and resulting N-values are presented on the individual soil boring logs.

The soil samples were placed in sealed containers in the field and brought to our laboratory for testing and classification. During field operations, a professional engineering and the drilling crew representatives maintained soil boring logs of the subsurface conditions, including changes in stratigraphy and observed groundwater levels. The final boring logs are based on the field logs supplemented by laboratory soil classification and test results. The soil borings were backfilled with auger cuttings and cold patch upon completion of drilling operations.

LABORATORY TESTING

Representative soil samples were subjected to laboratory testing to determine soil parameters pertinent to pavement design and site preparation. An experienced geotechnical engineer classified the samples in general conformance with the Unified Soil Classification System.

Laboratory testing included Atterberg Limits, natural moisture content, and unconfined compressive strength determinations. Atterberg limits were determined in accordance with ASTM D 4318 “Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils”. The unconfined compressive strengths were determined by using a spring-loaded hand penetrometer. The hand penetrometer estimates the unconfined compressive strength to a maximum of 4-1/2 tons per square foot (tsf) by measuring the resistance of the soil sample to the penetration of a calibrated spring-loaded cylinder.

The results of the moisture content and unconfined compressive strength laboratory tests are indicated on the soil boring logs at the depths the samples were obtained. Atterberg limits are shown graphically on Figure No. 9 in the Appendix. We will hold the soil samples for 60 days from the date of this report. If you would like the samples, please let us know.

EXISTING PAVEMENT AND SUBGRADE CONDITIONS

Fire Station No. 5 (Borings PC-1 through PC-6)

The existing pavements at Fire Station No. 5 consist of Portland cement concrete pavements with integral curbs and generally supported on an aggregate base. Moderate to high severity joint cracking is present along more than half of the pavement surface. It appears some cold patching and full depth replacement patching has been performed in the past. The pavements are sloped to drain into a catch basin located within the middle of the pavement areas. The catch basins are generally brick and mortar construction atop of pre-cast concrete structures and are in fair condition with some minor visible cracking observed within the mortar joints during our site visit.

The Portland cement concrete ranges in thickness from 6-1/2 to 11 inches. The underlying aggregate base consist of crushed limestone sandy gravel, measuring 2-1/2 to 8-1/2 inches in thickness. Silty clay fill with occasional sand seams is present below the pavement section and generally extends to an approximate depth of 8 feet within borings PC-2 and PC-3 and the explored depth of 5 feet within borings PC-1, PC-5, and PC-6. Gravelly sand fill underlies the silty clay fill within boring PC-4 and extends to the explored depth of 5 feet. Native silty clay is present below the silty clay fill within borings PC-2 and PC-3 and extend to the explored depth of 10 feet.

The silty clay fill is stiff to hard in consistency with moisture contents ranging from 9 to 20 percent, a liquid limit of 22 percent, a plasticity index of 10 percent, and unconfined compressive strengths ranging from 2,500 to 9,000 pounds per square foot (psf). The gravelly sand fill is compact with a Standard Penetration Test (SPT) N-value of 40 blows per foot (bpf). The native silty clay is stiff to very stiff in consistency with natural moisture contents ranging from 20 to 29 percent and unconfined compressive strengths ranging from 2,000 to 4,000 psf.

Fire Station No. 4 (Borings PC-7 and PC-8)

The existing pavements on the north and south sides of Fire Station No. 4 consist of Portland cement concrete pavements with integral curbs and generally supported on an aggregate base. The parking lot present to the northeast of Fire Station No. 4 consists of bituminous concrete supported on an aggregate base. Moderate to high severity joint cracking is present along more than half of the Portland cement concrete pavement surface. It appears some cold patching and full depth replacement patching has been performed in the past. The bituminous concrete parking lot pavement is in poor condition with most of the pavement surface exhibiting high severity block and fatigue cracking. The pavements are sloped to drain into catch basins located within the middle of the Portland cement concrete pavement areas. The catch basins are generally brick and mortar construction atop of pre-cast concrete structures and are in fair condition with some minor visible cracking observed within the mortar joints during our site visit.

The Portland cement concrete measures 11 inches thick at boring PC-7. The bituminous concrete measures 3-3/4 inch thick at boring PC-8. A crushed concrete sandy gravel aggregate base underlies the bituminous concrete within boring PC-8 and measures 10-1/4 inches thick. Gravelly sand fill is present below the Portland cement concrete within boring PC-7 and extends to an approximate depth of 3 feet. Native silty clay is present below the gravelly sand fill fill within boring PC-7 and pavement section within boring PC-8 and extends to the explored depth of 5 feet.

The gravelly sand fill is medium compact with a SPT N-value of 11 bpf. The native silty clay is very stiff to hard in consistency with natural moisture contents ranging from 15 to 18 percent and unconfined compressive strengths ranging from 7,500 to 9,000 psf.

General

The stratification depths shown on the soil boring logs represent the soil conditions at the boring locations. Variations may occur between borings. Additionally, the stratigraphic lines represent the approximate boundaries between soil types. The transition may be more gradual than what is shown. We have prepared the boring logs on the basis of laboratory classification and testing as well as field logs of the soils encountered.

Soil Boring Location Plan, Plate Nos. 1 and 2, Soil Boring Logs, Figure Nos. 1 through 8, Atterberg Limits Results, Figure No. 9, and Photographic Documentation, Figure Nos. 10 through 17, are presented in the Appendix. The soil profiles described above are generalized descriptions of the conditions encountered at the boring locations. General Notes Terminology defining the nomenclature used on the soil boring logs and elsewhere in this report are presented on Figure No. 18.

GROUNDWATER CONDITIONS

Groundwater readings were performed during and upon completion of drilling operations. Groundwater was encountered at an approximate depth of 8 feet within borings PC-2 and PC-3 during drilling operations. Upon completion of drilling operations, no measurable groundwater was observed within borings PC-2 and PC-3. Groundwater was not encountered within the remaining borings during or upon completion of drilling operations.

Fluctuations in perched and long-term groundwater levels should be anticipated due to seasonal variations and following periods of prolonged precipitation. It should also be noted that groundwater observations made during drilling operations in predominantly cohesive soils are not necessarily indicative of the static groundwater level. This is due to the low permeability of such soils and the tendency of drilling operations to seal off the natural paths of groundwater flow.

PAVEMENT EVALUATION AND RECOMMENDATIONS

General

The existing pavements within Fire Station No. 5 are generally in poor condition with more than half of the pavement surface exhibiting moderate to high severity joint cracking. The existing aggregate base material is generally too thin (less than 6 inches) to support a new pavement section. Therefore, we recommend reconstructing the pavements with a new Portland cement concrete pavement section with new aggregate base.

At the time of the investigation, finished site grades were not available; however, we anticipate the proposed pavements will be supported on the existing silty clay fill. These soils should be suitable for support of proposed pavements following satisfactory completion of subgrade preparation operations as described in the Pavement Subgrade Preparation Recommendations section of this report. In general, cohesive soils are considered to be of poor quality for the direct support of conventional pavement structures, have poor drainage characteristics, and are considered to be highly frost susceptible.

The pavements within Fire Station No. 4 are generally in poor condition with most of the bituminous concrete pavements exhibiting high severity block and fatigue cracking and the Portland cement concrete pavements exhibiting high severity joint cracking. However, a suitable aggregate base is generally present below the pavements at Fire Station No. 4. Therefore, we recommend reconstructing the Portland cement concrete pavement and bituminous concrete pavement surface at Fire Station No. 4 and leaving the existing aggregate base and gravelly sand fill in place. However, within areas where the underlying aggregate base does not pass a proof compaction evaluation, we recommend supporting the pavements at Fire Station No. 4 on a minimum of 8 inches of aggregate base after any necessary

undercuts.

Pavement Reconstruction Recommendations (Fire Station No. 5)

The existing pavements and underlying aggregate base should be completely removed within the pavement areas of Fire Station No 5. The exposed subgrade should be cut to proposed grade and graded to promote effective subsurface drainage. Once a rough grade has been achieved, the exposed subgrade should be evaluated for stability. We recommend subgrade soils be proof rolled using a fully loaded tri-axle dump truck. Any unstable or unsuitable areas noted should be improved by additional compaction or removed and replaced with engineered fill.

Given the existing native silty clay subgrade conditions, we anticipate a moderate to high amount of subgrade treatment by undercut may be required during construction operations if performed during the spring or fall months. We recommend construction operations be performed during the summer months and the exposed subgrade not left exposed to rain events.

Subgrade undercuts, if required, should be evaluated by a qualified engineering technician to determine if subgrade stabilization is necessary. We recommend that undercut excavations, where required, be backfilled MDOT 21AA placed in an engineered manner. A drain tile should be placed at the deepest portion of subgrade undercuts and connected to the closest catch basin to prevent trapped water from collecting in the granular cut soils. In addition, edge drains and catch basin finger drains should be installed to remove groundwater from the aggregate base layer. Lift thicknesses should not exceed 9 inches. All engineered fill should be compacted to a density of at least 95 percent of the maximum density determined by the Modified Proctor (ASTM D 1557) method of testing. All engineered fill material should be placed and compacted at approximately the optimum moisture content. Frozen material should not be used as fill, nor should fill be placed on a frozen subgrade.

Pavement Surface Reconstruction Recommendations (Fire Station No. 4)

We recommend completely removing the existing bituminous concrete and Portland cement concrete within the pavement areas. The exposed aggregate base should be graded to promote effective drainage, allow for the proposed bituminous sections, and then compacted. Once a rough grade has been achieved, the exposed aggregate base should be evaluated for stability and proof compacted with a vibratory roller. The vibratory roller should make a minimum of 10 passes across the aggregate base in two perpendicular directions where possible. Any unstable or unsuitable areas noted should be improved by additional compaction or removed and replaced with engineered fill.

Subgrade undercuts, if required, should be evaluated by a qualified engineering technician to determine if subgrade stabilization is necessary. Lift thicknesses should not exceed 9 inches. Within any potential undercut, we recommend placing a minimum of 8 inches of MDOT 21AA aggregate base. All engineered fill should be compacted to a density of at least 95 percent of the maximum density determined by the Modified Proctor (ASTM D 1557) method of testing. All engineered fill material should be placed and compacted at approximately the optimum moisture content. Frozen material should not be used as fill, nor should fill be placed on a frozen subgrade.

Pavement Design

We performed pavement design analyses in accordance with the "AASHTO Guide for Design of Pavement Structures". The subgrade soils will generally consist of silty clay fill at Fire Station No. 5 and native very stiff to hard silty clay at Fire Station No. 4. Based on the existing subgrade soils, we have provided design pavement sections based on an effective subgrade resilient modulus of 6,000 pounds per square inch (psi) and an effective modulus of subgrade reaction, k, of 50 pounds per cubic inch (pci). The subgrade values are representative of the cohesive subgrade soils present beneath the fire station pavements. The analysis assumes that any soft or weak subgrade identified at the time of construction

by proof roll testing is corrected by subgrade undercut treatment or additional vibratory compaction.

It is our understanding each of the Fire Stations have pavements which service fire trucks and areas for only car parking. We have designated the areas which service fire trucks as heavy-duty pavements and the car parking areas as standard duty pavements. No information regarding how many fire trucks service Fire Station No. 4 or 5. Therefore, we have estimated 30-year traffic loading each of the Fire Stations of 2.6 million 18-kip Equivalent Single-Axle Loads (ESAL's), assuming a truck factor of 4.0. We have estimated the parking areas at each Fire Station service an estimated 50,000 ESAL's over a 20 year design life.

For evaluation purposes, we have utilized a serviceability loss of 2.0, a standard deviation of 0.49 for flexible pavements, 0.39 for rigid pavements, a reliability factor of 0.95, a Portland cement concrete modulus of rupture of 670 psi, and an elastic modulus of the Portland cement concrete slab of 4,200,000 psi. If any actual traffic volume information becomes available, G2 Consulting Group should be notified so we can reevaluate our recommendations.

Based on the results of our analyses, we recommend a minimum access drive heavy duty pavement design for the proposed pavement reconstruction at Fire Station No. 5 consisting of 10 inches of non-reinforced MDOT 3500HP concrete atop 8 inches of the MDOT 21AA aggregate base course. We recommend the proposed access drive heavy duty pavement surface reconstruction at Fire Station No. 4 consist of 10 inches of non-reinforced MDOT 3500HP concrete atop of the existing aggregate base or a minimum of 8 inches of the MDOT 21AA aggregate base course.

We recommend the parking lot standard duty pavement section for Fire Station No. 5 consisting of 7 inches of non-reinforced MDOT 3500HP concrete atop 8 inches of the MDOT 21AA aggregate base course. We recommend the parking lot standard duty pavement section at Fire Station No. 4 consist of 2 inches of MDOT 5EML bituminous concrete wearing course, 2 inches of MDOT 4EML bituminous concrete leveling course, supported on the existing aggregate base or a minimum of 8 inches of MDOT 2AA aggregate base.

For the bituminous concrete pavements, we recommend a binder from RAP be limited to less than 17 percent of the total binder and using a binder of PG 64-22. It is recommended that 3500HP grade concrete mixture contain at least 25 percent GGBFS substitution for Portland cement or use low alkali (0.6% or less total cement alkali) Type I or Type II cement.

All pavement materials are specified within the 2020 Standard Specifications for Construction from the Michigan Department of Transportation. The concrete pavement materials are described in Section 601. The bituminous pavement materials are described in Section 501 and can be assigned a structural coefficient number of 0.42. Any imported aggregate base course materials can be assigned a structural coefficient number of 0.14.

Pavement Drainage

Proper pavement drainage is essential given the cohesive soil conditions. We recommend edge drains be provided continuously along the pavement edge since they can become a source of water infiltration into the pavement subgrade. Such drains should extend to minimum depths of 4 inches below the bottom of the proposed aggregate base course or granular fill placed within undercut areas. These drains could be connected to nearby catch basins. In addition, we recommend a minimum of 4 finger drains be installed at each catch basin location, extending a minimum of 20 feet from the catch basin. The pavement and subgrade should be properly sloped to promote effective surface and subsurface drainage and prevent water from ponding. We also recommend pavement subbase materials consist of non-frost-susceptible aggregates where possible.

Pavement Maintenance

We recommend that the joints within newly constructed pavements be sealed with hot rubber to prevent moisture intrusion into the subgrade soils below, as well as prevent spalling of the joint due to material entering the joint.

Regular timely maintenance should be performed on the pavement to reduce the potential deterioration associated with moisture infiltration through surface cracks. The owner should be prepared to seal the cracks with a hot-applied elastic crack filler as soon as possible after cracking develops and as often as necessary to block the passage of water to the subgrade soils. In addition, regular joint maintenance should be performed.

STORMWATER DETENTOIN SYSTEM CONSTRUCTION RECOMMENDATIONS

General

It is our understanding that the proposed stormwater detention system be constructed in conjunction with the pavement reconstruction within Fire Station No. 5. We anticipate the stormwater detention system will be constructed within open-cut excavations with invert depths between 5 and 7 feet below existing grades. Once the proposed project profile becomes available, G2 should be notified so that we can review our recommendations presented herein.

Infiltration Evaluation

Two areas on site were evaluated for infiltration potential. The infiltration evaluation was conducted in accordance with the Cased Borehole Test per The City of Detroit: Stormwater Management Design Manual, developed in 2018. Cased borehole infiltration testing was performed adjacent to borings PC-2 and PC-3 at a depth of 6 feet below existing grade as directed by OHM. Encased borehole infiltration testing involves advancing boreholes to the infiltration interface depth and firmly setting a 4-inch diameter casing into the bottom of the borehole. After setting the pipe, a minimum of 2 inches of pea stone was placed at the bottom of the hole. Water was added to the casing at a slow rate until it was flush with the top of the casing.

The test area is pre-soaked for one hour prior to testing to simulate saturated conditions.
If the water level drop is two inches or more during the last 30 minutes of the pre-soak period, use 10-minute measurement intervals between readings. If the water level drop is less than 2 inches, use 30-minute measurement intervals between readings. Measurements of water level are made from the top of the casing and must continue at the interval determined until a minimum of eight readings are completed or until a stabilized rate of drop is obtained, whichever occurs first. A stabilized rate of drop means a difference of 1/4 inch or less of drop between the highest and lowest readings of four consecutive readings.

Based on the drop in water of less than 2 inches for the last 30-minute presoaking period, we determined 30-minute intervals would be utilized between readings during testing operations for the four locations. The following table provides the results of our four consecutive stable readings during test operations at locations PC-2 and PC-3 after the initial one-hour pre-soak period. The presented drop was measured from the top of casing to the water elevation. Water is to be added to the casing after each 30-minute interval until flush with the top; however no noticeable drop in water head was noted.

TEST LOCATION	TIME (minute)	DROP (inch)	AVERAGE (in/hr)
PC-2	30	0	0
	30	0	
	30	0	
	30	0	

TEST LOCATION	TIME (minute)	DROP (inch)	AVERAGE (in/hr)
PC-3	30	0	0
	30	0	
	30	0	
	30	0	

The soil conditions at 6 feet consist of silty clay fill. No measurable drop in head was noted within any of the test location; therefore, an infiltration rate of 0 inches/hour should be utilized for design.

Excavations

Temporary unsurcharged trench excavations for any proposed open-cut stormwater sewer installation operations must be sloped back at a minimum of 1H:1V (horizontal: vertical) within the stiff to hard cohesive soils. Where seepage from excavation cuts is observed, the slopes must be flattened sufficiently to achieve stability, but in no case left steeper that 3H:1V at and below the seepage level. If the temporary construction slopes are to be maintained during the rainy season, berms are suggested along the tops of the embankments to prevent runoff water from entering the excavation and eroding the slope faces. The soils exposed in slope faces should be inspected by qualified personnel so modifications of the slopes can be made if variations in the soil or water conditions occur. If sufficient space for open cut consideration is not available trench box shoring may be used.

Trench box shoring may be used provided some lateral deflection of adjacent soils can be tolerated. If a trench box is used, excavations should be performed from within the trench box, such that no unsupported vertical cut is allowed to exist. A trench box is not recommended where adjacent utilities, roadways, or structures are located less than a lateral distance delineated by a plane extending upward from the bottom edges of the excavation at a 1H:1V slope.

All excavations should be safely sheeted, shored, sloped, or brace in accordance with MI-OSHA requirements. If material is stored or equipment is operated near the excavation, stronger shoring must be used to resist the extra pressure due to the superimposed loads. Care should always be exercised when excavating near existing buildings, roadways, or utilities to avoid undermining. In no case should excavations extend below the level of adjacent structures or utilities unless underpinning is planned.

Groundwater Control

Groundwater was encountered within soil borings PC-2 and PC-3 at an approximate depth of 8 feet during drilling operations. The proposed stormwater detention system inverts may range from 5 to 7 feet below existing grades. We anticipate any groundwater seepage or surface runoff can be controlled within construction excavations with pumping from properly constructed sumps.

GENERAL COMMENTS

We have formulated the evaluations and recommendations presented in this report relative to stormwater management system construction, site preparation, and pavement rehabilitation/reconstruction on the basis of data provided to us relating to the general location for the proposed pavement improvements. Any significant change in this data should be brought to our attention for review and evaluation with respect to the prevailing subsurface conditions.

The scope of the present investigation was limited to evaluation of subsurface conditions for the support of the new stormwater management system, pavements, and other related aspects of the development. No chemical, environmental, or hydrogeological testing or analyses were included in the scope of this investigation. If changes occur in the design, location, or concept of the project, the conclusions and recommendations contained in this report are not valid unless G2 Consulting Group, LLC reviews the changes. G2 Consulting Group, LLC will then confirm the recommendations presented herein or make changes in writing.

We have based the analyses and recommendations submitted in this report upon the data from soil borings performed at the approximate locations shown on the Soil Boring Location Plan, Plate Nos. 1 and 2. This report does not reflect variations that may occur between the actual boring locations. The nature and extent of any such variations may not become clear until the time of construction. If significant variations then become evident, it may be necessary for us to re-evaluate our report recommendations.

Soil conditions at the site could vary from those generalized on the basis of soil borings made at specific locations. It is, therefore, recommended that G2 Consulting Group, LLC be retained to provide soil engineering services during the site preparation and pavement construction phases of the proposed project. This is to observe compliance with the design concepts, specifications, and recommendations. Also, this allows design changes to be made in the event that subsurface conditions differ from those anticipated prior to the start of construction.

APPENDIX

Legend

Pavement Cores/Soil Borings performed by Strata Drilling, Inc. on December 11, 2023

Soil Boring Location Plan		
Fire Station No. 5 Pavement Improvements 24477 Lahser Road Southfield, Michigan		
2G CONSULTING GROUP	Project No. 230950	
	Drawn by: JMH	
	Date: 1/15/24	Plate No. 1
	Scale: NTS	

Legend

Pavement Core/Soil Borings performed by Strata Drilling, Inc. on December 11, 2023

Soil Boring Location Plan

Fire Station No. 4 Pavement Improvements
25120 W 12 Mile Road
Southfield, Michigan

2G CONSULTING GROUP

Project No. 230950	
Drawn by: JMH	
Date: 1/15/24	Plate No. 2
Scale: NTS	

Project Name: City of Southfield Fire Station No. 4 & No. 5 Pavement Improvements

Project Location: 24477 Lasher Road & 25120 W. 12 Mile Road Southfield, Michigan

G2 Project No. 230950

Latitude: N/A Longitude: N/A

Soil Boring No. PC-1

CONSULTING GROUP

SUBSURFACE PROFILE

SOIL SAMPLE DATA

DEPTH (ft)	PRO-FILE	GROUND SURFACE ELEVATION: N/A	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Portland Cement Concrete (7-3/4 inches) 0.6							
		Crushed Limestone Aggregate Base: Gray Sandy Gravel (3-1/4 inches) 0.9							
				S-1	6 7 6	13	11.4		6500*
		Fill: Very Stiff Gray Silty Clay with trace sand and gravel, occasional sand seems							
5		5.0	5	S-2	4 4 5	9	11.8		4500*
		End of Boring @ 5 ft							
10			10						
15			15						

Total Depth: 5 ft
Drilling Date: December 11, 2023
Inspector: J.Hayball
Contractor: Strata Drilling Inc
Driller: D. Watkins

Drilling Method:
6-inch diameter diamond tipped core barrel; 2-1/4 inch inside diameter hollow-stem augers

Water Level Observation:
Dry during and upon completion

Notes:
Fire Station No. 5
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings and capped with cold patch

Figure No. 1

SOIL / PAVEMENT BORING 230950.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 1/15/24

Project Name: City of Southfield Fire Station No. 4 & No. 5 Pavement Improvements

Project Location: 24477 Lasher Road & 25120 W. 12 Mile Road Southfield, Michigan

G2 Project No. 230950

Latitude: N/A Longitude: N/A

Soil Boring No. PC-2

G2 CONSULTING GROUP

SUBSURFACE PROFILE

SOIL SAMPLE DATA

DEPTH (ft)	PRO-FILE	GROUND SURFACE ELEVATION: N/A	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Portland Cement Concrete (11 inches)							
		0.9							
		Crushed Limestone Aggregate Base Gray Sandy Gravel (4 inches)							
		1.3		S-1	5 5 5	10	10.5		5000*
				S-2	4 5 4	9	13.2		4500*
5		Fill: Very Stiff Gray Silty Clay with trace sand and gravel, occasional sand seems	5						
				S-3	4 5 5	10	20.3		5000*
		8.0							
		Stiff Brown and Gray Silty Clay with trace sand and gravel		S-4	2 2 2	4	28.9		2000*
10		10.0	10						
		End of Boring @ 10 ft							
15			15						

Total Depth: 10 ft
Drilling Date: December 11, 2023
Inspector: J.Hayball
Contractor: Strata Drilling Inc
Driller: D. Watkins

Drilling Method:
6-inch diameter diamond tipped core barrel; 2-1/4 inch inside diameter hollow-stem augers

Water Level Observation:
8 feet during drilling; dry upon completion

Notes:
Fire Station No. 5
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings and capped with cold patch

Figure No. 2

SOIL / PAVEMENT BORING 230950.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 1/15/24

Project Name: City of Southfield Fire Station No. 4 & No. 5 Pavement Improvements

Project Location: 24477 Lasher Road & 25120 W. 12 Mile Road Southfield, Michigan

G2 Project No. 230950

Latitude: N/A Longitude: N/A

Soil Boring No. PC-3

CONSULTING GROUP

SUBSURFACE PROFILE

SOIL SAMPLE DATA

DEPTH (ft)	PRO-FILE	GROUND SURFACE ELEVATION: N/A	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Portland Cement Concrete (10-1/2 inches)							
		0.9							
		Crushed Limestone Aggregate Base Gray Sandy Gravel (3-1/2 inches)							
		1.2							
		Fill: Hard Gray Silty Clay with trace sand and gravel		S-1	18 27 32	59	8.4		9000*
		3.0							
5			5	S-2	3 3 4	7	12.2		3500*
		Fill: Stiff to Very Stiff Gray Silty Clay with trace sand and gravel, occasional sand seems		S-3	5 5 5	10	12.3		5000*
		8.0							
		Very Stiff Brown and Gray Silty Clay with trace sand and gravel							
10		10.0	10	S-4	2 3 5	8	19.7		4000*
		End of Boring @ 10 ft							
15			15						

Total Depth: 10 ft
Drilling Date: December 11, 2023
Inspector: J.Hayball
Contractor: Strata Drilling Inc
Driller: D. Watkins

Drilling Method:
6-inch diameter diamond tipped core barrel; 2-1/4 inch inside diameter hollow-stem augers

Water Level Observation:
8 feet during drilling; dry upon completion

Notes:
Fire Station No. 5
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings and capped with cold patch

Figure No. 3

SOIL / PAVEMENT BORING 230950.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 1/15/24

Project Name: City of Southfield Fire Station No. 4 & No. 5 Pavement Improvements

Project Location: 24477 Lasher Road & 25120 W. 12 Mile Road Southfield, Michigan

G2 Project No. 230950

Latitude: N/A Longitude: N/A

Soil Boring No. PC-4

G2 CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
DEPTH (ft)	PRO-FILE	GROUND SURFACE ELEVATION: N/A	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Portland Cement Concrete (9-1/2 inches)							
		0.8							
		Crushed Limestone Aggregate Base							
		1.0							
		Gray Sandy Gravel (2-1/2 inches)							
		Fill: Very Stiff Gray Silty Clay with trace sand and gravel		S-1	4 5 6	11	11.4		5500*
		2.5							
		Fill: Compact Brown Gravelly Sand with trace clay and silt							
5		5.0	5	S-2	11 19 21	40			
		End of Boring @ 5 ft							
10			10						
15			15						

Total Depth: 5 ft
Drilling Date: December 11, 2023
Inspector: J.Hayball
Contractor: Strata Drilling Inc
Driller: D. Watkins

Drilling Method:
6-inch diameter diamond tipped core barrel; 2-1/4 inch inside diameter hollow-stem augers

Water Level Observation:
Dry during and upon completion

Notes:
Fire Station No. 5
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings and capped with cold patch

Figure No. 4

SOIL / PAVEMENT BORING 230950.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 1/15/24

Project Name: City of Southfield Fire Station No. 4 & No. 5 Pavement Improvements

Project Location: 24477 Lasher Road & 25120 W. 12 Mile Road Southfield, Michigan

G2 Project No. 230950

Latitude: N/A Longitude: N/A

Soil Boring No. PC-5

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
DEPTH (ft)	PRO-FILE	GROUND SURFACE ELEVATION: N/A	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Portland Cement Concrete (9-1/2 inches)							
		0.8							
		Crushed Limestone Aggregate Base Gray Sandy Gravel (5-1/2 inches)							
		1.3							
		Fill: Hard Gray Silty Clay with trace sand and gravel		S-1	5 6 13	19	8.8		9000*
		3.0							
		Fill: Stiff Gray Silty Clay with trace sand and gravel		S-2	5 4 3	7	15.2		3500*
5		5.0	5						
		End of Boring @ 5 ft							
10			10						
15			15						

Total Depth: 5 ft
Drilling Date: December 11, 2023
Inspector: J.Hayball
Contractor: Strata Drilling Inc
Driller: D. Watkins

Drilling Method:
6-inch diameter diamond tipped core barrel; 2-1/4 inch inside diameter hollow-stem augers

Water Level Observation:
Dry during and upon completion

Notes:
Fire Station No. 5
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings and capped with cold patch

Figure No. 5

SOIL / PAVEMENT BORING 230950.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 1/15/24

Project Name: City of Southfield Fire Station No. 4 & No. 5 Pavement Improvements

Project Location: 24477 Lasher Road & 25120 W. 12 Mile Road Southfield, Michigan

G2 Project No. 230950

Latitude: N/A Longitude: N/A

Soil Boring No. PC-6

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
DEPTH (ft)	PRO-FILE	GROUND SURFACE ELEVATION: N/A	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Portland Cement Concrete (6-1/2 inches) 0.5							
		Crushed Limestone Aggregate Base Gray Sandy Gravel (8-1/2 inches) 1.3							
				S-1	3 2 3	5	14.1		2500*
		Fill: Stiff to Very Stiff Gray Silty Clay with trace sand and gravel, occasional sand seems							
5		5.0	5	S-2	3 4 6	10	13.2		4500*
		End of Boring @ 5 ft							
10			10						
15			15						

Total Depth: 5 ft
Drilling Date: December 11, 2023
Inspector: J.Hayball
Contractor: Strata Drilling Inc
Driller: D. Watkins

Drilling Method:
6-inch diameter diamond tipped core barrel; 2-1/4 inch inside diameter hollow-stem augers

Water Level Observation:
Dry during and upon completion

Notes:
Fire Station No. 5
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings and capped with cold patch

Figure No. 6

SOIL / PAVEMENT BORING 230950.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 1/15/24

Project Name: City of Southfield Fire Station No. 4 & No. 5 Pavement Improvements

Project Location: 24477 Lasher Road & 25120 W. 12 Mile Road Southfield, Michigan

G2 Project No. 230950

Latitude: N/A Longitude: N/A

Soil Boring No. PC-7

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
DEPTH (ft)	PRO-FILE	GROUND SURFACE ELEVATION: N/A	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Portland Cement Concrete (10 inches) 0.8							
		Fill: Medium Compact Brown Gravelly Sand with trace clay and silt 3.0		S-1	4 5 6	11			
5		Hard Brown and Gray Silty Clay with trace sand and gravel 5.0	5	S-2	6 8 11	19	17.6		9000*
		End of Boring @ 5 ft							
10			10						
15			15						

Total Depth: 5 ft
Drilling Date: December 11, 2023
Inspector: J.Hayball
Contractor: Strata Drilling Inc
Driller: D. Watkins

Drilling Method:
6-inch diameter diamond tipped core barrel; 2-1/4 inch inside diameter hollow-stem augers

Water Level Observation:
Dry during and upon completion

Notes:
Fire Station No. 4
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings and capped with cold patch

Figure No. 7

SOIL / PAVEMENT BORING 230950.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 1/15/24

Project Name: City of Southfield Fire Station No. 4 & No. 5 Pavement Improvements

Project Location: 24477 Lasher Road & 25120 W. 12 Mile Road Southfield, Michigan

G2 Project No. 230950

Latitude: N/A Longitude: N/A

Soil Boring No. PC-8

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
DEPTH (ft)	PRO-FILE	GROUND SURFACE ELEVATION: N/A	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Bituminous Concrete (3-3/4 inches) 0.3							
		Crushed Limestone Aggregate Base Gray Sand and Gravel (10-1/4 inches) 1.2							
				S-1	4 6 9	15	18.0		7500*
		Very Stiff to Hard Brown and Gray Silty Clay with trace sand and gravel							
5		5.0	5	S-2	7 9 12	21	14.7		9000*
		End of Boring @ 5 ft							
10			10						
15			15						

Total Depth: 5 ft
Drilling Date: December 11, 2023
Inspector: J.Hayball
Contractor: Strata Drilling Inc
Driller: D. Watkins

Drilling Method:
6-inch diameter diamond tipped core barrel; 2-1/4 inch inside diameter hollow-stem augers

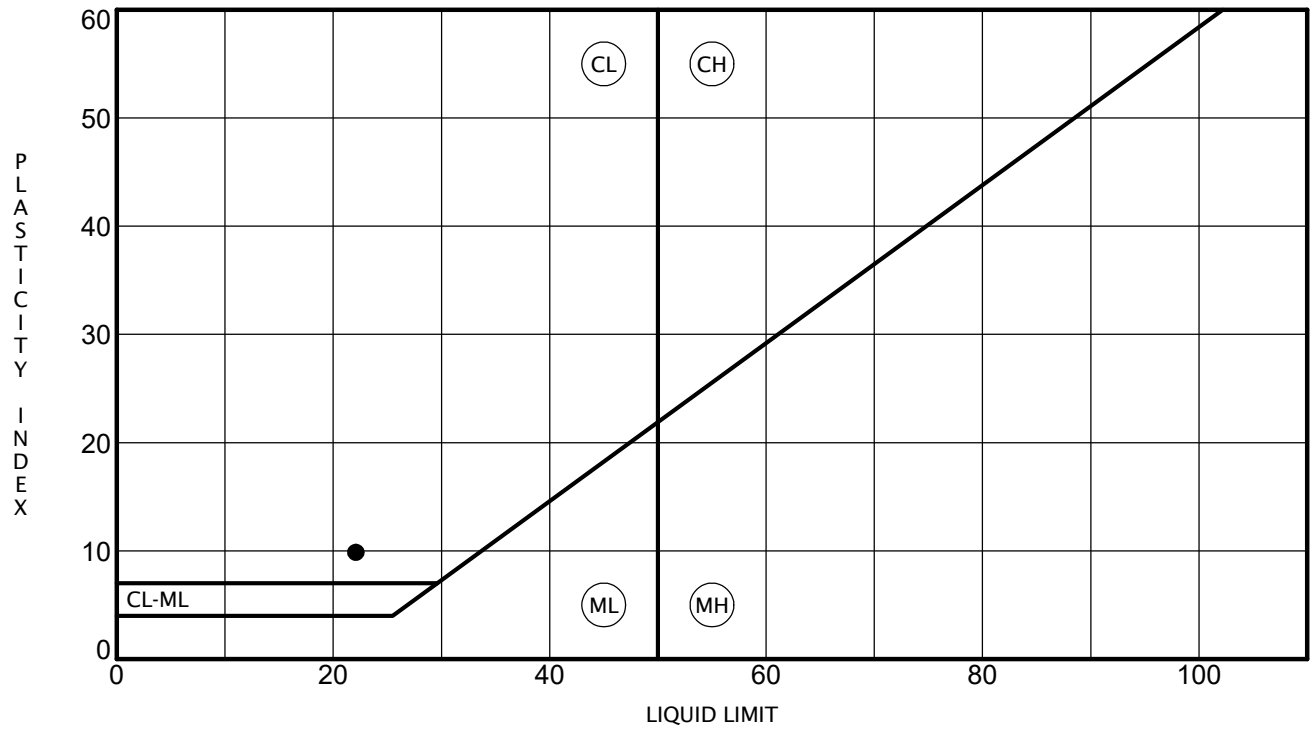
Water Level Observation:
Dry during and upon completion

Notes:
Fire Station No. 4
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings and capped with cold patch

Figure No. 8

SOIL / PAVEMENT BORING 230950.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 1/15/24



Specimen Identification		LL	PL	PI	Fines	M %	Classification
● PC-1	S-1	22	12	10		11	Fill: Gray Silty Clay

CONSULTING GROUP

ATTERBERG LIMITS RESULTS

Project Name: City of Southfield Fire Station No. 4 & No. 5 Pavement Improvements

Project Location: 24477 Lasher Road & 25120 W. 12 Mile Road Southfield, Michigan

G2 Project No.: 230950

Figure No. 9

US_ATTERBERG_LIMITS 230950.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 1/12/24

Photographic Documentation
Fire Station Nos. 4 & 5 Pavement Improvements
Southfield, Michigan
G2 Project No. 230737

Core Photograph of PC-1: Portland Cement Concrete = 7-3/4 inches

Figure No. 10

Photographic Documentation
Fire Station Nos. 4 & 5 Pavement Improvements
Southfield, Michigan
G2 Project No. 230737

Core Photograph of PC-2: Portland Cement Concrete = 11 inches

Figure No. 11

Photographic Documentation
Fire Station Nos. 4 & 5 Pavement Improvements
Southfield, Michigan
G2 Project No. 230737

Core Photograph of PC-3: Portland Cement Concrete = 10-1/2 inches

Figure No. 12

Photographic Documentation
Fire Station Nos. 4 & 5 Pavement Improvements
Southfield, Michigan
G2 Project No. 230737

Core Photograph of PC-4: Portland Cement Concrete = 9-1/2 inches

Figure No. 13

Photographic Documentation
Fire Station Nos. 4 & 5 Pavement Improvements
Southfield, Michigan
G2 Project No. 230737

Core Photograph of PC-5: Portland Cement Concrete = 9-1/2 inches

Figure No. 14

Photographic Documentation
Fire Station Nos. 4 & 5 Pavement Improvements
Southfield, Michigan
G2 Project No. 230737

Core Photograph of PC-6: Portland Cement Concrete = 6-1/2 inches

Figure No. 15

Photographic Documentation
Fire Station Nos. 4 & 5 Pavement Improvements
Southfield, Michigan
G2 Project No. 230737

Core Photograph of PC-7: Portland Cement Concrete = 10 inches

Figure No. 16

Photographic Documentation
Fire Station Nos. 4 & 5 Pavement Improvements
Southfield, Michigan
G2 Project No. 230737

Core Photograph of PC-8: Portland Cement Concrete = 3-3/4 inches

GENERAL NOTES TERMINOLOGY

Unless otherwise noted, all terms herein refer to the Standard Definitions presented in ASTM 653.

PARTICLE SIZE

Boulders		- greater than 12 inches
Cobbles		- 3 inches to 12 inches
Gravel	- Coarse	- 3/4 inches to 3 inches
	- Fine	- No. 4 to 3/4 inches
Sand	- Coarse	- No. 10 to No. 4
	- Medium	- No. 40 to No. 10
	- Fine	- No. 200 to No. 40
Silt		- 0.005mm to 0.074mm
Clay		- Less than 0.005mm

CLASSIFICATION

The major soil constituent is the principal noun, i.e. clay, silt, sand, gravel. The second major soil constituent and other minor constituents are reported as follows:

Second Major Constituent (percent by weight)	Minor Constituent (percent by weight)
Trace - 1 to 12%	Trace - 1 to 12%
Adjective - 12 to 35%	Little - 12 to 23%
And - over 35%	Some - 23 to 33%

COHESIVE SOILS

If clay content is sufficient so that clay dominates soil properties, clay becomes the principal noun with the other major soil constituent as modifier, i.e. sandy clay. Other minor soil constituents may be included in accordance with the classification breakdown for cohesionless soils, i.e. silty clay, trace sand, little gravel.

Consistency	Unconfined Compressive Strength (psf)	Approximate Range of (N)
Very Soft	Below 500	0 - 2
Soft	500 - 1,000	3 - 4
Medium	1,000 - 2,000	5 - 8
Stiff	2,000 - 4,000	9 - 15
Very Stiff	4,000 - 8,000	16 - 30
Hard	8,000 - 16,000	31 - 50
Very Hard	Over 16,000	Over 50

Consistency of cohesive soils is based upon an evaluation of the observed resistance to deformation under load and not upon the Standard Penetration Resistance (N).

COHESIONLESS SOILS

Density Classification	Relative Density %	Approximate Range of (N)
Very Loose	0 - 15	0 - 4
Loose	16 - 35	5 - 10
Medium Compact	36 - 65	11 - 30
Compact	66 - 85	31 - 50
Very Compact	86 - 100	Over 50

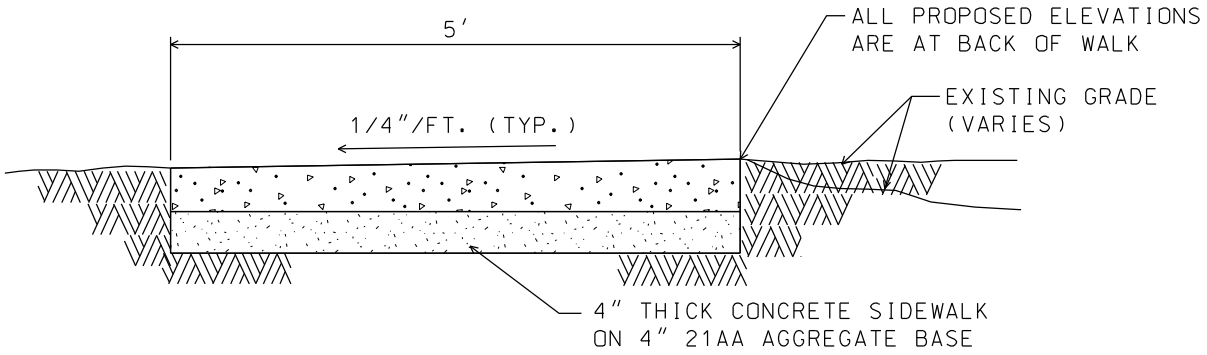
Relative Density of cohesionless soils is based upon the evaluation of the Standard Penetration Resistance (N), modified as required for depth effects, sampling effects, etc.

SAMPLE DESIGNATIONS

AS - Auger Sample – Cuttings directly from auger flight
BS - Bottle or Bag Samples
S - Split Spoon Sample - ASTM D 1586
LS - Liner Sample with liner insert 3 inches in length
ST - Shelby Tube sample - 3 inch diameter unless otherwise noted
PS - Piston Sample - 3 inch diameter unless otherwise noted
RC - Rock Core - NX core unless otherwise noted

STANDARD PENETRATION TEST (ASTM D 1586) - A 2.0 inch outside-diameter, 1-3/8 inch inside-diameter split barrel sampler is driven into undisturbed soil by means of a 140-pound weight falling freely through a vertical distance of 30 inches. The sampler is normally driven three successive 6-inch increments. The total number of blows required for the final 12 inches of penetration is the Standard Penetration Resistance (N).

Appendix B- City of Southfield Standard Details



NOTES:

1. SIDEWALK SHALL SLOPE AT 1/4" PER FOOT UNLESS THE FIELD ENGINEER DETERMINES OTHERWISE TO MEET EXISTING CONDITIONS.

2. THICKNESS OF CONCRETE SIDEWALK THRU EXISTING RESIDENTIAL DRIVEWAYS SHALL BE 6".

3. PLACE 1/2" BITUMINOUS FIBER BOARD AT ALL INTERSECTIONS WITH WALKS, DRIVEWAYS AND STREETS, AND NOT MORE THAN 50 FOOT INTERVALS.

4. ANY DEFLECTIONS IN THE PROPOSED WALK SHALL BE FORMED AS A 10' RADIUS.

5. ALL PROPOSED WALK ELEVATIONS AND LOCATIONS ARE AT THE BACK OF WALK.

6. ALL SPRINKLER HEADS TO BE RELOCATED BY THE CONTRACTOR PER THE OWNER'S DIRECTION. RELOCATION OF SPRINKLER HEADS AND REPAIRS MADE TO SPRINKLER SYSTEMS DISTURBED DUE TO CONSTRUCTION SHALL BE CONSIDERED INCIDENTAL.

7. ANY TREE ROOT AND/OR STUMP THAT IS LARGER THAN 6" IN DIAMETER SHALL BE REMOVED BY A STUMP GRINDER TO A MINIMUM DEPTH OF 10" AND A MINIMUM WIDTH OF 7'. SMALL SURFACE ROOTS MAY BE REMOVED WITH AN AXE.

	DESCRIPTION	DRW	CHK	DATE
P				
O				
N				
M				
L				
K				
J				
I				
H				
G				
F				
E				
D				
C				
B				
A	ADDED NOTE	LJS	TS	3/06

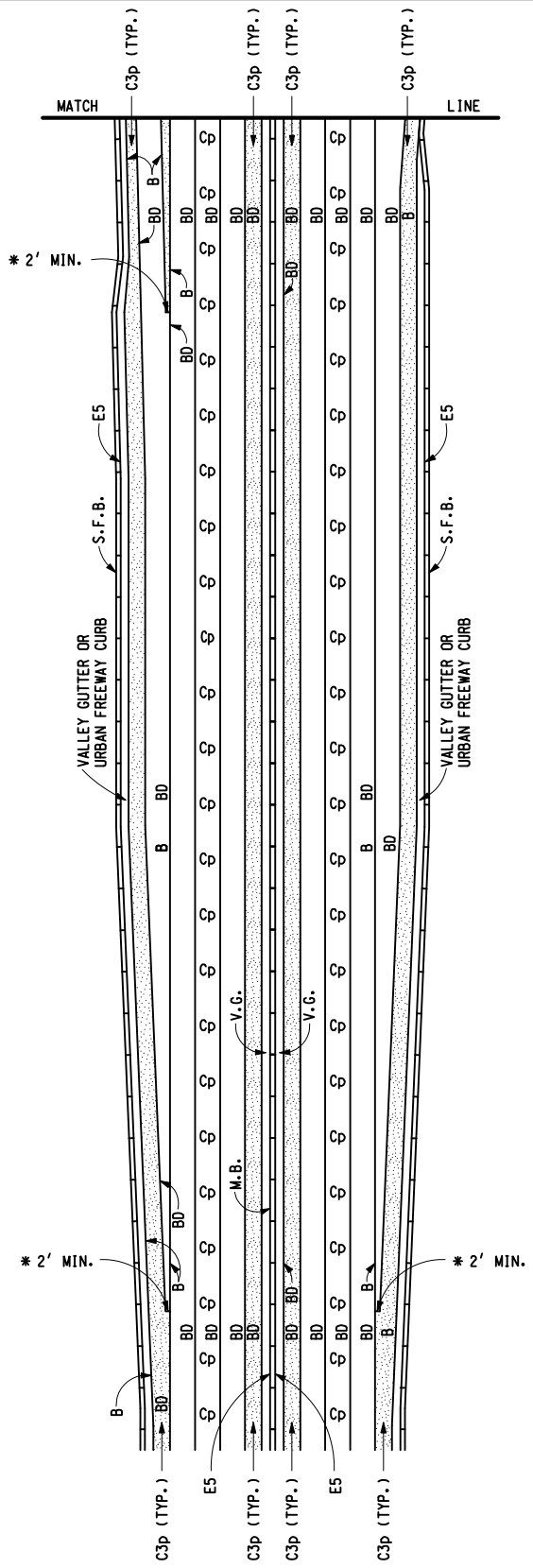
REVISIONS

CITY OF SOUTHFIELD STANDARD DETAIL

CONCRETE SIDEWALK SECTION

ISSUE: 2000	SD#: SW-2
SHEET:	SCALE: N.T.S.

Appendix C- MDOT Special Details & Typicals



JOINT LEGEND (ALL SHEETS)

B	LONGITUDINAL BULKHEAD JOINT.
B1	LONGITUDINAL BULKHEAD JOINT, EXCEPT OMIT SEALS AND LANE TIES, APPLY TWO ADDITIONAL COATS OF CURING COMPOUND, AS A BOND BREAKER, AT THE RATE OF 1 GALLON PER 100 SFT PER COAT.
BD	OPTIONAL B OR D JOINT.
Cp	TRANSVERSE CONTRACTION JOINT WITH LOAD TRANSFER DEVICE.
C3p	TRANSVERSE CONTRACTION JOINT WITHOUT LOAD TRANSFER DEVICE. (SHOULDERS)
D	LONGITUDINAL LANE TIE JOINT.
W	PLANE OF WEAKNESS JOINT.
E2	1" TRANSVERSE EXPANSION JOINT WITH LOAD TRANSFER DEVICE.
E3	1" TRANSVERSE EXPANSION JOINT WITHOUT LOAD TRANSFER DEVICE.
E4	1" TRANSVERSE EXPANSION JOINT WITHOUT LOAD TRANSFER DEVICE. (SHOULDERS)
E5	1" LONGITUDINAL SEALED EXPANSION JOINT (SEE STANDARD PLAN R-49-SERIES)
L2	LONGITUDINAL BULKHEAD JOINT USING EPOXY ANCHORED LANE TIES.
U	TRANSVERSE PLANE OF WEAKNESS JOINT FOR CONCRETE BASE COURSE.

SHOULDER

EXISTING CONCRETE PAVEMENT

C. & G. = CURB & GUTTER
E.O.M. = EDGE OF METAL
F.O.B. = FACE OF BARRIER
M.B. = MEDIAN BARRIER
S.F.B. = SINGLE FACE BARRIER
V.G. = VALLEY GUTTER

* END GORE AND RAMP TAPERS SO THAT THE LAST SECTION ENDS WITH A MINIMUM 2'-0" CUT-OFF AND IT ALIGNS WITH A TRANSVERSE PAVEMENT JOINT. EXPANSION JOINTS SHALL BE PLACED AT THE END OF PAVED GORES AS SPECIFIED ON THIS PLAN.

SEE STANDARD PLAN R-43-SERIES FOR JOINT SPACING AND STANDARD PLAN R-39-SERIES FOR CONTRACTION JOINT DESIGNS.

JOINTS IN URBAN FREEWAY

12', 14', OR 16' JOINT SPACING FOR JOINTED PLAIN CONCRETE PAVEMENT

MDOT Michigan Department of Transportation

PREPARED BY DESIGN DIVISION

DRAWN BY: B.L.T.

CHECKED BY: W.K.P.

DEPARTMENT DIRECTOR
Kirk T. Steudle

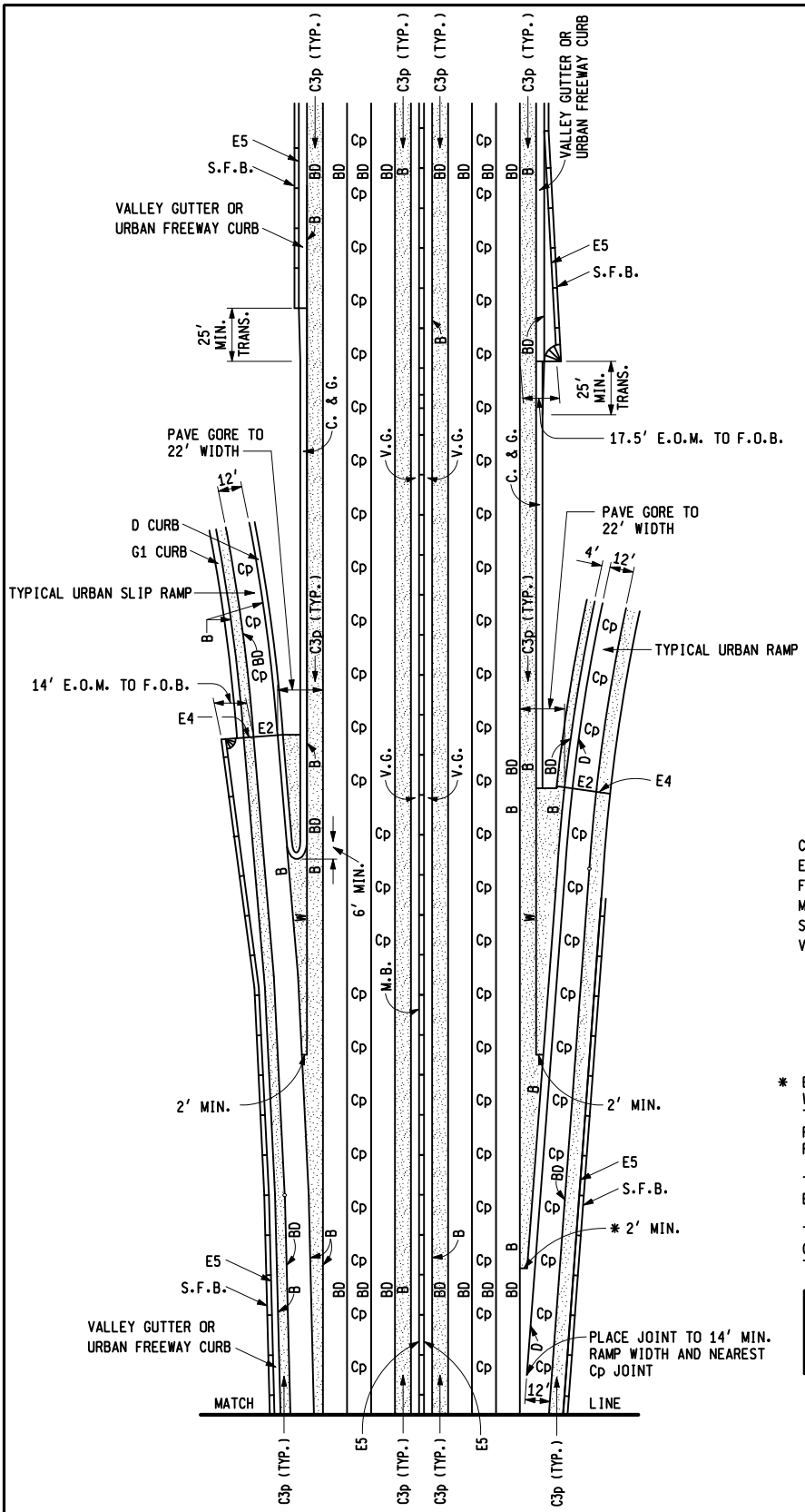
APPROVED BY: _____ ENGINEER OF DELIVERY

APPROVED BY: _____ ENGINEER OF DEVELOPMENT

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

TYPICAL JOINT LAYOUTS FOR CONCRETE PAVEMENT

F.H.W.A. APPROVAL	12-6-2010 PLAN DATE	R-42-F	SHEET 1 OF 6



C. & G. = CURB & GUTTER
E.O.M. = EDGE OF METAL
F.O.B. = FACE OF BARRIER
M.B. = MEDIAN BARRIER
S.F.B. = SINGLE FACE BARRIER
V.G. = VALLEY GUTTER

* END GORE AND RAMP TAPERS SO THAT THE LAST SECTION ENDS WITH A MINIMUM 2'-0" CUT-OFF AND IT ALIGNS WITH A TRANSVERSE PAVEMENT JOINT. EXPANSION JOINTS SHALL BE PLACED AT THE END OF PAVED GORES AS SPECIFIED ON THIS PLAN.

THE TAPER ON THE RAMP NOSE CONE (APPROACH OR DEPARTING END) SHALL BE AS SPECIFIED ON THE PLANS.

THE MINIMUM 2'-0" CUT-OFF ON CURB & GUTTER AND VALLEY GUTTER TRANSITION SECTIONS NEED NOT BE ALIGNED WITH TRANSVERSE PAVEMENT JOINTS.

SEE STANDARD PLAN R-43-SERIES FOR JOINT SPACING AND STANDARD PLAN R-39-SERIES FOR CONTRACTION JOINT DESIGNS.

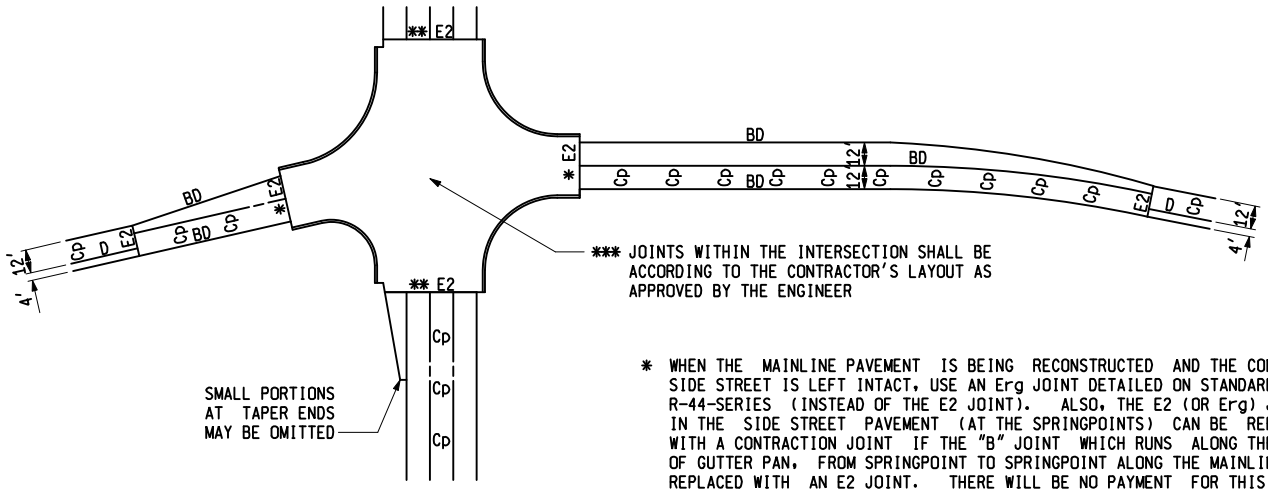
JOINTS IN URBAN FREEWAY

12', 14', OR 16' JOINT SPACING FOR JOINTED PLAIN CONCRETE PAVEMENT

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

TYPICAL JOINT LAYOUTS FOR CONCRETE PAVEMENT

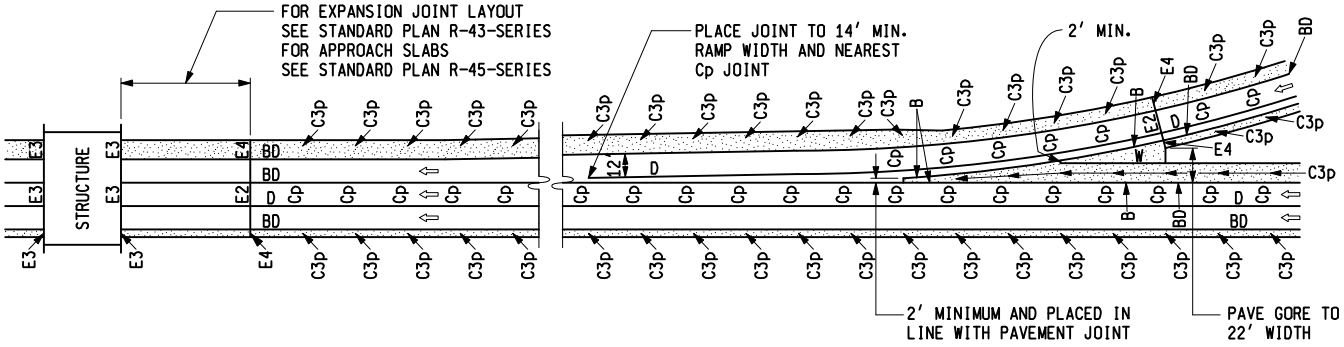
F.H.W.A. APPROVAL	12-6-2010 PLAN DATE	R-42-F	SHEET 2 OF 6

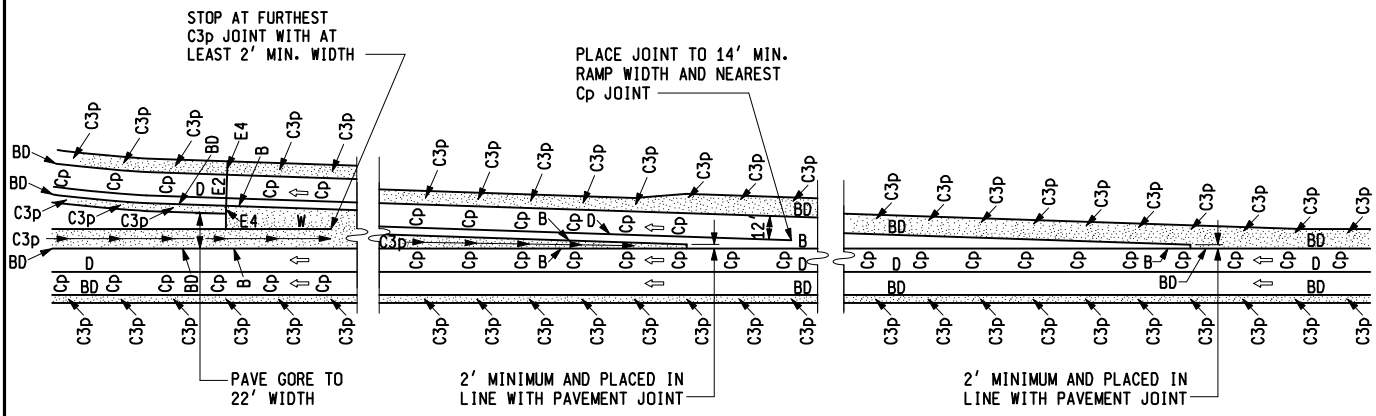


* WHEN THE MAINLINE PAVEMENT IS BEING RECONSTRUCTED AND THE CONCRETE SIDE STREET IS LEFT INTACT, USE AN Erg JOINT DETAILED ON STANDARD PLAN R-44-SERIES (INSTEAD OF THE E2 JOINT). ALSO, THE E2 (OR Erg) JOINTS IN THE SIDE STREET PAVEMENT (AT THE SPRINGPOINTS) CAN BE REPLACED WITH A CONTRACTION JOINT IF 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.





JOINTS IN RURAL FREEWAY

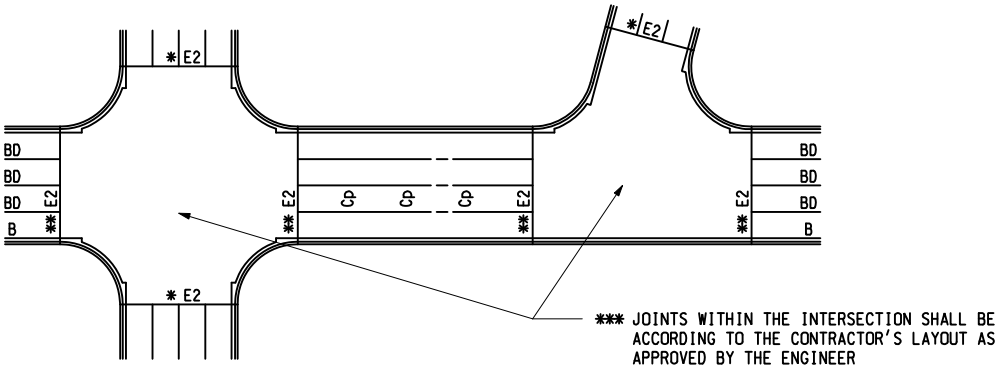
12', 14', OR 16' JOINT SPACING FOR JOINTED PLAIN CONCRETE PAVEMENT

SEE STANDARD PLAN R-43-SERIES FOR JOINT SPACING AND STANDARD PLAN R-39-SERIES FOR CONTRACTION JOINT DESIGNS.

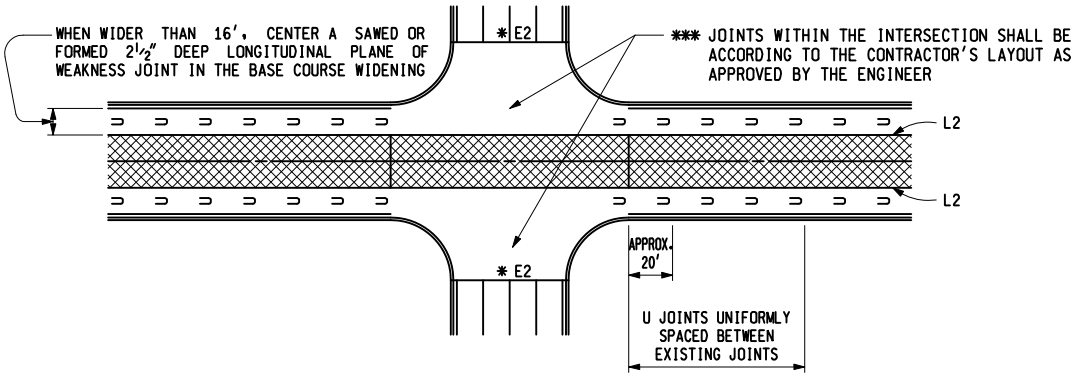
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

TYPICAL JOINT LAYOUTS FOR CONCRETE PAVEMENT

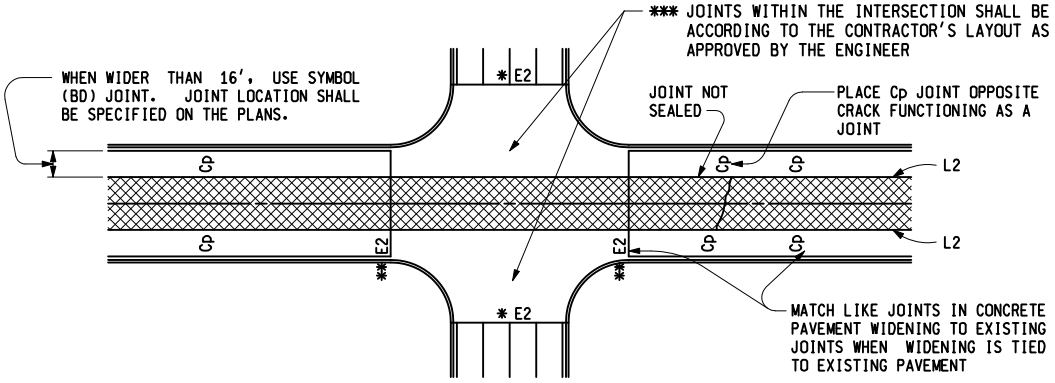
F.H.W.A. APPROVAL	12-6-2010 PLAN DATE	R-42-F	SHEET 3 OF 6



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.

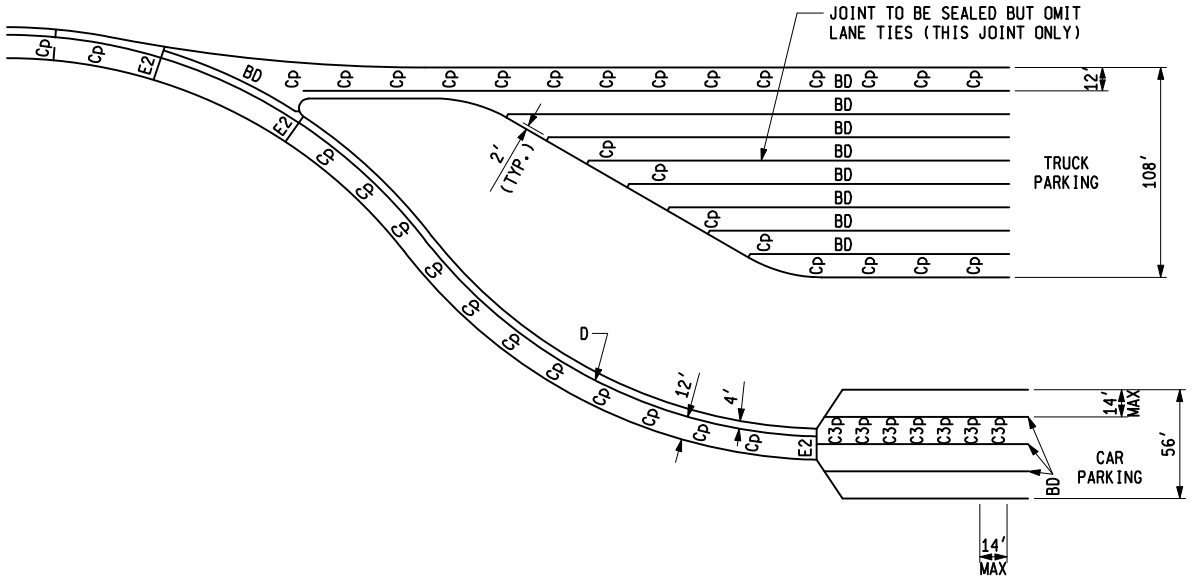
** THE E2 JOINTS IN THE MAINLINE PAVEMENT (AT THE SPRINGPOINTS) CAN BE REPLACED WITH A CONTRACTION JOINT IF THE MAINLINE IS BEING PAVED THROUGH THE INTERSECTION IN THE SAME OPERATION AS THE NON-INTERSECTION MAINLINE.

*** 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

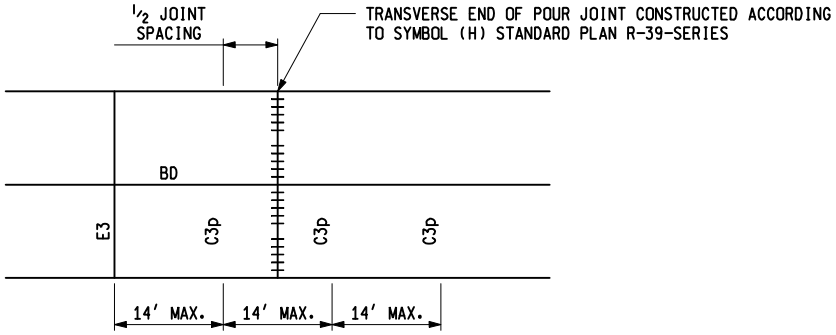
TYPICAL JOINT LAYOUTS FOR CONCRETE PAVEMENT

F.H.W.A. APPROVAL	12-6-2010 PLAN DATE	R-42-F	SHEET 4 OF 6

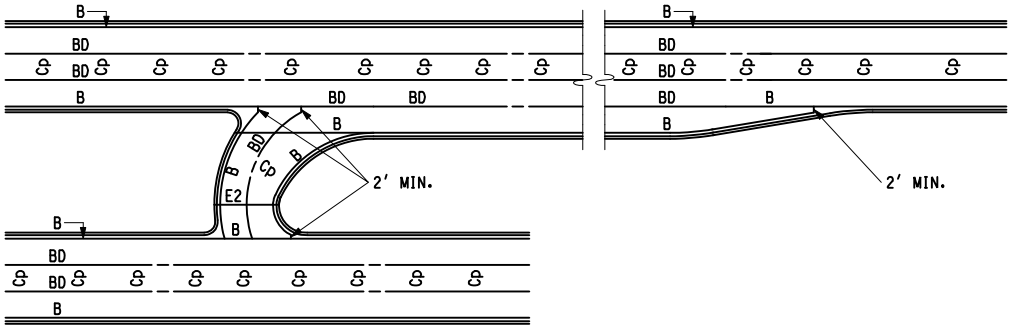


CONCRETE PARKING AREAS AND APPROACHES

(JOINT SPACING AS SPECIFIED IN TABLE ON R-43-SERIES)



LOCATION OF TRANSVERSE END OF POUR JOINT



JOINTS FOR CONCRETE PAVEMENT CROSSOVER

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

TYPICAL JOINT LAYOUTS FOR CONCRETE PAVEMENT

F.H.W.A. APPROVAL	12-6-2010 PLAN DATE	R-42-F	SHEET 5 OF 6

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 NOT CAST INTEGRALLY WITH CURB, CURB AND GUTTER, VALLEY GUTTER OR CONCRETE SHOULDER SHALL BE CONNECTED WITH A LONGITUDINAL SYMBOL (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.

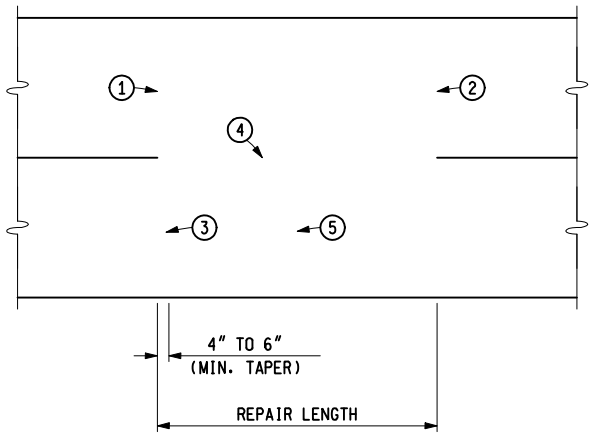
THE CONCRETE PAVEMENT IN THE TRUCK AND PASSENGER CAR PARKING AREAS OF REST AREAS SHALL BE TEXTURED ACCORDING TO THE CURRENT STANDARD SPECIFICATIONS FOR CONSTRUCTION.

MICHIGAN DEPARTMENT OF TRANSPORTATION

BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

TYPICAL JOINT LAYOUTS FOR CONCRETE PAVEMENT

F.H.W.A. APPROVAL	12-6-2010 PLAN DATE	R-42-F	SHEET 6 OF 6



PLAN OF SAWING DIAGRAM

THIS METHOD OF REMOVING DISTRESSED CONCRETE SHALL BE USED IN CONJUNCTION WITH FULL DEPTH CAST-IN-PLACE REPAIRS LESS THAN 50'-0" LONG AND IS OPTIONAL FOR REPAIRS OVER 50'-0" IN LENGTH.

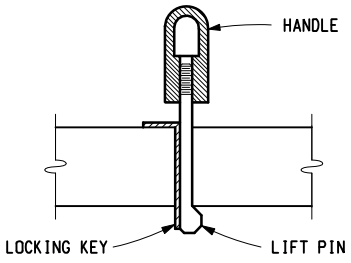
① & ② THESE SAW CUTS SHALL BE FULL DEPTH AND PERPENDICULAR TO THE EDGE OF THE ROADWAY, WITHIN A TOLERANCE OF 1". NO OVERCUTTING INTO ADJACENT LANES SHALL BE MADE UNLESS THE OVERCUT IS WITHIN THE LIMITS OF A SUBSEQUENT REPAIR TO THE ADJACENT LANE. SHOULDER OVERCUTS WILL BE ALLOWED.

③ THIS FULL DEPTH SAW CUT IS MADE TO FACILITATE OPENING A TRENCH ACROSS THE SLAB TO RELIEVE COMPRESSION IN THE PAVEMENT PRIOR TO LIFTING OUT THE FAILED AREA. THIS SAW CUT MAY BE OMITTED PROVIDED NO SPALLING OF THE REMAINING CONCRETE OCCURS. IF SPALLING DOES OCCUR, THE CONTRACTOR WILL BE REQUIRED TO MAKE THIS SAW CUT ON SUBSEQUENT REPAIRS. WHEN THIS SAW CUT IS USED AND THE ADJACENT LANE IS NOT REPAIRED, NO OVERCUTTING INTO THAT LANE SHALL BE MADE.

④ THIS LONGITUDINAL FULL DEPTH SAW CUT IS MADE BETWEEN LANES OR BETWEEN ANY COMBINATION OF THE FOLLOWING: LANE, RAMP, CURB, CONCRETE SHOULDER, OR PARTIAL LANE WIDTH REPAIR.

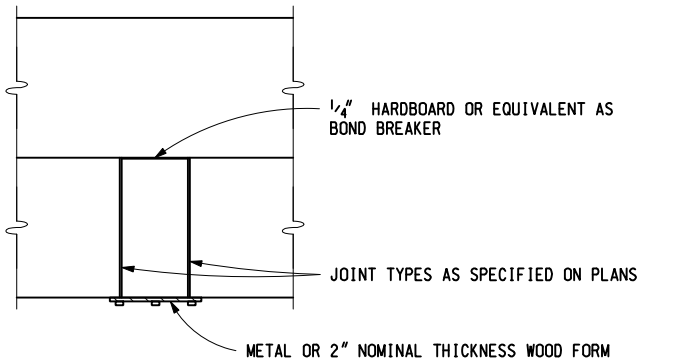
⑤ IF REQUIRED, INTERMEDIATE SAW CUTS MAY BE MADE TO REMOVE A SECTION OF PAVEMENT LANE WHICH IS OVER 6'-0" IN LENGTH, TO PERMIT LOADING INTO THE HAULING UNITS.

ADDITIONAL SAW CUTS, AT CONTRACTOR'S EXPENSE, MAY BE MADE INSIDE THE REPAIR LIMITS TO REDUCE 6'-0" BY 12'-0" OR LESS SLABS INTO SMALLER PIECES TO FACILITATE REMOVAL.

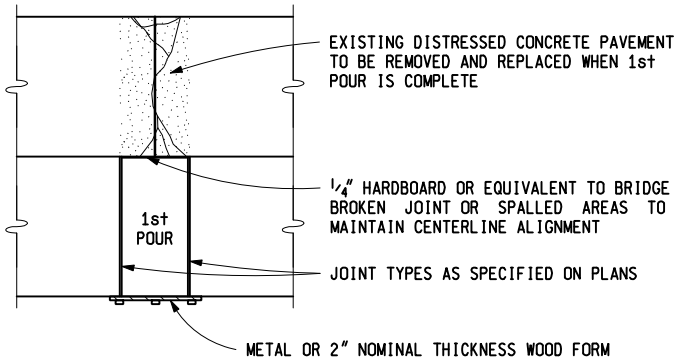


SCHEMATIC OF TYPICAL
LIFT PIN ASSEMBLY

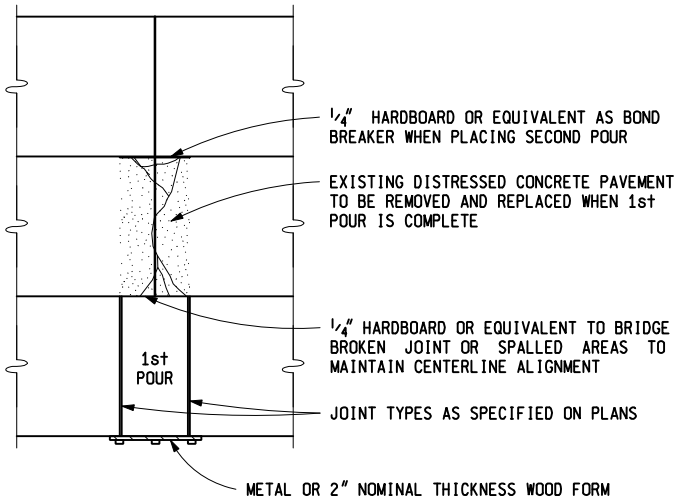
SAWING DIAGRAM & LIFT PIN FOR REMOVING OLD SLAB



ONE LANE REPAIRS
(2 - LANE ROADWAY SHOWN)



ALL LANES REPAIRED
(2 - LANE ROADWAY SHOWN)



MORE THAN ONE LANE REPAIRED
BUT REPAIR LESS THAN FULL WIDTH
(3 - LANE ROADWAY SHOWN)

FORMING NOTES:

STAKES USED TO HOLD HMA FILLER OR HARDBOARD IN PLACE DURING CONCRETE PLACEMENT SHALL BE REMOVED BEFORE SCREEDING THE CONCRETE.

ADJACENT LANE REPAIRS MAY BE CAST INTEGRALLY, WHEN APPROVED BY THE ENGINEER.

FORMING REQUIREMENTS FOR CAST-IN-PLACE REPAIRS 12'-0" OR LESS

MDOT Michigan Department of Transportation

PREPARED BY DESIGN DIVISION

DRAWN BY: B.L.T.

CHECKED BY: W.K.P.

DEPARTMENT DIRECTOR
Kirk T. Steudle

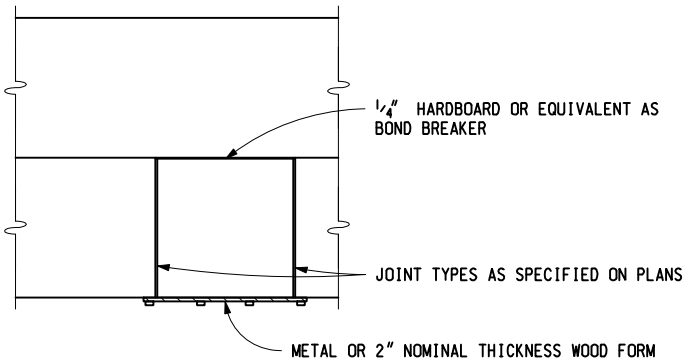
APPROVED BY: John C. Friend
ENGINEER OF DELIVERY

APPROVED BY: Paul A Van Poperin
ENGINEER OF DEVELOPMENT

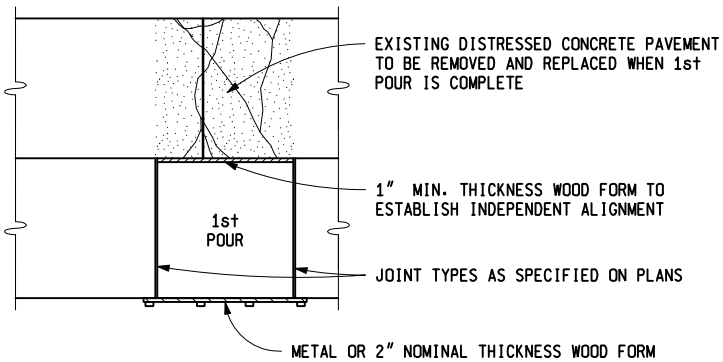
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

CONCRETE PAVEMENT REPAIR

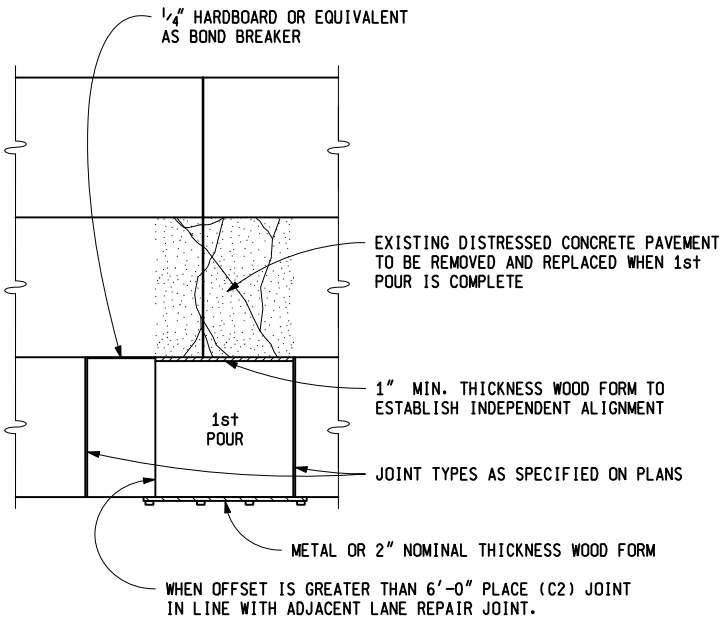
9-10-2010 F.H.W.A. APPROVAL	8-9-2010 PLAN DATE	R-44-F	SHEET 1 OF 6



ONE LANE REPAIRS
(2 - LANE ROADWAY SHOWN)



ALL LANES REPAIRED
(2 - LANE ROADWAY SHOWN)



MORE THAN ONE LANE REPAIRED
BUT REPAIRS ARE OFFSET
(3 - LANE ROADWAY SHOWN)

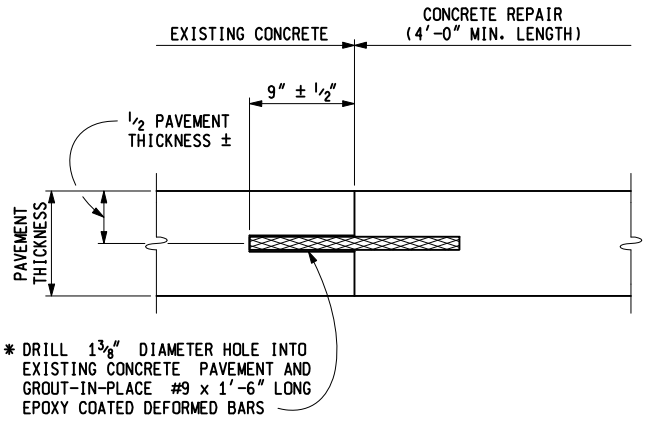
FORMING NOTES:

WHERE REPAIRS LONGER THAN 12'-0" ARE REQUIRED, A NEW GRADE MUST BE ESTABLISHED ALONG THE OLD PAVEMENT INNER JOINT LINE INDEPENDENT OF THE OLD PAVEMENT SURFACE, SO THAT SCREEDING MAY BE DONE PERPENDICULAR TO THE CENTERLINE AND INDEPENDENT OF THE OLD PAVEMENT GRADE.

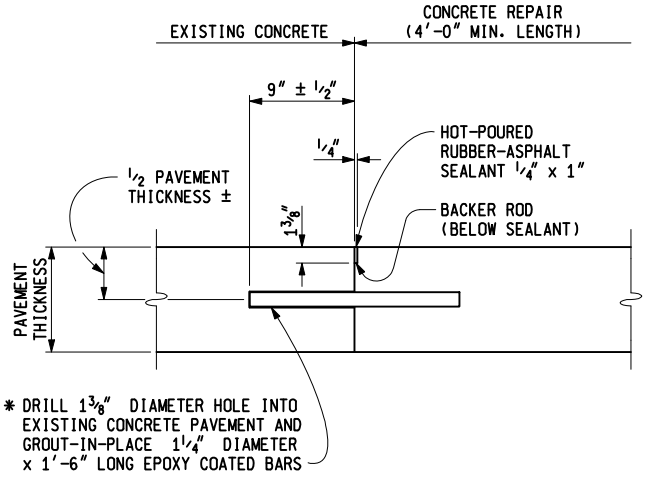
STAKES USED TO HOLD HMA FILLER OR HARDBOARD IN PLACE DURING CONCRETE PLACEMENT SHALL BE REMOVED BEFORE SCREEDING THE CONCRETE.

ADJACENT LANE REPAIRS MAY BE CAST INTEGRALLY, WHEN APPROVED BY THE ENGINEER.

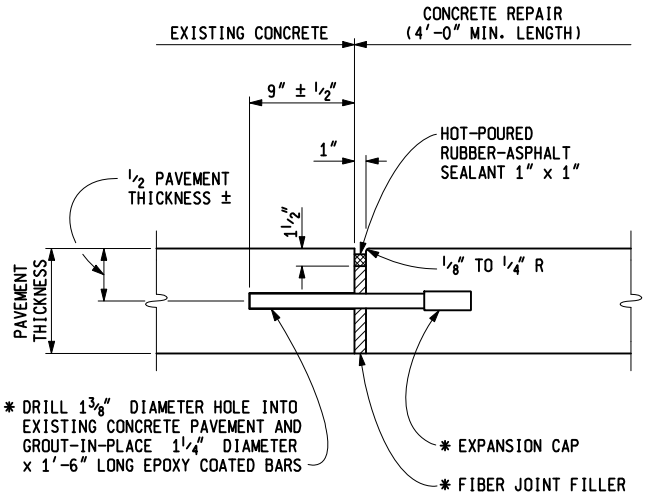
FORMING REQUIREMENTS FOR CAST-IN-PLACE REPAIRS GREATER THAN 12'-0"



TIED JOINT, Trg



CONTRACTION JOINT, Crg



EXPANSION JOINT, Erg

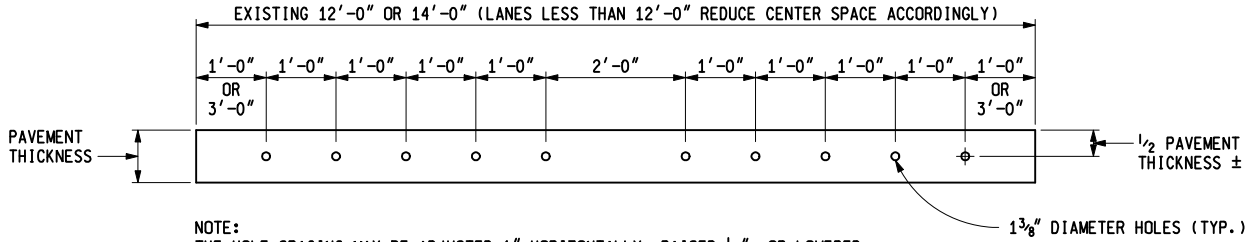
* SEE SHEET 3 OF 6 FOR BAR SPACING AND SHEET 6 OF 6 FOR NOTES.

CAST-IN-PLACE REPAIR JOINTS USING GROUTED DOWEL OR DEFORMED BARS

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

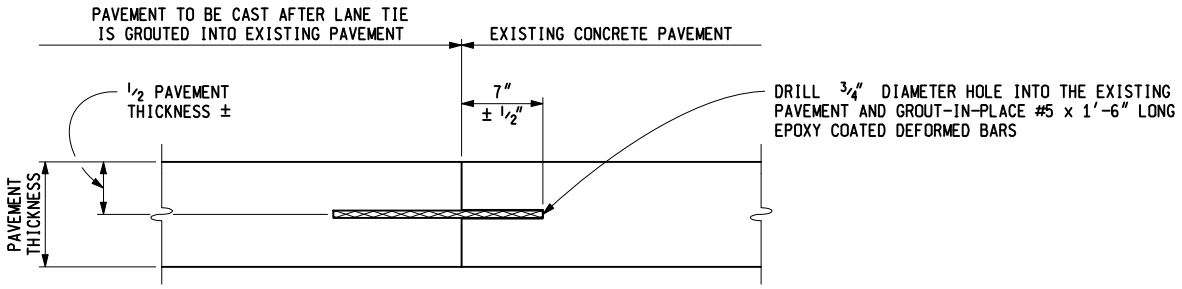
CONCRETE PAVEMENT REPAIR

9-10-2010 F.H.W.A. APPROVAL	8-9-2010 PLAN DATE	R-44-F	SHEET 2 OF 6

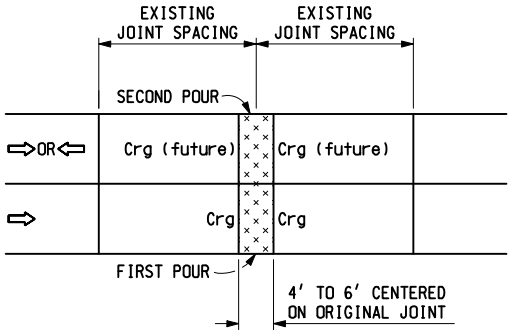


NOTE:
THE HOLE SPACING MAY BE ADJUSTED 1" HORIZONTALLY, RAISED ½", OR LOWERED ½" FROM THE ABOVE LOCATIONS TO AVOID DRILLING INTO THE REINFORCEMENT.

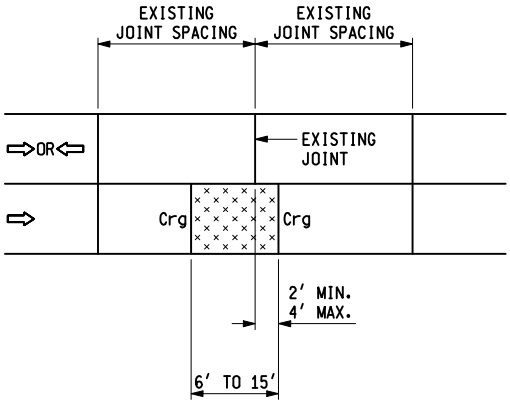
DOWEL OR DEFORMED BAR SPACING FOR CONCRETE REPAIRS



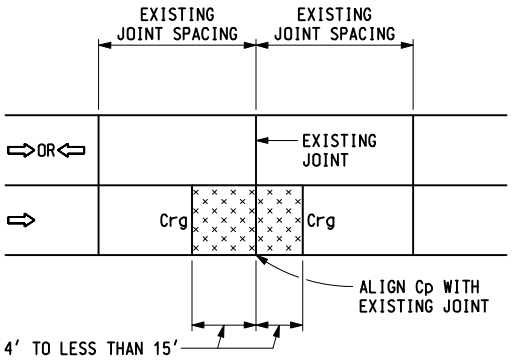
EPOXY ANCHORED LANE TIE



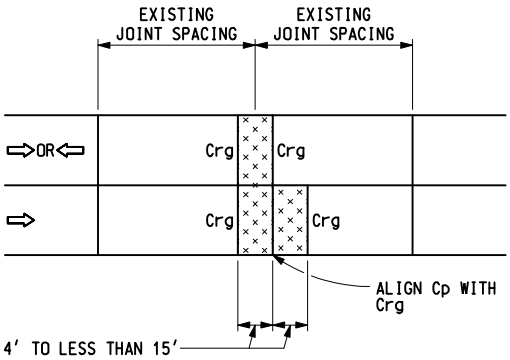
SINGLE LANE OR FULL WIDTH REPAIR



REPAIR LENGTH 6' - 15' WITH ONE JOINT NEAR AN EXISTING JOINT
(SINGLE LANE REPAIR)



REPAIR LENGTHS OVER 15' WITH Cp JOINT
(SINGLE LANE REPAIR)

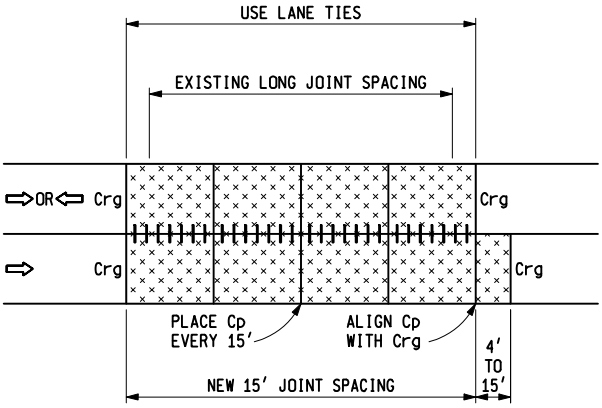


OFFSETTING LANE REPAIRS WITH Cp JOINT

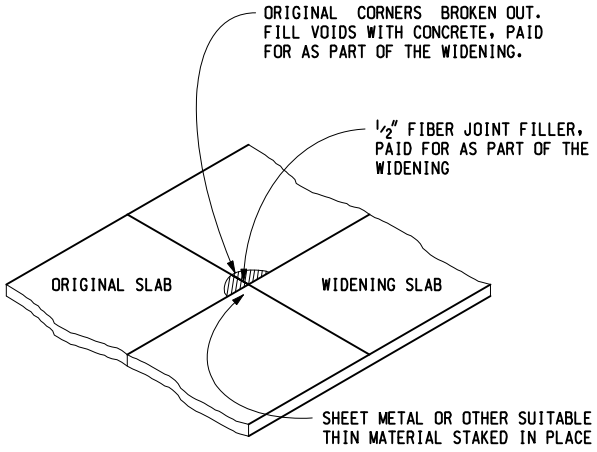
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

CONCRETE PAVEMENT REPAIR

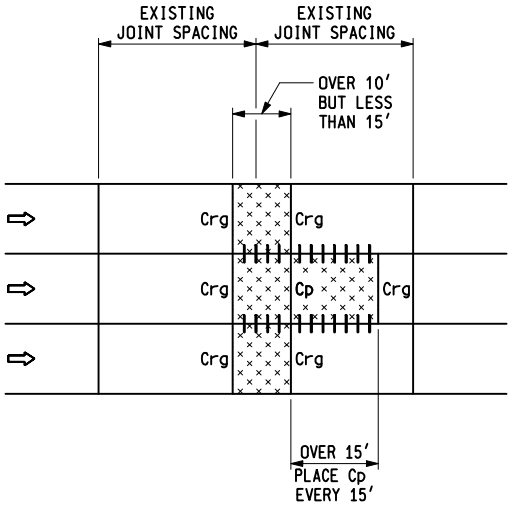
9-10-2010 F.H.W.A. APPROVAL	8-9-2010 PLAN DATE	R-44-F	SHEET 3 OF 6



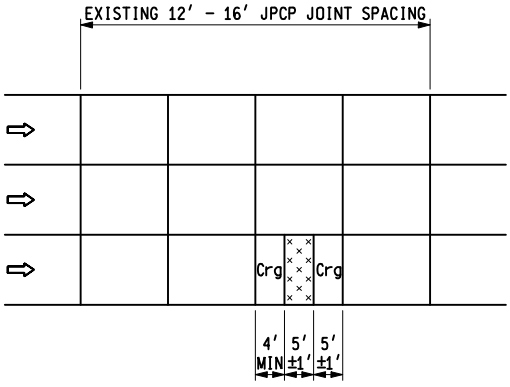
LONG REPAIR SHOWING
Cp JOINT ALIGNMENTS AND LANE TIES



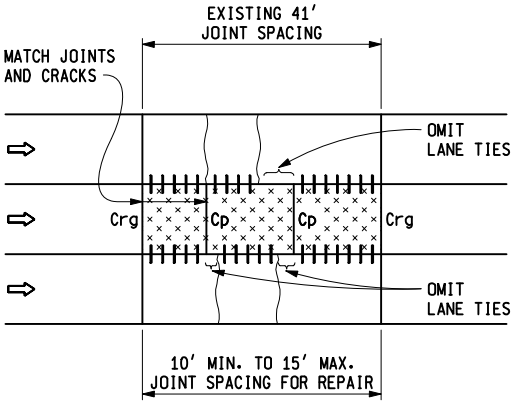
JOINT PATCH ADJACENT TO WIDENING SLAB



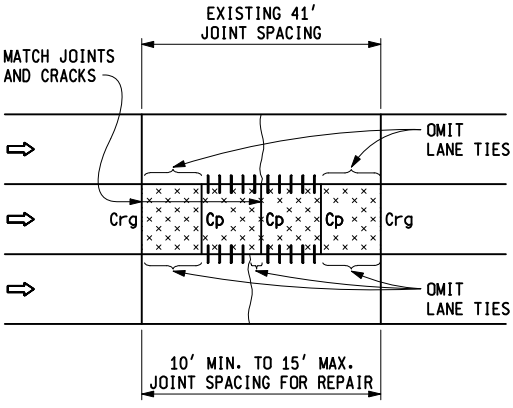
FULL WIDTH MULTI-LANE REPAIRS
WITH OFFSET IN ONE LANE



REPAIR OF 12' - 16' JPCP WITH
ONLY ONE MID-PANEL CRACK
(IF THE PANEL HAS MORE THAN ONE MID-PANEL CRACK REPLACE ENTIRE PANEL)
(SINGLE LANE OR FULL WIDTH REPAIR)



TWO CRACK PANEL REPAIR

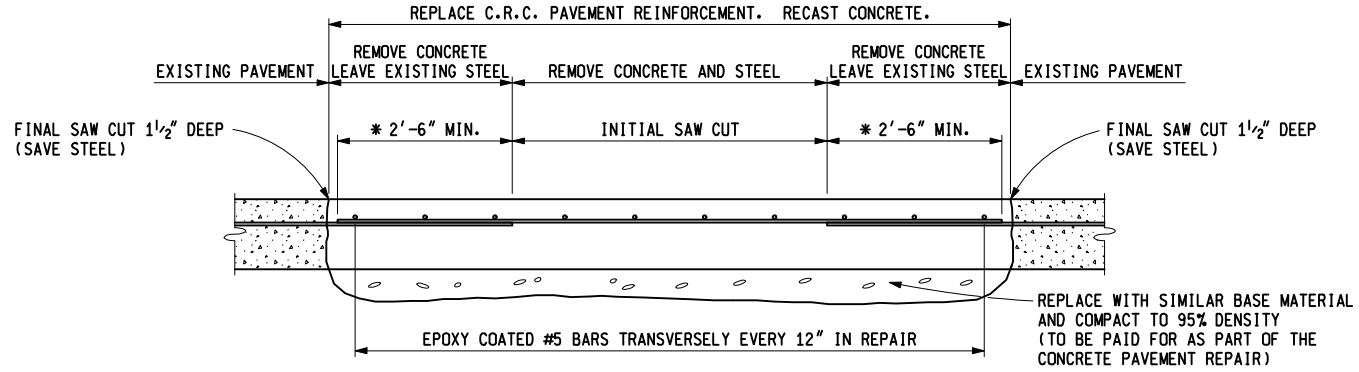


MID PANEL CRACK REPAIR

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

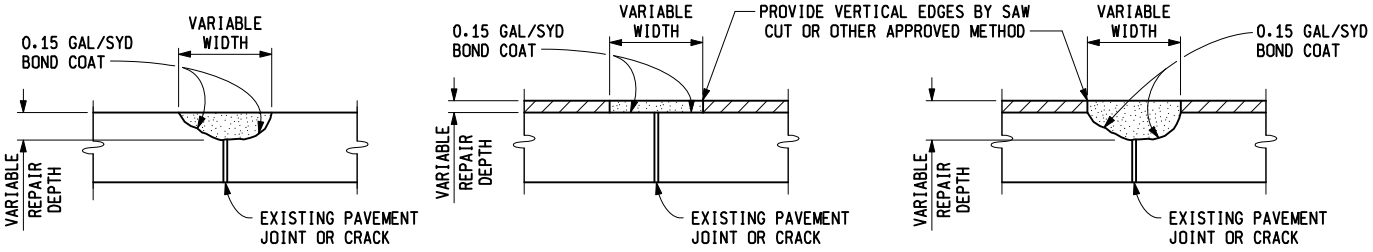
CONCRETE PAVEMENT REPAIR

9-10-2010 F.H.W.A. APPROVAL	8-9-2010 PLAN DATE	R-44-F	SHEET 4 OF 6



* NOTE: IF EXISTING REINFORCEMENT LAPS ARE ENCOUNTERED IN THIS AREA, FINAL SAW CUT MUST BE MOVED BACK TO PROVIDE MINIMUM 2'-6" LAP OF PAVEMENT REINFORCEMENT.

REPAIRING CONTINUOUSLY REINFORCED CONCRETE



CASE I

HMA REPAIR OF CONCRETE PAVEMENT

REMOVE LOOSE DETERIORATED CONCRETE. (NOT TO EXCEED PAVEMENT THICKNESS)

CASE II

HMA REPAIR OF CONCRETE PAVEMENT WITH HMA SURFACE

REMOVE HMA OVERLAY TO CONCRETE SURFACE.

CASE III

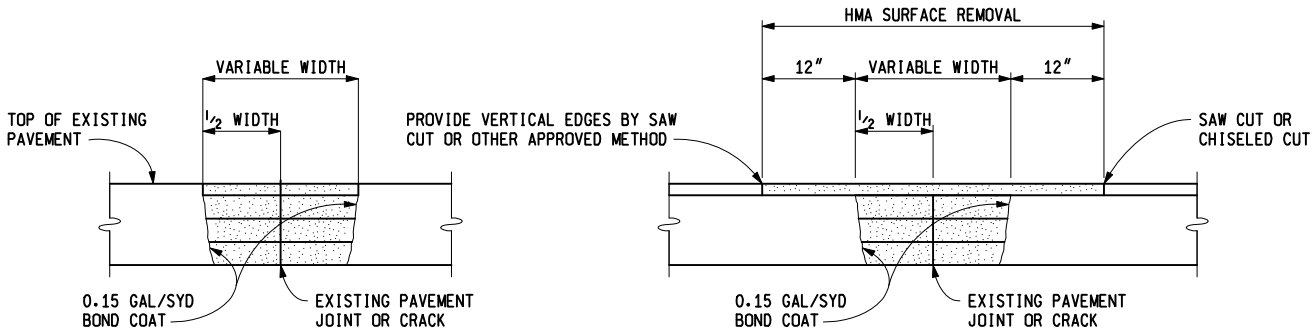
HMA REPAIR OF CONCRETE PAVEMENT WITH HMA SURFACE

REMOVE HMA OVERLAY AND LOOSE DETERIORATED CONCRETE. (NOT TO EXCEED PAVEMENT THICKNESS)

FOR CASES I, II, & III, THE REMOVED MATERIAL SHALL BE REPLACED WITH A HMA TOP COURSE MIXTURE. THE HMA SHALL BE COMPACTED WITH A MACHINE VIBRATOR OR APPROVED ROLLER WITH BASE LIFT THICKNESSES NOT TO EXCEED 3" AND WITH THE TOP LIFT THICKNESS NOT TO EXCEED 2". THE FINAL SURFACE OF THE REPAIR SHALL BE FLUSH WITH THE EXISTING PAVEMENT SURFACE.

SURFACE REPAIR FOR JOINT OR CRACK (TRANSVERSE OR LONGITUDINAL)

DETAIL 7



CASE IV

FULL DEPTH HMA REPAIR OF CONCRETE PAVEMENT

REMOVE THE DETERIORATED CONCRETE FULL DEPTH. COMPACT LOOSE EXISTING BASE. REPLACE AND COMPACT WITH HMA ANY LOST BASE.

CASE V

FULL DEPTH HMA REPAIR OF CONCRETE PAVEMENT WITH HMA SURFACE

REMOVE EXISTING HMA DETERIORATED CONCRETE PAVEMENT FULL DEPTH. COMPACT LOOSE EXISTING BASE. REPLACE AND COMPACT WITH HMA ANY LOST BASE.

FOR CASES IV, & V, THE REMOVED MATERIAL SHALL BE REPLACED WITH A HMA TOP COURSE MIXTURE. THE HMA SHALL BE COMPACTED WITH A MACHINE VIBRATOR OR APPROVED ROLLER WITH BASE LIFT THICKNESSES NOT TO EXCEED 3" AND WITH THE TOP LIFT THICKNESS NOT TO EXCEED 2". THE FINAL SURFACE OF THE REPAIR SHALL BE FLUSH WITH THE EXISTING PAVEMENT SURFACE.

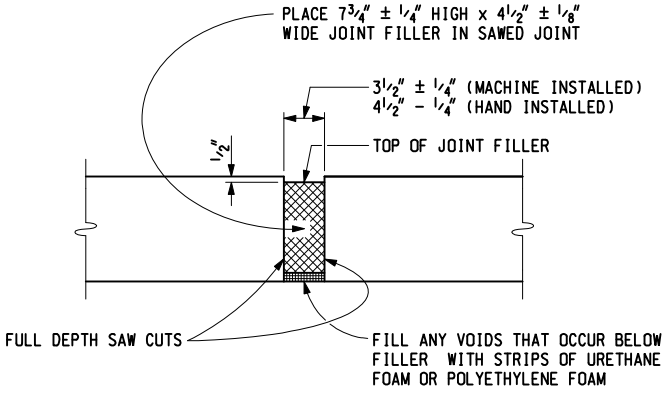
FULL DEPTH REPAIR FOR JOINT OR CRACK (TRANSVERSE OR LONGITUDINAL)

DETAIL 8

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

CONCRETE PAVEMENT REPAIR

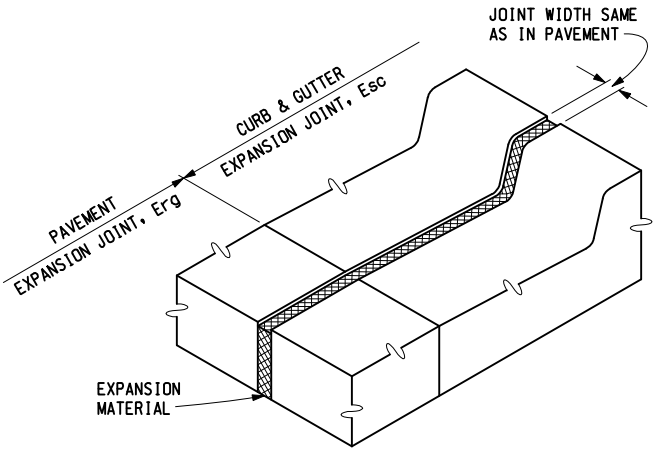
9-10-2010 F.H.W.A. APPROVAL	8-9-2010 PLAN DATE	R-44-F	SHEET 5 OF 6



NOTES:
WHEN PRESSURE RELIEF JOINT IS TO BE CONSTRUCTED THROUGH CONCRETE SHOULDER, TRENCHING BELOW CONCRETE MAY BE NECESSARY TO ALLOW ROOM FOR 7 1/4" FILLER.

PRESSURE RELIEF JOINT

THIS DETAIL ALSO APPLIES TO HMA SURFACED
CONCRETE PAVEMENT REQUIRING PRESSURE RELIEF JOINTS



CURB, GUTTER, AND CURB FACE SHALL BE SAWED AS DEEP AS THE EXISTING PAVEMENT THICKNESS. THE REMAINING CONCRETE SHALL BE CHIPPED OUT AND EXPANSION MATERIAL OF SUFFICIENT THICKNESS SHALL BE PLACED IN SAWED JOINT TO FILL THE GAP AS DIRECTED BY THE ENGINEER.

EXPANSION JOINT, Esc

NOTES:

CONCRETE PAVEMENT REPAIRS (INCLUDING JOINT TYPES) OR PRESSURE RELIEF DETAILS SHALL BE AS SPECIFIED ON THE PLANS OR IN THE LOG OF PROJECT.

IF THE EXISTING PAVEMENT HAS A HMA SURFACE, THE SAW CUTS SHALL EXTEND THROUGH THE UNDERLYING PORTLAND CEMENT CONCRETE.

SAW OVERCUTS IN ADJACENT LANE, SHOULDER, RAMP, AND GUTTERS THAT WILL REMAIN IN PLACE, SHALL BE CLEANED AND THEN SEALED WITH HOT-POURED RUBBER-ASPHALT.

WHEN THE CONCRETE PAVEMENT REPAIR IS CONSTRUCTED IN PREPARATION FOR AN OVERLAY, Crg JOINT RESERVOIRS AND SEALANTS SHALL BE OMITTED AND EXPANSION JOINTS (Erg) SHALL HAVE THE FIBER JOINT FILLER KEPT FLUSH TO THE PAVEMENT SURFACE.

EXPANSION CAPS SHALL BE ACCORDING TO STANDARD PLAN R-40-SERIES.

TRANSVERSE CONTRACTION Cp AND EXPANSION E2 JOINTS SHALL BE ACCORDING TO STANDARD PLAN R-39P-SERIES.

DOWEL AND DEFORMED BARS USED IN Trg, Crg, AND Erg JOINTS SHALL BE EPOXY COATED ACCORDING TO THE CURRENT STANDARD SPECIFICATIONS.

DOWEL BARS AND DEFORMED BARS FOR TIED JOINTS SHALL BE GROUTED INTO EXISTING PAVEMENT WITH A GROUT SELECTED FROM THE PREQUALIFIED MATERIALS LISTED IN THE DEPARTMENT'S "MATERIALS SOURCE GUIDE" UNDER ADHESIVE SYSTEMS FOR GROUTING DOWEL BARS AND TIE BARS FOR FULL-DEPTH CONCRETE PAVEMENT REPAIRS.

THE BACKER ROD SHALL MEET THE REQUIREMENTS OF THE STANDARD SPECIFICATIONS FOR CONSTRUCTION.

THE SAME TYPE JOINT SHALL EXTEND ACROSS ADJACENT LANE REPAIRS.

AFTER GROUTING IN-PLACE, RC-250 OR AN APPROVED BOND BREAKER SHALL BE APPLIED TO THAT PORTION OF Crg AND Erg DOWEL BARS THAT EXTEND INTO THE CAST CONCRETE.

REPAIRED CONCRETE PAVEMENTS REQUIRE THAT 1" OF Erg EXPANSION JOINTS BE DISTRIBUTED THROUGHOUT A GIVEN 1000' SECTION.

WHERE THERE ARE NO REPAIR LOCATIONS WITHIN A 1000' LENGTH, NO EXPANSION SPACE WILL BE PROVIDED.

EXPANSION JOINT FILLER SHALL EXTEND THE FULL DEPTH OF THE REPAIR AND BE FLUSH WITH THE EXISTING PAVEMENT SURFACE. PRIOR TO SEALING, THE JOINT FIBER FILLER AT THE PAVEMENT SURFACE SHALL BE REMOVED BY CUTTING 1" WIDE AND 1 1/2" DEEP TO PERMIT THE PLACEMENT OF THE HOT-POURED RUBBER ASPHALT SEALANT. HOLES IN EXPANSION JOINT FILLER SHALL BE 1 1/2" MAXIMUM DIAMETER AND SHALL BE ALIGNED TO FIT DRILLED HOLES IN CONCRETE.

Erg JOINTS SHALL BE CONSTRUCTED ONLY WHEN THEY EXTEND ACROSS ALL LANES, RAMPS, OR SHOULDERS.

WHEN Erg JOINTS ARE PLACED ADJACENT TO CONCRETE CURB AND GUTTER THAT IS NOT REQUIRED TO BE REMOVED, AN Esc JOINT SHALL BE CONSTRUCTED IN THE CURB AND GUTTER.

JOINT RESERVOIRS FOR THE HOT-POURED RUBBER-ASPHALT SEALANT SHALL BE ABRASIVE BLAST CLEANED, FOLLOWED BY A FINAL CLEANING OF OIL-FREE COMPRESSED AIR PRIOR TO SEALING.

LANE TIES (TO ADJACENT PAVEMENT LANE, WHEN REQUIRED) SHALL BE SPACED ACCORDING TO STANDARD PLAN R-41-SERIES, EXCEPT THAT THE FIRST LANE TIE ADJACENT TO A TRANSVERSE JOINT SHALL BE INSTALLED AT A DISTANCE OF 1'-8" FROM THE JOINT. WHEN BOTH SIDES OF A LONGITUDINAL JOINT ARE POURED INTEGRALLY, LANE TIES SHALL BE STRAIGHT DEFORMED EPOXY COATED BARS CAST-IN-PLACE AS SPECIFIED ON STANDARD PLAN R-41-SERIES. WHEN ADJACENT LANES ARE CAST SEPARATELY, LANE TIES SHALL BE GROUTED-IN-PLACE AS SPECIFIED ON THIS PLAN. THE GROUT SHALL BE SELECTED FROM THE PREQUALIFIED MATERIALS LISTED IN THE DEPARTMENT'S "MATERIALS SOURCE GUIDE", UNDER LANE TIES.

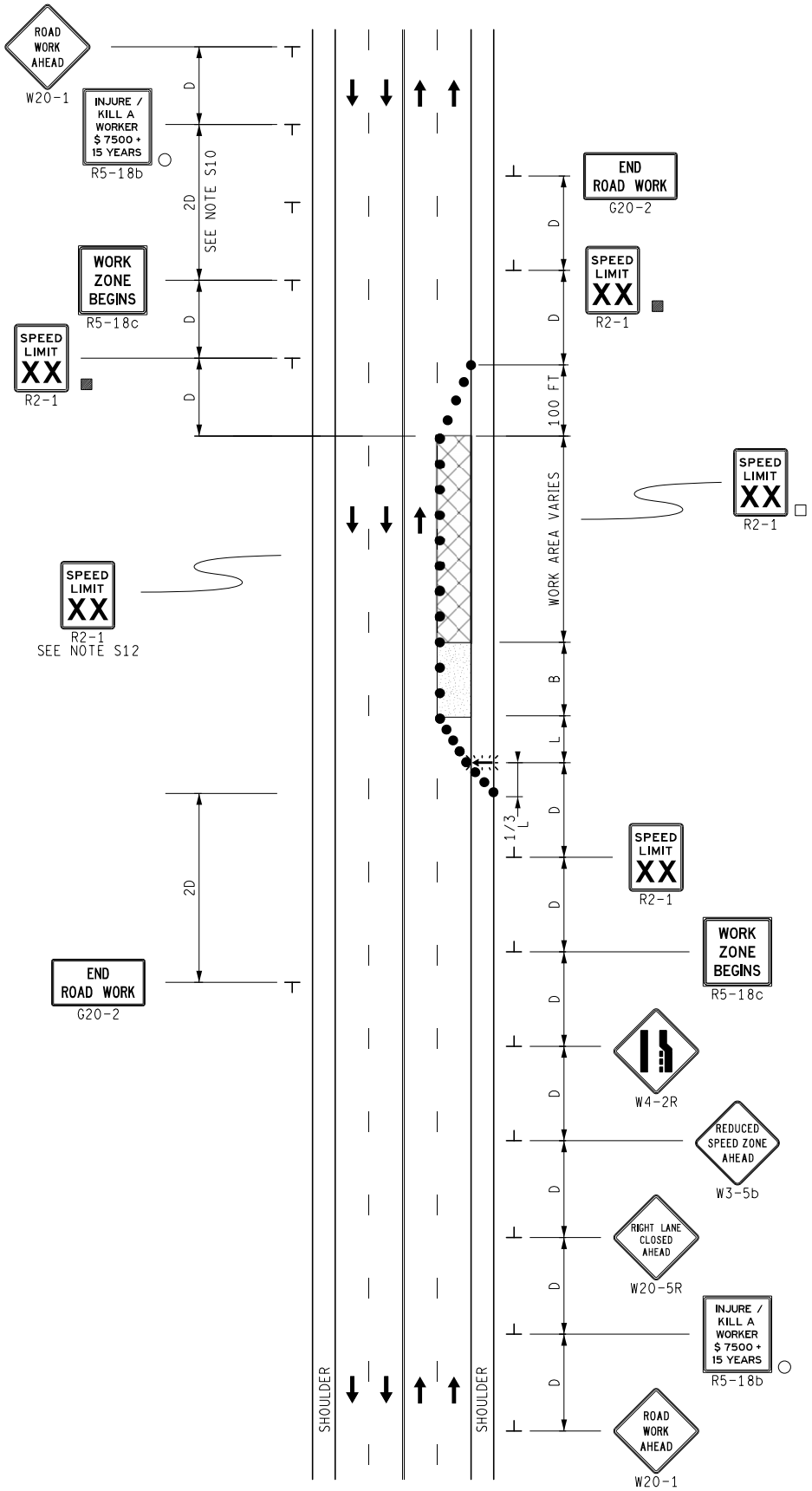
THE MONTH AND YEAR OF CASTING AND STATION NUMBER (IF REMOVED) SHALL BE STENCILED ON EACH CONCRETE REPAIR.

ALL REPAIRS WILL BE JOINTED PLAIN CONCRETE PAVEMENT.

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

CONCRETE PAVEMENT REPAIR

9-10-2010 F.H.W.A. APPROVAL	8-9-2010 PLAN DATE	R-44-F	SHEET 6 OF 6



KEY

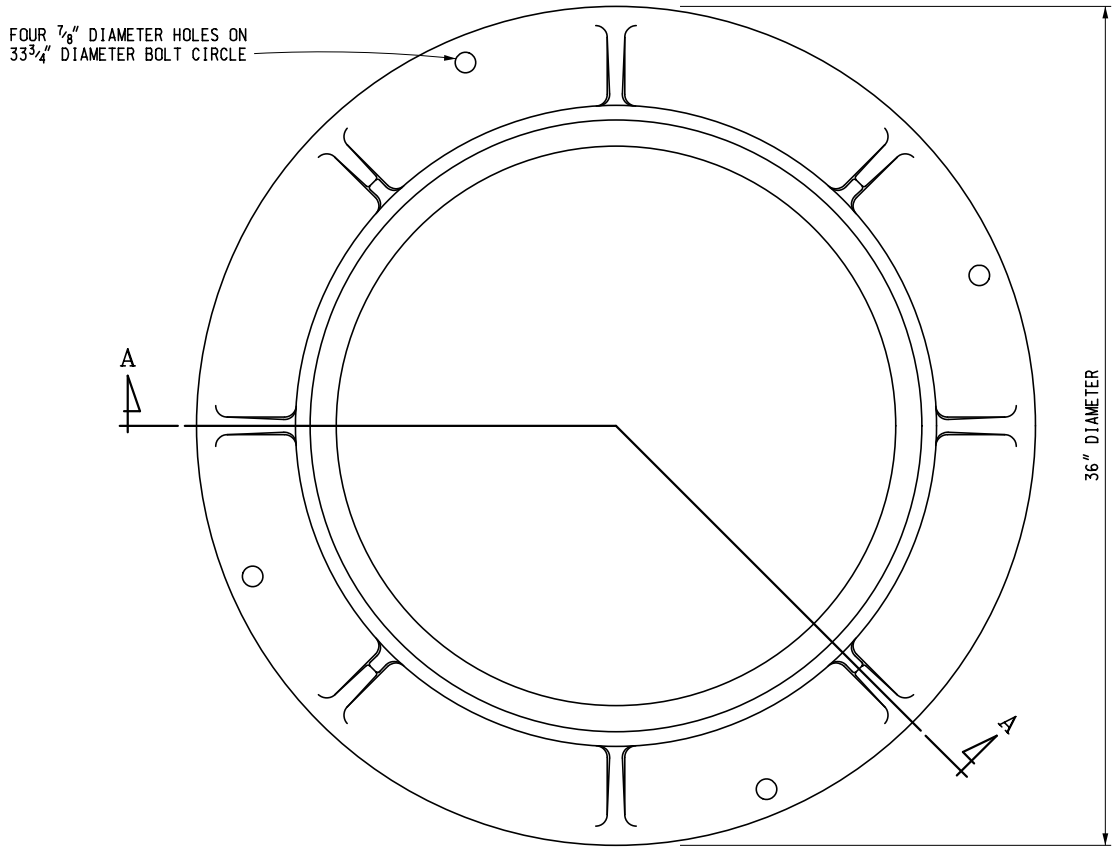
- CHANNELIZING DEVICES
- LIGHTED ARROW PANEL
- TRAFFIC FLOW
- ▩ REFLECTS EXISTING SPEED LIMIT
- □ PLACE SIGN AS INDICATED IN NOTE S5
- ○ PLACE SIGN AS INDICATED IN NOTE S2

STANDARD NOTES

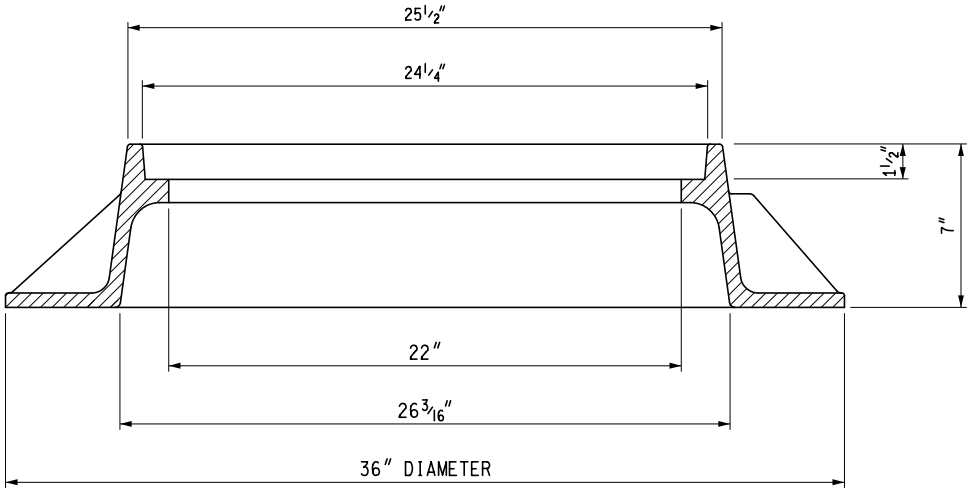
(SEE 102-GEN-NOTES)

GENERAL: G1, G2, G3, G4
SIGNING: S1, S2, S3, S5, S10, S12
DEVICES: TCD1, TCD2, TCD6

MDOT Michigan Department of Transportation	NOT TO SCALE	MAINTAINING TRAFFIC TYPICAL NO: 123-NFW-1LC-(R)	1 RIGHT LANE CLOSURE ON A 4-LANE UNDIVIDED ROADWAY	DATE: MAY 2021 SHEET: 1 OF 1
FILE: 123-NFW-1LC-(R).dgn				



TOP VIEW OF FRAME



SECTION A - A

MDOT Michigan Department of Transportation

PREPARED BY DESIGN DIVISION

DRAWN BY: B.L.T.

CHECKED BY: W.K.P.

DEPARTMENT DIRECTOR
Kirk T. Steudle

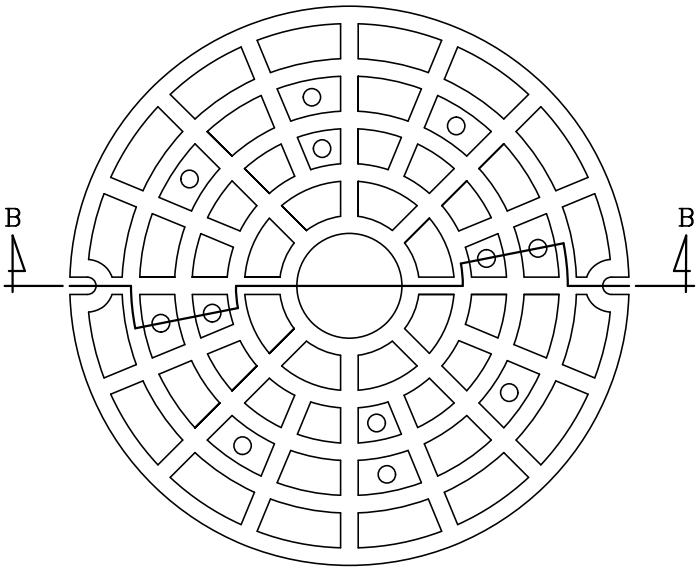
APPROVED BY: _____
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: _____
DIRECTOR, BUREAU OF HIGHWAY DEVELOPMENT

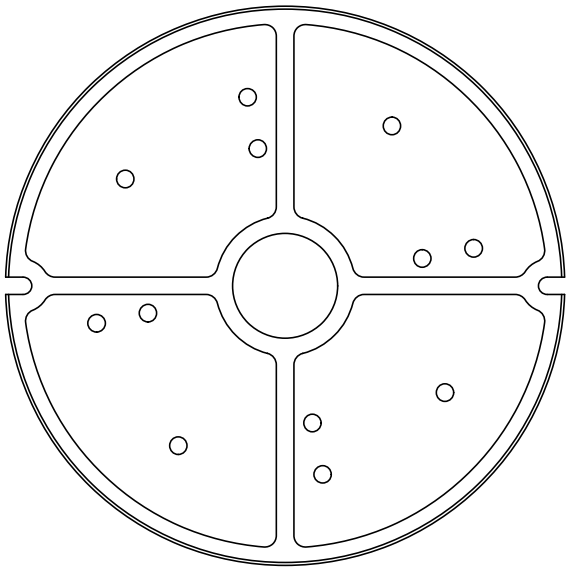
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

COVER B
FOR USE ON MANHOLES

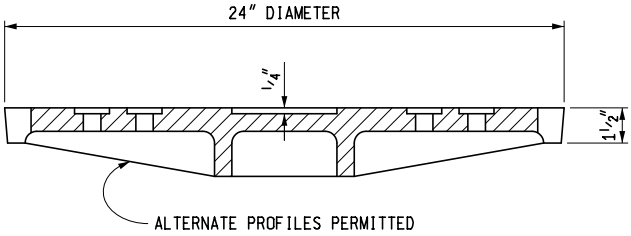
9-30-2014	3-7-2014	R-7-F	SHEET 1 OF 2
F.H.W.A. APPROVAL	PLAN DATE		



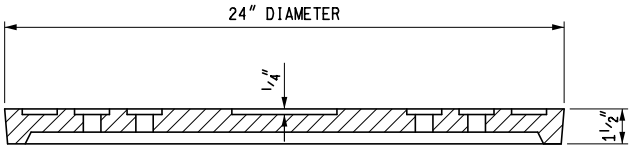
TOP VIEW OF COVER



BOTTOM VIEW OF COVER



SECTION B - B



SECTION B - B

ALTERNATE PROFILE EXAMPLE

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 LID AND THE SEAT FOR THE SAME ON THE FRAME SHALL BE GROUND OR MACHINED SO THAT THE LID 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 VARNISH.

THIS COVER IS DESIGNED TO FIT ON ANY MANHOLE OR ON ANY EXISTING SIMILAR STRUCTURE WHEN SO DESIGNATED ON THE PLANS.

MICHIGAN DEPARTMENT OF TRANSPORTATION

BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

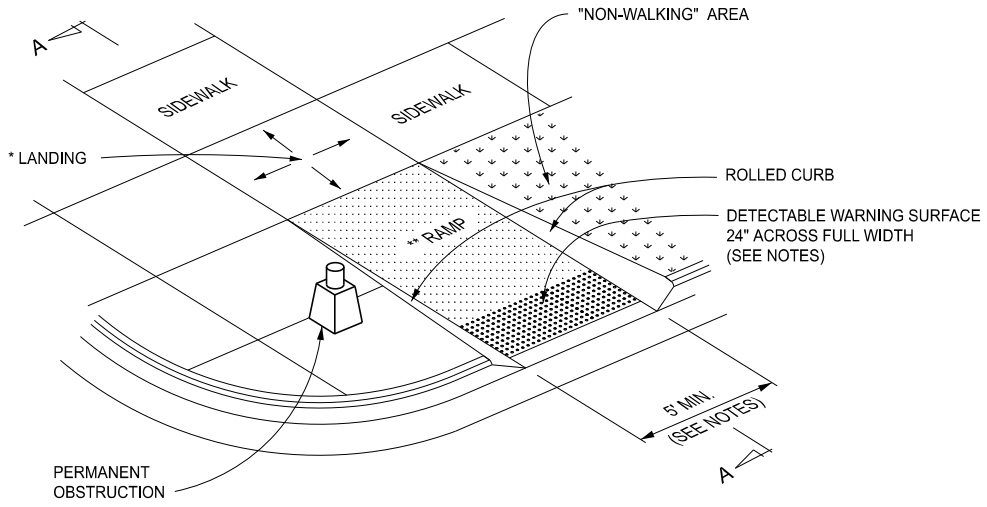
COVER B

FOR USE ON MANHOLES

9-30-2014 F.H.W.A. APPROVAL	3-7-2014 PLAN DATE	R-7-F	SHEET 2 OF 2

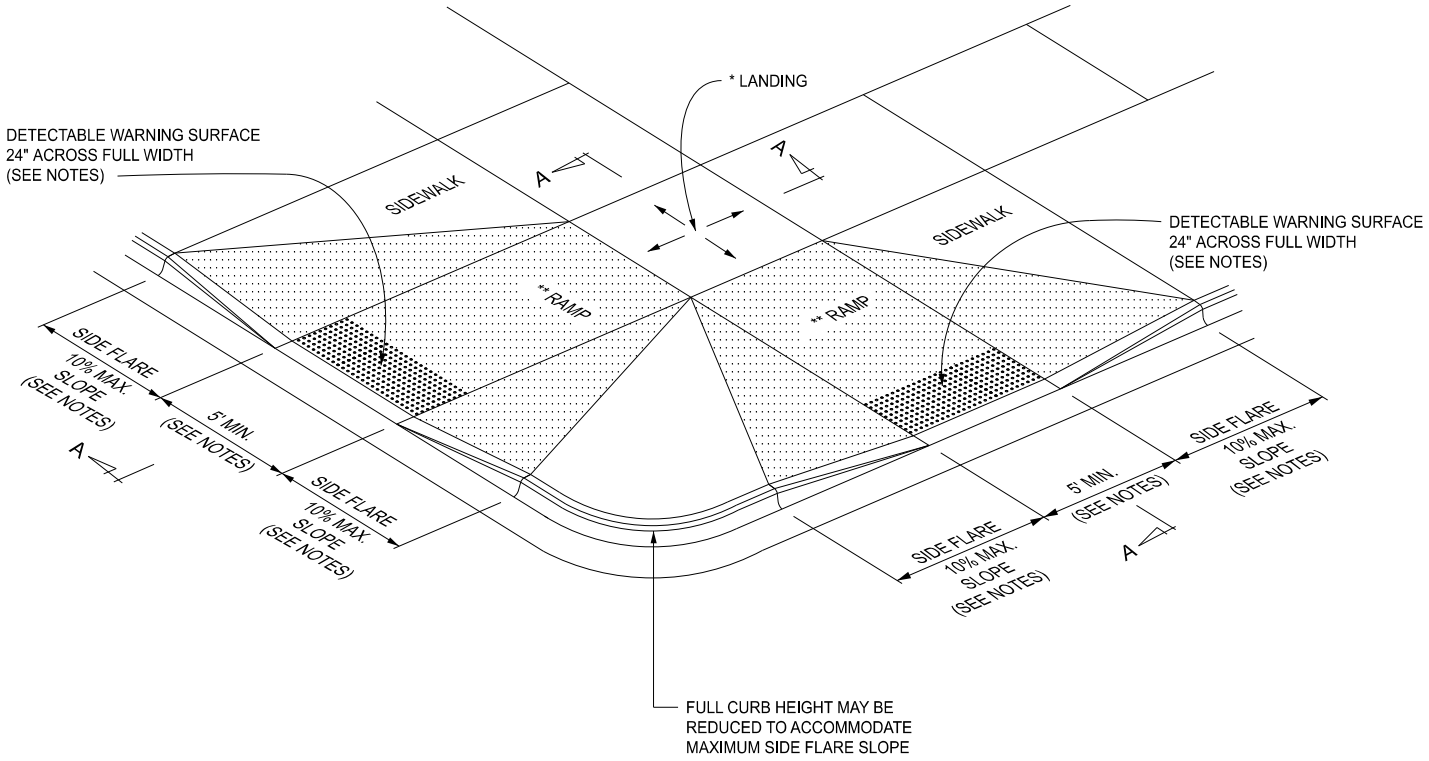
* MAXIMUM LANDING SLOPE IS 2.1% IN EACH DIRECTION OF TRAVEL. LANDING MINIMUM DIMENSIONS 5' x 5'. SEE NOTES.

** MAXIMUM RAMP CROSS SLOPE IS 2.1%, RUNNING SLOPE 5% - 7% (8.3% MAXIMUM). SEE NOTES.



CURB RAMP TYPE R

(ROLLED SIDES)



CURB RAMP TYPE F

(FLARED SIDES, TWO RAMPS SHOWN)

APPROVED BY: _____
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: _____
DIRECTOR, BUREAU OF DEVELOPMENT

MDOT
Michigan Department of Transportation

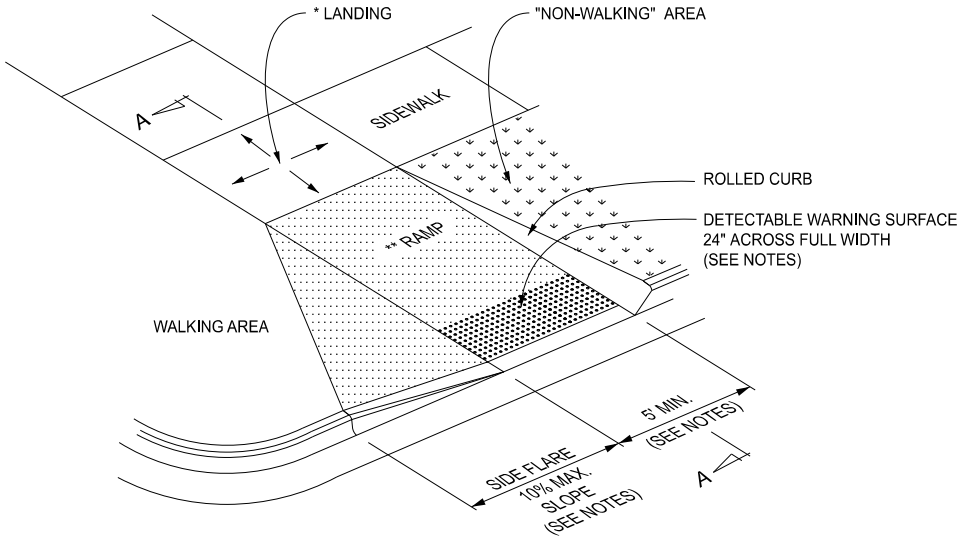
DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
CURB RAMP AND
DETECTABLE WARNING DETAILS

(SPECIAL DETAIL)	11/08/2023	R-28-K	SHEET
FHWA APPROVAL	PLAN DATE		1 OF 7

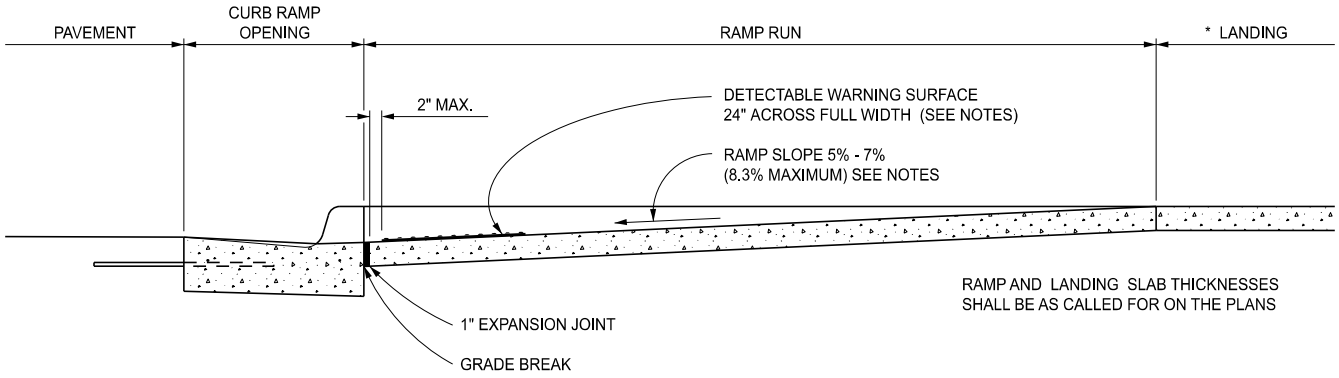
* MAXIMUM LANDING SLOPE IS 2.1% IN EACH DIRECTION OF TRAVEL. LANDING MINIMUM DIMENSIONS 5' x 5'. SEE NOTES.

** MAXIMUM RAMP CROSS SLOPE IS 2.1%, RUNNING SLOPE 5% - 7% (8.3% MAXIMUM). SEE NOTES.



CURB RAMP TYPE RF

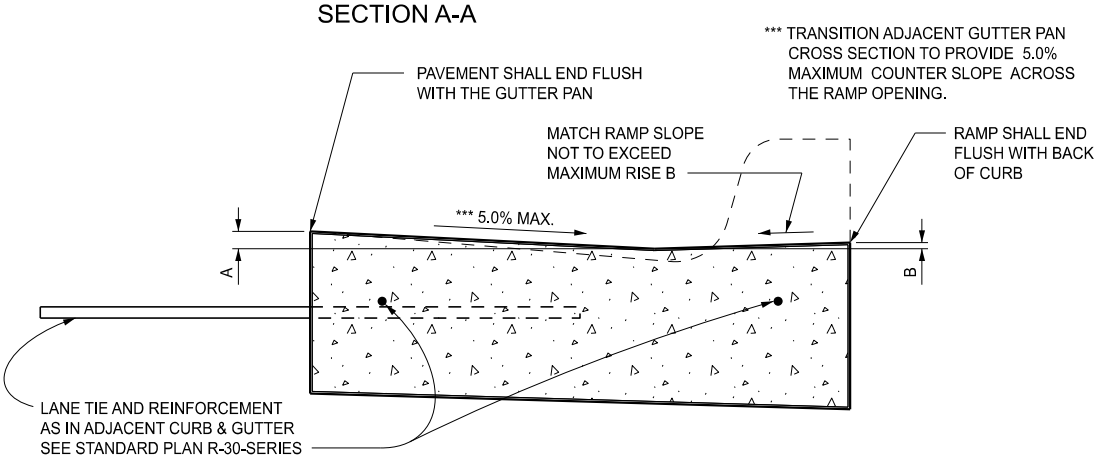
(ROLLED / FLARED SIDES)



SECTION A-A

CURB TYPE	MAXIMUM RISE (INCHES)	
	A	B
B1	¾	1
B2	¾	1
B3	¾	1
D1	¾	1
D2	¾	1
D3	¾	1
C1	½	½
C2	½	½
C3	¾	½
C4	¾	½
C5	1	½
C6	1	½
F1	½	½
F2	½	½
F3	¾	½
F4	¾	½
F5	1	½
F6	1	½

FOR CURB TYPES SEE STANDARD PLAN R-30-SERIES



SECTION THROUGH CURB RAMP OPENING

(TYPICAL ALL RAMP TYPES)

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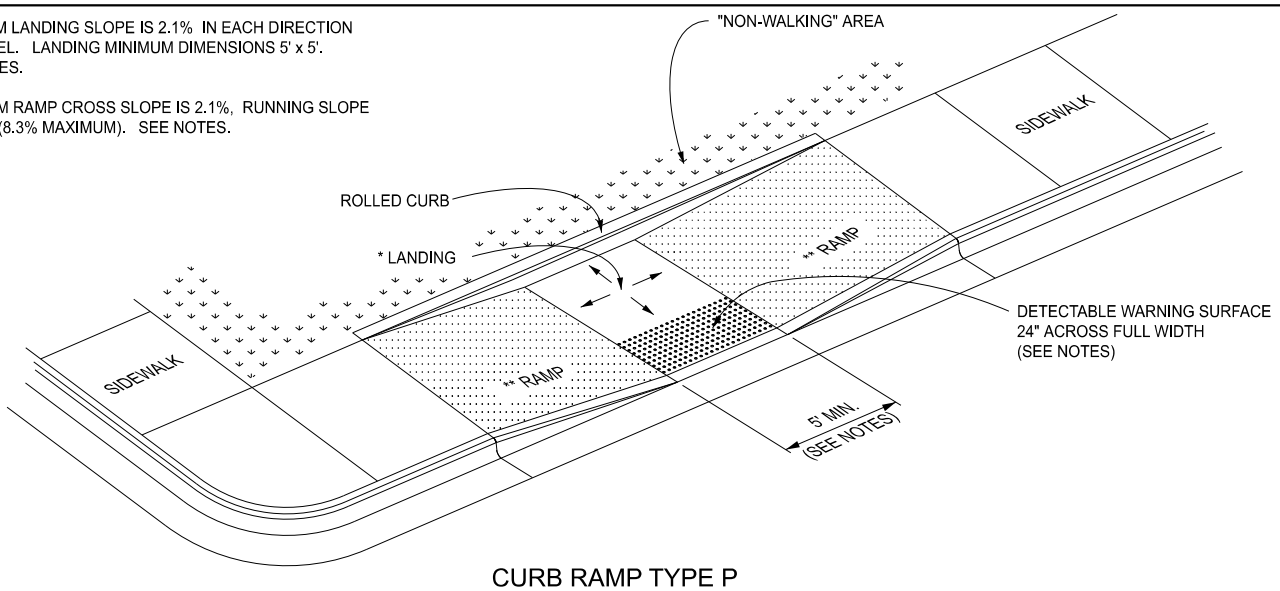
STANDARD PLAN FOR
CURB RAMP AND
DETECTABLE WARNING DETAILS

(SPECIAL DETAIL) FHWA APPROVAL	11/08/2023 PLAN DATE	R-28-K	SHEET 2 OF 7

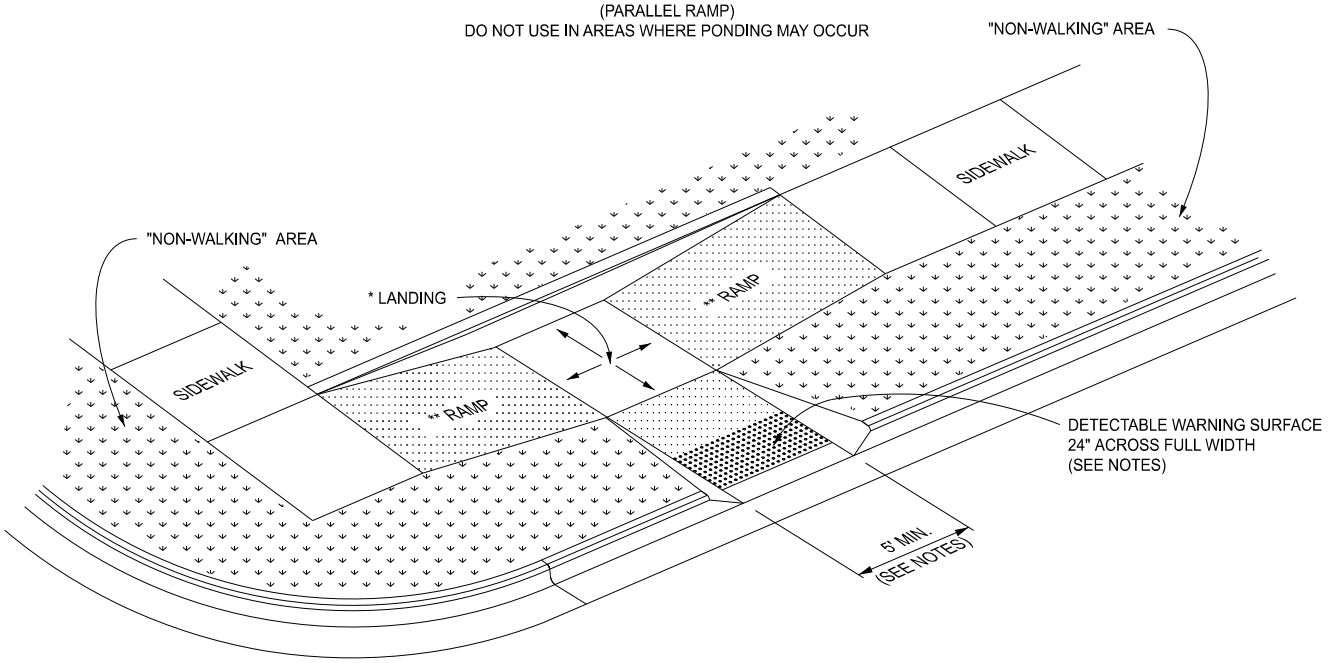
* MAXIMUM LANDING SLOPE IS 2.1% IN EACH DIRECTION OF TRAVEL. LANDING MINIMUM DIMENSIONS 5' x 5'. SEE NOTES.

** MAXIMUM RAMP CROSS SLOPE IS 2.1%, RUNNING SLOPE 5% - 7% (8.3% MAXIMUM). SEE NOTES.



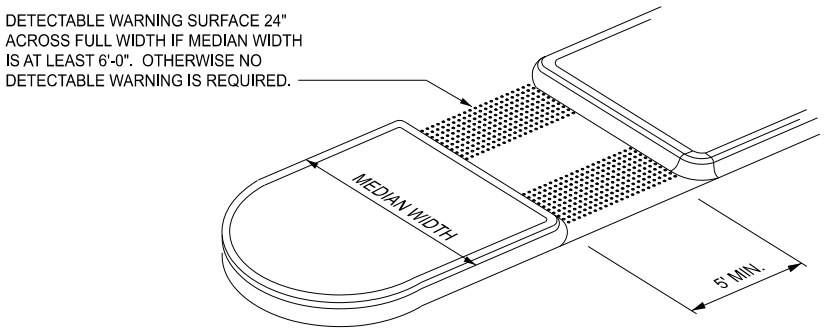
CURB RAMP TYPE P

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



CURB RAMP TYPE C

(COMBINATION RAMP)



CURB RAMP TYPE M

(MEDIAN ISLAND)

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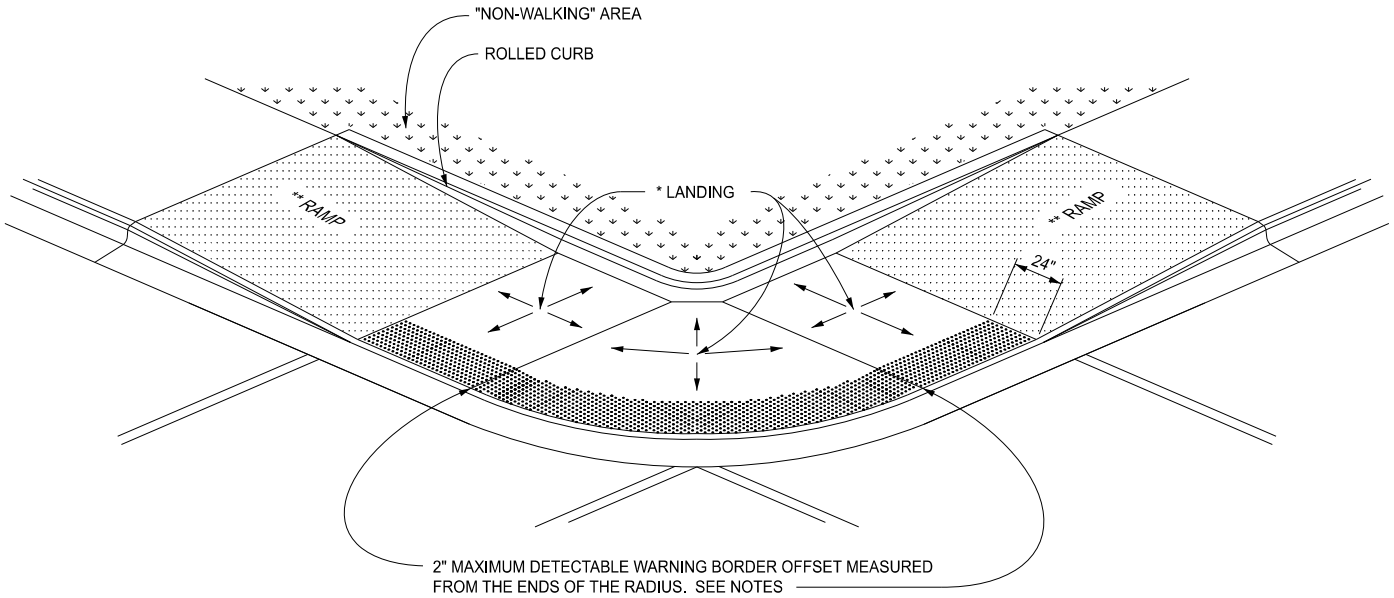
STANDARD PLAN FOR
CURB RAMP AND
DETECTABLE WARNING DETAILS

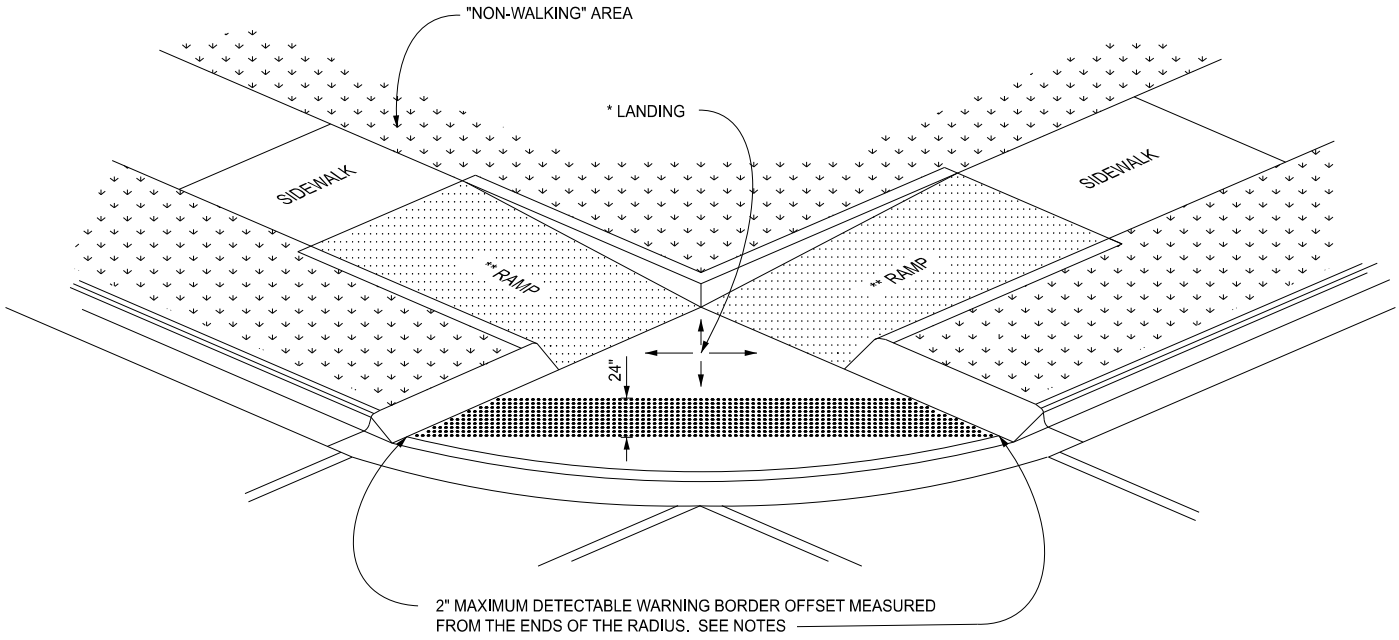
(SPECIAL DETAIL) / FHWA APPROVAL	11/08/2023 / PLAN DATE	R-28-K	SHEET 3 OF 7

* MAXIMUM LANDING SLOPE IS 2.1% IN EACH DIRECTION OF TRAVEL. LANDING MINIMUM DIMENSIONS 5' x 5'. SEE NOTES.

** MAXIMUM RAMP CROSS SLOPE IS 2.1%, RUNNING SLOPE 5% - 7% (8.3% MAXIMUM). SEE NOTES.



(RADIAL DETECTABLE WARNING SHOWN)



(TANGENT DETECTABLE WARNING SHOWN)

CURB RAMP TYPE D

(DEPRESSED CORNER)

USE ONLY WHEN INDEPENDENT DIRECTIONAL RAMPS CAN NOT BE CONSTRUCTED FOR EACH CROSSING DIRECTION

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STANDARD PLAN FOR
CURB RAMP AND
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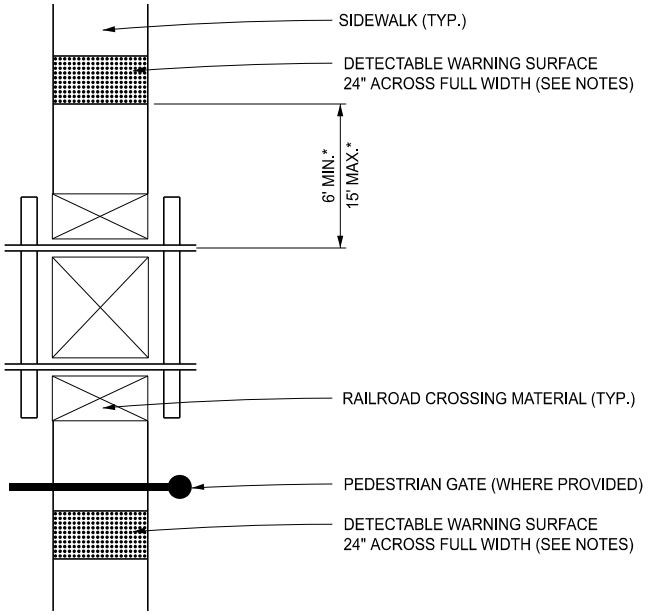
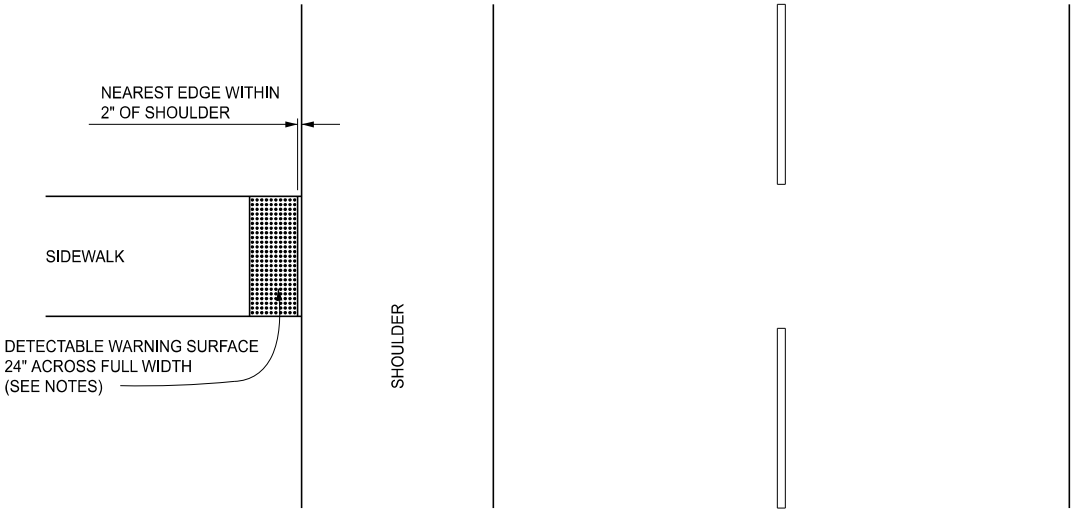
(SPECIAL DETAIL) / FHWA APPROVAL	11/08/2023 / PLAN DATE	R-28-K	SHEET 4 OF 7

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



DETECTABLE WARNING AT RAILROAD CROSSING



DETECTABLE WARNING AT FLUSH SHOULDER OR ROADWAY

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STANDARD PLAN FOR
CURB RAMP AND
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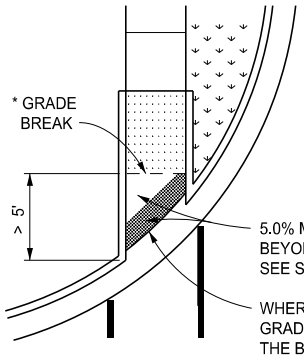
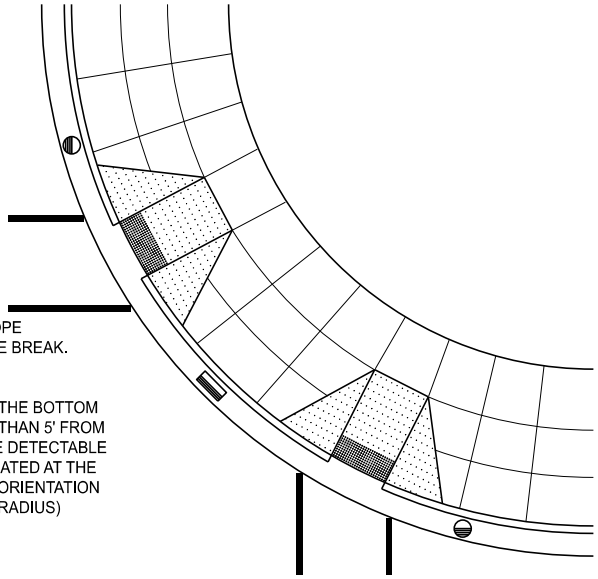
(SPECIAL DETAIL) / FHWA APPROVAL	11/08/2023 / PLAN DATE	R-28-K	SHEET 5 OF 7



CURB RAMP LOCATED IN RADIUS (TYPE R SHOWN)
(GRADE BREAK OFFSET GREATER THAN 5')

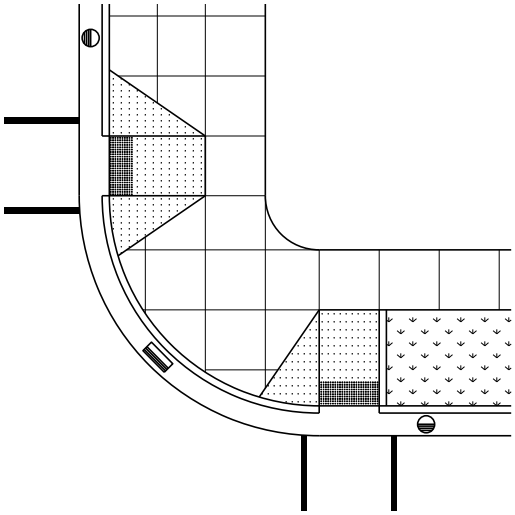


CURB RAMP PERPENDICULAR TO RADIAL CURB (TYPE F SHOWN)

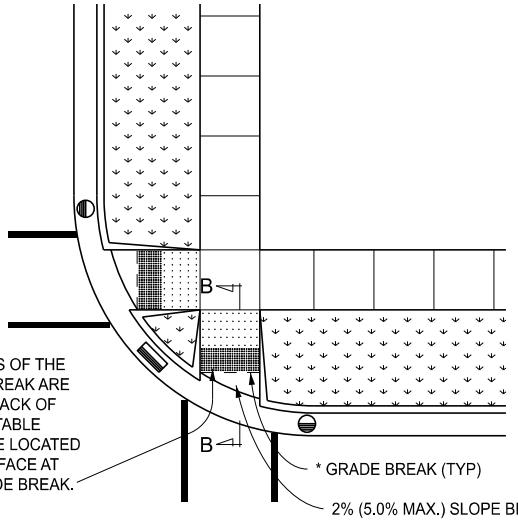
(USE WITH RADIAL CURB WHEN THE CROSSWALK AND CURB RAMP ARE NOT ALIGNED)

LEGEND

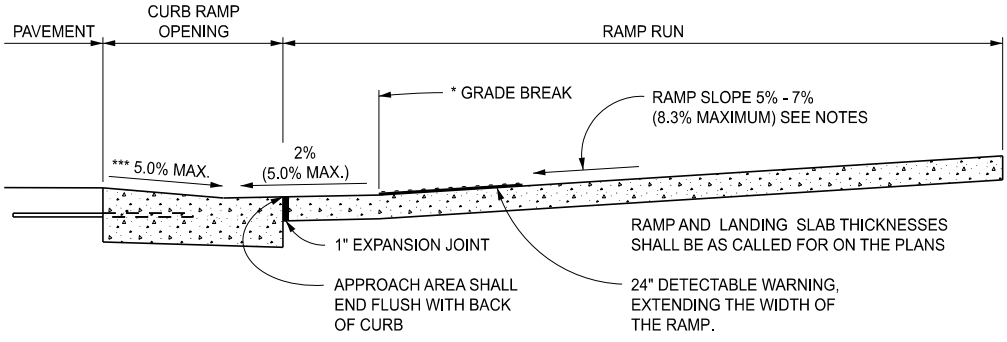
- SLOPED SURFACE
- DETECTABLE WARNING
- "NON-WALKING" AREA
- CROSSWALK MARKING
- PREFERRED LOCATION OF DRAINAGE INLET (TYP.)
- ALTERNATE LOCATION OF DRAINAGE INLET (TYP.)



CURB RAMP PERPENDICULAR TO TANGENT CURB
(TYPE F AND TYPE RF SHOWN)



CURB RAMP LOCATED IN RADIUS (TYPE R SHOWN)
(GRADE BREAK OFFSET LESS THAN 5')



* GRADE BREAKS AT THE TOP AND BOTTOM OF CURB RAMPS SHALL BE PERPENDICULAR TO THE DIRECTION OF TRAVEL.

*** TRANSITION ADJACENT GUTTER PAN CROSS SECTION TO PROVIDE 5.0% MAXIMUM COUNTER SLOPE ACROSS THE RAMP OPENING.

SEE SHEET 2 FOR CURB RAMP OPENING DETAILS.

SECTION B-B

CURB RAMP ORIENTATION

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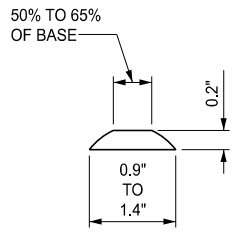
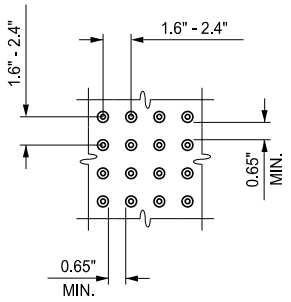
STANDARD PLAN FOR
CURB RAMP AND
DETECTABLE WARNING DETAILS

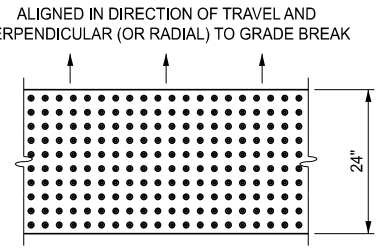
(SPECIAL DETAIL) / FHWA APPROVAL	11/08/2023 / PLAN DATE	R-28-K	SHEET 6 OF 7



DOME SECTION



DOME SPACING



DOME ALIGNMENT

DETECTABLE WARNING DETAILS

NOTES:

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

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 CROSSINGS.

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 TRAVEL.

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

WHEN 5' MINIMUM WIDTHS ARE NOT FEASIBLE, RAMP WIDTH MAY BE REDUCED TO NOT LESS THAN 4' AND LANDINGS TO NOT LESS THAN 4' x 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 2.1% 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 CURB TRANSITION AREAS. A BORDER OFFSET NOT GREATER THAN 2" MEASURED ALONG THE EDGES OF THE DETECTABLE WARNING IS ALLOWABLE. FOR RADIAL CURB THE OFFSET IS MEASURED FROM THE ENDS OF THE RADIUS.

FOR NEW ROADWAY CONSTRUCTION, THE RAMP CROSS SLOPE MAY NOT EXCEED 2.1%. 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 GREATER THAN ½". ELONGATED OPENINGS SHALL BE PLACED SO THAT THE LONG DIMENSION IS PERPENDICULAR TO THE DOMINANT DIRECTION OF TRAVEL.

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 UNOBSTRUCTED CIRCULATION PATH LATERALLY CROSSES THE CURB RAMP. FLARED SIDES ARE NOT REQUIRED WHERE THE RAMP IS BORDERED BY LANDSCAPING, UNPAVED SURFACE OR PERMANENT FIXED OBJECTS. WHERE THEY ARE NOT REQUIRED, FLARED SIDES CAN BE CONSIDERED IN ORDER TO AVOID SHARP CURB RETURNS AT RAMP OPENINGS.

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

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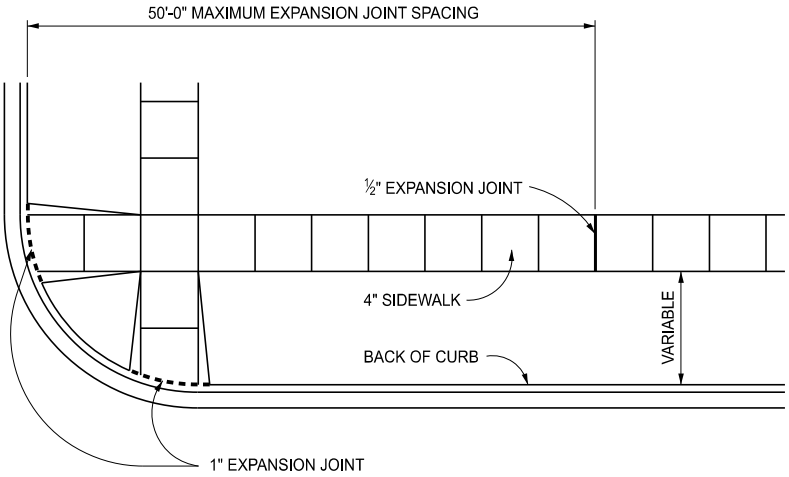
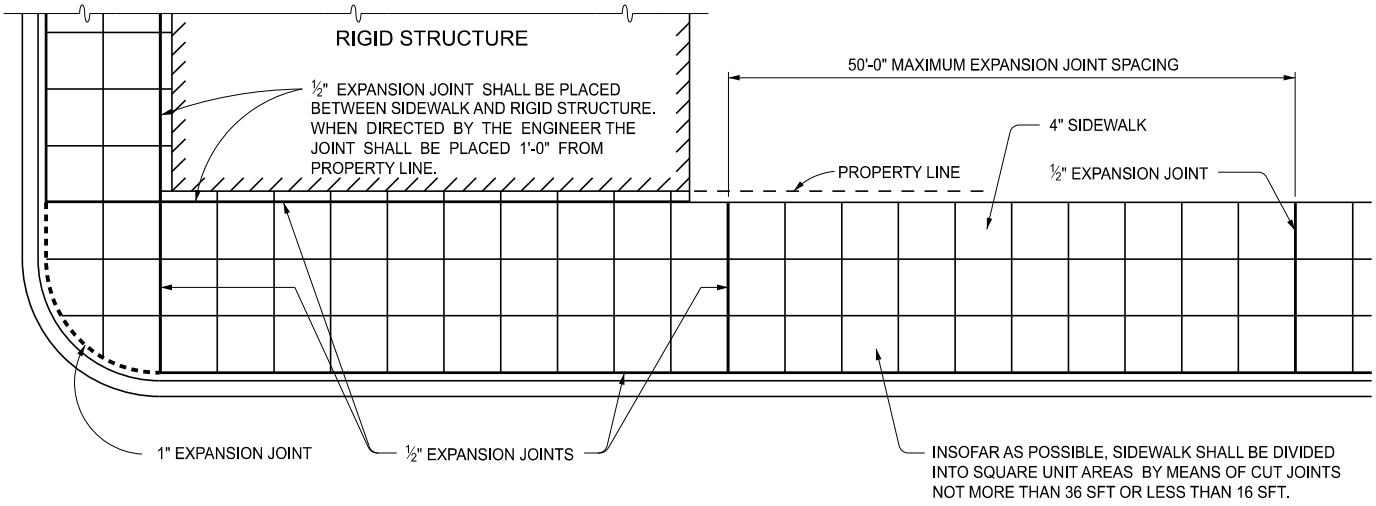
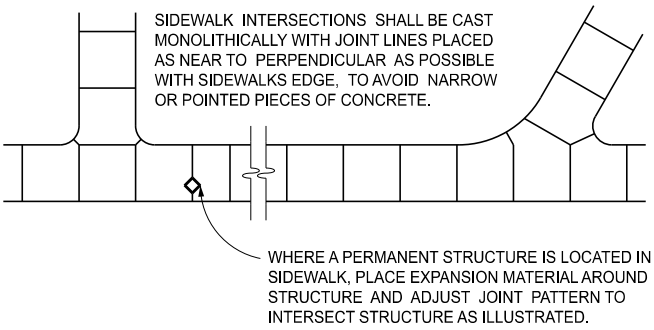
STANDARD PLAN FOR
CURB RAMP AND
DETECTABLE WARNING DETAILS

(SPECIAL DETAIL)	11/08/2023	R-28-K	SHEET
FHWA APPROVAL	PLAN DATE		7 OF 7

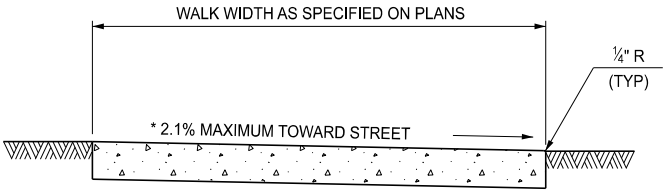




LOCATION OF JOINTS IN CONCRETE SIDEWALK



TYPICAL SIDEWALK JOINT LAYOUTS



* SEE NOTES

4" CONCRETE SIDEWALK

APPROVED BY: _____
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: _____
DIRECTOR, BUREAU OF DEVELOPMENT

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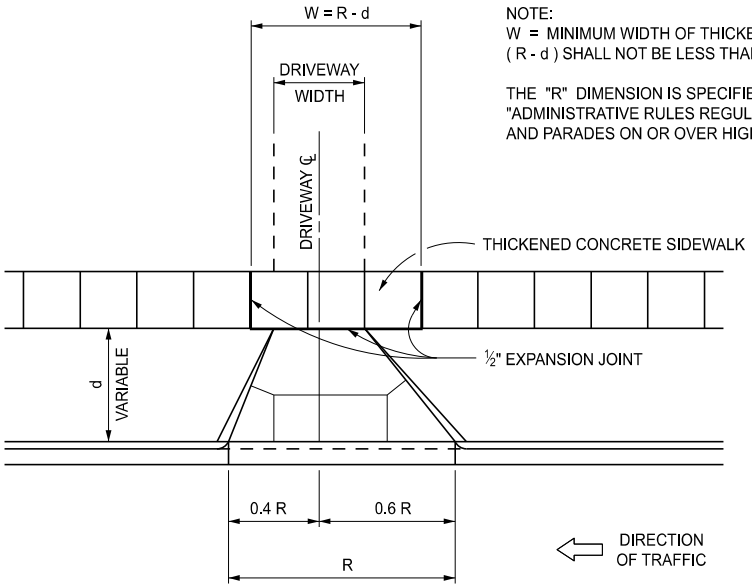
STANDARD PLAN FOR
DRIVEWAY OPENINGS & APPROACHES, AND CONCRETE SIDEWALK

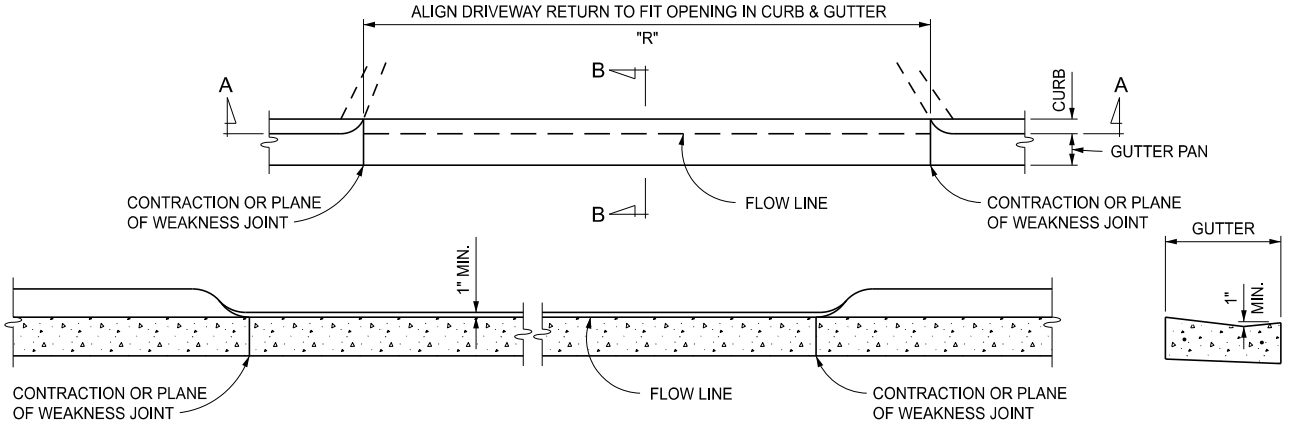
(SPECIAL DETAIL) FHWA APPROVAL	11/08/2023 PLAN DATE	R-29-J	SHEET 1 OF 4



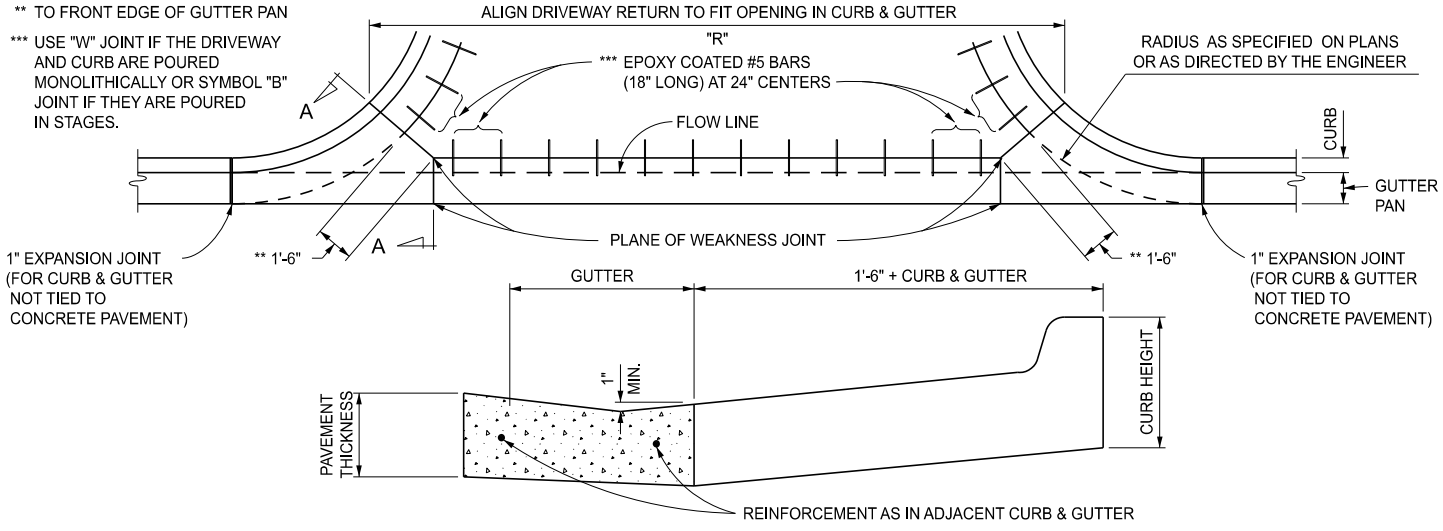
NOTE:
W = MINIMUM WIDTH OF THICKENED CONCRETE SIDEWALK.
(R - d) SHALL NOT BE LESS THAN DRIVEWAY WIDTH.

THE "R" DIMENSION IS SPECIFIED IN THE PUBLICATION "ADMINISTRATIVE RULES REGULATING DRIVEWAYS, BANNERS AND PARADES ON OR OVER HIGHWAYS".

CONCRETE DRIVEWAY OPENING LAYOUT



CONCRETE DRIVEWAY OPENING, DETAIL L



CONCRETE DRIVEWAY OPENING, DETAIL M

NOTE:
FOR ROADWAYS WITH CONCRETE PAVEMENTS, LONGITUDINAL LANE TIES WILL BE CONTINUOUS THROUGH THE DRIVEWAY OPENING AND THE SPACING OF THE #5 BARS IN CONCRETE DRIVEWAYS SHALL BE ADJUSTED TO AVOID CONFLICT WITH THE LONGITUDINAL LANE TIES.

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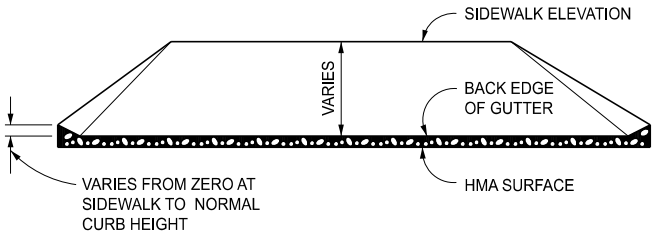
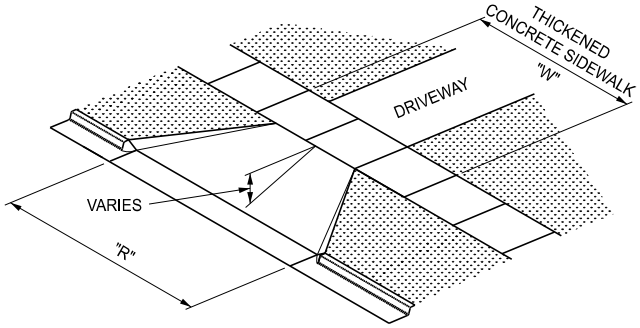
STANDARD PLAN FOR
DRIVEWAY OPENINGS & APPROACHES, AND CONCRETE SIDEWALK

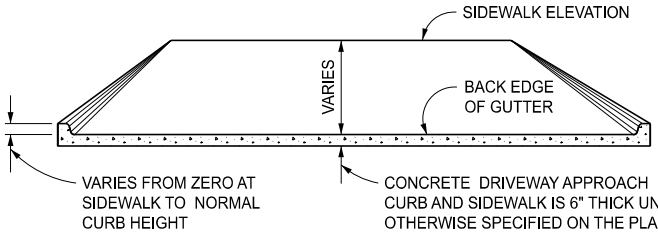
(SPECIAL DETAIL) / FHWA APPROVAL	11/08/2023 / PLAN DATE	R-29-J	SHEET 2 OF 4

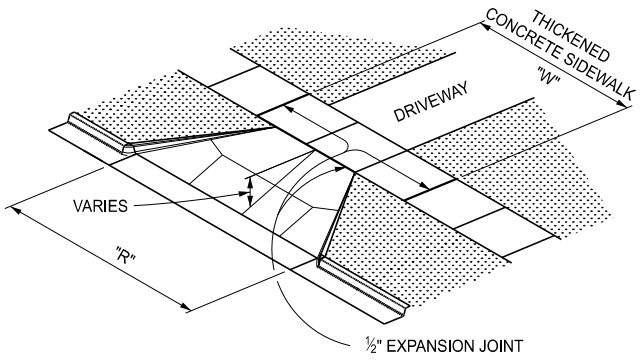




HMA DRIVEWAY APPROACH

(TO BE USED WITH DETAIL L)





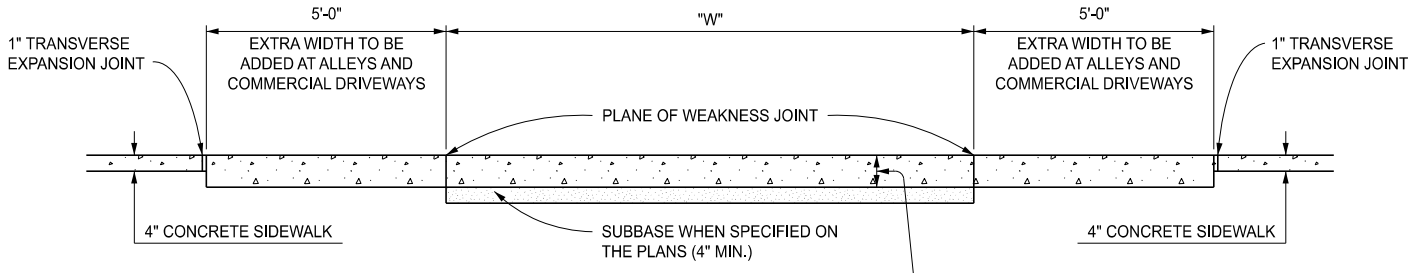
NOTES:

MONOLITHIC CURB IS INCLUDED IN THE CONCRETE DRIVEWAY APPROACH QUANTITY.

REINFORCEMENT IS NOT REQUIRED UNLESS SPECIFIED ON THE PLANS. WHEN REINFORCEMENT IS SPECIFIED, SEE CHART ON THIS SHEET.

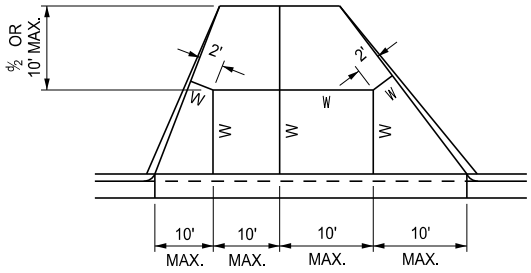
CONCRETE DRIVEWAY APPROACH

(TO BE USED WITH DETAIL L OR M)



WHEN CONCRETE DRIVEWAY APPROACH IS SPECIFIED, THE THICKENED CONCRETE SIDEWALK THICKNESS IS EQUAL TO THE THICKNESS OF THE CONCRETE DRIVEWAY APPROACH. WHEN HMA DRIVEWAY APPROACH IS SPECIFIED, THE THICKENED CONCRETE SIDEWALK THICKNESS IS 6" MIN.

THICKENED CONCRETE SIDEWALK



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

REINFORCEMENT FOR CONCRETE DRIVEWAYS		
CONCRETE DRIVEWAY THICKNESS	WIRE SIZE (6" x 6" MESH)	AVERAGE WEIGHT (LBS/100 SFT)
LESS THAN 8"	W1.4	21
	W2.9	42
8" OR GREATER	USE WIRE FABRIC REINFORCEMENT SPECIFIED ON STANDARD PLAN R-37-SERIES	

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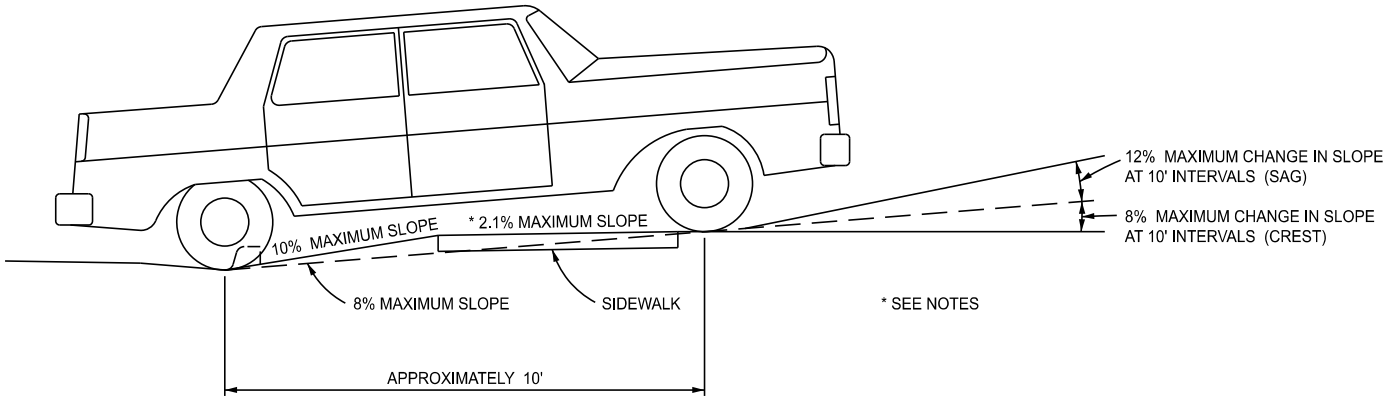
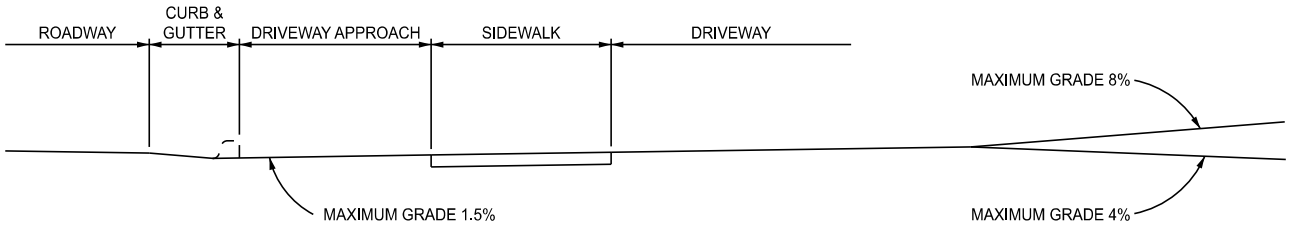
STANDARD PLAN FOR
DRIVEWAY OPENINGS & APPROACHES, AND CONCRETE SIDEWALK

(SPECIAL DETAIL) FHWA APPROVAL	11/08/2023 PLAN DATE	R-29-J	SHEET 3 OF 4



LOW VOLUME COMMERCIAL OR RESIDENTIAL DRIVEWAY SLOPES



COMMERCIAL DRIVEWAY PROFILE FOR MAJOR TRAFFIC GENERATORS

NOTES:

FOR DRIVEWAY DESIGN REFER ALSO TO "ADMINISTRATIVE RULES REGULATING DRIVEWAYS, BANNERS, AND PARADES ON OR OVER HIGHWAYS" AND GEOMETRIC DESIGN G-680-SERIES, COMMERCIAL DRIVEWAYS.

FOR CURB AND GUTTER DETAILS, SEE STANDARD PLAN R-30-SERIES.

TRANSVERSE SIDEWALK SLOPES ARE 2.1% MAXIMUM. IN ORDER TO MEET SITE CONDITIONS, IF THE TRANSVERSE SLOPE IS REQUIRED TO BE LESS THAN 1.5%, LONGITUDINAL DRAINAGE MUST BE PROVIDED.

WHEN SETTING GRADES FOR COMMERCIAL DRIVES, THE TYPES OF VEHICLES USING THE DRIVE SHOULD BE CONSIDERED.

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STANDARD PLAN FOR
DRIVEWAY OPENINGS & APPROACHES, AND CONCRETE SIDEWALK

(SPECIAL DETAIL) / FHWA APPROVAL	11/08/2023 / PLAN DATE	R-29-J	SHEET 4 OF 4

Appendix D - Act 524 of 1980

CONSTRUCTION CONTRACTS WITH CERTAIN PUBLIC AGENCIES
Act 524 of 1980

AN ACT to provide for the terms of certain construction contracts with certain public agencies; to regulate the payment and retainage of payments on construction contracts with certain public agencies; and to provide for the resolution of certain disputes.

History: 1980, Act 524, Eff. Jan. 1, 1983.

The People of the State of Michigan enact:

125.1561 Definitions.

Sec. 1. As used in this act:

(a) "Agent" means the person or persons agreed to or selected by the contractor and the public agency pursuant to section 4(2).

(b) "Architect or professional engineer" means an architect or professional engineer licensed under Act No. 299 of the Public Acts of 1980, being sections 339.101 to 339.2601 of the Michigan Compiled Laws, and designated by a public agency in a construction contract to recommend progress payments.

(c) "Construction contract" or "contract" means a written agreement between a contractor and a public agency for the construction, alteration, demolition, or repair of a facility, other than a contract having a dollar value of less than $30,000.00 or a contract that provides for 3 or fewer payments.

(d) "Contract documents" means the construction contract; instructions to bidders; proposal; conditions of the contract; performance bond; labor and material bond; drawings; specifications; all addenda issued before execution of the construction contract and all modifications issued subsequently.

(e) "Contractor" means an individual, sole proprietorship, partnership, corporation, or joint venture, that is a party to a construction contract with a public agency.

(f) "Facility" means a building, utility, road, street, boulevard, parkway, bridge, ditch, drain, levee, dike, sewer, park, playground, or other structure or work that is paid for with public funds or a special assessment.

(g) "Progress payment" means a payment by a public agency to a contractor for work in place under the terms of a construction contract.

(h) "Public agency" means this state, or a county, city, township, village, assessment district, or other political subdivision, corporation, commission, agency, or authority created by law. However, public agency does not include the state transportation department, a school district, junior or community college, the Michigan state housing development authority created in Act No. 346 of the Public Acts of 1966, as amended, being sections 125.1401 to 125.1496 of the Michigan Compiled Laws, and a municipal electric utility or agency. "Assessment district" means the real property within a distinct area upon which special assessments are levied or imposed for the construction, reconstruction, betterment, replacement, or repair of a facility to be paid for by funds derived from those special assessments imposed or levied on the benefited real property.

(i) "Retainage" or "retained funds" means the amount withheld from a progress payment to a contractor pursuant to section 3.

History: 1980, Act 524, Eff. Jan. 1, 1983.

125.1562 Construction contract; designation of person to submit written requests for progress payments; designation of person to whom requests for progress payments to be submitted; manner and times of submissions; deferring the processing of progress payments; payment of requested progress payment; failure of public agency to make timely progress payment; interest.

Sec. 2. (1) The construction contract shall designate a person representing the contractor who will submit written requests for progress payments, and a person representing the public agency to whom request for progress payments are to be submitted. The written requests for progress payments shall be submitted to the designated person in a manner and at such times as provided in the construction contract.

(2) The processing of progress payments by the public agency may be deferred by the public agency until work having a prior sequence, as provided in the contract documents, is in place and is approved.

(3) Each progress payment requested, including reasonable interest if requested under subsection (4), shall be paid within 1 of the following time periods, whichever is later:

(a) Thirty days after the architect or professional engineer has certified to the public agency that work is in place in the portion of the facility covered by the applicable request for payment in accordance with the contract documents.

(b) Fifteen days after the public agency has received the funds with which to make the progress payment

from a department or agency of the federal or state government, if any funds are to come from either of those sources.

(4) Upon failure of a public agency to make a timely progress payment pursuant to this section, the person designated to submit requests for progress payments may include reasonable interest on amounts past due in the next request for payment.

History: 1980, Act 524, Eff. Jan. 1, 1983.

125.1563 Retaining portion of each progress payment to assure proper performance of construction contract; retainage; limitations; exceeding pro rata share of public agency's matching requirement; commingling and deposit of retained funds; releasing to contractor retainage and interest earned on retainage; irrevocable letter of credit.

Sec. 3. (1) To assure proper performance of a construction contract by the contractor, a public agency may retain a portion of each progress payment otherwise due as provided in this section.

(2) The retainage shall be limited to the following:

(a) Not more than 10% of the dollar value of all work in place until work is 50% in place.

(b) After the work is 50% in place, additional retainage shall not be withheld unless the public agency determines that the contractor is not making satisfactory progress, or for other specific cause relating to the contractor's performance under the contract. If the public agency so determines, the public agency may retain not more than 10% of the dollar value of work more than 50% in place.

(3) The retained funds shall not exceed the pro rata share of the public agency's matching requirement under the construction contract and shall not be commingled with other funds of the public agency and shall be deposited in an interest bearing account in a regulated financial institution in this state wherein all such retained funds are kept by the public agency which shall account for both retainage and interest on each construction contract separately. A public agency is not required to deposit retained funds in an interest bearing account if the retained funds are to be provided under a state or federal grant and the retained funds have not been paid to the public agency.

(4) Except as provided in section 4(7) and (8), retainage and interest earned on retainage shall be released to a contractor together with the final progress payment.

(5) At any time after 94% of work under the contract is in place and at the request of the original contractor, the public agency shall release the retainage plus interest to the original contractor only if the original contractor provides to the public agency an irrevocable letter of credit in the amount of the retainage plus interest, issued by a bank authorized to do business in this state, containing terms mutually acceptable to the contractor and the public agency.

History: 1980, Act 524, Eff. Jan. 1, 1983.

125.1564 Construction contract; agreement to submit matters described in subsection (3) to decision of agent; designation of agent; dispute resolution process; use; agent to receive pertinent information and provide opportunity for informal meeting; decision of agent to be final and binding; vacation of decision by circuit court; dispute resolution resulting in decision; final progress payment to original contractor where public agency contracts with subsequent contractor.

Sec. 4. (1) The construction contract shall contain an agreement to submit those matters described in subsection (3) to the decision of an agent at the option of the public agency.

(2) If a dispute regarding a matter described in subsection (3) arises, the contractor and the public agency shall designate an agent who has background, training, and experience in the construction of facilities similar to that which is the subject of the contract, as follows:

(a) In an agreement reached within 10 days after a dispute arises.

(b) If an agreement cannot be reached within 10 days after a dispute arises, the public agency shall designate an agent who has background, training, and experience in the construction of facilities similar to that which is the subject of the contract and who is not an employee of the agency.

(3) The public agency may request dispute resolution by the agent regarding the following:

(a) At any time during the term of the contract, to determine whether there has been a delay for reasons that were within the control of the contractor, and the period of time that delay has been caused, continued, or aggravated by actions of the contractor.

(b) At any time after 94% of work under the contract is in place, whether there has been an unacceptable delay by the contractor in the performance of the remaining 6% of work under the contract. The agent shall consider the terms of the contract and the procedures normally followed in the industry and shall determine

whether the delay was for failure to follow reasonable and prudent practices in the industry for completion of the project.

(4) This dispute resolution process shall be used only for the purpose of determining the rights of the parties to retained funds and interest earned on retained funds and is not intended to alter, abrogate, or limit any rights with respect to remedies that are available to enforce or compel performance of the terms of the contract by either party.

(5) The agent may request and shall receive all pertinent information from the parties and shall provide an opportunity for an informal meeting to receive comments, documents, and other relevant information in order to resolve the dispute. The agent shall determine the time, place, and procedure for the informal meeting. A written decision and reasons for the decision shall be given to the parties within 14 days after the meeting.

(6) The decision of the agent shall be final and binding upon all parties. Upon application of either party, the decision of the agent may be vacated by order of the circuit court only upon a finding by the court that the decision was procured by fraud, duress, or other illegal means.

(7) If the dispute resolution results in a decision:

(a) That there has been a delay as described in subsection (3)(a), all interest earned on retained funds during the period of delay shall become the property of the public agency.

(b) That there has been unacceptable delay as described in subsection (3)(b), the public agency may contract with a subsequent contractor to complete the remaining 6% of work under the contract, and interest earned on retained funds shall become the property of the public agency. A subsequent contractor under this subdivision shall be paid by the public agency from the following sources until each source is depleted, in the order listed below:

(*i*) The dollar value of the original contract, less the dollar value of funds already paid to the original contractor and the dollar value of work in place for which the original contractor has not received payment.

(*ii*) Retainage from the original contractor, or funds made available under a letter of credit provided under section 3(5).

(*iii*) Interest earned on retainage from the original contractor, or funds made available under a letter of credit provided under section 3(5).

(8) If the public agency contracts with a subsequent contractor as provided in subsection (7)(b), the final progress payment shall be payable to the original contractor within the time period specified in section 2(3). The amount of the final progress payment to the original contractor shall not include interest earned on retained funds. The public agency may deduct from the final progress payment all expenses of contracting with the subsequent contractor. This act shall not impair the right of the public agency to bring an action or to otherwise enforce a performance bond to complete work under a construction contract.

History: 1980, Act 524, Eff. Jan. 1, 1983.

125.1565 Construction contracts to which act applicable.

Sec. 5. (1) Except as provided in subsection (2), this act shall apply only to a construction contract entered into after the effective date of this act.

(2) For a construction contract entered into before the effective date of this act, the provisions of this act may be implemented by a public agency, through a contract amendment, upon the written request of the contractor, with such consideration as the public agency considers adequate.

History: 1980, Act 524, Eff. Jan. 1, 1983.

125.1566 Effective date.

Sec. 6. This act shall take effect January 1, 1983.

History: 1980, Act 524, Eff. Jan. 1, 1983.