



## AGENDA

### SPECIAL MEETING OF THE VILLAGE COUNCIL - SIDEWALK IMPROVEMENT PROGRAM

Thursday, January 09, 2025

6:00 PM

Village Hall – 21 East Church Street, Lake Orion, MI 48362

(248) 693-8391 ext. 102

1. Call to Order
2. Pledge of Allegiance
3. Roll Call and Determination of Quorum

**ADDRESSING THE VILLAGE COUNCIL:** Each person wishing to address the village council shall be afforded an opportunity to do so. If you wish to comment, please stand or raise a hand to indicate that you wish to speak. When recognized, give your name and address and direct your comments to the Chair.

**PURPOSE OF SPECIAL MEETING:** The purpose of the Special Meeting of the Lake Orion Village Council is to review, discuss, and formulate a proposed perpetual sidewalk improvement program for the Village.

4. Call to the Public
5. Other Items
  - A. Sidewalk Improvement Program
6. Call to the Public
7. Adjournment

*In the spirit of compliance with the Americans with Disabilities Act, individuals with a disability should feel free to contact the Village, at least three (3) business days in advance of the meeting, if requesting accommodations. The Village of Lake Orion will provide foreign language or hearing impaired interpretation services for those individuals who contact the village to request such services at least seven (7) days prior to the meeting.*

*En el espíritu de la observancia de la Ley de Estadounidenses con Discapacidades, las personas con discapacidad debe sentirse libre para ponerse en contacto con el pueblo, por lo menos tres (3) días hábiles de antelación a la fecha de la reunión, si se solicitan alojamiento. El municipio de Lake Orion proporcionará*

*idioma extranjero o personas con problemas de audición servicios de interpretación para las personas que se ponen en contacto con el pueblo de solicitar dichos servicios con no menos de siete (7) días antes de la reunión.*



**COUNCIL ACTION SUMMARY SHEET**

**MEETING DATE:** January 9, 2025

**TOPIC** Sidewalk Improvement Program

**BACKGROUND BRIEF:**

Council is scheduled to conduct a work session to review, discuss, and formulate a comprehensive, perpetual sidewalk improvement program. To complete this work, Council must approve an administrative policy governing the implementation of the sidewalk improvement program and then approve the details of the first year’s improvement project. Village Manager McClary recommends addressing the administrative policy at the January 9 work session meeting and formulating the first year project at the January 16 work session.

Attached is a proposed draft administrative policy to kick off discussion.

**SUMMARY OF PREVIOUS COUNCIL ACTION:**

None

**FINANCIAL IMPACT:**

None

**RECOMMENDED MOTION:**

None



# ADMINISTRATIVE DIRECTIVE

<b>DIRECTIVE NO:</b> 2025-01	<b>ISSUE DATE:</b>
<b>ISSUED BY:</b>	<b>SIGNATURE:</b>
<b>COUNCIL APPROVAL DATE:</b>	
<b>REVISION DATES:</b>	
<b>RESCINDS/REPLACES:</b>	
<b>CATEGORY: Sidewalks</b>	
<b>SUBJECT: Sidewalk Improvement Program Policy</b>	

**LEGAL AUTHORITY CITATION**

This administrative directive is issued by the Village Manager pursuant to the following legal authority:

- Village Charter – Sec. 3.12 – Duties of administrative officers; performing such duties as are provided for such officers by state law, this Charter, the village ordinances, and the administrative directives of the Village Manager
- Village Charter – Sec. 6.8 – Streets and Alleys; powers of Council to regulate the same
- Village Charter – Sec. 11.1 – Public Improvements, Contracts, Utilities ; power of Council to do any public work or make any public improvement
- Village Charter – Sec. 11.5 – Sidewalks, Curbs, and Gutters; power of Council to prescribe the building of sidewalks by property owners and to assess the cost thereof
- Village Charter – Chapter 12 – Assessments; power of Council to defray the cost of public improvements by special assessment; process for specially assessing costs of public improvements
- Village Code of Ordinances – Chapter 92 – Streets and Sidewalks; powers of the Village to inspect, construct, and regulate sidewalks and to regulate spacing of shade trees near sidewalks
- 2013 Village Engineering Design and Construction Standards – Chapter Six – Design and Construction Standards for Streets, Driveways, Pedestrian Facilities and Paving

**PURPOSE**

The purpose of this Sidewalk Improvement Program policy is to establish the rules, regulations, procedures, and specifications for the construction, reconstruction, repair, and replacement of public sidewalks within the Village and the allocation of the costs of such improvements.

## **POLICY**

**Location of Sidewalks.** Public sidewalks are required in residential and commercial areas where deemed necessary by the Village Council upon the recommendation of the Village Manager.

**Sidewalk Specifications.** The design and construction specifications for public sidewalks shall be as determined by the Village of Lake Orion Engineering Design and Construction Standards adopted by the Village Council from time to time.

**Sidewalk Maintenance Responsibility.** The property owner is responsible for maintaining all sidewalks adjacent to their property to include frontage, rearage, and sideage, including removal of snow, ice, grass and weeds, debris, and other obstructions in accordance with the Village Charter, Code of Ordinances, and rules, regulations, and policies adopted by the Village Council. The property owner is responsible for all costs associated with such maintenance of abutting sidewalks. Property owners shall notify the Department of Public Works of any sidewalk defects as soon as discovered.

**Repair/Replacement of Sidewalks.** Any sidewalk that is in disrepair at the determination of the Village Manager or his designee shall be removed and replaced.

Sidewalk slabs that are lifted  $\frac{3}{4}$  inch or greater shall be patched within 48 hours of notification by the Department of Public Works. An asphalt patch is considered to be a temporary measure only. Likewise, property owners filling vertical displacements or cracks in sidewalks by “ramping” with mortar, asphalt, or other material is not considered a permanent repair. “Mud jacking” of sidewalk slabs will not be performed by the Village but may be done at the discretion of the property owner at the owner’s sole expense.

If deemed necessary by the Village Manager to repair or replace a sidewalk slab immediately, the property owner shall be notified and required to make such repairs in accordance with Village Charter Secs. 11.3 and 11.5 and Code of Ordinances Sec. 92.03 ordinance to make such repairs. The costs of such repairs or replacement, if completed by the Village, will be assessed in accordance with Chapters 11 and 12 of the Village Charter and Chapter 92 of the Village Code of Ordinances.

**Sidewalk Repair/Replacement Criteria Guidelines.** Sidewalks should not be required to be replaced on the basis of appearance only. The type and severity of the hazard presented needs to be considered.

Sidewalks should be replaced on the basis of an existing hazard and not on the basis of what may happen to the sidewalk in the future.

A combination of small defects that, when considered individually might not cause an area to be replaced, should cause replacement when occurring together.

If a concrete sidewalk does not exist through an asphalt driveway, new sidewalk shall be installed to provide continuity of the sidewalk facility.

**Conditions Justifying Sidewalk Installation or Replacement.** The Village Manager will recommend to the Village Council that sidewalk replacement be required in accordance with Sec. 11.3 of the Village Charter and Secs. 92.02 and 92.03 of the Village Code of Ordinances if the Village Manager determines that such conditions constitute a nuisance or hazard:

1. The sidewalk possesses temporary patch or ramping repairs.
2. The sidewalk exhibits differential elevations of one-half inch (1/2") or greater.
3. The sidewalk is cracked or broken with any of the following:
  - a. Sidewalk is broken into three or more pieces
  - b. Sidewalk exhibits cracks that are not tight and well-seated
  - c. Sidewalk exhibits crazing (alligator cracking)\_
  - d. Sidewalk exhibits deteriorating joints (at least four inches long by one inch wide at any point)
  - e. Sidewalk exhibits spalled areas (at least three inches along any one side)
  - f. Sidewalk exhibits pitting with any pit larger than one and one-half inch and at least a half inch deep)
  - g. Sidewalk exhibits surface deterioration consisting of severe scaling or popping causing a safety issue
4. Gaps in sidewalk exist in areas that are heavily traveled by pedestrians or are deemed by the Village to be in need of connection for community walkability and pedestrian safety purposes.

Sidewalks may exhibit more than one type of deficiency.

**Deterioration Description and Details.** Following are descriptions and details providing additional clarification on the types of sidewalk deterioration that may give cause for repair or replacement:

1. PITTING: Pitting in sidewalks occurs over time as individual stones break up through the freeze/thaw cycle leaving a void in the sidewalk surface. This type of deterioration in small amounts may not necessarily constitute a hazardous walking surface. In large quantities, however, these defects diminish the smooth walking surface, compromise the sidewalk's structural integrity, and contribute to poor drainage which propagates further pitting and surface defects.

2. **SCALING:** Scaling is the general loss of surface mortar exposed to freezing and thawing. The aggregate is usually clearly exposed and often stands out from the concrete. Scaling is primarily a physical action caused by hydraulic pressure from water freezing within the concrete and not usually caused by chemical corrosive action. When pressure exceeds the tensile strength of concrete, scaling can result if entrained-air voids are not present to act as internal pressure relief valves.
3. **SPALLING:** Spalling is a deeper surface defect than scaling, often appearing as circular or oval depressions on surfaces or as elongated cavities along joints. Spalls may be one inch or more in depth and six inches or more in diameter, although smaller spalls also occur. Spalls are caused by pressure or expansion within the concrete, bond failure in two-course construction, impact loads, fire, or weathering. Improperly constructed joints and corroded reinforcing steel are two common causes of spalls. If left unrepaired, spalls can accelerate pavement deterioration.
4. **POPPING OR POP-OUTS:** A pop-out is a conical fragment that breaks out of the surface of the concrete leaving a hole that may vary in size generally from ¼ inch to two inches, but up to as much as one foot in diameter. Usually, a fractured aggregate particle will be found at the bottom of the hole with part of the aggregate still adhering to the point of the pop-out cone. Most pop-outs appear within the first year after placement. Pop-outs caused by alkali-silica reactivity (ASR) may occur as early as a few hours to a few weeks, or even a year, after the concrete is placed. Pop-outs caused by moisture induced swelling may occur shortly after placement due to the absorption of water from the plastic concrete, or they may not appear until after a season or year of high humidity or rainfall or after the concrete has been exposed to freezing temperatures. Pop-outs are considered a cosmetic detraction and generally do not affect the service life of the concrete.
5. **DIFFERENTIALS:** Differentials typically occur at the joint between two sidewalk slabs. A differential consists of a lip or elevation difference at the joint and is measured along the vertical face of the joint. A differential sidewalk that exceeds ½ inch is a condition that warrants removal and replacement. The differential may have been caused by tree roots, trench settlement, or heavy weights placed on the sidewalk.

**Property Owner Costs.** The property owner is required to pay for all costs associated with the removal and replacement of defective sidewalk. This shall include inspections, contractor costs, and administration (percentage as established by ordinance or resolution of Council). Minor temporary repairs performed by the Department of Public Works (temporary patches or ramping) will not be charged to the property owner. Property owners shall pay for 100% of the cost of any repairs or replacement of sidewalk abutting the front, side, or rear of the property.

If the sidewalk is damaged from roots from a tree, shrub, or bush on private or public property, the property owner shall pay for 100% of the cost of repair or replacement.

Any objects, including but not limited to trees, shrubs, fences, poles, rocks, landscaping timbers, retaining walls, or other vegetation or improvements, within one foot of the existing or proposed sidewalk shall be removed at the Village's discretion at the sole cost of the property owner.

The property owner shall have two options for payment for sidewalk repair or replacement when such work is completed by the Village or its contractor:

1. Pay the amount due upon receipt of invoice.
2. Enter into a Special Assessment agreement. This option allows the property owner to make up to five annual payments with interest at six percent (6%) per year. Payments will be permitted beyond one year for each \$500 of assessment up to the maximum five-year repayment schedule (e.g., a \$1,500 assessment could be paid in three equal annual installments of \$500 plus interest accrued to date). Assessments will be levied and collected in accordance with Village Charter, ordinances, and policies.

If neither the invoice is paid nor the Special Assessment option selected, the unpaid balance for sidewalk improvements, together with accrued interest, will become a lien upon the property and will be placed on the next tax bill for collection in accordance with Village Charter and ordinance provisions.

All other assessment procedures and appeals processes will be subject to Village Charter and ordinance requirements.

**Village Costs.** The Village shall pay for all expenses associated with the patching, removal, and replacement of sidewalk handicap ramps at street intersections. In addition, the Village will pay 100% of the cost of any sidewalk repairs or replacement resulting from damage directly caused by a water gate valve or manhole. The Village will invoice other public utility companies if their facilities result in sidewalk damage and needed repairs or replacement. The Village reserves the right to utilize any lawful and appropriate funding source to cover its share of sidewalk repair or replacement costs, including but not limited to General Fund, Act 51 of 1951 Major and Local Streets funds, Water and Sewer funds, Community Development Block Grant (CDBG) funds, and other funding sources.

**Sidewalk Improvement Districts.** The Village will establish three or more Sidewalk Improvement Districts for the administration of the improvement program. Sidewalk improvements will be completed annually on a rotating basis so that one district is inspected and improved each year. The Public Works Director will prepare a Sidewalk Improvement District map periodically for Council approval based on the needs of the community and the ability of the Village to reasonably

manage and fund the program. The first district to be improved will be selected to the extent possible based on the greatest need for improvement and nuisance or hazard to the community.

**Sidewalk Improvement Fund.** Village Administration will establish a separate Sidewalk Improvement Fund to properly account for all revenues and expenditures relating to the perpetual sidewalk improvement program. The Village Council will initially appropriate \$\_\_\_\_\_ from the General Fund for transfer to the Sidewalk Improvement Fund to provide the initial funds for the program. All payments on special assessments and invoices from property owners, including interest payments, will be deposited into the Sidewalk Improvement Fund. Monies dedicated to the Sidewalk Improvement Program shall be used for no other purpose.

**Administrative Procedure.** The Village will follow the procedures outlined in the Village Charter and ordinances in administering the Sidewalk Improvement Program and special assessment processes.

By October 1 of each year, the Director of Public Works shall cause to be prepared and submitted to the Village Manager a report listing the sidewalk repairs, replacement, or new construction to be completed within the subsequent calendar year's scheduled Sidewalk Improvement District, with the report to include the affected properties identified by address and parcel ID number, description of the improvements proposed for each, the estimated cost for each property, and the total estimated cost of the district improvement project. A map identifying the affected properties and all improvements and new gap sidewalk construction will accompany the report. Existing sidewalk flags requiring repair or replacement shall be properly marked for later identification.

The Village Manager shall review the report and, if acceptable, present the same to the Village Council by the Council's first meeting in November for consideration for approval and commencement of the special assessment process.

After the special assessment needs public hearing is conducted by the Village Council, if the Village Council determines the need to proceed with sidewalk improvements, the Director of Public Works shall, in consultation with the Village Engineer, prepare the necessary project bid specifications and proceed to solicit bids in accordance with the Village's purchasing policy. After receipt of bids, the Director of Public Works shall submit the bid tabulation to the Village Manager, who shall cause a proposed special assessment roll to be prepared and shall present the same to the Village Council for review. If acceptable to the Village Council, Council will schedule a special assessment roll public hearing and give final approval to the project in accordance with Village Charter and ordinance provisions.

Upon approval of the special assessment roll, the Village Council will approve the contract for the sidewalk improvements.

The Village will endeavor to complete sidewalk improvements during July and August of each year. The Public Works Director shall be responsible to the Village Manager for the general management and supervision of the annual sidewalk improvement projects and the perpetual improvement program.

**Sidewalk Repair Program Warranty Policy.** The Village’s sidewalk improvement contractor shall provide, for a period of two (2) years from the date of approval of the final pay application, to repair any defect in all of the work done under the contract, either by them, their subcontractors, or their material suppliers, that may develop due to improper materials, defective equipment, or substandard workmanship. The Department of Public Works shall inspect the sidewalk work immediately prior to the expiration of the two-year warranty period, shall document any defects, and report the same to the contractor for repair. This sidewalk repair warranty requirement shall be included in the bid specifications and contract documents for the project.

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Section 5, Item A.

**Section 6.8 STREETS AND ALLEYS.**

Except, insofar as limited by state law and the provisions of this Charter, the Council shall have power to establish and vacate and use, and to control and regulate the use of its streets, alleys, bridges, and public places (whether such public places be located within or without the limits of the village) and the space above and beneath them. Such power shall include, but not be limited to, the proper policing and supervision thereof; to the licensing and regulation, or the prohibition of the placing of signs, awnings, awning posts, and other things which are of such nature as to impede or make dangerous the use of sidewalks or streets, upon or over the sidewalks or streets of the village; and the licensing and regulation of the construction and use of openings in the sidewalks or streets, and of all vaults, structures, and excavations under the same.

(Adopted 3-13-67)

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## § 92.01 DEFINITIONS.

For the purpose of this chapter, the following definitions shall apply unless the context clearly indicates or requires a different meaning.

**DOWNTOWN AREA.** The area bounded by the following streets:

- (1) On the west - M24 and Lapeer Street, both sides;
- (2) On the south - Paint Creek;
- (3) On the east - Slater Street, both sides;
- (4) On the north - Jackson Street, south side and Shadbolt, south side

**SIDEWALK.** The portion of the street right-of-way designed for pedestrian travel.

**SUPERINTENDENT.** The Superintendent of Public Works of the village.

(Ord. 8.01, passed 10-11-71; Am. Ord. 8.04, passed 2-12-07)

## § 92.02 INSPECTION.

The Village Manager shall have the responsibility of periodic inspections of sidewalks and shall make recommendations to the Council relative thereto.

(Ord. 8.01, passed 10-11-71)

## § 92.03 CONSTRUCTION.

(A) No person shall construct, rebuild, or repair any sidewalk except in accordance with the line, grade, slope and specifications established by the Superintendent nor without first obtaining permission from the Village Council.

(B) Whenever the Village Council shall determine that the public convenience or necessity requires that any sidewalk shall be built or rebuilt within the limits of the village, a resolution shall be passed by the Council directing and requiring that the sidewalk be built or rebuilt as the case may be, and ordering or requiring that the Street Superintendent shall with due diligence build or rebuild the sidewalk in accordance with the resolution.

(C) Within ten days after the passage of the resolution the Superintendent shall file with the Village Clerk an estimate in writing showing the number of square feet of sidewalk required to be built adjacent to each lot or parcel or parcels or land named in the resolution as provided for in division (B) of this section and shall cause a written or printed copy of the resolution, together with a copy of the estimate to be served on the owners of the lot or parcels of land abutting on the sidewalk. The notice and estimate shall be served by delivering a copy thereof to each of the owners of the lots or premises abutting on such sidewalk, and if such owner cannot be found in the village, the notice and estimate shall be left with the occupants, or family on premises, or with some member of the occupant's family of suitable age and discretion, and if any such lot or premises shall be unoccupied and the owner or owners thereof cannot be found in the village, then the notice and estimate shall be served by posting a copy of same in some conspicuous place on such lot or premises.

(D) The cost of building or rebuilding the sidewalk shall be paid by the property owner whose property is abutting on the sidewalk. The cost of building or rebuilding the sidewalk, or any portion thereof, may be levied on the lot or premises adjacent to land abutting the sidewalk as a special assessment which shall be a lien upon the lot or premises, the same as other special assessments and the Council may order the assessor of the village to spread the amount upon his roll as a special assessment on the lot, lots or premises and the same shall be collected in the same manner as other

village taxes; or the village may collect the amount from the owner or occupant of the lot in an action of assumpsit and such owner or occupant shall be liable for same, together with the costs of suit.

Section 5, Item A.

(E) In the event an owner of abutting property requests an approach by cutting the curb with or without crossing a sidewalk, same shall be done at the owner's expense in accordance with specifications established by the Village Council.

(Ord. 8.01, passed 10-11-71)

#### **§ 92.05 MERCHANDISE ON SIDEWALKS.**

No person, company or corporation shall use any of the sidewalk within the village for the storage, keeping or displaying thereon of any goods, wares, merchandise, produce provisions, vegetables, boxes, barrels or show cases except within the distance of three feet from the wall of the building used or occupied by such person, company or corporation in the business portion of the village.

(Ord. 8.01, passed 10-11-71)

#### **§ 92.08 SIGNS, AWNINGS AND CANOPIES.**

(A) No person, company or corporation shall put up, erect, keep, use or maintain on or in any sidewalk in the village, any post or fixture for the support of any sign, awning, canopy or advertisement or for any other purpose without first having obtained permission of the Village Manager.

(B) No person, company or corporation shall put up, erect, keep, maintain or use any awning for canopy of or over any sidewalk in the village extending a greater distance than eight feet from the wall or the side of the building to which the same is attached, or coming nearer than seven feet, five inches of the sidewalk underneath it, nor shall any curtain, fringe or other appendage be attached or be maintained, on any awning or canopy so that any part of it shall be within six feet, five inches of the sidewalk underneath it.

(Ord. 8.01, passed 10-11-71)

#### **§ 92.09 SIDEWALK OPENINGS.**

No person, company or corporation shall cut, keep or have any opening through any sidewalk over any area, vault or window without having the same safely and securely covered, all covering to be on level with the walks.

(Ord. 8.01, passed 10-11-71)

#### **§ 92.10 BARRICADES.**

It shall be unlawful for any person to remove any barricade, fence, railing, barrier or other obstruction erected to protect persons passing along the streets or alleys of the village at or near any crosswalk, pavement, sewer, or other village improvement that has been constructed, or that is in the course of being constructed or repaired or to remove or extinguish any light at or near the place or places where any such improvement is being made, or at or near any obstruction or dangerous place in the streets or alleys of the village.

(Ord. 8.01, passed 10-11-71)

#### **§ 92.13 SNOW AND ICE ON SIDEWALKS.**

(A) Owners, occupants and persons in control of any property shall be responsible for keeping all sidewalks adjoining the property clear of snow and ice as provided in this section. Ice shall be cleared by removal or application of sufficient quantities of deicing material or sand.

(B) Failure to remove snow or ice from a sidewalk for a period of 24 consecutive hours of this chapter.

(C) On sidewalks in the downtown area, accumulations of two or more inches of snow that falls and ice that forms, between the hours of 9:00 a.m. and 9:00 p.m., shall be removed immediately, with any snow that accumulates or ice that forms after 9:00 p.m. to be removed by 9:00 a.m. of the following day, with failure to comply with these requirements being a violation of this chapter.

(D) Upon a violation of a requirement of this section, in addition to and without regard to whether the violation is pursued as provided in § 92.32, the Village Manager may cause all snow and ice to be cleared and removed from the sidewalk, at the expense of all persons responsible, with payment of the village's actual and administrative costs and expenses incurred in doing so to be a joint and several debt to the village by all of the persons responsible, which shall be paid in full within 30 days of the village's billing to those persons, and which shall be secured by a lien on the property adjoining the sidewalk from the time the snow and/or ice is cleared and removed by the village.

(Ord. 8.01, passed 10-11-71; Am. Ord. 8.04, passed 2-12-07)



## § 92.26 SPACING OF SHADE TREES.

(A) Future planting of shade and ornamental trees in the streets, parks and public places of the village may be done by the village upon payment of certain fees and charges and in accordance with such rules and regulations as may be established by the Village Council in so far as such rules and regulations do not conflict with any other provisions of this subchapter.

(B) No future planting of shade and any other ornamental trees or shrubs in the streets, parks and public places by owners or anyone employed by them shall be permitted without the approval of the Village Manager and in compliance with the following rules as to spacing:

- (1) Elm trees shall be spaced not less than 35 feet;
- (2) Oak trees not less than 30 feet; and
- (3) Other shade trees and ornamental trees not less than 25 feet.

(C) However, any owner of a single lot may in order to provide a shade or ornamental tree in front of his lot, secure special permission from the village to plant a shade or ornamental tree within a lesser distance from an existing tree than the spacing mentioned in division (B) of this section, but shall in no case make a special planting within 20 feet of an existing shade or ornamental tree located in the street or other public place.

(D) No tree shall be planted in the parkways, between the curb and sidewalks less than three and one half feet from the curb line, nor less than three feet from the sidewalks; provided however, when the parkways are less than six feet, six inches in width, any trees planted therein shall be located not less than two feet, six inches from the curb and as near midway between the curb and sidewalk as possible. No trees shall be planted nearer to the intersection of any streets than 20 feet from the corner of such intersection.

(Ord. 8.01, passed 10-11-71)



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Construction  
Standards

Section 5, Item A.

## CHAPTER SIX

### DESIGN AND CONSTRUCTION STANDARDS FOR STREETS, DRIVEWAYS, PEDESTRIAN FACILITIES AND PAVING

#### SECTION 6-1 INTENT

It is the intent of this chapter to provide the Applicant with a guide for the design and construction of streets, driveways, pedestrian facilities (i.e. bike paths, safety paths, sidewalks, and other non-motorized trails) and all other private paved surfaces such as parking lots.

#### SECTION 6-2 JURISDICTION

Any work proposed within the existing rights of way of the Village, Road Commission for Oakland County (RCOC) or the Michigan Department of Transportation (MDOT) is to be reviewed and approved by the respective agency that has jurisdiction over the subject right of way.

Any roads within the Village Corporate limits intended to be publicly dedicated are to be reviewed and approved by the Village prior to construction. Plans must be submitted to the Village for review by the Village Engineer in accordance with the Village's established plan submission requirements. Acceptance of the roadway into the Village road system upon completion is a requirement of final project approval. In order for the constructed roadway to be accepted by the Village, appropriate legal conveyance documents including legal descriptions, must be prepared by the Applicant for review and approval by the Village Engineer and Village Attorney.

While RCOC and MDOT will issue construction permits for work within their respective rights of way and their standards will dictate design improvements within their respective jurisdictions, the Village reserves the right to require additional plan provisions or paving requirements above those required by the governmental agency having jurisdiction.

#### SECTION 6-3 GENERAL

It is the intent of the Village to encourage paving layouts and street designs that preserve natural features by minimizing the clearing and mass grading required to construct streets, parking lots, pedestrian facilities, etc. Paving designs should meet current AASHTO standards.

#### SECTION 6-4 REFERENCE TO STANDARDS

1. Public roads shall be designed and constructed to current AASHTO standards.
2. Private roads, where permitted by the Village, shall be designed and constructed in accordance with sound engineering principles, taking into consideration public health, safety, and welfare, as well as preservation of natural resources. At a minimum, current AASHTO design standards applicable to appropriate traffic volumes shall be adhered to.
3. Off-street parking shall be designed in accordance with the current Village Zoning Ordinance and the specifications herein.

## CHAPTER SIX

4. Sidewalks shall be designed and constructed in accordance with the Americans with Disabilities Act (ADA) barrier free specifications. The more strict interpretation between these standards and ADA shall apply.
5. Non-Motorized Pedestrian Paths such as safety paths, bike paths, paved nature trails, etc. shall be designed and constructed to current AASHTO "Guide for the Development of Bicycle Facilities" and ADA "Outdoor Recreational Trails" standards except where modified herein. The more strict interpretation between these standards and AASHTO and ADA shall apply.

### SECTION 6-5 DESIGN CONSIDERATIONS

#### 1. STREETS

##### A. Layout

1. Street layout shall provide for the continuation of existing major or collector streets in surrounding areas or conform to the development plan approved by the Village.
2. Certain streets, public or private, as designated by the Village, shall be extended to the limits of the property to be developed to provide future connection with adjoining undeveloped land.
3. Proposed streets shall be designed in accordance to the existing topography and produce a reasonable gradient.
4. Service entrances and drives shall be permitted to provide a secondary means of access for service and safety vehicles, provided that appropriate signage limiting usage shall be established as required by the Village.
5. Street jogs with centerline offsets of less than 125 feet shall be approved by the Village only upon an adequate demonstration that there are no reasonably feasible alternatives.
6. Alleys and half-streets are prohibited except where absolutely essential to the reasonable development of the property in conformance to these Standards and the Zoning Ordinance and as reviewed and approved by the Village on a case by case basis.

##### B. Right of Way Requirements

1. New public road rights of way shall meet minimum Village standards, subject to review by the Village Engineer.
2. Private roads, where permitted, shall be contained within a dedicated easement for ingress and egress. The easement widths shall be as necessary to accommodate paving and drainage improvements.

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## C. Geometrics

1. Existing public roads or roads intended on being publicly dedicated shall meet the width standards of the Village.
2. The paved surface width of private roads shall be as necessary in order to accommodate vehicle access, planned on-street parking, and safe vehicular maneuverability, subject to review by the Village Engineer.
3. Pavement widths for each side of a boulevard shall, at a minimum, accommodate 1-way traffic. Island widths shall typically be ten (10') to sixteen (16') feet. The nose of the island shall be twelve (12') feet from the edge of pavement of the intersecting street.
4. Private road grades shall be typically eight (8%) percent or less. Where essential to maintain natural features, grades exceeding eight (8%) percent may be permitted, provided AASHTO Standards applicable to the proposed design volumes are met as a minimum. The grade shall not exceed three (3%) for a minimum distance of one hundred (100') feet from the edge of all existing public road rights of way.
5. Vertical curves shall be required for all grade changes in excess of one (1%) percent and shall meet AASHTO standards for public roads, and private roads, where permitted, factoring in the applicable design traffic volumes.
6. For public roads, the minimum sight distance for vertical curves shall be six hundred (600') feet for all major roads and three hundred (300') feet for all other streets. For private roads, current AASHTO Standards applicable to proposed traffic volumes as a minimum shall apply.
7. For public roads, road centerlines that deflect more than ten (10) degrees but less than ninety (90) degrees shall be connected with a horizontal curve radius with a minimum radius of two hundred thirty (230') feet. Actual radii, subject to the above minimum, shall be designed for the posted speed of the road and in accordance with AASHTO standards. For private roads, current AASHTO Standards applicable to the proposed design traffic volume as a minimum shall apply.
8. Streets intersecting major thoroughfares shall do so at approximately ninety (90) degrees.
9. Cul-de-sac lengths shall not exceed 1,000 feet. Intermediary turn-a-rounds or other available means to provide fire truck maneuverability shall be required approximately half way along the street if the total length exceeds 1,000 feet.
10. Acceleration, deceleration and passing lanes for approaches to existing roads shall be required as determined by Village Administration with recommendations provided by the Village Engineer based upon such criteria as traffic volumes, accident data,

Adopted: 08-12-13

Design and Construction Standards  
Village of Lake Orion

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horizontal and vertical alignment, site distance, land use, topography and other natural conditions. Where required, acceleration, deceleration and passing lanes shall be constructed to AASHTO standards.

11. Streets shall be crowned with 2 percent transverse slopes provided from the centerline to the edge of the road.
12. The proposed street cross section shall include shoulders with open ditch drainage or curb and gutter with an enclosed storm sewer system.

### 2. DRIVEWAYS

- A. Unless determined by the Village, property shall be developed to minimize the number of ingress/egress points from an existing or proposed road.
- B. Use of shared or common driveways for all developments, including between two businesses is encouraged.
- C. Maximum driveway grades shall be ten (10%) percent.
- D. All driveway approaches to a roadway shall not exceed 1.5% for a distance of twenty-five (25') feet from the edge of the roadway, unless existing site topography dictates a steeper grade. In such cases, the safety of access must be considered in the final driveway grade.
- E. Driveways to individual residential lots shall be surfaced as required by the Zoning Ordinance.
- F. Driveways within the public road right-of-way are to be built to the same standards as a road with the same surface.
- G. Driveways to commercial, industrial, multifamily, institutional, etc. developments shall be surfaced in accordance to the requirements herein specified for Streets.

### 3. PEDESTRIAN FACILITIES

#### A. General

1. Pedestrian facilities are to be installed as required by the Village Zoning Ordinance.
2. Where topography, vegetation, natural features, utilities, poles, signs etc. dictate, the pedestrian facilities shall be meandered around these features.
3. Barrier free ramps shall be installed in accordance with current ADA barrier free requirements and MDOT specifications at all intersections with driveways, roads, parking lots etc.

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4. Pedestrian facilities installed outside of the right of way will require a dedicated easement.
5. Proper signage for the pedestrian facilities shall be the Applicant's responsibility.

## B. Sidewalks

1. The sidewalk shall be sloped to provide for positive drainage of storm water off of and away from the path.
2. Sidewalks shall be concrete with a mix design suitable to achieve a strength requirement of 3500 psi at 28 days.
3. Concrete sidewalks shall be four (4") inches thick non-reinforced except at driveways and approaches where they shall be six (6") inches thick non-reinforced for residential applications or eight (8") inches thick non-reinforced for commercial applications, extending ten (10') feet past the edge of drive pavement or back of curb. The mix design shall meet current MDOT standards. The concrete shall be placed on a prepared granular compacted subgrade void of all unstable soils. If native soils are not granular, then a six (6") inch thick granular Type II sub base shall be provided.
4. Sidewalks shall be no less than four (4') feet wide.
5. Gaps or joints must not be wider than one-half of an inch (1/2") and run perpendicular to the traveled path.
6. Transverse slope of sidewalks shall not exceed two (2%) percent.
7. Longitudinal grade (running grade) shall be as follows: up to five (5%) percent for any length, maximum 8.33% for up to 200 feet.
8. Resting intervals (landings) shall be required where the running grade exceeds the maximum length as specified in No. 7 above. Resting intervals shall be minimum five (5') feet in length and match the width of the sidewalk. The longitudinal grade shall not exceed zero (0%) percent.

## C. Pedestrian, Bicycle, Safety or Non-Motorized Paths (referred herein as paths)

1. Paths shall be sloped to provide for positive drainage of stormwater off of and away from the path.
2. Paths shall meet the following criteria for the type of material approved by the Village:

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- a. Three (3") inch thick bituminous on a six (6") inch thick aggregate base. Mix designs shall meet current MDOT standards, subject to approval by the Village Engineer.
  - b. Concrete meeting specifications as outlined in paragraph 3.B.3 above.
  - c. Six (6") of 21AA aggregate compacted to 98% density to provide a firm and stable surface. Provisions for long-term maintenance of gravel paths shall be incorporated in the development deeds, bylaws, or other legal document approved by Village Administration.
  - d. Alternative materials as approved by Village Administration.
3. Gaps or joints must not be wider than one-half of an inch (1/2") and run perpendicular to the traveled path.
  4. Transverse slope of paths shall not exceed two (2%) percent.
  5. Longitudinal grade (running grade) shall be as follows; up to five (5%) percent for any length, 8.33% for up to 200 feet, without a landing. Gravel paths cannot exceed three (3%) percent for any distance.
  6. Resting intervals (landings) shall be required where the running grade exceeds the maximum length as specified in No. 7 above. Resting intervals shall be at minimum five (5') feet in length and match the width of the sidewalk. The longitudinal grade shall not exceed zero (0%.) percent.

### 4. PAVING

- A. All areas required to be hard surfaced under the Village Zoning Ordinance shall be surfaced with Bituminous Asphalt or Concrete pavement in accordance with the following minimum cross sections:
  1. For residential driveways, private parking lots and storage areas not subject to heavy equipment loads, the required pavement section shall consist of three (3") inches of bituminous asphalt pavement over eight (8") inches of compacted MDOT 22A (or alternate six (6") inches of compacted MDOT 21AA) aggregate on existing sand subgrade. For commercial or industrial driveways, private roads, and storage areas subject to heavy equipment loads, the required pavement section shall consist of four (4") inches of bituminous asphalt pavement over ten (10") inches of compacted MDOT 22A (or alternate eight (8") inches of compacted MDOT 21AA) aggregate on existing sand subgrade. For all pavement on an existing clay subgrade, a minimum of four (4") inches of compacted MDOT Class II subbase or four (4") inches of additional aggregate base material shall be provided. For private developments, all access drives and internal routes to loading areas, dumpsters, equipment storage areas, or any other

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areas subject to traffic loading by heavy non-passenger type vehicles, the Applicant shall be required to install the thicker pavement cross-section as outlined above.

2. Alternate deep strength bituminous asphalt or concrete pavement designs will be considered on a case by case basis provided adequate engineering data is made available demonstrating equal structural stability and longevity to the section as outlined under Paragraph 1 above. However, at no time, will the thickness of deep strength bituminous pavement be less than seven (7") inches or concrete pavement be less than six (6") inches.
  3. All proposed pavement sections are subject to review and approval by Village Administration.
- B. All pavement surfaces must be supported upon a prepared subgrade that is properly drained and has been compacted to MDOT standards. When unstable subgrade materials (i.e. peat, muck, marl, wet clays, etc.) are encountered, excavation and removal of such unstable materials and replacement with suitable engineered fill compacted in place shall be required. Fill materials shall be approved by the Village Engineer. Where the removal of unstable soils is not feasible due to excessive depths, an alternative pavement section must be submitted to Village Administration for review. Soil stabilization measures such as geotextile fabric, geotensile reinforcement products, etc may be required to provide a paved surface that meets the intent of this standard.
- C. Maximum parking lot grades shall be six percent.
- D. Parking lots shall be of the size and configuration as required in the Village Zoning Ordinance.

### SECTION 6-6 PLAN REQUIREMENTS

#### 1. PLAN VIEW

- A. Road and right-of- way width must be shown on the plans.
- B. Cross sections of all pavement sections shall be provided, including surface, subbase, and a shoulder and ditch profile.
- C. All parking lots, loading spaces, and driveway layouts, along with typical dimensions and layouts of parking spaces shall be shown.
- D. Entrance, intersection, and cul-de-sac details must be shown.
- E. Existing grade elevations at the center of the proposed roadway curbed in fifty (50') foot intervals or as need to accurately demonstrate proposed plan.
- F. Complete mix design for asphalt or concrete shall be given.
- G. The location of any proposed or existing utilities and structures within the proposed right of way.

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- H. Provisions for the removal of any unsuitable soils including peat, muck, and marl, as well as brush, trees, tree stumps, and similar material from the full width of the roadway.
  - I. Any proposed culverts (driveway or cross) including size, type and invert elevations.
  - J. Proposed and existing parking lot and driveway grades.
  - K. Legal descriptions for the road right of way for public roads and ingress and egress easements for private roads must be provided.
  - L. Sight distances must be provided.
2. PROFILE VIEW
- A. Elevations at top of curb or centerline if not curbed in fifty (50') foot intervals or as need to accurately demonstrate proposed plan.
  - B. Existing grade elevations at the center of the proposed roadway curbed in fifty (50') foot intervals or as need to accurately demonstrate proposed plan.
  - C. Station and elevations of all high and low points, grade breaks, curb returns, intersecting property lines and vertical curve information.
  - D. The station and elevation of the rim grade of all drainage structures.

### SECTION 6-7 CONSTRUCTION PROVISIONS

#### 1. CONCRETE

No aggregates shall be used which have become mixed, while in storage, with foreign material. Frozen aggregates or aggregates containing frozen lumps shall be thawed before use.

Fine aggregate shall consist of natural sand. It shall be composed of clean, hard, strong, durable, uncoated grains and shall conform to current Standard Specifications 2NS for fine aggregate for Portland cement concrete pavement of the Michigan Department of Transportation (M.D.O.T.).

Coarse aggregate shall be crushed stone, rock, gravel or blast furnace slag weighing not less than 75 pounds per cubic foot in accordance with AST C-29, and shall be composed of hard, sound, uncoated pieces conforming to Michigan Department of Transportation designation 6A.

Cement shall be Air-Entraining Portland Cement, Type 1A conforming to ASTM C150. Air-Entraining Portland Blast-Furnace Slag Cement, Type IS-A conforming to ASTM C595 or High-Early-Strength Air-Entraining Portland Cement, Type IIIA conforming to ASTM C150.

The water used in mixing or curing concrete shall be clean, clear, and reasonably free of oil, salt, acid, alkali, sugar, vegetable, organic or other matter or substance injurious to the finished

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product. If the water is of questionable quality, it shall be tested in accordance with AASHTO T-26.

Air-entraining agents shall conform to the requirements of ADTM C-260. Air-entraining agents shall have proven compatibility with all local concrete materials, including cement, and shall be capable of providing in the concrete the required air contents and an air-void system known to produce durable, scale-resistance concrete.

Water-reducing admixtures shall conform to the requirements of ASTM C-494, Type A. Water-reducing retarding admixtures shall be used only when specified or authorized, in which case they shall conform to the requirements of ASTM C-494, Type D. When conditions warrant, Village Administration may allow or require the use of an accelerator conforming to the requirements of ASTM C-494 for chemical admixtures or ASTM D-98 for calcium chloride.

The proportioning of concrete mixtures shall be based upon the water-cement ratio.

All concrete must be placed using forms built to current standards.

The subgrade under the forms shall be compacted and cut to grade so that the form when set will be uniformly supported for its entire length at the specified elevation. All forms shall be cleaned and oiled each time they are used.

Forms shall not be removed from freshly placed concrete until it has set for 12 hours unless slipform is used. The forms shall be carefully removed so that no damage will be done to the pavement.

The concrete shall be mixed in quantities required for immediate use and shall be deposited on the subbase in such a manner as to require as little rehandling as possible. Necessary hand spreading shall be done with shovels, not rakes.

The sequence of finishing operations shall be the strike-off and consolidation, floating, if necessary, straightedging, and final surface finish. The pavement shall be struck off and consolidated with a mechanical finishing machine, vibrator strike board, or by hand-finishing methods when approved by the engineer.

In general, adding water to the surface of the concrete to assist in finishing operations shall not be permitted. If it is permitted, it shall be applied as a fog spray with approved spray equipment.

Before final finishing is completed and before the concrete has taken its initial set, the edges of the slab and curb shall be carefully finished with an edge of the radius shown on the plans.

The final surface of the concrete pavement shall have a uniform gritty texture true to the grades and cross-section shown on the plans.

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Concrete shall be cured by protecting it against loss of moisture, rapid temperature change, and mechanical injury for at least three (3) days after placement.

All longitudinal and transverse joints shall conform to the plans, specifications, and standard details.

All joints shall be constructed true to line with their faces perpendicular to the surface of the pavement.

Sealing of joints shall be completed before the pavement is opened to traffic and as soon after completion of the curing period as is feasible. Just before sealing, each joint shall be thoroughly cleaned of all foreign material, including membrane curing compound, and the joint faces shall be cleaned by means of sand blasting and thoroughly blown out with a stream of compressed air and surface-dry when the seal is applied. Material for seal shall be stirred during heating to prevent localized overheating. Joint sealing material shall not be placed when the air temperature in the shade is less than 50 deg. F.

The Contractor shall take such precautions as are necessary to protect the concrete from rain damage.

Casting of concrete during hot weather shall be limited by the temperature of the concrete at the time of placing. Concrete shall not be cast when the temperature of the concrete is above 90 degrees F.

No concrete shall be placed unless the temperature of the air in the shade and away from artificial heat is at least 20 degrees F. and rising.

The Contractor shall employ whatever measures are necessary to prevent damage to the work and shall be responsible for the concrete placed during cold weather. Any concrete injured by frost action, as determined by the Village Engineer, shall be removed and replaced at the Contractor's expense.

All materials proposed to be used may be inspected and tested at any time and at any place during their preparation, storage and use. All tests of materials will be made in accordance with methods as described or designated in the specifications. All rejected materials shall be removed immediately from the job site.

The project under construction, or any section thereof, shall not be opened to traffic until so directed or authorized by the Village.

### 2. CONCRETE CURB AND GUTTER

This work shall consist of constructing portland cement concrete curb, gutter or combination curb and gutter, with or without steel reinforcement as provided on a prepared base. The construction shall follow the construction of concrete base course or concrete pavement but

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shall be in advance of the construction of non-rigid types of pavement or base course. The materials and construction shall be as specified in MDOT Specification Section 6.09.

### 3. REINFORCEMENT

When steel reinforcement or tie bars are called for on the plans, the bars shall be properly spaced and held in the correct position during the placing of concrete by the use of bar chairs or other approved devices. Bars shall be lapped at least ten (10") inches unless otherwise shown on the Plans. Reinforcement bar materials shall be in accordance with current MDOT standards.

### 4. BACKFILLING

After the concrete has sufficiently cured, the curb, gutter or combination curb and gutter, shall be backfilled to the required elevation with approved material, which shall be compacted and left in a neat and workmanlike condition.

### 5. AGGREGATE SHOULDER

The subgrade for the shoulders shall be graded to an elevation below the finished surface that will permit the placing of the specified thickness of shoulder material.

The aggregate shall be placed on the prepared subgrade to such a depth that the compacted layer will be not more than five (5") inches thick. Where the completed shoulder is to be more than five (5") inches thick, it shall be constructed in two or more courses. The aggregate shall be deposited on the shoulders by means of an approved mechanical spreader. On irregular areas where the use of a mechanical spreader is not practical, the use of hand tools or power grading equipment will be approved for spreading and shaping of the shoulder material.

Dumping the aggregate on the road and grading it onto the shoulder will not be permitted.

The aggregate shall be compacted to not less than 100 percent of the maximum unit weight, by the use of pneumatic-tired compaction equipment or vibrator compactors.

The rolling and compacting operation shall be performed immediately after the shoulder material has been spread. Water shall be applied as needed, to aid in the compaction and shaping of the surface. The water shall be applied by means of approved sprinkler equipment.

### 6. BITUMINOUS PAVING

The bituminous mixture required shall be as specified on the plans. The bituminous mixture shall be designed to meet the applicable requirements for stability, flow, voids in mineral aggregate (VMA) and air-voids, all as specified in current MDOT standards. The aggregates, mineral filler (if required) and asphalt cement shall be combined as necessary to produce a

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mixture proportioned within the master gradation range limits as included in current MDOT standards.

For bituminous base course mixtures required to be placed directly on the sub-grade or sub-base, the density, grade, and cross-section shall meet the approval of Village Administration prior to placement of any mixture. The sub-grade or sub-base shall meet the specified tolerances for grade and elevation and shall be compacted to not less than 95% of maximum density as determined by ASTM Method D-1557 for a depth of not less than nine (9") inches. If a prime coat is specified, it shall be placed at a rate of 0.25 gallons per square yard. Before placing the prime coat, the surface shall be clean and free from excessive moisture. Under no circumstances shall pools or excess bituminous prime coat material be allowed to remain on the surface. The prime coat shall be properly cured before placing the bituminous mixture, but in no case less than 24 hours.

Prior to placing the bituminous mixture on the aggregate base, the finished surface shall be shaped to line and grade within a tolerance of +/- 3/8 inch, unless otherwise specified. The aggregate base course shall be compacted for its full depth to not less than 98% of maximum density as determined by ASTM D-1557. The aggregate surface shall be maintained in a smooth, compacted condition and in close conformity to line, grade, and cross-section. No bituminous material may be placed until the aggregate surface has been inspected and approved by Village Administration.

Catch basin and manhole covers, monument boxes, and water shutoffs shall be adjusted in accordance with current MDOT procedures or under the specific specifications within the approved site plan.

Before placing any bituminous mixture, the surface of the pavement and paved shoulders, if applicable, shall be thoroughly cleaned of all dirt and debris using a method approved by the Engineer. This work shall also include routine blowing, with compressed air, of the joints and cracks to remove loose material. The Contractor shall not place any bituminous mixture until the condition of the pavement to be resurfaced has been inspected and approved by the Village Engineer or the agency having jurisdiction over the road. Existing bituminous patches with a high bitumen content, cold patches, or any patches which may cause an unsatisfactory performance of the overlay shall be removed. Prior to placing of an intermediate or surface course, the underlying or level course shall be cleared of all foreign or objectionable matter and debris with power blowers, power brooms, or hand brooms.

Hand patching consists of filling holes and depressions in the existing pavement and replacing patches. The patches shall be compacted in maximum three (3") inch lifts to a grade which is approximately 1/8 inch above the adjacent pavement surface by use of a machine vibrator or approved roller.

A bond coat shall be applied to the prepared surface of the existing pavement and/or the previously placed layer of bituminous mixture and to the vertical edge of the adjacent pavement and structures. The rate shall be 0.10 gallons per square yard or less. The bond coat shall be

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applied ahead of the paving operation for a distance of at least 1500 feet, depending upon traffic conditions, as determined by the Village Engineer. The bituminous mixture shall not be placed until the bond coat has cured.

The bituminous mixture shall be placed by an approved self-propelled mechanical paver to such a depth that when compacted, it will have the thickness specified on the approved plans. Pavers will be required to have an automatically controlled and activated screed and strikeoff assembly except when placing mixtures for 1) variable width sections; 2) the first course of a base course mixture on a sub-grade or on a sand sub-base; 3) base course mixtures for shoulders and widenings less than 10.5 feet in width; or, 4) top and leveling course mixtures for shoulders and widenings less than 8 feet in width.

When necessary to take out irregularities in the existing road surface, wedging with bituminous mixture shall be done by placing several layers with the paver, or as directed by the Village Engineer. Any corrections made to the foundation by wedging with bituminous material shall be placed, compacted, and allowed to cool prior to placing base, leveling, or top course mixtures.

Bituminous base course mixtures shall not be placed in lifts exceeding three (3") inches, compacted.

The base may be opened to traffic for a period of time to be determined by the Village Engineer and Administration prior to placing of the surface.

When placing the bituminous top course, or the top two (2) courses of multi-level pavement on the traveled portion of the roadway, the paving operation shall be conducted in a combination of widths which will cause the final course longitudinal joint lines to coincide with the proposed painted lane lines.

When the temperature of the previously placed mat falls below 170°F prior to placement of the adjacent mat, the vertical edges of the initial mat shall be coated with bituminous bond coat material before the mixture is placed on the adjacent section. In placing the mixture adjacent to all joints, hand raking or brooming will be required to provide a dense smooth connection.

When placing the bituminous mixture in a lane adjoining a previously placed lane, the mixture shall be placed such that it uniformly overlaps the first lane by two (2") to four (4") inches and is placed at a height above the cold mat equal to the breakdown roller depression on the hot mat.

A sufficient number of experienced shovelers and rakers shall follow the spreading machine, adding hot mixture and raking the mixtures as required to produce a course that, when completed, will conform to all requirements specified herein. Broadcasting or fanning of mixture over areas being compacted will not be permitted. When segregation occurs in the mixture during placing, the spreading operation shall be suspended until the cause is determined and corrected.

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In areas where the use of machine spreading is impractical, the mixture shall be spread by hand. Spreading shall be in a manner to prevent segregation. The mixture shall be spread uniformly with hot shovels and hot rakes in a loose layer of a thickness that, when compacted, will conform to the required grade and thickness. During hand-spreading, each shovel full of mixture shall be carefully placed by turning the shovel over in a manner that will prevent segregation. In no case shall the mixture be placed by throwing or broadcasting from a shovel.

Each layer of bituminous mixture shall be compacted to the required density. Except for base and leveling courses used for overlays, steel 3-wheeled rollers may be used for initial compaction immediately following the paver. On base and leveling courses used for overlays, pneumatic-tired rollers shall be used for initial compaction immediately following the paver except where severe mat displacement takes place, in which case, a steel-wheeled roller shall be used for breakdown followed by a pneumatic-tired roller.

The final rolling operation on each layer of bituminous mixture placed shall be accomplished by use of tandem steel-wheeled rollers. Vibratory rollers shall be operated in the static mode when used for finish rolling or pinching the joint. Pneumatic-tired rollers will not be permitted on top courses. Steel rollers wheels shall be kept properly moistened with water but usage of an excess is prohibited. Pneumatic-tired rollers shall be wiped down, off the paved surface, with fuel oil prior to rolling.

Rolling of the mixture shall begin as soon after placing as it will bear the roller without undue displacement, picking up the mat or cracking. Rolling can start longitudinally at the extreme sides of the lanes and proceed toward the center of the pavement, overlapping on successive trips by at least half the width of the drive wheel of the roller. Alternate passes of the roller shall be of slightly different lengths. The maximum roller speed shall not exceed the manufacturer's recommended speed for the type of mixture or thickness of layer being placed.

When compacting an adjoining lane, the longitudinal joint shall be rolled first with the roller supported mainly on the cold lane with three (3") to six (6") inches of the roller extending onto the freshly placed bituminous mixture.

Pneumatic-tired rolling of longitudinal joints shall overlap the hot joint. Pneumatic-tired rollers shall not mark or rut the surface or displace the pavement edges. The pneumatic-tired roller shall be ballasted to obtain the required ground-contact pressures. In order to obtain a uniformly textured mat and the desired in-place density, the Contractor shall raise or lower tire pressures at any time during the rolling operations. The roller operations shall be conducted in such a manner as to prevent scuffing or chatter marks in the pavement surface. The number of passes made by the pneumatic-tired roller shall not be less than two round trip passes over each area.

In all places not accessible to the roller, the hot mixture shall be compacted by hand-tampers. Skin patching on an area that has been rolled will not be permitted. Any mixture that becomes contaminated, or is in any way defective, shall be removed, replaced with hot mixture, and compacted to the density of the surrounding area.

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When the placement rate exceeds 800 square yards per hour, a separate finish roller shall be used in addition to the roller(s) used in establishing the rolling procedure. Roller speeds shall not exceed those established by the rolling pattern. Rolling shall proceed continuously until the required in-place density is attained. This density shall be not less than 97% of density of laboratory compacted specimens of the same mixture, using the Marshall Method with 50 blows per side. If specified on the plans, the compaction of the bituminous mixture may be controlled by the MDOT Nuclear Gage Method, in which case requirements of MDOT Section 4.00.11 will apply.

Finish rolling shall continue until all roller marks are eliminated. No traffic shall be allowed on the surface being placed until rolling has been completed and the surface has cooled sufficiently to prevent damage from traffic.

After final rolling, the surface may be tested using a 10 foot straight-edge at selected locations shall not have a variation of the surface from the testing edge of the straight-edge between any two contacts with the surface exceeding 1/4 inch. Variations in excess of the specified tolerance shall be corrected.

Joints between old and new pavements or between successive day's work, or joints that have become cold because of delay, shall be made carefully to insure continuous bond between old and new sections of the course. All joints shall have the same texture, density, and smoothness as other sections of the layer. Contact surfaces of previously constructed pavements that have become coated with dust, sand, or other objectionable material shall be cleaned by brushing or cut back with an approved power saw, as directed. The surface against which new material is to be placed shall be sprayed with a thin, uniform tack coat of bituminous material. The material shall be applied far enough in advance of placement of the fresh mixture to insure adequate curing. Care shall be taken to prevent damage or contamination of the sprayed surface.

The roller shall pass over the unprotected end of freshly placed mixture only when placing of the layer is discontinued or when delivery of mixture is interrupted to the extent that unrolled material may become cold. In all cases, the edge of the previously placed layer shall be cut back to expose an even, vertical surface for its full thickness. In continuing placement of a strip, the mechanical hot mixture will be spread to obtain a joint after rolling which conforms to the required density and smoothness specified. When required, the fresh mixture shall be raked against the joints, thoroughly tamped with hot tampers, and smoothed with hot irons and rolled.

Longitudinal joints in surface course or leveling course shall be so placed that the joint will be offset from that of any underlying course by at least 1 foot. Edges of previously placed strips that have cooled or are irregular, honeycombed, poorly compacted, damaged, or otherwise defective, and unsatisfactory sections of the joint shall be cut back to expose a clean, sound surface for the full thickness of the course as directed. When required, fresh mixtures shall be raked against the joint, thoroughly tamped with hot tampers, smoothed with hot irons, and rolled.

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Bituminous material shall not be applied when rain is threatening or when the temperature in the shade is lower than 60 deg. F.