CITY OF ROCHESTER HILLS

ENGINEERING DESIGN STANDARDS

CHAPTER 6

Road Paving

A. Plans & Specifications – Submittal Procedure

1. The plans and specifications shall be prepared in accordance with ~~section~~ Chapter 1, *General Requirements and Submittals*.

2. Paving designs, including soil borings (minimum of five feet (5') deep) may be required with particular paving submittals.

B. Requirements for New Public Roadways

1. Paving width and thickness shall conform to the following requirements for public roadways.

   a. Concrete roads shall be eight inches (8") 3,500 psi concrete over four inches (4") 21AA aggregate base coarse materials (crushed limestone or crushed concrete). Alternate recycled asphalt product (RAP) base course materials may be considered upon approval of the City Engineer. Alternate RAP materials must meet equivalent structural strength of 21AA aggregate (crushed limestone or concrete).
   Extend four inches (4") of base coarse material to one foot (1'). beyond edge drain.
   All industrial subs shall be constructed with concrete to meet all weather conditions.

   b. Asphalt roads shall be ~~8~~ nine inches (9") deep strength asphalt over six inches (6") of 21AA aggregate base coarse materials (crushed limestone or crushed concrete). Alternate recycled asphalt product (RAP) base course materials may be considered upon approval of the City Engineer. Alternate RAP materials must meet equivalent structural strength of 21AA aggregate (crushed limestone or concrete). ~~natural aggregate limestone~~. The ~~eight~~ nine inches (9") shall consist of two inches (2") of HMA 13A (wearing), two inches (2") HMA 3C (leveling), five inches (5") HMA 2C (base course). Extend six inches (6") base coarse material to one foot (1') beyond edge drain.

2. Other alternative paving and drainage designs may be submitted to the Department of Public Services for consideration, following review and recommendation by the City's Engineer, in limited areas where such alternative paving and drainage designs would be more consistent with the character and construction of existing paving and drainage facilities in the area. Such alternative paving and drainage facilities shall only be acceptable in those instances where the City finds that the proposed design will provide an acceptable level of serviceability, ease of maintenance, and facility life, consistent with public paving and drainage facilities in similar areas, elsewhere in the City.

3. The minimum radius of cul-de-sacs is as follows.

a. With island, ~~T~~the minimum outside radius of a cul-de-sac from back-of-curb (b/c) shall be ~~47~~ fifty-seven feet (57'). The inside radius shall be thirty feet (30') (~~back of curb~~ b/c). All right-of-way radii shall be seventy-three feet (73') minimum. ~~(See attached detail.)~~

b. Without island, the minimum outside radius of a cul-de-sac (b/c) shall be forty-seven feet (47'). All right-of-way shall be sixty-three feet (63') minimum.

4. Pavement widths for residential streets shall be twenty-seven feet (27') (~~back of curb~~ b/c to ~~back of curb~~ b/c). Pavement widths for streets in an industrial subdivision shall be thirty-six feet (36') (b/c to b/c).

5. A boulevard section may be allowed in an enlarged right-of-way. Pavement widths shall be at least twenty-four feet (24') (b/c to b/c) for all boulevard streets within residential subdivisions. ~~The distance from the property line to curb shall be 16 feet on boulevards.~~ The minimum island width shall be ~~10~~ sixteen feet (16') ~~and maximum 16 feet~~. Within industrial subdivisions the pavement sections should be increased to twenty-seven feet (27') (b/c to b/c). ~~When boulevard sections are used at the entrance to residential or industrial subdivision; minimum pavement widths shall be 27 feet (b/c to b/c), and the minimum island width shall be 10 feet.~~ The nose of the median shall be offset at least ~~12~~ eight feet (8') from the edge of pavement of the intersecting street.

6. The minimum ~~pavement vertical grade~~ longitudinal pavement slope shall be one percent (1%) ~~for concrete roadways shall be 0.40 six percent (6%) and one percent (1%) for asphalt,~~ and a maximum of six percent (6%) for major roads and eight percent (8%) for local roads ~~(local eight percent (8%))~~. A grade in excess of the standard will not be allowed. Vertical curves are necessary when a change in grade of ~~1.50%~~ one percent (1%) or more occurs. The minimum length of vertical curve shall be one-hundred feet (100'). Cross slope shall be at two and one-half percent (2.5%).

   The pavement profile view must include:

   a. Elevations at top of curb or at centerline if not curbed.
   b. Existing ground elevations at the center of the right-of-way, and at other locations as required for review.
   c. Station and elevations of all high points, low points, grade-breaks, curb returns intersecting property lines and necessary information at vertical curves.
   d. Top of curb (or centerline) elevations at each station. Grade in vertical curves must be indicated at twenty-five foot (25') intervals.
   e. The station and top of casting grade of all pavement catch basins and inlets.

   The pavement radius at all intersections of all roads shall be a minimum twenty-five feet (25'). Allow for a minimum of one-half foot (0.5') drop in elevation around the curb return for twenty-five foot (25') radius. For larger radii, a proportionately greater amount of fall must be provided.

   ~~At intersections with road under the jurisdiction of t~~The Michigan Department of Transportation and/or Road Commission for Oakland County, ~~their~~ design requirements shall be met for intersecting roads under their jurisdictions. Passing lanes, center left-turn lanes, and acceleration and deceleration lanes shall conform to the requirements as outlined under Chapter 8, *Widening Lanes*. ~~designed to the City standards are required at all entrances on major roads.~~

All horizontal curves shall be consecutively numbered and indicated in the plan view. Curve data shall be given for the respective curve on the same sheet as it occurs.

Finish grade of all structures shall be indicated in the plan view.

All pavement in residential areas shall have ~~4"~~ ~~inch~~ mountable concrete curb and gutter with a four inch (4") curb height. All island curbs and street intersections shall have ~~6 inch concrete roll curb and gutter~~ MDOT B-2 modified curbing with a five and one-half inch (5.5") curb height. In either case, the face of gutter depth shall be nine inches (9") thick.

City ~~M~~major roads shall have ~~6 inch minimum concrete roll curb and gutter~~ B-2 modified curbing. A five foot (5') transition area is required where the curb changes from ~~6 inch roll~~ MDOT B-2 modified to four inch (4") mountable curb and gutter.

Show a detail of all intersections and cul-de-sacs. The detail shall show jointing and detailed grades. Maximum scale of the detail shall be one inch (1") = thirty feet (30'). On intersections where jointing is shown on the pavement Standard Detail sheet and where grades are completely determined by additional notes on the plans, separate details need not be shown.

At the end of a street that may be extended in the future, indicate a one-foot (1') end header, barricade and signs (end of roadway object marker "OM4-3" ~~"ER-1"~~ and a "Road ends" sign "W-14-2-a").

~~Underdrains~~ Edge drains shall be placed one foot (1') offset from ~~beneath~~ the back of curb and placed with three and a half feet (3.5') of cover (from top of curb) for the full length of all curb. Edge drains in open ditched sections where the ditch slope is less than one percent (1%) will require a solid wall perforated in a fabric/sock pipe under the ditch. Edge drain, six inches (6") in diameter, perforated or slotted, shall be constructed in the back of curb line for the full length of curb, backfilled with either 2NS sand or pea stone. Perforated pipe shall be Smooth-Wall PVC Plastic Edge Drain ~~Underdrain~~ with 3/16 inch to 3/8 inch perforations. Slotted pipe shall be A-2000 (Contech or equivalent approved by the City Engineer) sewer pipe, with slotted perforations of 1.90 IN^2/FT ~~square inches per foot~~ of pipe length. The pipe shall be installed with the protective geotextile sock wrap. ~~Add ADS N-12 pipe unless installed in a stone trench with fabric.~~

Temporary access roads shall be sixteen feet (16') wide minimum.

Streetlights – The City may require street lighting at street intersections or other locations to serve purposes of safety and/or security. When required, the intensity and type of illumination, location and types of poles, bases, etc. shall be coordinated with the existing and future street lighting within that area and conform to the latest version of the American Association of State Highway and Transportation Officials (AASHTO) Roadway Lighting Design Guide.

The owner/developer shall provide and properly maintain until accepted by the City all traffic and pavement markings, which the City may determine, necessary for the proper operation of the roadway/driveway/curb cut. Only those traffic signs and pavement markings specified by the City (or jurisdictional authority) may be used within the road right-of-way. All signs and pavement markings shall conform to the current Michigan Manual of Uniform Traffic Control Devices (MMUTCD).

7. All plans are to clearly identify public/private dedication.

8. Private roads are to be designed to City Public Road Standards.